

## **FRANKLIN CLEANERS GROUNDWATER EXTRACTION AND TREATMENT SYSTEM**

Latitude 40.688°, Longitude -73.627°

### **REPORT TITLE**

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Report No. 30

### **REPORTING PERIOD**

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February 2012

### **CLIENT**

New York State Department of  
Environmental Conservation

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## **NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION**

*Division of Environmental Remediation*

625 Broadway, 12th Floor, Albany, New York 12233

### **Site**

**NYSDEC Site No. 130050**, Franklin Cleaners Site  
Groundwater Extraction and Treatment System  
Village of Rockville Centre, Town of Hempstead,  
Nassau County, New York



### **Project Background and Site Description**

The Franklin Cleaners groundwater extraction and treatment system (GWE&TS) is actively recovering and treating the “leading edge” of a chlorinated solvent-contaminated groundwater plume emanating from the former Franklin Cleaners dry cleaner site, located approximately one mile upgradient of the GWE&TS, in the Village of Hempstead, Nassau County, New York. The Franklin Cleaners GWE&TS has been in operation since September 2004. Refer to [Figure 1](#) for a site location map depicting the treatment system location.

### **Groundwater Extraction and Treatment System Overview**



The GWE&TS consists of two 6-inch diameter wells screened approximately 75 to 90 feet below grade. Extracted groundwater is conveyed via underground piping to a low-profile stacked-tray air stripper located in the GWE&TS building. The treated groundwater is discharged from the air stripper to a wet well equipped with submersible pumps, which conveys 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 treated utilizing two granular activated carbon (GAC) vessels in series; however, it should be noted that, based on historic low contaminant concentrations detected in the air stripper exhaust gas, 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 direction of the NYSDEC. The GWE&TS is equipped with instrumentation and controls which allow for automated startup and operation, and an autodial alarm notification system. Refer to [Figure 2](#) for an “as-built” treatment system layout diagram.

### **Regulatory Requirements/Cleanup Goals**

Site-specific remedial goals have been established through the remedy selection process as defined in 6 NYCRR Part 375-1.10, and are documented in the Record of Decision (ROD), dated March 1998. The overall goal is to meet all appropriate Standards, Criteria, and Guidance (SCGs) and to be protective of human health and the environment. Implementation of the GWE&TS is specifically focused on the following goals:

- Reduce, control, or eliminate contaminated media to the extent practicable;
- Eliminate the potential for exposure to contaminated groundwater; and
- Provide for attainment of SCGs for groundwater, soil and indoor air within the limits of the affected area, to the extent practical.



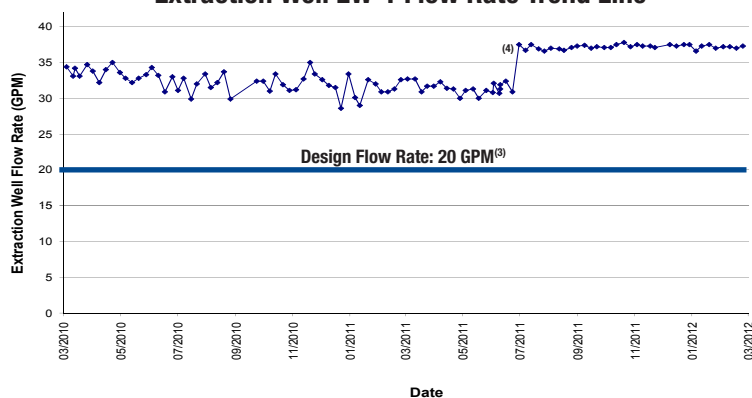
## Treatment System Performance Summary

The GWE&TS performance during the current reporting period and since inception in September 2004 is summarized below:

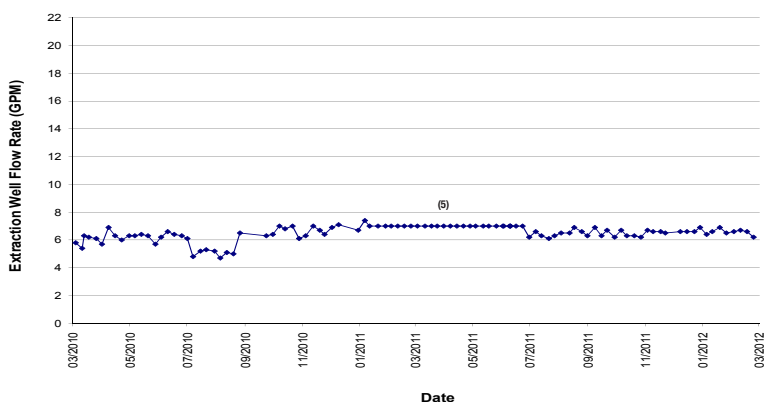
### System Extraction Rates and Total Flow Volumes

