Olin

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

May 7, 1998

Mr. James Craft
Engineering Geologist
New York State Department of Environmental Conservation
Region 8 Office - Division of Hazardous Waste Remediation
6274 East Avon - Lima Road
Avon, New York 14414-9519

Re: Olin Rochester RI/FS Quarterly Report No. 18
Olin Chemicals (Site #628018a) 100 McKee Rd, Rochester, NY

Dear Mr. Craft:

This is the eighteenth quarterly report of progress on the Olin Rochester RI/FS, covering the period from January 1, 1998 through March 31, 1998.

Surface water and seep sampling:

- First quarter 1998 surface water sampling was done at nine locations: the original three Barge Canal locations near the groundwater plume, and at one upstream and one downstream locations. The quarry outfall and one nearby canal point were also sampled to monitor the chloropyridine input to the canal and its level of dilution near the input point. One quarry seep point (QS4, the historically most contaminated location) was also sampled. The inflow to the north quarry pond was also sampled. This is the point which receives most runoff from the quarry wall seep before the water is pumped from the quarry to the quarry outfall at the Barge Canal.
- Generally, the first quarter surface water sampling results were consistent with prior monitoring episodes.
- Specifically, the first quarter results indicated the presence of 2-chloropyridine at trace (detected but below practical quantitation limit) levels of 1 to 2 ug/l at points SW1,2 and 3. These detections are consistent with prior detections for low-water periods, such as during the first quarter 1998. the one canal location,

SW-2, at the Buffalo Road bridge, at an estimated 2 ug/l. The quarry seep contained a total of 478 ug/l of chloropyridines, consistent with previously detected levels. The quarry outfall contained an estimated total of 10 ug/l chloropyridines indicating a continued decreasing level. No chloropyridines were detected at the monitoring point 100 feet from the quarry outfall, or at the quarry north pond inflow.

- Canal monitoring results are documented in ***attachment 1 .***

groundwater monitoring:

- Piezometric plots were developed for March, 1998. Plots and piezometric data are included as ***attachment 2***.
- In 1997 Olin had installed and sampled three deep aquifer monitor wells to more precisely define the pathway taken by the chloropyridine plume as it moves from the Olin plant to its discharge point at the Dolomite Products quarry.
- The initial analytical data from these new wells indicated that the northernmost two wells contained chloropyridine compounds, while the southernmost well showed no detected chloropyridines, thus defining the offsite plume pathway. The March, 1998 sampling confirmed the results of that initial sampling. BR122D and BR123D showed chloropyridines on the order of approximately 100 and 700 ug/l respectively. Each of these two wells had minor detections of VOC's. BR124D, the southernmost well did not show any detected chloropyridines or VOC's. These data support the conclusion that the groundwater plume discharges to the quarry and has a defined southern limit. We will include these wells in our routine sampling.
- A data report is included in ***attachment 3***.

Feasibility Study Issues:

- Olin, NYSDEC and NYSDOH met at the Olin plant on February 27, 1998 in a combined work session to identify and work through remaining FS issues and alternatives. We believe that this work session allowed us to determine common technical criteria by which to determine the most appropriate remedial strategy for the site.
- As agreed at the work session, Olin will respond to both specific written agency comments and verbal agency comments by revising the FS to address concerns, rather than by a point-by-point written response. Olin's first step will be to develop a letter to NYSDEC summarizing a revised FS strategy. After all parties concur on that strategy, Olin will submit a revised FS to the Agencies.

Monitoring issues:

- Olin submitted proposed 1998 monitoring program for agency review and approval. The program identifies monitoring points, parameters and frequencies for both groundwater and surface water. Olin will implement the monitoring upon agency approval. The letter containing the proposed monitoring program is Included as ***attachment 4.***
- For the first quarter of 1998, the interim groundwater remediation system has collected and treated approximately 3,600,000 gallons of groundwater, removing approximately 394 pounds of organic contaminants.

Olin will continue to communicate progress and issues with NYSDEC. Please direct any questions to me at 423 / 336-4587.

Sincerely,

Michael J. Bellotti
Olin Corporation

Attachments

List of Attachments:

1] ABB report: First Quarter 1998 Erie Barge Canal Water and Quarry Sampling Results

2] Piezometric Plots and supporting data: December - 1997

3] ABB report: March 1998 Offsite Groundwater Sampling Results

4] Letter to Mr. James Craft from Mr. Michael J. Bellotti, March 20, 1998, re: Olin Rochester 1998 proposed monitoring program.

cc:
Mr. Joseph Ryan
New York State Department of Environmental Conservation
Division of Environmental Enforcement
600 Delaware Avenue
Buffalo, New York 14202-1073

Mr. Joseph White
New York State Department of Environmental Conservation
Division of Hazardous Waste Remediation
50 Wolf Road
Albany, New York 12433-1010

Mr. Steven Shost
New York State Department of Health
Bureau of Environmental Exposure Investigation
2 University Place
Albany, New York 12203

Mr. Rick Gahagan: Olin Rochester, NY
Ms. Monica L. Fries Esq.: Husch & Eppenberger, St. Louis, MO
Mr. Thomas Eschner: ABB, Portland, ME

ASEA BROWN BOVERI

April 24, 1998

Mr. Michael Bellotti
Olin Chemical Corporation
P.O. Box 248, Lower River Road
Charleston, TN 37310

Subject: **Olin Rochester Site - First Quarter 1998**
Erie Barge Canal Water and Quarry Sampling Results

Dear Mr. Bellotti:

Enclosed are the sampling results for the water samples collected during the first quarter of 1998 from the Erie Barge Canal (Canal) and the Dolomite Products Company quarry (quarry) as part of the on-going quarterly monitoring program for the Olin Rochester site. The sampling program, analytical procedure, data review findings, and validated data for the March 1998 monitoring event are discussed below.

Sampling

Nine canal and quarry surface water samples were collected by and submitted to Recra Environmental, Inc. (Recra) for selected pyridine analysis on March 23, 1998. The locations sampled during this quarter are listed below and are shown on the figures in Attachment 1.

Canal Samples	Quarry Samples
SW-1	QS-4 (Quarry Seep)
SW-2	QO-2 (Quarry Outfall)
SW-3	QO-2S1 (100 ft south of QO-2)
SW-6	QI-1 (Quarry Pond Inflow)
SW-12	

Analytical Procedures and Data Review

All water samples were analyzed and reviewed in accordance with 1995 New York State Category B Analytical Services Protocols (ASP95) for the Olin suite of selected pyridines (pyridine, 2-chloropyridine, 3-chloropyridine, 4-chloropyridine, 2,6-dichloropyridine, and p-fluoroaniline). The reporting limit for the selected pyridines is 10 micrograms per liter (µg/L).

A preliminary review of the quality control sample results associated with the analytical results was performed for data quality assurance purposes. Sample results were reviewed for holding time compliance; instrument calibration; surrogate standard recoveries; blank contamination; and matrix spike blank (MSB) and matrix spike/matrix spike duplicate (MS/MSD) accuracy and precision. The results of the data review are discussed in the quality control section of this letter. Overall, the data quality appears to be very good based on the information reviewed.

511 Congress Street
P.O. Box 7050
Portland, Maine 04112-7050
Telephone (207) 775-5401
Fax (207) 772-4762

Analytical Results

The results from the March 1998 canal and quarry monitoring event are presented in Attachment 2. Samples which were observed to contain one or more of the selected pyridines are summarized below; all results are expressed in µg/L.

Sample ID	2,6-DCPYR	2-CPYR	3-CPYR
QO-2	2 J	10	ND
QS-4	58	420	5 J
SW-1	ND	1 J	ND
SW-2	ND	2 J	ND
SW-3	ND	1 J	ND

Notes: ND = Not Detected
J = Estimated value below reporting limit, but greater than zero.
CPYR = chloropyridine
2,6-DCPYR = 2,6-dichloropyridine

Canal surface water analysis indicated the results for the first quarter of 1998 were consistent with previous concentrations observed for the locations sampled. Trace concentrations (values above zero but below the laboratory quantitation limit) of 2-chloropyridine have been observed in the past at locations SW-1, SW-2, and SW-3, particularly when the Canal water level is low and the direction of flow is northward. None of the Olin suite of selected pyridines were observed in the other canal locations sampled further upstream (SW-12) and downstream (QO-2S1 and SW-6) from the site during the first quarter.

Results reported for the sample collected from the quarry seep (QS-4) continue to show elevated selected pyridine results relative to canal concentrations; however, results observed this quarter continue to indicate a decreasing trend in concentrations for the detected pyridines. Results reported for the quarry outfall (QO-2) were consistent with historical results. No chloropyridines were detected 100 feet south of the outfall (QO-2S1) or in the quarry pond inflow sample (QI-1). Sample QI-1 represents a composited sample of the water flowing into the northern quarry pond.

Quality Control

As part of the March 1998 Canal and quarry water sampling program, one matrix spike/matrix spike duplicate (MS/MSD) sample and a field blank sample were collected as quality control samples. All quality control results were acceptable, and no qualifying statements were necessary.

Conclusions

Results from the first quarter 1998 canal surface water sampling program indicated trace concentrations (above zero but below laboratory PQL) of 2-chloropyridine in surface water locations nearest to the Site (SW-1, SW-2, SW-3). The Olin suite of selected pyridines were not detected in surface water samples collected in the Canal from established sampling locations further upstream (SW-12) or downstream (SW-6) from the site. Chemical results reported for the quarry seep sample indicate a continued decrease in selected pyridine concentrations was observed.

