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Results from the Supplemental PRB Design Investigation

Former Miller Container Plant, Volney, NY

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1 Introduction

Miller Brewing Company (MBCo) is planning to install a permeable reactive barrier (PRB) system to treat target constituents in groundwater at the Former Miller Container Plant located in Volney, New York. MBCo installed a pilot PRB system in 2000 to evaluate the efficacy of PRBs under Volney site conditions (URS, 2001). Pilot test results indicate PRBs constructed with zero-valent iron are a viable technology for treating target constituents at the site.

The proposed full scale PRB system targets three distinct areas where constituents have been identified through the analysis of past and ongoing groundwater monitoring data. To support the design of the PRB system, a data gap analysis and supplemental investigation was conducted at the three proposed PRB locations. Supplemental data collection included installation of temporary monitoring wells, groundwater sampling and analyses, and water level measurements. The information was used to complete the conceptual site model that will form the basis for the PRB system 90% Design.

The following sections present the supplemental design investigation data obtained during the August 6,2002 and September 16,2002 field mobilizations. Following presentation of the supplemental investigation data, the data is incorporated with the most recent data (generally 9/2002) from periodic site wide monitoring. The resultant plan views and cross sections of contaminant distributions, site geology and hydrogeology, developed from the combined data form the conceptual site model. The conceptual site model in turn form the context and basis of the PRB design.

2 Supplemental Design Investigation Field Work

The Work Plan for the supplemental design investigation was submitted on August 2, 2002 to the New York State Department of Environmental Conservation (NYSDEC) (titled *"Work Plan PRB Design Data Acquisition, Former Miller Container Plant, Volney, NY"),* All field tasks and procedures described in the Work Plan were substantially completed with the following modifications based on access to the Taylor property and field conditions.

Changes from the Work Plan involved the collection of additional data and the relocation of several sample points. In the proposed PRB #1 area, access was not granted for work on the Taylor property. The proposed Taylor property temporary wells were relocated west of Highway 57 on the City of Fulton property. Since the temporary wells had to be located further from the proposed PRB #1 location, two well nests, TW-9 and TW-10, were added to provide more information about the distribution of target constituents and flow conditions near the Oswego River. Temporary well TW-1II was added to the PRB #2 supplemental program to provide information about the vertical distribution of target constituents. Temporary well nest TW-13 was added to provide information about the distribution of target constituents south of proposed PRB #2. All groundwater samples were collected and analyzed as proposed in the Work Plan except for municipal wells M-2A and Keller #1, recovery well RW-2, and monitoring well MW-12S where there was not access for sample collection.

Temporary wells were installed by URS Corporation using a direct push rig. Each well was constructed with 1-inch diameter PVC riser and 10-slot screen. Well installation details are provided in Table 1 and include well depth and screen interval. The temporary well locations are depicted on Figure 1. Lithologies were described for two of the temporary wells (TW-2D and TW-10D). Boring logs are included in Appendix A. The remaining wells were drilled to a predetermined depth (wells with the shallow water table "S" designation or the intermediate depth "I" designation) or until the top of the glacial till was encountered (wells with the deep boring "D" designation). The only exception is temporary well TW-3I, which encountered the glacial till at a shallower depth than expected. The data obtained from these wells will be used to refine the vertical and lateral extent of the proposed PRBs..

Groundwater samples were collected by URS using a peristaltic pump and dedicated tubing at each well. All new temporary wells and some existing monitoring wells were analyzed by method EPA 601 for chlorinated volatile organic compounds plus cis-l,2-dichloroethene. Groundwater from a series of wells down gradient from the Pilot PRB were sampled for iron reducing bacteria (IRB) (SM -9240B), heterotrophic plate count (HPC) (SM-9215B), and iron and manganese (SW-6010). Table 2 is a detailed list of the wells and analyses performed during the supplemental design investigation.

