# FOURTH FIVE-YEAR REVIEW REPORT FOR BREWSTER WELL FIELD SUPERFUND SITE PUTNAM COUNTY, NEW YORK

**Prepared by**

**U.S. Environmental Protection Agency**
**Region 2**
**New York, New York**

for **John Prince, Acting Director**
**Emergency and Remedial Response Division**

8.15.17
**Date**

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## LIST OF ABBREVIATIONS & ACRONYMS

| | |
|---|---|
| CDM Smith | Camp Dresser McKee & Smith |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulations |
| DCE | 1,2-Dichloroethene |
| Ebasco | Ebasco Services, Inc. |
| EPA | United States Environmental Protection Agency |
| ESD | Explanation of Significant Differences |
| FS | Feasibility Study |
| FYR | Five-Year Review |
| GMS | Groundwater Management System |
| HDR | Henningson, Durham & Richardson Architecture and Engineering, P.C.<br>In association with HDR Engineering, Inc. |
| ICs | Institutional Controls |
| MCL | Maximum Contaminant Level |
| MGMS | Modified-Groundwater Management System |
| MTBE | Methyl-Tert-Butyl Ether |
| NCP | National Oil and Hazardous Substances Pollution Contingency Plan |
| NYC | New York City |
| NYSDEC | New York State Department of Environmental Conservation |
| NPL | National Priorities List |
| O&M | Operation and Maintenance |
| OU | Operable Unit |
| PCE | Tetrachloroethene |
| RA | Remedial Action |
| RAOs | Remedial Action Objectives |
| RI | Remedial Investigation |
| River | East Branch Croton River |
| ROD | Record of Decision |
| RSE | Remedial System Evaluation |
| Site | Brewster Well Field Site |
| SPDES | State Pollutant Discharge Elimination System |
| Subaru | Brewster Subaru |
| TCE | Trichloroethene |
| VOCs | Volatile Organic Compounds |

# I. INTRODUCTION

The purpose of a five-year review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in FYR reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The U.S. Environmental Protection Agency (EPA) is preparing this FYR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Contingency Plan (NCP)(40 CFR Section 300.430(f)(4)(ii)), and considering EPA policy.

This is the fourth FYR for the Brewster Well Field Superfund site (Site). The triggering action for this policy review is the completion date of the previous FYR, April 18, 2012. The FYR has been prepared due to the fact that the remedial action will not leave hazardous substances, pollutants or contaminants on-Site above levels that allow for unlimited use and unrestricted exposure, but requires five or more years to complete.

The Site consists of two Operable Units (OUs). OU1 addresses the groundwater remedy, which has been constructed and is currently operating. OU2 addressed the source of the groundwater contamination, the dry well and its contents, surrounding contaminated soils, and residual soil contamination found beneath a former dry cleaner (now an automobile dealership); OU2 was completed in 2011. Only OU1 will be evaluated in this FYR.

The FYR was led by Lisa Wong, EPA Remedial Project Manager. Participants included Michael Scorca, EPA hydrogeologist, Abbey States, EPA Human Health Risk Assessor, Michael Clemetson, EPA Ecological Risk Assessor, Cecilia Echols, EPA Community Involvement Coordinator, and Carl Hoffman, New York State Department of Environmental Conservation (NYSDEC) Project Manager. The FYR began on August 29, 2016.

## Site Background

The 30-acre Site is located on the northern and southern banks of the East Branch Croton River, approximately ¾ mile east of the Village of Brewster, Town of Southeast, Putnam County, New York (Figure 1; see Appendix C for all of the referenced figures). The Site includes a well field and two sources of contamination. Interstate 84 passes just to the west of the Site. The land to the north of the Site is the community of Brewster Hill. This area is largely residential, with some agricultural use. Most of the land south of the Site is occupied by commercial or light industrial facilities.

A municipal water system serves the Village of Brewster, several areas in the Town of Southeast, and several business establishments and the Consolidated Rail Corporation's Putnam Junction Rail Yard. The Village of Brewster accounts for 2,200 residential users. Three thousand feet to the east of the Site, the East Branch Croton River is impounded to form the East Branch Reservoir, part of New York City's (NYC's) Croton watershed reservoir system. Three thousand feet from

the Site to the northeast, Bog Brook, a tributary to the East Branch Croton River, is impounded to form NYC's Bog Brook Reservoir. The East Branch Croton River also contributes to the Croton Falls Reservoir, located approximately 3.5 miles downstream from the Site.

The Site was placed on the National Priorities List of Superfund sites in December 1982.

**FIVE-YEAR REVIEW SUMMARY FORM**

| **SITE IDENTIFICATION** | | |
|---|---|---|
| **Site Name:** **Brewster Well field** | | |
| **EPA ID:** NYD980652275 | | |
| **Region:** 2 | **State:** NY | **City/County:** Brewster/Putnam |
| **SITE STATUS** | | |
| **NPL Status:** Final | | |
| **Multiple OUs?** Yes | **Has the site achieved construction completion?** Yes | |
| **REVIEW STATUS** | | |
| **Lead agency:** EPA *[If "Other Federal Agency", enter Agency name]*: | | |
| **Author name (Federal or State Project Manager):** Lisa Wong | | |
| **Author affiliation:** EPA | | |
| **Review period:** 4/19/2012 - 4/18/2017 | | |
| **Date of site inspection:** 11/3/2016 | | |
| **Type of review:** Policy | | |
| **Review number:** 4 | | |
| **Triggering action date:** 4/18/2012 | | |
| **Due date** *(five years after triggering action date)*: 4/18/2017 | | |

## II. RESPONSE ACTION SUMMARY

### Basis for Taking Action

The Brewster Well Field was found to be contaminated with volatile organic compounds (VOCs), primarily tetrachloroethene (PCE), trichloroethene (TCE), and 1,2-dichloroethene (1,2-DCE) in 1978.

From 1984 to 1986, through a cooperative agreement between NYSDEC and EPA, NYSDEC's consultant, GHR Engineering Associates, performed a remedial investigation and feasibility study (RI/FS) to determine the nature and extent of the groundwater contamination, and to evaluate cleanup alternatives at the Site. The RI concluded that the primary contaminants found in the groundwater are PCE, TCE, and 1,2-DCE, and that a plume of contamination was found to extend from the vicinity of Alben Dry Cleaners (now a Subaru dealership) to the well field.

In 1988, a source control RI/FS was completed by EPA's contractor, Ebasco Services, Inc. (Ebasco). The RI concluded that a dry well located adjacent to Alben Dry Cleaners, used for disposal of dry-cleaning wastes from the initial operation in 1965 until 1983, was the source of the contamination present at the well field.

## Response Actions

Upon discovery of VOC contamination in the Brewster Well Field, from 1978 to 1984, the Village of Brewster used several drilling, blending, and pumping strategies to keep contaminant levels down.

Under a cooperative agreement with EPA, the Village installed a full-scale air stripper in 1984, which is currently providing drinking water to the Village that meets federal and state drinking water requirements.

*Remedy Selection*

On September 30, 1986, a Record of Decision (ROD) was signed to address the groundwater. The remedial action objectives (RAOs) related to the groundwater are:

- Provide a safe, reliable water supply, meeting EPA standards, to the village of Brewster;
- Contain the plume of contamination to mitigate further contamination of public water supplies; and
- Restore groundwater quality at and in the vicinity of the Brewster Well Field to acceptable levels (NYS Groundwater Standards)

The selected remedy includes continuing to operate the existing air stripping system at the well field in order to continue to provide a safe and reliable water supply. The remedy also included the design and construction of a Groundwater Management System (GMS) to extract contaminated groundwater to restore groundwater quality. After the treatment, the groundwater was to be reinjected to the aquifer so as not to adversely impact area wetlands.

The Applicable or Relevant and Appropriate Requirements for groundwater cleanup include EPA's Maximum Contaminant Levels (MCLs) and New York State's groundwater quality standards. The action level established for TCE at the Site is 5 micrograms per liter (µg/l).[1]

[1] Proposed MCL at the time of the ROD issuance.

After the GMS was constructed, due to operational difficulties related to the reinjection system, the remedy was modified via an Explanation of Significant Differences (ESD) in December 1996. The ESD changed the final disposition of the treated groundwater from reinjection to surface water discharge. The ESD also called for the monitoring of nearby wetlands to determine whether or not the cessation of reinjection of the treated groundwater would have an adverse impact on them.

On September 29, 1988, a ROD was signed to address the source area. The RAOs were:

- Ensure the viability of the GMS to be constructed under OU1 by removing any continuing source of contamination; and
- Minimize any potential risks associated with direct contact with contaminated residual Site soils by removing any soils posing unacceptable health risks.

The selected remedy called for the excavation, removal, and off-Site incineration of the contents of the dry well and the surrounding contaminated soils. An additional source was subsequently found beneath the Subaru dealership building. A vapor mitigation system installed under the Subaru dealership building was expanded to address the small source, as documented in a 2009 ESD.

## Status of Implementation

### OU1 Groundwater

A packed tower air stripper was installed in 1984 to provide treatment of the Village of Brewster water supply.

Ebasco awarded a remedial action (RA) contract to YWC, Inc. to construct the original GMS on October 13, 1989; the construction was completed in March 1991. The GMS consisted of four extraction wells (EW-1, EW-2, EW-3, and EW-4)[2] screened from approximately 20 to 32 feet below ground surface. The combined flow from the four extraction wells was designed to be 45 to 50 gallons per minute (gpm).

The system was originally designed such that treated water would be reinjected through a series of wells, cross-gradient from the extraction wells. However, after installation and during shakedown, the GMS was unable to process water consistent with the designed performance criteria. As a result, an evaluation of the viability of discharging the air-stripped water to the East Branch Croton River, in lieu of reinjecting it on-Site, was performed by Malcolm Pirnie Inc. Based on the findings of this investigation, surface water discharge was determined to be the optimal alternative to reinjection.[3]

[2] Figure 2 shows the locations of the monitoring and extraction wells on the Site.

[3] The modification to the selected remedy (*i.e.,* changing the final disposition of the treated groundwater from reinjection to surface water discharge) was documented in an ESD, which was issued in December 1996.

Construction of a 150-foot, 4-inch, underground discharge pipe and outfall system for the GMS was completed in September 1996, and the GMS was restarted in October 1996. The GMS is required to treat contaminated groundwater to groundwater standards and applicable state surface water discharge criteria. Additionally, as part of the long-term performance monitoring of the GMS, potential wetland and flood plain-related impacts associated with the surface water discharge were to be evaluated on an annual basis. The evaluations conducted did not find any undesirable wetland and floodplain impacts.

In late 2001, a Remedial System Evaluation (RSE) was conducted at the Site. The results were presented in a 2002 report.[4] To improve capture, three new extraction wells (ERTEW-5, ERTEW-6, and ERTEW-7) were installed close to the source area, and a multipoint air sparge well (ERT-SPR-1) was installed immediately upgradient of the source area to provide a possible enhancement to the groundwater remedy. The air sparging well operated to assist in contaminant removal until it was no longer needed and was decommissioned in August 2012. The Modified Groundwater Management System (MGMS) became operational in late fall 2007.

