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April 24, 2000

Mr. William Wertz
New York State Dept. of Environmental. Conservation
Division of Solid Waste Management
50 Wolf Road
Albany, New York 12233

re: Annual Report: Olin Chemicals
Buffalo Ave. Facility, Niagara Falls, NY

Dear Mr. Wertz:

This is the tenth Quarterly report, as required by Olin's Administrative Order on Consent (AOC) for our Niagara Falls Plant, (Index #R9-4171-94-08, Site Registry #9-32-051A, and B). The timeframe for this report covers the period from January 1, 2000 through March 31, 2000.

This report also serves as the second annual report, as required by the above noted order. In addition to quarterly monitoring and operational issues, this report provides an overview of annual issues, accomplishments and future goals for the remedial system. The annual report timeframe is from April 1, 1999 through March 31, 2000.

QUARTERLY ISSUES:

Operation / Maintenance issues :

- O&M Documentation: Details of the implementation of routine maintenance tasks and trouble shooting activities are included in the monthly memoranda from Olin's consultant, Law Engineering and Environmental Services, included as **Attachment 1**. While the monthly O&M reports document details of all issues, the most significant O&M issues are described below:

- Transducer relocation. Transducers have all been relocated from the recovery well casing to the in-well piezometer. Per prior discussion, this will allow remote OMNX reading of actual water levels at the RW's without well loss anomalies in the data.
- System interruption incident. On March 14, 2000 Mike Bellotti notified Bill Wertz via email **(Attachment 2)** re: discovery that a blower line had come disconnected. This was caused by air stripper system vibration. This malfunction allowed water to pass through the air stripper without air flow. This significantly diminished the blower efficiency, Olin has communicated this incident to the local POTW, and is addressing the matter with them. Total time of malfunction could not be determined with accuracy. Possible range of time is likely to have been several weeks. Olin has taken two steps re: corrective action. First, we have made the inspection of this connection a daily inspection item. Second, we have planned to upgrade the blower hose connection hardware, to minimize the likelihood of recurrence of this malfunction.
- Acid feed: All acid feed systems to the recovery wells have been converted to HCl from sulfuric acid.

Hydraulic capture:

Attachment 3 includes piezometric maps for each hydraulic zone for January, February and March, 2000. Data on piezometric levels are included electronically on the diskette in **Attachment 4.**

- The piezometric plots indicate that we are achieving capture in the A-zone. This is measured by monitoring the cones of depression around each of the five recovery wells, by comparison of the elevation of Gill Creek relative to A-zone groundwater levels west of Gill Creek, and by observation of a dry zone between the northern recovery wells (RW-1 and 2) and Buffalo Avenue.
- B-zone capture is consistently being achieved at Plant 2. Data from the new piezometers indicate a gradient toward the recovery wells (RW1 and 2) from Buffalo Avenue. B-zone capture is being achieved along Gill Creek, as evidenced by the piezometric contours. The Gill Creek stage measurements have added to the certainty of this conclusion, as it is consistently greater than B-zone wells west of Gill Creek.
- C and CD zone groundwater flow and capture was consistent with prior measurements, with flow being predominantly westward toward the Olin production well.

Groundwater sampling and analysis:

- Isograd plots for the second semiannual 1999 sampling are included in **Attachment 5.** Organic compounds represent the greatest onsite contaminant mass. Of these, aromatics (Olin compounds) on the Olin plant site represent less than ten per cent of the total organics mass, with aliphatics (non-Olin compounds) representing the remaining 90% of total organics mass.

- Distribution of total chlorinated benzenes is similar to that shown in plots from prior sampling events, except for minor decreases in the northeast corner of the Plant 2 area. Increases in extracted organics mass are likely to be a function of increased groundwater capture.
- Extracted mercury mass has decreased since the start of remediation. While extracted groundwater volume has increased, a decreased extracted mercury mass, plus decreasing concentrations at the RW headers, could be an indication that mercury removal has improved the quality of groundwater at the plant site.
- Extracted pesticide mass has increased. Pesticide concentrations at the RW headers have shown moderate increases, indicating that pesticide removal rates have not peaked.
- The data for the second semiannual 1999 sampling event were submitted electronically on diskette in the previous quarterly report (Fourth Quarter, 1999).
- The first semiannual sampling is scheduled for June, 2000.

Extracted groundwater volume and contaminant mass:

- The volume of pumped groundwater for the first quarter of 2000 was approximately 6.7 million gallons. The total volume of groundwater extracted and treated since system startup is approximately 34.6 million gallons.
- **Attachment 6** contains data and tables to support calculations of mass removed during the first quarter 2000 and for the entire project duration. Included are recovery well flow data, recovery well header contaminant concentrations, estimated mass removed for the first quarter of 2000 by parameter group and a table of groundwater flow and mass removed since start-up.
- A summary table of extracted groundwater and contaminant mass is presented below:

Summary: Contaminant Mass and Groundwater Extracted

Quarter	organics lb	Mercury Lb	pesticides lb	g.w. extracted gal
Startup/Q1-98 [est]	27.81	0.02	0.2	210,000
Q2-98	154.5	0.1	1.3	1,175,799
Q3-98	595.5	0.6	4.9	2,583,159
Q4-98	1273.1	0.1	5.2	4,054,996
Q1-99	817.3	0.05	8.5	4,233,521
Q2-99	1034.7	0.05	7.1	3,991,584
Q3-99	1188.2	0.1	8.7	5,219,207
Q4-99	976.3	0.02	6.9	6,366,935
Q1-00	1422.9	0.06	6.2	6,757,602
TOTAL	**7490**	**1.1**	**49**	**34,592,803**

ANNUAL ISSUES:

Annual maintenance improvements:

- Transducer relocation. Transducers have all been relocated from the recovery well casing to the in-well piezometer. This allows remote OMNX reading of actual water levels at the RW's without well loss anomalies in the data.
- Mechanical Well Cleaning: This maintenance task has been implemented on a routine basis, since it has been effective in removing scale from the interior of the recovery well casings.
- Transducer calibration: Transducers are now calibrated monthly for more accurate level readings.
- DNAPL monitoring program: DNAPL checks are done at all recovery wells, with the small volume detected, if any, documented in monthly memoranda. All detected DNAPL is removed and disposed of appropriately.
- Target drawdown levels. Target drawdown levels have been established for all recovery wells. These assist in tracking and correlation between remotely monitored level via OMNX and actual level measured in field.
- OMNX: OMNX levels are now calibrated monthly and after each well cleaning, i.e. after down-hole equipment has been temporarily removed.
- Well efficiency: Olin documents well efficiency by making well efficiency comparisons and documenting them in monthly O&M reports, which are included as attachments to Quarterly Reports. Any maintenance issues that arise from these checks may then be addressed in a timely manner.
- Acid drip: Olin has changed the acid drip from sulfuric acid to hydrochloric acid. The HCl will dissolve pipe scale more aggressively.

Groundwater yield and capture:

- Groundwater volume extracted has increased significantly over 1999 and to the present month in 2000. This yield increase is attributable to more aggressive maintenance efforts such as mechanical well cleaning and stronger acid drip. The extracted volume increase is shown graphically on the graph in **Attachment 7.**
- Groundwater capture. Piezometric plots indicate that capture is being achieved when all wells are operational. Olin has endeavored to implement maintenance improvements so as to minimize the time when any well is down. These maintenance improvements are itemized in the preceding section.

Annual submittal:

The 2000 annual oversight fee of $3,000 was remitted to NYSDEC in a letter of March 8, 2000. The letter is included as **Attachment 8.**

Annual Monitoring Program Modification:

The 2000 monitoring program includes a modified parameter list to reflect Olin's request and NYSDEC granting the elimination of selected parameters for groundwater analysis. The parameters barium, copper, cyanide, lead, zinc, methanol and semivolatile compounds (trichlorophenol) are removed from the analytical parameter list until the system approaches a remedial endpoint. At that time the removed parameters will be check-sampled. Volatile organic compounds, mercury and BHC's remain on the list.

Operations and Maintenance Manual Modifications:

An annual review of O&M issues and practices has resulted in several improvements to the standard procedures listed in the original O&M Plan. Improvements to inspection schedules and to inspection sheets have been made. The modified sheets are included in **Attachment 9**, with changes highlighted in bold.

We believe that we have made significant progress since system startup. We will continue to improve the system and monitor its effectiveness. Please direct any questions or comments to me at 423/336-4587.

Sincerely,

Michael J. Bellotti

Michael J. Bellotti

OLIN CORPORATION

List of Attachments

Attachment 1:
Monthly Operation and Maintenance Status Reports: 1Q-900

Attachment 2
Email: M.J. Bellotti to W. Wertz re: notification of blower disconnect, March 14, 2000

Attachment 3:
Piezometric maps: first quarter, 2000

Attachment 4:
Data diskette:

- Piezometric data: first quarter: 2000,
- recovery well header data: first quarter: 2000

Attachment 5: contaminant isograd plots: A, B and C zones: November, 1999 sampling: total chlorobenzenes and total aliphatic compounds

Attachment 6: Contaminant mass removed tables:

- Recovery well flow data
- Recovery well header contaminant concentrations
- Estimated contaminant mass removed: first quarter, 2000
- Groundwater flow and mass removed since project start-up

Attachment 7: Bar Graph of historic total flow volume

Attachment 8: Letter of transmittal of annual oversight fee

Attachment 9 : O&M manual revised pages

cc:
Stanley Radon - NYSDEC Buffalo, NY
Kelly McIntosh: Geomatrix, Buffalo, NY
Vickie Ray: Olin Charleston
Armand Damesimo: Olin Niagara Falls, NY
Dale Carpenter: USEPA: Region II, New York, NY
Rick Marotte: Law Engineering: Kennesaw, GA
Monica L. Fries Esq.- Husch & Eppenberger: St. Louis, MO

LAW

LAWGIBB Group Member

MEMORANDUM

To: Mike Bellotti @ Olin-Charleston; Don Greer, Karl Rasch, Ben Brayley, and Armand Damesimo @ Olin-Niagara; John Martin, and Rick Marotte @ LAW.

From: Anna Moomaw

Date: April 18, 2000

Subject: Monthly O&M Status Update for Ground-Water Collection and Treatment System for March 2000

In continuing efforts to keep everyone informed, this memo addresses the status of the O&M issues for the ground-water collection and treatment system. This memo follows from the monthly status update memo issued 3/6/2000.

System Status

The following table presents general treatment system data obtained from OMNX and during field monitoring for the month of March.

Ground-Water Collection and Treatment System Status					
	RW-1	RW-2	RW-3	RW-4	RW-5
Pumping Systems (Data from 3/1/00-3/31/00)					
Average Flow Rate (gpm)	2.9	3.0	14.6	13.8	17.9
End of Month Flow Rate (gpm)	3.2	3.9	15.5	13.6	19.3
Maximum achievable flow rate of pump (to date) (gpm)	*4.2*	*6.6*	*21.8*	*24.1*	*22.6*
Newly Developed Target Drawdown Level (ft above MSL) at PZ	**559**	**556**	**558.3**	**558.1**	**557.5**
Avg GW Elev. (OMNX) (ft above MSL)	558.2	558.0	563.3	556.0	550.2
End of Period GW Elev. (OMNX) (ft above MSL)	558.1	555.9	565.7	555.3	554.0
New OMNX Low-High Level Set Points for Auto. Pump Off-On (ft above MSL)	*551.8 - 558*	*551.2 – 555*	*550.6 – 557.3*	*546.5 – 557.1*	*548.7 – 556.5*
Comments	None	None	Add 1 gallon acid to piezometer. If level still reads high, manually check level	None	None

Ground-Water Collection and Treatment System Status					
Well Screen Losses (The well screen loss is defined as the difference between the well piezometer outside the casing and the water level inside the casing)					
	RW-1	RW-2	RW-3	RW-4	RW-5
March 2, 2000 Data					
Target Drawdown Level (ft above MSL) at PZ	**559**	**556**	**558.3**	**558.1**	**557.5**
GW Elevation at Piezometer (ft above MSL)	558.89	558.76	558.29	558.9	549.96
GW Elevation at RW (ft above MSL)	566.89 (Manually checked – similar to RW1-PZ)	558.8	558.33	558.87	549.45
Difference (ft)	Negligible	-0.04	-0.04	0.03	0.51
Comments	None	None	None	None	None
Notes:					

Total Flow, Pumping Rates, and Down Time

Increased pumping rates were achieved at RW-1 and RW-2 in the month of March. RW-3, RW-4 and RW-5 are operating at acceptable flow rates.

Transducer Calibrations

Transducer calibrations are checked monthly. CRA records manual water level data and OMNX transducer output data during monthly water level data collection activities. The difference between the manual level data and the OMNX reading is then used to readjust the zero setting of the transducer through OMNX so that the two readings "match".

The transducers will be re-calibrated through OMNX as follows:

Transducer Calibration (Water Level Data from: March 2, 2000)							
	Well Elevation	OMNX Elevation	Difference	OMNX Zero	Adjusted Zero	Difference, Last Calibr.	Notes
Well ID	*(Man)*	*(OMNX)*	*(Diff = Man – OMNX)*	*(Zero)*	*(Zero + Diff)*	*(Feb 7, 2000)*	
RW-1	558.46	558.4	0.06	550.64	550.7	0.21	
RW-2	558.76	558.64	0.12	550.08	550.2	0.38	
RW-3	558.29	558.39	-0.1	549.5	549.4	NA	
RW-4	558.87	558.03	0.84	543.68	544.52	-3.08	
RW-5	549.45	549.31	0.14	547.80	547.94	1.27	

The transducers will be re-calibrated monthly and after each well cleaning event.

Transducers

The RW-1, RW-4, and RW-5 transducers were re-located during the April well cleaning event. Wells were cleaned the week of April 10, 1999.

In the month of March, RW-1, RW-4, and RW-5 target drawdown was achieved every day. For RW-2 and RW-3, the target drawdown was not achieved.

DNAPL Checks

In March, the following observations were noted during DNAPL (dense non-aqueous phase liquid) checks:

Well	Volume Purged	DNAPL Presence	Quantity Recovered	Comments
RW-1	1 gallon	No	NA	None
RW-2	1 gallon	No	NA	None
RW-3	1 gallon	No	NA	None
RW-4	1 gallon	Yes	Trace	None
RW-5	1 gallon	Yes	Approx 20 mL	None

Air Stripper Influent/Effluent Sampling

Data from the latest round of air stripper sampling (sampled on March 10, 2000) was received in April 1999. This data is attached. Removal efficiencies are generally consistent with previous data. Influent concentrations for many of the constituents have decreased since the September 1999 sampling event.

Attachments: ***Monthly Flow and Groundwater Level Data Excel spreadsheet***
Air Stripper Influent/Effluent Data Excel spreadsheet

Olin - Niagara Falls
Groundwater Remediation System
Air Stripper Efficiency Verification

Print Date: 4/19/00

Parameter	Dec-97			Jan-98 *		Apr-99			Jun-99			Sep-99			Nov-99	Mar-00			Design/Model		
FLOW RATE (gpm)	55			55		33			27			54.1			49.2	53.1			180		
	Influent (ug/l)	Effluent (ug/l)	% removal	Effluent (ug/l)	% removal*	Influent (ug/l)	Effluent (ug/l)	% removal	Influent (ug/l)	Effluent (ug/l)	% removal	Influent (ug/l)	Effluent (ug/l)	% removal	Effluent (ug/l)	Influent (ug/l)	Effluent (ug/l)	% removal	Influent (ug/l)	Effluent (ug/l)	% removal
Trichloroethene	5520	78.5	98.58	135	97.55	8800	110	98.75	8800	110	98.75	14000	120	99.14	170	10000	74	99.26	25650	3	99.99
Tetrachloroethene	2360	27.4	98.84	49.4	97.91	5300	52	99.02	5800	51	99.12	9800	52	99.47	80	6800	30	99.56	10707	0.6	99.99
1,1,2,2-Tetrachloroethane	1630	126	92.27	229	85.95	1500	140	90.67	1200	62	94.83	1700	290	82.94	560	1300	280	78.46	6864	3241	52.79
cis-1,2-Dichloroethene	1070	22.8	97.87	46	95.70	1800	45	97.50	1400	32	97.71	2400	37	98.46	61	1500	24	98.40	4254	5	99.89
1,2,4-Trichlorobenzene	975	28	97.13	NA		ND (330)	19		ND (1000)	20		820	48	94.15	34	460	18	96.09	1213	19	98.43
Chloroform	700	14.3	97.96	28.9	95.87	ND (330)	ND (1)		NA	NA		NA	NA		NA	NA	NA		3450	4	99.87
1,3-Dichlorobenzene	104	ND (5)		NA		ND (330)	2.9		ND (1000)	ND (5)		ND (400)	ND (20)		ND (10)	ND (330)	ND (5)		245	0.8	99.69
1,4-Dichlorobenzene	86.6	ND (5)		NA		ND (330)	2.9		ND (1000)	ND (5)		ND (400)	ND (20)		ND (10)	ND (330)	ND (5)		415	3	99.36
1,2-Dichlorobenzene	85.6	ND (5)		NA		ND (330)	1.6		ND (1000)	ND (5)		ND (400)	ND (20)		ND (10)	ND (330)	ND (5)		568	13	97.67
Vinyl Chloride	82.1	ND (10)		ND (10)		ND (670)	ND (1)		ND (2000)	ND (10)		ND (800)	ND (40)		ND (20)	ND (670)	ND (10)		399	0.0	100.00
Chlorobenzene	27.4	ND (5)		ND (5)		ND (330)	ND (1)		ND (1000)	ND (5)		ND (400)	ND (20)		ND (10)	ND (330)	ND (5)		2179	5	99.78
1,1,2-Trichloroethane	24.2	ND (5)		ND (5)		ND (330)	1.3		ND (1000)	ND (5)		ND (400)	ND (20)		ND (10)	ND (330)	ND (5)		75	6	92.27
Benzene	20.9	ND (5)		ND (5)		ND (330)	ND (1)		ND (1000)	ND (5)		ND (400)	ND (20)		ND (10)	ND (330)	ND (5)		805	0.3	99.97
Methylene Chloride	17	ND (5)		5.65	66.76	ND (330)	1.6		1100	5.5	99.50	560	ND (20)	>96.43	ND (10)	ND (330)	ND (5)		719	7	99.05
2-Butanone (MEK)	NA	NA		ND(100)		NA	NA		NA	NA		NA	NA		NA	NA	NA		1848	1786	3.36
Total VOCs	12703	297	97.66	494	96.11	17400	376	97.84	18300	281	98.47	29280	547	98.13	905	20060	426	97.88	59391	5092	91.43
1,2,3-Trichlorobenzene	331	10.3	96.89	NA	NA	NA	NA		NA	NA		NA	NA		NA	NA	NA				
Hexachlorobutadiene	32.9	ND (5)		NA		NA	NA		NA	NA		NA	NA		NA	NA	NA				
trans-1,2-Dichloroethene	28.7	ND (5)		NA		ND (330)	ND (1)		ND (1000)	ND (5)		ND (400)	ND (20)		ND (10)	ND (330)	ND (5)				
1,1,1-Trichloroethane	11.9	ND (5)		ND (5)		ND (330)	ND (1)		ND (1000)	ND (5)		ND (400)	ND (20)		ND (10)	ND (330)	ND (5)				
1,1-Dichloroethene	9.99	ND (5)		ND (5)		ND (330)	ND (1)		ND (1000)	ND (5)		ND (400)	ND (20)		ND (10)	ND (330)	ND (5)				
Carbon Tetrachloride	9.53	ND (5)		ND (5)		ND (330)	ND (1)		ND (1000)	ND (5)		ND (400)	ND (20)		ND (10)	ND (330)	ND (5)				
1,1,1,2-Tetrachloroethane	5.98	ND (5)		NA		NA	NA		NA	NA		NA	NA		NA	NA	NA				

ND : Parameter was not detected above the laboratory detection limit (shown in parentheses)
NA : Constituent was not included in the list of constituents for the analytical method used
J : Estimated result
D: Duplicate analysis performed. Result listed is highest value reported.
Dec. 97 data - no defoamer addition. Modeling assumed no defoamer addition.
* : Influent concentrations assumed to be equal to those from December 9, 1997 sampling event.

LAW

LAWGIBB Group Member

MEMORANDUM

To: Mike Bellotti @ Olin-Charleston; Don Greer, Karl Rasch, Ben Brayley, and Armand Damesimo @ Olin-Niagara; John Martin, and Rick Marotte @ LAW.

From: Anna Moomaw

Date: March 6, 2000

Subject: Monthly O&M Status Update for Ground-Water Collection and Treatment System for February 2000

In continuing efforts to keep everyone informed, this memo addresses the status of the O&M issues for the ground-water collection and treatment system. This memo follows from the monthly status update memo issued 2/9/2000.

System Status

The following table presents general treatment system data obtained from OMNX and during field monitoring for the month of February.

Ground-Water Collection and Treatment System Status					
	RW-1	RW-2	RW-3	RW-4	RW-5
Pumping Systems (Data from 2/1/00-2/29/00)					
Average Flow Rate (gpm)	1.84	1.94	16.17	14.01	17.01
End of Month Flow Rate (gpm)	2.3	0.0	15.5	15.3	19.4
Maximum achievable flow rate of pump (to date) (gpm)	*4.2*	*6.6*	*21.8*	*24.1*	*22.6*
Newly Developed Target Drawdown Level (ft above MSL) at PZ	**559**	**556**	**558.3**	**558.1**	**557.5**
Avg GW Elev. (OMNX) (ft above MSL)	557.9	557.9	558.4	558.0	549.4
End of Period GW Elev. (OMNX) (ft above MSL)	558.5	558.7	558.4	558.0	550.4
New OMNX Low-High Level Set Points for Auto. Pump Off-On (ft above MSL)	*551.8 - 558*	*551.2 – 555*	*550.6 – 557.3*	*546.5 - 557.1*	*548.7 – 556.5*
Comments	None	None	Transducer to be re-calibrated and checked.	Transducer to be checked.	None

Ground-Water Collection and Treatment System Status					
Well Screen Losses (The well screen loss is defined as the difference between the well piezometer outside the casing and the water level inside the casing)					
	RW-1	RW-2	RW-3	RW-4	RW-5
February 4, 2000 Data					
Target Drawdown Level (ft above MSL) at PZ	**559**	**556**	**558.3**	**558.1**	**557.5**
GW Elevation at Piezometer (ft above MSL)	556.41	555.26	552.64	554.44	549.18
GW Elevation at RW (ft above MSL)	561.20	554.94	555.36	554.95	547.54
Difference (ft)	-4.79	0.32	-2.72	-.51	1.64
Comments	None	None	None	None	None
Notes:					

Total Flow, Pumping Rates, and Down Time

Increased pumping rates were achieved at RW-1 in the month of February. RW-2, RW-3, RW-4 and RW-5 are operating at acceptable flow rates.

Transducer Calibrations

Transducer calibrations are checked monthly. CRA records manual water level data and OMNX transducer output data during monthly water level data collection activities. The difference between the manual level data and the OMNX reading is then used to readjust the zero setting of the transducer through OMNX so that the two readings "match".

The transducers were re-calibrated through OMNX on March 6 as follows:

Transducer Calibration (Water Level Data from: Feb 4, 2000)							
	Well Elevation	OMNX Elevation	Difference	OMNX Zero	Adjusted Zero	Difference, Last Calibr.	Notes
Well ID	*(Man)*	*(OMNX)*	*(Diff = Man – OMNX)*	*(Zero)*	*(Zero + Diff)*	*(Feb 7, 2000)*	
RW-1	556.41	556.2	0.21	550.43	550.64	-0.24	
RW-2	555.26	554.88	0.38	549.7	550.08	NA	
RW-3	552.64	558.39	-5.75	549.5	NA	2.8	Not Adjusted- Faulty input reading
RW-4	554.95	558.03	-3.08	546.76	543.68	0.02	
RW-5	547.54	546.27	1.27	546.53	547.80	0.82	

The transducers will be re-calibrated monthly and after each well cleaning event.

Transducers

The RW-1, RW-4, and RW-5 transducers still need to be re-located during the next well cleaning event.

In the month of February, RW-4 and RW-5 target drawdown was achieved every day. For RW-2, the target drawdown was not achieved. Due to a faulty input signal from the transducer, RW-3

readings indicated that drawdown was not achieved for the month; However, manual data indicated a level of 552.64 ft AMSL (February 4), which is below the target drawdown level. Plant maintenance is troubleshooting this transducer. The RW-4 transducer reported a constant 558.0 ft AMSL for the month, and therefore needs to be checked out as well. At RW-1, the target level was not achieved on one day. The RW-1 pump was operating at approximately 2.5 gpm continuously on this day.

DNAPL Checks

In February, the following observations were noted during DNAPL (dense non-aqueous phase liquid) checks:

Well	Volume Purged	DNAPL Presence	Quantity Recovered	Comments
RW-1	1 gallon	No	NA	None
RW-2	1 gallon	No	NA	None
RW-3	1 gallon	No	NA	None
RW-4	1 gallon	No	NA	None
RW-5	1 gallon	Yes	Approx 20 mL	None

Attachments: ***Monthly Flow and Groundwater Level Data Excel spreadsheet***

LAW

LAWGIBB Group Member

MEMORANDUM

To: Mike Bellotti @ Olin-Charleston; Don Greer, Karl Rasch, Ben Brayley, and Armand Damesimo @ Olin-Niagara; John Martin, and Rick Marotte @ LAW.

From: Anna Moomaw

Date: February 9, 2000

Subject: Monthly O&M Status Update for Ground-Water Collection and Treatment System for January 2000

In continuing efforts to keep everyone informed, this memo addresses the status of the O&M issues for the ground-water collection and treatment system. This memo follows from the monthly status update memo issued 1/9/2000.

System Status

The following table presents general treatment system data obtained from OMNX and during field monitoring for the month of January.

Ground-Water Collection and Treatment System Status					
	RW-1	RW-2	RW-3	RW-4	RW-5
Pumping Systems (Data from 1/1/00-1/31/00)					
Average Flow Rate (gpm)	0.9	0.1	18.6	16.2	18.7
End of Month Flow Rate (gpm)	1.3	0.5	17.8	16.2	16.7
Maximum achievable flow rate of pump (to date) (gpm)	*4.2*	*6.6*	*21.8*	*24.1*	*22.6*
Newly Developed Target Drawdown Level (ft above MSL) at PZ	**559**	**556**	**558.3**	**558.1**	**557.5**
Avg GW Elev. (OMNX) (ft above MSL)	558.4	558.0	557.0	558.1	547.8
End of Period GW Elev. (OMNX) (ft above MSL)	558.1	556.5	558.4	558.0	546.3
New OMNX Low-High Level Set Points for Auto. Pump Off-On (ft above MSL)	*551.8 - 558*	*551.2 – 555*	*550.6 – 557.3*	*546.5 - 557.1*	*548.7 – 556.5*
Comments	None	Pipes backflushed w/ acid; pump repaired; ice build-up thawed. New transducer installed. Pumping re-start: 1/31	Transducer to be re-calibrated and checked.	None	None

Ground-Water Collection and Treatment System Status					
Well Screen Losses (The well screen loss is defined as the difference between the well piezometer outside the casing and the water level inside the casing)					
	RW-1	RW-2	RW-3	RW-4	RW-5
January 6, 2000 Data					
Target Drawdown Level (ft above MSL) at PZ	**559**	**556**	**558.3**	**558.1**	**557.5**
GW Elevation at Piezometer (ft above MSL)	557.50	558.14	558.07	558.13	550.86
GW Elevation at RW (ft above MSL)	557.60	558.17	558.09	558.16	558.30
Difference (ft)	-.10	-.03	-.02	-.03	-7.44
Comments	None	None	None	None	Flow rate is still good; repeatable difference result, therefore clean well in spring
Notes:					

Total Flow, Pumping Rates, and Down Time

Increased pumping rates continue to be achieved at RW-3 since the well was cleaned and re-started. RW-1 began operating again as of January 5, 2000 after suction hose was cleared. RW-4 and RW-5 are still operating at acceptable flow rates.