No chloropyridines were detected in the quarry pond inflow sample (QI-1). This sample represents the water flowing into the northern quarry pond and is a mixture of groundwater from along the quarry seep. The concentrations of chloropyridines detected in the quarry outfall sample (QO-2) were at or below the reporting limit of 10 µg/L.

The next quarterly sampling event is scheduled for June 1998.

If you have any questions or comments on the material described in this letter, please do not hesitate to contact me at (207) 828-3437.

Sincerely,

ABB ENVIRONMENTAL SERVICES, INC.

Thomas R. Eschner, R.G.
Project Manager/Principal Hydrogeologist

TRE/jpc
Attachments: Sample Location Maps - Attachment 1
Laboratory Data Summary Tables - Attachment 2
Chain of Custody Forms - Attachment 3

cc: N. Breton
J. Connolly
file 10.1

ATTACHMENT 1

SAMPLE LOCATION MAPS

T:\7311-34\7311F501 C&P 4/1/97

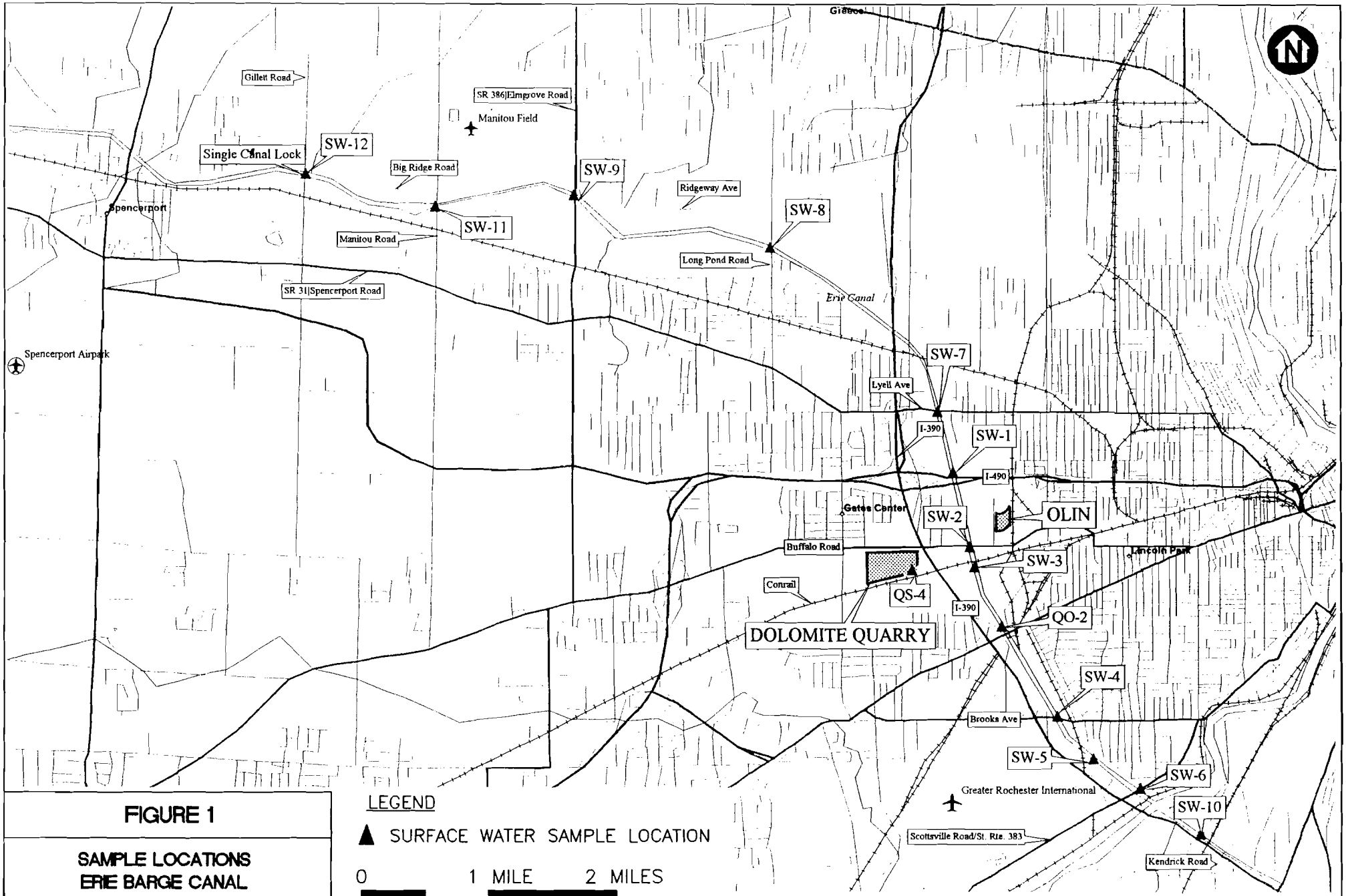


FIGURE 1

SAMPLE LOCATIONS
ERIE BARGE CANAL

OLIN CHEMICALS
ROCHESTER, N.Y.

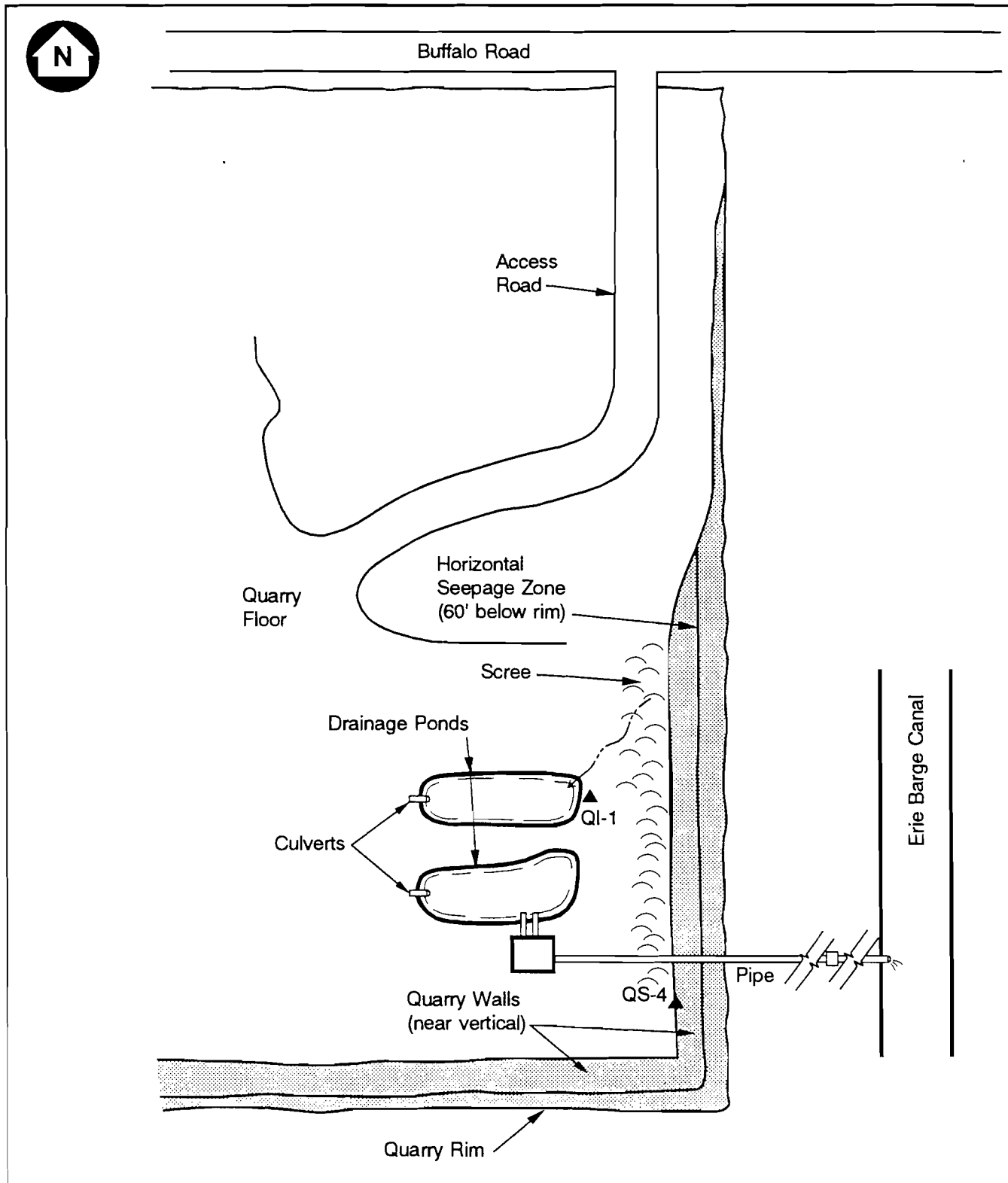
LEGEND

▲ SURFACE WATER SAMPLE LOCATION

0 1 MILE 2 MILES

SCALE: 1" = 1 MILE

SOURCE: DeLorme Mapping 1995



Legend

QS-4 ▲ Seep Sample Location

QI-1 ▲ Pond Inflow Sample Location

Not to Scale

FIGURE 2

SAMPLE LOCATIONS DOLOMITE PRODUCTS QUARRY

OLIN CHEMICALS
PHASE II RI REPORT ADDENDUM
ROCHESTER, NEW YORK

W9801019

ATTACHMENT 2

LABORATORY DATA SUMMARY TABLES

Olin Chemicals
Rochester, NY
March 1998 Sampling Event

Selected Pyridine ASP95 Analysis (ug/L)

LOCATION		QI-1	QO-2	QO-2S1	QS-4	SW-1	SW-12	SW-2	SW-3
LAB ID		A8091903	A8091904	A8091905	A8091902	A8091906	A8091910	A8091907	A8091908
LABORATORY		Recra	Recra	Recra	Recra	Recra	Recra	Recra	Recra
DATE SAMPLED		3/23/98	3/23/98	3/23/98	3/23/98	3/23/98	3/23/98	3/23/98	3/23/98
SAMPLE TYPE		FS	FS	FS	FS	FS	FS	FS	FS
PARAMETER (ug/L)	**RL**								
2,6-Dichloropyridine	10	10 U	2 J	10 U	58	10 U	10 U	10 U	10 U
2-Chloropyridine	10	10 U	10	10 U	420	1 J	10 U	2 J	1 J
3-Chloropyridine	10	10 U	10 U	10 U	5 J	10 U	10 U	10 U	10 U
4-Chloropyridine	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
p-Fluoroaniline	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Pyridine	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U

NOTES:

FS = Field Sample

RB = Rinse Blank

U = Compound was analyzed, but not detected at or above associated numerical value.