Water levels were measured by URS in all temporary and many existing monitoring wells. Since ultimately the PRB system will exist under natural flow conditions, water levels had to be measured under non-pumping conditions. The pump and treat system was shut down on September 19, 2002 with authorization from the NYSDEC (Appendix B). The levels were measured four days after shutting down the pump and treat system when static or nearly static conditions were observed. Water level data and vertical gradients for well pairs along each cross section are provided in Table 3. A table summarizing the water level data is included in Appendix C. Measuring point elevations for the newly constructed temporary wells were surveyed by URS. The survey data are included in Appendix D.

Table 1. Well Construction Details, Supplemental Design Investigation, Former Miller Container Plant, Volney, NY

Boring ID	Temporary Well Depth (ftbgs)	Screen Interval (ftbgs)	Screen Length (ftbgs)
PRB#1			
rw-is	**21**	**S 11-21**	**10**
TW-ID	**40**	**D 30-40**	**10**
rw-2S	21.5	S 11.5-21.5	**10**
rw-21	**40**	**I 30^0**	**10**
TW-2D	**62**	D 52-62	**10**
rw-3S	20.5	S 10.5-20.5	**10**
TW-3D	**40**	**D** 30-40	**10**
rw-4i	**40**	**I 30^0**	**10**
TW-4D	**63**	**D** 53-63	**10**
TW-9S	**15**	S **10-20**	**10**
TW-9D	**50**	**D 30-40**	**10**
rw-iOD	**77**	**D** 67-77	**10**
PRB#2			
TW-5S	**25**	S 15-25	**10**
rw-5i	**55**	**I** 45-55	**10**
TW-5D	**85**	**D** 75-85	**10**
rw-6D	**85**	D 75-85	**10**
rw-in	**55**	I 45-55	**10**
rw-ns	**25**	S 15-25	**10**
TW-13D	**75**	D 65-75	**10**
PRB#3			
TW-7S	**25**	S 15-25	**10**
TW-7D	**75**	D 65-75	10
rw-8i	**35**	I 25-35	**10**
rw-121	**55**	**I** 45-55	**10**

Table 2. Summary of Analytical Tests Performed, Supplemental Design Investigation, Former Miller Container Plant, Volney, NY

Boring ID	Analytical Test
PRB#1	
rw-is	601
TW-ID	601
rw-2S	601
rw-21	601
TW-2D	601
rw-3s	601
rw-3D	601
rw-4i	601
rw^D	601
rw-9S	601
TW-9D	601
MW-25D	IRB,HPC
MW-30S	601, IRB, HPC, Fe, Mn
PRB#2	
rw-ss	601
rw-5i	601
TW-5D	601, IRB, HPC, Fe, Mn
TW-6D	601, IRB, HPC, Fe, Mn
rw-in	601
TW-13S	601
TW-13D	601
MW-11S	601
MW-11D	601
PRB#3	
TW-7S	601
TW-7D	601
TW-8I	601
rw-121	601
MW-12D	601
MW-53D	601

Table 3. Groundwater Elevations and Vertical Gradients Relative to Cross Section Well Pairs
Former Miller Container Plant, Volney, New York

Well Pair	Groundwater Elevation (ft msl) September 19,2002	Vertical Gradient	Direction
Cross-Section A-A'			
TW9S	345.92	-0.0153	Downward
TW9D	345.59		
MW10S	348.01	-0.0307	Downward
MW10D	347.34		
MW25S	349.03	0.0091	Upward
MW25D	349.33		
MW8S	352.46	-0.0190	Downward
MW8I	351.84		
MW8I	351.84	-0.0324	Downward
MW8D	351.24		
TW5S	352.64	0.0022	Upward
TVV5I	352.71		
TW5I	352.71	-0.0063	Downward
rwsb	352.52		
MW11S	353.01	-0.0044	Downward
MW11D	352.75		
MW3S	352.64	0.0046	Upward
MW3D	352.80		
MW2S	353.50	0.0009	Upward
MW2D	353.53		
Cross-Section B-B'			
MW29I	344.96	-0.0285	Downward
MW29D	344.27		
TW1S	345.63	0.005	Upward
TW1D	345.72		
TW2S	346.79	-0.0009	Downward
7W2I	346.78		
TW2I	346.78	-0.0004	Downward
7W2D	346.77		
TW3S	347.02	-0.0092	Downward
TW3I	346.85		
MW21S	349.36	0.0087	Upward
MW21D	349.43		
Cross-Section C-C			
MW37S	353.74	0.0120	Upward
MW37I	353.92		
MW37I	353.92	0.0044	Upward
MW37D	354.00		
MW53I	353.06	-0.0050	Downward
MW53D	352.98		
Cross-Section D-D'			
TW13S	353.17	-0.0032	Downward
TW13D	353.01		
TW7S	354.3	-0.0088	Downward
TW7D	353.86		
MW54I	353.24	0.0115	Upward
MW54D	353.56		