OU2 Source Control

In August 1991, the drywell was excavated and confirmation sampling at the excavation limits was performed. The remediation of the source of contamination reduced contamination of the soils in the unsaturated zone to acceptable health based levels.

Because of the potential for the migration of volatile chemicals from the subsurface into overlying buildings at properties located near VOC-contaminated groundwater, soil gas (vapor) samples were collected from beneath the slab of the Subaru dealership building in May 2006. The results of this investigation showed elevated VOC concentrations. Because of concerns that these vapors could be impacting indoor air at the dealership, a subslab mitigation system[5] was installed in January 2007. The vapor mitigation system continues to operate due to residual contamination remaining in the groundwater beneath the building.

In January 2009, a soil investigation beneath the dealership building was performed to determine if residual soil contamination was present. The results of this investigation indicated that a small volume of contaminated soil was located underneath the building. Although the removal of the contaminated soil was considered, because this would significantly disrupt the dealership's business and could potentially impact the structural integrity of the building, the subslab mitigation system was enhanced with a greater capacity blower and additional piping so that it could target the contaminated soil[6]. Confirmation soil samples collected from the soil area in July 2011 indicated that the cleanup objectives for the 1988 OU ROD had been met.

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[4] Remedial System Evaluation, Brewster Well Field Superfund Site, Brewster, New York, Final Report, April 2002

[5]. The collected vapors are vented to the atmosphere consistent with the requirements of the NYSDEC's DAR-l Guidelines for the Control of Toxic Ambient Air Contaminants (1997).

[6] In October 2009, an ESD was approved to document EPA’s decision to install the enhanced subslab mitigation system to address soil vapor intrusion and the additional source material found beneath the Subaru dealership building

Although the OU2 soil remedy is completed and will no longer be evaluated in this FYR, due to residual groundwater contamination, the vapor mitigation system still proactively addresses the groundwater vapor intrusion pathway and will be evaluated as part of OU1. In March 2013, NYSDEC assumed responsibility for the subslab mitigation system O&M as part of the groundwater restoration remedial action (OU1).

## IC Summary Table

*Institutional Controls for Soils and Groundwater*

New private wells cannot be installed without prior approval of the Putnam County Health Department, thereby preventing the installation of new wells in the contaminated plume. There are three private water supply wells located downgradient of the source area. Two of these wells are located outside of the plume and the other well is screened below the plume. Because treatment of contaminated water extracted from a well is required by the Putnam County Department of Health, these wells are protected.

To prevent the potential exposure to the contaminated soils below the water table on the Subaru dealership property and to area groundwater, EPA notified the Town of Southeast planning board via a March 19, 2007 letter that EPA should be contacted prior to the approval of any construction on the dealership property and any planned development in the general vicinity of the Site. The dealership was similarly notified on June 18, 2009. Periodic reminders have been issued and will continue to be issued by EPA or NYSDEC to the planning board and the dealership. The Putnam County Department of Health's restrictions related to the installation of wells and the notifications to the planning board and the dealership constitute "informational device" institutional controls, which were added to the implemented remedy. In addition, on an annual basis, the Site is to be inspected to determine whether any intrusive activities have been performed at the Site (*i.e.,* at the Subaru dealership). EPA's decision to add the above-noted institutional controls to the remedy were documented in the 2009 ESD.

Table 1, below, summarizes the planned and/or implemented ICs.

**Table 1: Summary of Planned and/or Implemented ICs**

| Media, engineered controls, and areas that do not support UU/UE based on current conditions | ICs Needed | ICs Called for in the Decision Documents | Impacted Parcel(s) | IC Objective | Title of IC Instrument Implemented and Date (or planned) |
|---|---|---|---|---|---|
| Soil and Groundwater | Yes | Yes | Subaru Dealership Property | To prevent the potential exposure to the contaminated soils located below the watertable and groundwater and to prevent any actions which might adversely impact the remedy | March 19, 2007 notification letter sent to Town of Southeast Planning Board and June 18, 2009 notification letter to the dealership that EPA should be contacted prior to any planned construction on the dealership |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | property. Periodic reminders have been issued and will continue to be issued by EPA or NYSDEC to the planning board and dealership. |
| Groundwater | Yes | Yes | Areas downgradient of Dealership Property | To prevent the potential exposure to the contaminated groundwater and to prevent any actions which might adversely impact the remedy | March 19, 2007 notification letter sent to Town of Southeast Planning Board that EPA should be contacted prior to the approval of any any planned future development in the general vicinity of the Site. Periodic reminders have been issued and will continue to be issued by EPA or NYSDEC to the planning board.<br><br>Putnam County Department of Health's well installation permit requirements: http://www.putnamcountyny.com/health/environmental/<br><br>New York Department of Health Codes, Rules, and Regulations for water well permit need: https://regs.health.ny.gov/content/section-5-24-need-permit |

**Systems Operations/Operation & Maintenance**

In October 2007, NYSDEC assumed responsibility for the MGMS operation and maintenance (O&M).[7] NYSDEC's contractors operate and perform O&M activities on the MGMS system.

On a monthly basis, each extraction well, the combined influent, and the treated water discharge are sampled for VOCs.

The air stripper trays of the MGMS are cleaned about once per year by scraping and washing using a dilute muriatic acid solution to remove or reduce the scale build-up seen historically through the GMS operations.

On a monthly basis, the pin wheels on the flow meters are removed and cleaned to ensure that accurate flow volumes are recorded.

Due to fouling of extraction well ERTEW6, it was abandoned and a new replacement well was installed a few feet away in June 2013. After successful troubleshooting and transducer replacement was completed in November 2015, the new well has been in full operation. In addition, during the FYR period, ERTEW-5's pump was replaced and ERTEW-7's transducer was replaced.

The MGMS also experienced power outages during the review period that impacted the overall run time and treatment volume. In October 2015, underground wiring from the extraction wells EWERT-5 and EWERT-7 was defective and replaced. During replacement, rocks/debris were observed in the existing conduits, indicating that the conduits were compromised. The conduits should be repaired or replaced.

The MGMS is currently operating at an average monthly pumping rate of approximately 34 gpm. The total cumulative flow from the three new extraction wells from February 2008 to December 27, 2016 was about 146 million gallons. The pumping rate of extraction well ERTEW-7 has been relatively constant around the design flow and producing the largest amount of water. The pumping rate of extraction wells ERTEW-5 and ERTEW-6 was reduced during periods of low water level conditions and occurrences of subsurface material infiltration in the wells and/or fouling of the lines between the treatment system and the wells.

The Site monitoring wells are inspected at a minimum of once per year to ensure their integrity and identify the needs of any repairs. The inspection includes checking the wells' inner and outer casing structure, recording the presence of well caps or plugs, and any features or damage that may impact the functionality of the wells. As needed, wells are repaired. In addition, groundwater-level data is collected annually from about 49 monitoring wells and groundwater quality monitoring is performed annually from 30 to 33 monitoring wells and samples are

[7] At Superfund sites, if after 10 years of GMS operation by EPA, groundwater cleanup goals are not achieved, states take over the responsibility for the O&M of the GMS.

analyzed for VOCs and Methyl-Tert-Butyl Ether (MTBE).[8]
The packed tower air stripper that is providing treatment to the Village of Brewster water supply continues to be properly operated and maintained by the Village. The Village water supply is a public water supply that is covered under the Safe Drinking Water Act, as well as state and county requirements.

In addition, in 2013, NYSDEC assumed responsibility for the vapor mitigation system O&M. When the Subaru dealership building's subslab mitigation system was inspected in May 2016, some deficiencies were noted and repaired. Specifically, the manometer on the blower was malfunctioning and replaced, manometers were installed on all of the remaining blowers, and a broken conduit was repaired.

*Climate Change*

Potential Site impacts from climate change have been assessed, and the performance of the remedy is currently not at risk due to the expected effects of climate changes in the region and near the Site.

## III. PROGRESS SINCE THE LAST REVIEW

This section includes the protectiveness determinations and statements from the last FYR, as well as the recommendations from the last FYR and the current status of those recommendations.

**Table 2: Protectiveness Determinations/Statements from the 2012 FYR**

| OU # | Protectiveness Determination | Protectiveness Statement |
|---|---|---|
| 1 | Short-term Protective | The groundwater remedy at the Brewster Well Field Site is protective of human health and the environment in the short-term since area-wide well drilling bans and the use of a treated municipal water supply prevent exposure to contaminated groundwater. In order for the remedy to be protective in the long-term, the extent of the low level VOC concentration plume needs to be delineated and alternatives to address plume containment and restoration need to be evaluated. |
| 2 | Protective | The source control remedies at the Brewster Well Field |

[8] In February 1997, under state authorities, a gasoline service station's leaking underground storage tanks and associated contaminated soil (located less than 100 feet upgradient from the original GMS) were removed and excavated, respectively. As a result of this leakage of gasoline, MTBE was detected in several on-Site monitoring wells and in the influent of the GMS' air stripper. While MTBE was detected in the GMS' surface water discharge, the levels were in compliance with the State Pollutant Discharge Elimination System discharge (SPDES) criteria. MTBE was not detected in the influent of the MGMS (located upgradient from the gasoline leakage) following startup in 2008 and subsequently was not required to be monitored under the SPDES. The Village monitors for MTBE and has not detected any MTBE in its water supply system.

| | | |
|---|---|---|
| | | are protective of human health and the environment. All exposure pathways that could result in unacceptable risks are being controlled by the operation of the vapor mitigation system at the Subaru dealership. |
| Sitewide | Short-term Protective | The remedies at the Brewster Well Field Site currently protect human health and the environment in the short-term since vapor mitigation is preventing exposure to contaminated vapors and area- wide well drilling bans and use of a treated municipal water supply prevent exposure to contaminated groundwater. In order for the remedy to be protective in the long-term, the extent of the low level VOC concentration plume needs to be delineated and alternatives to address plume containment and restoration need to be evaluated. |

**Table 3**: **Status of Recommendations from the 2012 FYR**

| OU # | Issue | Recommendations | Current Status | Current Implementation Status Description | Actual Completion Date |
|---|---|---|---|---|---|
| 1 | A portion of the contaminant plume near the East Branch Croton River with low level VOC concentrations will require additional data to be collected for assessment of approaches for better treatment. | Evaluation of groundwater plume capture for this area near the East Branch Croton River as part of the overall performance of the modified groundwater management system needs to continue following collection of additional data from new monitoring wells and implementation of the optimal capture strategy. | Considered But Not Implemented | Installation of two additional monitoring wells previously planned for this area are not likely to be needed based on the sampling data collected since the 2012 FYR. Sampling results from majority of the existing monitoring wells near the East Branch Croton River have shown steadily low VOC concentrations. Monitoring of existing wells near the River will continue to confirm that the VOC levels are not increasing and information will be used to inform future optimization or need for system enhancements to expedite aquifer restoration. | 12/31/2012 |

# IV. FIVE-YEAR REVIEW PROCESS

## Community Notification, Involvement & Site Interviews

On November 14, 2016, EPA Region 2 posted a notice on its website indicating that it would be reviewing site cleanups and remedies at 38 Superfund sites in New York and New Jersey, including the Brewster Well Field Site. The announcement can be found at the following web address:

https://www.epa.gov/sites/production/files/2016-11/documents/five_year_reviews_fy2017_final.pdf.

