



New York State Department of Environmental Conservation Division of Environmental Remediation

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

2011 Periodic Review Report





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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.

Based on evaluation of the performance, effectiveness and protectiveness of the GWE&TS throughout this reporting period (January 1, 2011 through December 31, 2011), the following conclusions and associated recommendations are briefly summarized:

- **O&M Plan:** The Operation and Maintenance scope of services was generally performed in accordance with the requirements outlined in the site-specific Operations and Maintenance (O&M) Plan, dated October 2003, with the exception of the routine maintenance of the pressure blower and wet well pump. The following O&M recommendations have been proposed in order to increase the performance, effectiveness and protectiveness of the GWE&TS:
 - Routine Maintenance of the Pressure Blower and Wet Well Pumps: In order to reduce the likelihood of premature equipment failure and associated system downtime, D&B recommends that the NYSDEC “call-out” contractor perform maintenance of the pressure blower and wet well pumps, and all other system components, in accordance with their respective manufacturer’s specifications and per the requirements of the October 2003 O&M Plan;
 - Based on several alarm events associated with extraction well VFD over/under voltage conditions occurring during this reporting period, it may be warranted to have an electrician inspect the extraction well VFDs; and
 - Based on the observed damage at monitoring wells ASMW-4, ASMW-6 and ASMW 7, D&B recommends restoring these wells so they may be adequately accessed and protected.
- **Monitoring Plan:** System monitoring requirements were maintained throughout this reporting period in accordance with the requirements outlined in the October 2003 O&M Plan. However, the following recommendations are provided to increase the effectiveness and protectiveness of the GWE&TS:
 - As the current SPDES permit equivalency expired on January 31, 2006, D&B recommends that this permit equivalency be renewed; and
 - In order to ensure that site-related VOCs are not present in Molloy College irrigation well MCOL-2, D&B recommends that this well be accessed and sampled on an annual basis.
- **Institutional Control/Engineering Control (IC/EC) Plan:** The following recommendations have been proposed based on evaluation of the IC/EC Plan for the Site:
 - 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; and
 - Molloy Irrigation Well: The IC/EC form should be revised and updated to include Molloy College irrigation well MCOL-2 as an active EC for the Site.
- **General Recommendations:** The following general recommendations are provided based on evaluation of the overall remedy:
 - The GWE&TS EC should remain in-place until remedial objectives have been obtained; and
 - PRRs should 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.



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 1 mile downgradient of the Site.

The information provided in this report covers the period from January 1, 2011 through December 31, 2011. However, portions of this report incorporate pertinent historical background information and monitoring data, as appropriate.

Environmental Assessment and Remediations (EAR), a NYSDEC "call-out" contractor, was responsible for the Site operation, monitoring and maintenance throughout this reporting period, while all reporting and engineering services were completed by Dvirka and Bartilucci Consulting Engineers (D&B).

The objectives of the PRR for the Site include:

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



FRANKLIN CLEANERS SITE
VILLAGE OF HEMPSTEAD, NEW YORK
SITE LOCATION MAP

FRANKLIN CLEANERS SITE
VILLAGE OF HEMPSTEAD, NEW YORK
SITE LOCATION MAP

SOURCE: GOOGLETARTH.COM

FIGURE 1-1





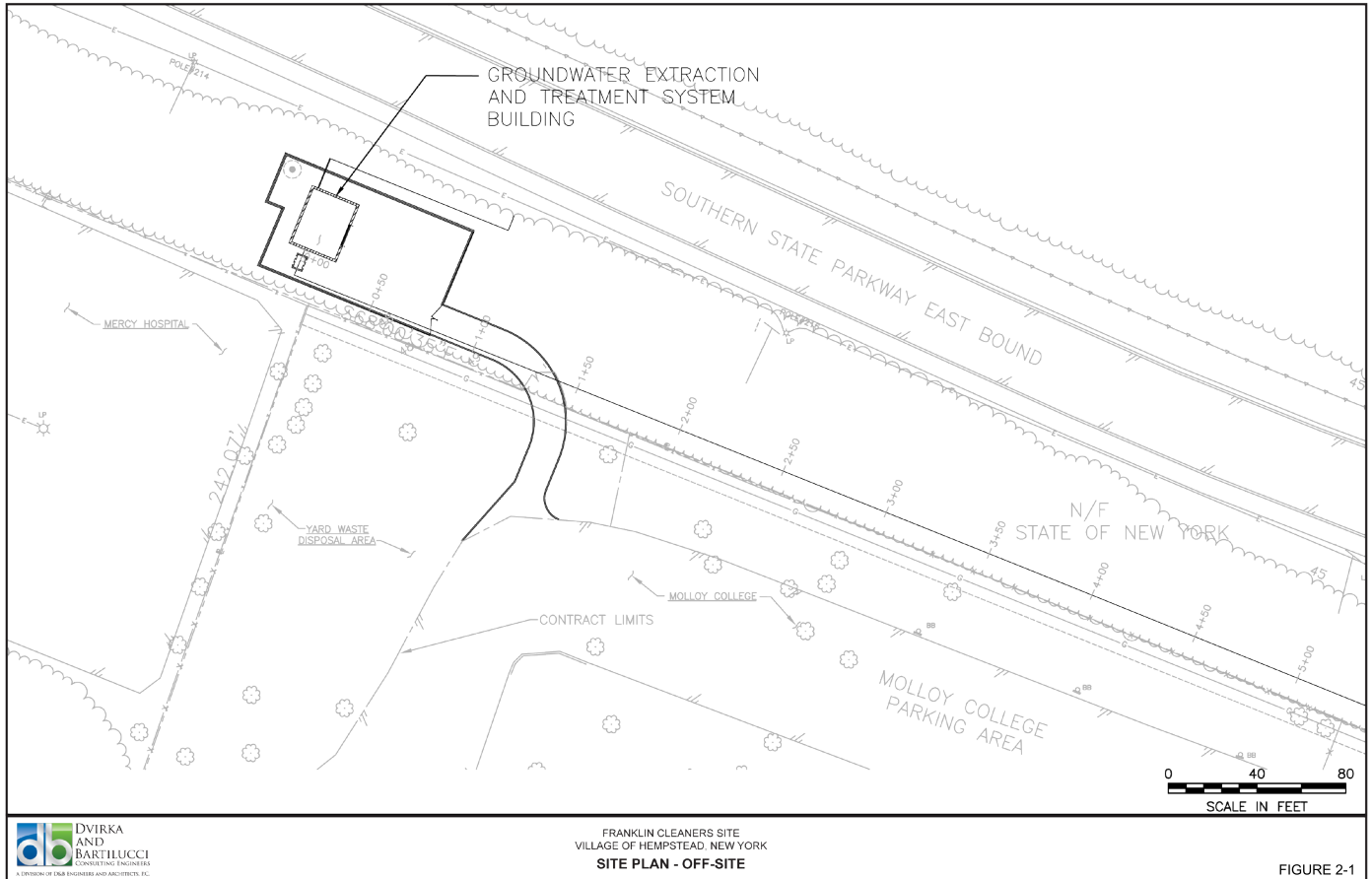
2.0 SITE OVERVIEW

2.1 Site Operations and Description

The Site is a NYSDEC Class 2 Inactive Hazardous Waste 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 and 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. The Site is bordered by Marvin Avenue to the south, private residences to the north and east, and 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 cleaning facility.