Notes:

Based on groundwater levels measured 4 days after recovery system was shut down.

3 Groundwater Analytical Results

Groundwater samples were analyzed by Certified Environmental Services (CES) from Syracuse, NY for VOCs and metals and Microbac Laboratories for iron reducing bacteria and heterotrophic plate count. All samples were held on ice and analyzed within appropriate hold times. No analytes were detected in the trip blanks.

Results from the analytical tests are summarized in the following tables. EPA 601 results are provided in Table 3 and the other analyses are provided in Table 4. The supplemental design investigation results are also provided in map view on Figure 2. Laboratory reports are included in Appendix E.

Table 4: Groundwater Analytical Results by Method EPA 601, Supplemental Design Investigation, Former Miller Container Plant, Volney, NY

Sample ID			MW-53D	TW-6D	TW-5I	MW-11S	MW-11D	MW-12D	TW-5S	TW-5D
Screened Interval			44-54	75-85	45-55	19-24	78.5-83.5	76-81	15-25	75-85
Water Level			16.49	19.2	19.0	19.68	19.05	22.62	19.0	19.0
Date Sampled		Regulatory Limits	9/19/2002	9/19/2002	9/19/2002	9/19/2002	9/19/2002	9/19/2002	9/19/2002	9/19/2002
VOCs										
Dichlorodifluoromethane	ug/L	5	< 2.0	<2.0	< 2.0	<2.0	< 2.0	< 2.0	<2.0	<2.0
Chloromethane	ug/L	5	< 2.0	<2.0	<2.0	<2.0	< 2.0	<2.0	< 2.0	< 2.0
Vinyl Chloride	ug/L	5	<2.0	< 2.0	<2.0	<2.0	<2.0	<2.0	< 2.0	< 2.0
Bromomethane	ug/L	5	<2.0	< 2.0	<2.0	< 2.0	<2.0	< 2.0	< 2.0	< 2.0
Chloroe thane	ug/L	5	<2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	<2.0	<2.0
Trichlorofluoromethane	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	ug/L	5	< 1.0	4.3	1.4	< 1.0	< 1.0	**3.3**	< 1.0	**16.0**
Methylene Chloride	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	< 1.0	< 1.0	< 1.0
Trans-1,2-Dichloroethene	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.2	< 1.0	< 1.0
1.1-Dichloroethane	ug/L	5	< 1.0	4.9	< 1.0	< 1.0	< 1.0	4.9	< 1.0	2.2
Chloroform	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1 -Trichloroethane	ug/L	5	< 1.0	16.0	4.8	< 1.0	1.0	13.0	< 1.0	**15.0**
Carbon Tetrachloride	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	4.0	< 1.0	< 1.0
1,2-Dichloropropane	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,3-Dichloropropene	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chloroethylvinyl Ether	ug/L	5	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
1,1,2-Trichloroethane	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1,0	< 1.0	< 1.0	< 1.0
Tetrachloroothene	ug/L	5	< 1.0	1.6	2.3	< 1.0	8,1	4.2	< 1.0	**13.0**
Dibromochloromethane	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dlchlorobenzene	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dlchlorobenzene	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Table 4: Groundwater Analytical Results by Method EPA 601, Supplemental Design Investigation, Former Miller Container Plant, Volney, NY

