Dvirka and Bartilucci CONSULTING ENGINEERS
a Division of D&B Engineers and Architects, P.C.

# NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

*Division of Environmental Remediation*
*625 Broadway, 12th Floor, Albany, New York 12233*

## FRANKLIN CLEANERS GROUNDWATER EXTRACTION AND TREATMENT SYSTEM

Latitude 40.688°, Longitude -73.627°

### REPORT TITLE

Site Management Quarterly Report No. 26

### REPORTING PERIOD

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### CLIENT

New York State Department of Environmental Conservation

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## Site

***NYSDEC Site No. 1-30-050***, 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 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 treatment system, in the Village of Hempstead, Nassau County, New York. The Franklin Cleaners groundwater extraction and treatment system 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 treatment system 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 treatment system 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 initially treated utilizing two granular activated carbon (GAC) vessels; however, based on low contaminant concentrations detected in the effluent vapor, the exhaust is currently being discharged directly to the atmosphere per the direction of the NYSDEC since June 2011. The treatment system 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 defined at 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 groundwater extraction and treatment system 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

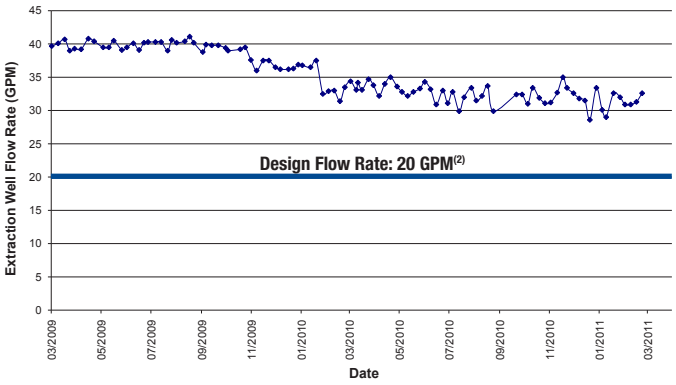
The treatment system performance during the current reporting period and since inception in September 2004 is summarized below:

### System Extraction Rates and Total Flow Volumes

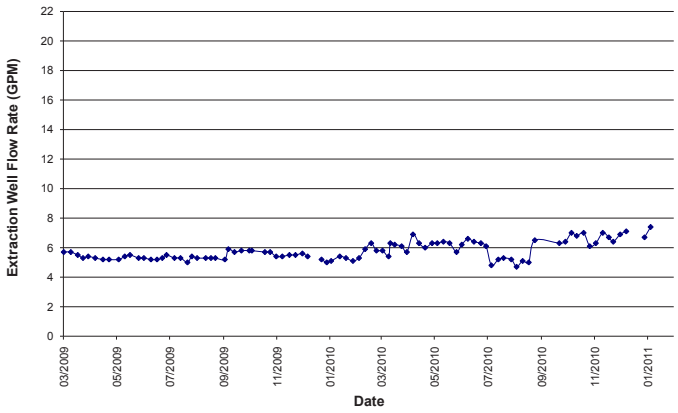
| | EW-1 | EW-2 | System Influent | System Effluent(1) |
|---|---|---|---|---|
| **Average Pumping Rate - Current Reporting Period** | 31.3 gpm | 7.0 gpm | 38.3 gpm | 63.8 gpm |
| **Average Pumping Rate - Previous Reporting Period** | 32.5 gpm | 6.6 gpm | 39.1 gpm | 62.1 gpm |
| **Average Pumping Rate to Date** | 37.2 gpm | 4.6 gpm | 41.8 gpm | 71.5 gpm |
| **Total Flow Volume to Date** | 116,391,347 gal. | 13,532,732 gal. | 129,924,079 gal. | 162,544,743 gal. |

1. System influent and effluent pumping rates and volumes are monitored on a bi-weekly basis. The system effluent total flow volumes is not consistent with the system influent total flow volume due to influent flow meter malfunctions. The system effluent total flow is monitored utilizing a mag-style flow meter while each extraction well influent total flow is monitored utilizing paddle wheel-style flow meters, which are prone to fouling in the iron oxide-rich flow streams observed at the site.

