JANUARY 21, 2020

2018 ANNUAL GROUNDWATER MONITORING REPORT

ARKEMA COATING RESINS
340 RAILROAD STREET
SAUKVILLE, WISCONSIN 53080
WDNR FID#: 246004330
BRRTS #: 02-46-000767

ENDPOINT PROJECT NO. 341-001-007-001

PREPARED FOR:

RETIA USA LLC
665 STOCKTON DRIVE, SUITE 100
EXTON, PA 19341

PREPARED BY:

Endpoint Solutions
6871 South Lovers Lane
Franklin, Wisconsin 53132
(414) 427-1200

2018 ANNUAL GROUNDWATER MONITORING REPORT

ARKEMA COATING RESINS
340 RAILROAD STREET
SAUKVILLE, WISCONSIN

JANUARY 21, 2020

Prepared By: ______________________ January 21, 2020

Robert A. Cigale, P.G. Date
Principal

Reviewed By: ______________________ January 21, 2020

Kirk L. Kapfhammer, P.G. Date
Principal

Endpoint Solutions

TABLE OF CONTENTS

GLOSSARY

amsl	Above mean sea level
AOC	Area of Concern
Arkema	Arkema Coating Resins
BETX	Benzene, Ethylbenzene, Toluene, and Total Xylenes
CCP	CCP Composites US
CMS	Corrective Measures Study
COC	Chain-of-Custody
CVOC	Chlorinated Volatile Organic Compounds
cis-1,2 - DCE	cis-1,2-dichloroethene
EDD	Electronic Data Download
Endpoint	Endpoint Solutions Corp.
ES	WAC Chapter NR 140 Enforcement Standard
ft	Feet
Freeman	Freeman Chemical Corporation
gpm	Gallons per Minute
GEMS	Groundwater and Environmental Monitoring System
GWMP	Groundwater Monitoring Plan
MDL	Method Detection Limit
MPPE	Macro-Porous Polymer Extraction
µg/kg	Micrograms per Kilogram
µg/L	Micrograms per Liter
msl	Mean Sea Level
PAL	WAC Chapter NR 140 Preventive Action Limit
PCB	Polychlorinated Biphenyl
POTW	Publicly Owned Treatment Works
RC	Ranney Collector
RCRA	Resource Conservation and Recovery Act
Reaction water	Esterification water
RFI	RCRA Facility Investigation
SVE	Soil Vapor Extraction
SVOC	Semi-Volatile Organic Compound
trans-1,2-DCE	trans-1,2-dichloroethene
1,1,1 - TCA	1,1,1-trichloroethane
TCE	Trichloroethene
TOTAL	Total Petrochemicals - the former owner of CCP
URS	URS Corp.
USEPA	United States Environmental Protection Agency
VC	Vinyl Chloride
VOC	Volatile Organic Compounds
WAC	Wisconsin Administrative Code
WDNR	Wisconsin Department of Natural Resources
WDWPC	Wisconsin Department of Water Pollution Control
WPDES	Wisconsin Pollutant Discharge Elimination System

EXECUTIVE SUMMARY

The purpose of this Annual Report is to summarize the groundwater data collected during the previous year of sampling at the Arkema Coating Resins (Arkema) Saukville facility (the "Saukville Facility"), discuss any changes to the monitoring network during the previous year, evaluate the effectiveness of the existing on-site extraction system and determine whether any changes to the monitoring or extraction networks are necessary to maintain control of the contaminants in the subsurface. In July 2011, the ownership of the real property of the Saukville facility was transferred from CCP Composites US (CCP) to Arkema. On December 31, 2015, Arkema idled the Saukville facility, and responsibility for operating and maintaining the groundwater extraction system was transferred to RETIA USA LLC, a legacy site services group owned by Total Petrochemicals (TOTAL) (the former owner of CCP).

No changes to the Wisconsin Department of Natural Resources (WDNR) approved 2005 Revised Groundwater Monitoring Plan (GWMP) for the Saukville facility occurred in 2018. A summary of the revised 2005 GWMP is presented below.

System maintenance activities performed in 2018 included the replacement of the pumps in Ranney Collector No. 1 (**RC-1**) and shallow dolomite extraction well **W-29**.

WINTER QUARTER

The Winter quarterly sampling event is performed in January and is limited to the sampling of Municipal Water Supply Well No. 1 (**MW-1**).

SPRING QUARTER

The Spring quarterly sampling event is performed in April and includes sampling the receptor monitoring points and the perimeter monitoring points, in addition to groundwater elevation measurements from all wells in the monitoring network.

SUMMER QUARTER

The Summer quarterly sampling event is performed in July and is limited to the sampling of **MW-1**.

FALL QUARTER

The Fall quarterly sampling event is performed in October and includes sampling the receptor monitoring points, the perimeter monitoring points and the remediation progress points. Groundwater elevation measurements are collected from all wells in the monitoring network.

The following exceptions to the 2005 revised GWMP occurred during the 2018 sampling events.

- During the Fall 2018 sampling event, samples for arsenic and barium could not be collected from shallow dolomite extraction well **W-21A** due to insufficient sample volume.

- o During the Fall 2018 sampling event, samples for semi-volatile organic compounds (SVOCs), arsenic and barium could not be collected from shallow dolomite extraction well **W-28** due to pump malfunction.

Results of the groundwater sampling performed in 2018 indicate that contaminant concentrations are generally consistent with the trends observed during previous years and no contaminants of concern were detected in the Municipal Water Supply Wells **MW-1**, **MW-3** and **MW-4** screened in the deep dolomite aquifer.

The groundwater extraction system currently operating at the Saukville facility was designed to minimize the downward migration of impacts from the glacial drift and shallow dolomite aquifers to the deep dolomite aquifer and to control the off-site migration of impacts from within the glacial drift, shallow dolomite, and deep dolomite aquifers. Results of the groundwater sampling conducted in 2018 continue to indicate the extraction system is operating as designed.

In 2018, the perimeter monitoring wells remained generally free of detectable concentrations of VOCs. However, impacts from off-site sources continue to be detected in several upgradient perimeter monitoring wells, as well as several on-site monitoring wells. In addition, elevated concentrations of contaminants continue to be detected in the shallow dolomite aquifer along the southern fence line. However, the results from the glacial drift monitoring points along the southern fence line are free of detections.

Groundwater samples collected in 2018 from the on-site remediation progress points continue to indicate that contaminants are effectively being contained on-site and are slowly being removed from the subsurface through the active extraction system.

1.0 INTRODUCTION

Arkema Resin Coatings (Arkema) operated a polyester, acrylic and alkyd resin manufacturing facility located at 340 Railroad Street in Saukville, Wisconsin (the "Saukville facility"). The location of the Saukville facility is depicted on **Figure 1**. In 2011, Arkema purchased the Saukville facility from CCP Composites US (CCP). Although Arkema purchased the Saukville facility, the responsibility for operating and maintaining the groundwater extraction system remained with CCP. Prior to 1991, the Saukville facility was owned and operated by Freeman Chemical Corporation (Freeman). The Saukville facility was initially operated as a cannery until 1949 when Freeman installed resin manufacturing equipment. Alkyd, polyester and urethane synthetic resins have been manufactured at the Saukville facility since 1949. On December 31, 2015, Arkema idled the Saukville facility, and responsibility for operating and maintaining the groundwater extraction system was transferred to RETIA USA LLC, a legacy site services group owned by Total Petrochemicals (TOTAL) (the former owner of CCP).

From 1952 to 1968, esterification water (reaction water) produced as a byproduct of the resin manufacturing process was disposed in a dry well formerly located on the western edge of the Saukville facility with approval from the Wisconsin Division of Water Pollution Control (WDWPC). In 1968, the dry well method of disposal for the reaction water was replaced with an on-site hazardous waste incinerator, located south of the main office. The original hazardous waste incinerator was replaced in the early 1990s with a new hazardous waste incinerator east of the existing tank farm. The hazardous waste incinerator was in operation until 2003 when a macro-porous polymer extraction (MPPE) system was added to the process to render the hazardous reaction water non-hazardous. The incinerator continued to operate as a non-hazardous incinerator to dispose of the post-MPPE, non-hazardous reaction water, until October 2004. From October 2004 to 2014, reaction water was disposed off-site via deep well injection in Texas after transport by rail.

Three (3) Areas of Concern (AOCs) were identified on the Saukville facility during the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI). The three (3) AOCs are as follows:

> <u>AOC No. 1 – Former Urethane Laboratory/Former Liquids Incinerator Area</u>
>
> The former liquids incinerator was used to dispose reaction water from 1968 to 1989. AOC No. 1 is located on the northeast portion of the Saukville facility immediately south of the office building in the vicinity of the former solid waste incinerator and the former soil vapor extraction (SVE) system near monitoring well **W-47**. In addition to being identified as an AOC in the Consent Order, AOC No. 1 is also regulated by the Wisconsin Department of Natural Resources (WDNR) under a *Closure Plan Modification (RMT – April 1992)* related to the former hazardous waste incinerator.

AOC No. 2 – Former Dry Well

The former dry well was used from approximately 1952 through 1968 to dispose of reaction water as approved by the WDWPC. AOC No. 2 is located in the west-central portion of the Saukville facility near monitoring well **W-06A** along the west fence line.

AOC No. 3 – Former Tank Farm Storage Area

An aboveground storage tank (AST) containment dike consisting of an earthen berm utilized for the storage of raw materials and finished product formerly occupied this area. AOC No. 3 is located near the center of the Saukville facility to the east and south of the existing non-hazardous liquid waste incinerator, in the vicinity of the existing concrete AST containment dike.

The existing layout of the Saukville facility, including the location of monitoring points and AOCs, is depicted on the Existing Site Layout included as **Figure 2**.

In compliance with the 1987 Corrective Action Order on Consent (Docket #V-W-88-R-002), October 19, 1987, 3008h order for RCRA, quarterly groundwater monitoring is required to be performed and reported for specific wells. RETIA USA LLC retains the obligation to remediate the site as determined in the Consent Order.

Groundwater samples were collected and submitted to Synergy Environmental Lab Inc. under standard chain-of-custody (COC) procedures by Endpoint Solutions Corp. (Endpoint) personnel for all 2018 sampling events. The field data and results were compiled by Endpoint. All results were submitted on a quarterly basis to the WDNR. Exceedances of the Wisconsin Administrative Code (WAC) Chapter NR 140 Preventive Action Limits (PALs) and Enforcement Standards (ESs) were reported quarterly in accordance with WAC Chapter NR 508. This report was prepared to summarize the results of the groundwater monitoring during the 2018 calendar year and to compare the results from the 2018 sampling events with those from previous years.

2.0 PURPOSE AND SCOPE

This document presents a summary of the data collected during the quarterly, semi-annual and annual groundwater sampling events conducted during 2018, and provides an evaluation of the historical groundwater elevation and quality trends at the Saukville facility. The water quality data has been submitted to the WDNR in the quarterly reports. Additionally, electronic data downloads (EDDs) of the analytical data are submitted to the WDNR Bureau of Waste Management Groundwater and Environmental Monitoring System (GEMS) on a quarterly basis. Copies of the analytical result summary tables created for each of the quarterly events in 2018 are included in **Appendix A.**

The contents of this report include the following:

- A summary of the site groundwater monitoring program, and contaminant concentrations by well;
- Isoconcentration maps for select contaminants in groundwater in the glacial drift and shallow dolomite units;
- Time versus concentration plots of selected volatile organic compounds (VOCs) in groundwater in selected wells;
- An evaluation of the trends in groundwater quality for each of the monitoring groups;
- An evaluation of the effectiveness of the containment of the groundwater impacts by the on-site groundwater extraction system, based on groundwater flow and quality data; and,
- An estimate of the total VOC mass removed by the extraction system since 1992.

3.0 SITE HYDROGEOLOGY

3.1 Description of Hydrogeologic Units

The geology at the Saukville facility has been divided into three (3) distinct hydrogeologic units. These units include the unconsolidated glacial drift deposits, the shallow dolomite unit consisting of the Silurian dolomite to approximately 100 feet below the ground surface (ft bgs), and the deep dolomite unit consisting of Silurian dolomite between approximately 100 ft and 600 ft bgs. A detailed description of the three (3) units is provided below.

3.1.1 Glacial Drift

The glacial drift unit consists of a complex succession of fill and glaciolacustrine deposits that is underlain by a glacial till. The materials that compose this unit have been extensively used as fill at the Saukville facility. Both the till and the glaciolacustrine deposits are considered to be part of a partially confining hydrostratigraphic unit.

The total thickness of the glacial drift varies between ten (10) ft and 30 ft in the vicinity of the Saukville facility, but the glacial drift is generally on the order of ten (10) ft thick beneath the Saukville facility. Glaciolacustrine deposits are up to 20 ft thick on the western side of the Saukville facility, and consist of interbedded sands, silts and clays. The clay is soft to medium hard, gray, and plastic to slightly plastic. Between five (5) ft and 25 ft of glacial till is present beneath the eastern side of the Saukville facility. The till is composed of interbedded silty sands and sandy gravel. The sandy gravel varies from loose to very dense, is brown to gray, and is typically well-graded.

The stratigraphic order of the deposits from the ground surface is generally 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.

3.1.2 Shallow Dolomite

The glacial deposits are unconformably underlain by fractured, thin- to massive-bedded Silurian dolomite, with a total thickness of approximately 600 ft in the area, which includes the deep dolomite aquifer.

The uppermost 100 ft 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 monitoring well **W-24A**, which extracts groundwater at 40 gallons per minute (gpm) and yet shows little drawdown.

3.1.3 Deep Dolomite

The deep dolomite aquifer is defined as the Silurian dolomite from approximately 100 ft to 600 ft bgs. The dominant lithology in the deep dolomite aquifer in the Saukville area is the Racine Formation. Municipal wells in the vicinity of the Saukville facility are typically cased to approximately 100 ft bgs, and are completed in the Silurian dolomite to depths in the range of 450 ft to 550 ft bgs.

Several solution features have been identified in the dolomite beneath the Saukville facility. An apparent sinkhole, filled with glacial deposits, which extends to a depth of approximately 200 ft bgs, was encountered on the eastern edge of the Saukville facility during the installation of wells **W-3A**, **W-3B**, and **W-20**. The aerial extent of the sinkhole was further defined based on the seismic refraction survey performed by Minnesota Geophysical Associates. Further evidence of the karstic features includes solution enlarged joints in the dolomite observed during the borehole video logging of deep pumping well **W-30**. These observations, coupled with the hydraulic response of the aquifer during pumping tests in Saukville, suggest that groundwater flow in the Silurian dolomite is primarily fracture controlled in the vicinity of the Saukville Facility.

3.2 GROUNDWATER LEVELS AND FLOW PATTERNS IN 2018

Groundwater levels in the monitoring wells were measured prior to purging and sampling during the Spring and Fall sampling events. **Table 1 – 2018 Summary of Groundwater Level Measurements** presents a summary of the water level measurements collected in 2018. The water level data collected in 2018 was used to develop water table maps for the glacial drift unit, and potentiometric surface maps for the shallow and deep dolomite units. These maps were created using groundwater elevation data from the Fall 2018 sampling event and are attached as **Figure 3** and **Figure 4**.

Groundwater elevations at the Saukville Facility are influenced by the active groundwater extraction systems. A total of eight (8) extraction points in the glacial drift, four (4) shallow dolomite extraction wells, and one (1) deep dolomite extraction well are actively pumped to contain the extent of impacts. **Table 2 – 2018 Summary of Well Running Times and Volume Removed**, provides a summary of the monthly pump running times and an estimate of the volume of groundwater removed by each well during 2018. A review of the estimated volumes removed indicates that the majority of groundwater extraction during 2018 occurred in the deep dolomite unit. Approximately 78,840,000 gallons of groundwater were removed from the deep dolomite aquifer through near-continuous pumping of **W-30.** Due to the shutdown of production at the Saukville facility, the discharge from **W-30** is no longer needed for non-contact cooling water (NCCW). Therefore, the pumping rate has been reduced to approximately 150 gallons per minute (gpm). Approximately 6,404,114 gallons of groundwater were removed from the glacial drift aquifer, and approximately 3,617,712 gallons of groundwater were removed from the shallow dolomite aquifer during 2018. In total, approximately 88,861,826 gallons of groundwater were removed from the glacial drift, shallow dolomite and deep dolomite aquifers at the Saukville facility in 2018. With the exception of the groundwater extracted from deep dolomite well **W-30**, all extracted groundwater is discharged to the Saukville publicly-owned treatment works (POTW). Groundwater extracted from the deep dolomite aquifer is discharged to the Milwaukee River via Outfall 001 under limits imposed by the Wisconsin Pollutant Discharge Elimination System (WPDES) permit. The Saukville publicly-owned treatment works (POTW) discharges its effluent to the Milwaukee River.

In order to evaluate the continued effectiveness of the on-site groundwater extraction system, annual pump run times and volume removal rates were evaluated. A summary of the trends observed are as follows.

Glacial Drift Unit

Extraction Point	Hours		Change
	2017	2018	
W-31	3.7	156.4	+152.7
W-32	26.1	1.0	-25.1
W-33	0	0.9	+0.9
W-34	296.2	0.2	-295.2
W-35	1.1	0.5	-.06
RC-1	245.2	3,852.6	+3,607.4
RC-2	8,572.2	7,554.2	-1,018
RC-3	2,027.2	7,433.3	+5,406.1
TOTALS	**11,171.7**	**18,999.1**	**+7,827.4**

Shallow Dolomite Unit

Extraction Point	Hours		Change
	2017	2018	
W-21A	826.9	8,331.3	+7,504.4
W-24A	959.3	966.2	+6.9
W-28	24.5	127.7	+103.2
W-29	403.8	394.1	-9.7
Totals	**2,214.5**	**9,819.3**	**+7,604.8**

Appendix B includes plots of Pump Run Time Trends from 1992 – 2018.

In December 2017, it was determined that the pumps in **RC-1** and **W-29** were not operating. In January 2018, new pumps were installed in both of these locations, resulting in significantly increased pump run times in **RC-1**. While the **W-29** pump run time did not increase significantly from 2017 to 2018, the pump in **W-29** consistently pumped throughout the year.

3.2.1 GROUNDWATER ELEVATION TRENDS

Groundwater elevation trends from 1995 to 2018 were also evaluated as part of this Annual Report. The water levels tend to follow a general trend where increases are observed during the Spring and Summer quarters and decreases are observed during the Fall and Winter quarters. The water level measurements continue to indicate that dewatering of the on-site glacial deposits is occurring, there is convergent flow within the shallow dolomite unit towards the extraction wells, and the on-site extraction system is controlling off-site migration of groundwater in the glacial drift.

3.2.2 GLACIAL DRIFT HYDROGEOLOGIC UNIT

Monitoring well **W-20** is constructed as a piezometer within the glacial drift present in the sinkhole identified in the northeast corner of the Saukville Facility, and the hydraulic head within this well is representative of groundwater flow in the shallow dolomite unit. Therefore, water levels from monitoring well **W-20** were not used to construct the water table maps, but have been used to construct the potentiometric surface maps for the shallow dolomite unit.

The water table occurs in the glacial drift unit. The water table beneath the Saukville Facility generally slopes from the southwest to the northeast, towards the Milwaukee River. However, on-site shallow groundwater flow is diverted towards the Ranney Collectors and the active on-site extraction network.

3.2.3 SHALLOW DOLOMITE UNIT

The piezometers constructed at the Saukville Facility have been completed at varying depths in the dolomite. The shallow dolomite and deep dolomite are typically mapped as one (1) unit. In general, the potentiometric surface in the shallow and deep dolomite aquifers indicate a steep cone of depression in the vicinity of deep dolomite well **W-30**. The continuous pumping at deep dolomite well **W-30** appears to have dewatered the shallow dolomite in the vicinity of shallow dolomite extraction well **W-28**. The influence of pumping **W-30** appears to extend approximately over 50% of the Arkema facility, as well as the adjoining Saukville Feed Mill and JT Roofing properties to the west.

3.2.4 DEEP DOLOMITE UNIT

Well **W-30** has a bottom elevation of approximately 215 ft above mean sea level (amsl), and was previously utilized to provide non-contact cooling water (NCCW) extracted from deep dolomite unit. Since production at the Saukville Facility ceased at the end of 2015, the pumping rate of **W-30** has been reduced to approximately 150 gpm. Based on the results of the groundwater modeling conducted during the RFI, groundwater flow in the deep dolomite unit in the Saukville area is towards well **W-30**, and the three (3) existing off-site Saukville municipal water supply wells (**MW-1**, **MW-3** and **MW-4**). Only one (1) on-site data point (**W-30**) is available to document flow direction in the deep dolomite unit. Therefore, there is insufficient data to prepare potentiometric surface maps for the deep dolomite unit. However, groundwater on the Saukville Facility exhibits a strong downward flow from the glacial deposits and the shallow dolomite unit to the deep dolomite unit due to the continuous pumping of well **W-30**. At all three (3) of the glacial drift/shallow dolomite nested pairs (**W-18/W-22**, **W-43/W-38** and **W-16A/W-40**), the groundwater elevation in the glacial drift wells is three (3) to ten (10) feet higher than the groundwater elevation measured in the paired shallow dolomite wells.

3.3 GROUNDWATER GRADIENTS

3.3.1 HORIZONTAL GRADIENTS

3.3.1.1 GLACIAL DRIFT AQUIFER

In 2018, the groundwater in the glacial drift aquifer flowed eastward with a horizontal gradient of 0.027. According to information included in the *Site Conditions and Construction Report* (Hatcher Incorporated – February 15, 1988), the permeability of the glacial deposits was measured to range between 1.2 x 10^{-8} to 5.5 x 10^{-8} centimeters per second (cm/sec).

3.3.1.2 SHALLOW DOLOMITE AQUIFER

In 2018, the groundwater in the shallow dolomite unit exhibited convergent flow towards deep dolomite pumping well **W-30**. The gradient appears steeper to the west of **W-30** as compared to the east, based on the natural west to east flow in the dolomite aquifers. The hydraulic gradient ranged from 0.388 to the west of **W-30** to 0.170 to the east of **W-30**. According to information included in the *Site Conditions and Construction Report* (Hatcher Incorporated – February 15, 1988), the natural potentiometric gradient in the dolomite aquifer was 0.0125 from the center of the Saukville Facility to the Milwaukee River prior to the onset of pumping from the extraction system and deep dolomite well.

3.3.2 VERTICAL GRADIENT

The vertical gradient between the glacial drift and shallow dolomite aquifers was calculated using the groundwater elevations measured in nested pairs during the Fall 2018 sampling event.

Glacial Drift		Shallow Dolomite		Gradient	
Well ID	**Water Elevation**	**Well ID**	**Water Elevation**	**Downwards**	**Upwards**
W-18A	770.02	W-22	763.09	0.16	
W-43	764.45	W-38	755.51	0.25	
W-16A	764.48	W-40	757.95	0.19	
W-3B	747.78	W-3A	747.56	0.00	
W-49	756.84	W-50	754.78	0.11	
W-51	754.93	W-52	762.89		0.55
			AVERAGE	0.142	0.55

Hydrogeologic calculations are summarized in **Appendix C**.

4.0 GROUNDWATER MONITORING PROGRAM

4.1 Program Description

The groundwater monitoring network at the Saukville Facility includes 46 monitoring points consisting of 21 glacial drift wells, 14 shallow dolomite wells, five (5) deep dolomite wells, three (3) RCs, and three (3) sample points at the Village of Saukville POTW. The monitoring points are further grouped according to four (4) sampling objectives: receptor points, perimeter monitoring points, remediation progress points, and groundwater elevation monitoring points. The organization of the monitoring wells by monitoring objective is summarized in **Table 3 – Modified Groundwater Monitoring Plan Summary**.

Receptor monitoring points include three (3) municipal water supply wells (**MW-1**, **MW-3**, and **MW-4**), POTW influent, effluent, and sludge (**POTW-I**, **POTW-E** and **POTW-S**), and three (3) Ranney Collectors (**RC-1**, **RC-2** and **RC-3**). The RCs are essentially multi-legged French drains which intercept shallow groundwater and drain by gravity to a manhole equipped with a discharge pump. The receptor monitoring points are sampled semi-annually during the Spring and Fall quarterly sampling events. Municipal water supply well **MW-2** was abandoned by CCP in November 2004 following transfer of the **MW-2** property from the Village of Saukville to CCP. At the request of the Village of Saukville, Municipal water supply well **MW-1** is sampled on a quarterly basis.

Perimeter monitoring points include monitoring wells which are located both on-site and off-site at, or beyond, the edge of the extent of the known impacts. These monitoring points provide necessary information to define the extent of the plume. The perimeter monitoring points are sampled semi-annually during the Spring and Fall sampling events.

Remediation progress points are monitoring wells and extraction wells located within the area of impacts. These wells provide an indication regarding the effectiveness of the on-site extraction wells. The remediation progress points are sampled annually during the Fall sampling event.

Each of the monitoring points is also grouped based on hydrogeologic unit monitored. The hydrogeologic units monitored at the Saukville Facility include: glacial drift; shallow dolomite; and deep dolomite units. This subdivision allows for more effective evaluation of the on-site groundwater flow and quality trends.

4.2 Changes in Monitoring Network

Since the onset of the monitoring program, three (3) monitoring points have been abandoned. Monitoring wells **W-25** (shallow dolomite) and **W-37** (glacial drift) were abandoned due to damage to the wells from nearby construction projects. Municipal water supply well **MW-2** (deep dolomite) was abandoned following transfer of ownership from the Village of Saukville to CCP in 2004. These wells have not been replaced since the remaining monitoring network is providing sufficient data for plume assessment.

In July 2005, the WDNR approved a revised GWMP for the Saukville facility. The revised GWMP reflected the abandonment of the two (2) perimeter monitoring points (**W-25** and **W-37**), the abandonment of the Village water supply well (**MW-2**), the addition of five (5) new perimeter monitoring points (**W-49**, **W-50**, **W-51**, **W-52** and **W-53**), and historical concentration trends for the existing monitoring network.

Ongoing maintenance activities are performed on the system to maintain active pumping. During 2018, the pumps in shallow dolomite extraction well **W-29** and Ranney Collector **RC-1** were replaced.

4.3 SAMPLING SCHEDULE

Table 3 – Modified Groundwater Sampling Plan Summary presents the sampling schedule that was developed as part of the revised GWMP, submitted to, and approved by the WDNR, along with the analytical methods used each quarter. The methods and associated parameters are listed in **Table 4 – Summary of Analytes and Methods**. The analytical testing was performed by Synergy Environmental Lab located in Appleton, Wisconsin (WI Certification # 445037560). The following methods were used to analyze the submitted samples:

VOC	SW846 8260B
Semi-Volatile Organic Compounds (SVOC)	SW846 8270C
Metals	SW846 6020
Polychlorinated Biphenyls (PCBs)	SW846 8081

5.0 GROUNDWATER QUALITY

5.1 VOC Sampling Results

The tabulated results of the VOC concentrations in each well and the supporting laboratory data were presented in each of the four (4) quarterly reports. Copies of the result summary tables included in each of the quarterly reports are attached in **Appendix A**.

The individual detected VOCs in the glacial drift, and the shallow dolomite unit for 2018 are depicted on **Figure 5 – VOC Detections - Glacial Drift Aquifer – Fall 2018** and **Figure 6 – VOC Detections - Shallow and Deep Dolomite Aquifers – Fall 2018**. A discussion of the VOC detections during 2018 follows.

5.1.1 Municipal Water Supply Wells

Results of the groundwater samples collected from the Municipal Water Supply Wells during 2018 were as follows:

- Winter 2018 – No VOCs were detected in the sample collected from municipal well **MW-1**, the blind duplicate or the associated trip blank.
- Spring 2018 – No VOCs were detected in any of the samples collected from the three (3) municipal wells **(MW-1**, **MW-3** and **MW-4)**, the blind duplicate sample or the associated trip blank.
- Summer 2018 – No VOCs were detected in the sample collected from municipal well **MW-1**, the blind duplicate or the associated trip blank.
- Fall 2018 – No VOCs were detected in the samples collected from two (2) of the municipal wells **(MW-3** and **MW-4)**, the blind duplicate sample or the associated trip blank; however, chloroform was detected at 0.86 µg/L in the sample collected from **MW-1**. The concentration of chloroform is above its WAC NR 140 PAL of 0.6 µg/L. **MW-1** was rehabilitated during the summer of 2018 and it is assumed the chloroform detection is due to residual chlorine used to disinfect the well following rehabilitation.

5.1.2 POTW

Samples were collected from the Village of Saukville POTW during the Spring and Fall 2018 sampling events per the revised GWMP. Samples were collected from the influent, effluent and sludge (**POTW-I**, **POTW-E** and **POTW-S**) and submitted for VOC analysis. During 2018, the total VOC concentration in the **POTW-I** samples ranged between 16.13 µg/L during the Fall 2018 sampling event and 18.99 micrograms per liter (µg/L) during the Spring 2018 sampling event. Individual constituents detected in the **POTW-I** samples included: benzene, chloroform, ethylbenzene, toluene and xylenes during both sampling events; with acetone during the Spring sampling event and carbon disulfide and cis-1,2-dichloroethene during the Fall sampling event.

VOCs were not detected in the **POTW-E** samples collected during the 2018 Spring and Fall sampling events.

The total VOC concentration in the **POTW-S** samples ranged from 1,400 µg/L during the Spring sampling event to 2,320 µg/L during the Fall sampling event, consisting entirely of toluene. The **POTW-S** sample collected in Spring was diluted 500 times while the sample collected in Fall was diluted 20 times due to the presence of high organic content.

5.1.3 Ranney Collectors

Ranney Collectors are wells with horizontal slotted stainless-steel pipes that stretch out like spider legs (French Drains) and drain water from soil by gravity to the center well casing where the pump is located. The approximate layout of each of the RC legs are depicted on **Figure 2** through **Figure 15.** All three (3) Ranney Collectors were sampled from their central collection manholes during both the Spring and Fall sampling events.

- RC-1 – The samples collected from Ranney Collector **RC-1** contained 294.30 µg/L total VOCs in the sample collected during the Spring 2018 sampling event and 2,773 µg/L total VOCs in the sample collected during the Fall 2018 sampling event. Both samples contained elevated concentrations of benzene, cis-1,2-dichloroethene, ethylbenzene, toluene, vinyl chloride and xylenes during both the Spring and Fall 2018 sampling events. Ranney Collector **RC-1** is located on the eastern portion of the Saukville facility and collects groundwater to the east of AOCs 1 and 3.
- RC-2 –The samples collected from Ranney Collector **RC-2** during the Spring 2018 and Fall 2018 sampling events did not contain any VOC constituents. Ranney Collector **RC-2** is located in the southwest corner of the Saukville facility with a single leg which extends to the north along the west side of AOC 2.
- RC-3 – Total VOC concentrations in the samples collected from Ranney Collector **RC-3** ranged between 5,479.4 µg/L during the Spring 2018 sampling event to 18,204.2 µg/L during the Fall 2018 sampling event. Both samples contained elevated concentrations of benzene, ethylbenzene, toluene and xylenes. Ranney Collector **RC-3** is located near the center of the Saukville facility with legs which extending to the east and southwest of AOC 1 and to south in between AOCs 2 and 3.

5.1.4 Detected Contaminants in the Glacial Drift Unit

The distribution of VOCs detected in the glacial drift aquifer in 2018 is depicted on **Figure 5 – VOC Detections - Glacial Drift Aquifer – Fall 2018.** Monitoring points in the glacial drift unit include the following:

Perimeter Monitoring

- **W-01A**, **W-03B**, **W-04A**, **W-08R**, **W-16A**, **W-27**, **W-49** and **W-51**.

Remediation Progress

- **W-06A**, **W-19A**, **W-41**, **W-42**, **W-43** and **W-47**.

As discussed in **Section 3.2.2**, monitoring well **W-20** is completed in the glacial drift deposit within the sinkhole in the shallow dolomite unit, and therefore, the results obtained from **W-20** are more representative of the water quality in the shallow dolomite aquifer. Isoconcentration contours in the glacial drift unit do not include total VOC concentrations in the RCs as the RC samples are composite groundwater samples that are collected from broad areas of the Saukville facility through radial collection lines.

The distribution of VOCs in the groundwater in the glacial drift in 2018 is generally similar to the distribution observed in the past. In general, the impacts observed in the glacial drift aquifer are closely related to the three (3) on-site AOCs. Exceedances for benzene, ethylbenzene, toluene and xylenes are primarily located in AOCs Nos. 1 and 2.

Chlorinated VOCs (CVOCs), primarily in the form of trichloroethene (TCE), 1,2-dichloroethene (cis- and trans-) and vinyl chloride, were detected in the groundwater samples collected from glacial drift wells **W-19A** and **W-27**. TCE was detected at concentrations of 21.2 µg/L to 90 µg/L in the samples collected from **W-27** during the Spring 2018 and Fall 2018 sampling events, respectively. TCE was detected at a concentration of 13 µg/L in the sample collected from **W-19A** during the Fall 2018 sampling event. All of these concentrations exceeded the ES. Both of these wells are located hydrogeologically upgradient of the Saukville facility. These results continue to indicate an off-site, upgradient source of the CVOC impacts. Currently, a site investigation is underway by others on the adjacent property to the west (the former Northern Signal property) to evaluate the character and extent of CVOC impacts in the soil and groundwater beneath that site.

5.1.4.1 Perimeter Monitoring Group – Glacial Drift

In general, VOC concentrations in the glacial drift perimeter monitoring wells have not changed significantly since 1995. No detectable VOC constituents were reported in the samples collected from the following glacial drift monitoring well in 2018: **W-03B**, **W-04A** and **W-49**. During the Spring 2018 sampling event, estimated concentrations of toluene were detected in **W-01A**, **W-08R** and **W-16A** ranging between 0.22 µg/L and 0.29 µg/L. During the Fall 2018 sampling event, an estimated concentration of toluene was detected in **W-08R** at 0.28 µg/L and an estimated concentration of carbon disulfide was detected in **W-51** at 0.34 µg/L; however, none of these concentrations exceeded their respective PALs. These monitoring points are located either on the Saukville facility or hydrogeologically downgradient of the Saukville facility.

The following provides a discussion of the character and concentration of contaminants detected in glacial drift monitoring wells sampled in 2018.

W-27

Samples collected from upgradient glacial drift monitoring well **W-27** during the Spring and Fall sampling events both contained elevated concentrations of TCE and cis-1,2-dichloroethene. The concentrations of TCE detected in the samples collected during the Spring and Fall 2018 sampling events both exceeded its enforcement standard (ES) and the concentration of cis-1,2-dichloroethene detected during the Fall 2018 sampling event exceeded its preventive action limit (PAL).

It should be noted, perimeter monitoring point **W-27** is located upgradient of the Saukville facility on the JT Roofing (former Laubenstein Roofing and Northern Signal) property. CVOCs have never been utilized at the Saukville facility. However, a chlorinated solvent degreasing pit was historically located at the former Northern Signal site in the general vicinity of perimeter monitoring point **W-27**.

According to information contained on the WDNR Bureau of Remediation and Redevelopment Tracking System (BRRTS) online database, the Northern Signal/Laubenstein Property is identified as an open environmental repair program (ERP) site (BRRTS # 02-46-535604) and on August 8, 2018, WDNR approved the Site Investigation Workplan. It should be noted that there is also an open leaking underground storage tank (LUST) case at the JT Roofing property (BRRTS # 03-46-218762). The WDNR indicates that diesel fuel has impacted the soil and fractured bedrock.

5.1.4.2 Remediation Progress Group

Six (6) glacial drift remediation progress wells (**W-6A**, **W-19A**, **W-41**, **W-42**, **W-43** and **W-47**) are sampled annually during the Fall sampling event. In general, these wells are located on the Saukville facility within the AOCs. However, **W-19A** is located hydrogeologically upgradient of the Saukville facility on the JT Roofing property.

Overall, contaminant concentrations in the glacial drift remediation progress wells have been relatively stable since 1995, with annual variance in the range of a standard deviation. A discussion of the specific contaminant concentrations observed in the glacial drift remediation progress wells during 2018 is as follows.

- The groundwater sample collected from glacial drift remediation progress monitoring well **W-06A** during the Fall 2018 sampling event contained the highest detectable concentrations of xylenes (82,900 µg/L), toluene (28,100 µg/L), ethylbenzene (18,800 µg/L) and an estimated concentration of benzene (140 µg/L). In addition, the groundwater sample collected contained detectable concentrations of 2,4-dimethylphenol (198 µg/L), total cresol (188 µg/L), phenol (92 µg/L), cresol (72 µg/L), acetophenone (35 µg/L), an estimated concentration of naphthalene (8.4 µg/L), barium (57.6 µg/L) and arsenic (32.3 µg/L). The concentrations of xylenes, toluene, ethylbenzene, benzene and arsenic exceeded their respective ESs. Glacial drift remediation progress monitoring well **W-06A** is located along the west fence of the Saukville facility within AOC 3.
- As previously discussed, the groundwater sample collected from glacial drift remediation progress point **W-19A** during the Fall 2018 sampling event contained detectable concentrations of cis-1,2-dichloroethene (14.9 µg/L), TCE (13 µg/L), vinyl chloride (0.65 µg/L) and an estimated concentration of trans-1,2-dichloroethene (0.50 µg/L). The concentrations of TCE and vinyl chloride exceeded their respective ESs, while the concentration of cis-1,2-dichloroethene exceeded its PAL. Glacial drift remediation progress point **W-19A** is located to the west of the Saukville facility on the adjoining JT Roofing (former Northern Signal) property and is hydrogeologically upgradient to the Saukville facility.

- The groundwater sample collected from glacial drift remediation progress monitoring point **W-41** during the Fall 2018 sampling event contained detectable concentrations of xylenes (1.66 µg/L) and an estimated concentration of benzene (0.32 µg/L). Neither of the detected concentrations exceeded their respective PALs or ESs. Glacial drift remediation progress monitoring point **W-41** is located in the southwest corner of the Saukville facility south of AOC 2.
- The groundwater sample collected from glacial drift remediation progress monitoring well **W-42** during the Fall 2018 sampling event contained detectable concentrations of xylenes (10,200 µg/L), ethylbenzene (236 µg/L), benzene (44 µg/L) and an estimated concentration of toluene (25.5 µg/L). The concentrations of xylenes and benzene exceed their respective ESs, while the concentration of ethylbenzene exceeded its PAL. Glacial drift remediation progress monitoring well **W-42** is located along the west fence of the Saukville facility between AOCs 1 and 2.
- The groundwater sample collected from glacial drift remediation progress monitoring well **W-43** during the Fall 2018 sampling event contained detectable concentrations of phenanthrene (92 µg/L), 2,4-dimethylphenol (86 µg/L), 1-methyl naphthalene (54 µg/L), 2-methyl naphthalene (18.7 µg/L), barium (9.97 µg/L), an estimated concentration of anthracene (9.2 µg/L), carbon disulfide (9.1 µg/L), benzene (0.82 µg/L) and an estimated concentration of ethylbenzene (0.41 µg/L). The concentrations of benzene exceeded its respective PAL. Glacial drift remediation progress monitoring well **W-43** is located adjacent to the southwest corner of the tank farm near AOC 3.
- The groundwater sample collected from glacial drift remediation progress monitoring well **W-47** during the Fall 2018 sampling event contained detectable concentrations of xylenes (15,200 µg/L), ethylbenzene (1,340 µg/L), toluene (301 µg/L), 2,4-dimethylphenol (207 µg/L), total cresol (49.8 µg/L), barium (39.3 µg/L), and estimated concentrations of naphthalene (12.7 µg/L) and acetophenone (6.6 µg/L). The concentrations of toluene and the estimated concentration of naphthalene exceeded their respective ESs, while the concentrations of xylenes and ethylbenzene exceeded their respective PALs. While **W-47** is the only well where PCBs are analyzed for, no PCB cogeners were detected in the sample collected in Fall 2018. Glacial drift remediation progress monitoring well **W-47** is located in the northeast portion of the Saukville facility within AOC 1.

5.1.5 Detected Contaminants in the Shallow Dolomite Unit

VOC concentrations detected in the shallow dolomite aquifer in 2018 are shown on **Figure 6- VOC Detections – Shallow and Deep Dolomite Aquifers – Fall 2018**. Monitoring points in shallow dolomite unit include the following:

<u>Perimeter Monitoring</u>

W-03A, **W-07**, **W-20**, **W-22**, **W-23**, **W-40**, **W-50** and **W-52**.

Remediation Progress

W-21A, **W-24A**, **W-28**, **W-29** and **W-38**.

The overall horizontal extent of the contaminants observed in the shallow dolomite wells is generally the same as observed in previous years. More details regarding the results of the sampling are presented in the following sections.

5.1.5.1 *PERIMETER MONITORING GROUP – SHALLOW DOLOMITE*

In general, VOC concentrations in the shallow dolomite perimeter monitoring wells have not changed significantly since 1995. No detectable concentrations of VOCs were noted in the following wells during the Spring 2018 sampling event: **W-03A**, **W-07**, **W-20**, **W-22** and **W-40** and the following wells during the Fall 2018 sampling event **W-03A**, **W-07, W-40** and **W-50.**

A discussion of the specific contaminant concentrations observed in the shallow dolomite perimeter monitoring wells during 2018 is as follows.

- The groundwater samples collected from perimeter shallow dolomite monitoring point **W-20** contained an estimated concentration of xylene (0.52 µg/L) during the Fall 2018 sampling event, however during the Spring 2018 sampling event xylene was not detected above its method detection limit (MDL). The concentration of xylene detected in Fall did not exceed its PAL. Shallow dolomite monitoring point **W-20** is located in the northeast corner of the Saukville facility south of the Ozaukee Christian School building.
- The groundwater samples collected from perimeter shallow dolomite monitoring point **W-22** contained an estimated concentration of xylene (0.55 µg/L) during the Fall 2018 sampling event, however during the Spring 2018 sampling event xylene was not detected above its method detection limit (MDL). The concentration of xylene detected in Fall did not exceed its PAL. Shallow dolomite monitoring point **W-22** is located upstream of the Saukville facility on the Saukville Feed Mill property.
- The groundwater samples collected from perimeter shallow dolomite monitoring point **W-23** during the Spring and Fall 2018 sampling events contained estimated concentrations of cis-1,2-dichloroethene (0.84 µg/L and 0.89 µg/L) and estimated concentrations of benzene (0.27 µg/L and 0.29 µg/L). The detected concentrations did not exceed their respective PALs. Shallow dolomite monitoring point **W-23** is located along the south fence of the Saukville facility away from former production areas.
- The groundwater sample collected from perimeter shallow dolomite monitoring point **W-50** during the Spring 2018 sampling event contained an estimated concentration of cis-1,2-dichloroethene (0.44 µg/L). The detected concentration did not exceed its PAL. Shallow dolomite monitoring point **W-50** is located along the south fence of the Saukville facility away from former production areas.
- The groundwater samples collected from perimeter shallow dolomite piezometer **W-52** during the Spring and Fall 2018 sampling events contained detectable concentrations of cis-1,2-dichloroethene (19.4 µg/L and 16.8 µg/L), benzene (15.6 µg/L and 20.2 µg/L), vinyl

chloride (10.4 µg/L and 12.2 µg/L), trans-1,2-dichloroethene (1.19 µg/L and 1.39 µg/L) and estimated concentrations of TCE (0.56 µg/L and 0.54 µg/L). The concentrations of benzene and vinyl chloride detected during both sampling events exceeded their respective ESs. The concentrations of cis-1,2-dichloroethene and TCE detected during both sampling events exceeded their respective PALs. Shallow dolomite piezometer **W-52** is located along the south fence of the Saukville facility away from former production areas.

5.1.5.2 Remediation Progress Group – Shallow Dolomite

In general, the contaminant concentrations detected in the shallow dolomite remediation progress wells indicate a stable trend since 1995. Due to a lack of water caused by the continuous pumping of deep dolomite well **W-30** at approximately 150 gallons per minute (gpm), shallow dolomite remediation progress well **W-28** was not sampled during the Fall 2018 sampling event. Specific contaminants observed in the shallow dolomite remediation progress wells during 2018 are as follows.

- The groundwater sample collected from shallow dolomite extraction well **W-21A** during the Fall 2018 groundwater sampling event contained detectable concentrations of ethylbenzene (5,600 µg/L), xylenes (3,920 µg/L), benzene (1,390 µg/L), toluene (242 µg/L), 2,4-dimethylphenol (54 µg/L), phenol (30.2 µg/L), naphthalene (28.4 µg/L) and an estimated concentration of acetophenone (5.7 µg/L). The concentrations of xylenes, ethylbenzene and benzene exceeded their respective ESs, while the concentrations of toluene and naphthalene exceeded their respective PALs. Shallow dolomite extraction well **W-21A** is located north of AOC 3 and south of AOC 1.
- The groundwater sample collected from shallow dolomite extraction well **W-24A** during the Fall 2018 sampling event contained elevated concentrations of 1,4-dioxane (110 µg/L), barium (107 µg/L), cis-1,2-dichloroethene (56 µg/L), bis(2-ethylhexyl) phthalate (24.5 µg/L), vinyl chloride (15.7 µg/L), an estimated concentration of trans-1,2-dichloroethene (1.02 µg/L) and TCE (0.99 µg/L). The concentrations of 1,4-dioxane, bis(2-ethylhexyl) phthalate and vinyl chloride exceeded their respective ESs, while the concentrations of cis-1,2-dichloroethene, naphthalene and TCE and exceeded their respective PALs. Shallow dolomite extraction well **W-24A** is located in the southwest corner of the Saukville facility, south of AOC 2.
- The groundwater sample collected from shallow dolomite extraction well **W-29** during the Fall 2018 sampling event contained elevated concentrations of barium (175 µg/L), 1,4-dioxane (49 µg/L), bis(2-ethylhexyl) phthalate (8.2 µg/L), styrene (3.9 µg/L), xylene (1.38 µg/L) and an estimated concentration of ethylbenzene (0.73 µg/L). The concentrations of 1,4-dioxane and bis(2-ethylhexyl) phthalate exceeded their respective ESs, while the concentration of benzene exceeded its respective PAL. Shallow dolomite extraction well **W-29** is located in the western portion of the Saukville facility, west of AOC 3.
- The groundwater sample collected from shallow dolomite remediation progress point **W-38** during the Fall 2018 sampling event contained a detectable concentration of benzene

(1,020 µg/L) which exceeded its ES. Shallow dolomite remediation progress point **W-38** is located adjacent to the southwest corner of the tank farm near AOC 3.

5.1.6 Detected Contaminants in the Deep Dolomite Unit

VOC concentrations detected in the shallow dolomite aquifer in 2018 are shown on **Figure 6 - VOC Detections – Shallow and Deep Dolomite Aquifers – Fall 2018**. In general, the contaminant concentrations detected in the deep dolomite monitoring points are consistent with results observed since sampling of these wells began. Besides the three (3) municipal water supply wells (**MW-1**, **MW-2** and **MW-3**), the only deep dolomite wells sampled as part of the groundwater monitoring program are deep dolomite extraction well **W-30** and deep dolomite monitoring well **PW-08** located on the former Northern Signal property.

- The groundwater samples collected from deep dolomite perimeter monitoring point **PW-08** during the Spring and Fall 2018 sampling events did not contain any detectable VOC constituents. Deep dolomite perimeter monitoring point **PW-08** is located hydrogeologically upgradient to the Saukville facility on the JT Roofing property. During the initial investigations conducted at the Saukville facility in the 1980s, it was determined that a large washout existed at the base of the casing of **PW-08**, approximately 30 ft bgs. Hydrogeologic tests indicated a direct connection between **PW-08** and the former Municipal Well No. 2 (**MW-2**). The washout area at the base of the casing was theorized to be the entry point for contaminants to the deep dolomite aquifer. Therefore, predecessors of Total installed a new surface casing to a depth of 104 ft bgs, resolving the washout condition at the base of the original casing.
- The groundwater sample collected from deep dolomite pumping well **W-30** during the Fall 2018 sampling event contained detectable concentrations of barium (102 µg/L), an estimated concentration of 1,4-dioxane (25.4 µg/L), chloroform (5.6 µg/L), trichlorofluoromethane (2.34 µg/L), benzene (2.31 µg/L), and estimated concentrations of cis-1,2-dichloroethene (0.56 µg/L) and xylene (0.50 µg/L). The estimated concentration of 1,4-dioxane exceeded its respective ES, while the concentrations of chloroform and benzene exceeded their respective PALs. Deep dolomite pumping well **W-30** is no longer utilized for non-contact cooling water at the Saukville facility. As such, the pumping rate has been reduced to approximately 150 gpm.

5.1.7 VOC Distribution

In general, benzene, ethylbenzene and xylene are the most common VOCs detected in the groundwater at the Saukville facility. In order to effectively evaluate the character of the extent of impacts, isoconcentration maps were developed for each of the BETX compounds and CVOCs in the glacial drift aquifer and benzene and CVOCs in the shallow dolomite aquifers

5.1.7.1 Glacial Drift Aquifer

Isoconcentration maps for benzene, ethylbenzene, toluene and xylenes in the glacial drift aquifer are presented as **Figures 7, 8, 9 and 10**, respectively. Trichloroethene and vinyl chloride detections in the glacial drift aquifer are shown on **Figure 11**.

Based on an evaluation of the above-described maps, the VOC impacts in the glacial drift aquifer attributed to releases at the Saukville Facility vary depending on the VOC constituent, but are generally located on the western side of the Saukville Facility between AOCs 1 and 2. In general, benzene is detected at the lowest overall concentrations of all the BTEX constituents in the glacial drift aquifer with concentrations generally less than 50 µg/L, except for **W-6A** which was detected in the Fall sampling event at an estimated concentration of 140 µg/L. ES exceedances extend south from AOC 1 towards AOCs 2 and 3. PAL exceedances are estimated to extend north to south across the Saukville facility with a minor incursion onto the adjoining property to the east.

Ethylbenzene and toluene concentrations in the glacial drift aquifer generally ranged between approximately 0.41 µg/L to 28,100 µg/L. The highest concentrations for both of these constituents are detected in glacial drift remediation progress well **W-06A** located in AOC 2. ES exceedances for both constituents are located at the AOC 1 location extending to the south towards AOC 3 and within AOC 2. PAL exceedances generally connect the two (2) isolated areas of ES exceedances.

Total xylene concentrations in the glacial drift show the highest and most widespread extent of any of the BETX constituents. The highest concentration of xylene is detected within AOC 2. The concentration of xylene in AOC 1 is approximately 18% of the concentration detected in AOC 2. While lesser concentrations were detected in the area between AOC 1 and AOC 2, the concentrations detected in this area also exceeded the ES.

CVOCs, in the form of trichloroethene and vinyl chloride were detected in primarily off-site upgradient glacial drift wells during the 2018 sampling events as follows:

- The highest TCE concentrations in the glacial drift aquifer were detected upgradient in perimeter monitoring points **W-27** (90 µg/L) and **W-19A** (13 µg/L). The concentrations of TCE detected in **W-19A** and **W-27** exceed their respective ESs. Vinyl chloride was also detected at a concentration above its respective ES in the sample collected from **W-19A.** It should also be noted that vinyl chloride and other CVOC breakdown products were detected in the samples collected in the glacial drift by Ranney Collector **RC-1**.

5.1.7.2 Shallow Dolomite Aquifer

The concentrations of contaminants detected in the shallow dolomite aquifer are significantly less than the concentrations observed in the glacial drift aquifer. In general, benzene and CVOCs were the only contaminants detected in the shallow dolomite aquifer in 2018. Specific observations are as follows:

- The highest benzene concentration (1,390 µg/L) was detected in shallow dolomite piezometer **W-21A**, is located north of AOC 3 and south of AOC 1. The extent of benzene detected in the shallow dolomite extends to the south fence line at shallow dolomite piezometer **W-52** (20.2 µg/L) and to the north at the **W-21A** extraction well location (1,390 µg/L).
- CVOCs, primarily in the form of degradation products (cis-1,2-dichloroethene, trans-1,2-dichloroethene and vinyl chloride) were detected in three (3) shallow dolomite extraction

wells (**W-21A, W-24A** and **W-29**), as well as shallow dolomite piezometers **W-23** and **W-52**, located along the south fence line. Vinyl chloride was detected in wells **W-24A** and **W-52** at concentrations exceeding the ES. It important to note that vinyl chloride was not detected at concentrations above the MDL in wells **W-21A, W-23** and **W-29.**

The isoconcentration map for benzene in the shallow dolomite aquifer is presented on **Figures 12**. CVOC detections in the shallow dolomite aquifer are shown on **Figure 13**. In contrast to the location of the VOC impacts in the glacial drift aquifer, the VOC impacts in the shallow dolomite aquifer are located near the center of the Site.

5.2 METALS RESULTS AND DISTRIBUTION

A total of eight (8) on-site remediation progress wells are scheduled to be sampled for arsenic and barium concentrations on an annual basis during the Fall groundwater sampling event. The wells scheduled to be sampled for metals include glacial drift monitoring wells **W-06A**, **W-43** and **W-47**, shallow dolomite extraction wells **W-21A**, **W-24A**, **W-28** and **W-29**, and deep dolomite pumping well **W-30**. In 2018, insufficient water in shallow dolomite extraction wells **W-21A** and **W-28** prevented a sample for metals analysis from being submitted. The samples collected for metals analysis were field-filtered prior to preservation and analysis to provide a dissolved metals concentration result. The results of the metals analyses are depicted on **Figure 14 - Metals in Groundwater – Fall 2018**. A discussion of the results follows:

5.2.1 ARSENIC

One (1) of the six (6) wells sampled during the Fall 2018 sampling event contained detectable concentrations of arsenic. An arsenic concentration (32.3 µg/L) was detected in glacial drift remediation progress well **W-06A**, while all other concentrations were below MDLs. The arsenic concentration detected in **W-06A** exceeded its respective ES.

The concentration trends for arsenic have been relatively stable since the onset of analyzing for arsenic in 1994. It should be noted that naturally occurring arsenic has been detected in Wisconsin at concentrations similar to those detected in the groundwater at the Saukville facility.

5.2.2 BARIUM

All six (6) of the groundwater samples collected and analyzed for barium during the Fall 2018 sampling event contained detectable concentrations of barium. While barium was detected in all of the samples submitted, none of the detected barium concentrations exceeded its PAL.

5.3 SVOC RESULTS AND DISTRIBUTION

A total of eight (8) on-site remediation progress monitoring wells are scheduled to be sampled on an annual basis during the Fall sampling event for SVOC analysis. The wells scheduled to be sampled for SVOCs include glacial drift monitoring wells **W-06A**, **W-43** and **W-47**, shallow dolomite extraction wells **W-21A**, **W-24A**, **W-28** and **W-29**, and deep dolomite pumping well **W-30**. In 2018, insufficient water volume in shallow dolomite extraction well **W-28** prevented a sample for SVOCs from being submitted.

The results of the SVOC sampling performed in 2018 are as follows:

- Two (2) of the seven (7) samples contained estimated concentrations of bis(2-ethylhexyl) phthalate ranging between 8.2 µg/L to 24.5 µg/L. The bis(2-ethylhexyl) phthalate concentrations detected in **W-24A** and **W-29** exceeded its ES.
- The three (3) glacial drift remediation progress monitoring wells **W-06A**, **W-21A** and **W-47** contained concentrations of naphthalene ranging between an estimated 8.4 µg/L and 28.4 µg/L. The concentration of naphthalene in **W-21A** and the estimated concentration of naphthalene in **W-47** exceeded its PAL.

SVOC detections in groundwater are depicted on **Figure 15 - SVOCs in Groundwater – Fall 2018**.

5.4 PCB Results

Glacial drift monitoring point **W-47** is the only well scheduled to be sampled for PCBs during the Fall 2018 sampling event. No PCBs were detected in the sample collected from **W-47** during this sampling event.

Historical individual contaminant trends for selected parameters in selected wells are attached in **Appendix D**.

6.0 CONTAMINANT CONTAINMENT

6.1 Containment of Groundwater Impacts

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 containment at the Saukville Facility.

6.1.1 Glacial Drift Unit

Based on the results of the laboratory analyses performed during 2018 on the groundwater samples collected from the glacial drift perimeter monitoring wells, the groundwater contamination resulting from historical on-site operations is contained within the bounds of the Saukville Facility. Samples collected from off-site, upgradient glacial drift monitoring wells **W-19A** and **W-27** continue to contain the highest concentrations of CVOCs. VOCs have not historically been detected in the downgradient or sidegradient perimeter monitoring points in the glacial drift aquifer.

6.1.2 Shallow Dolomite Unit

Downgradient shallow dolomite monitoring points (**W-03A**, **W-40**, **W-07** and **W-50**) continue to be free of detectable concentrations of VOCs, however the groundwater sample collected from **W-20** during the Fall 2018 sampling event contained an estimated concentration of xylene at 0.52 µg/L; although, during the Spring 2018 sampling event xylene was not detected in **W-20** above its MDL. The groundwater samples collected from shallow dolomite monitoring point **W-52** and shallow dolomite extraction well **W-24A**, located along the south fence line of the Saukville Facility continued to contain elevated concentrations of several VOC constituents above their respective PALs and ESs. Since shallow dolomite monitoring point **W-52** was installed in 2005, elevated concentrations of benzene and vinyl chloride have been detected and reported. The concentrations of benzene and vinyl chloride detected in the samples collected from **W-52** exceeded their respective ESs during both sampling events in 2018, while the concentrations of cis-1,2-dichloroethene and the estimated concentration of TCE detected in the sample collected from **W-24A** during the Fall 2018 sampling event exceeded their respective PALs. Additionally, since its installation, the detected concentration of benzene is **W-52** has varied between approximately 10 µg/L and 20 µg/L (See page **D-44** in **Appendix D**).

6.1.3 Deep Dolomite Unit

No VOCs were detected in the deep dolomite receptor municipal wells (**MW-1, MW-3** and **MW-4**) in 2018. However, in the sample collected from **W-30** during the Fall 2018 sampling event, concentrations of 1,4-dioxane (25.4 µg/L), chloroform (5.6 µg/L), trichlorofluoromethane (2.34 µg/L), benzene (2.31 µg/L), along with estimated concentrations of cis-1,2-dichloroethene (0.56 µg/L) and xylene (0.50 µg/L) were detected. The estimated concentration of 1,4-dioxane exceeded its respective ES, while the concentrations of chloroform and benzene exceeded their respective PALs.

Production at the Saukville Facility was idled at the beginning of 2015. As part of the preparations for idling the Facility, a bypass was added to the **W-30** piping to remove the flow from the water jackets surrounding the kettles. Therefore, the groundwater pumped by **W-30** is no longer utilized onsite as non-contact cooling water and flow has been reduced to approximately 150 GPM.

Evaluating groundwater measurements collected from the deep dolomite pumping well **W-30** in April and October of each year since 2004 indicates the groundwater elevation in **W-30** has fluctuated between 533.44 and 690.76 ft amsl with an overall average elevation of 618.95 ft amsl. During 2018, the groundwater elevation in **W-30** was 681.52 in both April and October, ranging from 60 - 70 feet above the average elevation from the previous 12 years.

The convergent flow observed around **W-30**, the relatively stable total VOC concentrations in the extracted groundwater, and the continued non-detectable concentrations of VOCs in the municipal wells indicate that the migration of the impacted groundwater in the deep dolomite aquifer continues to be effectively controlled by on-site pumping.

The adjoining upgradient Saukville Feed Supply site is the former location of a bulk petroleum fuel storage and distribution facility which contained numerous large aboveground storage tanks (ASTs). The WDNR opened a leaking underground storage tank (LUST) case (03-46-174724) in September 1997 due to soil and groundwater contaminated with leaded and unleaded gasoline and diesel fuel. In July 2005, WDNR closed the LUST case. A review of the available geographic information system (GIS) Registry submittal indicates soil with benzene concentrations as high as 1,100 micrograms per kilogram (µg/kg) were detected within approximately six (6) feet of the shallow dolomite surface. However, the investigation did not include any sampling within the bedrock to evaluate whether contamination was migrating downwards in the groundwater in cracks and solution channels.

6.1.4 Mass Removal Estimates

Utilizing annual pumping rates along with average total VOC concentration data, an estimate of total VOC mass removal has been prepared. The estimated total is based on individual total VOC mass removal trend plots for each extraction well. Since 1992, approximately 448 pounds of total VOCs are estimated to have been removed from the aquifers beneath the Saukville Facility, including: approximately 221 pounds from the glacial drift, approximately 179 pounds from the shallow dolomite and approximately 47.5 pounds from the deep dolomite. In 2018, it is estimated nearly 29.25 pounds of VOCs were removed, including approximately 20.81 pounds from the glacial drift, approximately 6.75 pounds from the shallow dolomite and approximately 1.69 pounds from the deep dolomite.

Due to the completion of deferred maintenance on the groundwater extraction system in 2018, VOC removal increased significantly from approximately two (2) pounds in 2015.

VOC removal trends are shown on the graphs included as **Appendix E.**

7.0 CONCLUSIONS

The purpose of the quarterly groundwater sampling program is to document the effectiveness of the remediation system. Per the recommendations included in the Corrective Measures Study (CMS) (Woodward-Clyde, 1996), the recommended corrective measure strategy involves the following groundwater hydraulic control elements:

- Continued operation of the Ranney collector system to dewater unconsolidated soil and maintain hydraulic control of the shallow groundwater system;
- Continued operation of the shallow dolomite wells to maintain hydraulic control of the shallow groundwater system and prevent contamination of the deep dolomite aquifer; and,
- Continued operation of the deep dolomite pumping well to maintain the effective site-wide hydraulic control and provide an inward gradient for capture and recovery of off-site contaminated groundwater.

The results of the quarterly groundwater sampling performed in 2018, as summarized in this annual report, indicate the existing extraction system operating at the Saukville facility continues to effectively control off-site migration of the groundwater impacts in the glacial drift aquifer while reducing the volume of contaminants present in the groundwater. The results from shallow dolomite perimeter monitoring point **W-52** continue to indicate elevated concentrations of CVOCs and benzene along the south fence line of the Saukville facility. The elevated CVOC concentrations in **W-52** can be attributed to the upgradient source on the JT Roofing property. It is assumed the elevated benzene concentrations detected in the samples collected from **W-52** are indicative of the southern extent of the benzene contamination present in the shallow dolomite at AOC 3. As shown on page **D-44**, once the aquifer equilibrated following installation in 2005, the concentration of benzene in the groundwater samples collected from **W-52** ranged between 8.9 μg/L to 21.6 μg/L, with an average concentration of 13.05 μg/L over the past 20 sampling events, indicating a stable trend. As such, it is our opinion as long as the existing groundwater extraction system continues to operate, the benzene contamination detected at the **W-52** location does not constitute an expending plume margin which would require additional investigation and/or remediation. Should the concentration of benzene in samples collected from **W-52** increase in the future, additional extraction may be deemed necessary.

At the **W-51/W-52** well nest, groundwater elevations indicate a upward migration from the glacial aquifer to the shallow dolomite aquifer (vertical gradient of 0.55 ft/ft). The shallow dolomite aquifer is present approximately 21-ft bgs with approximately eight (8) to nine (9) feet of non-contaminated water present within the glacial drift aquifer above the shallow dolomite aquifer. The adjoining residences are supplied with potable water via the Village municipal distribution system. Therefore, the potential groundwater exposure pathway is not complete. In addition, due to the presence of the uncontaminated glacial drift aquifer above the shallow dolomite aquifer and the downward vertical gradient, the potential vapor intrusion threat from the contaminants in the shallow dolomite is not complete. We recommend continuing to monitor the concentrations of contaminants in **W-51** and **W-52** semi-annually as required in the modified GWMP.

8.0 REFERENCES

ELM Consulting, LLC. Modified Groundwater Monitoring Plan – Cook Composites and Polymers Co. July 2005.

Endpoint Solutions Corp. (Endpoint) 2018a. Report of Results – Winter 2018 Groundwater Sampling Event. December 3, 2018.

Endpoint 2018b. Report of Results – Spring 2018 Groundwater Sampling Event. December 3, 2018.

Endpoint 2018c. Report of Results – Summer 2018 Groundwater Sampling Event. December 3, 2018.

Endpoint 2018d. Report of Results – Fall 2018 Groundwater Sampling Event. January 2, 2019.

Hatcher Incorporated. Summary – Hydrologic Assessment Activities. January 11, 1985.

Hatcher Incorporated. Site Conditions & Construction Report. February 15, 1988.

RMT, Inc. Closure Plan Modification. April 1992.

Wisconsin Administrative Code Chapter NR 140 – Groundwater Quality.

Wisconsin Department of Natural Resources. RCRA 3008(h) Corrective Action Order. September 3, 1987.

Wisconsin Department of Natural Resources. 2005 Proposed Modified Groundwater Monitoring Plan, Cook Composites and Polymers Co. – Approval Letter. July 2005.

Woodward-Clyde. Corrective Measures Study – On-Site Areas of Concern 1, 2 and 3. September 17, 1996.