Due to numerous O&M issues, RW-2 was not started back up until January 31, 2000. In early January, RW-2 piping was acid cleaned from the building to the well due to scale build-up in the piping/hose. The suction hose was completely plugged and required replacement. After these repairs, the pump ran briefly (January 11-13), but there was a parts failure inside the pump casing and the hose split inside the casing. The pump was repaired with existing spare parts and the hose was replaced. While the pump was being repaired, ice formed in the hose part of the line leading to the building. The line was thawed and pumping resumed on January 31.

Target Drawdown Levels

The following updated configuration for OMNX setpoints was initiated on January 9, 2000:

	Lo-Lo Setpoint *Bottom of Probe in Piezometer (3 ft. off well bottom)*	**Lo Setpoint** *Lo-Lo Setpoint plus 1 foot*	**Hi Setpoint** *Hi-Hi Setpoint minus 1 foot*	**Hi-Hi Setpoint** *Target Drawdown Elevation*
RW-1	550.8	551.8	558	559
RW-2	550.2	551.2	555	556
RW-3	549.6	550.6	557.3	558.3
RW-4	545.5	546.5	557.1	558.1
RW-5	547.7	548.7	556.5	557.5

Transducer Calibrations

Transducer calibrations are checked monthly. CRA records manual water level data and OMNX transducer output data during monthly water level data collection activities. The difference between the manual level data and the OMNX reading is then used to readjust the zero setting of the transducer through OMNX so that the two readings "match".

The transducers were re-calibrated through OMNX on February 7 as follows:

Transducer Calibration (Water Level Data from: Jan. 6, 2000)							
	Well Elevation	OMNX Elevation	Difference	OMNX Zero	Adjusted Zero	Difference, Last Calibr.	Notes
Well ID	*(Man)*	*(OMNX)*	*(Diff = Man – OMNX)*	*(Zero)*	*(Zero + Diff)*	*(Nov 1, 1999)*	
RW-1	557.6	557.84	-0.24	550.43	550.19	1.23	
RW-2	558.17	0	NA	549.7	NA	NA	Not Adjusted- Transducer not in service at time of data collection
RW-3	558.09	555.29	2.8	549.5	NA	8.26	Not Adjusted- Faulty input reading
RW-4	558.16	558.14	0.02	546.76	546.78	-0.44	
RW-5	558.3	557.48	0.82	546.53	547.35	-2.87	

The transducers will be re-calibrated monthly and after each well cleaning event.

Transducers

The RW-1, RW-4, and RW-5 transducers still need to be re-located during the next well cleaning event. The transducer for RW-2 was replaced on January 8.

In the month of December, RW-1 and RW-5 target drawdown was achieved every day. For RW-2, the target drawdown was not achieved as the pump was out of service. Due to a faulty input signal from the transducer, RW-3 readings indicated exceedances for 18 days. Plant maintenance is troubleshooting this transducer. There is a voltage drop from 24V to 19V between the transducer and the OMNX I/O panel which is being investigated. At RW-4, the target level was exceeded on 8 days. The RW-4 pump was operating at approximately 16 gpm continuously during this period.

Sampling for Inorganics

A sample of pipe scale was submitted to Quanterra on December 15, 1999 for analysis of calcium, magnesium, iron, manganese, sulfates, sulfides, and phosphates. Silicon and carbonates analyses were also requested, but could not be performed due to inadequate sample volume. Analytical results are summarized below:

Parameter	**Encrustation (mg/kg)**		
	1998 Results		**Dec 1999 Results**
	RW-1	**RW-2**	**RW-2**
Barium	88.4	156	N/A
Calcium	**412,000**	**390,000**	**343,000**
Iron	**1,690**	**290**	**279**

Magnesium	**4,050**	**2,220**	**4480**
Manganese	**242**	**486**	**136**
Potassium	191	302	N/A
Sodium	3,380	1,740	N/A
Chloride	209	17	N/A
Sulfate	**968**	**47**	**1460**
Phosphate	N/A	N/A	<10
Sulfide	N/A	N/A	<250

N/A - Not Analyzed

DNAPL Checks

In January, the following observations were noted during DNAPL (dense non-aqueous phase liquid) checks:

Well	Volume Purged	DNAPL Presence	Quantity Recovered	Comments
RW-1	1 gallon	No	NA	None
RW-2	1 gallon	No	NA	None
RW-3	1 gallon	No	NA	None
RW-4	1 gallon	No	NA	None
RW-5	1 gallon	Yes	Trace	None

Air Stripper Influent/Effluent Sampling

Results for the September 20, 1999 air stripper are as follows. For December, samples were collected only from the air stripper effluent, therefore percent removals could not be estimated. A table of previous air stripper influent/effluent sampling data is attached for comparison purposes. Removal efficiencies are generally consistent with previous data. Influent concentrations for many of the constituents have increased as the pumping rates have increased, but the air stripper is still achieving good removal efficiencies.

Parameter	Influent (ug/l)	Effluent (ug/l)	% removal
Trichloroethene	14000	120	99.14
Tetrachloroethene	9800	52	99.47
1,1,2,2-Tetrachloroethane	1700	290	82.94
cis-1,2-Dichloroethene	2400	37	98.46
1,2,4-Trichlorobenzene	820	48	94.15
1,3-Dichlorobenzene	ND (400)	ND (20)	
1,4-Dichlorobenzene	ND (400)	ND (20)	
1,2-Dichlorobenzene	ND (400)	ND (20)	
Vinyl Chloride	ND (800)	ND (40)	
Chlorobenzene	ND (400)	ND (20)	

1,1,2-Trichloroethane	ND (400)	ND (20)	
Benzene	ND (400)	ND (20)	
Methylene Chloride	560	ND (20)	>96.43
trans-1,2-Dichloroethene	ND (400)	ND (20)	
1,1,1-Trichloroethane	ND (400)	ND (20)	
1,1-Dichloroethene	ND (400)	ND (20)	
Carbon Tetrachloride	ND (400)	ND (20)	
Total VOCs	29280	547	98.13
ND-Parameter not detected above the detection limit (shown in parentheses)			

Data Loggers

Per Hugh Bryan of OMNX, the new procedure for totalizers will be to reset the totalizers at the first of each month at 8 am. Start time for all data logger files will be 8 am.

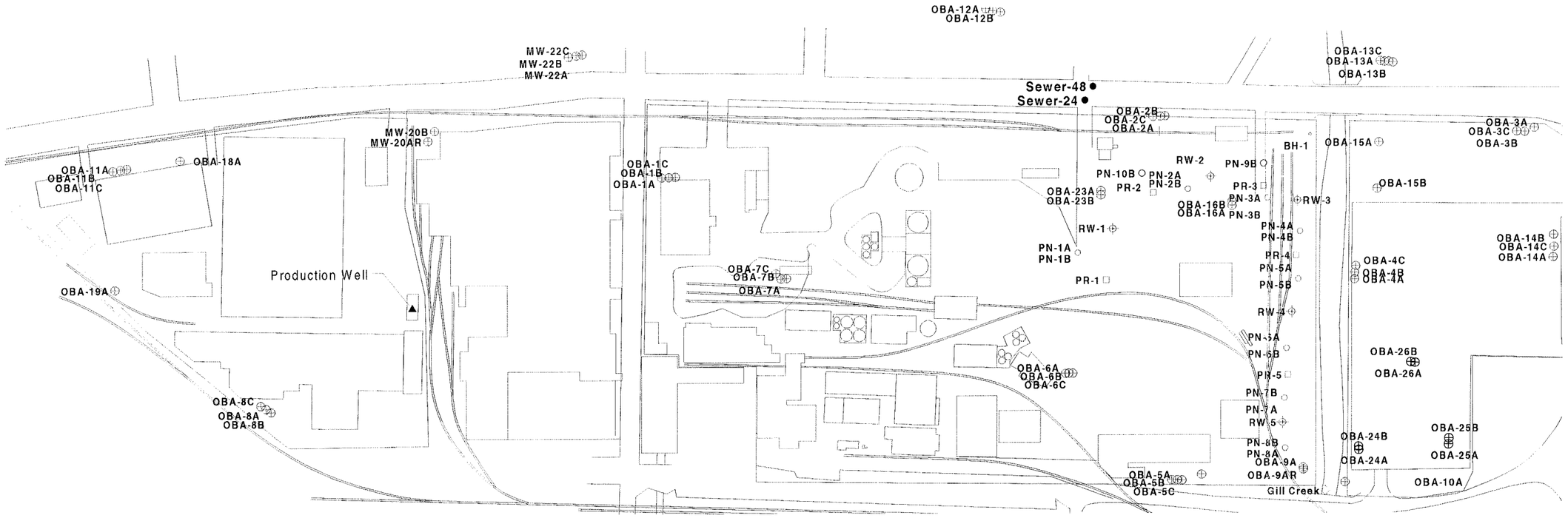
Attachments: ***Monthly Flow and Groundwater Level Data Excel spreadsheet***
Air Stripper Influent/Effluent Data Excel spreadsheet

Bellotti, Mike CHAS

From: Bellotti, Mike CHAS
Sent: Tuesday, March 14, 2000 4:53 PM
To: 'NYSDEC Wertz, Bill'
Subject: Olin Niagara Falls

Bill:
This is to let you know that we had an outage with the air stripper system at our NF plant. The blower inflow to the air stripper came disconnected, and allowed groundwater to pass thru the stripper untreated. We are trying to determine how long the outage was. However, the system is now functioning again.

Mike Bellotti



LEGEND

- ◇ GILL CREEK MONITORING POINT
- ▲ OLIN PRODUCTION WELL
- ⊕ WATER QUALITY MONITORING WELLS
- ○ A/B ZONE PIEZOMETER NESTS
- ⊕ GROUND WATER RECOVERY WELLS
- □ PASSIVE RELIFF WELLS
- ● SEWER INVERT ELEVATION
- ——— PROPERTY LINE

0 200 400

Scale 1 inch = 200 feet

OLIN CHEMICAL
NIAGARA FALLS, NEW YORK

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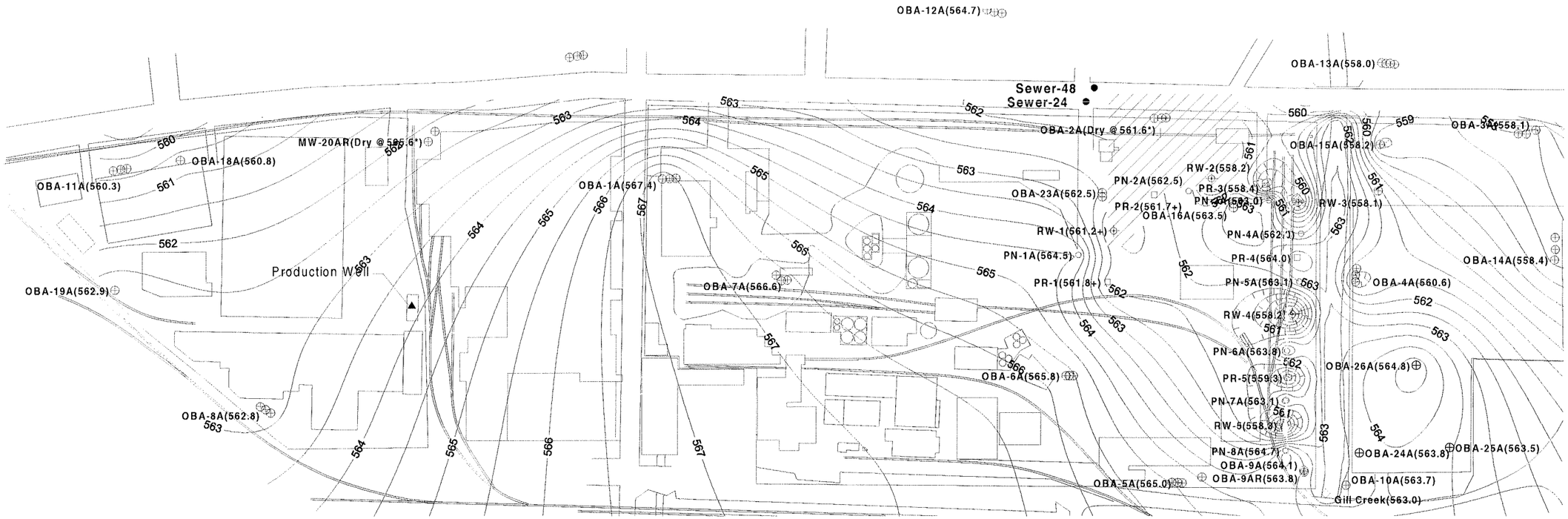
BASE MAP

Job No.: 12000-8-0030

Figure 0



LEGEND

- ◇ GILL CREEK MONITORING POINT
- ▲ OLIN PRODUCTION WELL (FLOW RATE FROM DUPONT)
- ⊕ WATER QUALITY MONITORING WELLS
- ○ A/B ZONE PIEZOMETER NESTS
- ⊕ GROUND WATER RECOVERY WELLS
- □ PASSIVE RELIEF WELLS
- ● SEWER INVERT
- PROPERTY LINE
- 565 ESTIMATED GROUND-WATER CONTOUR LINES (CONTOUR INTERVAL: 0.5 FEET)
- ESTIMATED DRY AREA IN ZONE A

Well	Average Flow Rate(gpm)*
RW-1	0.1
RW-2	0.4
RW-3	11.3
RW-4	17.3
RW-5	19.4

*: Averaged using daily flow rates since previous monthly field measurements.

0 200 400

Scale 1 inch = 200 feet

NOTE

*: Well dry, elevation of bottom of A-Zone used in contouring.
+: Bottom of A-Zone elevation used in contouring.
▲: Water Elevation not obtained from Olin Production Well.
●: Buffalo Avenue Sewer invert is assumed to be a groundwater sink. The piezometric surface is estimated as the bottom of the A-zone. The bottom of the A-zone along Buffalo Avenue was estimated from borings OBA-1A, OBA-2A, OBA-3A, and OBA-11A.

Two water level measurements were obtained in Gill Creek throughout the day at 08:59am (562.8 feet), and 12:30pm (563.0 feet). The Gill Creek elevation (563.0 feet) coinciding with the time water level measurements were obtained in the piezometers along Gill Creek was used in contouring in A zone.

POTENTIOMETRIC SURFACE CONTOUR GENERATED USING SURFER FOR WINDOWS BY GOLDEN SOFTWARE, INC. 1999.

OLIN CHEMICAL
NIAGARA FALLS, NEW YORK

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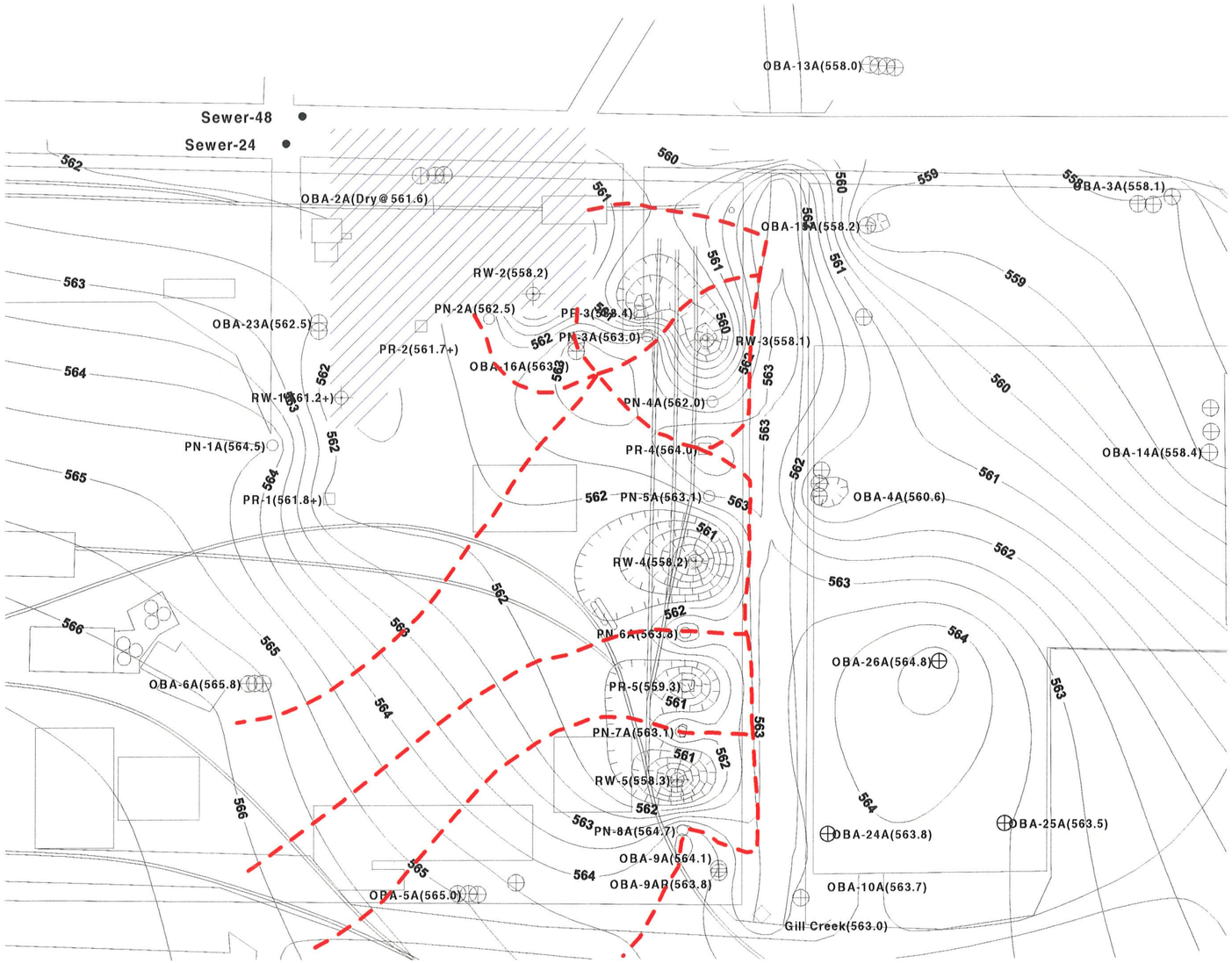
POTENTIOMETRIC SURFACE -- A ZONE (JANUARY 6, 2000)

Job No.: 12000-8-0030

Figure 1



Well	Average Flow Rate(gpm)*
RW-1	0.1
RW-2	0.4
RW-3	11.3
RW-4	17.3
RW-5	19.4

*: Averaged using daily flow rates since previous monthly field measurements.

LEGEND

- GILL CREEK MONITORING POINT
- OLIN PRODUCTION WELL (FLOW RATE FROM DUPONT)
- WATER QUALITY MONITORING WELLS
- A/B ZONE PIEZOMETER NESTS
- GROUND WATER RECOVERY WELLS
- PASSIVE RELIEF WELLS
- SEWER INVERT
- PROPERTY LINE
- 565 ESTIMATED GROUND-WATER CONTOUR LINES (CONTOUR INTERVAL: 0.5 FEET)
- ESTIMATED CAPTURE ZONE BOUNDARY
- ESTIMATED DRY AREA IN ZONE A

0 120 240

Scale 1 inch = 120 feet

NOTE

*: Well dry, elevation of bottom of A-Zone used in contouring.
+: Bottom of A-Zone elevation used in contouring.
●: Buffalo Avenue Sewer invert is assumed to be a groundwater sink.
The piezometric surface is estimated as the bottom of the A-zone.
The bottom of the A-zone along Buffalo Avenue was estimated from borings OBA-1A, OBA-2A, OBA-3A, and OBA-11A.

Two water level measurements were obtained in Gill Creek throughout the day at 08:59 am (562.8 feet), and 12:30 pm (563.0 feet). The Gill Creek elevation (563.0 feet) coinciding with the time water level measurements were obtained in the piezometers along Gill Creek was used in contouring in A zone.

POTENTIOMETRIC SURFACE CONTOUR GENERATED USING SURFER FOR WINDOWS BY GOLDEN SOFTWARE, INC. 1995. CAPTURE ZONE BOUNDARY WAS DRAWN BASED THE FLOW PATHLINES GENERATED BY GWPATH.

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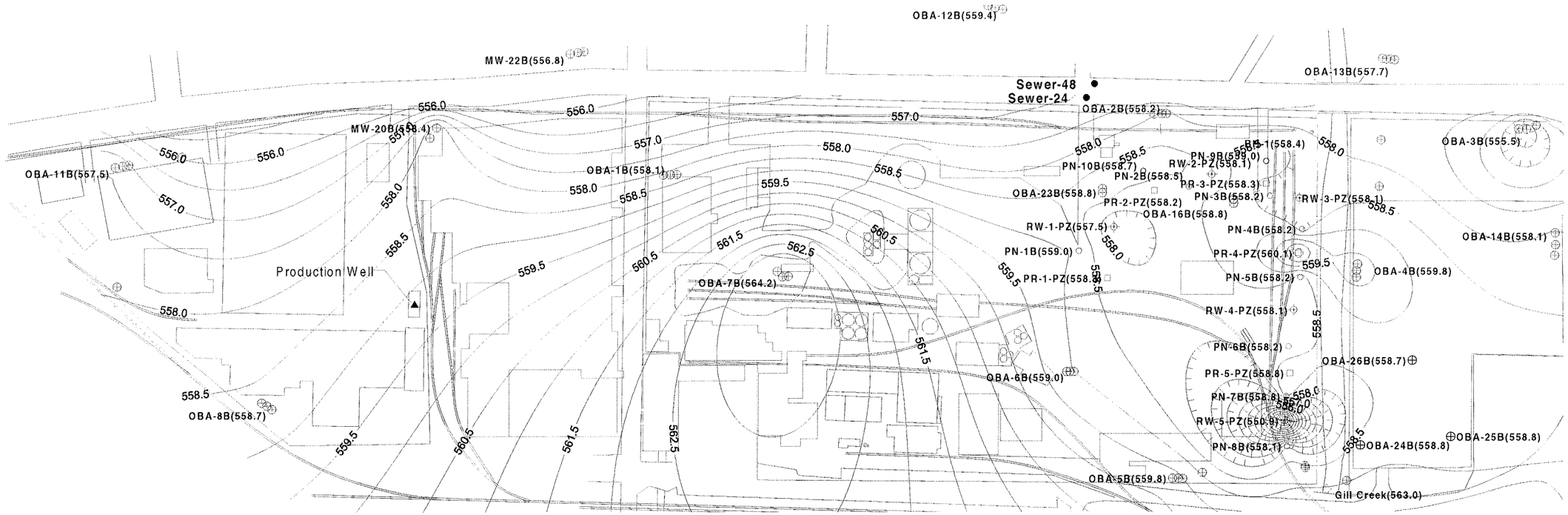
ESTIMATED CAPTURE ZONE AND POTENTIOMETRIC SURFACE -- A ZONE (JANUARY 6, 2000)

Job No.: 12000-8-0030

Figure 1A



LEGEND

- ◇ GILL CREEK MONITORING POINT
- ▲ OLIN PRODUCTION WELL (FLOW RATE FROM DUPONT)
- ⊕ WATER QUALITY MONITORING WELLS
- ○ A/B ZONE PIEZOMETER NESTS
- ⊖ GROUND WATER RECOVERY WELLS
- □ PASSIVE RELIEF WELLS
- ● SEWER INVERT ELEVATION
- PROPERTY LINE
- 565 ESTIMATED GROUND-WATER CONTOUR LINES (CONTOUR INTERVAL: 0.5 FEET)

Well	Average Flow Rate(gpm)*
RW-1	0.1
RW-2	0.4
RW-3	11.3
RW-4	17.3
RW-5	19.4

* : Averaged using daily flow rates since previous monthly field measurements.

0 200 400

Scale 1 inch = 200 feet

NOTE

**: RW-2-PZ was set at 556.1ft due to obstacle inside well.
▲: Olin Production Well.
●: Buffalo Avenue Sewer invert is assumed to be a ground-water sink. The piezometric surface is not known. The ground water contours were estimated based on the sewer invert elevation. PN-2B elevation used as dummy points north of RW-2.

Two water level measurements were obtained in Gill Creek throughout the day at 08:59am (562.8 feet), and 12:30pm (563.0 feet). The Gill Creek elevation was not used in contouring the B zone but is included on the map for comparative purposes.

POTENTIOMETRIC SURFACE CONTOUR GENERATED USING SURFER FOR WINDOWS BY GOLDEN SOFTWARE, INC. 1999.

OLIN CHEMICAL
NIAGARA FALLS, NEW YORK

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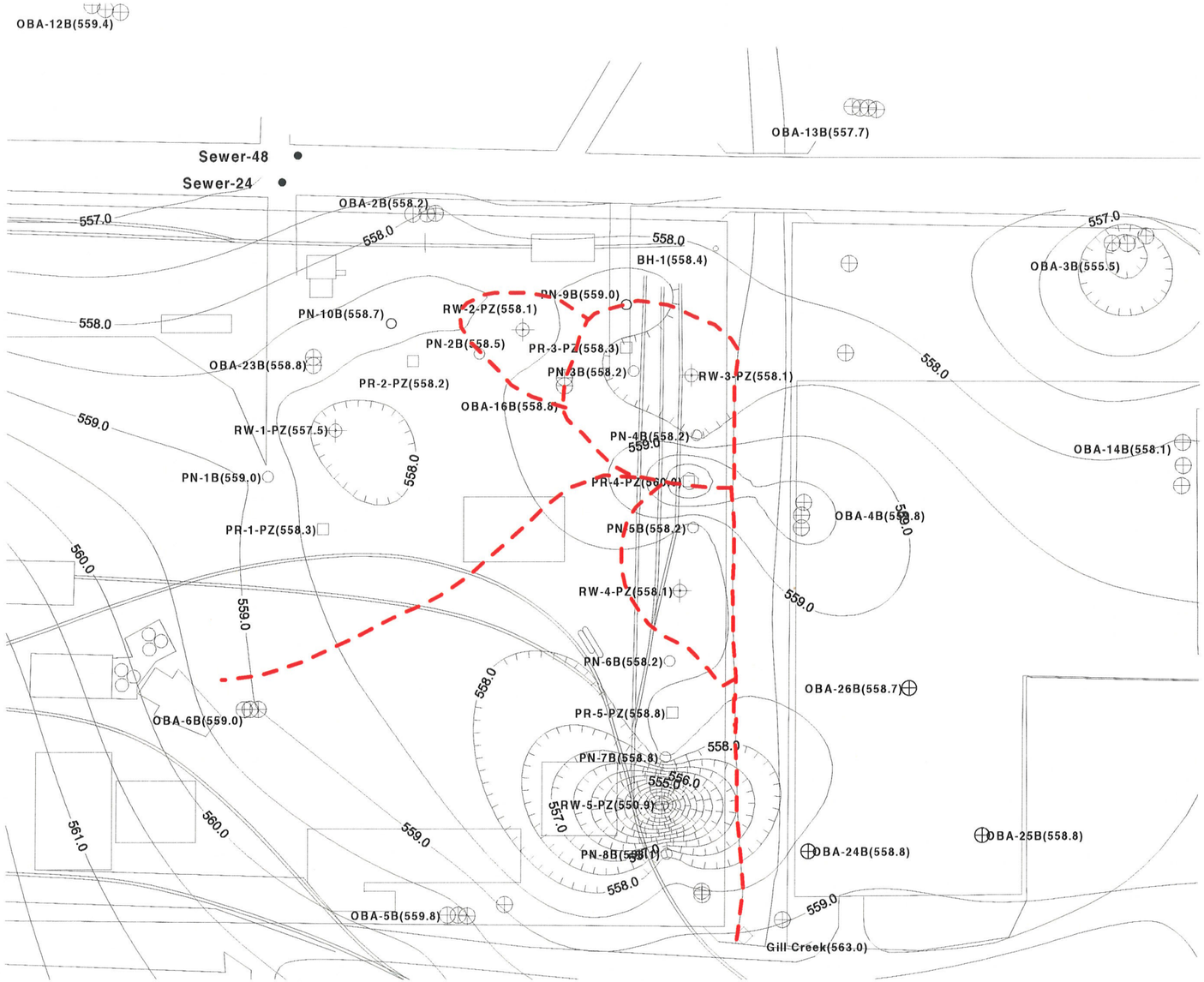
POTENTIOMETRIC SURFACE -- B ZONE
(JANUARY 6, 2000)

Job No.: 12000-8-0030

Figure 2



Well	Average Flow Rate(gpm)*
RW-1	0.1
RW-2	0.4
RW-3	11.3
RW-4	17.3
RW-5	19.4

*: Averaged using daily flow rates since previous monthly field measurements.