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

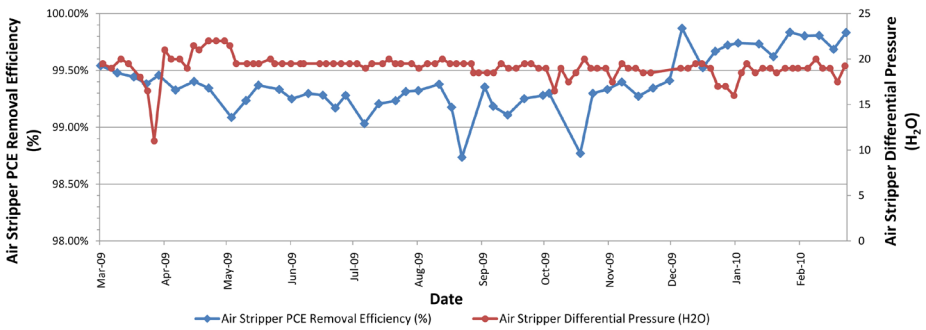



**Extraction Well EW-2 Flow Rate Trend Line**




2. 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 treatment system operating at a minimum required pumping rate of 20 GPM, in a one or two extraction well scenario. Extraction well EW-1, however, has been operating at an average flow rate of approximately 37 GPM since system start-up to provide for a 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 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.

**Air Stripper PCE Removal Efficiency and Differential Pressure ($H_2O$)(3)**

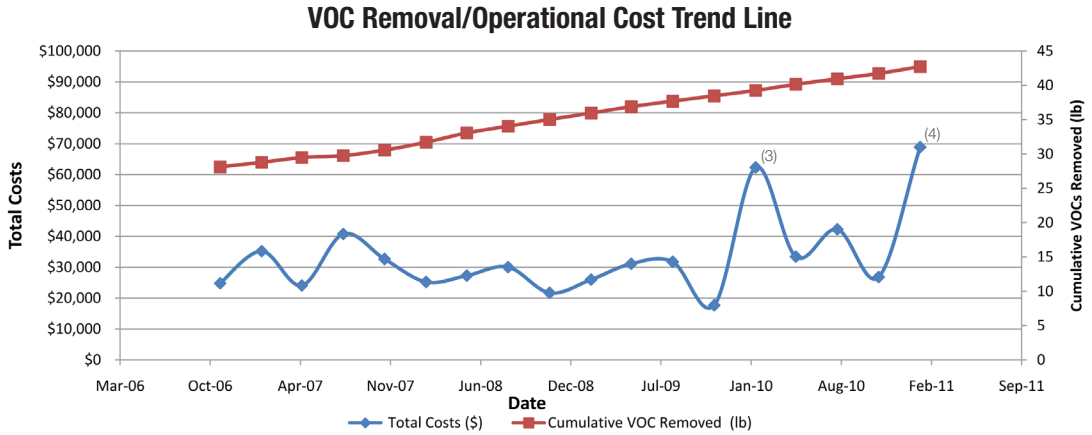



3. The low-profile stacked-tray air stripper is operating at an approximate efficiency ranging from 98.75% to 99.75%. In addition, the air stripper is operating below its differential pressure limit of approximately 45 inches of water, consistent with manufacturers specifications.

## Treatment System Performance Summary (cont.)

| VOC Removal Assessment | |
|---|---|
| VOC Removal - Current Reporting Period | 1.0 lbs. |
| VOC Removal - Previous Reporting Period | 0.78 lbs. |
| Average VOC Removal to Date | 0.97 lbs. |
| Total VOC Removal to Date | 42.73 lbs. |

| VOC Removal Costs (1) | |
|---|---|
| VOC Removal Cost - Current Reporting Period | $68,916 per lb. |
| VOC Removal Cost - Previous Reporting Period | $34,427 per lb. |
| Average VOC Removal Cost to Date (2) | $18,159 per lb. |




1. The VOC removal costs include monthly utility charges, maintenance costs and engineering costs. It does not include capital construction costs.

2. Average calculated from system inception (September 2004) through current reporting period.

3. This portion of the graph represents the time period when the NYSDEC required all site maintenance activities be performed by a "call-out" contractor directly under the NYSDEC, rather than by a subcontractor under D&B, as had been the arrangement since system start-up. As such, this portion of the graph includes expenses for routine system maintenance such as pressure blower maintenance and non-routine maintenance such as the replacement of the on-site extraction well pump and motor performed by D&B's former maintenance subcontractor, as well as upfront coordination and routine and non-routine maintenance items performed by the NYSDEC's current maintenance contractor.