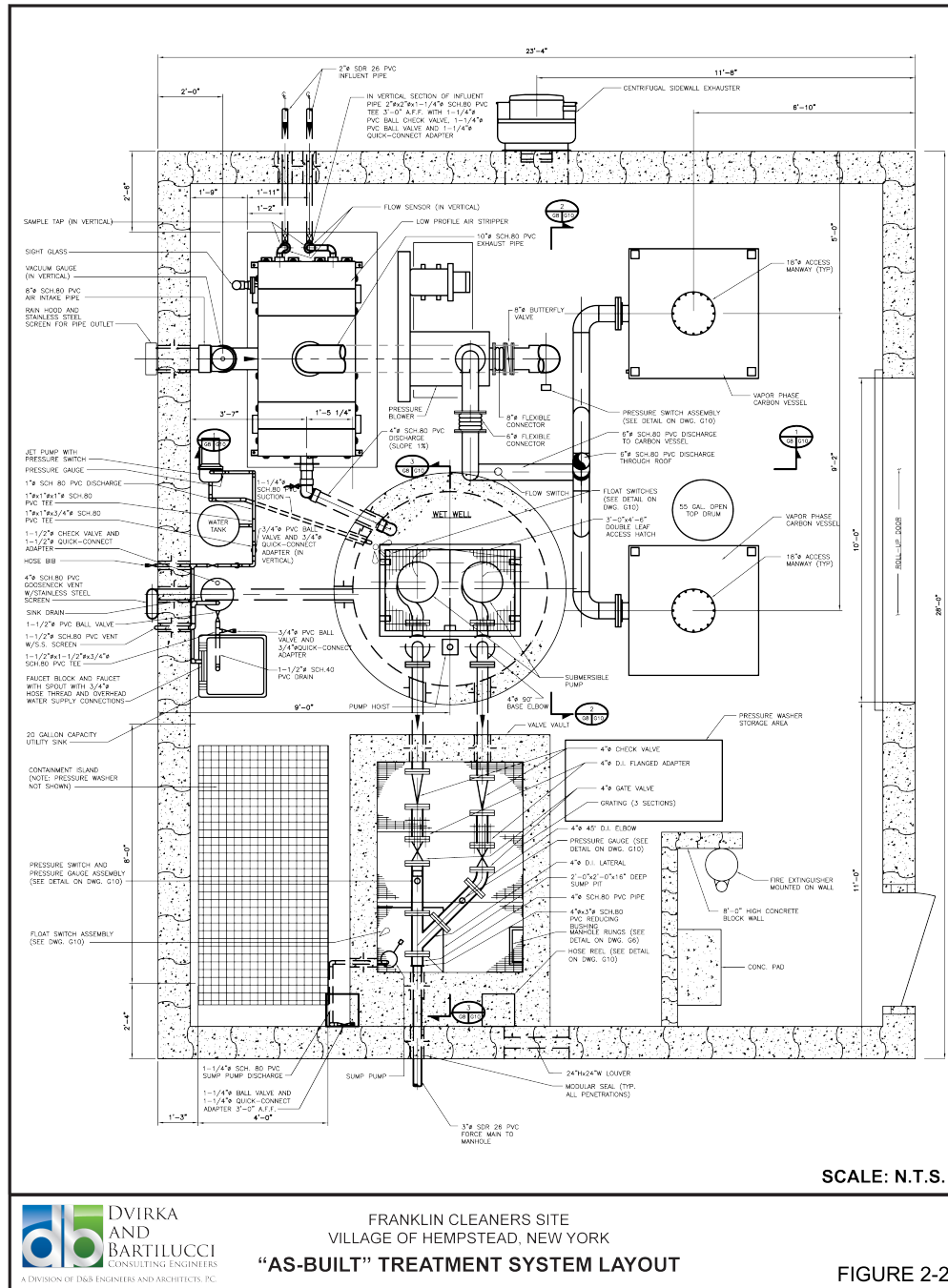
As summarized in further detail below, the “source area” contamination at the Site was remediated via a soil vapor extraction and air sparging (SVE/AS) system, which operated from November 2003 to August 2004. The SVE/AS system was shut down in August 2004 based on contaminant concentrations below NYSDEC guidelines.

The GWE&TS is located at 1000 Hempstead Avenue in the Village of Rockville Centre, Nassau County, New York, approximately 1 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](#).