Sample ID			TW-111	MW-30S	TW-13S	TW-13D	TW-121	TW7S	TW-7D	TW-81
Screened Interval			45-55	13-Aug	15-25	65-75	45-55	15-25	65-75	24.5-34.5
Water Level			18.02	9.08	, 20.47	20.65		20.0	20.1	20.4 ,
Oate Sampled		Regulatory Limits	9/19/2002	9/19/2002	9/18/2002	9/18/2002	9/18/2002	9/18/2002	9/18/2002	9/18/2002
VOCs										
Dichlorodifluoromethane	ug/L		<2.0	< 2.0	<2.0	<2.0	< 10.0	<2.0	< 10.0	< 2.0
Chloromethane	ug/L		<2.0	< 2.0	<2.0	< 2.0	< 10.0	< 2.0	< 10.0	< 2.0
Vinyl Chloride	ug/L		<2.0	< 2.0	<2.0	< 4.0	< 10.0	<2.0	< 10.0	< 2.0
Bromomethane	ug/L		<2.0	< 2.0	<2.0	<4.0	< 10.0	<2.0	< 10.0	<2.0
Chloroethane	ug/L		<2.0	< 2.0	<2.0	< 4.0	< 10.0	<2.0	< 10.0	<2.0
Trichlorofluoromethane	ug/L		< 1.0	< 1.0	1.0	<2.0	< 5.0	1.0	< 5.0	< 1.0
1,1-Dichloroethene	ug/L		**1.0**	1.0	1.0	**28.0**	**73.0**	1.0	**41.0**	< 1.0
Methylene Chloride	ug/L		1.0	1.0	1.0	< 2.0	<5.0	1.0	< 5.0	< 1.0
Trans-1,2-Dichloroethene	ug/L		1.0	1.0	**1.0**	< 2.0	<5.0	1.0	< 5.0	<1.0
1,1 -Dlchloroethane	ug/L		1.0	1.0	1.0	8.4	**11.0**	1.0	31.0	1.0
Chloroform	ug/L		1.0	1.0	1.0	<2.0	< 5.0	1.0	< 5.0	1.0
1,1,1 -Trichloroethane	ug/L		3.5	**1.8**	1.0	**27.0**	**106.0**	1.0	**85.0**	1.0
Carbon Tetrachloride	ug/L		< 1.0	1.0	1.0	<2.0	< **5.0**	1.0	< 5.0	1.0
1,2-Dichtoroethane	ug/L		< 1.0	1.0	1.0	< 2.0	< 5.0	1.0	< 5.0	1.0
Trichloroethene	ug/L		**1.4**	1.0	**1.0**	**8.8**	<**5.0**	1.0	< 5.0	1.0
1,2-Dichloropropane	ug/L		1.0	1.0	1.0	< 2.0	< **5.0**	1.0	< 5.0	1.0
Bromodichloromethane	ug/L		1.0	1.0	1.0	< 2.0	< 5.0	1.0	< 5.0	1.0
Cis-1,3-Dichloropropene	ug/L		1.0	1.0	1.0	< 2.0	< 5.0	1.0	< 5.0	1.0
Trans-1,3-Dichloropropene	ug/L		1.0	1.0	1.0	< 2.0	< 5.0	1.0	< 5.0	1.0
2-Chloroethylvinyl Ether	ug/L		10.0	10.0	10.0	< 20.0	< 50.0	10.0	< 50.0	10.0
1,1,2-Trichloroethane	ug/L		1.0	1.0	1.0	< 2.0	< **5.0**	1.0	< 5.0	1.0
Tetrachloroethene	ug/L		**14.0**	2.2	< 1.0	**21.0**	**435.0**	1.0	< 5.0	1.0
Dibromochloromethane	ug/L		1.0	1.0	< 1.0	<2.0	< **5.0**	1.0	< 5.0	1.0
Chlorobenzene	ug/L		1.0	1.0	1.0	<2.0	< 5.0	1.0	<5.0	1.0
Bromoform	ug/L		1.0	1.0	1.0	<2.0	< **5.0**	1.0	<5.0	1.0
1,1,2,2-Tetrachloroethane	ug/L		1.0	1.0	1.0	<2.0	<**5.0**	1.0	< 5.0	1.0
1,3-Dichlorobenzene	ug/L		1.0	1.0	1.0	< 2.0	< 5.0	1.0	< 5.0	1.0
1,4-Dichlorobenzene	ug/L		1.0	1.0	1.0	< 2.0	< 5.0	1.0	< 5.0	1.0
1,2-Dichlorobenzene	ug/L		1.0	1.0	1.0	< 2.0	< 5-0	1.0	< 5.0	1.0