	EW-1	EW-2 <sup>(1,2)</sup>	System Influent	System Effluent <sup>(2)</sup>
Average Pumping Rate - Current Reporting Period	37.2 gpm	6.6 gpm	43.8 gpm	61.5 gpm
Average Pumping Rate - Previous Reporting Period	37.3 gpm	6.5 gpm	43.8 gpm	62.0 gpm
Average Pumping Rate to Date	36.9 gpm	5.0 gpm	37.5 gpm	69.9 gpm
Total Flow Volume - Current Reporting Period	4,823,533 gal.	818,954 gal.	5,642,488 gal.	7,617,808 gal.
Total Flow Volume to Date	134,502,578 gal.	16,994,240 gal.	151,446,818 gal.	193,687,007 gal.

#### Extraction Well EW-1 Flow Rate Trend Line



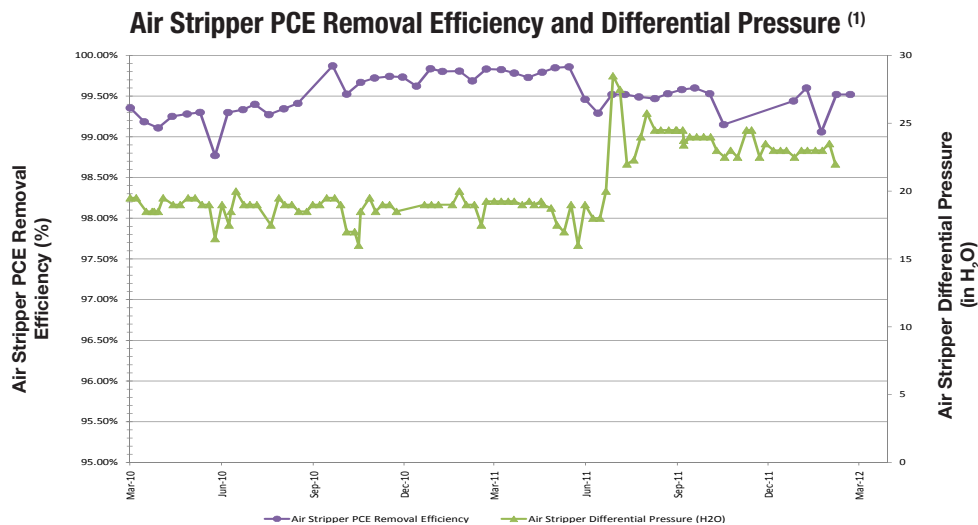
#### Extraction Well EW-2 Flow Rate Trend Line



1. Extraction EW-2 flow meter has consistently malfunctioned during the past several quarters. Based on previously recorded flow data, it has been assumed that EW-2 was operating at an average flow rate of 7 GPM during these reporting periods.
2. System influent and effluent pumping rates and volumes are monitored on a bi-weekly basis. Following replacement of the influent flow meters on June 23, 2011, total flow inconsistencies remain with respect to influent/effluent flow. As such, it may be warranted to replace the effluent flow meter.
3. Based on the results of the capture zone design modeling, containment of the Franklin Cleaners chlorinated plume (at a minimum 450-foot width) would be achieved with the GWE&TS operating at a minimum required pumping rate of 20 GPM, in a one or two extraction well scenario. Extraction well EW-1 has been operating at an average flow rate of approximately 37 GPM since system start-up to provide for a greater factor of safety and ensure the full width of the plume is captured. Extraction well EW-2 has been operating at an average flow rate of approximately 5 GPM since system start-up as a result of elevated VOC concentrations present within this well. It should be noted that the maximum yield for EW-2 has been historically limited to a range of 5-7 GPM due to a high silt/clay component in the screened interval of this extraction well.
4. Extraction well EW-1 was set at approximately 37 GPM following system shutdown to perform a pump test of extraction wells EW-1 and EW-2 as part of a Remedial System Optimization (RSO) from November to December, 2011.
5. As detailed above, it is assumed extraction well EW-2 was operating at an average of 7.0 GPM during this time period.



