Table of Contents

List of Tables

List of Figures

Appendices

2001 Annual Monitoring Report
Former Burroughs-Unisys Facility
1225 Ridgeway Avenue
Rochester, New York
NYSDEC Site #8-28-075

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this report is to provide the New York State Department of Environmental Conservation (NYSDEC) with a project status report for the 2001 Groundwater Monitoring Program at the Former Burroughs Facility located at 1225 Ridgeway Avenue, Rochester, New York.

With the successful completion of the Interim Measures (IMs), NYSDEC and Unisys entered into Administrative Order on Consent (AOC), Index #B8-0262-89-03, which outlined a Scope of Work to be completed at the site. This work ultimately lead to the shutdown of the Groundwater/Soil Vapor Extraction (GW/SVE) treatment system on March 25, 1997, with NYSDEC approval, as recommended in the *Focused Evaluation of Remedial Alternatives Report* (Unisys, October 15, 1997).

The GW/SVE was in operation from November 1990 through March 25, 1997. The NYSDEC approval of the system shut-down was subject to a **"groundwater monitoring only"** corrective action alternative to evaluate the groundwater quality conditions at the site for five years after the system shutdown. This report presents the findings of the sampling conducted in 2001, the fifth year post-shutdown of the GW/SVE treatment system. This is the fifth annual groundwater monitoring report for this site.

1.2 SITE LOCATION AND DESCRIPTION

The Former Burroughs Facility is located at 1225 Ridgeway Avenue, Rochester, New York. The location of the site is shown on Figure 1. The area surrounding the site is primarily zoned industrial/commercial. The site is bounded to the north by a large parcel owned by Eastman Kodak Company, to the east by commercial business, to the south and southwest by undeveloped parcels owned by 3M Corporation, and to the west by a parcel owned by Dimino Management, Inc.

The site plan is illustrated in Figure 2. The Ridgeway Avenue site consists of a manufacturing building, office building and a warehouse/storage building. Several businesses currently occupy these buildings under lease to Ridgeway Industrial Properties. The site is mostly covered with asphalt, concrete, or buildings, with only a few small grass covered areas. The location of buildings, treatment system, roadways, monitoring wells, and the GW/SVE system are shown on Figure 2.

1.3 SITE HISTORY

Since the beginning of industrial activity at this site in 1968, solvents have been used for manufacturing carbon copy paper, printer ribbons and other office supply products. Burroughs manufactured these products at this facility from 1976 to 1986. Although Burroughs sold the business operations in 1986 to NuKote International, similar manufacturing operations and chemical use continued at the facility. A more detailed discussion of the property including ownership and lease agreements is presented in the *Remedial Investigation Report* (Unisys, 1992).

Primary solvents used in the manufacturing process included isopropyl alcohol (isopropanol or IPA), methyl ethyl ketone (2-butanone or MEK), toluene and methanol. These solvents were stored in underground storage tanks (USTs) in the northeast corner of the site (Figure 2). Historical records and environmental investigations revealed that between 1986 and 1992, IPA, methanol, MEK, and toluene were the only chemicals stored in the former USTs. In 1985 it was discovered that soil and groundwater had been impacted beneath the site. These stored chemicals are four of the five constituents of concern identified in the ROD as site-specific indicator compounds (SSICs). The SSICs and NYSDEC regulations were used to develop the remedial action objectives (RAOs) for soil and groundwater. Acetone, the fifth SSIC, was not stored at the facility. The presence of acetone has been attributed to the subsurface biodegradation of IPA (Unisys, October 30, 1998).

1.4 REMEDIATION STATUS

The Record of Decision (ROD) (NYSDEC, March 1994) identified a remediation plan after evaluating and approving the *Remedial Investigation/Feasibility Study* (RI/FS). NYSDEC selected enhancements and modifications (Alternative 5 in the ROD) to the Interim Remedial Measures (IRM) GW/SVE system. In cooperation with NYSDEC, Unisys developed and implemented the *Remedial Design* (RD) in response to the ROD, finalized in March 1995 (BHE, March 10, 1995).