Table 4: Groundwater Analytical Results by Method EPA 601, Supplemental Design Investigation, Former Miller Container Plant, Volney, NY

Sample ID			MW-25D	TW-9S	TW-9D	TW-1S	TW-1D	TW-2I	TW-2S	TW-2D
Screened Interval			52-57	8.5-18.5	30-40	20-Oct	28-38	29-39	11.5-21.5	52-62
Water Level			18.81	14.06	14.56	14.49	14.01	13.14	13.38	13.29
Date Sampled		Regulatory Limits	9/19/2002	9/17/2002	9/17/2002	9/17/2002	9/17/2002	9/17/2002	9/17/2002	9/17/2002
VOCs										
Dichlorodifluoromethane	ug/L	5	< 2.0	< 2.0	<2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Chloromethane	ug/L	5	< 2.0	<2.0	< 2.0	< 2.0	<2.0	< 2.0	< 2.0	<2.0
Vinyl Chloride	ug/L	5	< 2.0	<2.0	<2.0	<2.0	< 2.0	< 2.0	< 2.0	<2.0
Bromcmethane	ug/L	5	<2.0	< 2.0	<2.0	<2.0	< 2.0	<2.0	< 2.0	< 2.0
Chloroethane	ug/L	5	<2.0	< 2.0	< 2.0	< 2.0	<2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methylene Chloride	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,2-Dlchloraethene	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1.1,1 -Trichloroethane	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Carbon Tetrachloride	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroe thane	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromodlchloromethane	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cls-1,3-Dlchloropropene	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dlchloropropene	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chloroethytvinyt Ether	ug/L	5	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
1,1,2-Trichloroethane	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1,0	< 1.0
Tetrachloroethene	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dlbromochtoromethane	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	< 1.0
1,3-Dichlorobenzene	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dlchlorobenzene	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Table 4: Groundwater Analytical Results by Method EPA 601, Supplemental Design Investigation, Former Miller Container Plant, Volney, NY

Sample ID			TW-3I	TW-3S	TW-4D	TW-41	TW-3I	Trip Blank
Screened Interval			29-39	10.5-20.5	53-63	30-40	10.5-20.5	
Water Level			13.26	12.89	5.24	5.18	13.26	
Date Sampled		Regulatory Limits	9/17/2002	9/17/2002	9/17/2002	9/17/2002	9/19/2002	9/17/2002
VOCs								
Dichlorodifluoromethane	ug/L	5	<2.0	< 2.0	<2.0	<2.0	<2.0	<2.0
Chloromethane	ug/L	5	<2.0	< 2.0	<2.0	< 2.0	<2.0	<2.0
Vinyl Chloride	ug/L	5	<2.0	< 2.0	<2.0	< 2.0	<2.0	< 2.0
Bromomethane	ug/L	5	<2.0	< 2.0	<2.0	< 2.0	<2.0	<2.0
Chloroethane	ug/L	5	<2.0	< 2.0	<2.0	< 2.0	<2.0	< 2.0
Trichloroftuoromethane	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	ug/L	5	1.5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methylene Chloride	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,2-Dlchloroethene	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	ug/L	5	5.4	2.3	< 1.0	< 1.0	2.5	< 1.0
Carbon Tetrachloride	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	ug/L	5'	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cls-1,3-Dichloropropene	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dlchloropropene	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chloroethylvlnyl Ether	ug/L:	5	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
1,1,2-Trlchloroethane	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	ug/L	5	3.6	1.2	< 1.0	< 1.0	1.2	< 1.0
Dibromochloromethane	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroelhane	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dlchlorobenzene	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	ug/L	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Table 5: Groundwater Analytical Results for IRB, HPC, and Metals Analyses, Supplemental Design Investigation, Former Miller Container Plant, Volney, NY