FRANKLIN CLEANERS SITE
VILLAGE OF HEMPSTEAD, NEW YORK
"AS-BUILT" TREATMENT SYSTEM LAYOUT

FIGURE 2-2

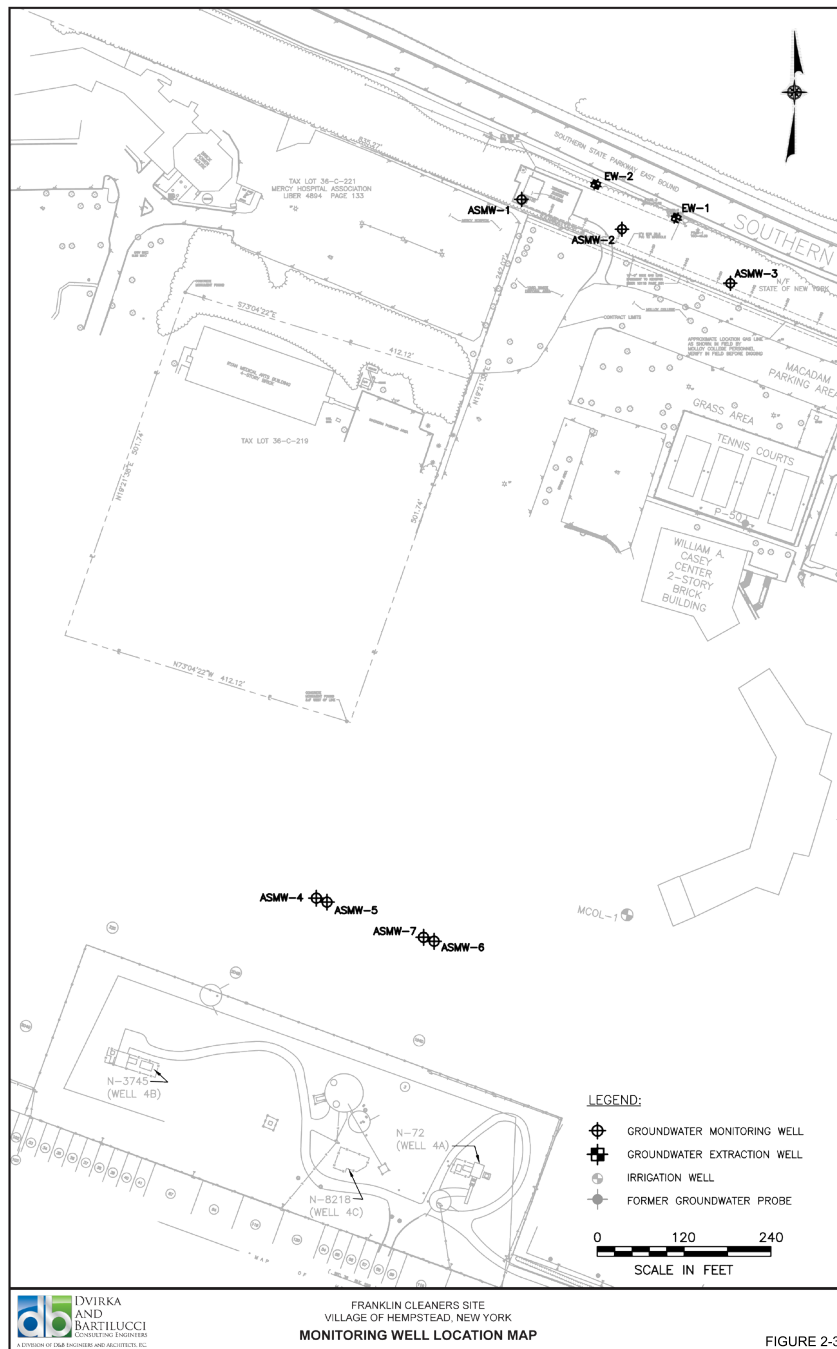
The GWE&TS consists of two 6-inch diameter extraction wells (EW-1 and EW-2) screened at a depth of 70-90 and 75-90 feet below grade, respectively. Extracted groundwater is conveyed via underground piping to a low profile stacked-tray air stripper located in the GWE&TS building. Treated groundwater is 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 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 during this reporting period (June 2011), per the approval 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.

In order to monitor the effectiveness of the GWE&TS, a monitoring well network was installed in the vicinity of 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 the PCE concentrations detected in groundwater described above, 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 investigate 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 timeline 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 Nassau County Department of Public Works (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 Dvirka and Bartilucci Consulting Engineers (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 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; and





- Elevated concentrations of PCE were detected in ambient air samples collected from within the Site building (e.g. 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; and
- 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; and
- 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 and 1st and 2nd 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 Record of Decision (ROD) in March 1998. In order to eliminate or mitigate threats to human health and the environment, the NYSDEC selected the following ICs/ECs to be implemented at the Site:

- Soil vapor extraction (SVE) of PCE-contaminated soils with on-site treatment of contaminated vapors using a vapor phase granular activated carbon (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; and



- 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 November 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; and
- 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 nondetectable concentrations of PCE in soil vapor extracted from the SVE wells. Further details of the “source area” remediation are provided in the draft 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. 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 site inspection, the SSDS is operating as designed.

As detailed above, the construction of the GWE&TS was completed in September 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 current 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 all but disappeared" within the areas investigated and "is not considered a source of vapors."

3.0 OPERATION AND MAINTENANCE (O&M) PLAN COMPLIANCE

3.1 O&M Plan Requirements and Compliance Status

The 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 site-specific Operations and Maintenance (O&M) Plan, dated October 2003. 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 B](#).

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 October 2003 O&M Plan. General facility maintenance activities completed during this reporting period include:

- Weekly cleaning of the building louver inlet vent screen;
- Weekly cleaning of the air stripper inlet vent screen;



- Snow removal services (January 12 and 28, and February 2, 2011);
- Removal of on-site overgrown vegetation (May 12, 18 and 26, July 13, August 25 and 31, October 6, and November 17, 2011);
- Replenishment of expendable O&M supplies; and
- Providing general facility housekeeping.

Overall, the scope of services for general facility maintenance activities is considered satisfactory.

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-Monthly	Semiannual	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)	✓			



Table 3-1: Routine Inspection and Maintenance Services Summary (cont.)				
Routine Inspection/Maintenance Item	Frequency			
	Monthly	Bi-Monthly	Semiannual	As-Needed
Flow Meter Vault				
Total Flow (gpm)	✓			
Jet Pump				
Operational Status	✓			
Line Pressure (psi)	✓			
Pressure Washer/Containment Island				
Operational Status			✓	
Routine Maintenance Items				
Pressure Blower Maintenance		✓		
Low Profile Stacked-Tray Air Stripper Maintenance				✓
Wet Well Submersible Pump Maintenance			✓	
Wet Well Strainer Cleaning/Maintenance			✓	
Flow Meter Vault Effluent Screen Cleaning/Maintenance			✓	
Utility Sink Screen Cleaning/Maintenance			✓	
Pressure Washer/Containment Island Maintenance				✓

The routine GWE&TS inspection and maintenance activities completed during this reporting period include:

- Weekly performance monitoring of system equipment (extraction well pumps, low profile stacked-tray air stripper, pressure blower, etc.);
- Weekly inspection of all equipment, piping, flanges, valves, instruments, etc. for leakage, unusual noise and proper working condition;
- Pressure blower maintenance (April 7, May 26 and November 17, 2011); and
- Low profile air-stripper maintenance (July 27, 2011). Note that D&B did not recommend air stripper maintenance at this time, as the air stripper differential pressure did not indicate this component needed maintenance.

