# Periodic Review Report No. 3
# January 1, 2016 – December 31, 2016
# National Heatset Printing Co. Site (152140)

## Town of Babylon
## Suffolk County, New York

*Prepared for*
New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau E
625 Broadway
Albany, New York 12233-7017

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December 2017
Version:  FINAL
EA Project No. 14907.16

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| | |
|---|---|
| µg/L | Microgram(s) per liter |
| | |
| amsl | Above mean sea level |
| AWQS | Ambient Water Quality Standard |
| AWT | AWT Environmental Services, Inc. |
| | |
| bgs | Below ground surface |
| | |
| cfm | Cubic feet per minute |
| CVOC | Chlorinated volatile organic compound |
| | |
| DCE | Dichloroethene |
| D&D | D&D Electric Motors & Compressors |
| DDC | Density driven convection |
| DER | Division of Environmental Remediation |
| DTI | Directional Technologies, Inc. |
| | |
| EA | EA Engineering, P.C. and Its Affiliate EA Science and Technology |
| EC | Engineering control |
| EN | Environmental notice |
| | |
| ft | Feet (foot) |
| FS | Feasibility Study |
| | |
| GAC | Granular activated carbon |
| GHG | Greenhouse gases |
| | |
| HPT | Hydraulic profiling tool |
| Hz | Cycle per second |
| | |
| IC | Institutional control |
| IDW | Investigation derived waste |
| in. | Inch(es) |
| | |
| lb | Pound(s) |
| | |
| mi | Miles |
| MIP | Membrane interface probe |
| MJ | M.J. Engineering and Land Surveying, P.C. |
| MW | Monitoring well |
| | |
| NHP | National Heatset Printing Co. |
| No. | Number |

| | |
|---|---|
| NYSDEC | New York State Department of Environmental of Conservation |
| NYSDOH | New York State Department of Health |
| | |
| O&M | Operation and maintenance |
| | |
| PCE | Tetrachloroethene |
| PID | Photoionization detection |
| PLC | Programmable Logic Controls |
| ppb | Parts per billion |
| PRR | Periodic Review Report |
| PSEG | Public Service Enterprise Group |
| | |
| RA | Remedial action |
| RAO | Remedial action objectives |
| RD | Remedial design |
| RI | Remedial investigation |
| ROD | Record of decision |
| RSO | Remedial system optimization |
| | |
| SCDHS | Suffolk County Department of Health Services |
| SCG | Standards, Criteria, and Guidance |
| SCWA | Suffolk County Water Authority |
| SMP | Site Management Plan |
| SVE | Soil vapor extraction |
| | |
| TAGM | Technical and Administrative Guidance Memorandum |
| TCE | Trichloroethene |
| | |
| VFD | Variable frequency drive |
| VC | Vinyl chloride |
| VOC | Volatile organic compound |

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# ES. EXECUTIVE SUMMARY

The New York State Department of Environmental Conservation (NYSDEC) tasked EA Engineering, P.C. and Its Affiliate EA Science and Technology (EA) to provide site management services from January 1, 2016 through December 31, 2016 at the National Heatset Printing Co. site (Site Number [No.] 152140) in Babylon, Suffolk County, New York (**Figure 1**). This Work Assignment is being conducted under NYSDEC Standby Engineering Services Contract No. D007624-16.

Operation, maintenance, and monitoring program activities have been conducted at the National Heatset Printing Co. site since April 2013 in accordance with the New York State Inactive Hazardous Waste Disposal Site Remedial Program and as stipulated in the Record of Decision (NYSDEC 1999) and Site Management Plan (EA 2013a) in order to attain identified cleanup goals.

The purpose of this Periodic Review Report is to summarize the results of the January 2016 through December 2016 quarterly groundwater monitoring, system influent/effluent air monitoring, and site inspection events; evaluate the effectiveness of the remedial actions implemented at the site; and to provide sufficient documentation that the remedy remains in place, is performing properly and effectively, and is protective of public health and the environment. Specifically, this report provides the following information:

- Results of groundwater monitoring
- Evaluation of the current groundwater quality conditions
- Results of system influent/effluent air monitoring
- Results of site inspections
- Maintenance activities performed
- Remedial System Optimization (RSO) activities conducted.

This report also documents any problems or changes necessary for the site to be in compliance with the Site Management Plan (SMP) including removal of Institutional Controls/Engineering Controls that are no longer applicable, modifications in monitoring requirements, as applicable, or a Corrective Action Work Plan and schedule, as necessary.

## ES.1 EFFECTIVENESS OF REMEDIAL PROGRAM

### *Groundwater Monitoring*

Groundwater sampling was completed at the onsite and offsite monitoring well networks on a quarterly basis during the reporting period. Groundwater concentrations of total chlorinated volatile organic compounds (CVOCs) showed an overall decreasing trend from baseline conditions onsite. Offsite concentrations of CVOCs are more inconsistent. During the 2016 reporting period, total volatile organic compounds (VOCs) concentrations generally decreased in onsite shallow groundwater. However, offsite shallow groundwater exhibited more variation in total VOC concentration than onsite shallow groundwater. A general decreasing trend in total VOC concentrations was also observed in deep groundwater at the onsite wells; however, no clear trend was observed in deep groundwater at the offsite wells.

While spikes of individual CVOC concentrations were noted in several wells onsite and offsite, it is expected that additional CVOC mass will be removed from the onsite and offsite groundwater system through the operation of the treatment systems. Groundwater CVOC concentration spikes during system downtime and CVOC mass recoveries suggest that a functioning treatment system suppresses the migration of the CVOCs by intercepting the impacted groundwater in the wells. This supports that the system continues to function as it was designed.

***System Influent/Effluent Air Monitoring***

Influent/effluent system air sampling at the soil vapor extraction (SVE) system, onsite density-driven convection (DDC) system, and offsite DDC system was completed on a quarterly basis. The mass recoveries calculated using system information and laboratory air results confirm that while the systems are up and running, they continue to be effective at removing primary CVOCs and daughter compounds.

***Remedial System Optimization (Soil Vapor Extraction System)***

In February 2016, soil and soil vapor sampling was performed as part of the overall RSO program. Soil samples were collected from borings advanced through the building foundation at 1 Adams Boulevard. Soil boring and boreholes were field screened for VOCs using a hand-held photoionization detection (PID). New vapor monitoring points were installed in the building based on the results of the PID screening. Vapor samples were collected from the new vapor monitoring points under the building foundation at 1 Adams Boulevard. The samples were sent to a laboratory for CVOC analysis. Results of this sampling effort were incorporated into follow-on modifications to the SVE system.

Over the course of Spring/Summer 2016, the original SVE system design was modified to include additional SVE wells, in a horizontal configuration. The intent of this approach was to enhance the recovery of contaminants from the source area, promote the mitigation of indoor air issues, and ultimately reduce the timeframe associated with addressing potential source area mass (thereby, reducing overall remedial costs). In June 2016, the SVE system was shut down in preparation for the installation of new horizontal wells to expand the SVE system. Five new horizontal wells were installed and connected to the SVE system through a manifold mounted to the south side of the treatment trailer. The system was restarted in August 2016 using all five wells simultaneously and operated in that manner for the remainder of the reporting period.

***Remedial System Optimization (Groundwater Plume Delineation)***

In May 2016, a Membrane Interface Probe (MIP) study was implemented to advance plume delineation efforts at the site. The MIP program was performed at 25 sample locations over a period of 2 weeks, via direct-push technology. Field data and observations from MIP study were used to select locations associated with the subsequent Hydraulic Profiling Tool (HPT) program, which was implemented at 10 locations over the course of 4 weeks. Sample depths associated with both programs ranged from approximately 8 to 85 feet (ft) below ground surface (bgs). In addition, groundwater samples from the HPT program were sent to a laboratory for CVOC analysis.

***Site Inspection and Maintenance***

Site inspection and maintenance was completed on a monthly/quarterly basis during site visits associated with system operation and maintenance. A more detailed annual inspection was performed in December 2016. The fencing, locks, and access gates/doors were in good condition. Both the asphalt/concrete areas and the grassy areas were in good condition. There was no evidence of vandalism observed to the DDC wells, treatment systems, or utilities, and penetrations (including poles, posts, or stakes) were not observed.

The SVE system and surrounding areas were generally observed to be in good condition during the annual inspection. There was no evidence of vandalism to the SVE treatment system and new outdoor manifold. Additionally, a roof drain from the 1 Adams Boulevard building (located near the horizontal well manifold) was observed to be eroding the soil cover for the well lines and entering the system during heavy rain events. Modifications will be made in early 2017 to divert flow away from the SVE treatment trailer. Inside the building, vapor-monitoring points sustained continual wear and tear due to the daily operations of the tenant. At the time of inspection, it was noted that one of the well covers for MW-G was broken. The cap will be replaced in early 2017.

Minor damage was observed at the offsite DDC system enclosure during the October 2016 quarterly event. Upon arrival, it was observed that a tree branch from the Suffolk County Water Authority (SCWA) – Albany Avenue Well Field property, had fallen onto the west fence line of the equipment trailer compound. The branch was removed and placed back on SCWA property. A portion of the west fence line is bent slightly as a result, but still retains its functionality.

The DDC treatment systems were observed to be in good condition during the annual inspection; no additional damage to the system enclosures or wellheads in either location was noted at that time. All gauges and meters read within acceptable levels and all remote communication equipment was functional. The equipment was not noted to be making any abnormal noises. The heating and ventilation for the enclosure had not changed since the last inspection.

## ES.2 COMPLIANCE

No areas of noncompliance regarding the major elements of the SMP were identified during performance of site management services from January – December 2016 at the National Heatset Printing Co. site.

## ES.3 RECOMMENDATIONS

- Site management tasks should continue during the next period (2017). This includes annual site inspections, maintenance (as needed), quarterly groundwater monitoring and sampling, and quarterly DDC system influent and effluent/SVE system air monitoring.

- New dial-out units (i.e., Sensaphone) should be installed at the SVE and both onsite DDC systems with more modern cellular-based setups to improve the reliability of these features.

- Based upon the results of the MIP/HPT investigation, the Conceptual Site Model should be refined. In addition, new permanent monitoring wells should be installed to augment the existing well network in order to further refine plume delineation efforts at the site.

- Depending on the outcome of additional groundwater plume delineation efforts, enhancement of the remedial approach may be warranted through the use of complementary technologies such as *in situ* bioremediation or chemical oxidation in order to reduce the overall remedial timeframe and achieve remedial action objectives.

- The SMP should be updated to reflect changes to the SVE system and any additional changes to the DDC systems and/or monitoring well networks.

# 1. SITE OVERVIEW

## 1.1 LOCATION

The National Heatset Printing Co. (NHP) site is currently a Class 4 site listed on the New York State Department of Environmental Conservation (NYSDEC) Registry of Inactive Hazardous Waste Sites (Number [No.] 152140). The site is located at 1 Adams Boulevard in the Hamlet of Farmingdale, Town of Babylon, Suffolk County, New York, and is identified as Block 1.00 and Lot 20.001 on the Town of Babylon Tax Map No. 132.20-1-3.2. A site location map is presented in **Figure 1**. The site is currently owned by 1 Adams Boulevard Realty Corporation, managed by Finkelstein Realty, and leased by a tenant. The site contains one industrial building and is 4.5 acres in size. The site is located in an industrial area and is bounded by railroad tracks to the north, Adams Boulevard and an industrial property to the south, an industrial property to the east, and an industrial property to the west (**Figure 2**).

NHP occupied a portion of this building from July 1983 to April 1989. Their operations consisted of lithographic tri-color printing of newspaper and periodical advertisements, and the manufacturer of lithographic printing plates. NHP had been using organic solvents at the site since 1983. An inspection by the Suffolk County Department of Health Services (SCDHS) in 1983 revealed that NHP was discharging photo-plating waste to the onsite sanitary system. In March 1986, an inspection performed by the SCDHS revealed strong evidence of dumping from staining of inks and oils on the ground. The inspection report indicated that drums were being stored improperly both inside and outside of the building.

NHP filed for bankruptcy in 1987. The SCDHS discovered that after filing for bankruptcy, NHP disposed of its chemical inventory by dumping the materials onto the soil and into a leaching pool located off the rear of the building in the northeast side of the property.

In February 1988, a water sample collected by SCDHS from the leaching pool off the northeast side of the building contained elevated levels of volatile organic compounds (VOCs) (i.e., 24,000 parts per billion [ppb] of 1,2-dichloroethene [DCE] and 1,000 ppb of p-ethyltoluene). At the request of SCDHS, the leaching pool bottom sediments were excavated to a depth of 15 feet (ft) and end-point samples were collected in November 1988. The end-point soil samples indicated that the remaining leaching pool sediment still contained elevated levels of VOCs (i.e., 13,000 parts per million of tetrachloroethene [PCE]).

## 1.2 NATURE AND EXTENT OF CONTAMINATION (PRE-REMEDIAL ACTION)

A remedial investigation (RI)/feasibility study (FS) was performed at the site in 1999 to determine the nature and extent of contamination in onsite soil, determine the onsite and offsite groundwater conditions, evaluate potential qualitative risks to human health and the environment of site-related contaminants, and determine the best remedial technology to remediate soil and groundwater contamination onsite and offsite. The results of the RI are described in detail in the RI/FS Report (H2M 1999). Potential remedial alternatives for the site were identified, screened, and evaluated in the FS.

The RI/FS report is summarized below:

- Six surface soil samples were obtained from 0 to 6 inches (in.) bgs at the leaching pool area and were tested for VOCs. None of the surface soils exhibited concentrations exceeding NYSDEC recommended soil cleanup objectives included in the Technical and Administrative Guidance Memorandum (TAGM) 4046: Determination of Soil Cleanup Objectives and Cleanup Levels (NYSDEC 1994).

- Subsurface soil samples were collected from saturated and unsaturated soils to characterize the extent of contamination from the leaching pool. Prior to the RI, contaminated soils in the source area were excavated down to 15 ft bgs and were backfilled with clean sand under the supervision of the SCDHS. Analytical results revealed no soil contaminants in unsaturated soils, which are above 15 ft bgs. PCE was detected in the saturated soils located directly below the leaching pool at concentrations exceeding the NYSDEC recommended soil cleanup objective. The exceedances ranged from 8.2 to 7,700 parts per million.

- Twelve groundwater monitoring wells were sampled including one upgradient, seven onsite, and four downgradient wells. Seventy-four Geoprobe® groundwater samples were also obtained, including 8 upgradient, 39 onsite and 27 downgradient.

    — Elevated concentrations of PCE, trichloroethene (TCE), and 1,2-DCE were detected in the Geoprobe® groundwater samples obtained below the onsite leaching pool. Concentrations of PCE (496–7,690 ppb), TCE (162–9,620 ppb), and 1,2-DCE (124–12,200 ppb) exceeded the NYSDEC groundwater standard of 5 ppb. Samples from shallow and deep monitoring wells below the leaching pool exhibited concentrations ranging from 210 to 330 ppb. VOC-contaminated groundwater was observed to be migrating offsite in a southeast direction.

- In summary, the RI determined that, based on the Standards, Criteria, and Guidance (SCGs) for the site, subsurface soil and groundwater contained VOCs contamination that was to be addressed in the remedy selection.

Based on the RI and FS (H2M 1999), the NYSDEC issued a Record of Decision (ROD) document dated June 17, 1999 (NYSDEC 1999) which identified the selected remedy for the site, cleanup objectives/goals, and site closure criteria.

## 1.3 REMEDIAL ACTION OBJECTIVES

The overall remedial goal for the site is to meet all SCGs and be protective of human health and the environment.

The remedial action objectives (RAOs) for this site, as presented in the ROD, are as follows:

- Eliminate, to the extent practicable, the source area contamination by remediating the groundwater directly below the leaching pool.

- Eliminate, to the extent practicable, ingestion of groundwater affected by the site that does not attain New York State Department of Health (NYSDOH) drinking water standards.

- Eliminate, to the extent practicable, further offsite migration of groundwater that does not attain NYSDEC Class GA Ambient Water Quality Criteria (AWQS).

### 1.3.1 Groundwater Remedial Action Objectives

***RAOs for Public Health Protection***

- Monitor groundwater containing contaminant levels exceeding drinking water standards, and evaluate any potential public health issues.

- Prevent contact with, or inhalation of, volatiles emanating from contaminated groundwater.

***RAOs for Environmental Protection***

- Maintain, to the extent possible, ambient groundwater quality standards by eliminating potential groundwater contamination source(s).

### 1.3.2 Soil Remedial Action Objectives

***RAOs for Public Health Protection***

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure to, contaminants volatizing from contaminated soil.

***RAOs for Environmental Protection***

- Prevent migration of contaminants that would result in groundwater contamination.

- Prevent impacts to biota due to ingestion/direct contact with contaminated soil that would cause toxicity or bioaccumulation though the terrestrial food chain.

### 1.3.3 Surface Water Remedial Action Objectives

Not applicable.

### 1.3.4 Sediment Remedial Action Objectives

Not applicable.

## 1.4 SUMMARY OF REMEDIAL ACTIONS

Potential remedial alternatives for the site were identified, screened, and evaluated in the FS. Based on the RI and FS (H2M 1999), NYSDEC issued the ROD document (NYSDEC 1999), which identified the selected remedy for the site. The remedy included groundwater treatment using pump and treat, or an alternate technology (i.e., in-well vapor stripping) for three locations: (1) source area, (2) downgradient edge of the site, and (3) downgradient edge of the offsite plume (**Figures 3A, 3B, and 3C**).

## 1.5 GEOLOGY AND HYDROGEOLOGY

The geologic formations that underlie Suffolk County are composed of a series of thick deposits of unconsolidated water bearing sediments of late Cretaceous and Pleistocene age. These unconsolidated deposits are underlain by crystalline bedrock of Precambrian age. The site is located approximately 4 miles (mi) north of South Oyster Bay, which is just north of Jones Beach Island and the Atlantic Ocean. The site topography and surrounding area is relatively flat.

There are three primary water bearing aquifers underlying Suffolk County. These aquifers, from shallow to deep, are the Upper Glacial, Magothy, and Lloyd. The aquifers are considered to be hydraulically connected, with the Glacial and Magothy contributing recharge for the underlying Lloyd aquifer. Together, they are a federally designated sole source of drinking water for Long Island.

During the glacial retreat, the area was covered with outwash deposits that constitute most of the Upper Glacial aquifer of Long Island. Because these sand and gravel deposits contain virtually no interstitial clay and silt, the Upper Glacial aquifer is the most permeable. The estimated average horizontal hydraulic conductivity of the outwash is from 1,000 to 1,500 gallons per day/square feet. The direction of groundwater movement through Long Island's aquifers is horizontal and is generally more rapid than the movement in the vertical direction. This arises because of an anisotropic effect; the largest dimensions of particles in the interbedded fine- and coarse-grained layers tend to be oriented horizontally.

Groundwater in the Upper Glacial aquifer flows away from two major highs on the main water table divide on Long Island. The general directions of groundwater flow of the island are north toward the Long Island Sound and south toward the Great South Bay. Groundwater has been encountered onsite at depths ranging from approximately 4 to 19 ft below ground surface (bgs). Based on site-specific data, local groundwater flow at the site moves south to southeast toward the Great South Bay with a gradient of 0.0014 ft/ft and velocity of approximately 1.34 ft/day. Overburden groundwater flow is shown in **Figures 4 and 5**.

### 1.5.1 Source Area

The remedy in the ROD was refined during the remedial design (RD). An additional investigation performed during the RD concluded that injection of sodium and potassium permanganate would be the most effective source area remedy. Therefore, an RD and construction contract (Contract No. D005272) was prepared for implementation of this technology.

Sampling during the RD (obtained in 2001) revealed the presence of contaminated soil beneath the onsite building's slab. In addition, four indoor air samples (AS-1, AS-2, AS-3, and AS-4) were collected from the onsite commercial building in July 2001 and analyzed for VOCs. The concentration of PCE in sample AS-1, collected near the identified source area, exceeded the corresponding NYSDOH guidance value; no other samples reported a PCE concentration above the NYSDOH guidance value. As this VOC contamination was affecting the indoor air, the NYSDEC installed a soil vapor extraction (SVE) system to remediate the contaminated soil beneath the building slab and address potential vapor intrusion.

The SVE system has been running since September 2002 (**Figure 3A**). In July 2014, the vertical extraction well was converted to a buried horizontal screen in order to accommodate the daily operations of a new building tenant, as well as to improve the capacity for extraction. In February 2016, soil and soil vapor sampling was performed as part of the overall Remedial System Optimization (RSO) program. Soil samples were collected from borings advanced through the building foundation at 1 Adams Boulevard. Soil boring and boreholes were field screened for VOCs using a hand-held photoionization detection (PID). New vapor monitoring points were installed in the building based on the results of the PID screening. Vapor samples were collected from the new vapor monitoring points under the building foundation at 1 Adams Boulevard. The samples were sent to a laboratory for CVOC analysis. Results of this sampling effort were presented in the Sampling and Delineation; 1 Adams Boulevard Memorandum (EA Engineering, P.C. and its affiliate EA Science and Technology [EA 2016a]), which was approved by NYSDEC. The results were also incorporated into follow-on modifications to the SVE system as discussed below.

Over the course of Spring/Summer 2016, the original SVE system design was modified to include additional SVE wells, in a horizontal configuration. The intent of this approach was to enhance the recovery of contaminants from the source area, promote the mitigation of indoor air issues, and ultimately reduce the timeframe associated with addressing potential source area mass (thereby, reducing overall remedial costs). In June 2016, the SVE system was shut down in preparation for the installation of new horizontal wells to expand the SVE system. Five new horizontal wells were installed and connected to the SVE system through a manifold mounted to the south side of the treatment trailer. The system was restarted in August 2016 using all five wells simultaneously and operated in that manner for the remainder of the reporting period. A description of the construction activities (including as-built drawings) associated with the modification of the SVE system will be presented in a Construction Completion Report (to be provided in 2017).

### 1.5.2 Non-Source Area

For the two non-source area treatment systems, the NYSDEC awarded Contract No. D005539 to Earth Tech to construct in-well vapor stripping systems (**Figures 3B and 3C**). The previous standby engineer, O'Brien and Gere, managed the in-well stripping pilot test performed in 2006, which was accepted by NYSDEC. Based on the pilot test data, the effectiveness of the density driven convection (DDC) system was determined and full scale (onsite and offsite) DDC construction was implemented. This system became known as onsite treatment system #1. In 2010, an additional DDC well was added to the pilot study system and a second onsite system (treatment system # 2) was constructed (**Figure 3B**). Treatment system #2 consists of two DDC wells. In 2012, the offsite DDC system was constructed at the Suffolk County Water Authority (SCWA) – Albany Avenue Well Field (**Figure 3C**). The system consists of six DDC wells and two treatment trailers. Detailed descriptions of the above remedial systems can be found in Section 1.4.1 of the Site Management Plan (SMP) (EA 2013a). The site is being remediated in accordance with the RD, which included two construction contracts described above and the SVE work plan (EarthTech 2006, 2007; Shaw 2003).

The NYSDEC prepared an Environmental Notice (EN) for the site, which was issued in lieu of an Environmental Easement/Deed Restriction as referenced in Division of Environmental Remediation (DER)-33. The document includes a map of the property subject to the EN, and identifies certain limitations, which apply to the cleanup of contamination disposed at the property. The EN was prepared on March 28, 2013, and recorded at the Suffolk County Clerk's Office on April 16, 2013.

### 1.5.3 Remaining Contamination

After completion of the remedial work described in the onsite and offsite Remedial Action (RA) Work Plans (AECOM 2009, 2011), some contamination was left in the subsurface soil and groundwater at this site, which is hereafter referred to as remaining contamination. The SMP (EA 2013a) was prepared to manage remaining contamination at the site.

#### Soil/Soil Vapor

As previously mentioned, the SVE system was installed to remediate the remaining contaminated soil beneath the building slab and address potential vapor intrusion. The system has been remediating the soil and vadose zone since 2002, and has been modified in 2014 and again in 2016.

#### Groundwater

Groundwater contamination is present onsite and offsite. The groundwater plume extends approximately 7,100 ft downgradient of the site. Historically, the highest concentrations of PCE in groundwater have been detected at approximately 80 ft bgs. Concentrations of VOCs greater than 1,000 ppb (maximum 12,021 ppb) in groundwater have been present in the 75–85 ft sampling interval approximately 4,100 ft downgradient (south-southeast) of the site. The intent of the two onsite DDC systems is to mitigate further migration of contaminants downgradient. The intent of the offsite DDC system is to capture contamination at the end of the plume and mitigate further migration of contaminants to the south-southeast.

In May 2016, a Membrane Interface Probe (MIP) study was implemented to advance plume delineation efforts at the site. The MIP program was performed at 25 sample locations over a period of 2 weeks, via direct-push technology. Field data and observations from MIP study were used to select locations associated with the subsequent Hydraulic Profiling Tool (HPT) program, which was implemented at 10 locations over the course of 4 weeks. Sample depths associated with both programs ranged from approximately 8 to 85 ft bgs. In addition, groundwater samples from the HPT program were sent to a laboratory for CVOC analysis. Preliminary results from the MIP/HPT programs generally align with historical understanding of groundwater plume; the results will be further evaluated and presented in a separate deliverable (to be provided in 2017).

Since contaminated soil, soil vapor, and groundwater remain at the onsite and offsite locations after completion of the RA, engineering controls (ECs) and institutional controls (ICs) are required to protect human health and the environment. The SMP (EA 2013a) provides a detailed description of all procedures required to manage remaining contamination at the site after completion of the RA, including: (1) implementation and long-term management of all ECs and ICs, (2) media monitoring, (3) operation and maintenance (O&M) of all treatment, collection, containment, or recovery systems, (4) performance of periodic inspections, certification of results, and submittal of this Periodic Review Report (PRR), and (5) defining criteria for termination of treatment system operations.

### 1.5.4 Final Engineering Report

The Final Engineering Report (EA 2013b) was completed in August 2013 and details the remedial activities conducted at the NHP site.

## 1.6 SITE MANAGEMENT PLAN

The SMP (EA 2013a) was originally completed in June 2013 and detailed the future management of the NHP site. The SMP specifies the methods necessary to ensure compliance with all ECs and ICs required by the EN for contamination that remains at the site. Environmental monitoring points at the NHP site have been maintained and sampled during the monitoring period in accordance with the SMP. This included collection of groundwater and system influent/effluent air samples at various locations across the site, periodic inspection of the systems, and treatment system and monitoring well maintenance. Sampling locations, sampling methodology, list of analytes, analytical methods, inspection methodology, and site maintenance objectives are documented in the SMP.