TABLES

Table 1

2018 Summary of Groundwater Level Measurements (ft, msl)
Arkema Coating Resins
Saukville, Wisconsin

GEOLOGIC UNIT	WELL ID	TOC	Apr-18	Oct-18
Glacial	W-1A	768.55	761.59	764.32
Glacial	W-3B	770.32	744.60	747.78
Glacial	W-4A	767.55	758.34	759.45
Glacial	W-6A	773.27	769.59	769.77
Glacial	W-8R	759.71	749.52	753.48
Glacial	W-14B	773.07	768.33	768.84
Glacial	W-16A	768.74	758.87	764.48
Glacial	W-18A	772.07	768.09	770.02
Glacial	W-19A	775.48	768.95	770.80
Glacial	W-20	767.91	743.08	746.20
Glacial	W-27	775.70	770.34	770.76
Glacial	W-37	Well Abondoned 8/1996		
Glacial	W-41	773.73	764.30	766.09
Glacial	W-42	774.40	764.09	763.82
Glacial	W-43	768.44	764.47	764.45
Glacial	W-44	769.30	NM	759.61
Glacial	W-45	767.97	754.33	756.08
Glacial	W-46	766.17	760.45	760.46
Glacial	W-47	771.22	764.91	766.09
Glacial	W-48	773.37	764.48	764.50
Glacial	W-49	765.83	756.47	756.84
Glacial	W-51	773.48	761.77	754.93
Glacial	W-53	773.12	762.83	763.65
Shallow Dolomite	W-3A	769.31	744.34	747.56
Shallow Dolomite	W-7	759.32	748.04	752.58
Shallow Dolomite	W-21A*	769.22		
Shallow Dolomite	W-22	772.29	760.95	763.09
Shallow Dolomite	W-23	768.90	748.02	750.80
Shallow Dolomite	W-24A*	772.45		
Shallow Dolomite	W-25	Well Abondoned 7/1997		
Shallow Dolomite	W-28*	772.41		
Shallow Dolomite	W-29*	765.45		
Shallow Dolomite	W-38	768.75	753.28	755.51
Shallow Dolomite	W-39	782.19	761.28	764.17
Shallow Dolomite	W-40	767.95	754.48	757.95
Shallow Dolomite	W-50	765.74	751.65	754.78
Shallow Dolomite	W-52	773.01	752.06	762.89
Deep Dolomite	MW-1	766	674	692
Deep Dolomite	MW-2	Well Abandoned 12/2004		
Deep Dolomite	MW-3	756	543	582
Deep Dolomite	MW-4	771	671	673
Deep Dolomite	PW-08	775.66	740.69	747.92
Deep Dolomite	W-30*	771.64	681.52	681.52

* = Extraction Well
ft - feet
msl - mean sea level
NM - Not measured
TOC = top of casing
Access to measure water levels in W-21A, W-24A, W-28 and W-29
removed to provide sampling access from ground surface.

TABLE 2
2018 SUMMARY OF WELL RUNNING TIMES AND VOLUME REMOVED
ARKEMA COATING RESINS
SAUKVILLE, WISCONSIN

Hydrogeologic Unit	Well ID	Monthly Running Times (hours) Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Total (hours)	Pumping Rate (gpm)	Volume Removed (gal)	Comments
Glacial Drift	W-31	0.0	0.0	75.9	1.1	39.2	3.4	0.8	0.4	16.2	18.1	0.6	0.7	156.4	0.07	657	Continued pumping assists in controlling off-site migration.
	W-32	0.1	0.5	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.0	0.0	1.0	0.07	4	
	W-33	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.07	4	
	W-34	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.07	1	
	W-35	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.1	0.5	0.07	2	
	RC-1	0.0	127.6	235.6	396.9	671.8	709.0	107.0	56.2	0.0	107.8	768.4	670.5	3,850.8	3	693,144	
	RC-2	451.6	671.1	836.7	672.0	671.9	839.4	37.1	683.4	503.3	675.5	839.3	672.9	7,554.2	3	1,359,756	
	RC-3	672.5	343.0	843.4	672.2	671.9	838.5	196.9	347.2	669.8	674.8	830.2	672.9	7,433.3	3	1,337,994	
																3,391,562	**Total Removed from Glacial Drift**
Shallow	W-21A	671.7	671.1	620.1	672.0	671.8	839.7	621.0	777.1	600.1	674.6	839.2	672.9	8,331.3	2	999,756	Pumping is contributing to the creation of a large dewatered area in the overlying glacial drift.
	W-24A	671.8	20.8	120.0	16.2	15.8	19.5	16.0	20.0	15.9	15.9	19.6	14.7	966.2	40	2,318,880	
	W-28	6.2	12.0	14.4	32.3	50.7	11.8	0.3	0.0	0.0	0.0	0.0	0.0	127.7	2	15,324	
	W-29	0.0	32.1	40.9	32.9	33.2	40.6	34.5	42.9	33.3	32.0	38.6	33.1	394.1	12	283,752	
																3,617,712	**Total Removed from Shallow Dolomite**
Deep	W-30													8,760	150	**78,840,000**	**Total Removed from Deep Dolomite**
																85,849,274	**Total Removed from All Aquifers**

gpm - Gallons Per Minute
gal - Gallons

Table 3

Modified Groundwater Monitoring Plan Summary
Arkema Coating Resins
Saukville, Wisconsin

Monitoring Objective	Sampling Point	Sampling Event				Parameters	Duplicates		Sample Method
		January	April	July	October		Blind	MS/MSD	
Receptor Monitoring Points	MW-1	X	X	X	X	8260			Tap
	MW-3		X		X	8260		X	Tap
	MW-4		X		X	8260	DUP1		Tap
	RC-1		X		X	8021			Manhole
	RC-2		X		X	8021			Manhole
	RC-3		X		X	8021			Manhole
	POTW-I		X		X	8260			Trough
	POTW-E		X		X	8260			Aeration
	POTW-S		X		X	8260			Sink
Perimeter Monitoring Points	W-01A		X		X	8260			Bailer
	W-03A		X		X	8260	DUP3		Pump
	W-03B		X		X	8260			Pump
	W-04A		X		X	8260			Bailer
	W-07		X		X	8260			Bailer
	W-08R		X		X	8260			Bailer
	W-16A		X		X	8260			Bailer
	W-20		X		X	8260			Pump
	W-22		X		X	8260			Pump
	W-23		X		X	8260	DUP2		Pump
	W-27		X		X	8260			Pump
	W-40		X		X	8260			Pump
	W-49		X		X	8260			Bailer
	W-50		X		X	8260			Bailer
	W-51		X		X	8260			Bailer
	W-52		X		X	8260			Bailer
	PW-08		X		X	8260			Pump
Remediation Progress Point	W-06A				X	Appendix IX 8260, Appendix IX 8270, 7060, 6010			Bailer
	W-19A				X	8260	X		Bailer
	W-21A				X	Appendix IX 8260, Appendix IX 8270, 7060, 6010			Tap
	W-24A				X	Appendix IX 8260, Appendix IX 8270, 7060, 6010			Tap
	W-28				X	Appendix IX 8260, Appendix IX 8270, 7060, 6010			Tap
	W-29				X	Appendix IX 8260, Appendix IX 8270, 7060, 6010			Tap
	W-30				X	Appendix IX 8260, Appendix IX 8270, 7060, 6010	X		Tap
	W-38				X	8260			Pump
	W-41				X	8260		X	Bailer
	W-42				X	8260			Bailer
	W-43				X	Appendix IX 8260, Appendix IX 8270, 7060, 6010			Bailer
	W-47				X	Appendix IX 8260, Appendix IX 8270, 7060, 6010, 8081	X (8081)		Peristaltic

MS/MSD: Matrix Spike/Matrix Spike Duplicate
WPDES: Wisconsin Pollution Discharge Elimination System

TABLE 4

SUMMARY OF ANALYTES AND METHODS

Volatile Organic Compounds by Method 8260		
Chloroethane	1,1,1-Trichloroethane	2-Hexanone
Chloromethane	Carbon Tetrachloride	4-Methyl-2-Pentanone
Bromomethane	Vinyl Acetate	Tetrachloroethene
Vinyl Chloride	Bromodichloromethane	Toluene[1]
Methylene Chloride	1,1,2,2-Tetrachloroethane	Chlrorbenzene[1]
Acetone	1,2-Dichloropropane	Ethylbenzene[1]
Carbon Disulfide	trans-1,2-Dichloropropene	Styrene
1,1-Dichloroethene	Trichloroethene	Xylenes (total)[1]
1,1-Dichloroethane	Dibromochloromethane	1,4-Dichlorobenzene[1]
1,2-Dichloroethene (total)	1,1,2-Trichloroethane	1,3-Dichlorobenzene[1]
Chloroform	Benzene	1,2-Dichlorobenzene[1]
1,2-Dichlroethane	cis-1,3-Dichloropropene	
2-Butanone	Bromoform	

Volatile Organic Compounds by Method 8021[1]
Benzene
Toluene
Ethylbenzene
Chlorobenzene
Xylenes (total)
1,4-Dichlorobenzene
1,3-Dichlorobenzene
1,2-Dichlorobenzene

Semivolatile Organic Compounds by Method 8270[2]
1,4-Dioxane
2,4-Dimethylphenol
2-Methylnaphthalene
2-Methylphenol
4-Methylphenol
Acetophenone
bis(2-ethylhexyl)phthalate
Naphthalene
Phenanthrene
Phenol

Polychlorinated Biphenyls (PCBs) by Method 8080[3]
Arochlor 1016
Arochlor 1221
Arochlor 1232
Arochlor 1242
Arochlor 1248
Arochlor 1254
Arochlor 1260

Metals by Methods 7060, 6010[2]
Barium
Arsenic

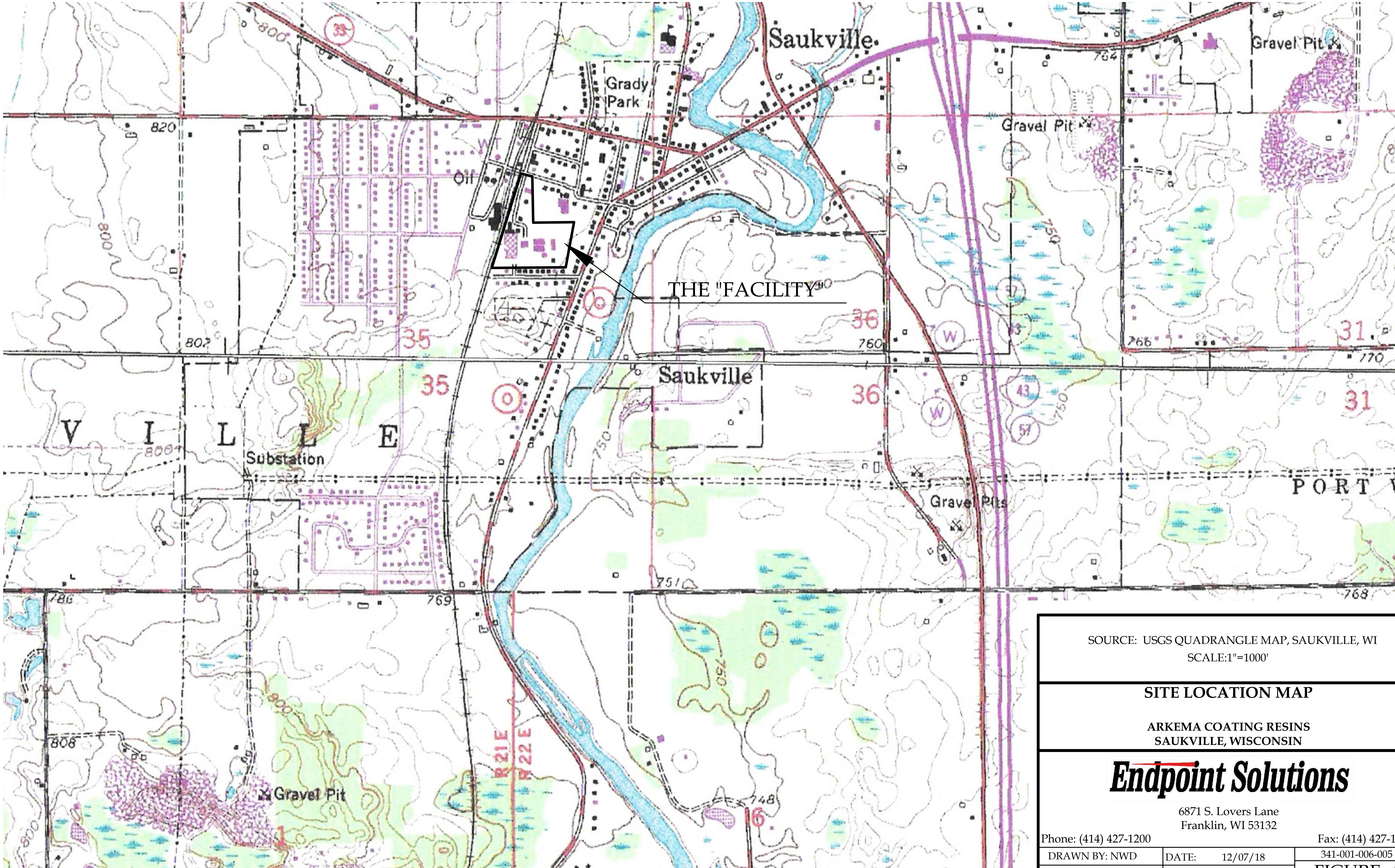
NOTES

1 Volatile organic compounds

2 Analyzed annually at 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.

FIGURES



SOURCE: USGS QUADRANGLE MAP, SAUKVILLE, WI
SCALE:1"=1000'

SITE LOCATION MAP

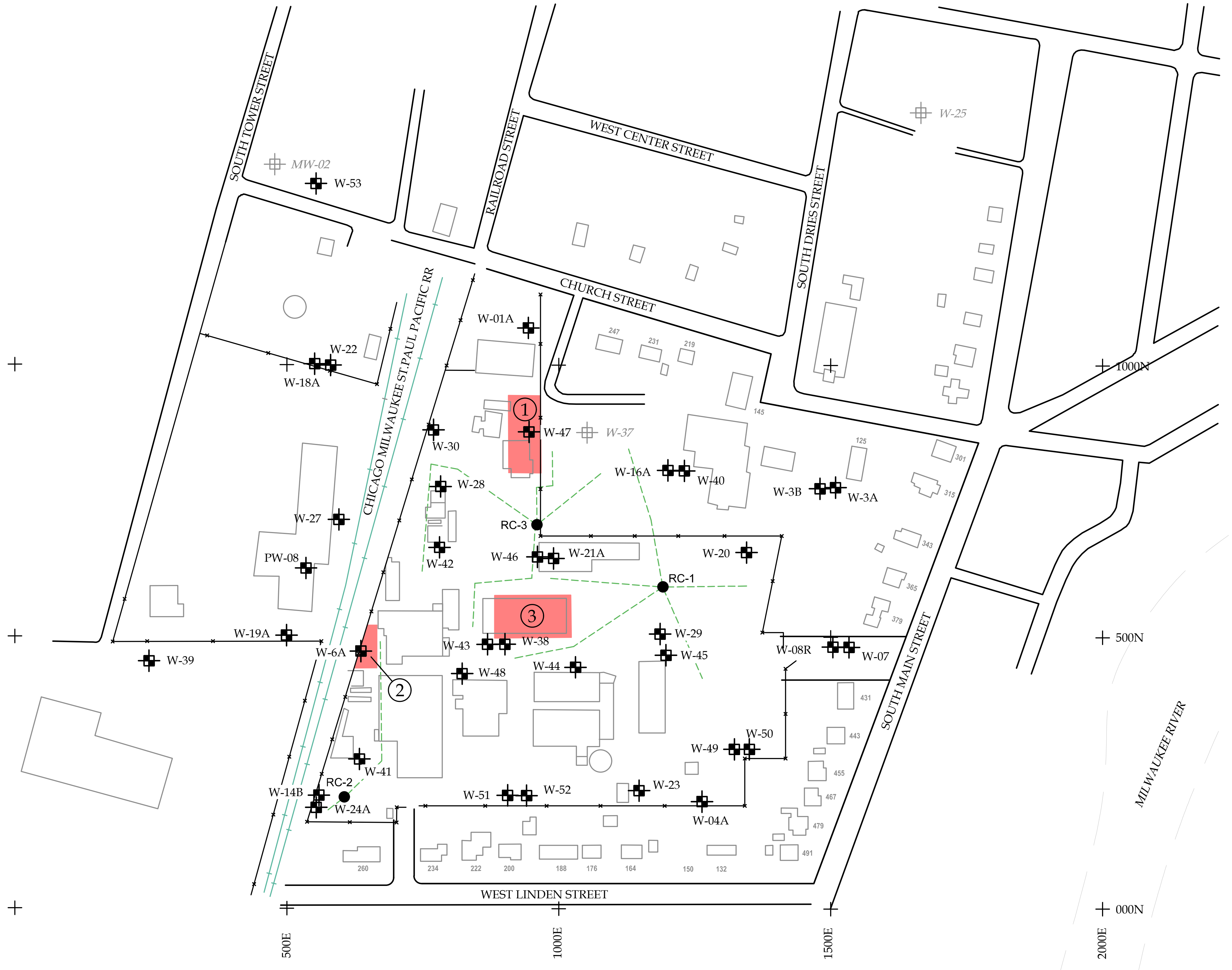
ARKEMA COATING RESINS
SAUKVILLE, WISCONSIN

Endpoint Solutions

6871 S. Lovers Lane
Franklin, WI 53132

Phone: (414) 427-1200 Fax: (414) 427-1259

DRAWN BY: NWD	DATE: 12/07/18	341-001-006-005
REVIEWED BY: RAC	DWG: SEE INFO BLOCK	FIGURE 1

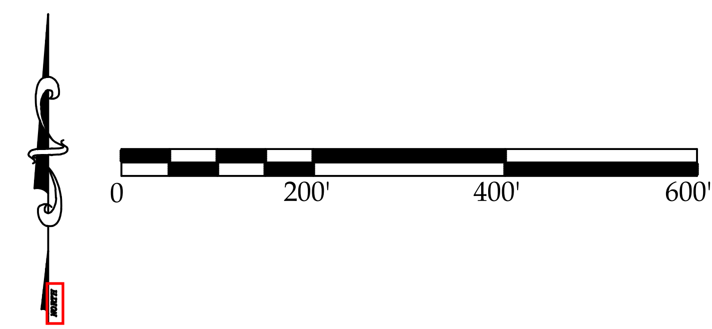


LEGEND

- BUILDING
- ROAD
- FENCE
- RAILROAD
- W-18A MONITORING WELL LOCATION AND NUMBER
- W-25 ABANDONED WELL LOCATION AND NUMBER
- RANNEY COLLECTOR
- (1) AREA OF CONCERN

NOTES

1. BASE MAP WAS DEVELOPED FROM DRAWINGS PROVIDED BY RMT, INC.
2. W-37 WAS ABANDONED AUGUST 2, 1996.
3. W-25 WAS ABANDONED JULY 29, 1997.
4. MW-02 WAS ABANDONED NOVEMBER 2004.



EXISTING SITE LAYOUT

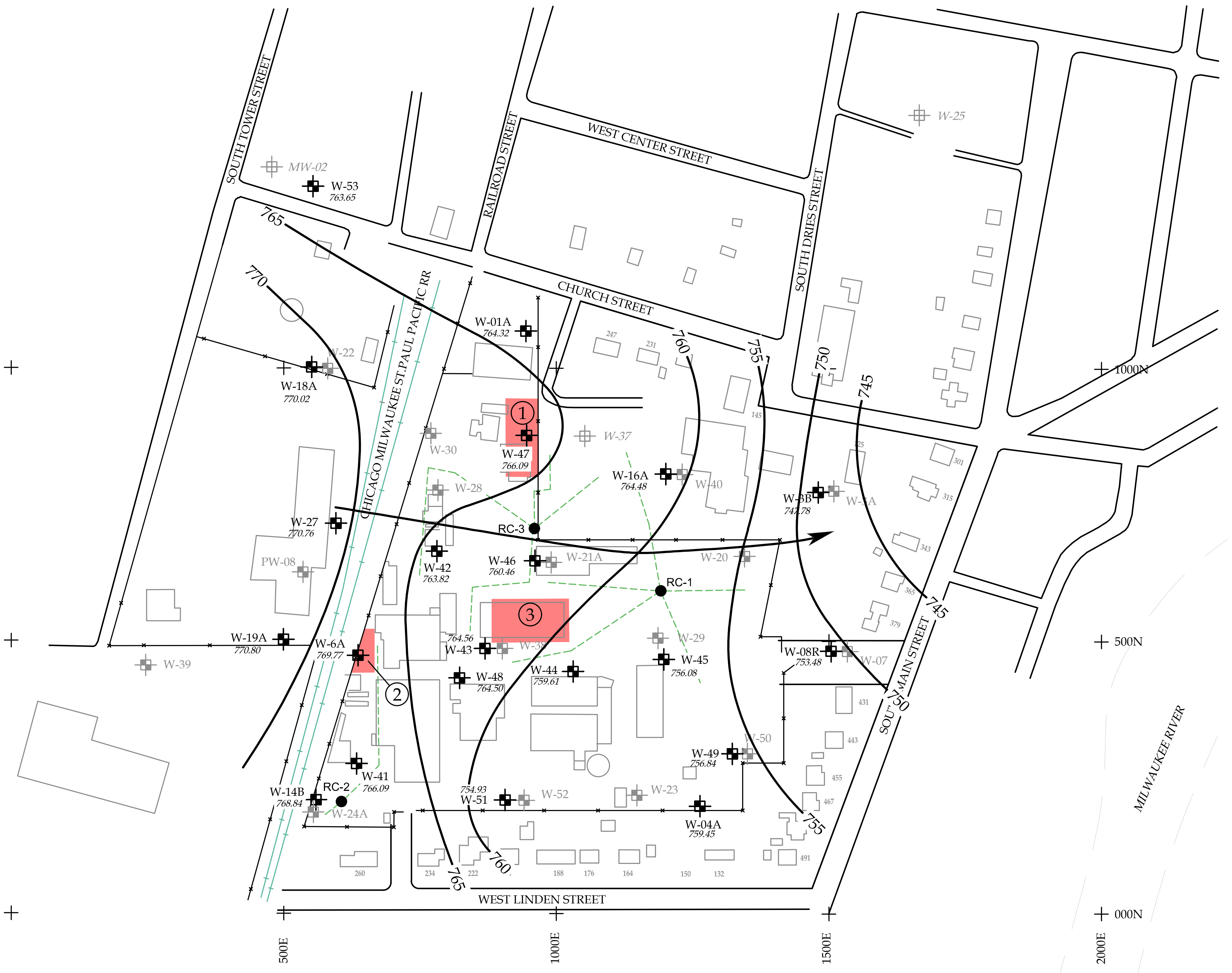
ARKEMA COATING RESINS
SAUKVILLE, WISCONSIN

Endpoint Solutions

6871 S. Lovers Lane
Franklin, WI 53132

Phone: (414) 427-1200 Fax: (414) 427-1259

DRAWN BY: NWD	DATE: 12/07/18	341-001-006-005
REVIEWED BY: RAC	DWG: SEE INFO BLOCK	FIGURE 2



LEGEND

W-18A	MONITORING WELL LOCATION AND NUMBER
W-18A	ABANDONED WELL LOCATION AND NUMBER
	GROUNDWATER FLOW DIRECTION
NM	NOT MEASURED
	CONTOUR INTERVAL = 5 FEET
	RANNEY COLLECTOR
1	AREA OF CONCERN

NOTES

1. BASE MAP WAS DEVELOPED FROM DRAWINGS PROVIDED BY RMT, INC.
2. W-37 WAS ABANDONED AUGUST 2, 1996.
3. W-25 WAS ABANDONED JULY 29, 1997.
4. MW-02 WAS ABANDONED NOVEMBER 2004.

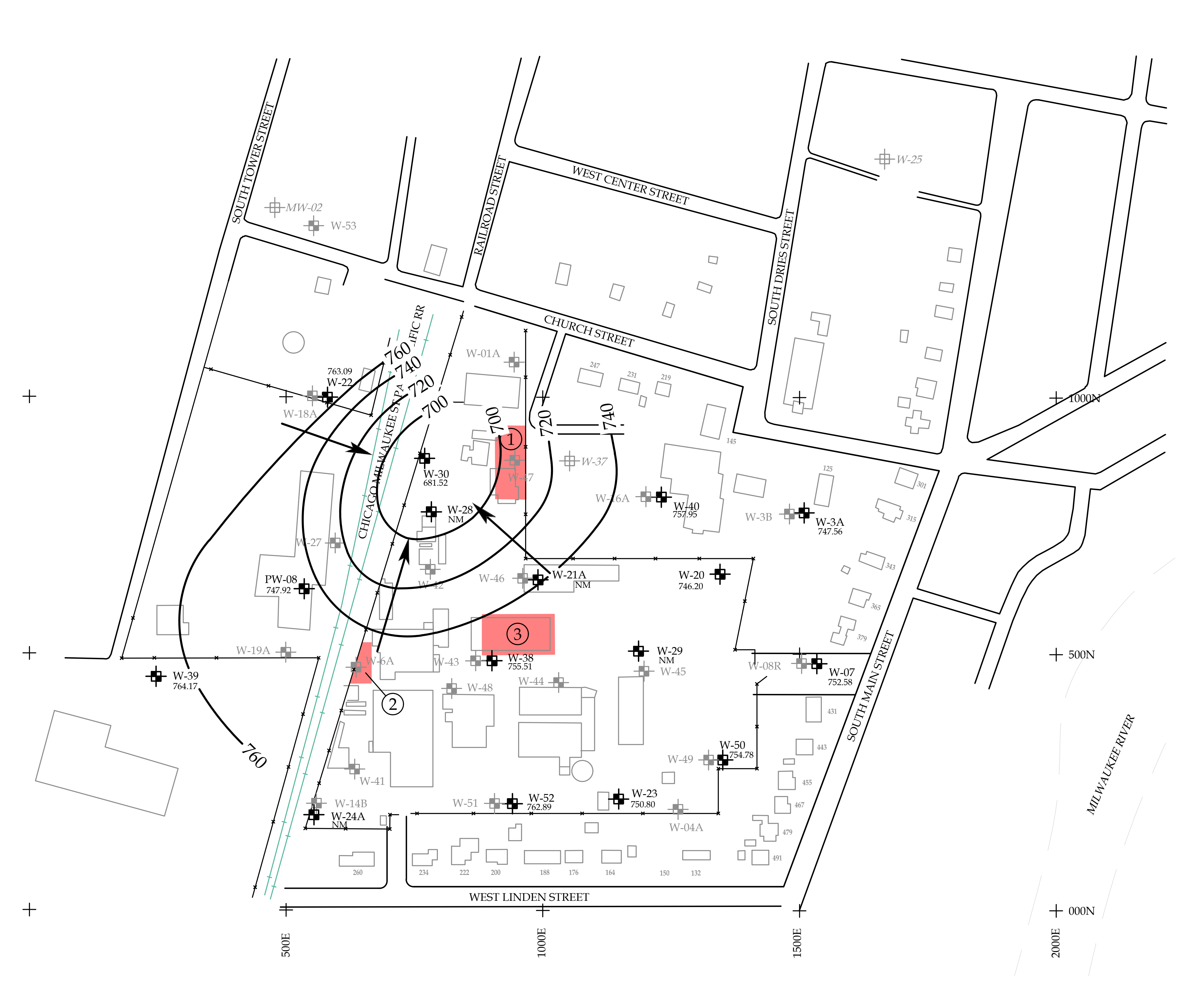
SCALE:1"=200'

0 200' 400' 600'

WATER TABLE MAP
GLACIAL DRIFT AQUIFER - FALL 2018
ARKEMA COATING RESINS
SAUKVILLE, WISCONSIN

Endpoint Solutions
6871 S. Lovers Lane
Franklin, WI 53132
Phone: (414) 427-1200 Fax: (414) 427-1259

DRAWN BY: NWD	DATE: 12/07/18	341-001-006-005
REVIEWED BY: RAC	DWG: FALL 2018 FIGURES	FIGURE 3



LEGEND

W-18A MONITORING WELL LOCATION AND NUMBER

W-18A ABANDONED WELL LOCATION AND NUMBER

GROUNDWATER FLOW DIRECTION

NM NOT MEASURED

CONTOUR INTERVAL =20 FEET

1 AREA OF CONCERN

NOTES

1. BASE MAP WAS DEVELOPED FROM DRAWINGS PROVIDED BY RMT, INC.
2. W-37 WAS ABANDONED AUGUST 2, 1996.
3. W-25 WAS ABANDONED JULY 29, 1997.
4. MW-02 WAS ABANDONED NOVEMBER 2004.

SCALE:1"=200'

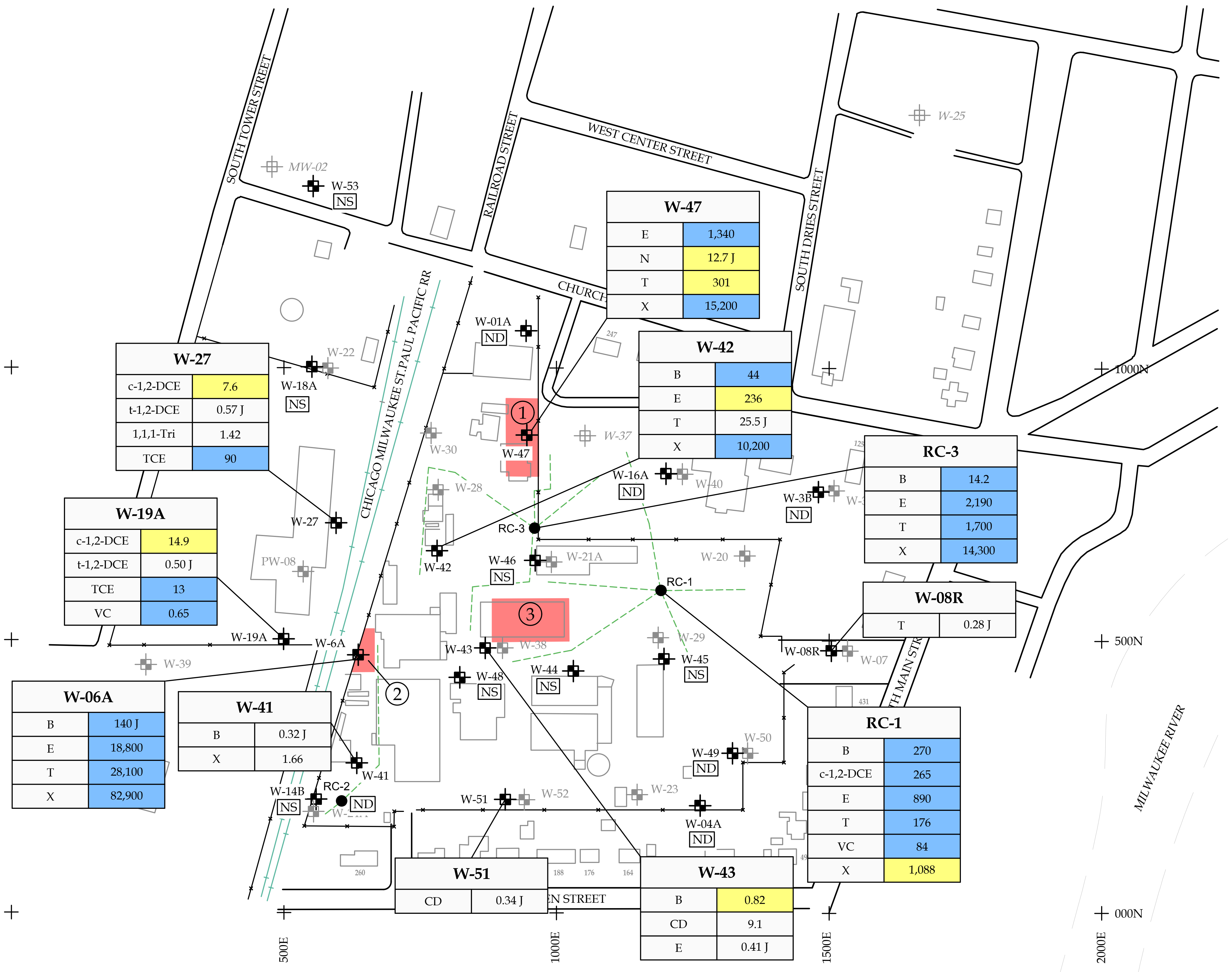
0 200' 400' 600'

POTENTIOMETRIC SURFACE MAP
SHALLOW AND DEEP DOLOMITE AQUIFERS - FALL 2018

ARKEMA COATING RESINS
SAUKVILLE, WISCONSIN

Endpoint Solutions
6871 S. Lovers Lane
Franklin, WI 53132
Phone: (414) 427-1200
Fax: (414) 427-1259

DRAWN BY: NWD	DATE: 12/07/18	341-001-006-005
REVIEWED BY: RAC	DWG: FALL 2018 FIGURES	FIGURE 4



W-47	
E	1,340
N	12.7 J
T	301
X	15,200

W-42	
B	44
E	236
T	25.5 J
X	10,200

W-27	
c-1,2-DCE	7.6
t-1,2-DCE	0.57 J
1,1,1-Tri	1.42
TCE	90

W-19A	
c-1,2-DCE	14.9
t-1,2-DCE	0.50 J
TCE	13
VC	0.65

RC-3	
B	14.2
E	2,190
T	1,700
X	14,300

W-08R	
T	0.28 J

W-06A	
B	140 J
E	18,800
T	28,100
X	82,900

W-41	
B	0.32 J
X	1.66

RC-1	
B	270
c-1,2-DCE	265
E	890
T	176
VC	84
X	1,088

W-51	
CD	0.34 J

W-43	
B	0.82
CD	9.1
E	0.41 J

LEGEND

- W-18A MONITORING WELL LOCATION AND NUMBER
- W-18A ABANDONED WELL LOCATION AND NUMBER
- RANNEY COLLECTOR
- (1) AREA OF CONCERN

B	Benzene
CD	Carbon Disulfide
c-1,2-DCE	cis-1,2-Dichloroethene
t-1,2-DCE	trans-1,2-Dichloroethene
E	Ethylbenzene
N	Nappthalene
T	Toluene
1,1,1-Tri	1,1,1-Trichloroethene
TCE	Trichloroethene
VC	Vinyl Chloride
X	Xylenes, Total

ND	Not Detected
NS	Not Sampled
J	Estimated Value
(yellow)	PAL Exceedance
(blue)	ES Exceedance

NOTES

1. BASE MAP WAS DEVELOPED FROM DRAWINGS PROVIDED BY RMT, INC.
2. W-37 WAS ABANDONED AUGUST 2, 1996.
3. W-25 WAS ABANDONED JULY 29, 1997.
4. MW-02 WAS ABANDONED NOVEMBER 2004.

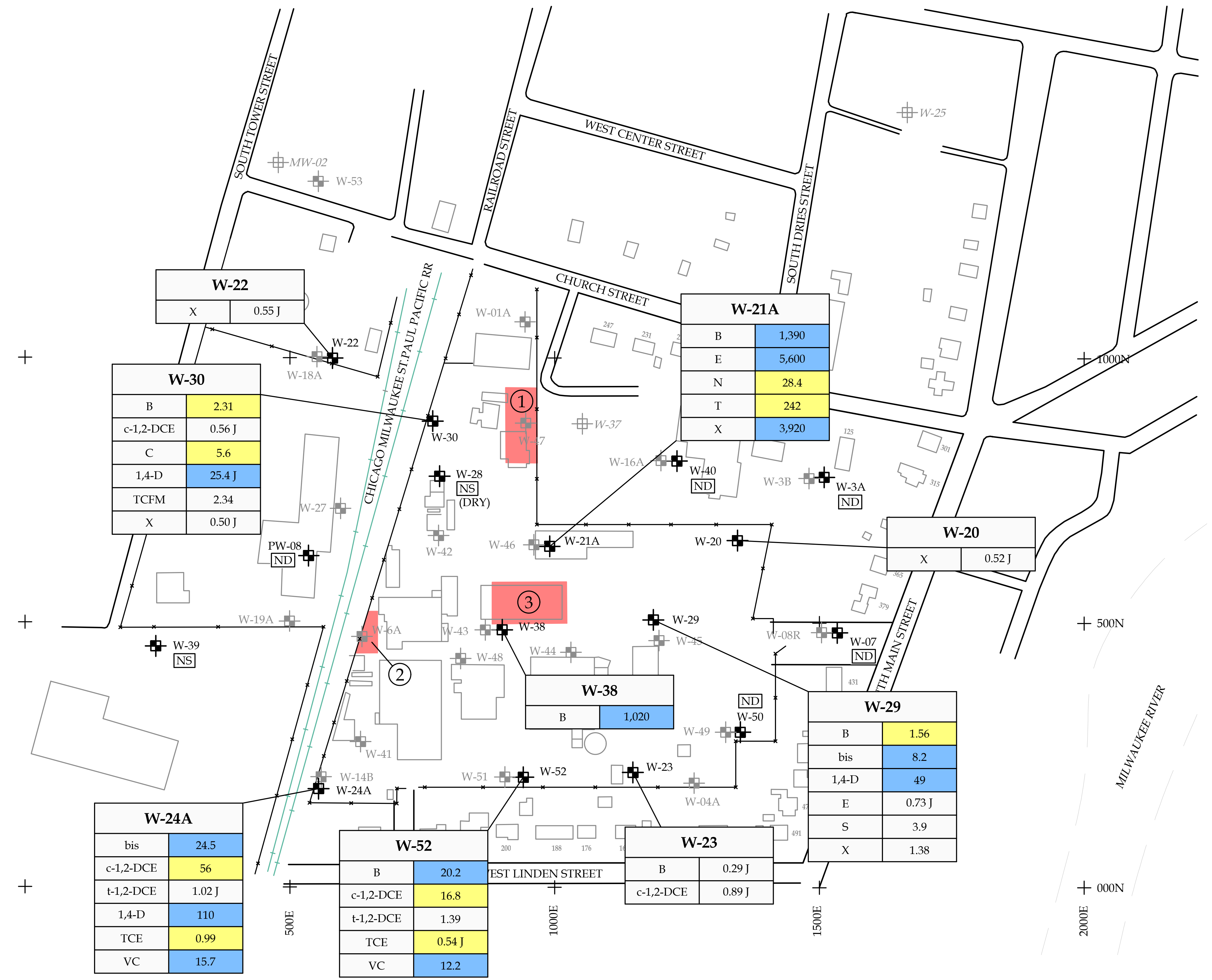
SCALE:1"=200'

0 200' 400' 600'

VOC DETECTIONS (ug/L)
GLACIAL DRIFT AQUIFER - FALL 2018
ARKEMA COATING RESINS
SAUKVILLE, WISCONSIN

Endpoint Solutions
6871 S. Lovers Lane
Franklin, WI 53132
Phone: (414) 427-1200
Fax: (414) 427-1259

DRAWN BY: NWD	DATE: 01/02/19	341-001-006-005
REVIEWED BY: RAC	DWG: FALL 2018 FIGURES	FIGURE 5



W-22	
X	0.55 J

W-30	
B	2.31
c-1,2-DCE	0.56 J
C	5.6
1,4-D	25.4 J
TCFM	2.34
X	0.50 J

W-21A	
B	1,390
E	5,600
N	28.4
T	242
X	3,920

W-20	
X	0.52 J

W-38	
B	1,020

W-29	
B	1.56
bis	8.2
1,4-D	49
E	0.73 J
S	3.9
X	1.38

W-24A	
bis	24.5
c-1,2-DCE	56
t-1,2-DCE	1.02 J
1,4-D	110
TCE	0.99
VC	15.7

W-52	
B	20.2
c-1,2-DCE	16.8
t-1,2-DCE	1.39
TCE	0.54 J
VC	12.2

W-23	
B	0.29 J
c-1,2-DCE	0.89 J

LEGEND

- W-18A MONITORING WELL LOCATION AND NUMBER
- W-18A ABANDONED WELL LOCATION AND NUMBER
- (1) AREA OF CONCERN

B	Benzene
bis	bis (2-Ethylhexyl) Phthalate
C	Chloroform
CD	Carbon Disulfide
c-1,2-DCE	cis-1,2-Dichloroethene
t-1,2-DCE	trans-1,2-Dichloroethene
1,4-D	1,4-Dioxane
E	Ethylbenzene
N	Naphthalene
S	Styrene
T	Toluene
TCE	Trichloroethene
TCFM	Trichlorofluoromethane
VC	Vinyl Chloride
X	Total Xylenes

ND	Not Detected
NS	Not Sampled
J	Estimated Value
(yellow)	PAL Exceedance
(blue)	ES Exceedance

NOTES

1. BASE MAP WAS DEVELOPED FROM DRAWINGS PROVIDED BY RMT, INC.
2. W-37 WAS ABANDONED AUGUST 2, 1996.
3. W-25 WAS ABANDONED JULY 29, 1997.
4. MW-02 WAS ABANDONED NOVEMBER 2004.

SCALE:1"=200'

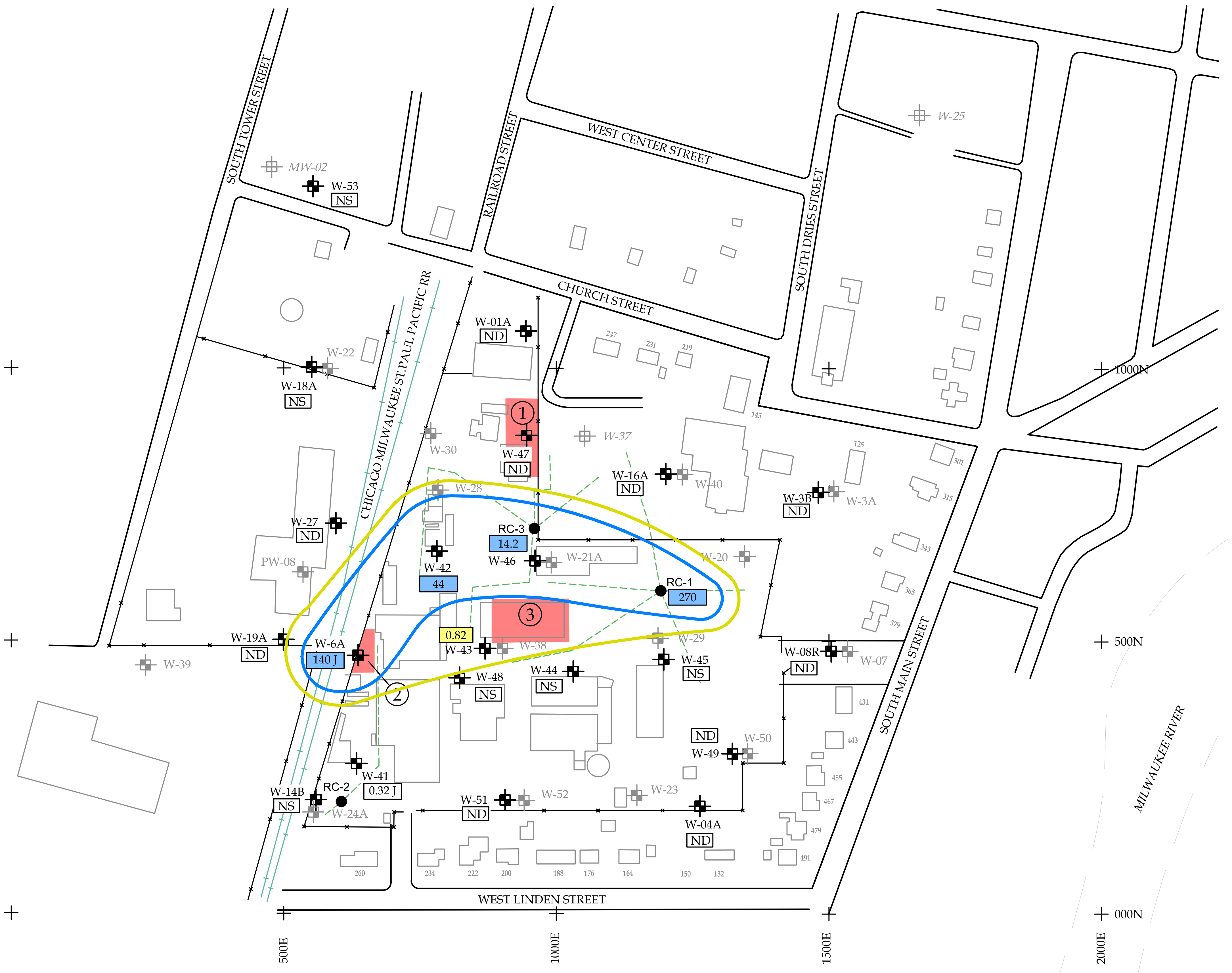
0 200' 400' 600'

VOC DETECTIONS (ug/L) SHALLOW AND DEEP DOLOMITE AQUIFERS - FALL 2018

ARKEMA COATING RESINS
SAUKVILLE, WISCONSIN

Endpoint Solutions
6871 S. Lovers Lane
Franklin, WI 53132
Phone: (414) 427-1200 Fax: (414) 427-1259

DRAWN BY: NWD	DATE: 01/02/19	341-001-006-005
REVIEWED BY: RAC	DWG: FALL 2018 FIGURES	FIGURE 6



LEGEND

W-18A — MONITORING WELL LOCATION AND NUMBER

W-18A — ABANDONED WELL LOCATION AND NUMBER

APPROXIMATE EXTENT OF ES LIMITS

APPROXIMATE EXTENT OF PAL LIMITS

RANNEY COLLECTOR

(1) AREA OF CONCERN

ND	Not Detected
NS	Not Sampled
J	Estimated Value
(yellow)	PAL Exceedance
(blue)	ES Exceedance

NOTES

1. BASE MAP WAS DEVELOPED FROM DRAWINGS PROVIDED BY RMT, INC.
2. W-37 WAS ABANDONED AUGUST 2, 1996.
3. W-25 WAS ABANDONED JULY 29, 1997.
4. MW-02 WAS ABANDONED NOVEMBER 2004.

BENZENE IN GROUNDWATER (ug/L) GLACIAL DRIFT AQUIFER - FALL 2018

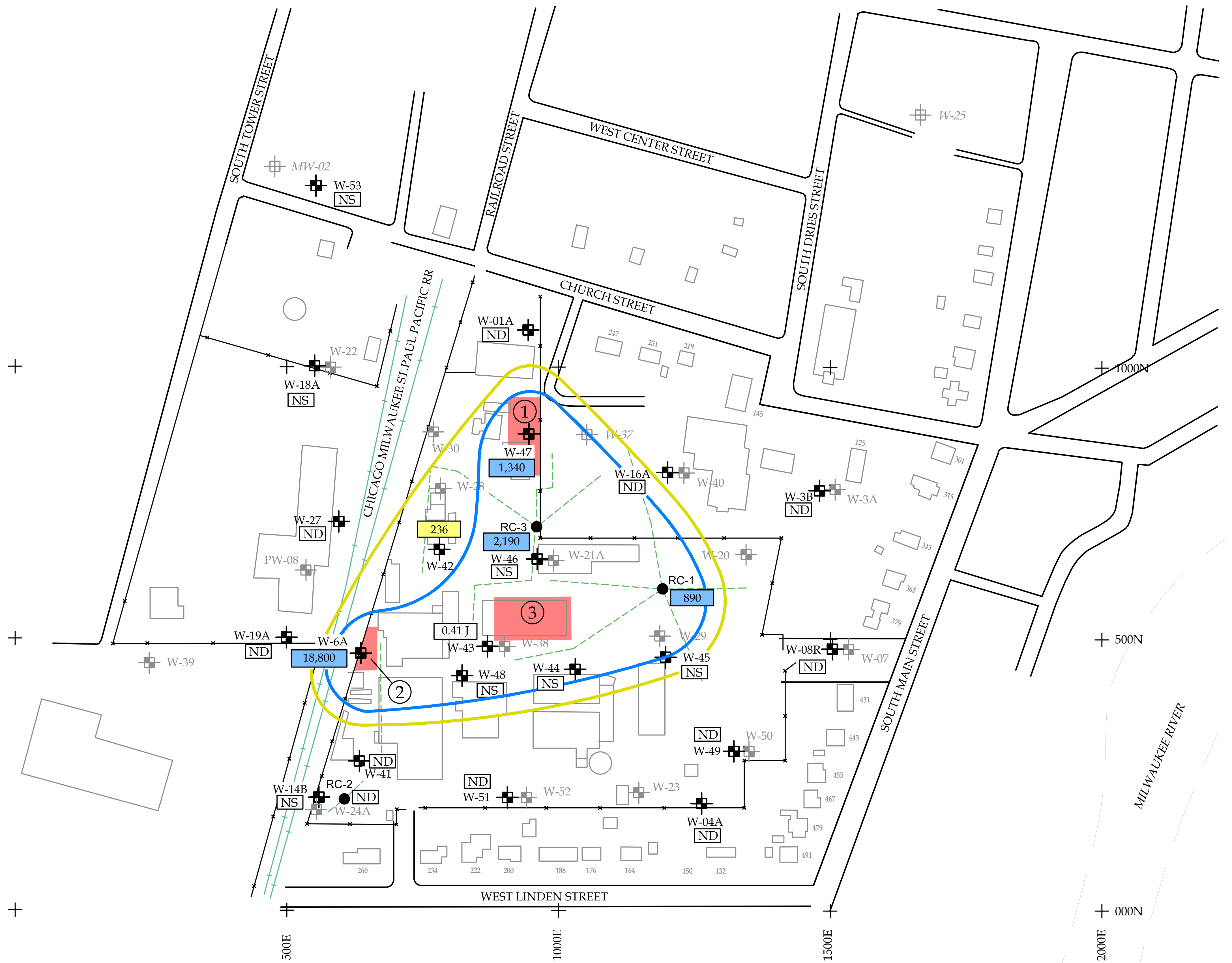
ARKEMA COATING RESINS
SAUKVILLE, WISCONSIN

Endpoint Solutions

6871 S. Lovers Lane
Franklin, WI 53132

Phone: (414) 427-1200 Fax: (414) 427-1259

DRAWN BY: NWD	DATE: 12/20/18	341-001-006-005
REVIEWED BY: RAC	DWG: FALL 2018 FIGURES	FIGURE 7



LEGEND

W-18A	MONITORING WELL LOCATION AND NUMBER
W-18A	ABANDONED WELL LOCATION AND NUMBER
	APPROXIMATE EXTENT OF ES LIMITS
	APPROXIMATE EXTENT OF PAL LIMITS
	RANNEY COLLECTOR
1	AREA OF CONCERN

ND	Not Detected
NS	Not Sampled
	PAL Exceedance
	ES Exceedance

NOTES

1. BASE MAP WAS DEVELOPED FROM DRAWINGS PROVIDED BY RMT, INC.
2. W-37 WAS ABANDONED AUGUST 2, 1996.
3. W-25 WAS ABANDONED JULY 29, 1997.
4. MW-02 WAS ABANDONED NOVEMBER 2004.

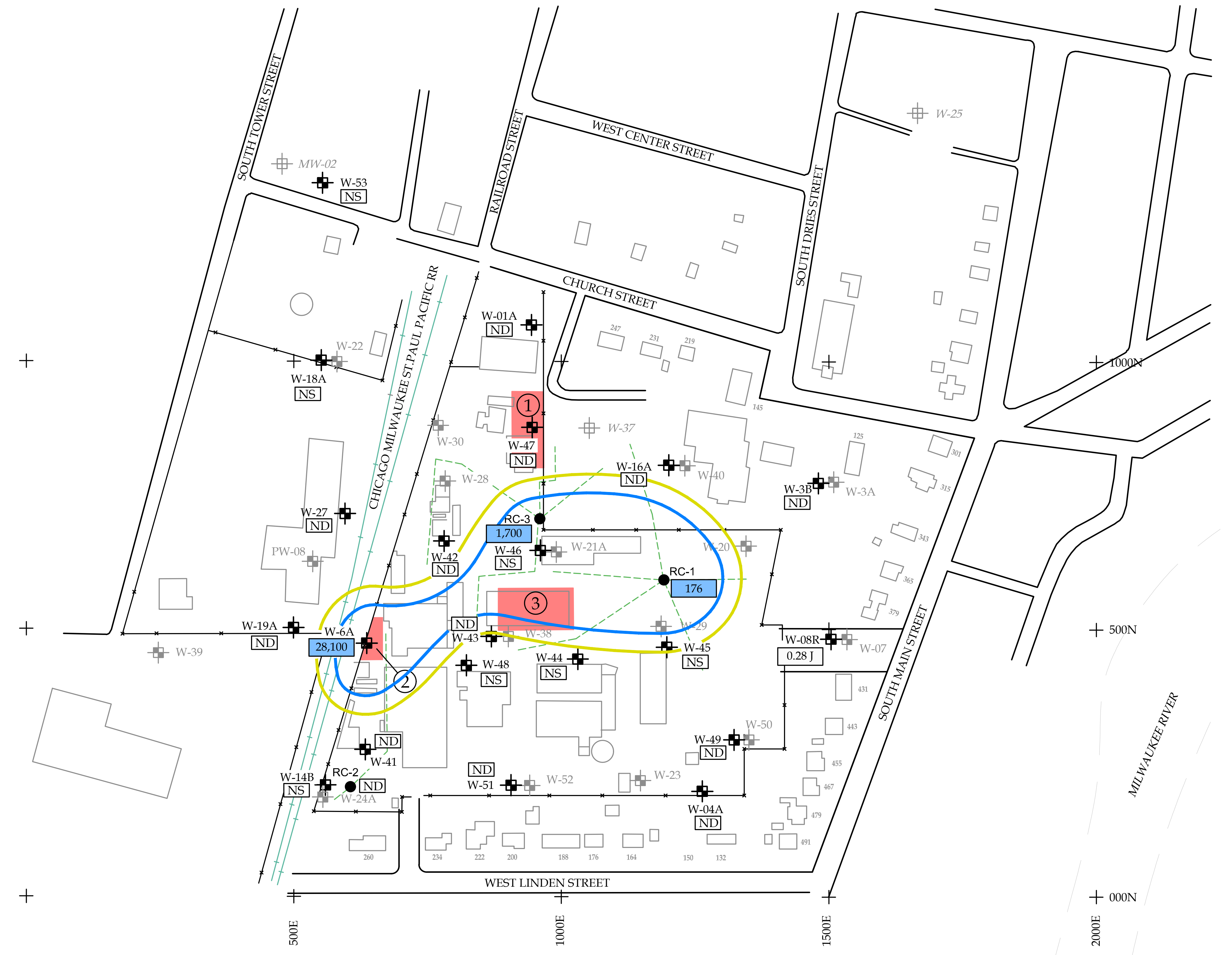
SCALE:1"=200'

0 200' 400' 600'

ETHYLBENZENE IN GROUNDWATER (ug/L)
GLACIAL DRIFT AQUIFER - FALL 2018
ARKEMA COATING RESINS
SAUKVILLE, WISCONSIN

Endpoint Solutions
6871 S. Lovers Lane
Franklin, WI 53132
Phone: (414) 427-1200
Fax: (414) 427-1259

DRAWN BY: NWD	DATE: 01/02/19	341-001-006-005
REVIEWED BY: RAC	DWG: FALL 2018 FIGURES	FIGURE 8



LEGEND

W-18A	MONITORING WELL LOCATION AND NUMBER
W-18A	ABANDONED WELL LOCATION AND NUMBER
	APPROXIMATE EXTENT OF ES LIMITS
	APPROXIMATE EXTENT OF PAL LIMITS
	RANNEY COLLECTOR
1	AREA OF CONCERN

ND	Not Detected
NS	Not Sampled
	PAL Exceedance
	ES Exceedance

NOTES

1. BASE MAP WAS DEVELOPED FROM DRAWINGS PROVIDED BY RMT, INC.
2. W-37 WAS ABANDONED AUGUST 2, 1996.
3. W-25 WAS ABANDONED JULY 29, 1997.
4. MW-02 WAS ABANDONED NOVEMBER 2004.

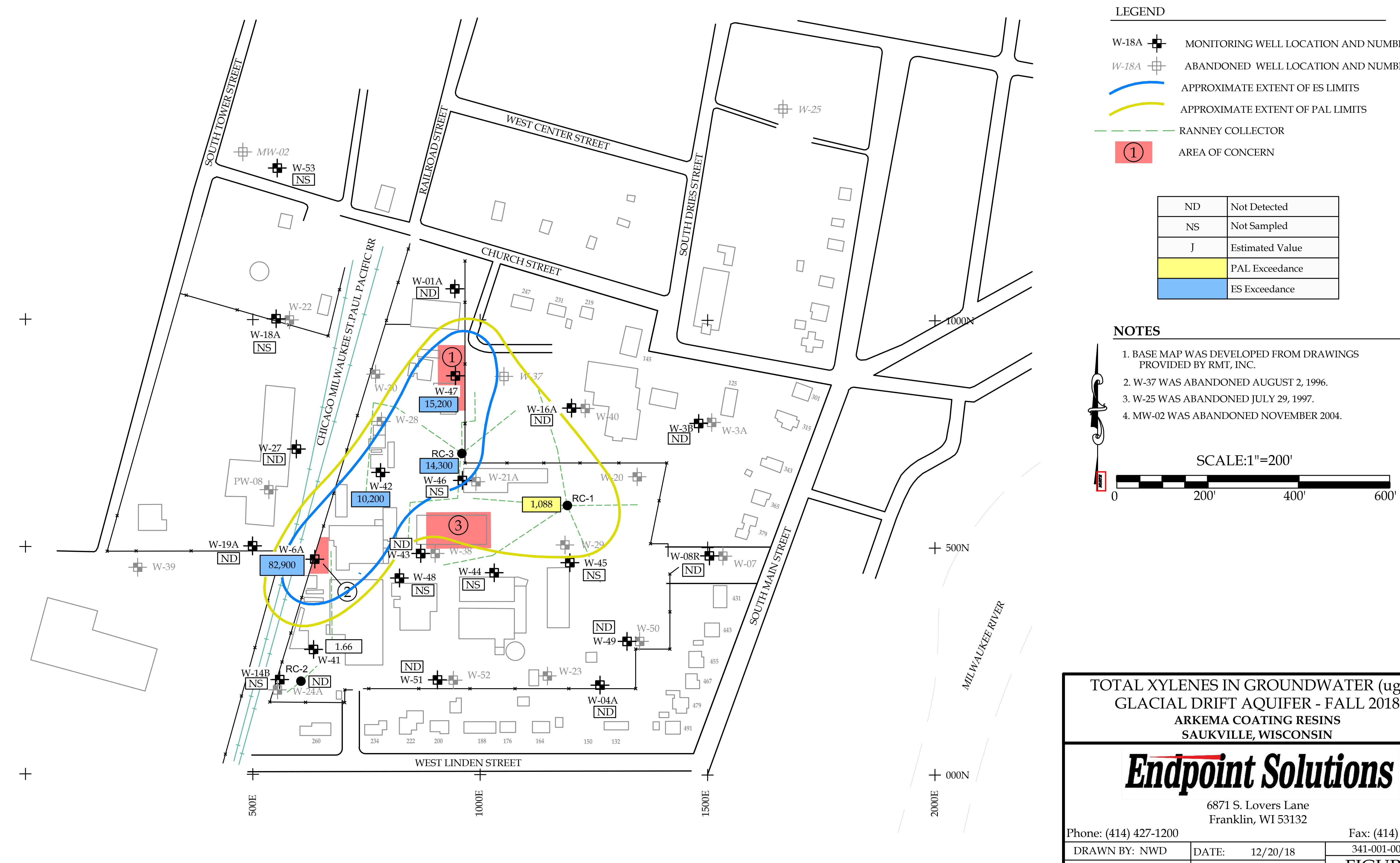
SCALE:1"=200'

0 200' 400' 600'

TOLUENE IN GROUNDWATER (ug/L)
GLACIAL DRIFT AQUIFER - FALL 2018
ARKEMA COATING RESINS
SAUKVILLE, WISCONSIN

Endpoint Solutions
6871 S. Lovers Lane
Franklin, WI 53132
Phone: (414) 427-1200
Fax: (414) 427-1259

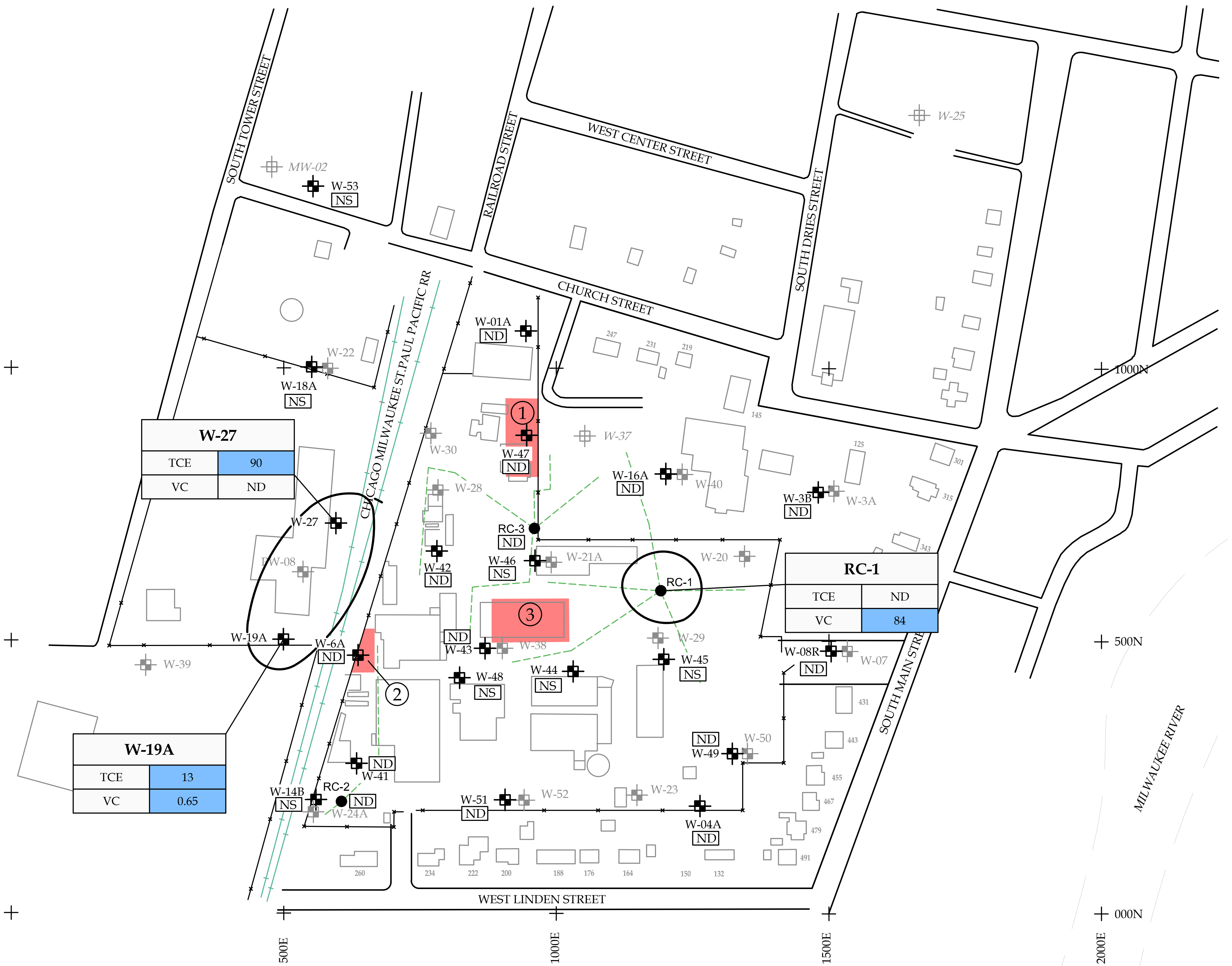
DRAWN BY: NWD	DATE: 12/20/18	341-001-006-005
REVIEWED BY: RAC	DWG: FALL 2018 FIGURES	FIGURE 9



TOTAL XYLENES IN GROUNDWATER (ug/L)
GLACIAL DRIFT AQUIFER - FALL 2018
ARKEMA COATING RESINS
SAUKVILLE, WISCONSIN

Endpoint Solutions
6871 S. Lovers Lane
Franklin, WI 53132
Phone: (414) 427-1200
Fax: (414) 427-1259

DRAWN BY: NWD	DATE: 12/20/18	341-001-006-005
REVIEWED BY: RAC	DWG: FALL 2018 FIGURES	FIGURE 10



LEGEND

W-18A	MONITORING WELL LOCATION AND NUMBER
W-18A	ABANDONED WELL LOCATION AND NUMBER
	APPROXIMATE EXTENT OF GROUNDWATER CONTAINING TCE & VC
	RANNEY COLLECTOR
1	AREA OF CONCERN

TCE	Trichloroethene
VC	Vinyl Chloride

ND	Not Detected
NS	Not Sampled
	ES Exceedance

NOTES

1. BASE MAP WAS DEVELOPED FROM DRAWINGS PROVIDED BY RMT, INC.
2. W-37 WAS ABANDONED AUGUST 2, 1996.
3. W-25 WAS ABANDONED JULY 29, 1997.
4. MW-02 WAS ABANDONED NOVEMBER 2004.

