Optimized Monitoring Plan

Olin Niagara Falls Plant
Niagara Falls, New York

Prepared for:

OLIN CORPORATION

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ACRONYMS AND ABBREVIATIONS

ARGC	Alundum Road Gill Creek
BHCs	Benzene Hexachlorides
NYSDEC	New York State Department of Environmental Conservation
Olin	Olin Corporation
Order	Administrative Order on Consent
Plan	Optimized Monitoring Plan
Site	Olin Facility, Niagara Falls, New York
VOCs	Volatile Organic Compounds

1.0 INTRODUCTION

Olin Corporation (Olin) is implementing a Remedial Plan (CRA, 1996) at their facility located at 2400 Buffalo Avenue in Niagara Falls, New York (Site) as required by the Administrative Order on Consent (Order) #R9-4171-94-08 between New York State Department of Environmental Conservation (NYSDEC) and Olin. The goal of the Remedial Plan is to control migration and reduce concentrations of Olin-derived constituents (aromatic compounds, benzene hexachlorides (BHCs), and mercury) in A and B-Zone groundwater within the Alundum Road Gill Creek (ARGC) Area. Additionally, the Remedial Plan requires Olin to monitor the extent of C and CD-Zone capture zones which are being addressed under a separate consent order between NYSDEC and Chemours.

This Optimized Monitoring Plan (Plan) describes the proposed program that will be used to monitor and document Site groundwater conditions. Once approved, this Plan supersedes previous monitoring programs outlined in the Remedial Plan, Groundwater Treatment System Operations, Maintenance, and Monitoring Plan (AMEC, 2014), and the Demonstration Program Work Plan (Amec Foster Wheeler, 2015). The Plan was developed based on the previous monitoring programs and Site knowledge gained over 20 years of monitoring.

The main goal of this revision is to optimize the frequency and number of the long-term monitoring locations at the Site following the Demonstration Program (and subsequent changes to site remediation activities) while continuing to comply with the Order and Remedial Plan. The Plan provides the optimization rationale, monitoring schedule and locations, groundwater sampling procedures, analytical methods, and reporting format that will be used to monitor and report groundwater conditions at the Site.

2.0 OPTIMIZATION RATIONALE

The site monitoring program was evaluated to optimize monitoring frequency and locations for the current site activities. More than twenty years of potentiometric surface and constituent data have been collected quarterly at the Site and provided a thorough understanding of site conditions and trends during previous remedial activities. Potentiometric surface and constituent monitoring frequency and locations were optimized based on the current site monitoring needs and the historical information.

2.1 Potentiometric Surface Monitoring

Potentiometric surface monitoring was previously performed on a quarterly basis at 139 wells in the following zones:

- A-Zone – 48 wells
- A/B-Zone – 29 wells
- B-Zone – 50 wells
- C-Zone – 6 wells
- CD-Zone – 6 wells

Historical data has shown that the potentiometric surfaces have generally been consistent over time with only very small fluctuations in wells not used for groundwater extraction. Additionally, the Demonstration Program showed little change in the potentiometric surface after the groundwater treatment system shutdown. Groundwater elevations do not show a consistent seasonal cycle related to precipitation which is likely due to the extent of paved surfaces at the site and the confined nature of the bedrock groundwater system.

Given the stable potentiometric surfaces over time, reducing potentiometric surface monitoring frequency from quarterly to semi-annually will continue to provide necessary potentiometric data to confirm that groundwater continues to be controlled consistent with the Remedial Plan and Order. Monitoring during winter has been historically difficult due to the flush mount wells that need to be located and opened beneath the snow and ice cover.

The number and location of the monitoring wells are appropriate for generating the potentiometric surfaces for these zones and will not be changed. Section 3 provides the specific potentiometric surface monitoring locations.

2.2 Constituent Monitoring

Constituent monitoring was previously performed on a quarterly basis. Fifteen A and B-Zone wells were monitored during each quarterly monitoring event, and an additional 37 A and B-Zone wells were monitored during the summer quarterly event each year.

The data generated from historical monitoring events have shown, with few exceptions, that the constituent concentrations and distributions do not fluctuate seasonally or over wide ranges and that constituent concentrations are predictable with time. Exceptions include OBA 26B where trichloroethene concentrations are more recently higher in the fall, and OBA 26B and OBA 25B where 1,2,4-trichlorobenzene concentrations also appear to be higher in the fall. A reduction from quarterly constituent monitoring to semi-annual constituent monitoring, that includes spring and fall events, will continue to capture these fluctuations and provide monitoring data that allows prediction of concentration patterns and trends over time.