The objectives of the monitoring and maintenance program are to:

- Collect representative groundwater and system influent/effluent air samples and evaluate the data to confirm that the remedy continues to be effective in protecting public health and the environment.
- Assess compliance with applicable NYSDEC SCGs, particularly ambient groundwater standards and assess achievement of the remedial performance criteria.
- Periodically inspect the site and provide routine maintenance, as necessary.
- Document and report this information to the NYSDEC.

It is anticipated that the SMP will be updated in 2017 to reflect any changes to the treatment systems and associated monitoring well networks.

## 1.7 CRITERIA FOR COMPLETION OF REMEDIATION/TERMINATION OF REMEDIAL SYSTEM

Generally, remedial processes are considered completed when effectiveness monitoring indicates that the remedy has achieved the remediation goals identified by the ROD (NYSDEC 1999). The framework for determining when remedial processes are complete is provided in Section 6.4 of NYSDEC DER-10.

### 1.7.1 Soil Vapor Extraction System

The SVE system will continue to be monitored on a monthly basis to determine whether the system remains necessary at the site, or if the RA objectives were achieved. The decision to terminate operation of the SVE system will be based upon the evaluation of whether soil remediation is complete by assessing system performance/monitoring data, soil sampling results, and soil gas results. The following is a list of factors that may influence the commencement of shut down:

- System Off-gas Analysis

  — Total influent or individual VOCs extracted from area of influence are not evident.

  — Total influent or individual VOCs extracted from area of influence reach predetermined level.

  — Total influent or individual VOCs extracted from area of influence reach asymptotic conditions and design deemed adequate.

- No rebound is observed in influent concentrations upon system restart, following reasonable system shut down period.
- Operation costs greatly exceed value of continued vapor removal (operator's decision).

- Soil Gas Analysis

  - Soil gas constituents collected from remediation area reach asymptotic conditions, and extraction and monitoring system designs deemed adequate.
  - Soil gas constituents collected from the remediation area indicate levels of non-detection with reasonable detection limits and concentrations.
  - Soil gas constituents collected from the remediation area indicate low levels of residual mass that is no longer threat to groundwater.
  - Soil gas concentrations do not significantly rebound following reasonable system shut down period.

- Soil Sample Analysis

  - Soil constituents collected from the area being remediated indicated levels below regulatory requirements or levels of non-detection (confirmatory analyses).

The SVE system will not be discontinued unless prior written approval is granted by the NYSDEC. In the event that monitoring data indicate that the SVE system is no longer required, a proposal to discontinue the system will be submitted by the property owner.

### 1.7.2 Density Driven Convection Systems

The DDC systems will continue to be monitored on a monthly basis to determine whether the systems remain necessary at the site, or if the RA objectives were achieved. The DDC systems will not be discontinued unless prior written approval is granted by the NYSDEC. In the event that monitoring data indicate that the DDC systems are no longer required, a proposal to discontinue the systems will be submitted by the property owner. Conditions that warrant discontinuing the DDC systems include contaminant concentrations in groundwater that: (1) reach levels that are consistently below NYSDEC AWQS, (2) have become asymptotic to a low level over an extended period of time as accepted by the NYSDEC, or (3) the NYSDEC has determined that the DDC systems have reached the limit of their effectiveness. In addition, the remedial status of the groundwater contaminant plume between the onsite and offsite DDC systems must be determined before the DDC systems can be discontinued. This assessment will be based in part on post-remediation contaminant levels in groundwater collected from monitoring wells located throughout the site (both onsite and offsite). Systems will remain in place and operational until permission to discontinue their use is granted in writing by the NYSDEC.

# 2. EVALUATION OF REMEDY PERFORMANCE, EFFECTIVENESS, AND PROTECTIVENESS

This section provides a brief summary evaluating remedy performance, effectiveness, and protectiveness at the NHP site, based upon assessment of historical groundwater data and mass removal rates. Groundwater data is presented in **Tables 1, 2A and 2B**; and mass removal data is provided in **Tables 3A through 3F**. Additional discussions of groundwater data and mass removal rates are provided in Sections 4 and 5 of this PRR.

***Groundwater Data***

- Historical groundwater data from 2010 to 2016 showed a general decreasing trend in total VOCs in shallow onsite and offsite groundwater. Trend graphs prepared for VOC concentrations in site groundwater are presented in **Figures 6A, 6B, 6C, and 6D**.

- During the 2016 reporting period, total VOC concentrations generally decreased in onsite shallow groundwater. However, offsite shallow groundwater exhibited more seasonal variation in total VOC concentration than onsite shallow groundwater.

- A general decreasing trend in total VOC concentrations was also observed in both shallow and deep groundwater at the onsite wells.

- No clear trend was observed across the entire set of offsite wells; however, concentrations in upgradient-nested wells (MW-1S/MW-1D) have shown a decreasing trend since offsite system installation in 2012. Specifically, MW-1D has shown an order of magnitude decrease in total CVOCs since 2012, and MW-1S had no detections in 2016.

***Mass Removal***

SVE system air monitoring/sampling has been continuously performed at the site since August 2008. DDC influent/effluent air monitoring has been continuously performed on a quarterly basis at the site since June 2010 (onsite DDC systems) and July 2012 (offsite DDC system). Summaries of the VOC mass recovery rates for the SVE and DDC systems can be found in **Tables 3A through 3C**. During the January 2016 – December 2016 reporting period, the following mass removal amounts were observed:

- Approximately 19.04 pounds (lb) of PCE, 1.15 lb of TCE, and 1.58 lb of DCE have been removed from the source area via the SVE system.

- Approximately 18.89 lb of PCE, 0.03 lb of TCE and 0.00 lb of DCE have been removed from onsite groundwater by onsite DDC system #1.

- Approximately 3.57 lb of PCE, 0.08 lb of TCE and 0.46 lb of DCE have been removed from onsite groundwater by onsite DDC system #2.

- Approximately 6.91 lb of PCE, 3.2 lb of TCE, and 4.43 lb of DCE have been removed from offsite groundwater by the offsite DDC system.

Based upon the results for groundwater monitoring and mass removal, it appears that remedial system operation is reducing total VOC concentrations in source area soil, as well as both onsite and offsite groundwater.

- Based on the first 5 months of monitoring and laboratory data obtained from the SVE system (August 2016 – December 2016), it appears the system modifications performed in Spring/Summer 2016 have been particularly effective for increasing mass recovery from the source area soil.

- Mass recovery observed at onsite DDC system #1 is similar to the previous reporting period.

- Mass recovery continues to be observed at onsite DDC system #2; however, the overall mass removed in 2016 has decreased approximately 50 percent when compared to 2015.

- Mass recovery continues to be observed at the offsite; however, the overall mass removed in 2016 has decreased more than 50 percent when compared to 2015. It should be noted that a significant decrease in groundwater concentrations upgradient of the offsite system (MW-1S/MW-1D) has been observed during the same period.

# 3. INSTITUTIONAL CONTROLS/ENGINEERING CONTROLS PLAN COMPLIANCE REPORT

The SMP (EA 2013a) was submitted and approved as final by the NYSDEC in June 2013.

## 3.1 INSTITUTIONAL CONTROLS/ENGINEERING CONTROLS REQUIREMENTS AND COMPLIANCE

Since remaining contaminated soil, soil vapor, and groundwater exists at the site, ICs and ECs are required to protect human health and the environment.

### 3.1.1 Institutional Controls

A series of ICs are required by the ROD (NYSDEC 1999) to: (1) implement, maintain, and monitor EC systems, (2) prevent future exposure to remaining contamination by controlling disturbances of the subsurface contamination, and (3) limit the use and development of the site to industrial uses only. ICs consist of:

- Compliance with the SMP
- Compliance with the EN—ICs identified in the EN may not be discontinued without an amendment to or extinguishment of the EN. The site has a series ICs in the form of site restrictions which include:
  - The property may only be used for industrial use provided that the long-term ECs and ICs are employed.
  - The property may not to be used for a higher level of use, such as unrestricted, restricted residential or commercial uses without additional remediation and amendment of the EN, as approved by NYSDEC.
  - There shall be no disturbance or excavation of the property which threatens the integrity of the ECs or which results or may result in a significantly increased threat of harm or damage at any site as a result of exposure to soils.
  - The use of the groundwater underlying the property is prohibited without treatment rendering it safe for intended use unless the user first obtains permission to do so from NYSDEC.
  - The potential for vapor intrusion must be evaluated for any buildings developed within the site boundaries, and any potential impacts that are identified must be monitored or mitigated.

— Vegetable gardens and farming on the property are prohibited.

— Site owner or remedial party will submit to NYSDEC a written statement that controls employed at the Controlled Property are unchanged or any changes have approval of NYSDEC.

- Development of an Excavation Work Plan (included as an appendix to the SMP), which identifies the procedures and protocols required to be implemented should any remaining contamination be breached, penetrated or temporarily removed.

- Compliance with O&M Plan (as defined in the SMP).

- Compliance with Monitoring Plan (as defined in the SMP).

- Compliance with IC/EC Plan (as defined in the SMP).

### 3.1.2 Engineering Controls

ECs, which consist of an SVE system (source area) and several DDC systems (onsite DDC systems #1 and #2, and offsite DDC system), are fully in place. A description of each EC, their objective(s), and an explanation of how the performance of each EC is evaluated is provided below.

#### 3.1.2.1 Soil Vapor Extraction System

***Objectives***

The remedial objectives for the SVE system include soil remediation and soil vapor intrusion mitigation. The SVE system was designed to operate continuously. Potential exposure to indoor air impacted with VOCs within the site building is mitigated by the SVE system. In order to achieve the remedial objectives, long-term monitoring programs are in place to monitor the effectiveness of the SVE system.

***Description***

The equipment associated with SVE is housed in an enclosure (20 ft long × 8 ft wide × 8 ft high) located adjacent to the north wall of the site building. Modifications to the system were made in Spring/Summer 2016. As of August 2016, five horizontal well legs were installed and in use, and are oriented west to east beneath the 1 Adams Boulevard building. The five wells are connected to the SVE system via underground piping to the manifold housed on the exterior of the system enclosure. Inside the enclosure, the 2-in. diameter SVE piping contains a ball valve to control the airflow and vacuum, as well as sampling ports for drawing air samples and conducting flow measurements. The 2-in. piping is connected to the existing vacuum blower designed to extract a maximum of 400 cubic feet per minute (cfm) of airflow from the subsurface. Vapors from the source area are extracted by applying vacuum via the blower system. A 10-horse power regenerative blower develops a maximum vacuum of approximately 98 in. of water. Vapors extracted from below the building foundation are treated through two treatment vessels containing granular activated carbon (GAC) before being discharged to the atmosphere. In addition, the SVE system has a dial-out telemetry system to provide notification of system alarms.

***Evaluation Methods***

Performance monitoring data showing mass removal rates versus time will be used to evaluate trends for the source area. The SVE system is currently monitored on a monthly basis to evaluate system performance, to assure that all components are in working order, and to maintain compliance with the requirements of a NYSDEC Air Discharge Permit.

Monitoring the performance of the SVE system (i.e., off-gas samples, air concentration readings) in reducing contaminant concentrations in soils is necessary to determine the effectiveness of the SVE system. The mass removed during long-term monitoring can be calculated using vapor concentration and flow rate measurements taken at the manifold. The instantaneous and cumulative mass removal is then plotted versus time. The contaminant mass removed during an operating period can be calculated using the equation provided below.

$$M = C \times Q \times t$$

where:
- M = cumulative mass removed
- C = vapor concentration
- Q = extraction flow rate
- t = operational period

Remedial progress of SVE systems typically exhibits asymptotic behavior with respect to both vapor concentration reduction and cumulative mass removal. At this point, the composition of the vapor should be determined and compared with soil vapor samples. This comparison will enable confirmation that there has been a shift in composition toward less volatile components. Soil vapor samples may indicate the composition and extent of the residual contamination. When asymptotic behavior begins to occur, the operator should closely evaluate alternatives that increase mass removal rate such as pulsing. Pulsing involves the periodic shut down and start-up operation of extraction wells to allow the subsurface environment to equilibrate (shut down) and then begin extracting vapors again (start-up). Other more aggressive steps to curb asymptotic behavior can include installation of additional extraction wells.

If asymptotic behavior is persistent for periods greater than 6 months, and the concentration rebound is sufficiently small following periods of pulsing, termination of operations may be appropriate if residual levels are at or below regulatory limits.

***Effectiveness***

Based upon the results for mass removal, it appears that SVE system operation is reducing total VOC concentrations in source area soil. Additional discussion of SVE system monitoring and effectiveness is presented in Section 5.

***Conclusions and Recommendations for Changes***

It is recommended that a new dial-out unit (i.e., Sensaphone) be installed at the SVE system with more modern cellular-based setup to improve the reliability of these features.

Once 6 months of baseline data has been obtained while operating all five legs simultaneously, it may be desirable to focus mass recovery efforts on individual legs or pairings of individual legs. By focusing on one or two legs, it may be possible to improve mass recovery from those areas farthest away from the SVE system trailer (i.e., VP-20 along east side of 1 Adams Boulevard building) where higher soil gas concentrations have been observed.

#### 3.1.2.2 Density Driven Convection Systems

***Objectives***

The remedial objectives for the DDC systems include achieving groundwater standards and preventing further offsite migration of contaminated groundwater. The DDC systems were designed to operate continuously. In order to achieve the remedial objectives, long-term monitoring programs are in place to monitor the effectiveness of the systems.

***Description***

The DDC systems consist of blowers that both extract and inject pressurized air into the wells, heat exchangers that reduce the blower discharge temperature, and carbon adsorbers for VOC treatment before re-injection back into the wells. The systems are controlled by variable frequency drives (VFDs) for the blower speed and programmable logic controls (PLCs) for automation of the systems. The onsite DDC systems have dial-out telemetry systems to provide notification of system alarms; the offsite DDC system has a bi-directional telemetry system that enables remote control of the treatment system, as well as the ability to obtain performance data. All supplied equipment is housed in ventilated and insulated shipping containers.

***Evaluation Methods***

Performance monitoring data showing mass removal rates (as well as changes in groundwater concentrations) versus time will be used to evaluate trends for the source area and downgradient area. The DDC systems are currently monitored on a monthly/quarterly basis to evaluate system performance and to assure that all components are in working order.

Monitoring the performance of the DDC systems (i.e., off-gas samples, air concentration readings, and groundwater sampling data) in reducing contaminant concentrations in groundwater is necessary to determine the effectiveness of the DDC systems. Similar to the SVE system, the mass removed during long-term monitoring can be calculated using vapor concentration and flow rate measurements taken at each DDC system.

***Effectiveness***

Based upon the results for groundwater monitoring and mass removal, it appears that DDC system operation is reducing total VOC concentrations in both onsite and offsite groundwater. Additional discussion of DDC system monitoring and effectiveness is presented in Section 5.

***Conclusions and Recommendations for Changes***

The following changes are recommended for the DDC systems:

- New dial-out (i.e., Sensaphone) units should be installed at both of the onsite DDC systems with more modern cellular-based setups to improve the reliability of these features.

- A modification was made to the operation of the offsite DDC system in January 2015 to reduce the power consumption of the system and reduce the change-out frequency of the GAC and blowers. The offsite DDC system configuration has been modified to allow one blower to operate all six DDC wells. Monthly monitoring and quarterly sampling has confirmed the effectiveness of this reconfiguration and operation. EA recommends continuing to rotate blower operation every 3 months to equalize wear and tear to the blower and usage of carbon.

### 3.1.3 Institutional Controls/Engineering Controls Compliance

Determination of compliance with the ICs/ECs at the NHP site is made on the following criteria:

- The ICs/ECs applied at the site are in place and unchanged since completion of the remedial activities and issuance of the SMP.

- No changes or occurrences of activity have impaired or influenced the ability of such controls to protect human health and the environment, or constitute a violation or failure to comply with any element of the SMP for such controls.

- Access to the NHP site will continue to be provided for evaluation of the remedy, including access to the site-monitoring network and other controls (e.g., SVE/DDC systems) for continued monitoring and/or maintenance.

## 3.2 INSTITUTIONAL CONTROLS/ENGINEERING CONTROLS CERTIFICATION

The IC/EC certification form has been included as **Appendix A** of this PRR. The IC/EC – Property Owner Survey, which was completed by the property owner on May 5, 2016, has also been included in **Appendix A** of this PRR.

# 4. MONITORING PLAN COMPLIANCE REPORT

This PRR assesses whether the NHP site is being remediated and managed as set forth in the SMP (EA 2013a) and ROD (NYSDEC 1999). The Monitoring Plan includes a description of the methods and rationale to be used for assessing the remedy effectiveness, and addresses the following elements:

- Sampling and analysis of all appropriate media (e.g., groundwater, SVE and DDC system influent/effluent air)
- Assessing compliance with applicable NYSDEC SCGs, particularly ambient groundwater standards
- Assessing achievement of the remedial performance criteria
- Evaluating site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment.

Sampling and analysis of SVE and DDC system influent/effluent air is presented and discussed in Section 5 of this PRR.

## 4.1 GROUNDWATER MONITORING AND SAMPLING

Groundwater monitoring and sampling has been continuously performed in the vicinity of the onsite system since June 2010, as well as in the vicinity of the offsite system since July 2012. During the reporting period (January 2016 – December 2016), four groundwater monitoring, and sampling events were completed. Prior to groundwater sampling activities, monitoring wells were gauged to measure groundwater depth, determine potentiometric surface elevations, and evaluate groundwater flow paths.

The following table identifies the monitoring well network that is included in the monitoring plan for the site. All monitoring wells identified in this table were sampled during each quarterly sampling event for this reporting period. Quarterly sampling events took place in January, April, July, and October 2016.

**Monitoring Plan – Monitoring Wells**

| Onsite System | Well Status/Notes | Offsite System | Well Status/Notes |
|---|---|---|---|
| DDC-2-PD | Good | DDC-5-PD | Good |
| DDC-2-PS | Good | DDC-5-PS | Good |
| DDC-4-PD | Good | DDC-6-PD | Good |
| DDC-4-PS | Good | DDC-6-PS | Good |
| MW-14D | Good – Repairs made in 2/2016 | DDC-7-PD | Good |
| MW-14S | Good | DDC-7-PS | Good |
| MW-15D | No bolts for well cap | DDC-8-PD | Good |
| MW-15S | Good | DDC-8-PS | Good |
| MW-1D | No bolts for well cap | DDC-9-PD | Good |
| MW-1S | Good | DDC-9-PS | Good |
| MW-2A | Good – Repairs made in 2/2016 | DDC-10-PD | Good |
| MW-2AD | Good – Repairs made in 2/2016 | DDC-10-PS | Good |
| MW-3D | Good | MW-1D | Good |
| MW-3S | Good | MW-1S | Good |
| MW-5D | Good | MW-2D | Good |
| MW-5S | Good | MW-2S | Good |
| MW-6S | Good | MW-3D | Good |
| | | MW-3S | Good |

Local groundwater flow direction based on groundwater elevation data collected both historically and during the reporting period is generally in a south-southeast direction towards the Great South Bay. Interpreted groundwater contour maps illustrating the direction of groundwater flow for the most recent onsite and offsite groundwater gauging events are shown in **Figures 4 and 5**, respectively. A summary of groundwater gauging data is provided in **Table 1**.

Groundwater depth at the site could potentially be influenced by temporal changes and seasonal precipitation events. Onsite shallow groundwater depths during the reporting period ranged from 43.84 ft above mean sea level (amsl) (MW-6S) in April 2016 to 37.51 ft amsl (MW-15S) in October 2016. Offsite shallow groundwater depths during the reporting period ranged from 28.03 ft amsl (MW-1S) in April 2016 to 23.87 ft amsl (MWS-3S) in October 2016. A copy of the daily field reports and photograph logs completed during monitoring and sampling activities are provided in quarterly reports submitted to the NYSDEC. Additionally, monitoring well gauging, purging, and sampling forms are provided in the quarterly reports.

### 4.1.1 Chlorinated Volatile Organic Compounds

During the reporting period, concentrations of at least one CVOC (PCE, TCE, DCE, and vinyl chloride [VC]) were consistently reported in at least 16 of the 17 onsite monitoring well locations and in at least 16 of the 18 offsite monitoring wells. A summary of VOCs detected in groundwater samples collected from site monitoring wells is provided in **Tables 2A and 2B**. Trend graphs summarizing CVOC concentrations at each monitoring location and including historical data are presented on **Figures 6A through 6D**. Full laboratory reports from quarterly groundwater sampling are provided in the quarterly reports submitted to the NYSDEC.

**Onsite Monitoring Wells**

CVOCs were detected in all onsite wells during at least one sampling event throughout the reporting period. Concentrations of one or more CVOC in all wells except MW-1S, DDC-4-PS, and DDC-4-PD were above NYSDEC AWQS from January – December 2016.

Trend graphs for onsite shallow and deep wells (**Figures 6A and 6B**) show a general reduction of concentrations in most wells over time, with total CVOC concentrations during the reporting period on average lower than the baseline (June 2010) concentrations at each well except MW-3S,MW-6S, and MW-14S. The concentration spikes that were observed in several of the onsite wells during the previous reporting periods (2013–2015) came during or immediately following an extended period of system downtime. However, the correlation between system downtime and increased CVOC concentrations cannot be clearly seen during this reporting period. VC was detected in eight onsite wells in January 2016 and in DDC-2-PS and MW-5S during the other reporting periods.

**Offsite Monitoring Wells**

CVOCs were detected in all offsite wells during at least one sampling event throughout the reporting period. Concentrations of one or more CVOC in all wells except MW-1S, MW-2D, and MW-3S were above NYSDEC AWQS from January – December 2016. The majority of offsite wells has exceedances in July and October 2016.

Trend graphs for offsite shallow wells (**Figure 6C**) show a relatively consistent concentration of CVOCs for the January – December 2016 reporting period. However, there is an overall reduction of concentrations in nearly half of the wells since system start-up, with total CVOC concentrations during the reporting period on average lower than the baseline (July 2012) concentrations at each well. Wells MW-3D, DDC-10-PD, DDC-9-PS, DDC-9-PD, DDC-7-PS, DDC-7-PD, and MW-2S did not exhibit total CVOCs lower than baseline conditions. CVOC detections at DDC-10-PD and DDC-9-PS have fluctuated between lower and higher concentrations since 2012. Additionally, CVOC concentrations in MW-3D, DDC-9-PD, DDC-7-PS, DDC-7-PD, and MW-2S have increased in 2016. No VC has been detected in the offsite wells. Even though no clear trend was observed in the offsite deep well network as a whole (**Figure 6D**), it should be noted that a significant decrease in groundwater concentrations upgradient of the offsite system (MW-1S/MW-1D) has been observed during the same period.

## 4.2 CONFIRM COMPLIANCE WITH MONITORING PLAN

The following table identifies the SMP (EA 2013a) requirements on an annual basis and demonstrates that compliance with the monitoring plan has been, or is scheduled to be achieved, prior to the end of the 2016 calendar year.

| Monitoring Program Activity | Required Frequency* | | Compliance Dates |
|---|---|---|---|
| | Quarterly | Monthly | |
| Groundwater monitoring/sampling | x | | January – December 2016 |
| *The frequency of events will be conducted as specified until otherwise approved by NYSDEC. | | | |

## 4.3 CONFIRM THAT PERFORMANCE STANDARDS ARE BEING MET

**Tables 2A and 2B** provide a summary of groundwater results for the reporting period. Overall, onsite groundwater concentrations of primary CVOCs (PCE/TCE) have remained at or below baseline concentrations. Since the last reporting period; however, there has been an increase in total CVOC concentrations at the following wells:

- DDC-2-PS (high of 997 micrograms per liter [µg/L] in July 2016)
- MW-14S (high of 35.2 µg/L in October 2016)
- MW-5S (high of 314.7 µg/L in February 2016)
- MW-15D (high of 35.2 µg/L in October 2016)
- MW-5D (high of 25.8 µg/L in October 2016).

Similarly, daughter compounds (VC) remained at or below concentrations previously seen during the reporting period. Total groundwater CVOC concentrations in onsite wells continues to remain less than or similar to baseline conditions in the former source area.

Offsite groundwater concentrations of individual CVOCs in shallow wells have remained at or below concentrations previously seen in the wells during the reporting period and display a decreasing trend, except in DDC-7-PS where concentrations of PCE, TCE, and DCE hit historic highs in January 2016 of 46 µg/L, 36 µg/L, and 87 µg/L, respectively. DCE was also detected in more wells and at higher concentrations in wells MW-2S and DDC-9-PS where the concentration of DCE hit historic highs of 5.3 µg/L and 13 µg/L, respectively. However, CVOC concentrations in MW-1S and MW-1D, immediately upgradient of DDC-7-PS, MW-2S, and DDC-9-PS, continued to decrease, suggesting that the high baseline CVOC concentrations seen in MW-1S/1D in 2012 have migrated downgradient toward the offsite DDC treatment wells. Offsite shallow and deep wells continue to have a total CVOC mass below or similar to the baseline CVOC concentrations in the former source area (1 Adams Boulevard).

## 4.4 CONCLUSIONS AND RECOMMEDATIONS FOR CHANGES

While spikes in individual CVOC concentrations were noted in several wells onsite and offsite, groundwater results generated during this reporting period generally show an overall decreasing trend for total CVOCs. The number of onsite wells with AWQS exceedances decreased from January to October 2016 and remained consistent through the end of the period.

In May 2016, the MIP/HPT study was implemented to advance plume delineation efforts at the site. The MIP program was performed at 25 sample locations over a period of 2 weeks, via direct-push technology. The subsequent HPT program was implemented at 10 locations over the course of 4 weeks. Sample depths associated with both programs ranged from approximately 8 to 85 ft bgs. Groundwater samples from the HPT program were sent to a laboratory for CVOC analysis. Preliminary results from the MIP/HPT programs generally align with historical understanding of groundwater plume. The results will be used to refine the extents of the CVOC plume and conceptual site model, and be presented in a future deliverable. In the follow-up report, the existing monitoring well network will be evaluated to determine the need and location of new permanent monitoring wells, and if any modifications need to be made to the existing wells sampling program. The SMP will also be updated accordingly.

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# 5. OPERATION & MAINTENANCE PLAN COMPLIANCE REPORT

The O&M Plan describes the measures necessary to operate, monitor, and maintain the mechanical components of the remedy in place at the site, and includes the following elements:

- The steps necessary to allow individuals unfamiliar with the site to operate and maintain the SVE and DDC systems

- An O&M Contingency Plan.

The O&M Plan will be updated periodically to reflect changes in site conditions or the manner in which the systems are operated and maintained.

## 5.1 SITE INSPECTION

The condition of the overall site and individual systems was noted during all monthly O&M visits, as well as during quarterly groundwater/air monitoring and sampling events. A more detailed annual site-wide inspection was completed on December 22, 2016. The fencing, locks, and access gates/doors were in good condition. Both the asphalt/concrete areas and the grassy areas were in good condition. There was no evidence of vandalism observed to the DDC wells, treatment systems, or utilities, and penetrations (including poles, posts, or stakes) were not observed.