J = Estimated Value

ASP95 = New York State Analytical Services Protocol

Olin Chemicals
Rochester, NY
March 1998 Sampling Event

Selected Pyridine ASP95
Analysis (ug/L)

LOCATION		SW-6	SW-6 FD	FIELD BLANK
LAB ID		A8091909	A8091909FD	A8091901
LABORATORY		Recra	Recra	Recra
DATE SAMPLED		3/23/98	3/23/98	3/23/98
SAMPLE TYPE		FS	FD	RB
PARAMETER (ug/L)	**RL**			
2,6-Dichloropyridine	10	10 U	10 U	10 U
2-Chloropyridine	10	10 U	10 U	10 U
3-Chloropyridine	10	10 U	10 U	10 U
4-Chloropyridine	10	10 U	10 U	10 U
p-Fluoroaniline	10	10 U	10 U	10 U
Pyridine	10	10 U	10 U	10 U

ATTACHMENT 3

CHAIN OF CUSTODY FORMS

RECRA LABNET, a division of Recra Environmental, Inc.

CHAIN OF CUSTODY RECORD

PROJECT NO	SITE NAME
5A5762	OLIN ROCH. RI

SAMPLERS (SIGNATURE): Jeff Yohe / L. DUMINUCO

STATION NO	DATE	TIME	COMP	GRAB	STATION LOCATION	NO OF CONTAINERS	1L AMBER PYRIDINE (0100)						REMARKS
1	3-23-98	1230		X	FIELD BLANK	2	2						
2		1345			QS-4	2	2						
3		1400			QI-1	2	2						
4		1220			QO-2	2	2						
5		1240			QO-2S1	2	2						
6		1305			SW-1	2	2						
7		1330			SW-2	2	2						
8		1316			SW-3	2	2						
9		1155			SW-6	4	4						FIELD DUPLICATE
10	↓	1118		↓	SW-12	5	5						MS/MSD
						25							

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
Jeff Yohe	3-23-98 1600	P C [illegible]			
[illegible]	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED FOR LABORATORY BY (SIGNATURE)	DATE/TIME	REMARKS	
				COOL - 6°C	

Distribution: Original accompanies shipment copy to coordinator field files

Olin Rochester: Piezometric Data: March-1998

WELL	ZONE	EASTING	NORTHING	REF_ELEV	WATER LEVEL	WATER_ELEV	DATE
BR-1	Bedrock	744790	1150533	537.11	6.2	530.91	24-Mar-98
BR-101	Bedrock	744667.01	1150160.39	540.65	7.74	532.91	24-Mar-98
BR-102	Bedrock	744318.49	1150208.75	540.21	23.83	516.38	24-Mar-98
BR-103	Bedrock	745135.04	1150224.7	533.19	3.32	529.87	24-Mar-98
BR-104	Bedrock	744593.99	1149095.97	537.56	7.68	529.88	24-Mar-98
BR-105	Bedrock	744174.6	1149326.99	536.9	24.8	512.1	24-Mar-98
BR-106	Bedrock	744046.17	1149764.09	535.74	26.04	509.7	24-Mar-98
BR-107	Bedrock	743671.08	1150473.93	536.32	not measured		24-Mar-98
BR-108	Bedrock	743660.52	1150057.89	540.58	28.59	511.99	24-Mar-98
BR-111	Bedrock	743206.54	1149839.08	540.42	30.5	509.92	24-Mar-98
BR-112A	Bedrock	743367.38	1149224.41	547.72	47.04	500.68	24-Mar-98
BR-113	Bedrock	743457.71	1148716.61	543.02	40.7	502.32	24-Mar-98
BR-114	Bedrock	745138.77	1148994.04	539.77	13.72	526.05	24-Mar-98
BR-116	Bedrock	744009.16	1147280.72	545.38	29.33	516.05	24-Mar-98
BR-117	Bedrock	741024.65	1147585.02	547.61	33.25	514.36	24-Mar-98
BR-118	Bedrock	740953.73	1147306.56	547.79	34.56	513.23	24-Mar-98
BR-2	Bedrock	744818	1149860	538.97	10.42	528.55	24-Mar-98
BR-2A	Bedrock	744828.14	1149853.14	540.36	8.83	531.53	24-Mar-98
BR-3	Bedrock	744582	1149728	538.04	9.55	528.49	24-Mar-98
BR-4	Bedrock	744961	1149899	538.93	6	532.93	24-Mar-98
BR-5	Bedrock	744962	1150215	536.3	5.66	530.64	24-Mar-98
BR-5A	Bedrock	744954	1150217	536.35	8.22	528.13	24-Mar-98
BR-6	Bedrock	744603	1149602	538	10.16	527.84	24-Mar-98
BR-6A	Bedrock	744583.18	1149605.23	540.9	17.48	523.42	24-Mar-98
BR-7	Bedrock	744322	1149662	539.7	20.3	519.4	24-Mar-98
BR-7A	Bedrock	744327.98	1149658.77	539.26	32.98	506.28	24-Mar-98
BR-8	Bedrock	744325	1149928	540	7.93	532.07	24-Mar-98
BR-9	Bedrock	744318.63	1150210.4	539.31	28.15	511.16	24-Mar-98
CANAL	Bedrock	743273.65	1149049.08	544.79	42.4	502.39	24-Mar-98
NESS-E	Bedrock	744349.2	1148802.75	540.31	29.38	510.93	24-Mar-98
NESS-W	Bedrock	743964.28	1148805.43	543.04	38.93	504.11	24-Mar-98
PZ-102	Bedrock	744225.66	1149951.16	540.89	13.56	527.33	24-Mar-98
PZ-103	Bedrock	744237.71	1149791.36	540.22	9.05	531.17	24-Mar-98
PZ-104	Bedrock	744318.3	1149460.33	537.21	13.47	523.74	24-Mar-98
PZ-105	Bedrock	744448.43	1149588.39	536.93	23.09	513.84	24-Mar-98
PZ-106	Bedrock	744800.61	1149711.4	537.21	8.83	528.38	24-Mar-98
PZ-107	Bedrock	744851.4	1149632.87	538.39	7.66	530.73	24-Mar-98
BR-105D	Deep Bedrock	744183.87	1149325.68	536.49	33.26	503.23	24-Mar-98
BR-111D	Deep Bedrock	743206.81	1149846.76	540.34	38.52	501.82	24-Mar-98
BR-112D	Deep Bedrock	743357.43	1149253	547.91	45.54	502.37	24-Mar-98
BR-113D	Deep Bedrock	743458.97	1148704.29	542.93	40.66	502.27	24-Mar-98
BR-116D	Deep Bedrock	744019.01	1147297.57	545.22	42.75	502.47	24-Mar-98
BR-117D	Deep Bedrock	741010.87	1147606.85	547.16	51.72	495.44	24-Mar-98
BR-118D	Deep Bedrock	740974.5	1147291.51	547.93	51.38	496.55	24-Mar-98
BR-119D	Deep Bedrock	740851.35	1146669.93	567.06	69.96	497.1	24-Mar-98
BR-120D	Deep Bedrock	740188.52	1146929.38	557.43	58.62	498.81	24-Mar-98
BR-121D	Deep Bedrock	739994.56	1147353.28	554.79	56.26	498.53	24-Mar-98
BR-122D	Deep Bedrock	742965.57	1148062.15	552.34	50.99	501.35	24-Mar-98
BR-123D	Deep Bedrock	743551.83	1147218.89	553.62	51.88	501.74	24-Mar-98
BR-124D	Deep Bedrock	744244.66	1146161.23	537.45	36.71	500.74	24-Mar-98
BR-2D	Deep Bedrock	744803	1149850	538	56.7	481.3	24-Mar-98
BR-3D	Deep Bedrock	744595	1149728	537	80.23	456.77	24-Mar-98
B-1	Overburden	744301	1150506	537.48	7.57	529.91	24-Mar-98
B-10	Overburden	744886	1149653	537.97	7.09	530.88	24-Mar-98