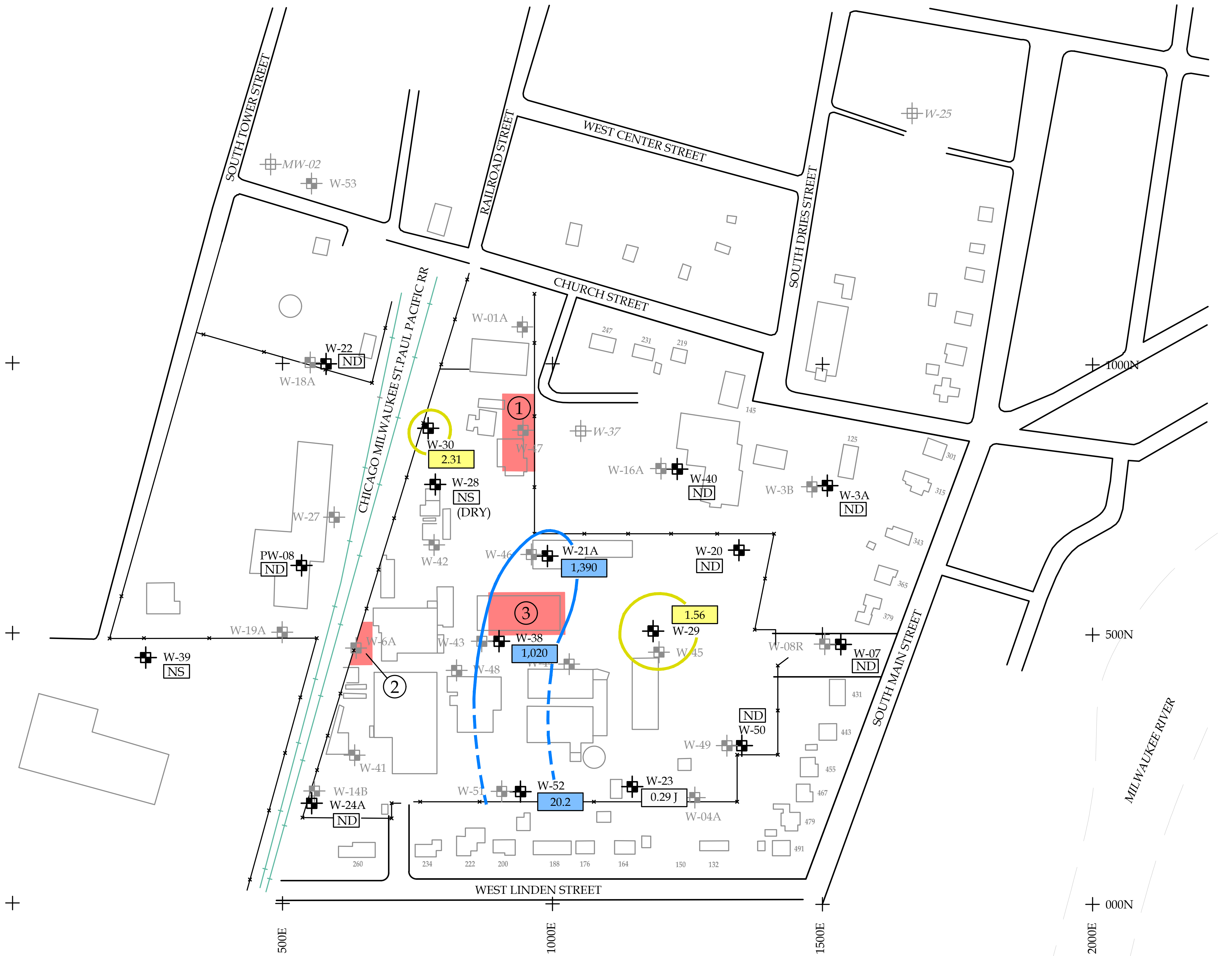
SCALE:1"=200'

0 200' 400' 600'

TCE AND VC IN GROUNDWATER (ug/L)
GLACIAL DRIFT AQUIFER - FALL 2018
ARKEMA COATING RESINS
SAUKVILLE, WISCONSIN

Endpoint Solutions
6871 S. Lovers Lane
Franklin, WI 53132
Phone: (414) 427-1200 Fax: (414) 427-1259

DRAWN BY: NWD	DATE: 12/19/18	341-001-006-005
REVIEWED BY: RAC	DWG: FALL 2018 FIGURES	FIGURE 11



LEGEND

- W-18A — MONITORING WELL LOCATION AND NUMBER
- W-18A — ABANDONED WELL LOCATION AND NUMBER
- APPROXIMATE EXTENT OF ES LIMITS
- APPROXIMATE EXTENT OF PAL LIMITS
- ① AREA OF CONCERN

ND	Not Detected
NS	Not Sampled
J	Estimated Value
(yellow)	PAL Exceedance
(blue)	ES Exceedance

NOTES

1. BASE MAP WAS DEVELOPED FROM DRAWINGS PROVIDED BY RMT, INC.
2. W-37 WAS ABANDONED AUGUST 2, 1996.
3. W-25 WAS ABANDONED JULY 29, 1997.
4. MW-02 WAS ABANDONED NOVEMBER 2004.

SCALE:1"=200'

0 200' 400' 600'

BENZENE IN GROUNDWATER (ug/L) SHALLOW AND DEEP DOLOMITE AQUIFERS - FALL 2018

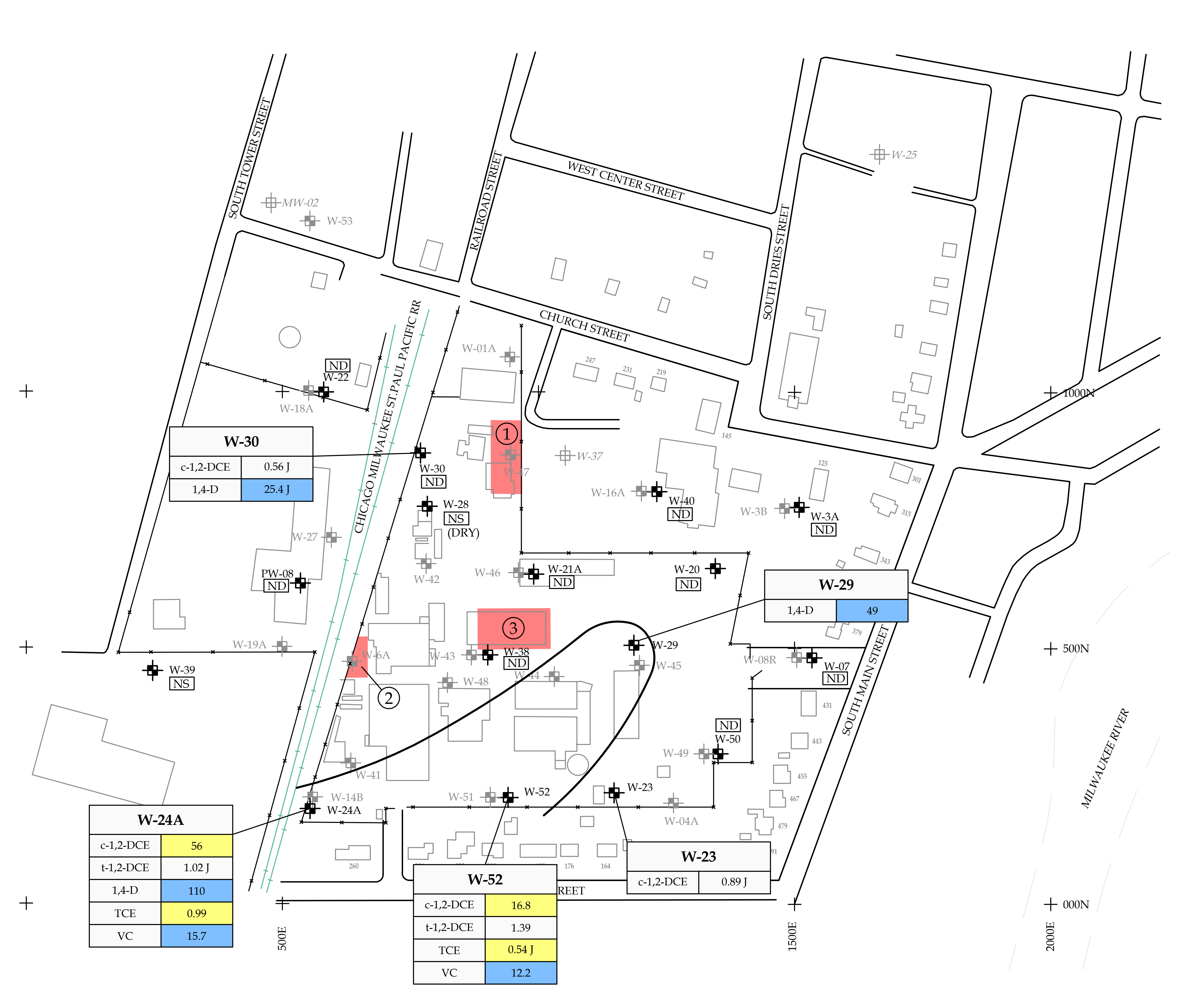
ARKEMA COATING RESINS
SAUKVILLE, WISCONSIN

Endpoint Solutions

6871 S. Lovers Lane
Franklin, WI 53132

Phone: (414) 427-1200 Fax: (414) 427-1259

DRAWN BY: NWD	DATE: 12/19/18	341-001-006-005
REVIEWED BY: RAC	DWG: FALL 2018 FIGURES	FIGURE 12



W-30	
c-1,2-DCE	0.56 J
1,4-D	25.4 J

W-29	
1,4-D	49

W-24A	
c-1,2-DCE	56
t-1,2-DCE	1.02 J
1,4-D	110
TCE	0.99
VC	15.7

W-52	
c-1,2-DCE	16.8
t-1,2-DCE	1.39
TCE	0.54 J
VC	12.2

W-23	
c-1,2-DCE	0.89 J

LEGEND

W-18A MONITORING WELL LOCATION AND NUMBER

W-18A ABANDONED WELL LOCATION AND NUMBER

APPROXIMATE EXTENT OF CVOCs IN EXCESS OF PALs AND ESs

① AREA OF CONCERN

c-1,2-DCE	cis-1,2-Dichloroethene
t-1,2-DCE	trans-1,2-Dichloroethene
1,4-D	1,4-Dioxane
TCE	Trichloroethene
VC	Vinyl Chloride

ND	Not Detected
NS	Not Sampled
J	Estimated Value
(yellow)	PAL Exceedance
(blue)	ES Exceedance

NOTES

1. BASE MAP WAS DEVELOPED FROM DRAWINGS PROVIDED BY RMT, INC.
2. W-37 WAS ABANDONED AUGUST 2, 1996.
3. W-25 WAS ABANDONED JULY 29, 1997.
4. MW-02 WAS ABANDONED NOVEMBER 2004.

SCALE:1"=200'

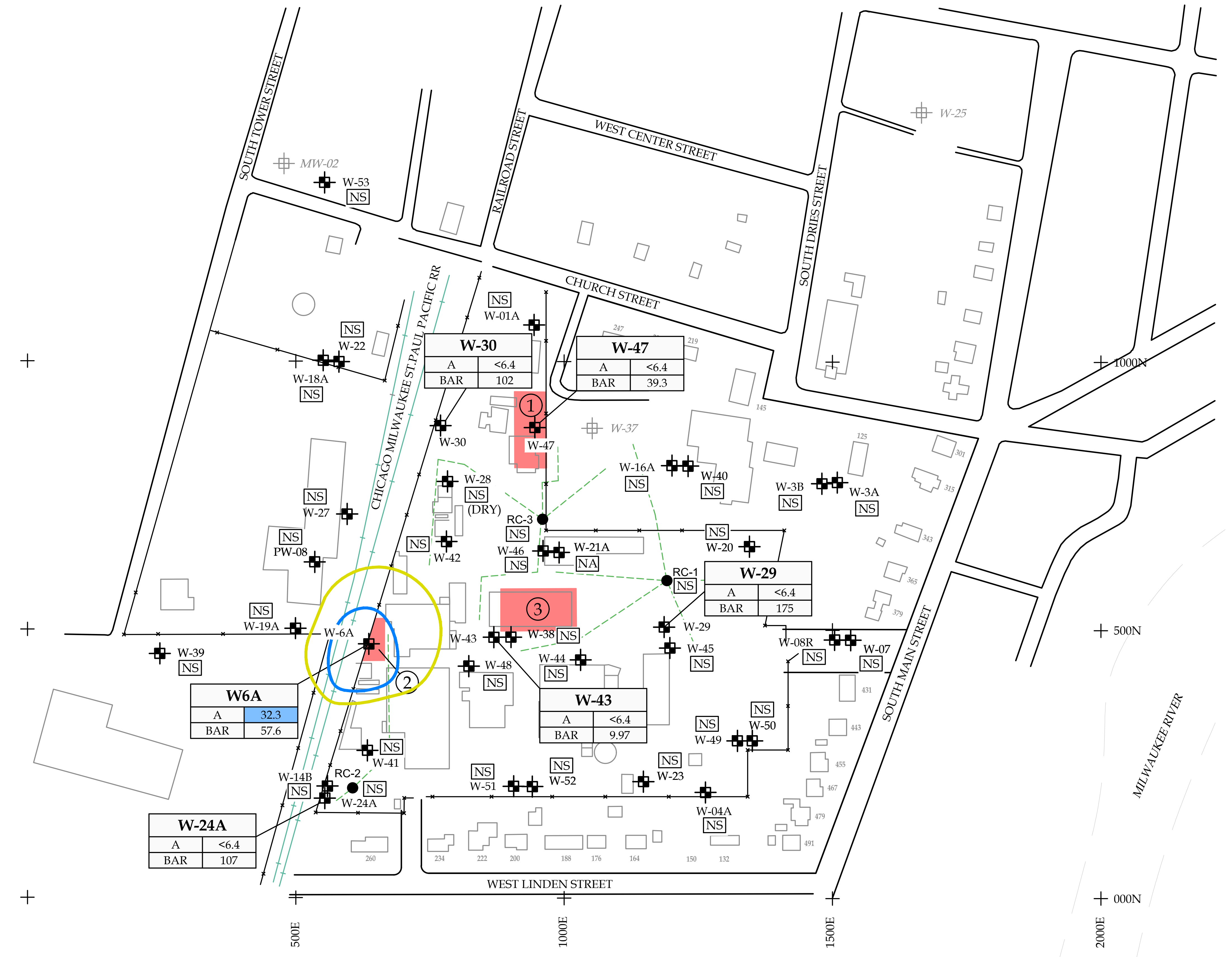
0 200' 400' 600'

CVOCs IN GROUNDWATER (ug/L) SHALLOW AND DEEP DOLOMITE AQUIFERS - FALL 2018

ARKEMA COATING RESINS
SAUKVILLE, WISCONSIN

Endpoint Solutions
6871 S. Lovers Lane
Franklin, WI 53132
Phone: (414) 427-1200
Fax: (414) 427-1259

DRAWN BY: NWD	DATE: 12/20/18	341-001-006-005
REVIEWED BY: RAC	DWG: FALL 2018 FIGURES	FIGURE 13



LEGEND

- W-18A — MONITORING WELL LOCATION AND NUMBER
- W-18A — ABANDONED WELL LOCATION AND NUMBER
- APPROXIMATE EXTENT OF ES LIMITS
- APPROXIMATE EXTENT OF PAL LIMITS
- RANNEY COLLECTOR
- ① AREA OF CONCERN

A	Arsenic
BAR	Barium
NA	Not Analyzed due to inssuficient sample volume
ND	Not Detected
NS	Not Sampled
	PAL Exceedance
	ES Exceedance

NOTES

1. BASE MAP WAS DEVELOPED FROM DRAWINGS PROVIDED BY RMT, INC.
2. W-37 WAS ABANDONED AUGUST 2, 1996.
3. W-25 WAS ABANDONED JULY 29, 1997.
4. MW-02 WAS ABANDONED NOVEMBER 2004.

SCALE:1"=200'

0 200' 400' 600'

METALS IN GROUNDWATER (ug/L) COMBINED GLACIAL DRIFT AND DOLOMITE AQUIFERS -FALL 2018

ARKEMA COATING RESINS

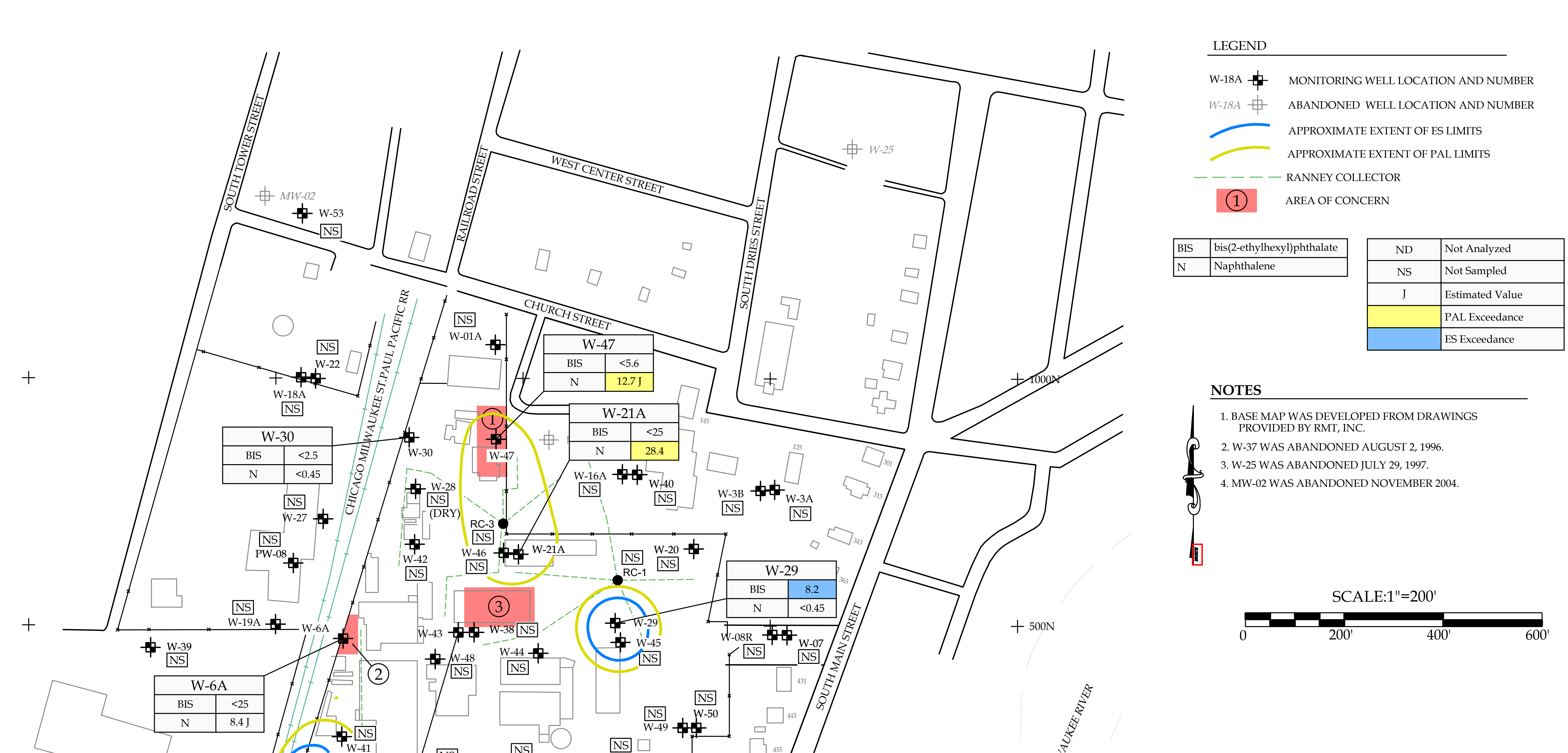
SAUKVILLE, WISCONSIN

Endpoint Solutions

6871 S. Lovers Lane
Franklin, WI 53132

Phone: (414) 427-1200 Fax: (414) 427-1259

DRAWN BY: NWD	DATE: 12/07/18	341-001-006-005
REVIEWED BY: RAC	DWG: FALL 2018 FIGURES	FIGURE 14



SVOCs IN GROUNDWATER (ug/L) COMBINED GLACIAL DRIFT AND DOLOMITE AQUIFERS - FALL 2018

ARKEMA COATING RESINS

SAUKVILLE, WISCONSIN

Endpoint Solutions

6871 S. Lovers Lane
Franklin, WI 53132

Phone: (414) 427-1200 Fax: (414) 427-1259

DRAWN BY: NWD	DATE: 12/20/18	341-001-006-005
REVIEWED BY: RAC	DWG: FALL 2018 FIGURES	FIGURE 15

APPENDIX A

QUARTERLY REPORT SUMMARY TABLES

January 2018

Municipal Water Supply Wells - VOC Results
Arkema Coating Resins
Saukville, Wisconsin

Parameter	PAL	ES	Units	MW-1-18-1	DUP1-18-1	TB-18-1
Sample ID				MW-1-18-1	DUP1-18-1	TB-18-1
Collection Date				1/23/2018	1/23/2018	1/23/2018
Laboratory ID				5034156A	5034156C	5034156B
Duplicate Parent					(MW1-18-1)	
Monitoring Objective				Receptor		
Hydrogeologic Unit				Deep Dolomite		
Dilution				1	1	1
Acetone	1,800	9,000	µg/L	<7.2	<7.2	<7.2
Benzene	0.5	5	µg/L	<0.17	<0.17	<0.17
Bromodichloromethane	0.06	0.6	µg/L	<0.31	<0.31	<0.31
Bromoform	0.44	4.4	µg/L	<0.49	<0.49	<0.49
Bromomethane	1	10	µg/L	<2.14	<2.14	<2.14
Carbon disulfide	200	1,000	µg/L	<0.45	<0.45	<0.45
Carbon tetrachloride	0.5	5	µg/L	<0.21	<0.21	<0.21
Chlorobenzene	20	100	µg/L	<0.27	<0.27	<0.27
Chloroethane	80	400	µg/L	<0.5	<0.5	<0.5
Chloroform	0.6	6	µg/L	<0.96	<0.96	<0.96
Chloromethane	3	30	µg/L	<1.3	<1.3	<1.3
1,2-Dibromo-3-chloropropane	0.02	0.2	µg/L	<1.88	<1.88	<1.88
Dibromochloromethane	6	60	µg/L	<0.45	<0.45	<0.45
Dibromomethane	--	--	µg/L	<0.56	<0.56	<0.56
1,4-Dichlorobenzene	15	75	µg/L	<0.42	<0.42	<0.42
1,3-Dichlorobenzene	120	600	µg/L	<0.45	<0.45	<0.45
1,2-Dichlorobenzene	60	600	µg/L	<0.34	<0.34	<0.34
Dichlorodifluoromethane	200	1,000	µg/L	<0.38	<0.38	<0.38
1,2-Dichloroethane	0.5	5	µg/L	<0.45	<0.45	<0.45
1,1-Dichloroethane	85	850	µg/L	<0.42	<0.42	<0.42
1,1-Dichloroethene	0.7	7	µg/L	<0.46	<0.46	<0.46
cis-1,2-Dichloroethene	7	70	µg/L	<0.41	<0.41	<0.41
trans-1,2-Dichloroethene	20	100	µg/L	<0.35	<0.35	<0.35
1,2-Dichloropropane	0.5	5	µg/L	<0.39	<0.39	<0.39
trans-1,3-Dichloropropene	0.04	0.4	µg/L	<0.42	<0.42	<0.42
cis-1,3-Dichloropropene	0.04	0.4	µg/L	<0.21	<0.21	<0.21
1,2-Dibromoethane (EDB)	0.005	0.05	µg/L	<0.34	<0.34	<0.34
Ethylbenzene	140	700	µg/L	<0.2	<0.2	<0.2
Methyl ethyl ketone (MEK)	800	4,000	µg/L	<8.54	<8.54	<8.54
Methylene chloride	0.5	5	µg/L	<0.94	<0.94	<0.94
Methyl tert-butyl ether (MTBE)	12	60	µg/L	<0.82	<0.82	<0.82
Naphthalene	10	100	µg/L	<2.17	<2.17	<2.17
Styrene	10	100	µg/L	<0.27	<0.27	<0.27
Tetrachloroethene (PCE)	0.5	5	µg/L	<0.48	<0.48	<0.48
Tetrahydrofuran	10	50	µg/L	<4.78	<4.78	<4.78
Toluene	160	800	µg/L	<0.67	<0.67	<0.67
1,1,1-Trichloroethane	40	200	µg/L	<0.35	<0.35	<0.35
1,1,2-Trichloroethane	0.5	5	µg/L	<0.65	<0.65	<0.65
Trichloroethene (TCE)	0.5	5	µg/L	<0.45	<0.45	<0.45
Trichlorofluoromethane	--	--	µg/L	<0.64	<0.64	<0.64
Vinyl Chloride	0.02	0.2	µg/L	<0.19	<0.19	<0.19
m&p-Xylene	400	2,000	µg/L	<1.56	<1.56	<1.56
o-Xylene			µg/L	<0.39	<0.39	<0.39
Total VOCs			µg/L	0.0	0.0	0.0

Indicates concentration in exceedance of Wisconsin Administrative Code Chapter NR140 Preventive Action Limit (PAL)

Indicates concentration in exceedance of Wisconsin Administrative Code Chapter NR140 Enforcement Standard (ES)

-- Indicates PAL and ES do not exist

VOC - volatile organic compound

µg/L - micrograms per liter

A-1

11/4/2019

April 2019

Municipal Water Supply Wells - VOC Results
Arkema Coating Resins
Saukville, Wisconsin

Parameter	PAL	ES	Units	MW-1-18-2	MW-3-18-2	MW-4-18-2	DUP1-18-2	TB-1-18-2
Sample ID				MW-1-18-2	MW-3-18-2	MW-4-18-2	DUP1-18-2	TB-1-18-2
Collection Date				4/17/2018	4/17/2018	4/17/2018	4/17/2018	4/17/2018
Laboratory ID				5034513F	5034513E	5034513G	5034513H	5034512D
Duplicate Parent							(MW-4-18-2)	
Monitoring Objective				Receptor	Receptor	Receptor		
Hydrogeologic Unit				Deep Dolomite	Deep Dolomite	Deep Dolomite		
Dilution				1	1	1	1	1
Acetone	1,800	9,000	µg/L	<5.01	<5.01	<5.01	<5.01	<5.01
Benzene	0.5	5	µg/L	<0.22	<0.22	<0.22	<0.22	<0.22
Bromochloromethane	-	-	µg/L	<0.93	<0.93	<0.93	<0.93	<0.93
Bromoform	0.44	4.4	µg/L	<0.45	<0.45	<0.45	<0.45	<0.45
Bromomethane	1	10	µg/L	<0.99	<0.99	<0.99	<0.99	<0.99
Carbon disulfide	200	1,000	µg/L	<0.29	<0.29	<0.29	<0.29	<0.29
Carbon tetrachloride	0.5	5	µg/L	<0.31	<0.31	<0.31	<0.31	<0.31
Chlorobenzene (Monochlorobenzene)	20	100	µg/L	<0.26	<0.26	<0.26	<0.26	<0.26
Chloroethane	80	400	µg/L	<0.61	<0.61	<0.61	<0.61	<0.61
Chloroform	0.6	6	µg/L	<0.26	<0.26	<0.26	<0.26	<0.26
Dibromochloromethane	6	60	µg/L	<0.22	<0.22	<0.22	<0.22	<0.22
1,4-Dichlorobenzene	15	75	µg/L	<0.7	<0.7	<0.7	<0.7	<0.7
1,3-Dichlorobenzene	120	600	µg/L	<0.85	<0.85	<0.85	<0.85	<0.85
1,2-Dichlorobenzene	60	600	µg/L	<0.86	<0.86	<0.86	<0.86	<0.86
1,2-Dichloroethane	0.5	5	µg/L	<0.25	<0.25	<0.25	<0.25	<0.25
1,1-Dichloroethane	85	850	µg/L	<0.36	<0.36	<0.36	<0.36	<0.36
1,1-Dichloroethene	0.7	7	µg/L	<0.42	<0.42	<0.42	<0.42	<0.42
cis-1,2-Dichloroethene	7	70	µg/L	<0.37	<0.37	<0.37	<0.37	<0.37
trans-1,2-Dichloroethene	20	100	µg/L	<0.34	<0.34	<0.34	<0.34	<0.34
1,2-Dichloropropane	0.5	5	µg/L	<0.44	<0.44	<0.44	<0.44	<0.44
trans-1,3-Dichloropropene	0.04	0.4	µg/L	<0.32	<0.32	<0.32	<0.32	<0.32
cis-1,3-Dichloropropene	0.04	0.4	µg/L	<0.26	<0.26	<0.26	<0.26	<0.26
Ethylbenzene	140	700	µg/L	<0.26	<0.26	<0.26	<0.26	<0.26
2-Hexanone (methyl butyl ketone)	-	-	µg/L	<1.44	<1.44	<1.44	<1.44	<1.44
Methyl ethyl ketone (MEK)	800	4,000	µg/L	<4.17	<4.17	<4.17	<4.17	<4.17
Methyl isobutyl ketone (MIBK)	50	500	µg/L	<3.95	<3.95	<3.95	<3.95	<3.95
Methylene chloride	0.5	5	µg/L	<1.32	<1.32	<1.32	<1.32	<1.32
Styrene	10	100	µg/L	<0.26	<0.26	<0.26	<0.26	<0.26
1,1,2,2-Tetrachloroethane	0.02	0.2	µg/L	<0.3	<0.3	<0.3	<0.3	<0.3
1,1,1,2-Tetrachloroethane	7	70	µg/L	<0.35	<0.35	<0.35	<0.35	<0.35
Tetrachloroethene (PCE)	0.5	5	µg/L	<0.38	<0.38	<0.38	<0.38	<0.38
Toluene	160	800	µg/L	<0.19	<0.19	<0.19	<0.19	<0.19
1,1,1-Trichloroethane	40	200	µg/L	<0.33	<0.33	<0.33	<0.33	<0.33
Trichloroethene (TCE)	0.5	5	µg/L	<0.3	<0.3	<0.3	<0.3	<0.3
Vinyl Acetate	-	-	µg/L	<2.26	<2.26	<2.26	<2.26	<2.26
Vinyl Chloride	0.02	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
m&p-Xylene	400	2,000	µg/L	<0.43	<0.43	<0.43	<0.43	<0.43
o--Xylene			µg/L	<0.29	<0.29	<0.29	<0.29	<0.29
Total VOCs			µg/L	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Previous Results			µg/L	0.0	0.0	0.0		
Date				January-18	Oct-17	Oct-17		
Dissolved Oxygen			mg/L	5.86	10.02	3.04		
pH				7.95	8.21	7.86		
Conductivity			mS/cm	0.726	0.656	0.494		
Temperature			°C	10.45	10.41	10.53		
Oxidation-Reduction Potential			mV	80.3	74.4	78.4		

Indicates concentration in exceedance of Wisconsin Administrative Code Chapter NR140 Preventive Action Limit (PAL)
Indicates concentration in exceedance of Wisconsin Administrative Code Chapter NR140 Enforcement Standard (ES)

VOC - volatile organic compound
µg/L - micrograms per liter
mg/L - milligrams per liter
mS/cm - millisiemens per centimeter
°C - degrees celsius
mV - millivolts

A-2
11/4/2019

POTW VOC Results
Arkema Coating Resins
Saukville, Wisconsin

Parameter	Units	POTW-I-18-2		POTW-E-18-2	POTW-S-18-2
Sample ID		POTW-I-18-2		POTW-E-18-2	POTW-S-18-2
Collection Date		4/17/2018		4/17/2018	4/17/2018
Laboratory ID		5034513B		5034513A	5034513C
Duplicate Parent					
Monitoring Objective		Receptor		Receptor	Receptor
Hydrogeologic Unit		POTW		POTW	POTW
Dilution		1		1	500
Acetone	µg/L	**15.1**	J	<5.01	<2,505
Benzene	µg/L	**0.25**	J	<0.22	<110
Bromochloromethane	µg/L	<0.93		<0.93	<465
Bromoform	µg/L	<0.45		<0.45	<225
Bromomethane	µg/L	<0.99		<0.99	<495
Carbon disulfide	µg/L	<0.29		<0.29	<145
Carbon tetrachloride	µg/L	<0.31		<0.31	<155
Chlorobenzene	µg/L	<0.26		<0.26	<130
Chloroethane	µg/L	<0.61		<0.61	<305
Chloroform	µg/L	**0.28**	J	<0.26	<130
Dibromochloromethane	µg/L	<0.22		<0.22	<110
1,4-Dichlorobenzene	µg/L	<0.7		<0.7	<350
1,3-Dichlorobenzene	µg/L	<0.85		<0.85	<425
1,2-Dichlorobenzene	µg/L	<0.86		<0.86	<430
1,2-Dichloroethane	µg/L	<0.25		<0.25	<125
1,1-Dichloroethane	µg/L	<0.36		<0.36	<180
1,1-Dichloroethene	µg/L	<0.42		<0.42	<210
cis-1,2-Dichloroethene	µg/L	<0.37		<0.37	<185
trans-1,2-Dichloroethene	µg/L	<0.34		<0.34	<170
1,2-Dichloropropane	µg/L	<0.44		<0.44	<220
trans-1,3-Dichloropropene	µg/L	<0.32		<0.32	<160
cis-1,3-Dichloropropene	µg/L	<0.26		<0.26	<130
Ethylbenzene	µg/L	**0.59**	J	<0.26	<130
2-Hexanone	µg/L	<1.44		<1.44	<720
Methyl ethyl ketone (MEK)	µg/L	<4.17		<4.17	<2,085
Methyl isobutyl ketone (MIBK)	µg/L	<3.95		<3.95	<1,975
Methylene chloride	µg/L	<1.32		<1.32	<660
Styrene	µg/L	<0.26		<0.26	<130
1,1,2,2-Tetrachloroethane	µg/L	<0.3		<0.3	<150
1,1,1,2-Tetrachloroethane	µg/L	<0.35		<0.35	<175
Tetrachloroethene (PCE)	µg/L	<0.38		<0.38	<190
Toluene	µg/L	**0.54**	J	<0.19	**1,400**
1,1,1-Trichloroethane	µg/L	<0.33		<0.33	<165
Trichloroethene (TCE)	µg/L	<0.3		<0.3	<150
Vinyl Acetate	µg/L	<2.26		<2.26	<1,130
Vinyl Chloride	µg/L	<0.2		<0.2	<100
m&p-Xylene	µg/L	**1.55**		<0.43	<215
o-Xylene	µg/L	**0.68**	J	<0.29	<145
Total VOCs	µg/L	**18.99**		**0.00**	**1,400**
Previous Results	µg/L	14.28		0.00	0.00
Date		Oct-17		Oct-17	Oct-17

VOC - volatile organic compound

µg/L - micrograms per liter

"J" - Results reported between Limit of Detection (LOD) and the Limit of Quantitation (LOQ) are less certain than results at or above the LOQ

POTW - Publicly Owned Treatment Works

A-3
11/4/2019

April 2018

Ranney Collector VOC Results
Arkema Coating Resins
Saukville, Wisconsin

Parameter	PAL	ES	Units	RC-1-18-2	RC-2-18-2	RC-3-18-2
Sample ID				RC-1-18-2	RC-2-18-2	RC-3-18-2
Collection Date				4/17/2018	4/17/2018	4/17/2018
Laboratory ID				5034513N	5034513O	5034513P
Duplicate Parent						
Monitoring Objective				Receptor	Receptor	Receptor
Hydrogeologic Unit				Glacial Drift	Glacial Drift	Glacial Drift
Dilution				1	1	10
Acetone	1,800	9,000	µg/L	<5.01	<5.01	<50.1
Benzene	0.5	5	µg/L	**20.8**	<0.22	**9.4**
Bromochloromethane	-	-	µg/L	<0.93	<0.93	<9.3
Bromoform	0.44	4.4	µg/L	<0.45	<0.45	<4.5
Bromomethane	1	10	µg/L	<0.99	<0.99	<9.9
Carbon disulfide	200	1,000	µg/L	**0.67 J**	<0.29	<2.9
Carbon tetrachloride	0.5	5	µg/L	<0.31	<0.31	<3.1
Chlorobenzene (Monochlorobenzene)	20	100	µg/L	<0.26	<0.26	<2.6
Chloroethane	80	400	µg/L	<0.61	<0.61	<6.1
Chloroform	0.6	6	µg/L	<0.26	<0.26	<2.6
Dibromochloromethane	6	60	µg/L	<0.22	<0.22	<2.2
1,4-Dichlorobenzene	15	75	µg/L	<0.7	<0.7	<7
1,3-Dichlorobenzene	120	600	µg/L	<0.85	<0.85	<8.5
1,2-Dichlorobenzene	60	600	µg/L	<0.86	<0.86	<8.6
1,2-Dichloroethane	0.5	5	µg/L	<0.25	<0.25	<2.5
1,1-Dichloroethane	85	850	µg/L	<0.36	<0.36	<3.6
1,1-Dichloroethene	0.7	7	µg/L	<0.42	<0.42	<4.2
cis-1,2-Dichloroethene	7	70	µg/L	**9.8**	<0.37	<3.7
trans-1,2-Dichloroethene	20	100	µg/L	<0.34	<0.34	<3.4
1,2-Dichloropropane	0.5	5	µg/L	<0.44	<0.44	<4.4
trans-1,3-Dichloropropene	0.04	0.4	µg/L	<0.32	<0.32	<3.2
cis-1,3-Dichloropropene	0.04	0.4	µg/L	<0.26	<0.26	<2.6
Ethylbenzene	140	700	µg/L	**131**	<0.26	**810**
2-Hexanone (Methyl butyl ketone)	-	-	µg/L	<1.44	<1.44	<14.4
Methyl ethyl ketone (MEK)	800	4,000	µg/L	<4.17	<4.17	<41.7
Methyl isobutyl ketone (MIBK)	50	500	µg/L	<3.95	<3.95	<39.5
Methylene chloride	0.5	5	µg/L	<1.32	<1.32	<13.2
Styrene	10	100	µg/L	<0.26	<0.26	<2.6
1,1,2,2-Tetrachloroethane	0.02	0.2	µg/L	<0.3	<0.3	<3
1,1,1,2-Tetrachloroethane	7	70	µg/L	<0.35	<0.35	<3.5
Tetrachloroethene (PCE)	0.5	5	µg/L	<0.38	<0.38	<3.8
Toluene	160	800	µg/L	**3.6**	<0.19	**530**
1,1,1-Trichloroethane	40	200	µg/L	<0.33	<0.33	<3.3
Trichloroethene (TCE)	0.5	5	µg/L	<0.3	<0.3	<3
Vinyl Acetate	-	-	µg/L	<2.26	<2.26	<22.6
Vinyl Chloride	0.02	0.2	µg/L	**2.33**	<0.2	<2
m&p-Xylene	400	2,000	µg/L	**108**	<0.43	**2,930**
o-Xylene			µg/L	**18.1**	<0.29	**1,200**
Total VOCs			µg/L	**294.30**	**0.00**	**5,479.40**
Previous Results			µg/L	8.00	0.00	1,851.60
Date				Oct-17	Oct-17	Oct-17

Indicates concentration in exceedance of Wisconsin Administrative Code Chapter NR140 Preventive Action Limit (PAL)

Indicates concentration in exceedance of Wisconsin Administrative Code Chapter NR140 Enforcement Standard (ES)

VOC - volatile organic compound

µg/L - micrograms per liter

"J" - Results reported between Limit of Detection (LOD) and the Limit of Quantitation (LOQ) are less certain than results at or above the LOQ.

A-4
11/4/2019

April 2018

Perimeter - Glacial Drift Monitoring Wells - VOC Results
Arkema Coating Resins
Saukville, Wisconsin

Parameter	PAL	ES	Units	W-01A-18-2	W-03B-18-2	W-04A-18-2	W-08R-18-2	W-16A-18-2	W-27-18-2	W-49-18-2	W-51-18-2
Sample ID				W-01A-18-2	W-03B-18-2	W-04A-18-2	W-08R-18-2	W-16A-18-2	W-27-18-2	W-49-18-2	W-51-18-2
Collection Date				4/17/2018	4/18/2018	4/17/2018	4/17/2018	4/18/2018	4/18/2018	4/17/2018	4/17/2018
Laboratory ID				5034513K	5034513Z	5034513Q	5034513J	5034513V	534513BB	5034513L	5034513R
Duplicate Parent											
Monitoring Objective				Perimeter	Perimeter	Perimeter	Perimeter	Perimeter	Perimeter	Perimeter	Perimeter
Hydrogeologic Unit				Glacial Drift	Glacial Drift	Glacial Drift	Glacial Drift	Glacial Drift	Glacial Drift	Glacial Drift	Glacial Drift
Dilution				1	1	1	1	1	1	1	1
Acetone	1,800	9,000	µg/L	<5.01	<5.01	<5.01	<5.01	<5.01	<5.01	<5.01	<5.01
Benzene	0.5	5	µg/L	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22
Bromochloromethane	-	-	µg/L	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93
Bromoform	0.44	4.4	µg/L	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45
Bromomethane	1	10	µg/L	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
Carbon disulfide	200	1,000	µg/L	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29
Carbon tetrachloride	0.5	5	µg/L	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31
Chlorobenzene Monochlorobenzene)	20	100	µg/L	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
Chloroethane	80	400	µg/L	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61
Chloroform	0.6	6	µg/L	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
Dibromochloromethane	6	60	µg/L	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22
1,4-Dichlorobenzene	15	75	µg/L	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
1,3-Dichlorobenzene	120	600	µg/L	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85
1,2-Dichlorobenzene	60	600	µg/L	<0.86	<0.86	<0.86	<0.86	<0.86	<0.86	<0.86	<0.86
1,2-Dichloroethane	0.5	5	µg/L	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
1,1-Dichloroethane	85	850	µg/L	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36
1,1-Dichloroethene	0.7	7	µg/L	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42
cis-1,2-Dichloroethene	7	70	µg/L	<0.37	<0.37	<0.37	<0.37	<0.37	**0.46**	<0.37	<0.37
trans-1,2-Dichloroethene	20	100	µg/L	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34
1,2-Dichloropropane	0.5	5	µg/L	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44
trans-1,3-Dichloropropene	0.04	0.4	µg/L	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32
cis-1,3-Dichloropropene	0.04	0.4	µg/L	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
Ethylbenzene	140	700	µg/L	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
2-Hexanone (methyl butyl ketone)	-	-	µg/L	<1.44	<1.44	<1.44	<1.44	<1.44	<1.44	<1.44	<1.44
Methyl ethyl ketone (MEK)	800	4,000	µg/L	<4.17	<4.17	<4.17	<4.17	<4.17	<4.17	<4.17	<4.17
Methyl isobutyl ketone (MIBK)	50	500	µg/L	<3.95	<3.95	<3.95	<3.95	<3.95	<3.95	<3.95	<3.95
Methylene chloride	0.5	5	µg/L	<1.32	<1.32	<1.32	<1.32	<1.32	<1.32	<1.32	<1.32
Styrene	10	100	µg/L	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
1,1,2,2-Tetrachloroethane	0.02	0.2	µg/L	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
1,1,1,2-Tetrachloroethane	7	70	µg/L	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35
Tetrachloroethene (PCE)	0.5	5	µg/L	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38
Toluene	160	800	µg/L	**0.22** J	<0.19	<0.19	**0.29** J	**0.22** J	<0.19	<0.19	<0.19
1,1,1-Trichloroethane	40	200	µg/L	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Trichloroethene (TCE)	0.5	5	µg/L	<0.3	<0.3	<0.3	<0.3	<0.3	**21.2**	<0.3	<0.3
Vinyl Acetate	-	-	µg/L	<2.26	<2.26	<2.26	<2.26	<2.26	<2.26	<2.26	<2.26
Vinyl Chloride	0.02	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
m&p-Xylene	400	2,000	µg/L	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43
o--Xylene			µg/L	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29
Total VOCs			µg/L	0.22	0.00	0.00	0.29	0.22	**21.66**	0.00	0.00
Previous Results			µg/L	0.00	0.00	0.00	0.00	0.00	125.06	0.00	0.00
Date				Oct-17	Oct-17	Oct-17	Oct-17	Oct-17	Oct-17	Oct-17	Oct-17
Dissolved Oxygen			mg/L	11.28	0.02	9.30	10.01	3.85	10.41	8.10	5.34
pH				7.23	8.70	7.37	7.47	7.66	7.07	7.16	7.42
Conductivity			mS/cm	0.337	0.726	0.705	0.433	0.452	1.779	0.665	1.573
Temperature			°C	5.82	10.79	5.90	6.12	6.94	4.89	5.62	8.34
Oxidation-Reduction Potential			mV	153.4	-146.5	160.5	118.8	27.5	118.1	154.3	139.7

Indicates concentration in exceedance of Wisconsin Administrative Code Chapter NR140 Preventive Action Limit (PAL)

Indicates concentration in exceedance of Wisconsin Administrative Code Chapter NR140 Enforcement Standard (ES)

VOC - volatile organic compound
µg/L - micrograms per liter
mg/L - milligrams per liter
mS/cm - millisiemens per centimeter
°C - degrees celsius
mV - millivolts
"J" - Results reported between Limit of Detection (LOD) and the Limit of Quantitation (LOQ) are less certain than results at or above the LOQ.

April 2018

Perimeter - Shallow and Deep Dolomite Wells - VOC Results
Arkema Coating Resins
Saukville, Wisconsin

Parameter	PAL	ES	Units	W-03A-18-2	DUP3-18-2	W-07-18-2	W-20-18-2	W-22-18-2	W-23-18-2	DUP2-18-2	W-40-18-2	W-50-18-2	W-52-18-2	PW-08-18-2
Sample ID				W-03A-18-2	DUP3-18-2	W-07-18-2	W-20-18-2	W-22-18-2	W-23-18-2	DUP2-18-2	W-40-18-2	W-50-18-2	W-52-18-2	PW-08-18-2
Collection Date				4/18/2018	4/18/2018	4/17/2018	4/18/2018	4/18/2018	4/17/2018	4/18/2018	4/18/2018	4/17/2018	4/17/2018	4/18/2018
Laboratory ID				5034513X	5034513Y	5034513I	5034513W	534513AA	5034513T	534513DD	5034513U	5034513M	5034513S	534513CC
Duplicate Parent					(W-03A-18-2)					(W-23-18-2)				
Monitoring Objective				Perimeter	Perimeter	Perimeter	Perimeter	Perimeter	Perimeter		Perimeter	Perimeter	Perimeter	Perimeter
Hydrogeologic Unit				Shallow Dolomite	Glacial Drift	Shallow Dolomite	Shallow Dolomite	Shallow Dolomite	Shallow Dolomite		Shallow Dolomite	Shallow Dolomite	Shallow Dolomite	Deep Dolomite
Dilution				1	1	1	1	1	1	1	1	1	1	1
Parameter	PAL	ES	Units											
Acetone	1,800	9,000	µg/L	<5.01	<5.01	<7.2	<5.01	<5.01	<5.01	<5.01	<5.01	<5.01	<5.01	<5.01
Benzene	0.5	5	µg/L	<0.22	<0.22	<0.17	<0.22	<0.22	**0.27 J**	**0.28 J**	<0.22	<0.22	**15.6**	<0.22
Bromochloromethane	-	-	µg/L	<0.93	<0.93	<0.67	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93
Bromoform	0.44	4.4	µg/L	<0.45	<0.45	<0.49	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45
Bromomethane	1	10	µg/L	<0.99	<0.99	<2.14	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
Carbon disulfide	200	1,000	µg/L	<0.29	<0.29	<0.45	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29
Carbon tetrachloride	0.5	5	µg/L	<0.31	<0.31	<0.21	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31
Chlorobenzene (Monochlorobenzene)	20	100	µg/L	<0.26	<0.26	<0.27	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
Chloroethane	80	400	µg/L	<0.61	<0.61	<0.5	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61
Chloroform	0.6	6	µg/L	<0.26	<0.26	<0.96	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
Dibromochloromethane	6	60	µg/L	<0.22	<0.22	<0.45	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22
1,4-Dichlorobenzene	16	75	µg/L	<0.7	<0.7	<0.42	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
1,3-Dichlorobenzene	120	600	µg/L	<0.85	<0.85	<0.45	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85
1,2-Dichlorobenzene	60	600	µg/L	<0.86	<0.86	<0.34	<0.86	<0.86	<0.86	<0.86	<0.86	<0.86	<0.86	<0.86
1,2-Dichloroethane	0.5	5	µg/L	<0.25	<0.25	<0.45	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
1,1-Dichloroethane	85	850	µg/L	<0.36	<0.36	<0.42	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36
1,1-Dichloroethene	0.7	7	µg/L	<0.42	<0.42	<0.46	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42
cis-1,2-Dichloroethene	7	70	µg/L	<0.37	<0.37	<0.41	<0.37	<0.37	**0.84 J**	**0.64 J**	<0.37	**0.44 J**	**19.4**	<0.37
trans-1,2-Dichloroethene	20	100	µg/L	<0.34	<0.34	<0.35	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	**1.19**	<0.34
1,2-Dichloropropane	0.5	5	µg/L	<0.44	<0.44	<0.39	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44
trans-1,3-Dichloropropene	0.04	0.4	µg/L	<0.32	<0.32	<0.42	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32
cis-1,3-Dichloropropene	0.04	0.4	µg/L	<0.26	<0.26	<0.21	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
Ethylbenzene	140	700	µg/L	<0.26	<0.26	<0.2	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
2-Hexanone (Methyl butyl ketone)	-	-	µg/L	<1.44	<1.44	<1.49	<1.44	<1.44	<1.44	<1.44	<1.44	<1.44	<1.44	<1.44
Methyl ethyl ketone (MEK)	800	4,000	µg/L	<4.17	<4.17	<8.54	<4.17	<4.17	<4.17	<4.17	<4.17	<4.17	<4.17	<4.17
Methyl isobutyl ketone (MIBK)	50	500	µg/L	<3.95	<3.95	<2.6	<3.95	<3.95	<3.95	<3.95	<3.95	<3.95	<3.95	<3.95
Methylene chloride	0.5	5	µg/L	<1.32	<1.32	<0.94	<1.32	<1.32	<1.32	<1.32	<1.32	<1.32	<1.32	<1.32
Styrene	10	100	µg/L	<0.26	<0.26	<0.27	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
1,1,2,2-Tetrachloroethane	0.02	0.2	µg/L	<0.3	<0.3	<0.69	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
1,1,1,2-Tetrachloroethane	7	70	µg/L	<0.35	<0.35	<0.47	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35
Tetrachloroethene (PCE)	0.5	5	µg/L	<0.38	<0.38	<0.48	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38
Toluene	160	800	µg/L	<0.19	<0.19	<0.67	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19
1,1,1-Trichloroethane	40	200	µg/L	<0.33	<0.33	<0.35	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Trichloroethene (TCE)	0.5	5	µg/L	<0.3	<0.3	<0.45	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	**0.56 J**	<0.3
Vinyl Acetate	-	-	µg/L	<2.26	<2.26	<1.13	<2.26	<2.26	<2.26	<2.26	<2.26	<2.26	<2.26	<2.26
Vinyl Chloride	0.02	0.2	µg/L	<0.2	<0.2	<0.19	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	**10.4**	<0.2
m&p-Xylene	400	2,000	µg/L	<0.43	<0.43	<1.56	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43
o--Xylene			µg/L	<0.29	<0.29	<0.39	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29
Total VOCs			µg/L	0.00	0.00	0.00	0.00	0.00	**1.11**	**0.92**	0.00	0.44	**47.15**	0.0
Previous Results			µg/L	0.00	0.00	0.00	0.00	0.00	0.94	0.88	0.00	0.00	42.31	0.00
Date				Oct-17		Oct-17	Oct-17	Oct-17	Oct-17		Oct-17	Oct-17	Oct-17	Oct-17
Dissolved Oxygen			mg/L	0.01		18.50	0.21	1.72	0.24		0.22	3.76	2.83	0.10
pH				10.43		7.61	8.36	7.37	7.56		8.05	7.62	8.04	9.25
Conductivity			mS/cm	0.274		0.503	0.400	0.650	1.785		0.594	0.651	1.125	0.368
Temperature			°C	10.70		8.35	10.75	9.23	10.94		11.59	8.04	9.83	11.34
Oxidation-Reduction Potential			mV	-287.1		98.6	-11.0	64.9	15.3		-53.0	128.4	38.4	-175.3

Indicates concentration in exceedance of Wisconsin Administrative Code Chapter NR140 Preventive Action Limit (PAL)
Indicates concentration in exceedance of Wisconsin Administrative Code Chapter NR140 Enforcement Standard (ES)

"J" - Results reported between Limit of Detection (LOD) and the Limit of Quantitation (LOQ) are less certain than results at or above the LOQ.
VOC - volatile organic compound
µg/L - micrograms per liter
mg/L - milligrams per liter
mS/cm - millisiemens per centimeter
°C - degrees celsius
mV - millivolts

July 2018

Municipal Water Supply Wells - VOC Results
Arkema Coating Resins
Saukville, Wisconsin

			Sample ID	MW-1-18-3	DUP1-18-1	Trip Blank
			Collection Date	7/17/2018	7/17/2018	-----
			Laboratory ID	5034949A	5034949B	5034949C
			Duplicate Parent		(MW-1-18-3)	
			Monitoring Objective	Receptor		
			Hydrogeologic Unit	Deep Dolomite		
			Dilution	1	1	1
Parameter	PAL	ES	Units			
Acetone	1,800	9,000	µg/L	<7.2	<7.2	<7.2
Benzene	0.5	5	µg/L	<0.17	<0.17	<0.17
Bromodichloromethane	0.06	0.6	µg/L	<0.31	<0.31	<0.31
Bromoform	0.44	4.4	µg/L	<0.49	<0.49	<0.49
Bromomethane	1	10	µg/L	<2.14	<2.14	<2.14
Carbon disulfide	200	1,000	µg/L	<0.45	<0.45	<0.45
Carbon tetrachloride	0.5	5	µg/L	<0.21	<0.21	<0.21
Chlorobenzene	20	100	µg/L	<0.27	<0.27	<0.27
Chloroethane	80	400	µg/L	<0.5	<0.5	<0.5
Chloroform	0.6	6	µg/L	<0.96	<0.96	<0.96
Chloromethane	3	30	µg/L	<1.3	<1.3	<1.3
1,2-Dibromo-3-chloropropane	0.02	0.2	µg/L	<1.88	<1.88	<1.88
Dibromochloromethane	6	60	µg/L	<0.45	<0.45	<0.45
Dibromomethane	--	--	µg/L	<0.56	<0.56	<0.56
1,4-Dichlorobenzene	15	75	µg/L	<0.42	<0.42	<0.42
1,3-Dichlorobenzene	120	600	µg/L	<0.45	<0.45	<0.45
1,2-Dichlorobenzene	60	600	µg/L	<0.34	<0.34	<0.34
Dichlorodifluoromethane	200	1,000	µg/L	<0.38	<0.38	<0.38
1,2-Dichloroethane	0.5	5	µg/L	<0.45	<0.45	<0.45
1,1-Dichloroethane	85	850	µg/L	<0.42	<0.42	<0.42
1,1-Dichloroethene	0.7	7	µg/L	<0.46	<0.46	<0.46
cis-1,2-Dichloroethene	7	70	µg/L	<0.41	<0.41	<0.41
trans-1,2-Dichloroethene	20	100	µg/L	<0.35	<0.35	<0.35
1,2-Dichloropropane	0.5	5	µg/L	<0.39	<0.39	<0.39
trans-1,3-Dichloropropene	0.04	0.4	µg/L	<0.42	<0.42	<0.42
cis-1,3-Dichloropropene	0.04	0.4	µg/L	<0.21	<0.21	<0.21
1,2-Dibromoethane (EDB)	0.005	0.05	µg/L	<0.34	<0.34	<0.34
Ethylbenzene	140	700	µg/L	<0.2	<0.2	<0.2
Methyl ethyl ketone (MEK)	800	4,000	µg/L	<8.54	<8.54	<8.54
Methylene chloride	0.5	5	µg/L	<0.94	<0.94	<0.94
Methyl tert-butyl ether (MTBE)	12	60	µg/L	<0.82	<0.82	<0.82
Naphthalene	10	100	µg/L	<2.17	<2.17	<2.17
Styrene	10	100	µg/L	<0.27	<0.27	<0.27
Tetrachloroethene (PCE)	0.5	5	µg/L	<0.48	<0.48	<0.48
Tetrahydrofuran	10	50	µg/L	<4.78	<4.78	<4.78
Toluene	160	800	µg/L	<0.67	<0.67	<0.67
1,1,1-Trichloroethane	40	200	µg/L	<0.35	<0.35	<0.35
1,1,2-Trichloroethane	0.5	5	µg/L	<0.65	<0.65	<0.65
Trichloroethene (TCE)	0.5	5	µg/L	<0.45	<0.45	<0.45
Trichlorofluoromethane	--	--	µg/L	<0.64	<0.64	<0.64
Vinyl Chloride	0.02	0.2	µg/L	<0.19	<0.19	<0.19
m&p-Xylene	400	2,000	µg/L	<1.56	<1.56	<1.56
o-Xylene			µg/L	<0.39	<0.39	<0.39
Total VOCs			µg/L	0.0	0.0	0.0

Indicates concentration in exceedance of Wisconsin Administrative Code Chapter NR140 Preventive Action Limit (PAL)
Indicates concentration in exceedance of Wisconsin Administrative Code Chapter NR140 Enforcement Standard (ES)
-- Indicates PAL and ES do not exist
VOC - volatile organic compound
µg/L - micrograms per liter

A-7
11/4/2019

October 2018

Municipal Water Supply Wells - VOC Results
Arkema Coating Resins
Saukville, Wisconsin

Parameter	PAL	ES	Units	MW-1-18-4	MW-3-18-4	MW-4-18-4	DUP1-18-4	Trip Blank	Trip Blank
		Sample ID		MW-1-18-4	MW-3-18-4	MW-4-18-4	DUP1-18-4	Trip Blank	Trip Blank
		Collection Date		10/9/2018	10/9/2018	10/9/2018	10/9/2018	10/9/2018	10/11/2018
		Laboratory ID		5035352R	5035352Q	5035352S	5035352T	5035352X	5035352TT
		Duplicate Parent					(MW-4-18-4)		
		Monitoring Objective		Receptor	Receptor	Receptor			
		Hydrogeologic Unit		Deep Dolomite	Deep Dolomite	Deep Dolomite			
		Dilution		1	1	1	1	1	1
Acetone	1,800	9,000	µg/L	<5.01	<5.01	<5.01	<5.01	<5.01	<5.01
Benzene	0.5	5	µg/L	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22
Bromochloromethane	-	-	µg/L	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93
Bromoform	0.44	4.4	µg/L	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45
Bromomethane	1	10	µg/L	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
Carbon disulfide	200	1,000	µg/L	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29
Carbon tetrachloride	0.5	5	µg/L	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31
Chlorobenzene (Monochlorobenzene)	20	100	µg/L	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
Chloroethane	80	400	µg/L	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61
Chloroform	0.6	6	µg/L	**0.86**	<0.26	<0.26	<0.26	<0.26	<0.26
Dibromochloromethane	6	60	µg/L	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22
1,4-Dichlorobenzene	15	75	µg/L	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
1,3-Dichlorobenzene	120	600	µg/L	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85
1,2-Dichlorobenzene	60	600	µg/L	<0.86	<0.86	<0.86	<0.86	<0.86	<0.86
1,2-Dichloroethane	0.5	5	µg/L	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
1,1-Dichloroethane	85	850	µg/L	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36
1,1-Dichloroethene	0.7	7	µg/L	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42
cis-1,2-Dichloroethene	7	70	µg/L	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37
trans-1,2-Dichloroethene	20	100	µg/L	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34
1,2-Dichloropropane	0.5	5	µg/L	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44
trans-1,3-Dichloropropene	0.04	0.4	µg/L	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32
cis-1,3-Dichloropropene	0.04	0.4	µg/L	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
Ethylbenzene	140	700	µg/L	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
2-Hexanone (methyl butyl ketone)	-	-	µg/L	<1.44	<1.44	<1.44	<1.44	<1.44	<1.44
Methyl ethyl ketone (MEK)	800	4,000	µg/L	<4.17	<4.17	<4.17	<4.17	<4.17	<4.17
Methyl isobutyl ketone (MIBK)	50	500	µg/L	<3.95	<3.95	<3.95	<3.95	<3.95	<3.95
Methylene chloride	0.5	5	µg/L	<1.32	<1.32	<1.32	<1.32	<1.32	<1.32
Styrene	10	100	µg/L	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
1,1,2,2-Tetrachloroethane	0.02	0.2	µg/L	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
1,1,1,2-Tetrachloroethane	7	70	µg/L	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35
Tetrachloroethene (PCE)	0.5	5	µg/L	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38
Toluene	160	800	µg/L	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19
1,1,1-Trichloroethane	40	200	µg/L	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Trichloroethene (TCE)	0.5	5	µg/L	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Vinyl Acetate	-	-	µg/L	<2.26	<2.26	<2.26	<2.26	<2.26	<2.26
Vinyl Chloride	0.02	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
m&p-Xylene	400	2,000	µg/L	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43
o--Xylene			µg/L	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29
Total VOCs			µg/L	0.86	0.0	0.0	0.0	0.0	0.0
Previous Results			µg/L	0.0	0.0	0.0			
Date				July-18	Apr-18	Apr-18			
Dissolved Oxygen			mg/L	2.89	4.22	2.72			
pH				7.18	7.35	7.06			
Conductivity			mS/cm	0.533	0.659	0.474			
Temperature			°C	11.09	12.94	11.54			
Oxidation-Reduction Potential			mV	-190.6	-83.5	-213.9			

Indicates concentration in exceedance of Wisconsin Administrative Code Chapter NR140 Preventive Action Limit (PAL)
Indicates concentration in exceedance of Wisconsin Administrative Code Chapter NR140 Enforcement Standard (ES)

VOC - volatile organic compound
µg/L - micrograms per liter
mg/L - milligrams per liter
mS/cm - millisiemens per centimeter
°C - degrees celsius
mV - millivolts

A-8
11/4/2019

October 2018

POTW VOC Results
Arkema Coating Resins
Saukville, Wisconsin

Parameter	Units	POTW-I-18-4		POTW-E-18-4	POTW-S-18-4
Sample ID		POTW-I-18-4		POTW-E-18-4	POTW-S-18-4
Collection Date		10/9/2018		10/9/2018	10/9/2018
Laboratory ID		5035352O		5035352N	5035352P
Duplicate Parent					
Monitoring Objective		Receptor		Receptor	Receptor
Hydrogeologic Unit		POTW		POTW	POTW
Dilution		1		1	20
Acetone	µg/L	<5.01		<5.01	<100.2
Benzene	µg/L	**0.27**	J	<0.22	<4.4
Bromochloromethane	µg/L	<0.93		<0.93	<18.6
Bromoform	µg/L	<0.45		<0.45	<9
Bromomethane	µg/L	<0.99		<0.99	<19.8
Carbon disulfide	µg/L	**0.38**		<0.29	<5.8
Carbon tetrachloride	µg/L	<0.31		<0.31	<6.2
Chlorobenzene	µg/L	<0.26		<0.26	<5.2
Chloroethane	µg/L	<0.61		<0.61	<12.2
Chloroform	µg/L	**0.26**		<0.26	<5.2
Dibromochloromethane	µg/L	<0.22		<0.22	<4.4
1,4-Dichlorobenzene	µg/L	<0.7		<0.7	<14
1,3-Dichlorobenzene	µg/L	<0.85		<0.85	<17
1,2-Dichlorobenzene	µg/L	<0.86		<0.86	<17.2
1,2-Dichloroethane	µg/L	<0.25		<0.25	<5
1,1-Dichloroethane	µg/L	<0.36		<0.36	<7.2
1,1-Dichloroethene	µg/L	<0.42		<0.42	<8.4
cis-1,2-Dichloroethene	µg/L	**0.58**	J	<0.37	<7.4
trans-1,2-Dichloroethene	µg/L	<0.34		<0.34	<6.8
1,2-Dichloropropane	µg/L	<0.44		<0.44	<8.8
trans-1,3-Dichloropropene	µg/L	<0.32		<0.32	<6.4
cis-1,3-Dichloropropene	µg/L	<0.26		<0.26	<5.2
Ethylbenzene	µg/L	**1.11**		<0.26	<5.2
2-Hexanone	µg/L	<1.44		<1.44	<28.8
Methyl ethyl ketone (MEK)	µg/L	<4.17		<4.17	<83.4
Methyl isobutyl ketone (MIBK)	µg/L	<3.95		<3.95	<79
Methylene chloride	µg/L	<1.32		<1.32	<26.4
Styrene	µg/L	<0.26		<0.26	<5.2
1,1,2,2-Tetrachloroethane	µg/L	<0.3		<0.3	<6
1,1,1,2-Tetrachloroethane	µg/L	<0.35		<0.35	<7
Tetrachloroethene (PCE)	µg/L	<0.38		<0.38	<7.6
Toluene	µg/L	**1.23**		<0.19	**2,320**
1,1,1-Trichloroethane	µg/L	<0.33		<0.33	<6.6
Trichloroethene (TCE)	µg/L	<0.3		<0.3	<6
Vinyl Acetate	µg/L	<2.26		<2.26	<45.2
Vinyl Chloride	µg/L	<0.2		<0.2	<4
m&p-Xylene	µg/L	**7.6**		<0.43	<8.6
o-Xylene	µg/L	**4.7**		<0.29	<5.8
Total VOCs	µg/L	**16.13**		0.00	**2,320**
Previous Results	µg/L	14.28		0.00	1,400
Date		Apr-18		Apr-18	Apr-18

J - Results reported between the Method Detection Limit (MDL) and the Limit of Quantitation (LOQ) are less certain than results at or above the LOQ.
VOC - volatile organic compound
µg/L - micrograms per liter

