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A Division of D&B Engineers and Architects, P.C.

FRANKLIN CLEANERS GROUNDWATER EXTRACTION AND TREATMENT SYSTEM

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REPORT TITLE

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CLIENT

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NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Remediation
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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 two series-configured 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 series-configured granular activated carbon (GAC) vessels; 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.

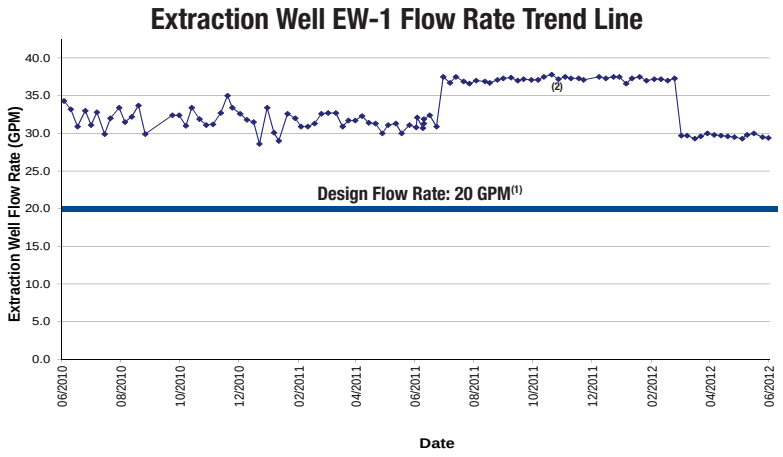
Treatment System Performance Summary

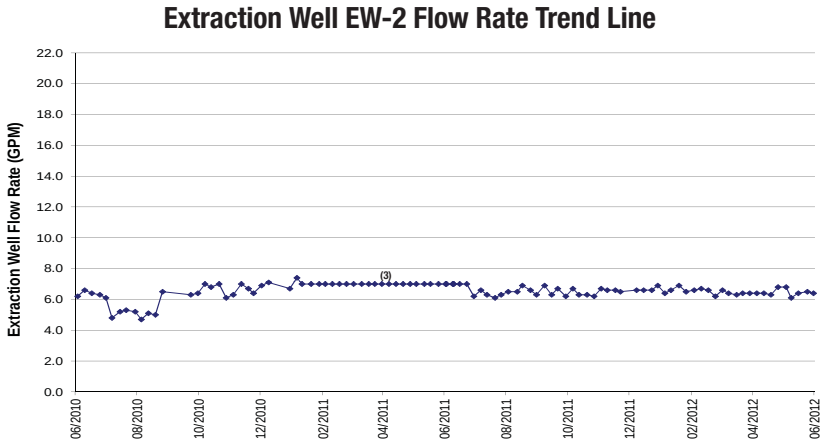
The GWE&TS performance during the current reporting period and since inception in September 2004 is summarized below:

System Extraction Rates and Total Flow Volumes

	EW-1	EW-2 (1,2)	System Influent	System Effluent (2)
Average Pumping Rate - Current Reporting Period	29.6 gpm	6.4 gpm	36.1 gpm	49.1 gpm
Average Pumping Rate - Previous Reporting Period	37.2 gpm	6.6 gpm	43.8 gpm	61.5 gpm
Average Pumping Rate to Date	36.6 gpm	5.1 gpm	37.5 gpm	69.2 gpm
Total Flow Volume - Current Reporting Period	3,932,616 gal.	842,099 gal.	4,774,715 gal.	4,814,790 gal.
Total Flow Volume to Date	138,367,637 gal.	17,787,141 gal.	156,154,778 gal.	198,501,797 gal.

