D&B Engineers and Architects, P.C.

ACTIVE INDUSTRIAL UNIFORM SITE GROUNDWATER EXTRACTION AND TREATMENT SYSTEM

Latitude 40.677°, Longitude -73.365°

REPORT TITLE

Site Management Quarterly Report No. 49

REPORTING PERIOD

January 1, 2017 through March 31, 2017

CLIENT

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SEPTEMBER 2017

3150-07 - AIU Quarterly Report 49.indd (09/13/17 - 12:04 PM)

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Division of Environmental Remediation
625 Broadway, 12th Floor, Albany, New York 12233

Site

NYSDEC Site No. 152125, Active Industrial Uniform Site Groundwater Extraction and Treatment System, Village of Lindenhurst, Town of Babylon, Suffolk County, New York.

Project Background and Site Description

The Active Industrial Uniform site (the Site) groundwater extraction and treatment system (GWE&TS) was designed to recover and treat a chlorinated solvent-contaminated groundwater plume emanating from the Site, a former dry cleaning and laundry facility. Dry cleaning activities were conducted at the Site from the 1980's to 1987. The GWE&TS has been in operation since December 2001; however, D&B assumed site management duties for the Site in February 2005. Refer to *Figure 1* for a Site location map depicting the GWE&TS location.

Groundwater Extraction and Treatment System Overview

The GWE&TS consists of two, 8-inch diameter extraction wells; one located on-site in the southwest portion of the Site (RW-1), and one located off-site, approximately 1,500 feet southwest of the Site (RW-2). As per NYSDEC direction, extraction well RW-2 was shut down in April 2010 due to historically low VOC concentrations, and is now being monitored on a quarterly basis. Extracted groundwater is conveyed to the GWE&TS building via underground piping to two series-configured packed-tower air strippers. Treated groundwater is pumped via underground piping to a storm water basin located approximately 1,000 feet west of the Site, which subsequently discharges into Little Neck Creek, in accordance with all applicable discharge standards. Exhaust gas from the air stripping towers was treated utilizing two granular activated carbon (GAC) vessels in series. Based on historically low contaminant concentrations detected in the air stripper exhaust gas, the air stripper exhaust piping was reconfigured to bypass the GAC vessels and discharge directly to the atmosphere in June 2011, per the direction of the NYSDEC. The GWE&TS is equipped with instrumentation and controls which allow for automated start-up and operation, and an autodial alarm notification system. Refer to *Figure 2* for an "as-built" system layout diagram.

Regulatory Requirements/Cleanup Goals

Site-specific remedial goals have been established through the remedy selection process and are documented in the Record of Decision (ROD), dated March 1997. The site-specific goals outlined in the March 1997 ROD are provided in *Attachment A*. The overall goal is to meet all appropriate Standards, Criteria, and Guidance (SCGs) and to be protective of human health and the environment. Implementation of the GWE&TS is specifically focused on the following goals:

- Reduce, control, or eliminate contaminated media to the extent practicable.
- Eliminate the threat to surface waters by remediating groundwater to the extent practicable.
- Mitigate the impacts of contaminated groundwater to the environment.

- Prevent, to the extent possible, migration of contaminants.
- Provide for attainment of SCGs for groundwater, soil and indoor air within the limits of the affected area, to the extent practicable.
- Reduce the threat of inhalation of site-related vapor-phase contaminants to residents within homes downgradient of the Site.

Remedial System Optimization (RSO)

As part of an ongoing Remedial System Optimization (RSO) effort to improve the efficiency, effectiveness and net environmental benefit of the GWE&TS, an on-site source area assessment and temporary well plume re-delineation program was completed at the Site in February and March 2013. As per a recommendation of the following July 2013 RSO Data Summary Report, a remedial alternatives study was performed for the Site in October 2013. Following review of the remedial alternatives study and several follow-up discussions with the NYSDEC, it was determined that further plume delineation would be required prior to implementing any alternative remedial approach for the Site.

To this end, and based on D&B's recommendations, a membrane interface probe (MIP) investigation, including targeted groundwater sample collection, was completed at the Site on July 7 through 11 and July 14, 2014. It should be noted that the GWE&TS was manually shut down during the MIP Investigation in an effort to achieve static aquifer conditions. The results of the completed MIP investigation and groundwater sampling activities were summarized in a February 2015 MIP Investigation Summary Report. Based on the recommendations presented in the February 2015 MIP Investigation Summary Report, D&B prepared a draft chemical injection Pilot Study Scope of Work to address the identified remaining contamination at and downgradient of the Site. NYSDEC is currently evaluating moving forward with a chemical injection program at the Site.

It should be noted that a system repair and upgrade effort is planned to be completed at the Site in the near future. As a Baseline Investigation for the proposed chemical injection a Pilot Study was initially planned to be completed and as several system repair items were planned to be completed, the system was off-line per NYSDEC's direction following the MIP Investigation. The NYSDEC is still evaluating implementation of the chemical injection program.

As further detailed below, the GWE&TS was restarted in August 2016; however, the system was only operational for a few days until Transfer Pump P-2 failed. Continued efforts to complete system troubleshooting and bring the system back on have been completed throughout this reporting period. However, due to ongoing issues associated with various GWE&TS components, the system has not been operating since August 2016.

Treatment System Operational Status

The GWE&TS was down for the majority of this reporting period as a result of several operational issues as detailed below.