October 2018

Ranney Collector VOC Results
Arkema Coating Resins
Saukville, Wisconsin

Parameter	PAL	ES	Units	RC-1-18-4	RC-2-18-4	RC-3-18-4
Sample ID				RC-1-18-4	RC-2-18-4	RC-3-18-4
Collection Date				10/8/2018	10/8/2018	10/8/2018
Laboratory ID				5035352E	5035352F	5035352G
Duplicate Parent						
Monitoring Objective				Receptor	Receptor	Receptor
Hydrogeologic Unit				Glacial Drift	Glacial Drift	Glacial Drift
Dilution				5	1	20
Acetone	1,800	9,000	µg/L	<25.05	<5.01	<100.2
Benzene	0.5	5	µg/L	**270**	<0.22	**14.2**
Bromochloromethane	-	-	µg/L	<4.65	<0.93	<18.6
Bromoform	0.44	4.4	µg/L	<2.25	<0.45	<9
Bromomethane	1	10	µg/L	<4.95	<0.99	<19.8
Carbon disulfide	200	1,000	µg/L	<1.45	<0.29	<5.8
Carbon tetrachloride	0.5	5	µg/L	<1.55	<0.31	<6.2
Chlorobenzene (Monochlorobenzene)	20	100	µg/L	<1.3	<0.26	<5.2
Chloroethane	80	400	µg/L	<3.05	<0.61	<12.2
Chloroform	0.6	6	µg/L	<1.3	<0.26	<5.2
Dibromochloromethane	6	60	µg/L	<1.1	<0.22	<4.4
1,4-Dichlorobenzene	15	75	µg/L	<3.5	<0.7	<14
1,3-Dichlorobenzene	120	600	µg/L	<4.25	<0.85	<17
1,2-Dichlorobenzene	60	600	µg/L	<4.3	<0.86	<17.2
1,2-Dichloroethane	0.5	5	µg/L	<1.25	<0.25	<5
1,1-Dichloroethane	85	850	µg/L	<1.8	<0.36	<7.2
1,1-Dichloroethene	0.7	7	µg/L	<2.1	<0.42	<8.4
cis-1,2-Dichloroethene	7	70	µg/L	**265**	<0.37	<7.4
trans-1,2-Dichloroethene	20	100	µg/L	<1.7	<0.34	<6.8
1,2-Dichloropropane	0.5	5	µg/L	<2.2	<0.44	<8.8
trans-1,3-Dichloropropene	0.04	0.4	µg/L	<1.6	<0.32	<6.4
cis-1,3-Dichloropropene	0.04	0.4	µg/L	<1.3	<0.26	<5.2
Ethylbenzene	140	700	µg/L	**890**	<0.26	**2,190**
2-Hexanone (Methyl butyl ketone)	-	-	µg/L	<7.2	<1.44	<28.8
Methyl ethyl ketone (MEK)	800	4,000	µg/L	<20.85	<4.17	<83.4
Methyl isobutyl ketone (MIBK)	50	500	µg/L	<19.75	<3.95	<79
Methylene chloride	0.5	5	µg/L	<6.6	<1.32	<26.4
Styrene	10	100	µg/L	<1.3	<0.26	<5.2
1,1,2,2-Tetrachloroethane	0.02	0.2	µg/L	<1.5	<0.3	<6
1,1,1,2-Tetrachloroethane	7	70	µg/L	<1.75	<0.35	<7
Tetrachloroethene (PCE)	0.5	5	µg/L	<1.9	<0.38	<7.6
Toluene	160	800	µg/L	**176**	<0.19	**1,700**
1,1,1-Trichloroethane	40	200	µg/L	<1.65	<0.33	<6.6
Trichloroethene (TCE)	0.5	5	µg/L	<1.5	<0.3	<6
Vinyl Acetate	-	-	µg/L	<11.3	<2.26	<45.2
Vinyl Chloride	0.02	0.2	µg/L	**84**	<0.2	<4
m&p-Xylene	400	2,000	µg/L	**880**	<0.43	**10,800**
o-Xylene			µg/L	**208**	<0.29	**3,500**
Total VOCs			µg/L	**2,773**	0.00	**18,204.2**
Previous Results			µg/L	294.30	0.00	5,479.4
Date				Apr-18	Apr-18	Apr-18

VOC - volatile organic compound
µg/L - micrograms per liter

A-10
11/4/2019

October 2018

Perimeter - Glacial Drift Monitoring Wells - VOC Results
Arkema Coating Resins
Saukville, Wisconsin

Parameter	PAL	ES	Units	W-01A-18-4	W-03B-18-4	W-04A-18-4	W-08R-18-4	W-16A-18-4	W-27-18-4	W-49-18-4	W-51-18-4
Sample ID				W-01A-18-4	W-03B-18-4	W-04A-18-4	W-08R-18-4	W-16A-18-4	W-27-18-4	W-49-18-4	W-51-18-4
Collection Date				10/8/2018	10/11/2018	10/9/2018	10/8/2018	10/11/2018	10/9/2018	10/8/2018	10/8/2018
Laboratory ID				5035352D	535352PP	535352DD	5035352C	535352LL	535352JJ	5035352H	5035352J
Duplicate Parent											
Monitoring Objective				Perimeter	Perimeter	Perimeter	Perimeter	Perimeter	Perimeter	Perimeter	Perimeter
Hydrogeologic Unit				Glacial Drift	Glacial Drift	Glacial Drift	Glacial Drift	Glacial Drift	Glacial Drift	Glacial Drift	Glacial Drift
Dilution				1	1	1	1	1	1	1	1
Acetone	1,800	9,000	µg/L	<5.01	<5.01	<5.01	<5.01	<5.01	<5.01	<5.01	<5.01
Benzene	0.5	5	µg/L	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22
Bromochloromethane	-	-	µg/L	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93
Bromoform	0.44	4.4	µg/L	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45
Bromomethane	1	10	µg/L	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
Carbon disulfide	200	1,000	µg/L	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	**0.34** J
Carbon tetrachloride	0.5	5	µg/L	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31
Chlorobenzene Monochlorobenzene)	20	100	µg/L	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
Chloroethane	80	400	µg/L	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61
Chloroform	0.6	6	µg/L	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
Dibromochloromethane	6	60	µg/L	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22
1,4-Dichlorobenzene	15	75	µg/L	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
1,3-Dichlorobenzene	120	600	µg/L	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85
1,2-Dichlorobenzene	60	600	µg/L	<0.86	<0.86	<0.86	<0.86	<0.86	<0.86	<0.86	<0.86
1,2-Dichloroethane	0.5	5	µg/L	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
1,1-Dichloroethane	85	850	µg/L	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36
1,1-Dichloroethene	0.7	7	µg/L	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42
cis-1,2-Dichloroethene	7	70	µg/L	<0.37	<0.37	<0.37	<0.37	<0.37	**7.6**	<0.37	<0.37
trans-1,2-Dichloroethene	20	100	µg/L	<0.34	<0.34	<0.34	<0.34	<0.34	**0.57** J	<0.34	<0.34
1,2-Dichloropropane	0.5	5	µg/L	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44
trans-1,3-Dichloropropene	0.04	0.4	µg/L	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32
cis-1,3-Dichloropropene	0.04	0.4	µg/L	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
Ethylbenzene	140	700	µg/L	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
2-Hexanone (methyl butyl ketone)	-	-	µg/L	<1.44	<1.44	<1.44	<1.44	<1.44	<1.44	<1.44	<1.44
Methyl ethyl ketone (MEK)	800	4,000	µg/L	<4.17	<4.17	<4.17	<4.17	<4.17	<4.17	<4.17	<4.17
Methyl isobutyl ketone (MIBK)	50	500	µg/L	<3.95	<3.95	<3.95	<3.95	<3.95	<3.95	<3.95	<3.95
Methylene chloride	0.5	5	µg/L	<1.32	<1.32	<1.32	<1.32	<1.32	<1.32	<1.32	<1.32
Styrene	10	100	µg/L	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
1,1,2,2-Tetrachloroethane	0.02	0.2	µg/L	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
1,1,1,2-Tetrachloroethane	7	70	µg/L	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35
Tetrachloroethene (PCE)	0.5	5	µg/L	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38
Toluene	160	800	µg/L	<0.19	<0.19	<0.19	**0.28** J	<0.19	<0.19	<0.19	<0.19
1,1,1-Trichloroethane	40	200	µg/L	<0.33	<0.33	<0.33	<0.33	<0.33	**1.42**	<0.33	<0.33
Trichloroethene (TCE)	0.5	5	µg/L	<0.3	<0.3	<0.3	<0.3	<0.3	**90**	<0.3	<0.3
Vinyl Acetate	-	-	µg/L	<2.26	<2.26	<2.26	<2.26	<2.26	<2.26	<2.26	<2.26
Vinyl Chloride	0.02	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
m&p-Xylene	400	2,000	µg/L	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43
o--Xylene			µg/L	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29
Total VOCs			µg/L	0.00	0.00	0.00	**0.28**	0.00	**99.59**	0.00	**0.34**
Previous Results			µg/L	0.00	0.00	0.00	0.29	0.22	125.06	0.00	0.00
Date				Apr-18	Apr-18	Apr-18	Apr-18	Apr-18	Apr-18	Apr-18	Apr-18
Dissolved Oxygen			mg/L	5.06	0.06	4.88	9.17	7.30	3.58	4.25	2.32
pH				7.09	7.21	6.74	7.67	7.34	6.44	6.77	7.01
Conductivity			mS/cm	0.657	7.745	11.420	0.721	5.076	4.705	0.719	3.539
Temperature			°C	17.07	10.88	15.99	16.89	10.84	20.76	14.43	12.63
Oxidation-Reduction Potential			mV	-79.5	-221.3	-167.0	-85.1	-176.4	-175.2	-74.1	-93.3

Indicates concentration in exceedance of Wisconsin Administrative Code Chapter NR140 Preventive Action Limit (PAL)

Indicates concentration in exceedance of Wisconsin Administrative Code Chapter NR140 Enforcement Standard (ES)

J - Results reported between the Method Detection Limit (MDL) and the Limit of Quantitation (LOQ) are less certain than results at or above the LOQ.
VOC - volatile organic compound
µg/L - micrograms per liter
mg/L - milligrams per liter
mS/cm - millisiemens per centimeter
°C - degrees celsius
mV - millivolts

October 2018

Perimeter - Shallow and Deep Dolomite Wells - VOC Results
Arkema Coating Resins
Saukville, Wisconsin

Sample ID				W-03A-18-4	DUP3-18-4	W-07-18-4	W-20-18-4	W-22-18-4	W-23-18-4	DUP2-18-4	W-40-18-4	W-50-18-4	W-52-18-4	PW-08-18-4
Collection Date				10/11/2018	10/11/2018	10/8/2018	10/9/2018	10/9/2018	10/9/2018	10/9/2018	10/11/2018	10/8/2018	10/8/2018	10/11/2018
Laboratory ID				535352NN	535352OO	5035352A	535352AA	535352KK	535352BB	535352CC	535352MM	5035352I	5035352K	535352SS
Duplicate Parent					(W-03A-18-4)					(W-23-18-4)				
Monitoring Objective				Perimeter	Perimeter	Perimeter	Perimeter	Perimeter	Perimeter		Perimeter	Perimeter	Perimeter	Perimeter
Hydrogeologic Unit				Shallow Dolomite	Glacial Drift	Shallow Dolomite	Shallow Dolomite	Shallow Dolomite	Shallow Dolomite		Shallow Dolomite	Shallow Dolomite	Shallow Dolomite	Deep Dolomite
Dilution				1	1	1	1	1	1	1	1	1	1	1
Parameter	PAL	ES	Units											
Acetone	1,800	9,000	µg/L	<5.01	<5.01	<5.01	<5.01	<5.01	<5.01	<5.01	<5.01	<5.01	<5.01	<5.01
Benzene	0.5	5	µg/L	<0.22	<0.22	<0.22	<0.22	<0.22	**0.29** J	**0.29** J	<0.22	<0.22	**20.2**	<0.22
Bromochloromethane	-	-	µg/L	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93
Bromoform	0.44	4.4	µg/L	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45
Bromomethane	1	10	µg/L	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
Carbon disulfide	200	1,000	µg/L	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29
Carbon tetrachloride	0.5	5	µg/L	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31
Chlorobenzene (Monochlorobenzene)	20	100	µg/L	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
Chloroethane	80	400	µg/L	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61
Chloroform	0.6	6	µg/L	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
Dibromochloromethane	6	60	µg/L	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22
1,4-Dichlorobenzene	16	75	µg/L	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
1,3-Dichlorobenzene	120	600	µg/L	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85
1,2-Dichlorobenzene	60	600	µg/L	<0.86	<0.86	<0.86	<0.86	<0.86	<0.86	<0.86	<0.86	<0.86	<0.86	<0.86
1,2-Dichloroethane	0.5	5	µg/L	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
1,1-Dichloroethane	85	850	µg/L	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36
1,1-Dichloroethene	0.7	7	µg/L	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42
cis-1,2-Dichloroethene	7	70	µg/L	<0.37	<0.37	<0.37	<0.37	<0.37	**0.89** J	**0.65** J	<0.37	<0.37	**16.8**	<0.37
trans-1,2-Dichloroethene	20	100	µg/L	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	**1.39**	<0.34
1,2-Dichloropropane	0.5	5	µg/L	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44
trans-1,3-Dichloropropene	0.04	0.4	µg/L	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32
cis-1,3-Dichloropropene	0.04	0.4	µg/L	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
Ethylbenzene	140	700	µg/L	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
2-Hexanone (Methyl butyl ketone)	-	-	µg/L	<1.44	<1.44	<1.44	<1.44	<1.44	<1.44	<1.44	<1.44	<1.44	<1.44	<1.44
Methyl ethyl ketone (MEK)	800	4,000	µg/L	<4.17	<4.17	<4.17	<4.17	<4.17	<4.17	<4.17	<4.17	<4.17	<4.17	<4.17
Methyl isobutyl ketone (MIBK)	50	500	µg/L	<3.95	<3.95	<3.95	<3.95	<3.95	<3.95	<3.95	<3.95	<3.95	<3.95	<3.95
Methylene chloride	0.5	5	µg/L	<1.32	<1.32	<1.32	<1.32	<1.32	<1.32	<1.32	<1.32	<1.32	<1.32	<1.32
Styrene	10	100	µg/L	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
1,1,2,2-Tetrachloroethane	0.02	0.2	µg/L	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
1,1,1,2-Tetrachloroethane	7	70	µg/L	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35
Tetrachloroethene (PCE)	0.5	5	µg/L	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38
Toluene	160	800	µg/L	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19
1,1,1-Trichloroethane	40	200	µg/L	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Trichloroethene (TCE)	0.5	5	µg/L	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	**0.54** J	<0.3
Vinyl Acetate	-	-	µg/L	<2.26	<2.26	<2.26	<2.26	<2.26	<2.26	<2.26	<2.26	<2.26	<2.26	<2.26
Vinyl Chloride	0.02	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	**12.2**	<0.2
m&p-Xylene	400	2,000	µg/L	<0.43	<0.43	<0.43	**0.52** J	**0.55** J	<0.43	<0.43	<0.43	<0.43	<0.43	<0.43
o--Xylene			µg/L	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29
Total VOCs			µg/L	0.00	0.00	0.00	0.52	0.55	**1.18**	**0.94**	0.00	0.00	**51.13**	0.0
Previous Results			µg/L	0.00		0.00	0.00	0.00	0.94	0.88	0.00	0.00	42.31	0.00
Date				Apr-17		Apr-17	Apr-17	Apr-17	Apr-17		Apr-17	Apr-17	Apr-17	Apr-17
Dissolved Oxygen			mg/L	0.25		4.36	0.50	1.80	0.01		0.16	4.39	3.54	0.04
pH				8.73		7.48	8.08	6.66	6.35		6.92	7.01	7.59	7.20
Conductivity			mS/cm	0.349		0.728	0.513	6.850	19.690		4.700	0.586	3.155	7.058
Temperature			°C	10.73		13.81	10.83	12.85	11.17		11.91	11.94	13.65	11.78
Oxidation-Reduction Potential			mV	-324.4		236.2	-49.0	-239.3	-205.7		-232.6	-72.5	-113.8	-213.5

Indicates concentration in exceedance of Wisconsin Administrative Code Chapter NR140 Preventive Action Limit (PAL)

Indicates concentration in exceedance of Wisconsin Administrative Code Chapter NR140 Enforcement Standard (ES)

J - Results reported between the Method Detection Limit (MDL) and the Limit of Quantitation (LOQ) are less certain than results at or above the LOQ.
VOC - volatile organic compound
µg/L - micrograms per liter
mg/L - milligrams per liter
mS/cm - millisiemens per centimeter
°C - degrees celsius
mV - millivolts

October 2018

Remediation Progress - Glacial Drift and Shallow Dolomite Wells - VOC Results
Arkema Coating Resins
Saukville, Wisconsin

Parameter	PAL	ES	Units	W-19A-18-4	DUP4-18-4	W-38-18-4	W-41-18-4	W-42-18-4
Collection Date				10/11/2018	10/11/2018	10/9/2018	10/8/2018	10/8/2018
Laboratory ID				535352QQ	535352RR	535352II	5035352L	5035352M
Duplicate Parent					(W-19A-18-4)			
Monitoring Objective				Remediation Progress		Remediation Progress	Remediation Progress	Remediation Progress
Hydrogeologic Unit				Glacial Drift		Shallow Dolomite	Glacial Drift	Glacial Drift
Dilution				1	1	10	1	50
Acetone	1,800	9,000	µg/L	<5.01	<5.01	<50.1	<5.01	<250.5
Benzene	0.5	5	µg/L	<0.22	<0.22	**1,020**	**0.32 J**	**44**
Bromochloromethane	-	-	µg/L	<0.93	<0.93	<9.3	<0.93	<46.5
Bromoform	0.44	4.4	µg/L	<0.45	<0.45	<4.5	<0.45	<22.5
Bromomethane	1	10	µg/L	<0.99	<0.99	<9.9	<0.99	<49.5
Carbon disulfide	200	1,000	µg/L	<0.29	<0.29	<2.9	<0.29	<14.5
Carbon tetrachloride	0.5	5	µg/L	<0.31	<0.31	<3.1	<0.31	<15.5
Chlorobenzene (Monochlorobenzene)	20	100	µg/L	<0.26	<0.26	<2.6	<0.26	<13
Chloroethane	80	400	µg/L	<0.61	<0.61	<6.1	<0.61	<30.5
Chloroform	0.6	6	µg/L	<0.26	<0.26	<2.6	<0.26	<13
Dibromochloromethane	6	60	µg/L	<0.22	<0.22	<2.2	<0.22	<11
1,4-Dichlorobenzene	15	75	µg/L	<0.7	<0.7	<7	<0.7	<35
1,3-Dichlorobenzene	120	600	µg/L	<0.85	<0.85	<8.5	<0.85	<42.5
1,2-Dichlorobenzene	60	600	µg/L	<0.86	<0.86	<8.6	<0.86	<43
1,2-Dichloroethane	0.5	5	µg/L	<0.25	<0.25	<2.5	<0.25	<12.5
1,1-Dichloroethane	85	850	µg/L	<0.36	<0.36	<3.6	<0.36	<18
1,1-Dichloroethene	0.7	7	µg/L	<0.42	<0.42	<4.2	<0.42	<21
cis-1,2-Dichloroethene	7	70	µg/L	**14.9**	**10.5**	<3.7	<0.37	<18.5
trans-1,2-Dichloroethene	20	100	µg/L	**0.50 J**	**0.48 J**	<3.4	<0.34	<17
1,2-Dichloropropane	0.5	5	µg/L	<0.44	<0.44	<4.4	<0.44	<22
trans-1,3-Dichloropropene	0.04	0.4	µg/L	<0.32	<0.32	<3.2	<0.32	<16
cis-1,3-Dichloropropene	0.04	0.4	µg/L	<0.26	<0.26	<2.6	<0.26	<13
Ethylbenzene	140	700	µg/L	<0.26	<0.26	<2.6	<0.26	**236**
2-Hexanone (Metyl butyl ketone)	-	-	µg/L	<1.44	<1.44	<14.4	<1.44	<72
Methyl ethyl ketone (MEK)	800	4,000	µg/L	<4.17	<4.17	<41.7	<4.17	<208.5
Methyl isobutyl ketone (MIBK)	50	500	µg/L	<3.95	<3.95	<39.5	<3.95	<197.5
Methylene chloride	0.5	5	µg/L	<1.32	<1.32	<13.2	<1.32	<66
Styrene	10	100	µg/L	<0.26	<0.26	<2.6	<0.26	<13
1,1,2,2-Tetrachloroethane	0.02	0.2	µg/L	<0.3	<0.3	<3	<0.3	<15
1,1,1,2-Tetrachloroethane	7	70	µg/L	<0.35	<0.35	<3.5	<0.35	<17.5
Tetrachloroethene (PCE)	0.5	5	µg/L	<0.38	<0.38	<3.8	<0.38	<19
Toluene	160	800	µg/L	<0.19	<0.19	<1.9	<0.19	**25.5 J**
1,1,1-Trichloroethane	40	200	µg/L	<0.33	<0.33	<3.3	<0.33	<16.5
Trichloroethene (TCE)	0.5	5	µg/L	**13**	**10.8**	<3	<0.3	<15
Vinyl Acetate	-	-	µg/L	<2.26	<2.26	<22.6	<2.26	<113
Vinyl Chloride	0.02	0.2	µg/L	**0.65**	**0.54 J**	<2	<0.2	<10
m&p-Xylene	400	2,000	µg/L	<0.43	<0.43	<4.3	**1.66**	**10,200**
o--Xylene			µg/L	<0.29	<0.29	<2.9	<0.29	<14.5
Total VOCs			µg/L	**29.05**	**22.32**	**1,020**	**1.98**	**10,505.5**
Previous Results			µg/L	30.21	27.7	1,350	0.0	11,265
Date				Oct-16		Oct-16	Oct-16	Oct-16
Dissolved Oxygen			mg/L	4.76		-0.03	2.28	5.04
pH				6.77		6.16	6.90	6.30
Conductivity			mS/cm	9.555		24.42	1.040	6.391
Temperature			°C	11.35		14.24	17.09	15.47
Oxidation-Reduction Potential				-175.4		-240.0	-75.3	-55.6

Indicates concentration in exceedance of Wisconsin Administrative Code Chapter NR140 Preventive Action Limit (PAL)

Indicates concentration in exceedance of Wisconsin Administrative Code Chapter NR140 Enforcement Standard (ES)

VOC - volatile organic compound

J - Results reported between the Method Detection Limit (MDL) and the Limit of Quantitation (LOQ) are less certain than results at or above the LOQ.

NS - Not Sampled

µg/L - micrograms per liter

mg/L - milligrams per liter

mS/cm - millisiemens per centimeter

°C - degrees celsius

mV - millivolts

October 2018

Remediation Progress - Glacial Drift, Shallow and Deep Dolomite Wells - Metals, SVOCs and PCBs Results
Arkema Coating Resins
Saukville, Wisconsin

			Sample ID	W-06A-18-4	W-21A-18-4	W-24A-18-4	W-28-18-4	W-29-18-4	W-30-18-4	DUP5-18-4	W-43-18-4	W-47-18-4	DUP6-18-4
			Collection Date	10/9/2018	10/9/2018	10/9/2018	Not Sampled	10/9/2018	10/9/2018	10/9/2018	10/9/2018	10/9/2018	10/9/2018
			Laboratory ID	5035352W	535352EE	535352GG	Dry	535352FF	5035352U	5035352V	535352HH	5035352Y	5035352Z
			Duplicate Parent							(W-30-18-4)			(W-47-18-4)
			Monitoring Objective	Remediation Progress	Remediation Progress	Remediation Progress	Remediation Progress	Remediation Progress	Remediation Progress		Remediation Progress	Remediation Progress	
			Hydrogeologic Unit	Glacial Drift	Shallow Dolomite	Shallow Dolomite	Shallow Dolomite	Shallow Dolomite	Deep Dolomite		Glacial Drift	Glacial Drift	
Parameter	PAL	ES	Units										
Arsenic	1	10	µg/L	**32.3**	NA	<6.4	NA	<6.4	<6.4	<6.4	<6.4	<6.4	
Barium	400	2,000	µg/L	**57.6**	NA	**107**	NA	**175**	**102**	**95.5**	**9.97**	**39.3**	
Parameter	PAL	ES	Units										
Aroclor 1016	0.003	0.03	ug/L									<0.1	<0.1
Aroclor 1221			ug/L									<0.243	<0.243
Aroclor 1232			ug/L									<0.14	<0.14
Aroclor 1242			ug/L									<0.047	<0.047
Aroclor 1248			ug/L									<0.086	<0.086
Aroclor 1254			ug/L									<0.047	<0.047
Aroclor 1260			ug/L									<0.12	<0.12
Parameter	PAL	ES	Units										
Acetophenone	-	-	µg/L	**35**	**5.7** J	<0.44	NA	<0.44	<0.44	<0.44	<4.4	**6.6** J	
Acenaphthene	-	-	µg/L	<5.1	<5.1	<0.51	NA	<0.51	<0.51	<0.51	<5.1	<5.1	
Anthracene	600	3,000	µg/L	<3.7	<3.7	<0.37	NA	<0.37	<0.37	<0.37	**9.2** J	<3.7	
bis(2-ethylhexyl)phthalate	0.6	6	µg/L	<25	<25	**24.5**	NA	**8.2**	<2.5	<2.5	<5.6	<5.6	
4-Chloro-3-methylphenol	-	-	µg/L	<6	<6	<0.6	NA	<0.6	<0.6	<0.6	<6	<6	
o-Cresol	-	-	µg/L	**72**	<3.8	<0.38	NA	<0.38	<0.38	<0.38	<3.8	**17.8**	
m & p-Cresol	-	-	µg/L	**116**	<5.4	<0.54	NA	<0.54	<0.54	<0.54	<5.4	**32**	
Dibenzofuran	-	-	µg/L	<4.5	<4.5	<0.45	NA	<0.45	<0.45	<0.45	<4.5	<4.5	
1,4-Dichlorobenzene	15	75	µg/L	<3	<3	<0.3	NA	<0.3	<0.3	<0.3	<3	<3	
1,3-Dichlorobenzene	120	600	µg/L	<3.8	<3.8	<0.38	NA	<0.38	<0.38	<0.38	<3.8	<3.8	
1,2-Dichlorobenzene	60	600	µg/L	<5.3	<5.3	<0.53	NA	<0.53	<0.53	<0.53	<5.3	<5.3	
2,4-Dimethylphenol	-	-	µg/L	**198**	**54**	<0.54	NA	<0.54	<0.54	<0.54	**86**	**207**	
Di-n-butyl phthalate	-	-	µg/L	<2.3	<2.3	<0.23	NA	<0.23	<0.23	<0.23	<2.3	<2.3	
Fluorene	80	400	µg/L	<2.9	<2.9	<0.29	NA	<0.29	<0.29	<0.29	<2.9	<2.9	
1-Methyl naphthalene	-	-	µg/L	<6.7	<6.7	<0.67	NA	<0.67	<0.67	<0.67	**54**	<6.7	
2-Methyl naphthalene	-	-	µg/L	<5.4	<5.4	<0.54	NA	<0.54	<0.54	<0.54	**18.7**	<5.4	
Naphthalene	10	100	µg/L	**8.4** J	**28.4**	<0.45	NA	<0.45	<0.45	<0.45	<4.5	**12.7** J	
Pentachlorophenol (PCP)	0.1	1	µg/L	<5.5	<5.5	<0.55	NA	<0.55	<0.55	<0.55	<5.5	<5.5	
Phenanthrene	-	-	µg/L	<2.9	<2.9	<0.29	NA	<0.29	<0.29	<0.29	**92**	<2.9	
Phenol	400	2,000	µg/L	**92**	**30.2**	<0.28	NA	<0.28	<0.28	<0.28	<2.8	<2.8	

Indicates concentration in exceedance of Wisconsin Administrative Code Chapter NR140 Preventive Action Limit (PAL)

Indicates concentration in exceedance of Wisconsin Administrative Code Chapter NR140 Enforcement Standard (ES)

J - Results reported between the Method Detection Limit (MDL) and the Limit of Quantitation (LOQ) are less certain than results at or above the LOQ.

NA - Not Analyzed due to insufficient sample volume

µg/L - micrograms per liter

October 2018

Remediation Progress - Glacial Drift, Shallow and Deep Dolomite Wells - VOC Results
Arkema Coating Resins
Saukville, Wisconsin

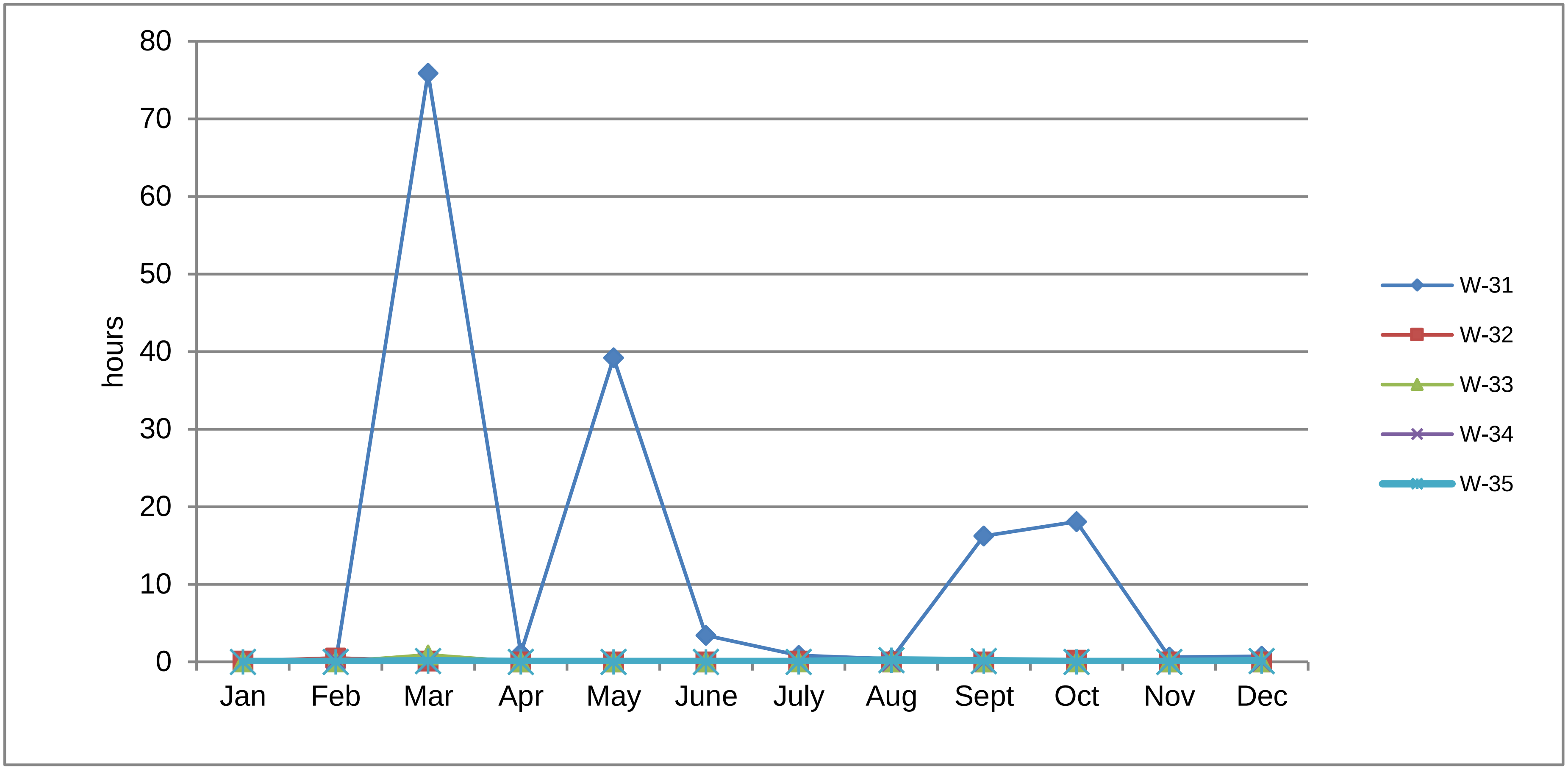
			Sample ID	W-06A-18-4	W-21A-18-4	W-24A-18-4	W-28-18-4	W-29-18-4	W-30-18-4	W-43-18-4	W-47-18-4
			Collection Date	10/9/18	10/9/2018	10/9/2018	Not Sampled	10/9/2018	10/9/2018	10/9/2018	10/9/2018
			Laboratory ID	5035352W	535352EE	535352GG	Dry	535352FF	5035352U	535352HH	5035352Y
			Duplicate Parent								
			Monitoring Objective	Remediation Progress	Remediation Progress	Remediation Progress	Remediation Progress	Remediation Progress	Remediation Progress	Remediation Progress	Remediation Progress
			Hydrogeologic Unit	Glacial Drift	Shallow Dolomite	Shallow Dolomite	Shallow Dolomite	Shallow Dolomite	Deep Dolomite	Glacial Drift	Glacial Drift
			Dilution	500	200	1		1	1	1	100
Parameter	PAL	ES	Units								
Propionitrile	-	-	µg/L	<950	<380	<1.9	NS	<1.9	<1.9	<1.9	<190
Methylacrylonitrile	-	-	µg/L	<230	<92	<0.46	NS	<0.46	<0.46	<0.46	<46
Isobutanol	-	-	µg/L	<3900	<1560	<7.8	NS	<7.8	<7.8	<7.8	<780
Acenonitrile	-	-	µg/L	<1940	<776	<3.88	NS	<3.88	<3.88	<3.88	<388
Acetone	1,800	9,000	µg/L	<2505	<1002	<5.01	NS	<5.01	<5.01	<5.01	<501
Allyl Chloride	-	-	µg/L	<450	<180	<0.9	NS	<0.9	<0.9	<0.9	<90
Benzene	0.5	5	µg/L	**140 J**	**1,390**	<0.22	NS	**1.56**	**2.31**	**0.82**	<22
Bromodichloromethane	0.06	0.6	µg/L	<165	<66	<0.33	NS	<0.33	<0.33	<0.33	<33
Bromoform	0.44	4.4	µg/L	<225	<90	<0.45	NS	<0.45	<0.45	<0.45	<45
Bromomethane	1	10	µg/L	<495	<198	<0.99	NS	<0.99	<0.99	<0.99	<99
Carbon disulfide	200	1,000	µg/L	<145	<58	<0.29	NS	<0.29	<0.29	**9.1**	<29
Carbon tetrachloride	0.5	5	µg/L	<155	<62	<0.31	NS	<0.31	<0.31	<0.31	<31
Chlorobenzene	20	100	µg/L	<130	<52	<0.26	NS	<0.26	<0.26	<0.26	<26
Chloroethane	80	400	µg/L	<305	<122	<0.61	NS	<0.61	<0.61	<0.61	<61
Chloroform	0.6	6	µg/L	<130	<52	<0.26	NS	<0.26	**5.6**	<0.26	<26
Chloromethane	3	30	µg/L	<270	<108	<0.54	NS	<0.54	<0.54	<0.54	<54
1,2-Dibromo-3-chloropropane	0.02	0.2	µg/L	<1480	<592	<2.96	NS	<2.96	<2.96	<2.96	<296
Dibromochloromethane	6	60	µg/L	<110	<44	<0.22	NS	<0.22	<0.22	<0.22	<22
Dibromomethane	-	-	µg/L	<215	<86	<0.43	NS	<0.43	<0.43	<0.43	<43
1,4-Dichlorobenzene	15	75	µg/L	<350	<140	<0.7	NS	<0.7	<0.7	<0.7	<70
1,3-Dichlorobenzene	120	600	µg/L	<425	<170	<0.85	NS	<0.85	<0.85	<0.85	<85
1,2-Dichlorobenzene	60	600	µg/L	<430	<172	<0.86	NS	<0.86	<0.86	<0.86	<86
Dichlorodifluoromethane	200	1000	µg/L	<160	<64	<0.32	NS	<0.32	<0.32	<0.32	<32
1,2-Dichloroethane	0.5	5	µg/L	<125	<50	<0.25	NS	<0.25	<0.25	<0.25	<25
1,1-Dichloroethane	85	850	µg/L	<180	<72	<0.36	NS	<0.36	<0.36	<0.36	<36
1,1-Dichloroethene	0.7	7	µg/L	<210	<84	<0.42	NS	<0.42	<0.42	<0.42	<42
cis-1,2-Dichloroethene	7	70	µg/L	<185	<74	**56**	NS	<0.37	**0.56 J**	<0.37	<37
trans-1,2-Dichloroethene	20	100	µg/L	<170	<68	**1.02 J**	NS	<0.34	<0.34	<0.34	<34
1,2-Dichloropropane	0.5	5	µg/L	<220	<88	<0.44	NS	<0.44	<0.44	<0.44	<44
trans-1,3-Dichloropropene	0.04	0.4	µg/L	<160	<64	<0.32	NS	<0.32	<0.32	<0.32	<32
cis-1,3-Dichloropropene	0.04	0.4	µg/L	<130	<52	<0.26	NS	<0.26	<0.26	<0.26	<26
1,4-Dioxane	0.3	3	µg/L	<4450	<1780	**110**	NS	**49**	**25.4 J**	<8.9	<890
1,2-Dibromoethane (EDB)	0.005	0.05	µg/L	<170	<68	<0.34	NS	<0.34	<0.34	<0.34	<34
Ethyl Methacrylate	-	-	µg/L	<3000	<1200	<6	NS	<6	<6	<6	<600
Ethylbenzene	140	700	µg/L	**18,800**	**5,600**	<0.26	NS	**0.73 J**	<0.26	**0.41 J**	**1,340**
Hexachlorobutadiene	-	-	µg/L	<670	<268	<1.34	NS	<1.34	<1.34	<1.34	<134
2-Hexanone	-	-	µg/L	<720	<288	<1.44	NS	<1.44	<1.44	<1.44	<144
Iodomethane	-	-	µg/L	<720	<288	<1.44	NS	<1.44	<1.44	<1.44	<144
Methyl ethyl ketone (MEK)	800	4,000	µg/L	<2085	<834	<4.17	NS	<4.17	<4.17	<4.17	<417
Methyl isobutyl ketone (MIBK)	50	500	µg/L	<1975	<790	<3.95	NS	<3.95	<3.95	<3.95	<395
Methyl Methacrylate	-	-	µg/L	<3200	<1280	<6.4	NS	<6.4	<6.4	<6.4	<640
Methylene Chloride	0.5	5	µg/L	<660	<264	<1.32	NS	<1.32	<1.32	<1.32	<132
Styrene	10	100	µg/L	<130	<52	<0.26	NS	**3.9**	<0.26	<0.26	<26
1,1,2,2-Tetrachloroethane	0.02	0.2	µg/L	<150	<60	<0.3	NS	<0.3	<0.3	<0.3	<30
1,1,1,2-Tetrachloroethane	7	70	µg/L	<175	<70	<0.35	NS	<0.35	<0.35	<0.35	<35
Tetrachloroethene (PCE)	0.5	5	µg/L	<190	<76	<0.38	NS	<0.38	<0.38	<0.38	<38
Toluene	160	800	µg/L	**28,100**	**242**	<0.19	NS	<0.19	<0.19	<0.19	**301**
1,2,4-Trichlorobenzene	14	70	µg/L	<575	<230	<1.15	NS	<1.15	<1.15	<1.15	<115
1,1,1-Trichloroethane	40	200	µg/L	<165	<66	<0.33	NS	<0.33	<0.33	<0.33	<33
1,1,2-Trichloroethane	0.5	5	µg/L	<210	<84	<0.42	NS	<0.42	<0.42	<0.42	<42
Trichloroethene (TCE)	0.5	5	µg/L	<150	<60	**0.99**	NS	<0.3	<0.3	<0.3	<30
Trichlorofluoromethane	-	-	µg/L	<175	<70	<0.35	NS	<0.35	**2.34**	<0.35	<35
1,2,3-Trichloropropane	12	60	µg/L	<415	<166	<0.83	NS	<0.83	<0.83	<0.83	<83
Vinyl Acetate	-	-	µg/L	<1130	<452	<2.26	NS	<2.26	<2.26	<2.26	<226
Vinyl Chloride	0.02	0.2	µg/L	<100	<40	**15.7**	NS	<0.2	<0.2	<0.2	<20
m&p-Xylene	400	2,000	µg/L	**63,000**	**3,400**	<0.43	NS	**1.38**	**0.50 J**	<0.43	**13,300**
o--Xylene			µg/L	**19,900**	**520**	<0.29	NS	<0.29	<0.29	<0.29	**1,900**
Total VOCs			µg/L	**129,940**	**11,152.00**	**183.71**	**NS**	**56.57**	**36.71**	**10.3**	**16,841**
Previous Results			µg/L	133,100	183.6	167.31		125.3	3.71	86	21,277
Date				Oct-17	Oct-17	Oct-17		Oct-17	Oct-17	Oct-17	Oct-17
Dissolved Oxygen			mg/L	2.23	ND	1.07	NS	2.40	1.38	5.73	1.72
pH				7.17	ND	7.66	NS	7.49	7.60	7.87	7.15
Conductivity			mS/cm	0.600	ND	0.838	NS	0.845	0.646	0.847	0.815
Temperature			°C	15.23	ND	12.42	NS	12.53	11.39	15.78	15.14
Oxidation-Reduction Potential			mV	-85.3	ND	-41.8	NS	-28.3	-42.2	-49.8	-77.2

Indicates concentration in exceedance of Wisconsin Administrative Code Chapter NR140 Preventive Action Limit (PAL)
Indicates concentration in exceedance of Wisconsin Administrative Code Chapter NR140 Enforcement Standard (ES)
J - Results reported between the Method Detection Limit (MDL) and the Limit of Quantitation (LOQ) are less certain than results at or above the LOQ.
VOC - volatile organic compound
NS - Not Sampled or No Data
µg/L - micrograms per liter
mg/L - milligrams per liter
mS/cm - millisiemens per centimeter
°C - degrees celsius
mV - millivolts

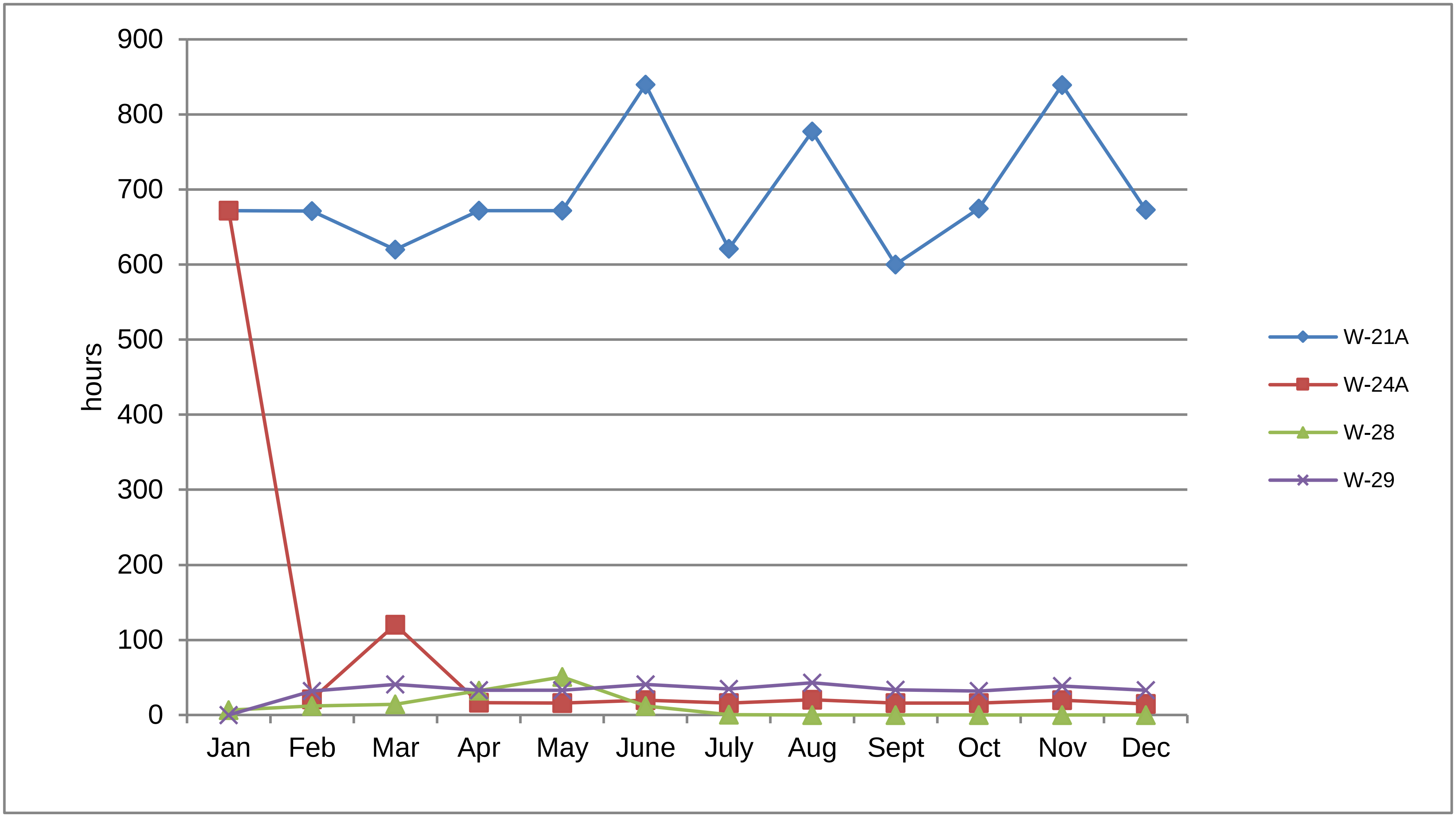
APPENDIX B

PUMP RUN TIME TRENDS: 1992 - 2018

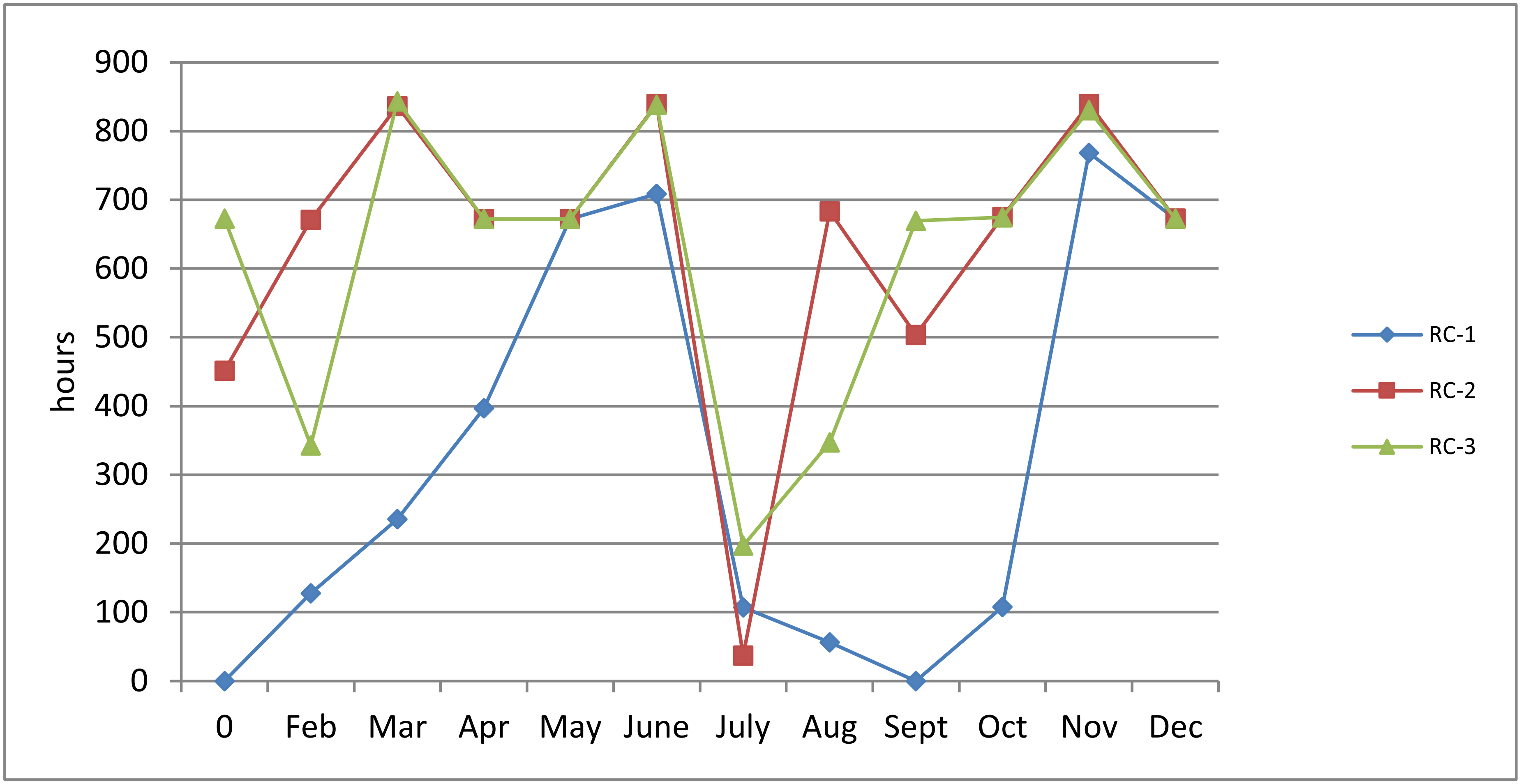
Glacial Extraction Wells
2018 Pump Run Times
Arkema Coating Resins
Saukville, Wisconsin

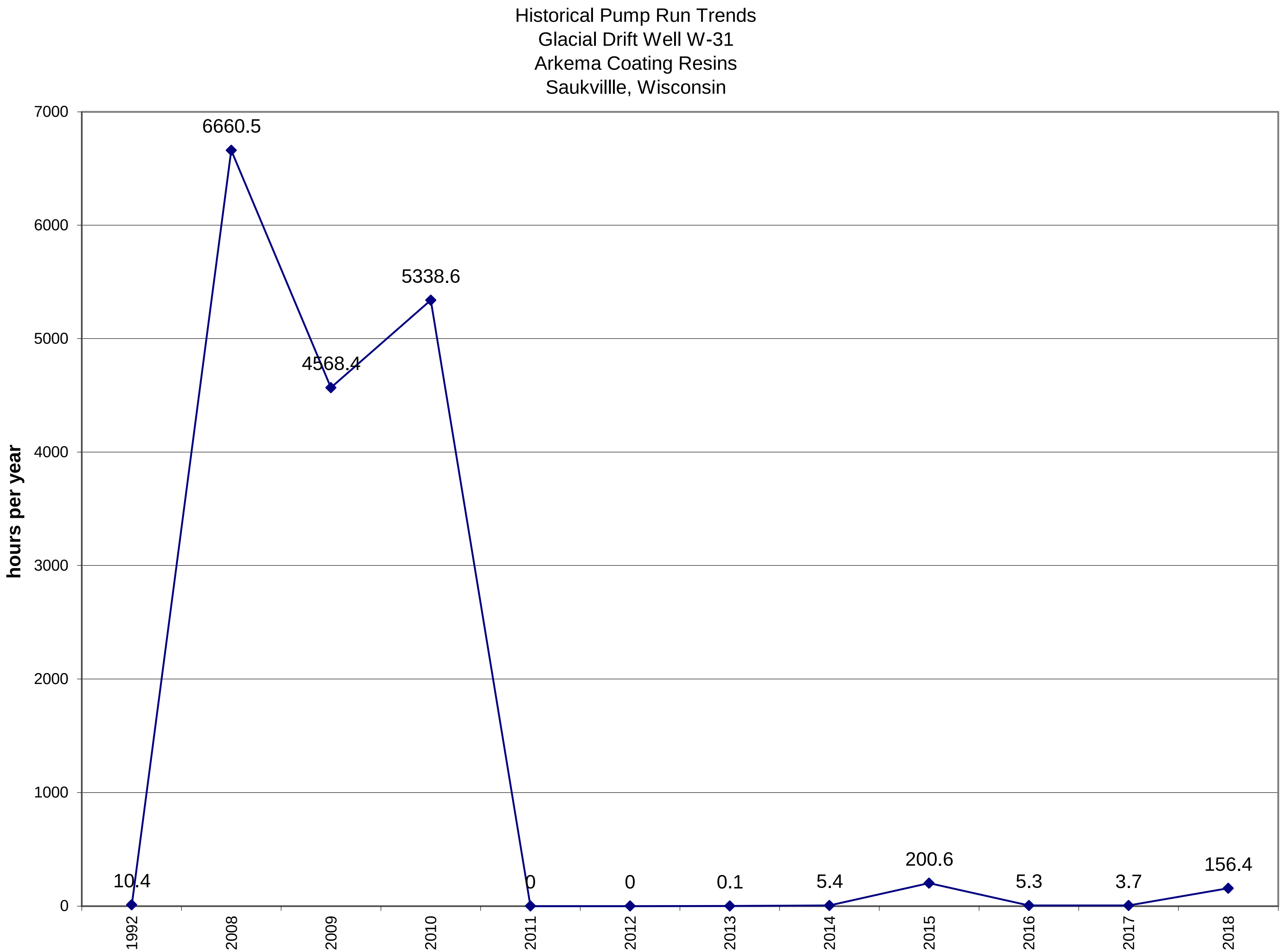


Shallow Dolomite Extraction Wells
2018 Pump Run Times
Arkema Coating Resins
Saukville, Wisconsin

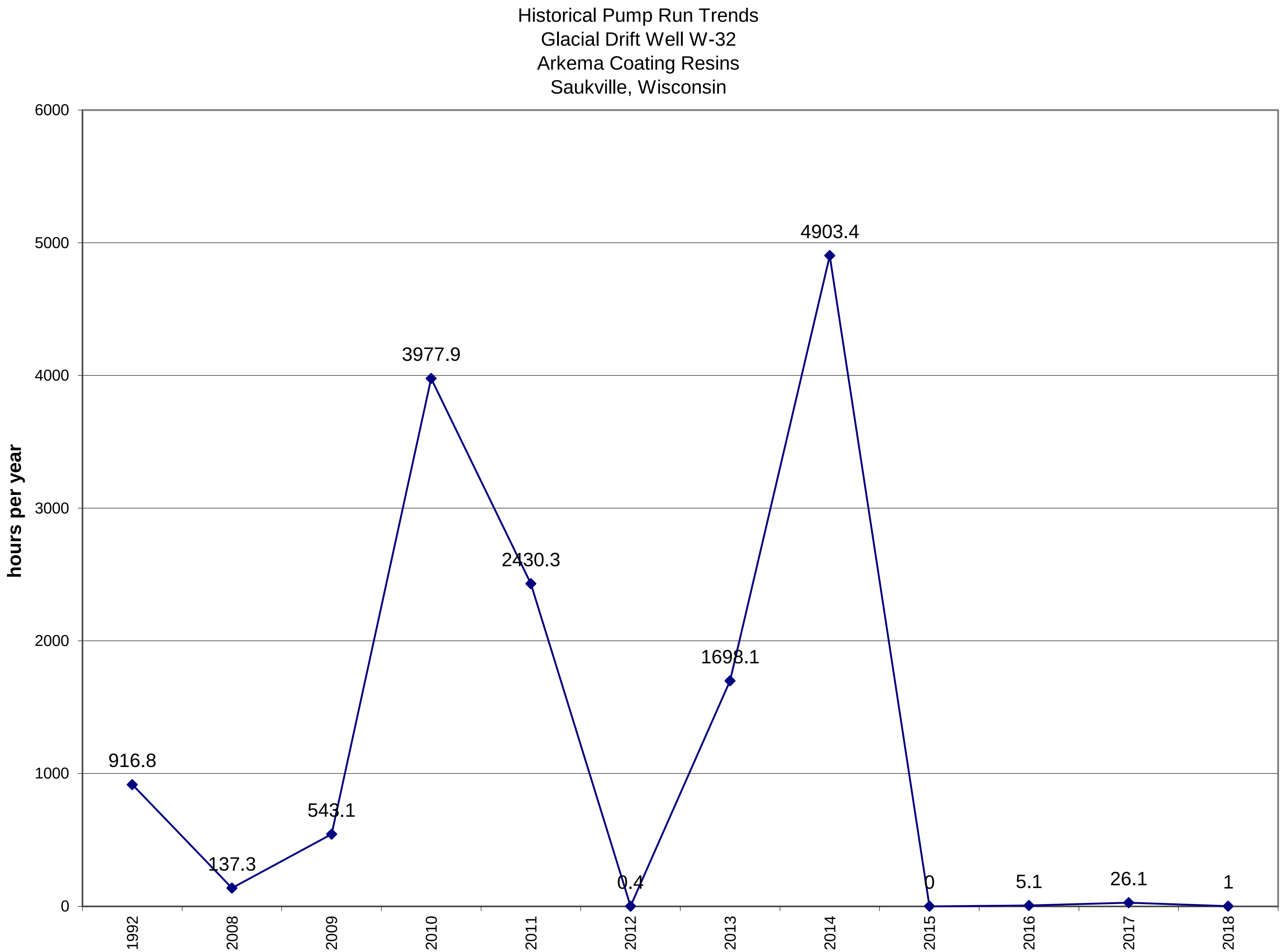


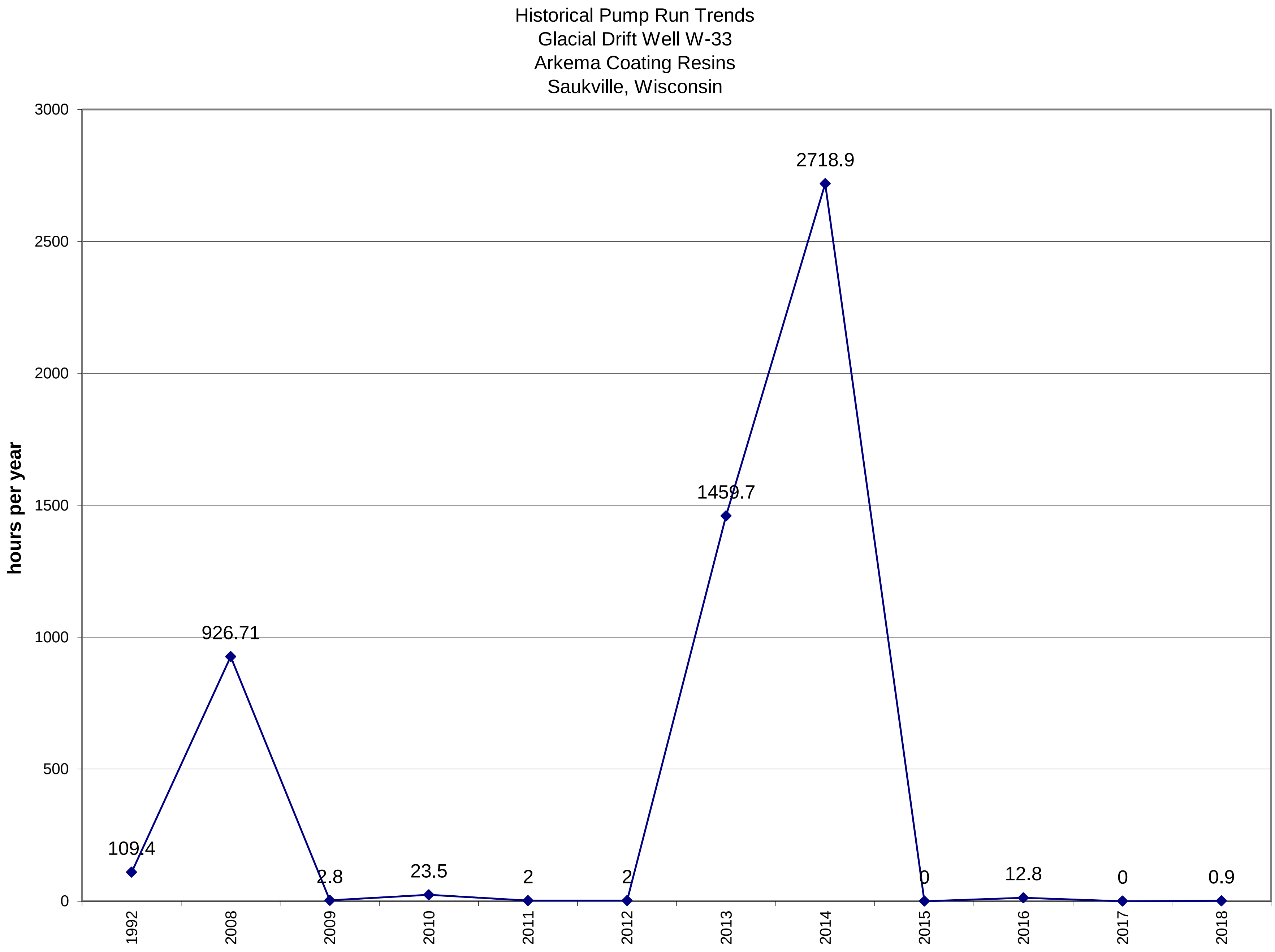
Ranney Collectors
2018 Pump Run Times
Arkema Coating Resins
Saukville, Wisconsin

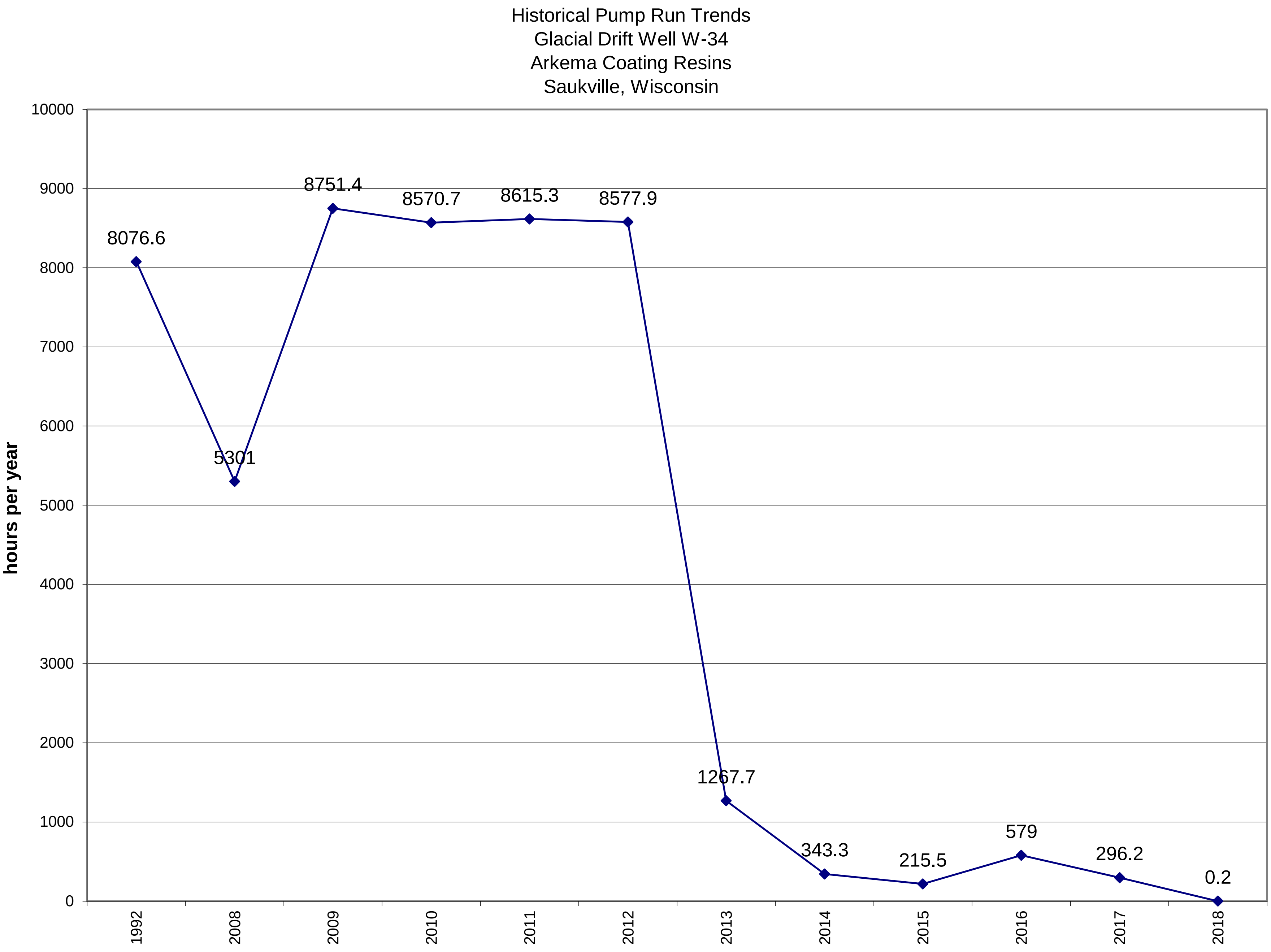


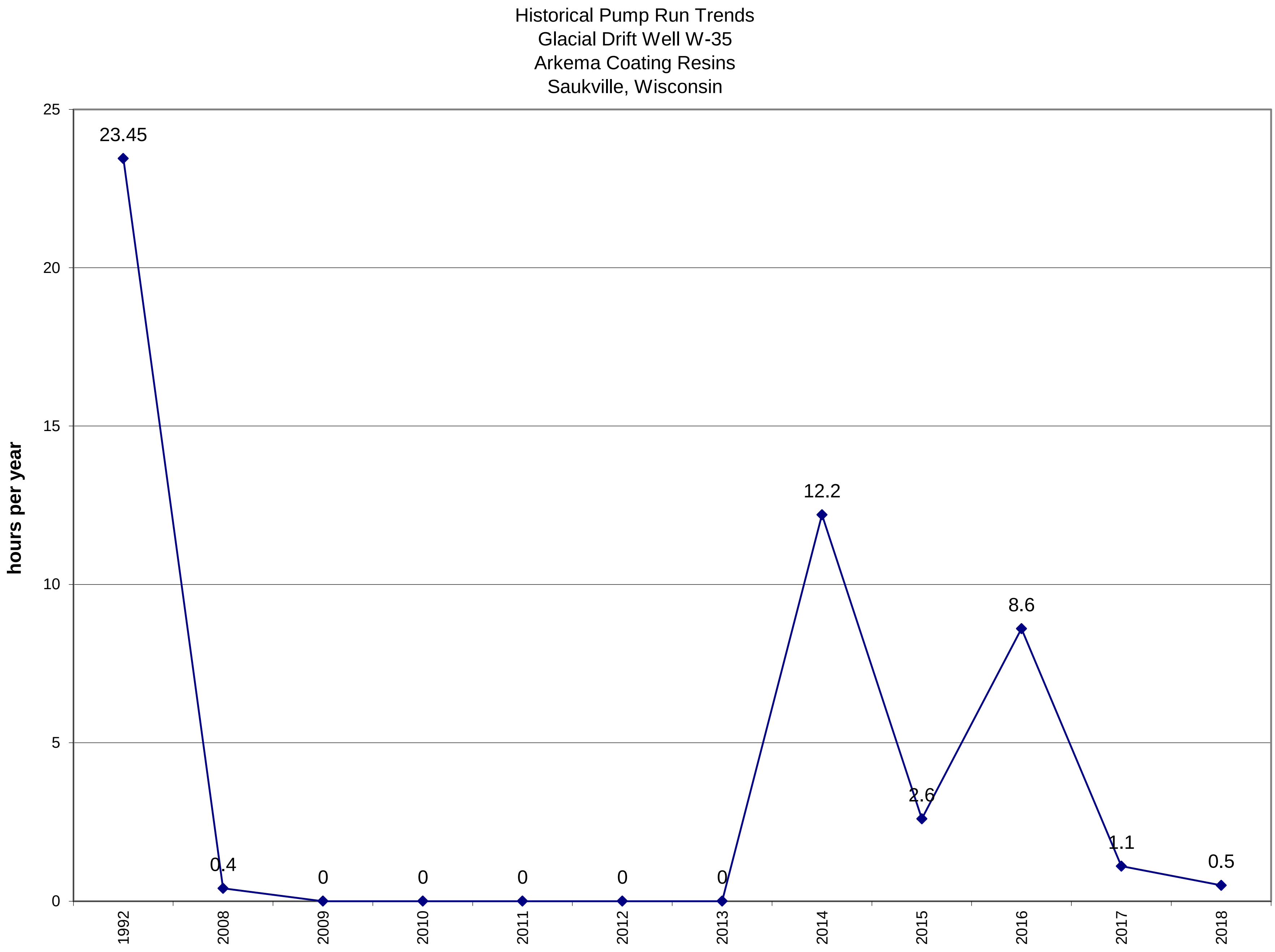


Historical Pump Run Trends
Glacial Drift Well W-31
Arkema Coating Resins
Saukvillle, Wisconsin
hours per year
7000
6000
5000
4000
3000
2000
1000
0
6660.5
5338.6
4568.4
10.4
0
0
0.1
5.4
200.6
5.3
3.7
156.4
1992
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018