In addition to this notification, a public notice was provided to the Village of Brewster for posting on the Village's website on February15, 2017, stating that there was a FYR underway and inviting the public to submit any comments to EPA. In addition, the notice included contact information, including addresses and telephone numbers, for questions related to the FYR process or the Site. The results of the review and report will be made available at the Site information repositories, located at EPA Region 2, 290 Broadway, 18th Floor, New York, New York, 10007, and at the Brewster Village Hall, 50 Main Street, Brewster, NY 10509.

## Data Review

### Groundwater

Groundwater-level data is collected annually from about 49 monitoring wells. The water levels are measured while the MGMS and the Brewster Village well field are actively pumping. Beyond the immediate capture zone of the MGMS, groundwater generally flows northward toward the East Branch Croton River and some flows beneath the river due to the influence of the Village well field. Under non-pumping conditions, groundwater would flow to the East Branch Croton River, from the north and south.

Since the last FYR, groundwater quality monitoring has been performed annually. Groundwater samples were analyzed for VOCs by EPA Method 8260B. The analytical data was evaluated and compared to previous monitoring results, as well as EPA's MCLs, NYSDEC's Ambient Water Quality Standards and Guidance Values, and New York State Drinking Water Standards. The primary groundwater contaminants are PCE and its reductive dehalogenation daughter products, TCE, 1,2-DCE, and vinyl chloride.

VOC concentrations in the pretreatment system influent at the Brewster Village well field have remained low through the FYR period and are below the New York State Drinking Water Standards (Figure 3) for PCE and its reductive dehalogenation daughter products.

A review of the historical groundwater monitoring data indicates a trend of overall reduction in VOC levels in most of the wells. The trends at several selected wells are illustrated in Figures 4 through 12 and are discussed below.

Monitoring well DGC-19I (Figure 4) is the nearest well directly downgradient of the new MGMS extraction wells, which are located near the source area under the Subaru dealership building. VOC concentrations have declined significantly since the startup of the MGMS in 2007 (Figure 4) and have remained near or below the groundwater standards since 2011, which indicates that the MGMS has been working effectively to capture the source area contamination.

VOC concentrations at several other downgradient monitoring wells have declined at a faster rate since the startup of the MGMS. Monitoring wells DGC-6I (Figure 5) and DGC-16I (Figure 6) are south of the East Branch Croton River and both have shown long term declining PCE concentrations. Monitoring well DGC-16I had stable PCE concentrations around 10 µg/L during the last five years. Although monitoring well DGC-6I showed a short term increase in cis-1,2-DCE in 2010, it is currently continuing to decline. Monitoring well TH-7, which is on the north side of the East Branch Croton River, has demonstrated a larger decrease in VOC concentrations since the startup of the MGMS.

Monitoring wells DGC-7I (Figure 8), DGC-9I (Figure 9), and DGC-17I (Figure 10) are in the wetlands area on the south side of the East Branch Croton River. Concentrations of the daughter product cis-1,2-DCE are notably higher than PCE at each of these wells. Although the historical concentrations of cis-1,2-DCE in monitoring well DGC-7I have been variable, they have shown a decreasing trend since the late 2000s, with progressively decreasing maximum concentrations. VOC concentrations at monitoring well DGC-9I also have shown considerable variability since 2000 and could be influenced by seasonal conditions. Recent cis-1,2-DCE concentrations at monitoring well DGC-9I have ranged from 14 µg/L to non-detect. The concentrations of cis-1,2-DCE in monitoring well DGC-17I from 2013 to 2016 ranged from 22 to 62 µg/L.

Monitoring wells DGC-1I (Figure 11) and DGC-12IA (Figure 12) are in an area on the north side of the river to the northeast of the wetlands area. Residual PCE contamination was observed at these wells during the FYR period with no discernable trend. The PCE concentration in this area was as high as 35 µg/L in monitoring well DGC-12IA in 2014.

VOC concentrations in the combined groundwater influent of the MGMS extraction wells have been generally stable since the last FYR (Figure 13). PCE remains the predominant contaminant and it ranged between 200 and 300 µg/L from 2011 through 2016, with a few short-term fluctuations.

In summary, the effectiveness of the groundwater extraction and treatment remedy is demonstrated by a) the significant decline in VOC concentrations at immediately downgradient monitoring well DGC-19I since the startup of the MGMS in 2007, b) effective treatment of VOC concentrations at the Brewster Village well field from very low influent levels to drinking water standards, and c) the generally declining VOC concentrations at most of the wells in the monitoring network. Although there is a low level VOC plume downgradient of the MGMS, VOC concentrations remain low and do not appear to be increasing at this time. Trends in the wells downgradient of the MGMS will continue to be evaluated over the next five years. If they increase or do not decline as expected, additional efforts to identify remedial enhancement strategies will be considered.

Vapor Intrusion Mitigation

Indoor air and subslab samples collected at the Subaru dealership building have shown substantial, declining VOC reductions since the installation of the mitigation system. The reductions are attributable to the mitigation system in conjunction with operation of the MGMS.

In April 2012, indoor air and subslab samples were collected at the Subaru dealership building when the vapor mitigation system had been turned off by the dealership[9]; both indoor air and sub-slab results exceeded EPA's risk-based vapor intrusion screening levels (VISLs) for PCE and TCE. Follow-up indoor air samples collected in August 2012 and January 2013 (when the mitigation system was on) were below the screening levels, indicating that the system is protective when it is operating. In March 2013, NYSDEC assumed responsibility for the subslab mitigation system O&M. Indoor air and subslab samples at the Subaru dealership building have not been collected since the 2013 sampling; however, the system is annually monitored by NYSDEC to ensure that adequate pressure is being maintained.

**Site Inspection**

The inspection of the Site was conducted on November 3, 2016. In attendance were Ms. Wong, Mr. Scorca, Ms. States, Mr. Hoffman, Susan Edwards, NYSDEC Section Chief, and Katelyn Reepmeyer, CDM Smith Project Manager. The purpose of the inspection was to assess the protectiveness of the remedy.

The inspection found the MGMS and subslab mitigation system operating in a well-maintained and functional facility.

During the inspection, extraction well ERTEW-5 was found not to be pumping water.[10] Also, a bubble wrap plug was observed on a PVC pipe reducer fitting hidden behind supply boxes in the parts room of the Subaru dealership building.[11]

## V. TECHNICAL ASSESSMENT

***QUESTION A:*** *Is the remedy functioning as intended by the decision documents?*

[9] The dealership was provided with the April 2012 indoor air and subslab sample results and advised of the need to have the mitigation system in continued operation for protection of the workers.
[10] A new pump motor was installed in January 2017 and this well was returned to operation.
[11] In December 2016, it was discovered that this fitting was part of the piping disconnected from the subslab extraction well SDS-5N. This piping was reconnected by NYSDEC's subslab system O&M subcontractor Geologic NY, Inc. on February 24, 2017.

Plume Containment

The 1986 ROD called for the continued operation of the existing air stripping system at the well field so as to continue to provide a safe and reliable water supply. The Village of Brewster's air stripping system is well maintained and meets all treatment goals as described earlier. The system is properly operated and has no history of noncompliance.

The 1986 ROD, as modified by the 1996 ESD, also called for a GMS to contain the groundwater contaminant plume and to restore groundwater quality south of the East Branch Croton River. The original GMS operated from 1997 to 2007. Following an optimization study, the MGMS was constructed at a location closer to the source area; it has operated since 2007. Since its operation, the MGMS' effluent meets all surface water discharge requirements.[12] The MGMS is working effectively to capture the source area contamination near the Subaru dealership building. Some residual groundwater contamination remains in the downgradient portion of the plume near the East Branch Croton River, but groundwater sampling data suggest that concentrations are declining. Further, any VOCs that reach the Village well field are treated by the municipal air stripper system. It is recommended that monitoring of the existing monitoring wells in this downgradient area continue so as to confirm that VOC levels are not increasing. Trends in the wells downgradient of the MGMS will continue to be evaluated over the next five years. If they increase or do not decline as expected, additional efforts to identify remedial enhancement strategies will be considered.

Vapor Mitigation

The vapor mitigation system that was installed under the Subaru dealership building (pursuant to the 1988 OU2 ROD) to address source areas continues to be operated to address potential vapor intrusion from groundwater contamination. Sampling conducted over the five-year period demonstrates that the system is operating effectively to prevent exposure to vapors in the Subaru dealership building.

***QUESTION B:*** *Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?*

Although specific parameters may have changed since the time the risk assessment was completed, the process that was used remains valid and is not expected to affect the remedy. The exposure assumptions, toxicity data, cleanup levels, and RAOs identified remain valid. There are no changes in the physical conditions of the Site or Site uses that would affect the protectiveness of the selected remedies. Land use assumptions and pathways evaluated in the RI/FS and considered in the decision documents remain valid.

[12] Groundwater treatment to EPA's MCLs and New York State's groundwater quality standards is being met under the 1986 ROD's original remedy. Due to operational difficulties related to the reinjection system, the 1996 ESD changed the final disposition of the treated groundwater from reinjection to surface water discharge.

As mentioned in the previous FYR report, although the toxicity of PCE has changed since the time of the original risk assessment, the levels of PCE present in the dry well area, beneath the Subaru dealership building, and in indoor air are within EPA's acceptable risk range. The institutional controls for the Site prevent exposure to contaminated soils below the water table on the Subaru dealership property and to area groundwater.

Shallow groundwater results at monitoring wells ERT-1S and DGC-19S in the vicinity of the Subaru building continue to exceed VISLs which warranted the continued operation of the vapor mitigation system. No other buildings are located over the groundwater plume where this exposure pathway may be an issue.

An ecological evaluation was conducted in 1986. It cited studies regarding the low likelihood of chlorinated solvent bioaccumulation in fish. It also emphasized the high volatility of these chemicals that translates to a low residency time in surface water. Since the time of this evaluation, new ecological risk guidance has been published, as well as benchmark surface water concentrations that can be used to screen data for potential problems and further evaluation. The March 2012 confirmation samples taken upstream and downstream of the MGMS' outfall during the last FYR did not detect the chemicals of concern and indicates that neither the groundwater plume nor the treatment effluent are impacting surface water in the East Branch Croton River. Additionally, the actions taken at the Site have eliminated any potential risk from surface soil contaminants to terrestrial receptors. Therefore, the remedy currently remains protective of ecological resources.

The RAOs selected for OU1 include: providing a safe, reliable water supply, meeting EPA standards, to the village of Brewster; containing the plume of contamination to mitigate further contamination of public water supplies; and restoring groundwater quality at and in the vicinity of the Brewster Well Field to acceptable levels (NYS Groundwater Standards). These RAOs are still valid.