Sample ID			TW-6D	TW-5D	MW-30S	MW-25D
Screened Interval			75-85	75-85	13-Aug	52-57
Water Level			19.2	19.0	9.08	18.81
Date Sampled		Regulatory Limits	9/19/2002	9/19/2002	9/19/2002	9/19/2002
Other Analyses						
Iron Reducing Bacteria	#/ml		< 1	< 1	< 1	< 1
Heterotrophic Plate Count	#/mL		30000	11000	1200	48000
Iron	mg/l		0.223		0.607	0.174
Manganese	mg/l		0.415		0.816	0.049

4 Discussion of Results

The results of the supplemental design investigation were incorporated into a conceptual site model consisting of map view and cross-sectional view plume maps for the compounds perchloroethene (PCE) and 1,1,1-trichloroethane (TCA). These compounds control the PRB system design configuration including barrier thickness, height, and width. The mapped plume distributions will aid in developing the PRB heights and widths for the 90% Design document.

Each plume map and cross-section includes data from both the supplemental design investigation and from the recent performance monitoring activities. Combining results from the supplemental investigation with recent routine performance monitoring data provides a more complete, current representation of the plume configurations.

Results are presented in map view using isoconcentration contours for PCE and TCA on Figures 3 and 4 respectively. Shallow results are represented by the dashed isoconcentration contours. The maps illustrate that the highest concentrations of PCE and TCA are situated close to the former container plant, while relatively low concentrations are found in somewhat isolated areas on the Taylor property and near the municipal well field.

The cross-section locations are depicted relative to the original proposed PRB locations on Figure 5. Note that these proposed PRB locations may change based on the data presented herein. Any changes to the PRB configuration will be discussed fully in the forthcoming PRB 90% design document.

To facilitate viewing the data in cross-sectional view, the PCE and TCA data are presented on separate cross-sections for each line of cross-section (A-A* through D-D') on Figures 6 through 13. The cross-sections illustrate how the PCE and TCA extend across the entire saturated thickness of the aquifer near the former container plant, yet they extend from only intermediate to deep depths down gradient from the plant. Cross-section B-B' (Figures 8 and 9) shows that constituents at the municipal well field may be isolated from the PCE and TCA found on the Taylor property.

Shallow and deep groundwater contour maps are provided in Figures 14 and 15. The shallow map was created using data from wells screened across the water table. The

deep map was created using data from wells that are screened immediately above the hard, glacial till. Each maps shows a predominantly westward flow direction with the Oswego River creating a hydraulic boundary at the west end of the map. Groundwater drawdown at the pumping municipal well M-2A is also apparent evidenced by the roughly circular depression in the water table at the municipal well.

The potential for the presence of iron reducing bacteria was also investigated. Samples for iron reducing bacteria (IRB), heterotrophic plate counts, and iron and manganese were collected from select wells down gradient of the pilot PRB. No IRB were detected in the samples.

5 References

Malcolm Pirnie, 1993, Remedial Investigation Report, Miller Brewing Company, Container Division, Fulton, New York, July, 1993.

URS Corporation, 2001, Zero-Valent Iron Permeable Reactive Wall Treatability Test and Design Report, Former Miller Container Plant, Town of Volney, NY, May 2001.

URS Corporation, 2002, Work Plan PRB Design Data Acquisition, Former Miller Container Plant, Volney, NY, August, 2002.