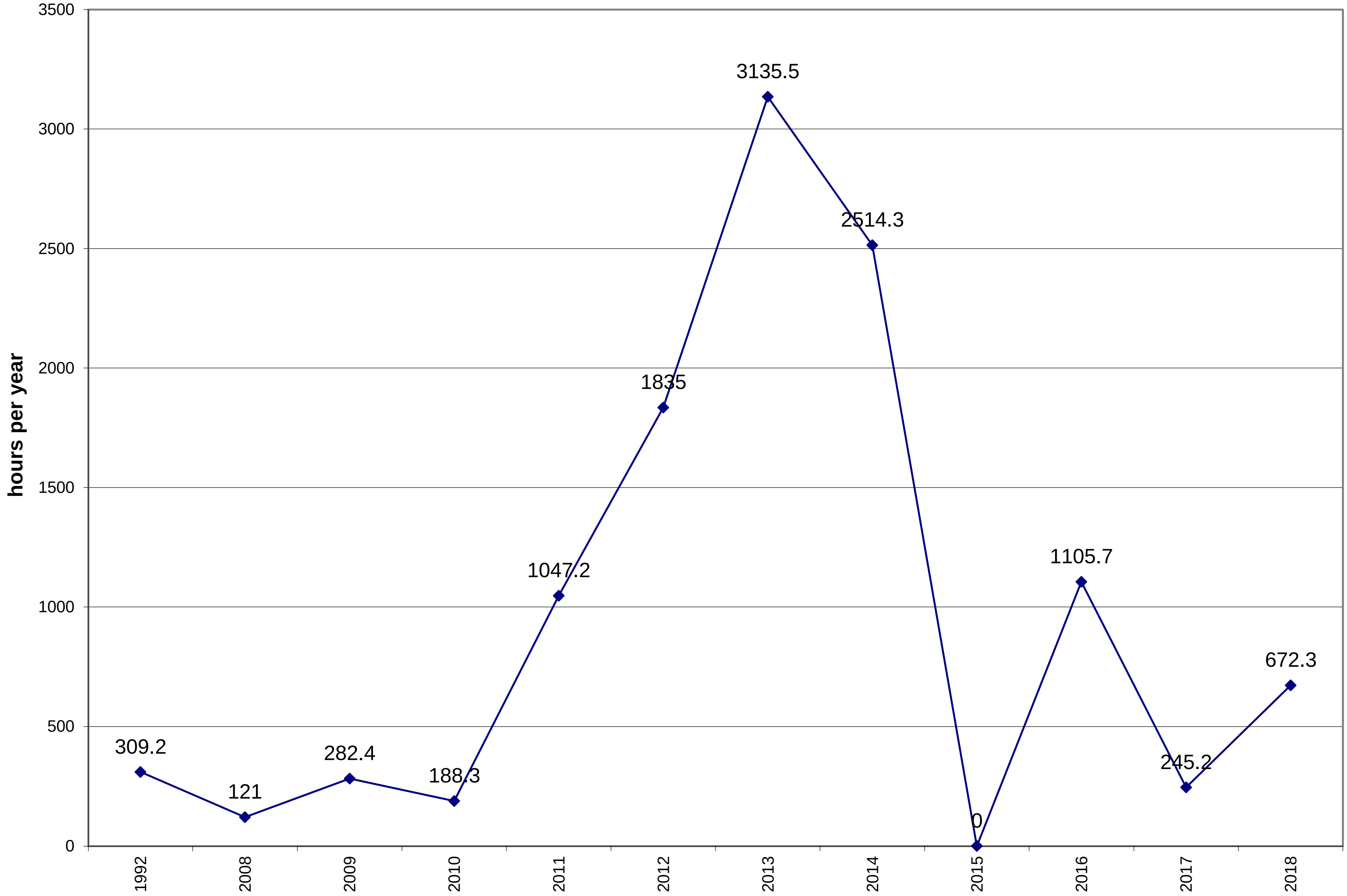

Historical Pump Run Trends
Glacial Drift Well W-32
Arkema Coating Resins
Saukville, Wisconsin
hours per year
6000
5000
4000
3000
2000
1000
0
916.8
137.3
543.1
3977.9
2430.3
0.4
1698.1
4903.4
0
5.1
26.1
1
1992
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018

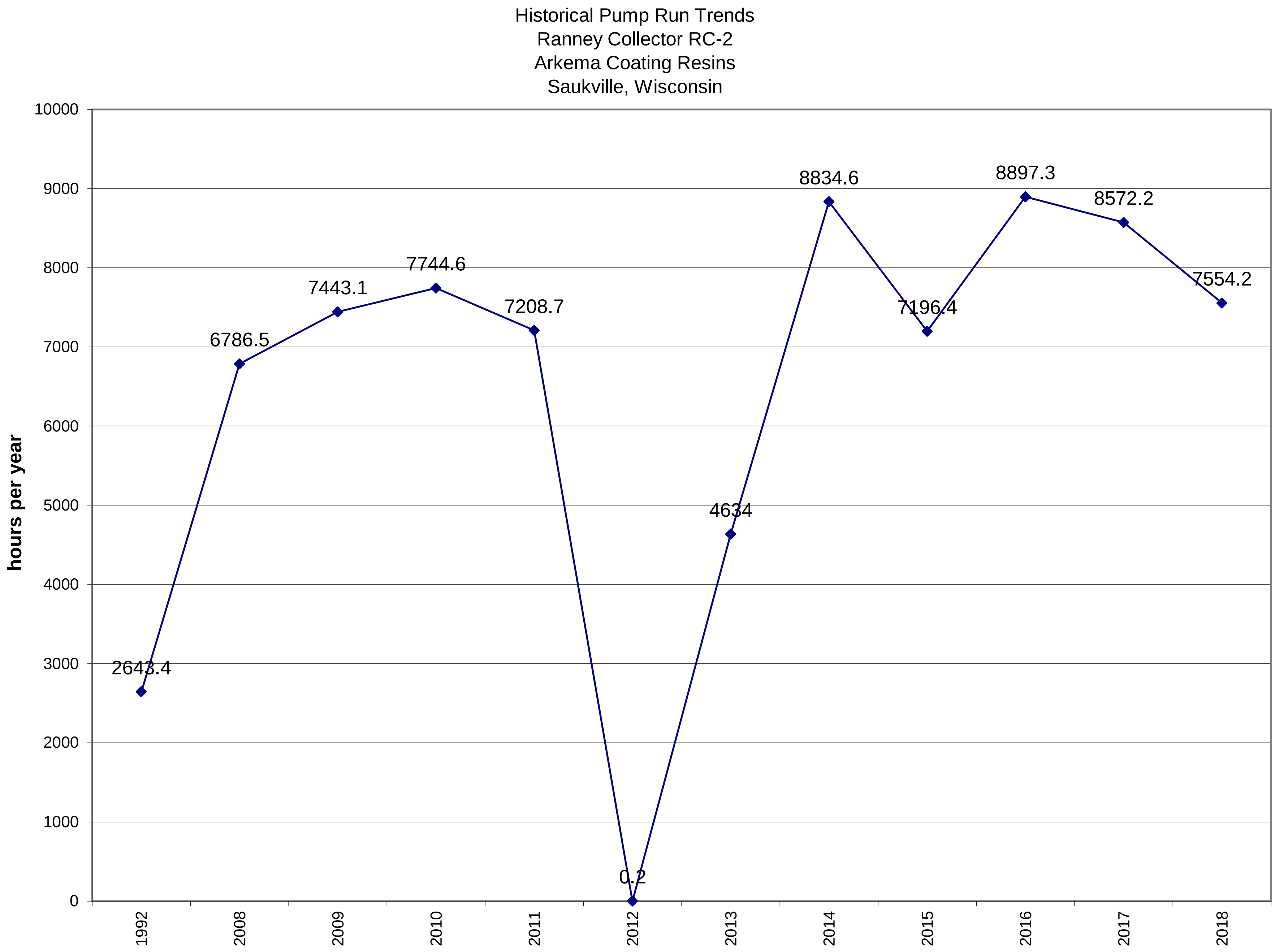

Historical Pump Run Trends
Glacial Drift Well W-33
Arkema Coating Resins
Saukville, Wisconsin
hours per year
3000
2500
2000
1500
1000
500
0
1992
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
109.4
926.71
2.8
23.5
2
2
1459.7
2718.9
0
12.8
0
0.9

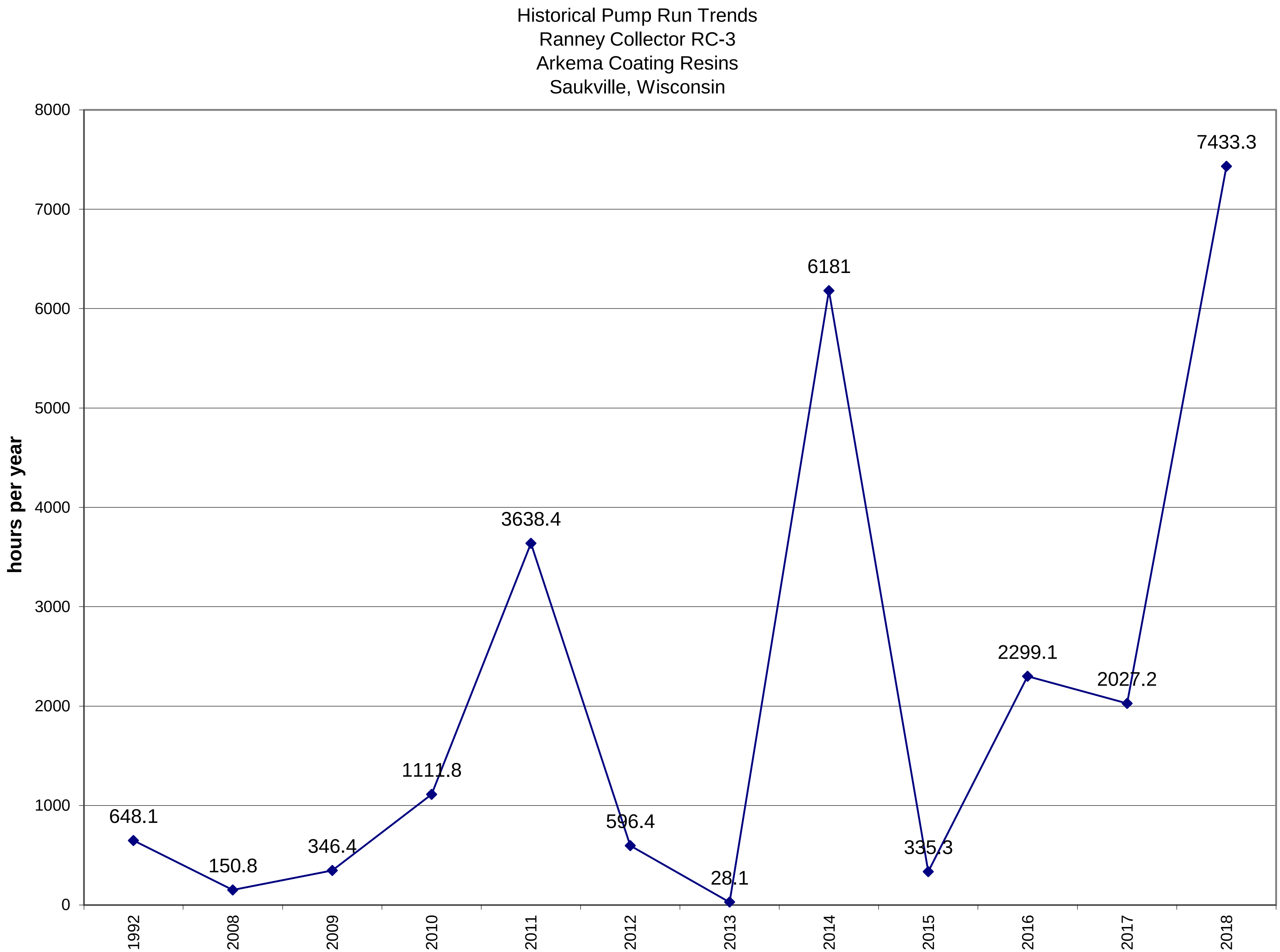

Historical Pump Run Trends
Glacial Drift Well W-34
Arkema Coating Resins
Saukville, Wisconsin
hours per year
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
8076.6
5301
8751.4
8570.7
8615.3
8577.9
1267.7
343.3
215.5
579
296.2
0.2
1992
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018

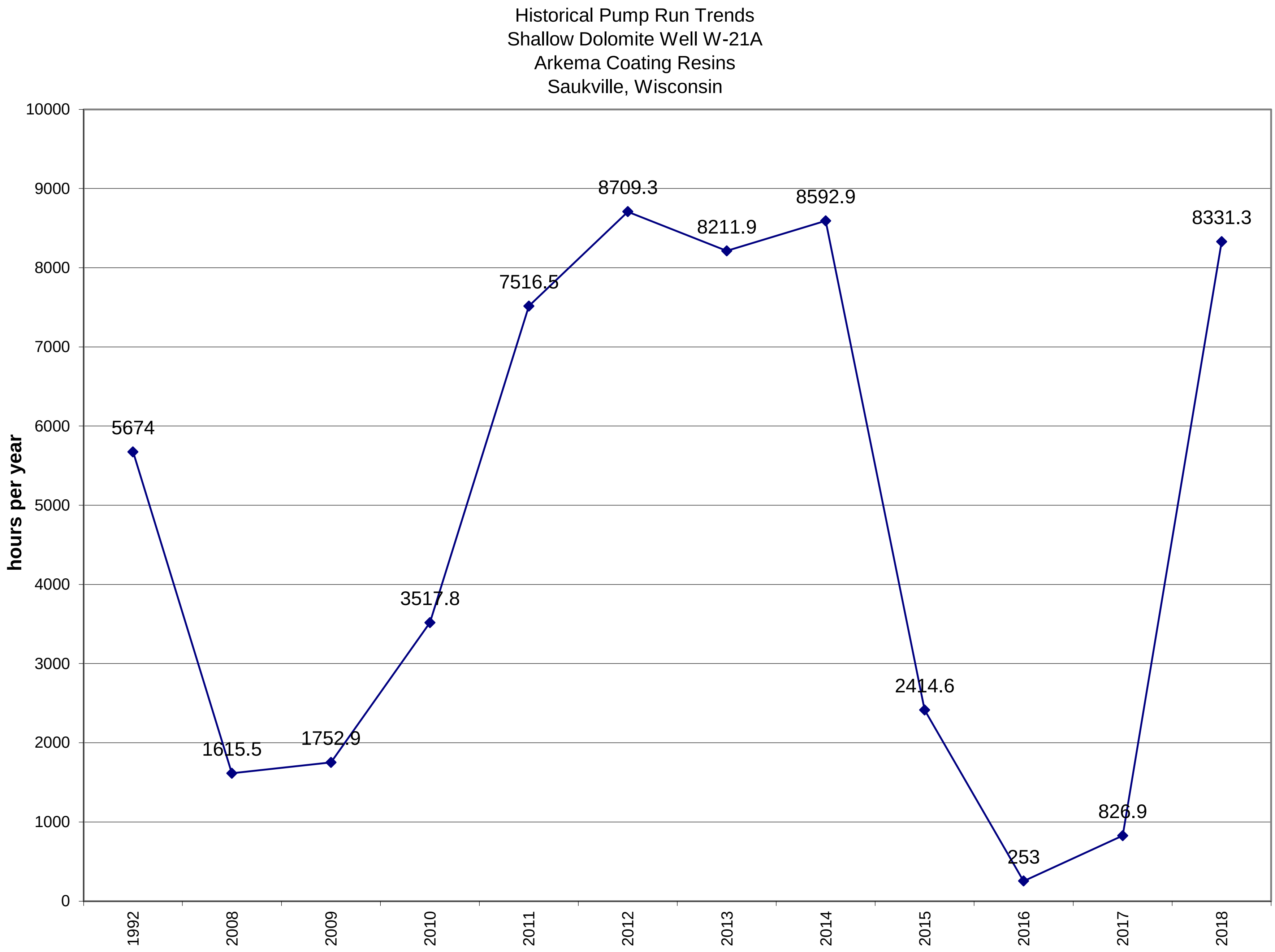

Historical Pump Run Trends
Glacial Drift Well W-35
Arkema Coating Resins
Saukville, Wisconsin
hours per year
25
20
15
10
5
0
23.45
0.4
0
0
0
0
0
12.2
2.6
8.6
1.1
0.5
1992
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018

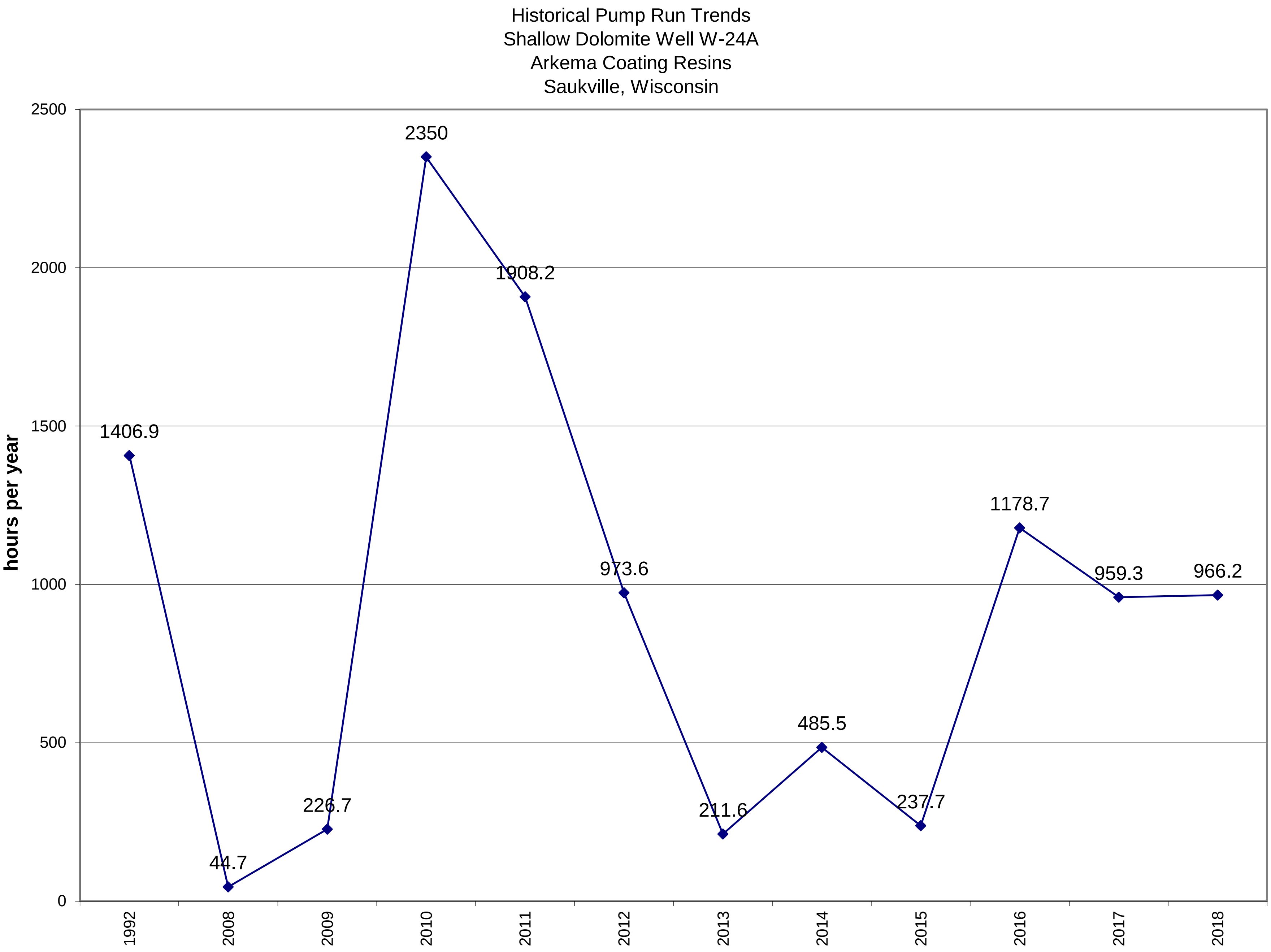
Historical Pump Run Trends
Ranney Collector RC-1
Arkema Coating Resins
Saukville, Wisconsin




Historical Pump Run Trends
Ranney Collector RC-2
Arkema Coating Resins
Saukville, Wisconsin
hours per year
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
2643.4
6786.5
7443.1
7744.6
7208.7
0.2
4634
8834.6
7196.4
8897.3
8572.2
7554.2
1992
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018

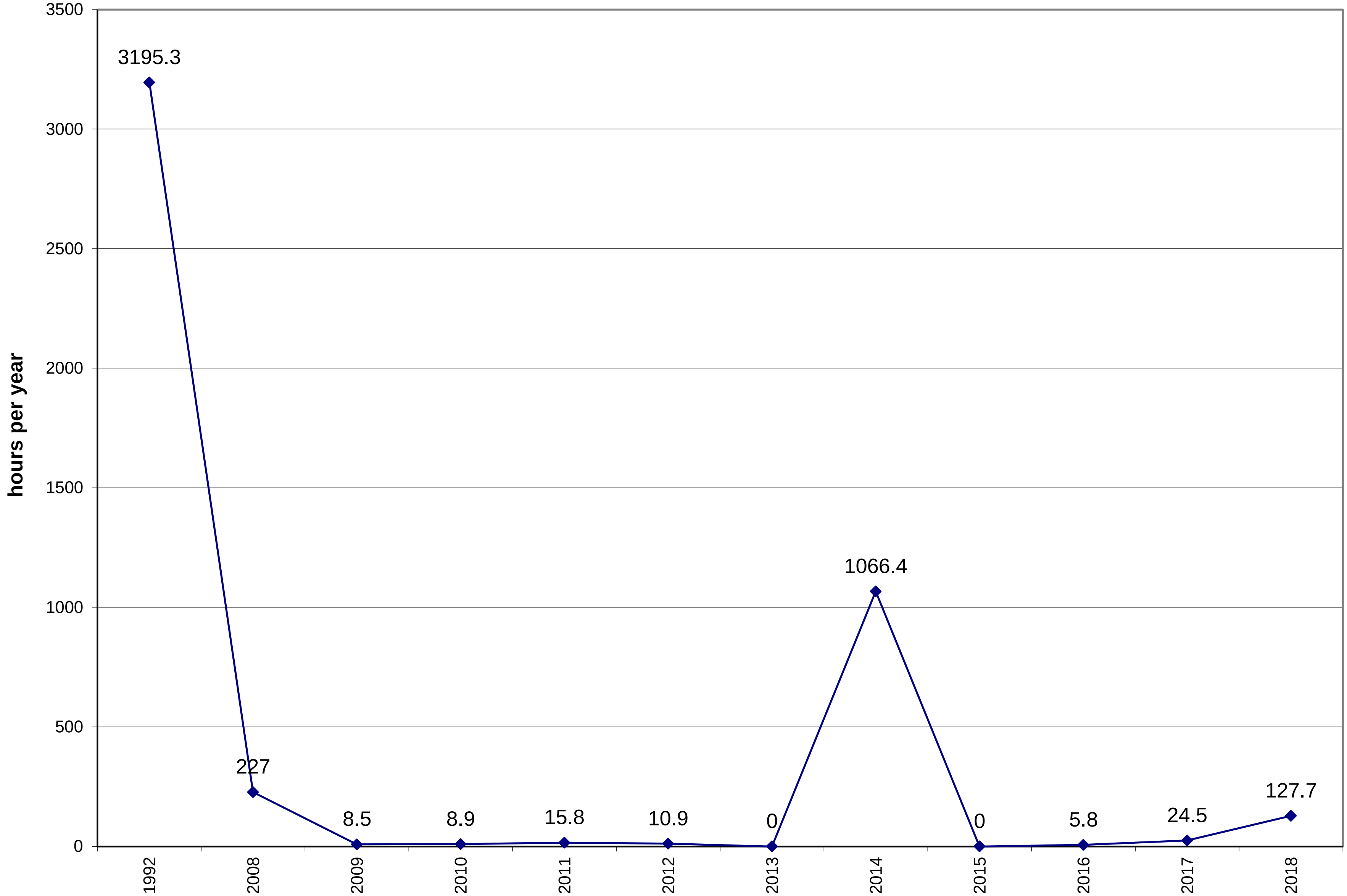

Historical Pump Run Trends
Ranney Collector RC-3
Arkema Coating Resins
Saukville, Wisconsin
hours per year
0
1000
2000
3000
4000
5000
6000
7000
8000
648.1
150.8
346.4
1111.8
3638.4
596.4
28.1
6181
335.3
2299.1
2027.2
7433.3
1992
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018

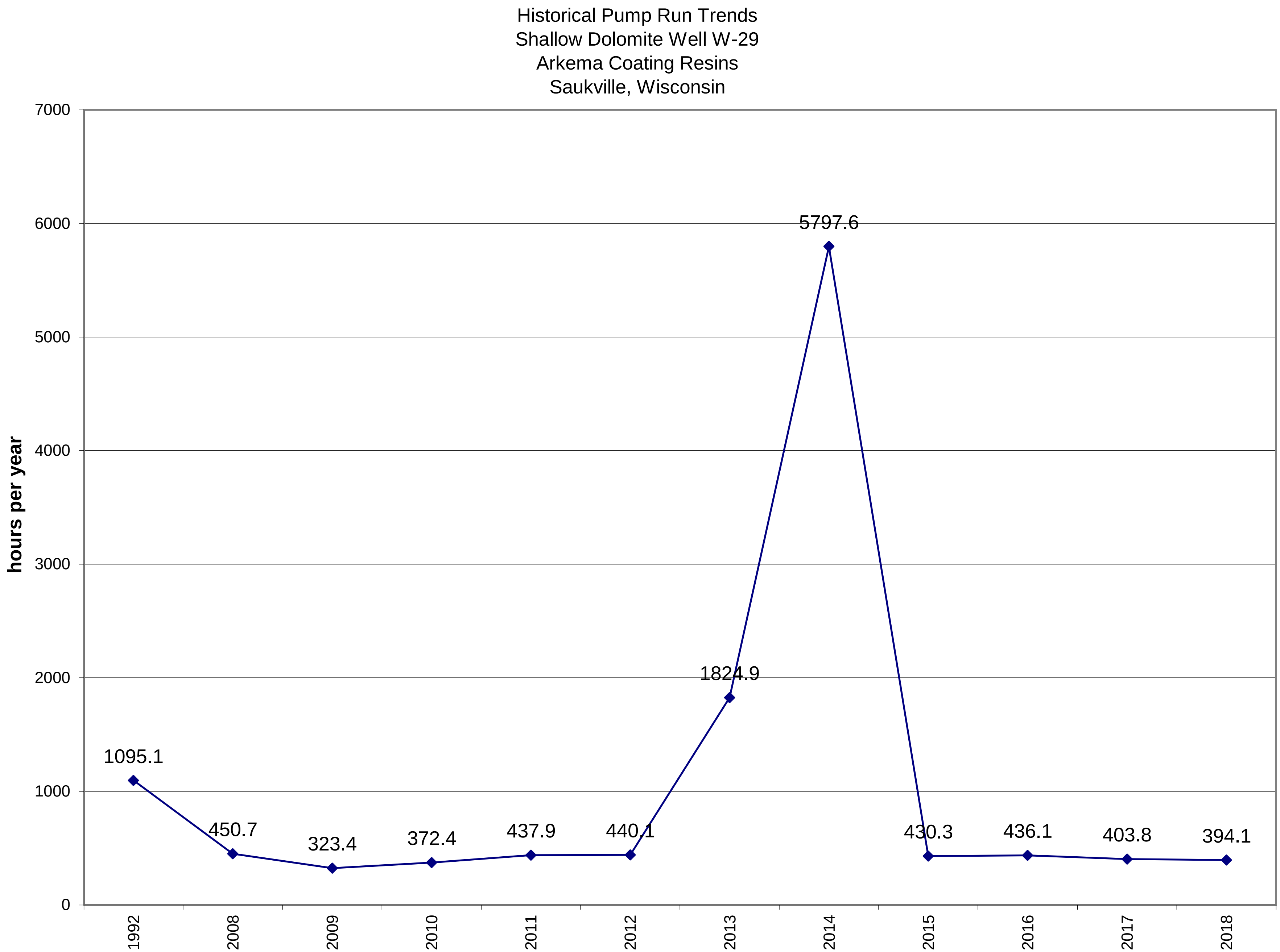

Historical Pump Run Trends
Shallow Dolomite Well W-21A
Arkema Coating Resins
Saukville, Wisconsin
hours per year
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
1992
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
5674
1615.5
1752.9
3517.8
7516.5
8709.3
8211.9
8592.9
2414.6
253
826.9
8331.3

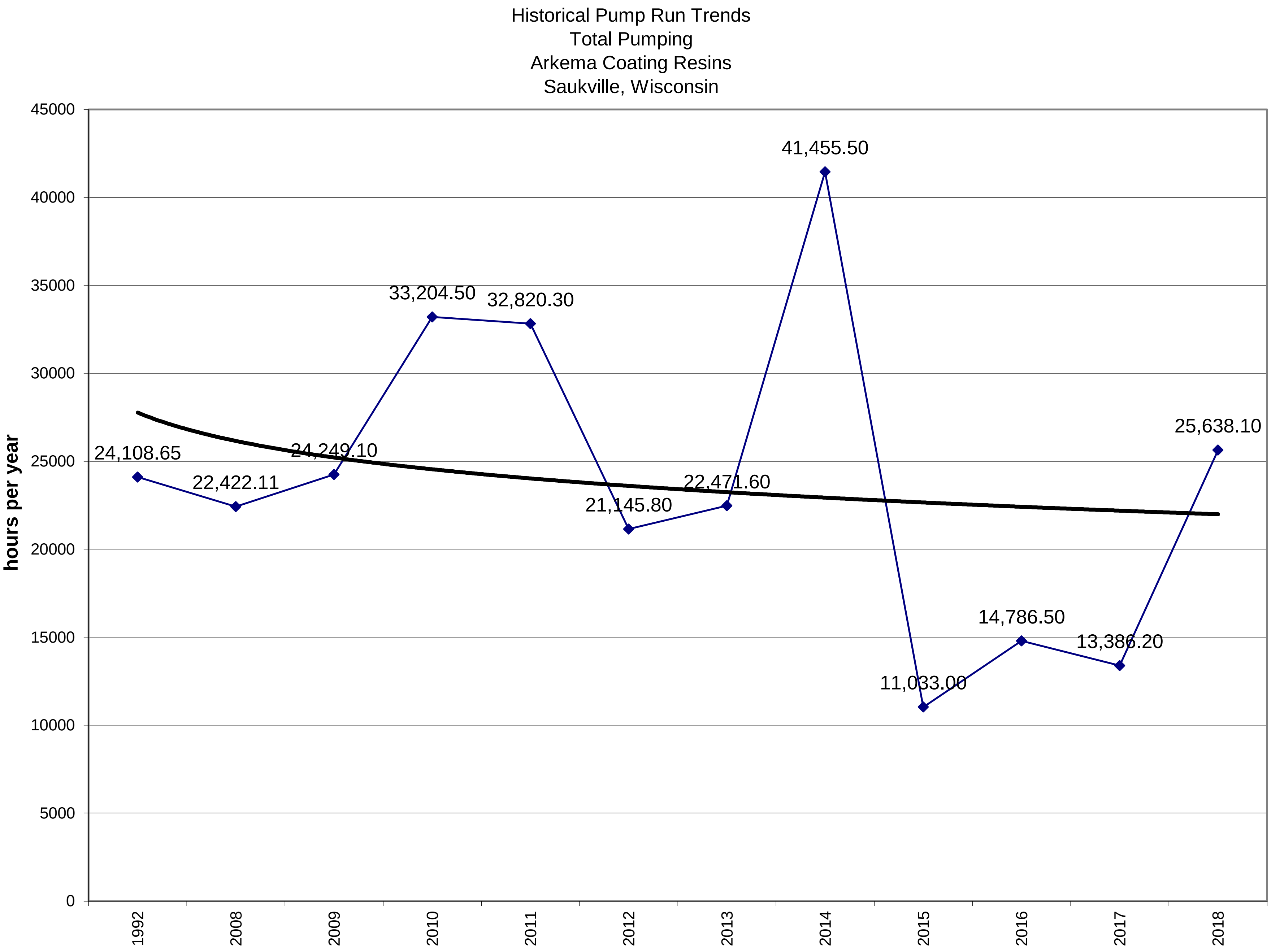


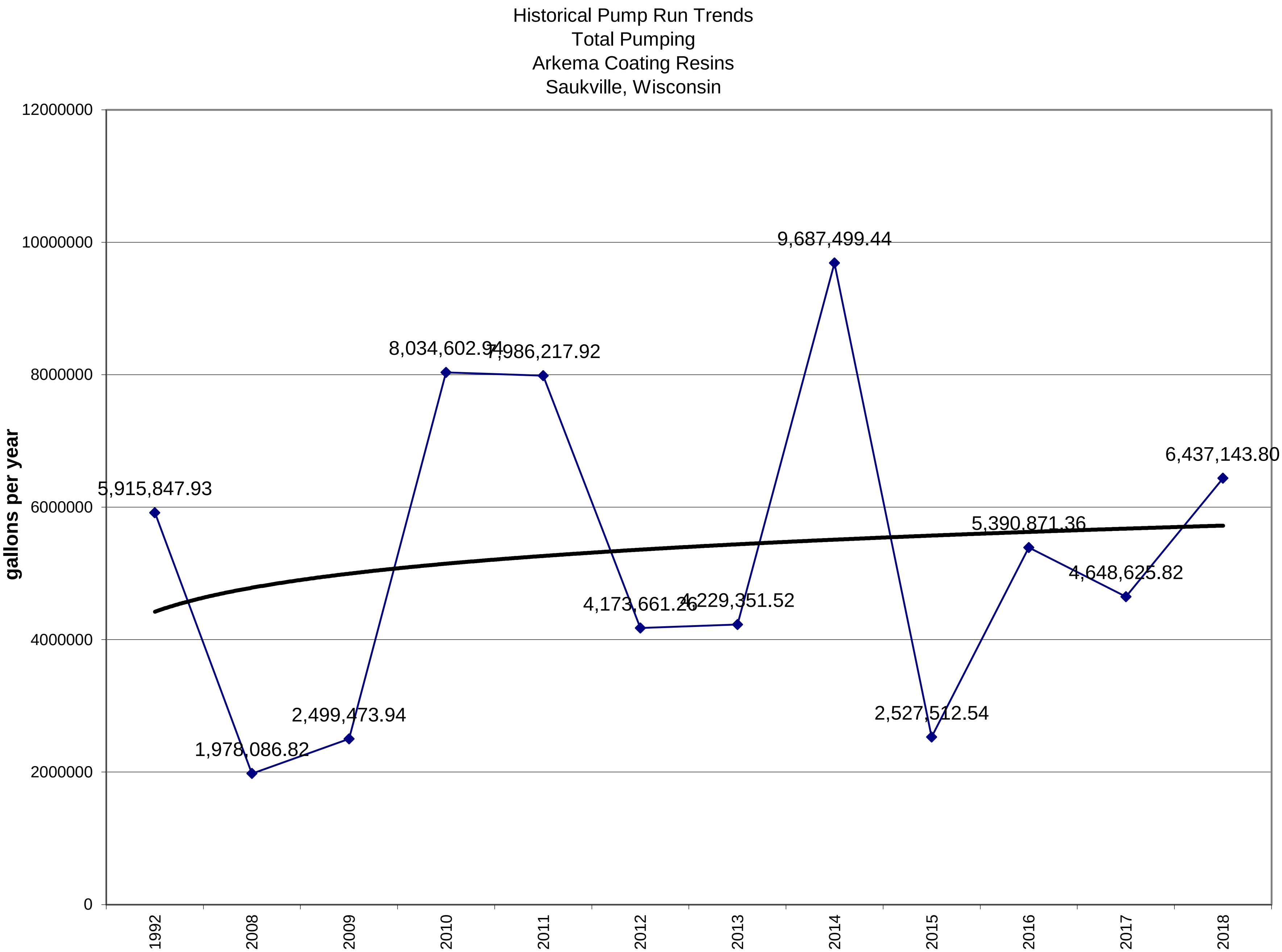
Historical Pump Run Trends
Shallow Dolomite Well W-24A
Arkema Coating Resins
Saukville, Wisconsin
hours per year
2500
2000
1500
1000
500
0
2350
1908.2
1406.9
1178.7
973.6
959.3
966.2
485.5
226.7
211.6
237.7
44.7
1992
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018

Historical Pump Run Trends
Shallow Dolomite Well W-28
Arkema Coating Resins
Saukville, Wisconsin




Historical Pump Run Trends
Shallow Dolomite Well W-29
Arkema Coating Resins
Saukville, Wisconsin
hours per year
7000
6000
5000
4000
3000
2000
1000
0
1095.1
450.7
323.4
372.4
437.9
440.1
1824.9
5797.6
430.3
436.1
403.8
394.1
1992
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018


Historical Pump Run Trends
Total Pumping
Arkema Coating Resins
Saukville, Wisconsin
hours per year
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
24,108.65
22,422.11
24,249.10
33,204.50
32,820.30
21,145.80
22,471.60
41,455.50
11,033.00
14,786.50
13,386.20
25,638.10
1992
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018


Historical Pump Run Trends
Total Pumping
Arkema Coating Resins
Saukville, Wisconsin
gallons per year
12000000
10000000
8000000
6000000
4000000
2000000
0
1992
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
5,915,847.93
1,978,086.82
2,499,473.94
8,034,602.94
7,986,217.92
4,173,661.26
4,229,351.52
9,687,499.44
2,527,512.54
5,390,871.36
4,648,625.82
6,437,143.80

APPENDIX C

HYDROGEOLOGIC CALCULATIONS

Hydrogeological Calculations
Fall 2018
Arkema Coating Resins
Saukville, Wisconsin

Horizontal Gradient

Glacial Drift Unit

$$i = \frac{dH}{dL} = \frac{22.98}{850} = 0.027 \quad \text{(eastward)}$$

W-27	770.76
W-3B	747.78
dL	850

Shallow and Deep Dolomite Units

$$i = \frac{dH}{dL} = \frac{81.57}{210} = 0.388 \quad \text{eastward}$$

W-22	763.09
W-30	681.52
dL	210

$$i = \frac{dH}{dL} = \frac{76.43}{450} = 0.170 \quad \text{westward}$$

W-40	757.95
W-30	681.52
dL	450

Vertical Gradient

Between glacial drift unit and shallow dolomite unit

W-18A/W-22 Fall 2018 Water Level Data

D_{Center} (772.29-66) +(0.5*40) = 726.29

$$Iv = \frac{S_{WL} - D_{WL}}{S_{WL} - D_{Center}}$$

S_{WL} = 770.02 W-18A
D_{WL} = 763.09 W-22
0.16 (downward)

W-3B/W-3A Fall 2018 Water Level Data

D_{Center} (769.31-234) +(0.5*147) = 608.81

$$Iv = \frac{S_{WL} - D_{WL}}{S_{WL} - D_{Center}}$$

S_{WL} = 747.78 W-3B
D_{WL} = 747.56 W-3A
0.00

W-43/W-38 Fall 2018 Water Level Data

D_{Center} (768.75-49) +(0.5*16.8) = 728.15

$$Iv = \frac{S_{WL} - D_{WL}}{S_{WL} - D_{Center}}$$

S_{WL} = 764.45 W-43
D_{WL} = 755.51 W-38
0.25 (downward)

W-49/W-50 Fall 2018 Water Level Data

D_{Center} (765.74-31) +(0.5*5) = 737.24

$$Iv = \frac{S_{WL} - D_{WL}}{S_{WL} - D_{Center}}$$

S_{WL} = 756.84 W-49
D_{WL} = 754.78 W-50
0.11 (downward)

W-16A/W-40 Fall 2018 Water Level Data

D_{Center} (768.36-48) +(0.5*20) = 730.36

$$Iv = \frac{S_{WL} - D_{WL}}{S_{WL} - D_{Center}}$$

S_{WL} = 764.48 W-16A
D_{WL} = 757.95 W-40
0.19 (downward)

W-51/W-52 Fall 2018 Water Level Data

D_{Center} (773.01-35) +(0.5*5) = 740.51

$$Iv = \frac{S_{WL} - D_{WL}}{S_{WL} - D_{Center}}$$

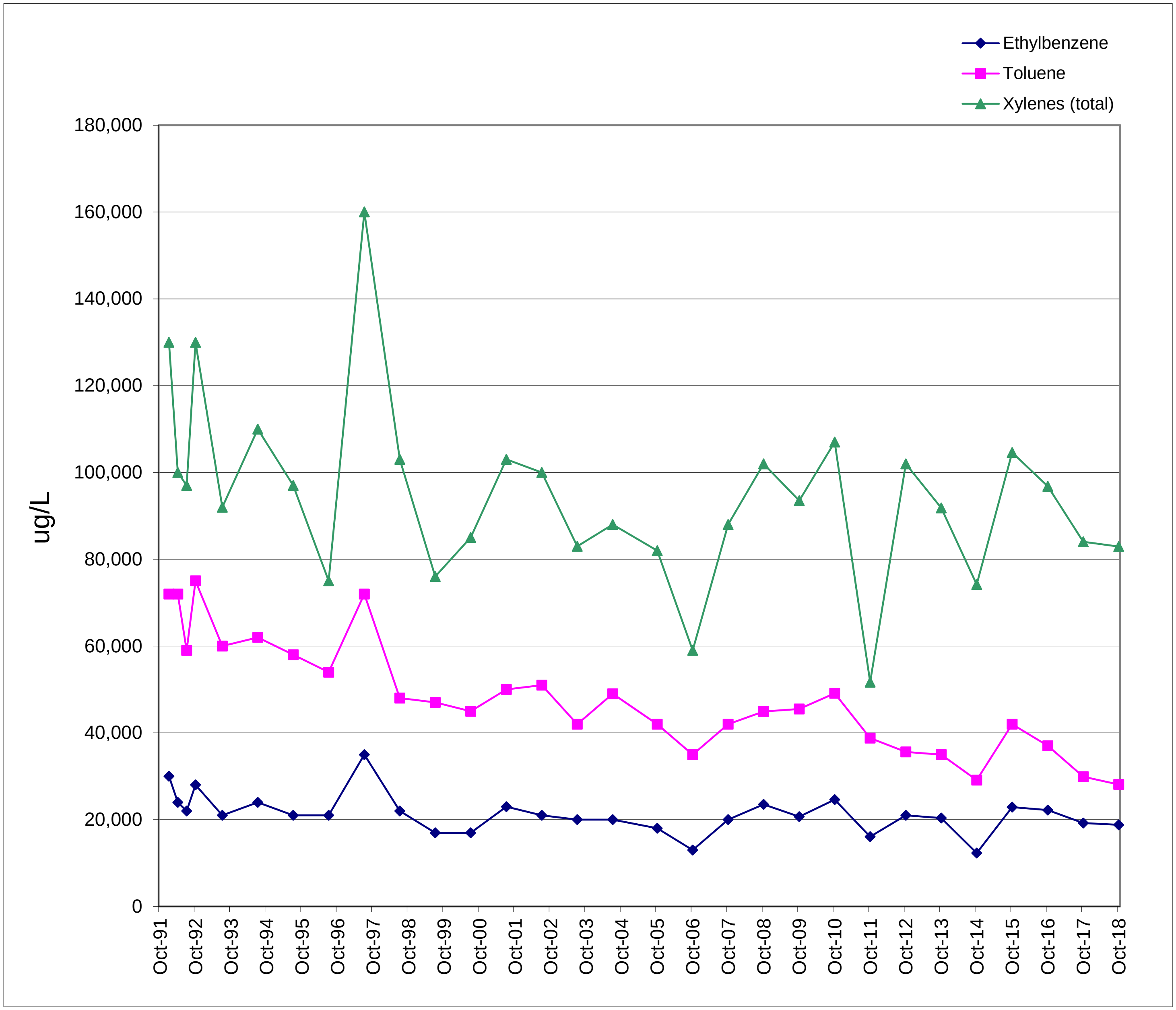
S_{WL} = 754.93 W-51
D_{WL} = 762.89 W-52
-0.55 (upward)

APPENDIX D

INDIVIDUAL CONTAMINANT TRENDS: 1992-2018

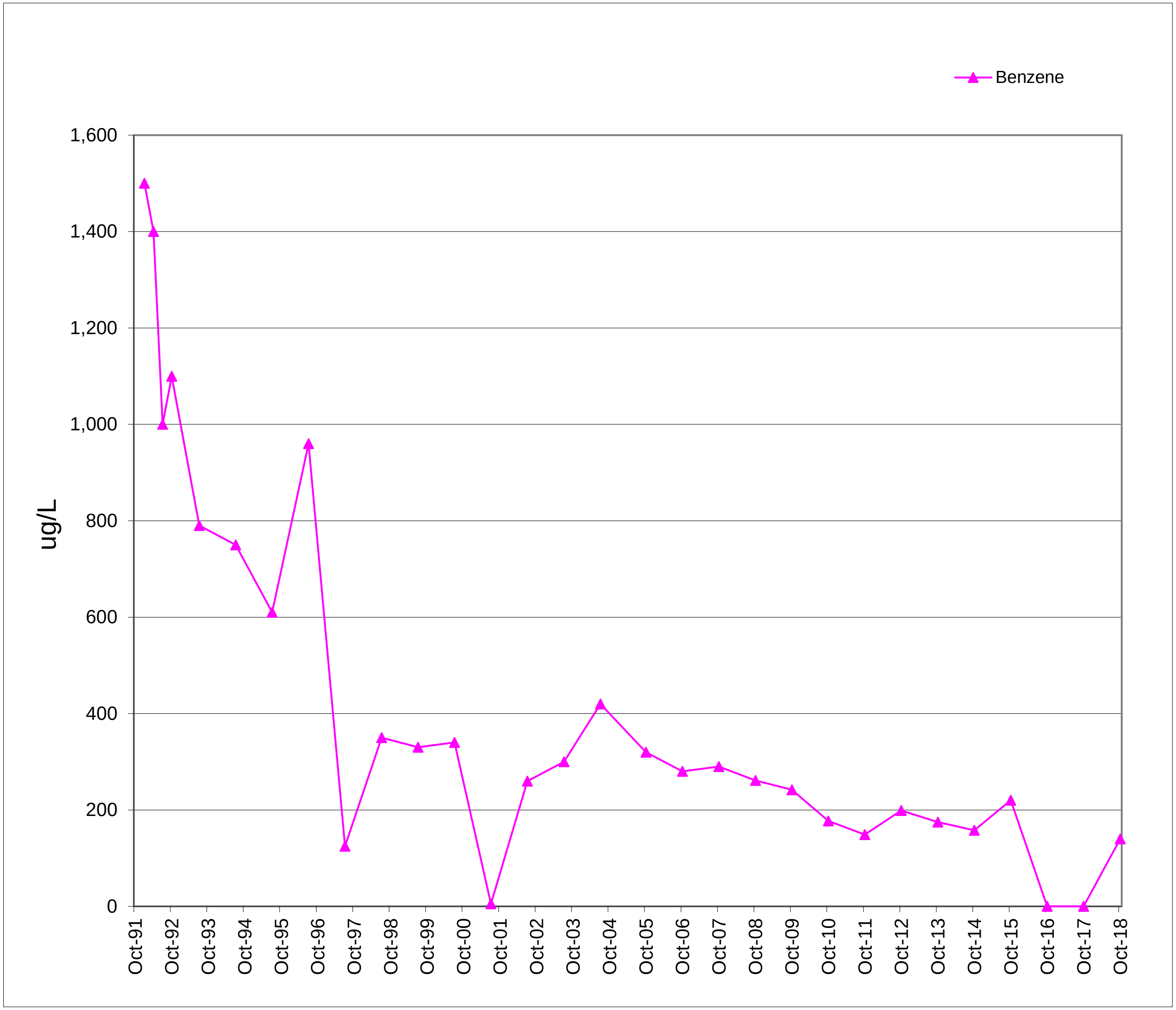
W-06A VOC

Remediation Progress - Glacial Drift



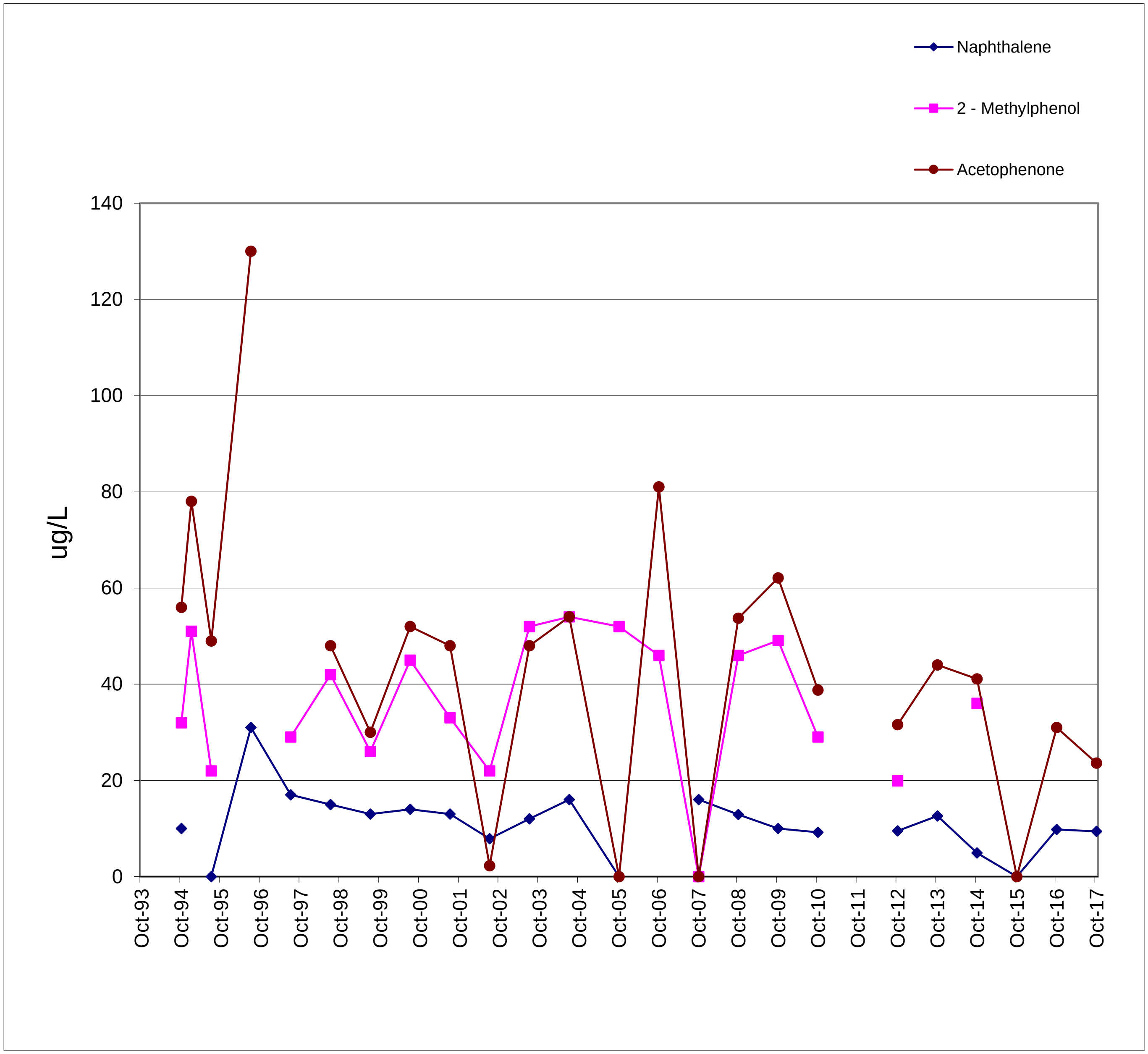
W-06A VOC

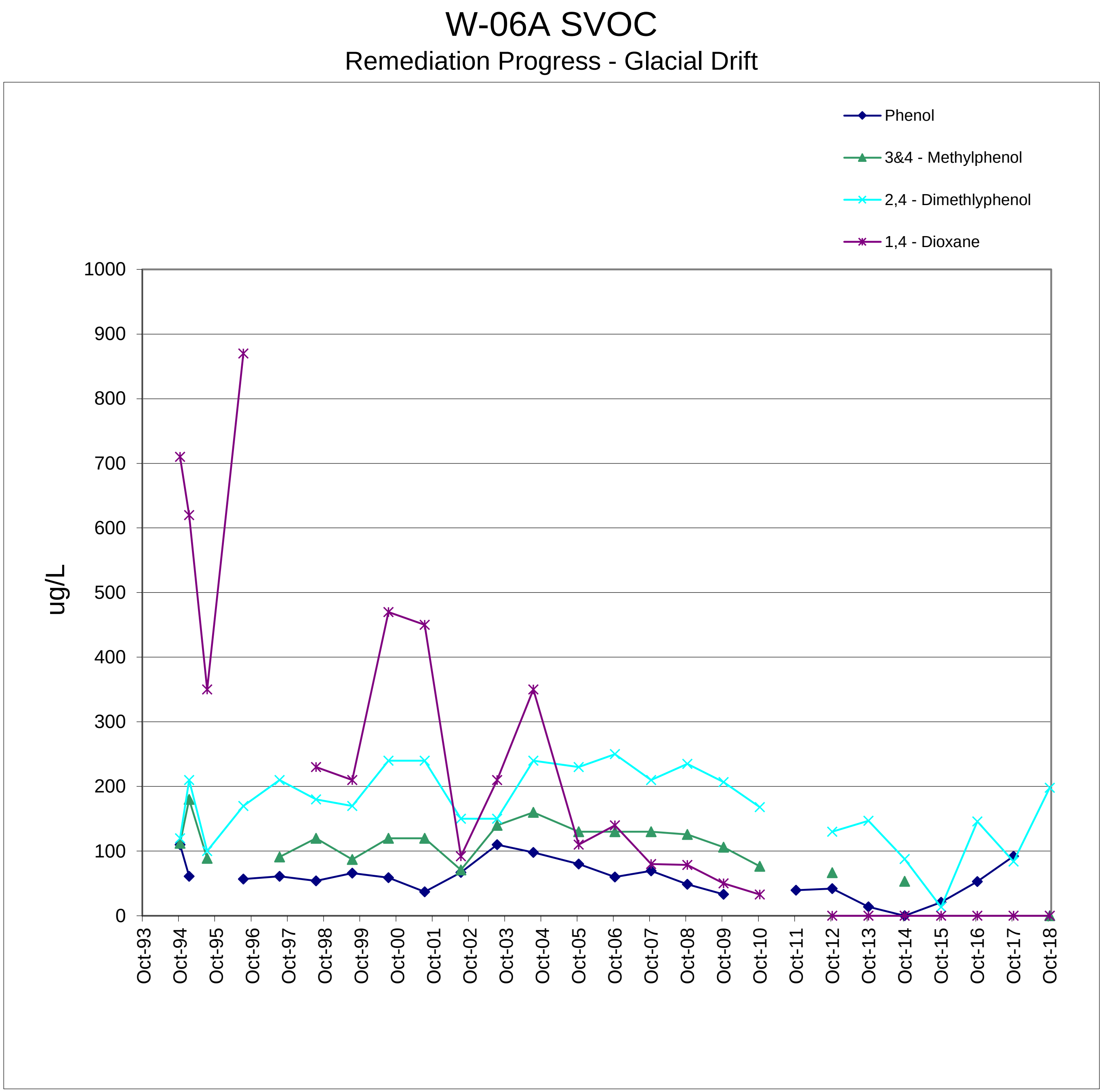
Remediation Progress - Glacial Drift



W-06A SVOC

Remediation Progress - Glacial Drift

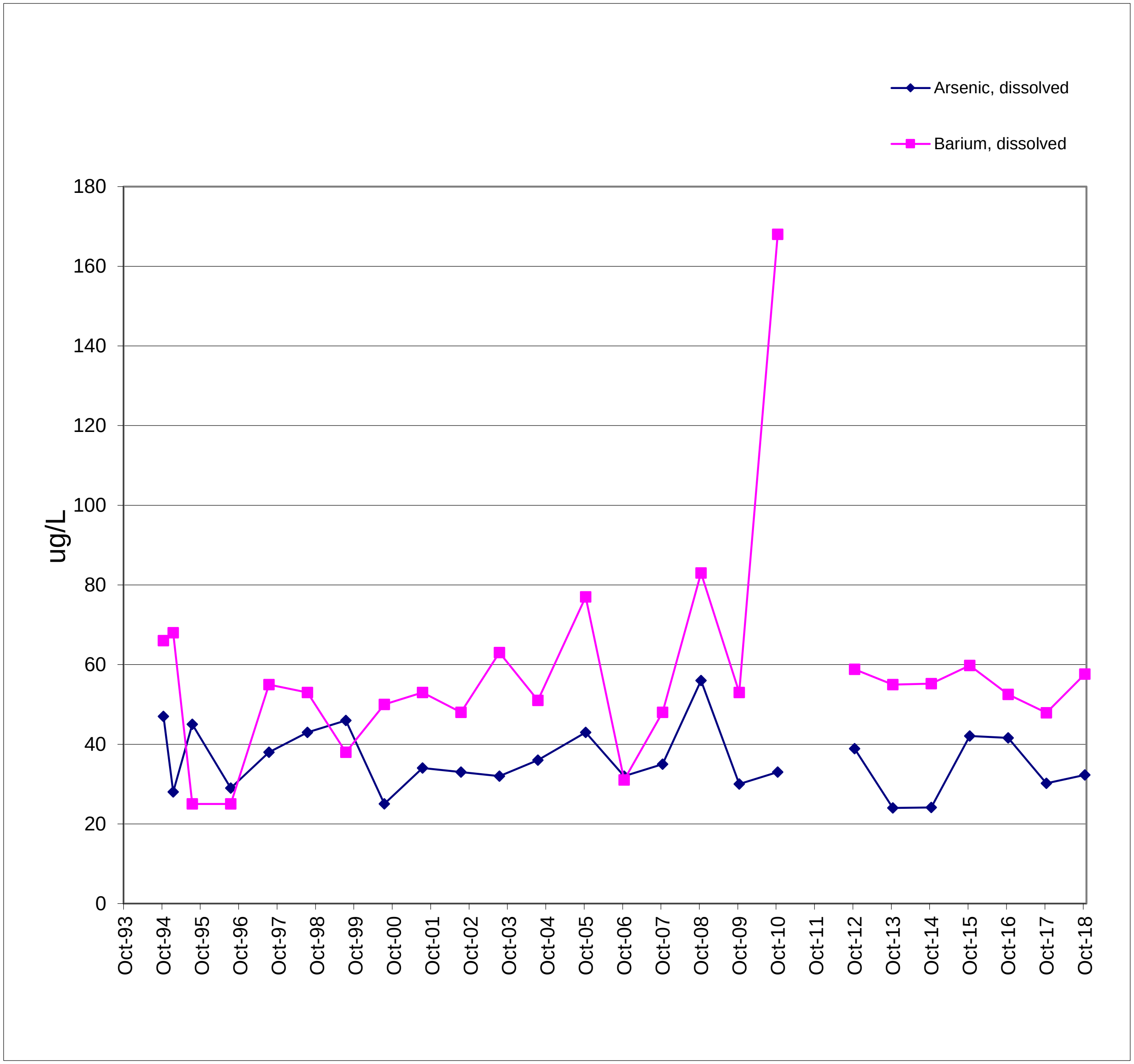




W-06A SVOC
Remediation Progress - Glacial Drift
Phenol
3&4 - Methylphenol
2,4 - Dimethlyphenol
1,4 - Dioxane
ug/L
1000
900
800
700
600
500
400
300
200
100
0
Oct-93
Oct-94
Oct-95
Oct-96
Oct-97
Oct-98
Oct-99
Oct-00
Oct-01
Oct-02
Oct-03
Oct-04
Oct-05
Oct-06
Oct-07
Oct-08
Oct-09
Oct-10
Oct-11
Oct-12
Oct-13
Oct-14
Oct-15
Oct-16
Oct-17
Oct-18