System Wiring and Controls

During a previous reporting period the NYSDEC Remedial Services Contractor contacted ALM Systems, a systems integrator, to assess and troubleshoot issues associated with electrical wiring and systems controls. Following their assessment, several wiring issues were noted at the systems control panel and the PLC was also noted to not be optimally programmed. ALM Systems also concluded that wiring in the VFD had been incorrectly installed and an inoperable cooling fan in the VFD was contributing to operational issues with Transfer Pump P-1. ALM Systems recommended the wiring and systems control issues be rectified. A portion of these activities have been addressed and are detailed below. In February of 2016 the NYSDEC Remedial Services Contractor replaced the transducers at AST-1 and AST-2. On January 16, 2017, the NYSDEC Remedial Services Contractor was on-site to complete troubleshooting activities for the GWE&TS. While on-site the technician completed a check of the transducer wiring to confirm the correct wiring was previously evaluated. On January 17, 2017, the NYSDEC Remedial Services Contractor was on-site to continue troubleshooting activities. At the start of testing the technician reported no readings from the transducers at the PLC, the NYSDEC Remedial Services Contractor then checked and confirmed the transducer was receiving power. After re-checking the wiring and connections all were determined to be shielded and grounded properly. No motors were found to be running, no freezing was evident at the transducer and no splices were found in the lines. The technician continued the system check utilizing a process

meter; however all readings displayed at the PLC were erratic. On January 18, 2017, the NYSDEC Remedial Services Contractor returned to site to continue troubleshooting activities. Utilizing a process meter the NYSDEC Remedial Services Contractor continued simulating signal checks at the PLC; however, all readings displayed erratic results. In response to the issues noted by the NYSDEC remedial services contractor, D&B continued troubleshooting activities on February 14, 2017. They confirmed that the transducers were properly wired and producing appropriate outputs based on varying levels in the respective sumps. Based on their observations it was concluded that the erratic readings observed at the PLC were most likely attributed to faulty PLC components and recommended coordinating with a controls contractor to continue troubleshooting efforts. On March 8, 2017, D&B returned to the site with ALM Systems where the following items were identified and remedied:

1. The VFD for the fan blower would not run when the system was in auto and required the operator to start the VFD manually. A jumper was installed to automatically engage the drive instead of relying on manually starting the blower;
2. The pressure switches at the discharge of Transfer Pump P-1 & P-2 had been disabled and the pressure switch at Transfer Pump P-1 was also inoperable. As Transfer Pump P-2 has failed, its pressure switch was relocated to Transfer Pump P-1 and the switch was properly hooked up to the system controls; and,
3. The PLC analog input module was replaced as erroneously high readings were being observed at the PLC for liquid levels in AST-1 and AST-2 and for flow readings. Upon replacement, the levels observed properly correlated to the level readings anticipated from directly powering and measuring the pressure transducers at the towers. Additionally, the flow readings correlated with the readings observed at the individual flow meters except for at discharge flowmeter. The span was adjusted for the discharge flowmeter to correct the discrepancy.

Following completion of the above repairs the system was successfully restarted on March 8, 2017, utilizing only AST-1 as Transfer Pump P-2 needs repair or replacement. Based on the system inspection completed on March 8, 2017, D&B recommended implementation of the following repairs pertaining to the GWE&TS wiring and controls:

1. Addition of a low safety switch for the AST-1 and AST-2 sumps;
2. Replacement of the pressure switches for Transfer Pump P-1 and P-2
3. Repair of wiring for Transfer Pump P-1 and P-2;
4. Replacement of the control panel lights with LEDs as all lights were inoperable;
5. Replacement of the auto dialer as it was inoperable; and,
6. Configuring of the VFDs for Transfer Pump P-1 and P-2 to operate at operator selected fixed frequencies instead of PID loops.

On March 13, 2017, D&B returned to the site for a system inspection and found the system off due to a freeze up at AST-1. Additionally, erratic signals were observed at the PLC and D&B recommended replacing the PLC base. Per the NYSDEC's direction the system was left off pending completion of additional system repairs recommended by D&B which are further discussed below.

Transfer Pump P-1

As noted above the GWT&ES was successfully restarted on March 8, 2017, utilizing only AST-1 as Transfer Pump P-2 needs repair or replacement. Based on the system inspection completed on March 8, 2017, D&B recommended repairing a leak that was identified at the 4-inch discharge union of Transfer Pump P-1.

Transfer Pump P-2

Based on the system inspection completed on March 8, 2017, D&B recommended repair or replacement of the Transfer Pump P-2 pump head and repair of the Transfer Pump P-2 motor shroud. Additionally, D&B recommend replacing the pressure gauge for Transfer Pump P-2.

Influent and Effluent Piping

Based on the system inspection completed on March 8, 2017, D&B recommended implementation of the following repairs pertaining to the GWE&TS influent and effluent piping:

1. Replacement of the pressure gauges for RW-1 and the combined influent line;
2. Install a vacuum breaker on the effluent line to eliminate siphoning; and,
3. Repair a leak identified at the threaded plug/tee where piping exits through building slab.

Condensate Pump and Piping

Based on the system inspection completed on March 8, 2017, D&B recommended repairing the piping from the fan blower knock out tank and from the pump to the system influent line.

Air Stripper Towers

Based on the system inspection completed on March 8, 2017, D&B recommended implementation of the following repairs pertaining to the Air Stripper Towers:

1. Reinstalling heat trace and associated insulation on the drains of both towers;
2. Replacing the vacuum gauges and associated tubing for both towers; and,
3. Installing a sight glass with associated heat trace and insulation for both towers.

Extraction Well Redevelopment

On August 8, 2016, the NYSDEC Remedial Services Contractor performed the following well redevelopment activities at extraction well RW-1; one round of well screen brushing, two rounds of pumping (via air lift) and surging of the well, where approximately 465 gallons were removed from the well per air lift. On August 10, 2016, the NYSDEC Remedial Services Contractor returned to site to redeploy the pump in RW-1 completing all well redevelopment activities. Additionally, on August 9, 2016, well redevelopment activities were attempted at extraction well RW-2. Approximately 13 feet of material was identified in the well. After several attempts approximately 6 feet of the accumulated material was removed; however, NYSDEC Remedial Services Contractor was unable to successfully complete the slated well redevelopment. On August 16, 2016, the NYSDEC Remedial Services Contractor was on-site to complete boroscoping activities at extraction well RW-2 to identify any structural issues within the well. The inspection did not identify any structural issues with RW-2.