***QUESTION C:*** *Has any other information come to light that could call into question the protectiveness of the remedy?*

There is no other information that calls into question the protectiveness of the remedy.

## VI. ISSUES/RECOMMENDATIONS

**Table 4: Issues/Recommendations**

| **Issues/Recommendations** |
|---|
| **OU(s) without Issues/Recommendations Identified in the Five-Year Review:** |
| 1 and 2 |

**Other Findings**

Trends in the wells downgradient of the MGMS will continue to be evaluated over the next five years. If they increase or do not decline as expected, additional efforts to identify remedial enhancement strategies will be considered.

Indoor air and subslab samples should be collected at the Subaru dealership building during the 2017/2018 heating season to ensure integrity and effectiveness of the vapor mitigation system.

In addition, the following suggestions may improve performance of the MGMS:

- To reduce potential extraction well fouling and pump failure problems, extraction wells ERTEW5, EW6 and -EW7 should be cleaned by surging and pumping. The pumps should be cleaned, and if needed, the lines to the treatment system should be cleaned on an annual basis.
- To prevent the recurrence of power failures, the broken electrical conduit for extraction well ERTEW5 and ERTEW7 should be repaired or replaced so as to properly protect the new wiring.
- Extraction well pumps and transducers should be thoroughly inspected annually to assess preventative maintenance measures needed to minimize system downtimes due to pump and transducer failures.
- The Pro Control system has not been sending daily system reports since September 2014 due to communication errors. So that remote monitoring of the status of the system can resume, the system should be further analyzed for problem identification, corrections/repairs, and if necessary, replacement. In the interim, for adequate monitoring of system operation and assisting in system troubleshooting, flow rates and other system data/information should continue to be obtained on a weekly basis by manually logging into the system to retrieve the data.

# VII. PROTECTIVNESS STATEMENT

| **Protectiveness Statement(s)** | |
|---|---|
| *Operable Unit:*<br>1 | *Protectiveness Determination:*<br>Protective |
| *Protectiveness Statement:*<br>The groundwater remedy at the Brewster Well Field Site is protective of human health and the environment | |
| **Sitewide Protectiveness Statement** | |
| *Protectiveness Determination:*<br>Protective | *Planned Addendum Completion Date:*<br>Click here to enter a date |
| *Protectiveness Statement:* | |

The remedies at the Brewster Well Field Site are protective of human health and the environment.

## VIII. NEXT REVIEW

The next FYR report for the Brewster Well Field Superfund Site is required five years from the completion date of this review.

# APPENDIX A – REFERENCE LIST

| Documents, Data, and Information Reviewed in Completing the Five-Year Review | |
|---|---|
| **Document Title, Author** | **Submittal Date** |
| Remedial Investigation Report, GHR Engineering Associates | July 1986 |
| Record of Decision, Operable Unit (OU) 1 Groundwater Remedy, EPA | September 1986 |
| Record of Decision, OU2 Source Control, EPA | September 1988 |
| Remedial Action Report, OU2 Source Control, EPA | September 1991 |
| Revised Final Work Plan Malcolm Pirnie, Inc. | January 1995 |
| Interim Treatability Study Report Malcolm Pirnie, Inc. | February 1995 |
| Explanation of Significant Differences, EPA | December 1996 |
| Report of Findings, Volume 1: Aquifer Test Results, Malcolm Pirnie, Inc. | February 1997 |
| Remedial Action Report, OU1 Groundwater Remedy, EPA | October 1997 |
| Preliminary Site Close-Out Report, EPA | April 1997 |
| Bi-Monthly Reports, Sevenson Environmental Services, Inc. | July 2002 - January 2007 |
| Annual Reports, Sevenson Environmental Services, Inc. | August 2003 - January 2007 |
| Contractor Quality Control Program, Sevenson Environmental Services, Inc. | April 2000 |
| Long-Term Remedial Action Work Plan, Sevenson Environmental Services, Inc. | October 2000 |
| Sampling and Analysis Plan for Long-Term Remedial Response Activities, Sevenson Environmental Services, Inc. | November 2000 |
| Quality Control Summary Report Sevenson Environmental Services, Inc. | January 2001 |
| Remedial System Evaluation, Brewster Well Field Superfund Site, Brewster, New York | April 2002 |
| 2005-2016 Village of Brewster Water Quality Report, Village of Brewster | April 2006-October 2016 |

| | |
|---|---|
| May 2006 Sub-Slab/Soil Gas Installation and Sampling Trip Report, Lockheed Martin | June 2006 |
| May 2006 Soil Gas Investigation Trip Report, Lockheed Martin | July 2006 |
| August-September 2006 Prepacked Monitoring Wells Installation and Sampling, Lockheed Martin | September 2006 |
| October-November 2006 Well Installation Trip Report, Earth Tech, Inc. | December 2006 |
| Conceptual Model and Capture Zone Analysis Report, Earth Tech, Inc. | March 2007 |
| May 2007 Sub-Slab/Indoor Air/Mitigation System Gas Sampling Trip Report, Lockheed Martin | September 2007 |
| Nov 2007 Sub-Slab/Indoor Air/Mitigation System Gas Sampling Laboratory Results | February 2008 |
| January 2009 Residual Soil Sampling Laboratory results | February 2009 |
| February 2009 Sub-Slab/Indoor Air/Mitigation System Gas Sampling Trip Report, Lockheed Martin | May 2009 |
| Annual Reports, Camp Dresser McKee & Smith (CDM Smith) | September 2009 – April 2017 |
| March 2011 Sub-Slab/Indoor Air/Mitigation System Gas Sampling Trip Report, Lockheed Martin | May 2011 |
| July 2011 Residual Soil Sampling Trip Report, Weston Solutions | October 2011 |
| 2011 Village of Brewster Water Quality Report, Village of Brewster | April 2012 |
| March 2012 Surface Water Sampling Results | March 2012 |
| May 2016 Sub-Slab Mitigation System Inspection Results Letter Report, CDM Smith | June 2016 |
| June 2016 Completion of Vapor Mitigation System Maintenance Letter Report, Henningson, Durham & Richardson Architecture and Engineering, P.C. in association with HDR Engineering, Inc. (HDR) | June 2016 |
| June 2016 Vapor Mitigation System Magnehelic Gauges Installation Report, GeoLogic NY, Inc. | June 2016 |
| March 2017 Completion of Vapor Mitigation System Maintenance Letter Report, HDR | March 2017 |
| EPA guidance for conducting FYRs and other guidance and regulations to determine if any new Applicable or Relevant and Appropriate Requirements relating to the protectiveness of the remedy have been developed since EPA issued the Record of Decision. | |

# APPENDIX B – CHRONOLOGY OF EVENTS

| Chronology of Site Events | |
|---|---|
| **Event** | **Date** |
| Volatile organic compounds detected in Brewster Well Field | 1978 |
| Site placed on National Priorities List | 1982 |
| Packed Tower installed for the Village's well field | 1984 |
| Record of Decision for groundwater | 1986 |
| Remedial Design for groundwater started | 1987 |
| Record of Decision for source control | 1988 |
| Remedial Design for source control started | 1988 |
| Superfund State Contract executed | 1988 |
| Remedial Design for groundwater completed | 1989 |
| Remedial Action for groundwater started | 1990 |
| Remedial Design for source control completed | 1990 |
| Remedial Action for source control started | 1991 |
| Remedial Action for source control completed | 1991 |
| Explanation of Significant Differences for groundwater | 1996 |
| Remedial Action completed for groundwater | 1997 |
| Preliminary Site Close-Out Report | 1997 |
| Long Term Remedial Response started | 1997 |
| Remedial System Evaluation | 2001-2002 |
| First Five-Year Review conducted | 2002 |
| Groundwater Management System Optimization Efforts | 2002-2007 |
| Second Five-Year Review conducted | 2007 |
| Residual Soils Underlying Subaru Dealership Building Cleanup completed | 2011 |

| | |
|---|---|
| Third Five-Year Review conducted | 2012 |
| Periodic Written Reminders to the Planning Board and the Dealership That EPA Should Be Contacted Prior to the Approval of Any Construction on the Dealership Property and to Be Informed of Any Planned Future Development in the General Vicinity of the Site Sent. | 2007- 2017 |