Olin Rochester: Piezometric Data: March-1998

B-11	Overburden	744958	1149723	536	3.31	532.69	24-Mar-98
B-13	Overburden	744317	1149548	537.07	not measured		24-Mar-98
B-14	Overburden	744465	1149561	537.95	9.93	528.02	24-Mar-98
B-15	Overburden	744578	1149562	535.29	7.78	527.51	24-Mar-98
B-16	Overburden	744751	1149566	536.21	not measured		24-Mar-98
B-17	Overburden	744642	1149803	538.84	8.46	530.38	24-Mar-98
B-2	Overburden	744303	1150347	538.91	8.57	530.34	24-Mar-98
B-3	Overburden	744304	1150205	541.62	4.05	537.57	24-Mar-98
B-4	Overburden	744302	1150056	542.87	11.32	531.55	24-Mar-98
B-5	Overburden	744302	1149926	540.1	8.28	531.82	24-Mar-98
B-7	Overburden	744381	1149579	540.68	14.51	526.17	24-Mar-98
B-8	Overburden	744512	1149578	538.21	10.45	527.76	24-Mar-98
B-9	Overburden	744692	1149582	537.67	7.74	529.93	24-Mar-98
C-1	Overburden	744828	1150148	539.05	6.24	532.81	24-Mar-98
C-2A	Overburden	744825	1149858	539.12	6.74	532.38	24-Mar-98
C-3	Overburden	744699	1150147	541.63	9.18	532.45	24-Mar-98
C-4	Overburden	744754	1149978	540.82	8.93	531.89	24-Mar-98
C-5	Overburden	744579	1149734	536.35	9.59	526.76	24-Mar-98
E-1	Overburden	744965	1149750	534.32	not measured		24-Mar-98
E-2	Overburden	744968	1149924	538.32	4.03	534.29	24-Mar-98
E-3	Overburden	744962	1150203	536	5.84	530.16	24-Mar-98
E-4	Overburden	744961	1150392	538.58	DRY @ 2.95 FT.		24-Mar-98
E-5	Overburden	744943	1150532	539.31	5.24	534.07	24-Mar-98
EC-1	Overburden	743581	1149215	539.99	17.34	522.65	24-Mar-98
EC-2	Overburden	743457	1148724.9	542	DRY @ 12.75 FT.		24-Mar-98
MW-103	Overburden	745135.42	1150219.29	533.25	1.02	532.23	24-Mar-98
MW-104	Overburden	744588.18	1149096.45	537.54	6.94	530.6	24-Mar-98
MW-105	Overburden	744167.08	1149328.34	536.91	18.78	518.13	24-Mar-98
MW-106	Overburden	744058.26	1149765.85	535.44	7.24	528.2	24-Mar-98
MW-107	Overburden	743670.06	1150479.14	536.29	not measured		24-Mar-98
MW-108	Overburden	743664.22	1150065.58	540.69	11.4	529.29	24-Mar-98
MW-114	Overburden	745139.13	1148999.32	539.69	11.69	528	24-Mar-98
MW-2	Overburden	744460.19	1150564.06	535.5	2.72	532.78	24-Mar-98
MW-3	Overburden	744309.06	1150635.55	535.89	5.09	530.8	24-Mar-98
MW-G6	Overburden	744200.58	1150806.6	534.65	2.84	531.81	24-Mar-98
MW-G8	Overburden	744005.21	1150589.41	534.25	6.09	528.16	24-Mar-98
MW-G9	Overburden	743626.16	1150700.55	536.6	4.62	531.98	24-Mar-98
N-1	Overburden	744797	1150534	537.06	2.8	534.26	24-Mar-98
N-2	Overburden	744663	1150532	536.92	3.28	533.64	24-Mar-98
N-3	Overburden	744537	1150522	537.16	4.64	532.52	24-Mar-98
PZ-101	Overburden	744226.08	1150063.43	542.95	11.05	531.9	24-Mar-98
PZ-108	Overburden	744967	1149660	536.56	4.8	531.76	24-Mar-98
W-1	Overburden	744301	1150498	536.98	8.72	528.26	24-Mar-98
W-2	Overburden	744304	1150251	539.53	11.75	527.78	24-Mar-98
W-3	Overburden	744307	1150142	541.91	8.05	533.86	24-Mar-98
W-4	Overburden	744308	1149987	540.35	7.89	532.46	24-Mar-98
W-5	Overburden	744304	1149730	537.69	10.63	527.06	24-Mar-98
W-6	Overburden	744313	1149578	538.25	12.32	525.93	24-Mar-98

LEGEND

OLIN PROPERTY

500 — BEDROCK GROUNDWATER ELEVATION CONTOUR (MSL)

BR-114D — BEDROCK WELL ('D' DESIGNATES DEEP WELL)

(500.0) — PIEZOMETRIC ELEVATION AT DEEP BEDROCK WELL

MW — OVERBURDEN WELL

INTERPRETED GROUNDWATER FLOW DIRECTION (DEEP BEDROCK GROUNDWATER SYSTEM)

NOTES:

1. WATER LEVELS MEASURED DECEMBER 3, 1997
2. DASHED CONTOURS REFLECT LOWER DATA DENSITY

N

I-390

ERIE BARGE CANAL

BUFFALO ROAD

HOWARD ROAD

LETTINGTON DRIVE

DOLOMITE PRODUCTS QUARRY

MORIE WELL

CUMBERLAND FARMS PETROLEUM TERMINAL

FIRTH RIXSON

OLIN

KODAK

AID TO HOSPITALS

NESS

GENERAL RAIL SIGNAL CO.

PFAUDLER

BR-107
BR-9
BR-108
BR-111
BR-111D (501.82)
BR-106
BR-20 (481.30)
BR-20 (456.77)
MW-PZ-105
BR-105D (503.23)
BR-105
BR-112
BR-112D (502.37)
BR-104
BR-103
BR-114
12-6 (NM)
8-6 (NM)
7-6 (NM)
OW-105 (NM)
11-6 (NM)
RW-1 (NM)
9-6 (NM)
10-6 (NM)
13-4 (NM)
OW-102A (NM)
BR-122D (501.35)
OW-103 (NM)
BR-113
BR-113D (502.27)
BR-117
BR-117D (495.44)
BR-118
BR-118D (496.55)
BR-121D (498.53)
BR-120D (498.81)
BR-119D (497.10)
BR-123D (501.74)
BR-116
BR-116D (502.47)
BR-124D (500.74)

498
496
500
502

Scale in Feet
0 500 1000

Source:
USGS Topographic Quadrangle 7.5-Minute Series;
Rochester West, N.Y., 1971 (Photorevised 1978).

MARCH 1998
DEEP BEDROCK GROUNDWATER
INTERPRETED PIEZOMETRIC CONTOURS

OLIN CHEMICALS
ROCHESTER, N.Y.

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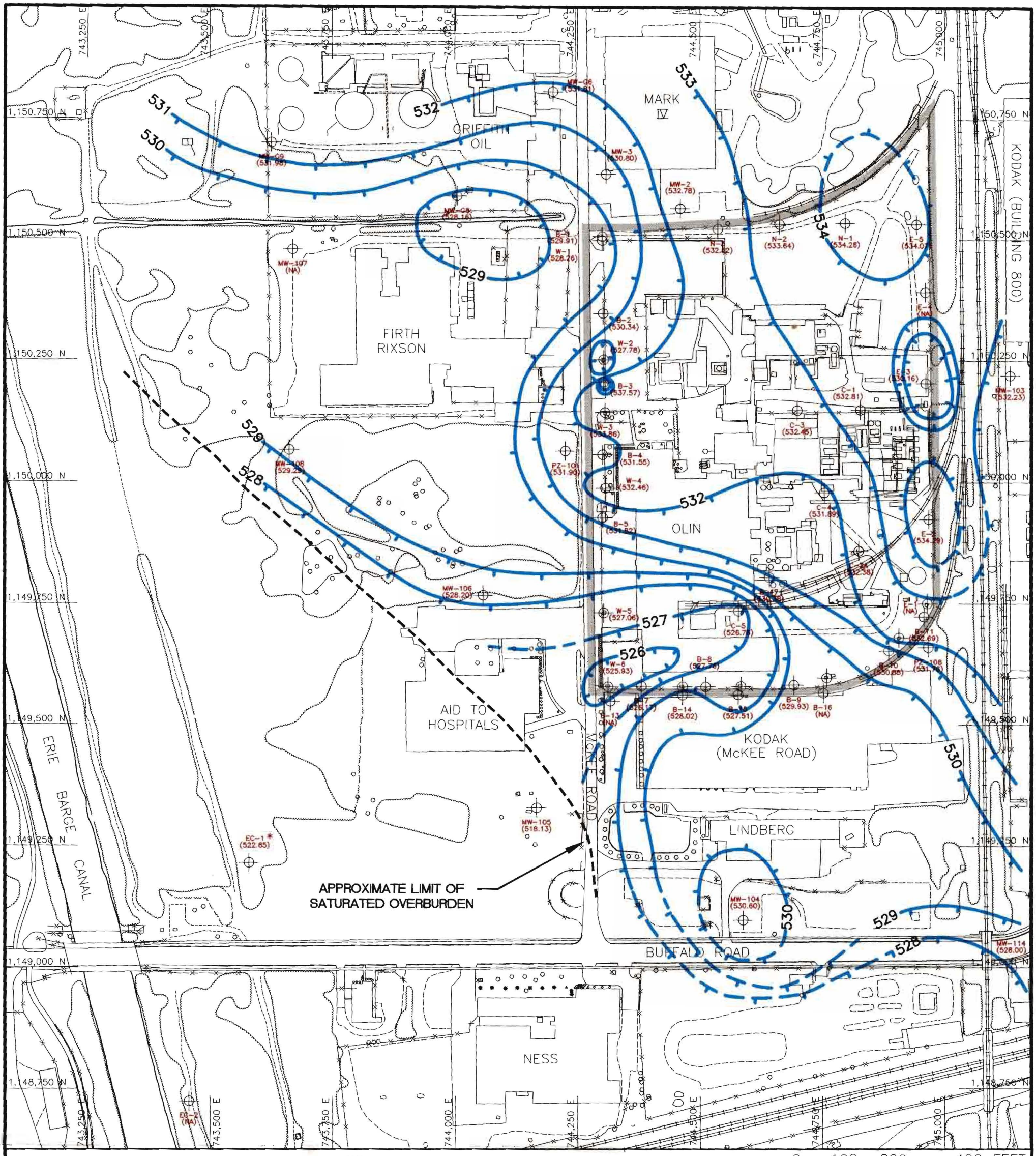