A summary of GWE&TS runtime/downtime for this reporting period is summarized below.

Treatment System Runtime/Downtime Summary		
Approximate Runtime - Current Reporting Period [(1)(2)]	114 hours	5.3%
Approximate Downtime - Current Reporting Period [(2)]	2,046 hours	94.7%
Approximate Total Runtime to Date [(3)]	61,695 hours	58.8%
Approximate Total Downtime to Date [(3)]	43,276 hours	41.2%

Notes:

1. Total elapsed time for current reporting period is 2,160 hours (January 1, 2017 through March 31, 2017).
2. The downtime associated with this reporting period is due to on-going system control issues.
3. Total downtime is based on when D&B assumed O&M duties in February 2005. The GWE&TS was shut down from December 2012 to May 2013 due to elevated VOC concentrations detected in system aqueous-phase effluent samples and to allow for the completion of the field investigation portion of the RSO evaluation at the Site. Additionally, GWE&TS was manually shut down on April 30, 2014 and remained off until November 3, 2014, when it was restarted. The GWE&TS remained off during this time due to anomalous elevated contaminant concentrations in aqueous-phase effluent samples, for inspection of a partially blocked discharge pipe and in an effort to achieve static aquifer conditions for the MIP Investigation program. Furthermore, the GWE&TS has not operated since December of 2014, except for brief periods in August of 2016 and during this reporting period, as noted above.

Treatment System Performance Summary

The GWE&TS performance during the current reporting period and since D&B assumed O&M duties in February 2005 is summarized below. The GWE&TS was not operational for the majority of this reporting period, as detailed above.

Treatment System Performance Summary

Parameter	Quarter 49 (January 1, 2017 through March 31, 2017)	Quarter 48 (October 1, 2016 through December 31, 2016)[4]	Totals to Date (February 2005 through current Quarter)
Influent [1]			
RW-1 Average Pumping Rate (gal per min)	50.34	NA	78
RW-1 Total Flow Volume (gal)	359,452	NA	386,712,064
RW-1 Maximum Influent PCE Concentration (ug/l)	0.39	1.4	510
RW-2 Average Pumping Rate (gal per min) [2]	NA	NA	80
RW-2 Total Flow Volume (gal)	NA	NA	129,900,729
RW-2 Maximum Influent PCE Concentration (ug/l)	0.31	1.6	140
Influent Total Flow Volume (gal)	NA	NA	516,253,341
Effluent [3]			
Effluent Total Flow Volume (gal)	347,200	NA	513,482,731
Maximum Effluent PCE Concentration (ug/l)	NA	NA	16
VOC Removal Summary			
Total VOC Removal (lbs)	0.01	NA	1,640
Average VOC Removal Rate (lbs/hr)	5.82E-05	NA	1.48E-02
VOC Removal Efficiency Range (%)	100%	NA	77.66 - 100%

NA: Not applicable. ND: Constituents concentrations below the analytical detection limit.

Notes:

1. As the GWE&TS was not operating for the majority of this reporting period, as detailed above, aqueous-phase influent samples were not collected throughout this reporting period. However, the NYSDEC Remedial Services Contractor collected a groundwater sample from extraction well RW-1 for VOC analysis only, during the quarterly groundwater sampling event conducted on January 31, 2017, per NYSDEC direction.
2. As described above, extraction well RW-2 was shut down in April 2010, and has generally remained off since this time, based on low historic VOC concentrations, as per NYSDEC direction. As RW-2 is not currently operating, monthly samples are not collected from this extraction well. RW-2 is currently being sampled on a quarterly basis, as part of the quarterly groundwater sampling effort.
3. The effluent flow meter was noted by the NYSDEC Remedial Services Contractor to be malfunctioning on January 1, 2014. The GWE&TS was shut down from this date until January 10, 2014. Per NYSDEC request, the GWE&TS was then operated without the effluent flow meter from January 10, 2014 to March 19, 2014, when a new meter was installed. The GWE&TS flow values were estimated based on recent effluent flow volume data from this approximate time period. As the GWE&TS was not operating throughout the majority of this reporting period, aqueous-phase effluent samples were not collected.
4. As the GWE&TS was not operating throughout the previous reporting period, aqueous-phase influent and effluent samples were not collected.

Treatment System Cost Summary[1]		
COST ITEM	**CURRENT REPORTING PERIOD BUDGET EXPENDED (January 1, 2017 through March 31, 2017)**	**PREVIOUS REPORTING PERIOD BUDGET EXPENDED (October 1, 2016 through December 31, 2016)**
ENGINEERING SUPPORT		
D&B Engineers and Architects, P.C.	$39,832	$17,674
SUBCONTRACTORS		
NYSDEC Remedial Services Contractor[2] (Routine/Non-Routine Maintenance Activities)	$10,709	$6,863
Test America (Analytical Laboratory)	$986	$677
SUB-TOTAL	$11,695	$7,540
UTILITIES		
Electric	$1,805	$1,410
Telephone	$247	$297
Natural Gas	$148	$140
Water	$335	$34
SUB-TOTAL	$2,535	$1,881
TOTAL COSTS	$54,062	$27,095
AVERAGE COST/MONTH	$18,021	$9,032
COST/POUND OF VOC REMOVED	NA[3]	NA[3]

NA: Not applicable.