# APPENDIX C – FIGURES

Figure 1

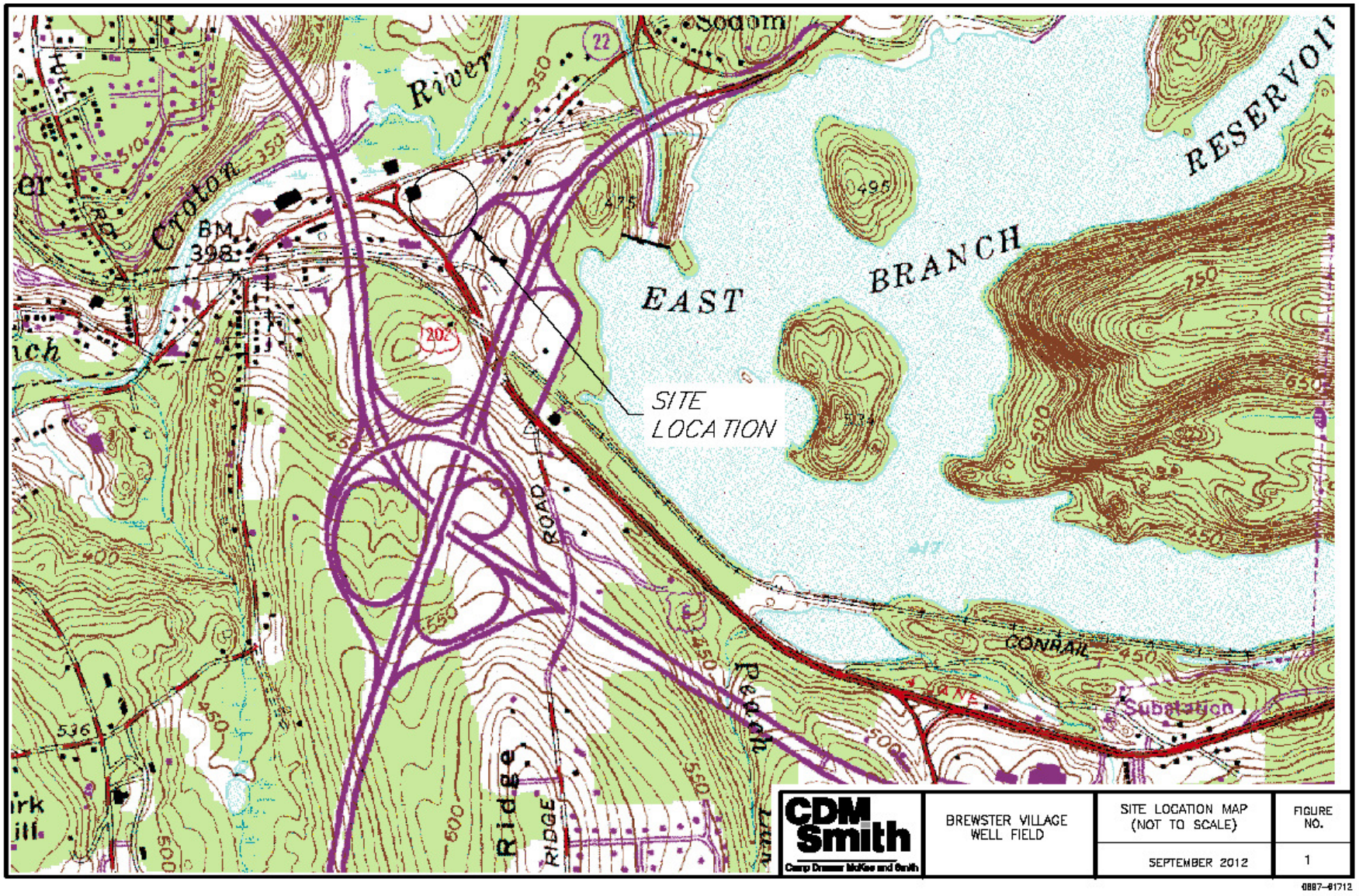

Sodom
RESERVOIR
EAST BRANCH
SITE LOCATION
Croton River
BM 398
ROAD
Ridge
RIDGE
CONRAIL
Substation
CDM Smith
Camp Dresser McKee and Smith
BREWSTER VILLAGE WELL FIELD
SITE LOCATION MAP (NOT TO SCALE)
SEPTEMBER 2012
FIGURE NO.
1
0887-01712

Figure 2

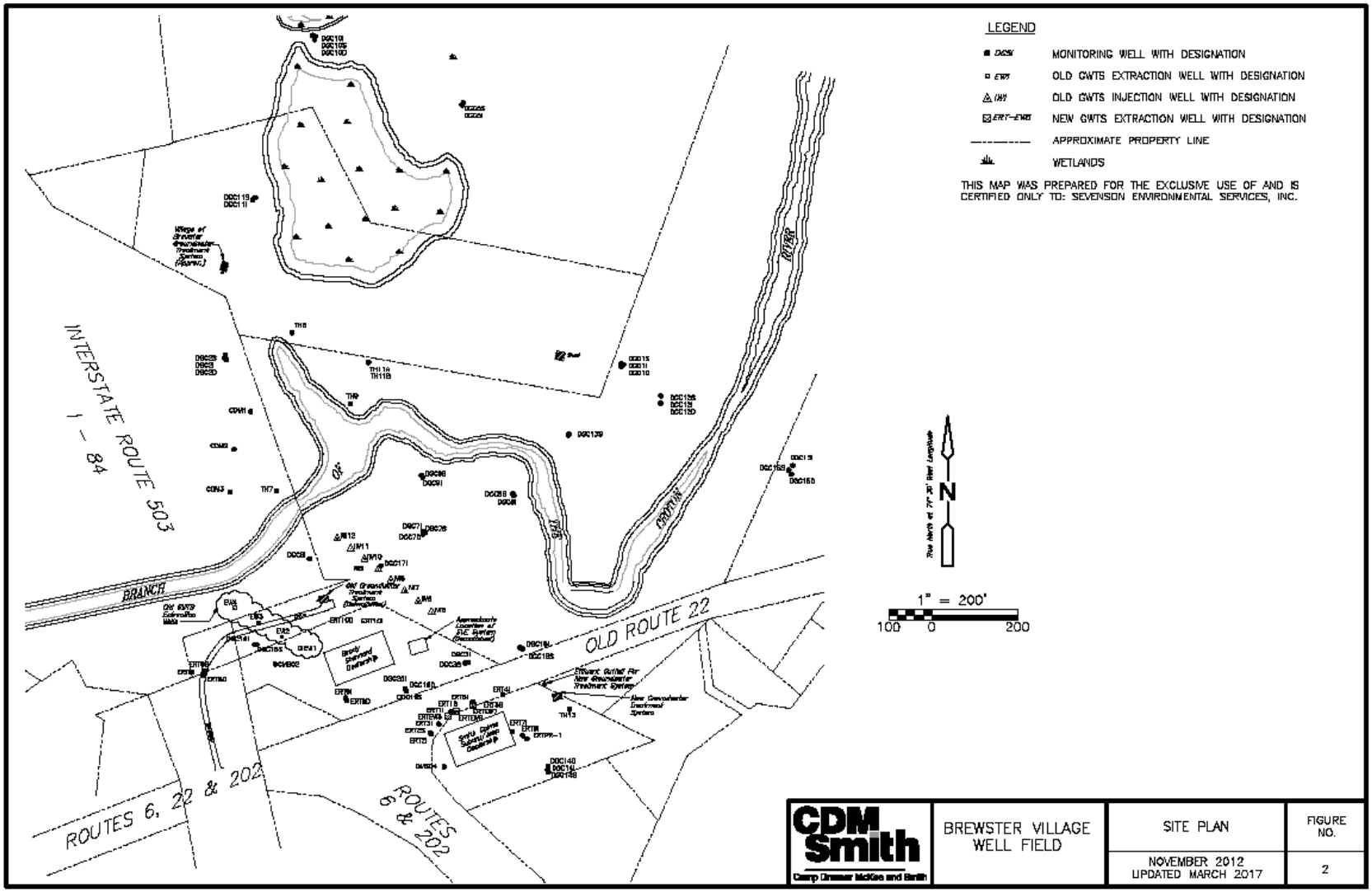

LEGEND
MONITORING WELL WITH DESIGNATION
OLD GWTS EXTRACTION WELL WITH DESIGNATION
OLD GWTS INJECTION WELL WITH DESIGNATION
NEW GWTS EXTRACTION WELL WITH DESIGNATION
APPROXIMATE PROPERTY LINE
WETLANDS
THIS MAP WAS PREPARED FOR THE EXCLUSIVE USE OF AND IS CERTIFIED ONLY TO: SEVENSON ENVIRONMENTAL SERVICES, INC.
INTERSTATE ROUTE 503
I - 84
OLD ROUTE 22
ROUTES 6, 22 & 202
ROUTES 6 & 202
N
1" = 200'
100 0 200
CDM Smith
Camp Dresser McKee and Smith
BREWSTER VILLAGE WELL FIELD
SITE PLAN
NOVEMBER 2012
UPDATED MARCH 2017
FIGURE NO.
2

Figure 3

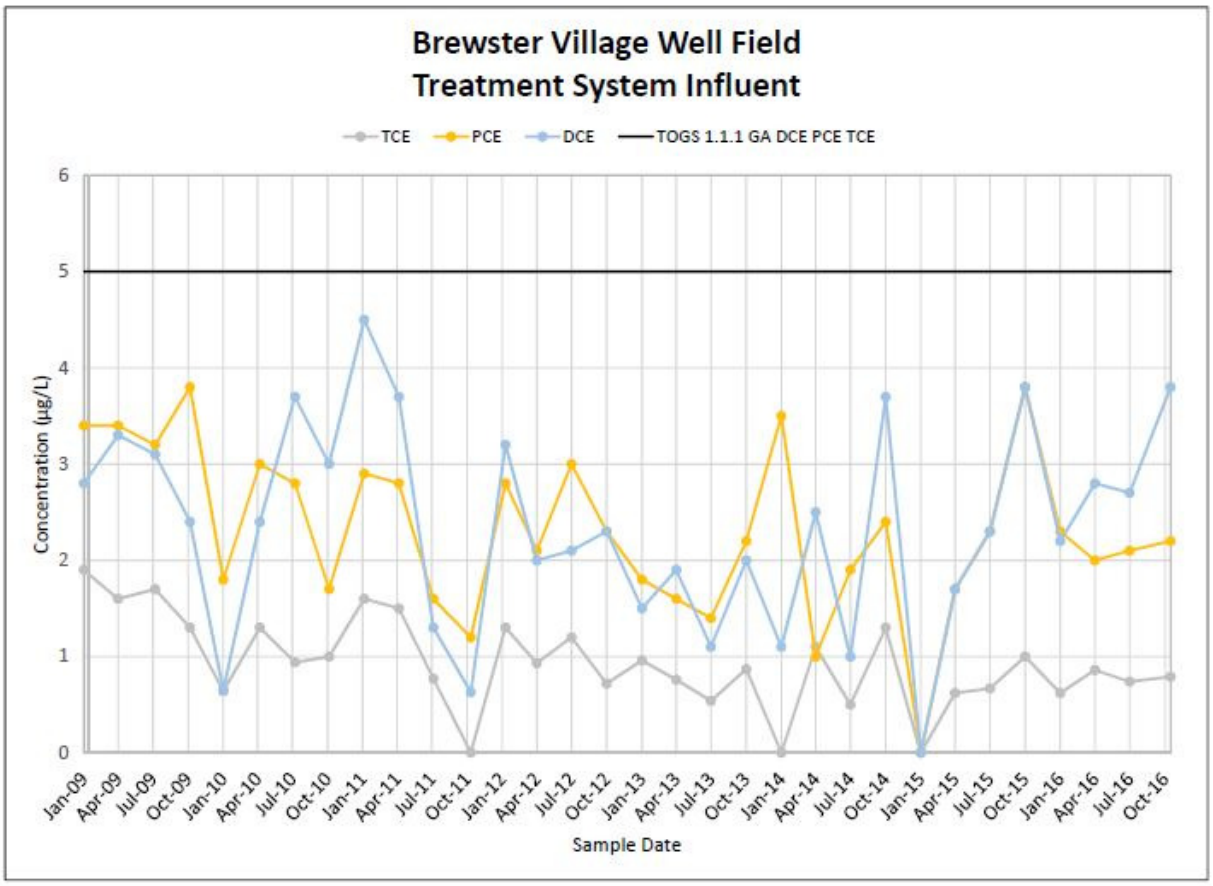

Brewster Village Well Field
Treatment System Influent
TCE
PCE
DCE
TOGS 1.1.1 GA DCE PCE TCE
Concentration (µg/L)
Sample Date
0
1
2
3
4
5
6
Jan-09
Apr-09
Jul-09
Oct-09
Jan-10
Apr-10
Jul-10
Oct-10
Jan-11
Apr-11
Jul-11
Oct-11
Jan-12
Apr-12
Jul-12
Oct-12
Jan-13
Apr-13
Jul-13
Oct-13
Jan-14
Apr-14
Jul-14
Oct-14
Jan-15
Apr-15
Jul-15
Oct-15
Jan-16
Apr-16
Jul-16
Oct-16