4. This portion of the graph represents the time period following approval of D&B's budget Amendment. Note, prior to approval of the budget Amendment D&B's initial project budget was expended. In consultation with the NYSDEC, development of several Quarterly and Groundwater Monitoring Reports and revisions to the Periodic Review Report (PRR) were temporarily put on hold until the budget Amendment was approved for completion of these work items. As a result, this time period includes costs to complete all reporting which had been put on hold. In addition, the NYSDEC "call-out" consultant performed several non-routine maintenance items during this time period, including diagnosis of a recurring high wet well alarm condition and an assessment of elevated VOC concentrations in the headspace of several monitoring wells.

## System Operation and Maintenance

Routine and non-routine maintenance completed during this reporting period and a summary of the alarm conditions and associated treatment 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 | Model Number | Manufacturer | Maintenance Frequency | Maintenance Summary | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Current Reporting Period | | | Next Reporting Period | | |
| | | | | Dec-10 | Jan-11 | Feb-11 | Mar-11 | Apr-11 | May-11 |
| Extraction Well Pumps | Redi-Flo-4 Model 25E3 | Grundfos Pump Corp. | As needed based on flow trends | -- | -- | | | | |
| Air Stripper | STAT Model 180 | Carbonair | As needed based on differential pressure readings | | | | | | |
| Pressure Blower | Model 2506A | New York Blower Company | Bi-Monthly | | 1/6/11 | 2/17/11 | | | |
| Vapor Carbon Vessels | Model VF-1000 | Tetrasolv Filtration Inc. | As needed based on PID screening results | | | | | | |
| Wet Well Pumps | Model CP3085 | Flygt Corporation | Annual | | | | | | |
| Sump Pump | Model KP-350 | Grundfos Pump Corp. | As needed | | | | | | |

##/##/## ***Activity Completed*** ***Planned Activity***

### *Non-Routine System Maintenance:*

- Maintenance of influent flow sensor for EW-2 on December 22, 2010.
- Snow removal activities performed on December 27, 2010, January 13, 2011, January 28, 2011 and February 2, 2011.

### *Alarm Conditions:*

- General alarm caused by severe weather conditions (1.5 hours downtime) on January 11, 2011.
- General failure caused by a malfunction of the VFD at extraction well EW-1 (3 hours downtime) on January 31, 2011.

### System Runtime/Downtime Summary

| | | |
|---|---|---|
| **Runtime - Current Reporting Period** | 2,150 hours | 99.50% |
| **Downtime - Current Reporting Period** | 9.95 hours | 0.50% |
| **Total Runtime to Date [1]** | 51,027 hours | 89.63% |
| **Total Downtime to Date** | 5,901 hours | 10.37% |

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

## System Monitoring and Sampling Results

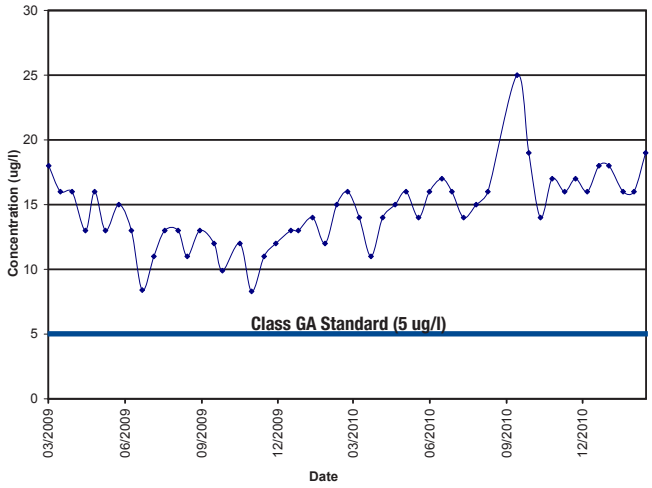
A summary of the pertinent routine treatment system monitoring and sampling results are provided below. Refer to *Attachment B* for analytical data results.