Notes:

1. The treatment system costs include monthly utility charges, maintenance costs and engineering costs. Capital construction costs and NYSDEC project management efforts are not included in this evaluation.
2. Remedial Services Contractor costs do not include utility costs.
3. As the GWE&TS was not operating throughout the majority of this or the previous reporting period, VOCs removal rates were not calculated for this or the previous reporting period; therefore, total costs per pound of VOCs removed are not able to be calculated.

Treatment System Operation and Maintenance

It should be noted that, as the GWE&TS was not operating throughout the majority of this reporting period, no alarm conditions occurred throughout this reporting period and routine and non-routine system maintenance activities were not conducted. As such, there are no operation and maintenance logs associated with this reporting period.

Routine Equipment Maintenance Schedule Summary

Major System Component	Manufacturer	Model Number	Maintenance Frequency	Maintenance Summary					
				Current Reporting Period (1)			Next Reporting Period		
				Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17
Extraction Well Pump RW-1	Grundfos Pump Corp.	150550-2	As needed based on flow trends						
Extraction Well Pump RW-2	Grundfos Pump Corp.	1505100-5	As needed based on flow trends						
Pressure Blower	Cincinnati Fan	PB-18	Bi-Monthly						
Vapor Carbon Vessels	Cameron Great Lake	VS7.2x6.7x8.6-5000-DUAL	As needed based on analytical results						
Air Stripper Maintenance	Branch Environmental	48T-25H	As needed based contaminant concentrations						
Air Stripper Transfer Pump Maintenance	Magnatex Pumps, Inc.	MTA-A10-P-F20-2-FE	Quarterly						

: Planned Activity

Notes:
1. Routine maintenance was not performed due to the system being shut down throughout the majority of this reporting period.

Non-Routine Treatment System Maintenance:

- On January 16, 2017, the NYSDEC Remedial Services Contractor was on-site to complete troubleshooting activities for the GWE&TS. While on-site the technician completed a check of the transducer wiring to confirm the correct wiring was previously evaluated. Upon arrival to site the NYSDEC Remedial Services Contractor found the SCWA waterline cracked at the flow meter due to freezing. The NYSDEC Remedial Services Contractor was able to pump out the accumulated water and repair the copper line prior to departure from site.
- On January 17, 2017, the NYSDEC Remedial Services Contractor was on-site to continue troubleshooting activities. At the start of testing the technician reported no readings from the transducers at the PLC, the NYSDEC Remedial Services Contractor then checked and confirmed the transducer was receiving power. After re-checking the wiring and connections all were determined to be shielded and grounded properly. No motors were found to be running, no freezing was evident at the transducer and no splices were found in the lines. The technician continued the system check utilizing a process meter; however all readings displayed at the PLC were erratic.
- On January 18, 2017, the NYSDEC Remedial Services Contractor returned to site to continue troubleshooting activities. Utilizing a process meter the NYSDEC Remedial Services Contractor continued simulating signal checks at the PLC; however, all readings displayed erratic results.
- On February 14, 2017, D&B was on-site to continue troubleshooting activities to confirm the transducers were properly wired and producing appropriate outputs based on varying levels in the respective sumps. Based on observations it was concluded that the erratic readings observed at the PLC were most likely attributed to faulty PLC components and recommended coordinating with a controls contractor to continue troubleshooting efforts.

- On March 8, 2017, D&B and ALM Systems were on-site to continue troubleshooting activities. A jumper was installed at the VFD for the fan blower, allowing for the system to automatically engage the drive instead of relying on the manual start by the operator. It was also identified that the pressure switches at the discharge of Transfer Pump P-1 & P-2 had been disabled and the pressure switch at Transfer Pump P-1 was also inoperable. Due to failure at Transfer Pump P-2 its pressure switch was relocated to Transfer Pump P-1 and the switch was properly hooked up to the system controls. Additionally, the PLC analog input module was replaced as erroneously high readings were being observed for liquid levels in AST-1 and AST-2 and for flow readings. Upon replacement, the levels observed properly correlated to the level readings anticipated from directly powering and measuring the pressure transducers at the towers. In addition, it was observed that flow readings correlated with readings observed at the individual flow meters except for at the discharge flowmeter. D&B and ALM Systems adjusted the span for the discharge flowmeter to correct the discrepancy. Following completion of these repairs the system was successfully restarted.

- On March 13, 2017, D&B was on-site for a system inspection and found the system off due to a freeze up at AST-1. Additionally, erratic signals were observed at the PLC and D&B recommended replacing the PLC base. Per the NYSDEC's direction the system was left off pending completion of additional system repairs recommended by D&B.

- On March 15, 2017, the NYSDEC Remedial Services Contractor was on-site to assess the gas heater operation. Both units were found inoperable and determined HVAC services is required for assessment and or replacement.

Facility Maintenance:

No facility maintenance occurred throughout this reporting period.

Alarm Conditions:

- On March 13, 2017, D&B was on-site for a system inspection and found the system off due to general alarm caused by a freeze up at AST-1. Per the NYSDEC's direction the system was left off pending completion of additional system repairs.

Treatment System Monitoring and Sampling Results

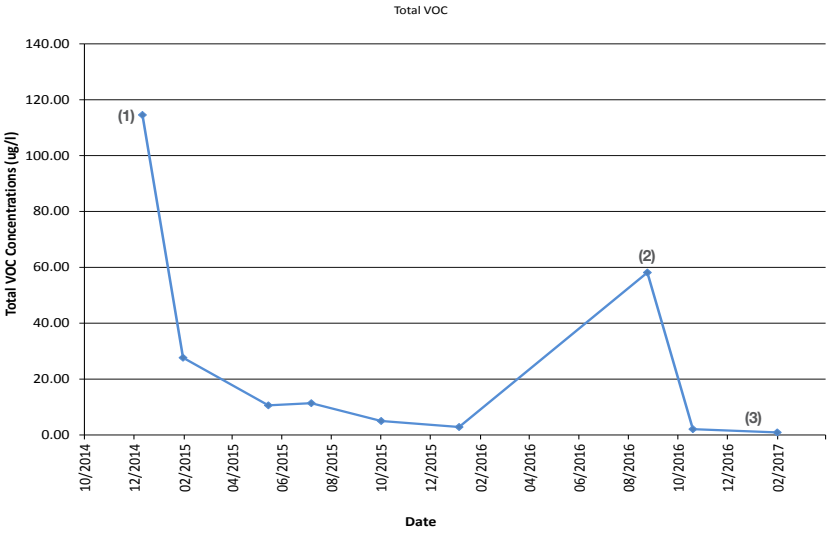
A summary of the routine treatment system monitoring and sampling collection and associated results are provided below.