SCALE: 1"=200'

LEGEND

- OUTLINE OF OLIN PROPERTY BOUNDARY
- 525 — OVERBURDEN GROUNDWATER ELEVATION CONTOUR (MSL)
- 525.76 — PIEZOMETRIC ELEVATION AT WELL OR PIEZOMETER (MSL)
- 520.25* — PIEZOMETRIC ELEVATION AT WELL SCREENED IN OVERBURDEN AND SHALLOW BEDROCK; WATER LEVEL IS BELOW BEDROCK SURFACE.
- INTERPRETED GROUNDWATER FLOW DIRECTION

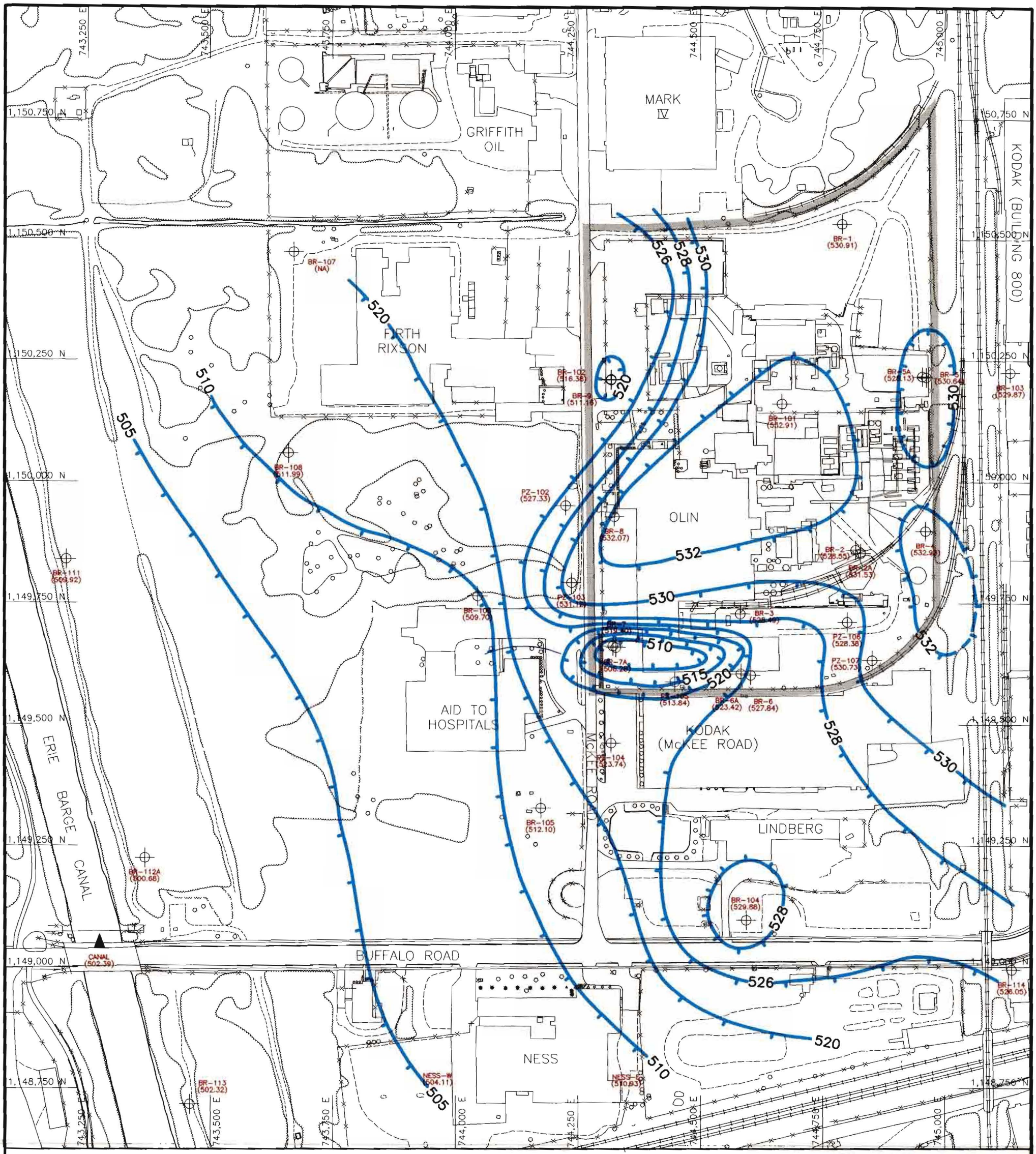
NOTE:

1. WATER LEVELS MEASURED ON MARCH 24, 1998
2. CONTOURS ARE INTERPRETIVE. SOME MEASUREMENTS HAVE BEEN DISCOUNTED WHERE THEY APPEAR ANOMALOUS.

MARCH 1998 OVERBURDEN GROUNDWATER INTERPRETED PIEZOMETRIC CONTOURS

OLIN CHEMICALS
ROCHESTER, N.Y.

J:\7311-52\7311F012.DWG 4-24-98



0 100 200 400 FEET

SCALE: 1" = 200'

LEGEND

- OUTLINE OF OLIN PROPERTY BOUNDARY
- 525 — BEDROCK GROUNDWATER ELEVATION CONTOUR (MSL)
- INTERPRETED GROUNDWATER FLOW DIRECTION (SHALLOW BEDROCK SYSTEM)
- PIEZOMETRIC ELEVATION AT WELL OR PIEZOMETER (MSL)
- PIEZOMETRIC ELEVATION AT SURFACE WATER MEASUREMENT POINT

NOTE:

1. WATER LEVELS MEASURED ON MARCH 24, 1998
2. CONTOUR INTERVALS VARY.

MARCH 1998 BEDROCK GROUNDWATER INTERPRETED PIEZOMETRIC CONTOURS

OLIN CHEMICALS
ROCHESTER, N.Y.

J:\7311-52\7311F013.DWG 4-24-98

ASEA BROWN BOVERI

May 1, 1998

Mr. Michael Bellotti
Olin Chemicals Corporation
PO Box 248, Lower River Road
Charleston, TN 37310

Subject: Olin Rochester Site - March 1998 Off-Site Groundwater Sampling Results

Dear Mr. Bellotti:

This letter presents the results of chemical analysis and describes the sampling, analytical methodology, and analytical quality control for off-site groundwater sampling conducted in March 1998 for the Olin Chemicals (Olin) Rochester site. Sampling activities were undertaken as follow- up to the installation of new wells to supplement the Phase II Remedial Investigation. Groundwater sampling results are enclosed for the samples collected from the three bedrock wells installed in Novemebr 1997 opposite the Pfaudler property along the Erie Barge Canal (canal).

Sampling

Groundwater samples were collected from the bedrock wells for analysis for selected pyridines and volatile organic compounds (VOCs) on March 30, 1998. Samples were collected by and submitted to Recra Environmental, Inc. (Recra) for chemical analysis. The locations of these sampling points are shown in Figure 1.

Analytical Procedures and Data Review

All groundwater samples were analyzed for the Olin suite of selected pyridines (pyridine, 2-chloropyridine, 3-chloropyridine, 4-chloropyridine, 2,6-dichloropyridine, and p-fluoroaniline) and VOCs in accordance with the 1995 New York State Category B Analytical Services Protocols (ASP 95-2 and ASP 95-1, respectively).

A review of the quality control sample results associated with the analytical results was performed for data quality assurance purposes. Sample results were reviewed for holding time compliance, surrogate standard recoveries, blank contamination, matrix spike blank/matrix spike blank duplicate (MSB/MSBD) and matrix spike/matrix spike duplicate (MS/MSD) accuracy and precision, and field duplicate precision. Overall, the data quality appears to be good based on the quality control items reviewed. The results of the data review are discussed in the quality control section of this letter.

Analytical Results

The validated results from the March 1998 off-site groundwater monitoring event are provided as a table in Attachment 1. A summary of analytical findings is presented below by compound class.

ABB Environmental Services, Inc.