### 5.1.1 Soil Vapor Extraction Treatment System

The SVE system and surrounding areas were generally observed to be in good condition during the annual inspection (**Appendix B**). There was no evidence of vandalism to the SVE treatment system and new outdoor manifold. Additionally, a roof drain from the 1 Adams Boulevard building (located near the horizontal well manifold) was observed to be eroding the soil cover for the well lines and entering the system during heavy rain events. Modifications will be made in early 2017 to divert flow away from the SVE treatment trailer. Inside the building, vapor-monitoring points sustain continual wear and tear due to the daily operations of the tenant. At the time of inspection, it was noted that one of the well covers for MW-G was broken. The cap will be replaced in early 2017.

### 5.1.2 Onsite and Offsite Density Driven Convection Treatment Systems

Minor damage was observed at the offsite DDC system enclosure during the October 2016 quarterly event. Upon arrival, it was observed that a tree branch from the SCWA – Albany Avenue Well Field property had fallen onto the west fence line of the equipment trailer compound. The branch was removed and placed back on SCWA property. A portion of the west fence line is bent slightly as a result, but still retains its functionality.

The DDC treatment systems were observed to be in good condition during the annual inspection; no additional damage to the system enclosures or wellheads in either location was noted at that time. All gauges and meters read within acceptable levels and all remote communication equipment was functional. The equipment was not noted to be making any abnormal noises. The heating and ventilation for the enclosure had not changed since the last inspection.

## 5.2 SUMMARY OF OPERATION & MAINTENANCE COMPLETED DURING REPORTING PERIOD

Over the reporting period, average runtimes for the NHP systems were 71.9 percent for the SVE system, 88.9 percent for onsite DDC system #1, 85.3 percent for the onsite DDC system #2, and 49.13 percent for blower B-501 and 51.49 percent for blower B-502 at the offsite DDC treatment system. Offsite system blowers have run percentages around 50 percent due to the practice of switching the blowers used to run the system about every 6 months. The following table summarizes site visits and the maintenance that was performed.

## National Heatset Site Visits and Maintenance

| Date | System | Purpose |
|---|---|---|
| 1/18/16 – 1/21/16 | Onsite and offsite | Quarterly visit and sampling. Replaced DDC-6 sump pump. Restarted offsite system. |
| 2/8/16 | Onsite and offsite | Monthly visit. Onsite DDC system #2 was off upon arrival due to a “power loss” alarm (but no dial-out alarm was received). Restarted DDC system #2. Onsite DDC system #1 was off upon arrival due to a “low drive/voltage flux” alarm (but no dial-out alarm was received). Restarted DDC system #1. SVE system shut down after O&M completed in preparation for drilling and sampling activities in 1 Adams Boulevard. |
| 2/25/16 | SVE | SVE system was restarted following completion of drilling and sampling activities in 1 Adams Boulevard. |
| 3/2/16 | Onsite | Unscheduled visit to check systems following a “power failure” alarm. |
| 3/8/16 | Onsite and offsite | Monthly visit. SVE running at high temperature on arrival. Opened dilution valve fully to let blower cool down, then closed to 50 percent dilution. Sump pump for DDC-9 (offsite system) was down due to debris. The offsite DDC system was shut down briefly to repair the sump pump; then the system was restarted. |
| 4/11/16 – 4/14/16 | Onsite and offsite | Quarterly visit and sampling. Replaced DDC-7 sump pump that was damaged and inoperable due to debris. Switched system to run-off blower B-501 previously ran off blower B-502. |
| 5/15/16 – 5/17/16 | Onsite and offsite | Monthly visit. Onsite system #2 was off upon arrival due to a “high after cooler temperature” and “high carbon temperature” alarm were triggered. No alarm call out was received; could not restart system. D&D determined two temperature sensors needed to be replaced. Hose in the offsite system carbon trailer was kinked/cracked which was affecting flow rates in the return lines. Switched offsite system to run off blower B-502 pending repairs to hose on the blower B-501 side of the system. |
| 5/23/16-5/24/16 | Onsite and offsite | Carbon change-out of onsite systems. Performed O&M and site maintenance. Replaced sump pump at DDC-3. Repaired damaged hose at the offsite system and restarted system-using blower B-501. |
| 6/8/16 – 6/10/16 | Onsite and offsite | Monthly visit. Shut SVE system down for remedial system optimization work. |
| 7/12/16 – 7/14/16 | Onsite and offsite | Quarterly visit and sampling. Collected groundwater and system air samples at onsite and offsite treatment systems. SVE system still off due to horizontal drilling. |
| 8/12/16 | Onsite | High temperature alarm at onsite system #1; shut system down due to high summer temperatures. |
| 8/17/16 – 8/18/16 | Onsite and offsite | Monthly visit. Turned onsite system #1 back on and let run for approximately 1 hour before collecting system readings. Air samples collected. |
| 8/26/16 | Onsite | High temperature alarm at onsite system #1; shut system down due to high summer temperatures. |
| 9/12/16 | Onsite and offsite | Monthly visit. Turned onsite system #1 back on and let run for approximately 1 hour before collecting system readings. |
| 9/30/16 | Onsite | Sampled influent and effluent of SVE system. |
| 10/25/16 – 10/26/16 | Onsite and offsite | Quarterly visit and sampling. Collected groundwater and system air samples at onsite and offsite systems. |
| 11/15/16 | Onsite and offsite | Monthly visit. Observed roof drain located near new SVE manifold draining water to area behind SVE treatment trailer. Shut SVE system down to prevent water from entering system. |
| 11/17/16 | Onsite | Drained knockout tank at SVE system. Restarted system and cleaned out each well leg. Drained knockout tank once again and collected system measurements |
| 11/30/16 | Onsite | Sampled influent and effluent samples of SVE system. |
| 12/21/16 | Onsite and offsite | Monthly visit. Knockout tank full upon arrival. Collected system measurements at SVE system. Shut down SVE system and drained knockout tank. |
| 12/22/16 | Onsite and offsite | Monthly visit. Restarted SVE system and sampled influent and effluent of SVE system. Conducted monthly O&M on DDC systems. |

Note:
DDC = Density driven convection
SVE = Soil vapor extraction
O&M = Operation and maintenance
D&D = D&D Electric Motors & Compressors

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### 5.2.1 Onsite System Maintenance

#### 5.2.1.1 First Quarter Maintenance (January – March 2016)

**SVE System**

The SVE system remained inactive from the last quarter of 2015 (December 13, 2015) until January 20, 2016, due to the need for repairs to the bearings on the blower motor. The SVE blower was repaired and reinstalled by D&D Electric Motors & Compressors (D&D) on January 8, 2016, and the system was left off until EA conducted the quarterly O&M visit the week of January 18, 2016. On January 20, 2016, EA restarted the SVE system and collected a vapor sample from the influent stream immediately following start-up using a Summa® canister. EA also collected additional influent vapor samples 1-, 5-, and 24-hours after start-up.

The SVE system then operated continuously until the February O&M event. The system was shut down on February 8, 2016, following completion of the O&M, in preparation for drilling and sampling activities at 1 Adams Boulevard. In February 2016, EA collected soil samples, installed, and sampled permanent vapor points to assess the nature and extent of sub-slab contamination at 1 Adams Boulevard; evaluate the zone of influence of the SVE system; and provide data for potential improvements to the SVE system. Further information on the work performed and results of this investigation can be found in the Sampling and Delineation, 1 Adams Boulevard Memorandum (EA 2016a). The SVE system was restarted following completion of drilling and sampling activities on February 25, 2016. The dilution valve was adjusted as necessary during the March 2016 visit in order to reduce the blower discharge temperature.

**Onsite DDC Systems**

During the February 2016 monthly visit, onsite DDC system #2 was off upon arrival due to a power failure alarm; EA restarted the system the same day. Onsite DDC system #1 was also off upon arrival due to a “low drive/voltage flux” alarm and EA restarted DDC system #1 as well. An unscheduled visit was performed on March 2, 2016 following a power failure alarm to check the systems.

#### 5.2.1.2 Second Quarter Maintenance (April – June 2016)

**SVE System**

The SVE system operated continuously until the system was shut down for a few hours to change out the carbon in May 2016. Following the change out, the SVE system was restarted and operated continuously until June 2016. In June 2016, the system was shut down to begin drilling of the horizontal wells to expand the SVE system. The system was off for the remainder of the quarter.

**Onsite DDC System**

On May 15, 2016, onsite DDC system #2 was off upon arrival due to "high carbon temperature" and "high aftercooler temperature" alarms. No alarm call out was received. EA attempted to restart the system after resetting the alarms, but the system would not operate more than 15 seconds before the alarms were triggered again. EA arranged a site visit with D&D to repair onsite DDC system #2. It was determined the two faulty temperature sensors were incapable of resetting after the alarms had been cleared on the control panel. D&D reset the temperature sensors and restarted the system. New temperature sensors were ordered and replaced in July 2016.

During May 24–25, 2016, the onsite systems were shut down briefly to change out the carbon. Both systems were restarted following the carbon change out; however, onsite DDC system #1 was off upon arrival during the June 2016 monthly visit due to a high temperature alarm. Comparison of the run times between the carbon change out and the June 2016 monthly event show that the system only ran for approximately one day before the alarm was triggered. No alarm callout was received. DDC system #1 was restarted on June 8, 2016. The high temperature alarm was tripped again the evening of June 8, 2016. On June 9, 2016, the system was restarted and the blower speed was reduced from 42 cycles per second (Hz) to 32 Hz to decrease the heat generated by the blower.

#### 5.2.1.3 Third Quarter Maintenance (July – September 2016)

**SVE System**

In June 2016, the system was shut down to begin drilling new horizontal wells to expand the SVE system. The system was off for the remainder of the second quarter until August 3, 2016 when the five new horizontal wells were connected to the SVE system, and the system was restarted using all five wells simultaneously. The system was operated using all five horizontal wells for the remainder of the quarter.

**Onsite DDC Systems**

On August 12, 2016, a high temperature alarm was triggered at the onsite DDC system #1 due to high summer temperatures. Preferred Environmental Services mobilized to the site the same day to shut the system down. The system remained off until the following week when EA restarted the system during a monthly O&M visit. Another high temperature alarm was triggered on August 26, 2016, due to high ambient temperatures. The system was shut down for a period of 2 weeks until it was restarted again on September 12, 2016, and remained operational for the rest of the third quarter.

In the previous quarter, it was discovered that two temperature sensors in onsite DDC system #2 were beginning to malfunction and needed to be replaced. On July 14, 2016, the two temperature sensors were replaced by D&D.

#### 5.2.1.4 Fourth Quarter Maintenance (October – December 2016)

**SVE System**

During the reporting period, the SVE system was temporarily shut down on November 15, 2016, during the monthly visit due to heavy rain; water was observed discharging from a roof drain at 1 Adams Boulevard in the vicinity of the new horizontal well manifold. Water was entering was observed eroding the soil cover for the well lines and entering the system during heavy rain events. As such, the system was shut down on November 15, 2016, and restarted on November 17, 2016, to stop additional water from being drawn into the system during the rain event. Modifications will be made in early 2017 to divert flow away from the SVE treatment trailer. During the reporting period, the SVE system was only shut down for a few hours at a time to remove accumulated water from the knockout tank. No other operational issues were observed with the SVE system during the reporting period.

**Onsite DDC System**

On December 22, 2016, it was noted that the BP-01 pressure gauge on the blower in onsite DDC system #2 might be faulty. A replacement was ordered though D&D and repairs are scheduled for early 2017; in the interim, the system will remain operational.

### 5.2.2 Offsite System Maintenance

#### 5.2.2.1 First Quarter Maintenance (January – March 2016)

EA restarted the offsite DDC system the week of January 18, 2016, after replacing the faulty DDC-6 sump pump on SCWA property. The offsite system was shut down during the previous O&M visit on December 16, 2016, which resulted in a lower number of operational hours for the month of January.

During the monthly event in March 2016, EA discovered that the sump pump for DDC-9 at the offsite sump gallery was down due to debris, which damaged the pump impellers. The offsite system was then shut down briefly in order to repair the sump pump and was restarted upon completion of repairs.

#### 5.2.2.2 Second Quarter Maintenance (April – June 2016)

During the quarterly event in April 2016, EA discovered that the sump pump for DDC-7 in the offsite sump gallery was down due to debris entering the pump and damaging the impellers. The offsite system was shut down briefly in order to replace the pump. The system was restarted using blower B-501 to operate all DDC wells. Blower B-502 was used to operate all the DDC wells in the previous quarter.

During the following monthly event on May 16, 2016, EA noted that airflows in the return lines for all the offsite DDC wells were lower than usual. It was discovered that a damaged section of flex hose connecting the carbon vessels associated with blower B-501 was leaking significantly. EA restarted the system using blower B-502 pending further repairs to the flex hose. On May 25, 2016, EA repaired the section of damaged flex hose in the carbon trailer and restarted the system using blower B-501.

#### 5.2.2.3 Third Quarter Maintenance (July – September 2016)

No operational issues were observed with the offsite DDC systems during the third quarter.

#### 5.2.2.4 Fourth Quarter Maintenance (October – December 2016)

No operational issues were observed with the offsite DDC system during the fourth quarter.

## 5.3 EVALUATION OF REMEDIAL SYSTEMS

SVE system air monitoring and sampling has been continuously performed at the NHP site since August 2008 to assure that all components are in working order, and to maintain compliance with the requirements of a NYSDEC Air Discharge Permit. From August 2008 to June 2009, monitoring and sampling were performed monthly. Between June 2009 and December 2015, O&M was performed quarterly. Since January 2016, O&M has been performed monthly and monthly sampling began in August 2016.

DDC influent/effluent air monitoring has been continuously performed on a quarterly basis since June 2010 (onsite DDC systems) and July 2012 (offsite DDC system). During the reporting period (January – December 2016), four air monitoring, and sampling events were completed at the site.

**System Influent/Effluent Air Monitoring**

| Location Identification | Sampling Date | | | | | | | | Notes |
|---|---|---|---|---|---|---|---|---|---|
| | January 2016 | April 2016 | July 2016 | August 2016 | September 2016 | October 2016 | November 2016 | December 2016 | |
| SVE Influent | X | | | X | X | X | X | X | |
| SVE Effluent | X | X | X | X | X | X | X | X | |
| Treatment System #1 Influent | X | X | X | | | X | | | |
| Treatment System #1 Mid GAC | X | X | X | | | X | | | |
| Treatment System #1 Effluent | X | X | X | | | X | | | |
| Treatment System #2 Influent #1 | X | X | X | | | X | | | |
| Treatment System #2 Influent #2 | X | X | X | | | X | | | |
| Treatment System #2 Effluent | X | X | X | | | X | | | |
| B-501 Influent (VI-401B) | X | | X | | | X | | | |
| B-501 Intermediate #1 (VI-403B) | X | | X | | | X | | | |
| B-501 Intermediate #2 (VI-401A) | X | | X | | | X | | | |
| B-501 Effluent (VI-501) | X | | X | | | X | | | |
| B-502 Influent (VI-402B) | | X | | | | | | | |
| B-502 Intermediate #1 (VI-403A) | | X | | | | | | | |
| B-502 Intermediate #2 (VI-402A) | | X | | | | | | | |
| B-502 Effluent (VI-502) | | X | | | | | | | |

Note: “X” indicates that the location was sampled.

### 5.3.1 Soil Vapor Extraction System

A summary of the field monitoring results, laboratory air discharge analytical results, and estimated mass recovery are presented in **Table 3A**; the laboratory data reports are presented in the quarterly reports submitted to the NYSDEC.

Based on the difference between the influent and effluent sampling results, and estimated 19.04 lb of PCE, 1.15 lb of TCE, and 1.58 lb of DCE have been removed from the source area since modifications were completed to the SVE system in August 2016 and December 2016.

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Using effluent sampling results, it was determined an estimated 3.09 lbs of PCE has been discharged during the reporting period of January – December 2016 toward the permitted annual discharge limit of 270 lb. An estimated total of 0.06 lb of TCE has been discharged during the reporting period toward the permitted annual discharge limit of 120 lb. A negligible amount of DCE has been discharge during the reporting period (the annual discharge limit is 5,510 lb).

Based on the first 5 months of monitoring and laboratory data obtained from the SVE system (August – December 2016), it appears the system modifications performed in Spring/Summer 2016 have been particularly effective for increasing mass recovery from the source area soil.

### 5.3.2 Onsite Density Driven Convection Systems

A summary of the field monitoring results, laboratory air discharge analytical results, and estimated mass recovery are presented in **Tables 3B and 3C**; the laboratory data reports are provided in the quarterly reports.

Based on the difference between the influent and effluent sampling results, an estimated total of 18.89 lb (onsite DDC system #1) and 3.57 lb (onsite DDC system #2) of PCE were recovered from the subsurface in the vicinity of the source area during the reporting period. An estimated total of 0.03 lb (onsite DDC system #1) and 0.08 lb (onsite DDC system #2) of TCE were recovered from the subsurface in the vicinity of the source area during the reporting period. An estimated total 0.46 lb (onsite DDC system #2) of DCE were recovered from the subsurface in the vicinity of the source area during the reporting period. A negligible amount of DCE was recovered from onsite DDC system #1 during the reporting period. Mass recovery observed at onsite DDC system #1 is similar to the previous reporting period, and continues to be observed at onsite DDC system #2; however, the overall mass removed in 2016 has decreased approximately 50 percent when compared to 2015.

### 5.3.3 Offsite Density Driven Convection System

A summary of the field monitoring results, laboratory air discharge analytical results, and estimated mass recovery are presented in **Tables 3D and 3F**; the laboratory data reports are presented in the quarterly reports.

Based on the difference between the influent and effluent sampling results, an estimated total of 3.61 lb (offsite DDC system B-501) and 3.30 lb (offsite DDC system B-502) of PCE were recovered from the subsurface in the vicinity of the source area during the reporting period. An estimated total of 1.80 lb (offsite DDC system B-501) and 1.40 lb (offsite DDC system B-502) of TCE were recovered from the subsurface in the vicinity of the source area during the reporting period. An estimated total of 2.91 lb (offsite DDC system B-501) and 1.52 lbs (offsite DDC system B-502) of DCE were recovered from the subsurface during the reporting period.

Mass recovery continues to be observed at the offsite; however, the overall mass removed in 2016 has decreased more than 50 percent when compared to 2015. It should be noted that a significant decrease in groundwater concentrations upgradient of the offsite system (MW-1S/MW-1D) has been observed during the same period.

## 5.4 CONFIRM THAT PERFORMANCE STANDARDS ARE BEING MET

**Tables 3A** through **3E** provide a summary of the influent/effluent system air results for the reporting period. The mass recoveries shown in these tables confirm that while the systems are up and running, they continue to be effective at removing primary CVOCs and daughter compounds.

It is expected that additional CVOC mass will be removed from the onsite and offsite groundwater system through both the operation of the treatment systems and natural attenuation. The concentration spikes during system downtime, as well as mass recoveries, suggest that a functioning treatment system suppresses the migration of the CVOCs by intercepting the contaminants in the wells. This supports the conclusion that the system continues to function as it was designed.

## 5.5 CONFIRM COMPLIANCE WITH OPERATION & MAINTENANCE PLAN

The following table identifies the O&M Plan (EA 2013a) requirements on an annual basis and demonstrates that compliance with the monitoring plan has been or is scheduled to be achieved prior to the end of the 2016 calendar year.

| Monitoring Program Activity | Required Frequency* | | Compliance Dates |
|---|---|---|---|
| | Quarterly | Monthly | |
| SVE Influent/Effluent Air Sampling | X | X | January – December 2016 |
| DDC Systems Air Sampling | X | | January – December 2016 |
| System O&M | | X | January – December 2016 |

*The frequency of events will be conducted as specified until otherwise approved by NYSDEC.
Monthly sampling of the SVE system began in August 2016.
Note:
SVE = Soil vapor extraction
DDC = Density driven convection
O&M = Operation and maintenance

## 5.6 CONCLUSIONS AND RECOMMENDATIONS FOR IMPROVEMENT

### 5.6.1 System Influent/Effluent Air Monitoring

System influent/effluent air monitoring will continue on a quarterly basis at DDC systems; monthly sampling will continue at the SVE system. Mass removal calculations show that when the systems are on, they are functioning as designed.

### 5.6.2 Site Inspection and Maintenance

The SVE system and surrounding areas were observed to be in good condition with no major problems noted. The SVE blower required repair at the end of 2015 and was taken offsite to have the motor bearing replaced. The SVE blower was replaced and the system was back-up and running as of January 18, 2016. The horizontal trench installed in 1 Adams Boulevard in 2014 has been damaged by wear and tear due to daily operations of the tenant. Cracks to the concrete were repaired in early 2016. As mentioned, a roof drain from the 1 Adams Boulevard building was discharging water adjacent to the SVE system trailer.

With the exception of the temperature sensors needing to be replaced at onsite DDC system #2 and the slight damage to the offsite system fencing, the systems were observed to be in good overall condition.

Site inspection and maintenance of the SVE system, onsite DDC systems, and offsite DDC systems will continue on a monthly basis during site visits to complete O&M. A more detailed inspection will continue to be performed on an annual basis.

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# 6. COST EVALUATION

Total costs for reporting and site management services, including groundwater monitoring and sampling, site inspection, and system air sampling was $941,948 for the reporting period. A breakdown of major costs for January 1, 2016 – December 31, 2016 is provided in the table below.

| Site Management Activity | Cost Incurred for the period of January – December 2016 |
|---|---|
| 1.Monitoring, Sampling, Inspection, Oversight, Supplies/Equipment, Travel, and Reporting (EA) | $433,208 |
| 2. Analytical Laboratory (Eurofins Air Toxics and Hampton Clarke-Veritech) | $33,593 |
| 3. O&M Field Support (Preferred Environmental Services) | $7,162 |
| 4. Carbon Change-Out (General Carbon) | $21,751 |
| 5. Kaiser Blower Maintenance (D&D Electric Motors & Compressors) | $13,865 |
| 6. Electricity | $60,620 |
| 7. Soil Sampling & Delineation at 1 Adams Boulevard (Clearwater Drilling) (NYSDEC callout) | $18,932 |
| 8. SVE Horizontal Well Drilling (DTI) | $205,238 |
| 9. SVE IDW (AWT) | $14,595 |
| 10. MPI/HPT Groundwater Delineation (Cascade) | $125,539 |
| 11. Surveying Services (MJ) | $7,445 |
| **TOTAL** | $941,948 |
| Note:<br>EA = EA Engineering, P.C. and Its Affiliate EA Science and Technology<br>O&M = Operation and maintenance<br>NYSDEC = New York State Department of Environmental Conservation<br>IDW = Investigation derived waste<br>DTI = Directional Technologies, Inc.<br>AWT = AWT Environmental Services, Inc.<br>MJ = M.J. Engineering and Land Surveying, P.C. | |

The monitoring, sampling, inspection, oversight, and reporting costs, which are billed by EA, include costs associated with project management, quality assurance, and periodic reporting throughout the reporting period. These monitoring and reporting costs are based on fiscal data generated and tracked by an EA internal financial management system and includes travel expenses, equipment/supply costs, and other direct charges. The analytical costs, billed by Eurofins Air Toxics, Inc. of Folsom, California, covered monthly/quarterly system air analyses, and Hampton Clarke-Veritech of Fairfield, New Jersey, covered quarterly groundwater analyses and RSO-related sampling activities (for sub-slab soil sampling at 1 Adams Boulevard and groundwater plume delineation). The electricity costs, billed by Public Service Enterprise Group (PSEG) - Long Island, cover power for operating the SVE system and each DDC system. The costs associated with item numbers 1 and 2 are higher than previous years due to EA's effort with RSO oversight, reporting, and deliverables. The activities included in items 3 through 6 are primarily reflective of the typical site management services, and the remaining costs (items 7 through 11) are associated with the subcontractor costs for RSO activities completed in 2016.

# 7. GREEN REMEDIATION

## 7.1 METRICS FOR SITE MANAGEMENT

NYSDEC DER-31, Green Remediation (NYSDEC 2011 [January]) provides concepts and techniques of green remediation and guidance on how to apply them to DER's remedial program, and applies to all phases of the site cleanup process from investigation through completion of remediation. It is intended to be a holistic approach, which improves the sustainability of the cleanups by promoting the use of more sustainable practices and technologies. Such practices and technologies are, for example, less disruptive to the environment, generate less waste, increase reuse and recycling, and emit fewer pollutants, including greenhouse gases (GHGs), to the atmosphere.

As with prior PRRs, EA prepared a summary table, which presents green remediation metrics for site management (**Appendix C**). These metrics include energy usage, solid waste generation, transportation/shipping, water usage, and land use/ecosystems. This table is intended to be used to track the quantities established for each metric over time, with the goal of minimizing energy consumption, reducing GHG emissions, and conserving natural resources. This table will be updated in conjunction with future PRR revisions and revised accordingly.

The quantity of electricity utilized by the SVE and DDC systems was obtained from PSEG-Long Island utility bills associated with this monitoring period (January – December 2016).
The majority of solid waste generated during 2016 was associated with spent GAC media from the DDC systems during the carbon change out that occurred in May 2016, and the RSO modifications to the SVE system. Drilling of the five horizontal well legs for the SVE system generated approximately five roll-off containers of soil and soil/water slurry.

Metrics for transportation were primarily associated with travel to and from the site for the performance of system O&M and monitoring. In 2016, there were three unscheduled visits to the site due to system alarms, averaging less than once per quarter. One unscheduled visit occurred in the first quarter. The subsequent visits occurred in the third quarter and were to shut the systems down due to high ambient temperatures. In comparison to 2015, there were less unscheduled visits to the site in 2016, reducing the amount of emissions and energy used through transportation.

## 7.2 ENVIRONMENTAL FOOTPRINT

In the two previous PRRs (PRR No. 1 [EA 2015] and PRR No. 2 [EA 2016b]), EA also evaluated the environmental impact of the NHP treatment systems and green remediation techniques that could be applied to the site. EA utilized SiteWise™ Tool for Green and Sustainable Remediation, developed by the United States Navy, United States Army Corps of Engineers, and Battelle to calculate the environmental footprint of the overall remedial approach. The tool consists of a series of spreadsheets which provide a baseline assessment of several quantifiable sustainability metrics including: GHG emissions, energy usage, and electricity usage from renewable and non-renewable sources; criteria air pollutants that include sulfur oxides, oxides of nitrogen, and particulate matter; water usage; resource consumption; and accident risk (Battelle 2013).