Treatment System and Groundwater Sampling Summary

Sampling Location	Monthly				Quarterly	Semi-Annual	
	Influent/Effluent VOC (EPA Method 8260)	Influent/Effluent TAL Metals (EPA Method 6010)	Effluent pH (Field Screening)	Effluent TDS (EPA Method 160.1 or SM 2540C)	Monitoring Well VOC (EPA Method 8260)	Monitoring Well VOC (EPA Method 8260)	Effluent VOC (EPA Method TO-15)
Extraction Well RW-1 Influent[1]	1/31/2017						
Extraction Well RW-2 Influent[2]							
Air Stripper Aqueous-Phase Effluent [3]							
Air Stripper Vapor-Phase Effluent [4] [5]							
Groundwater Monitoring Wells MW-103 through MW-107, MW-2S, MW-4D, MW-5S and RW-2					1/19/2017 1/20/2017 1/31/2017		
Groundwater Monitoring Wells MW-101, MW-102, MW-108, MW-109 and MW-111						1/19/2017 1/20/2017	

1. As the GWE&TS was not operating for the majority of this reporting period, aqueous-phase influent samples were not collected throughout this reporting period. However, the NYSDEC Remedial Services Contractor collected a groundwater sample from extraction well RW-1 for VOC analysis only, during the quarterly groundwater sampling event conducted on January 31, 2017.
2. As RW-2 is not currently being operated, monthly samples are not collected from this extraction well; however, RW-2 is currently being sampled on a quarterly basis, as part of the quarterly groundwater sampling effort.
3. As the GWE&TS was not operating throughout the majority of this reporting period, aqueous-phase effluent samples were not collected throughout this reporting period.
4. Monthly effluent vapor samples are analyzed utilizing tedlar bags and a hand-held photoionization detector (PID). However, effluent vapor samples were not collected during this reporting period as the GWE&TS was not operating for the majority of this reporting period.
5. System vapor-phase effluent samples are to be collected on a semi-annual basis. However, as the system was not operating throughout the majority of this reporting period, a vapor-phase effluent sample was not collected. Vapor-phase effluent samples for laboratory analysis were last collected on April 3, 2014.

Extraction Well RW-1 Total VOC Concentration Trend Line



1. As previously discussed, the GWE&TS was manually shut down on April 30, 2014 and remained off until November 3, 2014, when it was restarted, as per NYSDEC direction. The GWE&TS remained off during this time due to anomalous elevated contaminant concentrations in aqueous-phase effluent samples, for inspection of a partially blocked discharge pipe and in an effort to achieve static aquifer conditions for the MIP Investigation program.
2. The GWE&TS was operating for a brief amount of time throughout the July to September reporting period, as such only one aqueous-phase influent sample was collected from RW-1 for VOC analysis only, in August 2016.
3. The GWE&TS was not operating throughout the majority of this reporting period and through the duration of the previous reporting period. As such, aqueous-phase influent samples were not collected throughout these reporting periods. It should be noted that a groundwater sample was collected from extraction well RW-1 for VOC analysis only, as part of the quarterly groundwater sampling conducted on January 31, 2017.

Extraction Well RW-1 - System Influent Contaminant Concentration Ranges/Averages (1)

Contaminant (2)	Current Reporting Period (3)	Previous Reporting Period	Average to Date	Class GA Groundwater Standard
Tetrachloroethene (PCE)	0.39	1.40 ug/l	166 ug/l	5.0 ug/l
Trichloroethylene (TCE)	ND	0.23 ug/l	43.9 ug/l	5.0 ug/l
Cis-1,2-Dichloroethene (cis-1,2-DCE)	0.52	0.43 ug/l	72 ug/l	5.0 ug/l
Vinyl chloride (VC)	ND	ND	0.96 ug/l	2.0 ug/l
Iron	--	--	186 ug/l	300 ug/l
Manganese	--	--	1,198 ug/l	300 ug/l
Sodium	--	--	25,622 ug/l	20,000 ug/l

ND: Constituent concentration below the analytical detection limit. --: Not analyzed

Red font denotes an exceedance of the applicable standard.

1. Only includes constituents consistently or periodically detected in exceedance of their respective Class GA Groundwater Standard.
2. Click on the blue-colored contaminants for graphs of VOC concentrations over the last 2 years for VOCs detected above the Class GA Groundwater Standards for this and/or the previous reporting periods.
3. As the GWE&TS was not operating for the majority of this reporting period or the previous reporting period, the aqueous-phase influent sample collected from RW-1 was submitted for VOC analysis only, as per NYSDEC direction.

Aqueous-Phase Air Stripper Effluent Concentration Ranges (1)			
Discharge Permit Parameters	Current Reporting Period (2)	Previous Reporting Period (2)	Site-Specific Effluent Limit
PCE	--	--	10.0 ug/l
TCE	--	--	10.0 ug/l
Cis-1,2-DCE	--	--	NL
VC	--	--	10.0 ug/l
Iron	--	--	1,000 ug/l
Manganese	--	--	NL
Sodium	--	--	NL
pH	--	--	6.5 - 8.5

ND: Constituent concentration below the analytical detection limit. NL: No limit. - - : Not analyzed.