The selected remedial alternative included continued operation of the IRM with documented modifications that included installation of five additional GW/SVE wells, and enhancements that included cycling, evaluation of pulsing, and evaluation of passive air or active water injection to assist fluid migration. The wells (SV-41 through SV-45) shown on Figure 2, were added to the existing GWE\SVE extraction network on May 16, 1995, and the system was restarted on May 30, 1995. After restarting, the system operated on a cycling and pulsing schedule designed to enhance the remediation by allowing soil flushing of the areas impacted by volatile organic compounds (VOCs). The GW/SVE treatment system terminated operations March 25, 1997. In the fall of 1998, the GW/SVE treatment system was decommissioned under the supervision of Day Environmental and NYSDEC. The decommissioning was reporting in the *1998 Annual Monitoring Report* (Unisys, 1998). Subsequent groundwater monitoring was documented in the *2000 Annual Monitoring Report* (Unisys, April 13, 2001), and this report.

1.5 REMEDIAL ACTION OBJECTIVES

The soil RAOs, which are stated in the ROD, reflect the NYSDEC-TAGM-4046 *Determination of Soil Clean Up Objectives and Clean Up Level* criteria. These groundwater RAOs reflect the standards outlined in 10NYCRR Part 5 and 6NYCRR Part 700. For the SSICs they are as follows:

SSIC	Soil RAO (ppm)	Groundwater RAO (ppb)
Acetone	0.11	50
Isopropyl Alcohol (IPA)	0.11	50
Methanol	0.11	50
2-Butanone (MEK)	0.23	50
Toluene	1.5	5

Remedial Action Objective Soil Concentrations using TAGM 4046

These RAOs are used to evaluate the progress of the cleanup in the soil and groundwater environment.

2.0 2001 ACTIVITIES

As mandated by the Environmental Conservation Law (ECL), NYSDEC maintains a Registry of all Inactive Hazardous Waste Disposal Sites. Effective January 8, 1999, the Classification for this site was changed from a **Class II** to a **Class IV** site. The requirements for changing classification to a **Class IV** site indicates the site has been properly closed, but conditions require continued operation, maintenance, and/or monitoring. The successful GW/SVE remediation system resulted in a significant reduction of the SSICs, indicating that continued monitoring at the site is properly restricted to a **groundwater monitoring only program**. The long-term groundwater sampling program monitors groundwater downgradient of the former UST area, where low levels of VOCs were detected after the remediation system was shut-down in March 1997. This post-remediation groundwater monitoring program was designed to collect the appropriate data concerning the groundwater conditions at and downgradient of the former UST basin, principally in the area of well GM-5, which is essentially the only location to detect VOCs since March 1997. The goal of the post-remediation groundwater monitoring program is to demonstrate the remedial actions and water quality conditions are protective of the soil and groundwater conditions of the state of New York.

2.1 GROUNDWATER MONITORING WELL NETWORK

In November 1998, 67 (sixty-seven) groundwater monitoring and SVE extraction points were abandoned at the site. The resulting groundwater monitoring network was reduced to 8 sampling locations in the bedrock groundwater flow system. The monitoring well completion details for these eight wells are highlighted below:

Location	Top of Casing (TOC in ft-AMSL)	Depth of Borehole (ft)	Casing Diameter (in)	Casing material	Screen Material	Screen Length (ft)	Total Well Depth (below TOC - ft)
GM-3	**505.61**	18.95	2	PVC	PVC	10	18.95
GM-3D	**505.48**	38.26	2	PVC	PVC	10	38.26
GM-5	**505.23**	16.27	2	PVC	PVC	10	16.27
GM-8	**505.45**	16.00	4	PVC	PVC	10	15.70
GM-10	**505.52**	15.00	4	PVC	PVC	10	14.32
MW-13	**505.21**	12.70	2	PVC	PVC	5	12.70
MW-13D	**505.50**	40.00	2	PVC	PVC	10	40.00
MW-13DD	**505.19**	60.50	2	PVC	PVC	10	60.50