## Treatment System Performance Summary (cont.)



1. The approximate PCE removal efficiency for the low-profile stacked-tray air stripper ranged from 99.06% to 99.60% during this reporting period. Additionally, it should be noted that the average differential pressure across the low-profile air stripper was well below 45 inches of water (manufacturer's recommended threshold for equipment maintenance) during this reporting period.

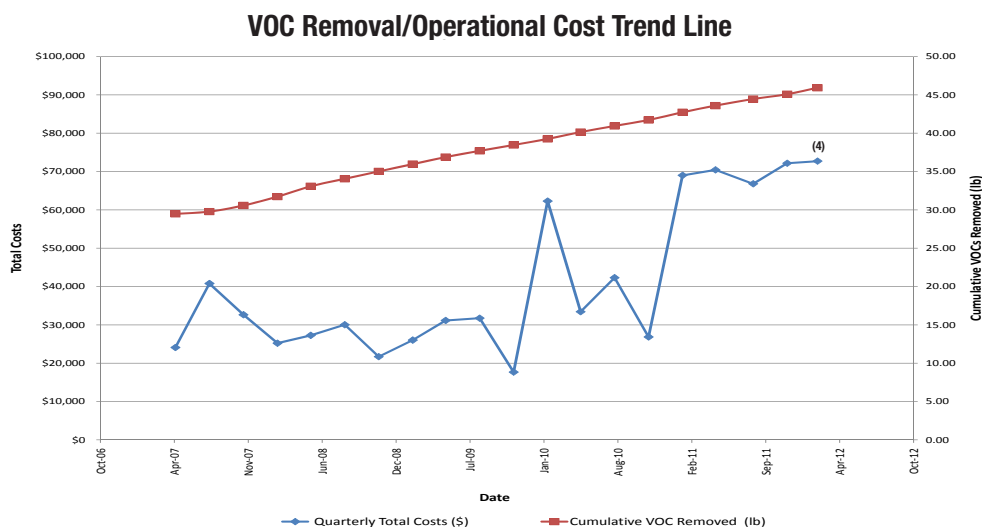
### VOC Removal Assessment

VOC Removal - Current Reporting Period	0.88 lbs.
VOC Removal - Previous Reporting Period	0.60 lbs.
Average VOC Removal to Date (per period)	0.95 lbs.
Total VOC Removal to Date	45.9 lbs.

### VOC Removal Costs <sup>(2)</sup>

VOC Removal Cost - Current Reporting Period	\$82,621 per lb.
VOC Removal Cost - Previous Reporting Period	\$121,196 per lb.
Average VOC Removal Cost to Date <sup>(3)</sup>	\$37,153 per lb.

2. The VOC removal costs include monthly utility charges, maintenance costs and engineering costs. Capital construction costs and NYSDEC project management effort are not included in this evaluation. Due to the increasing VOC removal costs, a Remedial System Optimization (RSO) evaluation is being performed for the Franklin Cleaners Site in order to improve the efficiency and effectiveness of the GWE&TS, while at the same time, reducing the overall associated operating costs.
3. Average calculated from system start-up (September 2004) through current reporting period.



4. These costs reflect higher than typical NYSDEC "call-out" contractor and engineering costs associated with completion of field and reporting activities as part of the RSO evaluation of the GWE&TS.



## System Operation and Maintenance

Routine and non-routine system maintenance completed during this reporting period, as well as a summary of the alarm conditions and associated system runtime/downtime for this reporting period, are summarized below. Refer to [Attachment A](#) for operation and maintenance logs, as prepared by NYSDEC "call out" contractor for this reporting period.