Routine maintenance of the pressure blower and wet well pumps were not completed as per the frequencies specified in Table 3-1.

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:

- Collection of granular activated carbon (GAC) samples for waste characterization (April 15, 2011);
- Reapplication of the epoxy coating (Sikagard 62) to the treatment system building floor (April 28, 29, and May 5, 12, and 27, 2011);
- Scraping and painting of bollard poles (May 27, 2011);
- Reconfiguration of the vapor-phase discharge piping (June 10, 2011);





- Replacement of each extraction well influent flow meter (June 23, 2011); and
- Extraction well pump test for Remedial System Optimization (RSO) evaluation (November 30 and December 2, 2011).

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:

- General System Alarm likely caused by a power spike/dip during a storm event (January 19, 2011);
- General System and General Failure EW-1/EW-2 Alarms resulting from an extraction well VFD over/under current condition (January 31, 2011);
- General System Alarm resulting from an extraction well VFD over/under-current condition (June 29, 2011); and
- General System Alarm resulting from an extraction well VFD over/under-current condition (July 25, 2011).

Overall, the GWE&TS was non-operational for a total of approximately 4.9 days (119 hours) throughout this reporting period as a result of routine/non-routine maintenance activities and alarm events. As detailed below, this downtime resulted from several extraction well VFD over/under voltage current conditions occurring during this reporting period, as well as completion of a pump test for the RSO evaluation.

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 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 36.9 gpm and 5.0 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 the well during 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 concentration levels below the specified site-specific effluent limits, as detailed on the State Pollution Discharge Elimination System (SPDES) permit equivalency, provided in [Appendix C](#);

Pressure Blower: The design flow rate for the pressure blower is 650 cubic feet per minute (cfm); however, the pressure blower has been operating at approximately 875 cfm throughout this reporting period following the bypassing of the GAC vessels/reconfiguration of the vapor-phase effluent piping in June 2011.



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; and total VOC removals and efficiencies is provided on Table 3-2. As summarized on Table 3-2, extraction well EW-1 operated at a flow rate of between 30.1 gpm and 37.3 gpm and extraction well EW-2 has been operating at a flow rate of between 6.5 gpm and 7.0 gpm during this reporting period. The GWE&TS treated and discharged approximately 31,111,442 gallons of contaminated groundwater and removed approximately 3.1 pounds of PCE throughout this reporting period. However, note that the EW-2 and effluent flow meters have consistently malfunctioned throughout the majority of this reporting period.

Table 3-2: Treatment System Performance Summary ⁽¹⁾					
Parameter	Quarter 26 (December 1, 2010 through February 28, 2011)	Quarter 27 (March 1, 2011 through May 31, 2011)	Quarter 28 (June 1, 2011 through August 31, 2011)	Quarter 29 (September 1, 2011 through November 30, 2011)	Quarter 30 (December 1, 2011 through February 29, 2011)
Influent					
EW-1 Average Pumping Rate (gal per min)	30.1	31.4	34.7	37.3	37.5
EW-1 Total Flow Volume (gal)	2,557,296	4,127,094	4,563,778	4,819,896	1,674,000
EW-1 Maximum Influent PCE Concentration (ug/l)	19	19	18	19	14
EW-2 Average Pumping Rate (gal per min) ⁽²⁾	7.0	7.0	6.5	6.5	6.6
EW-2 Total Flow Volume (gal) ⁽²⁾	594,720	922,410	829,304	840,840	294,624
EW-2 Maximum Influent PCE Concentration (ug/l)	60	61	56	60	39
Effluent					
Effluent Total Flow Volume (gal per min) ⁽³⁾	4,846,118	7,835,637	7,772,809	7,916,009	2,740,869
Maximum Effluent PCE Concentration (ug/l)	0.19	0.16	0.13	Nondetect	Nondetect
VOC Removal Summary					
Total PCE Removal (lbs) ⁽⁴⁾	0.54	0.87	0.85	0.60	0.24
Average PCE Removal Rate (lbs/hr)	4.63E-04	4.53E-04	4.44E-04	5.17E-04	3.98E-04
PCE Removal Efficiency Range (%) ⁽⁵⁾	99.69 - 99.84	99.73 - 99.86	99.29 - 99.53	99.15 - 99.60	99.44

Notes:

1. Only the applicable portions of Quarter 26 (January 1, 2011 through February 28, 2011) and Quarter 30 (December 1, 2011 through December 31, 2011) are included in this reporting period.
2. The flow meter for extraction EW-2 consistently malfunctioned throughout the beginning and prior to this reporting period. Based on previously recorded flow data, it has been assumed that EW-2 was operating at an average flow rate of 7 gpm during Quarters 26 and 27. Note that the EW-1 and EW-2 influent flow meters were replaced on June 23, 2011.
3. Following replacement of the influent flow meters, inconsistencies remain with respect to influent/effluent total flow values. These inconsistencies are related to an effluent flow meter malfunction.
4. The average quarterly PCE removal is 0.78 lbs for this reporting period and the total cumulative VOC removal is 3.1 lbs for this reporting period.
5. The PCE removal efficiency has ranged from approximately 99.03% to 99.86% from system start-up in September 2004 to the end of this reporting period (December 31, 2011).

With regard to the overall operation of the GWE&TS, all system components functioned as intended, with the exception of the influent and effluent flow meters. As detailed above, the EW-2 influent and effluent flow meters consistently malfunctioned throughout this reporting period. Note that the influent flow meters were replaced on June 23, 2011. In addition, the effluent flow meter was replaced following this reporting period, as will be detailed in the following PRR.

As described above, pressure blower and wet well submersible pump maintenance activities were not completed as per the frequencies specified in the October 2003 O&M Plan. As such and as recommended in Section 8.2, D&B recommends that the NYSDEC "call-out" contractor complete these routine maintenance items as soon as possible and as per the





frequencies specified in the October 2003 O&M Plan during future reporting periods in order to avoid premature equipment failures.

GWE&TS Downtime Evaluation

The GWE&TS experienced a total of approximately 4.9 days (119 hours) of downtime throughout this reporting period due to system alarm/shutdown conditions, routine maintenance events and as a result of a pump test of the GWE&TS extraction wells completed as part of a RSO evaluation during Quarters 29 and 30. Downtime and associated non-routine maintenance and/or alarm events are detailed on Table 3-3.