2.2 SITE GEOLOGY

Pleistocene-age glacial lake sediments composed predominantly of brown-to-tan clayey silt with occasional fine sand overlie shale and limestone bedrock. These sediments generally range in thickness from approximately 10 to 20 feet. The Irondequoit Limestone Formation underlies the overburden and consists of interbedded dark gray-to-black calcareous shale, and gray-to-light gray dolomite and crystalline limestone. A thin weathered portion of the Rochester Shale Formation was identified above the limestone. The shale appears to be present across most of the site with a maximum thickness of approximately five feet. Bedrock is reported to have a slight regional dip to the south. On-site, the bedrock surface slopes to the east with bedrock highs to the north and west portions of the site.

2.3 SITE HYDROGEOLOGY

Two hydrogeologic units have been identified and monitored at the site. These include a water bearing zone in the overburden clay and silt, and the bedrock aquifer comprising of the Irondequoit Formation. The bedrock aquifer is monitored by wells with screened intervals ranging from 12 to 60 feet bgs. Eight (8) monitoring wells are currently used for monitoring groundwater quality and water level measurements. The wells are shown on Figure 3. Table 1 provides the groundwater levels measurements collected in 2001.

Groundwater level measurement were collected September 18, 2001. Depths to groundwater in 2001 range from a high water level of 7.46 feet in the well MW-10, to a low water level of 36.80 feet in monitoring well MW-13DD. In general, the water levels were deeper in the shallow bedrock wells, and shallower in the deep bedrock wells, as compared to 2000 potentiometric levels. The hydraulic gradient across the site measured during the monitoring period revealed:

Date	Horizontal Hydraulic Gradient
September 2001	**0.013**

Figure 4 depicts the groundwater contour map and flow direction in September 2001. This flow direction is consistent with the historical flow patterns measured at the site, with groundwater flow from the former UST basin toward monitoring well GM-5.

Historical measurements have indicated a steep downward hydraulic gradient in nested wells on-site. The measured vertical hydraulic gradient measurements for 2001 are presented below, consistent with historical data:

	Vertical Hydraulic Gradient GM-3/GM-3D	Vertical Hydraulic Gradient MW-13/MW-13D
September 2001	**0.606481**	**0.679435**

Historical groundwater elevation data are presented in Appendix A. Groundwater monitoring well hydrographs are included in Appendix B.

2.4 GROUNDWATER SAMPLING

Figure 3 presents the post-remediation groundwater monitoring network. As part of the 1998 GW/SVE system demolition, the treatment plant components and 67 extraction and monitoring wells were abandoned. The wellheads of monitoring wells GM-3, GM-8, and GM-10 were modified (cut-off below grade and equipped with at-grade curb boxes) to allow their use as groundwater monitoring locations. The post-remediation groundwater level and water quality sampling locations in the post-remediation monitoring program are listed below:

Location	1998		1999				2000				2001			
	Monthly	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
GM-3	X	X	X	X	X	X		X		X			X	
GM-3D		X	X	X	X	X		X		X			X	
GM-5	X	X	X	X	X	X		X		X			X	
GM-8	X	X	X	X	X	X		X		X			X	
GW-10	X	X	X	X	X	X		X		X			X	
MW-13	X	X	X	X	X	X		X		X			X	
MW-13D	X	X	X	X	X	X		X		X			X	
MW-13DD		X	X	X	X	X		X		X			X	

***X** – indicates sampling location and period*

The 2001 groundwater quality sampling locations are listed below:

Location	2001
	Sept-19
GM-3	X
GM-3D	X
GM-5	X
GM-8	X
GW-10	X
MW-13	X
MW-13D	X
MW-13DD	X

***X** – indicates sampling location and period*

Appendix A presents the historical groundwater elevation summary. Figure 4 presents the potentiometric contour map for water levels measured in September 2001. Review of potentiometric surface maps generated from 1987 through 2001 show flow in the bedrock has been consistently to the northeast with an approximate hydraulic gradient of 0.005 to 0.05. Horizontal and vertical hydraulic gradients measured in 2001 are consistent with the historical data trends in the bedrock aquifer in 2001. Well hydrographs, representative of groundwater fluctuations at the site are provided in Appendix B.