Four alternatives were compared to evaluate the environmental impacts of the system and potential for improvements. The four alternatives modeled emissions savings that could be achieved through reducing travel to the site, reducing operation of DDC systems (if appropriate) to save electricity, and utilizing refurbished treatment media (GAC) instead of virgin materials in all onsite and offsite systems. A full description of the four alternatives can be found in the PRR No. 2 (EA 2016b).

Currently the systems are still operated and running in the same manner as the previous 2015 reporting period: all onsite and offsite system utilize a telemetry alarm system, regenerated GAC was used in the May 2016 change out, and the offsite system runs all offsite DDC wells with one blower. As such, the sustainability savings of these measures (outlined in PRR No. 2 [EA 2016b]) are still being recognized.

# 8. OVERALL PERIODIC REVIEW REPORT CONCLUSIONS AND RECOMMENDATIONS

## 8.1 COMPLIANCE WITH SITE MANANGEMENT PLAN

### 8.1.1 Groundwater Monitoring

While spikes in individual CVOC concentrations were noted in several wells onsite and offsite, groundwater results generated since the inception of the project generally show an overall decreasing trend from baseline conditions for total CVOCs. The number of wells with AWQS exceedances also decreased over the reporting period (January – December 2016) in onsite wells. In offsite wells, the number of wells with AWQS exceedances increased over the reporting period, with the highest number of wells (12 wells) with exceedances occurring in July 2016 and October 2016. Continued groundwater monitoring and sampling will allow for further assessment of the capability and efficiency.

### 8.1.2 System Influent/Effluent Air Monitoring

System influent/effluent air monitoring should be continued on a monthly basis at the SVE system and on a quarterly basis at the DDC systems. Mass removal calculations show that when the systems are operating, they are functioning as designed.

### 8.1.3 Site Inspection and Maintenance

The SVE system and surrounding areas were observed to be in good condition with no major problems noted. The SVE blower required repair at the end of 2015 and was taken offsite to have the motor bearing replaced. The SVE blower was replaced and the system was back-up and running as of January 18, 2016. The horizontal trench installed in 1 Adams Boulevard in 2014 has been damaged by wear and tear due to daily operations of the tenant. Cracks to the concrete were repaired in early 2016. As mentioned, a roof drain from the 1 Adams Boulevard building was discharging water adjacent to the SVE system trailer.

With the exception of the temperature sensors needing to be replaced at onsite DDC system #2 and the slight damage to the offsite system fencing, the systems were observed to be in good overall condition.

Site inspection and maintenance of the SVE system, onsite DDC systems, and offsite DDC systems will continue on a monthly basis during site visits to complete O&M. A more detailed inspection will continue to be performed on an annual basis.

## 8.2 PERFORMANCE AND EFFECTIVENESS OF REMEDY

Based upon the results for groundwater monitoring and mass removal, it appears that the remedial systems are operating as designed, which is reducing total VOC concentrations in source area soil as well as both onsite and offsite groundwater.

- Based on the first 5 months of monitoring and laboratory data obtained from the SVE system (August – December 2016), it appears the system modifications performed in Spring/Summer 2016 have been particularly effective for increasing mass recovery from the source area soil.

- Mass recovery observed at onsite DDC system #1 is similar to the previous reporting period.

- Mass recovery continues to be observed at onsite DDC system #2; however, the overall mass removed in 2016 has decreased approximately 50 percent when compared to 2015.

- Mass recovery continues to be observed at the offsite; however, the overall mass removed in 2016 has decreased more than 50 percent when compared to 2015. It should be noted that a significant decrease in groundwater concentrations upgradient of the offsite system (MW-1S/MW-1D) has been observed during the same period.

## 8.3 SUMMARY OF RECOMMENDATIONS

The following actions are recommended for future site management activities at the NHP site:

- Site management tasks should continue during the next period (2017). This includes annual site inspections, maintenance (as needed), quarterly groundwater monitoring and sampling, and quarterly DDC system influent and effluent/monthly SVE system air monitoring.

- New dial-out units (i.e., Sensaphone) should be installed at the SVE and both onsite DDC systems with more modern cellular-based setups to improve the reliability of these features.

- Based upon the results of the MIP/HPT investigation, the Conceptual Site Model should be refined. If necessary, additional permanent monitoring wells should be installed to further the plume delineation efforts at the site, and modifications should be made to the sampling program to incorporate any new wells and reduce the number of existing wells sampled.

- SMP to reflect changes to the SVE system and any additional changes to the DDC systems and/or monitoring well networks.

- Depending on the outcome of additional groundwater plume delineation efforts, enhancement of the remedial approach may be warranted through the use of complementary technologies such as *in situ* bioremediation or chemical oxidation in order to reduce the overall remedial timeframe and achieve remedial action objectives.

### 8.3.1 Soil Vapor Extraction System

- New dial-out (i.e., Sensaphone) units should be installed at the SVE system with more modern cellular-based setups to improve the reliability of these features.

- Once 6 months of baseline data has been obtained while operating all five legs simultaneously, it may be desirable to focus mass recovery efforts on individual legs or pairings of individual legs. By focusing on one or two legs, it may be possible to improve mass recovery from those areas farthest away from the SVE system trailer (i.e., VP-20 along east side of 1 Adams Boulevard building) where higher soil gas concentrations have been observed.

### 8.3.2 Density Driven Convection Systems

- Onsite DDC system #1 should continue running as is to address the contaminant mass in the source area.

- Given the lower mass recovery at onsite DDC system #2 during the reporting period, the mass removal rates should continue to be monitored for a decreasing trend. After a few more months of monitoring, it may be appropriate to cycle onsite DDC system #2 on and off on a monthly basis to save energy.

- While the mass removal at the offsite DDC system has reduced by more than 50 percent, the system should continue to operate as is. Total CVOC concentrations in MW-1D (upgradient of the system) have decreased since system installation in 2012 and CVOCs are beginning to be detected further downgradient.

- Installation of additional gauges (i.e., vacuum, pressure) and sampling ports is recommended in each system at select locations to improve data collection and the operator's understanding of equipment performance. In addition, new dial-out (i.e., Sensaphone) units should be installed at both onsite DDC systems with more modern cellular-based setups to improve the reliability of these features.

## 8.4 FUTURE PERIODIC REVIEW REPORT SUBMITTALS

Future PRRs should be prepared and submitted on an annual basis until further notice in order to evaluate the effectiveness of the remedial actions implemented at the site; provide sufficient documentation that the remedy remains in place, is performing properly and effectively, and is protective of public health and the environment; and to capture proposed/planned follow-on activities at the site.

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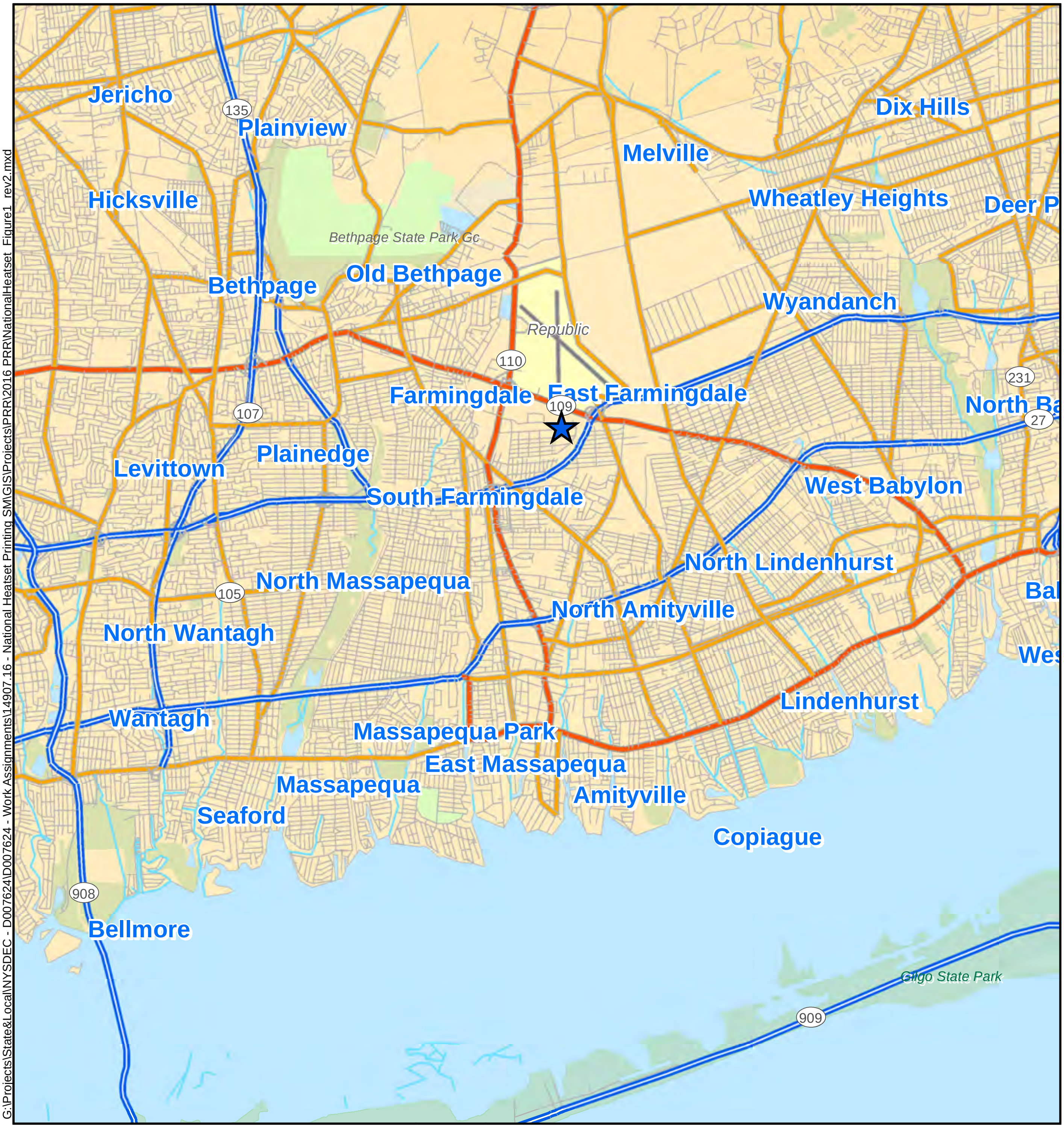
# Figures

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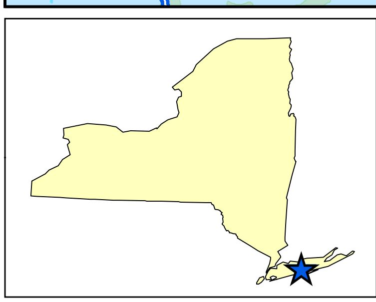

0 0.75 1.5 3

Miles

1 inch = 1.5 miles

N

**Legend**

★ Site Location

Figure 1

SITE LOCATION MAP

NATIONAL HEATSET SITE (152140)

BABYLON, NEW YORK

SUFFOLK COUNTY

Map Date: 8/11/2016

Source: ESRI, 2011

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

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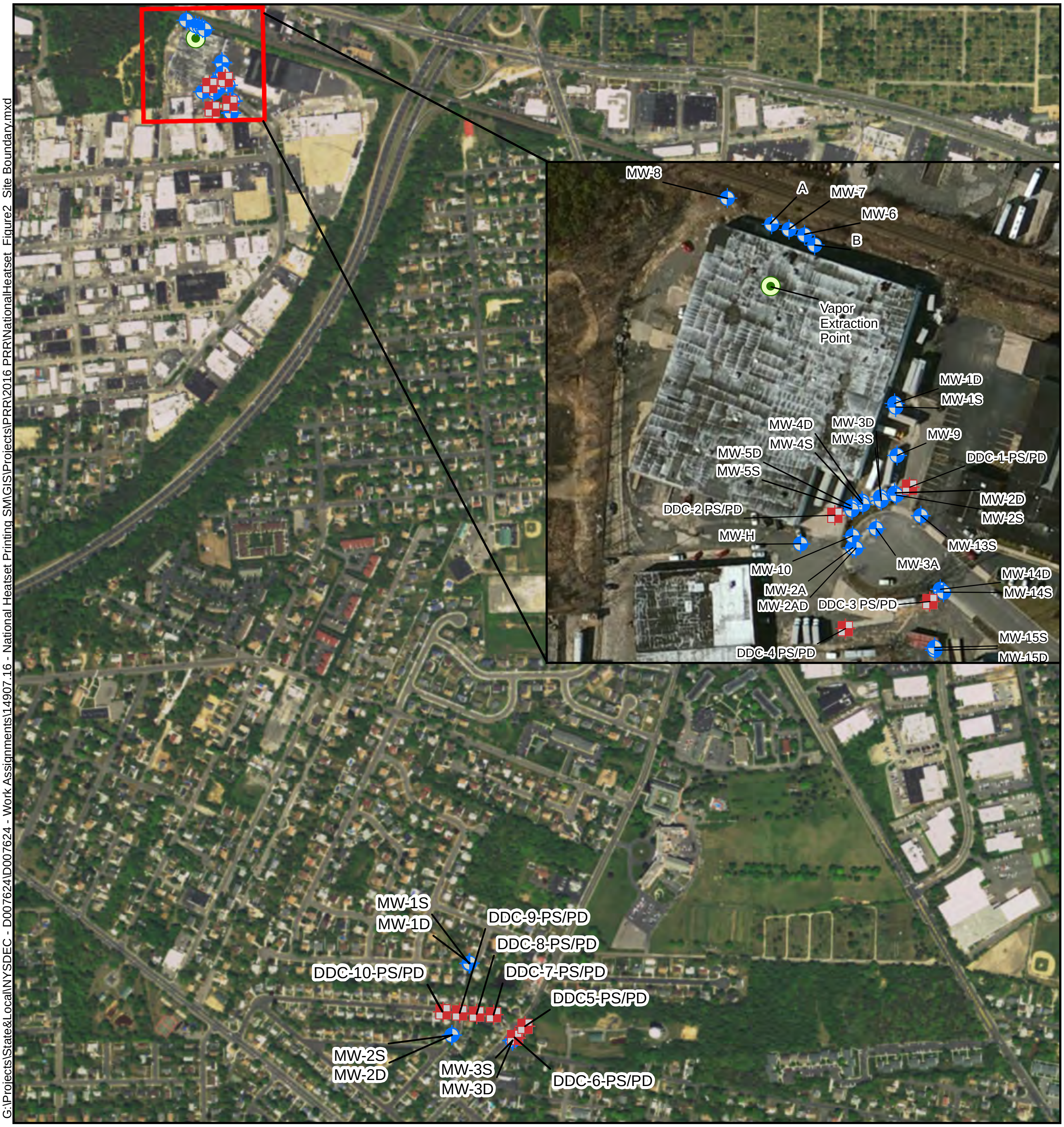
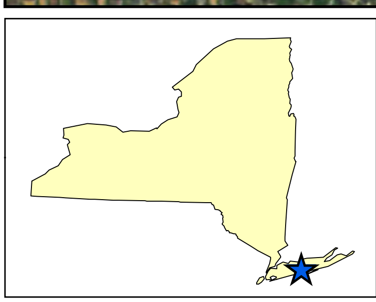
G:\Projects\State&Local\NYSDEC - D007624\D007624 - Work Assignments\14907.16 - National Heatset Printing SM\GIS\Projects\PRR\2016 PRR\NationalHeatset_Figure2_Site Boundary.mxd



0 0.05 0.1 0.2
Miles
N

**Legend**

- DDC Well Cluster
- Groundwater Monitoring Well
- Vapor Extraction Point
- Site Location

Figure 2
SITE, SURROUNDING AREA, AND MONITORING WELL NETWORK
NATIONAL HEATSET SITE (152140)
BABYLON, NEW YORK
SUFFOLK COUNTY

Map Date: 2/15/2017
Source: ESRI, 2011

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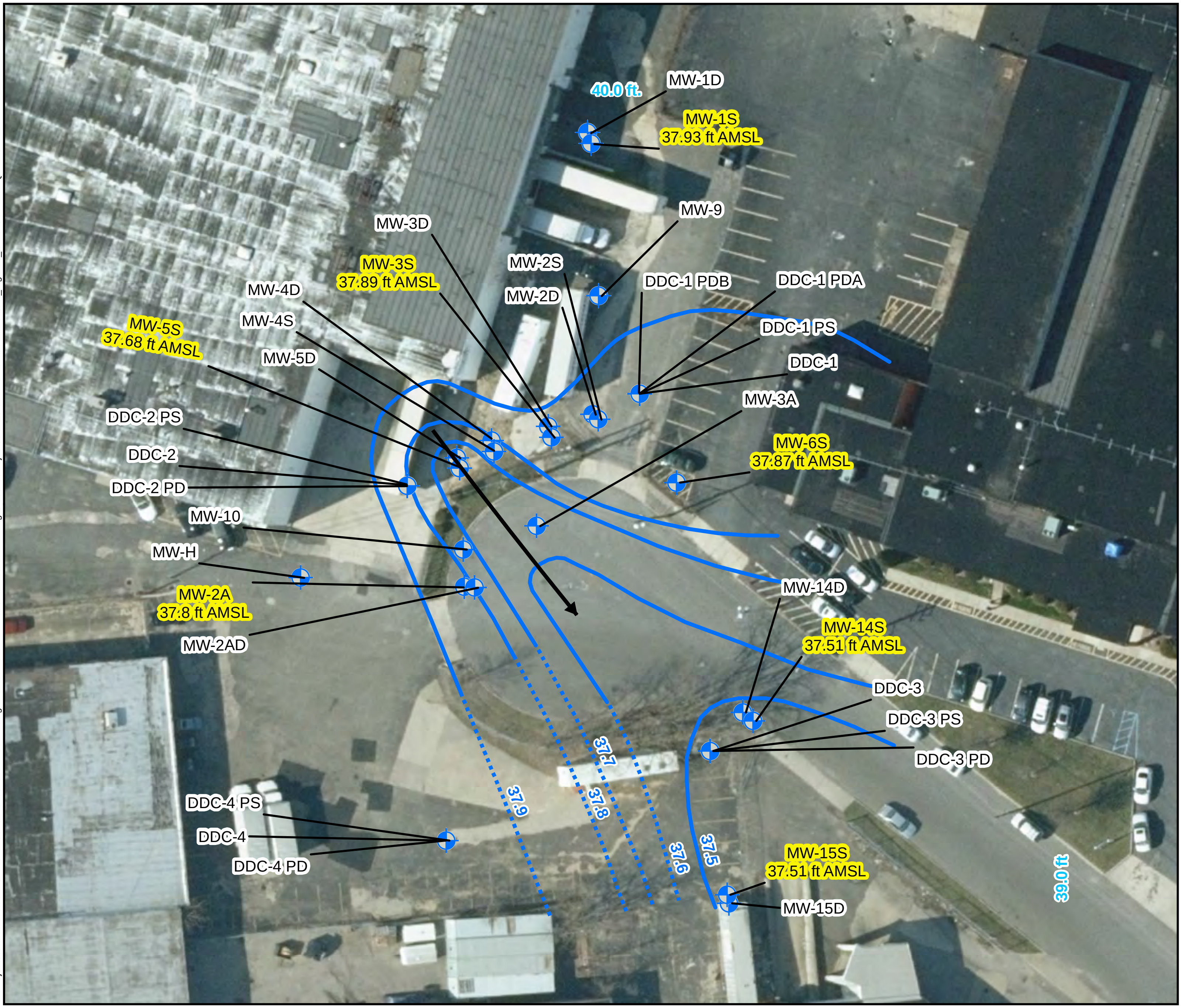
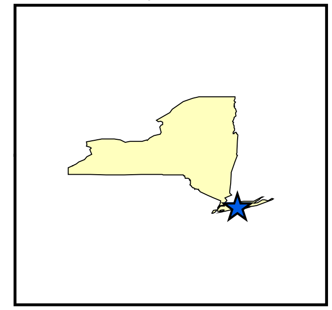



VICINITY MAP



## Legend

- Groundwater Monitoring Well
- Inferred Groundwater Contour
- Interpreted Groundwater Contour

Map Date: 2/15/2017

N

0 20 40 80
Feet

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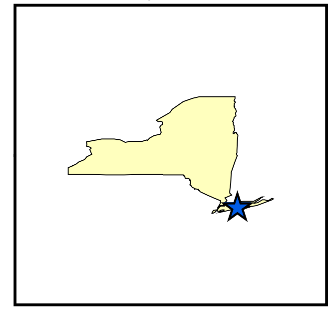
**Figure 3**
**ONSITE GROUNDWATER FLOW DIRECTION (October 2016)**
NATIONAL HEATSET SITE (152140)
BABYLON, NEW YORK
SUFFOLK COUNTY


VICINITY MAP



**Legend**

DDC Well Cluster

Groundwater Monitoring Well

Interpreted Groundwater Contour

Map Date: 2/15/2017

N

0 37.5 75 150

Feet

**Figure 4**
**OFFSITE GROUNDWATER FLOW DIRECTION (October 2016)**

NATIONAL HEATSET SITE (152140)
BABYLON, NEW YORK
SUFFOLK COUNTY

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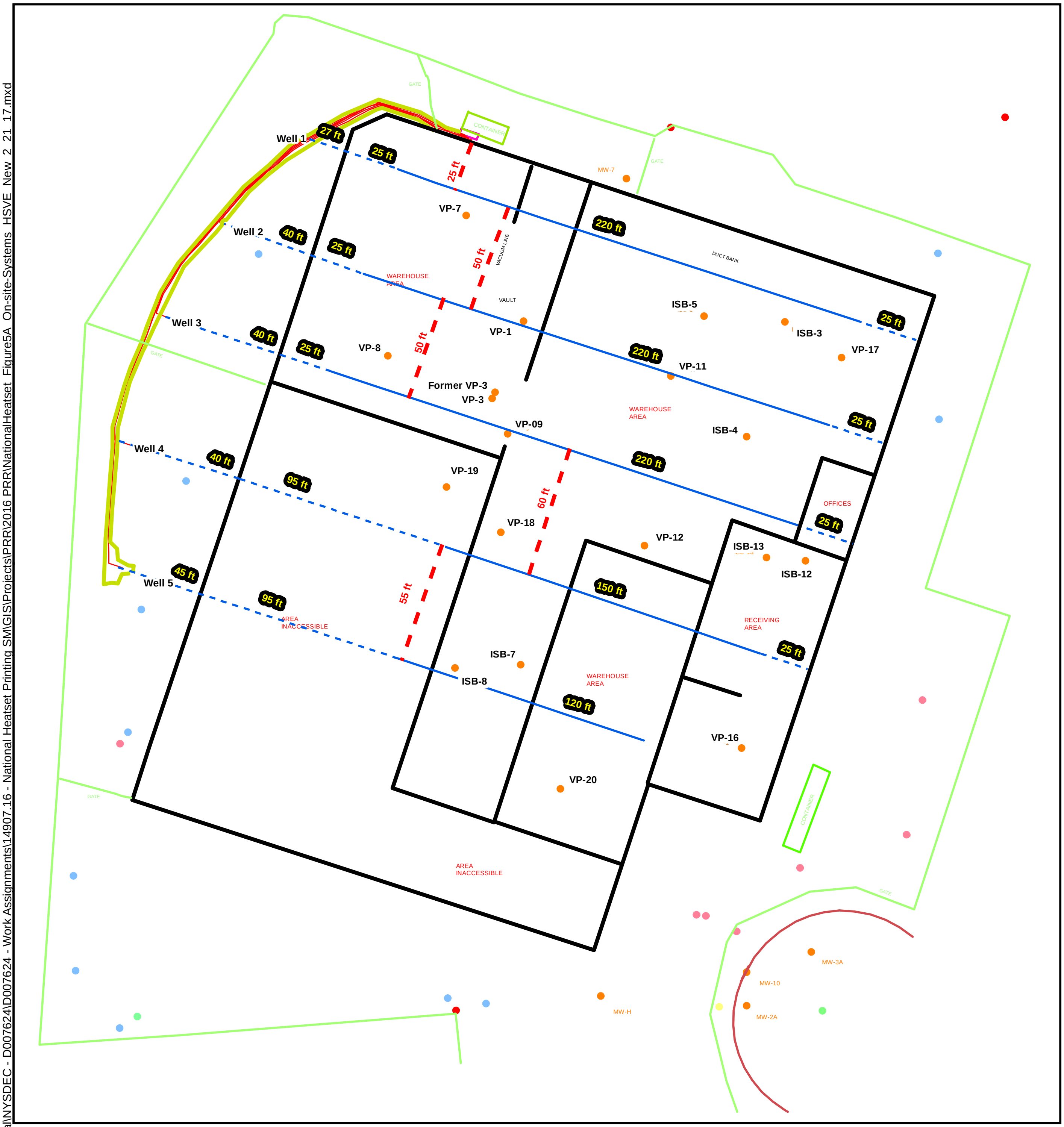


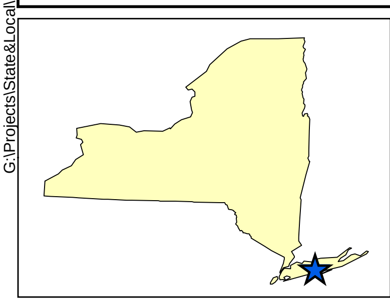

0 15 30 60
Feet

1 inch = 66.67 feet

N

## Legend

- HSVE Solid PVC Pipe
- HSVE Well Screen
- HSVE Well Piping (EA Installed)
- HSVE Trench
- HSVE Manifold Shed
- 1 Adams Blvd Building Outline
- Site Location
- Catch Basin Square
- Catch Basin Round
- Manhole
- Sanitary Manhole
- Soil Boring / Vapor Point
- Soil Boring
- Monitoring Well
- Chainlink Fence

# Figure 5A
## ONSITE TREATMENT SYSTEM LOCATION
## SVE System
NATIONAL HEATSET SITE (152140)
BABYLON, NEW YORK
SUFFOLK COUNTY