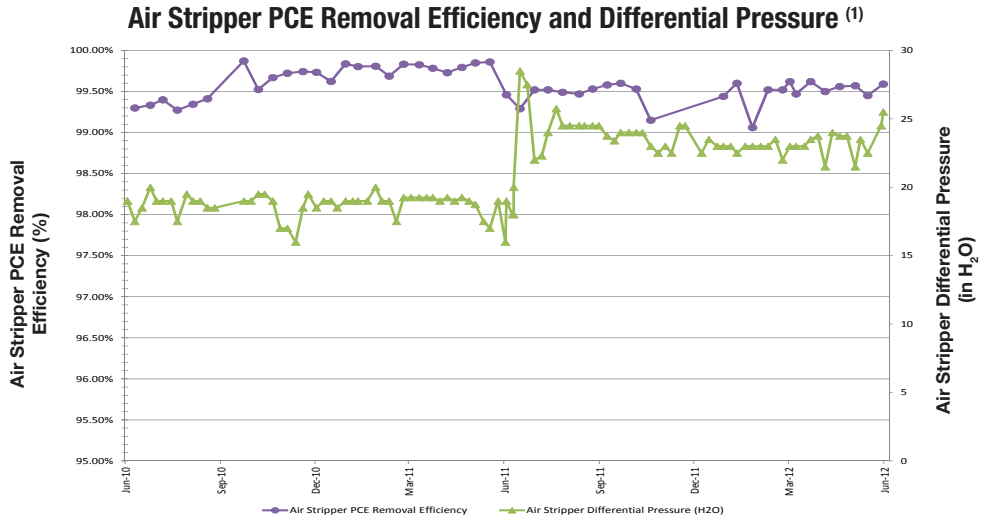
1. Extraction EW-2 flow meter consistently malfunctioned from approximately January 2010 to June 2011. Based on previously recorded flow data, it has been assumed that EW-2 was operating at an average flow rate of 7 gpm during this time period.
2. System influent and effluent pumping rates and volumes are monitored on a bi-weekly basis. Following replacement of the influent flow meters on June 23, 2011, total flow inconsistencies remained with respect to influent/effluent flow. As such, the effluent flow meter was replaced on May 2, 2012 and have been generally consistent since this time.





1. 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.
2. 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.
3. As detailed above, it is assumed extraction well EW-2 was operating at an average of 7.0 GPM during this time period.

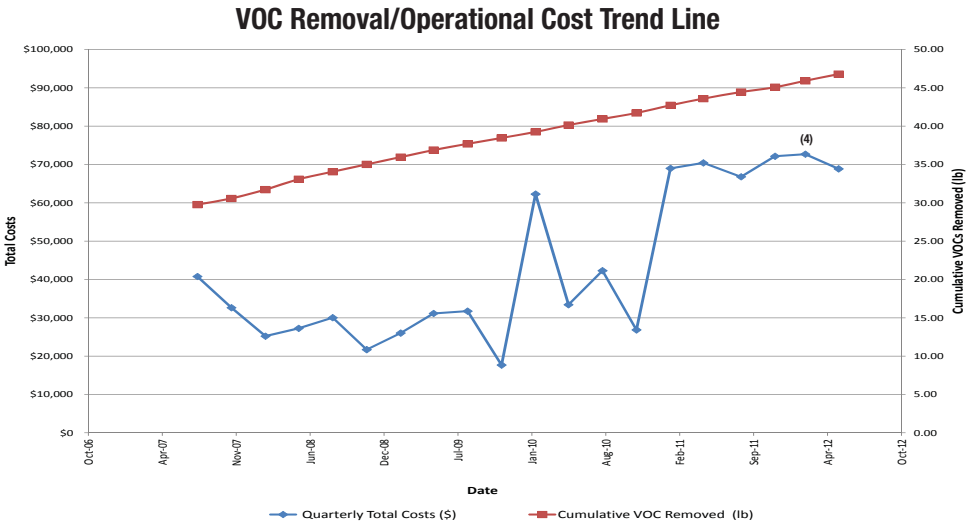
Treatment System Performance Summary (cont.)



VOC Removal Assessment	
VOC Removal - Current Reporting Period	0.87 lbs.
VOC Removal - Previous Reporting Period	0.88 lbs.
Average VOC Removal to Date (per period)	0.95 lbs.
Total VOC Removal to Date	46.8 lbs.

VOC Removal Costs (2)	
VOC Removal Cost - Current Reporting Period	$79,161 per lb.
VOC Removal Cost - Previous Reporting Period	$82,621 per lb.
Average VOC Removal Cost to Date (3)	$38,398 per lb.

1. The approximate PCE removal efficiency for the low-profile stacked-tray air stripper ranged from 99.45% to 99.62% 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.
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 relatively high VOC removal costs, a 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		
				Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-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(1)						
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						

: Planned activity

1. Note that the pressure blower maintenance and wet well pump maintenance were not completed per the above schedule during this reporting period.

Non-Routine System Maintenance:

- Drained wet well, inspected wet well pumps and cleaned aqueous-phase effluent screens on March 8, 2012;
- Adjust and reposition the wet well floats on March 27, 2012;
- Remove and clean aqueous-phase effluent filter on March 29, 2012;
- Installation of new aqueous-phase effluent flow meter and associated transmitter on May 2, 2012; and
- Landscaping activities completed on May 9, May 25 and May 31, 2012.