Routine Equipment Maintenance Schedule Summary									
Major System Component	Manufacturer	Model Number	Maintenance Frequency	Maintenance Summary					
				Current Reporting Period			Next Reporting Period		
				Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12
Extraction Well Pumps	Grundfos Pump Corp.	Redi-Flo-4 Model 25E3	As needed based on flow trends						
Air Stripper	Carbonair	STAT Model 180	As needed based on differential pressure readings						
Pressure Blower	New York Blower Company	Model 2506A	Bi-Monthly <sup>(1)</sup>						
Vapor Carbon Vessels	Tetrasolv Filtration Inc.	Model VF-1000	As needed based on PID screening results						
Wet Well Pumps	Flygt Corporation	Model CP3085	Annual						
Sump Pump	Grundfos Pump Corp.	Model KP-350	As needed						

	<b>Planned Activity</b>
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1. Note that the pressure blower maintenance was not completed on a bi-monthly schedule this reporting period.

### Non-Routine System Maintenance:

- Troubleshoot wet well pumps on January 23, 2012;
- Troubleshoot and replace relay for wet well pumps on February 13 and 14, 2012; and
- Repair wet well pumps on February 23, 2012.

### Alarm Conditions:

The GWE&TS triggered an alarm condition to the auto-dialer on January 27, 2012. However, upon arrival at the Site, the NYSDEC "call-out" contractor noted that the GWE&TS was operating normally and there were no apparent issues. No other alarm conditions occurred during this reporting period.

System Runtime/Downtime Summary		
Runtime - Current Reporting Period <sup>(1)</sup>	2,071 hours	94.8%
Downtime - Current Reporting Period <sup>(1)</sup>	113 hours <sup>(3)</sup>	5.2%
Total Runtime to Date <sup>(2)</sup>	65,078 hours	90.2%
Total Downtime to Date	6,372 hours	9.8%

1. Total elapsed time for current reporting period, 2,184 hours (December 1, 2011 through February 29, 2012).

2. Based on a system start-up date of September 20, 2004.

3. Downtime for this reporting period is the result of the pump test of the extraction wells and system shut-downs related to troubleshooting and maintenance of the wet well pumps.



## Extraction Well Pump Test

A pump test was undertaken from November 30 to December 2, 2011 in an effort to evaluate the “radius of influence” of the GWE&TS extraction wells as part of an RSO evaluation of the overall GWE&TS. All pump test field work was completed by a NYSDEC “call-out” contractor and D&B was on-site to perform spot checks during the pump test. The results of the pump test are summarized in the RSO report, dated June 2012. Note that based in-part on the pump test results, D&B recommended to operate extraction well EW-1 at approximately 30 GPM to limit the amount of “clean” groundwater entering the system.

## System Monitoring and Sampling Results

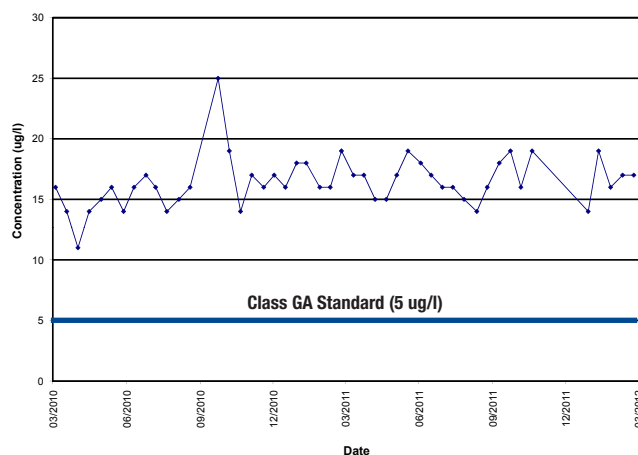
A summary of the pertinent routine system monitoring and sampling results are provided below. Refer to [Attachment B](#) for tabulated analytical results.

### Extraction Wells - System Influent PCE Concentration Ranges/Averages <sup>(1)</sup>

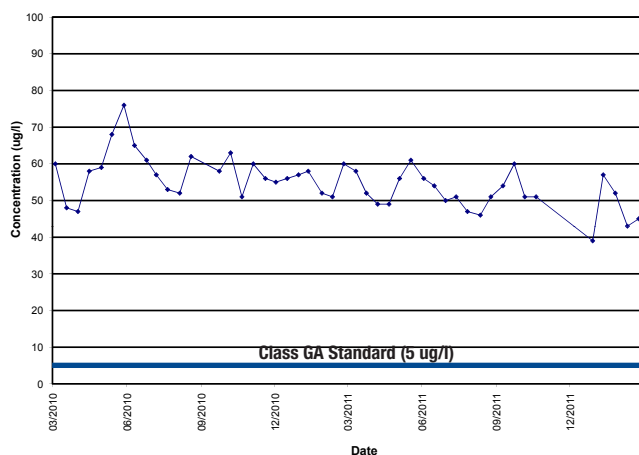
Sample Point	Current Reporting Period	Previous Reporting Period	Average to Date	Groundwater Standard
Extraction Well EW-1	14 ug/l - 19 ug/l	16 ug/l - 19 ug/l	18 ug/l	5.0 ug/l (Class GA)
Extraction Well EW-2	39 ug/l - 57 ug/l	51 ug/l - 60 ug/l	95 ug/l	5.0 ug/l (Class GA)