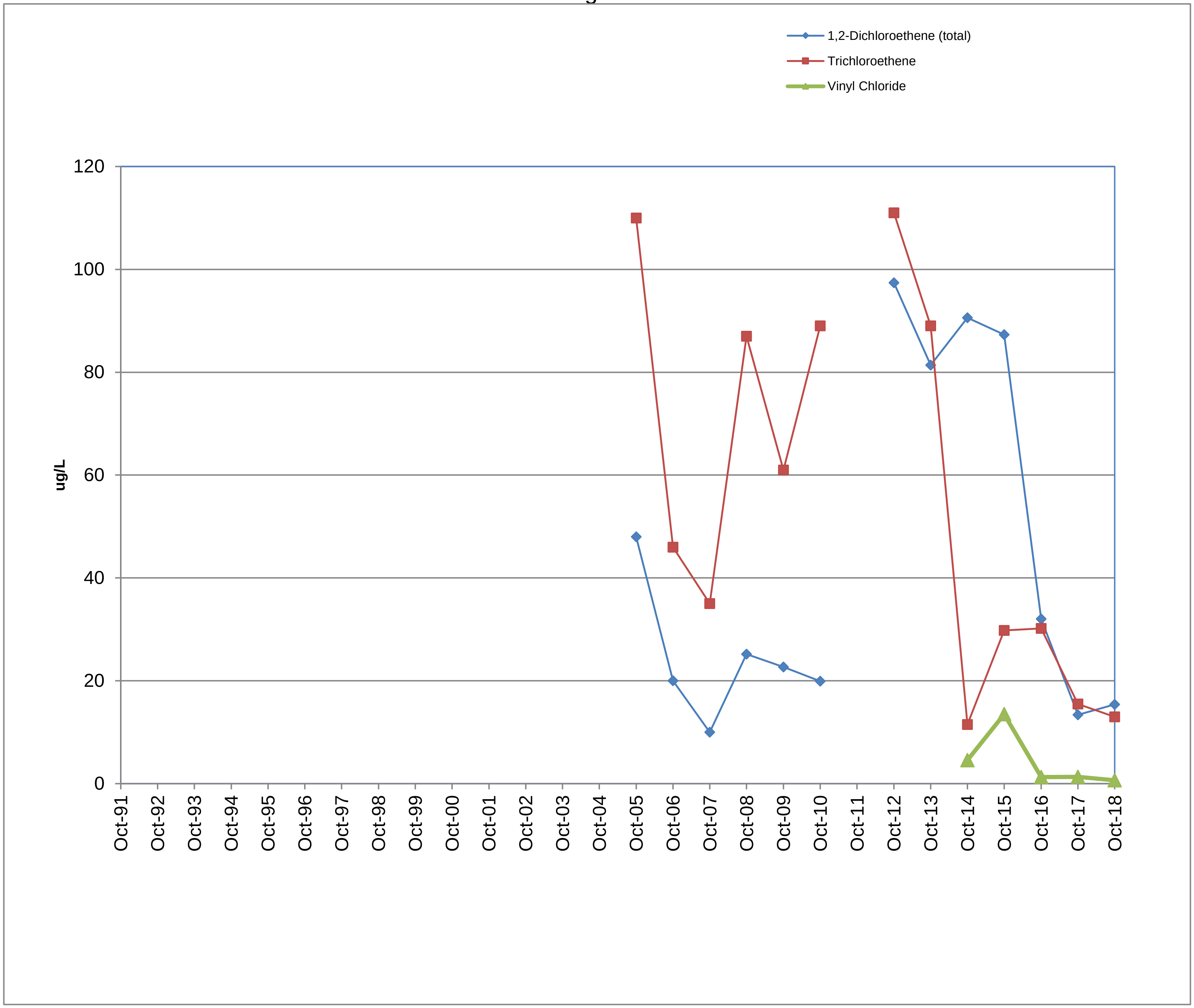
W-06A Metals

Remediation Progress - Glacial Drift



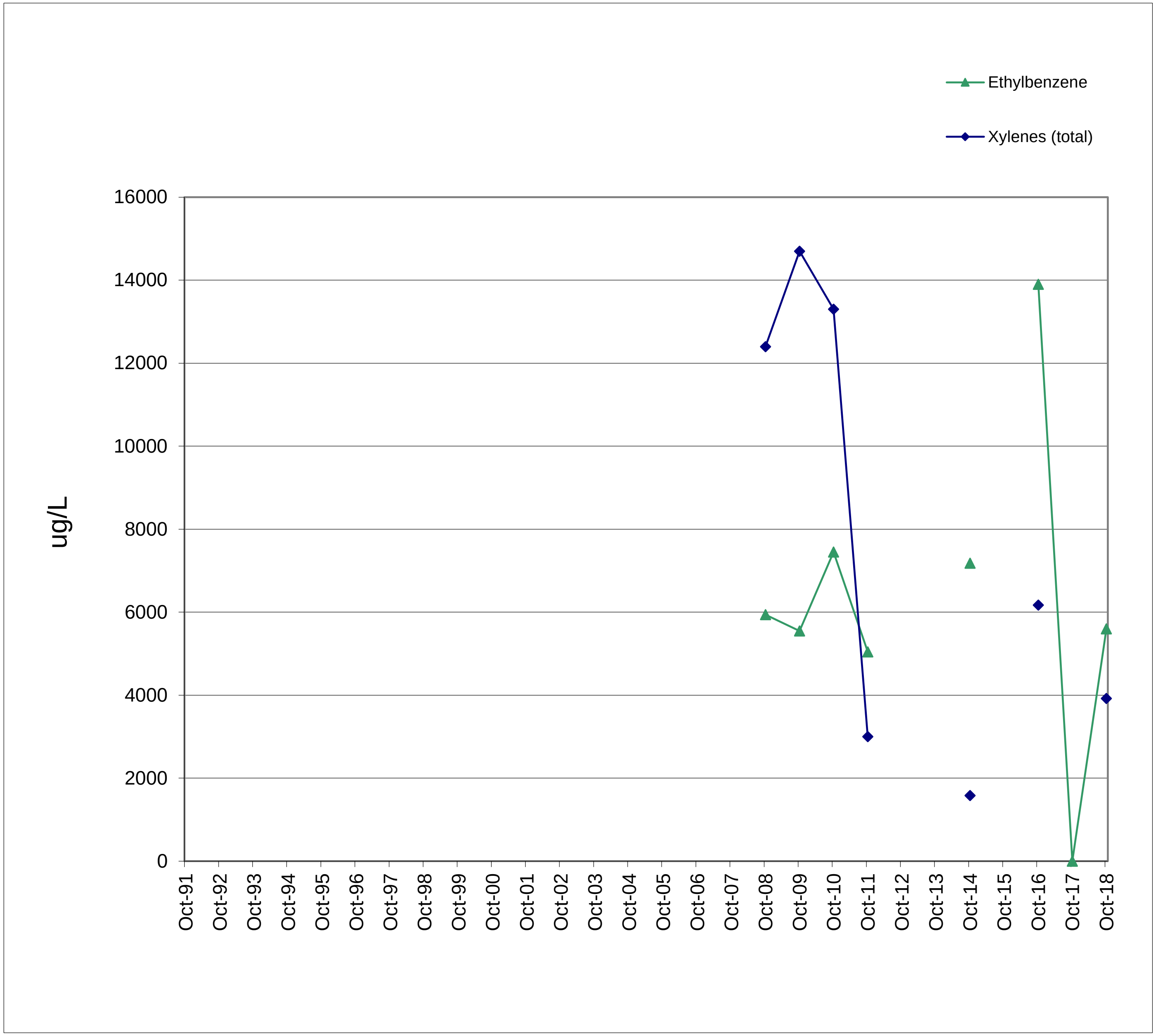
W-19A VOC

Remediation Progress - Glacial Drift



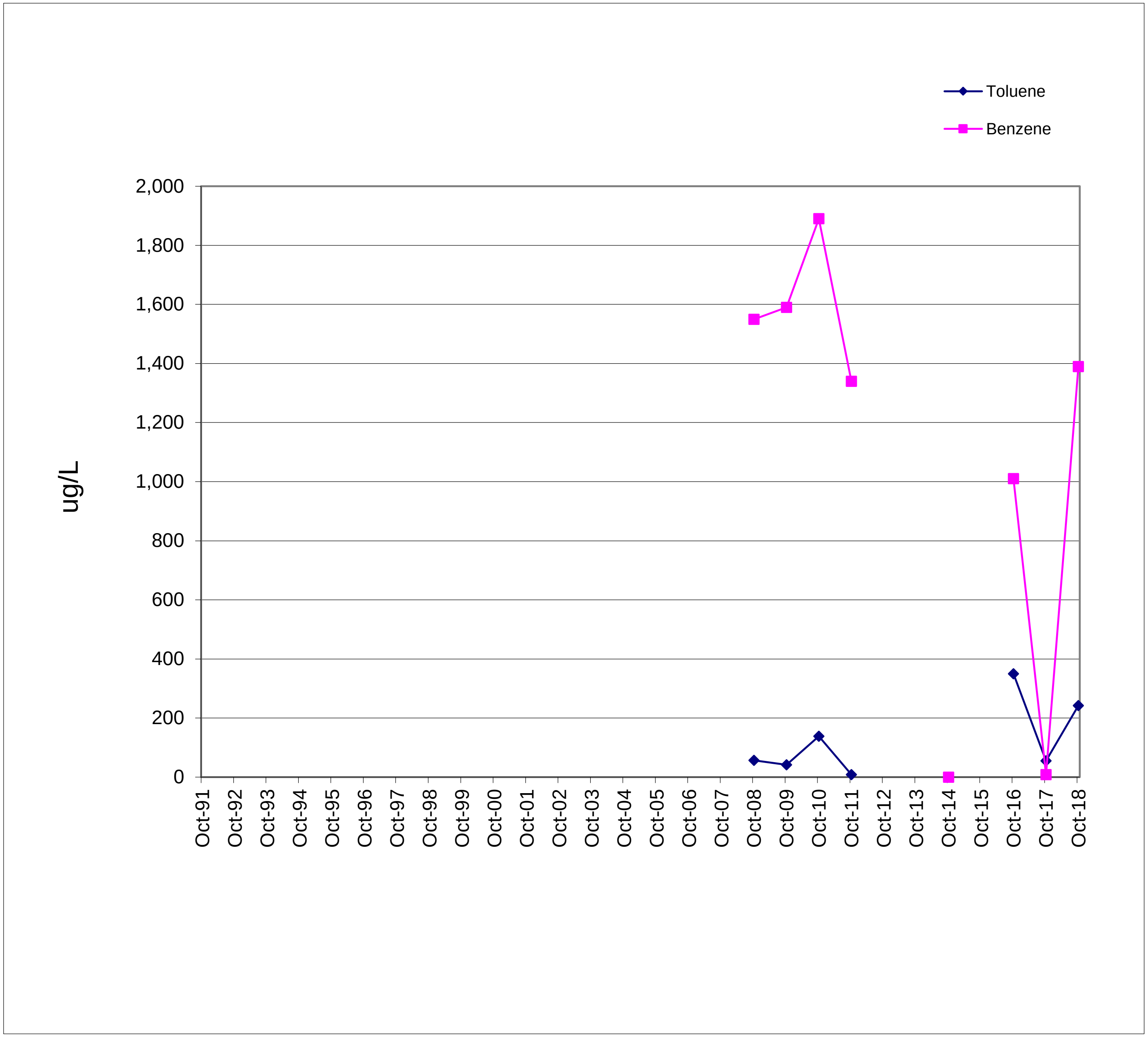
W-21A VOC

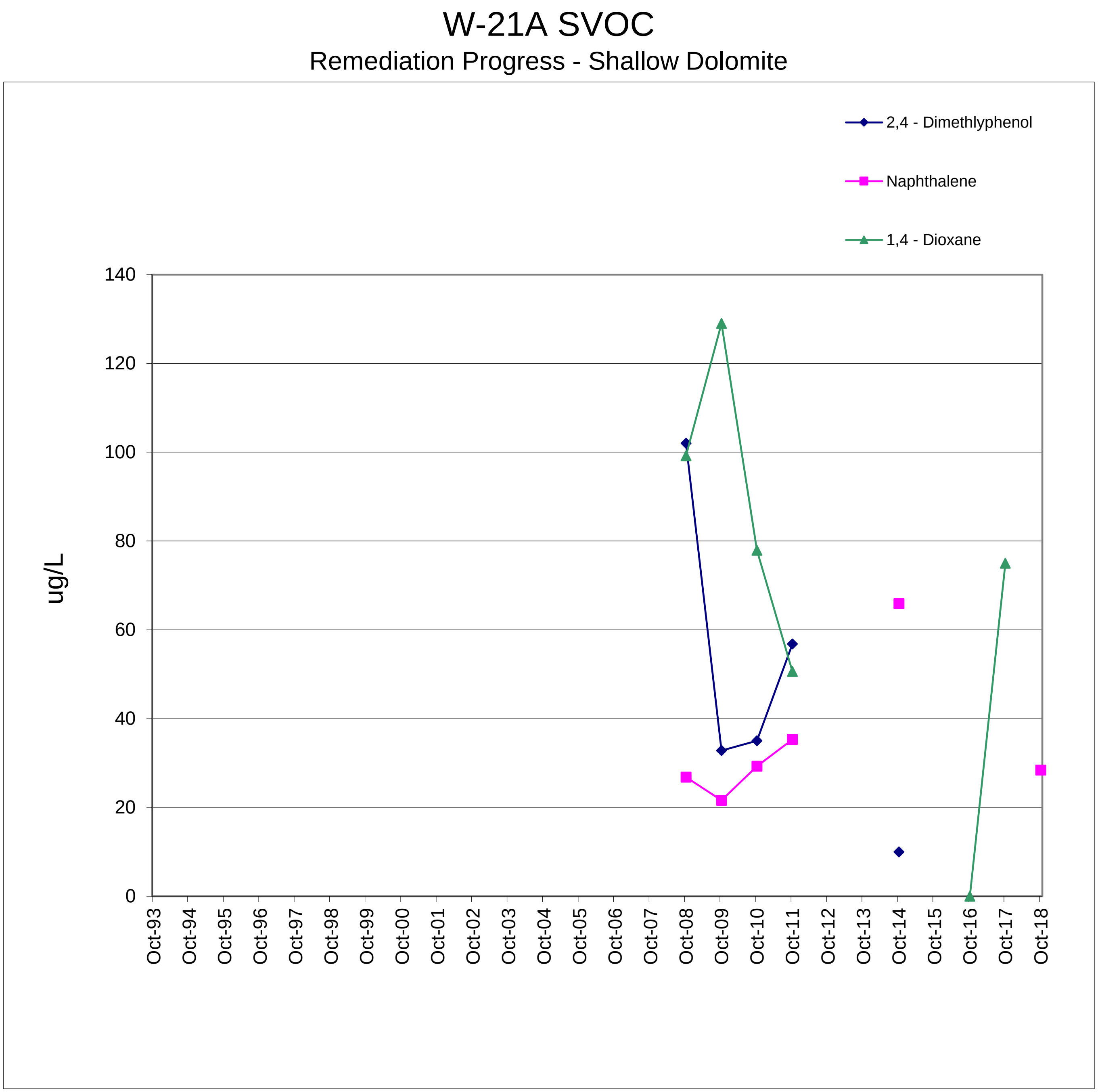
Remediation Progress - Shallow Dolomite



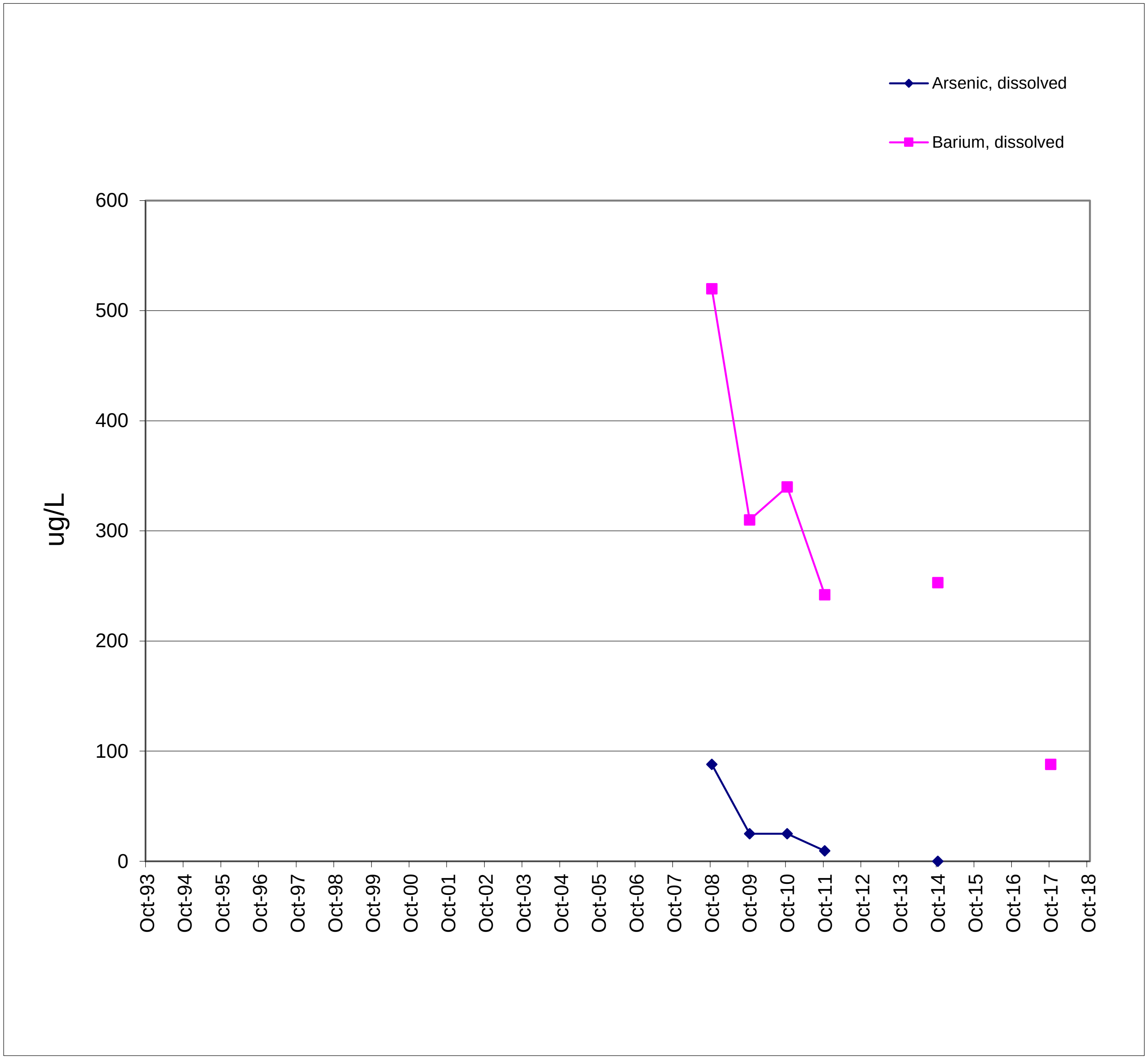
W-21A VOC

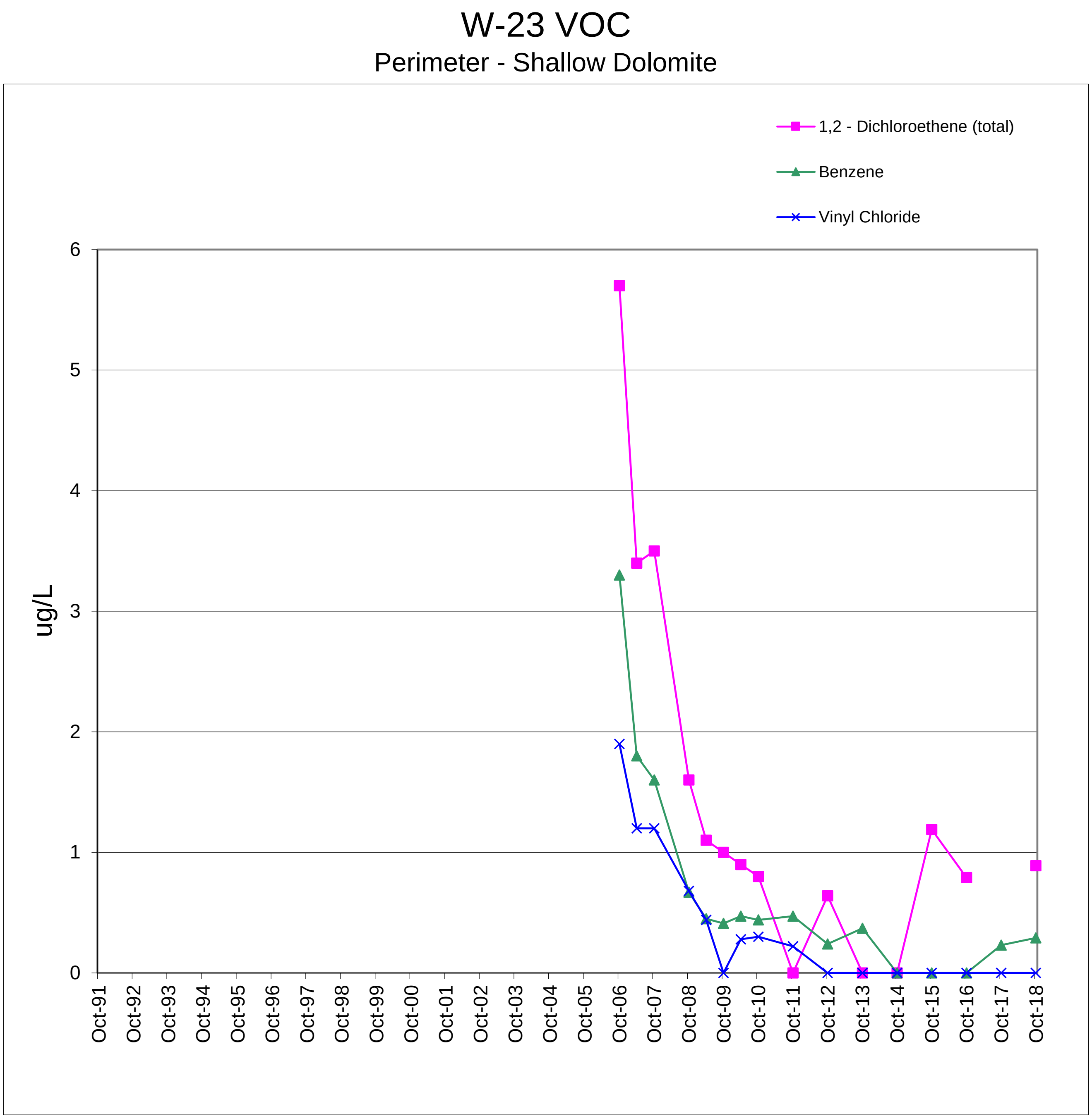
Remediation Progress - Shallow Dolomite




W-21A SVOC
Remediation Progress - Shallow Dolomite
2,4 - Dimethlyphenol
Naphthalene
1,4 - Dioxane
ug/L
0
20
40
60
80
100
120
140
Oct-93
Oct-94
Oct-95
Oct-96
Oct-97
Oct-98
Oct-99
Oct-00
Oct-01
Oct-02
Oct-03
Oct-04
Oct-05
Oct-06
Oct-07
Oct-08
Oct-09
Oct-10
Oct-11
Oct-12
Oct-13
Oct-14
Oct-15
Oct-16
Oct-17
Oct-18

W-21A Metals
Remediation Progress - Shallow Dolomite

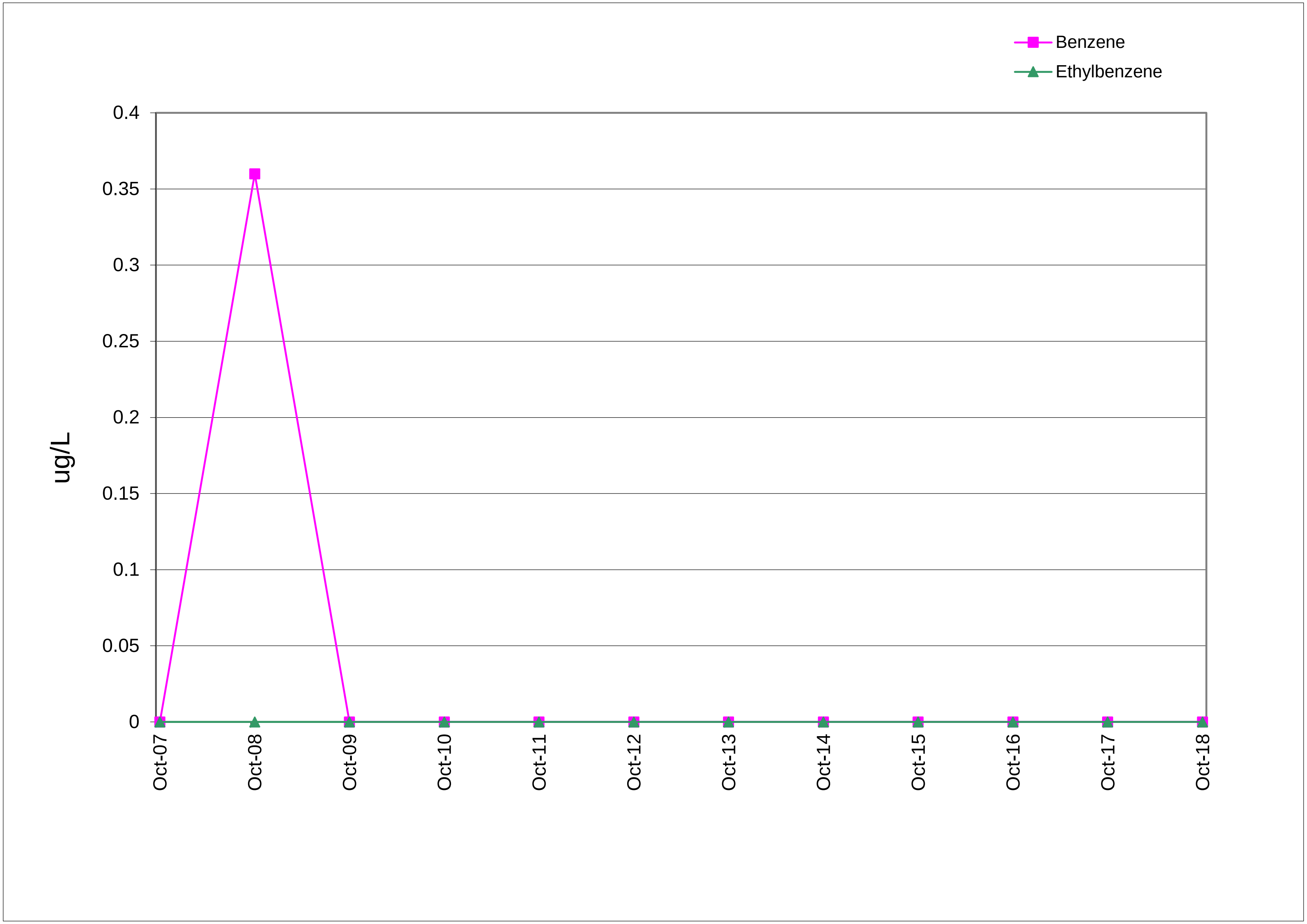


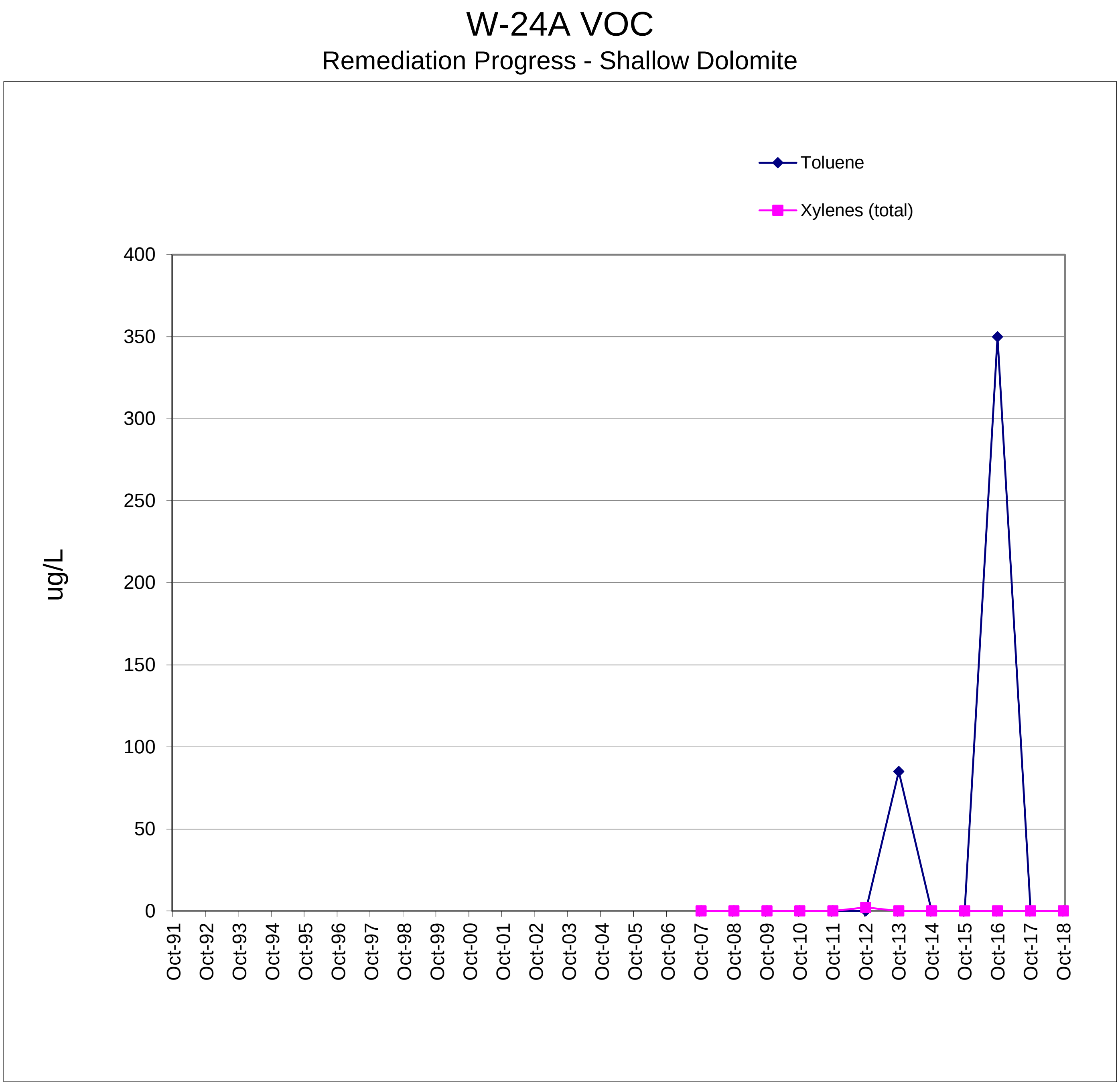


W-23 VOC
Perimeter - Shallow Dolomite
1,2 - Dichloroethene (total)
Benzene
Vinyl Chloride
ug/L
0
1
2
3
4
5
6
Oct-91
Oct-92
Oct-93
Oct-94
Oct-95
Oct-96
Oct-97
Oct-98
Oct-99
Oct-00
Oct-01
Oct-02
Oct-03
Oct-04
Oct-05
Oct-06
Oct-07
Oct-08
Oct-09
Oct-10
Oct-11
Oct-12
Oct-13
Oct-14
Oct-15
Oct-16
Oct-17
Oct-18

W-24A VOC

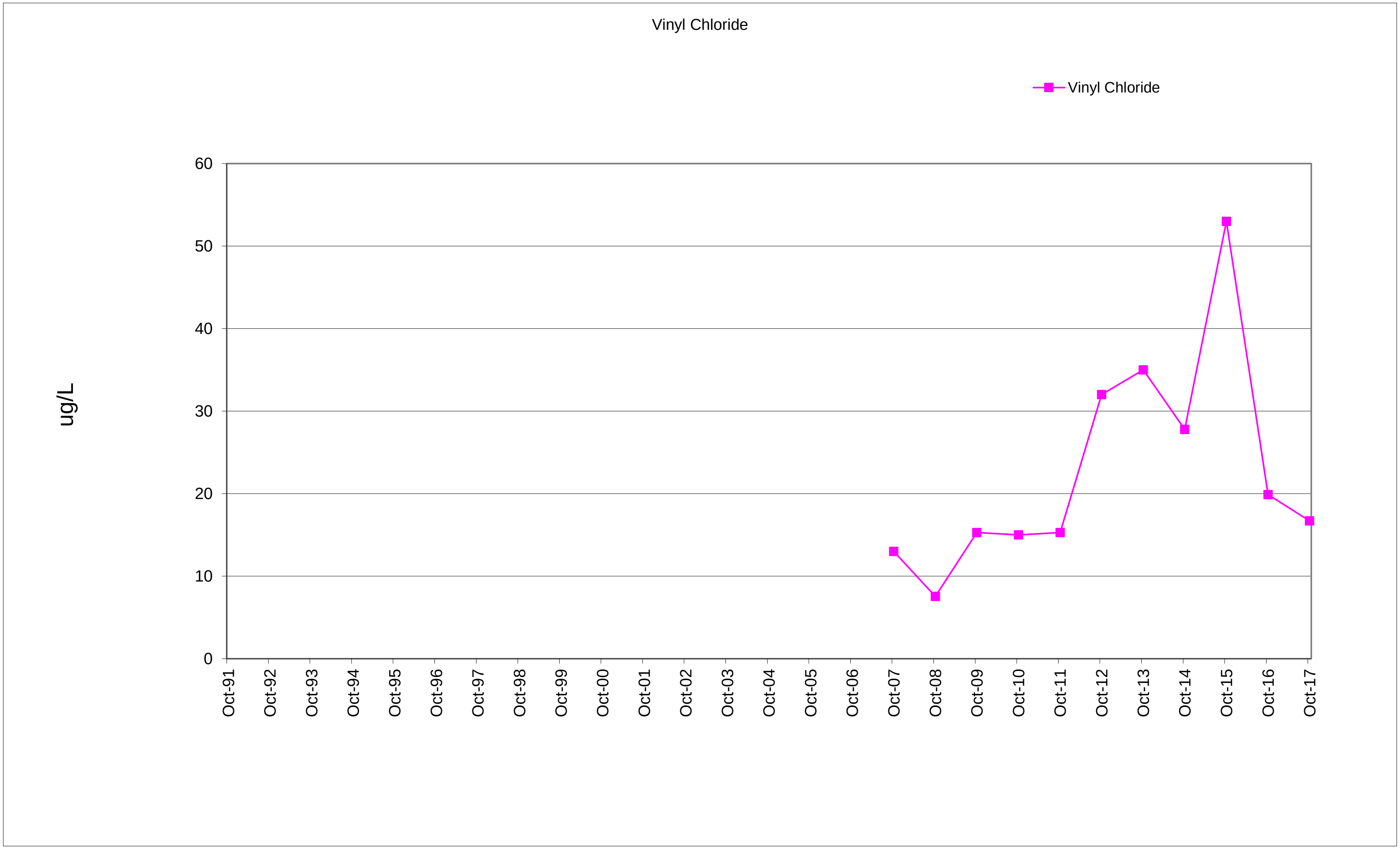
Remediation Progress - Shallow Dolomite




W-24A VOC
Remediation Progress - Shallow Dolomite
Toluene
Xylenes (total)
ug/L
400
350
300
250
200
150
100
50
0
Oct-91
Oct-92
Oct-93
Oct-94
Oct-95
Oct-96
Oct-97
Oct-98
Oct-99
Oct-00
Oct-01
Oct-02
Oct-03
Oct-04
Oct-05
Oct-06
Oct-07
Oct-08
Oct-09
Oct-10
Oct-11
Oct-12
Oct-13
Oct-14
Oct-15
Oct-16
Oct-17
Oct-18

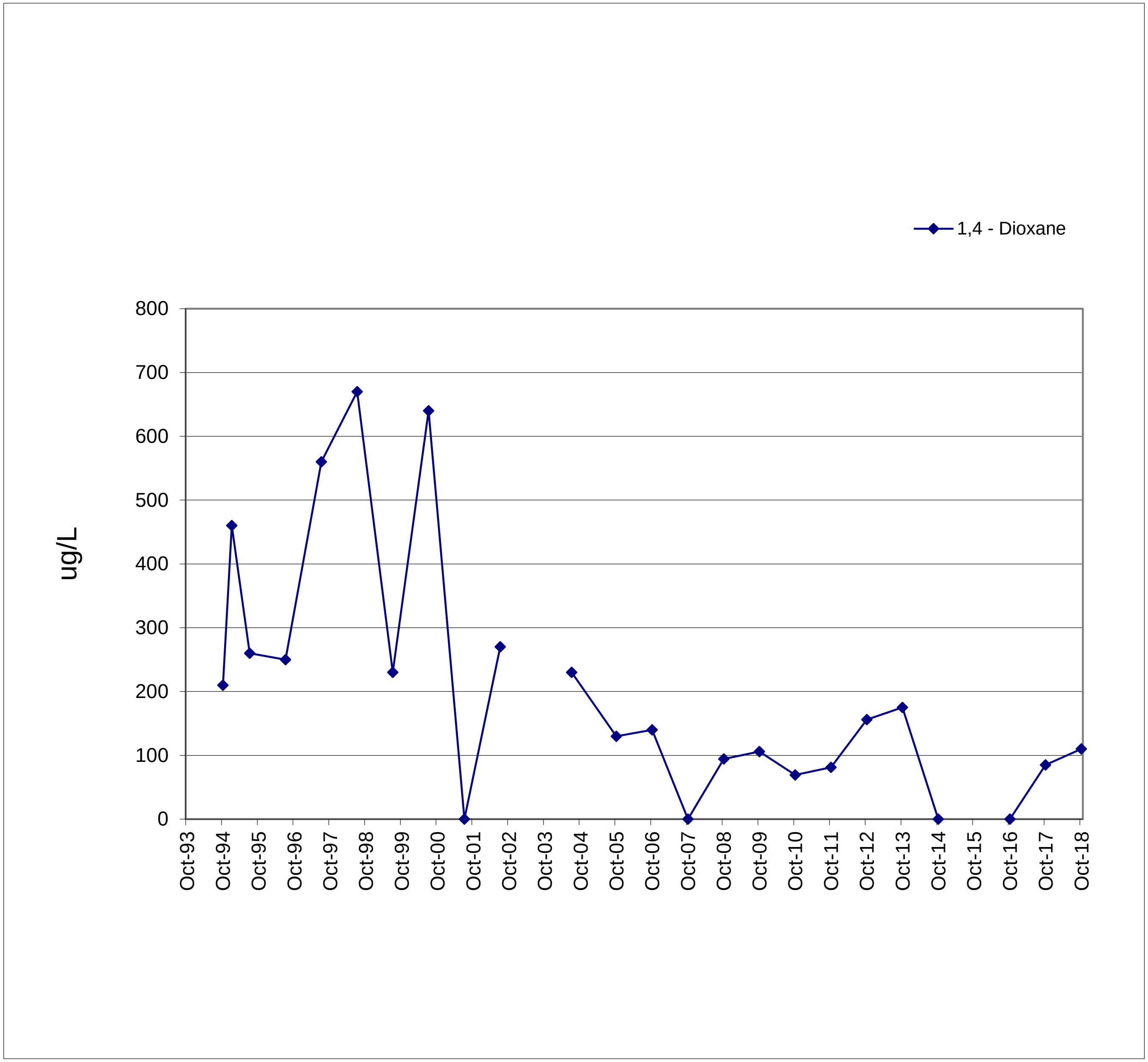
W-24A VOC

Remediation Progress - Shallow Dolomite



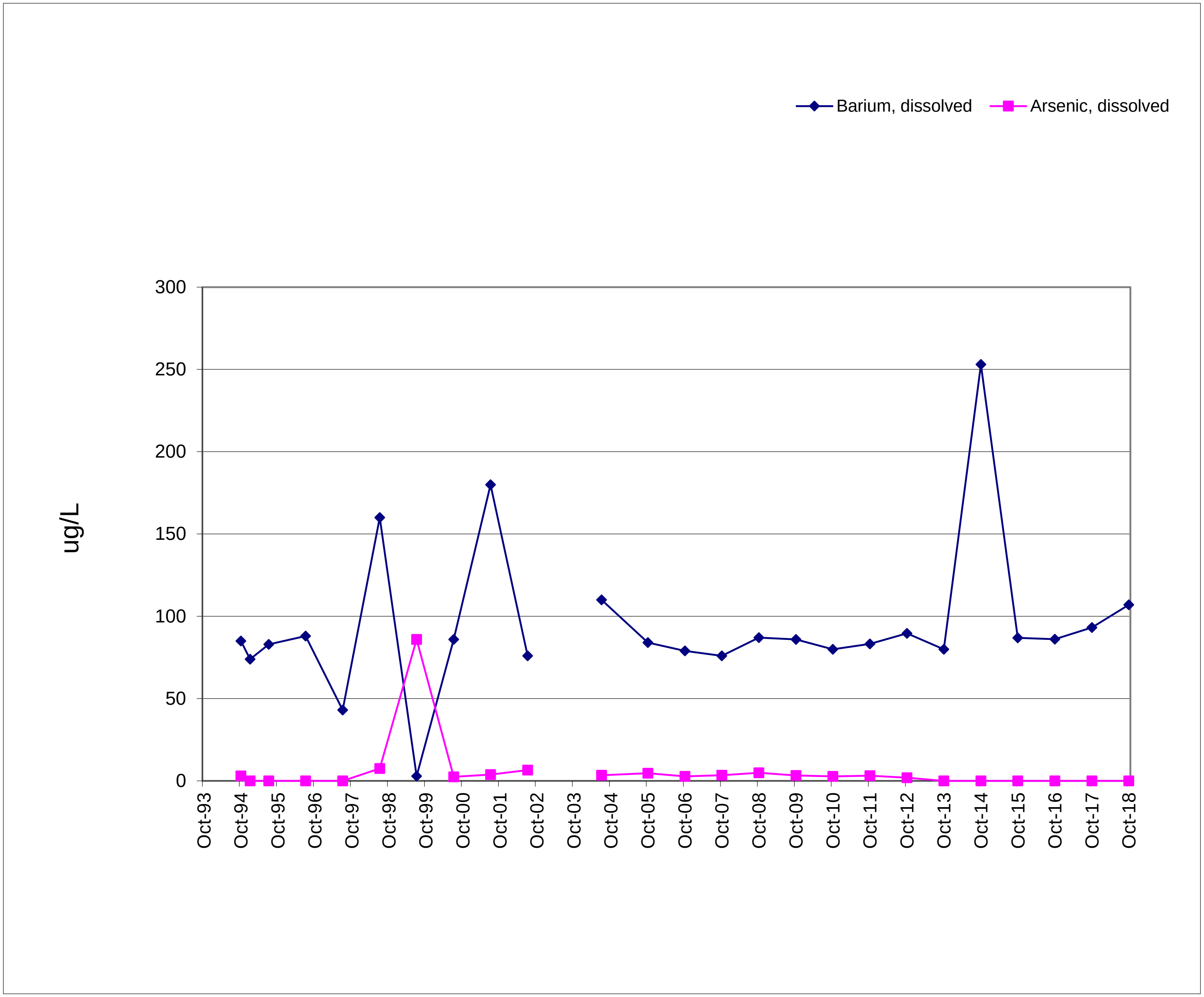
W-24 SVOC

Remediation Progress - Shallow Dolomite

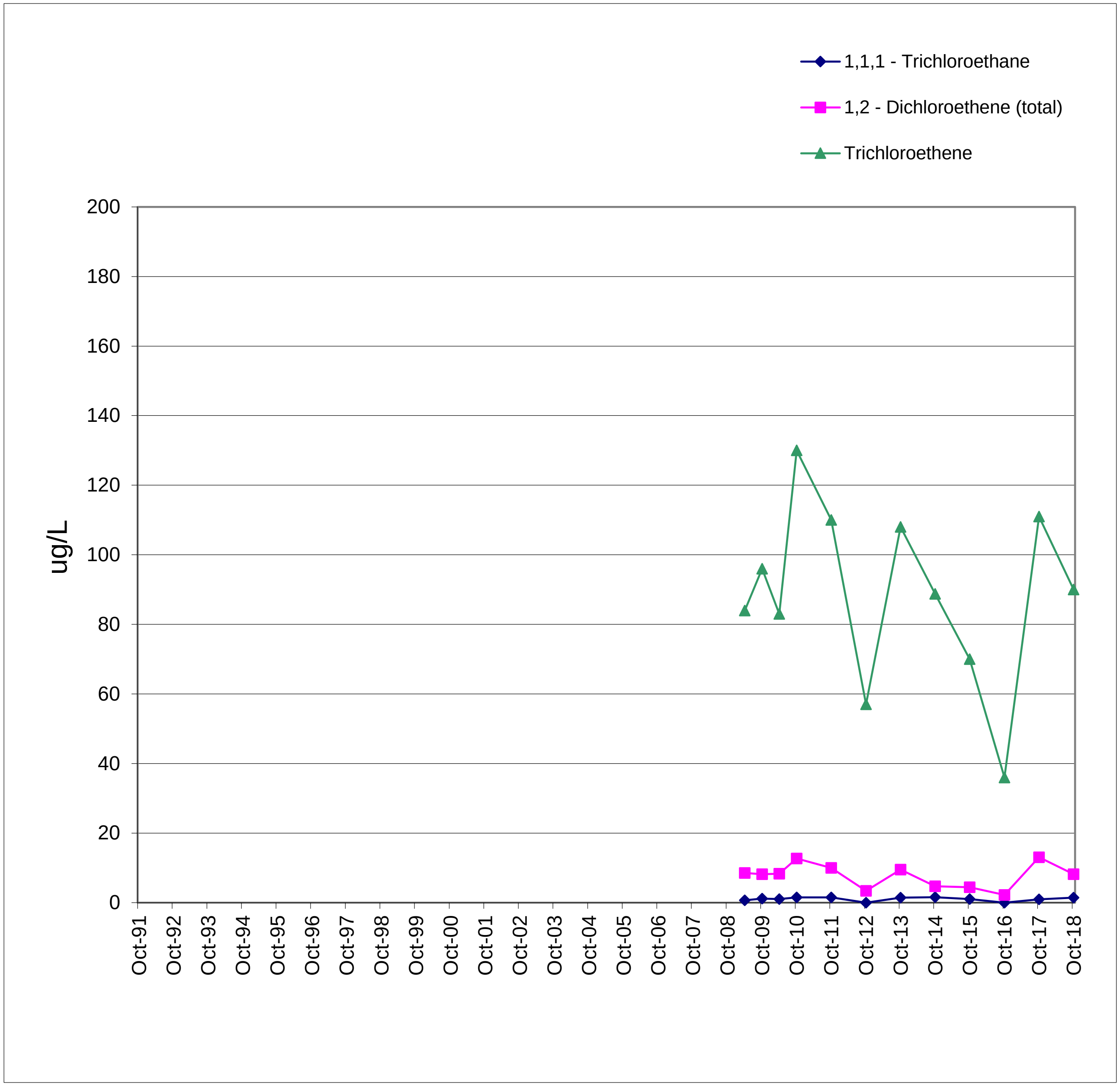


W-24 Metals

Remediation Progress - Shallow Dolomite

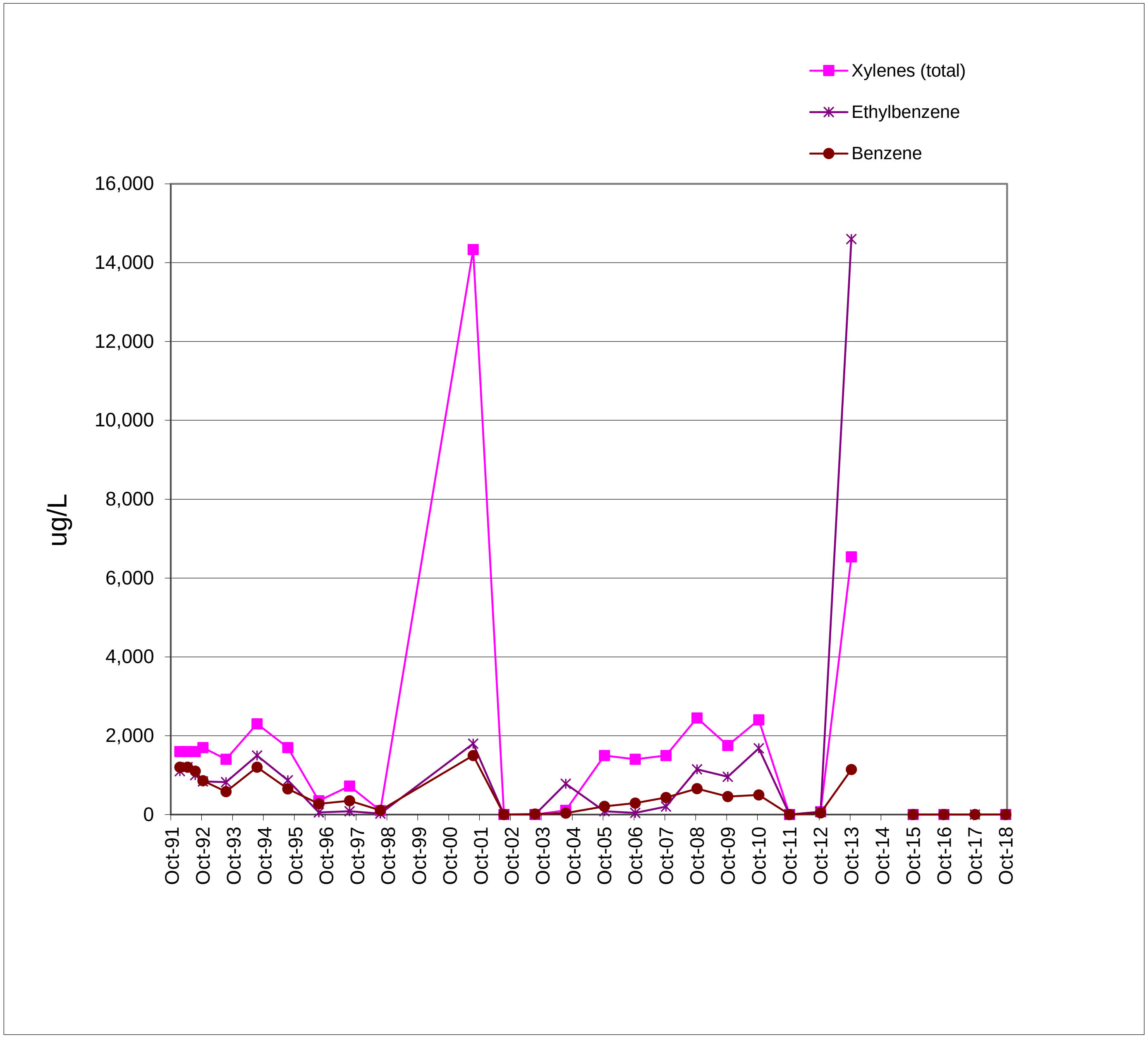


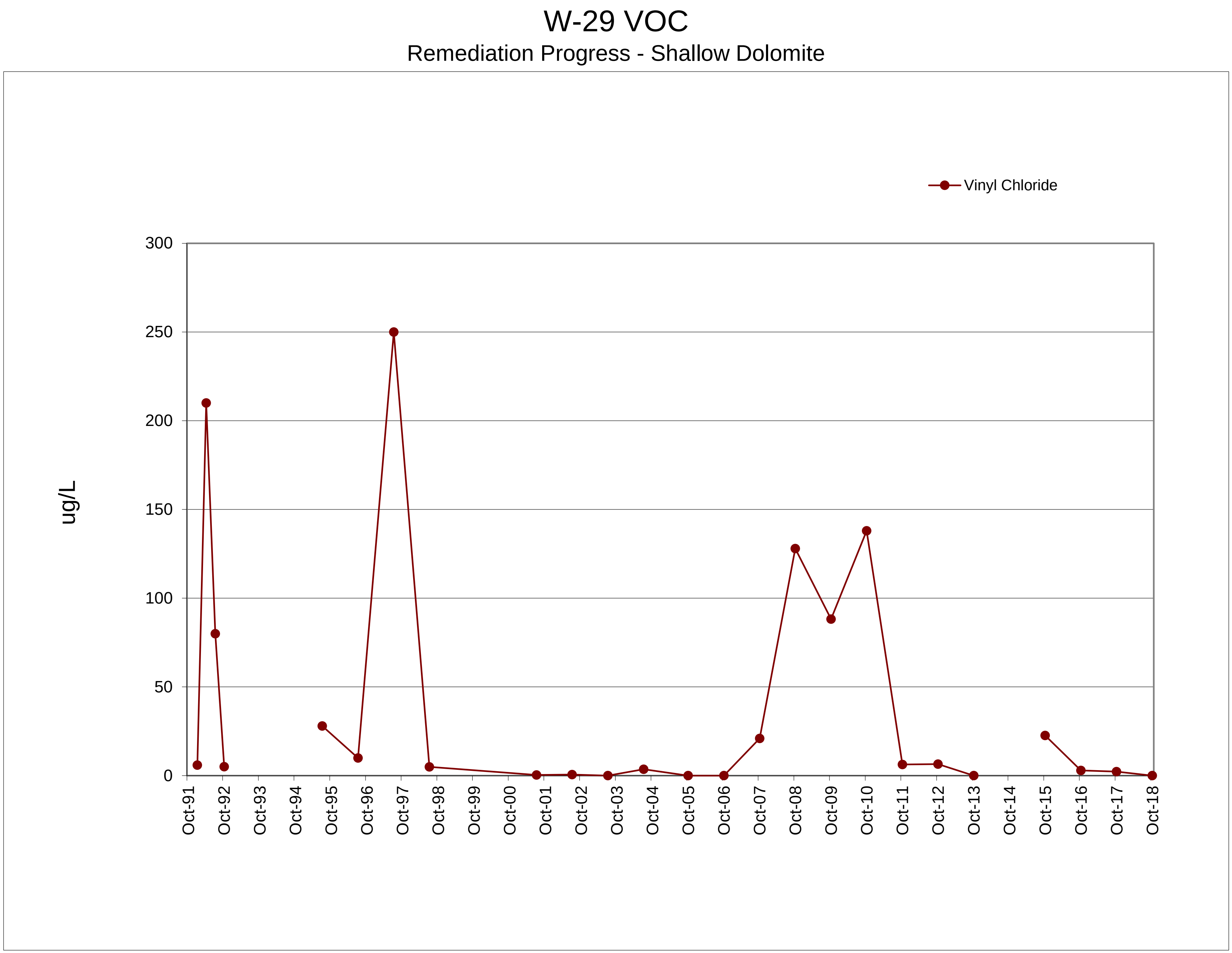
W-27 VOC
Perimeter - Glacial Drift



W-29 VOC

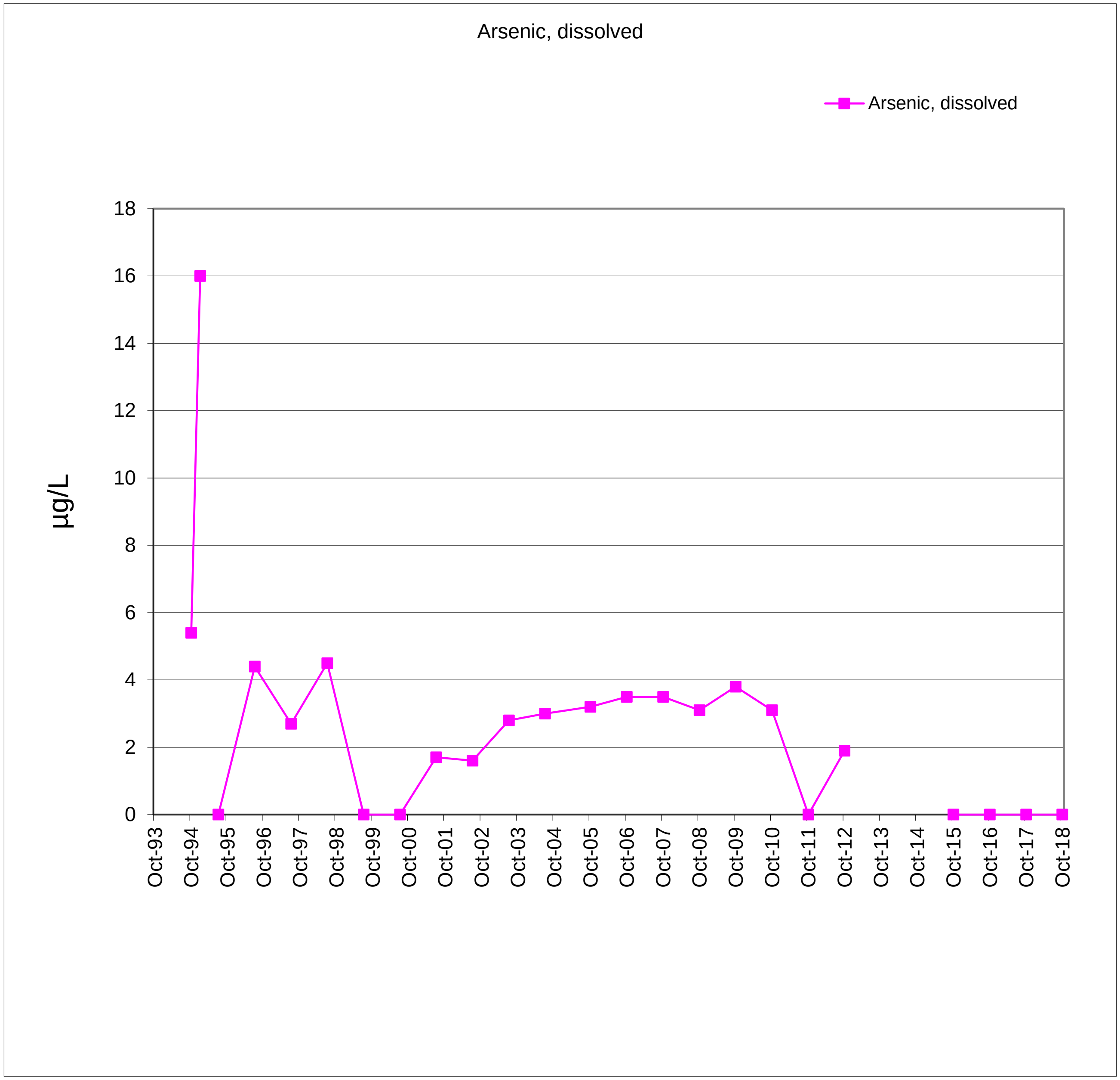
Remediation Progress - Shallow Dolomite




W-29 VOC
Remediation Progress - Shallow Dolomite
Vinyl Chloride
ug/L
300
250
200
150
100
50
0
Oct-91
Oct-92
Oct-93
Oct-94
Oct-95
Oct-96
Oct-97
Oct-98
Oct-99
Oct-00
Oct-01
Oct-02
Oct-03
Oct-04
Oct-05
Oct-06
Oct-07
Oct-08
Oct-09
Oct-10
Oct-11
Oct-12
Oct-13
Oct-14
Oct-15
Oct-16
Oct-17
Oct-18

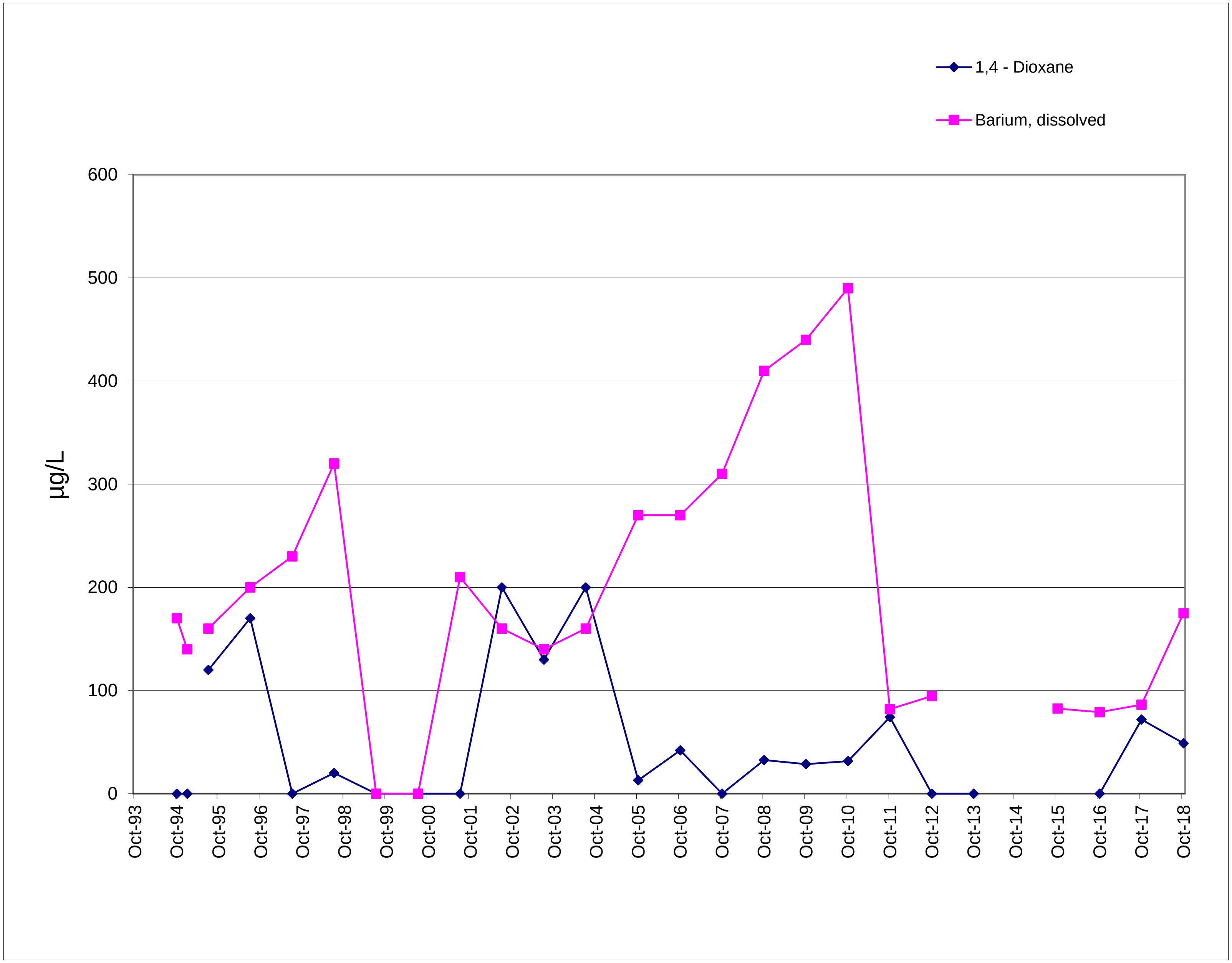
W-29 SVOC and Arsenic

Remediation Progress - Shallow Dolomite

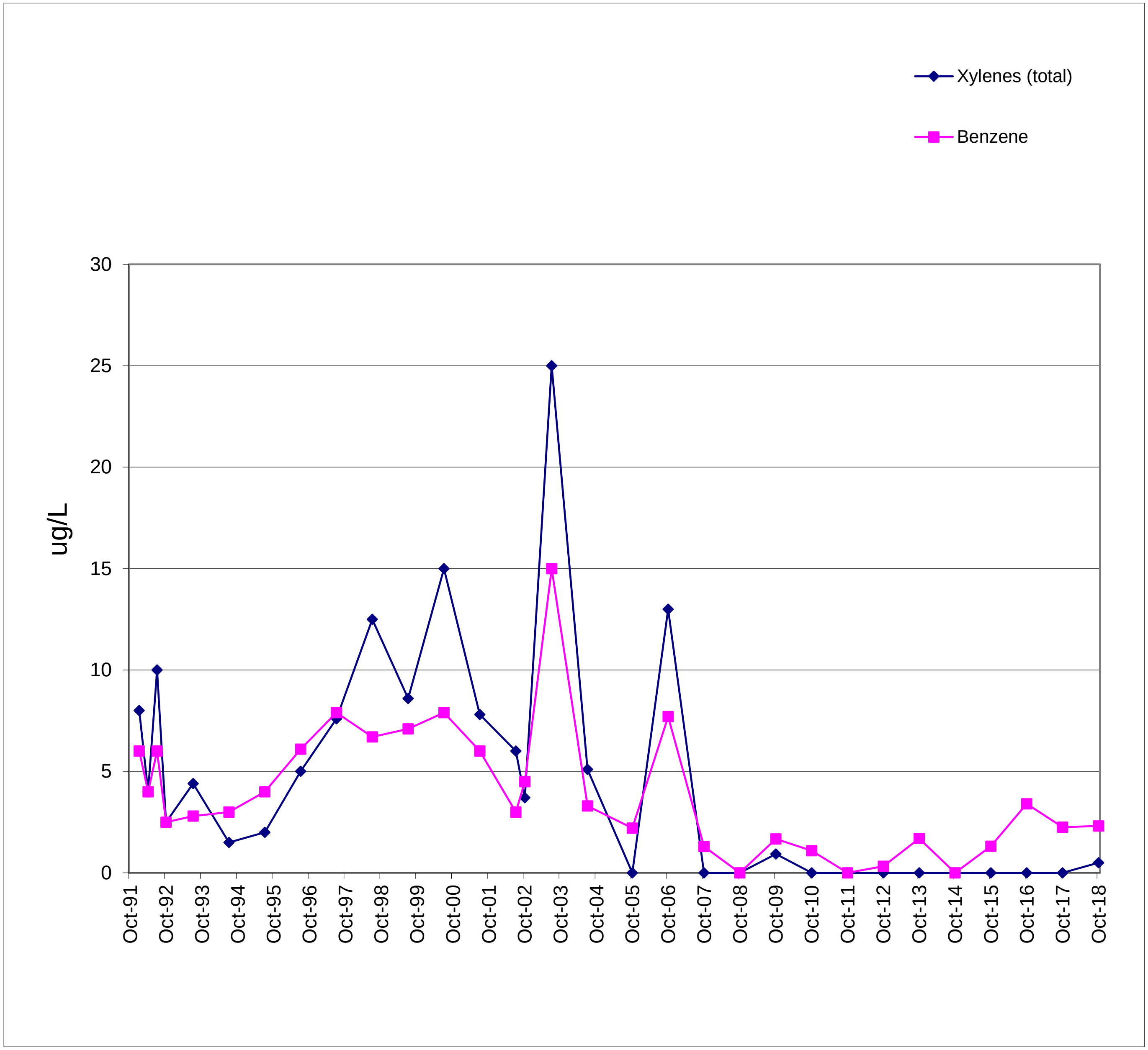


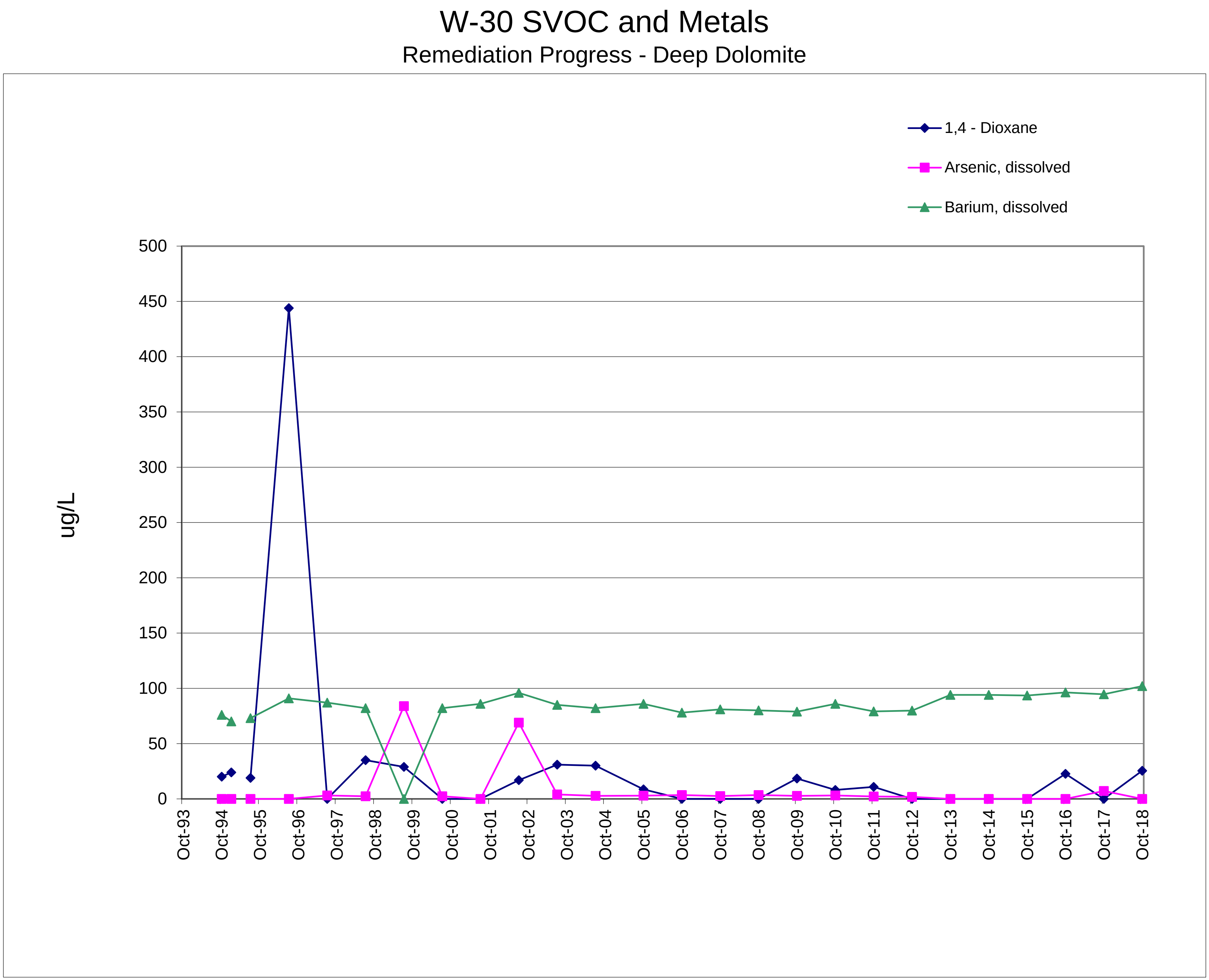
W-29 SVOC and Barium

Remediation Progress - Shallow Dolomite

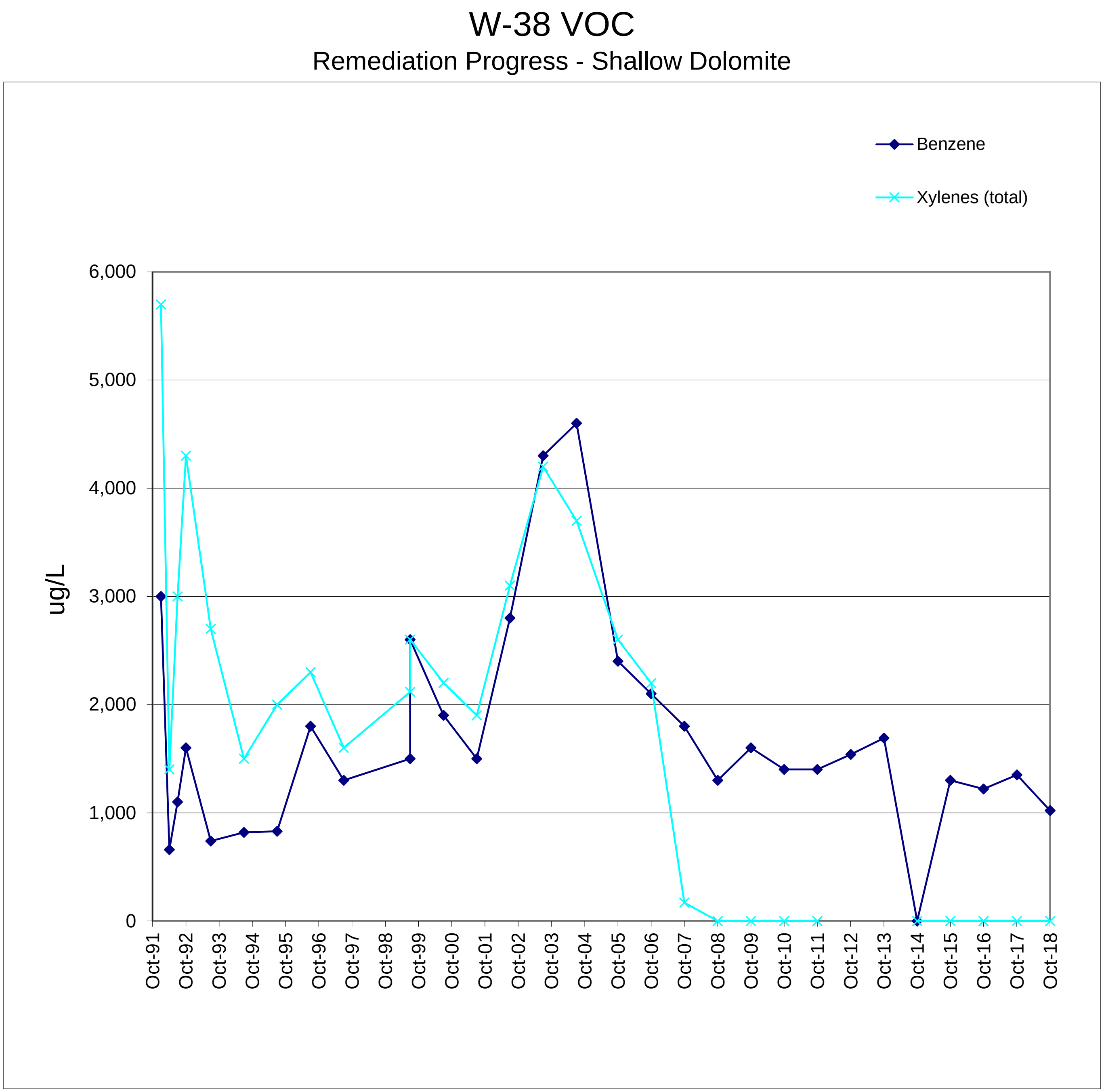


W-30 VOC
Remediation Progress - Deep Dolomite





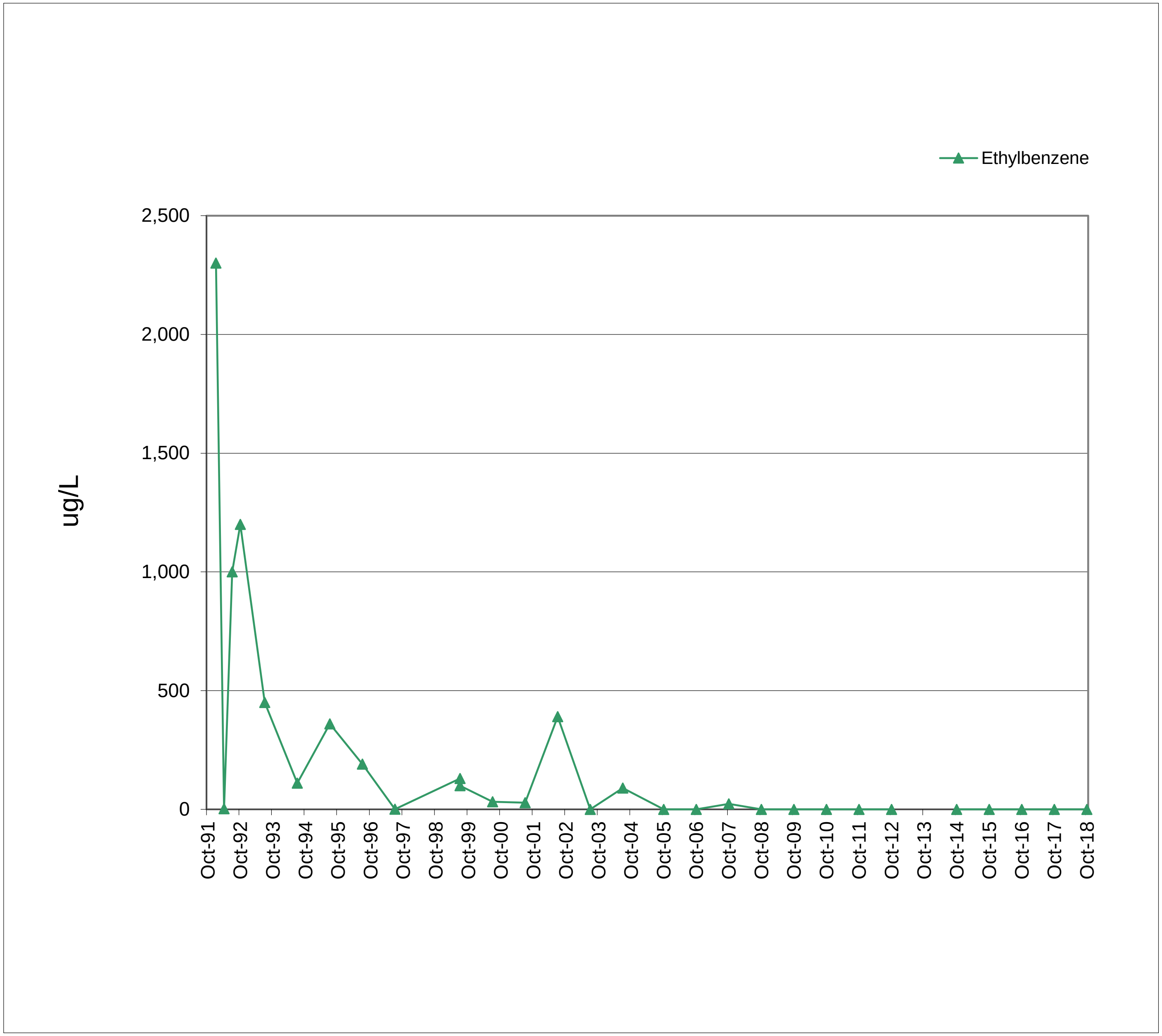
W-30 SVOC and Metals
Remediation Progress - Deep Dolomite
1,4 - Dioxane
Arsenic, dissolved
Barium, dissolved
ug/L
500
450
400
350
300
250
200
150
100
50
0
Oct-93
Oct-94
Oct-95
Oct-96
Oct-97
Oct-98
Oct-99
Oct-00
Oct-01
Oct-02
Oct-03
Oct-04
Oct-05
Oct-06
Oct-07
Oct-08
Oct-09
Oct-10
Oct-11
Oct-12
Oct-13
Oct-14
Oct-15
Oct-16
Oct-17
Oct-18

