

New York State Department of Environmental Conservation Division of Environmental Remediation

Franklin Cleaners Site Groundwater Extraction and Treatment System Site No. 130050

2016 Periodic Review Report (March 2016 through February 2017)





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EXECUTIVE SUMMARY

The Franklin Cleaners Site (the Site) is located at 206-208B South Franklin Street in the Incorporated Village of Hempstead, Nassau County, New York. The groundwater extraction & treatment system (GWE&TS) is located approximately one mile downgradient of the Site at 1000 Hempstead Avenue in the Village of Rockville Centre, New York. The GWE&TS was designed to recover and treat a chlorinated solvent groundwater contamination plume emanating from the Site and discharge the treated groundwater to a Nassau County Department of Public Works storm sewer manhole in accordance with all applicable discharge standards.

It should be noted that the quarterly reporting schedule for this project does not follow a typical calendar year schedule, as the quarterly monitoring period and associated reporting schedule begins in March rather than January. The reporting period for PRRs has been aligned with the project quarterly reporting period reports. As such, the reporting period for this PRR includes the period from March 2016 through February 2017.

Based on evaluation of the performance, effectiveness and protectiveness of the GWE&TS throughout this reporting period (March 1, 2016 through February 28, 2017), the following conclusions and associated recommendations are briefly summarized:

General

- GWE&TS Operation and Remedial Objectives: The overall GWE&TS and remedial components operated in a generally efficient manner and generally within design specifications during this reporting period, with the exceptions as noted below. The GWE&TS EC should remain in place until remedial objectives have been reached; however, it should be noted that the operational and performance data set for the GWE&TS indicates that the system, as configured, may be approaching asymptotic conditions. As such it is recommended that continued operation of the GWE&TS be evaluated in accordance with the Site Management Plan. The evaluation should consist of “pulsing” of the system and monitoring of contaminant concentrations within the existing monitoring well network located in the vicinity and downgradient of the GWE&TS. Pulsing would involve the periodic shutdown and startup of the system to allow for the subsurface environment to come to equilibrium prior to resuming groundwater extraction, as necessary.
- Plume Redelineation: Based on the fact that the greatest current PCE exceedance identified during the Plume Redelineation Program were identified upgradient of the Site (following the completion of the on-site “source area” remediation in August 2004) as presented in the July 2015 Franklin Cleaners Plume Redelineation Summary Report, the groundwater plume currently being captured by the GWE&TS may be emanating from an off-site “source area” located upgradient of the Site. Therefore, it is recommended that the NYSDEC investigate the area to the north, or upgradient, of the Site to locate and address any remaining “source areas” likely to exist in this vicinity. It should be noted that the November 1998 RI/FS identified at least three former dry cleaners known to have existed upgradient of the Site. Once the upgradient “source areas” are identified and addressed, it may be warranted to pursue alternate remedial actions, such as a chemical injection program, to address residual contamination at that time.
- Periodic Reviews: Based on a review of the guidance documents provided by the NYSDEC, it is recommended that PRRs be completed on an annual basis. The frequency of follow-up PRRs will be determined by the NYSDEC based on future Site conditions and compliance.

Operation and Maintenance Plan

- O&M Plan: The Operation and Maintenance (O&M) scope of services was performed in accordance with the requirements of the O&M Plan and SMP, with the exception of routine maintenance of the pressure blower, which was completed more frequently than what is specified in the routine maintenance schedule.

In order to reduce the likelihood of premature equipment failure and associated system downtime, D&B recommends that the NYSDEC Remedial Services Contractor perform maintenance of the pressure blower and all other system components in accordance with their respective manufacturer’s specifications and per the requirements of the O&M



Plan. It is recommended that the NYSDEC Remedial Services Contractor conduct routine monitoring as per the SMP and approved monitoring schedule. It is further recommended that the NYSDEC Remedial Services Contractor provide sufficient information on the O&M forms to clearly document the O&M activities performed.

- Alarm Conditions/Downtime: Several alarm conditions and system shutdowns occurred throughout this reporting period. These shut down events were primarily associated with low-voltage electric issues reportedly due to storm events, low level conditions at extraction well EW-2 and low-flow issues associated with the pressure blower. It is recommended that the NYSDEC Remedial Services Contractor investigate the cause of the “low flow” conditions that have been occurring at the pressure blower and redevelop EW-2 to ensure it is able to provide sufficient yield to prevent a low groundwater level in the well during operation of the submersible pump.
- EW-2 Runtime Meter: As the runtime meter was identified to be not functioning in October of this reporting period the NYSDEC Remedial Services Contractor replaced the runtime meter for EW-2 in February, after troubleshooting activities were conducted.

Monitoring Plan

- System Monitoring: Monitoring requirements were generally maintained throughout the reporting period in accordance with the requirements of the monitoring schedule provided in the SMP, with the exception of March, November and December 2016, when three routine monitoring events were conducted, rather than semi-monthly (twice per month) as per the routine monitoring schedule.
- pH Readings: pH readings were unable to be collected from aqueous-phase system samples on three occasions throughout this reporting period as the NYSDEC Remedial Services Contractor's pH meter was not functioning. The NYSDEC Remedial Services Contractor should ensure a functional pH meter is available for Site use during each semi-monthly monitoring event to ensure pH readings can be collected from the aqueous phase effluent. Additionally, one reading was not completed this reporting period in May 2016 due to budgetary restrictions, per the NYSDEC.
- Monitoring Well Sampling: The NYSDEC Remedial Services Contractor should continue to coordinate with Molloy College to collect groundwater samples from ASMW-7 per the routine schedule provided in the July 2012 SMP. It should be noted that this well was sampled twice this reporting period, once on July 13, 2016 and again on January 10, 2017.

Institutional and Engineering Controls

- IC/EC Compliance: ICs are not required by the March 1998 ROD as an element of the remedy. Therefore, ICs such as land or groundwater use restrictions are not currently implemented at the Site. However, note that the Site's inclusion in the New York State Registry of Inactive Hazardous Waste Sites as a Class 4 Inactive Hazardous Waste Site (Site No. 130050) acts as an IC for the Site. The GWE&TS EC, as listed in the IC/EC Certification Form provided by the NYSDEC, is currently in-place and operating as intended, as well as the groundwater monitoring well network (ASMW-1 through ASMW-6). In addition, the alternate groundwater irrigation well (ASMW-7) is in-place downgradient of the GWE&TS on Molloy College property and soil vapor mitigation system, operated by others, is in-place at the Site “source area.” Based on available information, ICs such as groundwater and land-use restrictions are not currently required for the Site. Based on the evaluation presented in Section 5.0, these restrictions are not warranted to be implemented at or downgradient of the Site at this time.



1.0 INTRODUCTION

The purpose of this Periodic Review Report (PRR) is to summarize and evaluate the performance of the Franklin Cleaners site (the Site) groundwater extraction and treatment system (GWE&TS). The Site is located at 206-208B South Franklin Street in the Incorporated Village of Hempstead, Nassau County, New York (see Figure 1-1), while the GWE&TS is located at 1000 Hempstead Avenue in the Village of Rockville Centre, Nassau County, New York, approximately one mile downgradient of the Site.

It should be noted that the quarterly reporting schedule for this project does not follow a typical calendar year schedule as the quarterly reporting schedule begins in March rather than January.

The reporting period for PRRs has been aligned with the project quarterly reporting schedule. As such, the reporting period for this PRR includes March 2016 through February 2017. In addition, portions of this report incorporate pertinent historical background information and monitoring data, as appropriate.

Several clickable hyperlinks are provided in this report, indicated by blue text, which include tables, graphs and other pertinent information.

Environmental Assessment and Remediations (EAR), a NYSDEC Remedial Services contractor, was responsible for GWE&TS operation and all monitoring and sampling activities and site maintenance throughout this reporting period, while all reporting and engineering services were completed by D&B Engineers and Architects, P.C. (D&B).

The objectives of this PRR for the Site include:

- Presenting background information.
- Identifying the remedial goals established for the Site.




D&B ENGINEERS AND ARCHITECTS, P.C.

 FRANKLIN CLEANERS SITE
 VILLAGE OF HEMPSTEAD, NEW YORK
SITE LOCATION MAP
 SOURCE: GOOGLEARH.COM

FIGURE 1-1



- Presenting a brief description of the overall GWE&TS and its major remedial components.
- Reviewing Site monitoring protocols.
- Evaluating the GWE&TS operation and performance.
- Presenting recommendations regarding the operation of the GWE&TS with respect to system performance, effectiveness and protectiveness of the GWE&TS, and its ability to achieve the goals established for the Site by the Record of Decision (ROD), dated March 1998.

Plume Redelineation Program

Based on recommendations presented in the May 2012 Remedial System Optimization (RSO) Summary Report, a plume redelineation program was completed in June and July 2014. The plume redelineation program consisted of the following:

- Existing Groundwater Monitoring Well Sampling: Groundwater samples were collected for chemical analysis from select existing monitoring wells located along the historical extent of the groundwater plume: well “clusters” MW-1, MW-2, MW-3 and MW-4.
- Vertical Profile Groundwater Probe Installation and Sampling: Seventeen vertical profile probes (FCTW-01 through FCTW-17) were installed and sampled within and to the east and west of the historical extent of the groundwater plume in order to determine the current horizontal and vertical extents of the remaining plume.
- Clay Layer Investigation: Soil samples were collected from select groundwater probe locations (FCTW 01, FCTW-09 and FCTW-14) for visual inspection of soil during this reporting period in order to determine the competency and depths of what are likely several discontinuous clay layers identified during the various investigations completed throughout the remedial history of the Site, as well as to screen the soil for the presence of volatile organics.

The results of the Plume Redelineation Program were documented in the NYSDEC-approved July 2015 Plume Redelineation Report.

In general, and following the completion of remedial activities at the on-site “source area” property in August 2004, PCE concentrations have reduced dramatically throughout the vast majority of the vertical and horizontal extents of the plume. In addition, the greatest PCE concentrations were detected within an existing monitoring well located upgradient of the former on-site “source area”. Recommendations for investigation of this upgradient contributing source area were presented in the July 2015 Plume Redelineation Program.