Time Period	Total Hours	Runtime		Downtime		Total Number of Alarm Events	Downtime Description
		Approximate Hours	Percent of Total Time Period	Approximate Hours	Percent of Total Time Period		
Quarter 26 (December 1, 2010 through February 28, 2011)	1,416	1,406.0	99.3%	10.0	0.7%	2	One General System Alarm event occurred on January 19, 2011, which was likely caused by a power spike/dip during a storm event, and one General Failure EW-1/EW-2 Alarm event occurred on January 31, 2011, which was caused by an over/under current condition at the extraction well EW-1 VFD. Non-routine maintenance performed during this time period (snow removal activities) did not contribute to system downtime.
Quarter 27 (March 1, 2011 through May 31, 2011)	2,208	2,196.0	99.5%	12.0	0.5%	0	The GWE&TS was manually shut-down for the completion of routine maintenance activities (blower maintenance on April 7, and May 26, 2011) and during the completion of non-routine maintenance activities (collection of GAC samples for disposal purposes on April 15, 2011). Non-routine maintenance performed during this time period (re-application of the epoxy coating, landscaping and bollard pole painting) did not contribute to system downtime.
Quarter 28 (June 1, 2011 through August 31, 2011)	2,209	2,141.0	96.9%	68.0	3.1%	2	The GWE&TS was manually shut-down for the completion of routine maintenance activities (air stripper on July 27, 2011). In addition, General Failure EW-1 /EW-2 Alarm events occurred on June 29 and July 25, 2011 during Quarter 28. Non-routine maintenance activities performed during this time period (landscaping) did not contribute to system downtime.
Quarter 29 (September 1, 2011 through November 30, 2011)	2,185	2,156.0	98.7%	29.0	1.3%	0	The GWE&TS was manually shut-down for the completion of routine maintenance activities (blower maintenance) on November 17, 2011. However, the majority of the downtime occurring during Quarter 29 was the result of a manual shut-down to perform a pump test of extraction wells EW-1 and EW-2 completed as part of the RSO evaluation.
Quarter 30 (December 1, 2011 through February 29, 2011)	744	654.0	87.9%	90.0	12.1%	0	The GWE&TS was manually shut-down for performance of a pump test of extraction wells EW-1 and EW-2 completed as part of the RSO evaluation.
Total	8,018	7,899.0	98.5%	119.0	1.5%	4	

Notes:

Only the applicable portions of the Quarters 26 (January 1, 2011 through February 28, 2011) and 30 (December 1, 2011 through December 31, 2011) are included in this reporting period.



Groundwater Monitoring Well Condition Summary

All groundwater monitoring and extraction wells were found to be accessible during the groundwater monitoring sampling events completed during this reporting period. Monitoring well field inspection forms are provided in [Appendix D](#). All concrete well pads (where applicable), protective casings, surface seals, well IDs, PVC well risers, well plugs and locks were generally observed to be present and in good condition; however, several monitoring wells were observed to be damaged. This well damage occurred in the beginning of this reporting period during the repaving of a parking area by Molloy College in the vicinity of the wells. The well conditions are summarized below:

- All groundwater monitoring wells had visible well IDs, with the exceptions of groundwater monitoring wells ASMW-6 and ASMW-7;
- The well pad at groundwater monitoring well ASMW-4 has been destroyed and/or removed. In addition, the monitoring well cover was observed to be damaged and the cover bolts were stripped;
- The well cover at groundwater monitoring well ASMW-5 is currently below present surface grade. The well pad has been destroyed and/or removed and the locking well cap has been damaged. In addition, the well riser will need to be extended and resurveyed;
- The well pad and protective casing/manhole at groundwater monitoring well ASMW-6 was observed to have been demolished and/or removed. Soil has been excavated around ASMW-6 and a black drainage pipe was installed around the well riser by Molloy College during parking lot repaving and construction activities. The well riser is currently below grade. In addition, a concrete drainage ring, including a manhole cover, has been installed around ASMW-6; and
- A large PVC vault was observed to have been installed directly over groundwater monitoring well ASMW-7. A drainage ring structure was installed around ASMW-7 by Molloy College during parking lot repaving and construction activities. Several drainage pipes enter the drainage ring structure, where it is presumed that runoff from a portion of the newly paved area is discharged. In addition, the well riser is currently below grade, and therefore the well riser will need to be extended and resurveyed.

4.0 MONITORING PLAN COMPLIANCE

4.1 Monitoring Requirements and Compliance Status

The monitoring scope of services for the GWE&TS consists of system monitoring activities and groundwater monitoring well network monitoring activities completed in accordance with the requirements of the October 2003 O&M Plan. Presented below is a summary of each monitoring activity 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			
	Biweekly	Monthly	Quarterly	Semi-Annually	VOC (EPA Method 624)	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	✓				✓		✓	✓
Air Stripper Vapor Effluent		✓ ⁽¹⁾		✓		✓		
Groundwater Monitoring Wells ASMW-1, ASMW-2, ASMW-4			✓		✓			
Groundwater Monitoring Wells ASMW-3 and ASMW-5 through ASMW-7				✓	✓			

Notes:

(1) Monthly effluent vapor samples are analyzed utilizing tedlar bags and a hand-held photoionization detector (PID).

Groundwater Monitoring Activities

Groundwater monitoring activities performed throughout this reporting period included the sampling of the monitoring well network 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 installed at the leading edge of the groundwater plume during the system construction (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 consists 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. However, due to issues regarding the approval of the NYSDEC’s “call-out” laboratory contract during this reporting period, aqueous and vapor-phase samples collected in December 2011 were submitted to Mitkem Corporation (Mitkem), a subsidiary of Spectrum Analytical, for analysis.

Mitkem and TAL are both New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified laboratories.

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 Nassau County Department of Public Works (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 provides for site-specific discharge limits. A copy of the SPDES permit equivalency, as included in the October 2003 O&M Plan, is provided in [Appendix C](#).

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 pH, as discussed below.

Field-screened aqueous-phase effluent samples exhibited pH slightly below the site-specific effluent range of 6.5 to 8.5 during the Site Management Quarterly Report 26 reporting period (4.89 on February, 3, 2011 and 6.48 on January 28, 2011). In addition, pH in laboratory-analyzed aqueous-phase effluent was detected at a value of 6.44 on April 21, 2011, slightly below the site-specific effluent range. Note that, in the vast majority of recent reporting periods, field screening of pH values has provided more consistent results than the laboratory-analyzed pH samples. As such, laboratory analysis of pH was discontinued during the December 2011 reporting period (Site Management Quarterly Report 30).