LEGEND

- ◇ GILL CREEK MONITORING POINT
- ▲ OLIN PRODUCTION WELL (FLOW RATE FROM DUPONT)
- ⊕ WATER QUALITY MONITORING WELLS
- ○ A/B ZONE PIEZOMETER NESTS
- ⊕ GROUND WATER RECOVERY WELLS (FLOW RATE FROM OMNX SYSTEM)
- □ PASSIVE RELIEF WELLS
- ● SEWER INVERT ELEVATION
- ——— PROPERTY LINE
- 565 ESTIMATED GROUND-WATER CONTOUR LINES (CONTOUR INTERVAL: 0.5 FEET)
- - - - ESTIMATED CAPTURE ZONE BOUNDARY

0 120 240

Scale 1 inch = 120 feet

NOTE

*: Elevation not used in contouring.
**: RW-2-PZ was set at 556.1 due to obstacle inseide well.
▲: Olin Production Well.
●: Buffalo Avenue Sewer invert is assumed to be a ground-water sink. The piezometric surface is not known. The ground water conturs were estimated based on the sewer invert elevation. PN-2B elevation used as dummy points north of RW-2.

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POTENTIOMETRIC SURFACE CONTOUR GENERATED USING SURFER FOR WINDOWS BY GOLDEN SOFTWARE, INC. 1999. CAPTURE ZONE BOUNDARY WAS DRAWN BASED THE FLOW PATHLINES GENERATED BY GWPATH.

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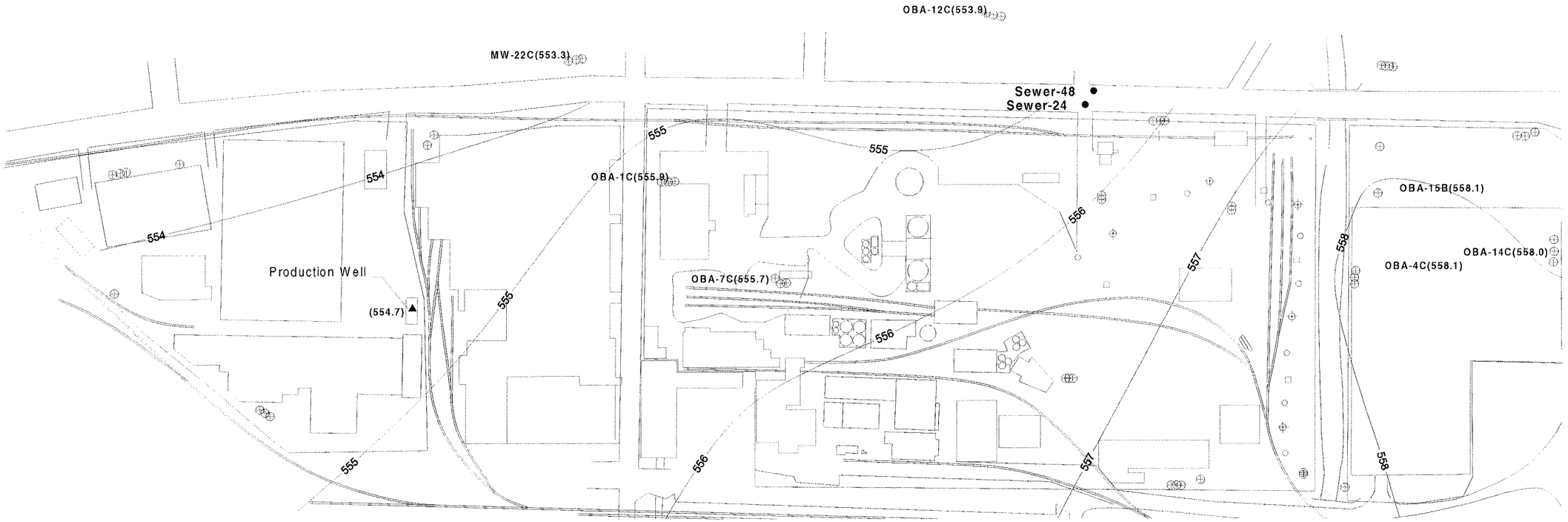
ESTIMATED CAPTURE ZONE AND
POTENTIOMETRIC SURFACE -- B ZONE
(JANUARY 6, 2000)

Job No.: 12000-8-0030

Figure 2A



N

LEGEND

- ◇ GILL CREEK MONITORING POINT
- ▲ OLIN PRODUCTION WELL (FLOW RATE FROM DUPONT)
- ⊙ WATER QUALITY MONITORING WELLS
- ○ A/B ZONE PIEZOMETER NESTS
- ⊕ GROUND WATER RECOVERY WELLS (FLOW RATE FROM OMNX SYSTEM)
- □ PASSIVE RELIEF WELLS
- ● SEWER INVERT
- ——— PROPERTY LINE
- 565 ESTIMATED GROUND-WATER CONTOUR LINES (CONTOUR INTERVAL: 1 FEET)

Well	Average Flow Rate(gpm)
Olin Production Well	554.7

0 200 400

Scale 1 inch = 200 feet

POTENTIOMETRIC SURFACE CONTOUR GENERATED USING SURFER FOR WINDOWS BY GOLDEN SOFTWARE, INC. 1995.

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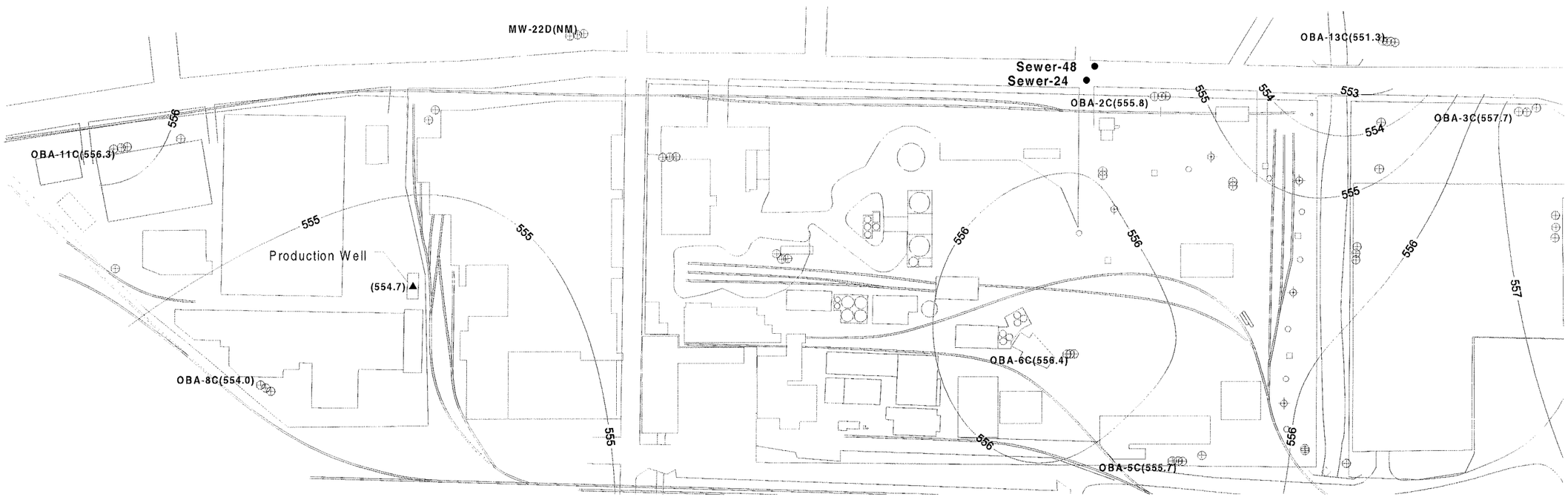
POTENTIOMETRIC SURFACE -- C ZONE
(JANUARY 6, 2000)

Job No.: 12000-8-0030

Figure 3



LEGEND

- ◇ GILL CREEK MONITORING POINT
- ▲ OLIN PRODUCTION WELL (FLOW RATE FROM DUPONT)
- ⊖ WATER QUALITY MONITORING WELLS
- ○ A/B ZONE PIEZOMETER NESTS
- ⊕ GROUND WATER RECOVERY WELLS (FLOW RATE FROM OMNX SYSTEM)
- □ PASSIVE RELIEF WELLS
- ● SEWER INVERT
- PROPERTY LINE
- 565 ESTIMATED GROUND-WATER CONTOUR LINES (CONTOUR INTERVAL: 1 FEETS)

Well	Average Flow Rate(gpm)
Olin Production Well	554.7

0 200 400

Scale 1 inch = 200 feet

POTENTIOMETRIC SURFACE CONTOUR GENERATED USING SURFER FOR WINDOWS BY GOLDEN SOFTWARE, INC. 1995.

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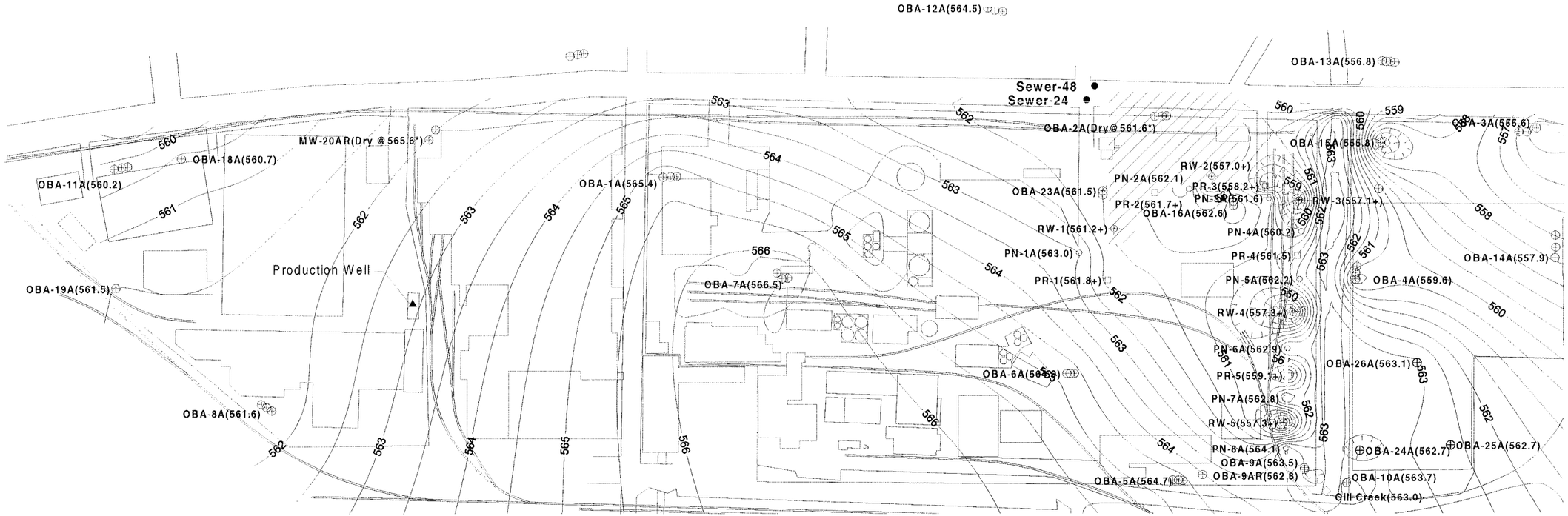
POTENTIOMETRIC SURFACE -- CD ZONE
(JANUARY 6, 2000)

Job No.: 12000-8-0030

Figure 4



LEGEND

- ◇ GILL CREEK MONITORING POINT
- ▲ OLIN PRODUCTION WELL (FLOW RATE FROM DUPONT)
- ⊕ WATER QUALITY MONITORING WELLS
- ○ A/B ZONE PIEZOMETER NESTS
- ⊙ GROUND WATER RECOVERY WELLS
- □ PASSIVE RELIEF WELLS
- ● SEWER INVERT
- PROPERTY LINE
- 565 ESTIMATED GROUND-WATER CONTOUR LINES (CONTOUR INTERVAL: 0.5 FEET)
- ESTIMATED DRY AREA IN ZONE A

Well	Average Flow Rate(gpm)*
RW-1	1.1
RW-2	0.3
RW-3	17.5
RW-4	15.6
RW-5	18.0

* : Averaged using daily flow rates since previous monthly field measurements.

0 200 400

Scale 1 inch = 200 feet

NOTE

* : Well dry, elevation of bottom of A-Zone used in contouring.
+ : Bottom of A-Zone elevation used in contouring.
▲ : Water Elevation not obtained from Olin Production Well.
● : Buffalo Avenue Sewer invert is assumed to be a groundwater sink. The piezometric surface is estimated as the bottom of the A-zone. The bottom of the A-zone along Buffalo Avenue was estimated from borings OBA-1A, OBA-2A, OBA-3A, and OBA-11A.

Ice formation on Gill Creek, measurement on top of ice. data were obtained in Gill Creek at 08:43 am (563.0 feet), The Gill Creek elevation (563.0 feet) was used in contouring in A zone.

POTENTIOMETRIC SURFACE CONTOUR GENERATED USING SURFER FOR WINDOWS BY GOLDEN SOFTWARE, INC. 1999.

OLIN CHEMICAL
NIAGARA FALLS, NEW YORK

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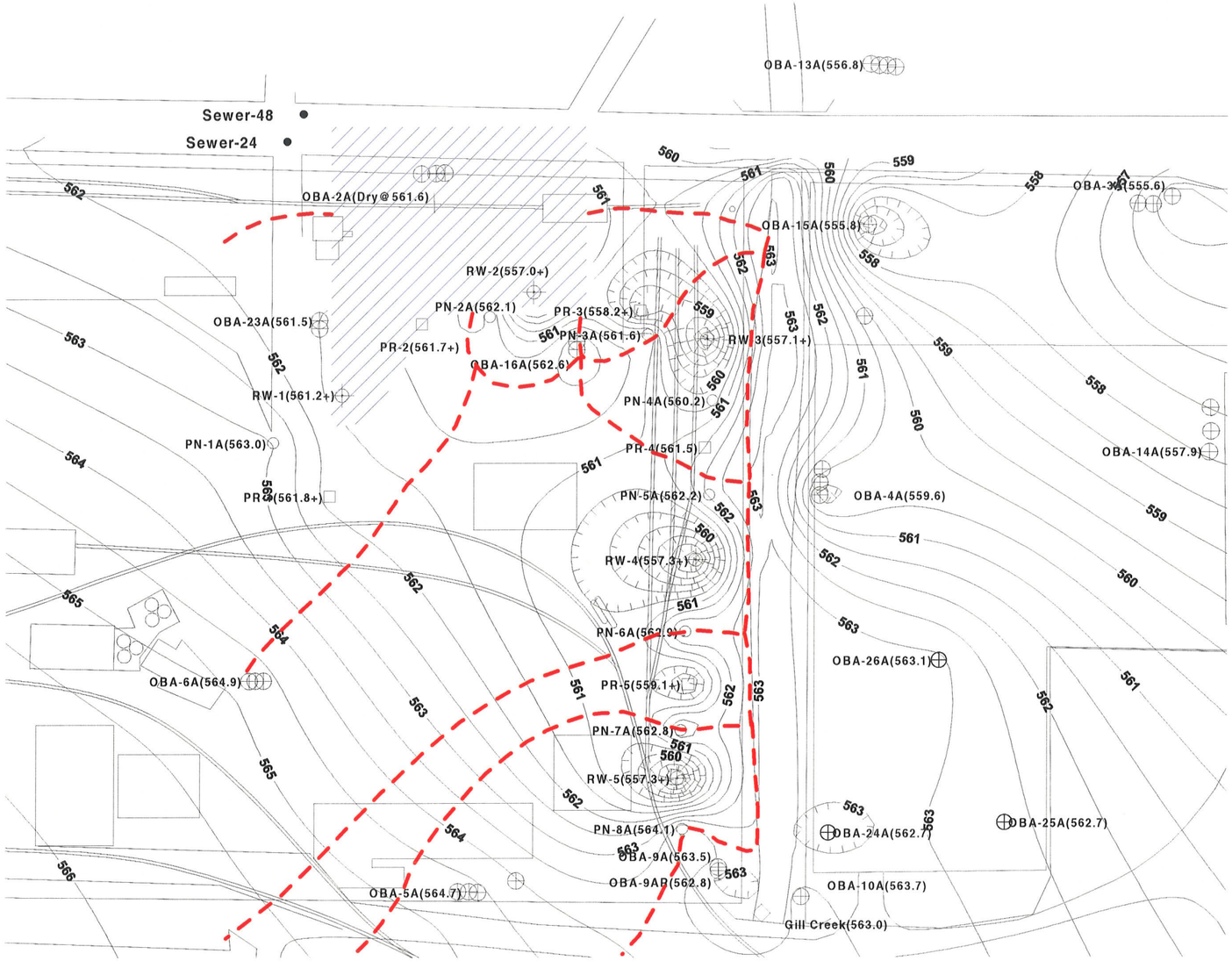
POTENTIOMETRIC SURFACE -- A ZONE
(FEBRUARY 4, 2000)

Job No.: 12000-8-0030

Figure 5



Well	Average Flow Rate(gpm)*
RW-1	1.1
RW-2	0.3
RW-3	17.5
RW-4	15.6
RW-5	18.0

*: Averaged using daily flow rates since previous monthly field measurements.

LEGEND

- GILL CREEK MONITORING POINT
- OLIN PRODUCTION WELL (FLOW RATE FROM DUPONT)
- WATER QUALITY MONITORING WELLS
- A/B ZONE PIEZOMETER NESTS
- GROUND WATER RECOVERY WELLS
- PASSIVE RELIEF WELLS
- SEWER INVERT
- PROPERTY LINE
- 565 — ESTIMATED GROUND-WATER CONTOUR LINES (CONTOUR INTERVAL: 0.5 FEET)
- ESTIMATED CAPTURE ZONE BOUNDARY
- ESTIMATED DRY AREA IN ZONE A

0 120 240

Scale 1 inch = 120 feet

NOTE

*: Well dry, elevation of bottom of A-Zone used in contouring.
+: Bottom of A-Zone elevation used in contouring.
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The bottom of the A-zone along Buffalo Avenue was estimated from borings OBA-1A, OBA-2A, OBA-3A, and OBA-11A.

Ice formation on Gill Creek, measurement on top of ice. data were obtained in Gill Creek at 08:43 am (563.0 feet), The Gill Creek elevation (563.0 feet) was used in contouring in A zone.

POTENTIOMETRIC SURFACE CONTOUR GENERATED USING SURFER FOR WINDOWS BY GOLDEN SOFTWARE, INC. 1995. CAPTURE ZONE BOUNDARY WAS DRAWN BASED THE FLOW PATHLINES GENERATED BY GWPATH.

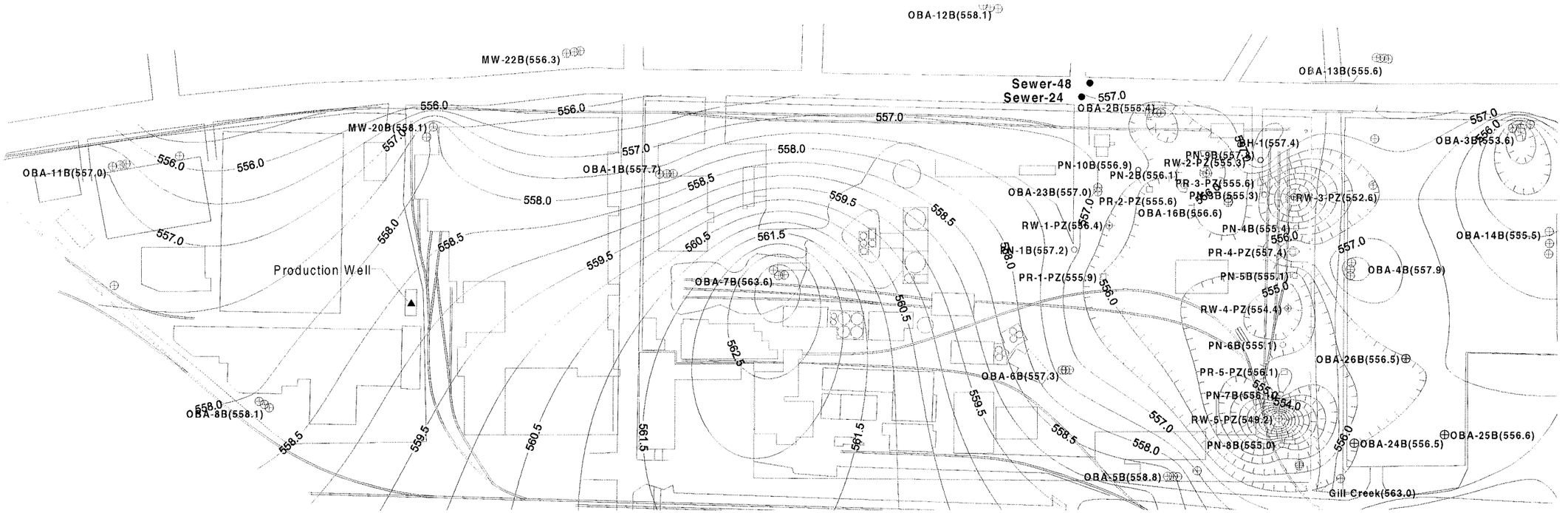
OLIN CHEMICAL
NIAGARA FALLS, NEW YORK

LAW
LAWGIBB Group Member

ESTIMATED CAPTURE ZONE AND
POTENTIOMETRIC SURFACE -- A ZONE
(FEBRUARY 4, 2000)

Job No.: 12000-8-0030

Figure 5A



0 200 400

Scale 1 inch = 200 feet

LEGEND

- ◇ GILL CREEK MONITORING POINT
- ▲ OLIN PRODUCTION WELL (FLOW RATE FROM DUPONT)
- ⊕ WATER QUALITY MONITORING WELLS
- ○ A/B ZONE PIEZOMETER NESTS
- ⊖ GROUND WATER RECOVERY WELLS
- □ PASSIVE RELIEF WELLS
- ● SEWER INVERT ELEVATION
- ——— PROPERTY LINE
- 565 ESTIMATED GROUND-WATER CONTOUR LINES (CONTOUR INTERVAL: 0.5 FEET)

Well	Average Flow Rate(gpm)*
RW-1	1.1
RW-2	0.3
RW-3	17.5
RW-4	15.6
RW-5	18.0

*: Averaged using daily flow rates since previous monthly field measurements.

NOTE

▲: Olin Production Well.
●: Buffalo Avenue Sewer invert is assumed to be a ground-water sink. The piezometric surface is not known. The ground water contours were estimated based on the sewer invert elevation. PN-2B elevation used as dummy points north of RW-2.

Ice formation on Gill Creek, measurement to top of ice. The Gill Creek elevation was not used in contouring the B zone but is included on the map for comparative purposes.

POTENTIOMETRIC SURFACE CONTOUR GENERATED USING SURFER FOR WINDOWS BY GOLDEN SOFTWARE, INC. 1999.

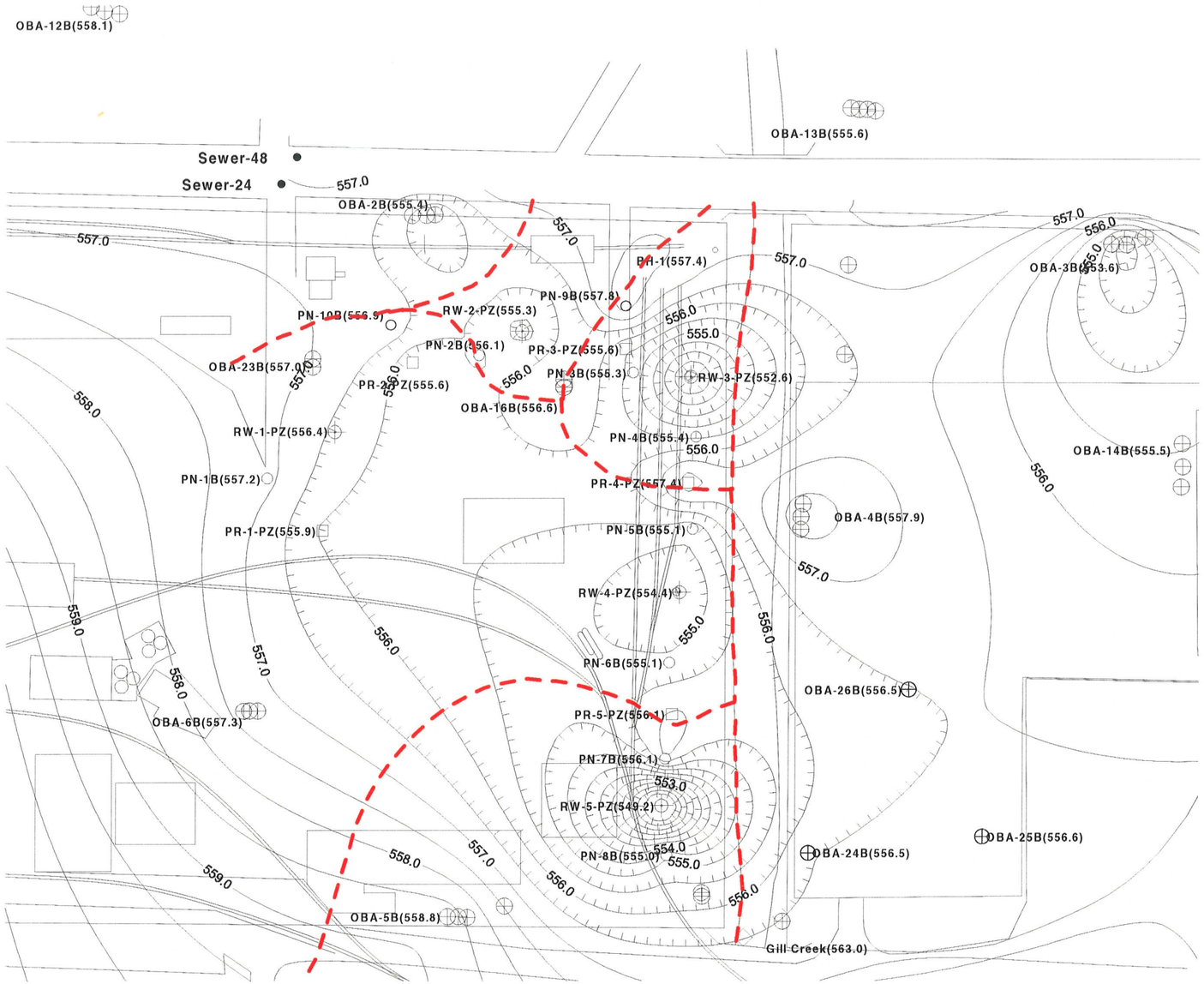
OLIN CHEMICAL
NIAGARA FALLS, NEW YORK

LAW
LAWGIBB Group Member

POTENTIOMETRIC SURFACE -- B ZONE
(FEBRUARY 4, 2000)

Job No.: 12000-8-0030

Figure 6



Well	Average Flow Rate(gpm)*
RW-1	1.1
RW-2	0.3
RW-3	17.5
RW-4	15.6
RW-5	18.0

*: Averaged using daily flow rates since previous monthly field measurements.