Map Date: 2/23/2017
Source: ESRI, 2011

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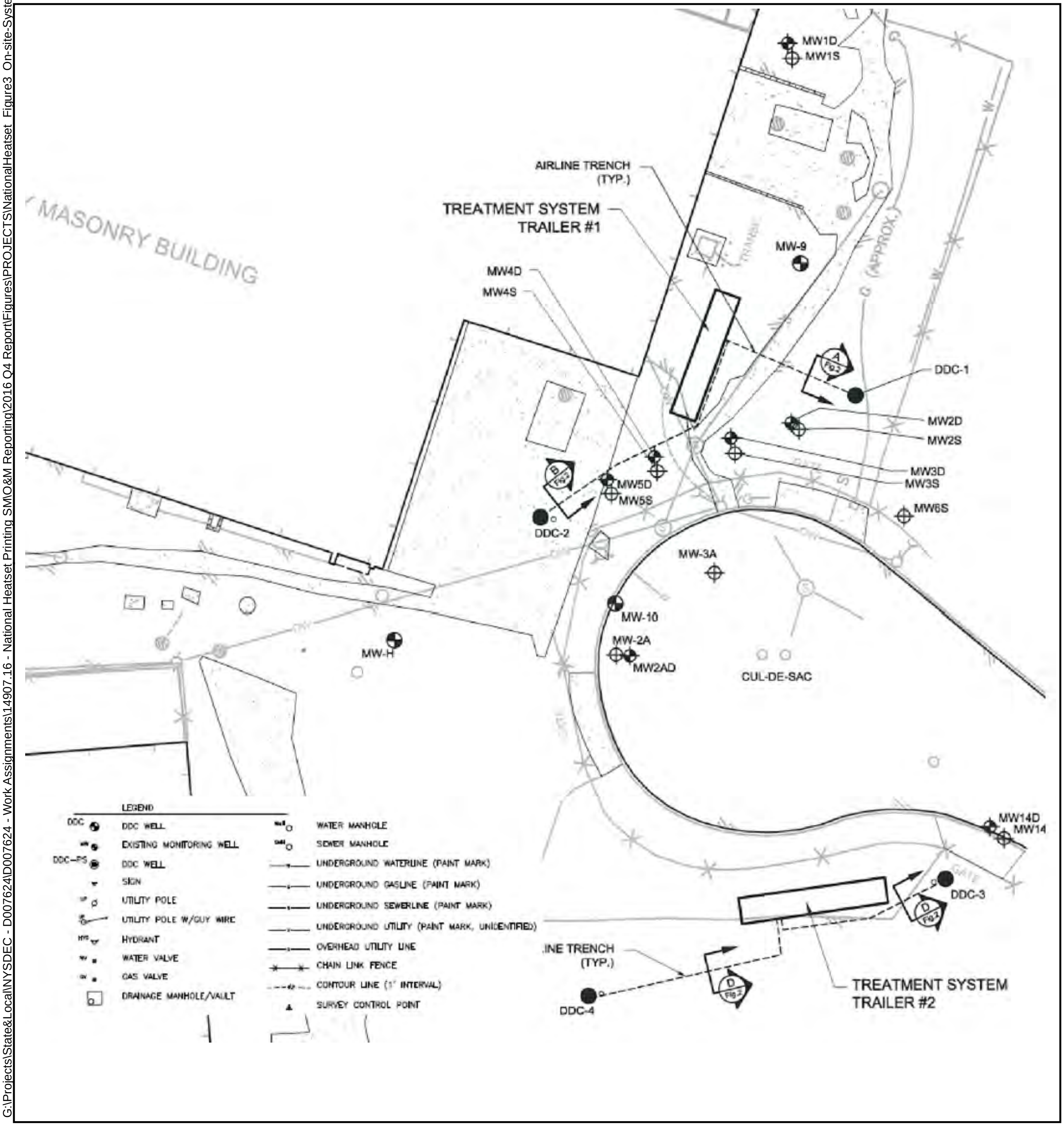
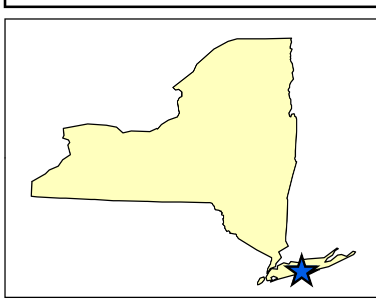


0 12.5 25 50

Feet

1 inch = 50 feet

N

**Legend**

★ Site Location

Figure **5B**

ONSITE TREATMENT SYSTEM LOCATION**S**

DDC #1 and DDC #2

NATIONAL HEATSET SITE (152140)

BABYLON, NEW YORK

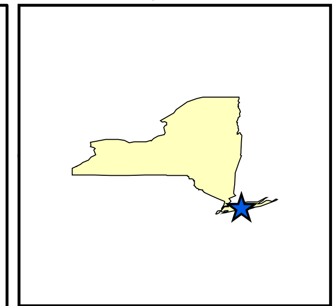
SUFFOLK COUNTY

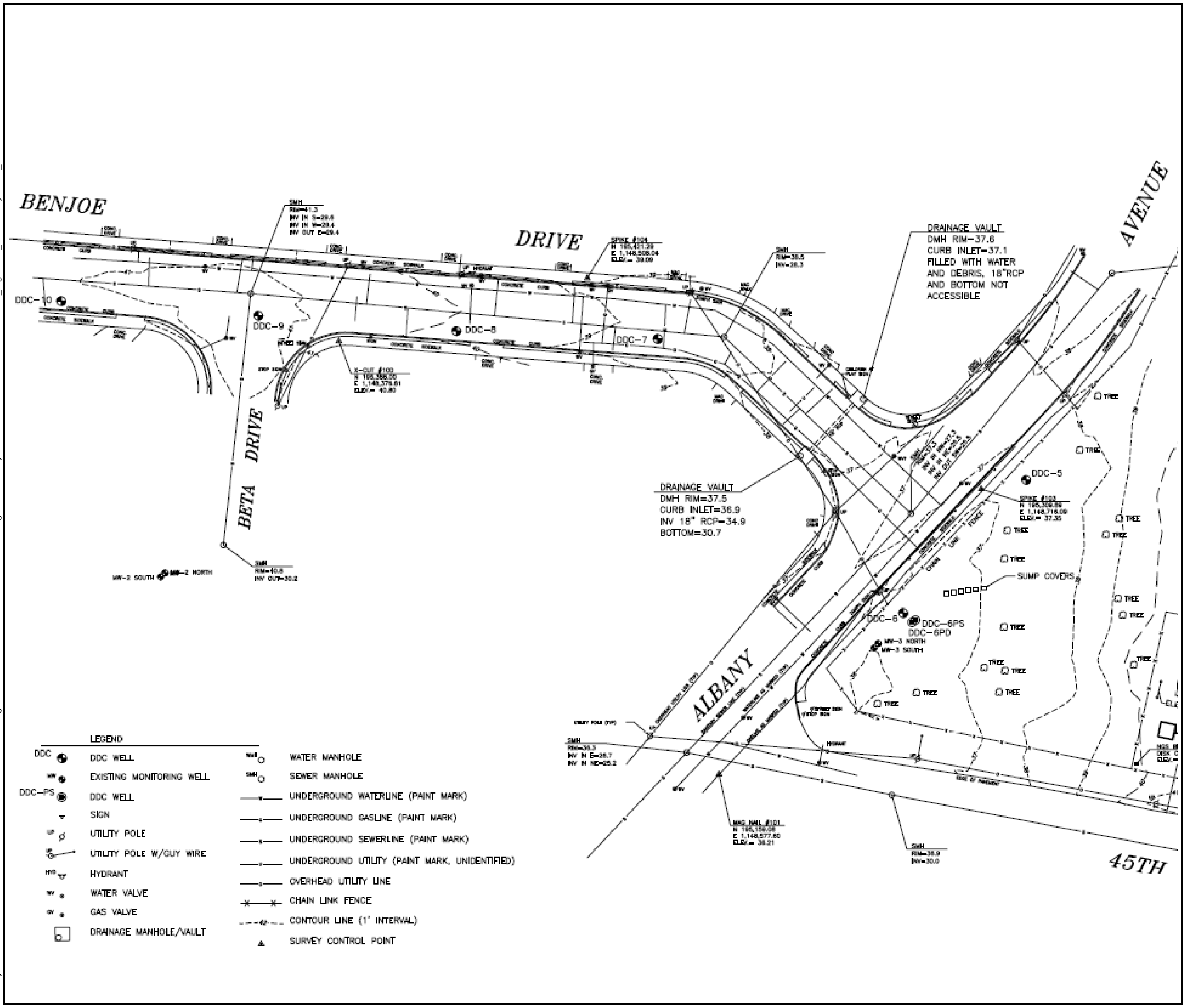
Map Date: 7/22/2016

Source: ESRI, 2011

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

VICINITY MAP






Map Date: 2/16/2017
Source:
Projection:

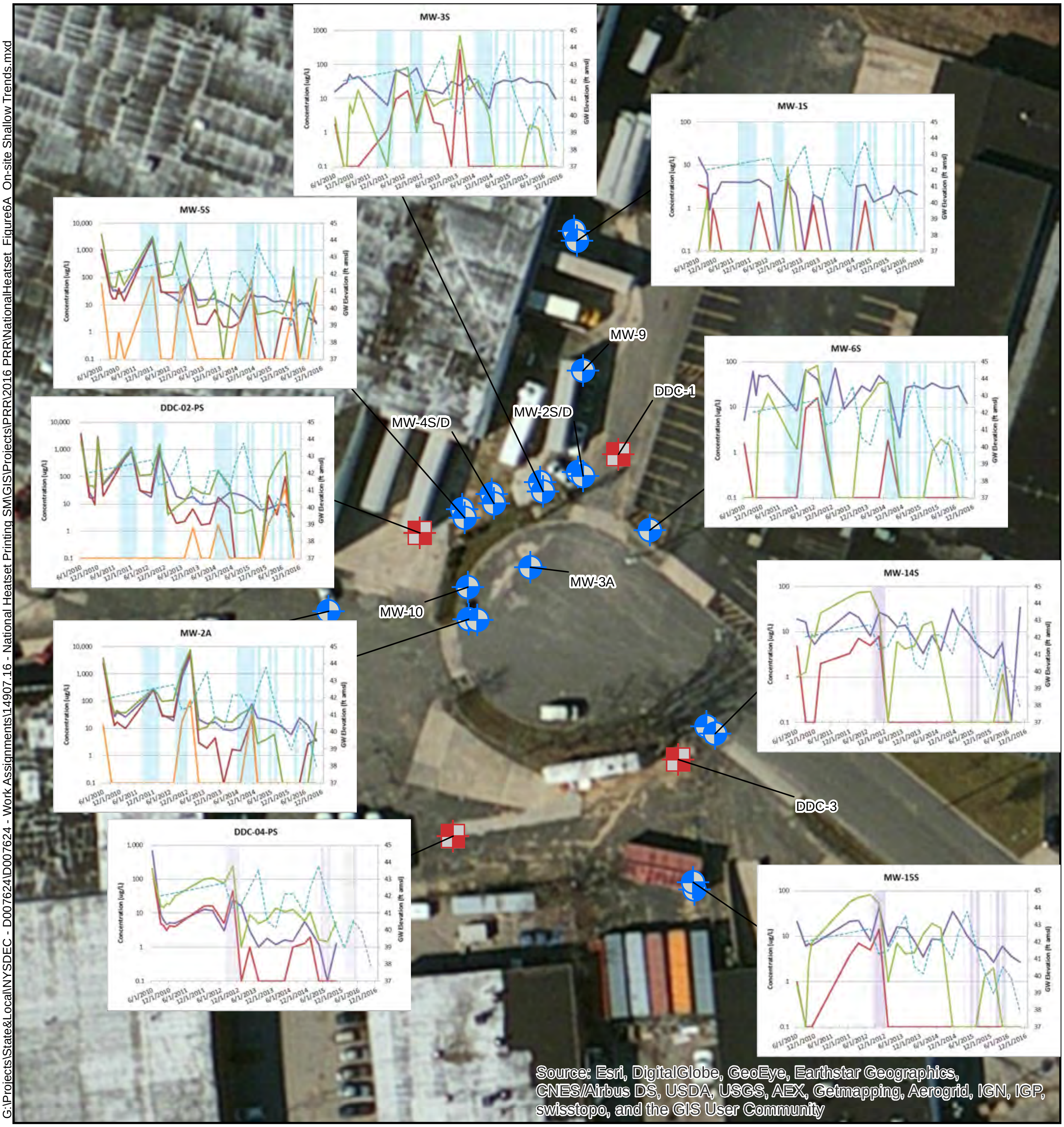
N

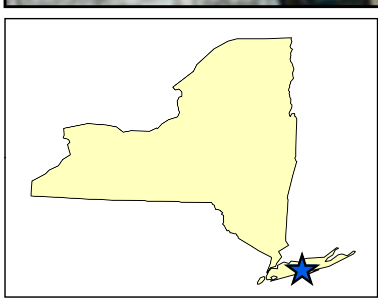
0 25 50 100
Feet

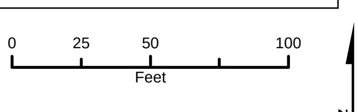
1 inch = 100 feet

**Figure 5C**
**OFFSITE TREATMENT SYSTEM LOCATION**
NATIONAL HEATSET SITE (152140) BABYLON, NEW YORK
SUFFOLK COUNTY

G:\Projects\State&Local\NYSDEC - D007624\D007624 - Work Assignments\14907.16 - National Heatset Printing SM\GIS\Projects\PRR\2016 PRR\NationalHeatset_Figure5C_Off-Site-Systems_rev.mxd






**Legend**

- DDC Well Cluster
- Groundwater Monitoring Well
- System 1 Down Time
- System 2 Down Time
- Site Location
- PCE
- TCE
- cis-1,2-DCE
- VC
- Groundwater

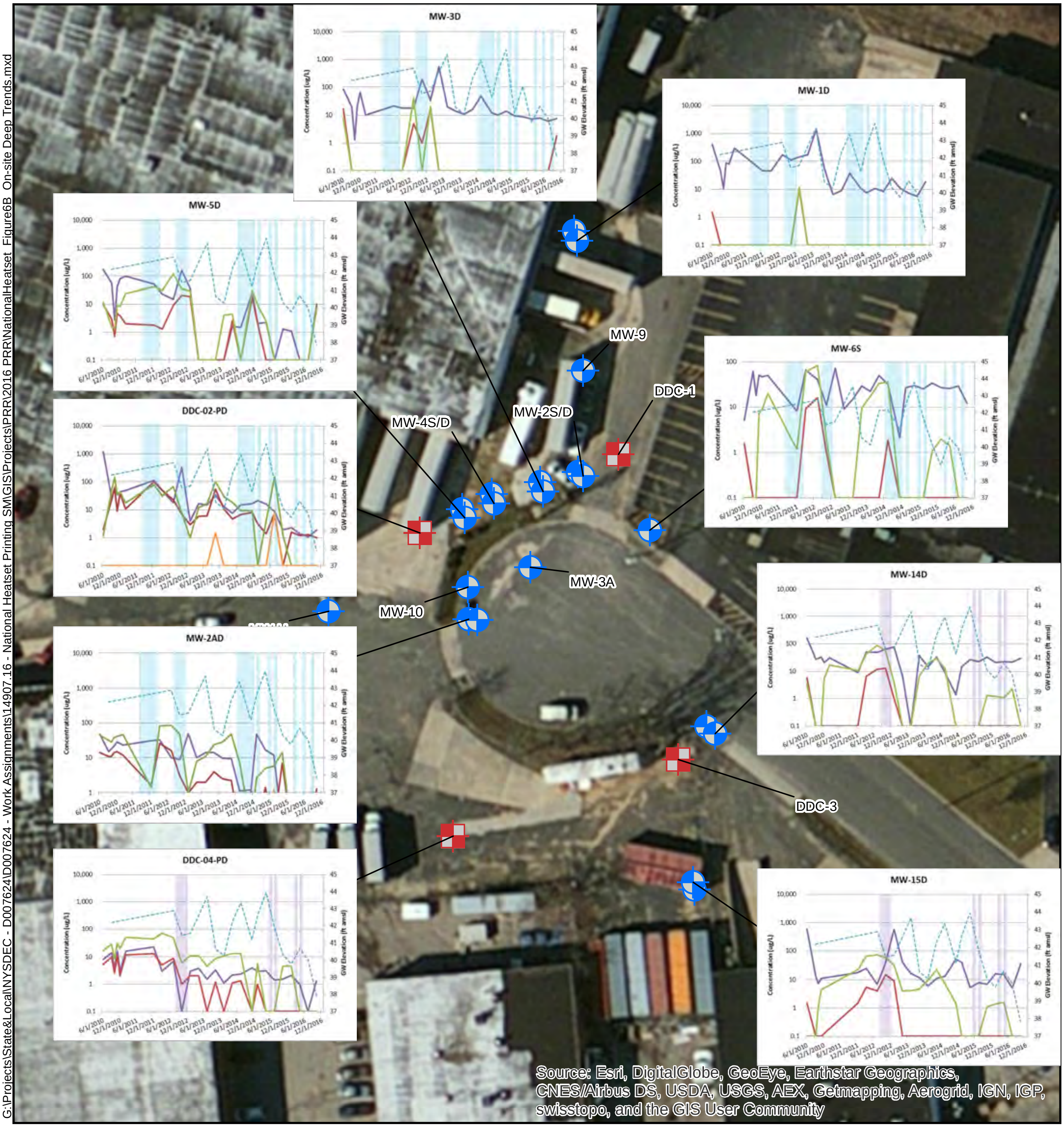
# Figure 6A
## ONSITE SHALLOW WELLS CVOC TREND GRAPHS
June 2010 - December 2016
NATIONAL HEATSET SITE (152140)
BABYLON, NEW YORK
SUFFOLK COUNTY

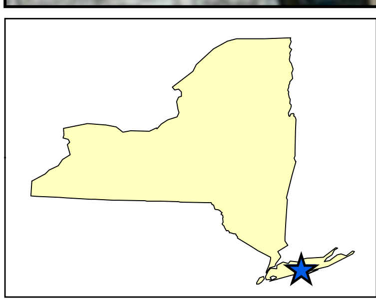
Map Date: 2/15/2017
Source: ESRI, 2011

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

G:\Projects\State&Local\NYSDEC - D007624\D007624 - Work Assignments\14907.16 - National Heatset Printing SM\GIS\Projects\PRR\2016 PRR\NationalHeatset_Figure6A_On-site Shallow Trends.mxd

G:\Projects\State&Local\NYSDEC - D007624\D007624\14907.16 - National Heatset Printing SM\GIS\Projects\PRR\2016 PRR\NationalHeatset_Figure6B_On-site Deep Trends.mxd



0 25 50 100
Feet

N

## Legend

- DDC Well Cluster
- Groundwater Monitoring Well
- System 1 Down Time
- System 2 Down Time
- Site Location
- PCE
- TCE
- cis-1,2-DCE
- VC
- Groundwater

# Figure 6B
## ONSITE DEEP WELLS CVOC TREND GRAPHS
June 2010 - December 2016

NATIONAL HEATSET SITE (152140)

BABYLON, NEW YORK

SUFFOLK COUNTY

Map Date: 2/15/2017

Source: ESRI, 2011

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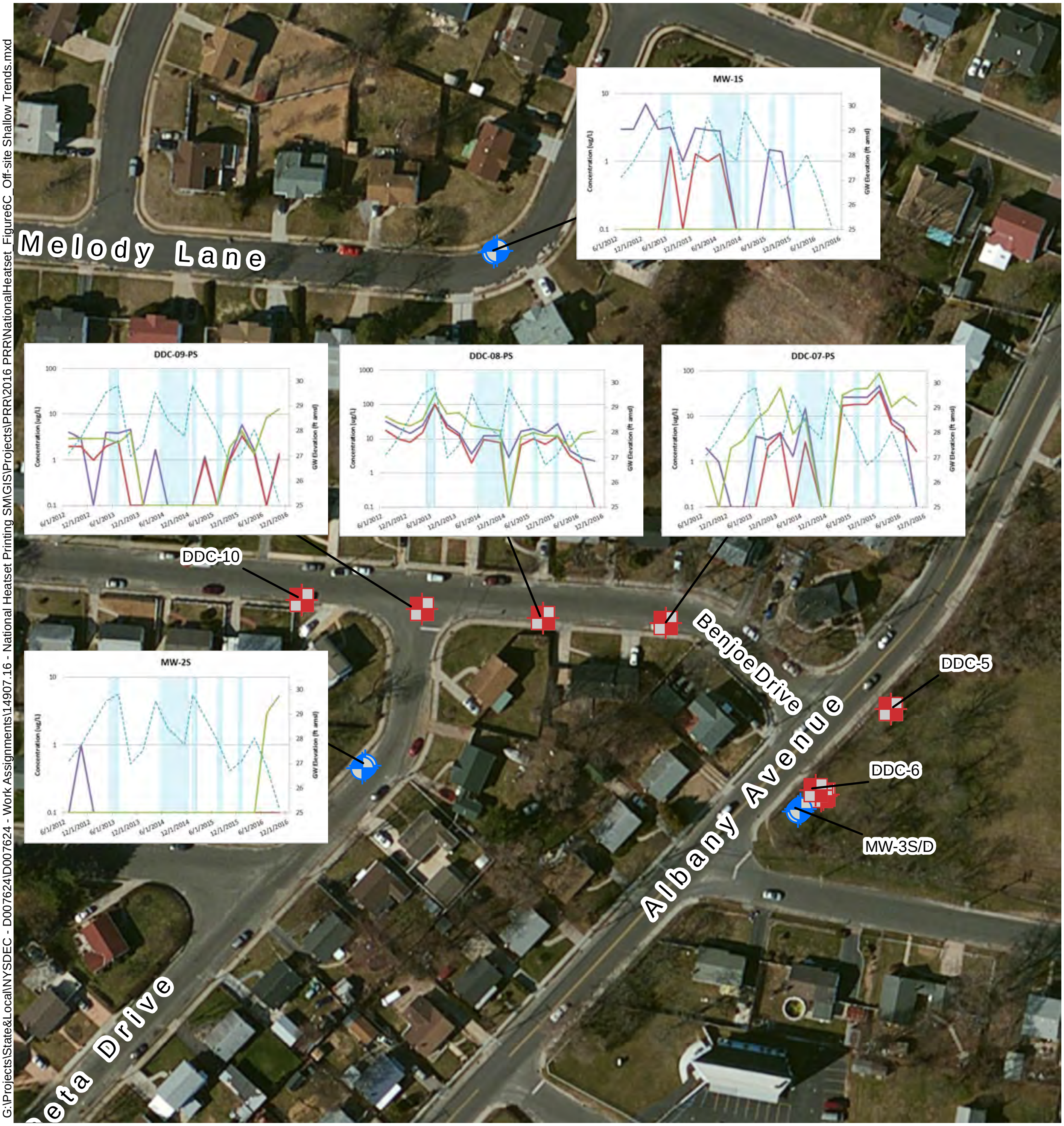


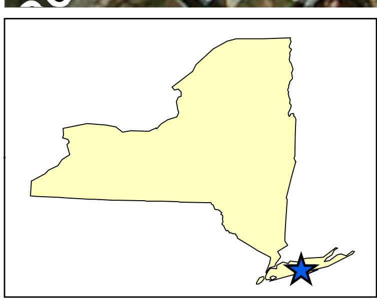

0 37.5 75 150
Feet

N

**Legend**

- DDC Well Cluster
- Groundwater Monitoring Well
- System 1 Down Time
- System 2 Down Time
- Site Location
- PCE
- TCE
- cis-1,2-DCE
- VC
- Groundwater

Figure 6C
OFFSITE SHALLOW WELLS
CVOC TREND GRAPHS
June 2012 - December 2016
NATIONAL HEATSET SITE (152140)
BABYLON, NEW YORK
SUFFOLK COUNTY

Map Date: 2/15/2017
Source: ESRI, 2011

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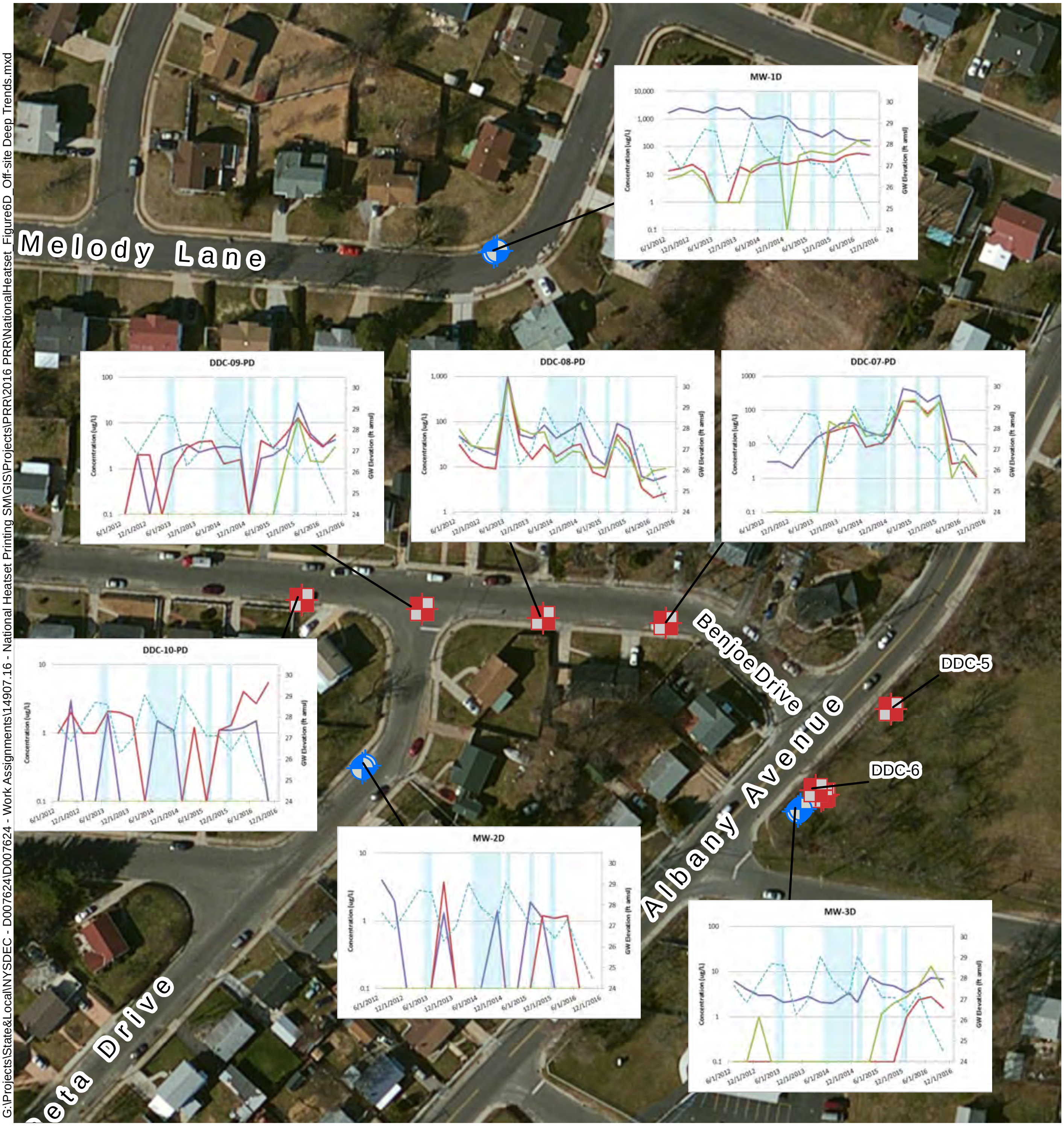