2.5 VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Historical water quality results are provided in Appendix C for all monitoring wells in the long-term groundwater monitoring program. Table 2 provides the results of the September 19, 2001, groundwater sampling event. Groundwater samples have been analyzed for the SSICs beginning in 1987, and remained consistent through the September 2001, sampling event.

Figure 5 presents the September 2001, groundwater quality sampling for the long-term monitoring wells. In September 2001, there were no detection of SSICs at or above the method detection limit (MDL). Groundwater samples were analyzed for non-halogenated volatile organics by GC, purgeables, EPA Test Method 624.

4 Year Post-Remediation Groundwater Monitoring Results – GM-5

Location	Date	2- Butanone	Acetone	Isopropanol	Methanol	Toluene	Total VOCs
GM-5	**26-Jan-98**	< 50	< 50	< 100	< 1000	**24**	**24**
GM-5	**25-Feb-98**	< 50	< 50	< 100	< 1000	**79**	**79**
GM-5	**24-Mar-98**	< 50	< 50	< 100	< 1000	**270**	**270**
GM-5	**28-Apr-98**	< 20	< 20	< 180	< 110	**100**	**100**
GM-5	**27-May-98**	< 20	< 20	< 98	< 110	**35**	**35**
GM-5	**23-Jun-98**	< 67	< 67	< 98	< 110	**430**	**430**
GM-5	**30-Jul-98**	< 40	< 40	< 98	< 110	**380**	**380**
GM-5	**31-Aug-98**	< 40	**73**	< 100	< 100	**290**	**363**
GM-5	**30-Sep-98**	< 400	< 400	< 100	< 100	**600**	**600**
GM-5	**29-Dec-98**	< 100	< 40	< 100	< 100	**300**	**300**
GM-5	**03-Mar-99**	< 50	< 50	< 100	< 100	**59**	**59**
GM-5	**24-Jun-99**	< 50	< 50	< 100	< 100	**360**	**360**
GM-5	**02-Nov-99**	< 20	< 20	< 500	< 500	< 5	**0**
GM-5	**14-Dec-99**	< 100	< 40	< 100	< 100	< 5	**0**
GM-5	**14-Apr-00**	< 20	< 20	< 1000	< 1000	< 5	**0**
GM-5	**21-Nov-00**	< 20	< 20	< 1000	< 1000	**170**	**170**
GM-5	**19-Sep-01**	< 20	< 20	< 1000	< 1000	< 5	**0**

Toluene has essentially been the only compound detected over the last four years (since 1998). Table 2 provides the results of the September 2001, groundwater sampling for SSICs at the site

Figure 6 plots the historical Total VOC concentrations detected in well GM-5 since the initiation of groundwater sampling through 2001. During this sampling event, no VOCs were detected in groundwater. A trend review of SSICs at monitoring well GM-5 indicates a continued drop in concentrations since the shutdown of the GW/SVE on March 25, 1997 (Figure 7). Figure 7 depicts no post-remediation rebound of VOC concentrations since the remediation system ceased operations. Additionally, the influence of the rebound of the water table at GM-5 with the cessation of remediation has not resulted in an increase in VOC concentrations, as depicted in Figure 8.