1. In addition to the PCE concentrations presented in this table, chloroform was detected in system influent samples collected on February 10 and 24, 2012; however, chloroform was detected at concentrations well below its respective Class GA Groundwater Standard.

Extraction Well EW-1 PCE Concentration Trend Line



Extraction Well EW-2 PCE Concentration Trend Line





### Aqueous-Phase Air Stripper Effluent Concentration Ranges

Discharge Permit Parameters	Current Reporting Period	Previous Reporting Period	Site-Specific Effluent Limit
PCE	ND	ND	5.0 ug/l
TCE	ND	ND	10.0 ug/l
1,1-DCE	ND	ND	10.0 ug/l
Cis-1,2-DCE	ND	ND	10.0 ug/l
1,1,1-TCA	ND	ND	10.0 ug/l
Iron	ND - 63.4 ug/l	ND - 40.4 ug/l	1,000 ug/l
Manganese	13.4 - 14.1 ug/l	15.0 ug/l - 17.4 ug/l	1,000 ug/l
pH (Laboratory Results) <sup>(1)</sup>	--	7.08 - 7.51	6.5 - 8.5
pH (Field Screening Results)	6.34 - 7.09	6.72 - 6.98	6.5 - 8.5

ND - Constituent concentration below the analytical detection limit.

--: Not analyzed

Red font denotes an exceedance of the site-specific effluent limits.

1. 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 a result and as previously recommended, laboratory analysis of pH was discontinued during this reporting period.

### Vapor-Phase Discharge

	System Vapor Discharge	Site-Specific Discharge Limit
Total VOC Concentrations (field screening with PID) <sup>(1)</sup>	0.0 - 3.1 ppm	NA
Total VOC Concentrations (laboratory analysis) <sup>(2)</sup>	0.03 ppmv	NA
Average Pressure Blower Flow Rate	973 cfm	NA
Maximum Total VOC Emissions <sup>(3)</sup>	5.7E-04 lbs/hr	0.5 lbs/hr <sup>(4)</sup>

1. The PID screening is utilized as a means to instantaneously monitor total vapor-phase VOC discharge concentrations.

2. Vapor-phase discharge samples for laboratory analysis via Method TO-15 are collected on a semi-annual basis.

3. Total VOC emissions were calculated utilizing the laboratory analytical data.

4. The site-specific effluent limit of 0.5 lbs/hr was developed in consultation with the NYSDEC as a means to monitor the vapor-phase VOCs discharged by the GWE&TS.

### Groundwater Monitoring Summary

The network of groundwater monitoring wells was sampled to determine groundwater quality at, and in the vicinity of, the Site. Groundwater samples were collected from three groundwater monitoring wells located in close proximity to the leading edge of the Franklin Cleaners plume (ASMW-1 through ASMW-3), and four groundwater monitoring wells located downgradient of the leading edge of the plume (ASMW-4 through ASMW-7). 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 downgradient of the treatment system building. The locations of the groundwater monitoring wells are depicted on [Figure 3](#).

#### Groundwater Monitoring Well Condition Summary:

All seven groundwater monitoring wells were found to be accessible during the groundwater monitoring/sampling event conducted from December 27 through 29, 2011. 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:





- All groundwater monitoring wells had visible well IDs, with the exception of groundwater monitoring wells ASMW-4 through ASMW-7;
- Well cover bolts at groundwater monitoring wells ASMW-2 and ASMW-4 were observed to be stripped. As a result, these bolts were replaced on December 28, 2011;
- The well cover at groundwater monitoring well ASMW-5 is currently below the final 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 had 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. Note that 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 runoff from a portion of the newly paved area is discharged. In addition, the well riser will need to be extended and resurveyed.