Alarm Conditions:

One alarm condition (VFD failure) occured on March 13, 2012 and the system was restarted on March 15, 2012. No other alarm conditions occurred during this reporting period.

System Runtime/Downtime Summary		
Runtime - Current Reporting Period (1)	2,174 hours	98.5%
Downtime - Current Reporting Period (1)	34 hours (3)	1.5%
Total Runtime to Date (2)	67,286 hours	90.5%
Total Downtime to Date	6,405 hours	9.5%

1. Total elapsed time for current reporting period, 2,208 hours (March 1, 2012 through May 31, 2012).
2. Based on a system start-up date of September 20, 2004.
3. Downtime for this reporting period is the result of troubleshooting of the aqueous-phase effluent flow meter and associated transmitter and repositioning of the wet well floats.

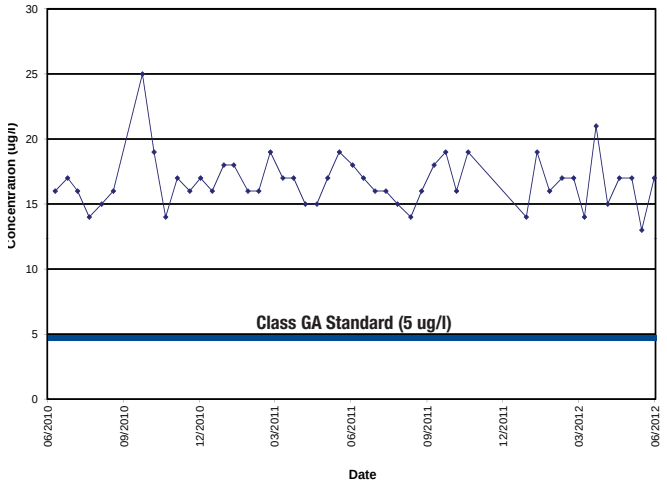
System Monitoring and Sampling Results

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

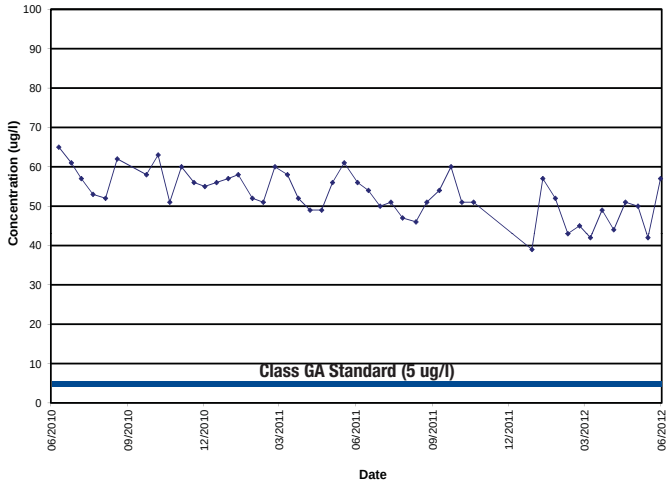
Extraction Wells - System Influent PCE Concentration Ranges/Averages (1)				
Sample Point	*Current Reporting Period*	*Previous Reporting Period*	*Average to Date*	*Groundwater Standard*
Extraction Well EW-1	13 ug/l - 21 ug/l	14 ug/l - 19 ug/l	18 ug/l	5.0 ug/l (Class GA)
Extraction Well EW-2	42 ug/l - 57 ug/l	39 ug/l - 57 ug/l	93 ug/l	5.0 ug/l (Class GA)

1. In addition to the PCE concentrations presented in this table, chloroform, 1,1-dichloroethene and trichloroethene were detected in one or more system influent samples; however, these analytes 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



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	ND - 63.4 ug/l	1,000 ug/l
Manganese	12.8 - 16.3 ug/l	13.4 ug/l - 14.1 ug/l	1,000 ug/l
pH (Field Screening Results)	6.01 - 7.36	6.34 - 7.09	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.