- Figure 9 depicts the acetone concentrations on a logarithmic scale with 1/2 the general MDL highlighted, which indicates the past 8 sampling rounds are less than the MDL. Statistical analysis with the Mann-Whitney U Statistical Test (Appendix D) indicates that the trend for acetone is **decreasing**.
- Figure 10 depicts the isopropanol concentrations on a logarithmic scale with 1/2 the general MDL highlighted, which indicates isopropanol concentrations for the past 4-years are less than the MDL. Statistical analysis with the Mann-Whitney U Statistical Test (Appendix D) indicates that the trend for isopropanol is **no trend**.
- Figure 11 depicts the methanol concentrations on a logarithmic scale with 1/2 the general MDL highlighted, which indicates methanol concentrations for the past 6-years are at or less than the MDL. Statistical analysis with the Mann-Whitney U Statistical Test (Appendix D) indicates that the trend for methanol is **no trend**.
- Figure 12 depicts the 2-butanone concentrations on a logarithmic scale with 1/2 the general MDL highlighted, which indicates the past 8 sampling rounds are at or less than the MDL. Statistical analysis with the Mann-Whitney U Statistical Test (Appendix D) indicates that the trend for 2-butanone is **no trend**.
- Figure 13 depicts the toluene concentrations on a logarithmic scale with 1/2 the general MDL highlighted, which indicates that 4 of the last 5 sampling rounds are less than the MDL. Statistical analysis with the Mann-Whitney U Statistical Test (Appendix D) indicates that the trend for toluene is **no trend**.

For the SSICs there are no **increasing trends** for the statistical analysis at the 90 % confidence interval for well GM-5. There have been no VOCs detected at any other well in the last three years of groundwater monitoring. Total VOC concentrations versus time graphs for well GM-5 are shown on Figure 6 for historical trends, and on Figure 7 for post-remediation trends. Groundwater quality results do not indicate a statistically significant increase in VOCs at GM-5 since the GW/SVE system was turned-off in March 1997 (Appendix D). Additionally, Figure 8 also shows that the VOC levels have not increased with the increase (rebound) in the water table at GM-5 since the remediation system was turned-off. The historical water table increase (rebound) in the former tank basin was approximately 5-feet in the center of the cone-of-depression in 1998 - 1999. This water table increase was later followed by a general decrease in groundwater elevations in 1999 and early-2000, and a decrease in late-2001 through 2001, however, no increase in the VOC levels at GM-5 has been detected with either a rising or falling water table. Figure 14 presents a linear regression analysis of the toluene data depicting the diminishing concentrations in GM-5. This figure shows the trend of toluene detection at GM-5 is below the RAOs.

3.0 SUMMARY AND CONCLUSIONS

Based on extensive groundwater monitoring data (collected from 1987 through 2001), and the monitoring of the VOC levels in groundwater pre- and post-remediation, it does not appear that there are any VOCs remaining in groundwater to migrate from the former UST basin. This result was predicted in the groundwater flow model (Unisys, October, 1997).

The groundwater monitoring and sampling schedule, outlined in the table below, summarizes the substantial post-remediation monitoring and sampling program implemented at the site. The lack of VOCs detected in the soil and groundwater environment in and downgradient of the former UST basin substantiates the success of the remedial program.

Location	1998		1999				2000				2001			
	Monthly	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
GM-3	X	X	X	X	X	X		X		X			X	
GM-3D		X	X	X	X	X		X		X			X	
GM-5	X	X	X	X	X	X		X		X			X	
GM-8	X	X	X	X	X	X		X		X			X	
GW-10	X	X	X	X	X	X		X		X			X	
MW-13	X	X	X	X	X	X		X		X			X	
MW-13D	X	X	X	X	X	X		X		X			X	
MW-13DD		X	X	X	X	X		X		X			X	

The goal of the long-term monitoring plan selected by NYSDEC for the post-remediation groundwater sampling program was to evaluate the potential for migration of SSICs in groundwater at the site. The sampling program has revealed there are no VOCs migrating in the groundwater at the site, and the IMs implemented were successful as the final remedy for corrective action. Accordingly, no further groundwater monitoring is scheduled for the site, and Unisys is requesting NYSDEC reclassify the site from a **Class IV** to a **Class V** site. The post-remediation groundwater monitoring program has demonstrated that the remedial actions implemented, and the resulting water quality conditions existing at the site are protective of the soil and groundwater quality for the state of New York.

It is recommended that the monitoring wells be abandoned in the spring-2002 and a well abandonment report is sent to NYSDEC following the successful abandonment of the groundwater monitoring wells.

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