Field inspection logs for all groundwater monitoring wells assessed during this period are provided in [Attachment C](#).

#### **Groundwater Monitoring Results Summary:**

A headspace reading was collected at each groundwater monitoring well immediately after the removal of the well caps utilizing a PID. VOCs were detected in the headspace of the monitoring wells ranging from non-detect to 1.3 ppm.

Below is a detailed summary of PCE concentrations in site groundwater. Refer to [Attachment B](#) for analytical data results.

#### **Groundwater Monitoring Wells - PCE Concentrations**

Monitoring Well <sup>(1)</sup>	Treatment System Effectiveness Monitoring Wells			Sentinel Monitoring Wells				Class GA Groundwater Standard
	<a href="#">ASMW-1</a>	ASMW-2	ASMW-3	ASMW-4	ASMW-5	ASMW-6	ASMW-7	
<b>Current Reporting Period</b>	24 ug/l	1.8 ug/l	ND	ND	ND	ND	ND	5.0 ug/l
<b>Previous Reporting Period <sup>(2)</sup></b>	--	--	--	--	--	--	--	5.0 ug/l
<b>2-Year PCE Trend Analysis <sup>(3)</sup></b>	Increasing	Decreasing	Stable	Stable	Stable	Stable	Stable	

ND: Constituent concentration below the analytical detection limit.

--: Not established

Red font denotes an exceedance of the Class GA Groundwater Standard.

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

2. As the NYSDEC's "call-out" laboratory contract had expired during the previous reporting period, and as per the direction of the NYSDEC, the network of groundwater monitoring wells was not sampled during the previous reporting period, while the NYSDEC evaluated options for renewing their "call-out" laboratory contract.

3. Trend analysis is calculated on an increase or decrease of 5.0 ug/l over a 2-year time frame.

The downgradient early warning "sentinel" groundwater monitoring wells for the Rockville Centre Water District exhibited non-detect VOC concentrations this reporting period. Therefore, D&B concludes that the selected remedy is functioning as intended by the ROD.



A figure depicting the current PCE concentrations in groundwater is provided as [Figure 4](#). In comparison with the previous reporting period, PCE concentrations have increased in groundwater monitoring well ASMW-1, but have remained stable or is decreasing in all of the groundwater monitoring wells, including all downgradient “sentinel” wells. Note that, groundwater contaminant data is limited to the west and south of ASMW-1, as the current monitoring well network does not include wells in these areas.

In addition to the PCE detections and exceedances noted above, 1,1,1-trichloroethane was detected in groundwater monitoring well ASMW-1; however, this VOC was detected at a concentration below its respective Class GA Groundwater Standard.

#### **Data Validation:**

All sample results have been reviewed by D&B and are deemed valid and usable for environmental assessment purposes. No qualification of the data was necessary based on D&B's review. Data Validation Checklists are presented in [Attachment D](#).

All analytical data associated with the Franklin Cleaners groundwater extraction and treatment system project have been submitted to the NYSDEC in the required EQulS format and within 30 days of receipt of the data from the analytical laboratory.

### **Findings and Recommendations**

#### **Findings:**

- Extraction Well Flow: The analytical results of the system influent samples demonstrate that groundwater extraction wells EW-1 and EW-2 continue to capture VOC-contaminated groundwater. Extraction well EW-1 operated at an approximate flow rate of 37.2 GPM throughout this reporting period and extraction well EW-2 operated at an approximate flow rate of 6.6 GPM throughout this reporting period;
- Treatment System Runtime: The treatment system was operational for approximately 94.8% of this reporting period (approximately 2,071 hours);
- GWE&TS Routine Maintenance: Bi-monthly maintenance was not completed as per the requirements of the routine maintenance schedule;
- Air Stripper: The air stripper continues to operate efficiently and within its design specifications;
- Air Stripper Discharge Parameters (Aqueous-phase): All aqueous-phase discharge analytes were detected at concentrations below their respective site-specific effluent limits, with the exception of a one-time, slight pH exceedance;
- Air Stripper Discharge Parameters (Vapor-phase): PID readings collected at the vapor-phase discharge piping outlet exhibited total VOCs ranging from non-detect to 3.1 ppm. However, note that laboratory-analyzed vapor samples collected this reporting period exhibited total VOC concentrations well below the site-specific effluent limit of 0.5 lbs/hr throughout this reporting period;
- Groundwater Monitoring Well Inspection/Sampling Summary:
  - Monitoring Well Conditions: All groundwater monitoring wells had visible well IDs, with the exception of groundwater monitoring wells ASMW-4 through ASMW-7. All groundwater monitoring wells were sealed at the surface and competent, with the exception of wells ASMW-6 and ASMW-7. In addition, the well pads at wells ASMW-6 and ASMW-7 have been destroyed and/or removed. Drainage structures have been installed surrounding wells ASMW-6 and ASMW-7, and evidence of drainage piping were observed entering the drainage structure surrounding well ASMW-7;
  - Monitoring Well PCE Exceedances: Concentrations of PCE detected in groundwater monitoring well ASMW-1 exhibited an exceedance of the Class GA Standard of 5.0 ug/l, at a concentration of 24.0 ug/l;
  - Monitoring Well PCE Detections: Although PCE was detected in groundwater monitoring well ASMW-2, PCE was