Vapor-Phase Discharge		
	System Vapor Discharge	**Site-Specific Discharge Limit**
Total VOC Concentrations (field screening with PID) (1)	0.0 - 4.4 ppm	NA
Total VOC Concentrations (laboratory analysis) (2)	--	NA
Average Pressure Blower Flow Rate	973 cfm	NA
Maximum Total VOC Emissions (3)	0.11 lbs/hr	0.5 lbs/hr (4)

--: Not analyzed
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 and were not collected during this reporting period.
3. Total VOC emissions were calculated utilizing the PID 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

As per the NYSDEC-approved modified sampling frequency, only three groundwater monitoring wells were sampled during this reporting period. These groundwater monitoring wells were sampled to determine groundwater quality at, and in the vicinity of, the Site. Groundwater samples were collected from two groundwater monitoring wells located in close proximity to the leading edge of the Franklin Cleaners plume (ASMW-1 and ASMW-2), and one groundwater monitoring well located downgradient of the leading edge of the plume (ASMW-4). Note that groundwater monitoring well ASMW-4 acts as an early warning or "sentinel" well 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 three of the sampled groundwater monitoring wells were found to be accessible during the groundwater monitoring/ sampling event conducted on March 15, 2012. 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.

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 of the sampled groundwater monitoring wells 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 1.2 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

	Treatment System Effectiveness Monitoring Wells			Sentinel Monitoring Wells				Class GA Groundwater Standard
Monitoring Well (1)	**ASMW-1**	**ASMW-2**	**ASMW-3**	**ASMW-4**	**ASMW-5**	**ASMW-6**	**ASMW-7**	
Current Reporting Period	22 ug/l	11 ug/l	--	ND	--	--	--	5.0 ug/l
Previous Reporting Period	24 ug/l	1.8 ug/l	ND	ND	ND	ND	ND	5.0 ug/l
2-Year PCE Trend Analysis (2)	Increasing	Increasing	Stable	Stable	Stable	Stable	Stable	

ND: Constituent concentration below the analytical detection limit.

--: Not analyzed. Per the requirements of the NYSDEC-approved sampling frequency, only groundwater monitoring wells ASMW-1, ASMW-2 and ASMW-4 were sampled during this reporting period.

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

Downgradient early warning "sentinel" groundwater monitoring well ASMW-4 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 wells ASMW-1 and ASMW-2, but have remained stable in downgradient "sentinel" well ASMW-4. 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-dichloroethene and 1,1,1-trichloroethane were detected in groundwater monitoring well ASMW-1 and chloroform was detected in groundwater monitoring wells ASMW-1 and ASMW-4; however, these VOCs were detected at concentrations below their respective Class GA Groundwater Standards.

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 GWE&TS project have been submitted to the NYSDEC in the required EQuIS format and within 30 days of receipt of the data from the NYSDEC "call-out" contractor.

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 average flow rate of 29.6 gpm throughout this reporting period and extraction well EW-2 operated at an average flow rate of 6.4 gpm throughout this reporting period;
- Treatment System Runtime: The treatment system was operational for approximately 98.5% of this reporting period (approximately 2,174 hours);
- GWE&TS Routine Maintenance: Required maintenance of the pressure blower and wet well pumps was not completed as per the requirments 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. Note, the field-screened pH results were observed at values within site-specific effluent ranges during this period, with the exception of a one-time pH result of 6.01, detected slightly below the site-specific effluent range of 6.5 - 8.5;
- Air Stripper Discharge Parameters (Vapor-phase): PID readings collected at the vapor-phase discharge piping outlet exhibited total VOCs ranging from non-detect to 4.4 ppm;
- Groundwater Monitoring Well Inspection/Sampling Summary:
  - Monitoring Well Conditions: All three of the sampled groundwater monitoring wells had visible well IDs and were sealed at the surface and competent;
  - Monitoring Well PCE Exceedances: Concentrations of PCE detected in groundwater monitoring wells ASMW-1 and ASMW-2 exhibited exceedances of the Class GA Standard of 5.0 ug/l, at concentrations of 22.0 ug/l and 11.0 ug/l, respectively;
  - Sentinel Monitoring Well (ASMW-4) Summary: With the exception of a trace detection of chloroform, downgradient early warning “sentinel” groundwater monitoring well ASMW-4 exhibited non detect VOC concentrations.

Recommendations:

- General Treatment System: Continue operation of the GWE&TS;
- GWE&TS Routine Maintenance: As the required maintenance of the pressure blower and wet well pumps was not completed as per the requirements of the routine maintenance schedule, D&B recommends the NYSDEC “call-out” contractor perform these maintenance items as soon as possible and adhere to the routine maintenance schedule in order to prevent premature equipment failure;
- RSO Evaluation: 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 fairly consistent PCE concentrations detected in groundwater monitoring well ASMW-1 and the elevated PCE concentration detected in ASMW-2 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:

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 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.

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* — 11.13.12 **Date**

Project Manager: Stephen E. Tauss — *Geologist II* — 11/12/12 **Date**