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

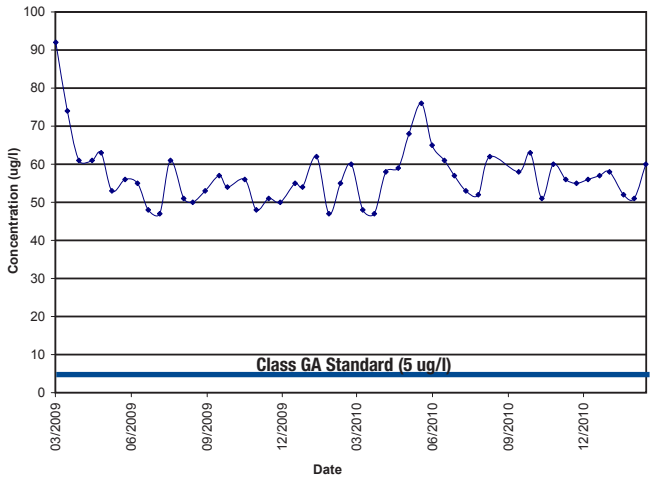
| Sample Point | Current Reporting Period | Previous Reporting Period | Average to Date | Groundwater Standard |
|---|---|---|---|---|
| **Extraction Well EW-1** | 16 ug/l - 19 ug/l | 14 ug/l - 25 ug/l | 22 ug/l | 5.0 ug/l (Class GA) |
| **Extraction Well EW-2** | 51 ug/l - 60 ug/l | 51 ug/l - 63 ug/l | 133 ug/l | 5.0 ug/l (Class GA) |

1. In addition to the PCE concentrations presented in this table, chloroform, chloromethane, chloroethane, 1,1-dichloroethane, 1,1-dichloroethene, 1,1,1-trichloroethane were detected in one or more system influent samples collected during this reporting period; however, these VOCs were detected at concentrations well below their respective Class GA Groundwater Standards.

**Extraction Well EW-1 PCE Concentration Trend Line**




**Extraction Well EW-2 PCE Concentration Trend Line**




### Vapor Phase Carbon Adsorption Vessels

| | Carbon Vessel 1 Influent | Carbon Vessel 1 Effluent | Carbon Vessel 2 Influent | Carbon Vessel 2 Effluent | Site-Specific Limits |
|---|---|---|---|---|---|
| **Total VOC Concentrations (field screening with PID)** | 0.0 - 22.0 ppm | 0.0 - 38.2 ppm | 0.0 - 10.7 ppm | 0.0 - 25.0 ppm | 1.0 ppm (1) |
| **Total VOC Concentrations (Laboratory Analysis)** (2) | 0.040 ppm | 0.021 ppm | NA | 0.029 ppm | 1.0 ppm (1) |
| **Pressure Blower Flow Rate** | 620 cfm | 620 cfm | NA | 620 cfm | NA |
| **Total VOC Emissions** (3) | 5.5E-04 lbs/hr | 3.2E-04 lbs/hr | NA | 4.3E-04 lbs/hr | 0.5 lbs/hr (4) |

1. The PID screening is utilized as a means to monitor the effectiveness of the activated carbon, with respect to carbon maintenance and change-out. The activated carbon maintenance threshold is 1.0 ppm. Note that this is not a site-specific effluent discharge limit.

2. In order to further investigate the observed PID concentrations, D&B recommended that vapor phase samples be collected from the carbon adsorption system for laboratory analysis of VOCs by USEPA Method TO-15. The vapor-phase effluent samples were collected on February 3, 2011.

3. Total VOC emissions were calculated utilizing laboratory analytical results for samples collected on February 3, 2011.

4. The site-specific effluent limit of 0.5 lbs/hr was developed in consultation with the NYSDEC and is utilized as a means to monitor total vapor-phase VOCs emitted by the treatment system.