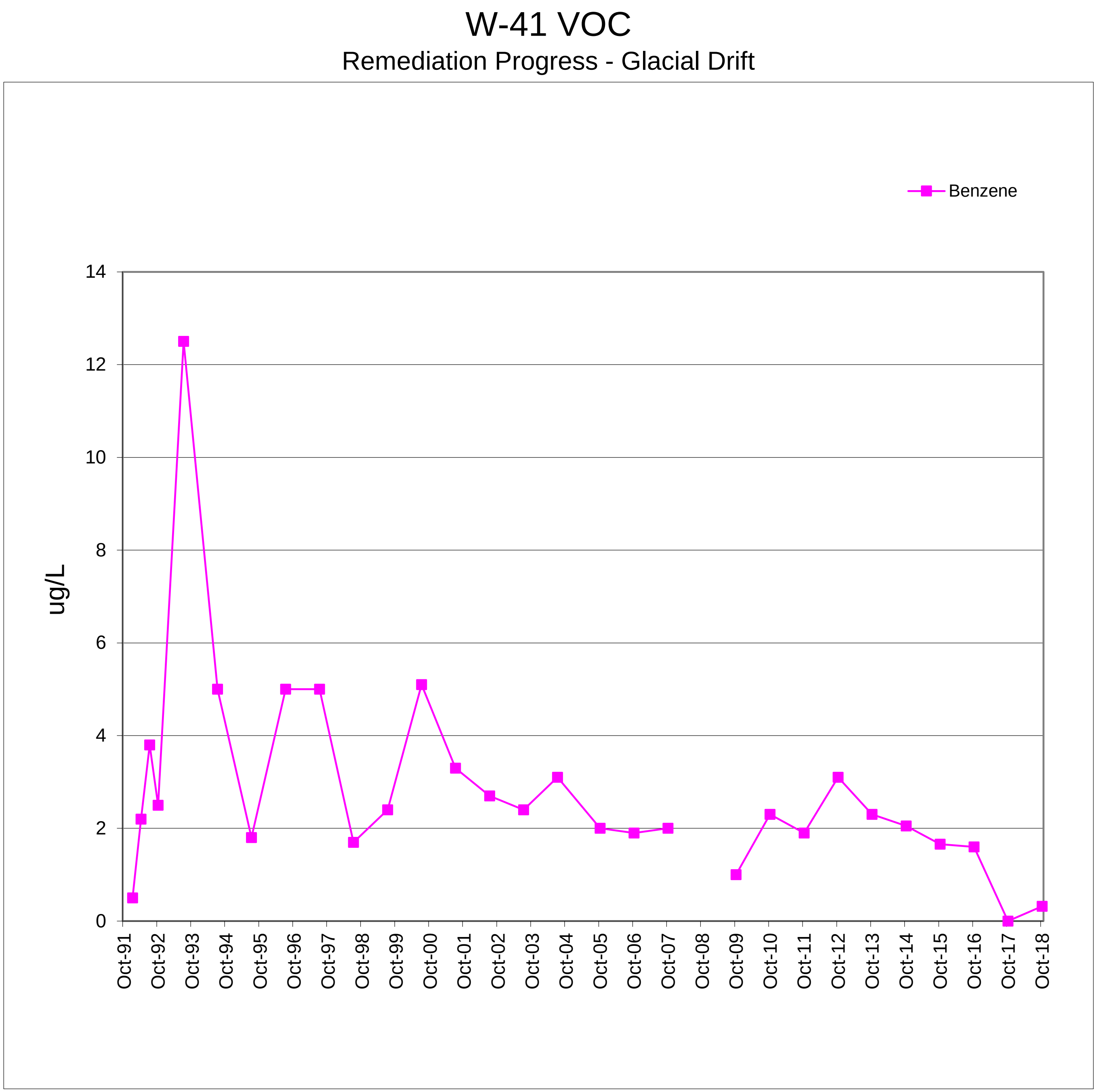


W-38 VOC
Remediation Progress - Shallow Dolomite
Benzene
Xylenes (total)
ug/L
6,000
5,000
4,000
3,000
2,000
1,000
0
Oct-91
Oct-92
Oct-93
Oct-94
Oct-95
Oct-96
Oct-97
Oct-98
Oct-99
Oct-00
Oct-01
Oct-02
Oct-03
Oct-04
Oct-05
Oct-06
Oct-07
Oct-08
Oct-09
Oct-10
Oct-11
Oct-12
Oct-13
Oct-14
Oct-15
Oct-16
Oct-17
Oct-18

W-38 VOC

Remediation Progress - Shallow Dolomite

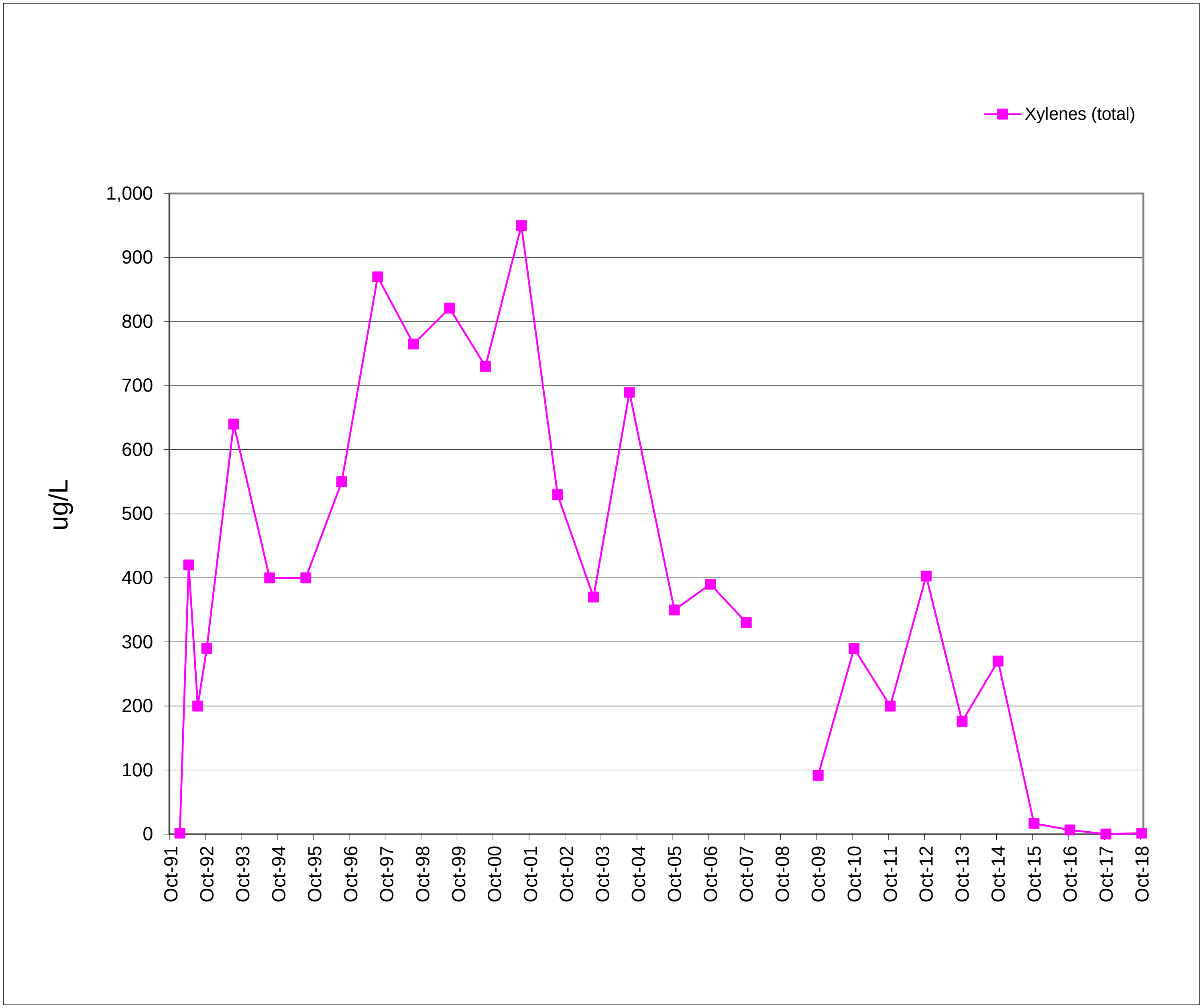




W-41 VOC
Remediation Progress - Glacial Drift
Benzene
ug/L
14
12
10
8
6
4
2
0
Oct-91
Oct-92
Oct-93
Oct-94
Oct-95
Oct-96
Oct-97
Oct-98
Oct-99
Oct-00
Oct-01
Oct-02
Oct-03
Oct-04
Oct-05
Oct-06
Oct-07
Oct-08
Oct-09
Oct-10
Oct-11
Oct-12
Oct-13
Oct-14
Oct-15
Oct-16
Oct-17
Oct-18

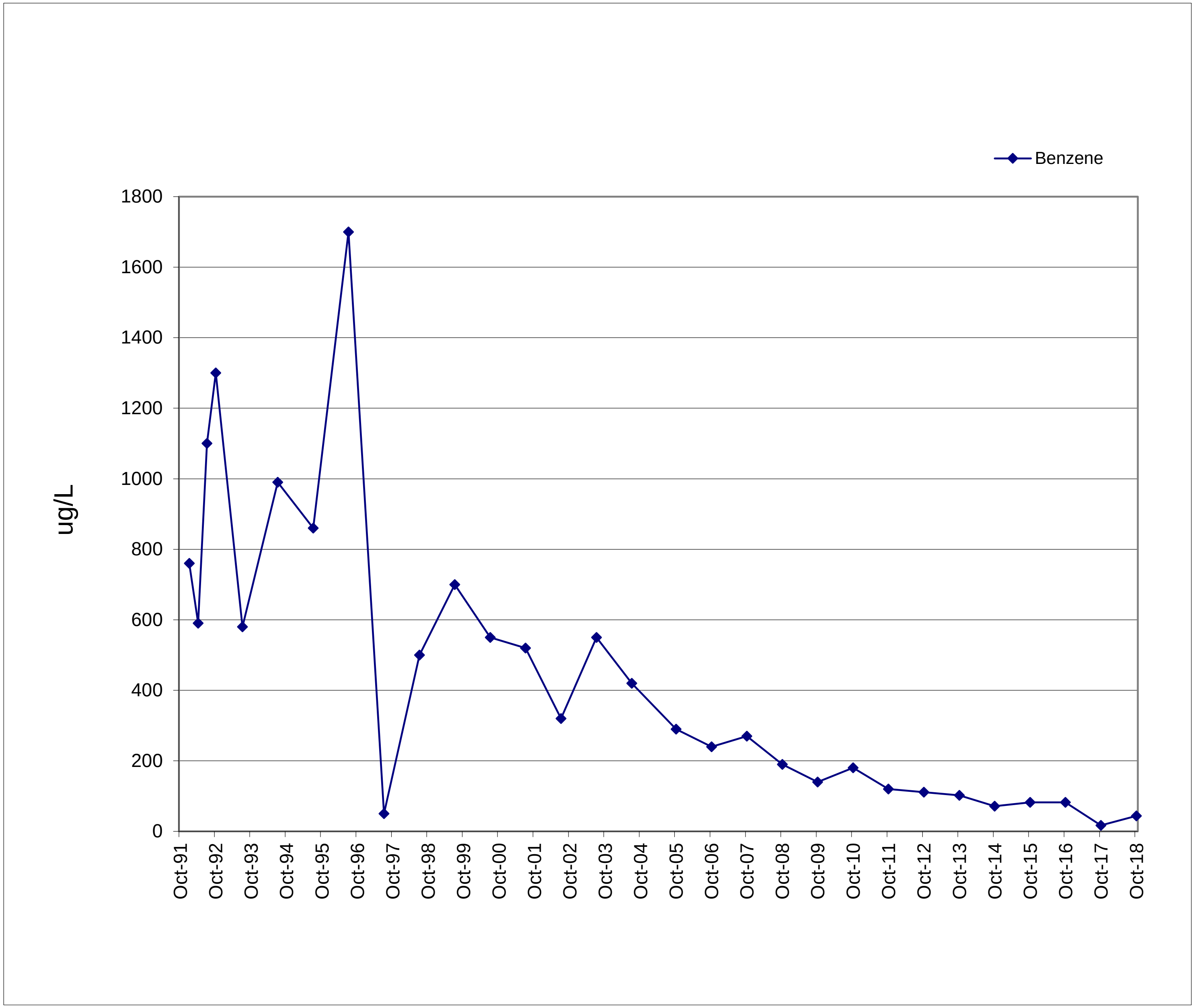
W-41 VOC

Remediation Progress - Glacial Drift

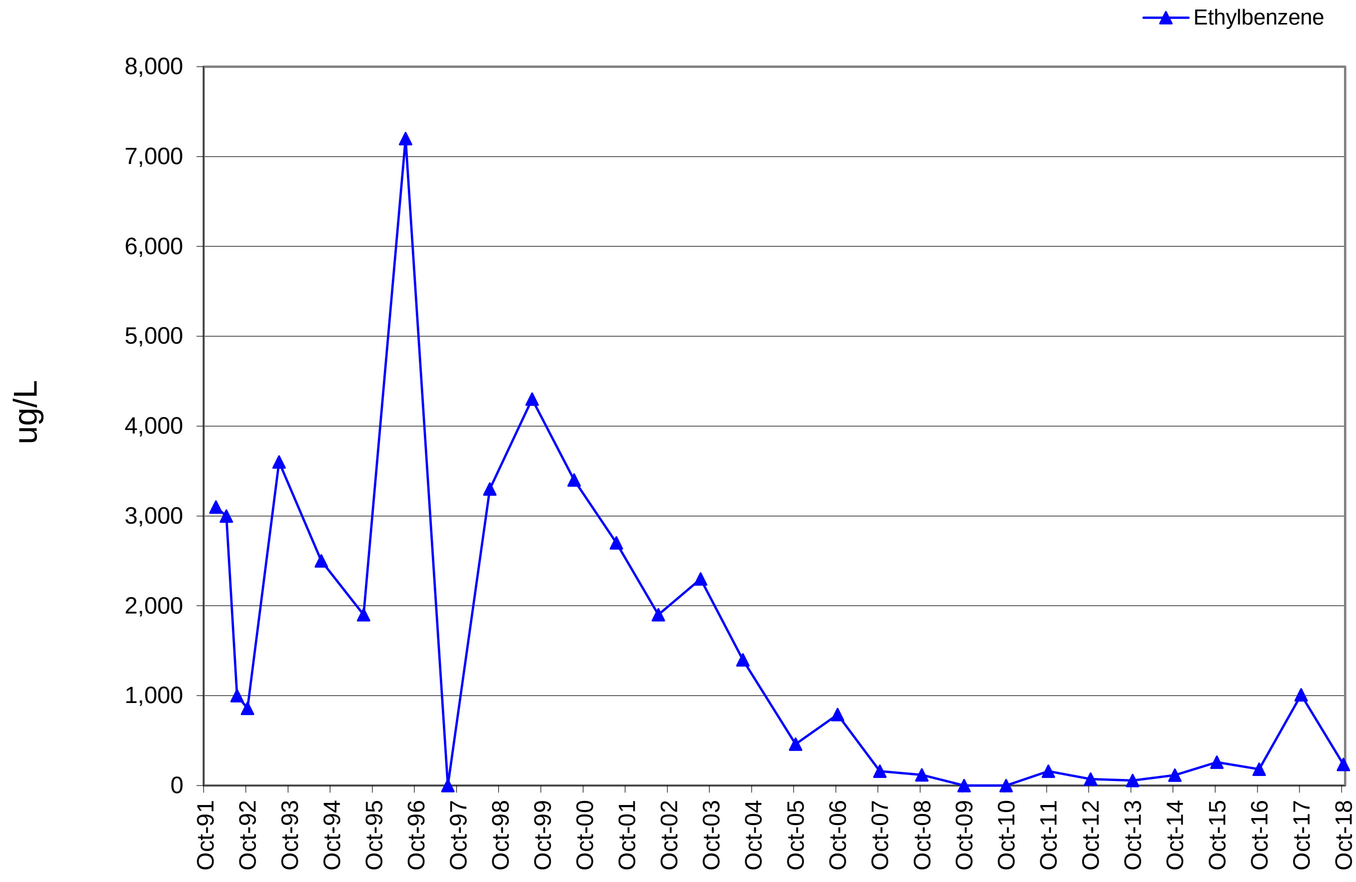


W-42 VOC

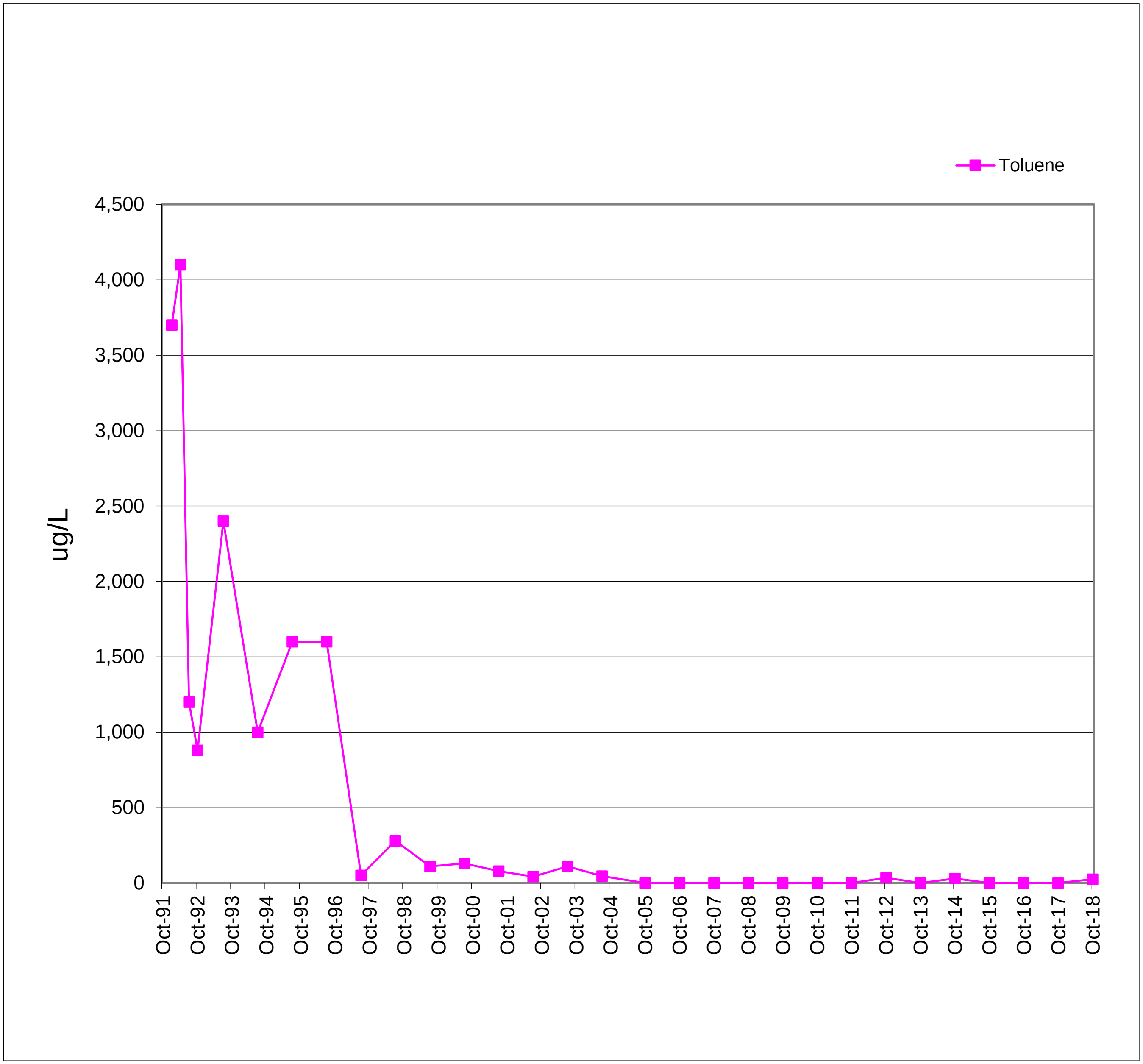
Remediation Progress - Glacial Drift



W-42 VOC
Remediation Progress - Glacial Drift

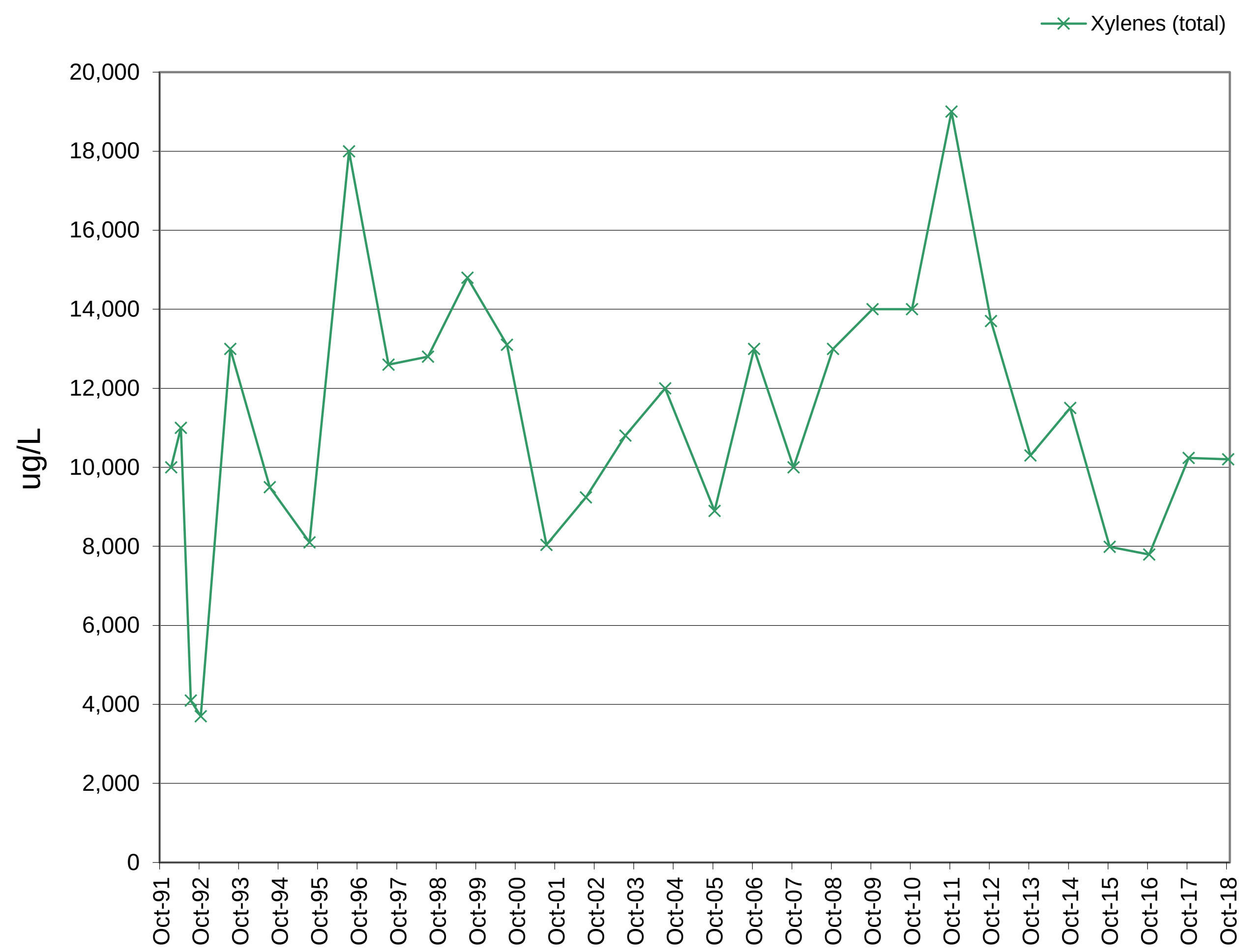


W-42 VOC
Remediation Progress - Glacial Drift



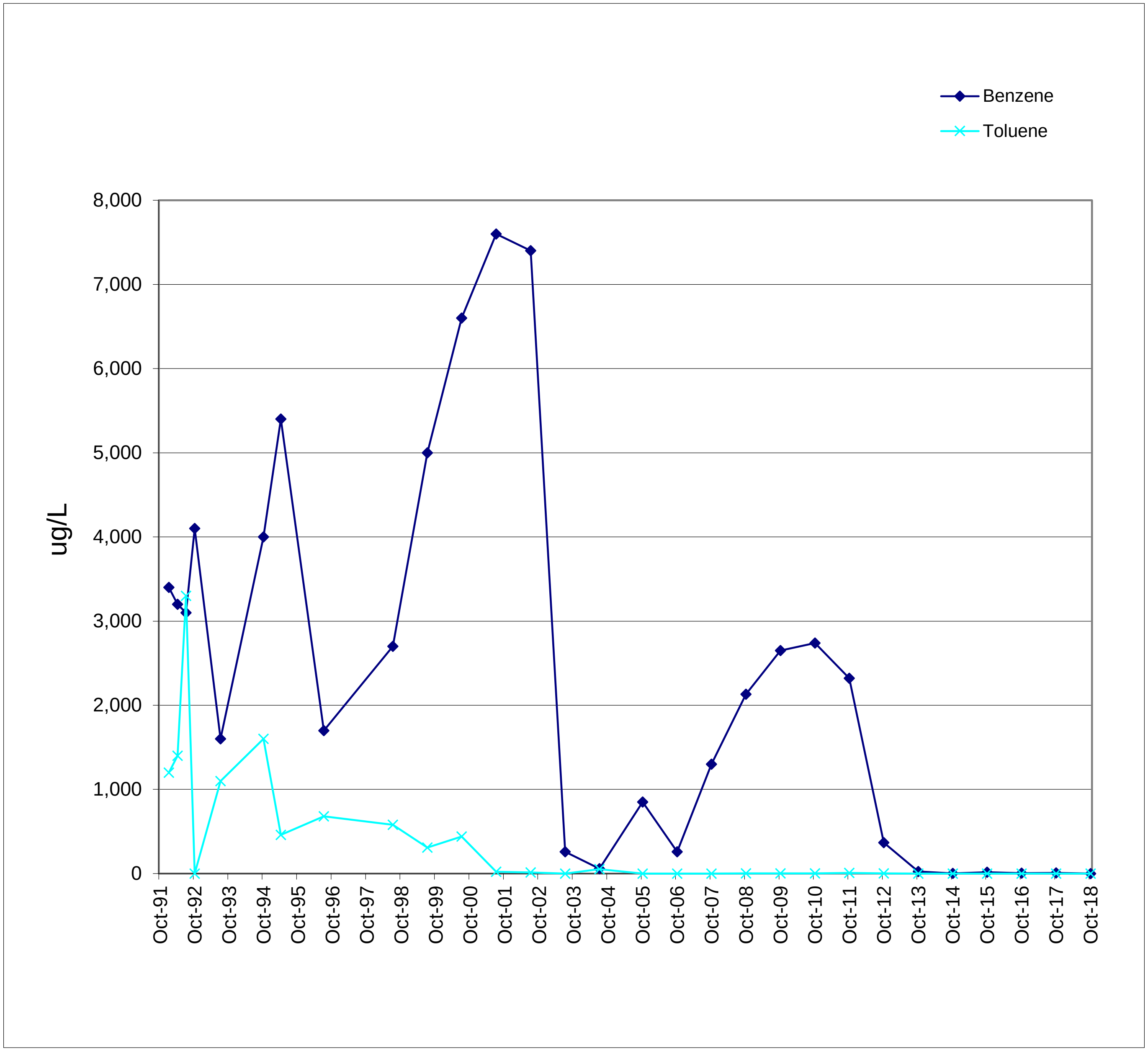
W-42 VOC

Remediation Progress - Glacial Drift



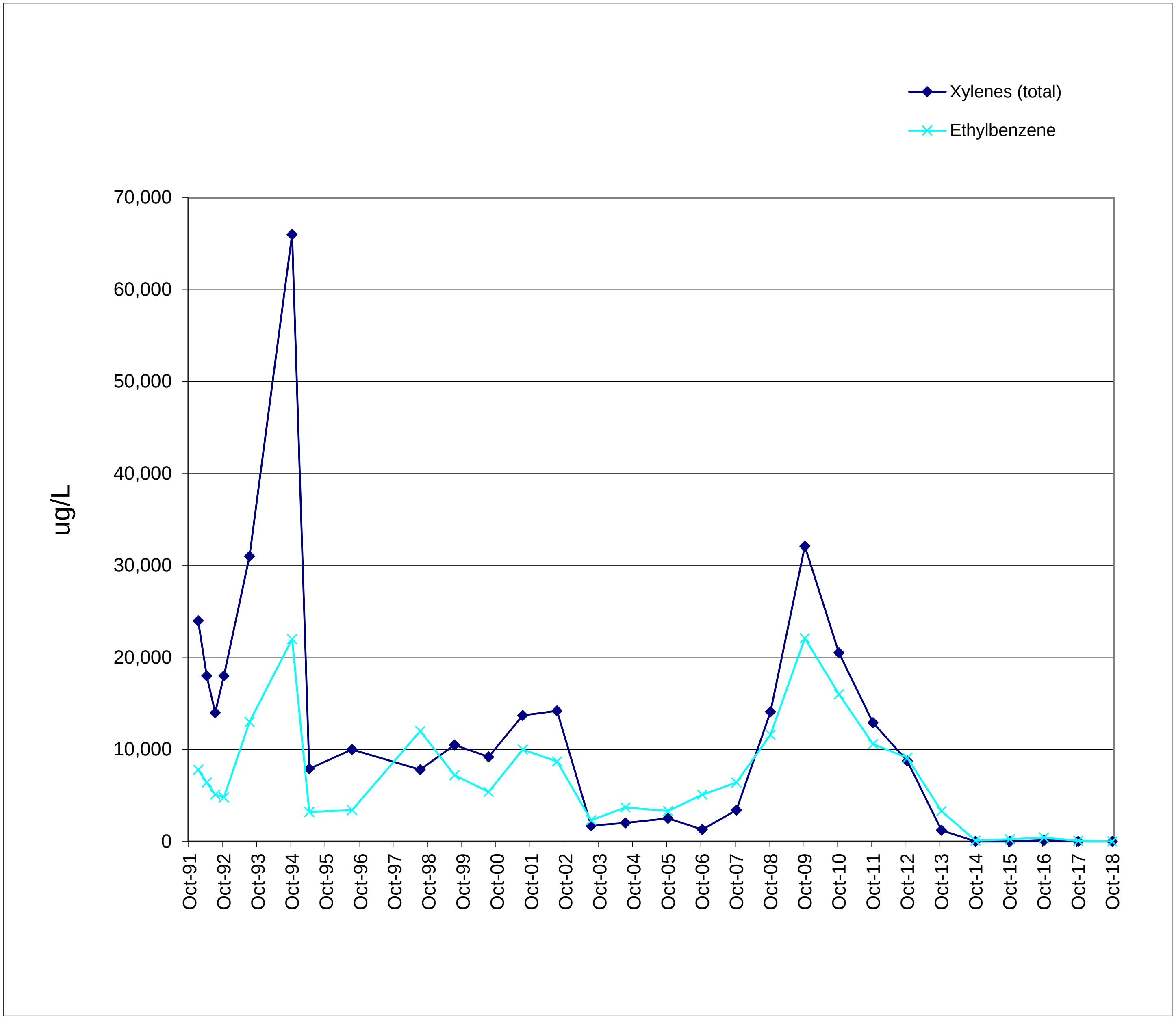
W-43 VOC

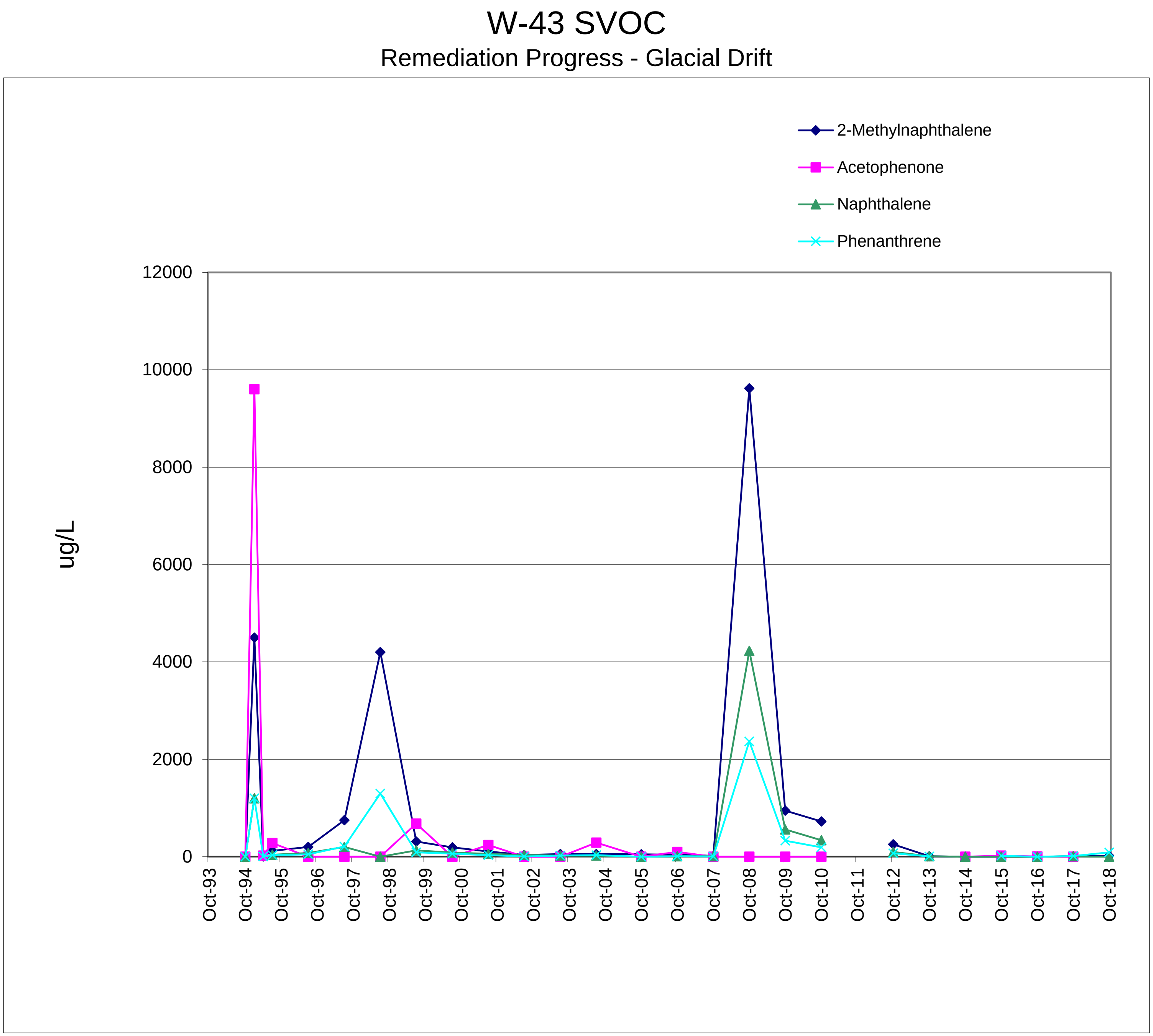
Remediation Progress - Glacial Drift



W-43 VOC

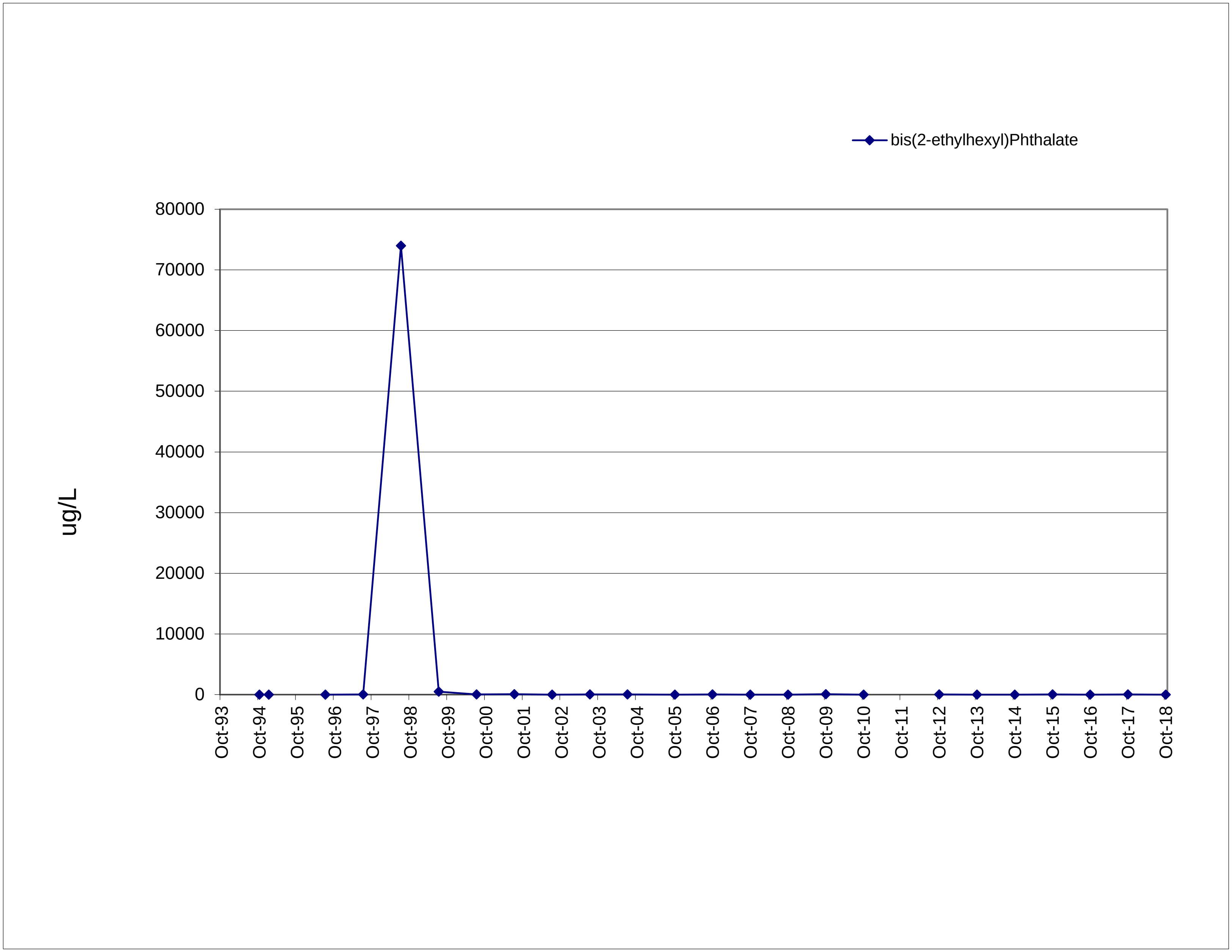
Remediation Progress - Glacial Drift




W-43 SVOC
Remediation Progress - Glacial Drift
2-Methylnaphthalene
Acetophenone
Naphthalene
Phenanthrene
ug/L
12000
10000
8000
6000
4000
2000
0
Oct-93
Oct-94
Oct-95
Oct-96
Oct-97
Oct-98
Oct-99
Oct-00
Oct-01
Oct-02
Oct-03
Oct-04
Oct-05
Oct-06
Oct-07
Oct-08
Oct-09
Oct-10
Oct-11
Oct-12
Oct-13
Oct-14
Oct-15
Oct-16
Oct-17
Oct-18

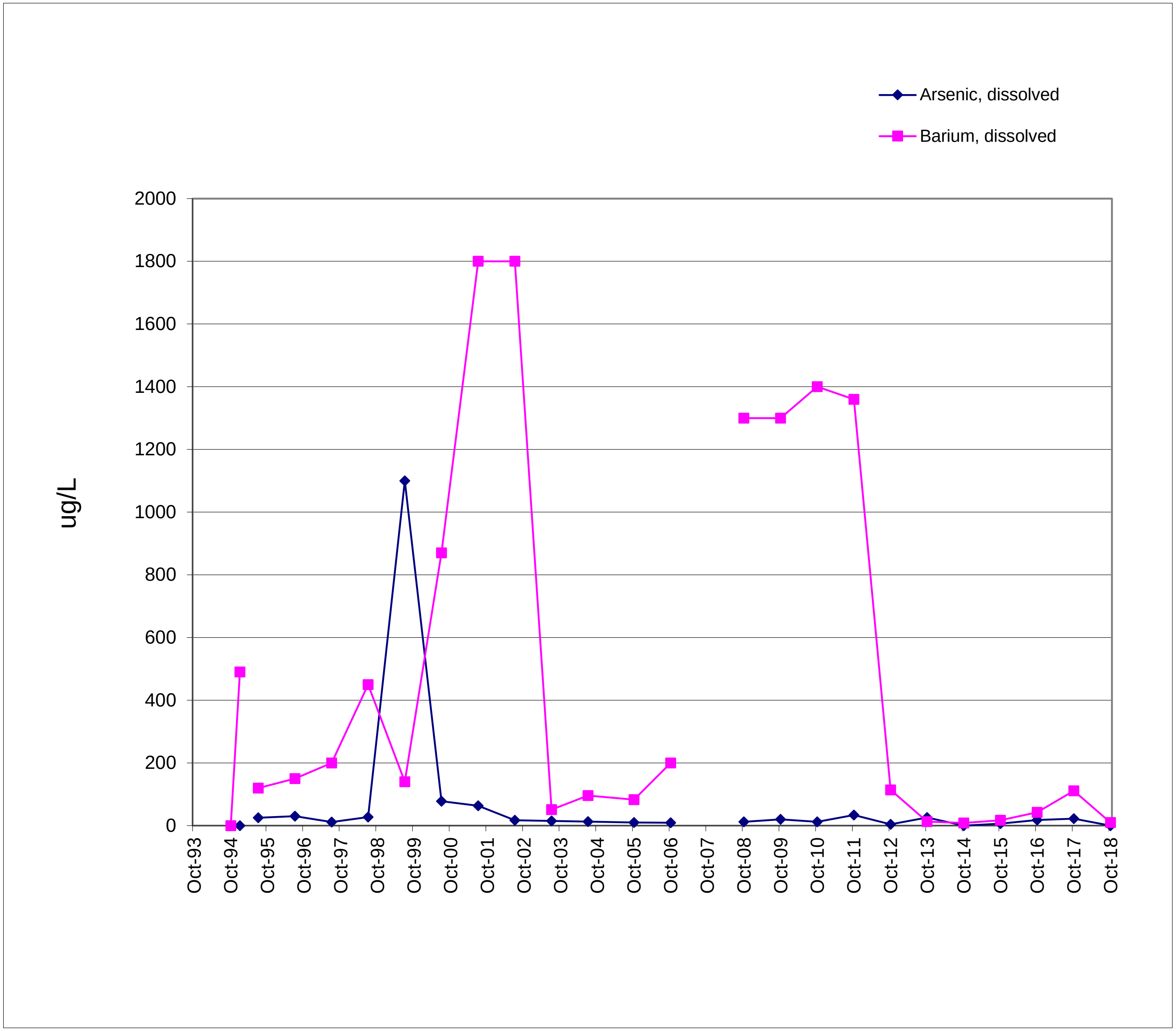
W-43 SVOC

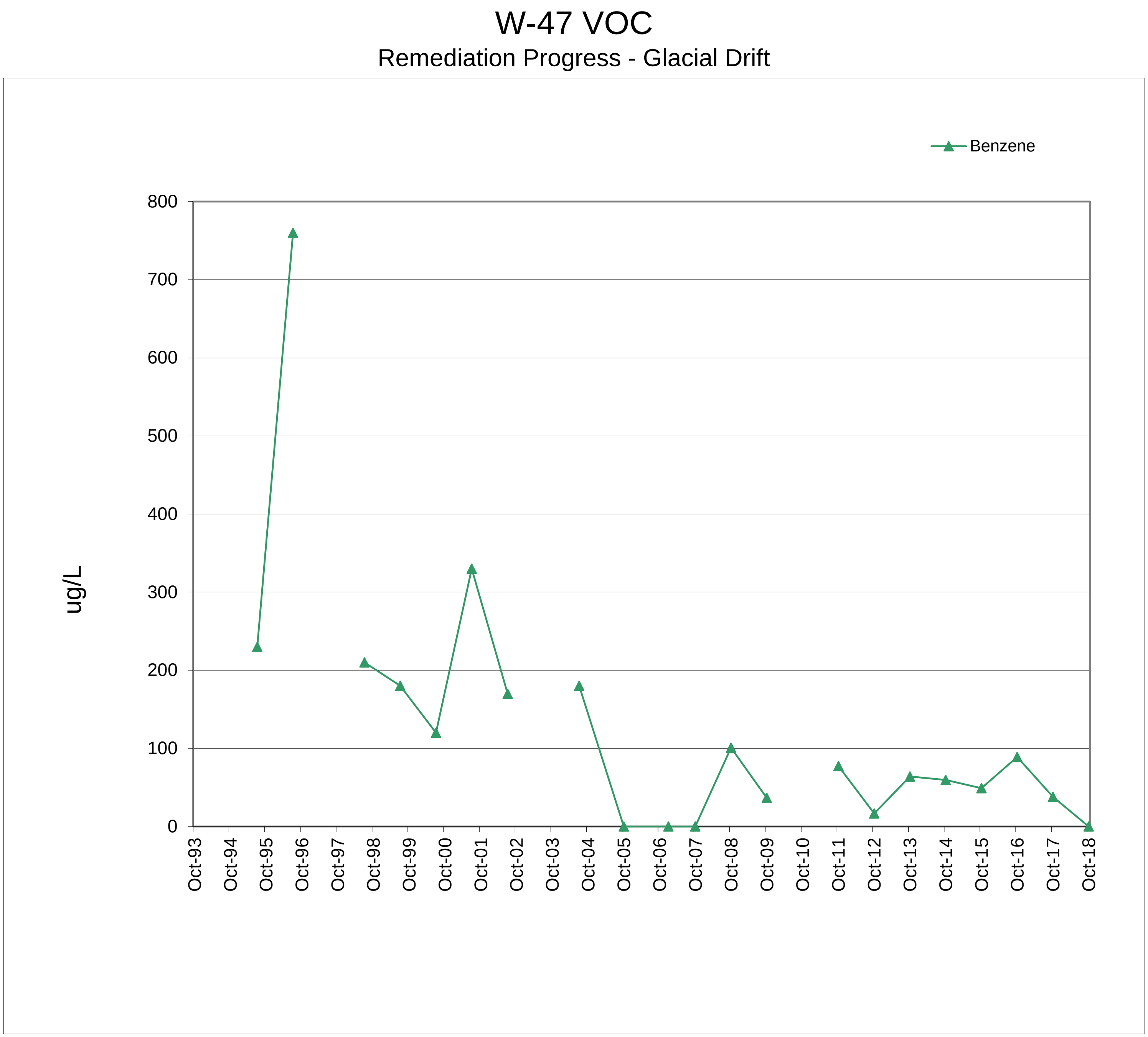
Remediation Progress - Glacial Drift



W-43 Metals

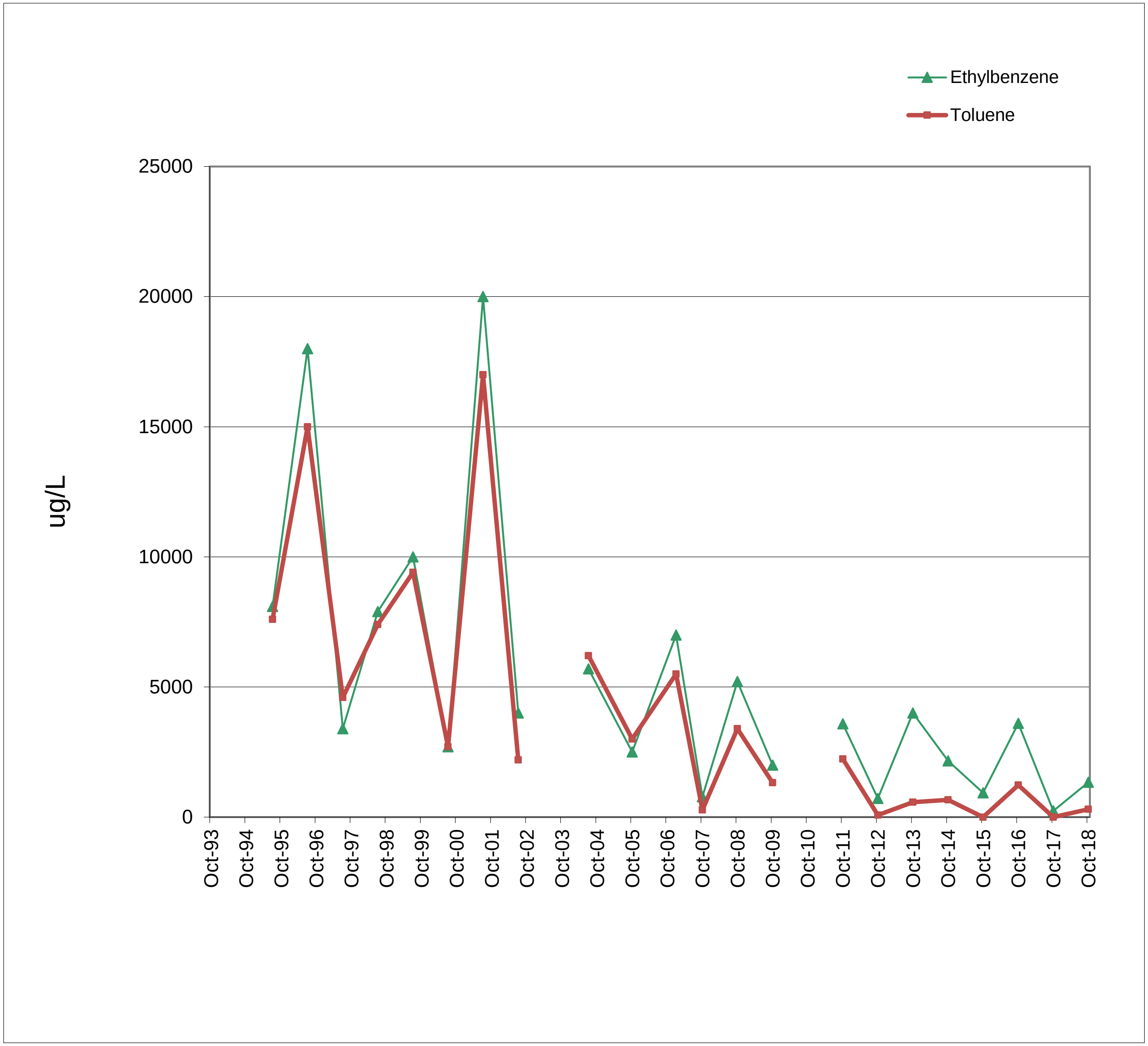
Remediation Progress - Glacial Drift

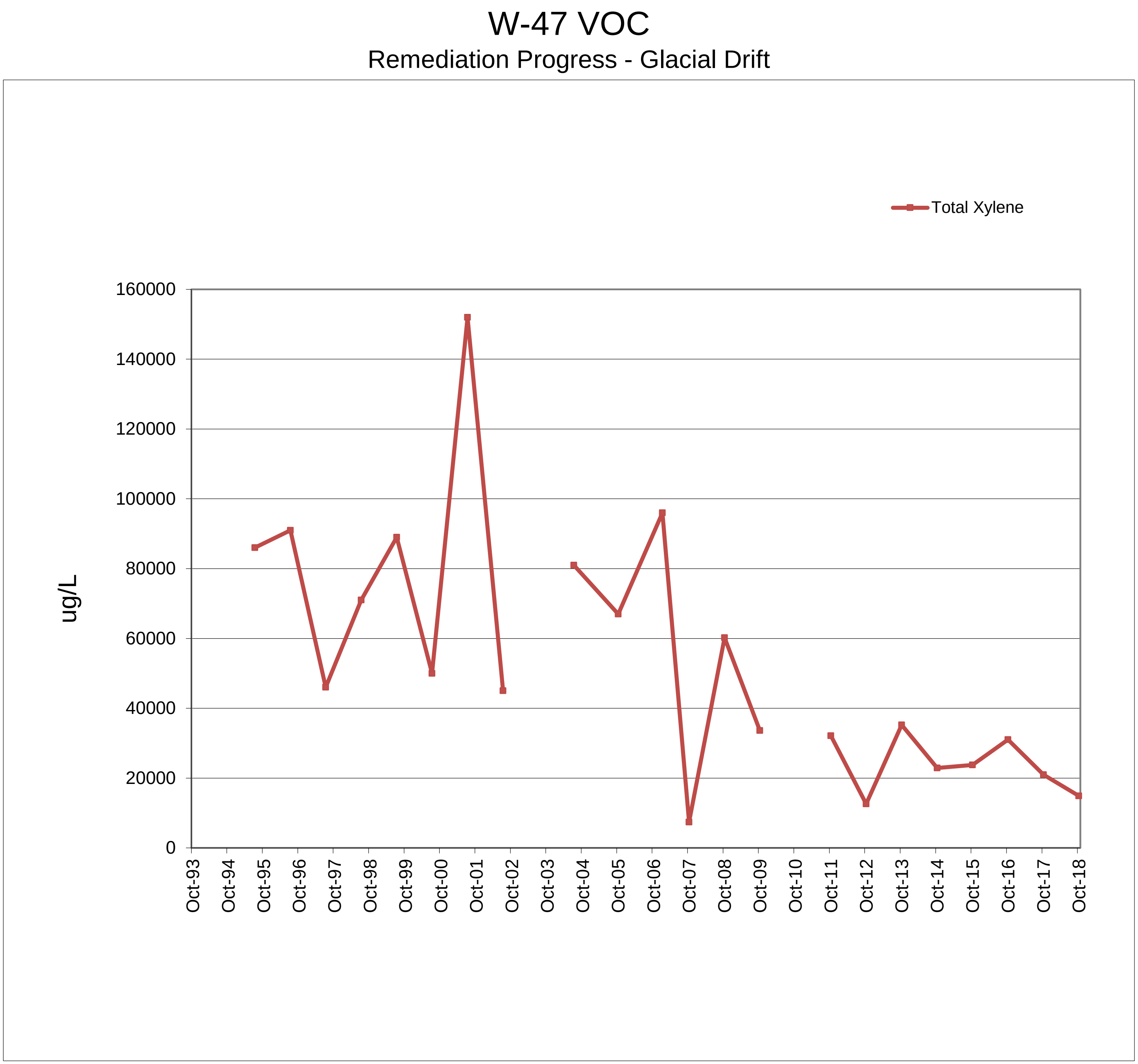



W-47 VOC
Remediation Progress - Glacial Drift
Benzene
ug/L
800
700
600
500
400
300
200
100
0
Oct-93
Oct-94
Oct-95
Oct-96
Oct-97
Oct-98
Oct-99
Oct-00
Oct-01
Oct-02
Oct-03
Oct-04
Oct-05
Oct-06
Oct-07
Oct-08
Oct-09
Oct-10
Oct-11
Oct-12
Oct-13
Oct-14
Oct-15
Oct-16
Oct-17
Oct-18