LEGEND

- ◇ GILL CREEK MONITORING POINT
- ▲ OLIN PRODUCTION WELL (FLOW RATE FROM DUPONT)
- ⊕ WATER QUALITY MONITORING WELLS
- ○ A/B ZONE PIEZOMETER NESTS
- ⊕ GROUND WATER RECOVERY WELLS (FLOW RATE FROM OMNX SYSTEM)
- □ PASSIVE RELIEF WELLS
- ● SEWER INVERT ELEVATION
- PROPERTY LINE
- 565 ESTIMATED GROUND-WATER CONTOUR LINES (CONTOUR INTERVAL: 0.5 FEET)
- ESTIMATED CAPTURE ZONE BOUNDARY

0 120 240

Scale 1 inch = 120 feet

NOTE

*: Elevation not used in contouring.

▲: Olin Production Well.

●: Buffalo Avenue Sewer invert is assumed to be a ground-water sink. The piezometric surface is not known. The ground water conturs were estimated based on the sewer invert elevation. PN-2B elevation used as dummy points north of RW-2.

Ice formation on Gill Creek, measurement to top of ice. The Gill Creek elevation was not used in contouring the B zone but is included on the map for comparative purposes.

POTENTIOMETRIC SURFACE CONTOUR GENERATED USING SURFER FOR WINDOWS BY GOLDEN SOFTWARE, INC. 1999. CAPTURE ZONE BOUNDARY WAS DRAWN BASED THE FLOW PATHLINES GENERATED BY GWPATH.

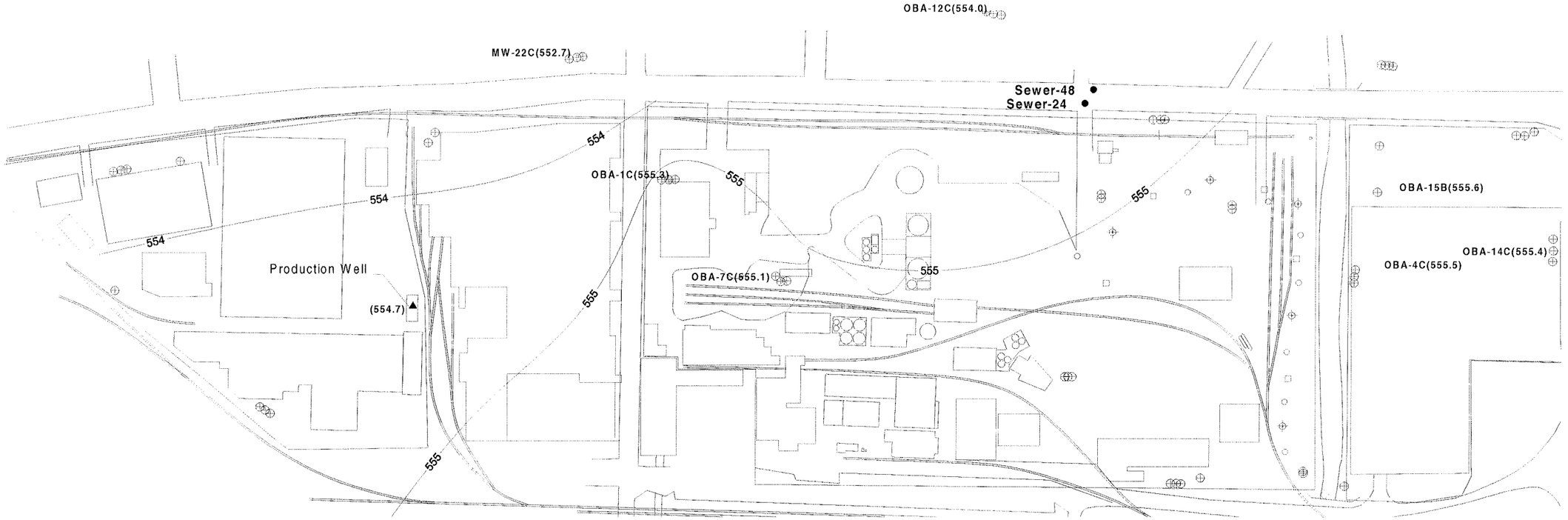
OLIN CHEMICAL
NIAGARA FALLS, NEW YORK

LAW
LAWGIBB Group Member

ESTIMATED CAPTURE ZONE AND
POTENTIOMETRIC SURFACE -- B ZONE
(FEBRUARY 4, 2000)

Job No.: 12000-8-0030

Figure 6A



N

LEGEND

- ◇ GILL CREEK MONITORING POINT
- ▲ OLIN PRODUCTION WELL (FLOW RATE FROM DUPONT)
- ⊕ WATER QUALITY MONITORING WELLS
- ○ A/B ZONE PIEZOMETER NESTS
- ⊙ GROUND WATER RECOVERY WELLS (FLOW RATE FROM OMNX SYSTEM)
- □ PASSIVE RELIEF WELLS
- ● SEWER INVERT
- ——— PROPERTY LINE
- 565 ESTIMATED GROUND-WATER CONTOUR LINES (CONTOUR INTERVAL: 1 FEETS)

Well	Average Flow Rate(gpm)
Olin Production Well	554.7

0 200 400

Scale 1 inch = 200 feet

POTENTIOMETRIC SURFACE CONTOUR GENERATED USING SURFER FOR WINDOWS BY GOLDEN SOFTWARE, INC. 1995.

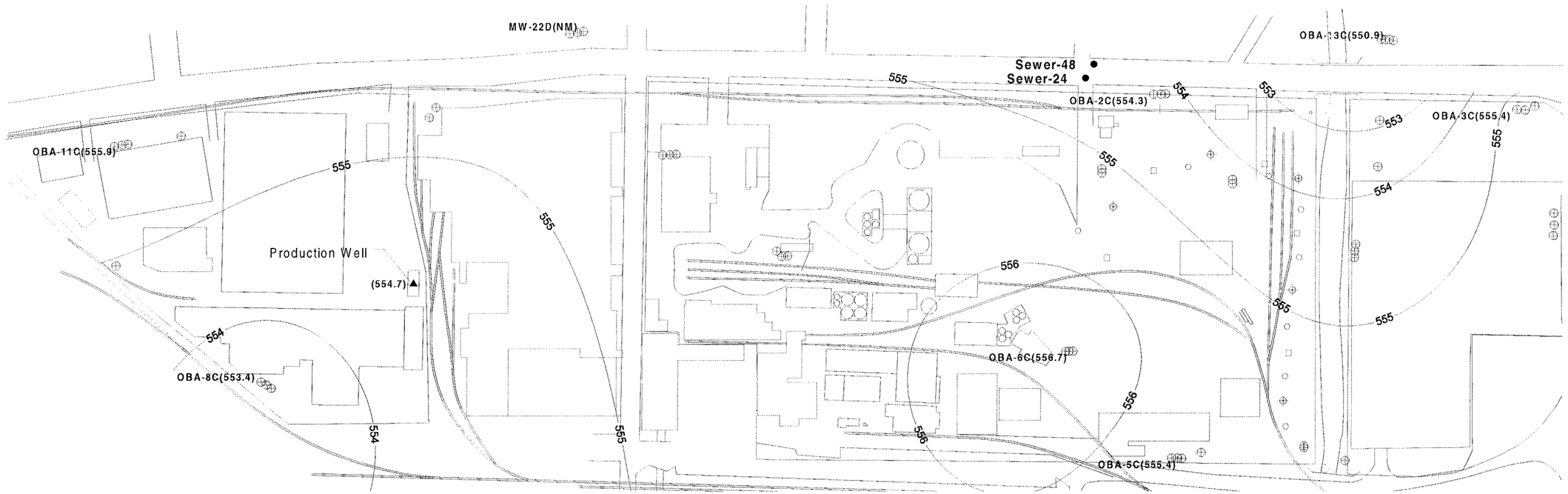
OLIN CHEMICAL
NIAGARA FALLS, NEW YORK

LAW
LAWGIBB Group Member

POTENTIOMETRIC SURFACE -- C ZONE
(FEBRUARY 4, 2000)

Job No.: 12000-8-0030

Figure 7



LEGEND

- ◇ GILL CREEK MONITORING POINT
- ▲ OLIN PRODUCTION WELL (FLOW RATE FROM DUPONT)
- ⊕ WATER QUALITY MONITORING WELLS
- ○ A/B ZONE PIEZOMETER NESTS
- ⊖ GROUND WATER RECOVERY WELLS (FLOW RATE FROM OMNX SYSTEM)
- □ PASSIVE RELIEF WELLS
- ● SEWER INVERT
- PROPERTY LINE
- 565 ESTIMATED GROUND-WATER CONTOUR LINES (CONTOUR INTERVAL: 1 FEETS)

Well	Average Flow Rate(gpm)
Olin Production Well	554.7

0 200 400
Scale 1 inch = 200 feet

POTENTIOMETRIC SURFACE CONTOUR GENERATED USING SURFER FOR WINDOWS BY GOLDEN SOFTWARE, INC. 1995.

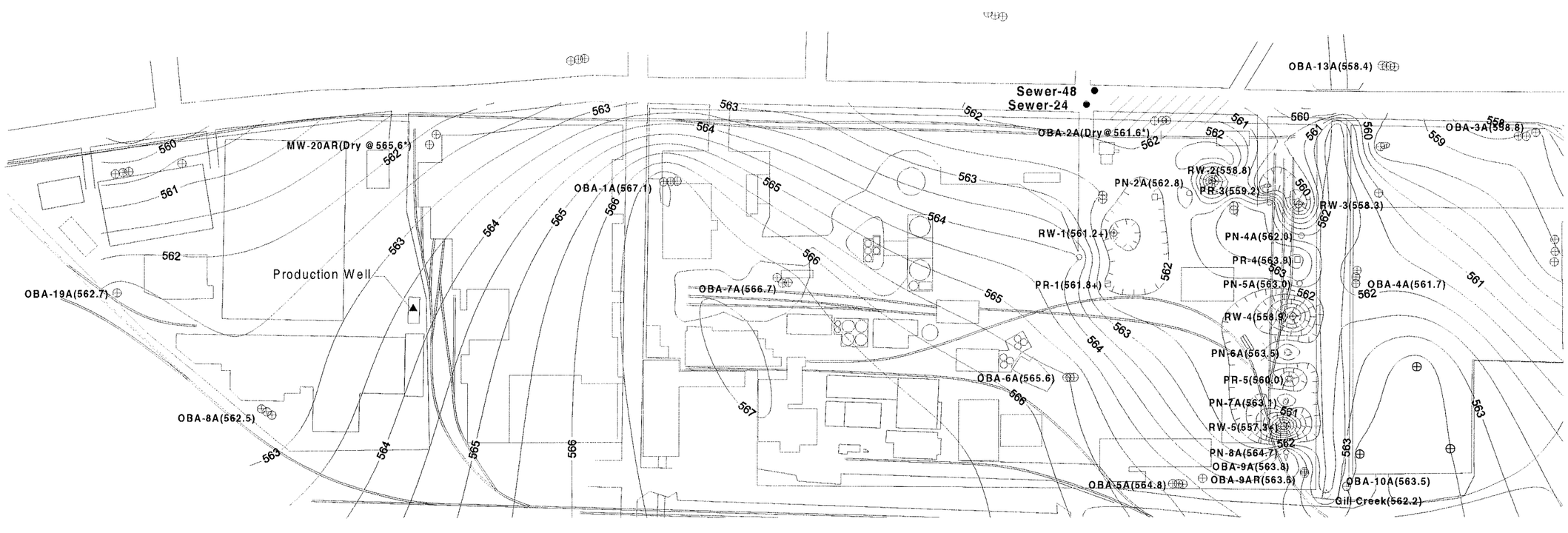
OLIN CHEMICAL
NIAGARA FALLS, NEW YORK

LAW
LAWGIBB Group Member

POTENTIOMETRIC SURFACE -- CD ZONE
(JANUARY 6, 2000)

Job No.: 12000-8-0030

Figure 8



LEGEND

- ◇ GILL CREEK MONITORING POINT
- ▲ OLIN PRODUCTION WELL (FLOW RATE FROM DUPONT)
- ⊕ WATER QUALITY MONITORING WELLS
- ○ A/B ZONE PIEZOMETER NESTS
- ⊕ GROUND WATER RECOVERY WELLS
- □ PASSIVE RELIEF WELLS
- ● SEWER INVERT
- PROPERTY LINE
- 565 ESTIMATED GROUND-WATER CONTOUR LINES (CONTOUR INTERVAL: 0.5 FEET)
- ESTIMATED DRY AREA IN ZONE A

Well	Average Flow Rate(gpm)*
RW-1	1.9
RW-2	1.8
RW-3	16.4
RW-4	14.0
RW-5	17.4

*: Averaged using daily flow rates since previous monthly field measurements.

0 200 400

Scale 1 inch = 200 feet

NOTE

*: Well dry, elevation of bottom of A-Zone used in contouring.
+: Bottom of A-Zone elevation used in contouring.
▲: Water Elevation not obtained from Olin Production Well.
●: Buffalo Avenue Sewer invert is assumed to be a groundwater sink. The piezometric surface is estimated as the bottom of the A-zone. The bottom of the A-zone along Buffalo Avenue was estimated from borings OBA-1A, OBA-2A, OBA-3A, and OBA-11A.

Data were obtained in Gill Creek at 09:08 am (562.1 feet), 11:10 am (562.2 feet), and 14:52 pm (562.2 feet). The Gill Creek elevation (562.2 feet) was used in contouring in A zone.
Measured water level at Gill Creek was suspect.
Measured water level at RW-1 was suspect; the top elevation of rock, 561.2 ft, was used in contouring.

POTENTIOMETRIC SURFACE CONTOUR GENERATED USING SURFER FOR WINDOWS BY GOLDEN SOFTWARE, INC. 1999.

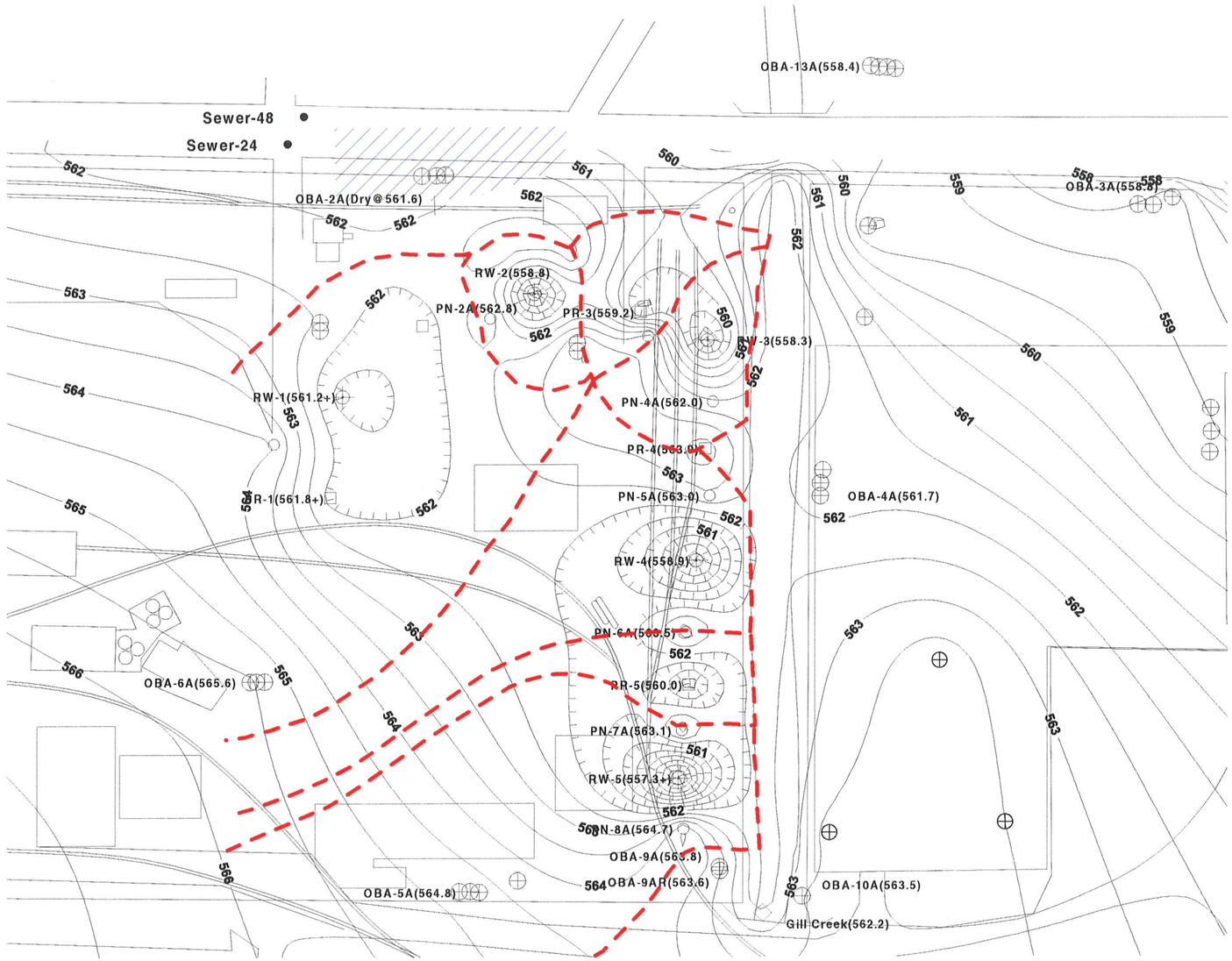
OLIN CHEMICAL
NIAGARA FALLS, NEW YORK

LAW
LAWGIBB Group Member

POTENTIOMETRIC SURFACE -- A ZONE
(MARCH 2, 2000)

Job No.: 12000-8-0030

Figure 9



Well	Average Flow Rate(gpm)*
RW-1	1.9
RW-2	1.8
RW-3	16.4
RW-4	14.0
RW-5	17.4

*: Averaged using daily flow rates since previous monthly field measurements.

LEGEND

- GILL CREEK MONITORING POINT
- OLIN PRODUCTION WELL (FLOW RATE FROM DUPONT)
- WATER QUALITY MONITORING WELLS
- A/B ZONE PIEZOMETER NESTS
- GROUND WATER RECOVERY WELLS
- PASSIVE RELIEF WELLS
- SEWER INVERT
- PROPERTY LINE
- 565 ESTIMATED GROUND-WATER CONTOUR LINES (CONTOUR INTERVAL: 0.5 FEET)
- ESTIMATED CAPTURE ZONE BOUNDARY
- ESTIMATED DRY AREA IN ZONE A

0 120 240

Scale 1 inch = 120 feet

NOTE

*: Well dry, elevation of bottom of A-Zone used in contouring.
+: Bottom of A-Zone elevation used in contouring.
●: Buffalo Avenue Sewer invert is assumed to be a groundwater sink.
The piezometric surface is estimated as the bottom of the A-zone.
The bottom of the A-zone along Buffalo Avenue was estimated from borings OBA-1A, OBA-2A, OBA-3A, and OBA-11A.

Data were obtained in Gill Creek at 09:08 am (562.1 feet), 11:10 am (562.2 feet), and 14:52 pm (562.2 feet). The Gill Creek elevation (562.2 feet) was used in contouring in A zone.
Measured water level at Gill Creek was suspect.
Measured water level at RW-1 was suspect; the top elevation of the rock, 561.2 ft, was used in contouring.

POTENTIOMETRIC SURFACE CONTOUR GENERATED USING SURFER FOR WINDOWS BY GOLDEN SOFTWARE, INC. 1995. CAPTURE ZONE BOUNDARY WAS DRAWN BASED THE FLOW PATHLINES GENERATED BY GWPATH.

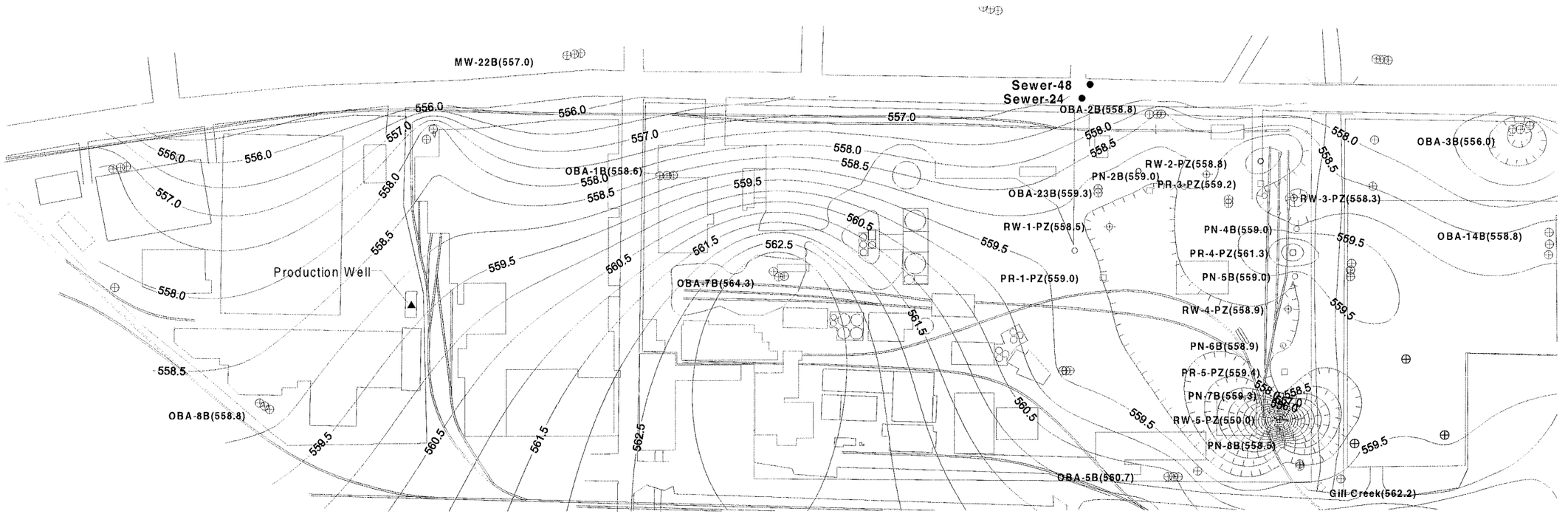
OLIN CHEMICAL
NIAGARA FALLS, NEW YORK

LAW
LAWGIBB Group Member

ESTIMATED CAPTURE ZONE AND
POTENTIOMETRIC SURFACE -- A ZONE
(MARCH 2, 2000)

Job No.: 12000-8-0030

Figure 9A



0 200 400

Scale 1 inch = 200 feet

LEGEND

- ◇ GILL CREEK MONITORING POINT
- ▲ OLIN PRODUCTION WELL (FLOW RATE FROM DUPONT)
- ⊕ WATER QUALITY MONITORING WELLS
- ○ A/B ZONE PIEZOMETER NESTS
- ⊕ GROUND WATER RECOVERY WELLS
- □ PASSIVE RELIEF WELLS
- ● SEWER INVERT ELEVATION
- ——— PROPERTY LINE
- 565 ESTIMATED GROUND-WATER CONTOUR LINES (CONTOUR INTERVAL: 0.5 FEET)

Well	Average Flow Rate(gpm)*
RW-1	1.9
RW-2	1.8
RW-3	16.4
RW-4	14.0
RW-5	17.4

* : Averaged using daily flow rates since previous monthly field measurements.

NOTE

▲ : Olin Production Well.
● : Buffalo Avenue Sewer invert is assumed to be a ground-water sink. The piezometric surface is not known. The ground water contours were estimated based on the sewer invert elevation. PN-2B elevation used as dummy points north of RW-2.

Data were obtained in Gill Creek at 09:08 am (562.1 feet), 11:10 am (562.2 feet), and 14:52 pm (562.2 feet). The Gill Creek elevation was not used in contouring the B zone but is included on the map for comparative purposes.

POTENTIOMETRIC SURFACE CONTOUR GENERATED USING SURFER FOR WINDOWS BY GOLDEN SOFTWARE, INC. 1999.

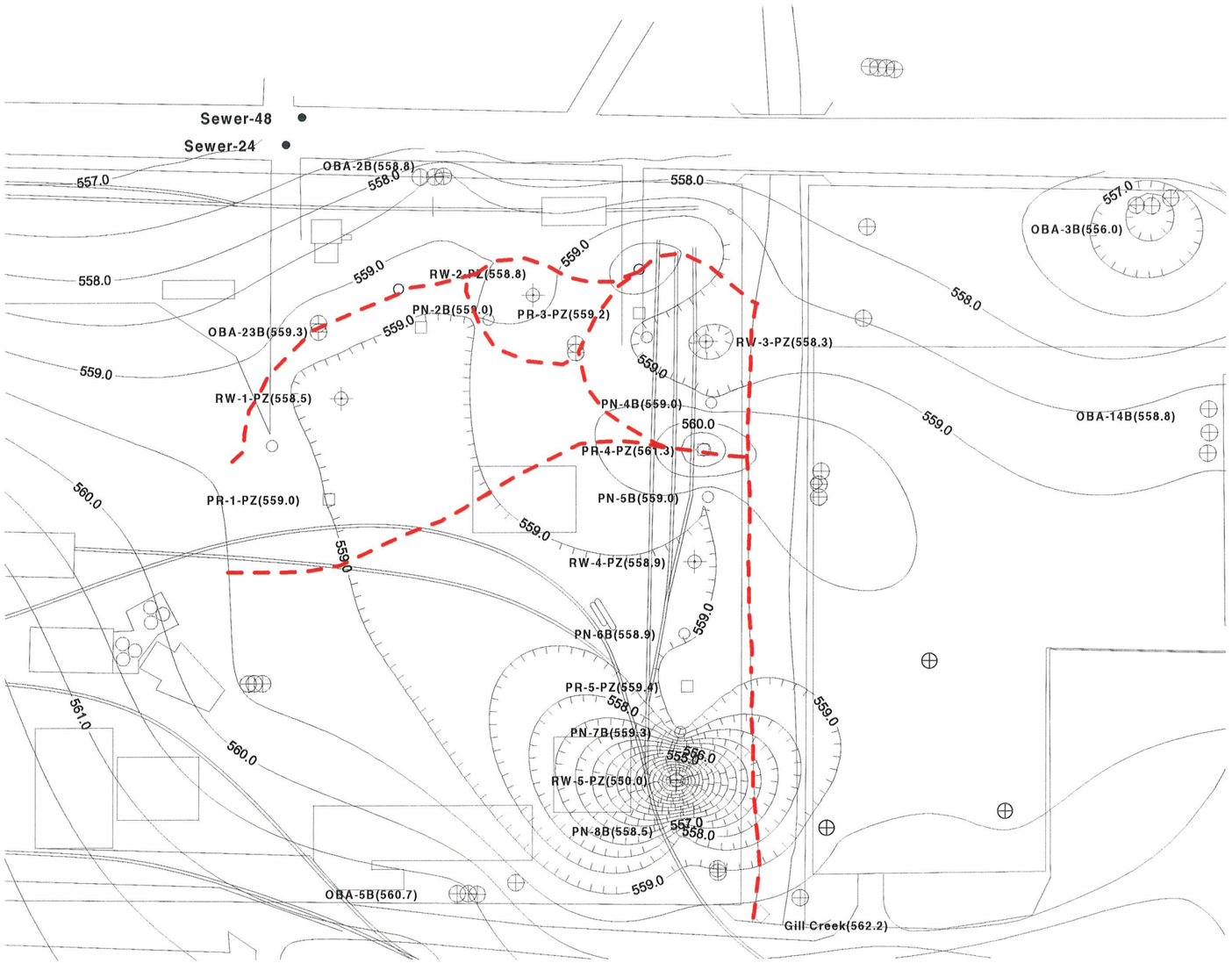
OLIN CHEMICAL
NIAGARA FALLS, NEW YORK

LAW
LAWGIBB Group Member

POTENTIOMETRIC SURFACE -- B ZONE
(MARCH 2, 2000)

Job No.: 12000-8-0030

Figure 10



Well	Average Flow Rate(gpm)*
RW-1	1.9
RW-2	1.8
RW-3	16.4
RW-4	14.0
RW-5	17.4

* : Averaged using daily flow rates since previous monthly field measurements.