2.0 SITE OVERVIEW

2.1 Site Operations and Description

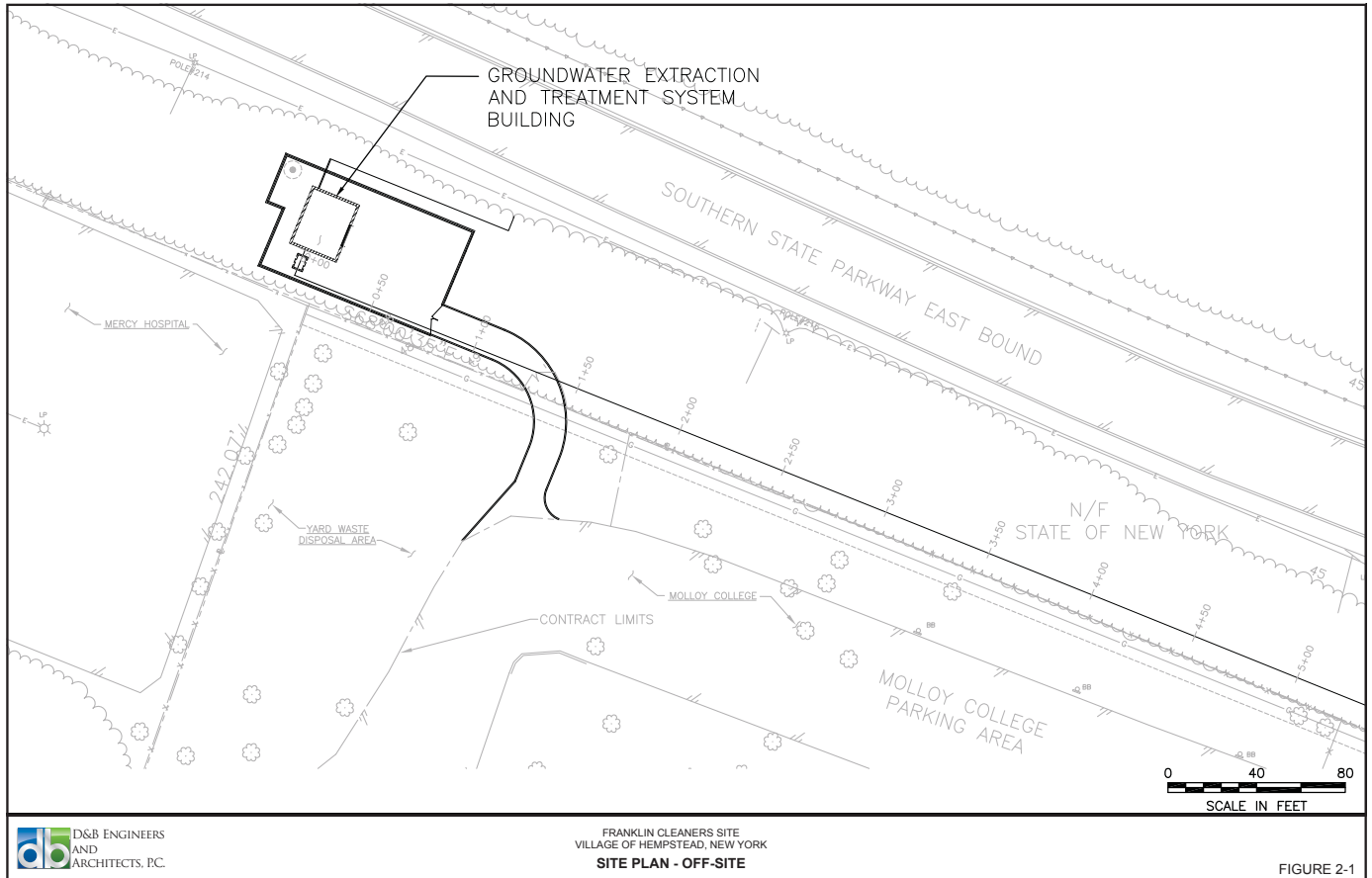
The Site is a former NYSDEC Class 2 Inactive Hazardous Waste Site (currently classified as a Class 4 site) and is listed on the New York State Registry of Inactive Hazardous Waste Sites (Site No. 130050). The Site operated as a dry cleaner and laundromat from 1957 through 1991. The dry cleaner is reported to be the source of the chlorinated solvent contamination identified at the Site, as well as the groundwater plume extending from the Site to the GWE&TS. However, it should be noted that the July 2015 Plume Redelineation Summary Report indicated the likely presence of additional upgradient sources of PCE contamination.

The Site is bordered by Marvin Avenue to the south, private residences to the north and east, with commercial buildings and South Franklin Street to the west (see Figure 1-1). The Site is approximately 0.25-acre in area and currently includes a two-story building with a coin-operated laundromat and delicatessen on the first floor, residential apartments on the second floor and a full basement. Portions of the first floor and basement were utilized by the former dry cleaner.

As summarized in further detail below, the on-site “source area” of soil and groundwater contamination was remediated via a soil vapor extraction and air sparging (SVE/AS) system, which operated from November 2003 to August 2004. The SVE/

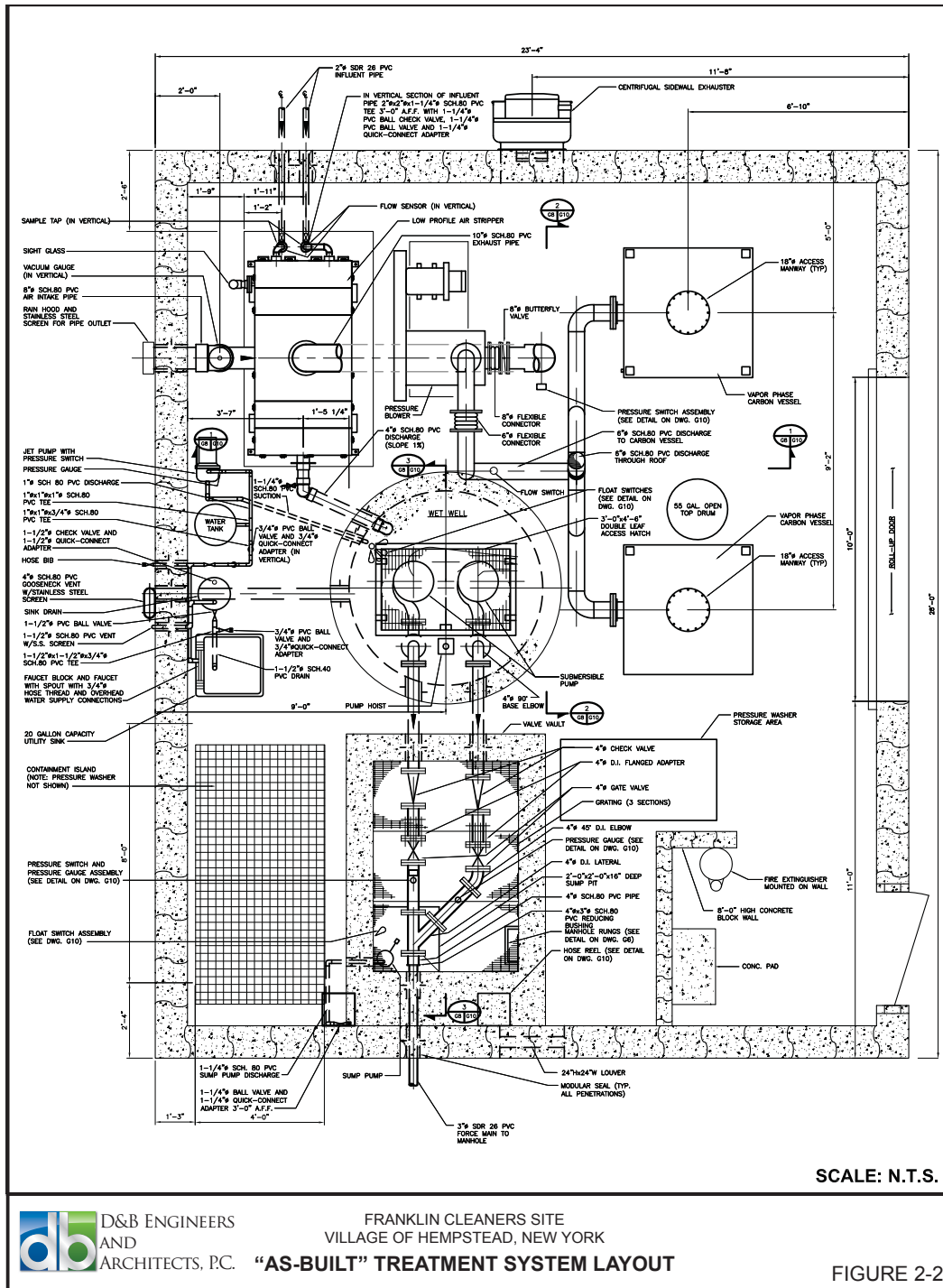


AS system was shut down in August 2004 based on contaminant concentrations within the soil and groundwater being below NYSDEC guidelines.



The GWE&TS is located at 1000 Hempstead Avenue in the Village of Rockville Centre, Nassau County, New York, approximately one mile downgradient of the Site. The GWE&TS is located on an approximately 0.25-acre property bounded by the Southern State Parkway to the north, Molloy College to the south, Hempstead Avenue to the east, and Mercy Medical Center to the west. A Site Plan is provided as Figure 2-1.

Start-up and routine system operation of the GWE&TS was initiated in September 2004 and the GWE&TS remains an active element of the selected remedy. A GWE&TS layout is provided as Figure 2-2. "As-built" drawings for the GWE&TS, including monitoring well and extraction well "as-builts," are provided in [Appendix A](#).



The GWE&TS consists of two 6-inch diameter extraction wells (EW-1 and EW-2) screened at a depth of 70-90 and 75-90 feet below grade, respectively. Extracted groundwater is conveyed via underground piping to a low profile stacked-tray air stripper located in the GWE&TS building. Treated groundwater is discharged from the air stripper to a wet well located in the treatment system building. Two alternating submersible pumps convey the treated water via underground piping to a





Nassau County Department of Public Works (NCDPW) storm sewer manhole in accordance with all applicable discharge standards.

Exhaust gas from the air stripper was initially treated utilizing two 1,000 lb. GAC vessels connected in series. However, based on historic low contaminant concentrations detected in the air stripper vapor-phase discharge, the air stripper exhaust piping was reconfigured to bypass the GAC vessels and discharge exhaust gas directly to the atmosphere in June 2011, per 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.

In order to monitor the effectiveness of the GWE&TS, a monitoring well network was installed in the vicinity and downgradient of the GWE&TS. Monitoring well locations are provided in [Figure 2-3](#). A routine groundwater monitoring sampling program was initiated following construction of the GWE&TS and associated groundwater monitoring well network.

2.2 Site Impacts and Investigation History

In March 1990, the Nassau County Department of Health (NCDOH) investigated a complaint of tainted drinking water from a private residence located approximately 100 feet southwest and downgradient of the Site. The residence was found to have a drinking water well (approximately 45 feet deep) and an irrigation well (approximately 32 feet deep) with concentrations of tetrachloroethene (PCE) of 5,500 micrograms per liter (ug/l) and 29,000 ug/l, respectively.