1. Only includes constituents historically detected in exceedance of their respective Class GA Groundwater Standard in influent water.
2. As the GWE&TS was not operating throughout the majority of this reporting period and the previous reporting period, no aqueous-phase effluent system samples were collected.

Quarterly Groundwater Monitoring Summary

Select groundwater monitoring wells and each extraction well were sampled on January 19, 2017, January 20, 2017, and January 31, 2017, to determine groundwater quality at and in the vicinity of the Site. Samples were collected from ten on-site groundwater monitoring wells (MW-101 through MW-108, MW-4D and MW-5S) and three off-site groundwater monitoring wells (MW-111, MW-109 and MW-2S) on January 19, and 20, 2017. Additionally, off-site and on-site extraction wells (RW-1 and RW-2) were sampled on January 31, 2017.

The locations of the on-site groundwater monitoring wells are depicted on *Figure 3* and the locations of off-site groundwater monitoring wells are depicted on *Figure 4*.

Groundwater Monitoring Well Condition Summary

All on-site sampled groundwater monitoring wells were located as indicated on the site map and the concrete well pads (where applicable), protective casings, surface seals, well IDs, PVC well risers, well plugs and locks were observed to be present and in good condition with the exception of:

- Bolts are missing from monitoring wells MW-102 and MW-106.
- Locks are not present at extraction wells RW-1 and RW-2.
- Dome cap at extraction well RW-2 is cracked.

Refer to *Attachment B* for monitoring well inspection logs.

Groundwater Monitoring Results Summary:

A headspace reading was collected utilizing a PID at each groundwater monitoring well. PID readings were collected from each well immediately after the removal of the well caps and plugs. VOCs were detected between 0.0 to 6.1 ppm in headspace readings of the monitoring wells.

Below is a table summarizing the site-specific contaminants of concern in on-site and off-site groundwater. Refer to *Attachment C* for analytical data results.

Site-Specific Contaminant of Concern Concentrations (1)

Monitoring Well (2)	PCE		TCE		Cis-1,2-DCE		Vinyl Chloride		Site-Specific 2-Year Contaminant Trend Analysis
	Current Reporting Period	Previous Reporting Period	Current Reporting Period	Previous Reporting Period	Current Reporting Period	Previous Reporting Period	Current Reporting Period	Previous Reporting Period	
On-Site Monitoring Wells									
MW-101	1.4 ug/l	NS	0.98 ug/l	NS	ND	NS	ND	NS	Stable
MW-102	1.9 ug/l	NS	0.50 ug/l	NS	ND	NS	ND	NS	Stable
MW-103	6.2 ug/l	4.0 ug/l	0.61 ug/l	0.58 ug/l	180 ug/l	0.81 ug/l	29 ug/l	ND	Increasing
MW-104	42 ug/l	21 ug/l	4.7 ug/l	4.7 ug/l	0.55 ug/l	3.5 ug/l	ND	ND	Decreasing
MW-105	14 ug/l	0.53 ug/l	ND	0.25 ug/l	0.52 ug/l	120 ug/l	ND	9.0 ug/l	Decreasing
MW-106	13 ug/l	3.0 ug/l	9.1 ug/l	1.8 ug/l	29 ug/l	34 ug/l	3.1 ug/l	6.0 ug/l	Decreasing
MW-107	1.7 ug/l	1.2 ug/l	0.63 ug/l	0.39 ug/l	ND	ND	ND	ND	Stable
MW-108	6.9 ug/l	NS	0.39 ug/l	NS	ND	NS	ND	NS	Stable
MW-4D	550 ug/l	360 ug/l	91 ug/l	46 ug/l	27 ug/l	5.3 ug/l	1.9 ug/l	ND	Decreasing
MW-5S	0.49 ug/l	0.34 ug/l	ND	ND	ND	ND	ND	ND	Stable
Off-Site Monitoring Wells									
MW-109	0.99 ug/l	NS	1.2 ug/l	NS	1.2 ug/l	NS	ND	NS	Decreasing
MW-111	ND	NS	ND	NS	ND	NS	ND	NS	Stable
MW-2S	4.4 ug/l	9.3 ug/l	1.1 ug/l	3.0 ug/l	11 ug/l	18 ug/l	0.72 ug/l	0.72 ug/l	Increasing
RW-2 (1)	0.31 ug/l	1.6 ug/l	0.63 ug/l	5.4 ug/l	0.46 ug/l	6.2 ug/l	ND	ND	Increasing

ND: Constituent concentration below the analytical detection limit. NS: Not sampled.

Red font denotes an exceedance of the constituents Class GA Groundwater Standard (5.0 ug/l for PCE, TCE and cis-1,2-DCE, and 2.0 ug/l for VC).

In addition, the following VOCs were also detected in one or more wells, generally well below their respective Class GA Groundwater Standards: acetone, bromoform, bromodichloromethane, chloroform, dibromochloroethane, 1,1-dichloroethane, MTBE and trans-1-2 dichloroethene.

Click on monitoring well IDs for graphs depicting contaminant concentrations over the last 2 years in wells exhibiting exceedances of the Class GA Groundwater Standards for this and the previous reporting period.

1. Extraction well RW-2 is sampled on a quarterly basis in order to better monitor off-site contaminant concentrations.

Site-specific VOC concentrations in wells sampled during this reporting period were generally slightly higher than, or consistent with, those detected during the previous reporting periods. In addition, eleven of the fourteen monitoring wells exhibited overall decreasing or stable concentrations of the site-specific contaminants of concern over the past 2-year period, and three of the fourteen monitoring wells exhibited generally increasing contaminant trends over the past 2-year period including MW-103, MW-2S and RW-2. A figure depicting total VOC concentrations in on-site and off-site wells is provided as *Figure 5*.