The constituent monitoring locations were evaluated as follows to select the locations that will remain in the program.

- Previously monitored wells located along the perimeter of the monitoring network were retained in the monitoring program.
- The 15 wells previously sampled quarterly were retained for semi-annual sampling.
- The 37 wells previously sampled annually were reduced in number by removing interior monitoring locations that provide redundant data. Ten wells were removed from the program that are adjacent to other wells with similar constituent concentrations and do not provide additional delineation of site constituents or useful information with respect to long term trends in the data set.

Section 3 provides the specific constituent monitoring locations.

3.0 MONITORING SCHEDULE AND LOCATIONS

A-Zone, B-Zone, C-Zone, and CD-Zone groundwater will be monitored on a semi-annual basis (twice a year) to evaluate site conditions. The specific monitoring dates will be dependent on plant activities, personnel availability and weather conditions. Sampling is anticipated to be completed during Second Quarter (spring) and Fourth Quarter (fall) each year. The semi-annual monitoring events will include groundwater level measurements and groundwater sampling and analysis.

The spring event will include the comprehensive event, consistent with prior monitoring plans. The fall event will consist of a subset of those locations necessary to document Site objectives are being met. This strategy will provide an understanding of contaminant distribution and potentiometric conditions at typical wet and dry seasons.

Monitoring locations are presented on Figure 3.1. Groundwater level measurements will be collected from the wells shown on Figure 3.1 and listed in Table 3.1 during the semi-annual monitoring events. Groundwater level measurements collected from the wells located on Solvent property (listed in Table 3.1), will be coordinated with Solvent personnel to gain site access.

Figure 3.1 also shows the groundwater sampling locations. Orange highlighted wells will be sampled in the spring and fall events, and the green highlighted wells will be sampled in the spring event only. Table 3.2 presents the wells to be sampled during the spring and fall monitoring events, respectively.

Wells will be maintained such that water level and groundwater sampling can be performed. The wells will be inspected during the groundwater level measurement events and maintenance issues will be noted. Maintenance will include keeping the wells clear of obstructions, and repairing any damage caused by activities on the Site, or by natural causes. Olin will communicate maintenance issues with wells located on Solvent property to the Solvent representatives.

4.0 GROUNDWATER SAMPLNG PROCEDURES

Groundwater level measurements will be collected from the monitoring locations on Figure 3.1 within a twenty-four hour period. The level measurements will be collected using an electronic water level meter with 0.01 foot graduations. The water level meter will be decontaminated between wells using a phosphate free detergent and deionized water. Less impacted wells will be measured prior to more impacted wells to minimize the potential for cross contamination.

Groundwater sampling will begin after groundwater level measurements have been completed. Sampling and purging procedures will be consistent with the NYSDEC March 1991 Sampling Guidelines and Protocols (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf). Samples will be collected for the following analyses in this order:

1. Volatile Organic Compounds (VOCs)
2. Pesticides
3. Total Mercury

Collected samples will be analyzed by a certified commercial analytical laboratory for the site-specific parameter list presented in Table 4.1 using the listed methods. Samples will be containerized and preserved according to the appropriate procedure for each analysis method, as directed by the analytical laboratory.

5.0 REPORTING

The groundwater level measurements and constituent data will be reported to NYSDEC in an annual monitoring report. The report will include tabulated results of groundwater elevations and analytical results. Additionally, potentiometric surface maps for all four zones will be generated, and the analytical results for mercury and the following indicator parameters will be presented on figures for both the A-zone and the B-zone:

- 1,2,4-trichlorobenzene – chlorinated benzene indicator
- gamma-BHC – BHC isomer indicator
- trichloroethene – chlorinated ethene indicator

6.0 REFERENCES

AMEC, 2014. *Groundwater Treatment System Operations and Maintenance Plan – Revision 7.* Kennesaw, GA. Amec Environment & Infrastructure, Inc. August 15, 2014.

Amec Foster Wheeler, 2015. *Demonstration Program Work Plan.* Kennesaw, GA. Amec Foster Wheeler Environment & Infrastructure, Inc. November 6, 2015.