## System Monitoring and Sampling Results (cont.)

### Aqueous Phase Effluent Concentration Ranges [1]

| | Current Reporting Period | Previous Reporting Period | Site-Specific Effluent Limit |
|---|---|---|---|
| **pH (Laboratory Results)** | 7.02 - 7.30 | 7.18 - 7.50 | 6.5 - 8.5 |
| **pH (Field Screening Results)** | 4.89 - 8.97 | 6.90 - 8.89 | 6.5 - 8.5 |
| **PCE** | 0.13 ug/l - 0.24 ug/l | 0.18 ug/l - 0.35 ug/l | 5.0 ug/l |
| **TCE** | ND | ND | 10.0 ug/l |
| **1,1-DCE** | ND | ND | 10.0 ug/l |
| **cis-DCE** | ND | ND | 10.0 ug/l |
| **TCA** | ND | ND | 10.0 ug/l |
| **Iron** | ND - 390 ug/l | 30.6 ug/l - 1,130 ug/l | 1,000 ug/l |
| **Manganese** | 18.8 ug/l - 67.2 ug/l | 21.0 ug/l - 149 ug/l | 1,000 ug/l |

ND - Constituent concentration below the analytical detection limit.

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

1. Chloroethane and chloromethane were sporadically detected in one or more aqueous phase system effluent sample throughout this and the last reporting period. Chloroethane and chloromethane do not have site-specific effluent limits; however, these two VOCs were detected at concentrations well below their respective Glass GA Groundwater Standards.

### Data Validation:

- All sample results have been reviewed by D&B and deemed valid and usable for environmental assessment purposes. Data Validation Checklists are presented in *Attachment C*.
- It should be noted that the EW-1, EW-2 and AS-1 system water samples collected on February 24, 2011 were analyzed on two separate occasions by the laboratory. The initial analysis was inadvertently assigned the incorrect sample IDs. In order to confirm the results of the initial analysis, the samples were re-analyzed outside of their holding times, and the results of the re-analysis were utilized to assign the proper sample IDs to the correct initial samples. The results reported are from the initial sample analysis.
- All analytical data associated with the Franklin Cleaners groundwater extraction and treatment system project have been submitted to the NYSDEC in the required EQuIS format and within 30 days of receipt of the data from the analytical laboratory.

### Groundwater Monitoring Results Summary:

Based on the results of the groundwater sampling conducted during this reporting period, D&B offers the following pertinent findings below. Refer to *Figure 3* for a groundwater monitoring well location map.

- Concentrations of PCE detected in groundwater monitoring well ASMW-1 increased from 8.2 ug/l (detected August 20, 2010) to 31.0 ug/l, and slightly increased in groundwater monitoring wells ASMW-2 from 2.1 ug/l (detected August 20, 2010) to 3.0 ug/l and in ASMW-3 from non-detect (August 20, 2010) to 0.25 ug/l. However, PCE concentrations have shown an overall decrease since startup of the treatment system in September 2004.
- Concentrations of PCE detected in groundwater monitoring well ASMW-4 increased from non-detect (August 20, 2010) to 0.27 ug/l. This marks the second occasion that PCE was detected in this monitoring well since startup of the treatment system in September 2004. We believe that this is attributable to the change in analytical methods for VOCs

from USEPA Method 8260 to Method 624, which utilizes a lower method detection limit (0.12 ug/l) than USEPA Method 8260 (0.81 ug/l).

- PCE concentrations remain non-detect in early warning "sentinel" groundwater monitoring wells ASMW-5, ASMW-6 and ASMW-7.
- With the exception of ASMW-4 as discussed above, the early warning "sentinel" groundwater monitoring wells for the Rockville Centre Water District exhibited non-detect VOC concentrations this reporting period. In addition, based on review of analytical data received from the Village of Rockville Centre, the Village's Public Supply Well located to the south of Molloy College and downgradient of the groundwater extraction and treatment system continues to exhibit non-detect concentrations of chlorinated VOCs. Therefore, D&B concludes that the selected remedy is functioning as intended by the ROD.