Figure 4

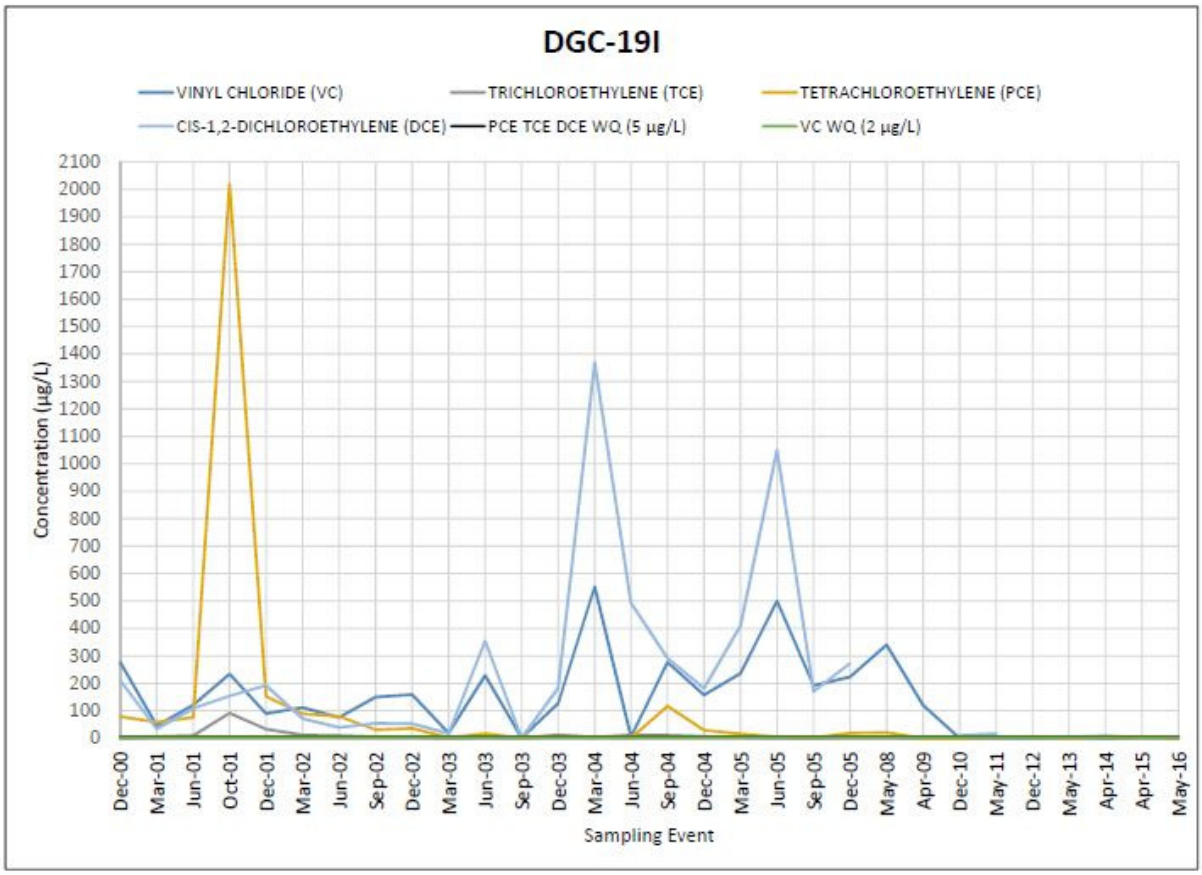

DGC-19I
VINYL CHLORIDE (VC)
TRICHLOROETHYLENE (TCE)
TETRACHLOROETHYLENE (PCE)
CIS-1,2-DICHLOROETHYLENE (DCE)
PCE TCE DCE WQ (5 µg/L)
VC WQ (2 µg/L)
Concentration (µg/L)
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
Dec-00
Mar-01
Jun-01
Oct-01
Dec-01
Mar-02
Jun-02
Sep-02
Dec-02
Mar-03
Jun-03
Sep-03
Dec-03
Mar-04
Jun-04
Sep-04
Dec-04
Mar-05
Jun-05
Sep-05
Dec-05
May-08
Apr-09
Dec-10
May-11
Dec-12
May-13
Apr-14
Apr-15
May-16
Sampling Event

Figure 5

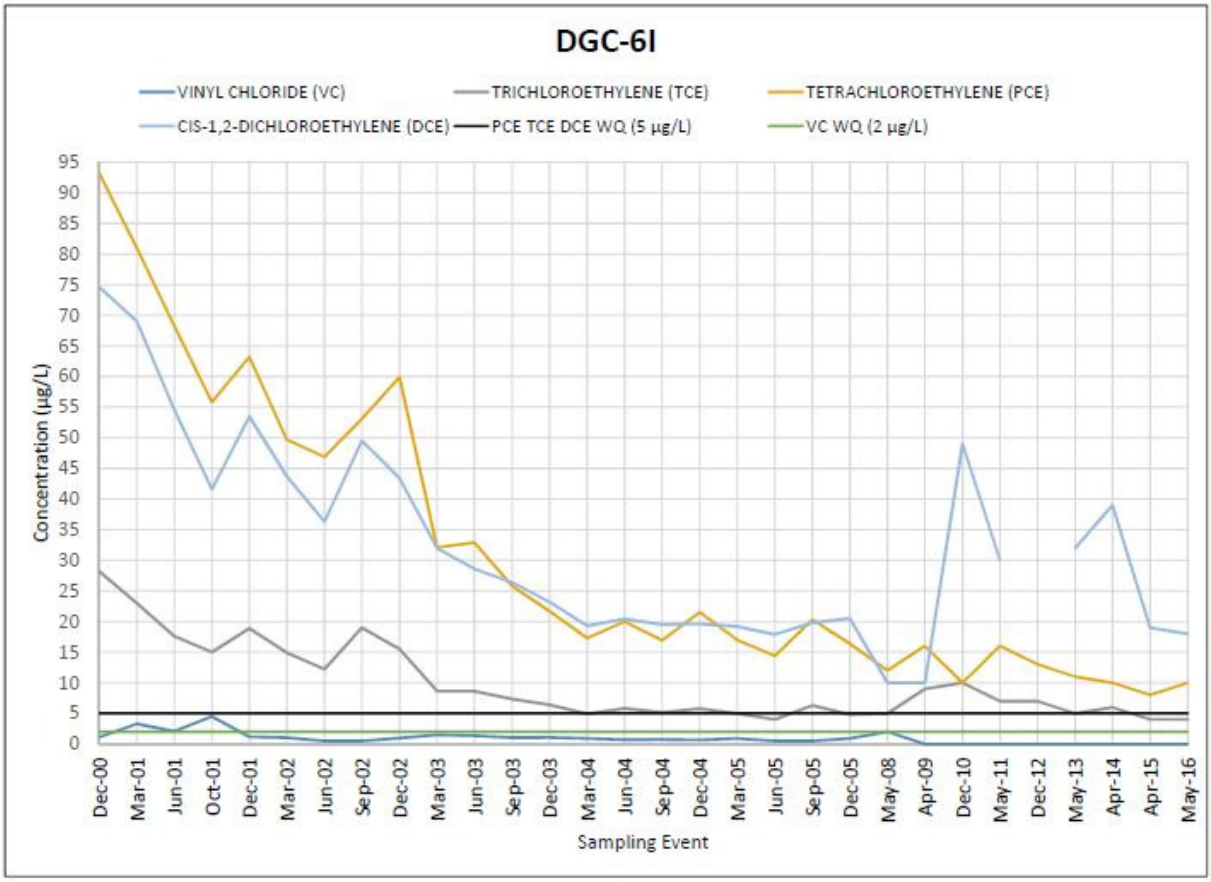

DGC-6I
VINYL CHLORIDE (VC)
TRICHLOROETHYLENE (TCE)
TETRACHLOROETHYLENE (PCE)
CIS-1,2-DICHLOROETHYLENE (DCE)
PCE TCE DCE WQ (5 µg/L)
VC WQ (2 µg/L)
Concentration (µg/L)
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
Dec-00
Mar-01
Jun-01
Oct-01
Dec-01
Mar-02
Jun-02
Sep-02
Dec-02
Mar-03
Jun-03
Sep-03
Dec-03
Mar-04
Jun-04
Sep-04
Dec-04
Mar-05
Jun-05
Sep-05
Dec-05
May-08
Apr-09
Dec-10
May-11
Dec-12
May-13
Apr-14
Apr-15
May-16
Sampling Event

Figure 6

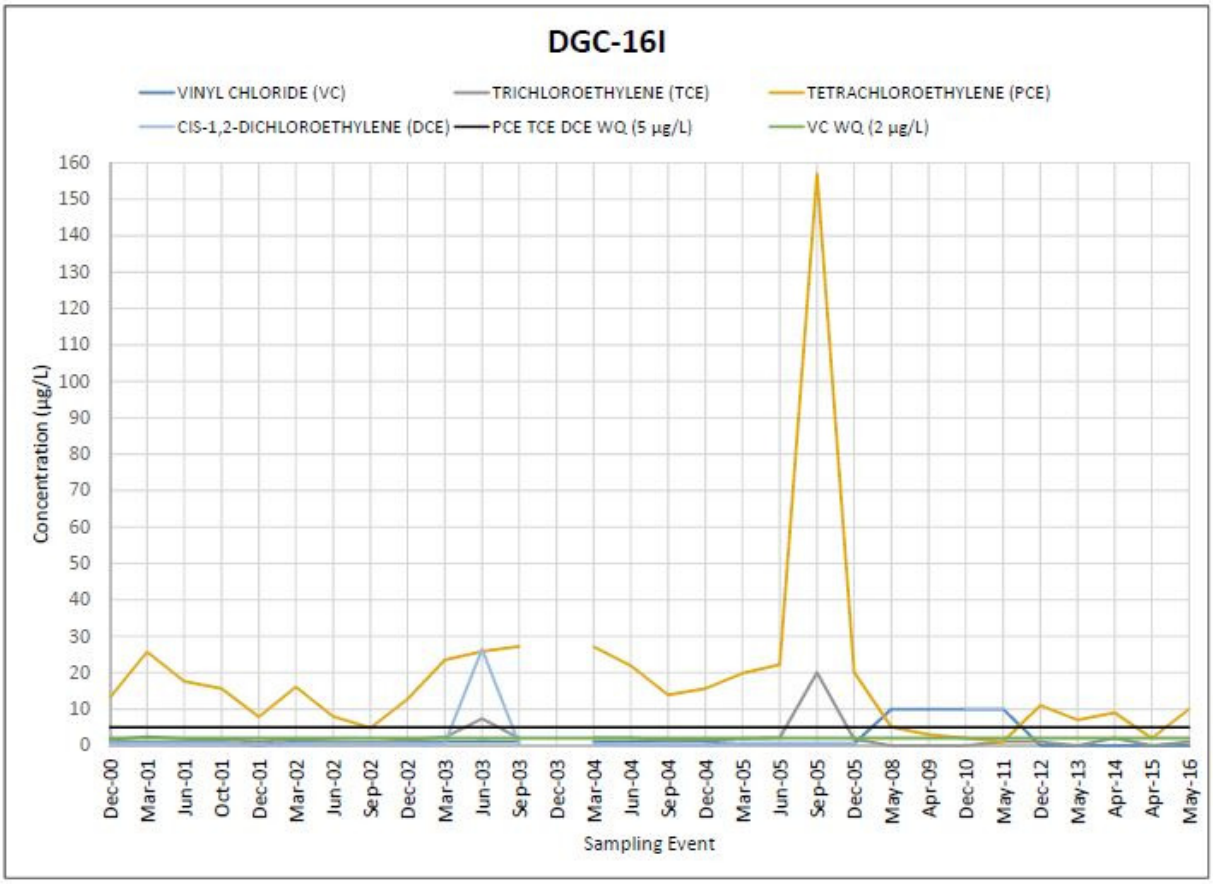

DGC-16I
VINYL CHLORIDE (VC)
TRICHLOROETHYLENE (TCE)
TETRACHLOROETHYLENE (PCE)
CIS-1,2-DICHLOROETHYLENE (DCE)
PCE TCE DCE WQ (5 µg/L)
VC WQ (2 µg/L)
Concentration (µg/L)
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
Dec-00
Mar-01
Jun-01
Oct-01
Dec-01
Mar-02
Jun-02
Sep-02
Dec-02
Mar-03
Jun-03
Sep-03
Dec-03
Mar-04
Jun-04
Sep-04
Dec-04
Mar-05
Jun-05
Sep-05
Dec-05
May-08
Apr-09
Dec-10
May-11
Dec-12
May-13
Apr-14
Apr-15
May-16
Sampling Event