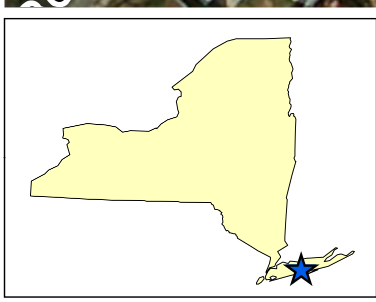

0 37.5 75 150
Feet

N

## Legend

- DDC Well Cluster
- Groundwater Monitoring Well
- System 1 Down Time
- System 2 Down Time
- Site Location
- PCE
- TCE
- cis-1,2-DCE
- VC
- Groundwater

# Figure 6D
## OFFSITE DEEP WELLS CVOC TREND GRAPHS

June 2012 - December 2016
NATIONAL HEATSET SITE (152140)
BABYLON, NEW YORK
SUFFOLK COUNTY

Map Date: 2/15/2017
Source: ESRI, 2011

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# Tables

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## Table 1 Well Gauging Data

| Onsite | | | | Offsite | | | |
|---|---|---|---|---|---|---|---|
| **Well ID** | **Depth to Groundwater (ft btoc)** | **Top of Casing Elevation (ft AMSL)** | **Groundwater Table Elevation (ft AMSL)** | **Well ID** | **Depth to Groundwater (ft btoc)** | **Top of Casing Elevation (ft AMSL)** | **Groundwater Table Elevation (ft AMSL)** |
| **January 2016** | | | | | | | |
| MW-1S | 18.9 | 57.83 | 38.93 | MW-1S | 9.75 | 36.88 | 27.13 |
| MW-1D | 18.39 | 58.17 | 39.779 | MW-1D | 10.45 | 36.86 | 26.41 |
| MW-2A | 18.7 | 58.20 | 39.5 | MW-2S | 14.02 | 40.34 | 26.32 |
| MW-2AD | 19.25 | 58.51 | 39.26 | MW-2D | 14.12 | 40.39 | 26.27 |
| MW-3S | 18.96 | 58.60 | 39.64 | MW-3S | 10.02 | 35.87 | 25.85 |
| MW-3D | 19.12 | 58.65 | 39.53 | MW-3D | 10.13 | 35.82 | 25.69 |
| MW-5S | 17.5 | 56.88 | 39.38 | DDC-5-PS | 10.79 | 37.24 | 26.45 |
| MW-5D | 17.7 | 56.19 | 38.49 | DDC-5-PD | 16.21 | 37.24 | 21.03 |
| MW-6S | 18.52 | 58.08 | 39.56 | DDC-6-PS | 10.41 | 36.49 | 26.08 |
| MW-14S | 18.02 | 57.19 | 39.17 | DDC-6-PD | 10.56 | 36.51 | 25.95 |
| MW-14D | 18.2 | 57.31 | 39.11 | DDC-7-PS | 10.58 | 38.59 | 28.01 |
| MW-15S | 18.2 | 57.29 | 39.09 | DDC-7-PD | 12.55 | 38.59 | 26.04 |
| MW-15D | 18.22 | 57.25 | 39.03 | DDC-8-PS | 10.28 | 39.87 | 29.59 |
| DDC-2-PS | 16.34 | 56.70 | 40.36 | DDC-8-PD | 14.91 | 39.87 | 24.96 |
| DDC-2-PD | 16.49 | 56.70 | 40.21 | DDC-9-PS | 11.41 | 41.37 | 29.96 |
| DDC-4-PS | 12.32 | 56.50 | 44.18 | DDC-9-PD | 15.58 | 41.37 | 25.79 |
| DDC-4-PD | 17.83 | 56.50 | 38.67 | DDC-10-PS | 12 | 40.56 | 28.56 |
| | | | | DDC-10-PD | 13.9 | 40.56 | 26.66 |

NOTE: ID = Identification
ft btoc = feet below top of casing
ft AMSL = ft Above Mean Sea Level
Horizontal Datum NAD 83(1996) - New York State Plane Coordinate System, Long Island Zone, U.S. foot
Vertical Datum NAVD 1988, U.S. foot

## Table 1 Well Gauging Data

| Onsite | | | | Offsite | | | |
|---|---|---|---|---|---|---|---|
| **Well ID** | **Depth to Groundwater (ft btoc)** | **Top of Casing Elevation (ft AMSL)** | **Groundwater Table Elevation (ft AMSL)** | **Well ID** | **Depth to Groundwater (ft btoc)** | **Top of Casing Elevation (ft AMSL)** | **Groundwater Table Elevation (ft AMSL)** |
| **April 2016** | | | | | | | |
| MW-1S | 14.05 | 57.83 | 43.78 | MW-1S | 8.85 | 36.88 | 28.03 |
| MW-1D | 14.20 | 58.17 | 43.969 | MW-1D | 9.55 | 36.86 | 27.31 |
| MW-2A | 14.52 | 58.20 | 43.68 | MW-2S | 13.13 | 40.34 | 27.21 |
| MW-2AD | 15.16 | 58.51 | 43.35 | MW-2D | 13.21 | 40.39 | 27.18 |
| MW-3S | 14.80 | 58.60 | 43.8 | MW-3S | 9.12 | 35.87 | 26.75 |
| MW-3D | 15.01 | 58.65 | 43.64 | MW-3D | 9.26 | 35.82 | 26.56 |
| MW-5S | 13.2 | 56.88 | 43.68 | DDC-5-PS | 9.89 | 37.24 | 27.35 |
| MW-5D | 12.62 | 56.19 | 43.57 | DDC-5-PD | 15.51 | 37.24 | 21.73 |
| MW-6S | 14.24 | 58.08 | 43.84 | DDC-6-PS | 9.49 | 36.49 | 27.00 |
| MW-14S | 13.63 | 57.19 | 43.56 | DDC-6-PD | 9.56 | 36.51 | 26.95 |
| MW-14D | 14.18 | 57.31 | 43.13 | DDC-7-PS | 9.72 | 38.59 | 28.87 |
| MW-15S | 14.1 | 57.29 | 43.19 | DDC-7-PD | 11.54 | 38.59 | 27.05 |
| MW-15D | 14.1 | 57.25 | 43.15 | DDC-8-PS | 9.38 | 39.87 | 30.49 |
| DDC-2-PS | 10.12 | 56.70 | 46.58 | DDC-8-PD | 13.45 | 39.87 | 26.42 |
| DDC-2-PD | 13.31 | 56.70 | 43.39 | DDC-9-PS | 10.49 | 41.37 | 30.88 |
| DDC-4-PS | 8.26 | 56.50 | 48.24 | DDC-9-PD | 14.70 | 41.37 | 26.67 |
| DDC-4-PD | 14.41 | 56.50 | 42.09 | DDC-10-PS | 11.07 | 40.56 | 29.49 |
| | | | | DDC-10-PD | 12.45 | 40.56 | 28.11 |

## Table 1 Well Gauging Data

| Onsite | | | | Offsite | | | |
|---|---|---|---|---|---|---|---|
| Well ID | Depth to Groundwater (ft btoc) | Top of Casing Elevation (ft AMSL) | Groundwater Table Elevation (ft AMSL) | Well ID | Depth to Groundwater (ft btoc) | Top of Casing Elevation (ft AMSL) | Groundwater Table Elevation (ft AMSL) |
| **July 2016** | | | | | | | |
| MW-1S | 17.93 | 57.83 | 39.9 | MW-1S | 10.05 | 36.88 | 26.83 |
| MW-1D | 18.16 | 58.17 | 40.009 | MW-1D | 11.13 | 36.86 | 25.73 |
| MW-2A | 18.4 | 58.20 | 39.8 | MW-2S | 14.38 | 40.34 | 25.96 |
| MW-2AD | 19.01 | 58.51 | 39.5 | MW-2D | 14.51 | 40.39 | 25.88 |
| MW-3S | 16.69 | 58.60 | 41.91 | MW-3S | 10.46 | 35.87 | 25.41 |
| MW-3D | 18.74 | 58.65 | 39.91 | MW-3D | 10.59 | 35.82 | 25.23 |
| MW-5S | 17.15 | 56.88 | 39.73 | DDC-5-PS | 12.31 | 37.24 | 24.93 |
| MW-5D | 16.36 | 56.19 | 39.83 | DDC-5-PD | 16.71 | 37.24 | 20.53 |
| MW-6S | 17.58 | 58.08 | 40.5 | DDC-6-PS | 10.82 | 36.49 | 25.67 |
| MW-14S | 17.62 | 57.19 | 39.57 | DDC-6-PD | 11.02 | 36.51 | 25.49 |
| MW-14D | 17.61 | 57.31 | 39.7 | DDC-7-PS | 11.00 | 38.59 | 27.59 |
| MW-15S | 17.88 | 57.29 | 39.41 | DDC-7-PD | 12.05 | 38.59 | 26.54 |
| MW-15D | 17.92 | 57.25 | 39.33 | DDC-8-PS | 10.74 | 39.87 | 29.13 |
| DDC-2-PS | 16.1 | 56.70 | 40.6 | DDC-8-PD | 15.19 | 39.87 | 24.68 |
| DDC-2-PD | 16.2 | 56.70 | 40.5 | DDC-9-PS | 11.72 | 41.37 | 29.65 |
| DDC-4-PS | 11.41 | 56.50 | 45.09 | DDC-9-PD | 15.84 | 41.37 | 25.53 |
| DDC-4-PD | 17.52 | 56.50 | 38.98 | DDC-10-PS | 12.01 | 40.56 | 28.55 |
| | | | | DDC-10-PD | 11.4 | 40.56 | 29.16 |

## Table 1 Well Gauging Data

| Onsite | | | | Offsite | | | |
|---|---|---|---|---|---|---|---|
| Well ID | Depth to Groundwater (ft btoc) | Top of Casing Elevation (ft AMSL) | Groundwater Table Elevation (ft AMSL) | Well ID | Depth to Groundwater (ft btoc) | Top of Casing Elevation (ft AMSL) | Groundwater Table Elevation (ft AMSL) |
| **October 2016** | | | | | | | |
| MW-1S | 19.9 | 57.83 | 37.93 | MW-1S | 11.71 | 36.88 | 25.17 |
| MW-1D | 20.31 | 58.17 | 37.859 | MW-1D | 12.35 | 36.86 | 24.51 |
| MW-2A | 20.4 | 58.20 | 37.8 | MW-2S | 16.02 | 40.34 | 24.32 |
| MW-2AD | 20.95 | 58.51 | 37.56 | MW-2D | 16.12 | 40.39 | 24.27 |
| MW-3S | 20.71 | 58.60 | 37.89 | MW-3S | 12.00 | 35.87 | 23.87 |
| MW-3D | 20.73 | 58.65 | 37.92 | MW-3D | 12.09 | 35.82 | 23.73 |
| MW-5S | 19.2 | 56.88 | 37.68 | DDC-5-PS | 16.8 | 37.24 | 20.44 |
| MW-5D | 18.31 | 56.19 | 37.88 | DDC-5-PD | 16.89 | 37.24 | 20.35 |
| MW-6S | 20.21 | 58.08 | 37.87 | DDC-6-PS | 12.42 | 36.49 | 24.07 |
| MW-14S | 19.68 | 57.19 | 37.51 | DDC-6-PD | 12.52 | 36.51 | 23.99 |
| MW-14D | 19.54 | 57.31 | 37.77 | DDC-7-PS | 12.42 | 38.59 | 26.17 |
| MW-15S | 19.78 | 57.29 | 37.51 | DDC-7-PD | 14.4 | 38.59 | 24.19 |
| MW-15D | 19.13 | 57.25 | 38.12 | DDC-8-PS | 12.25 | 39.87 | 27.62 |
| DDC-2-PS | 17.95 | 56.70 | 38.75 | DDC-8-PD | 16.4 | 39.87 | 23.47 |
| DDC-2-PD | 18.13 | 56.70 | 38.57 | DDC-9-PS | 13.2 | 41.37 | 28.17 |
| DDC-4-PS | 17.67 | 56.50 | 38.83 | DDC-9-PD | 17.26 | 41.37 | 24.11 |
| DDC-4-PD | 17.81 | 56.50 | 38.69 | DDC-10-PS | 13.4 | 40.56 | 27.16 |
| | | | | DDC-10-PD | 13.71 | 40.56 | 26.85 |

## Table 2A Summary of Detected Volatile Organic Compounds in Onsite Groundwater Samples (Quarterly Sampling Events, 2016)

**January 2016**

| Parameters List EPA Method 8260B | Sample ID | DDC-2-PD | | DDC-2-PS | | DDC-4-PD | | DDC-4-PS | | MW-1D | | MW-1S | | MW-2A | | MW-2AD | | MW-6S | | 152140-FD-02022016 | | NYSDEC AWQS (µg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sample Type | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Duplicate | | |
| | Sample Date | 1/14/15 | | 1/14/15 | | 1/14/15 | | 1/14/15 | | 1/14/15 | | 1/14/15 | | 1/14/15 | | 1/14/15 | | 1/14/15 | | | | |
| *cis* - 1,2-Dichloroethene | (µg/L) | (<1) | U | **69** | | 4.8 | | 3.4 | | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 2 | | (<1) | U | 5 (s) |
| trans -1,2-Dichloroethene | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 5 (s) |
| Trichloroethene | (µg/L) | 1.6 | | **21** | | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 2 (s) |
| Tetrachloroethene | (µg/L) | 2.3 | | **6.9** | | 2.1 | | 1.9 | | **11** | | 3.3 | | **5.9** | | (<1) | U | **27** | | **6.5** | | 5 (s) |
| Vinyl Chloride | (µg/L) | (<1) | U | 2.1 | | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 5 (s) |

| Parameters List EPA Method 8260B | Sample ID | MW-3S | | FD-011415 | | MW-3D | | MW-5D | | MW-5S | | MW-14D | | MW-14S | | MW-15D | | MW-15S | | 152140-FD-02 | | NYSDEC AWQS (µg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sample Type | Groundwater | | Duplicate | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Duplicate | | |
| | Sample Date | 1/14/15 | | 1/14/15 | | 1/14/15 | | 1/14/15 | | 1/14/15 | | 1/14/15 | | 1/14/15 | | 1/14/15 | | 1/14/15 | | | | |
| *cis* - 1,2-Dichloroethene | (µg/L) | (<1) | U | 3.8 | | (<1) | U | **9.6** | | 4.6 | | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 1.2 | | 5 (s) |
| trans -1,2-Dichloroethene | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 5 (s) |
| Trichloroethene | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 2 (s) |
| Tetrachloroethene | (µg/L) | (<1) | U | 3.7 | | (<1) | U | 2 | | 1.4 | | (<1) | U | (<1) | U | (<1) | U | (<1) | U | **17** | | 5 (s) |
| Vinyl Chloride | (µg/L) | **26** | | **17** | | **10** | | 2.1 | | **20** | | **15** | | **16** | | **39** | | **22** | | (<1) | U | 5 (s) |

NOTE:
EPA = U.S. Environmental Protection Agency
ID = Identification
NYSDEC = New York State Department of Environmental Conservation
AWQS = Ambient Water Quality Standard
µg/L = Micrograms per liter (parts per billion)
U = Analyte not detected at the listed laboratory reporting limit.
MW = Monitoring well
FD-011415 & 152140-FD-02 were blind field duplicate quality assurance/quality control samples of on-site sample MW-15S for this sampling event.; 152140-FD-0202216 collected from MW-2A during February resampling
Shaded cells indicate results from resampling in February for samples that were damaged during shipping.
**Bold** values indicate that the analyte was detected greater than the NYSDEC AWQS.

## Table 2A Summary of Detected Volatile Organic Compounds in Onsite Groundwater Samples (Quarterly Sampling Events, 2016)

**April 2016**

| Parameters List EPA Method 8260B | Sample ID | DDC-2-PD | | DDC-2-PS | | DDC-4-PD | | DDC-4-PS | | MW-1D | | MW-1S | | MW-2A | | MW-2AD | | MW-6S | | 152140-FD-01 | | NYSDEC AWQS (µg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sample Type | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Duplicate | | |
| | Sample Date | 4/12/2016 | | 4/12/2016 | | 4/12/2016 | | 4/12/2016 | | 4/12/2016 | | 4/12/2016 | | 4/11/2016 | | 4/12/2016 | | 4/12/2016 | | | | |
| *cis* - 1,2-Dichloroethene | (µg/L) | (<1) | U | **290** | | (<1) | U | 4.3 | | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 1.4 | | 1.2 | | 5 (s) |
| trans -1,2-Dichloroethene | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 5 (s) |
| Trichloroethene | (µg/L) | 1.2 | | 4 | | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 2 (s) |
| Tetrachloroethene | (µg/L) | 1.4 | | **9.2** | | 1 | | 3.7 | | **7.4** | | 2.2 | | **24** | | (<1) | U | **26** | | **5.5** | | 5 (s) |
| Vinyl Chloride | (µg/L) | (<1) | U | **6.5** | | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 5 (s) |

| Parameters List EPA Method 8260B | Sample ID | MW-3S | | MW-3D | | MW-5D | | MW-5S | | MW-14D | | MW-14S | | MW-15D | | MW-15S | | NYSDEC AWQS (µg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sample Type | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | |
| | Sample Date | 4/11/2016 | | 4/11/2016 | | 4/11/2016 | | 4/11/2016 | | 4/11/2016 | | 4/11/2016 | | 4/11/2016 | | 4/1/2016 | | |
| *cis* - 1,2-Dichloroethene | (µg/L) | 1.3 | | (<1) | U | (<1) | U | (<1) | U | 1.1 | | 1.2 | | 1.6 | | (<1) | U | 5 (s) |
| trans -1,2-Dichloroethene | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 5 (s) |
| Trichloroethene | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 2 (s) |
| Tetrachloroethene | (µg/L) | **32** | | **7.9** | | (<1) | U | **11** | | **23** | | 5.7 | | **15** | | **6** | | 5 (s) |
| Vinyl Chloride | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 5 (s) |

NOTE: 152140-FD-01 was a blind field duplicate quality assurance/quality control sample of on-site sample MW-15S for this sampling event.

**July 2016**

| Parameters List EPA Method 8260B | Sample ID | DDC-2-PD | | DDC-2-PS | | DDC-4-PD | | DDC-4-PS | | MW-1D | | MW-1S | | MW-2A | | MW-2AD | | MW-6S | | 152140-FD-01 | | NYSDEC AWQS (µg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sample Type | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Duplicate | | |
| | Sample Date | 7/11/2016 | | 7/11/2016 | | 7/11/2016 | | 7/11/2016 | | 7/13/2016 | | 7/12/2016 | | 7/13/2016 | | 7/13/2016 | | 7/11/2016 | | | | |
| *cis* - 1,2-Dichloroethene | (µg/L) | (<1) | U | **850** | | (<1) | U | 1.1 | | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 1.2 | | 5 (s) |
| trans -1,2-Dichloroethene | (µg/L) | (<1) | U | **7.1** | | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 5 (s) |
| Trichloroethene | (µg/L) | 1.3 | | **100** | | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 2.7 | | (<1) | U | (<1) | U | (<1) | U | 2 (s) |
| Tetrachloroethene | (µg/L) | 1.1 | | **10** | | (<1) | U | 1.4 | | **5.8** | | 2.6 | | **13** | | (<1) | U | **29** | | 2 | | 5 (s) |
| Vinyl Chloride | (µg/L) | (<1) | U | **37** | | (<1) | U | 1 | | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 5 (s) |

| Parameters List EPA Method 8260B | Sample ID | MW-3S | | MW-3D | | MW-5D | | MW-5S | | MW-14D | | MW-14S | | MW-15D | | MW-15S | | NYSDEC AWQS (µg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sample Type | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | |
| | Sample Date | 7/12/2016 | | 7/11/2016 | | 7/11/2016 | | 7/11/2016 | | 7/12/2016 | | 7/12/2016 | | 7/11/2016 | | 7/11/2016 | | |
| *cis* - 1,2-Dichloroethene | (µg/L) | (<1) | U | (<1) | U | (<1) | U | 3.4 | | 2.3 | | (<1) | U | (<1) | U | (<1) | U | 5 (s) |
| trans -1,2-Dichloroethene | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 5 (s) |
| Trichloroethene | (µg/L) | (<1) | U | (<1) | U | (<1) | U | 3.6 | | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 2 (s) |
| Tetrachloroethene | (µg/L) | **26** | | **6.1** | | (<1) | U | **12** | | **22** | | (<1) | U | **5.1** | | 3.6 | | 5 (s) |
| Vinyl Chloride | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 5 (s) |

NOTE: 152140-FD-01 was a blind field duplicate quality assurance/quality control sample of on-site sample MW-15S for this sampling event.

**Table 2A Summary of Detected Volatile Organic Compounds in Onsite Groundwater Samples (Quarterly Sampling Events, 2016)**

**October 2016**

| Parameters List EPA Method 8260B | Sample ID | DDC-2-PD | | DDC-2-PS | | DDC-4-PD | | DDC-4-PS | | MW-1D | | MW-1S | | MW-2A | | MW-2AD | | MW-6S | | 152140-FD-01 | | NYSDEC AWQS (µg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sample Type | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Duplicate | | |
| | Sample Date | 10/25/2016 | | 10/25/2016 | | 10/25/2016 | | 10/25/2016 | | 10/25/2016 | | 10/25/2016 | | 10/25/2016 | | 10/25/2016 | | 10/25/2016 | | 10/25/2016 | | |
| *cis* - 1,2-Dichloroethene | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | **17** | | (<1) | U | (<1) | U | (<1) | U | 5 (s) |
| trans -1,2-Dichloroethene | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 5 (s) |
| Trichloroethene | (µg/L) | 1 | | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 3.8 | | (<1) | U | (<1) | U | (<1) | U | 2 (s) |
| Tetrachloroethene | (µg/L) | 1.9 | | 3.5 | | 1.3 | | (<1) | U | **19** | | 2.1 | | 3.5 | | 1.3 | | **12** | | **9.2** | | 5 (s) |
| Vinyl Chloride | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 5 (s) |

| Parameters List EPA Method 8260B | Sample ID | MW-3D | | MW-3S | | MW-5D | | MW-5S | | MW-14D | | MW-14S | | MW-15D | | MW-15S | | NYSDEC AWQS (µg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sample Type | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | |
| | Sample Date | 10/25/2016 | | 10/25/2016 | | 10/25/2016 | | 10/25/2016 | | 10/25/2016 | | 10/25/2016 | | 10/25/2016 | | 10/25/2016 | | |
| *cis* - 1,2-Dichloroethene | (µg/L) | (<1) | U | (<1) | U | **7** | | **86** | | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 5 (s) |
| trans -1,2-Dichloroethene | (µg/L) | (<1) | U | (<1) | U | (<1) | U | 1.6 | | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 5 (s) |
| Trichloroethene | (µg/L) | 1.8 | | (<1) | U | **8.8** | | 2.3 | | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 2 (s) |
| Tetrachloroethene | (µg/L) | **7.5** | | **9.6** | | **10** | | **20** | | **30** | | **35** | | **35** | | 2.7 | | 5 (s) |
| Vinyl Chloride | (µg/L) | (<1) | U | (<1) | U | (<1) | U | **30** | | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 5 (s) |

NOTE: 152140-FD-01 was a blind field duplicate quality assurance/quality control sample of on-site sample MW-3S for this sampling event.

**Table 2B Summary of Detected Volatile Organic Compounds in Offsite Groundwater Samples (Quarterly Sampling Events, 2016)**

**January 2016**

| Parameters List EPA Method 8260B | Sample ID | DDC-5-PD | | DDC-5-PS | | DDC-6-PD | | DDC-6-PS | | DDC-7-PD | | DDC-7-PS | | 152140-FD-03 | | DDC-8-PD | | DDC-8PS | | | NYSDEC AWQS (µg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sample Type | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Duplicate | | Groundwater | | Groundwater | | | |
| | Sample Date | 1/20/2016 | | 1/20/2016 | | 1/20/2016 | | 1/20/2016 | | 1/20/2016 | | 1/20/2016 | | 1/20/2016 | | 1/20/2016 | | 1/20/2016 | | | |
| *cis* - 1,2-Dichloroethene | (µg/L) | (<1) | U | (<1) | U | **14** | | (<1) | U | **180** | | **87** | | **190** | | **17** | | **12** | | | 5 (s) |
| trans -1,2-Dichloroethene | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 1.8 | | (<1) | U | (<1) | U | (<1) | U | (<1) | U | | 5 (s) |
| Vinyl Chloride | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | | 2 (s) |
| Trichloroethene | (µg/L) | (<1) | U | (<1) | U | 4.9 | | (<1) | U | **170** | | **36** | | **170** | | **26** | | **12** | | | 5 (s) |
| Tetrachloroethene | (µg/L) | (<1) | U | 1 | | **10** | | (<1) | U | **280** | | **46** | | **280** | | **66** | | **27** | | | 5 (s) |

| Parameters List EPA Method 8260B | Sample ID | DDC-9-PD | | DDC-9-PS | | DDC-10-PD | | DDC-10-PS | | MW-1D | | MW-1S | | MW-2D | | MW-2S | | MW-3D | | MW-3S | | NYSDEC AWQS (µg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sample Type | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | |
| | Sample Date | 1/20/2016 | | 1/20/2016 | | 1/20/2016 | | 1/20/2016 | | 1/20/2016 | | 1/20/2016 | | 1/20/106 | | 1/20/2016 | | 1/20/2016 | | 1/20/2016 | | |
| *cis* - 1,2-Dichloroethene | (µg/L) | **12** | | 4.3 | U | (<1) | U | (<1) | U | **50** | | (<1) | U | (<1) | U | (<1) | U | 2.8 | | (<1) | U | 5 (s) |
| trans -1,2-Dichloroethene | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 5 (s) |
| Vinyl Chloride | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 2 (s) |
| Trichloroethene | (µg/L) | **13** | | 3.4 | | 1.3 | U | (<1) | U | **29** | | (<1) | U | 1.1 | | (<1) | U | 1 | | (<1) | U | 5 (s) |
| Tetrachloroethene | (µg/L) | **27** | | **5.8** | | 1.1 | U | (<1) | U | **410** | | (<1) | U | (<1) | U | (<1) | U | 3.4 | | (<1) | U | 5 (s) |

NOTE:
EPA = U.S. Environmental Protection Agency
ID = Identification
NYSDEC = New York State Department of Environmental Conservation
AWQS = Ambient Water Quality Standard
µg/L = Micrograms per liter (parts per billion)
U = Analyte not detected at the listed laboratory reporting limit.
MW = Monitoring well
152140-FD-03 was a blind field duplicate quality assurance/quality control sample of off-site sample DDC-7-PD for this sampling event.
**Bold** values indicate that the analyte was detected greater than the NYSDEC AWQS.