Vapor-Phase Discharge Standards and Compliance Status

Based on persistent erratic PID readings associated with PID readings collected from the GAC vessels throughout several monitoring rounds preceding and during this reporting period, D&B recommended vapor-phase samples be collected from the GAC vessels for laboratory analysis of VOCs by USEPA Method TO-15. These vapor-phase samples were collected at the lead-influent, lead-effluent and lag-effluent GAC vessel sample taps on February 3, 2011.

Based on evaluation of the analytical results, several VOCs, predominantly PCE, were detected in the vapor-phase effluent. PCE was detected at the GAC vessel lead-inlet, lead-outlet and lag-outlet sample taps at concentrations of 210 micrograms per cubic meter (ug/m^3) (approximately 0.03 ppm), 130 ug/m^3 (approximately 0.02 ppm) and 180 ug/m^3 (approximately 0.03 ppm), respectively, and total VOCs were detected at concentrations of approximately 0.04 ppm, 0.02 ppm and 0.03 ppm, respectively. The following was determined based on these sampling results:

- The PID readings collected at these sample taps appear to be biased high;
- Based on similar lead-inlet, lead-outlet and lag-outlet analytical results, the GAC vessels were no longer effectively removing VOCs from the vapor-phase effluent, indicating that the GAC was exhausted; and
- It was initially recommended to replace the GAC material; however, based on the fact that VOC concentrations in all vapor-phase samples were detected well below the site-specific effluent limit for total VOCs, the NYSDEC decided to bypass the GAC vessels and discharge the vapor-phase effluent directly to the atmosphere. As described above, the GAC vessels were bypassed on June 10, 2011.

Following the bypassing of the GAC vessels, PID readings are still collected from the vapor-phase effluent, and have remained slightly erratic, ranging from 0 ppm to 3.1 ppm.

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 during this reporting period, per D&B's recommendation. Vapor-phase effluent samples were collected on one occasion during this reporting period (December 29, 2011) and exhibited total VOC concentrations of 0.03 part per million by volume (ppmv), or $5.7\text{E}-04$ lbs/hr, well below the site-specific maximum total VOC emissions limit of 0.5 lbs/hr. The 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.



4.3 GWE&TS Performance Evaluation

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 and EW-2 throughout this reporting period. Graphs depicting PCE concentrations in extraction wells EW-1 and EW-2 for a 2-year period, prior to the end of this reporting period (December 2011), are provided as Figures 4-1 and 4-2, respectively.

Figure 4-1
EW-1 PCE Concentrations

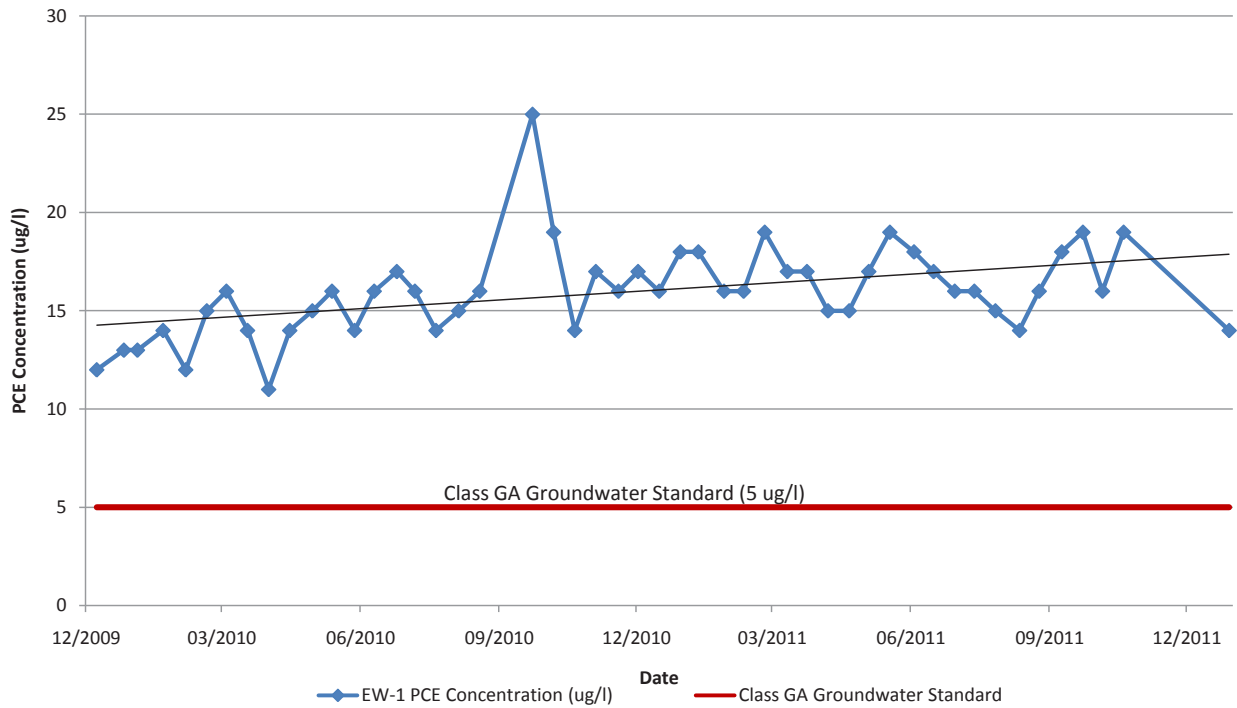
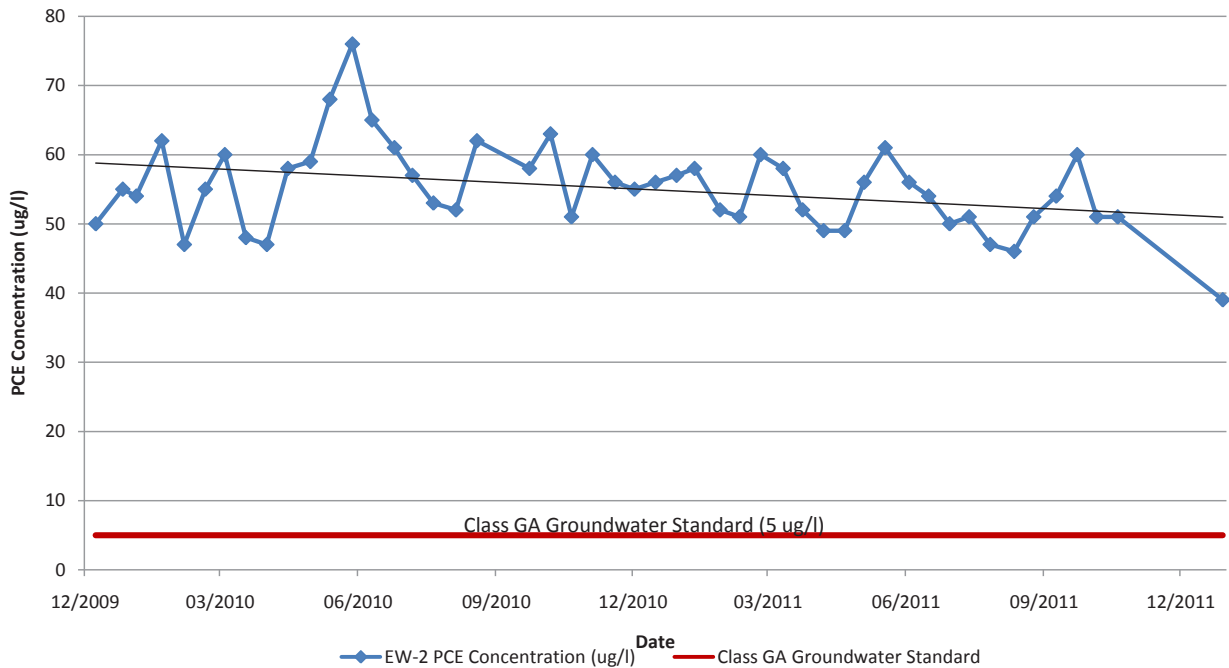