detected well below its Class GA Standard of 5.0 ug/l. In addition, PCE was not detected in groundwater monitoring well ASMW-3; and

- Sentinel Monitoring Well (ASMW-4, ASMW-5, ASMW-6 and ASMW-7) Summary: The downgradient early warning “sentinel” groundwater monitoring wells for the Rockville Center Water District exhibited non detect VOC concentrations during this reporting period.

### **Recommendations:**

- General Treatment System: Continue operation of the GWE&TS;
- GWE&TS Routine Maintenance: As bi-monthly maintenance was not completed as per the requirements of the routine maintenance schedule, D&B recommends the NYSDEC “call-out” contractor perform the pressure blower maintenance as soon as possible and adhere to the routine maintenance schedule in order to prevent premature equipment failure;
- Effluent Flow Meter: Based on the total flow differences noted with respect to total aqueous-phase system influent and effluent and the fact that the influent flow meters were recently replaced, D&B recommends that the effluent flow meter be further evaluated and replaced, if necessary;
- Monitoring Well Improvements: 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;
- RSO Evaluation: As previously recommended, a RSO evaluation of the GWE&TS has been completed in order to improve the efficiency, effectiveness and net environmental benefit of the GWE&TS which included several recommendations such as the plume re-delineation recommendation discussed below:
  - Groundwater Plume Re-delineation: Based on the PCE concentrations detected in groundwater monitoring well ASMW-1 during this reporting period, D&B recommends re-delineation of the groundwater plume via installing and sampling several temporary geoprobe wells along the leading edge, length and up/sidegradient areas of the plume to more accurately define its current location and extent. Based on the results of the plume re-delineation, it may be warranted to install additional permanent monitoring wells and/or modify the current extraction well configuration in order to optimize and accelerate the recovery and treatment of the entire groundwater plume. With the approval of the NYSDEC, D&B will provide a plume re-delineation scope of work for review and approval.

### **Reclassification/Delisting Evaluation**

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:

<b><i>Project Phases and Completion Dates</i></b>	
<b><i>Project Phase</i></b>	<b><i>Completion Date</i></b>
<b>Remedial Investigation</b>	03/1998
<b>Remedial Design</b>	02/2001
<b>Groundwater Extraction and Treatment System Construction</b>	07/2003 <sup>(2)</sup>
<b>Remedial Action (Source Area Remediation)</b>	03/2007 <sup>(1)</sup>

1. 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.
2. 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.



DVIRKA  
AND  
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Given the above, NYSDEC is currently reclassifying the Franklin Cleaners GWE&TS Site pursuant to the requirements identified in 6 NYCRR §375-2.7 as a Class 4 Site since the "source area" contamination does not appear to constitute a significant threat to public health or the environment based on remedial efforts performed to date. In doing so, the NYSDEC has implemented a post-remedial indoor air study within the source area structures/buildings to verify current site conditions, in support of the proposed Site reclassification. Site delisting is not feasible at this time, as all remediation and post-remediation activities have not been satisfactorily completed.

**Report Certification:**


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

**Project Director:**

  
**Richard M. Walka**  
Senior Vice President

  
**Date**

**Project Manager:**

  
**Stephen E. Tauss**  
Geologist II

  
**Date**