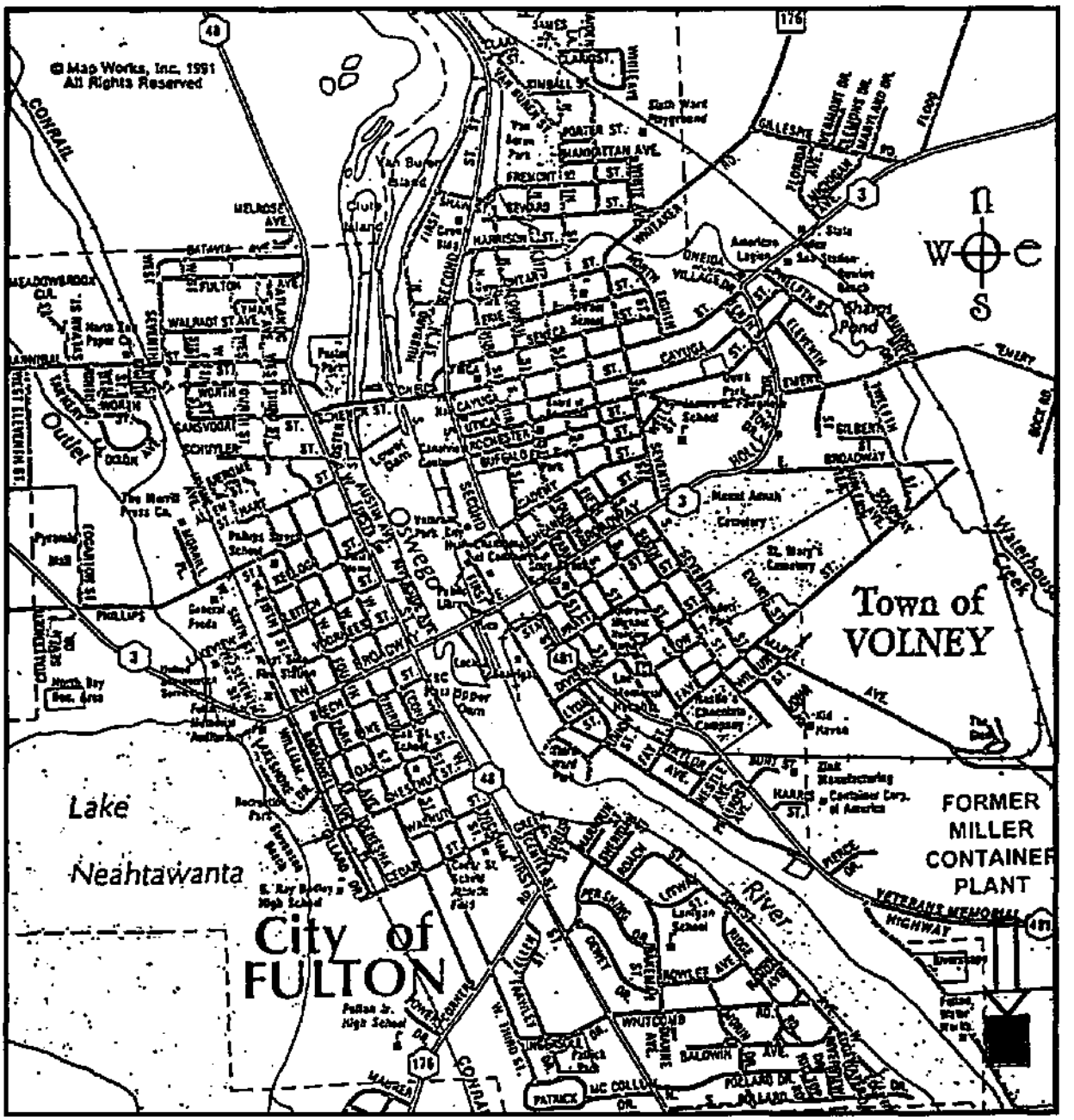

FIGURE 1-1. SITE LOCATON MAP.