LEGEND

- ◇ GILL CREEK MONITORING POINT
- ▲ OLIN PRODUCTION WELL (FLOW RATE FROM DUPONT)
- ⊕ WATER QUALITY MONITORING WELLS
- ○ A/B ZONE PIEZOMETER NESTS
- ⊕ GROUND WATER RECOVERY WELLS (FLOW RATE FROM OMNX SYSTEM)
- □ PASSIVE RELIEF WELLS
- ● SEWER INVERT ELEVATION
- PROPERTY LINE
- 565 ESTIMATED GROUND-WATER CONTOUR LINES (CONTOUR INTERVAL: 0.5 FEET)
- ESTIMATED CAPTURE ZONE BOUNDARY

0 120 240

Scale 1 inch = 120 feet

NOTE

* : Elevation not used in contouring.

▲: Olin Production Well.
●: Buffalo Avenue Sewer invert is assumed to be a ground-water sink. The piezometric surface is not known. The ground water conturs were estimated based on the sewer invert elevation. PN-2B elevation used as dummy points north of RW-2.

Data were obtained in Gill Creek at 09:08 am (562.1 feet), 11:10 am (562.2 feet), and 14:52 pm (562.2 feet). The Gill Creek elevation was not used in contouring the B zone but is included on the map for comparative purposes.

POTENTIOMETRIC SURFACE CONTOUR GENERATED USING SURFER FOR WINDOWS BY GOLDEN SOFTWARE, INC. 1999. CAPTURE ZONE BOUNDARY WAS DRAWN BASED THE FLOW PATHLINES GENERATED BY GWPATH.

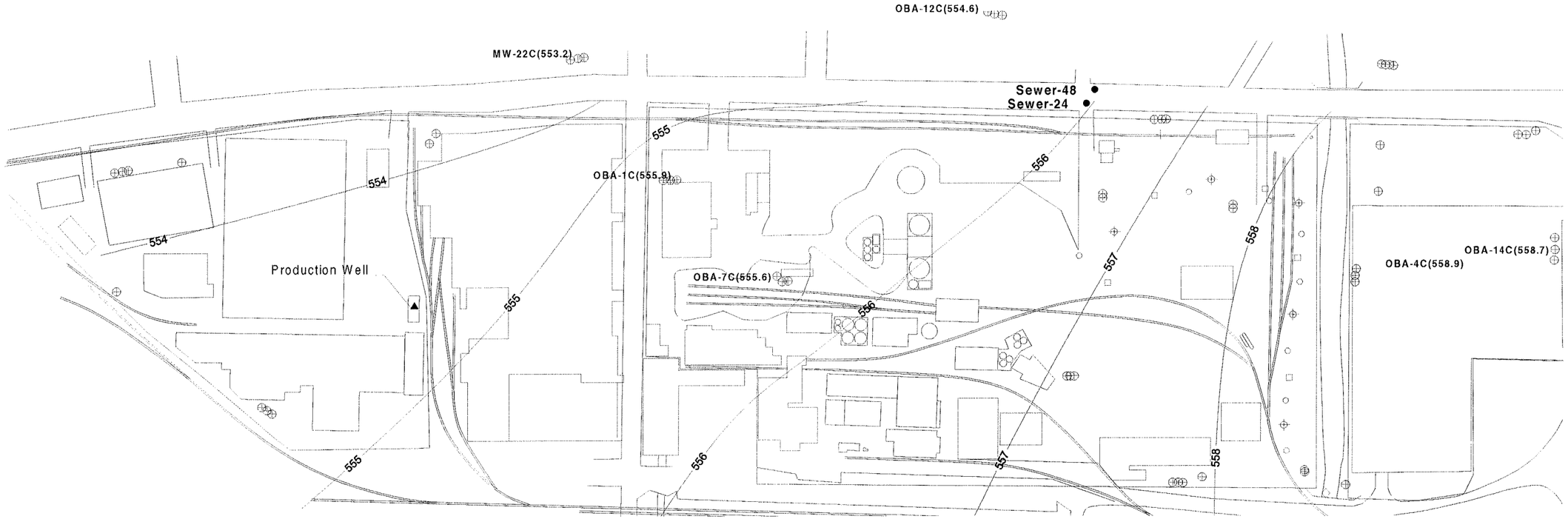
OLIN CHEMICAL
NIAGARA FALLS, NEW YORK

LAW
LAWGIBB Group Member

ESTIMATED CAPTURE ZONE AND
POTENTIOMETRIC SURFACE -- B ZONE
(MARCH 2, 2000)

Job No.: 12000-8-0030

Figure 10A



N

LEGEND

- ◇ GILL CREEK MONITORING POINT
- ▲ OLIN PRODUCTION WELL (FLOW RATE FROM DUPONT)
- ⊖ WATER QUALITY MONITORING WELLS
- ○ A/B ZONE PIEZOMETER NESTS
- ⊕ GROUND WATER RECOVERY WELLS (FLOW RATE FROM OMNX SYSTEM)
- □ PASSIVE RELIEF WELLS
- ● SEWER INVERT
- ——— PROPERTY LINE
- 565 ESTIMATED GROUND-WATER CONTOUR LINES (CONTOUR INTERVAL: 1 FEET)

Well	Average Flow Rate(gpm)
Olin Production Well	NA

0 200 400

Scale 1 inch = 200 feet

POTENTIOMETRIC SURFACE CONTOUR GENERATED USING SURFER FOR WINDOWS BY GOLDEN SOFTWARE, INC. 1995.

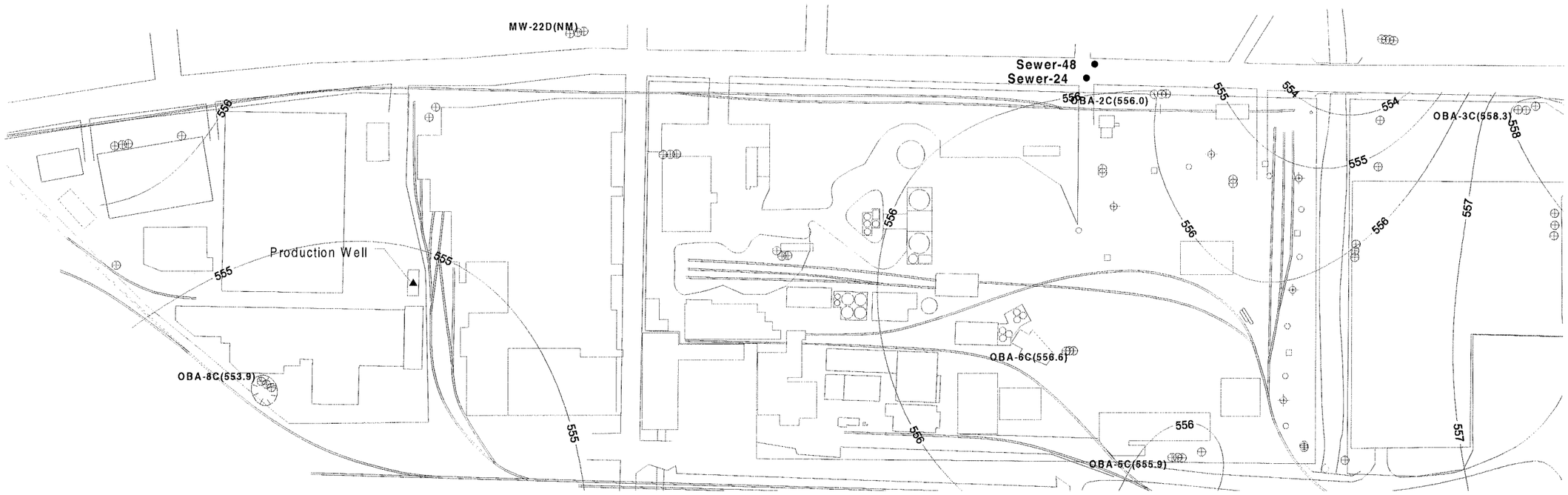
OLIN CHEMICAL
NIAGARA FALLS, NEW YORK

LAW
LAWGIBB Group Member

POTENTIOMETRIC SURFACE -- C ZONE
(MARCH 3, 2000)

Job No.: 12000-8-0030

Figure 11



LEGEND

- ◇ GILL CREEK MONITORING POINT
- ▲ OLIN PRODUCTION WELL (FLOW RATE FROM DUPONT)
- ⊕ WATER QUALITY MONITORING WELLS
- ○ A/B ZONE PIEZOMETER NESTS
- ⊕ GROUND WATER RECOVERY WELLS (FLOW RATE FROM OMNX SYSTEM)
- □ PASSIVE RELIEF WELLS
- ● SEWER INVERT
- ——— PROPERTY LINE
- 565 ESTIMATED GROUND-WATER CONTOUR LINES (CONTOUR INTERVAL: 1 FEET)

Well	Average Flow Rate(gpm)
Olin Production Well	NA

0 200 400

Scale 1 inch = 200 feet

POTENTIOMETRIC SURFACE CONTOUR GENERATED USING SURFER FOR WINDOWS BY GOLDEN SOFTWARE, INC. 1995.

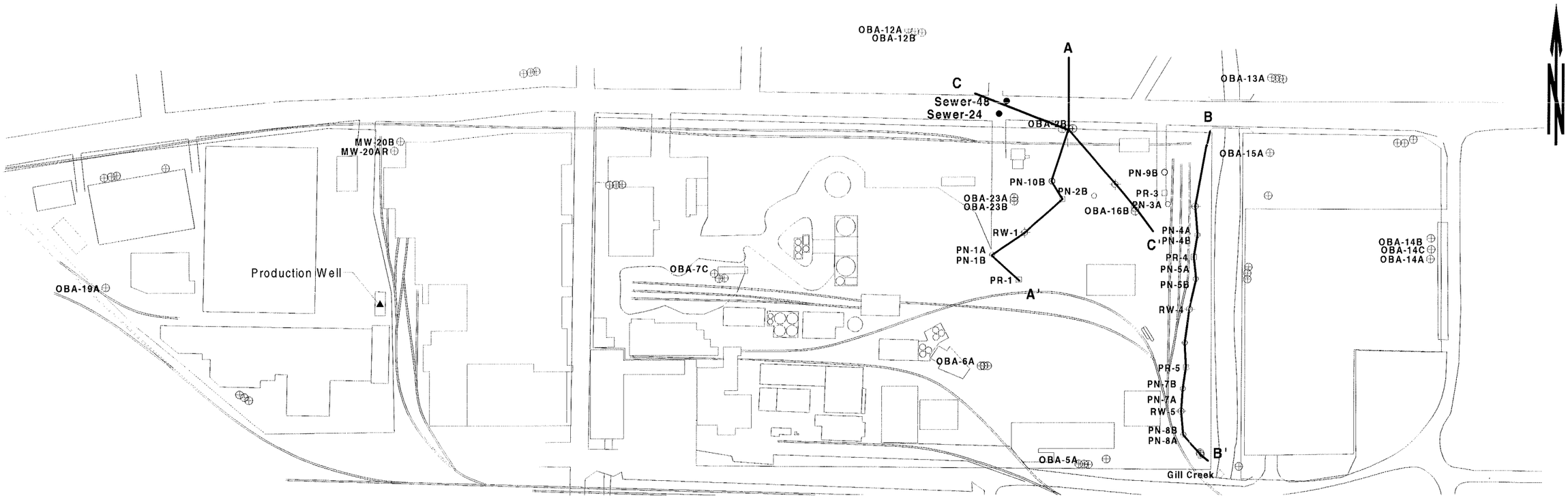
OLIN CHEMICAL
NIAGARA FALLS, NEW YORK

LAW
LAWGIBB Group Member

POTENTIOMETRIC SURFACE -- CD ZONE
(MARCH 2, 2000)

Job No.: 12000-8-0030

Figure 12



LEGEND

- ◇ GILL CREEK MONITORING POINT
- ▲ OLIN PRODUCTION WELL
- ⊕ WATER QUALITY MONITORING WELLS
- ○ A/B ZONE PIEZOMETER NESTS
- ⊕ GROUND WATER RECOVERY WELLS
- □ PASSIVE RELIFF WELLS
- ● SEWER INVERT ELEVATION
- ——— PROPERTY LINE
- A ——— A' HYDRAGEOLOGIC CROSS SECTION

0 200 400

Scale 1 inch = 200 feet

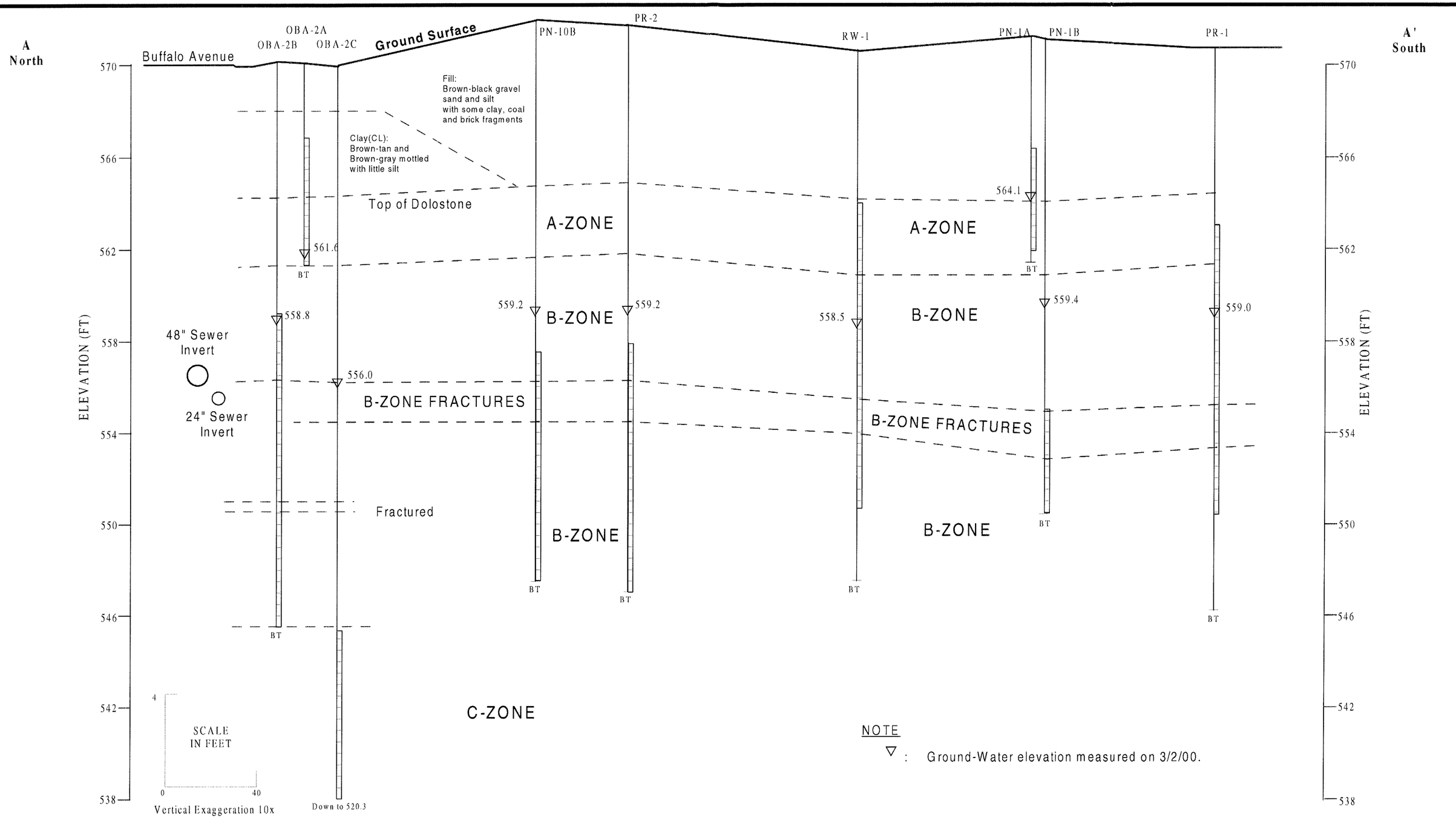
OLIN CHEMICAL
NIAGARA FALLS, NEW YORK

LAW
LAWGIBB Group Member

CROSS SECTION LOCATION MAP

Job No.: 12000-8-0030

Figure A4-1



NOTE

▽ : Ground-Water elevation measured on 3/2/00.

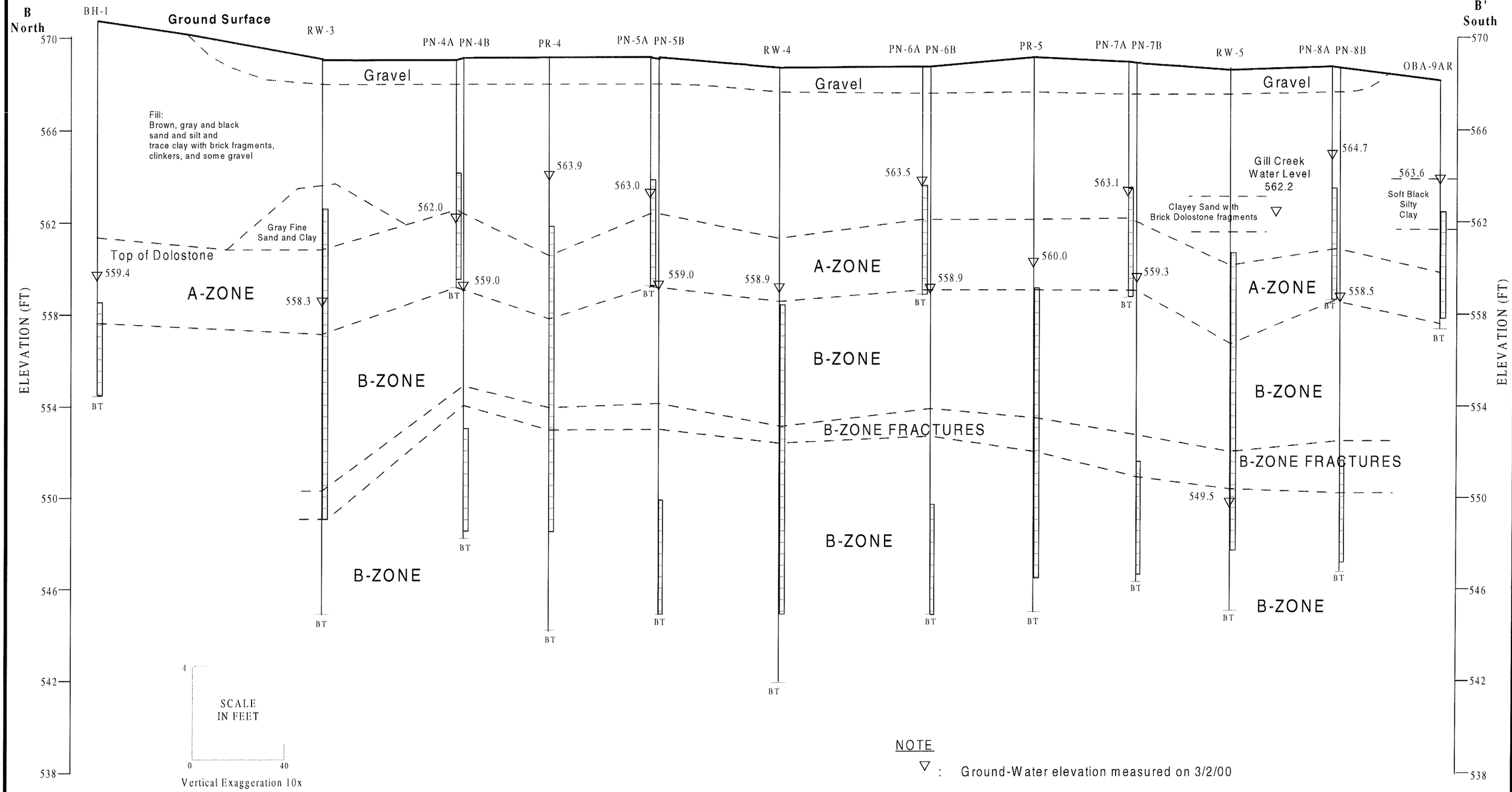
OLIN CHEMICAL
NIAGARA FALLS, NEW YORK

LAW
LAWGIBB Group Member

Hydrogeologic Cross Section AA'

Job Number 12000-8-0030

Figure A4-2



NOTE

▽ : Ground-Water elevation measured on 3/2/00

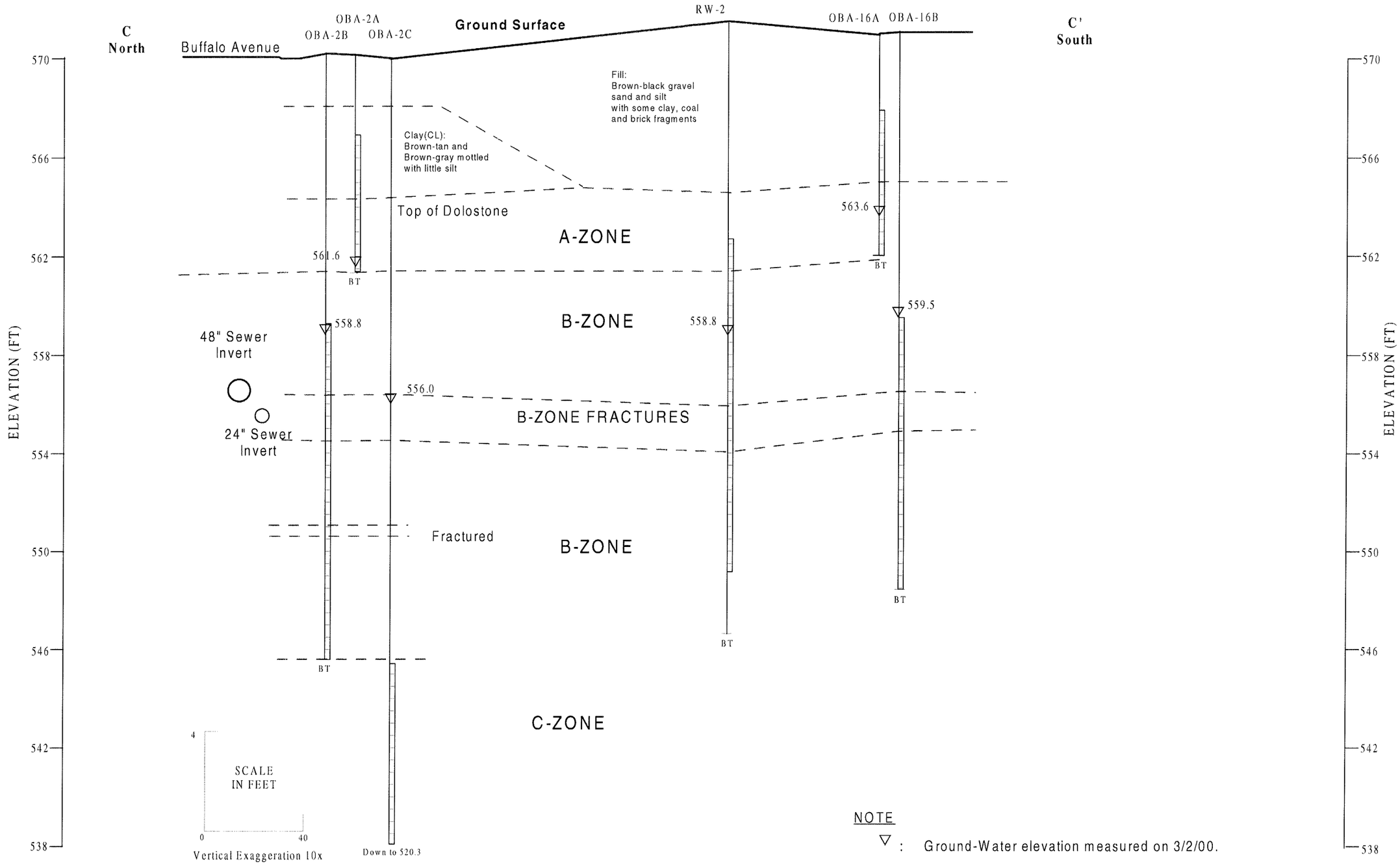
OLIN CHEMICAL
NIAGARA FALLS, NEW YORK

LAW
LAWGIBB Group Member

Hydrogeologic Cross Section BB'

Job Number 12000-8-0030

Figure A4-3



NOTE

▽ : Ground-Water elevation measured on 3/2/00.