511 Congress Street
Portland, Maine 04112-7050

Telephone (207) 775-5401

Fax (207) 772-4762

Selected Pyridines. Selected pyridines were detected in groundwater samples from wells BR-122D and BR-123D, but not from the southern-most well, BR-124D. Selected pyridines detected include 2,6-dichloropyridine, 2-chloropyridine, and 3-chloropyridine. Selected pyridine concentrations ranged from estimated low-level parts per billion (ppb) to several hundred ppb, with the highest concentrations observed in well BR-123D, directly opposite well BR-116D on the Pfaudler property. 2-Chloropyridine and 2,6-dichloropyridine concentrations detected during this monitoring event were consistent with results obtained during December 1997, shortly after well installation. Detections of 3-chloropyridine and 4-chloropyridine were less consistent. An estimated concentration of 4-chloropyridine (above zero, but below quantitation limit) was detected in the December 1997 sample collected from well BR-122D; however, groundwater results from the March 1998 monitoring event did not confirm the presence of this compound. In addition, an estimated amount concentration of 3-chloropyridine (again, above zero, but below quantitation limit) was detected in the field duplicate pair from well BR-123D this event, whereas, it was not detected in the December 1997 monitoring event. These low concentrations (below the quantitation limit) are qualified by the laboratory as estimated because the variability in detections is common. Furthermore, previous analyses of aqueous samples and corresponding quality control data have indicated the potential for reporting false positive results above zero but below the quantitation limit.

VOCs. Low concentrations (detected below or slightly above the quantitation limit) of a few VOCs (1,1-dichloroethane, benzene, chlorobenzene, and/or chloroethane) were detected in wells BR-122D and BR-123D. VOCs were not detected in well BR-124D (the southern-most well along the canal). These results are consistent with results obtained during the December 1997 monitoring event.

Quality Control

As part of the March 1998 off-site groundwater sampling program, a trip blank, field blank, MS/MSD samples, and field duplicate sample pair were collected as quality control samples. All analytical holding times were met, field duplicate precision was met, and no target compounds were reported in the trip or field blanks. Validation findings and qualifying statements are noted below.

- MSB and MS/MSD samples for the selected pyridine analysis indicated poor recovery (less than 10 percent) for p-fluoroaniline, and poor relative percent difference for 2-chloropyridine and 2,6-dichloropyridine. All non-detected sample results for p-fluoroaniline were rejected (R), and positive results for the pyridines detected in BR-122D noted above were qualified as estimated (J).

In summary, results qualified as estimated (J) by either the laboratory or during data review are not considered to have a negative impact on data usability. Results qualified during data review as rejected (R), however, are not considered usable (compound may or may not be present).

Conclusions

Results from the March 1998 off-site canal groundwater sampling event indicate that concentrations of the selected pyridines were consistent with previous results observed in the wells installed along the canal during November 1997 (BR-122D through BR-124D). Concentrations of pyridines and VOCs detected in the sample collected from BR-123D, just opposite from BR-116D on the Pfaudler property, were comparable to concentrations detected in December 1997 from this well. Groundwater collected from the southern-most canal well (BR-124D) did not contain any of the Olin suite of selected pyridines or VOCs. These results are consistent with December 1997 monitoring results and indicate that the southern extent of site-related contamination has been delinated (i.e., does not continue southward towards BR-124D).

If you have any questions or comments on the material described in this letter, please feel free to contact me at (207) 828-3437.

Sincerely,

ABB ENVIRONMENTAL SERVICES, INC.

Thomas R. Eschner, R.G.
Project Manager/Principal Hydrogeologist

TRE/jpc

Attachments: Figure 1 - Off-Site Groundwater Monitoring Well Locations
Attachment 1 - Laboratory Data Summary Table
Attachment 2 - Chain of Custody Form

cc: J. Connolly
N. Breton

LEGEND

OLIN PROPERTY

BR-114 BEDROCK WELL

I-390

ERIE BARGE CANAL

BUFFALO ROAD

HOWARD ROAD

LETTINGTON ROAD

McKEE ROAD

MW-107/BR-107

FIRTH RIXSON

MW-BR-9

MW-108/BR-108

BR-111/111D

MW-106/BR-106

AID TO HOSPITALS

MW-PZ-105

BR-112/112D

BR-105/BR-105D

OLIN

KODAK

MW-103/BR-103

KODAK

MW-104/BR-104

MW-114/BR-114

CUMBERLAND FARMS PETROLEUM TERMINAL

12-6

8-6

7-6

OW-105

11-6

RW-1

10-6

9-6

13-4

OW-102A

BR-122-D

OW-103

MORIE WELL

NESS-W

NESS-E

BR-113/113D

NESS

GENERAL RAIL SIGNAL CO.

PFAUDLER

BR-116D

BR-116

BR-123-D

DOLOMITE PRODUCTS QUARRY

MAIN EXTENT OF WATER-BEARING FRACTURE IN QUARRY WALL

D

BR-117D

BR-117

BR-121D

BR-118

BR-118D

BR-120D

BR-119D

BR-124-D

Scale in Feet

0 500 1000

Source:
USGS Topographic Quadrangle 7.5-Minute Series;
Rochester West, N.Y., 1971 (Photorevised 1978).

FIGURE 1

OFF-SITE GROUNDWATER MONITORING WELL LOCATIONS

OLIN CHEMICALS
ROCHESTER, N.Y.

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ATTACHMENT 1

LABORATORY DATA SUMMARY TABLE

Olin Chemicals
Rochester, NY
March 1998 Groundwater Sampling Event

March 1998 Groundwater Monitoring Results

LOCATION		BR-122D	BR-123D	BR-123D FD	BR-124D	FIELD BLANK	Trip Blank
LABORATORY ID		A8103703	A8103704	A8103704FD	A8103705	A8103702	A8103701
DATE SAMPLED		3/30/98	3/30/98	3/30/98	3/30/98	3/30/98	3/30/98
TYPE		FS	FS	FD	FS	FB	TB
Volatile Organic Compounds by ASP 95-1 (ug/L)	RL						
1,1,1-Trichloroethane	10	10 U	10 U	10 U	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	10	10 U	10 U	10 U	10 U	10 U	10 U
1,1,2-Trichloroethane	10	10 U	10 U	10 U	10 U	10 U	10 U
1,1-Dichloroethane	10	10	4 J	4 J	10 U	10 U	10 U
1,1-Dichloroethene	10	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethane	10	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethene (Total)	10	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloropropane	10	10 U	10 U	10 U	10 U	10 U	10 U
2-Butanone	10	10 U	10 U	10 U	10 U	10 U	10 U
2-Hexanone	10	10 U	10 U	10 U	10 U	10 U	10 U
4-Methyl-2-pentanone	10	10 U	10 U	10 U	10 U	10 U	10 U
Acetone	10	10 U	10 U	10 U	10 U	10 U	10 U
Benzene	10	18	27	26	10 U	10 U	10 U
Bromodichloromethane	10	10 U	10 U	10 U	10 U	10 U	10 U
Bromoform	10	10 U	10 U	10 U	10 U	10 U	10 U
Bromomethane	10	10 U	10 U	10 U	10 U	10 U	10 U
Carbon Disulfide	10	10 U	10 U	10 U	10 U	10 U	10 U
Carbon Tetrachloride	10	10 U	10 U	10 U	10 U	10 U	10 U
Chlorobenzene	10	10 U	7 J	6 J	10 U	10 U	10 U
Chloroethane	10	1 J	10 U	10 U	10 U	10 U	10 U
Chloroform	10	10 U	10 U	10 U	10 U	10 U	10 U
Chloromethane	10	10 U	10 U	10 U	10 U	10 U	10 U
cis-1,3-Dichloropropene	10	10 U	10 U	10 U	10 U	10 U	10 U
Dibromochloromethane	10	10 U	10 U	10 U	10 U	10 U	10 U
Ethylbenzene	10	10 U	10 U	10 U	10 U	10 U	10 U
Methylene chloride	10	10 U	10 U	10 U	10 U	10 U	10 U
Styrene	10	10 U	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	10	10 U	10 U	10 U	10 U	10 U	10 U
Toluene	10	10 U	10 U	10 U	10 U	10 U	10 U
Total Xylenes	10	10 U	10 U	10 U	10 U	10 U	10 U
trans-1,3-Dichloropropene	10	10 U	10 U	10 U	10 U	10 U	10 U
Trichloroethene	10	10 U	10 U	10 U	10 U	10 U	10 U
Vinyl chloride	10	10 U	10 U	10 U	10 U	10 U	10 U

Olin Chemicals
Rochester, NY
March 1998 Groundwater Sampling Event

March 1998 Groundwater Monitoring Results

LOCATION		BR-122D	BR-123D	BR-123D FD	BR-124D	FIELD BLANK	Trip Blank
LABORATORY ID		A8103703	A8103704	A8103704FD	A8103705	A8103702	A8103701
DATE SAMPLED		3/30/98	3/30/98	3/30/98	3/30/98	3/30/98	3/30/98
TYPE		FS	FS	FD	FS	FB	TB
Selected Pyridines by ASP 95-2 (ug/L)							
2,6-Dichloropyridine	10	7 J	66	78	10 U	10 U	NA
2-Chloropyridine	10	94 J	590	770	10 U	10 U	NA
3-Chloropyridine	10	10 U	3 J	4 J	10 U	10 U	NA
4-Chloropyridine	10	10 U	10 U	10 U	10 U	10 U	NA
p-Fluoroaniline	10	R	R	R	R	R	NA
Pyridine	10	10 U	10 U	10 U	10 U	10 U	NA
Field Parameters							
pH		6.88	7.02	7.02	7.26	NA	NA
Conductivity(umhos/cm)		1800	1800	1800	54000	NA	NA
Temperature (deg C)		13.3	13.9	13.9	14.3	NA	NA

ATTACHMENT 2

CHAIN OF CUSTODY FORM

RECRA ENVIRONMENTAL, INC.