In order to investigate these PCE concentrations, the NCDOH performed an inspection of the Site in April 1990. As part of this investigation, soil samples were collected from surface soil exposed at cracks and gaps within the building basement and from surface soil at the rear of the Site. Soil samples collected from the building basement exhibited PCE concentrations as high as 9,400 ug/kg. In addition, soil samples collected from the rear of the property exhibited PCE concentrations as high as 650,000 ug/kg, trichloroethene (TCE) concentrations as high as 1,700 ug/kg and dichloroethene (DCE) concentrations as high as 680 ug/kg.

Several additional investigations were completed at the Site in order to further evaluate the extents of soil and groundwater contamination. In addition, several interim remedial actions (IRMs) were completed at the Site in an effort to mitigate/reduce the potential for exposure to the elevated concentrations of chlorinated solvents within on-site soil and groundwater.

The following narrative provides a remedial history time line and a brief summary of the available project records to document key investigative and remedial milestones for the Site:

Preliminary Site Assessment (March 1993)

Based on the results of the NCDOH groundwater and soil investigations detailed above, a Preliminary Site Assessment was performed by the NCDPW between April 1992 and December 1992. As part of this investigation, four groundwater monitoring wells were installed as follows: monitoring well FC-1 was installed upgradient of the Site to a depth of 40 feet below ground surface and monitoring wells FC-2, FC-3 and FC-4 were installed downgradient of the Site, each to a depth of 37 feet below ground surface. Groundwater samples were subsequently collected from this groundwater monitoring well network for volatile organic compound (VOC) analysis. Groundwater monitoring well FC-2 exhibited PCE at a concentration of 83 ug/l, in exceedance of its Class GA Groundwater Standard of 5.0 ug/l. However, upgradient groundwater monitoring well FC-1 and downgradient groundwater monitoring wells FC-3 and FC-4 did not exhibit exceedances of PCE.

Remedial Investigation Feasibility Study (December 1996 through April 1997)

A Remedial Investigation and Feasibility Study (RI/FS) was performed by D&B between December 1996 and April 1997. The goals of the RI/FS were to identify the source of groundwater contamination at the Site, further characterize the nature and extent of the on-site groundwater contamination and develop what was then referred to as an IRM to remediate the source of contamination at the Site. A draft RI/FS report was issued in October 1997 and the final RI/FS was issued in November 1998. The results of the RI/FS are briefly summarized below:



- Elevated concentrations of PCE of up to 280 mg/kg were detected in soil beneath the basement floor slab, as well as within surface and subsurface soil located in the rear portion of the Site.
- Elevated concentrations of PCE in exceedance of 1,000 ug/l were detected in shallow groundwater in the immediate vicinity of the Site.
- Elevated concentrations of PCE and its associated breakdown products, including TCE, 1,1-dichloroethene (1,1-DCE) and 1,2-DCE, were detected in exceedance of 5 ug/l in shallow groundwater at depths of 20 to 26 feet below grade and up to 3,000 feet downgradient of the Site.
- Elevated concentrations of PCE and its associated breakdown products were detected in deeper groundwater samples at depths of 33 to 87 feet below grade and as far as 4,500 feet downgradient of the Site.
- Elevated concentrations of PCE were detected in ambient air samples collected from within the Site building (basement, 1st floor commercial areas and 2nd floor residential areas), and from commercial and residential properties immediately adjacent to the Site.

Based on these results, several remedial actions were recommended in the RI/FS to remediate the identified Site “source area” soil and groundwater contamination and associated downgradient groundwater contamination plume, including:

“Source Area” Remedial Actions

- Installation of a Soil Vapor Extraction/Air Sparge (SVE/AS) system, to remediate elevated concentrations of chlorinated VOCs within Site soil and groundwater.
- Installation of asphalt in the rear of the Site and patching of targeted areas of the building basement floor with concrete to limit short circuiting of the SVE/AS system and the migration of soil vapor.
- Use of the existing groundwater monitoring well network (and possible installation of additional wells) to provide a system to monitor the effectiveness of the SVE/AS system.

Downgradient Remedial Actions

- Installation of a GWE&TS downgradient of the Site.
- Use of any existing groundwater monitoring wells (and possible installation of additional wells) to provide a system to monitor the effectiveness of the GWE&TS.

Interim Remedial Measure (January 1998)

An Interim Remedial Measure (IRM) was conducted at the Site in January 1998 to address the elevated concentrations of PCE detected in the ambient air samples collected from the basement, first and second floors of the on-site building. As part of this IRM, fans with integrated particulate and granular activated carbon GAC filters, designed to recirculate and filter air to remove particulates and VOCs, were installed within the Site building. In addition, a wall was constructed to isolate the portions of the basement where the former dry cleaner “cooker” was located and where elevated PCE concentrations were detected in soil immediately beneath the basement floor slab.

Record of Decision (March 1998)

Based on the findings of the RI/FS, the NYSDEC issued a ROD in March 1998. In order to eliminate or mitigate threats to human health and the environment, the NYSDEC selected the following Institutional Controls/Engineering Controls (ICs/ECs) to be implemented at the Site:

- SVE of PCE-contaminated soils with on-site treatment of contaminated vapors using a vapor-phase (GAC) treatment system.



- Air sparging of shallow on-site groundwater and capture of PCE vapors by the SVE system.
- Extraction of contaminated groundwater at the leading edge of the contaminant plume for up to 20 years and treatment of water through the use of chemical precipitation and filtering of metals and air stripping of VOCs along with GAC treatment of off gasses, if necessary.
- Off-site disposal of all spent GAC at a Toxic Substance Control Act (TSCA) and Resource Conservation and Recovery Act (RCRA)-permitted incinerator.
- Installation of a deep irrigation/monitoring well located at Molloy College, downgradient of the Site to replace an existing irrigation well at Molloy College in the Upper Glacial aquifer.
- Long-term groundwater monitoring and groundwater use restrictions, as necessary.
- Control of indoor air contamination using air purifying, ventilation and vapor barrier systems along with a monitoring program until the “source area” remediation has been effectively completed.

Pre-Design Investigation (July 1999 through December 2000)

A pre-design investigation (PDI) was completed by D&B between July 1999 and December 2000 to aid in the design and construction of the GWE&TS. The results of the PDI are detailed in the Franklin Cleaners GWE&TS Design Report, dated December 2000. Based on the results of the PDI, the groundwater contamination plume emanating from the Site was determined to be approximately 400 feet wide at the shoulder of the east-bound Southern State Parkway, and was concentrated at a depth of approximately 80 to 95 feet below ground surface, immediately above a clay layer.

As part of the PDI a pilot extraction well was installed along the leading edge of the groundwater plume to establish parameters for the design of the GWE&TS (e.g. hydraulic conductivity, radius of influence and drawdown, etc). Several pump tests were completed utilizing the pilot extraction well at various flow rates for the purpose of developing capture zone modeling scenarios. The pump tests and groundwater flow/capture zone modeling determined that a minimum required flow rate of 20 gallons per minute (gpm), utilizing a one or two-well pumping scenario, would be sufficient for plume containment.

Based on the recommendations provided in the Design Report, D&B prepared remedial construction drawings and specifications for the construction of the GWE&TS to capture the leading edge of the groundwater plume.

Remedial Construction (June 2002 through September 2003)

On-site remedial activities and the construction of the on-site SVE/AS system were completed in September 2003, and included the following:

- Site preparation.
- Construction of Site fencing and gates.
- Remedial excavation and restoration of a contaminated dry well.
- Installation of an awning at the rear of the building to control Site drainage.
- Installation of the SVE/AS system and associated soil vapor extraction and air sparge wells.
- Installation of several soil vapor monitoring probes and groundwater monitoring wells.
- Repair and sealing of basement flooring cracks within the building and asphalt paving at the rear of the property.
- Start-up and performance testing of the SVE/AS system.
- Operation and maintenance of the SVE/AS system.
- Removal and decommissioning of the SVE/AS system and associated temporary utilities.



The AS/SVE system operated from November 2003 to August 2004, at which point it was shut down based on concentrations of PCE below 5 ug/l in on-site groundwater monitoring wells and non-detectable concentrations of PCE in soil vapor extracted from the SVE wells. Further details of the “source area” remediation are provided in the Final Remediation Report for the Franklin Cleaners On-Site SVE/AS System, dated June 2009.

In addition, a subslab depressurization system (SSDS) was installed within the Site building basement in January 2007 to address concentrations of chlorinated VOCs that were detected in soil gas immediately beneath the basement floor slab following the decommissioning of the AS/SVE system. The SSDS consists of four suction points installed through the building floor slab, connected to centrifugal fans and piping, which discharge through an exhaust stack to the atmosphere above the building. Based on available records, the operation of the SSDS is the responsibility of the property owner; however, inspection and maintenance of the SSDS are being managed by the NYSDEC under a separate State-wide program. A copy of the annual letter to the Property Owner regarding operation of the SSDS is provided as [Appendix B](#). Maintenance and inspection procedures and schedules are described in the Generic Work Plan prepared by HDR, Inc., dated July 2009. Based on a February 14, 2012 inspection, the SSDS is operating as designed.

As detailed above, the construction of the GWE&TS was completed in July 2003.

On-Site and Downgradient Groundwater and Soil Vapor Investigations (December 2008, March 2009 and September 2011)

Following the decommissioning of the SVE/AS system, the NYSDEC completed several groundwater and soil vapor investigations in the vicinity and downgradient of the Site pursuant to reclassifying the Site's Class 2 designation. Results of these groundwater investigations show a general decline in PCE concentrations from December 2008 to September 2011.

PCE was detected in three out of nine groundwater samples collected during a December 2008 groundwater monitoring well sampling round. PCE was detected at a concentration of 29 ug/l, exceeding its Class GA Standard of 5.0 ug/l, in one monitoring well: MW-2S, located approximately 300 feet downgradient of the Site.

An additional round of groundwater samples was collected from the nine groundwater monitoring wells in March 2009 in order to confirm the results of the December 2008 sampling event. PCE was again detected in exceedance of its Class GA Standard of 5.0 ug/l in monitoring well MW-2S, though PCE was detected at a concentration of 7.8 ug/l during this round of sampling, well below the 2008 levels.

A geoprobe groundwater investigation was completed along the centerline of the groundwater plume in September 2011. Groundwater grab samples were collected from 20 geoprobe locations ranging in depth from 18 to 23 feet below grade extending to a distance of up to approximately 3,600 ft. downgradient of the Site, and from four existing groundwater monitoring wells immediately downgradient of the Site. PCE was not detected in exceedance of its Class GA Standard of 5.0 ug/l in any collected groundwater sample, including a sample collected from groundwater monitoring well MW-2S.