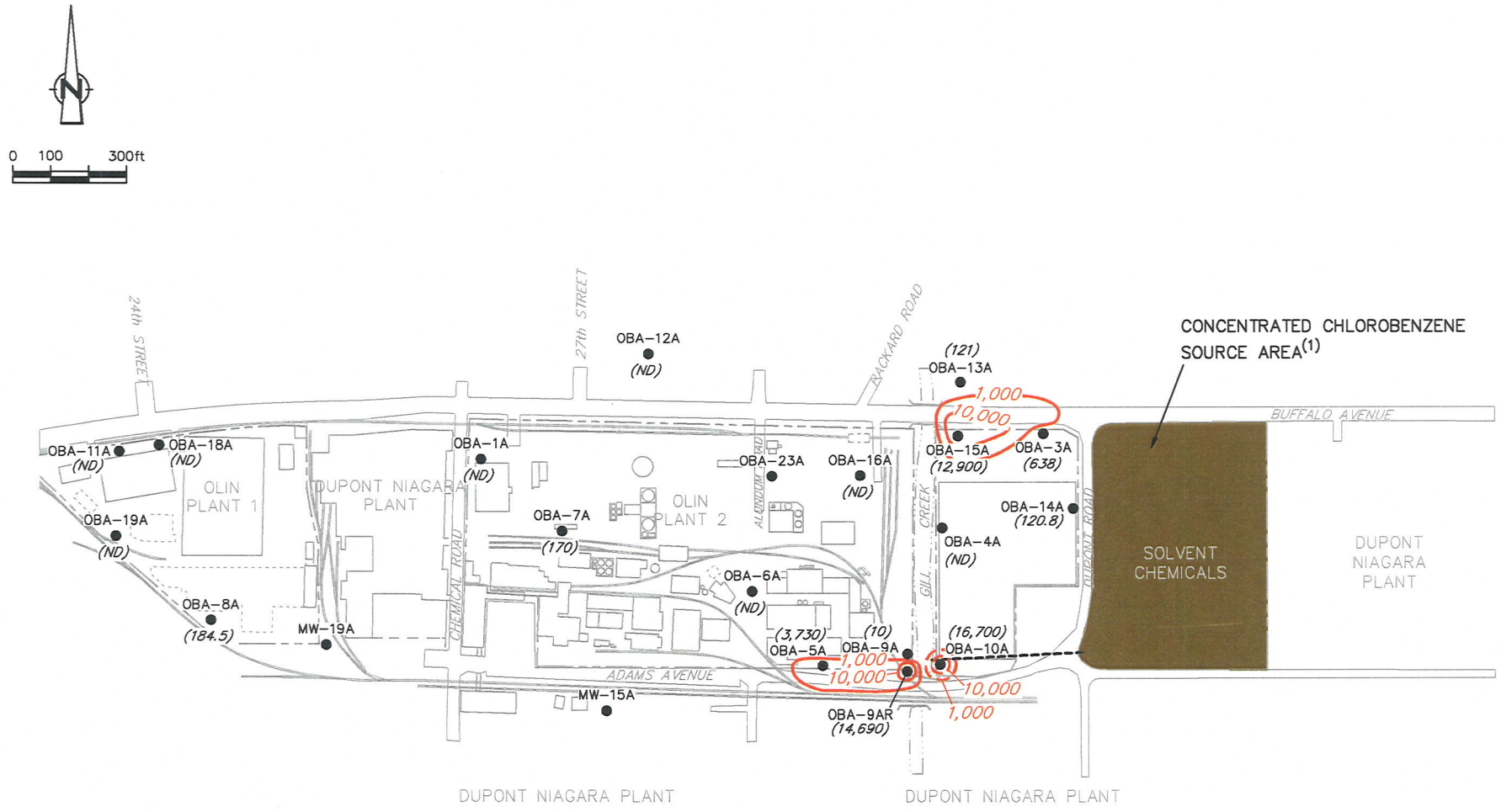
OLIN CHEMICAL
NIAGARA FALLS, NEW YORK

LAW
LAWGIBB Group Member

Hydrogeologic Cross Section CC'

Job Number 12000-8-0030

Figure A4-4



LEGEND

- PROPERTY LINE
- OBA-13A ● A-ZONE MONITORING WELL
- (31.9) CONCENTRATION (ug/L)
- SOLVENT CHEMICALS SEWER LOCATION (APPROXIMATE)
- ISOCONCENTRATION LINE

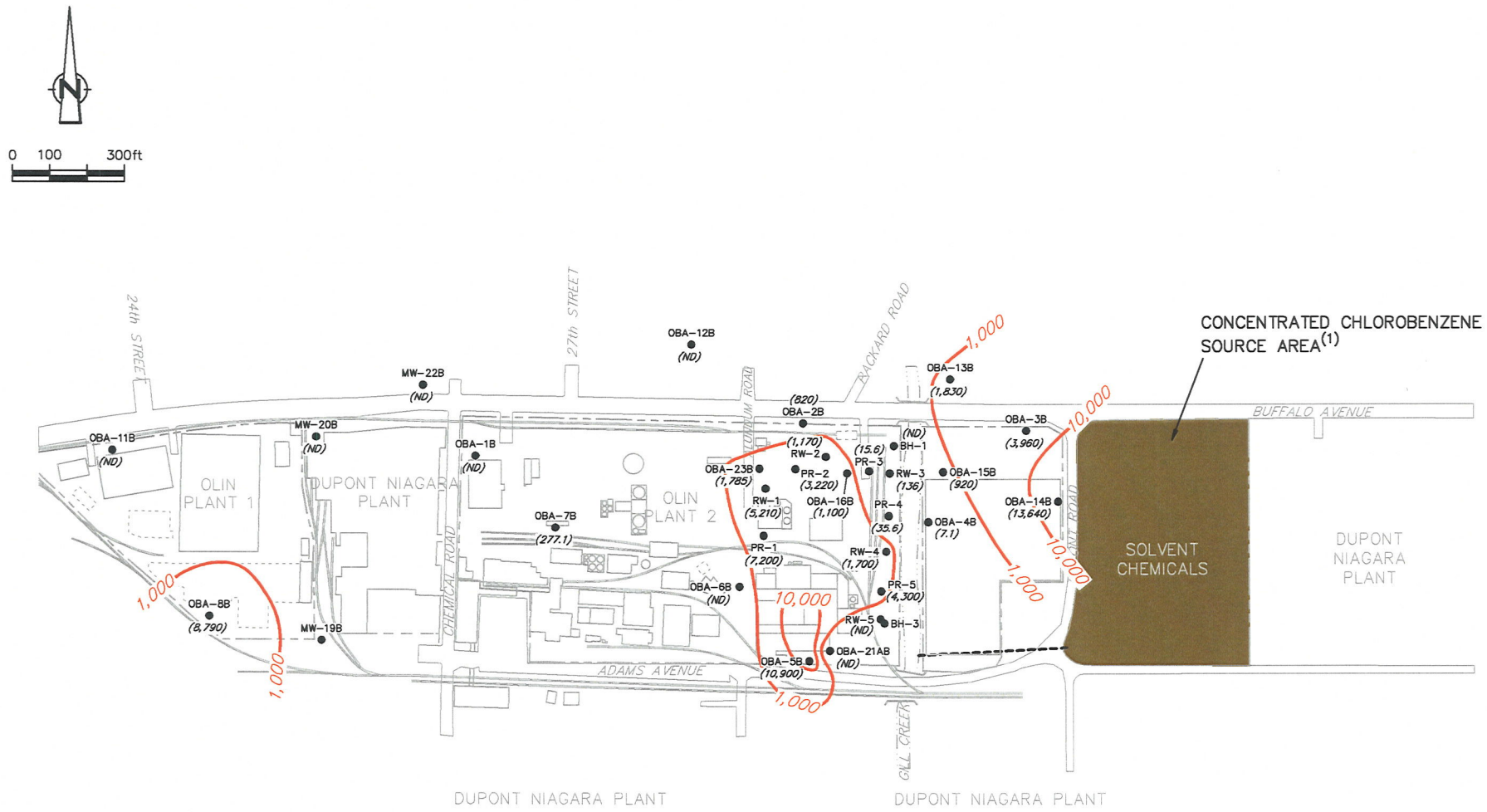
NOTE:

1. PAST SAMPLING DATA FROM THE SOLVENT CHEMICALS SITE SHOWS A-ZONE TOTAL CHLORINATED BENZENE CONCENTRATIONS RANGING UP TO APPROXIMATELY 2,000,000 ug/L. THE SOLVENT CHEMICALS SITE MONITORING WELLS HAVE NOT BEEN SAMPLED SINCE 1997.

TOTAL CHLORINATED BENZENES
SECOND SEMI-ANNUAL SAMPLING – 1999
A-ZONE CHEMICAL CONCENTRATION CONTOURS
OLIN CORPORATION
Niagara Falls, New York

CRA

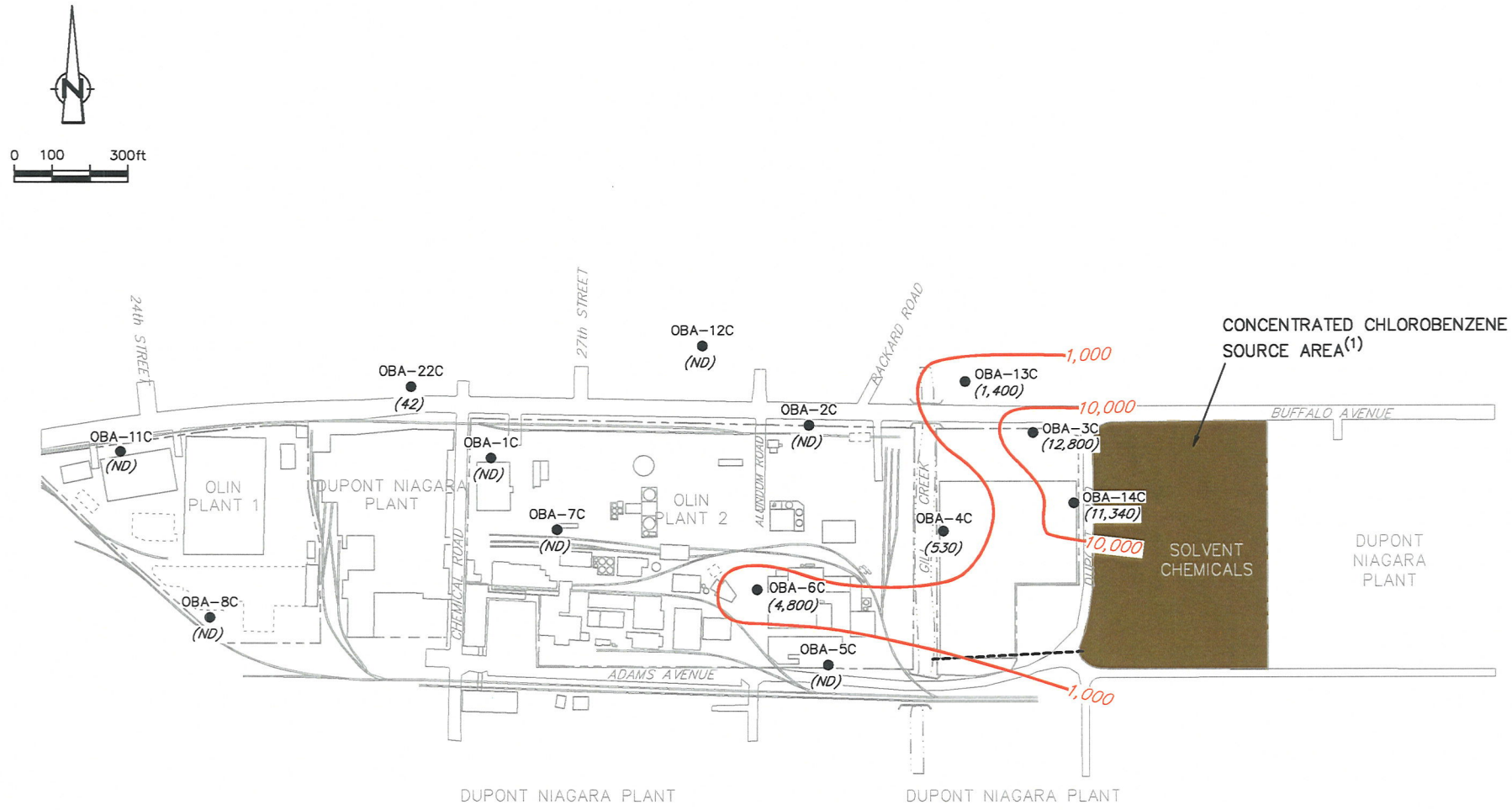
06548-00(PRES002)GN-NF002 APR 13/2000



CRA

TOTAL CHLORINATED BENZENES
SECOND SEMI-ANNUAL SAMPLING – 1999
B-ZONE CHEMICAL CONCENTRATION CONTOURS
OLIN CORPORATION
Niagara Falls, New York

06548-00(PRES002)GN-NF003 APR 13/2000



LEGEND

- PROPERTY LINE
- OBA-8C ● C-ZONE MONITORING WELL
- (31.9) CONCENTRATION (ug/L)
- SOLVENT CHEMICALS SEWER LOCATION (APPROXIMATE)
- ISOCONCENTRATION LINE

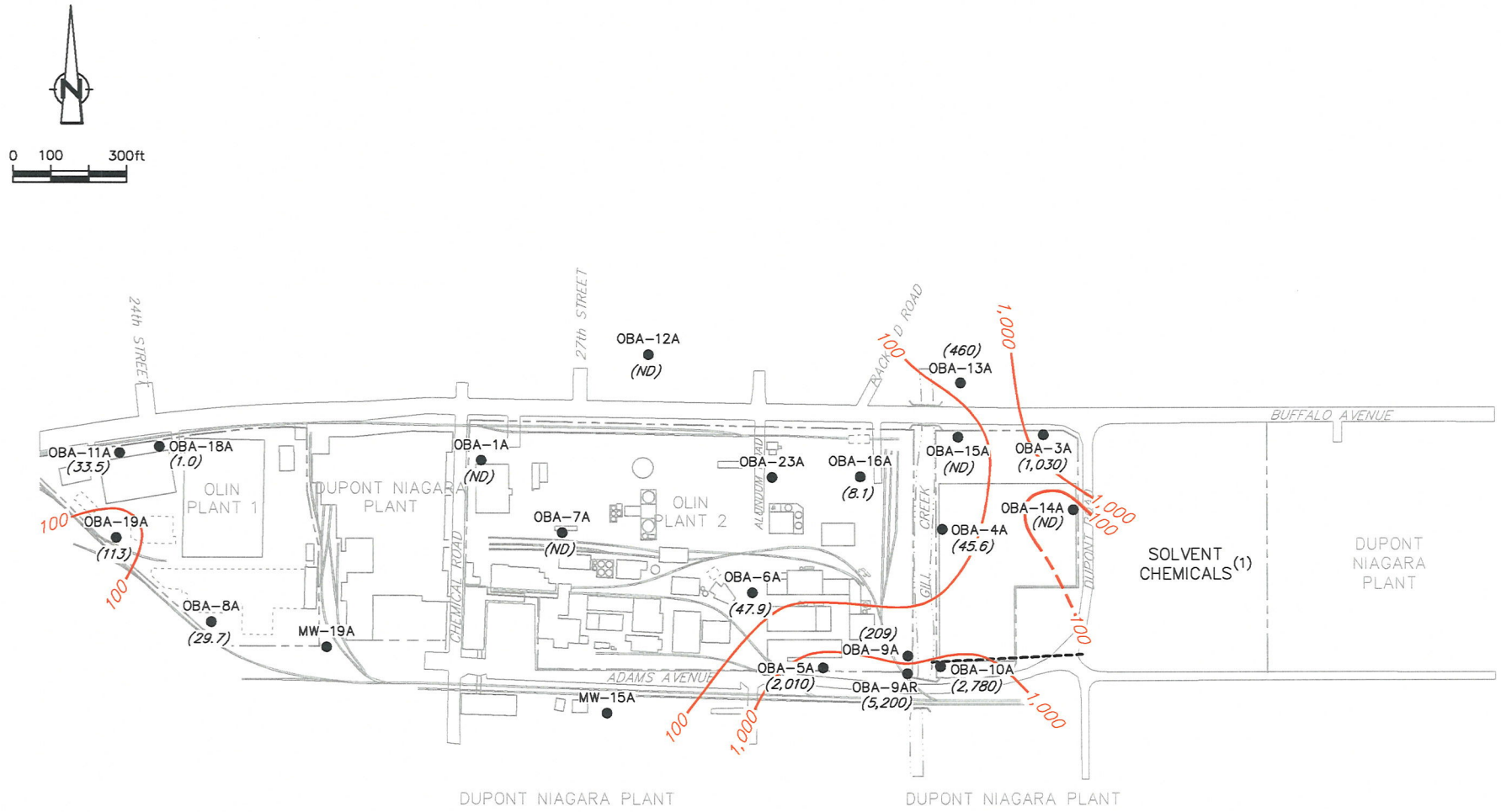
NOTE:

1. PAST SAMPLING DATA FROM THE SOLVENT CHEMICALS SITE SHOWS C-ZONE TOTAL CHLORINATED BENZENE CONCENTRATIONS RANGING UP TO APPROXIMATELY 55,000 ug/L. THE SOLVENT CHEMICALS SITE MONITORING WELLS HAVE NOT BEEN SAMPLED SINCE 1997.

TOTAL CHLORINATED BENZENES
SECOND SEMI-ANNUAL SAMPLING – 1999
C-ZONE CHEMICAL CONCENTRATION CONTOURS
OLIN CORPORATION
Niagara Falls, New York

CRA

06548-00(PRES002)GN-NF006 APR 13/2000



LEGEND

- PROPERTY LINE
- OBA–13A ● A–ZONE MONITORING WELL
- (31.9) CONCENTRATION (ug/L)
- SOLVENT CHEMICALS SEWER LOCATION (APPROXIMATE)
- ISOCONCENTRATION LINE

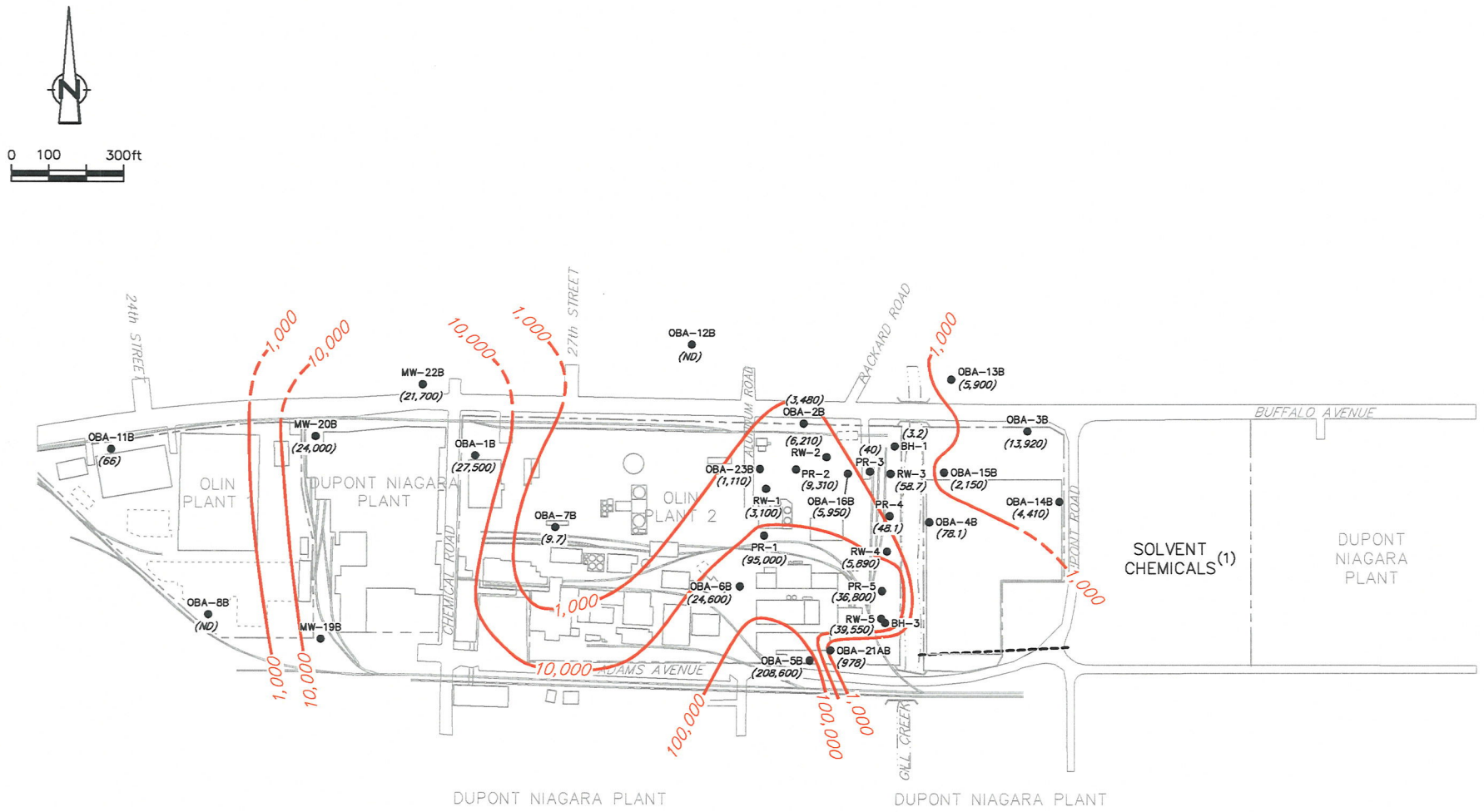
NOTE:

1. PAST SAMPLING DATA FROM THE SOLVENT CHEMICALS SITE SHOWS A–ZONE TOTAL CHLORINATED ALIPHATIC VOLATILE CONCENTRATIONS RANGING UP TO APPROXIMATELY 4,800 ug/L. THE SOLVENT CHEMICALS SITE MONITORING WELLS HAVE NOT BEEN SAMPLED SINCE 1997.

TOTAL CHLORINATED ALIPHATIC VOLATILES
SECOND SEMI–ANNUAL SAMPLING – 1999
A–ZONE CHEMICAL CONCENTRATION CONTOURS
OLIN CORPORATION
Niagara Falls, New York

CRA

06548–00(PRES002)GN–NF001 APR 13/2000



LEGEND

- PROPERTY LINE
- OBA–13B ● B–ZONE MONITORING WELL
- (31.9) CONCENTRATION (ug/L)
- SOLVENT CHEMICALS SEWER LOCATION (APPROXIMATE)
- ISOCONCENTRATION LINE

NOTE:

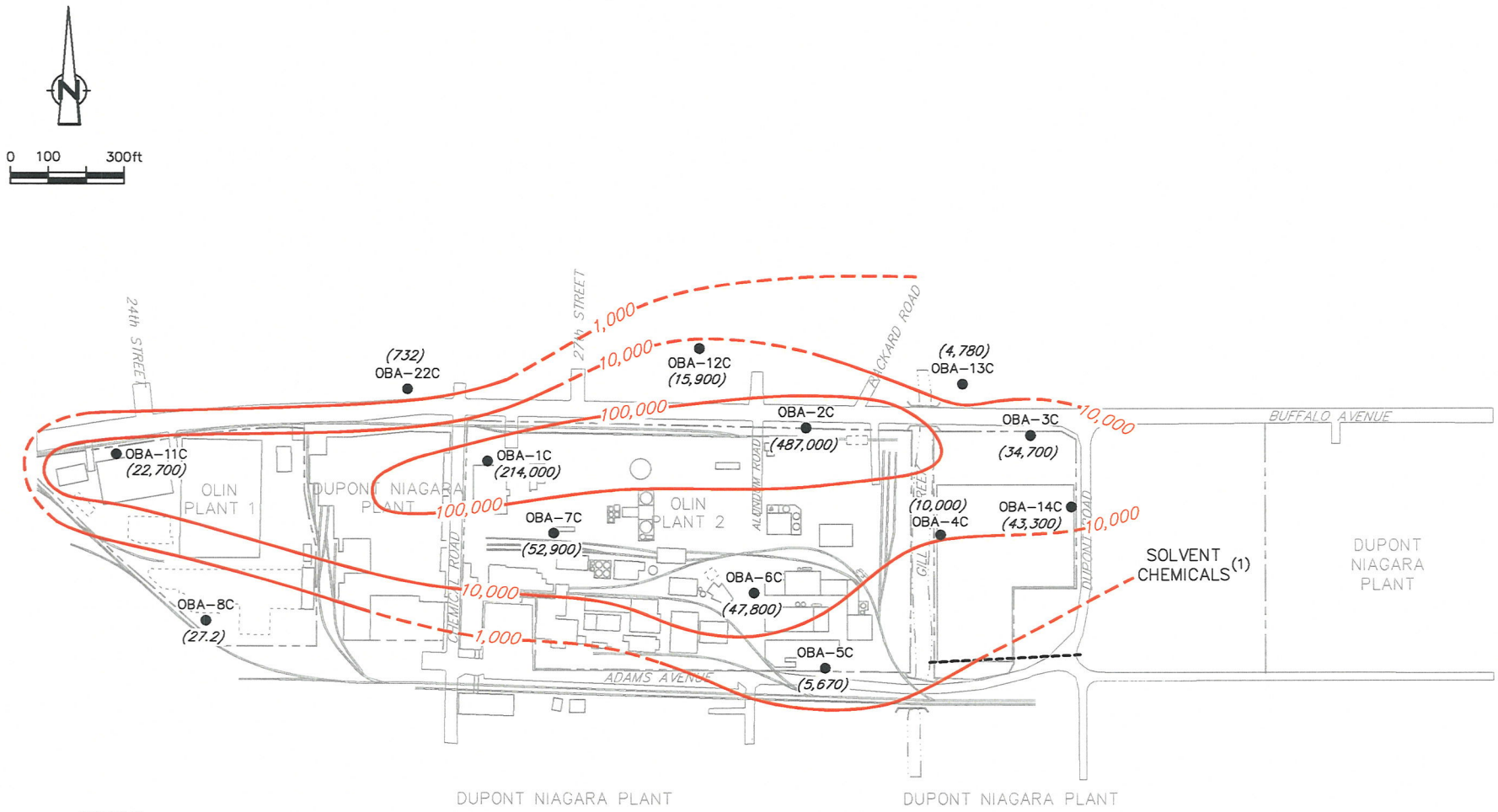
1. PAST SAMPLING DATA FROM THE SOLVENT CHEMICALS SITE SHOWS B–ZONE TOTAL CHLORINATED ALIPHATIC VOLATILE CONCENTRATIONS RANGING UP TO APPROXIMATELY 35,000 ug/L. THE SOLVENT CHEMICALS SITE MONITORING WELLS HAVE NOT BEEN SAMPLED SINCE 1997.

TOTAL CHLORINATED ALIPHATIC VOLATILES SECOND SEMI–ANNUAL SAMPLING – 1999 B–ZONE CHEMICAL CONCENTRATION CONTOURS OLIN CORPORATION

Niagara Falls, New York

CRA

06548–00(PRES002)GN–NF004 APR 13/2000



LEGEND

- PROPERTY LINE
- OBA-8C ● C-ZONE MONITORING WELL
- (31.9) CONCENTRATION (ug/L)
- SOLVENT CHEMICALS SEWER LOCATION (APPROXIMATE)
- ISOCONCENTRATION LINE

NOTE:

1. PAST SAMPLING DATA FROM THE SOLVENT CHEMICALS SITE SHOWS C-ZONE TOTAL CHLORINATED ALIPHATIC VOLATILE CONCENTRATIONS RANGING UP TO APPROXIMATELY 1,100 ug/L. THE SOLVENT CHEMICALS SITE MONITORING WELLS HAVE NOT BEEN SAMPLED SINCE 1997.