## Table 2B Summary of Detected Volatile Organic Compounds in Offsite Groundwater Samples (Quarterly Sampling Events, 2016)

### April 2016

| Parameters List EPA Method 8260B | Sample ID | DDC-5-PD | | DDC-5-PS | | DDC-6-PD | | DDC-6-PS | | DDC-7-PD | | DDC-7-PS | | DDC-8-PD | | DDC-8-PS | | 152140-FD-02 | | | | NYSDEC AWQS (µg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sample Type | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Duplicate | | | | |
| | Sample Date | 4/12/2016 | | 4/12/2016 | | 4/12/2016 | | 4/12/2016 | | 4/13/2016 | | 4/13/2016 | | 4/13/2016 | | 4/13/2016 | | | | | | |
| *cis* - 1,2-Dichloroethene | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 1 | | **16** | | 4.9 | | **5.7** | | 1.1 | | | | 5 (s) |
| trans -1,2-Dichloroethene | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | | | 5 (s) |
| Vinyl Chloride | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | | | 2 (s) |
| Trichloroethene | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 2.6 | | **6.7** | | 3.4 | | 3.2 | | (<1) | U | | | 5 (s) |
| Tetrachloroethene | (µg/L) | (<1) | U | (<1) | U | 2.3 | | (<1) | U | **14** | | **8.5** | | **6.2** | | 4.6 | | 3.9 | | | | 5 (s) |

| Parameters List EPA Method 8260B | Sample ID | DDC-9-PD | | DDC-9-PS | | DDC-10-PD | | DDC-10-PS | | MW-1D | | MW-1S | | MW-2D | | MW-2S | | MW-3D | | MW-3S | | NYSDEC AWQS (µg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sample Type | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | |
| | Sample Date | 4/13/2016 | | 4/13/2016 | | 4/13/2016 | | 4/13/2016 | | 4/13/2016 | | 4/13/2016 | | 4/13/2016 | | 4/13/2016 | | 4/13/2016 | | 4/12/2016 | | |
| *cis* - 1,2-Dichloroethene | (µg/L) | 1.5 | | 1.4 | | (<1) | U | (<1) | U | **84** | | (<1) | U | (<1) | U | (<1) | U | 4.9 | | (<1) | U | 5 (s) |
| trans -1,2-Dichloroethene | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 1.2 | | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 5 (s) |
| Vinyl Chloride | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 2 (s) |
| Trichloroethene | (µg/L) | 4.9 | | 1.4 | | 4 | | 1.1 | | **48** | | (<1) | U | 1.2 | | (<1) | U | 2.4 | | (<1) | U | 5 (s) |
| Tetrachloroethene | (µg/L) | **5.9** | | 1.7 | | 1.2 | | (<1) | U | **210** | | (<1) | U | (<1) | U | (<1) | U | 4.7 | | (<1) | U | 5 (s) |

NOTE: 152140-FD-02 was a blind field duplicate quality assurance/quality control sample of off-site sample DDC-6-PD for this sampling event.

### July 2016

| Parameters List EPA Method 8260B | Sample ID | DDC-5-PD | | DDC-5-PS | | DDC-6-PD | | DDC-6-PS | | DDC-7-PD | | DDC-7-PS | | DDC-8-PD | | DDC-8-PS | | 152140-FD-02 | | | | NYSDEC AWQS (µg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sample Type | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Duplicate | | | | |
| | Sample Date | 7/12/2016 | | 7/12/2016 | | 7/12/2016 | | 7/12/2016 | | 7/12/2016 | | 7/12/2016 | | 7/12/2016 | | 7/12/2016 | | | | | | |
| *cis* - 1,2-Dichloroethene | (µg/L) | **5.1** | | **9.3** | | 1.3 | | **7.8** | | 4.8 | | **27** | | **8.2** | | **14** | | **170** | | | | 5 (s) |
| trans -1,2-Dichloroethene | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 1.8 | | | | 5 (s) |
| Vinyl Chloride | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | | | 2 (s) |
| Trichloroethene | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 3 | | 4.2 | | 2.1 | | 1.8 | | **58** | | | | 5 (s) |
| Tetrachloroethene | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | **12** | | **5.4** | | **5** | | 2.8 | | **160** | | | | 5 (s) |

| Parameters List EPA Method 8260B | Sample ID | DDC-9-PD | | DDC-9-PS | | DDC-10-PD | | DDC-10-PS | | MW-1D | | MW-1S | | MW-2D | | MW-2S | | MW-3D | | MW-3S | | NYSDEC AWQS (µg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sample Type | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | |
| | Sample Date | 7/12/2016 | | 7/12/2016 | | 7/13/2016 | | 7/13/2016 | | 7/12/2016 | | 7/12/2016 | | 7/12/2016 | | 7/12/2016 | | 7/12/2016 | | 7/12/2016 | | |
| *cis* - 1,2-Dichloroethene | (µg/L) | 1.4 | | **8.4** | | (<1) | U | **5.4** | | **170** | | (<1) | U | (<1) | U | 3 | | **13** | | (<1) | U | 5 (s) |
| trans -1,2-Dichloroethene | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 1.8 | | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 5 (s) |
| Vinyl Chloride | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 2 (s) |
| Trichloroethene | (µg/L) | 3 | | (<1) | U | 2.7 | | (<1) | U | **57** | | (<1) | U | (<1) | U | (<1) | U | 2.8 | | (<1) | U | 5 (s) |
| Tetrachloroethene | (µg/L) | 3.2 | | (<1) | U | 1.5 | | (<1) | U | **170** | | (<1) | U | (<1) | U | (<1) | U | **7.3** | | (<1) | U | 5 (s) |

NOTE: 152140-FD-02 was a blind field duplicate quality assurance/quality control sample of on-site sample DDC-6-PD for this sampling event.

## Table 2B Summary of Detected Volatile Organic Compounds in Offsite Groundwater Samples (Quarterly Sampling Events, 2016)

### October 2016

| Parameters List EPA Method 8260B | Sample ID | DDC-5-PD | | DDC-5-PS | | DDC-6-PD | | DDC-6-PS | | DDC-7-PD | | DDC-7-PS | | DDC-8-PD | | DDC-8-PS | | 152140-FD-02 | | NYSDEC AWQS (µg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sample Type | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Duplicate | | |
| | Sample Date | 10/26/2016 | | 10/26/2016 | | 10/26/2016 | | 10/26/2016 | | 10/26/2016 | | 10/26/2016 | | 10/26/2016 | | 10/26/2016 | | 10/26/2016 | | |
| *cis* - 1,2-Dichloroethene | (µg/L) | 4.4 | | **12** | | (<1) | U | (<1) | U | 1.3 | | **17** | | **9.2** | | **16** | | **14** | | 5 (s) |
| trans -1,2-Dichloroethene | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 5 (s) |
| Vinyl Chloride | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 2 (s) |
| Trichloroethene | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 1.1 | | 1.7 | | 2.6 | | (<1) | U | (<1) | U | 5 (s) |
| Tetrachloroethene | (µg/L) | **5.5** | | (<1) | U | (<1) | U | (<1) | U | 4.8 | | (<1) | U | **6.1** | | 2.3 | | (<1) | U | 5 (s) |

| Parameters List EPA Method 8260B | Sample ID | DDC-9-PD | | DDC-9-PS | | DDC-10-PD | | DDC-10-PS | | MW-1D | | MW-1S | | MW-2D | | MW-2S | | MW-3D | | MW-3S | | NYSDEC AWQS (µg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sample Type | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | |
| | Sample Date | 10/26/2016 | | 10/26/2016 | | 10/26/2016 | | 10/26/2016 | | 10/25/2016 | | 10/25/2016 | | 10/26/2016 | | 10/26/2016 | | 10/26/2016 | | 10/26/2016 | | |
| *cis* - 1,2-Dichloroethene | (µg/L) | 3 | | **13** | | (<1) | U | **10** | | **100** | | (<1) | U | (<1) | U | (<1) | U | 4.4 | | (<1) | U | 5 (s) |
| trans -1,2-Dichloroethene | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 1.4 | | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 5 (s) |
| Vinyl Chloride | (µg/L) | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | (<1) | U | 2 (s) |
| Trichloroethene | (µg/L) | **5.6** | | 1.2 | | **5.4** | | (<1) | U | **50** | | (<1) | U | (<1) | U | (<1) | U | 1.6 | | (<1) | U | 5 (s) |
| Tetrachloroethene | (µg/L) | 4.3 | | 1.4 | | (<1) | U | (<1) | U | **170** | | (<1) | U | (<1) | U | **5.3** | | **6.8** | | (<1) | U | 5 (s) |

NOTE: 152140-FD-02 was a blind field duplicate quality assurance/quality control sample of on-site sample DDC-5-PS for this sampling event.

## Table 3A Treatment System Runtimes

**System Readings**

| | | SVE System | | | | | Onsite DDC Treatment System | | | | | | | | | | Offsite DDC Treatment System | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SVE Blower | | | | | System #1 | | | | | System #2 | | | | | Blower B-501 | | | | | Blower B-502 | | | | |
| Date | Notes | Meter Reading (Hrs) | Time | Elapsed Runtime (Hrs.) | Elapsed Available (Hrs.) | Runtime (%) | Meter Reading (Hrs) | Time | Elapsed Runtime (Hrs.) | Elapsed Available (Hrs.) | Runtime (%) | Meter Reading (Hrs) | Time | Elapsed Runtime (Hrs.) | Elapsed Available (Hrs.) | Runtime (%) | Meter Reading (Hrs) | Time | Elapsed Runtime (Hrs.) | Elapsed Available (Hrs.) | Runtime (%) | Meter Reading (Hrs) | Time | Elapsed Runtime (Hrs.) | Elapsed Available (Hrs.) | Runtime (%) |
| 01/21/16 | | 17,379.00 | 8:00 | 21.86 | 857.82 | 2.55 | 33,218.30 | 8:00 | 859.60 | 859.83 | 99.97 | 39,855.00 | 8:24 | 858.00 | 859.32 | 99.85 | -- | 15:00 | -- | 862.67 | -- | 15,395.8 | 15:00 | 43.70 | 862.7 | 5.07 |
| 02/08/16 | | 17,812.64 | 12:00 | 433.64 | 436.00 | 99.46 | 33,653.50 | 11:30 | 435.20 | 435.50 | 100 | 40,102.70 | 8:35 | 247.70 | 432.18 | 57.31 | -- | 13:30 | -- | 430.5 | -- | 15,846.4 | 13:30 | 430.50 | 430.5 | 100.00 |
| 03/08/16 | | 18,099.78 | 13:45 | 287.14 | 697.75 | 41.15 | 34,327.30 | 13:30 | 673.80 | 701.50 | 96.05 | 40,349.30 | 14:05 | 246.60 | 701.50 | 35.15 | -- | 15:00 | -- | 697.5 | -- | 16,523.4 | 15:00 | 677.00 | 697.5 | 97.06 |
| **Quarterly Run-Time** | | -- | -- | **742.64** | **1991.57** | **37.29** | -- | -- | **1968.60** | **1996.83** | **98.59** | -- | -- | **1352.30** | **1993.00** | **67.85** | | | **0.00** | **1990.67** | **0.00** | | | **1151.20** | **1990.67** | **57.83** |
| 04/12/16 | | 18,960.11 | 10:30 | 836.75 | 836.75 | 100.00 | 35,186.80 | 10:00 | 859.50 | 836.50 | 100.00 | 41,009.50 | 8:20 | 660.20 | 834.25 | 79.14 | 19,007.10 | 8:00 | -- | 833.00 | -- | 17,384.30 | 8:00 | 860.90 | 833.00 | 100.00 |
| 05/16/16 | | 19,778.02 | 13:45 | 819.25 | 819.25 | 100.00 | 35,982.20 | 13:40 | 795.40 | 819.67 | 97.04 | 41,333.70 | 15:50 | 324.20 | 823.50 | 39.37 | 19,796.00 | 14:35 | 788.90 | 822.58 | 95.91 | 17,393.00 | 14:35 | 8.70 | 822.58 | 1.06 |
| 06/08/16 | | 20,341.11 | 8:34 | 546.82 | 546.82 | 100.00 | 36,171.30 | 16:00 | 189.10 | 554.33 | 34.11 | 41,859.20 | 16:30 | 525.50 | 552.67 | 95.08 | 20,141.20 | 13:00 | 345.20 | 550.42 | 62.72 | 17,434.30 | 13:00 | 41.30 | 550.42 | 7.50 |
| **Quarterly Run-Time** | | | | **2202.82** | **2202.82** | **100.00** | | | **1844.00** | **2210.50** | **83.42** | | | **1509.90** | **2210.42** | **68.31** | | | **1134.10** | **2206.00** | **51.41** | | | **910.90** | **2206.00** | **41.29** |
| 07/11/16 | | 20,341.11 | 12:00 | 0.00 | 795.43 | 0.00 | 36,947.50 | 11:00 | 776.20 | 787.00 | 98.63 | 42,648.20 | 8:20 | 789.00 | 783.83 | 100.00 | 21025.9 | 10:00 | 884.70 | 789.00 | 112.13 | 17,434.30 | 10:00 | -- | 789.00 | -- |
| 08/18/16 | | 20,702.07 | 8:18 | 360.96 | 908.30 | 39.74 | 37,269.60 | 9:10 | 322.10 | 910.17 | 35.39 | 43,553.60 | 15:50 | 905.40 | 919.50 | 98.47 | 21,824.30 | 16:27 | 798.40 | 918.45 | 86.93 | 17,434.30 | 16:27 | -- | 918.45 | -- |
| 09/12/16 | | 21,341.11 | 12:35 | 639.04 | 604.28 | 100.00 | 37,846.86 | 13:00 | 577.26 | 603.83 | 95.60 | 44,157.60 | 16:30 | 604.00 | 600.67 | 100.00 | 22,446.20 | 14:00 | 621.90 | 597.55 | 104.07 | 17,434.30 | 14:00 | -- | 597.55 | -- |
| **Quarterly Run-Time** | | | | **1000.00** | **2308.02** | **43.33** | | | **1675.56** | **2301.00** | **72.82** | | | **2298.40** | **2304.00** | **99.76** | | | **2305.00** | **2305.00** | **100.00** | | | **0.00** | **2305.00** | **0.00** |
| 10/26/16 | | 22,394.93 | 10:24 | 1053.82 | 1053.82 | 100.00 | 38,498.10 | 12:00 | 1055.00 | 1055.00 | 100.00 | 45,187.50 | 9:27 | 1029.90 | 1048.95 | 98.18 | 23,502.90 | 15:21 | 1056.70 | 1057.35 | 99.94 | 17,438.60 | 17:00 | 4.30 | 1059.00 | 0.41 |
| 11/15/16 | | 22,874.03 | 9:30 | 479.10 | 479.10 | 100.00 | 38,974.85 | 8:45 | 476.75 | 476.75 | 100.00 | 45,689.70 | 8:15 | 502.20 | 478.80 | 100.00 | 23,478.70 | 10:30 | -- | 475.15 | -- | 17,913.10 | 10:30 | 474.50 | 473.50 | 100.21 |
| 12/22/16 | | 23,752.03 | 13:30 | 878.00 | 892.00 | 98.43 | 39,888.20 | 8:30 | 887.75 | 887.75 | 100.00 | 46,577.80 | 8:30 | 888.10 | 888.25 | 99.98 | 23,478.70 | 10:20 | -- | 887.83 | -- | 18,800.80 | 10:20 | 887.70 | 887.83 | 99.98 |
| 12/31/16 | A, D | 23,978.51 | 23:59 | 226.48 | 226.48 | 100.00 | 40,119.68 | 23:59 | 231.48 | 231.48 | 100.00 | 46,809.28 | 23:59 | 231.48 | 231.48 | 100.00 | 23,478.70 | 23:59 | -- | 229.65 | -- | 19,030.45 | 23:59 | 229.65 | 229.65 | 100.00 |
| **Quarterly Run-Time** | | | | **2637.40** | **2651.40** | **99.47** | | | **2650.98** | **2650.98** | **100.00** | | | **2651.68** | **2651.68** | **100.00** | | | **1056.70** | **2649.98** | **40.00** | | | **2649.98** | **2649.98** | **100.00** |
| | | | **PERIOD TOTALS =** | **6582.86** | **9153.80** | **71.91** | | | **8139.14** | **9159.32** | **88.86** | | | **7812.28** | **9159.10** | **85.30** | | | **4495.80** | **9151.65** | **49.13** | | | **4712.08** | **9151.65** | **51.49** |

NOTE:
SVE = Soil Vapor Extraction
DDC = Density Driven Convection
--- =
A = "Meter Reading" value was corrected for the SVE system to override a malfunctioning run-clock meter
B = "Meter Reading" value was updated and calculation overridden to incorporate new run-clock meter
C = On-site DDC System #1 not running. Hour reading only parameter collected
D = Hours were projected to close reporting period
E = Hours were corrected to align with new run-clock meter
10/26/16: Switched blowers at the Offsite System; switched from blower B-501 to B-502

## Table 3B Summary of Estimated Recovery Rate via Soil Vapor Extraction System

| | Field/System Data | | | | Laboratory Results | | | | | | Mass Discharged | | | | | | Recovery based on Laboratory Results | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | SYS INFLUENT | | | SYS EFFLUENT | | | | | | | | | | | | | | |
| **Date** | **SVE Blower Flow Rate (cfm)** | **Applied Vacuum (in. $H_2$0)** | **System Discharge VOC Concentration (ppmv)** | **Elapsed Run-Time (day)** | **PCE ($mg/m^3$)** | **TCE ($mg/m^3$)** | ***cis*-1,2-DCE ($mg/m^3$)** | **PCE (mg/cu m.)** | **TCE (mg/cu m.)** | ***cis*-1,2-DCE (mg/cu m.)** | **PCE Discharge During Period: lb/hr** | **PCE Discharge During Period (lb)** | **TCE Discharge During Period (lb/hr)** | **TCE Discharge During Period (lb)** | ***cis*-1,2-DCE Discharge During Period (lb/hr)** | ***cis*-1,2-DCE Discharge During Period (lb)** | **PCE Recovery During Period: lb/hr** | **PCE Recovery During Period (lb)** | **TCE Recovery During Period (lb/hr)** | **TCE Recovery During Period (lb)** | ***cis*-1,2-DCE Recovery During Period (lb/hr)** | ***cis*-1,2-DCE Recovery During Period (lb)** |
| 1/21/2016 | 162 | 96 | 34.0 | 0.91 | -- | -- | -- | 0.500 | 0.004 | ND | 0.0003 | 0.007 | 0.0000 | 0.00 | 0.0000 | 0.00 | -- | -- | -- | -- | -- | -- |
| 4/12/2016 | 200 | 63 | 1.0 | 34.86 | -- | -- | -- | 4.9 | 0.091 | 0.0089 | 0.0037 | 3.074 | 0.0001 | 0.06 | 0.0000 | 0.00 | -- | -- | -- | -- | -- | -- |
| 7/11/2016 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 8/18/2016 | 227 | 57 | 0.0 | 15.04 | 16.00 | 1.10 | 0.32 | 0.0 | 0.000 | 0.0000 | 0.0000 | 0.000 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0136 | 4.9150 | 0.0009 | 0.3379 | 0.000 | 1.4836 |
| 9/12/2016 | 230 | 56 | 0.0 | 25 | 0.00 | 0.01 | 0.03 | 0.0 | 0.000 | 0.0000 | 0.0000 | 0.000 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.0000 | 0.0000 | 0.0050 | 0.000 | 0.0129 |
| 10/26/2016 | 200 | 63 | 0.0 | 44 | 12.0 | 0.660 | 0.1000 | 0.0 | 0.000 | 0.0360 | 0.0000 | 0.000 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0090 | 9.5015 | 0.0005 | 0.5226 | 0.000 | 0.0507 |
| 11/30/2016 | 200 | 65 | 0.0 | 35 | 6.60 | 0.41 | 0.07 | 0.0 | 0.000 | 0.0240 | 0.0000 | 0.000 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0049 | 4.1569 | 0.0003 | 0.2582 | 0.000 | 0.0258 |
| 12/22/2016 | 218 | 62 | 0.0 | 22 | 1.10 | 0.06 | 0.01 | 0.023 | 0.000 | 0.0000 | 0.0000 | 0.010 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0009 | 0.4648 | 0.0000 | 0.0263 | 0.000 | 0.0039 |
| | | | | | | | | | | | **ANNUAL TOTALS =** | **3.09** | | **0.06** | | **0.00** | | **19.04** | | **1.15** | | **1.58** |

NOTE: SVE = Soil Vapor Extraction
cfm = cubic feet per minute
ppmv = parts per million (vol./vol.)
$mg/m^3$ = milligrams per cubic meter
PCE = Tetrachloroethylene
TCE = Trichloroethene
*cis*-1,2-DCE = cis-1,2-Dichloroethene
Mass Recovery (Lab Res., lb/hr) = flow (cfm)*effluent conc. (mg/cu. m.)*1g/1000mg*1lb/453.6g*1cu. m./35.31cu. ft*60min/1 hr
Mass Recovery (Lab Res., lb) = Discharge Rate (lb/hr) * # of days*24hours/day
Permit limit for PCE is 0.031 lb/hr and 270 lb/yr; TCE is 0.014 lb/hr and 120 lb/year; cis-1,2-DCE is 0.63 lb/hr and 5,510 lb/year
Samples for month of September 2016 were collected on 9/30/16, while sample measurements were taken on 9/12/16
Shaded cells indicate O&M events performed during a previous reporting period.
NOTE: Air samples were collected on 8/18/16 after SVE system was restarted with five new horizontal SVE wells. Carbon change out occurred in 05/2016

## Table 3C Summary of Estimated Recovery Rate via Onsite DDC System #1

| Date | Field/System Data | | | Elapsed Run-Time (days) | Laboratory Results | | | | | | | | | Recovery based on Laboratory Results | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | SYS1-INF1 | | | SYS1-MIDGAC | | | SYS1-EFF | | | | | | | | |
| | Vacuum Flow Rate (cfm) | Applied Vacuum (in. $H_20$) | System Influent VOC Concentration (ppmv) | | PCE ($mg/m^3$) | TCE ($mg/m^3$) | *cis*-1,2-DCE ($mg/m^3$) | PCE ($mg/m^3$) | TCE ($mg/m^3$) | *cis*-1,2-DCE ($mg/m^3$) | PCE ($mg/m^3$) | TCE ($mg/m^3$) | *cis*-1,2-DCE ($mg/m^3$) | PCE Recovery During Period: lb/hr | PCE Recovery During Period (lb) | TCE Recovery During Period (lb/hr) | TCE Recovery During Period (lb) | *cis*-1,2-DCE Recovery During Period (lb/hr) | *cis*-1,2-DCE Recovery During Period (lb) |
| 1/21/2016 | 154 | 28 | 4.561 | 36 | 4.8 | 0.019 | 0.11 | 4.8 | 0 | 0.097 | 0.78 | 0.011 | 0.13 | 0.0034 | 6.62 | 0.0000 | 0.01 | 0.0000 | 0.00 |
| 2/9/2016 | 280 | 32 | 3.3 | 18 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/8/2016 | 235 | 27 | 1.8 | 28 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4/12/2016 | 185 | 25 | - | 36 | 6.1 | 0.024 | 0.12 | 6 | 0.02 | 0.13 | 0.9 | 0.011 | 0.11 | 0.0041 | 7.50 | 0.0000 | 0.02 | 0.0000 | 0.00 |
| 5/16/2016 | 126 | 43 | 3.966 | 33 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 6/8/2016 | 315 | 60 | 1.358 | 8 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 7/11/2016 | 222 | 42 | 1.975 | 32 | 0.072 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0001 | 0.11 | 0.0000 | 0.00 | 0.0000 | 0.00 |
| 8/18/2016 | 258 | 42 | 1.876 | 13 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/12/2016 | 270 | 42 | 4.408 | 24 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 10/26/2016 | 266 | 44 | 1.26 | 44 | 1.900 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.0019 | 4.6590 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 11/30/2016 | 280 | 42 | 0.325 | 20 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 12/22/2016 | 265 | 43 | 1.23 | 37 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | | | | | | | | | | | | ANNUAL TOTALS= | 18.89 | | 0.03 | | 0.00 |

NOTE: cfm = cubic feet per minute
VOC = Volatile organic compound
ppmv = parts per million (vol./vol.)
$mg/m^3$ = milligrams per cubic meter
PCE = Tetrachloroethylene
TCE = Trichloroethene
*cis*-1,2-DCE = cis-1,2-Dichloroethene
Mass Recovery (Lab Res., lb/hr) = flow (cfm)*effluent conc. (mg/cu. m.)*1g/1000mg*1lb/453.6g*1cu. m./35.31cu. ft*60min/1 hr
Mass Recovery (Lab Res., lb) = Discharge Rate (lb/hr) * # of days*24hours/day
Shaded cells indicate O&M events performed during a previous reporting period.