Figure 4-2
EW-2 PCE Concentrations



Based on the influent sample results for this reporting period, PCE concentrations in extraction well EW-1 influent ranged from 14 micrograms per liter (ug/l) to a maximum concentration of 19 ug/l. PCE concentrations detected in extraction well EW-2 influent during this reporting period ranged from 39 micrograms per liter (ug/l) to a maximum concentration of 61 ug/l. Several other VOCs, including bromomethane, chloroform, chloromethane, 1,1-dichloroethane, 1,1-dichloroethene, 1,1,1-trichloroethene, were sporadically detected at generally low levels and well below their respective Class GA Standards in one or both wells during this reporting period.

PCE results in extraction well EW-1 during this reporting period indicate a general stable trend, while PCE results in extraction well EW-2 indicate a slightly decreasing trend during this reporting period. However, PCE concentrations in both extraction wells indicate an overall decreasing trend since system start-up.

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 VOC was detected at concentrations exceeding its site-specific aqueous-phase discharge limits during this reporting period. Approximately 3.1 pounds of VOCs were removed from the extracted groundwater during this reporting period and the total pounds per hour (lb/hr) average VOC removal rate for this reporting period ranged from a low of 3.98E-04 lb/hr to a high of 5.17E-04 lb/hr detected in Quarter 29 (September 1, 2011 through November 30, 2011). The average total VOC removal efficiency for the GWE&TS throughout this reporting period was approximately 99.54%. A summary of the GWE&TS performance results for the reporting period is provided on Table 3-2.

Vapor Phase Treatment Performance

In order to supplement the weekly PID screening of vapor-phase effluent and in order to more accurately monitor VOC concentrations, the collection of vapor-phase effluent samples for laboratory analysis was initiated on a semi-annual basis during this reporting period, per D&B's recommendation. As described above, vapor-phase effluent samples were collected on one occasion during this reporting period (December 29, 2011) and exhibited total VOC concentrations of 0.03 part per





million by volume (ppmv), or 5.7E-04 lbs/hr, well below the site-specific maximum total VOC emissions limit of 0.5 lbs/hr.

4.4 Groundwater Monitoring Network Evaluation

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 16 to a maximum of 31 ug/l, detected on January 11, 2011. Overall, PCE concentrations within monitoring well ASMW-1 have exhibited a slightly decreasing trend throughout this reporting period.

[ASMW-2](#): PCE was detected at concentrations ranging from 1.8 to a maximum of 5.6 ug/l, detected on April 22, 2011. Overall, PCE concentrations within monitoring well ASMW-2 have exhibited a generally stable trend throughout this reporting period.

ASMW-3: Consistent with historical data, PCE was detected at a trace concentration of 0.25 ug/l on January, 11, 2011. Overall, PCE has exhibited a stable trend in ASMW-3, exhibiting either nondetect or trace concentrations, well below the Class GA Standard of 5 ug/l.

ASMW-4: PCE was detected at concentrations ranging from nondetect to a maximum trace concentration of 0.27 ug/l, detected, on January, 11, 2011. As detailed in the Site Management Quarterly Report for this reporting period, the PCE detections in downgradient groundwater monitoring well ASMW-4 are likely attributable to utilizing Method 624 for VOC analysis. Prior to this reporting period, Method 8260, which uses a much higher method detection limit (MDL) than Method 624, was utilized for all VOC analysis. As such, trace concentrations of PCE such as these may have been intermittently present for some time within ASMW-4 (and within ASMW-3) and were not detectable utilizing Method 8260.

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

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

ASMW-7: Consistent with historical data, PCE was not detected in the groundwater samples collected from downgradient ASMW-7 during this reporting period.

Several other VOCs, including chloroform, 1,1-dichloroethane, 1,1-dichloroethene, 1,1,1-trichloroethene, were sporadically detected at generally low levels and well below their respective Class GA Standards within one or more monitoring 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 Institutional and Engineering Controls (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. However, note that the Site's inclusion in the New York State Registry of Inactive Hazardous Waste Sites as a Class 2 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 (MCOL-2) 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. In addition, groundwater monitoring well ASMW-7, located generally downgradient of irrigation well MCOL-2, could also be used to supplement irrigation water for Molloy College, if needed. Note that, based on available information, ASMW-7 has never been used by Molloy College. Sampling of ASMW-7 is completed on a quarterly basis as part of routine groundwater monitoring activities, and since sampling of the well began in 2004, all VOCs have been observed at non-detect concentrations.

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-7) and replacement irrigation well MCOL-2 are the ECs currently in-place at the Site. The GWE&TS has operated in accordance with the design standards throughout the majority of this reporting period. In addition, based on the continued operation of the GWE&TS and nondetect PCE concentrations within the downgradient monitoring wells, it is unlikely that replacement irrigation well MCOL-2 has been impacted by the groundwater plume.

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.



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 G](#).