CHAIN OF CUSTODY RECORD

PROJECT NO: 5A5762

SITE NAME: OLIN ROCH RI

SAMPLERS (SIGNATURE): [signature] / L. DUMINUCO

STATION NO	DATE	TIME	COMP	GRAB	STATION LOCATION	NO OF CONTAINERS	40ML VIAL VOC (COLOD)	1L AMBER PYRIDINES (COLOD)						REMARKS
1	3-30-98	0715		X	TRIP BLANK	2	2							
2	↓	1015		↓	FIELD BLANK	4	2	2						
3		1105			BR-122D	11	6	5						MS/MSD
4		1216			BR-123D	7	4	3						FIELD DUPLICATE
5	↓	1330		↓	BR-124D	4	2	2						
						28								

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
[signature]	3-30-98 1600	[signature]			
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED FOR LABORATORY BY (SIGNATURE)	DATE/TIME	REMARKS	
				Cool - 4°C	

Distribution: Original accompanies shipment copy to coordinator field files

Olin

P.O. BOX 248, 1186 LOWER RIVER ROAD, NW, CHARLESTON, TN 37310-0248

(423) 336-4000 FAX (423) 336-4183

March 20, 1998

Mr. James Craft
Engineering Geologist
New York State Department of Environmental Conservation
Region 8 Office - Division of Hazardous Waste Remediation
6274 East Avon - Lima Road
Avon, New York 14414-9519

Re: Olin Rochester RI/FS
Olin Chemicals (Site #628018a) 100 McKee Rd, Rochester, NY

Dear Mr. Craft:

As promised, I have attached a proposed 1998 monitoring program for the Olin Rochester site, for your review. Included is a table of sampling locations for groundwater, surface water and quarry locations, plus maps identifying the locations.

We will implement the quarterly canal and quarry sampling and the piezometric measurements during first quarter of 1998, since this will replicate prior monitoring episodes. I will initiate the groundwater sampling program upon receiving your feedback.

Please call me with any questions or discussion at 423/336-4587. Thanks.

Sincerely,

Michael J. Bellotti

Michael J. Bellotti
Olin Corporation

cc:

Mr. Steven Shost
New York State Department of Health
Bureau of Environmental Exposure Investigation
2 University Place
Albany, New York 12203

Ms. Mary Jane Peachey
New York State Department of Environmental Conservation
Region 8 Office - Division of Hazardous Waste Remediation
6274 East Avon - Lima Road
Avon, New York 14414-9519

Ms. Monica L. Fries Esq.:
Husch & Eppenberger
St. Louis, MO

By electronic copy: letter and table only
Mr. William Norman: Olin Rochester, NY
Mr. Charles Harrison: Olin Rochester, NY
Mr. Rick Gahagan: Olin Rochester, NY
Ms. Laura Tew: Olin Charleston, TN
Mr. John Burns: Olin Charleston, TN
Ms. Brenda Pantalone: Olin Norwalk, CT
Mr. Thomas Eschner: ABB, Portland, ME

MONITORING PROGRAM: OLIN ROCHESTER: 1998					
Well	***zone***	***onsite/ offsite***	***Pyridines smpls/yr***	***VOC's smpls/yr***	***Data Objective:***
PZ-101	BR	AID-HOSP	1		shallow bedrock plume monitoring
PZ-103	BR	AID-HOSP	1		shallow bedrock plume monitoring
BR-103	BR	KODAK EAST	1		shallow bedrock plume monitoring
BR104	BR	BUFFALO RD	1		shallow bedrock plume monitoring
BR105	BR	AID-HOSP	1		shallow bedrock plume monitoring
BR106	BR	AID-HOSP	1		shallow bedrock plume monitoring
BR112A	BR	CANAL	1		shallow bedrock plume monitoring
BR113	BR	CANAL	1		shallow bedrock plume monitoring
BR114	BR	BUFFALO RD	1		shallow bedrock plume monitoring
BR116	BR	PFAUDLER	1		shallow bedrock plume monitoring
BR105D	BRD	AID-HOSP	1		deep bedrock plume monitoring
BR112D	BRD	NYSDOT	1		deep bedrock plume monitoring
BR113D	BRD	NYSDOT	1		deep bedrock plume monitoring
BR116D	BRD	PFAUDLER	1		deep bedrock plume monitoring
BR117D	BRD	QUARRY	1		deep bedrock plume monitoring
BR118D	BRD	QUARRY	1		deep bedrock plume monitoring
BR119D	BRD	QUARRY	1		deep bedrock plume monitoring
BR120D	BRD	QUARRY	1		deep bedrock plume monitoring
BR121D	BRD	QUARRY	1		deep bedrock plume monitoring
BR122D	BRD	QUARRY	2	2	deep bedrock plume monitoring
BR123D	BRD	QUARRY	2	2	deep bedrock plume monitoring
BR124D	BRD	QUARRY	2	2	deep bedrock plume monitoring
collection	sump	on	12	12	monthly: track mass removed
PZ107	BR	on	1	1	onsite tracking of contam trends
PZ105	BR	on	1	1	onsite tracking of contam trends
BR101	BR	on	1	1	onsite tracking of contam trends
BR102	BR	on	1	1	onsite tracking of contam trends
BR8	BR	on	1	1	onsite tracking of contam trends
BR-5A	BR	on	1		onsite tracking of removed contaminants
BR-6A	BR	on	1		onsite tracking of removed contaminants
BR-7A	BR	on	1		onsite tracking of removed contaminants
B17	OB	on	1	1	onsite tracking of contam trends
B6	OB	on	1	1	onsite tracking of contam trends
E1	OB	on	1	1	onsite tracking of contam trends
E3	OB	on	1	1	onsite tracking of contam trends
QS4	quarry seep	quarry	4	1	track quarry seep quality
QO2	quarry outfall	canal	4	1	track wq input to canal
QO2S1	canal at outfall	canal	4		track dilution of input to canal
SW1	barge canal	canal	4		track canal water quality
SW2	barge canal	canal	4		track canal water quality
SW3	barge canal	canal	4		track canal water quality
SW6	barge canal	canal	4		track canal water quality
SW12	barge canal	canal	4		track canal water quality
TOTAL samples			81	29	

T:\7311-34\7311F501 C&P 4/1/97

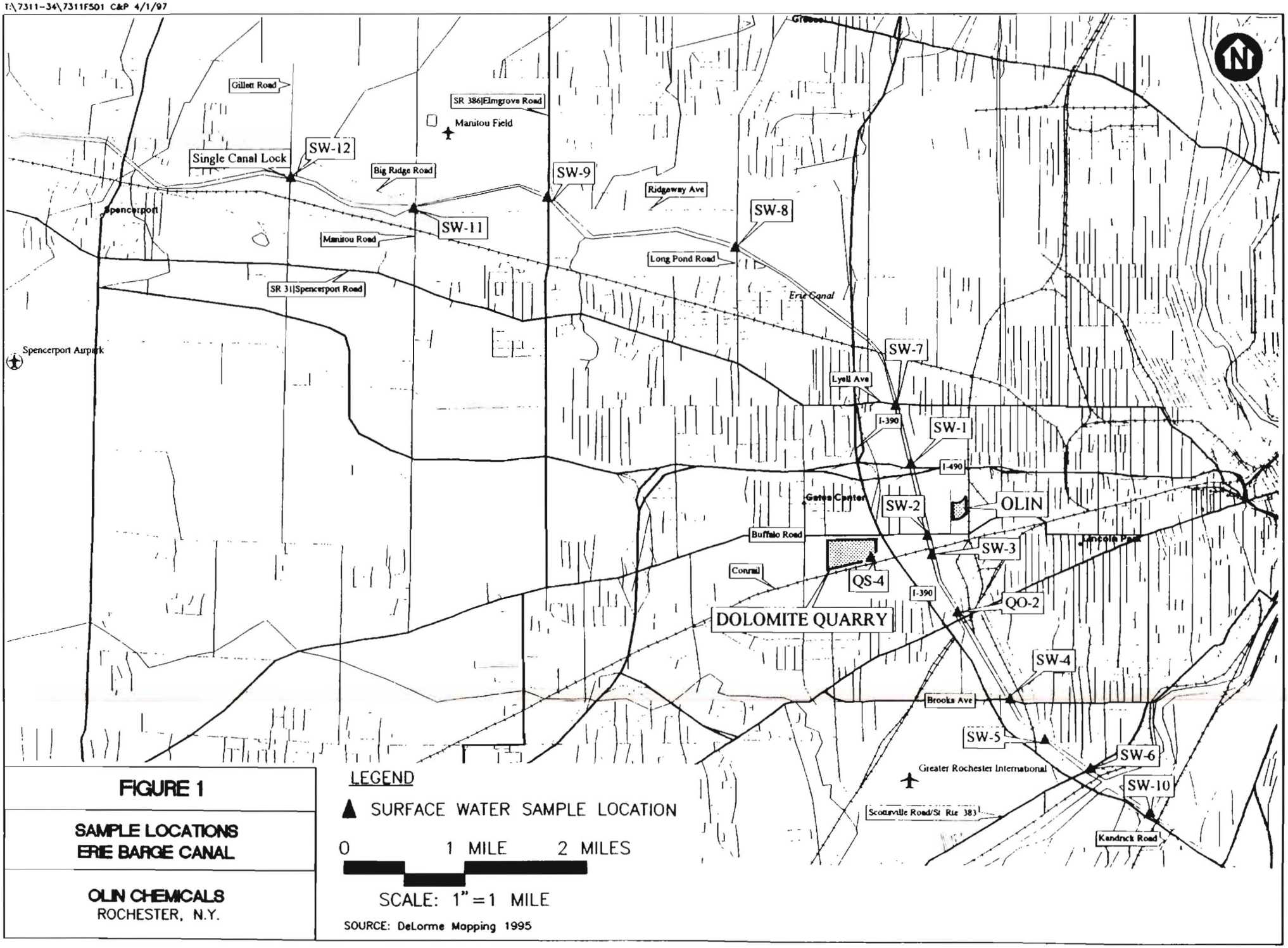


FIGURE 1

SAMPLE LOCATIONS
ERIE BARGE CANAL

OLIN CHEMICALS
ROCHESTER, N.Y.