**Table 3D Summary of Estimated Recovery Rate via Onsite DDC System #2**

| Date | Field/System Data | | | Elapsed Run-Time (day) | Laboratory Results | | | | | | | | | Recovery based on Laboratory Results | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | SYS2-INF1 | | | SYS2-INF2 | | | SYS2-EFF | | | | | | | | |
| | Vacuum Flow Rate (cfm) | Applied Vacuum (in. $H_20$) | System Influent VOC Concentration (ppmv) | | PCE (mg/m³) | TCE (mg/m³) | *cis*-1,2-DCE (mg/m³) | PCE (mg/m³) | TCE (mg/m³) | *cis*-1,2-DCE (mg/m³) | PCE (mg/m³) | TCE (mg/m³) | *cis*-1,2-DCE (mg/m³) | PCE Recovery During Period: lb/hr | PCE Recovery During Period (lb) | TCE Recovery During Period (lb/hr) | TCE Recovery During Period (lb) | *cis*-1,2-DCE Recovery During Period (lb/hr) | *cis*-1,2-DCE Recovery During Period (lb) |
| 1/21/2016 | 374 | 0.0 | 0.0492 | 36 | 0.27 | 0.0074 | 0.15 | 0.32 | 0.0086 | 0.18 | 0 | 0 | 0.14 | 0.0004 | 0.50 | 0.0000 | 0.01 | 0.0000 | 0.02 |
| 2/8/2016 | 376 | 13.6 | 0 | 10 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/8/2016 | 353 | 6.8 | 0.64 | 10 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4/12/2016 | 350 | 6.8 | 0.19 | 28 | 0.67 | 0.011 | 0.3 | 0.58 | 0.0095 | 0.28 | 0 | 0 | 0.14 | 0.0009 | 1.32 | 0.0000 | 0.02 | 0.0002 | 0.32 |
| 5/16/2016 | 350 | 6.8 | 0.716 | 14 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 6/8/2016 | 346 | 13.6 | 0.108 | 22 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 7/11/2016 | 354 | 34.0 | 1.309 | 33 | 0.31 | 0.0056 | 0.047 | 0.2 | -- | 0.028 | 0 | 0 | 0.0088 | 0.0004 | 0.98 | 0.0000 | 0.02 | 0.0001 | 0.12 |
| 8/18/2016 | 366 | 20.4 | 0.601 | 38 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/12/2016 | 385 | 14.9 | 2.349 | 25 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 10/26/2016 | 375 | 13.6 | 1.042 | 44 | 0.22 | 0.007 | 0.005 | 0.18 | 0.005 | 0.038 | 0 | 0 | 0.029 | 0.0003 | 0.7592 | 0.0000 | 0.0242 | 0.0000 | 0.0000 |
| 11/15/2016 | 385 | 13.6 | 0.304 | 20 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 12/22/2016 | 383 | 13.6 | 0.748 | 37 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | | | | | | | | | | | | **ANNUAL TOTALS =** | **3.57** | | **0.08** | | **0.46** |

NOTE: cfm = cubic feet per minute
VOC = Volatile organic compound
ppmv = parts per million (vol./vol.)
$mg/m^3$ = milligrams per cubic meter
PCE = Tetrachloroethylene
TCE = Trichloroethene
*cis*-1,2-DCE = cis-1,2-Dichloroethene
Mass Recovery (Lab Res., lb/hr) = flow (cfm)*effluent conc. (mg/cu. m.)*1g/1000mg*1lb/453.6g*1cu. m./35.31cu. ft*60min/1 hr
Mass Recovery (Lab Res., lb) = Discharge Rate (lb/hr) * # of days*24hours/day
Shaded cells indicate O&M events performed during a previous reporting period.

## Table 3E Summary of Estimated Recovery Rate via Offsite DDC System (Blower B501)

| | Field/System Data | | | | Laboratory Results | | | | | | | | | | | | Recovery based on Laboratory Results | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | B501-INF1 | | | B501-INTER1 | | | B501-INTER2 | | | B501-EFF | | | | | | | | |
| Date | Vacuum Flow Rate (cfm) | Applied Vacuum (in. $H_20$) | System Influent VOC Concentration (ppmv) | Elapsed Run-Time (day) | PCE ($mg/m^3$) | TCE ($mg/m^3$) | *cis* -1,2-DCE ($mg/m^3$) | PCE ($mg/m^3$) | TCE ($mg/m^3$) | *cis* -1,2-DCE ($mg/m^3$) | PCE ($mg/m^3$) | TCE ($mg/m^3$) | *cis* -1,2-DCE ($mg/m^3$) | PCE ($mg/m^3$) | TCE ($mg/m^3$) | *cis* -1,2-DCE ($mg/m^3$) | PCE Recovery During Period: lb/hr | PCE Recovery During Period (lb) | TCE Recovery During Period (lb/hr) | TCE Recovery During Period (lb) | *cis* -1,2-DCE Recovery During Period (lb/hr) | *cis* -1,2-DCE Recovery During Period (lb) |
| 1/21/2016 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2/8/2016 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/8/2016 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4/12/2016* | -- | -- | -- | -- | 0.3800 | 0.1700 | 0.2500 | 0.0000 | 0.0000 | 0.6900 | 0.0000 | 0.0000 | 0.0090 | 0.0000 | 0.0000 | 0.0000 | 0.0007 | 0.8094 | 0.0003 | 0.3621 | 0.0005 | 0.53 |
| 5/16/2016 | 459 | 52 | 1.494 | 33 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 6/8/2016 | 543 | 54 | 1.207 | 14 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 7/11/2016 | 518 | 54 | 1.093 | 37 | 0.400 | 0.190 | 0.870 | 0.000 | 0.0710 | 0.0990 | 0.0000 | 0.0000 | 0.5200 | 0.0000 | 0.0000 | 0.8200 | 0.0007 | 1.7179 | 0.0004 | 0.8160 | 0.0001 | 0.21 |
| 8/18/2016 | 509 | 54 | 0.586 | 33 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/12/2016 | 464 | 54 | 0.995 | 26 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 10/26/2016 | 631 | 54 | 0.726 | 44 | 0.210 | 0.120 | 1.1000 | 0.051 | 2.000 | 1.400 | 0.0000 | 0.0000 | 0.8300 | 0.0000 | 0.0000 | 0.6800 | 0.0004 | 1.0829 | 0.0003 | 0.6188 | 0.0009 | 2.17 |
| 11/15/2016** | 546 | 55 | 0.511 | 20 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 12/22/2016** | 529 | 55 | 0.702 | 37 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | | | | | | | | | | | | | | | **ANNUAL TOTALS =** | **3.61** | | **1.80** | | **2.91** |

NOTE: cfm = cubic feet per minute
VOC = Volatile organic compound
ppmv = parts per million (vol./vol.)
$mg/m^3$ = milligrams per cubic meter
PCE = Tetrachloroethylene
TCE = Trichloroethene
*cis* -1,2-DCE = cis-1,2-Dichloroethene
Mass Recovery (Lab Res., lb/hr) = flow (cfm)*effluent conc. (mg/cu. m.)*1g/1000mg*1lb/453.6g*1cu. m./35.31cu. ft*60min/1 hr
Mass Recovery (Lab Res., lb) = Discharge Rate (lb/hr) * # of days*24hours/day
Shaded cells indicate O&M events performed during a previous reporting period.
* 4/13/16: Switched blowers at the Offsite System; switched from blower B-502 to B-501. Samples collected from B-502
** 10/16/2016 Switched from B-501 from B-502. Samples collected from B-501; B-501 operational data was combined with B-502 system operational data to determine mass recovery for the whole quarter

## Table 3F Summary of Estimated Recovery Rate via Offsite DDC System (Blower B502)

| Date | Field/System Data | | | | Laboratory Results | | | | | | | | | | | | Recovery based on Laboratory Results | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | B502-INF1 | | | B502-INTER1 | | | B502-INTER2 | | | B502-EFF | | | | | | | | |
| | Vacuum Flow Rate (cfm) | Applied Vacuum (in. $H_2O$) | System Influent VOC Concentration (ppmv) | Elapsed Run-Time (day) | PCE (mg/m$^3$) | TCE (mg/m$^3$) | *cis* -1,2-DCE (mg/m$^3$) | PCE (mg/m$^3$) | TCE (mg/m$^3$) | *cis* -1,2-DCE (mg/m$^3$) | PCE (mg/m$^3$) | TCE (mg/m$^3$) | *cis* -1,2-DCE (mg/m$^3$) | PCE (mg/m$^3$) | TCE (mg/m$^3$) | *cis* -1,2-DCE (mg/m$^3$) | PCE Recovery During Period: lb/hr | PCE Recovery During Period (lb) | TCE Recovery During Period (lb/hr) | TCE Recovery During Period (lb) | *cis* -1,2-DCE Recovery During Period (lb/hr) | *cis* -1,2-DCE Recovery During Period (lb) |
| 1/21/2016 | 316 | 54 | 0.000 | 2 | 2.2000 | 0.9200 | 0.9200 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0024 | 2.72 | 0.0010 | 1.14 | 0.0010 | 1.14 |
| 2/8/2016 | 275 | 54 | 0.000 | 18 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/8/2016 | 268 | 56 | 0.095 | 28 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4/12/2016 | 472 | 56 | 0.360 | 36 | 0.3800 | 0.1700 | 0.2500 | 0.0000 | 0.0000 | 0.6900 | 0.0000 | 0.0000 | 0.0090 | 0.0000 | 0.0000 | 0.0000 | 0.0007 | 0.58 | 0.0003 | 0.26 | 0.0004 | 0.38 |
| 5/16/2016 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 6/8/2016 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 7/11/2016 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 8/18/2016 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/12/2016 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 10/26/2016** | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 11/15/2016** | 546 | 55 | 0.511 | 20 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 12/22/2016** | 529 | 55 | 0.702 | 37 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | | | | | | | | | | | | | | | ANNUAL TOTALS = | 3.30 | | 1.40 | | 1.52 |

NOTE: cfm = cubic feet per minute
VOC = Volatile organic compound
ppmv = parts per million (vol./vol.)
mg/m$^3$ = milligrams per cubic meter
PCE = Tetrachloroethylene
TCE = Trichloroethene
*cis* -1,2-DCE = cis-1,2-Dichloroethene
Mass Recovery (Lab Res., lb/hr) = flow (cfm)*effluent conc. (mg/cu. m.)*1g/1000mg*1lb/453.6g*1cu. m./35.31cu. ft*60min/1 hr
Mass Recovery (Lab Res., lb) = Discharge Rate (lb/hr) * # of days*24hours/day
Shaded cells indicate O&M events performed during a previous reporting period.
* 4/13/16: Switched blowers at the Offsite System; switched from blower B-502 to B-501. Samples collected from B-502
* *10/26/16 Switched blowers from B-501 to B-502. Samples collected from B-501; B-501 operational data was combined with B-502 system operational data to determine mass recovery for the whole quarter

# Appendix A

# Institutional/Engineering Control Certification

**Enclosure 1**

**Engineering Controls - Standby Consultant/Contractor Certification Form**

| **Site Details** | | **Box 1** |
|---|---|---|
| **Site No.** 152140 | | |

**Site Name National Heatset Printing Co.**

Site Address: 1 Adams Boulevard Zip Code: 11735
City/Town: East Farmingdale
County: Suffolk
Site Acreage: 4.3

Reporting Period: January ~~30~~ 1, 2016 to ~~January 30, 2017~~ December 31, 2016 JCH

| | | YES | NO |
|---|---|---|---|
| 1. | Is the information above correct? | ~~X~~ | (X) JCH |
| (*) | If NO, include handwritten above or on a separate sheet. | | |
| 2. | To your knowledge has some or all of the site property been sold, subdivided, merged, or undergone a tax map amendment during this Reporting Period? | ☐ | X |
| 3. | To your knowledge has there been any change of use at the site during this Reporting Period (see 6NYCRR 375-1.11(d))? | ☐ | X |
| 4. | To your knowledge have any federal, state, and/or local permits (e.g., building, discharge) been issued for or at the property during this Reporting Period? | ☐ | X |
| | **If you answered YES to questions 2 thru 4, include documentation or evidence that documentation has been previously submitted with this certification form.** | | |
| 5. | To your knowledge is the site currently undergoing development? | ☐ | X |

**Box 2**

| | | YES | NO |
|---|---|---|---|
| 6. | Is the current site use consistent with the use(s) listed below? Industrial | X | ☐ |
| 7. | Are all ICs/ECs in place and functioning as designed? | X | ☐ |

**IF THE ANSWER TO EITHER QUESTION 6 OR 7 IS NO, sign and date below and contact the DEC PM regarding the development of a Corrective Measures Work Plan to address these issues.**

Signature of Standby Consultant/Contractor ____________________ Date ____________

**SITE NO. 152140** **Box 3**

**Description of Institutional Controls**

| Parcel | Owner | Institutional Control |
| --- | --- | --- |
| **100.097-0001-020.001** | Michael Adamowicz III | Ground Water Use Restriction<br>Monitoring Plan<br>Site Management Plan<br>O&M Plan<br>IC/EC Plan<br>Landuse Restriction |

The environmental notice provides an alert that the groundwater use is restricted.

**Box 4**

**Description of Engineering Controls**

| Parcel | Engineering Control |
| --- | --- |
| **100.097-0001-020.001** | Groundwater Treatment System<br>Vapor Mitigation<br>Air Sparging/Soil Vapor Extraction |

The site contains a soil vapor extraction system and an in-well vapor stripping system. The soil vapor extraction system remediates soil contamination beneath the on-site building and provides vapor mitigation for the building. The in-well vapor stripping system remediates groundwater contamination.

**Box 5**

**Periodic Review Report (PRR) Certification Statements**

1. I certify by checking "YES" below that:

   a) the Periodic Review report and all attachments were prepared under the direction of, and reviewed by, the party making the certification, including data and material prepared by previous contractors for the current certifying period, if any;

   b) to the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and the information presented is accurate and compete.

| YES | NO |
|---|---|
| ☒ | ☐ |

2. If this site has an IC/EC Plan (or equivalent as required in the Decision Document), for each Institutional or Engineering control listed in Boxes 3 and/or 4, I certify by checking "YES" below that all of the following statements are true:

   (a) the Institutional Control and/or Engineering Control(s) employed at this site is unchanged since the date that the Control was put in-place, or was last approved by the Department;

   (b) nothing has occurred that would impair the ability of such Control, to protect public health and the environment;

   (c) nothing has occurred that would constitute a failure to comply with the Site Management Plan, or equivalent if no Site Management Plan exists.

| YES | NO |
|---|---|
| ☒ | ☐ |

**IF THE ANSWER TO QUESTION 2 IS NO, sign and date below and contact the DEC PM regarding the development of a Corrective Measures Work Plan to address these issues.**

______________________________ Signature of Standby Consultant/Contractor

______________ Date

Box 6

**IC/EC CERTIFICATIONS**

**Professional Engineer Signature**

I certify that all information in Boxes 2 through 5 are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

I JAMES C. HAYWARD at 6712 BROOKLAWN PARKWAY
print name

SUITE 104

SYRACUSE, NY 13211,
(print business address)

am certifying as a Professional Engineer.

James C Hayward
Signature of Professional Engineer

STATE OF NEW YORK
JAMES C HAYWARD
079439
LICENSED PROFESSIONAL ENGINEER

Stamp
(Required for PE)

12/19/2017
Date

# Appendix B

# Annual Inspection

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**SITE-WIDE INSPECTION** **Day: ___Thurs_____ Date: ______12/22/16_______**

| | | | | | | |
|---|---|---|---|---|---|---|
| NYSDEC | | Temperature: (F) | 35 | (am) | 48 | (pm) |
| | | Wind Direction: | W | (am) | | (pm) |
| **National Heatset Printing Site** | | Weather: | (am) Partly Cloudy<br>(pm) Partly Cloudy | | | |
| **NYSDEC Site # 152140** | | | | | | |
| **Contract # 1490716.0003** | | Arrive at site | 0630 | (am) | | |
| **Babylon, New York** | | Leave site: | 1300 | (pm) | | |

# Site Security

**Evidence of vandalism (wells, protective cover damage):**

None

**Evidence of penetrations (poles, posts, stakes):**

None

**General site condition (gates, access, storm drains):**

Good. Damage to offsite enclosure fence in October 2016.

**Additional Comments:**

None

## SVE System Enclosure

**Is there any damage to the system enclosure?**

No

**Does system piping appear to be compromised in any way? If so, describe:**

Yes. Erosion near new horizontal well manifold on South side of system trailer. Water from roof drain on 1 Adams Blvd. building possibly entering system

**Do gauges and meters read within acceptable levels?**

Yes. Flow rates and PID readings of individual well legs lower than normal. Typically due to water in knockout tank. Once tank drained, system operating properly.

**Is equipment making any abnormal noises?**

No

**Is remote communication equipment functional?**

No. No call out received in advance of arrival on 12/21/16. “High high water level” alarm on knockout tank triggered, yet no call out received.

**Has enclosure heating and ventilation changed since the last inspection?**

No

**Is there any damage to the well heads?**

No, except for erosion around horizontal well manifold piping.

## On-Site DDC Treatment System

**Is there any damage to the system enclosure?**

No

**Does system piping appear to be compromised in any way? If so, describe:**

No

**Do gauges and meters read within acceptable levels?**

Yes, with the exception of pressure gauge on blower in Onsite DDC System #2. Gauge on blower panel suspected to be faulty. Often reads zero, when should not.

| |
|---|
| **Is equipment making any abnormal noises?**<br><br>No |
| **Is remote communication equipment functional?**<br><br>Yes, at times. During 2016 there were a few alarms triggered that were not called-out. |
| **Has enclosure heating and ventilation changed since the last inspection?**<br><br>No |
| **Is there any damage to the well heads?**<br><br>No |
| **Off-site DDC Treatment System** |
| **Is there any damage to the system enclosure?**<br><br>No |
| **Does system piping appear to be compromised in any way? If so, describe:**<br><br>No |
| **Do gauges and meters read within acceptable levels?**<br><br>Yes |
| **Is equipment making any abnormal noises?**<br><br>No |
| **Is remote communication equipment functional?**<br><br>Yes |
| **Has enclosure heating and ventilation changed since the last inspection?**<br><br>No |

**Is there any damage to the well heads?**

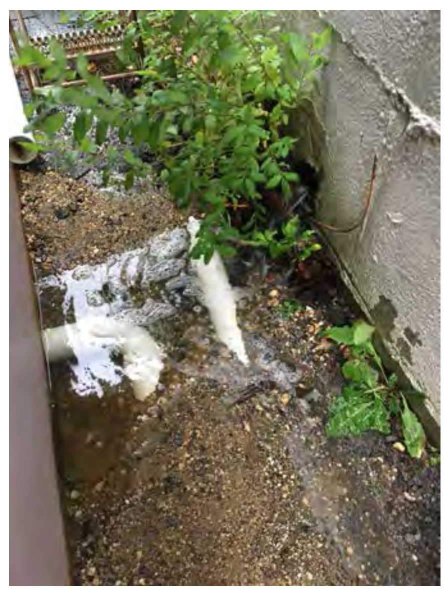
No

## INSPECTION PHOTOLOG

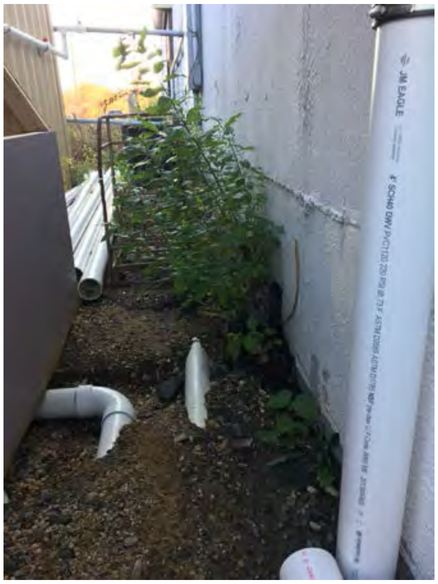
Tree from SCWA property on off-site system fence line (1 of 2)

Tree from SCWA property on off-site system fence line (2 of 2)

Damage to fence from tree

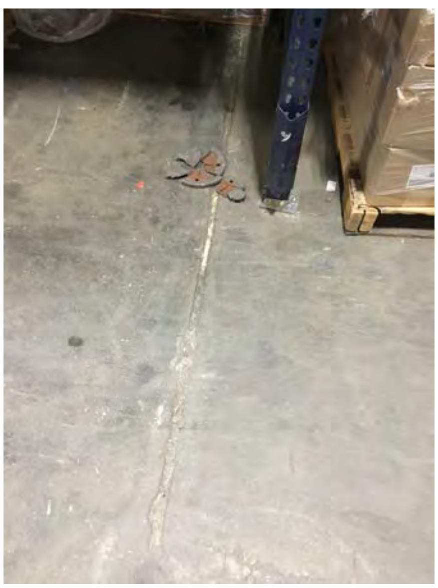


Water from roof drain ponding over horizontal well manifold



Erosion near SVE manifold

Missing well cap inside 1 Adams Blvd.



Well cap for MW-H


Blower in System #2 with faulty pressure gauge.

# Appendix C

# Green Remediation

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# Summary of Green Remediation Metrics for Site Management

Site Name: National Heatset Printing Co. Site Code: 152140
Address: 1 Adams Blvd City: Farmingdale
State: NY Zip Code: County: Nassau

**Initial Report Period (Start Date of period covered by the Initial Report submittal)**
Start Date: October 15, 2013

**Current Reporting Period**
Reporting Period From: 1 January 2016 To: 31 December 2016

**Contact Information**
Preparer's Name: James Hayward Phone No.: (315) 431-4610 x1857
Preparer's Affiliation: EA Engineering

**I. Energy Usage:** Quantify the amount of energy used directly on-site and the portion of that derived from renewable energy sources.

| | **Current Reporting Period** | **Total to Date** |
|---|---|---|
| Fuel Type 1 (e.g. natural gas (cf)) | 0 | 0 |
| Fuel Type 2 (e.g. fuel oil, propane (gals)) | 0 | 0 |
| Electricity (kWh) | 383,255 | 1,199,515 |
| **Of that Electric usage, provide quantity:** | | |
| Derived from renewable sources (e.g. solar, wind, and hydropower) | 57,182 (~14.92%) | 118,354 (~10%) |
| **Other energy sources** (e.g. geothermal, solar thermal (Btu)) | 0 | 0 |

*Provide a description of all energy usage reduction programs for the site in the space provided on Page 3.*

**II. Solid Waste Generation:** Quantify the management of solid waste generated on-site.

| | **Current Reporting Period (lb)** | **Total to Date (lb)** |
|---|---|---|
| **Total waste generated on-site** | | |
| OM&M generated waste | <5 | <15 |
| **Of that total amount, provide quantity:** | | |
| Transported off-site to landfills | <5 | <15 |
| Transported off-site to other disposal facilities | | 1,800 |
| Transported off-site for recycling/reuse | 5,077 | 19,077 |
| Reused on-site | 0 | 0 |

*Provide a description of any implemented waste reduction programs for the site in the space provided on Page 3.*

**III. Transportation/Shipping:** Quantify the distances travelled for delivery of supplies, shipping of laboratory samples, and the removal of waste.

| | Current Reporting Period (miles) | Total to Date (miles) |
|---|---|---|
| Standby Engineer/Contractor | 17,640 | 52,920 |
| Laboratory Courier/Delivery Service | 350 | 550 |
| Waste Removal/Hauling | 888 | 1,988 |

*Provide a description of all mileage reduction programs for the site in the space provided on Page 3. Include specifically any local vendor/services utilized that are within 50 miles of the site.*

**IV. Water Usage:** Quantify the volume of water used on-site from various sources.

| | Current Reporting Period (gallons) | Total to Date (gallons) |
|---|---|---|
| Total quantity of water used on-site | 0 | 0 |
| **Of that total amount, provide quantity:** | | |
| Public potable water supply usage | 0 | 0 |
| Surface water usage | 0 | 0 |
| On-site groundwater usage | 0 | 0 |
| Collected or diverted storm water usage | 0 | 0 |

*Provide a description of any implemented water consumption reduction programs for the site in the space provided on Page 3.*

**V. Land Use and Ecosystems:** Quantify the amount of land and/or ecosystems disturbed and the area of land and/or ecosystems restored to a pre-development condition (i.e. Green Infrastructure).

| | Current Reporting Period (acres) | Total to Date (acres) |
|---|---|---|
| Land disturbed | 0 | 0 |
| Land restored | 0 | 0 |

*Provide a description of any implemented land restoration/green infrastructure programs for the site in the space provided on Page 3.*

| **Description of green remediation programs reported above**<br>(Attach additional sheets if needed) |
|---|
| Energy Usage: PSE&G Environmental Information for Basic Generation states: Solar 2.75%, Wind 7.97%, Solid Waste 2.48%, Fuel Cells 0.02%, Hydro 0.01%, Captured Methane Gas 1.69%. https://www.pseg.com/info/environment/envirolabel.jsp |
| Waste Generation: Primarily spent GAC shipped off site for reactivation or blending to Darlington, PA |
| Transportation/Shipping: Primarily spent GAC shipped off site for reactivation or blending. Miles associated with Lab work increased when taking into account shipment of glassware to Syracuse office prior to sampling and shipping from site to the lab following sampling. |
| Water usage: |
| Land Use and Ecosystems: |
| Other: Modify operation of off-site DDC system to use single 100-HP blower (vs. two), which would also reduce amount of spent GAC.<br>Potential to cycle/alternate on-site DDC systems (based on groundwater velocity).<br>Use of "local" standby subcontractor to respond to system alarms (20 mi round trip for PES vs. 600 mi round trip for EA)<br>Use of nearby GAC vendor (100 mi round trip) for changeout support.<br>Use of dial-outs or remote communications to determine system status.<br>Green metrics for RSO work performed during 2016 will be captured in the 2017 PRR once quantities have been established. |

# Environmental Information for Basic Generation Service, PSE&G

## Electricity supplied from June 1, 2015 – May 31, 2016

Electricity can be generated in a number of ways with different impacts on the environment. The standardized environmental information shown below allows you to compare this electricity product with electricity products offered by other electric suppliers.

## Energy Source

PSE&G relied on these energy resources to provide this electricity product.

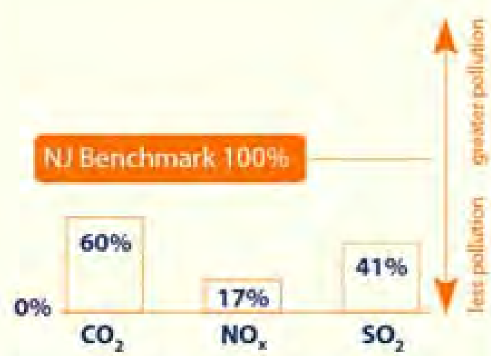
| | |
|---|---|
| **Coal** | **20.83%** |
| **Gas** | **22.30%** |
| **Hydroelectric (large)** | **0.04%** |
| **Nuclear** | **41.71%** |
| **Oil** | **0.20%** |
| **Renewable energy** | |
| **Captured Methane Gas** | **1.69%** |
| **Fuel Cells** | **0.02%** |
| **Geothermal** | **0%** |
| **Hydroelectric (small)** | **0.01%** |
| **Solar** | **2.75%** |
| **Solid Waste** | **2.48%** |
| **Wind** | **7.97%** |
| **Wood or other biomass** | **0%** |
| **Total** | **100%** |

**Renewable energy sources subtotal: 14.92%**

## Air Emissions

The amount of air pollution associated with the generation of the electricity product is shown. This amount is compared to a New Jersey benchmark. The benchmark approximates the average emission rate for all electricity generation in New Jersey.

**$CO_2$ is a "greenhouse gas" which may contribute to global climate change. $SO_2$ and $NO_x$ react to form acids found in acid rain. $NO_x$ also reacts to form ground level ozone, an unhealthful component of "smog."**




## Energy Conservation

Electricity generation and associated air emissions avoided through PSE&G's investments in conservation measures. Energy conservation measures mean less electricity needs to be generated and pollution is avoided.

| Avoided Generation | Avoided Air Emissions |
|---|---|
| **194,016, 261 KWh** | **107,853 tons $CO_2$** |
| | **92 tons $NO_x$** |
| | **214 tons $SO_2$** |

See your Terms of Service for further information regarding this electricity product.
You may also call PSE&G for additional information, or a copy of the Terms of Service at 1-800-706-PSEG.