TOTAL CHLORINATED ALIPHATIC VOLATILES SECOND SEMI-ANNUAL SAMPLING – 1999 C-ZONE CHEMICAL CONCENTRATION CONTOURS OLIN CORPORATION

Niagara Falls, New York

CRA

06548-00(PRES002)GN-NF005 APR 13/2000

Olin - Niagara Falls
OMNX Systems Check
Summary of Total Flow, Average System Flow Rates, and Average Ground-Water Elevations

Period	Total Flow (gal/month)	Total Quarterly Flow (gal)	Average Flow Rate (gpm)						Flow Contribution Per Well (gal/month)					Notes
			RW-1	RW-2	RW-3	RW-4	RW-5	Total	RW-1	RW-2	RW-3	RW-4	RW-5	
Dec-97	60,000		0.1	0.0	0.4	0.4	0.4	1.3	4,720	810	19,098	18,902	16,471	1,3
4th Qtr 97		**60,000**												
Jan-98	60,000		0.1	0.0	0.4	0.4	0.4	1.3	4,720	810	19,098	18,902	16,471	1,3
Feb-98	45,000		0.1	0.0	0.4	0.4	0.3	1.1	3,540	607	14,323	14,176	12,353	1,3
Mar-98	45,000		0.1	0.0	0.3	0.3	0.3	1.0	3,540	607	14,323	14,176	12,353	1,3
1st Qtr 98		**150,000**												
Apr-98	365,297		0.7	0.1	2.7	2.7	2.3	8.5	28,735	4,931	116,271	115,080	100,280	1,3
May-98	334,862		0.6	0.1	2.4	2.4	2.1	7.5	26,341	4,520	106,584	105,492	91,925	2,3
Jun-98	475,640		0.9	0.1	3.5	3.5	3.0	11.0	37,415	6,421	151,393	149,841	130,570	2,3
2nd Qtr 98		**1,175,799**												
Jul-98	921,665		1.6	0.3	6.6	6.5	5.7	20.6	72,501	12,441	293,359	290,353	253,011	2,3
Aug-98	526,034		0.1	0.6	3.7	3.8	3.4	11.6	5,554	26,894	169,255	172,032	152,300	2, 4
Sep-98	1,135,460		2.4	2.5	7.0	7.1	7.1	26.0	104,479	107,966	306,316	309,076	307,623	2, 4
3rd Qtr 98		**2,583,159**												
Oct-98	1,252,945		0.4	1.1	6.8	10.1	9.7	28.1	18,288	48,816	302,400	451,872	431,568	2, 4
Nov-98	1,408,950		2.2	0.7	5.0	14.4	10.5	32.8	94,806	31,590	213,858	618,408	450,288	2, 4
Dec-98	1,393,101		0.3	1.0	4.5	15.4	9.8	31.1	15,641.8	44,071.7	203,120.8	691,082.4	439,184.7	2, 4
4th Qtr 98		**4,054,996**												
Jan-99	1,295,192		0.0	0.4	3.6	17.2	7.8	29.0	859.8	18,177.9	162,180.7	767,147.9	346,825.6	2, 4
Feb-99	1,362,751		2.9	3.1	4.2	18.0	5.6	33.8	117,795.4	123,769.5	171,018.8	725,570.9	224,596.3	2, 4
Mar-99	1,575,578		3.0	5.1	4.1	18.7	4.4	35.3	134,877.1	229,744.9	181,540.4	833,891.5	195,523.8	2, 4
1st Qtr 99		**4,233,521**												
Apr-99	1,419,313		2.8	5.5	3.0	18.2	3.3	32.8	123,041.5	237,749.5	129,802.5	785,958.0	142,761.4	2, 4
May-99	1,394,656		2.6	4.8	2.3	17.8	3.7	31.2	116,709.4	213,374.1	102,339.5	796,659.0	165,574.1	2, 4
Jun-99	1,177,615		2.6	1.6	2.0	17.3	3.6	27.3	112,802.9	70,595.5	87,762.0	748,817.5	157,636.7	2, 4
2nd Qtr 99		**3,991,584**												
Jul-99	1,195,224		1.2	2.8	3.1	14.9	4.8	26.8	53,137.4	122,974.6	140,304.6	663,995.8	214,811.9	2, 4
Aug-99	1,847,659		0.0	5.0	6.2	20.3	9.8	41.4	863.3	222,431.1	278,726.9	908,309.3	437,328.0	2, 4
Sep-99	2,176,325		1.4	3.6	7.3	20.2	17.8	50.4	59,269.9	157,635.4	316,791.2	872,351.8	770,276.2	2, 4
3rd Qtr 99		**5,219,207**												
Oct-99	2,349,293		0.0	0.9	11.5	19.4	20.9	52.7	876.2	41,247.8	511,135.1	863,843.0	932,191.2	2, 4
Nov-99	1,934,640		0.0	1.4	5.0	17.0	21.3	44.8	852.5	60,535.0	217,494.8	736,290.0	919,468.1	2, 4
Dec-99	2,083,001		0.0	0.5	9.2	17.4	19.7	46.7	843.7	20,114.4	408,615.2	774,595.6	878,832.2	2, 4
4th Qtr 99		**6,366,935**												

Olin - Niagara Falls
OMNX Systems Check
Summary of Total Flow, Average System Flow Rates, and Average Ground-Water Elevations

Period	Total Flow (gal/month)	Total Quarterly Flow (gal)	Average Flow Rate (gpm)						Flow Contribution Per Well (gal/month)					Notes
			RW-1	RW-2	RW-3	RW-4	RW-5	Total	RW-1	RW-2	RW-3	RW-4	RW-5	
Jan-00	2,298,113		0.9	0.1	18.6	16.2	18.7	54.4	38,961.1	2,695.6	697,268.5	722,200.7	836,987.2	2, 4
Feb-00	2,128,415		1.8	1.9	16.2	14.0	17.0	51.0	76,885.5	80,883.3	675,164.4	585,207.5	710,273.9	2, 4
Mar-00	2,331,075		2.9	3.0	14.6	13.8	17.9	52.2	131,194.2	132,973.4	653,688.0	613,820.4	799,398.6	2, 4
1st Qtr 00		**6,757,602**												
Average	**1,235,457**		**1.1**	**1.7**	**5.5**	**11.7**	**8.3**	**28.3**	**49,616**	**72,335**	**237,972**	**513,145**	**362,389**	
Total	**34,592,803**								**1,389,250**	**2,025,388**	**6,663,230**	**14,368,052**	**10,146,883**	

1. Estimated total flow
2. Monthly flow totalizer data
3. Average % for totalized flow for Dec-97 through Jul-98.
4. % flow calculated from monthly totalizer data
- Data not available.

Recovery well header data: Q1-00

Well		Compound	value		det limit	event	type	units	total Hg	total pest	total organics
									mg/l	ug/l	ug/l
RW-1	SW7470	MERCURY	0.0079		0.0002	00s1 q100	Normal	MG/L			
RW-1	SW7470	MERCURY	0.0094		0.0002	00s1 q100	Normal	MG/L	**0.0094**		
RW-1	SW8081	GAMMA BHC (LINDANE)	1.2		0.5	00s1 q100	Normal	UG/L			
RW-1	SW8081	A BHC (BETA HEXACHLOROCYCLOHEX/	5.1		0.5	00s1 q100	Normal	UG/L			
RW-1	SW8081	A BHC (ALPHA HEXACHLOROCYCLOHE)	19		0.5	00s1 q100	Normal	UG/L		**25.3**	
RW-1	SW8260	cis-1,2-DICHLOROETHYLENE	1100		830	00s1 q100	Normal	UG/L			
RW-1	SW8260	METHYLENE CHLORIDE	1400		830	00s1 q100	Normal	UG/L			
RW-1	SW8260	TETRACHLOROETHENE (PCE)	3100		830	00s1 q100	Normal	UG/L			
RW-1	SW8260	1,2,4-TRICHLOROBENZENE	6000		830	00s1 q100	Normal	UG/L			
RW-1	SW8260	TRICHLOROETHYLENE (TCE)	24000		830	00s1 q100	Normal	UG/L			**35600**
RW-1	SW8081	A BHC (DELTA HEXACHLOROCYCLOHEXANE)		ND	0.5	00s1 q100	Normal	UG/L			
RW-1	SW8260	1,1,1-TRICHLOROETHANE		ND	830	00s1 q100	Normal	UG/L			
RW-1	SW8260	1,1,2,2-TETRACHLOROETHANE		ND	830	00s1 q100	Normal	UG/L			
RW-1	SW8260	1,1,2-TRICHLOROETHANE		ND	830	00s1 q100	Normal	UG/L			
RW-1	SW8260	1,1-DICHLOROETHENE		ND	830	00s1 q100	Normal	UG/L			
RW-1	SW8260	1,2-DICHLOROBENZENE		ND	830	00s1 q100	Normal	UG/L			
RW-1	SW8260	1,3-DICHLOROBENZENE		ND	830	00s1 q100	Normal	UG/L			
RW-1	SW8260	1,4-DICHLOROBENZENE		ND	830	00s1 q100	Normal	UG/L			
RW-1	SW8260	BENZENE		ND	830	00s1 q100	Normal	UG/L			
RW-1	SW8260	CARBON TETRACHLORIDE		ND	830	00s1 q100	Normal	UG/L			
RW-1	SW8260	CHLOROBENZENE		ND	830	00s1 q100	Normal	UG/L			
RW-1	SW8260	CHLOROMETHANE		ND	1700	00s1 q100	Normal	UG/L			
RW-1	SW8260	trans-1,2-DICHLOROETHENE		ND	830	00s1 q100	Normal	UG/L			
RW-1	SW8260	VINYL CHLORIDE		ND	1700	00s1 q100	Normal	UG/L			
RW-2	SW7470	MERCURY	0.00062		0.0002	00s1 q100	Normal	MG/L			
RW-2	SW7470	MERCURY	0.0039		0.0002	00s1 q100	Normal	MG/L	**0.0039**		
RW-2	SW8081	A BHC (BETA HEXACHLOROCYCLOHEX/	4.8		2.5	00s1 q100	Normal	UG/L			
RW-2	SW8081	A BHC (DELTA HEXACHLOROCYCLOHE)	11		2.5	00s1 q100	Normal	UG/L			
RW-2	SW8081	GAMMA BHC (LINDANE)	69		2.5	00s1 q100	Normal	UG/L			
RW-2	SW8081	A BHC (ALPHA HEXACHLOROCYCLOHE)	86		2.5	00s1 q100	Normal	UG/L		**170.8**	
RW-2	SW8260	1,4-DICHLOROBENZENE	210		200	00s1 q100	Normal	UG/L			
RW-2	SW8260	1,1,2,2-TETRACHLOROETHANE	460		200	00s1 q100	Normal	UG/L			
RW-2	SW8260	cis-1,2-DICHLOROETHYLENE	1200		200	00s1 q100	Normal	UG/L			
RW-2	SW8260	1,2,4-TRICHLOROBENZENE	1700		200	00s1 q100	Normal	UG/L			
RW-2	SW8260	TETRACHLOROETHENE (PCE)	5800		200	00s1 q100	Normal	UG/L			
RW-2	SW8260	TRICHLOROETHYLENE (TCE)	8000		200	00s1 q100	Normal	UG/L			**17370**
RW-2	SW8260	1,1,1-TRICHLOROETHANE		ND	200	00s1 q100	Normal	UG/L			
RW-2	SW8260	1,1,2-TRICHLOROETHANE		ND	200	00s1 q100	Normal	UG/L			
RW-2	SW8260	1,1-DICHLOROETHENE		ND	200	00s1 q100	Normal	UG/L			
RW-2	SW8260	1,2-DICHLOROBENZENE		ND	200	00s1 q100	Normal	UG/L			
RW-2	SW8260	1,3-DICHLOROBENZENE		ND	200	00s1 q100	Normal	UG/L			
RW-2	SW8260	BENZENE		ND	200	00s1 q100	Normal	UG/L			
RW-2	SW8260	CARBON TETRACHLORIDE		ND	200	00s1 q100	Normal	UG/L			
RW-2	SW8260	CHLOROBENZENE		ND	200	00s1 q100	Normal	UG/L			
RW-2	SW8260	CHLOROMETHANE		ND	400	00s1 q100	Normal	UG/L			
RW-2	SW8260	METHYLENE CHLORIDE		ND	200	00s1 q100	Normal	UG/L			
RW-2	SW8260	trans-1,2-DICHLOROETHENE		ND	200	00s1 q100	Normal	UG/L			
RW-2	SW8260	VINYL CHLORIDE		ND	400	00s1 q100	Normal	UG/L			
RW-3	SW7470	MERCURY	0.00032		0.0002	00s1 q100	Normal	MG/L			
RW-3	SW7470	MERCURY	0.0013		0.0002	00s1 q100	Normal	MG/L	**0.0013**		

Recovery well header data: Q1-00

Well		Compound	value		det limit	event	type	units	total Hg	total pest	total organics
									mg/l	ug/l	ug/l
RW-3	SW8081	A BHC (BETA HEXACHLOROCYCLOHEX/	0.71		0.5	00s1 q100	Normal	UG/L			
RW-3	SW8081	A BHC (DELTA HEXACHLOROCYCLOHE)	3		0.5	00s1 q100	Normal	UG/L		**3.71**	
RW-3	SW8260	CHLOROBENZENE	5.3		5	00s1 q100	Normal	UG/L			
RW-3	SW8260	1,1,2,2-TETRACHLOROETHANE	6.2		5	00s1 q100	Normal	UG/L			
RW-3	SW8081	A BHC (ALPHA HEXACHLOROCYCLOHE)	8		0.5	00s1 q100	Normal	UG/L			
RW-3	SW8081	GAMMA BHC (LINDANE)	13		0.5	00s1 q100	Normal	UG/L			
RW-3	SW8260	1,2-DICHLOROBENZENE	14		5	00s1 q100	Normal	UG/L			
RW-3	SW8260	1,3-DICHLOROBENZENE	19		5	00s1 q100	Normal	UG/L			
RW-3	SW8260	1,4-DICHLOROBENZENE	21		5	00s1 q100	Normal	UG/L			
RW-3	SW8260	cis-1,2-DICHLOROETHYLENE	50		5	00s1 q100	Normal	UG/L			
RW-3	SW8260	TETRACHLOROETHENE (PCE)	110		5	00s1 q100	Normal	UG/L			
RW-3	SW8260	TRICHLOROETHYLENE (TCE)	120		5	00s1 q100	Normal	UG/L			
RW-3	SW8260	1,2,4-TRICHLOROBENZENE	140		5	00s1 q100	Normal	UG/L			**506.5**
RW-3	SW8260	1,1,1-TRICHLOROETHANE		ND	5	00s1 q100	Normal	UG/L			
RW-3	SW8260	1,1,2-TRICHLOROETHANE		ND	5	00s1 q100	Normal	UG/L			
RW-3	SW8260	1,1-DICHLOROETHENE		ND	5	00s1 q100	Normal	UG/L			
RW-3	SW8260	BENZENE		ND	5	00s1 q100	Normal	UG/L			
RW-3	SW8260	CARBON TETRACHLORIDE		ND	5	00s1 q100	Normal	UG/L			
RW-3	SW8260	CHLOROMETHANE		ND	10	00s1 q100	Normal	UG/L			
RW-3	SW8260	METHYLENE CHLORIDE		ND	5	00s1 q100	Normal	UG/L			
RW-3	SW8260	trans-1,2-DICHLOROETHENE		ND	5	00s1 q100	Normal	UG/L			
RW-3	SW8260	VINYL CHLORIDE		ND	10	00s1 q100	Normal	UG/L			
RW-4	SW7470	MERCURY	0.00031		0.0002	00s1 q100	Normal	MG/L			
RW-4	SW7470	MERCURY	0.00078		0.0002	00s1 q100	Normal	MG/L	**0.00078**		
RW-4	SW8081	A BHC (BETA HEXACHLOROCYCLOHEX/	4.1		2.5	00s1 q100	Normal	UG/L			
RW-4	SW8081	A BHC (DELTA HEXACHLOROCYCLOHE)	10		2.5	00s1 q100	Normal	UG/L			
RW-4	SW8081	GAMMA BHC (LINDANE)	71		2.5	00s1 q100	Normal	UG/L			
RW-4	SW8081	A BHC (ALPHA HEXACHLOROCYCLOHE)	84		2.5	00s1 q100	Normal	UG/L		**169.1**	
RW-4	SW8260	1,3-DICHLOROBENZENE	160		120	00s1 q100	Normal	UG/L			
RW-4	SW8260	1,4-DICHLOROBENZENE	170		120	00s1 q100	Normal	UG/L			
RW-4	SW8260	1,1,2,2-TETRACHLOROETHANE	260		120	00s1 q100	Normal	UG/L			
RW-4	SW8260	cis-1,2-DICHLOROETHYLENE	580		120	00s1 q100	Normal	UG/L			
RW-4	SW8260	1,2,4-TRICHLOROBENZENE	1500		120	00s1 q100	Normal	UG/L			
RW-4	SW8260	TETRACHLOROETHENE (PCE)	3100		120	00s1 q100	Normal	UG/L			
RW-4	SW8260	TRICHLOROETHYLENE (TCE)	3200		120	00s1 q100	Normal	UG/L			**8970**
RW-4	SW8260	1,1,1-TRICHLOROETHANE		ND	120	00s1 q100	Normal	UG/L			
RW-4	SW8260	1,1,2-TRICHLOROETHANE		ND	120	00s1 q100	Normal	UG/L			
RW-4	SW8260	1,1-DICHLOROETHENE		ND	120	00s1 q100	Normal	UG/L			
RW-4	SW8260	1,2-DICHLOROBENZENE		ND	120	00s1 q100	Normal	UG/L			
RW-4	SW8260	BENZENE		ND	120	00s1 q100	Normal	UG/L			
RW-4	SW8260	CARBON TETRACHLORIDE		ND	120	00s1 q100	Normal	UG/L			
RW-4	SW8260	CHLOROBENZENE		ND	120	00s1 q100	Normal	UG/L			
RW-4	SW8260	CHLOROMETHANE		ND	250	00s1 q100	Normal	UG/L			
RW-4	SW8260	METHYLENE CHLORIDE		ND	120	00s1 q100	Normal	UG/L			
RW-4	SW8260	trans-1,2-DICHLOROETHENE		ND	120	00s1 q100	Normal	UG/L			
RW-4	SW8260	VINYL CHLORIDE		ND	250	00s1 q100	Normal	UG/L			
RW-5	SW8081	GAMMA BHC (LINDANE)	470		25	00s1 q100	Normal	UG/L			
RW-5	SW8081	A BHC (ALPHA HEXACHLOROCYCLOHE)	580		25	00s1 q100	Normal	UG/L		**1050**	
RW-5	SW8260	1,2,4-TRICHLOROBENZENE	1200		1000	00s1 q100	Normal	UG/L			
RW-5	SW8260	1,1,2,2-TETRACHLOROETHANE	3500		1000	00s1 q100	Normal	UG/L			
RW-5	SW8260	cis-1,2-DICHLOROETHYLENE	4300		1000	00s1 q100	Normal	UG/L			
RW-5	SW8260	TETRACHLOROETHENE (PCE)	17000		1000	00s1 q100	Normal	UG/L			

Recovery well header data: Q1-00

Well		Compound	value		det limit	event	type	units	total Hg	total pest	total organics
									mg/l	ug/l	ug/l
RW-5	SW8260	TRICHLOROETHYLENE (TCE)	28000		1000	00s1 q100	Normal	UG/L			**54000**
RW-5	SW7470	MERCURY		ND	0.0002	00s1 q100	Normal	MG/L			
RW-5	SW7470	MERCURY		ND	0.0002	00s1 q100	Normal	MG/L	**0**		
RW-5	SW8081	A BHC (BETA HEXACHLOROCYCLOHEXANE)		ND	25	00s1 q100	Normal	UG/L			
RW-5	SW8081	A BHC (DELTA HEXACHLOROCYCLOHEXANE)		ND	25	00s1 q100	Normal	UG/L			
RW-5	SW8260	1,1,1-TRICHLOROETHANE		ND	1000	00s1 q100	Normal	UG/L			
RW-5	SW8260	1,1,2-TRICHLOROETHANE		ND	1000	00s1 q100	Normal	UG/L			
RW-5	SW8260	1,1-DICHLOROETHENE		ND	1000	00s1 q100	Normal	UG/L			
RW-5	SW8260	1,2-DICHLOROBENZENE		ND	1000	00s1 q100	Normal	UG/L			
RW-5	SW8260	1,3-DICHLOROBENZENE		ND	1000	00s1 q100	Normal	UG/L			
RW-5	SW8260	1,4-DICHLOROBENZENE		ND	1000	00s1 q100	Normal	UG/L			
RW-5	SW8260	BENZENE		ND	1000	00s1 q100	Normal	UG/L			
RW-5	SW8260	CARBON TETRACHLORIDE		ND	1000	00s1 q100	Normal	UG/L			
RW-5	SW8260	CHLOROBENZENE		ND	1000	00s1 q100	Normal	UG/L			
RW-5	SW8260	CHLOROMETHANE		ND	2000	00s1 q100	Normal	UG/L			
RW-5	SW8260	METHYLENE CHLORIDE		ND	1000	00s1 q100	Normal	UG/L			
RW-5	SW8260	trans-1,2-DICHLOROETHENE		ND	1000	00s1 q100	Normal	UG/L			
RW-5	SW8260	VINYL CHLORIDE		ND	2000	00s1 q100	Normal	UG/L			
RW-5	SW7470	MERCURY	0.00022		0.0002	00s1 q100	Duplicate	MG/L			
RW-5	SW8081	A BHC (BETA HEXACHLOROCYCLOHEX/	5.3		2.5	00s1 q100	Duplicate	UG/L			
RW-5	SW8081	A BHC (DELTA HEXACHLOROCYCLOHE>	12		2.5	00s1 q100	Duplicate	UG/L			
RW-5	SW8081	GAMMA BHC (LINDANE)	59		2.5	00s1 q100	Duplicate	UG/L			
RW-5	SW8081	A BHC (ALPHA HEXACHLOROCYCLOHE>	79		2.5	00s1 q100	Duplicate	UG/L		**155.3**	
RW-5	SW8260	1,1,2,2-TETRACHLOROETHANE	3800		1000	00s1 q100	Duplicate	UG/L			
RW-5	SW8260	cis-1,2-DICHLOROETHYLENE	4600		1000	00s1 q100	Duplicate	UG/L			
RW-5	SW8260	TETRACHLOROETHENE (PCE)	21000		1000	00s1 q100	Duplicate	UG/L			
RW-5	SW8260	TRICHLOROETHYLENE (TCE)	30000		1000	00s1 q100	Duplicate	UG/L			**59400**
RW-5	SW7470	MERCURY		ND	0.0002	00s1 q100	Duplicate	MG/L	**0**		
RW-5	SW8260	1,1,1-TRICHLOROETHANE		ND	1000	00s1 q100	Duplicate	UG/L			
RW-5	SW8260	1,1,2-TRICHLOROETHANE		ND	1000	00s1 q100	Duplicate	UG/L			
RW-5	SW8260	1,1-DICHLOROETHENE		ND	1000	00s1 q100	Duplicate	UG/L			
RW-5	SW8260	1,2,4-TRICHLOROBENZENE		ND	1000	00s1 q100	Duplicate	UG/L			
RW-5	SW8260	1,2-DICHLOROBENZENE		ND	1000	00s1 q100	Duplicate	UG/L			
RW-5	SW8260	1,3-DICHLOROBENZENE		ND	1000	00s1 q100	Duplicate	UG/L			
RW-5	SW8260	1,4-DICHLOROBENZENE		ND	1000	00s1 q100	Duplicate	UG/L			
RW-5	SW8260	BENZENE		ND	1000	00s1 q100	Duplicate	UG/L			
RW-5	SW8260	CARBON TETRACHLORIDE		ND	1000	00s1 q100	Duplicate	UG/L			
RW-5	SW8260	CHLOROBENZENE		ND	1000	00s1 q100	Duplicate	UG/L			
RW-5	SW8260	CHLOROMETHANE		ND	2000	00s1 q100	Duplicate	UG/L			
RW-5	SW8260	METHYLENE CHLORIDE		ND	1000	00s1 q100	Duplicate	UG/L			
RW-5	SW8260	trans-1,2-DICHLOROETHENE		ND	1000	00s1 q100	Duplicate	UG/L			
RW-5	SW8260	VINYL CHLORIDE		ND	2000	00s1 q100	Duplicate	UG/L			

te: duplicate pesticide values were used for mass loading calculations for RW5. Original sample values were anomalously
n. Lab QC review did not establish causality for high values. Duplicate values were selected, per judgement that they were more consistent with historic pesticide values for RW5

Olin Niagara Falls Plant Site: Plant 2 Area Remediation
Groundwater Contaminant Mass Removed

ORGANICS — Q1-00

WELL	conc [A] mg/l	conv liter / gal	conv lb /mg	conversion lb/gallon	conversion gal/lb	flow gal/qtr	MASS lb/qtr
RW1	35.6	3.8	2.20E-06	0.00029762	1190476.19	247,041	73.52
RW2	17.4	3.8	2.20E-06	0.00014521	1190476.19	216,552	31.45
RW3	0.5	3.8	2.20E-06	0.00000423	1190476.19	2,026,121	8.58
RW4	9.0	3.8	2.20E-06	0.00007499	1190476.19	1,921,229	144.07
RW5	59.4	3.8	2.20E-06	0.00049658	1190476.19	2,346,660	1165.31
TOTAL							**1422.9**

MERCURY — Q1-00

WELL	conc [A] mg/l	conv liter / gal	conv lb /mg	conversion lb/gallon	conversion gal/lb	flow gal/qtr	MASS lb/qtr
RW1	0.009	3.8	2.20E-06	0.00000008	1190476.19	247,041	0.02
RW2	0.004	3.8	2.20E-06	0.00000003	1190476.19	216,552	0.01
RW3	0.0013	3.8	2.20E-06	0.00000001	1190476.19	2,026,121	0.02
RW4	0.0008	3.8	2.20E-06	0.00000001	1190476.19	1,921,229	0.01
RW5	0.0000	3.8	2.20E-06	0.00000000	1190476.19	2,346,660	0.00
TOTAL							**0.06**

PESTICIDES — Q1-00

WELL	conc [A] mg/l	conv liter / gal	conv lb /mg	conversion lb/gallon	conversion gal/lb	flow gal/qtr	MASS lb/qtr
RW1	0.025	3.8	2.20E-06	0.00000021	1190476.19	247,041	0.05
RW2	0.171	3.8	2.20E-06	0.00000143	1190476.19	216,552	0.31
RW3	0.004	3.8	2.20E-06	0.00000003	1190476.19	2,026,121	0.06
RW4	0.169	3.8	2.20E-06	0.00000141	1190476.19	1,921,229	2.72
RW5	0.155	3.8	2.20E-06	0.00000130	1190476.19	2,346,660	3.05
TOTAL							**6.2**

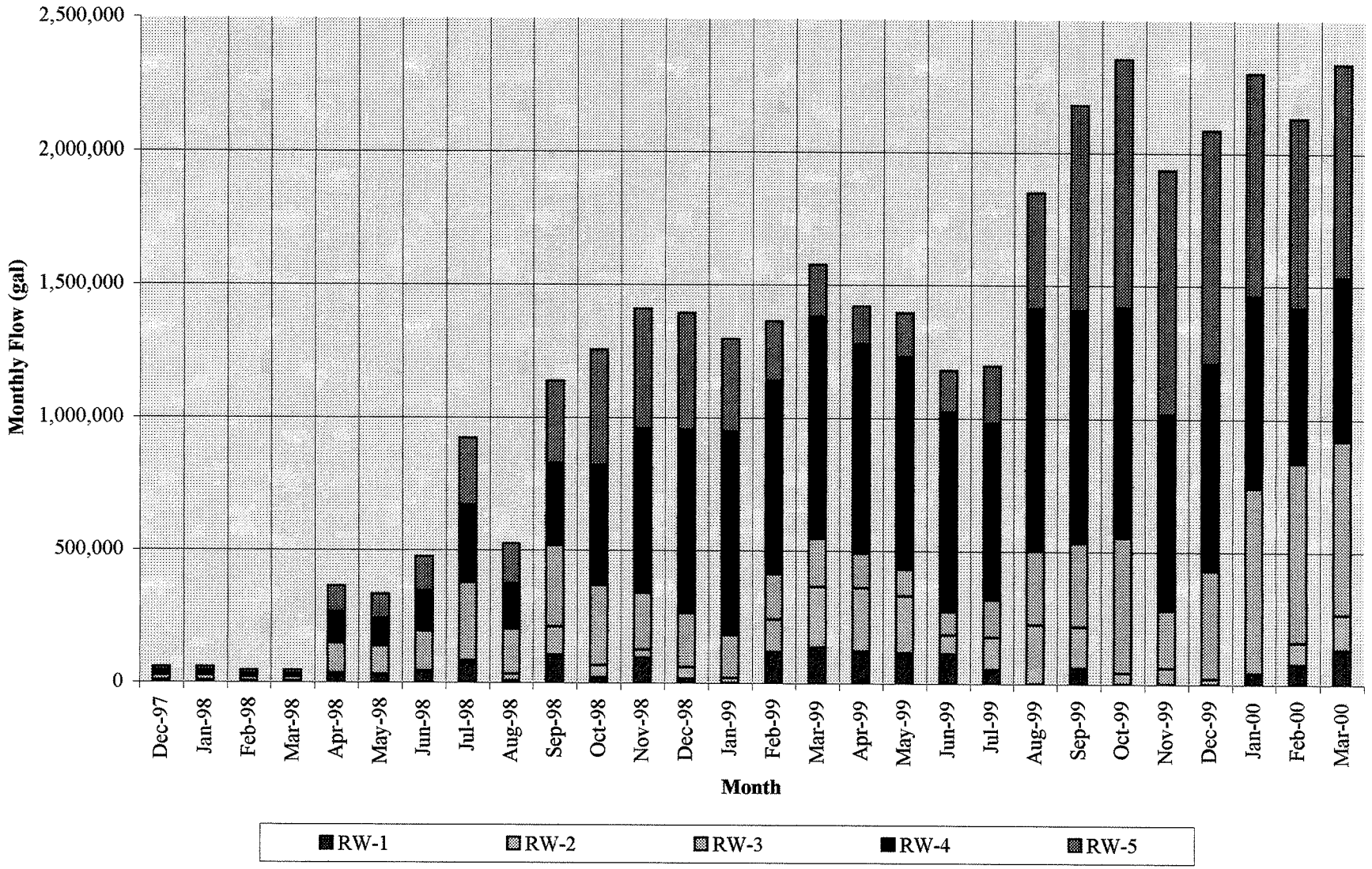
[A] = TOTAL OF PARAMETER GROUP IN QUARTERLY GRAB SAMPLE FROM DISCHARGE HEADER

Olin Niagara Falls
Plant 2 Area Remediation

Summary: Contaminant Mass and Groundwater Extracted

Quarter	organics lb	Ann. Tot.	mercury lb	Ann. Tot.	pesticides lb	Ann. Tot.	g.w. extracted gal	Ann. Tot.
Startup/Q1-98 [est]	27.81		0.02		0.2		210,000	
Q2-98	154.5		0.1		1.3		1,175,799	
Q3-98	595.5		0.6		4.9		2,583,159	
Q4-98	1273.1		0.1		5.2		4,054,996	
		2,051		1		12		8,023,954
Q1-99	817.3		0.05		8.5		4,233,521	
Q2-99	1034.7		0.05		7.1		3,991,584	
Q3-99	1188.2		0.1		8.7		5,219,207	
Q4-99	976.3		0.02		6.9		6,366,935	
		4,017		0.22		31		19,811,247
Q1-00	1422.9		0.06		6.2		6,757,602	
Q2-00								
Q3-00								
Q4-00								
		1,423		0.06		6		6,757,602
TOTAL	**7490**		**1.1**		**49**		**34,592,803**	

Olin-Niagara Falls
Total Monthly Flow from Ground-Water Extraction System



Olin

P.O. BOX 248, 1186 LOWER RIVER ROAD, NW, CHARLESTON, TN 37310-0248
(423) 336-4000 FAX: (423) 336-4183

March 8, 2000

Manager of Accounts and Payments
New York State Dept. of Env. Conservation
Bureau of Program Management
Division of Hazardous Waste Remediation
50 Wolf Road
Albany, New York 12233-7010

re: Olin Chemical, Buffalo Ave. Facility, Niagara Falls, NY

Dear Sir or Madame:

Per requirements of Olin's Order on Consent for our Niagara Falls Plant, (Index #R9-4171-94-08, Site Registry #9-32-051A, and B) Olin hereby submits a check in the amount of $3,000 (check number 610244) for NYSDEC oversight costs pertaining to the above-noted site.