The NYSDEC concluded from these investigations that the existing groundwater plume “has significantly decreased and is no longer considered a source of vapors” as summarized in a June 21, 2012 memorandum.

Remedial System Optimization Activities

An RSO evaluation to improve the efficiency and effectiveness of the GWE&TS was initiated in 2011. Following completion of the RSO evaluation, a RSO Report was submitted to the NYSDEC in May 2012, in which several recommendations to increase the efficiency and effectiveness of the GWE&TS were presented. These recommendations included the completion of a plume redelineation program in order to identify the current horizontal and vertical extents of the remaining groundwater plume associated with the Site. The plume redelineation field program was completed in June and July 2014.



Site Reclassification/Delisting

The Site was originally listed as a Class 2 Inactive Hazardous Waste Site by the NYSDEC on June 17, 1993. Since this time, completion of the following project phases has occurred, as summarized below:

Table 2-1: Project Phases and Completion Dates	
Project Phase	Completion Date
Remedial Investigation	03/1998
Remedial Design	02/2001
Groundwater Extraction and Treatment System Construction	07/2003 ⁽¹⁾
Remedial Action (Source Area Remediation)	03/2007 ⁽²⁾

1. Construction of the GWE&TS was completed in July 2003. The GWE&TS was placed into routine operation in September 2004 and currently continues to meet remedial objectives as originally designed.
2. Source area contaminated soil and groundwater were remediated with the Air Sparge/Soil Vapor Extraction (AS/SVE) system beginning in September 2003. The on-site AS/SVE system has successfully removed the contaminants from the vadose zone and greatly diminished groundwater contaminants to below detectable limits. Although confirmation soil samples met the required remedial goals, a subslab depressurization system replaced the on-site AS/SVE system in 2006 due to the detection of elevated vapor phase VOC concentrations in the basement level and below the basement floor slab.

Given the above, NYSDEC reclassified the Franklin Cleaners GWE&TS Site on December 11, 2012, pursuant to the requirements identified in 6 NYCRR §375-2.7, as a Class 4 Site since the NYSDEC determined that the site no longer presents a significant threat to public health and/or the environment based on remedial efforts performed to date and implementation of a Site Management Plan (SMP). In addition, the NYSDEC has implemented a post-remedial indoor air study within the source area structures/buildings to verify current site conditions. Site delisting is not feasible at this time, as all remediation and post-remediation activities have not been satisfactorily completed.

3.0 OPERATION AND MAINTENANCE (O&M) PLAN COMPLIANCE

3.1 O&M Plan Requirements and Compliance Status

The Operations and Maintenance (O&M) scope of services for the GWE&TS consists of general facility maintenance activities, routine GWE&TS maintenance activities, non-routine GWE&TS maintenance activities and system alarm/shutdown response activities, in accordance with the requirements of the O&M Plan and SMP. Copies of the Site Activities Logs and Maintenance reports completed throughout this reporting period, which include details of shut-downs and the non-routine maintenance activities that have occurred throughout this reporting period, are provided in [Appendix C](#).

Presented below is a summary of the O&M activities performed throughout this reporting period.

General Facility Maintenance Activities

General facility maintenance work items are those tasks which involve the maintenance and upkeep of the GWE&TS, as well as groundskeeping of the GWE&TS property. Throughout the course of this reporting period, general facility maintenance activities were completed as specified in the O&M Plan, and as per further direction provided by the NYSDEC. General facility maintenance activities completed on an as-needed basis during this reporting period include:

- Landscaping activities were completed on June 30, July 19, July 26, August 9, and October 19, 2016.
- Although several winter storm events occurred during the winter months of this reporting period, snow plowing/removal activities were not reported to have been completed by the NYSDEC Remedial Services Contractor.
- Replenishment of expendable O&M supplies on an as-needed basis.
- General facility housekeeping on an as-needed basis.



Routine GWE&TS Inspection and Maintenance Activities

A summary of the routine GWE&TS inspection and maintenance services and their typical frequencies of completion are provided on Table 3-1.

Table 3-1: Routine Inspection and Maintenance Services Summary

Routine Inspection/Maintenance Item	Frequency					
	Monthly	Bi-Weekly ⁽¹⁾	Bi-Monthly ⁽²⁾	Semi-Annual ⁽³⁾	Annual	As-Needed
Routine Inspection Items						
<i>Extraction Wells</i>						
Flow Rate (gpm)		✓				
Total Flow (gal)		✓				
Pump Runtime (hrs)		✓				
Depth to Water (feet)		✓				
Operating Frequency (Hz)		✓				
<i>Low Profile Stacked-Tray Air Stripper</i>						
Sump Level (in)		✓				
Fresh Air Inlet Vacuum (in H ₂ O)		✓				
Exhaust Flow Rate (scfm)		✓				
Exhaust Temperature (°F)		✓				
<i>Pressure Blower</i>						
Blower Suction (in H ₂ O)		✓				
Blower Discharge (in H ₂ O)		✓				
Blower Runtime (hrs)		✓				
<i>Effluent Valve Vault</i>						
Pump No. 1 Operating Pressure (psi)		✓				
Pump No. 1 Flow Rate (gpm)		✓				
Discharge No. 1 Line Back Pressure (psi)		✓				
Pump No. 2 Operating Pressure (psi)		✓				
Pump No. 2 Flow Rate (gpm)		✓				
Discharge No. 2 Line Back Pressure (psi)		✓				
<i>Flow Meter Vault</i>						
Total Flow (gpm)		✓				
<i>Jet Pump</i>						
Operational Status		✓				
Line Pressure (psi)		✓				
<i>Pressure Washer/Containment Island</i>						
Operational Status				✓		



Table 3-1: Routine Inspection and Maintenance Services Summary (cont.)

Routine Inspection/Maintenance Item	Frequency					
	Monthly	Bi-Weekly ⁽¹⁾	Bi-Monthly ⁽²⁾	Semi-Annual ⁽³⁾	Annual	As-Needed
Routine Maintenance Items						
Low Profile Stacked-Tray Air Stripper Maintenance						✓
Pressure Blower Maintenance			✓			
Wet Well Submersible Pump Maintenance					✓	
Blower Intake Screen Cleaning/Maintenance						✓
Flow Meter Vault Effluent Screen Cleaning/Maintenance					✓	
Wet Well Strainer Cleaning/Maintenance					✓	
Utility Sink Screen Cleaning/Maintenance						✓
Pressure Washer/Containment Island Maintenance						✓

Notes:

(1) Bi-weekly is defined as twice per month.

(2) Bi-Monthly is defined as once every other month.

(3) Semi-Annual is defined as twice per year.

The routine GWE&TS inspection and maintenance activities completed during this reporting period are summarized below:

- Bi-weekly performance monitoring of system equipment (extraction well pumps, low profile stacked-tray air stripper, pressure blower, etc.). It should be noted that only one performance monitoring event was completed in June due to budgetary issues, per the NYSDEC.
- Bi-weekly inspection of all equipment, piping, flanges, valves, instruments, etc. for leakage, unusual noise and proper working condition. It should be noted that only one equipment inspection event was completed in June due to budgetary issues, per the NYSDEC.
- Bi-monthly pressure blower maintenance was completed on March 2, March 16, March 30, April 12, April 28, May 11, June 30, July 19, July 26, August 9, August 23, September 7, September 20, October 5, October 19, November 18, December 1, December 16, December 29, January 13 2016, January 23, and February 16, 2017.
- Cleaning of the blower intake screen was completed on March 2, March 16, March 30, April 12, April 28, May 11, June 30, July 19, July 26, August 9, August 23, September 7, September 20, October 5, October 19, November 18, December 1, December 16, December 29, January 13 2016, January 23, and February 16, 2017.
- Annual cleaning of the flow meter vault effluent screen was completed on October 19, 2016.
- Annual wet well pump maintenance was completed on October 19, 2016.
- Annual cleaning of the wet well strainer was completed on October 19, 2016.

Non-Routine GWE&TS Maintenance Activities

Non-routine GWE&TS maintenance activities are those maintenance activities which involve out-of-scope maintenance and upkeep of the GWE&TS, as well as out-of-scope maintenance in response to system alarm conditions and/or shut-down events. The non-routine maintenance activities completed during this reporting period include:

Quarter 47 (March 1, 2016 through May 31, 2016)

Non-routine system maintenance activities were not conducted during this reporting period.





Quarter 48 (June 1, 2016 through August 31, 2016)

Non-routine system maintenance activities were not conducted during this reporting period.

Quarter 49 (September 1, 2016 through November 30, 2016)

Non-routine system maintenance activities were not conducted during this reporting period.

Quarter 50 (December 1, 2016 through February 29, 2017)

On February 16, 2017, the NYSDEC Remedial Services Contractor was on-site to replace the runtime meter at EW-2.

GWE&TS Alarms

The GWE&TS is equipped with an autodialer alarm notification system which is programmed to call technicians in the event of an alarm condition. The following is a list of the current alarms for the system:

- Alarm #1 – Temperature Alarm
- Alarm #2 – Building Entry Alarm
- Alarm #3 – General System Alarm
- Alarm #4 – General Failure Submersible Pump (Wet Well) Alarm
- Alarm #5 – General Failure EW-1/EW-2 Alarm
- Alarm #6 – Pressure Blower Failure Alarm
- Alarm #7 – High Level Air Stripper Sump Alarm
- Alarm #8 – High Level Valve Vault Sump Alarm

The alarm conditions occurring during this reporting period include the following:

Quarter 47 (March 1, 2016 through May 31, 2016)

- On March 28, 2016, a “low-flow” condition at the blower caused the GWE&TS to shut down. The NYSDEC Remedial Services Contractor reset and restarted the GWE&TS on March 29, 2016.