CRA, 1996. Remedial Plan – Olin Chemicals Corp. – Niagara Falls, New York. Conestoga-Rovers & Associates, February, 1996

TABLES

Table 3.1: Semi-Annual Water Level Monitoring Locations

SEMI-ANNUAL WATER LEVEL LOCATIONS				
A ZONE	**B ZONE**	**A&B ZONE**	**C ZONE**	**CD ZONE**
OBA-1A	OBA-1B	PR-1	OBA-1C	OBA-2C
OBA-2A	OBA-2B	PR-2	OBA-4C	OBA-3C
OBA-5A	OBA-5B	PR-3	OBA-7C	OBA-5C
OBA-6A	OBA-6B	PR-4	OBA-14C	OBA-6C
OBA-7A	OBA-7B	PR-5	OBA-15B	OBA-8C
OBA-8A	OBA-8B	PR-6	Production Well	OBA-11C
OBA-9A	OBA-11B	PR-7		
OBA-9AR	OBA-16B	PR-8		
OBA-11A	OBA-23B	PR-9		
OBA-16A	PN-1B	PR-10		
OBA-18A	PN-2B	PR-11		
OBA-19A	PN-3B	PR-12		
OBA-23A	PN-4B	PR-13		
PN-1A	PN-5B	PR-14		
PN-2A	PN-6B	RW-1		
PN-3A	PN-7B	RW-2		
PN-4A	PN-8B	RW-3		
PN-5A	PN-9B	RW-4		
PN-6A	PN-10B	RW-5		
PN-7A	PN-11B	PR-1-PZ		
PN-8A	PN-12B	PR-2-PZ		
PN-9A	PN-13B	PR-3-PZ		
PN-10A	PN-14B	PR-4-PZ		
PN-11A	PN-15B	PR-5-PZ		
PN-12A	PN-16B	RW-1-PZ		
PN-13A	PN-17B	RW-2-PZ		
PN-14A	PN-18B	RW-3-PZ		
PN-15A	PN-19B	RW-4-PZ		
PN-16A	PN-20B	RW-5-PZ		
PN-17A	PN-21B			
PN-18A	PN-22B			
PN-19A	PN-23B			
PN-20A	PN-24B			
PN-21A	OBA-4B			
Gill Creek Stilling Well	OBA-14B			
OBA-10A	OBA-24B			
OBA-15A	OBA-25B			
OBA-3A	OBA-26B			
OBA-4A	**OW-4B**			
OBA-14A	**OW-14B**			
OBA-24A	**OW-15B**			
OBA-25A	**OW-22B**			
OBA-26A	**OW-23B**			
OW-5A	**OW-24B**			
OW-6A	**OW-25B**			
OW-20A	**OW-31B**			
OW-21A	**OW-32B**			
OW-22A	**OW-33B**			
	PW-3B			
	PW-4B			

Notes:
OW-5A - Solvent well in Dupont Road-Gill Creek Area

Prepared By: A.Nelson 6/14/2018
Checked By: T. Englund 6/14/2018

Table 3.2: Constituent Monitoring Locations

Wells	Spring Monitoring Event	Fall Monitoring Event
A-Zone Wells		
OBA-1A	X	
OBA-2A	X	
OBA-3A	X	
OBA-4A	X	X
OBA-5A	X	
OBA-8A	X	
OBA-10A	X	
OBA-14A	X	
OBA-15A	X	
OBA-16A	X	
OBA-24A	X	X
OBA-25A	X	X
OBA-26A	X	X
PN-1A	X	
PN-3A	X	
PN-5A	X	
PN-7A	X	
PN-11A	X	
PN-14A	X	
PN-17A	X	
PN-20A	X	X
B-Zone Wells		
OBA-1B	X	
OBA-2B	X	X
OBA-4B	X	X
OBA-5B	X	X
OBA-6B	X	X
OBA-8B	X	
OBA-11B	X	
OBA-14B	X	
OBA-16B	X	
OBA-23B	X	
OBA-24B	X	X
OBA-25B	X	X
OBA-26B	X	X
PN-5B	X	X
PN-7B	X	
PN-11B	X	
PN-12B	X	
PN-15B	X	
PN-17B	X	
PN-20B	X	X
PN-24B	X	X

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Table 4.1: Site Specific Constituent List

Monitoring Parameters and Analysis Methods
Volatile Organic Compounds - SW846 8260C
1,1,1-Trichloroethane
1,1,2,2-Tetrachloroethane
1,1,2-Trichloroethane
1,1-Dichloroethene
1,2,4,-Trichlorobenzene
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
Benzene
Carbon Tetrachloride
Chlorobenzene
Chloromethane
cis-1,2-Dichloroethene
Methylene Chloride
Tetrachloroethene
trans-1,2-Dichloroethene
Trichloroethene
Vinyl Chloride
Pesticides - SW846 8081B
alpha-BHC
beta-BHC
delta-BHC
gamma-BHC (Lindane)
Mercury - SW846 7470A
Total Mercury