Figure 7

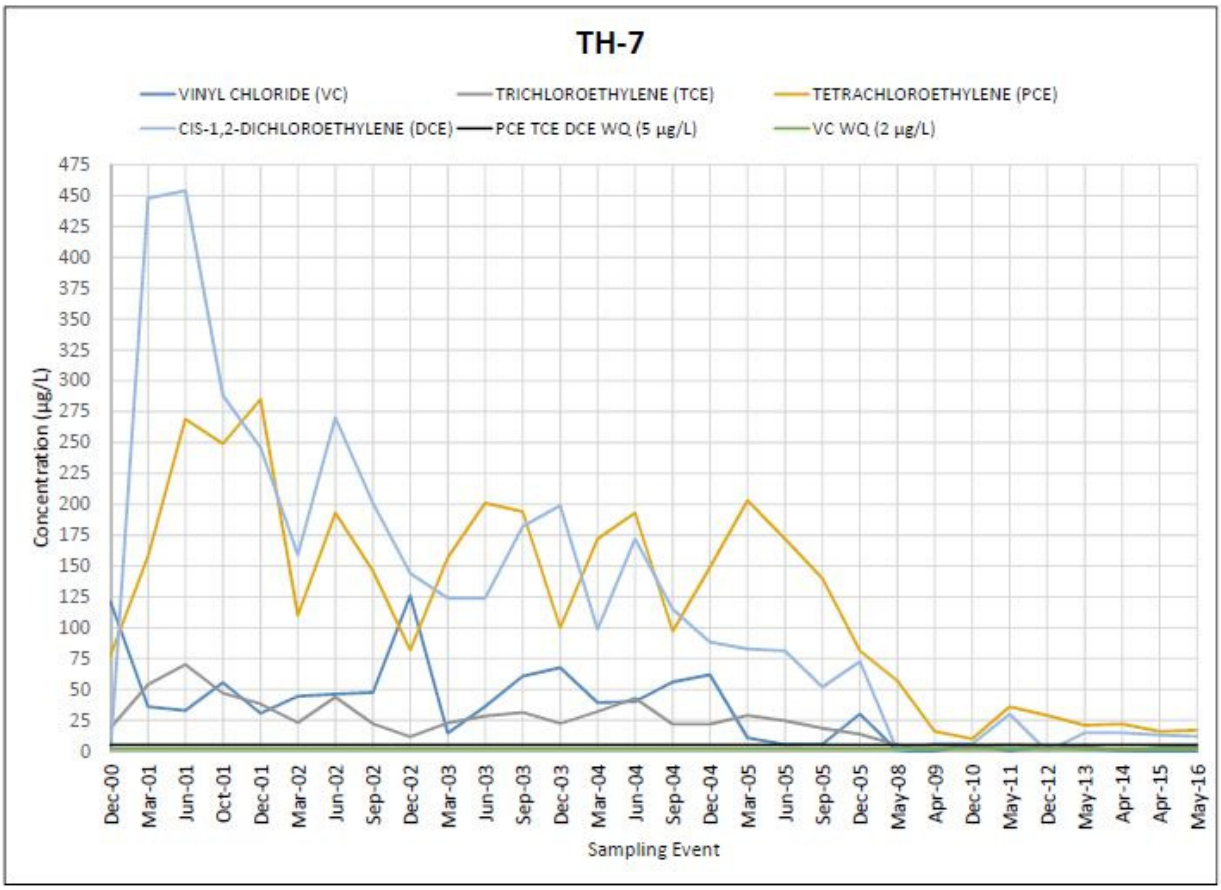

TH-7
VINYL CHLORIDE (VC)
TRICHLOROETHYLENE (TCE)
TETRACHLOROETHYLENE (PCE)
CIS-1,2-DICHLOROETHYLENE (DCE)
PCE TCE DCE WQ (5 µg/L)
VC WQ (2 µg/L)
Concentration (µg/L)
475
450
425
400
375
350
325
300
275
250
225
200
175
150
125
100
75
50
25
0
Dec-00
Mar-01
Jun-01
Oct-01
Dec-01
Mar-02
Jun-02
Sep-02
Dec-02
Mar-03
Jun-03
Sep-03
Dec-03
Mar-04
Jun-04
Sep-04
Dec-04
Mar-05
Jun-05
Sep-05
Dec-05
May-08
Apr-09
Dec-10
May-11
Dec-12
May-13
Apr-14
Apr-15
May-16
Sampling Event

Figure 8

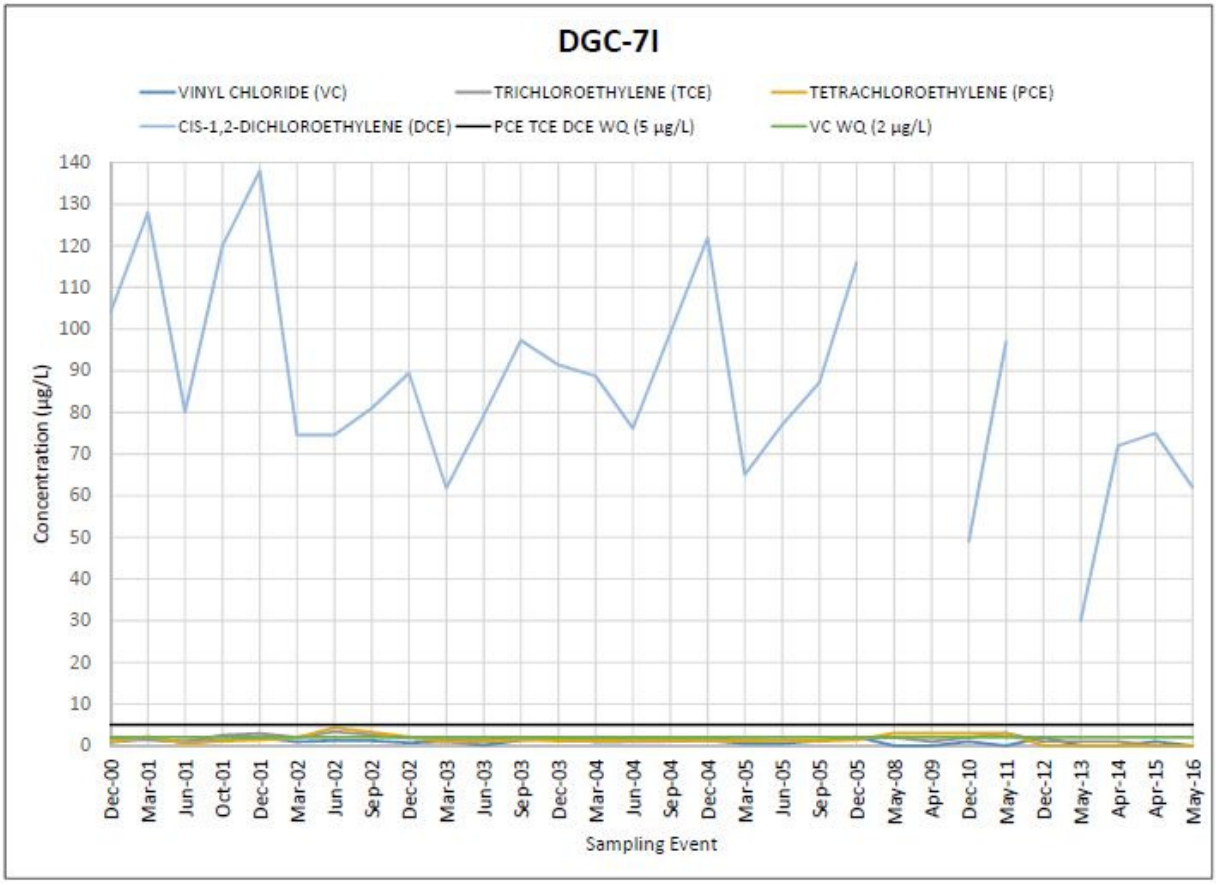
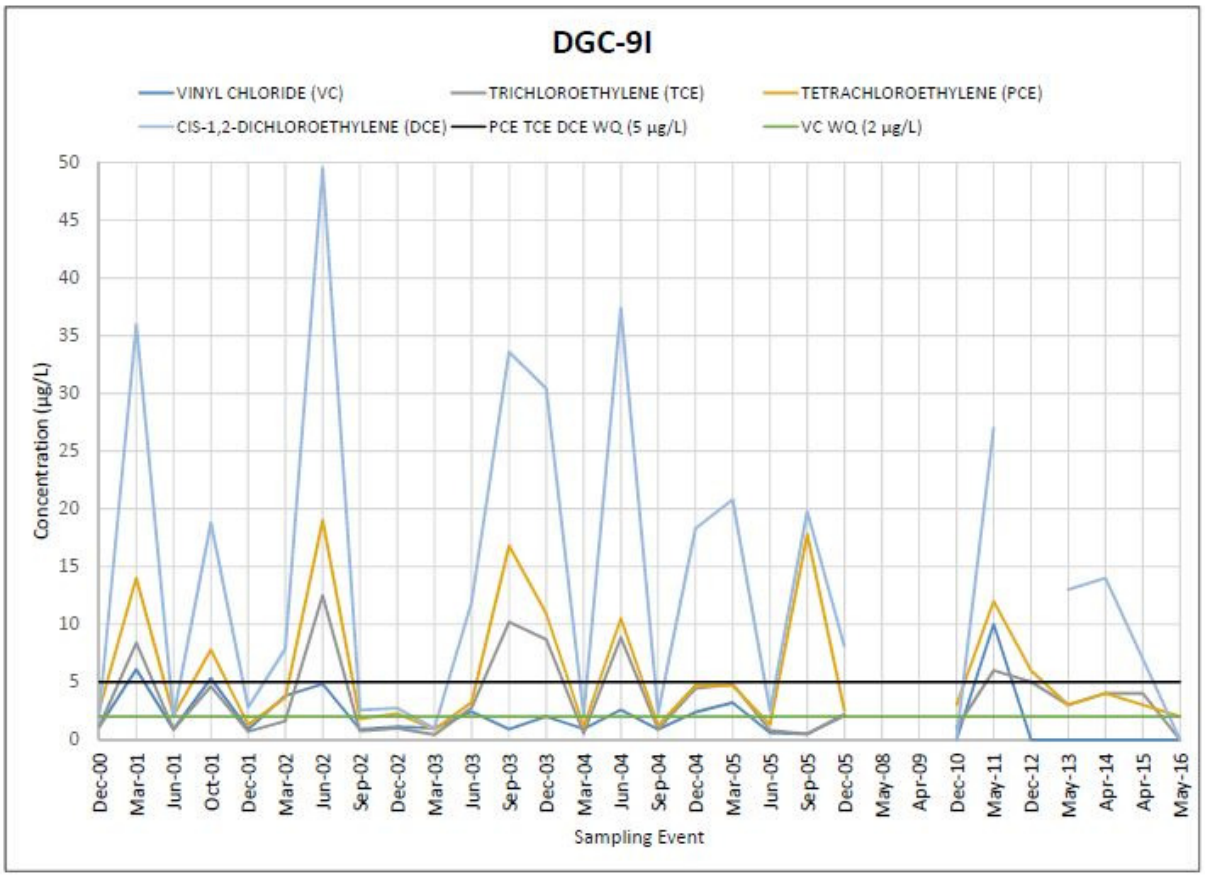