Quarter 48 (June 1, 2016 through August 31, 2016)

- On June 30, 2016 the NYSDEC Remedial Services Contractor was on-site to conduct routine system monitoring and observed that the GWE&TS was not operating. Although the date and time of shutdown was not reported by the NYSDEC Remedial Services Contractor, based on review of the NYSDEC Remedial Service Contractors’ operational time logs, D&B determined that the GWE&TS shut down occurred on June 9, 2016. The NYSDEC Remedial Services Contractor restarted the GWE&TS upon departure from the site.
- On July 8, 2016 the GWE&TS shut down due to a “low level” condition at extraction well EW-2. The NYSDEC Remedial Services Contractor reset and restarted the GWE&TS on that same day.
- On July 11, 2016 the GWE&TS shut down due to a general system alarm. The NYSDEC Remedial Services Contractor reset and restarted the GWE&TS that same day.
- On July 13, 2016 the GWE&TS shut down due to a “low level” condition at extraction well EW-2. The NYSDEC Remedial Services Contractor reset and restarted the GWE&TS on that same day.
- On July 16, 2016 the GWE&TS shut down due to a “low level” condition at extraction well EW-2. The NYSDEC Remedial Services Contractor reset and restarted the GWE&TS on July 19, 2016.
- On July 22, 2016 the GWE&TS shut down due to a “low level” condition at extraction well EW-2. The NYSDEC Remedial Services Contractor reset and restarted the GWE&TS that same day.
- On July 26, 2016 the GWE&TS shut down due to a “low level” condition at extraction well EW-2. The NYSDEC Remedial Services Contractor reset and restarted the GWE&TS that same day.



Quarter 49 (September 1, 2016 through November 30, 2016)

- On September 4, 2016, the GWE&TS shut down due to a “low-voltage” condition caused by low-voltage at the VFD. The NYSDEC Remedial Services Contractor reset and restarted the GWE&TS on September 6, 2016.
- On October 10, 2016, the GWE&TS was off upon arrival to the site due to a “low-voltage” condition at the VFDs. The NYSDEC Remedial Services Contractor reset and restarted the GWE&TS that same day.
- On October 22, 2016, the GWE&TS shut down due to a “low-flow” condition at the blower. The NYSDEC Remedial Services Contractor reset and restarted the GWE&TS on October 24, 2016.
- On November 23, 2016, the GWE&TS shut down due to a low-flow condition. The NYSDEC Remedial Services Contractor reset and restarted the GWE&TS on November 25, 2016.

Quarter 50 (December 1, 2016 through February 29, 2017)

- On December 22, 2016, the GWE&TS shut down due to a “low-air flow” condition. The NYSDEC Remedial Services Contractor reset and restarted the GWE&TS on December 23, 2016.
- On December 24, 2016, the GWE&TS shut down due to a “low-air flow” condition at Air Stripper and a “low flow” alarm condition at EW-1. The NYSDEC Remedial Services Contractor reset and restarted the GWE&TS on December 27, 2016.
- On January 24, 2017, the GWE&TS shut down due to a low flow alarm condition. The NYSDEC Remedial Services Contractor reset and restarted the GWE&TS on the same day.

A system downtime evaluation is provided below in Section 3.2.

3.2 Evaluation of O&M Activities

GWE&TS Inspection and Operation Evaluation

A summary of the minimum operating requirements for the major GWE&TS components is provided below:

- Extraction Wells: Based on extraction scenario modeling completed during the PDI utilizing either one or two well pumping scenarios, the minimum required pumping rate for the GWE&TS is 20 gpm. However, since the extraction scenario modeling was based on a simplification of actual Site conditions and utilized several assumptions, extraction wells EW-1 and EW-2 have been operating at flow rates of approximately 33.9 gpm and 5.3 gpm, respectively, since system start-up in September 2004 in order to provide for a factor of safety. The lower operating flow rate of extraction well EW-2 is the result of a silty clay soil unit located within the well screen zone. Note, due to the relatively high concentrations of VOCs detected in samples collected from the screened interval of EW-2 during its installation, the NYSDEC decided to keep the extraction well at this location and depth, and required the well to be pumped at its maximum yield.
- Low Profile Stacked-Tray Air Stripper: The design of the low profile stacked-tray air stripper is based on the removal of influent contaminant concentrations at a maximum design combined flow rate of 70 gpm and a maximum PCE concentration of 1,200 ug/l, to concentrations below the specified site-specific effluent limits, as detailed on the State Pollution Discharge Elimination System (SPDES) permit equivalency, provided in [Appendix D](#).
- Pressure Blower: The design flow rate for the pressure blower is 740 cubic feet per minute (cfm); however, due to influent water contaminant concentrations that are well below the maximum design concentrations, the pressure blower has been operating below the design flow rate at an average of approximately 648 cubic feet per minute (cfm) throughout this reporting period, as discussed with the NYSDEC.

A summary of the GWE&TS operating conditions during this reporting period, including average influent pumping rates, flow volumes and total VOC concentrations, total effluent flow volumes and total VOC concentrations, as well as total VOC removals and efficiencies is provided on Table 3-2.



Table 3-2: Treatment System Performance Summary ⁽¹⁾

<i>Parameter</i>	<i>Quarter 47 (March 1, 2016 through May 31, 2016)</i>	<i>Quarter 48 (June 1, 2016 through August 31, 2016)</i>	<i>Quarter 49 (September 1, 2016 through November 30, 2016)</i>	<i>Quarter 50 (December 1, 2016 through February 28, 2017)</i>	<i>Quarterly Average</i>
Influent					
EW-1 Average Pumping Rate (gal per min)	24.5	24.2	23.8	21.4	23.5
EW-1 Total Flow Volume (gal)	3,149,822	2,268,600	2,915,322	2,754,674	2,772,105
EW-1 Maximum Influent PCE Concentration (ug/l)	5.8	4.4	5.0	4.5	4.9
EW-2 Average Pumping Rate (gal per min)	6.1	5.2	4.6	4.4	5.1
EW-2 Total Flow Volume (gal)	776,728	485,954	467,400	463,056	548,285
EW-2 Maximum Influent PCE Concentration (ug/l)	100	110	130	100	110
Effluent					
Effluent Total Flow Volume (gal) ⁽¹⁾	4,540,930	3,209,065	4,117,380	3,744,757	3,903,033
Maximum Effluent PCE Concentration (ug/l)	Nondetect	Nondetect	Nondetect	Nondetect	Nondetect
VOC Removal Summary					
Total PCE Removal (lbs)	0.59	0.32	0.46	0.47	0.46
Average PCE Removal Rate (lbs/hr)	3.58E-04	3.28E-04	2.96E-04	2.66E-04	3.12E-04
PCE Removal Efficiency Range (%) ⁽²⁾	99.46-99.51	99.40-99.53	99.35-99.51	99.34-99.42	99.44

Notes:

1. The influent flow meters were replaced in June 2011 and the effluent flow meter was replaced in May 2012 due to influent/effluent flow total inconsistencies. Although influent/effluent total flow inconsistencies remain, the influent/effluent flows are more consistent than prior to these modifications.
2. The PCE removal efficiency has ranged from approximately 99.00% to 99.84% from system start-up in September 2004 to the end of this reporting period (February 28, 2017).

Based on the NYSDEC Remedial Services Contractor's system monitoring logs, the GWE&TS treated and discharged approximately 15,612,132 gallons of contaminated groundwater and removed approximately 1.84 pounds of PCE throughout this reporting period.

With regard to the overall operation of the GWE&TS, the majority of the system components functioned as intended; however, as detailed above, several issues were noted with regard to low level alarms at EW-2, low-flow conditions at the pressure blower and low voltage issues at the VFD.

As described above, pressure blower maintenance activities were not completed as per the requirements of the routine maintenance schedule, as the NYSDEC Remedial Services Contractor completed maintenance of the pressure blower more frequently than what is specified in the routine maintenance schedule.

GWE&TS Downtime Evaluation

Overall, the GWE&TS was down for a total of approximately 40 days (971 hours) throughout this reporting period, as compared to 24 days (576 hours) during the previous reporting period. This downtime was generally the result of alarm events associated with low-voltage electrical issues, low-flow conditions at the pressure blower and low-level conditions at EW-2, as reported by the NYSDEC Remedial Services Contractor.



A summary of system downtime and associated details regarding system shutdown/alarm events is provided on Table 3-3.

Table 3-3: Runtime/Downtime Evaluation							
<i>Time Period</i>	<i>Total Hours</i>	<i>Runtime</i>		<i>Downtime</i>		<i>Total Number of Shut-Down/Alarm Events</i>	<i>Downtime Description</i>
		<i>Approximate Hours</i>	<i>Percent of Total Time Period</i>	<i>Approximate Hours</i>	<i>Percent of Total Time Period</i>		
Quarter 47 (March 1, 2016 through May 31, 2016)	2,208	2,129	96.4%	79	3.6%	1	On March 28, 2016, a "low flow condition" triggered an alarm condition and system shut-down.
Quarter 48 (June 1, 2016 through August 31, 2016)	2,208	1,565	70.9%	643	29.1%	7	<p>On June 30, 2016 the NYSDEC Remedial Services Contractor was on-site to conduct routine system monitoring and observed that the GWE&TS was not operating. Although the date and time of shutdown was not reported by the NYSDEC Remedial Services Contractor, based on review of the NYSDEC Remedial Service Contractors' operational time logs, D&B determined that the GWE&TS shut down occurred on June 9, 2016. The NYSDEC Remedial Services Contractor restarted the GWE&TS upon departure from the site.</p> <p>On July 8, 2016 the GWE&TS shut down due to a "low level" condition at extraction well EW-2.</p> <p>On July 11, 2016 the GWE&TS shut down due to a general system alarm.</p> <p>On July 13, 2016 the GWE&TS shut down due to a "low level" condition at extraction well EW-2.</p> <p>On July 16, 2016 the GWE&TS shut down due to a "low level" condition at extraction well EW-2. The NYSDEC Remedial Services Contractor reset and restarted the GWE&TS on July 19, 2016.</p> <p>On July 22, 2016 the GWE&TS shut down due to a "low level" condition at extraction well EW-2.</p> <p>On July 26, 2016 the GWE&TS shut down due to a "low level" condition at extraction well EW-2.</p>
Quarter 49 (September 1, 2016 through November 31, 2016)	2,184	2,044	93.6%	140	6.4%	4	<p>On September 4, 2016, the GWE&TS shut down due to a "low-voltage" condition caused by low-voltage at the VFD. The NYSDEC Remedial Services Contractor reset and restarted the GWE&TS on September 6, 2016.</p> <p>On October 10, 2016, the GWE&TS was off upon arrival to the site due to a "low-voltage" condition at the VFDs.</p> <p>On October 22, 2016, the GWE&TS shut down due to a "low-flow" condition at the blower. The NYSDEC Remedial Services Contractor reset and restarted the GWE&TS on October 24, 2016.</p> <p>On November 23, 2016, the GWE&TS shut down due to a low-flow condition. The NYSDEC Remedial Services Contractor reset and restarted the GWE&TS on November 25, 2016.</p>
Quarter 50 (December 1, 2016 through February 28, 2017)	2,160	2,051	94.9%	109	5.1%	3	<p>On December 22, 2016, the GWE&TS shut down due to a "low-air flow" condition. The NYSDEC Remedial Services Contractor reset and restarted the GWE&TS on December 23, 2016.</p> <p>On December 24, 2016, the GWE&TS shut down due to a "low-air flow" condition at Air Stripper and a "low flow" alarm condition at EW-1. The NYSDEC Remedial Services Contractor reset and restarted the GWE&TS on December 27, 2016.</p> <p>On January 24, 2017, the GWE&TS shut down due to a low flow alarm condition. The NYSDEC Remedial Services Contractor reset and restarted the GWE&TS on the same day.</p>
Total	8,760	7,789	89.92%	971	11.08%	15	



4.0 MONITORING PLAN COMPLIANCE

4.1 Monitoring Requirements and Compliance Status

The monitoring scope of services for the GWE&TS consists monitoring system activities and groundwater monitoring well activities completed in accordance with the requirements of the O&M Plan and SMP. Presented below is a summary of the monitoring activities performed throughout this reporting period, as well as associated performance standards, a performance evaluation and associated compliance status, as appropriate.