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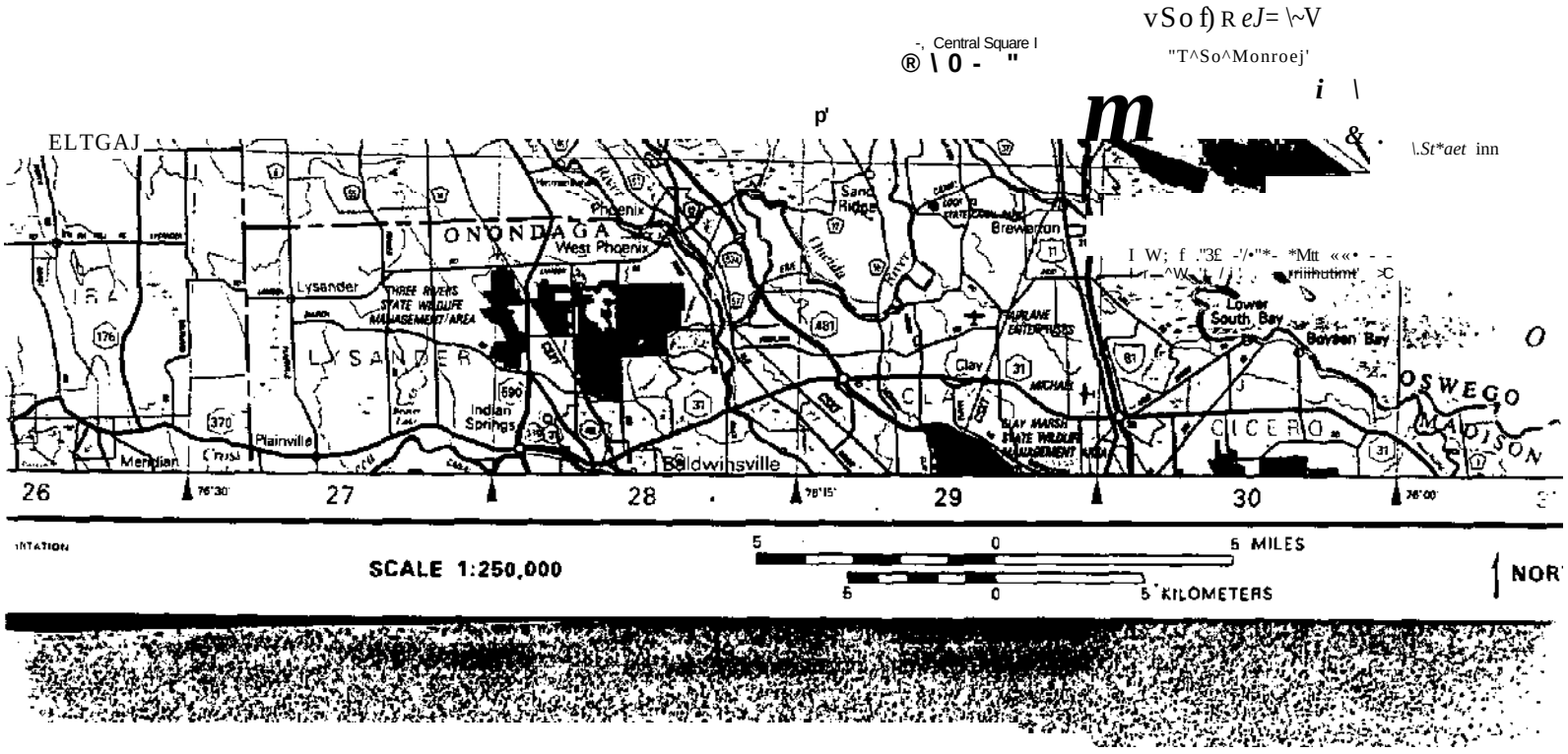
ELTGAJ
ONONDAGA
LYSANDER
Phoenix
West Phoenix
Lysander
Plainville
Meridian
Indian Springs
Baldwinsville
Sand Ridge
Brewerton
Lower South Bay
Bayden Bay
Clay
CICERO
OSWEGO
MADISON
26
27
28
29
30
SCALE 1:250,000
5 0 5 MILES
5 0 5 KILOMETERS

END

OF