W-47 VOC

Remediation Progress - Glacial Drift

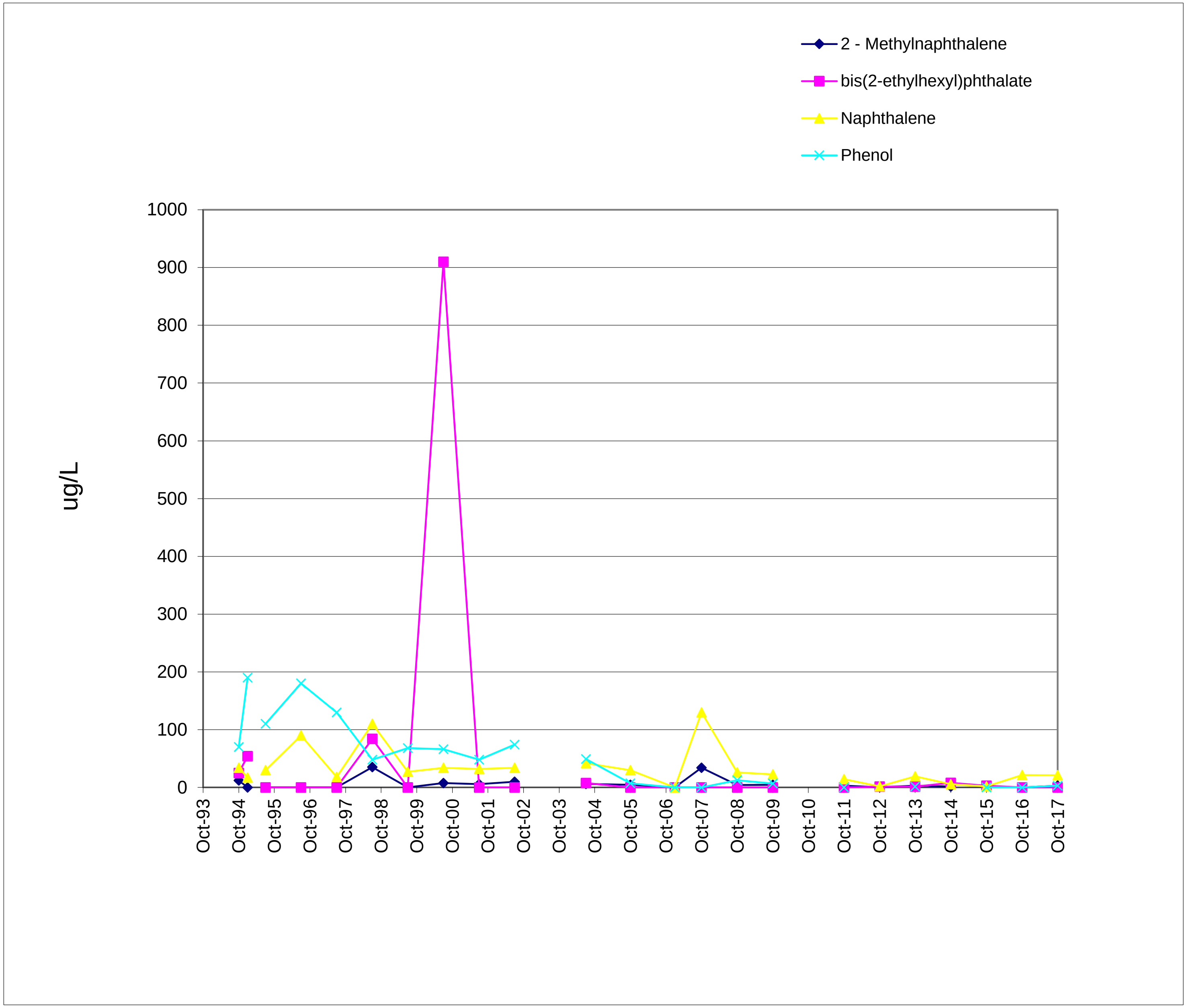




W-47 VOC
Remediation Progress - Glacial Drift
Total Xylene
ug/L
160000
140000
120000
100000
80000
60000
40000
20000
0
Oct-93
Oct-94
Oct-95
Oct-96
Oct-97
Oct-98
Oct-99
Oct-00
Oct-01
Oct-02
Oct-03
Oct-04
Oct-05
Oct-06
Oct-07
Oct-08
Oct-09
Oct-10
Oct-11
Oct-12
Oct-13
Oct-14
Oct-15
Oct-16
Oct-17
Oct-18

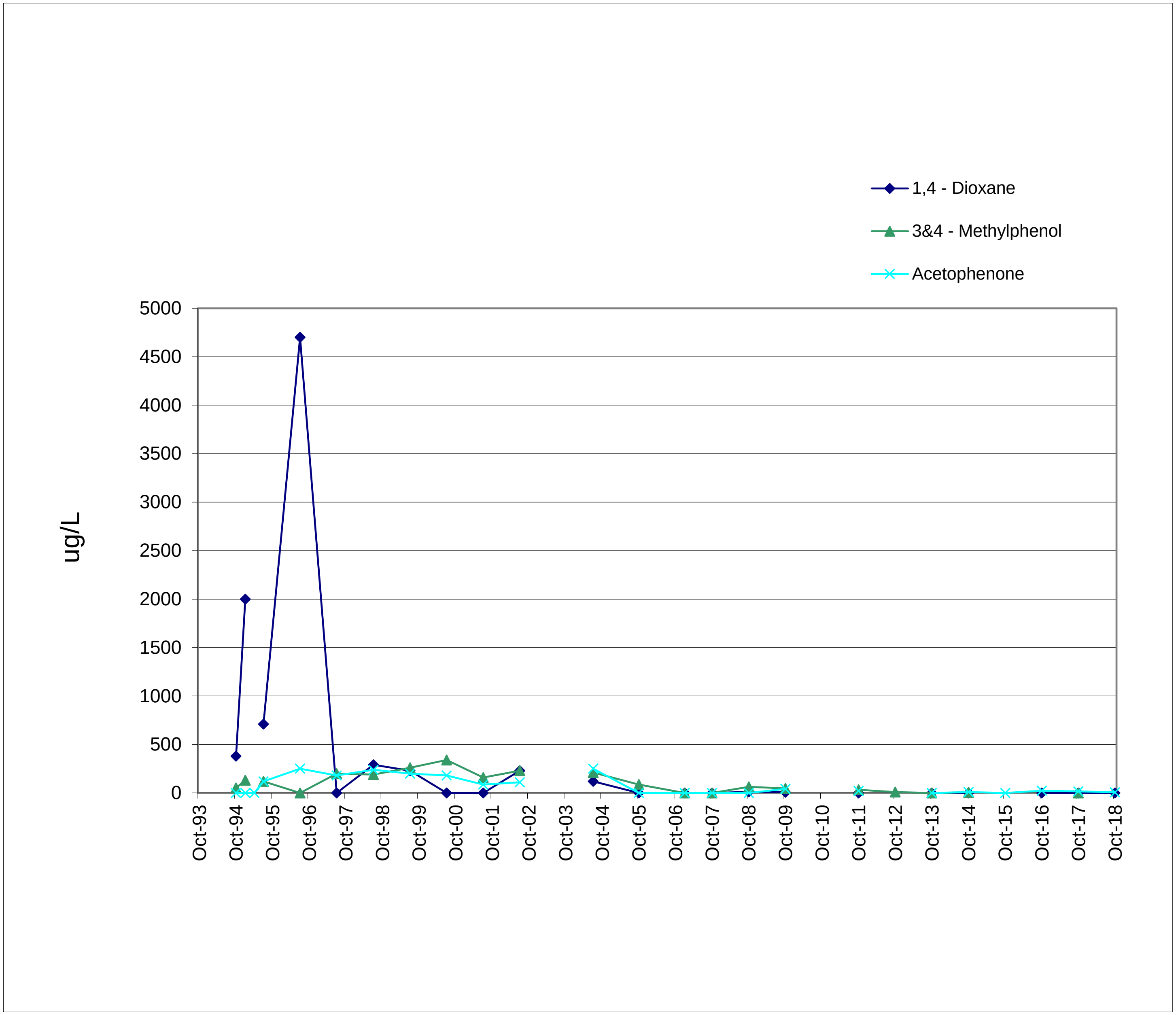
W-47 SVOC

Remediation Progress - Glacial Drift



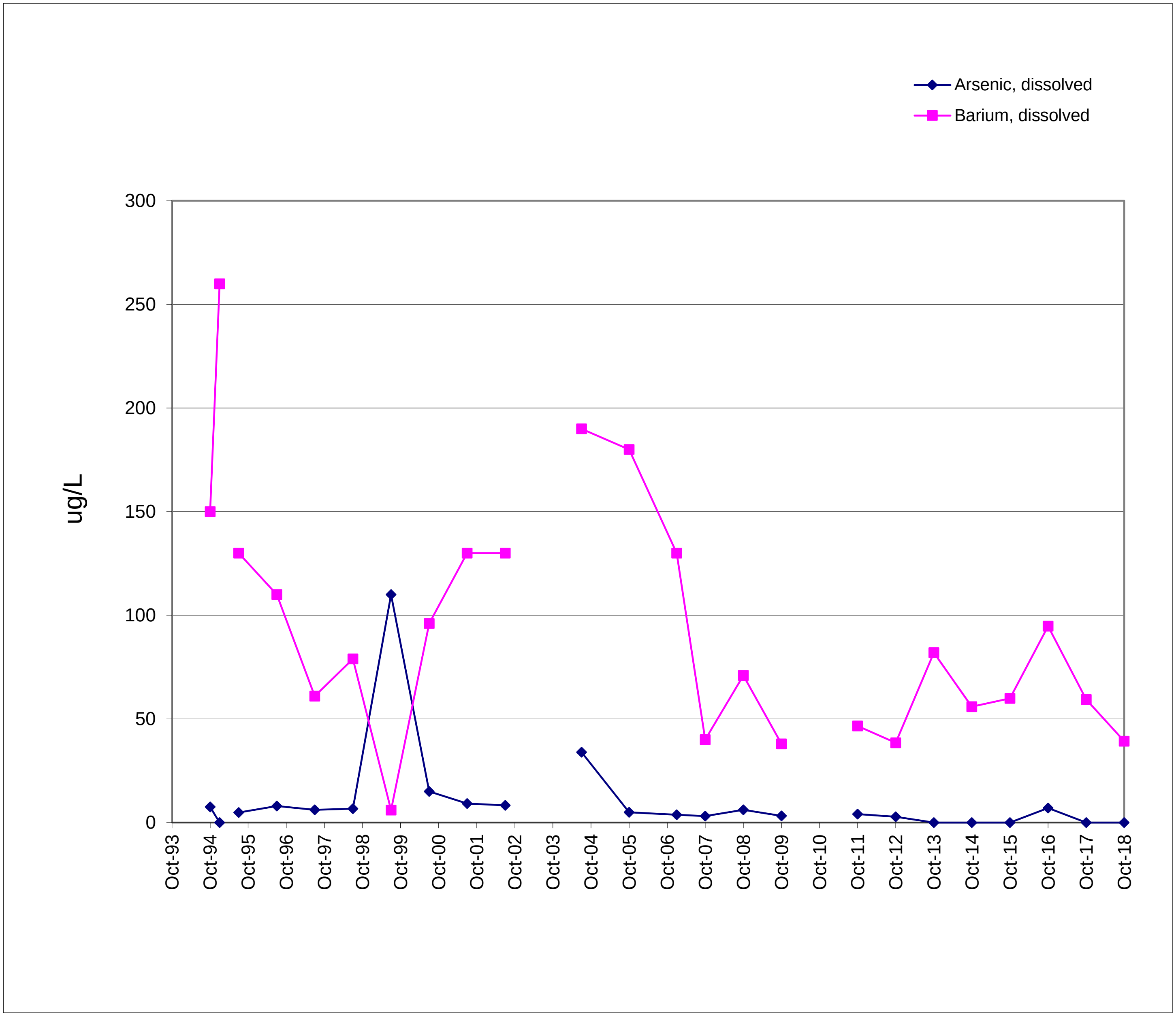
W-47 SVOC

Remediation Progress - Glacial Drift



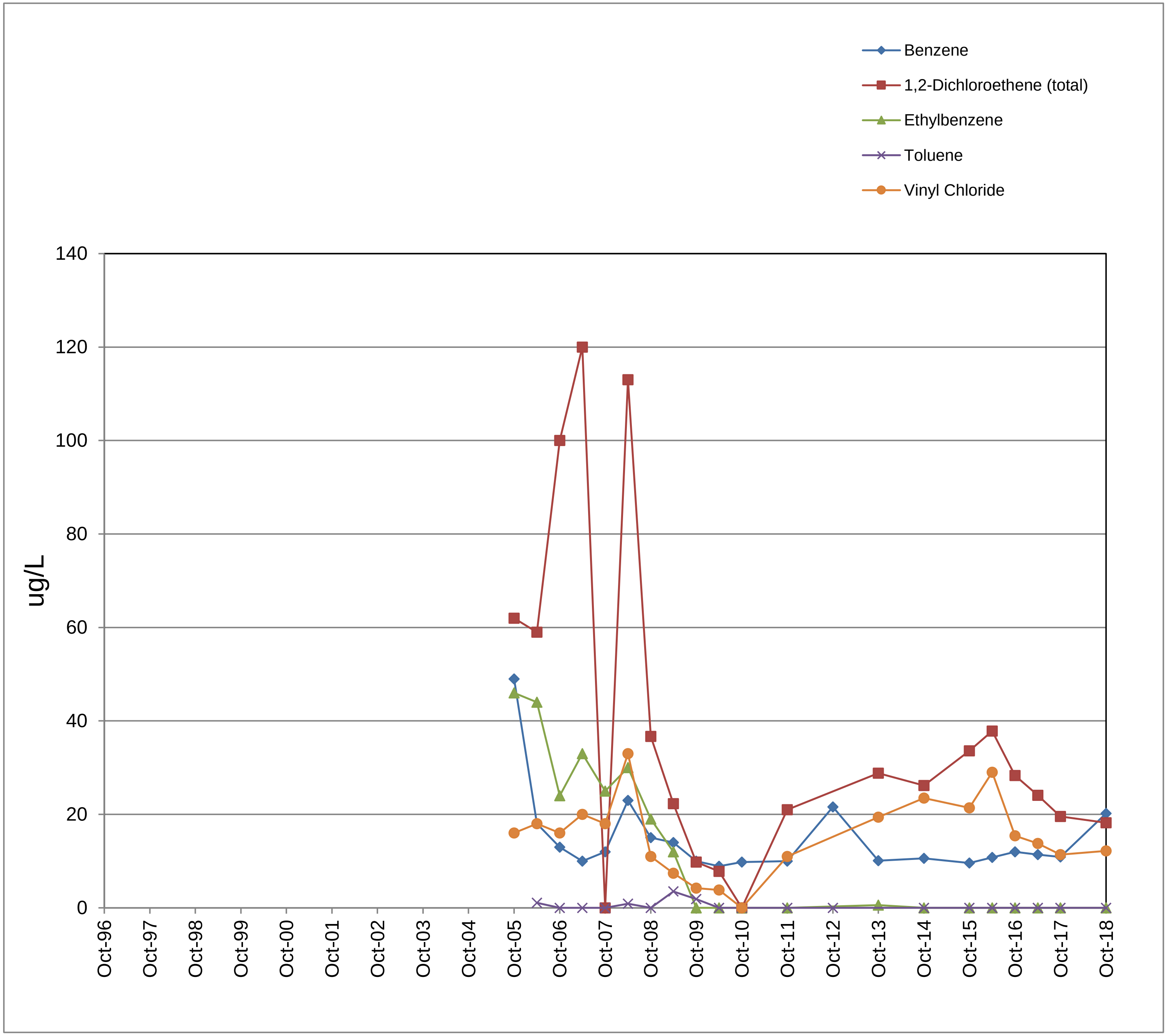
W-47 Metals

Remediation Progress - Glacial Drift



W-52 VOC

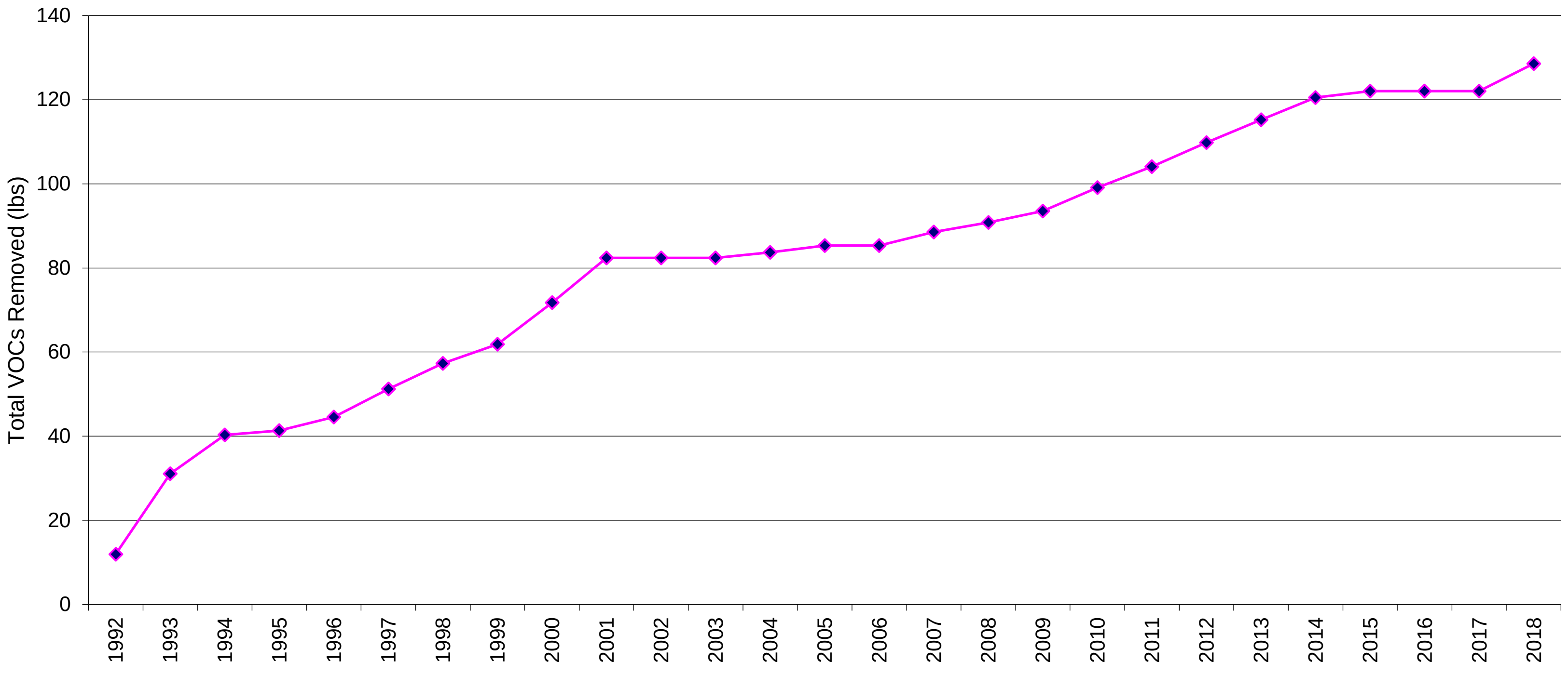
Perimeter - Glacial Drift



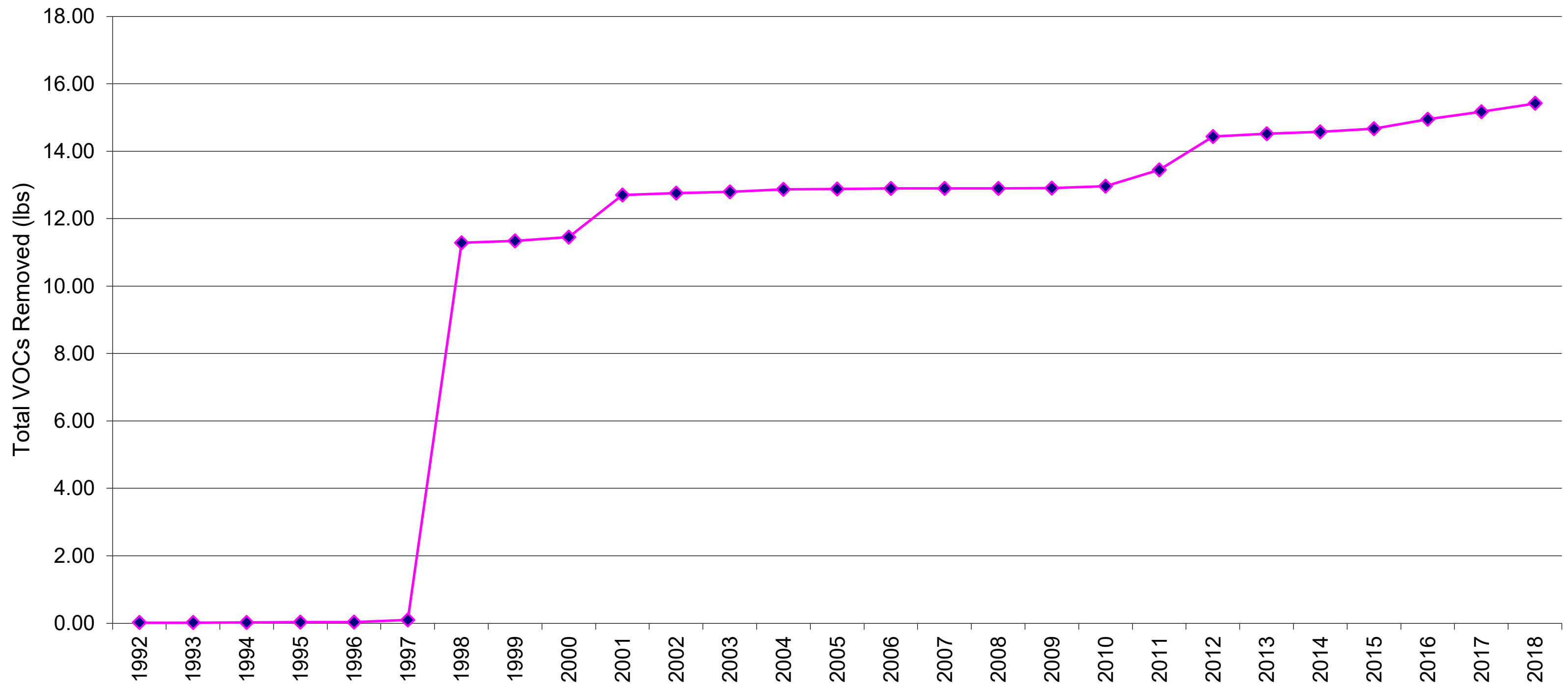
APPENDIX E

CUMULATIVE VOC MASS REMOVAL ESTIMATES

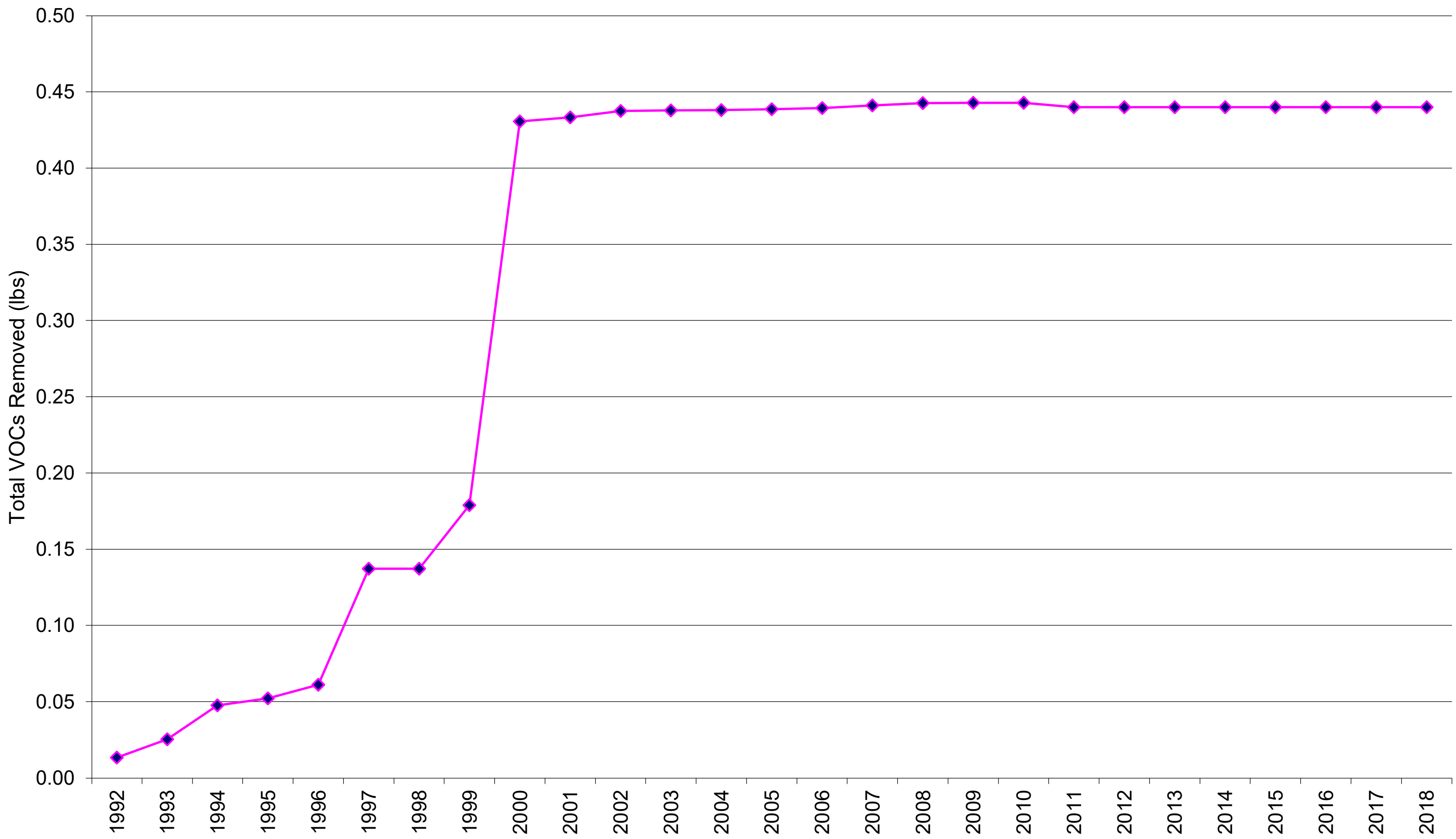
Cumulative Total VOC Removal
Shallow Dolomite Remediation Progress Well W-21A
Cook Composites and Polymers Co.
Saukville, Wisconsin



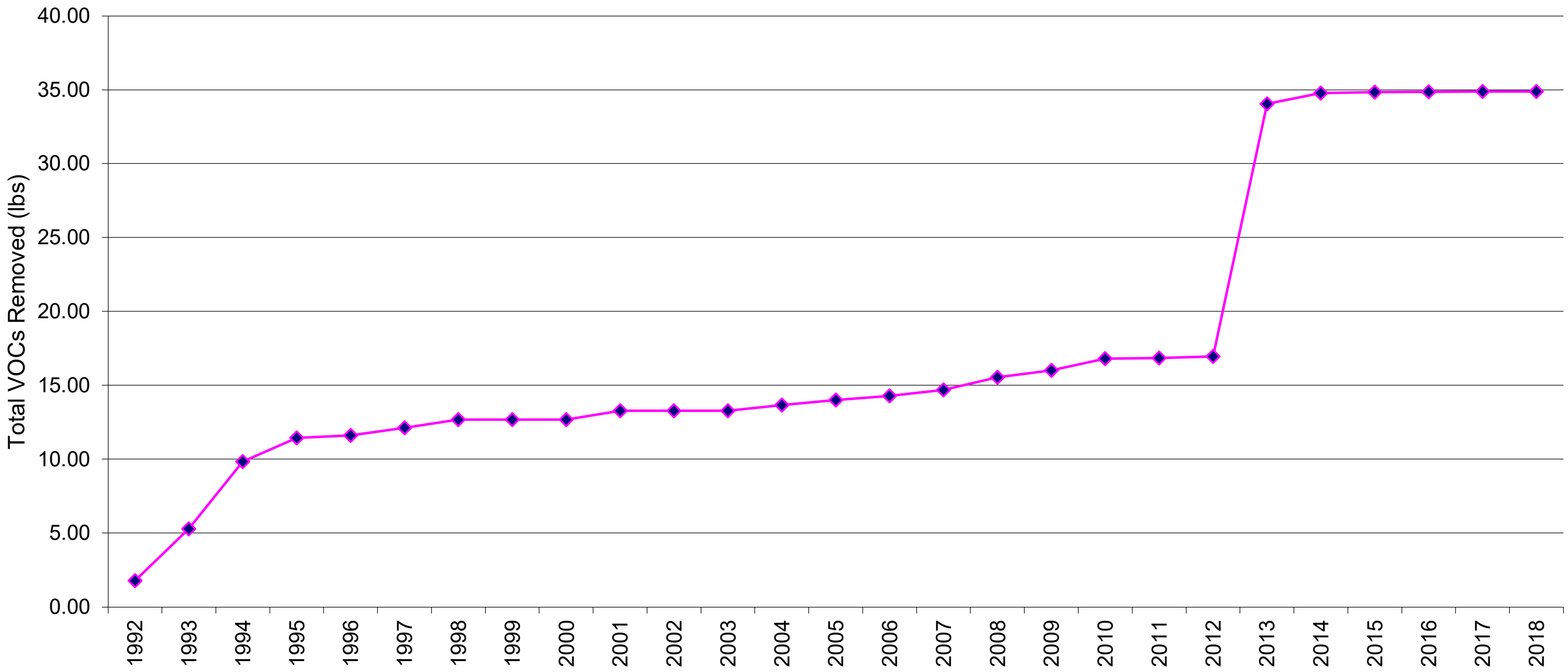
Cumulative Total VOC Removal
Shallow Dolomite Remediation Progress Well W-24A
Cook Composites and Polymers Co.
Saukville, Wisconsin



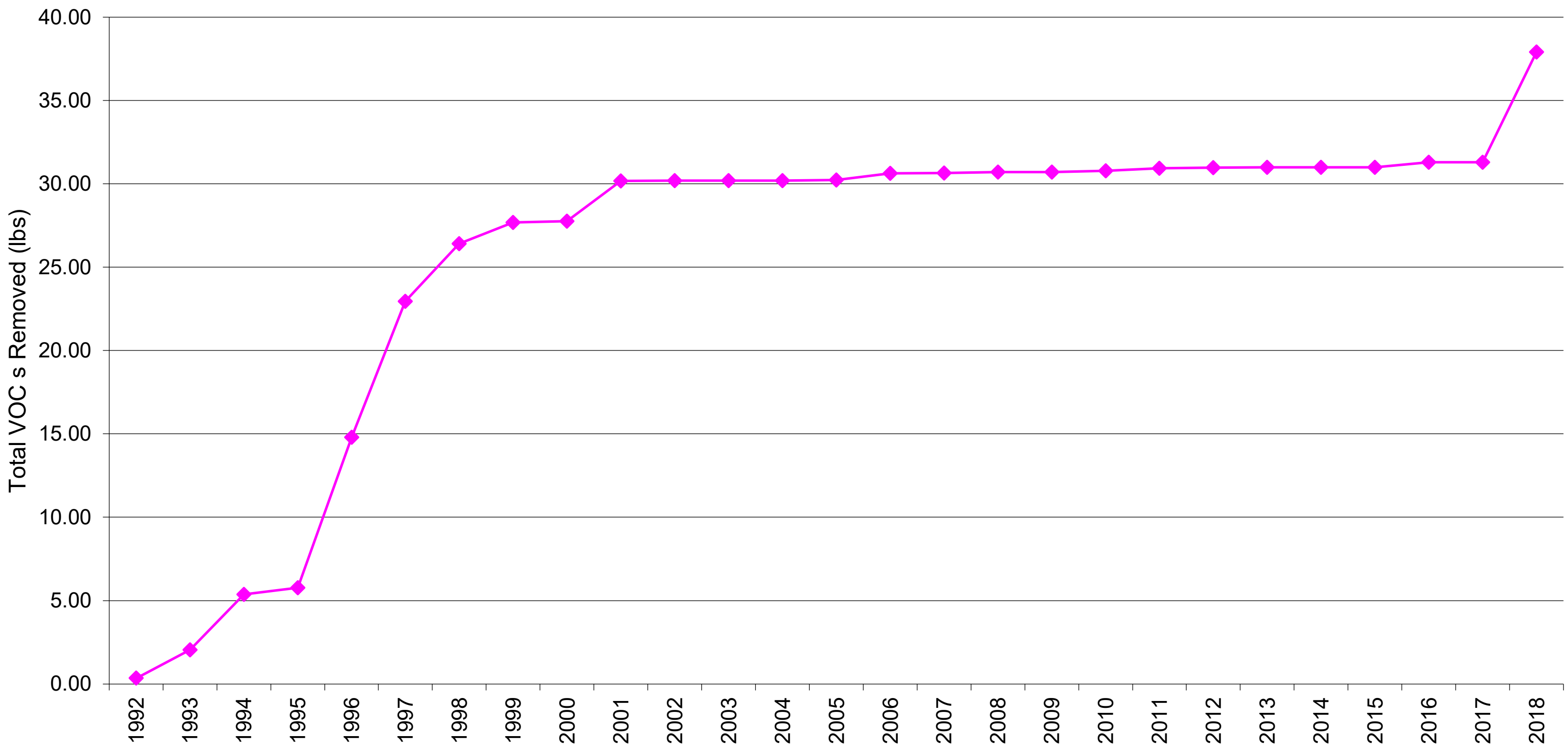
Cumulative Total VOC Removal
Shallow Dolomite Remediation Progress Well W-28
Cook Composites and Polymers Co.
Saukville, Wisconsin



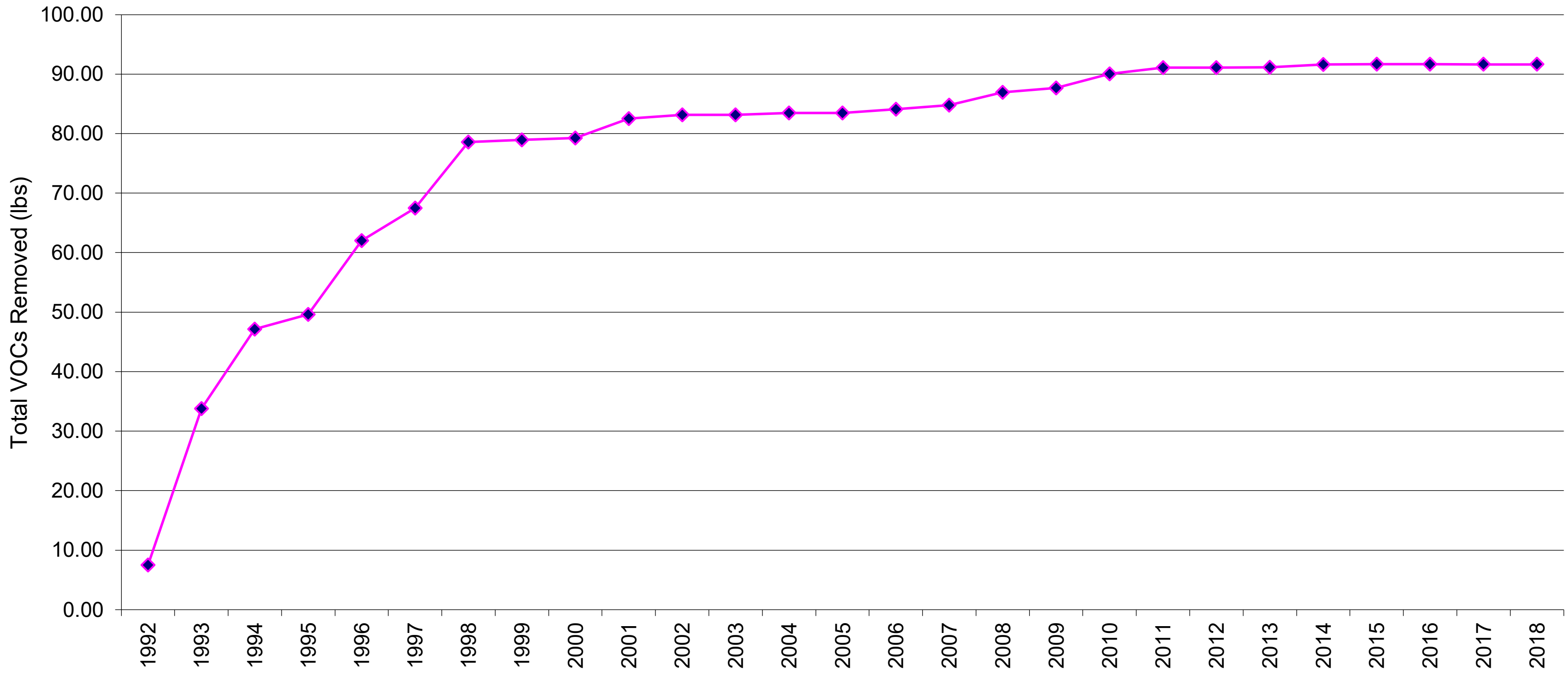
Cumulative Total VOC Removal
Shallow Dolomite Remediation Progress Well W-29
Cook Composites and Polymers Co.
Saukville, Wisconsin



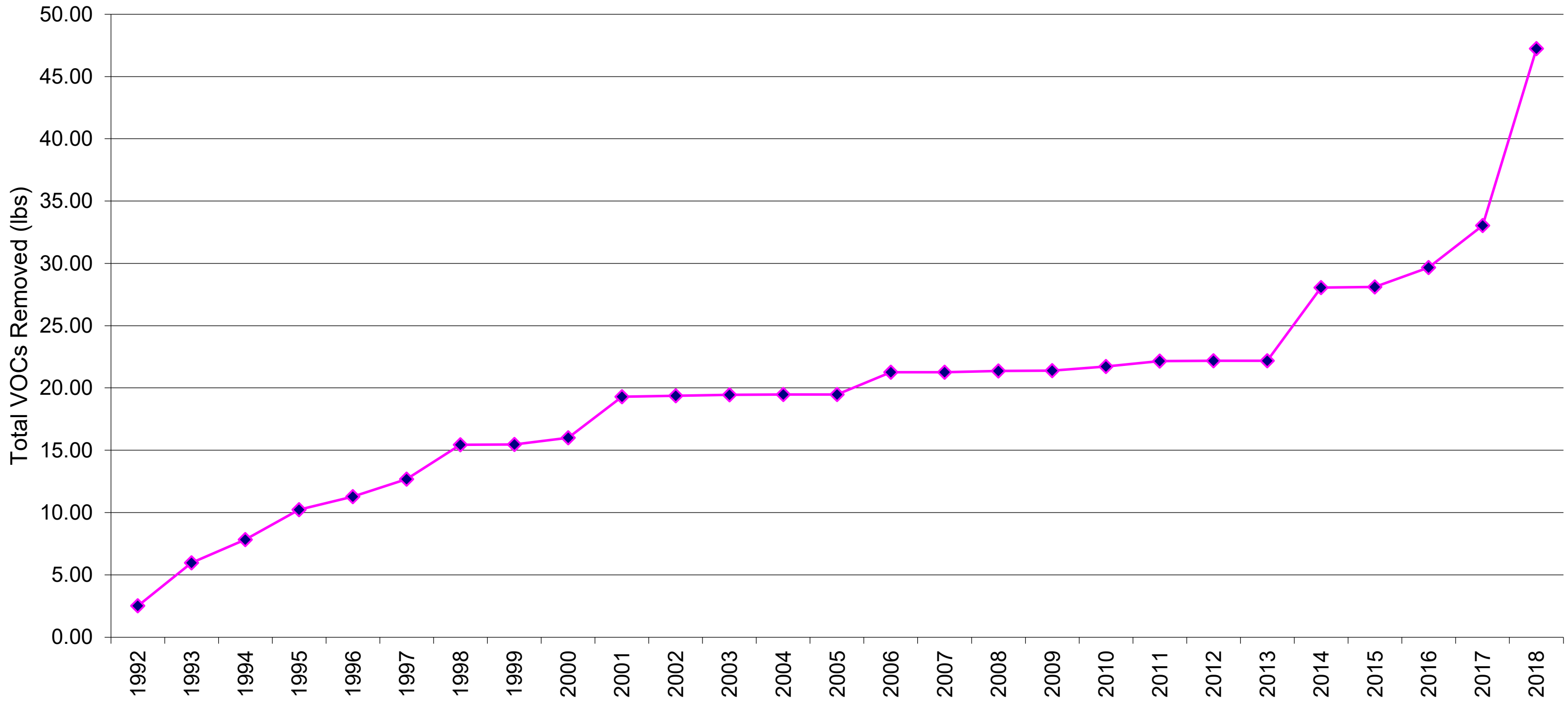
Cumulative Total VOC Removal
Glacial Ranney Collector RC-1
Cook Composites and Polymers Co.
Saukville, Wisconsin



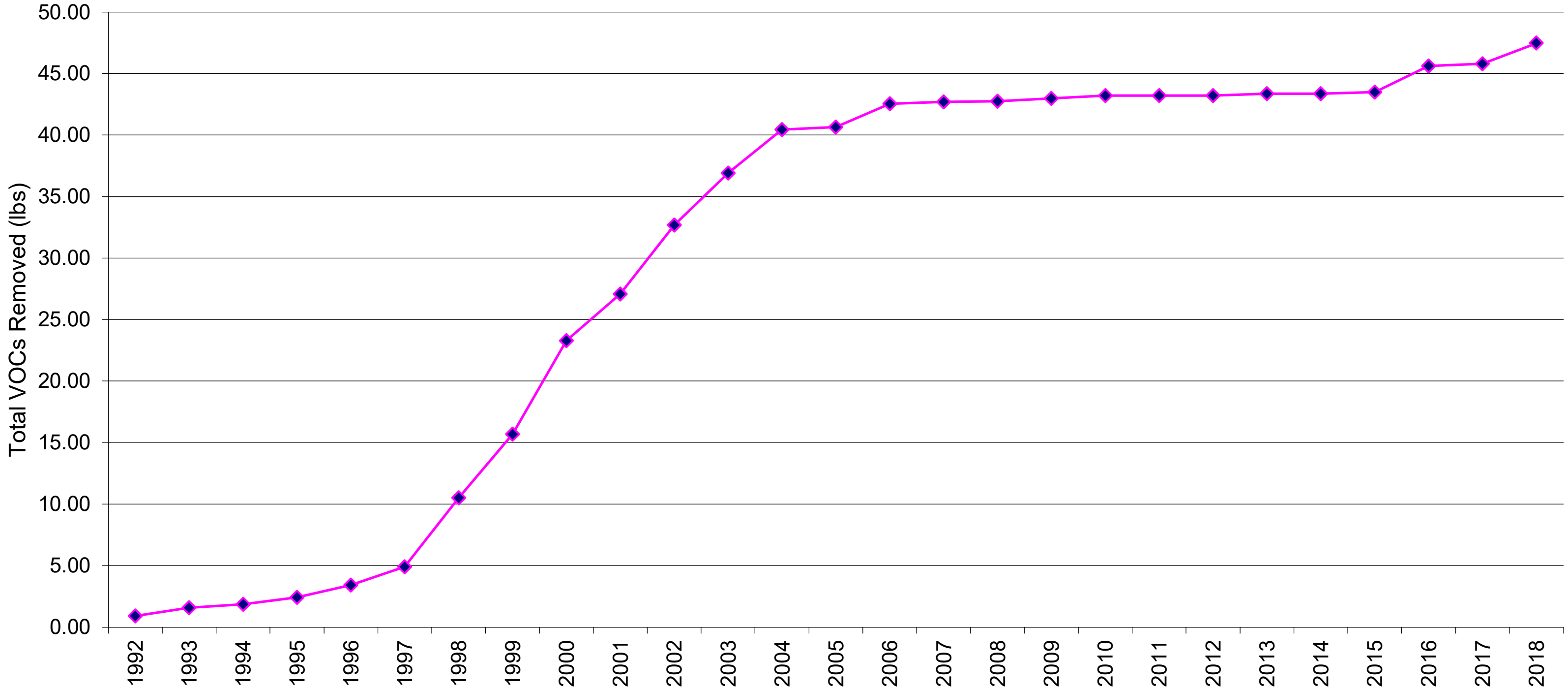
Cumulative Total VOC Removal
Glacial Ranney Collector RC-2
Cook Composites and Polymers Co.
Saukville, Wisconsin



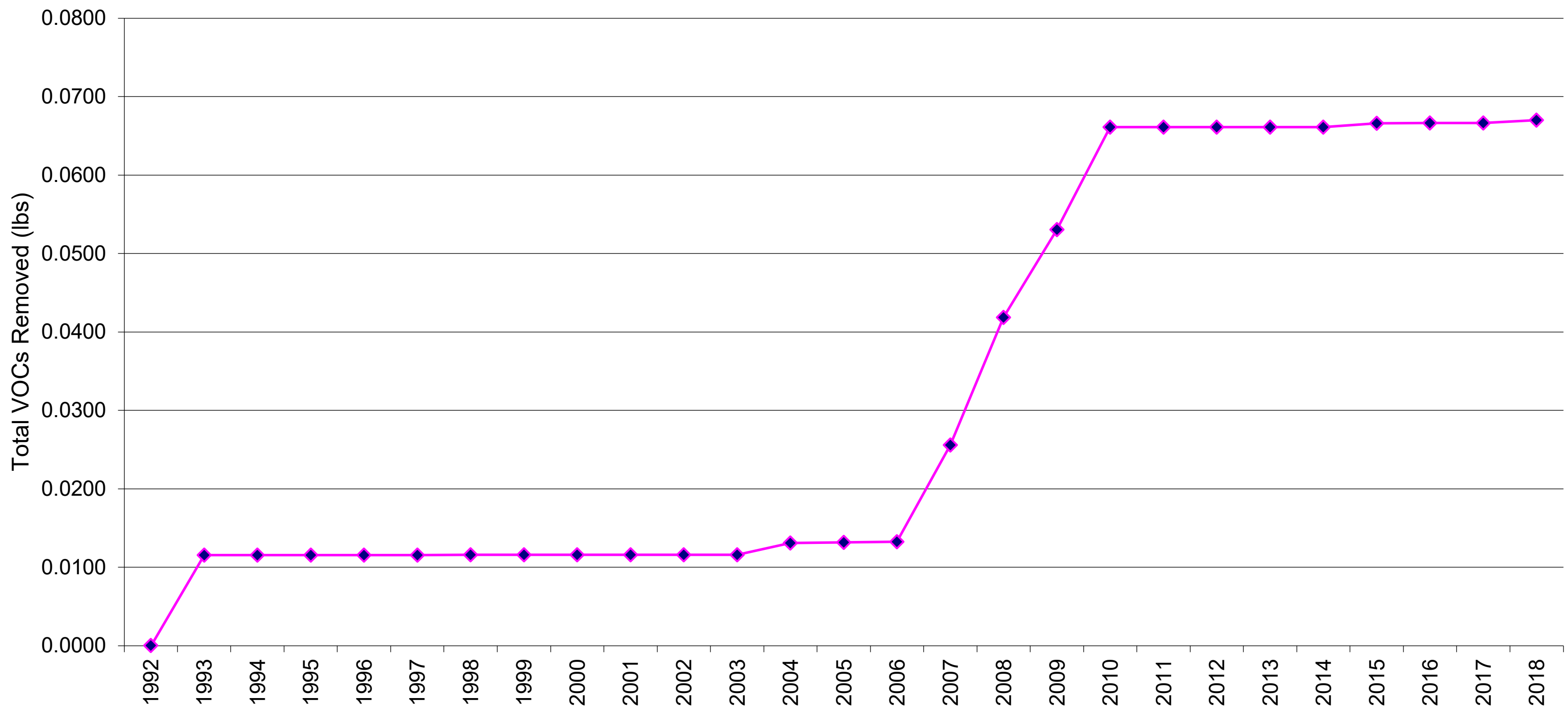
Cumulative Total VOC Removal
Glacial Ranney Collector RC-3
Cook Compoites and Polymers Co.
Saukville, Wisconsin



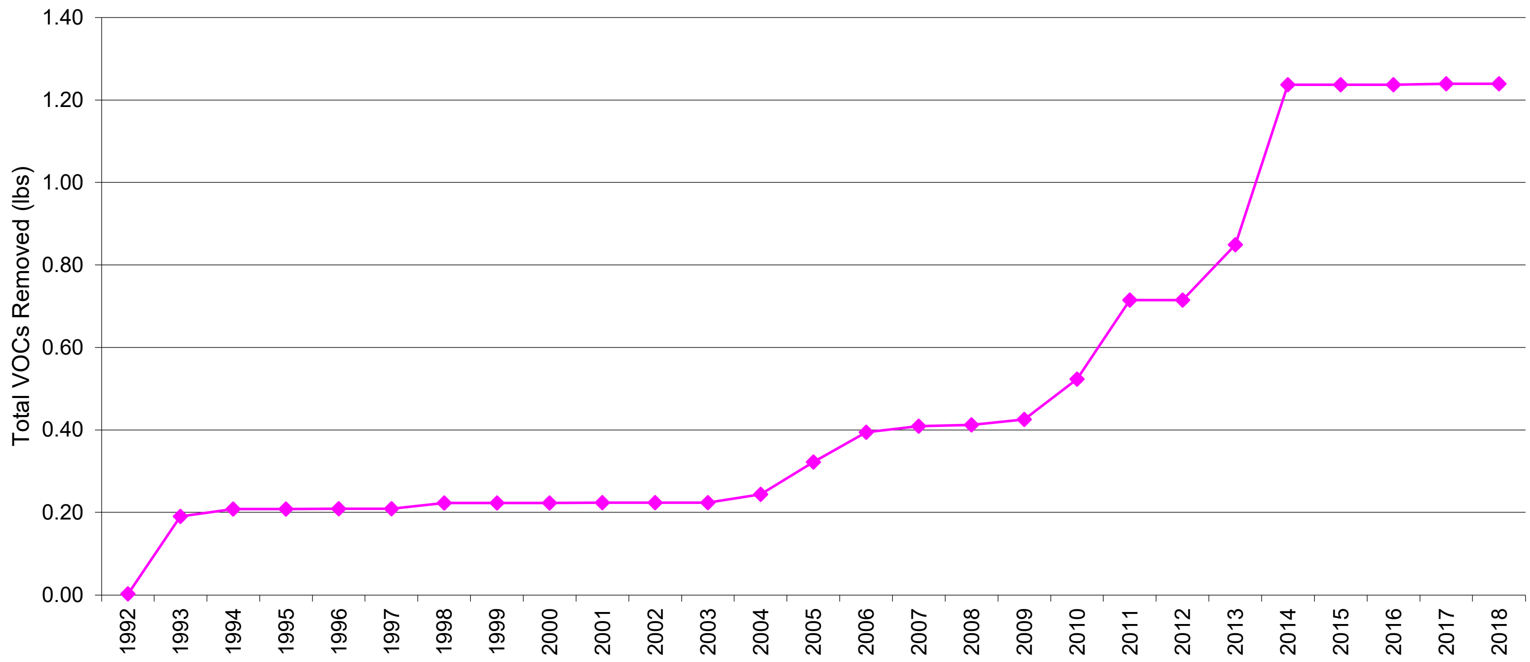
Cumulative Total VOC Removal
Deep Dolomite Well W-30
Cook Composites and Polymers Co.
Saukville, Wisconsin



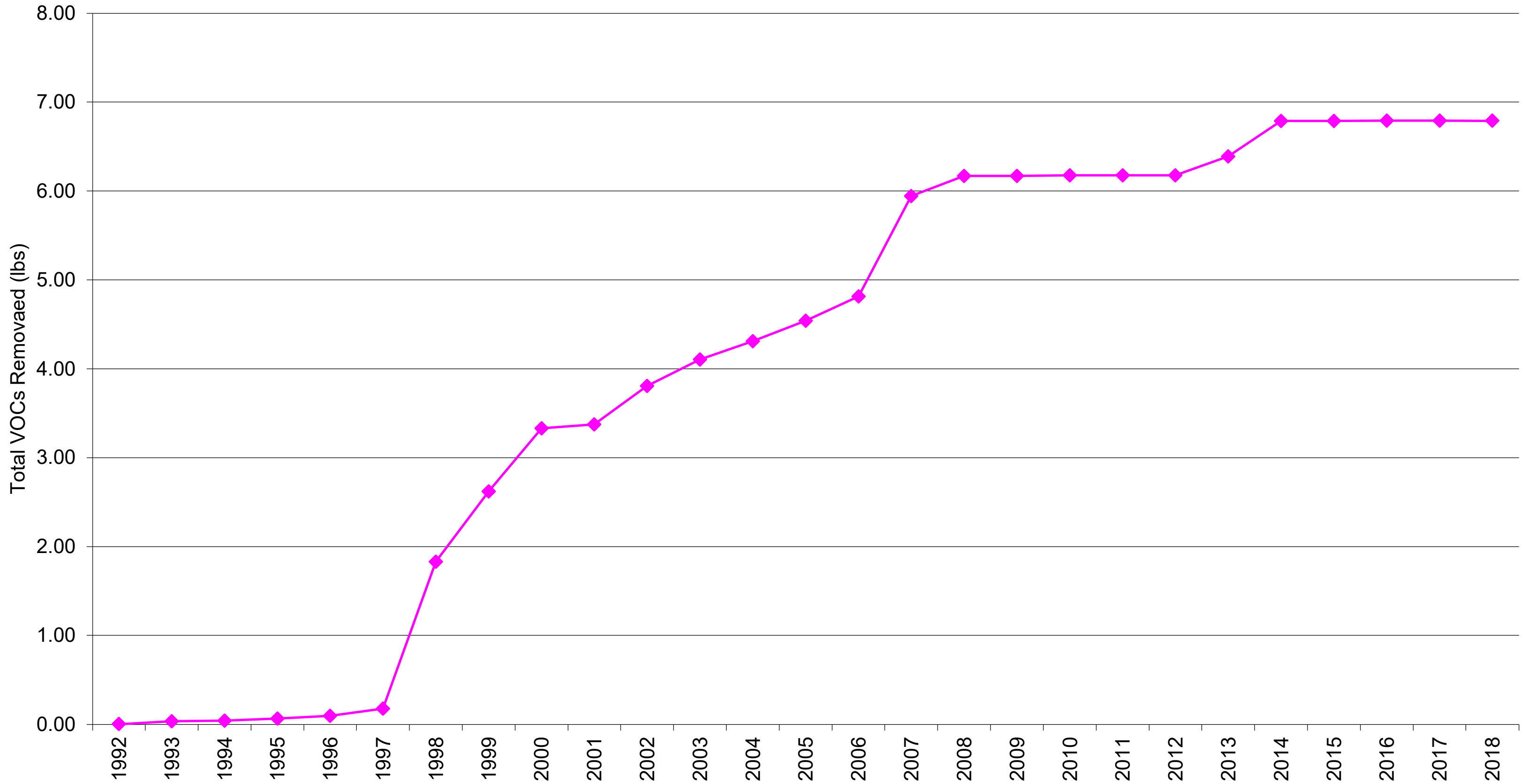
Cumulative Total VOC Removal
Glacial Extraction Well W-31
Cook Composites and Polymers Co.
Saukville, Wisconsin



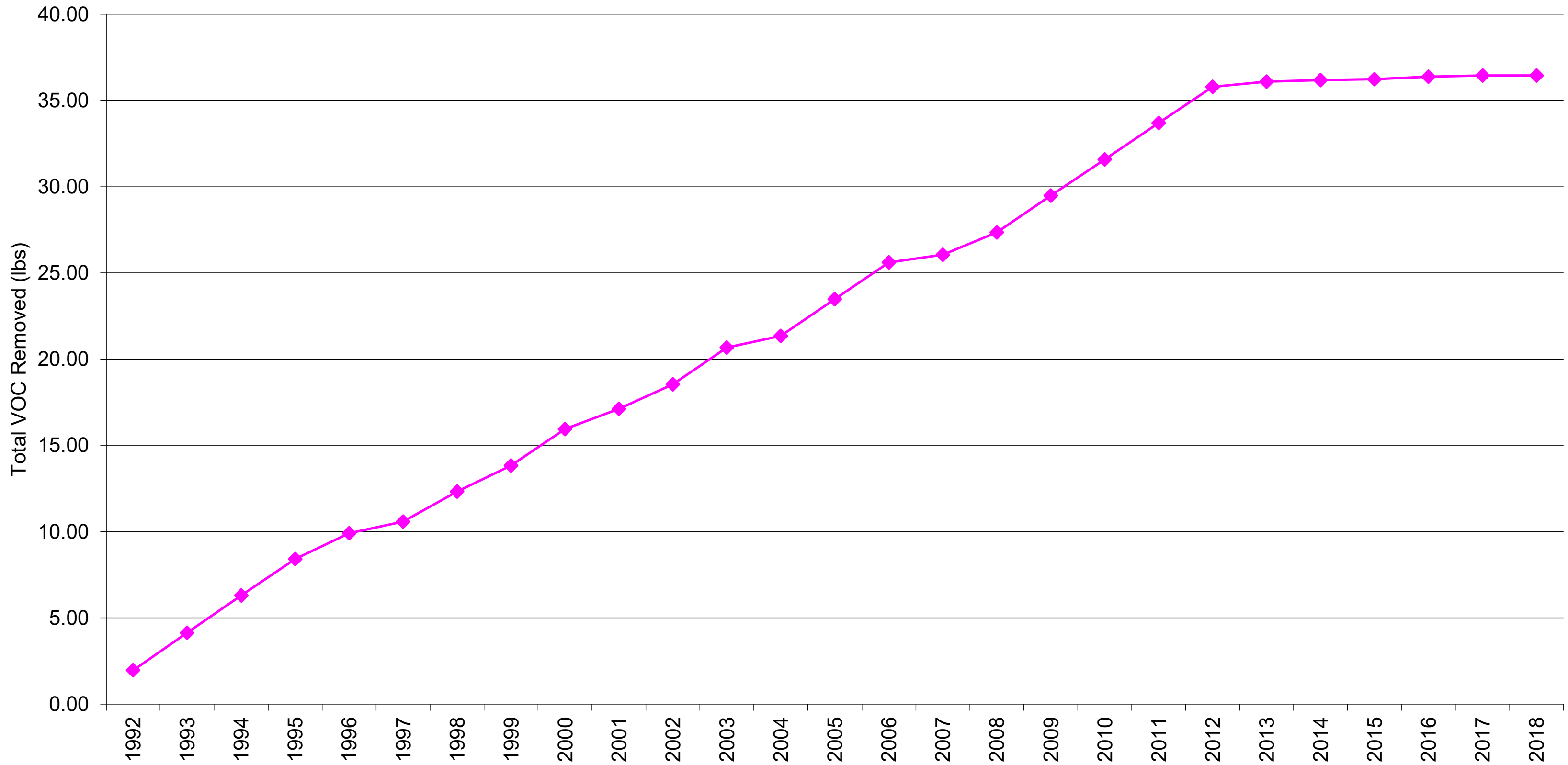
Cumulative Total VOC Removal
Glacial Extraction Well W-32
Cook Composites and Polymers Co.
Saukville, Wisconsin



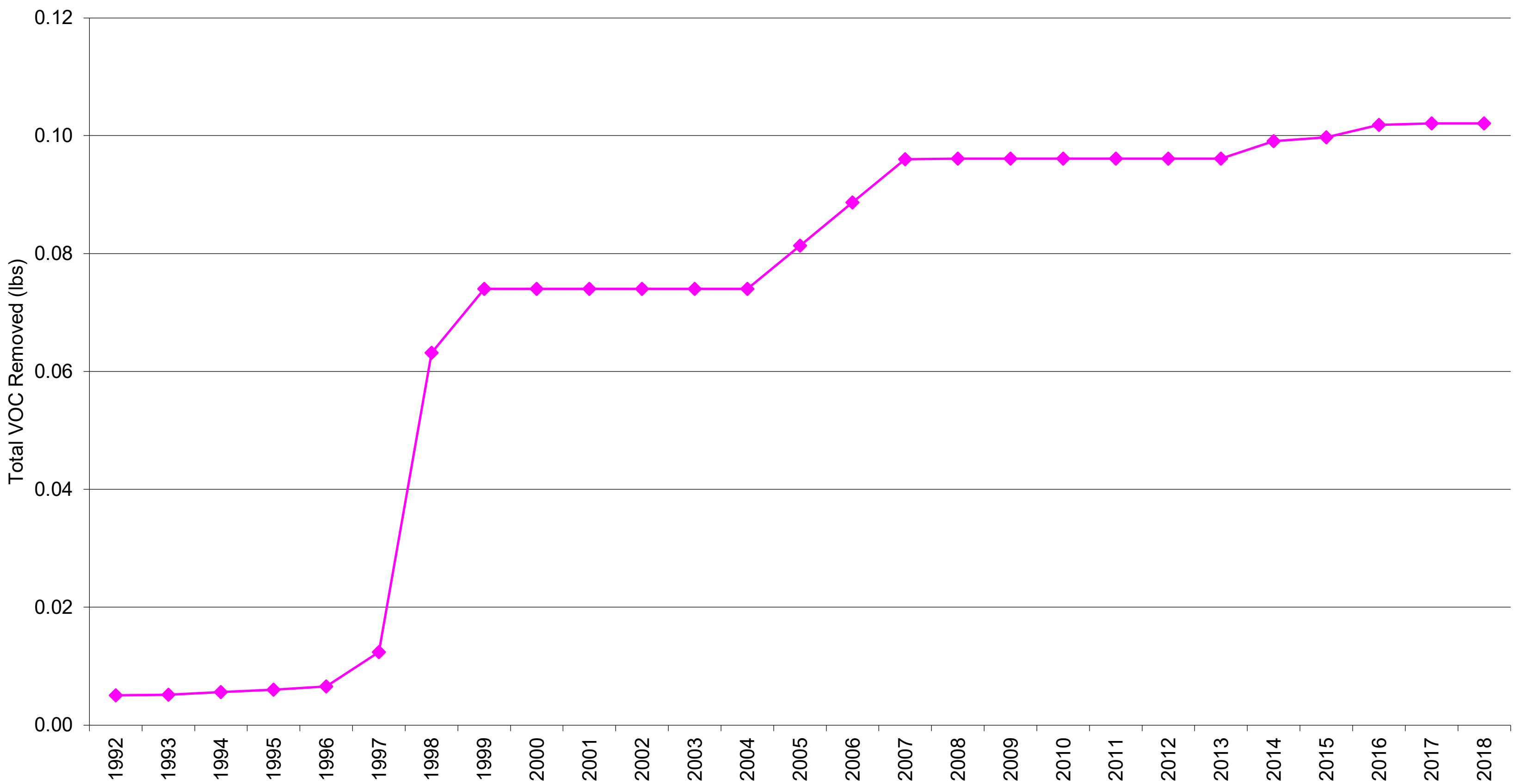
Cumulative Total VOC Removal
Glacial Extraction Well W-33
Cook Composites and Polymers Co.



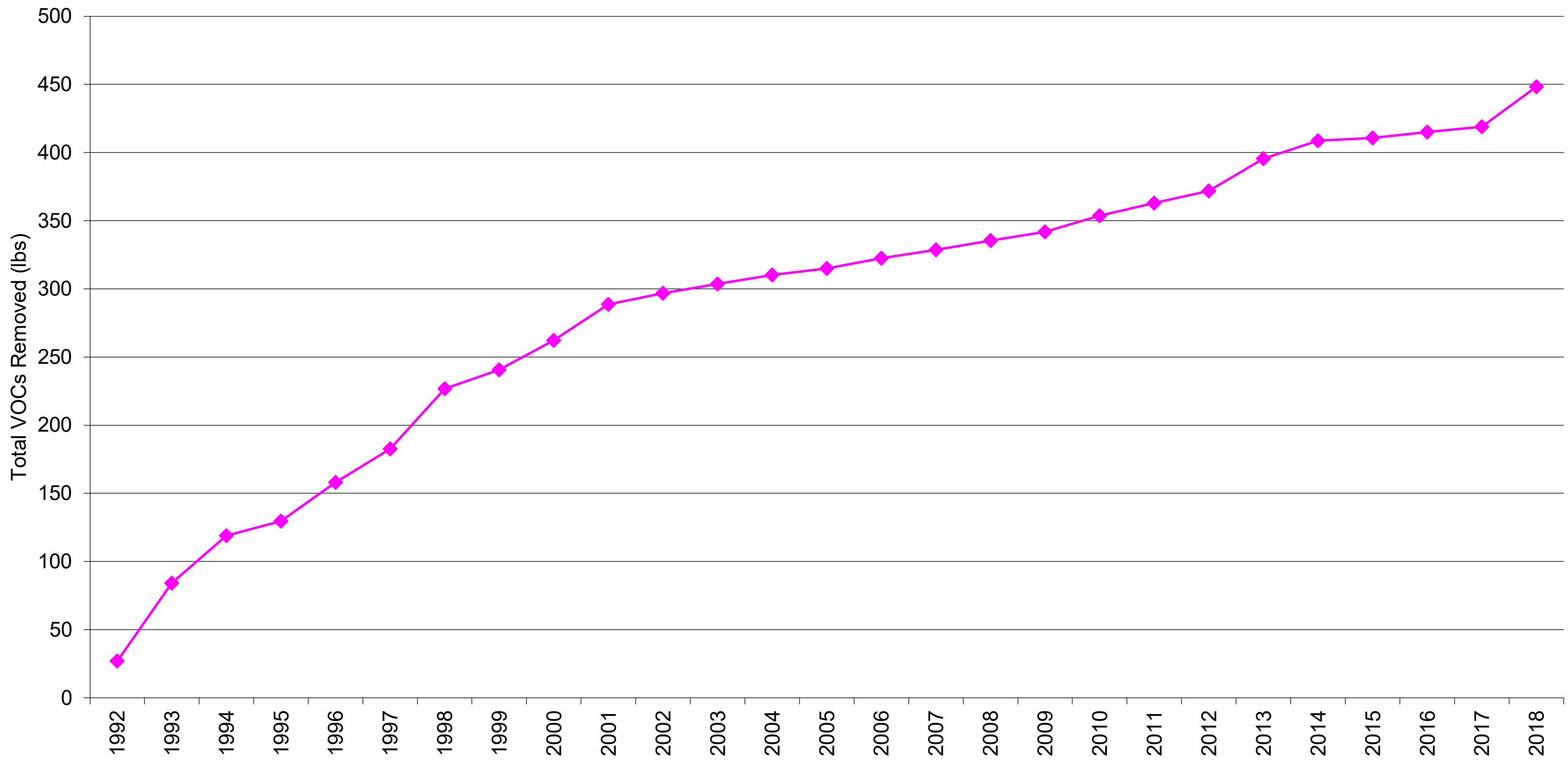
Cumulative Total VOC Removal
Glacial Extraction Well W-34
Cook Composites and Polymers Co.
Saukville, Wisconsin



Cumulative Total VOC Removal
Glacial Extraction Well W-35
Cook Composites and Polymers Co.
Saukville, Wisconsin



Cumulative Total VOC Removal
All Glacial, Shallow and Deep Dolomite Wells
Cook Composites and Polymers Co.
Saukville, Wisconsin



Endpoint Solutions
6871 South Lovers Lane
Franklin, Wisconsin 53132
Phone: 414-427-1200
Fax: 414-427-1259
www.endpointcorporation.com