GWE&TS Monitoring Activities

GWE&TS monitoring activities performed throughout this reporting period included the sampling of the various system processes to monitor overall VOC removal efficiencies, while at the same time, ensuring that all GWE&TS discharges are below applicable standards and/or discharge limits. A summary of the GWE&TS monitoring activities completed during this reporting period, including sampling frequencies and analytes, is provided on Table 4-1.

Table 4-1: Treatment System Monitoring Summary

Sampling Location	Sampling Frequency				Analytical Parameters			
	Monthly	Semi-Monthly ⁽²⁾	Quarterly ⁽³⁾	Semi-Annually ⁽⁴⁾	VOC (EPA Method 8260)	VOC (EPA Method TO-15)	Iron & Manganese (EPA Methods 150.1 and 236.1)	pH (Field Screening)
Extraction Well No. 1 Influent	✓				✓			
Extraction Well No. 2 Influent	✓				✓			
Air Stripper Aqueous Effluent ⁽⁵⁾	✓		✓		✓		✓	✓
Air Stripper Vapor Effluent		✓ ⁽¹⁾		✓		✓		
Groundwater Monitoring Wells ASMW-1, ASMW-2 and ASMW-4			✓		✓			
Groundwater Monitoring Wells ASMW-3 and ASMW-5 through ASMW-7				✓	✓			

Notes:

- (1) Semi-monthly effluent vapor samples are analyzed utilizing tedlar bags and a hand-held photoionization detector (PID).
- (2) Semi-monthly is defined as twice per month.
- (3) Quarterly is defined as once every three months.
- (4) Semi-annually is defined as twice per year.
- (5) Please note that in December 2016, per the NYSDEC request the sampling frequency for Iron and Manganese was modified to once per quarter.

Groundwater Monitoring Activities

Sampling of the monitoring well network was completed during this reporting period to determine groundwater quality at the leading edge of the groundwater plume and downgradient of the GWE&TS. The groundwater monitoring well network consists of three groundwater monitoring wells located at the leading edge of the groundwater plume (ASMW-1 through ASMW-3), and four groundwater monitoring wells located downgradient of the leading edge of the plume and GWE&TS (ASMW-4 through ASMW-7). Groundwater monitoring well locations are provided on [Figure 2-3](#). Note that groundwater monitoring wells ASMW-4 through ASMW-7 act as early warning or “sentinel” wells for a cluster of Village of Rockville



Centre public supply wells located further downgradient of the GWE&TS.

Groundwater monitoring activities consist of the collection and analysis of samples from each of the seven monitoring wells on a quarterly/semiannual basis, per the frequencies summarized on Table 4-1.

Data Analysis

All aqueous-phase samples collected during this reporting period were submitted to Test America Laboratories, Inc. (TAL) for analysis. TAL is a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified laboratory.

All data packages were reviewed for completeness and compliance with NYSDEC Analytical Services Protocol (ASP) Quality Assurance/Quality Control (QA/QC) requirements. Copies of all tabulated analytical data generated during this reporting period are provided in [Appendix E](#). Any QA/QC issues arising with the sample results were qualified in the Franklin Cleaners Site Management Quarterly Monitoring Reports. Copies of all Data Validation Checklists are provided in [Appendix F](#).

4.2 GWE&TS Performance Standards and Compliance Status

Aqueous-Phase Discharge Standards and Compliance Status

The treated groundwater discharged from the GWE&TS is pumped via underground piping to a NCDPW storm sewer located along Hempstead Avenue, east of the GWE&TS. This discharge is authorized by the NYSDEC under a State Pollution Discharge Elimination System (SPDES) permit equivalency, which outlines site-specific discharge limits. A copy of the SPDES permit equivalency, is provided in [Appendix D](#).

According to information provided by the NYSDEC Remedial Services Contractor, pH readings were not collected in January of this reporting period as the pH meter was not functioning properly. Additionally, one reading was not completed this reporting period in May 2016 due to budgetary restrictions, per the NYSDEC.

Based on the analytical data, all analytes in the treated groundwater discharged from the GWE&TS during this reporting period were in compliance with all SPDES requirements, with the exception of a one-time exceedance of iron and several pH exceedances, as summarized below:

- Iron was detected at a concentration of 2,620 ug/l on June 30, 2016, exceeding its site-specific effluent limitation of 1,000 ug/l.
- pH was detected at levels outside of its site-specific effluent limitation range of 6.5 to 8.5 standard units on three occasions throughout this reporting period. pH was detected below its site-specific effluent limitation range on October 5, 2016 and February 16, 2017 at 6.32 and 6.05 standard units, respectively. Additionally, pH was detected above site specific effluent limitation range on June 30, 2016 at 8.91 standard units.

Vapor-Phase Discharge Standards and Compliance Status

PID readings collected from the vapor-phase effluent ranged from 0 ppm to 0.4 ppm during this reporting period. In order to more accurately monitor VOC concentrations in the vapor-phase effluent, the collection of vapor-phase effluent samples for laboratory analysis was initiated on a semi-annual basis in 2011. A site-specific effluent limit of 0.5 pounds per hour (lbs/hr) was developed in consultation with the NYSDEC as a means to monitor the vapor-phase VOCs discharged by the GWE&TS.

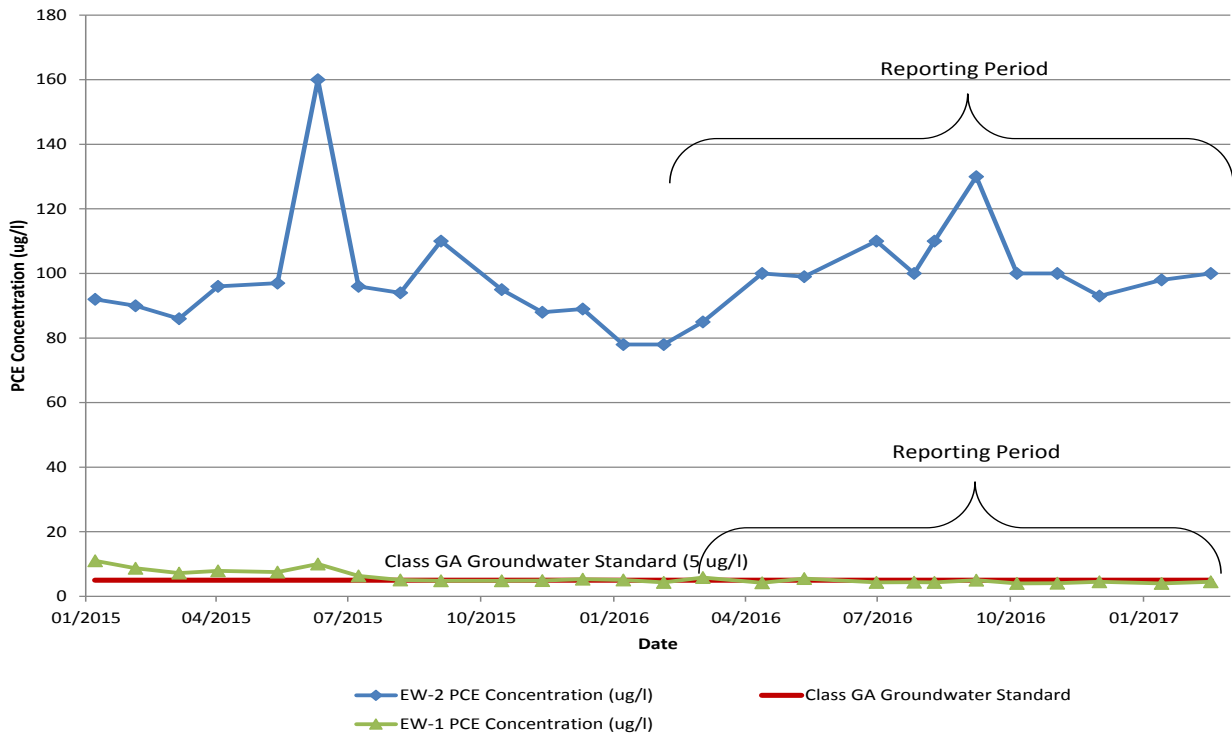
Vapor-phase effluent samples were collected on two occasions during this reporting period: April 12 and October 5, 2016. The April 12 and October 5, 2016 sample results corresponded to total VOC emissions of 4.5E-04 lbs/hr and 3.4E-04 lbs/hr, respectively, well below the site-specific maximum total VOC emissions limit of 0.5 lbs/hr.

Groundwater Treatment Performance

Based on the influent sample results, PCE has been detected in exceedance of its NYSDEC Class GA Standard of 5 ug/l in groundwater extracted from EW-1 on March 3, 2016 and May 11, 2016 of this reporting period and from EW-2 throughout this reporting period. A graph depicting PCE concentrations in extraction wells EW-1 and EW-2 for a 2-year period, prior to the end of this reporting period (February 2017), is provided as Figure 4-1.



Figure 4-1
EW-1 and EW-2 PCE Concentrations



Based on the influent sample results for this reporting period, PCE concentrations in extraction well EW-1 influent ranged from 4.0 ug/l to a maximum concentration of 5.8 ug/l, which was detected on March 2, 2016. PCE concentrations detected in extraction well EW-2 influent during this reporting period ranged from 85 ug/l to a maximum concentration of 130 ug/l, which was detected on September 7, 2016.

It should be noted that several other VOCs, including acetone, chloroform, methylene chloride, methyl tert-butyl ether (MTBE) and trichloroethene, were detected at generally low levels and well below their respective Class GA Standards in one or both wells during this reporting period.