Please direct any questions to me at 423/336-4587.

Sincerely,

Michael J. Bellotti

Michael J. Bellotti

OLIN CORPORATION

cc: w/o Attachments
William Wertz - NYSDEC Albany, NY
Annette Sansone Esq. NYSDEC, Buffalo, NY
Stanley Radon - NYSDEC Buffalo
Dale Carpenter: USEPA: Region II, New York, NY
M L Fries Esq.- Husch & Eppenberger: St. Louis, MO

Annual Oversight Fees
Olin Chem, Buffalo Ave., Niagara Falls, NY
Index#R-94171-94-08
Site Registry #9-32-051A, B

Wachovia Bank and Trust Co. 66-763 531

Check Number 610244

Olin Corporation
501 Merritt 7
PO Box 4500
Norwalk, CT 06856-4500

Date
03/08/2000

Dollars Cents
*********3,000.00*

*** THREE THOUSAND USD and ZERO cents ***

PAY TO THE ORDER OF

NEW YORK STATE-DEPT OF ENVIR
CONSERVATION/DIV OF HAZARDOUS
50 WOLFE ROAD
ALBANY, NY 12233-7010 US

* Richard A. Campbell
H.D. Bridges

⑈610244⑈ ⑆053100494⑆008735 044365⑈

Olin Corporation
501 Merritt 7
PO Box 4500
Norwalk, CT 06856-4500

CHECK DATE	ITEM PAGE TOTAL	CHECK NO
03/08/2000	3,000.00	610244
Vendor No.	Document No.	
404064	1500146494	

Invoice	Date	Invoice Amount	Discount	Net Amount
ANNUAL OVERSIGHT	03/07/2000	3,000.00	0.00	3,000.00
Total:		3,000.00	0.00	3,000.00

Invoice	Date	Invoice Amount	Discount	Net Amount

TABLE C-5: ANNUAL PREVENTIVE MAINTENANCE CHECK-LIST
GROUND-WATER COLLECTION AND TREATMENT SYSTEM
OLIN BUFFALO AVENUE PLANT SITE
NIAGARA FALLS, NEW YORK

					Corrective Action				Notification		
System	**Task**	**Date Inspection Completed**	**OK**	**NO**	**If NO, Notes/Reason/Action Taken**	**By**	**Date**	**Time**	**Lead Tech.**	**MJB**	**Law**
Air stripper blower	Check fan wheel for wear, corrosion, build-up, & excessive vibration. Check V-belt drive alignment, tension, wear, & lubrication. Check shaft seal for wear. Check all setscrews and bolts for tightness. Check damper setting.										
Electrical	**Inspect connections, replace labels, bulbs, switches, fuses where needed**										
Metering pumps - neutralization	**Replace seal rings, valve balls, and injection check valve spring where needed.**										
Metering pumps - Calsperse and acid feed at wells	**Replace seal rings, valve balls, and injection check valve spring where needed.**										
Metering pumps - defoamer and acidification	**Replace seal rings, valve balls, and injection check valve spring where needed.**										
Mixers	Check lubrication.										
Peristaltic pumps	Grease lubrication points and change oil in pump drive unit.										
Recovery wells - transducers	Inspect transducer connections, cable, transmitter for damage										
Acid totes	Check operation and calibration of level indicators										
Air conditioner	Change air filter. Check condenser coils for signs of clogging. Clean grille.										
Float switches in acid totes and sumps	Inspect for short circuit damage (mercury switches) or excessive wear (dry contact switches).										
Gauges, switches, control valves	Check for signs of trouble, such as corrosion, wear, leakage, o-ring damage, loose fittings/connections, set-point drift.										

Date: _____
Time: _____
Inspected By: _____
In Charge: _____

LOG SHEET #SFTY-____

TABLE C-4: QUARTERLY SAFETY INSPECTION CHECK-LIST
GROUND-WATER COLLECTION AND TREATMENT SYSTEM
OLIN BUFFALO AVENUE PLANT SITE
NIAGARA FALLS, NEW YORK

			Corrective Action				Notification	
Checklist Item	**OK**	**NO**	**If NO, Notes/Reason/Action Taken**	**By**	**Date**	**Time**	**Lead Tech.**	**MJB**
Machine Guards for Rotating/Moving Equipment								
Missing guards on gears, belts, pulleys and shafts								
Missing point-of-operation guards on all machines								
Pinch points guarded against inadvertent contact								
Support and Structure								
Faulty bracing, shoring								
Sharp-edged, jagged splinters								
Worn, cracked, broken conditions								
Slippery walking and working surfaces								
Uneven surfaces								
Missing hand rails and platform guardrails								
Broken steps								
Items susceptible to tip, fall, roll, collapse, slide, or move unexpectedly								
Protruding objects								
Electrical								
Ungrounded machines and equipment								
Low voltage leaks								
Obstructed/exposed switch or circuit breaker panels								
Use of "lock outs" for mechanics and electricians								
Close proximity to stop buttons on all machines								
Defective cords, plugs, receptacles								
Overloaded circuits								
Use of light duty extension cords instead of approved wiring								
Power cords across aisles or walkways								
Use of low voltage systems or ground fault interrupters in wet locations								
Ventilation, Illumination, Noise, Temperature Extremes								
Excessive heat or cold								
Arc welding without shielding								
Exposure to toxic dusts, fumes, gases								
Gas leaks								
Excessive noise								
Poor ventilation for chemical use and storage								
Poor lighting conditions								
Failure to protect workers from above								
Miscellaneous Items								
Good housekeeping								
Proper storage of corrosive liquids								
Exits clear for emergencies								
Fire extinguishers and emergency eyewash/shower stations in working condition								
Eye protection, head protection, respiratory protection, and other types of PPE available								
Use of confined space entry permit system								
Other								

Date: _____
Time: _____
Inspected By: _____
In Charge: _____

LOG SHEET #WK-____

TABLE C-2: WEEKLY INSPECTION CHECK-LIST
GROUND-WATER COLLECTION AND TREATMENT SYSTEM
OLIN BUFFALO AVENUE PLANT SITE
NIAGARA FALLS, NEW YORK

			Corrective Action				Notification		
Item	**YES/OK**	**NO**	**If NO, Notes/Reason/Action Taken**	**By**	**Date**	**Time**	**Lead Tech.**	**MJB**	**Law**
Continuous acid delivery system at RW-1									
Feed pump on/operational?									
Feed rate, setpoint ok?									
Leaks, cracks, spills, signs of deterioration or failure evident?									
Low level in carboy?									
Carboy properly vented for suction relief?									
Continuous acid delivery system at RW-2									
Feed pump on/operational?									
Feed rate, setpoint ok?									
Leaks, cracks, spills, signs of deterioration or failure evident?									
Low level in carboy?									
Carboy properly vented for suction relief?									
Continuous acid delivery system at RW-3									
Feed pump on/operational?									
Feed rate, setpoint ok?									
Leaks, cracks, spills, signs of deterioration or failure evident?									
Low level in carboy?									
Carboy properly vented for suction relief?									
Continuous acid delivery system at RW-4									
Feed pump on/operational?									
Feed rate, setpoint ok?									
Leaks, cracks, spills, signs of deterioration or failure evident?									
Low level in carboy?									
Carboy properly vented for suction relief?									
Continuous acid delivery system at RW-5									
Feed pump on/operational?									
Feed rate, setpoint ok?									
Leaks, cracks, spills, signs of deterioration or failure evident?									
Low level in carboy?									
Carboy properly vented for suction relief?									
Defoamer System									
Feed pump on/operational?									
Feed rate, setpoint ok?									
Leaks, cracks, spills, signs of deterioration or failure evident?									
Low level?									
System properly vented for suction relief?									
Peristaltic pump - RW-1									
Variable frequency inverter ok?									
Peristaltic pump - RW-2									
Variable frequency inverter ok?									
pH probes									
Stage 1 pH - Calibration ok?									
Stage 2 pH #1 - Calibration ok?									
Stage 2 pH #2 - Calibration ok?									
pH probes, meters operating within acceptable tolerances and not fouled?									
Acid delivery systems									

Date: _____
Time: _____
Inspected By: _____
In Charge: _____

TABLE C-2: WEEKLY INSPECTION CHECK-LIST
GROUND-WATER COLLECTION AND TREATMENT SYSTEM
OLIN BUFFALO AVENUE PLANT SITE
NIAGARA FALLS, NEW YORK

			Corrective Action				Notification		
Item	**YES/OK**	**NO**	**If NO, Notes/Reason/Action Taken**	**By**	**Date**	**Time**	**Lead Tech.**	**MJB**	**Law**
Desiccant capacity available?									
Monitor pH, inspect pH meters and probes. Adjust setpoints, repair/replace pH probes as needed.									
Acid tote level ok?									
Tanks, piping, valves, and appurtenances, in plant									
Leaks, cracks, spills, signs of deterioration or failure evident?									
Mixer operation ok?									
System									
List any other operational issues or concerns									
Note any downtime and approximate duration									

[redacted]

Date: _____
Time: _____
Inspected By: _____
In Charge: _____

TABLE C-1: DAILY INSPECTION GUIDELINES
GROUND-WATER COLLECTION AND TREATMENT SYSTEM
OLIN BUFFALO AVENUE PLANT SITE
NIAGARA FALLS, NEW YORK

DuPont production well Pump on/operation normal? Pump downtime?	**RW-4** Pump on/operation normal? Pump in auto mode? Flowmeter operation normal? Level indicator operation normal? Indications of fouling (visual fouling, decr. flow)? Flow adjusted properly to maintain goal level without cycling? System pressure ok?
RW-1 Pump on/operation normal? Pump in auto mode? Flowmeter operation normal? Level indicator operation normal? Indications of fouling (visual fouling, decr. flow)? Flow adjusted properly to maintain goal level without cycling? System pressure ok?	**RW-5** Pump on/operation normal? Pump in auto mode? Flowmeter operation normal? Level indicator operation normal? Indications of fouling (visual fouling, decr. flow)? Flow adjusted properly to maintain goal level without cycling? System pressure ok?
RW-2 Pump on/operation normal? Pump in auto mode? Flowmeter operation normal? Level indicator operation normal? Indications of fouling (visual fouling, decr. flow)? Flow adjusted properly to maintain goal level without cycling? System pressure ok?	**Acid feed systems for neutralization system** Acid feed pumps on/operational? Feed rates, setpoints ok to allow accurate control? Leaks or cracks evident?
RW-3 Pump on/operation normal? Pump in auto mode? Flowmeter operation normal? Level indicator operation normal? Indications of fouling (visual fouling, decr. flow)? Flow adjusted properly to maintain goal level without cycling? System pressure ok?	**Neutralization tanks** Mixers on/operational?
	Air stripper Foaming from stack? Blower on and operating properly? **Blower pressure OK?** **(Cold weather) Air Preheater operation ok?**
System Any other operational issues or concerns? Any downtime and approximate duration? Alarms or error messages of importance? Safety shower and eyewash stations operable?	**Discharge** Discharge flow rate less than 60 gpm?
Documentation **Are inspection logs and operation logs up-to-date?**	

Use System Maintenance/Corrective Action Log to document problems encountered and corrective actions taken.

TABLE I-1: ANALYTICAL PARAMETERS
GROUND-WATER COLLECTION AND TREATMENT SYSTEM
OLIN BUFFALO AVENUE PLANT SITE
NIAGARA FALLS, NEW YORK

Sampling Location	Sampling Frequency	Parameter	Analytical Method	Sampling Container Requirements					Hold Time (days)
				Quantity	Size	Type	Preservative *	Preservative (pH>10)*	
Monitoring Wells (Table I-2)	Semi-Annually	**Olin Project Analyte List (Except SVOCs)**							
		TCL-Volatile Organic Compounds (VOCs)	SW 8010/8020	3	40 mL	glass vial w/ Teflon lined septum cap	HCl to pH <2	None required	7 (unpreserved) / 14 (preserved)
		TCL-Pesticide/PCBs	SW 8080	2	1 L	glass bottle with Teflon lined cap	None required	None required	7 (unpreserved) / 14 (preserved)
		Total Mercury	SW 7470	1	1 L	HDPE bottle	HNO3 to pH<2	None required	28 days
Monitoring Wells (Table I-2)	**Quarterly, Near Project End**	Methanol	SW 8015A	3	40 mL	glass vial w/ Teflon lined septum cap	HCl to pH <2	None required	7 (unpreserved) / 14 (preserved)
		Chlorinated Phenolics (2,4,6-Trichlorophenol)	SW 8270	2	1 L	glass bottle with Teflon lined cap	HCl to pH <2	None required	28
		Cyanide, total and dissolved	SW 9010	1	1 L	HDPE bottle	Ascorbic acid	NaOH to pH>13	180
		Metals, total and dissolved (Barium, Copper, Lead, and Zinc)	SW 6010	1	1 L	HDPE bottle	None required	None required	180
Monitoring Wells (Table I-2)	Annually	TCL-Semi-Volatile Organic Compounds (SVOCs)	SW 8270	2	1 L	glass bottle with Teflon lined cap	None required	None required	7 (unpreserved) / 14 (preserved)
Recovery Wells	Quarterly	TCL-Volatile Organic Compounds (VOCs) **	SW 8010/8020	3	40 mL	glass vial w/ Teflon lined septum cap	HCl to pH <2	None required	7 (unpreserved) / 14 (preserved)
		TCL-Pesticide/PCBs **	SW 8080	2	1 L	glass bottle with Teflon lined cap	None required	None required	7 (unpreserved) / 14 (preserved)
		Total Mercury **	SW 7470	1	1 L	HDPE bottle	HNO3 to pH<2	None required	28 days
Recovery Wells	**Quarterly, Near Project End**	Methanol **	SW 8015A	3	40 mL	glass vial w/ Teflon lined septum cap	HCl to pH <2	None required	7 (unpreserved) / 14 (preserved)
		TCL-Semi-Volatile Organic Compounds (SVOCs) **	SW 8270	2	1 L	glass bottle with Teflon lined cap	None required	None required	7 (unpreserved) / 14 (preserved)
		Chlorinated Phenolics (2,4,6-Trichlorophenol) **	SW 8270	2	1 L	glass bottle with Teflon lined cap	HCl to pH <2	None required	28
		Cyanide, total and dissolved	SW 9010	1	1 L	HDPE bottle	Ascorbic acid	NaOH to pH>13	180
		Metals, total and dissolved (Barium, Copper, Lead, and Zinc) **	SW 6010	1	1 L	HDPE bottle	None required	None required	180
Air Stripper Influent & Discharge	Quarterly	**Dupont Niagara Plant Indicator Parameter List**							
		TCL-Volatile Organic Compounds (VOCs)	SW 8010/8020	3	40 mL	glass vial w/ Teflon lined septum cap	HCl to pH<2	None required	7 (unpreserved) / 14 (preserved)
Recovery Wells	As needed	**Inorganics**							
		pH	SW 9040	1	1 L	HDPE bottle	None required	None required	Analyze immediately
		Calcium, total	SW 6010B	1	1 L	HDPE bottle	None required	None required	180
		Alkalinity (as CaCO3)	EPA 310.1	1	1 L	HDPE bottle	None required	None required	14

* Cool all samples to 4°C.
** Olin Project Analyte List: VOCs, methanol, SVOCs, 2,4,6-trichlorophenol, pesticides, total & dissolved barium, copper, cyanide, lead, & zinc, & total mercury.

TABLE B-2: CONTACT LIST
GROUND-WATER COLLECTION AND TREATMENT SYSTEM
OLIN BUFFALO AVENUE PLANT SITE
NIAGARA FALLS, NEW YORK

	OFFICE	FACSIMILE	E-MAIL
OLIN CORPORATION **1186 Lower River Road, NW** **P.O. Box 248** **Charleston, Tennessee 37310**			
Mike Bellotti	423-336-4587	423-336-4166	mjbellotti@corp.olin.com
OLIN CORPORATION **2400 Buffalo Avenue** **Niagara Falls, New York 14303**			
Karl Rasch	716-278-6402	716-278-6495	kerasch@corp.olin.com
Don Greer	716-278-6427	716-278-6495	dhgreer@corp.olin.com
Mike Sebring	716-278-6544	716-278-6495	gmsebring@corp.olin.com
Plant - front gate	716-278-6469		
LAW ENGINEERING AND ENVIRONMENTAL SERVICES, P.C. (Law) **112 TownPark Drive** **Kennesaw, Georgia 30144**			
Rick Marotte, Project Principal	770-421-3581	770-421-3486	rmarotte@lawco.com
John Martin	**770-421-3311**	**770-421-3486**	**jmartin3@lawco.com**
Anna Moomaw	770-499-6642	770-421-3486	amoomaw@lawco.com
Law switchboard	770-421-3400	770-421-3486	
CONESTOGA-ROVERS ASSOCIATES, INC. (CRA) **2055 Niagara Falls Blvd.** **Niagara Falls, NY 14304**			
Andrew Kiesel	716-297-6150		
NOTHNAGLE DRILLING **1821 Scottsville-Mumford Road** **Scottsville, New York 14546**			
Tim Nothnagle	716-538-2328	716-538-2357	
NYSDEC **Division of Solid Waste Management** **50 Wolf Road** **Albany, New York 12233**			
William Wertz	518-457-9253		
Stanley Radon	716-851-7220		

TABLE G-1: OMNX I/O SUMMARY
GROUND-WATER COLLECTION AND TREATMENT SYSTEM
OLIN BUFFALO AVENUE PLANT SITE
NIAGARA FALLS, NEW YORK

Type	Tagname	Description	Board	Position	Zero	Span
AI	LT730301A	RW-1 Level (ft above MSL)	100	0	549.2	34.64
AI	LT730301B	RW-2 Level (ft above MSL)	100	1	549.7	34.64
AI	LT730301C	RW-3 Level (ft above MSL)	100	2	549.5	34.64
AI	FI2519	Outgoing Flow to sewer GPM	100	3	0	250
AI	LT730301D	RW-4 Level (ft above MSL)	100	4	547.2	34.64
AI	LI2514	7S Sump Level %	100	5	0	100
AO	LI2514B	SURGE TANK AUTOVALVE	100	6	-	-
AI	LI2516	7S Surge Tank Level %	100	7	0	100
AI	LT730301E	RW-5 Level (ft above MSL)	100	8	549.4	34.64
AI	FT730301A	RW-1 Flow (GPM)	100	9	0	80.81
AI	FT730301B	RW-2 Flow (GPM)	100	10	0	80.81
No module			100	11		
AI	AI2532B	Outlet pH Electrode	100	12	0	14
AI	FT730301C	RW-3 Flow (GPM)	100	13	0	80.81
AI	FT730301D	RW-4 Flow (GPM)	100	14	0	80.81
No module			100	15		
AI	AI2004A	7S Recirc Loop pH probe	102	0	0	14
AI	AI2004B	7S Sump Inlet pH Probe	102	1	0	14
AI	FT730301E	RW-5 Flow (GPM)	102	3	0	80.81
AO	AC730301B	Stage 1 Acid Pump Controller	102	4	-	-
AI	AIT730301A	Stage 1 pH Transmitter	102	5	0	14
AI	AIT730301B	Stage 2 pH Transmitter #1	102	6	0	14
AI	LIT730301	Acid Tote Level Transmitter	102	7	0	3.2
AI	AIT730301C	Stage 2 pH Transmitter #2	102	8	0	14
AO	AC730301A	Stage 2 Acid Pump Controller	102	9	-	-
No module			102	10		
No module			102	11		
No module			102	12		
No module			102	13		
No module			102	14		
No module			102	15		
DO	XS730301A	RW-1 Pump Signal to MCC	104	1		
DO	Not Available/Not Used		104	2		
DO	XS730301B	RW-2 Pump Signal to MCC	104	3		
DO	Not Available/Not Used		104	4		
DO	XS730301C	RW-3 Pump Signal to MCC	104	5		
DO	**ZC2535**	**Diverter Valve Control Switch**	**104**	**5**		
DO	Not Available/Not Used		104	6		
DO	**FQS2519**	**7S Outfall Sample Controller**	**104**	**7**		
DO	XS730301D	RW-4 Pump Signal to MCC	104	7		
DO	Not Available/Not Used		104	8		
DI	XAP409A	Sump Pump P-408A	105	1		
DI	XAP409B	Sump Pump P-408B	105	2		
DI	Not Used		105	3		
DI	Not Used		105	4		
DI	LALL2514	Lo-Lo Sump Level	105	5		
DI	Not Used		105	6		
DI	ASP408A	Moisture in P-408A Seal	105	7		
DI	ASP408B	Moisture in P-408B Seal	105	8		
DI	LSH730301F	RW-1 Leak Detection	106	1		
DI	LSH730301G	RW-2 Leak Detection	106	2		
DI	LSH730301H	RW-3 Leak Detection	106	3		
DI	LSH730301I	RW-4 Leak Detection	106	4		
DI	**XAA1202**	**N. Treatment Tank Agit-outse**	**106**	**4**		
DI	LSH730301J	RW-5 Leak Detection	106	5		
DI	QA730401	Blower Run Indicator	106	7		

TABLE G-1: OMNX I/O SUMMARY
GROUND-WATER COLLECTION AND TREATMENT SYSTEM
OLIN BUFFALO AVENUE PLANT SITE
NIAGARA FALLS, NEW YORK

Type	Tagname	Description	Board	Position	Zero	Span
DI	Not Available/Not Used		106	8		
DI	Not Used		106	8		
DO	XS730301E	RW-5 Pump Signal to MCC	107	1		
DO	Not Available/Not Used		107	2		
DO	HS730302A	Stage 1 pH Mixer OO to MCC	107	3		
DO	Not Available/Not Used		107	4		
DO	HS730302B	Stage 2 pH Mixer OO to MCC	107	5		
DO	Not Available/Not Used		107	6		
DO	XS730401	Stripper Enable/Disable to MCC	107	7		
DO	Not Available/Not Used		107	8		
DI	QL730301A	RW-1 Pump Run Indicator	108	1		
DI	Not Available/Not Used		108	2		
DI	QL730301B	RW-2 Pump Run Indicator	108	3		
DI	Not Available/Not Used		108	4		
DI	QL730301C	RW-3 Pump Run Indicator	108	5		
DI	Not Available/Not Used		108	6		
DI	QL730301D	RW-4 Pump Run Indicator	108	7		
DI	Not Available/Not Used		108	8		
DI	Not Used		109	1		
DI	Not Used		109	2		
DI	QL730301E	RW-5 Pump Run Indicator	109	3		
DI	Not Available/Not Used		109	4		
DI	QL730303A	Stage 1 pH Mixer Run Indicator	109	5		
DI	Not Available/Not Used		109	6		
DI	QL730303B	Stage 2 pH Mixer Run Indicato	109	7		
DI	Not Available/Not Used		109	8		
DI	LSHH730302	Spill Sump HiHi Level	10a	1		
DI	LSH730302	Spill Sump High Level (START)	10a	2		
DI	LSL730302	Spill Sump Low Level (STOP)	10a	3		
DI	Not Used		10a	4		
No module-input only			10a	5		
No module-input only			10a	6		
No module-input only			10a	7		
No module-input only			10a	8		
DO	XS730302	Spill Sump Pump HOA	10b	1		
DO	Not Available/Not Used		10b	2		
DO	Not Used		10b	3		
DO	Not Used		10b	4		
DO	ASHL2004	7S Sump pH Interlock	10b	5		
DO	Not Available/Not Used		10b	6		
DO	Not Used		10b	7		
DO	Not Used		10b	8		

AI - Analog input
AO - Analog output
DI - Discrete input
DO - Discrete output
Not available/Not used -Signal from prior I/O shares a possible common relaying a false signal.