On-site monitoring well MW-4D exhibited an over-all decreasing trend throughout the last 2 years; however, this reporting period site specific VOC concentrations increased as compared to the previous reporting period. Contaminant concentrations in monitoring well MW-4D have generally fluctuated widely over the last two years. However, it should be noted that contaminant concentrations have generally remained consistent in this well since May 2015, well below the greatly elevated concentrations initially observed in this well upon its identification in June 2012. It should be noted that monitoring well MW-4D is screened at a depth approximately 30 feet deeper than on-site extraction well RW-1 and the on-site monitoring wells. As previously reported, a MIP Investigation completed at the Site in July 2014 indicated that elevated concentrations of site-specific contaminants, primarily PCE, have been detected in groundwater monitoring well MW-4D, with PCE concentrations fluctuating up to a high of 110,000 ug/l (detected in both June and September 2012) since the well has been routinely sampled starting in September 2012.

As discussed in previous Site Management Quarterly Reports, off-site extraction well RW-2 has exhibited widely varying concentrations of total VOCs, with total VOC concentrations ranging from non-detect to a maximum of 103.3 ug/l (detected on February 12, 2014), since the well has been sampled along with the quarterly monitoring wells in mid-2011.

Data Validation:

All sample results have been reviewed by D&B and deemed valid and usable for environmental assessment purposes.

The percent recovery (%R) for 1,2,3-trichlorobenzene was below the quality control (QC) limit in the matrix spike (MS) associated with all samples except MW-106. The %R for 1,2,3-trichlorobenzene and naphthalene were below the QC limits in the MS associated with sample MW-106. 1,2,3-trichlorobenzene and naphthalene were qualified as an estimated detection limit (UJ) in their associated samples collected on January 19, 2017.

The %R for chloroethane was above the lab control sample (LCS). Chloroethane was not detected therefore qualification of the data was not necessary for the aqueous-phase samples collected on January 20, 2017.

Data Validation Checklists are presented in *Attachment D*.

Findings and Recommendations

Findings:

- GWE&TS Operation: Due to ongoing issues associated with various GWE&TS components, the system was not operational for the majority of this reporting period. The GWE&TS was restarted on March 8, 2017; however, due to a freeze up at AST-1 the system was found off on March 13, 2017. Per the NYSDEC's direction the system will remain off pending completion of additional system repairs recommended by D&B.
- GWE&TS Maintenance: The NYSDEC Remedial Services Contractor did not complete any routine maintenance during this reporting period, as the GWE&TS was not operating for the majority of this reporting period. However, as detailed above, non-routine maintenance was completed in an effort to restart the GWE&TS. Non-routine maintenance activities consisted of the installation of a jumper at the VFD for the fan blower; relocating the pressure switch for Transfer Pump P-2 to Transfer Pump P-1 and properly hooking up the pressure switch to the systems controls; and, the replacement of the PLC analog input module.
- System Aqueous-Phase Influent and Effluent Contaminant Concentrations: As the GWE&TS was not operating throughout the majority of this reporting period, aqueous-phase influent samples were not collected on a monthly basis; however, the NYSDEC Remedial Services Contractor collected a groundwater sample from each of the extraction wells (RW-1 and RW-2) on January 31, 2017, for VOC analysis only, as part of the quarterly groundwater sampling event, per NYSDEC direction. It should be noted that site-specific contaminants of concern, were detected at concentrations below their respective Class GA Standards within the collected groundwater samples.
- System Vapor-Phase Effluent Monitoring: System vapor-phase effluent samples are to be collected on a semi-annual basis. However, as the system was not operating throughout the majority of this reporting period and the entire previous reporting period, vapor-phase effluent samples for laboratory analysis have not been collected since April 2014.
- Monitoring Well Conditions: All on-site sampled groundwater monitoring wells were located as indicated on the site map and the concrete well pads (where applicable), protective casings, surface seals, well IDs, PVC well risers, well plugs and locks were observed to be present and in good condition with the exception of:
    - Bolts are missing from monitoring wells MW-102 and MW-106.
    - Locks are not present at extraction wells RW-1 and RW-2.
    - Dome cap at extraction well RW-2 is cracked.
- Monitoring/Extraction Well Sampling: On-site groundwater monitoring wells (MW-103, MW-104, MW-105, MW-106, MW-108 and MW-4D) and off-site monitoring well (MW-2S) exhibited one or more of the site-specific VOCs at concentrations exceeding their respective Class GA Groundwater Standards during this reporting period. It should also be noted that PCE was detected in thirteen of the fourteen groundwater monitoring wells at concentrations ranging from 0.49 ug/l to a maximum of 550 ug/l, as detected in groundwater monitoring well MW-4D. However, PCE only exceeded the Class GA Standard of 5 ug/l in six of the groundwater monitoring wells. It should be noted that, VOC's

detected in monitoring wells MW-103 and MW-105 display increased levels in MW-103 and decreased levels in MW-105 during this reporting period compared to the last reporting period. When examining the analytical data it appears that the sampling technician may have inadvertently mislabeled MW-103 with MW-105.