PCE results during this reporting period in extraction wells EW-1 and EW-2 exhibited slightly decreasing and increasing trends, respectively. In general, both extraction wells exhibit an overall decreasing trend since system start-up in September 2004.

As discussed in Section 4.2, the GWE&TS has been removing VOCs in the extracted groundwater to below the required site-specific aqueous-phase discharge standards. No VOCs were detected above site specific SCGs in aqueous-phase discharge during this reporting period; however, trace detections of acetone and methylene chloride at concentrations of 2.0 ug/l and 1.1 ug/l, respectively on February 16, 2017. Approximately 1.84 pounds of PCE were removed from the extracted groundwater during this reporting period, slightly less than the previous reporting period (2.15 pounds), and the total pounds per hour (lbs/hr) average PCE removal rate for this reporting period ranged from a low of 2.96E-04 lb/hr to a high of 3.58E-04 lb/hr, as compared to 2.94E-04 lb/hr to 6.36E-04 lb/hr during the previous reporting period.

The average total VOC removal efficiency for the GWE&TS throughout this reporting period was approximately 99.44%, slightly lower than the average efficiency throughout the previous reporting period (99.52%). A summary of the GWE&TS performance results for this reporting period is provided on Table 3-2.



4.3 Groundwater Monitoring Well Network Evaluation

Groundwater Monitoring Well Condition Summary

All of the sampled groundwater monitoring wells were found to be accessible during the groundwater monitoring/sampling events conducted throughout this reporting period. All 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 following exceptions:

Quarter 47 (March 1, 2016 through May 31, 2016)

- The concrete well pad at monitoring well ASMW-5 was observed to be damaged.
- A lock is not present at monitoring well ASMW-5.
- The locking well cap at monitoring wells ASMW-4 and ASMW-5 need to be replaced.
- Several monitoring well cover bolts are missing at monitoring well ASMW-4.

Quarter 48 (June 1, 2016 through August 31, 2016)

- The concrete well pad at monitoring well ASMW-5 was observed to be damaged due to heavy vehicular traffic through the area. According to information provided by NYSDEC Remedial Services Contractor, it is recommended that the manhole be raised or the well casing be lowered.
- A lock is not present at monitoring wells ASMW-4 and ASMW-5.
- The well IDs for monitoring wells ASMW-5 and ASMW-6 are not visible.

Quarter 50 (December 1, 2016 through February 29, 2017)

- On February 16, 2017, the NYSDEC Remedial Services Contractor was on-site to replace the runtime meter at EW-2.

Monitoring well field inspection forms are provided in [Appendix G](#).

Contaminant Concentrations

A summary of PCE concentrations detected in the monitoring well network is provided below. Note that graphs are provided in “hyperlinks” indicated in blue below, for monitoring wells exhibiting PCE concentrations in exceedance of its Class GA Standard of 5 ug/l during this reporting period.

As described above, monitoring wells ASMW-1 through ASMW-3 are located along the leading edge of the groundwater plume, in close proximity to the GWE&TS, while monitoring wells ASMW-4 through ASMW-7 are located downgradient of the GWE&TS, and act as early warning or “sentinel” wells for a cluster of Village of Rockville Centre public supply wells located further downgradient of the GWE&TS.

[ASMW-1](#): PCE was detected at concentrations ranging from 21 ug/l to a maximum of 47 ug/l, detected on July 6, 2016. Overall, PCE concentrations within monitoring well ASMW-1 have exhibited a generally stable trend throughout this reporting period, and a decreasing trend since 2003.

ASMW-2: PCE was detected at concentrations ranging from 0.51 ug/l to a maximum of 0.75 ug/l, detected on July 6, 2016. Overall, PCE concentrations within monitoring well ASMW-2 have exhibited a generally stable trend throughout this reporting period and a decreasing trend since 2003.

ASMW-3: Consistent with historical data, PCE was not detected in the groundwater samples collected from this monitoring well, with the exception of a trace detection at 0.18 ug/l on April 21, 2016. Overall, PCE has exhibited a stable trend in ASMW-3, exhibiting either nondetect or trace concentrations since 2004.

ASMW-4: PCE was not detected in the groundwater samples collected from this monitoring well. Overall, PCE has exhibited either nondetect or trace concentrations since system start-up 2003.

ASMW-5: Consistent with historical data, PCE was not detected in the groundwater samples collected from this downgradient well during this reporting period.

ASMW-6: Consistent with historical data, PCE was not detected in the groundwater samples collected from this downgradient well during this reporting period.



ASMW-7: Groundwater samples were collected on two occasions from ASMW-7 during this reporting period, as the NYSDEC Remedial Services Contractor was able to coordinate sampling with Molloy College. PCE was not detected in the groundwater samples collected from this monitoring well.

Several other VOCs, including chloroform, 1,1-dichloroethene, 4-methyl-2-pentanone, MTBE, 1,1,1-trichloroethane, and trans-1,2-dichloroethene were detected at generally low levels and well below their respective Class GA Standards within one or more well during this reporting period.

5.0 INSTITUTIONAL CONTROL/ENGINEERING CONTROL (IC/EC) CERTIFICATION PLAN

The intent of this section is to provide a description of the IC/ECs in place for the Site, as well as the mechanisms used to monitor and enforce these controls.

Institutional Controls

By definition, an IC is any non-physical means for enforcing restriction on the use of real property that limits human health and environmental exposure, restricts the use of groundwater, provides notice to potential owners, operators, or member of the public, or prevents action that would interfere with the effectiveness and/or integrity of operation, maintenance and monitoring activities at or pertaining to a remedial site.

ICs are not required by the March 1998 ROD as an element of the remedy. Therefore, ICs such as land or groundwater use restrictions are not currently implemented at the Site. A SMP for the Site, including a Monitoring Plan and an O&M Plan for the GWE&TS, was put in place in July 2012.

It should be noted that the Site's inclusion in the New York State Registry of Inactive Hazardous Waste Sites as a Class 4 Inactive Hazardous Waste Site (Site No. 130050) acts as an IC for the Site. In general, such Sites go through a process of investigation, evaluation, cleanup and monitoring in several distinct phases, which are recorded and maintained by New York State. The information recorded and maintained by New York State typically includes the Site name, identification number, description, cleanup status, types of cleanup, owner information, types and quantities of contaminants, and an assessment of health and environmental issues.

Based on the successful remediation of Site "source area" soil and groundwater contamination utilizing a SVE/AS system, and based on the results of the NYSDEC's September 2009 groundwater sampling event, land use restrictions are not warranted at the Site at this time.

In addition, groundwater is not currently nor planned to be utilized for any purpose at the Site. Based on the availability of public water downgradient of the Site, it is not anticipated that groundwater will be utilized for any purpose for the foreseeable future. In addition, Molloy College, located immediately downgradient of the leading edge of the groundwater plume, is serviced by public water supply. As detailed in Section 2.2, and as part of the requirements of the March 1998 ROD, a deep irrigation well (ASMW-7) was installed at Molloy College to replace shallow irrigation well (MCOL-1), which had the potential to become contaminated with PCE based on its depth and location downgradient of the groundwater plume.

Based on the above evaluation, groundwater use restrictions are not warranted to be implemented at or downgradient of the Site at this time.

Engineering Controls

By definition, an EC is any physical barrier or method employed to actively or passively contain, stabilize or monitor contamination, restrict the movement of contamination to ensure long-term effectiveness of a remedial program or eliminate potential exposure pathways to contamination. The GWE&TS, the groundwater monitoring network (ASMW-1 through ASMW-6) and replacement irrigation well ASMW-7 are the ECs currently in-place downgradient of the Site. The GWE&TS has operated in general accordance with the design standards throughout the majority of this reporting period. Although not required by the March 1998 ROD, the site fencing and security signage act as ECs at the Site as well. The Site fencing and security signage are currently in-place and functioning properly. In addition, based on information provided by the NYSDEC, a sub-slab soil vapor extraction system is currently operating, maintained by others, in the on-site former "source area."





The IC/EC Certification form provided by the NYSDEC includes the GWE&TS as an EC. A copy of the completed IC/EC Certification form, as provided by the NYSDEC, is included as [Appendix H](#). In addition, a property owner certification is provided as [Appendix I](#).

6.0 GREEN REMEDIATION PLAN

In accordance with the NYSDEC's DER-31 Green Remediation policy, the following section provides a qualitative assessment of the overall environmental impacts or "footprint" associated with the operation of the GWE&TS. In addition, recommendations are provided in order to minimize the environmental impacts of the remedy.

6.1 Qualitative Overview of Environmental Impacts

Electric Usage

The GWE&TS currently obtains 100% of its electricity from the local electric utility, PSEG Long Island (PSEG). Based on publicly available information, PSEG currently supplies electricity from a variety of fuel sources, including fossil fuels (46%), nuclear (11%), refuse burning (4%) and renewables (3%). The remaining 36% of its electric is supplied from other outside electric utilities. Electricity usage associated with the GWE&TS is mainly attributed to operation of the submersible pumps within extraction wells EW-1 and EW-2, the pressure blower and the wet well submersible pumps. Minor electricity usage can also be attributed to the treatment system building heating and lighting, as well as system controls.

Based on a review of the electric utility bill summary for this reporting period (provided by the NYSDEC), the GWE&TS used a total of approximately 116,320 kilowatt-hours (kWh) of electricity, at an average of approximately 319 kWh/day. Note that the average electricity usage during the previous reporting period was 352 kWh/day. It should be noted that the total average electricity usage decreased during this reporting period, as compared to the previous reporting period. This is likely due to the fact that there was more system downtime during this reporting period, as compared to the previous reporting period.

Fossil Fuel Usage

The GWE&TS does not directly use fossil fuels as part of its routine operation; however, fossil fuels are indirectly used during the completion of maintenance and monitoring activities associated with the overall operation of the GWE&TS. Indirect fossil fuel use results from completion of the following Site related activities:

- Transportation to and from the Site for monitoring, sampling and system alarm response.
- Operation of a portable generator to power a submersible pump for groundwater monitoring well sampling activities.
- Off-site transportation and shipment of samples collected for laboratory analysis.
- Disposal of waste generated at the Site.

Water Usage

The GWE&TS does not directly use water for operation. Note that the treatment system building is equipped with a pressurized water storage tank and jet pump, which was installed to provide for the ability store treated groundwater from the wet well for later use in a sump sink located next to the water storage tank. Therefore, the GWE&TS has no net impact associated with water usage.

Air Emissions

Vapor-phase discharge from the low profile stacked-tray air stripper is released directly to the atmosphere. The vapor-phase discharge is monitored on a routine basis to prevent or limit any vapor-phase contaminant concentration exceedances. Contaminant concentrations within vapor-phase discharge are consistently well below the site-specific discharge limits and were below the site-specific discharge limits throughout this reporting period.