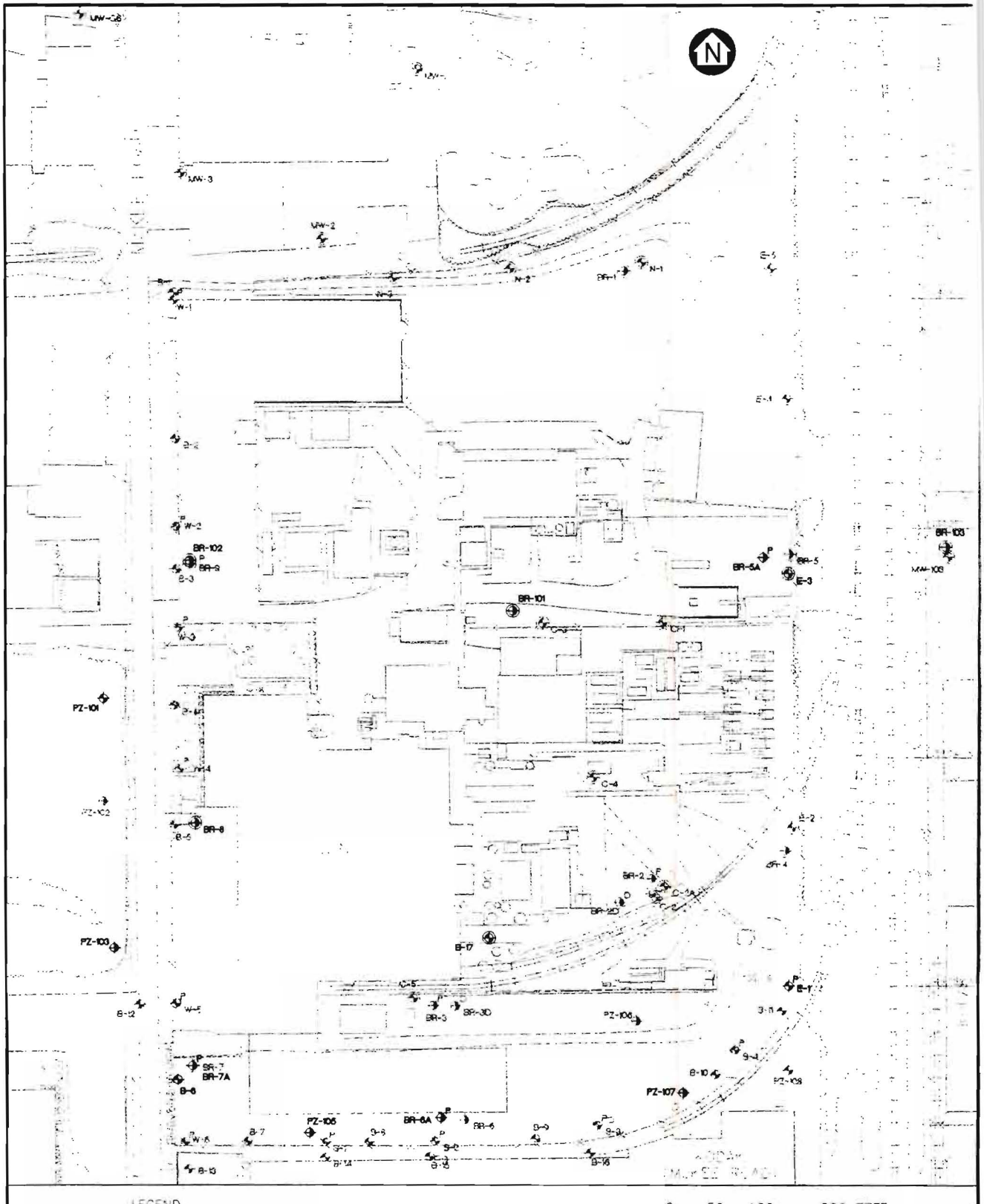
LEGEND

▲ SURFACE WATER SAMPLE LOCATION

0 1 MILE 2 MILES

SCALE: 1" = 1 MILE

SOURCE: DeLorme Mapping 1995



LEGEND

- OVERBURDEN PIEZOMETER
- BEDROCK PIEZOMETER
- OVERBURDEN MONITORING WELL
- BEDROCK MONITORING WELL
- DEEP BEDROCK MONITORING WELL
- OVERBURDEN PUMPING WELL
- BEDROCK PUMPING WELL
- OUTLINE OF OLIN PROPERTY BOUNDARY

0 50 100 200 FEET

SCALE: 1" = 100'

1998 PROPOSED MONITORING PROGRAM

OLIN CHEMICALS
PHASE I R. REPORT
ROCHESTER, N.Y.

J:\7311-52\7311F008.DWG 3-13-98

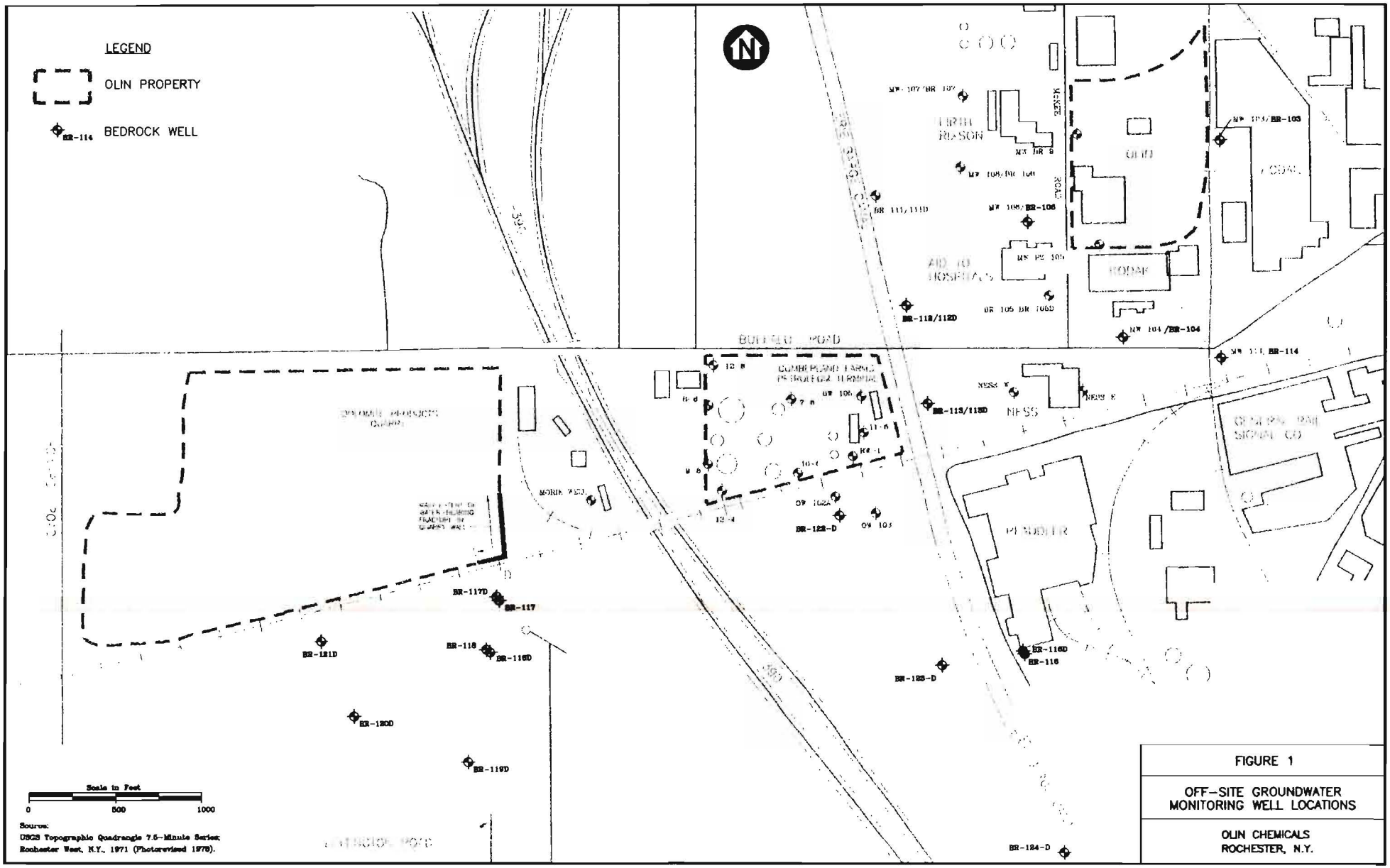


FIGURE 1

OFF-SITE GROUNDWATER MONITORING WELL LOCATIONS

OLIN CHEMICALS
ROCHESTER, N.Y.

T:\7311-34\7311F108.DWG 8-13-96