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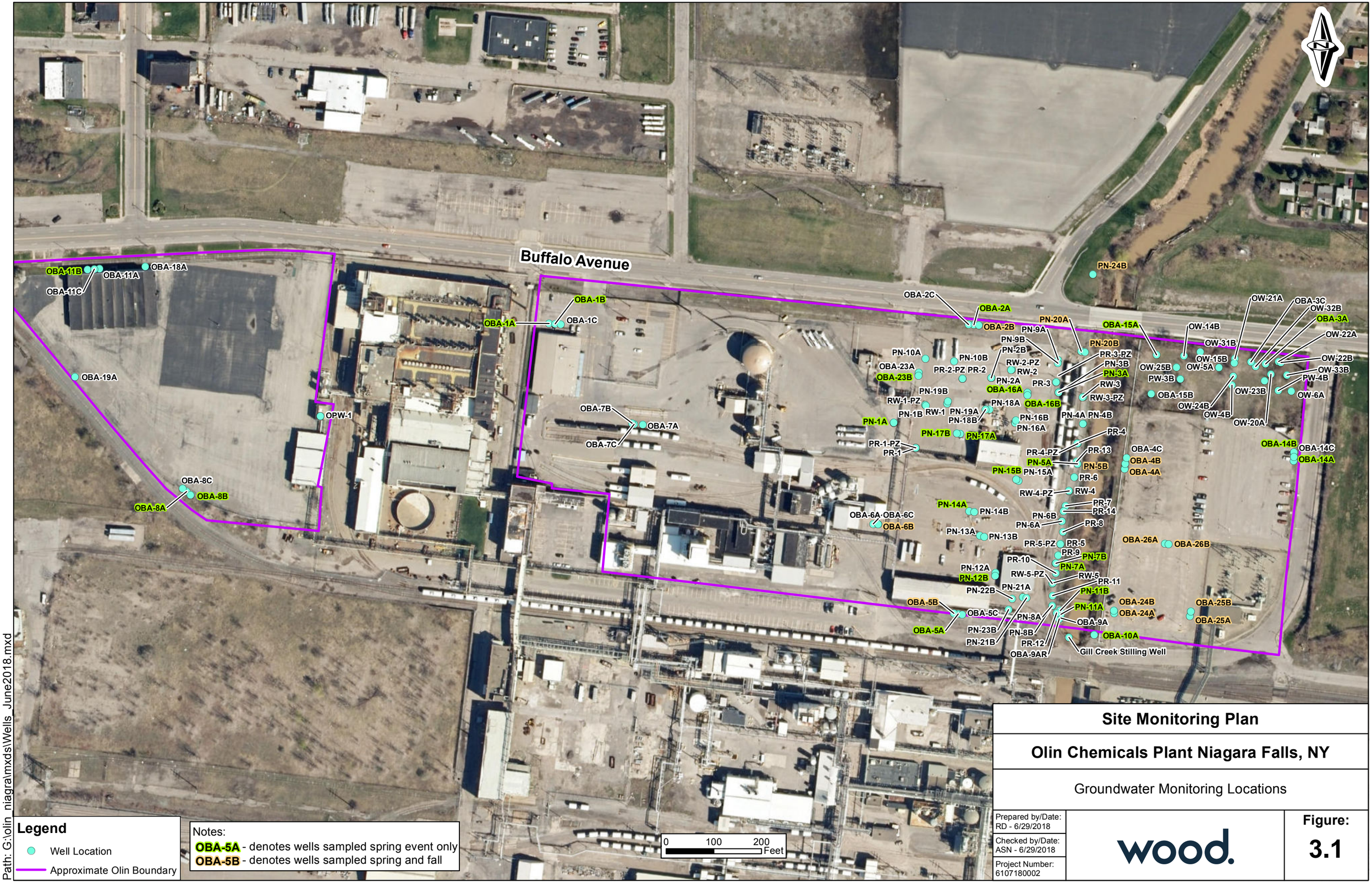
FIGURES



Legend

- Well Location
- Approximate Olin Boundary

Notes:

OBA-5A - denotes wells sampled spring event only

OBA-5B - denotes wells sampled spring and fall

Site Monitoring Plan

Olin Chemicals Plant Niagara Falls, NY

Groundwater Monitoring Locations

Prepared by/Date: RD - 6/29/2018	
Checked by/Date: ASN - 6/29/2018	
Project Number: 6107180002	wood.

Figure: 3.1

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