## Findings and Recommendations

### Findings:

- The analytical results of the system influent samples demonstrate that groundwater extraction wells EW-1 and EW-2 continue to capture VOC-contaminated groundwater at an average combined total flow rate of 38.3 gpm, which is greater than the minimum required pumping rate of 20 gpm.
- The influent flow meters continue to malfunction.
- Effluent pH values were detected above and below the site specific effluent range of 6.5 to 8.5 PCE.
- Iron was detected in exceedance of its site-specific effluent limit. The NYSDEC was immediately notified of the iron exceedance upon receipt and review of the analytical data and future iron concentrations will be closely monitored to ensure compliance with all discharge requirements. The remaining discharge parameters were either not detected or detected at concentrations well below their respective site-specific effluent limits.
- PID readings monitored at the outlet of each vapor-phase carbon adsorption vessel consistently exhibited total VOCs greater than the maintenance threshold of 1.0 ppm. However, the laboratory-analyzed discharge vapor-phase samples subsequently collected at these locations exhibited total VOC concentrations ranging from 0.019 ppm to 0.032 ppm, significantly below 1.0 ppm. Note, these laboratory-analyzed discharge vapor-phase concentrations equate to total VOC concentrations of 3.2E-04 lbs/hr to 5.5E-04 lbs/hr, significantly below the site-specific effluent limit of 0.5 lbs/hr.
- Based on evaluation of the low-profile stacked tray air stripper, the air stripper is efficiently operating within its design specifications.
- PCE was detected in groundwater monitoring wells ASMW-1, ASMW-2, ASMW-3 and early warning "sentinel" groundwater monitoring well ASMW-4. However, ASMW-1 was the only monitoring well exhibiting an exceedance of the Class GA Standard for PCE. In addition, the PCE detection noted in ASMW-4 was attributed to a relatively low MDL for PCE utilizing USEPA Method 624.

### Recommendations:

- Continue operation of the groundwater extraction and treatment system.
- Replace the malfunctioning paddle-style influent flow meters with mag-style flow meters.
- In the vast majority of recent reporting periods, field screening of pH values has provided more consistent results than the laboratory-analyzed pH samples. However, pH values recorded for this reporting period are not consistent with this trend. Based on historical pH results, it is recommended that laboratory analysis for aqueous phase effluent pH be discontinued. It is also recommended that effluent pH values be obtained through field monitoring procedures in the future, provided proper instrument calibration and sampling procedures are followed.
- Due to the aqueous-phase iron exceedance, future iron concentrations in effluent water will be closely monitored to ensure compliance with all discharge requirements.

- Due to the elevated effluent vapor PID readings, D&B initially recommended to replace the activated carbon within the carbon vessels. However, based on evaluation of the laboratory-analyzed effluent vapor samples, the NYSDEC has since decided to bypass the activated carbon vessels and vent the effluent vapor directly to the atmosphere. In order to better monitor possible effluent vapor emissions, D&B recommends collecting effluent vapor samples for laboratory analysis by Method TO-15 on a monthly basis to supplement the routine vapor-phase effluent PID screening. D&B also recommends continued PID screening of the effluent vapor as a means of providing instantaneous monitoring of VOC concentrations.
- Based on the PCE concentrations detected in groundwater monitoring wells ASMW-1 and ASMW-4, D&B recommends installing and sampling up to five temporary geoprobe wells to the south and west of the treatment system building to more accurately define the current location of the PCE plume. Based on the results of the temporary well sampling, it may be warranted to install additional permanent monitoring wells in these areas and/or modify the current extraction well configuration in order to optimize and accelerate the recovery and treatment of the entire plume.
- In order to ensure the treatment system extraction wells are operating at optimal and efficient flow rates, D&B recommends performing an annual radius of influence (ROI) analysis for both extraction wells.
- D&B recommends that the air/water ratio currently utilized for the air stripper be reevaluated based on current influent aqueous phase VOC concentrations to ensure that the system is operating at an optimal and efficient flow rate.
- Based on the increasing VOC removal costs observed as part of this and previous reporting periods, D&B recommends performing a Remedial Site Optimization (RSO) study to further investigate the aerial extent of the plume, equipment efficiency and operation, and possibly consider alternative remedial technologies. In addition, consideration may be given to a temporary system shutdown along with enhanced monitoring and natural attenuation.

## ***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:

***Project Phases and Completion Dates***

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

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 groundwater extraction and treatment system was completed in July 2003. The groundwater extraction and treatment system was placed into routine operation in September 2004 and currently continues to meet remedial objectives as originally designed.

Given the above, NYSDEC should consider potentially reclassifying the Franklin Cleaners Groundwater Extraction and Treatment System site pursuant to the requirements identified in 6 NYCRR §375-2.7 as either a Class 3 or 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, however, D&B suggests the NYSDEC also consider implementing 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** — **Date**
*Senior Vice President*

**Project Manager:** _____ _____

**Stephen E. Tauss** — **Date**
*Geologist II*