Monitoring and maintenance activities associated with the GWE&TS also result in indirect emissions to the air through the off-site generation of electricity utilized to power the GWE&TS and the combustion of fossil fuels, as discussed above.



Consumption of Materials and Generation of Waste

Monitoring, maintenance and reporting activities associated with the GWE&TS result in material consumption and the generation of waste. A summary of the current material consumption and waste generation activities for the GWE&TS are summarized below:

- Personal protective equipment associated with GWE&TS and groundwater sampling, such as nitrile gloves and hearing protection, etc.
- Polyethylene tubing, twine and bailers associated with groundwater sampling.
- Packaging material and ice used to pack and preserve samples to be submitted for laboratory analysis.
- Florescent light bulbs for building lighting.
- Paper and office supplies associated with GWE&TS Site logs, monitoring logs and report preparation.
- Repair and replacement of equipment associated with the GWE&TS.

7.0 COST EVALUATION

The total cost of operation of the GWE&TS from March 1, 2016 through February 28, 2017 was approximately \$141,135. This total includes engineering and subcontractor costs, as well as utility costs associated with the operation of the GWE&TS (electric). It should be noted that this total does not include any administrative costs incurred by the NYSDEC in support of this project throughout this reporting period. A review of these costs is provided on Table 7-1.

The following provides a brief review of each cost item:

- Engineering costs include effort invoiced in association with project management, report preparation, project planning and other office-related work items. As summarized on Table 7-1, engineering costs were approximately 55% of the total costs for this reporting period, similar to the previous reporting period.
- Subcontractors include the NYSDEC Remedial Services contractor, analytical laboratory and maintenance contractors associated with the routine/non-routine maintenance of the GWE&TS. As summarized on Table 7-1, subcontractor costs were approximately 26% of the total costs for this reporting period, down from approximately 37% during the previous reporting period.
- Utility costs in support of the overall operation of the GWE&TS include electric. As summarized on Table 7-1, utility costs were approximately 16% of the total costs for this reporting period, and were associated with electric usage, slightly down from approximately 17% during the previous reporting period.

Based on the total cost of \$141,135 incurred during this reporting period, the average cost of monthly system operation was approximately \$11,761 per month. In addition, when compared to a total of 1.84 pounds of VOCs removed throughout this reporting period (as summarized on Table 3-2), the average total VOC removal cost is approximately \$76,704 per pound of VOC, up from approximately \$58,605 during the previous reporting period. This is due to slightly higher operating costs and slightly less VOC recovery, as compared to the previous reporting period.



Table 7-1: Reporting Period Cost Summary

COST ITEM	BUDGET EXPENDED (March 1, 2016 through February 28, 2017)	PERCENT OF TOTAL
ENGINEERING SUPPORT		
D&B Engineers and Architects, P.C.	\$77,500	54.91%
SUBCONTRACTORS		
NYSDEC Remedial Services Contractor ⁽¹⁾ (Routine/Non-Routine Maintenance Activities)	\$37,118	26.30%
Test America (Analytical Laboratory)	\$4,124	2.92%
SUB-TOTAL	\$41,242	29.22%
UTILITIES		
Electric	\$22,393	15.87%
SUB-TOTAL	\$22,393	15.87%
TOTAL COSTS	\$141,135	--
AVERAGE COST/MONTH	\$11,761	--
COST/POUND OF VOC REMOVED⁽²⁾	\$76,704	--

Notes:

1. All expenses and labor are incorporated into the NYSDEC Remedial Services Contractor overall costs, excluding electric and telephone costs.
2. Based on a total of approximately 1.84 lbs of VOCs removed during this reporting period.

8.0 CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

Based on the evaluation of the GWE&TS performance, effectiveness and protectiveness throughout this reporting period, and as detailed in the preceding sections, the following conclusions have been established:

General

- GWE&TS Operation: The overall GWE&TS and remedial components operated in a generally efficient manner and generally within design specifications during this reporting period, with the exceptions as noted below.
- Plume Redelineation: Based on recommendations provided in the May 2012 RSO Summary Report, a plume re-delineation field program was completed in June and July 2014 to identify the current horizontal and vertical extents of the remaining groundwater plume associated with the Site. The results of the plume re-delineation program are documented in the June 2015 Plume Re-Delineation Summary Report. Recommendations for the investigation of an apparent upgradient “source area” of contamination were presented in the June 2015 Plume Redelineation Summary Report.

Operation and Maintenance

- O&M Plan: As noted in Section 3.2, the O&M scope of services was performed in accordance with the requirements of the O&M Plan and SMP, with the exception of routine maintenance of the pressure blower, which was completed more frequently than what is specified in the routine maintenance schedule.
- Alarm Conditions/Downtime: Several alarm conditions and system shutdowns occurred throughout this reporting period. These shut down events were primarily associated with power losses and low-voltage electric issues, reportedly due to storm events, low-level conditions at extraction well EW-2 and low-flow issues associated with the pressure blower.



- EW-2 Runtime Meter: As the runtime meter was identified to be not functioning in October of this reporting period the NYSDEC Remedial Services Contractor replaced the runtime meter for EW-2 in February, after troubleshooting activities were conducted.

Monitoring Plan

- System Monitoring: As noted in Section 4.0, monitoring requirements were generally maintained throughout the reporting period in accordance with the requirements of the monitoring schedule provided in the SMP. It should be noted that per direction of the NYSDEC, the sampling frequency for iron and manganese was modified in December of this reporting period to once per quarter.
- pH Readings: pH readings were unable to be collected from aqueous-phase system samples on three occasions throughout this reporting period as the NYSDEC Remedial Services Contractor's pH meter was not functioning. Additionally, one reading was not completed this reporting period in May 2016 due to budgetary restrictions, per the NYSDEC.
- Monitoring Well Sampling: As discussed in Section 4.3, the NYSDEC Remedial Services Contractor, should continue to coordination with Molloy College to collect groundwater samples from ASMW-7 per the routine schedule provided in the SMP.

Institutional and Engineering Controls

- IC/EC Compliance: As noted in Section 5.0, ICs are not required by the March 1998 ROD as an element of the remedy. Therefore, ICs such as land or groundwater use restrictions are not currently implemented at the Site. However, note that the Site's inclusion in the New York State Registry of Inactive Hazardous Waste Sites as a Class 4 Inactive Hazardous Waste Site (Site No. 130050) acts as an IC for the Site. The GWE&TS EC, as listed in the IC/EC Certification Form provided by the NYSDEC, is currently in-place and operating as intended, as well as, the groundwater monitoring well network (ASMW-1 through ASMW-6). In addition, the alternate groundwater irrigation well (ASMW-7) is in-place downgradient of the GWE&TS on Molloy College property and soil vapor mitigation system, operated by others, is in-place at the Site "source area."

8.2 Recommendations

Based on evaluation of the operation of the GWE&TS throughout this reporting period, and as detailed in the preceding sections, the following recommendations have been established to increase the overall performance, effectiveness and protectiveness of the GWE&TS:

General Recommendations

- GWE&TS Operation and Remedial Objectives: The GWE&TS Engineering Controls should remain in place until remedial objectives have been reached; however, it should be noted that the operational and performance data set for the GWE&TS indicates that the system, as configured, may be approaching asymptotic conditions. As such it is recommended that continued operation of the GWE&TS be evaluated in accordance with the Site Management Plan. The evaluation should consist of "pulsing" of the system and monitoring of contaminant concentrations within the existing monitoring well network located in the vicinity and downgradient of the GWE&TS. Pulsing would involve the periodic shutdown and startup of the system to allow for the subsurface environment to come to equilibrium prior to resuming groundwater extraction, as necessary.
- Plume Redelineation: Based on the fact that the greatest current PCE exceedance identified during the Plume Redelineation Program were identified upgradient of the Site (following the completion of the on-site "source area" remediation in August 2004), the groundwater plume currently being captured by the GWE&TS may be emanating from an off-site "source area" located upgradient of the Site. Therefore, it is recommended that the NYSDEC investigate the area to the north, or upgradient, of the Site to locate and address any remaining "source areas" likely to exist in this vicinity. It should be noted that the November 1998 RI/FS identified at least three former dry cleaners known to have existed in an upgradient arrangement with respect to the Site. Once the upgradient "source areas" are identified and addressed, it may be warranted to pursue alternate remedial actions, such as a chemical injection program, to address residual contamination at that time.



- Periodic Reviews: Based on a review of the guidance documents provided by the NYSDEC, it is recommended that PRRs be completed on an annual basis. The frequency of follow-up PRRs will be determined by the NYSDEC based on future Site conditions and compliance.

Operation and Maintenance Plan

- Facility Maintenance: Ensure that landscaping and snow plowing activities are adequately completed to maintain access and safety at the Site, as necessary.
- Alarm Conditions/Downtime: It is recommended that the NYSDEC Remedial Services Contractor investigate the cause of the “low flow” conditions that have been occurring at the pressure blower and redevelop EW-2 to ensure it is able to provide sufficient yield to prevent a low groundwater level in the well during operation of the submersible pump.
- Routine Maintenance of the GWE&TS: In order to reduce the likelihood of premature equipment failure and associated system downtime, D&B recommends that the NYSDEC Remedial Services Contractor perform maintenance of the pressure blower and all other system components, in accordance with their respective manufacturer’s specifications and per the requirements of the O&M Plan. Although the NYSDEC Remedial Services Contractor completed maintenance of the pressure blower, maintenance was conducted more frequently than what is specified in the routine maintenance schedule.

It is further recommended that the NYSDEC Remedial Services contractor provide sufficient information on the O&M forms to clearly document the O&M activities performed.

Monitoring Plan

- System Monitoring: Based on the requirements of the NYSDEC-approved schedule, routine system monitoring should be completed on a semi-monthly basis. It is recommended that the NYSDEC Remedial services Contractor conduct routine monitoring per this schedule in order to limit the completion of unnecessary work and associated costs.
- pH Readings: The NYSDEC Remedial Services Contractor should ensure a functional pH meter is available for Site use during each semi-monthly monitoring event to ensure pH readings can be collected from the aqueous-phase effluent.
- Monitoring Well Sampling: Ensure that the NYSDEC Remedial Services Contractor continues to coordinate with Molloy College to collect groundwater samples from ASMW-7 per the routine sampling schedule provided in the SMP.

Institutional and Engineering Control Recommendations

- Institutional Controls: Based on available information, ICs such as groundwater and land-use restrictions are not currently required for the Site. Based on the evaluation presented in Section 5.0, these restrictions are not warranted to be implemented at or downgradient of the Site at this time.