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, Long Island Power Authority (LIPA). Based on publically available information, LIPA 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 148,520 kilowatt-hours (kWh) of electricity, at an average of 407 kWh/day. Note, the average electricity usage during the previous reporting period (February 2005 through December 2010) was 315 kWh/day. This increase in average electric usage is likely related to the fact that the GWE&TS has experienced significantly less average downtime during this reporting period, as compared to the previous reporting period average downtime. Note that several system modifications, as detailed in the Remedial System Optimization (RSO) Report, dated May 2012, focus on increasing the GWE&TS efficiency and reducing its average electrical usage. These system modifications will be implemented during the following reporting period.

Fossil Fuel Usage

The GWE&TS does not directly uses 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; and
- Disposal of waste, such as spent GAC, 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 slop 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. However, as detailed above, contaminant concentrations within vapor-phase discharge are consistently well below the site-specific discharge limits. In addition, the vapor-phase discharge is monitored on a routine basis to prevent or limit any vapor-phase contaminant concentration exceedances.

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; and
- Repair and replacement of equipment associated with the GWE&TS.

Note that a RSO evaluation was performed at the Site during the latter portion of this reporting period. The overall goals of the RSO were to evaluate the current remedial status of the Site, as well as audit the performance of the GWE&TS in order to improve its efficiency, effectiveness and net environmental benefit. Several recommendations to reduce the environmental "footprint" of the GWE&TS were provided in a Remedial System Optimization Report for the Franklin Cleaners Site, dated May 2012. A number of these recommendations targeted reducing the electrical consumption of the extraction wells and pressure blower. These recommendations are planned to be implemented during the following reporting period.

7.0 COST EVALUATION

The total cost of operation of the GWE&TS from January 1, 2011 through December 31, 2011 was approximately \$264,540. This total includes engineering and subcontractor costs, as well as utility costs associated with the operation of the GWE&TS (electric and telephone). 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.



Table 7-1: Reporting Period Cost Summary		
COST ITEM	BUDGET EXPENDED (January 1, 2011 through December 31, 2011)	PERCENT OF TOTAL
ENGINEERING SUPPORT		
Dvirka and Bartilucci Consulting Engineers	\$136,492	51.6%
SUBCONTRACTORS		
NYSDEC "Call Out" Contractor ⁽¹⁾ (Routine/Non-Routine Maintenance Activities)	\$92,368	34.9%
Test America (Analytical Laboratory)	\$8,690	3.28%
H2M (Analytical Laboratory)	\$2,431	0.92%
SUB-TOTAL	\$103,489	39.1%
UTILITIES		
Electric	\$24,033	9.1%
Telephone	\$526	0.20%
SUB-TOTAL	\$24,559	9.3%
TOTAL COSTS	\$264,540	--
AVERAGE COST/MONTH	\$22,045	--
COST/POUND OF VOC REMOVED⁽²⁾	\$85,335	--

Notes:

1. All expenses are incorporated into the "call-out" contractor overall costs.
2. Based on a total of approximately 3.1 lbs of VOCs removed during this reporting period.

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 51.6% of the total costs for this reporting period;
- Subcontractors include the NYSDEC "call-out" 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 39.1% of the total costs for this reporting period; and
- Utility costs in support of the overall operation of the GWE&TS include electric and telephone. As summarized on Table 7-1, utility costs were approximately 9.3% of the total costs for this reporting period, and were primarily associated with electric usage.

Based on the total cost of \$264,540 incurred during this reporting period, the average cost of monthly system operation is approximately \$22,045 per month. In addition, when compared to a total of 3.1 pounds of VOCs removed throughout this reporting period (as summarized on Table 3-2), the average total VOC removal cost is approximately \$85,335 per pound of VOC.





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:

- O&M Plan: As noted in Section 3.2, the O&M scope of services was performed in accordance with the requirements of the October 2003 O&M Plan, with the exception of routine maintenance of the pressure blower and wet well pumps. In addition, it should be noted that several VFD over/under voltage conditions caused several alarm conditions during this reporting period;
- Monitoring Plan: 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; and
- 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 2 Inactive Hazardous Waste Site (Site No. 130050) acts as an IC for the Site. In addition, the GWE&TS EC, as listed in the IC/EC Certification Form provided by the NYSDEC, is currently in-place and operating as intended. However, Molloy College irrigation well MCOL-2 is not listed on the IC/EC Certification Form.

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:

Operation and Maintenance Recommendations

- Routine Maintenance of the Pressure Blower and Wet Well Pumps: In order to reduce the likelihood of premature equipment failure and associated system downtime, D&B recommends that the NYSDEC "call-out" contractor perform maintenance of the pressure blower and wet well pumps, and all other system components, in accordance with their respective manufacturer's specifications and per the requirements of the October 2003 O&M Plan;
- Extraction Well VFDs: Based on several alarm events associated with extraction well VFD over/under voltage conditions occurring during this reporting period, it may be warranted to have an electrician inspect the extraction well VFDs in order to prevent these alarm conditions from occurring in the future; and
- Monitoring Well Conditions: Based on the observed damage at monitoring wells ASMW-4, ASMW-6 and ASMW-7, D&B recommends restoring these wells so they may be adequately accessed and protected. In addition, D&B recommends the NYSDEC coordinate with Molloy College to remove the drainage structure and discharge piping observed in the immediate vicinity of ASMW-7, and to ensure that runoff water is not discharged in the immediate vicinity of this or any other monitoring well in the future.

Monitoring Recommendations

- SPDES Permit Equivalency Renewal: As the current SPDES permit equivalency expired on January 31, 2006, D&B recommends that this permit equivalency be renewed; and
- Molloy Irrigation Well: In order to ensure that site-related VOCs are not present in Molloy College irrigation well MCOL-2, D&B recommends coordinating with Molloy College to access and sample this well on an annual basis.



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; and
- Molloy Irrigation Well: The IC/EC form should be revised and updated to include Molloy College irrigation well MCOL-2 as an active EC for the Site.

General Recommendations

- GWE&TS: The GWE&TS EC should remain in place until remedial objectives have been obtained. However, note that a plume redelineation program is planned to be implemented, as recommended in the May 2012 RSO Report. Based on the results of the plume redelineation program, additional groundwater monitoring wells may be installed for inclusion in the routine groundwater monitoring program. In addition, alternate remedial technologies may be utilized in place of or in addition to the operation of the GWE&TS in order to expedite site closure. These alternate remedial technologies include chemical injection and a monitored natural attenuation program; and
- 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.