Recommendations:

- General Treatment System:
  - It is recommended to expedite the above-referenced repair activities and bring the GWE&TS back online and ensure contaminant capture on-site.
  - Based on varying site-specific contaminant concentrations in monitoring well MW-4D and extraction well RW-2, it is recommended that the GWE&TS be restarted with both extraction wells operating and remain operational to ensure capture of on-site and off-site shallow groundwater contamination.
  - Based on the remaining elevated contaminant concentrations in groundwater still detected at the site, it is recommended that additional subsurface investigation be completed beneath and in the immediate vicinity of the treatment system building to evaluate possible remaining areas of contamination below the treatment system building slab.
  - Site Perimeter Fencing – Repair hole in fence between the Site and the adjacent property to the west.
  - Water Service – Install the back flow preventer. Reconnect water supply line to acid storage tank and exterior hose bibs.
  - Building Heaters – Repair or replace two existing gas unit heaters.
  - D&B recommends that the NYSDEC Remedial Services Contractor record more clear and detailed descriptions of completed field activities and issues encountered, as well as alarm triggers, downtime dates and times and the steps taken to bring the GWE&TS back online on the Site Activities and System Operation Logs, as appropriate. In addition, logs received over the last several quarters have included multiple copies of logs, including some differing information. As such, D&B further recommends that the NYSDEC Remedial Services Contractor make an effort to provide one set of logs with all descriptions and dates of activities clearly indicated. These steps will help enable D&B to better understand the current status of the GWE&TS and facilitate a more efficient preparation of the Site Management Quarterly Reports. In addition, it is recommended that the NYSDEC Remedial Services Contractor adhere to the routine maintenance schedule.
- Treatment System Operational Issues:
  - System Wiring and Controls: D&B recommends that the NYSDEC Remedial Services Contractor add a low safety switch for the AST-1 and AST-2 sumps; replace the pressure switches for Transfer Pump P-1 and P-2; repair the wiring for Transfer Pump P-1 and P-2; replace the control panel lights with LEDs; replace the auto dialer; configure the VFDs for Transfer Pump P-1 and P-2 to operate at operator selected fixed frequencies instead of PID loops; and, replace the PLC base.
  - Transfer Pump P-1: D&B recommends that the NYSDEC Remedial Services Contractor repair the leak identified at the 4-inch discharge union of Transfer Pump P-1.
  - Transfer Pump P-2: D&B recommends that the NYSDEC Remedial Services Contractor repair or replace the Transfer Pump P-2 pump head; repair the Transfer Pump P-2 motor shroud; and, replace the pressure gauge to ensure proper system operations.
  - Influent and Effluent Piping: D&B recommends implementation of the following repairs pertaining to the GWE&TS influent and effluent piping: replacement of the pressure gauges for RW-1 and the combined influent line; installation of a vacuum breaker on the effluent line to eliminate siphoning; and, repair a leak identified at the threaded plug/tee where piping exits through building slab.

- Condensate Pump and Piping: D&B recommends repairing the piping from the fan blower Knock Out Tank and from the condensate pump to the system influent line.
- Air Stripper Towers: D&B recommends the implementation of the following repairs pertaining to AST-1 and AST-2: reinstall heat trace and associated insulation on the drains of both towers; replace the vacuum gauges and associated tubing for both towers; and, install a sight glass with associated heat trace and insulation for both towers.
- Well Redevelopment: D&B recommends that the NYSDEC Remedial Services Contractor complete well redevelopment activities at extraction well RW-2 and reinstall the submersible pump.

- Monitoring/Extraction Well Sampling: Based on the widely varying VOC concentrations detected in several wells over the course of several previous monitoring events it is recommended that the NYSDEC ensures that the Remedial Services Contractor is utilizing proper and consistent sampling techniques during each groundwater sampling event.
- Vapor-Phase Effluent Sampling: The NYSDEC Remedial Services Contractor should collect the semi-annual vapor-phase effluent samples as soon as the system is back up and running, as vapor-phase effluent samples have not been collected since April 3, 2014.
- Off-Site Extraction Well Contaminant Concentrations: As detailed above, off-site extraction well RW-2 has exhibited widely varying concentrations of total VOCs, with total VOC concentrations ranging from non-detect to a maximum of 258.83 ug/l (detected on March 21, 2014), since the well has been sampled along with the quarterly monitoring wells in mid-2011. It is recommended that the GWE&TS be restarted with both extraction wells operating and remain operational to ensure that site-specific contamination is adequately captured and not extending from the Site.
- Off-Site Monitoring Well Network: Due to the varying concentrations of total VOC's exhibited in RW-2 it is recommended that the shallow groundwater monitoring well network be expanded to include the installation of additional shallow monitoring wells on Lane Street, Grove Street, Willow Lane and Palm Street.

Reclassification/Delisting Evaluation

The Site was originally listed as a Class 2 Inactive Hazardous Waste Site by the NYSDEC in November 1990. Since this time, completion of the following project phases has occurred, as summarized below:

Project Phases and Completion Dates

Project Phase	Completion Date
Remedial Investigation	04/1994
Phase II Remedial Design Investigation	12/1998
Remedial Design	06/2000
Groundwater Extraction and Treatment System Construction	12/2001 (1)
UST Removal and Phase I Contaminated Soil Removal IRM	06/2010
Phase II Contaminated Soil Removal IRM	07/2011

1. Construction of the GWE&TS was completed in December 2001. The GWE&TS was placed into routine operation in December 2001 and D&B assumed O&M duties in February 2005.

Given the above, the Active Industrial Uniform Site cannot be reclassified at this time, pursuant to the requirements identified in 6 NYCRR §375-2.7, as site-related contamination has not been fully remediated and continues to pose a significant threat to public health and the environment. As such, Site delisting is not recommended at this time, as all remediation and post-remediation activities have not been satisfactorily completed. Work continues to address residual on-site contamination and system optimization to expedite overall remediation and Site closure.

Report Certification:

I have personally examined and am familiar with the information submitted in the referenced report. To the best of my knowledge and belief, and based upon my inquiry of those individuals immediately responsible for obtaining the information reported therein, I certify that the submitted information is true, accurate, and complete.

Project Director: _____ 9.18.17

Richard M. Walka — **Date**
Senior Vice President

Project Manager: _____ 9/19/2017

James Van Horn — **Date**
Project Manager