DGC-7I
VINYL CHLORIDE (VC)
TRICHLOROETHYLENE (TCE)
TETRACHLOROETHYLENE (PCE)
CIS-1,2-DICHLOROETHYLENE (DCE)
PCE TCE DCE WQ (5 µg/L)
VC WQ (2 µg/L)
Concentration (µg/L)
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
Dec-00
Mar-01
Jun-01
Oct-01
Dec-01
Mar-02
Jun-02
Sep-02
Dec-02
Mar-03
Jun-03
Sep-03
Dec-03
Mar-04
Jun-04
Sep-04
Dec-04
Mar-05
Jun-05
Sep-05
Dec-05
May-08
Apr-09
Dec-10
May-11
Dec-12
May-13
Apr-14
Apr-15
May-16
Sampling Event

Figure 9


DGC-9I
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TRICHLOROETHYLENE (TCE)
TETRACHLOROETHYLENE (PCE)
CIS-1,2-DICHLOROETHYLENE (DCE)
PCE TCE DCE WQ (5 µg/L)
VC WQ (2 µg/L)
Concentration (µg/L)
50
45
40
35
30
25
20
15
10
5
0
Dec-00
Mar-01
Jun-01
Oct-01
Dec-01
Mar-02
Jun-02
Sep-02
Dec-02
Mar-03
Jun-03
Sep-03
Dec-03
Mar-04
Jun-04
Sep-04
Dec-04
Mar-05
Jun-05
Sep-05
Dec-05
May-08
Apr-09
Dec-10
May-11
Dec-12
May-13
Apr-14
Apr-15
May-16
Sampling Event

Figure 10

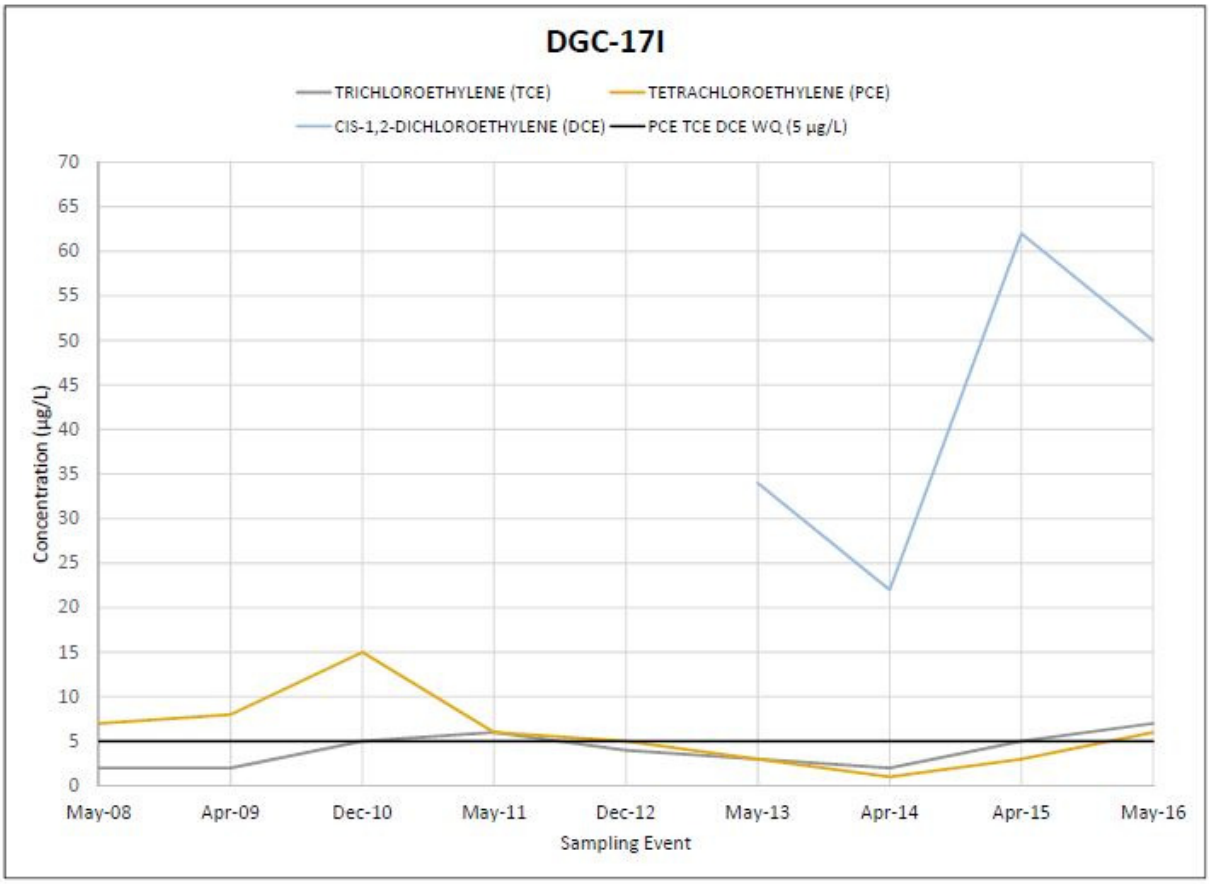

DGC-17I
TRICHLOROETHYLENE (TCE)
TETRACHLOROETHYLENE (PCE)
CIS-1,2-DICHLOROETHYLENE (DCE)
PCE TCE DCE WQ (5 µg/L)
Concentration (µg/L)
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
May-08
Apr-09
Dec-10
May-11
Dec-12
May-13
Apr-14
Apr-15
May-16
Sampling Event

Figure 11

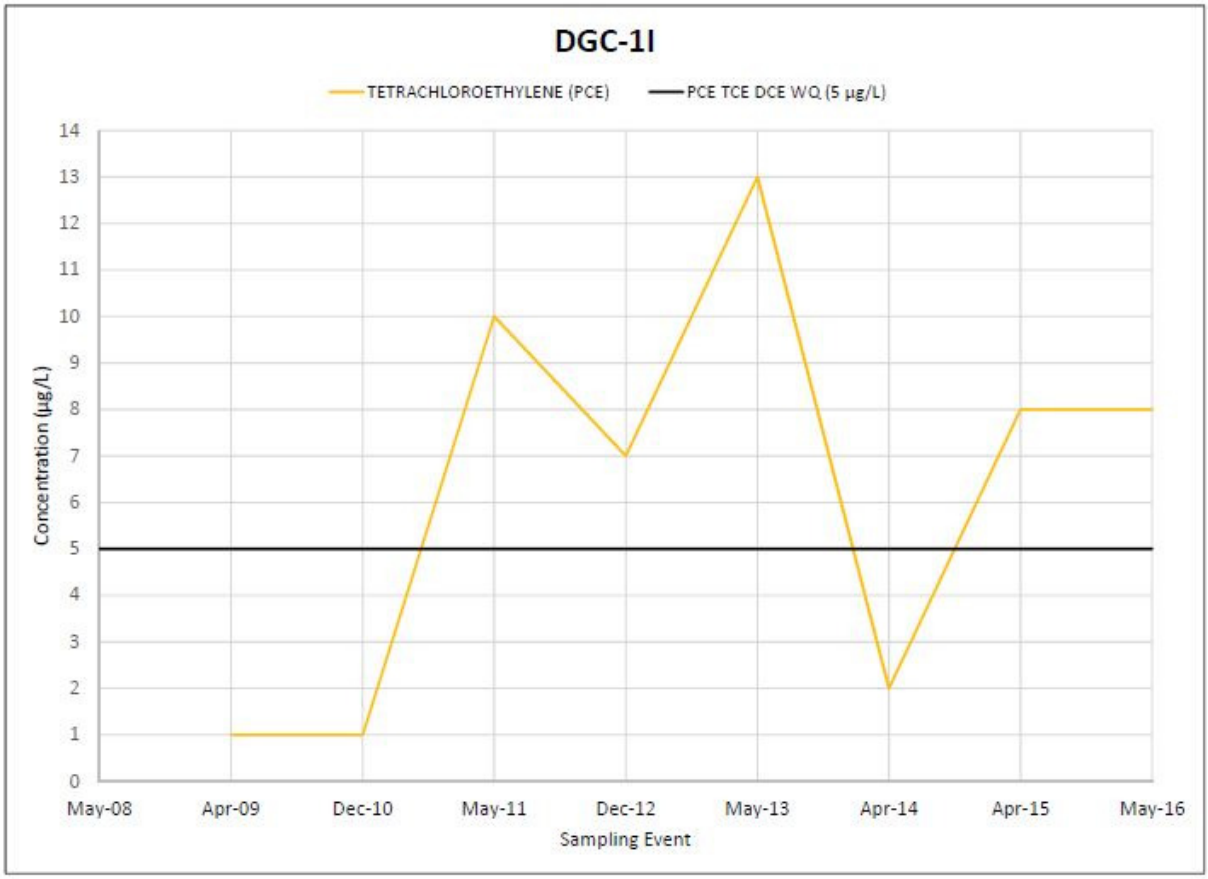

DGC-1I
TETRACHLOROETHYLENE (PCE)
PCE TCE DCE WQ (5 µg/L)
Concentration (µg/L)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
May-08
Apr-09
Dec-10
May-11
Dec-12
May-13
Apr-14
Apr-15
May-16
Sampling Event

Figure 12

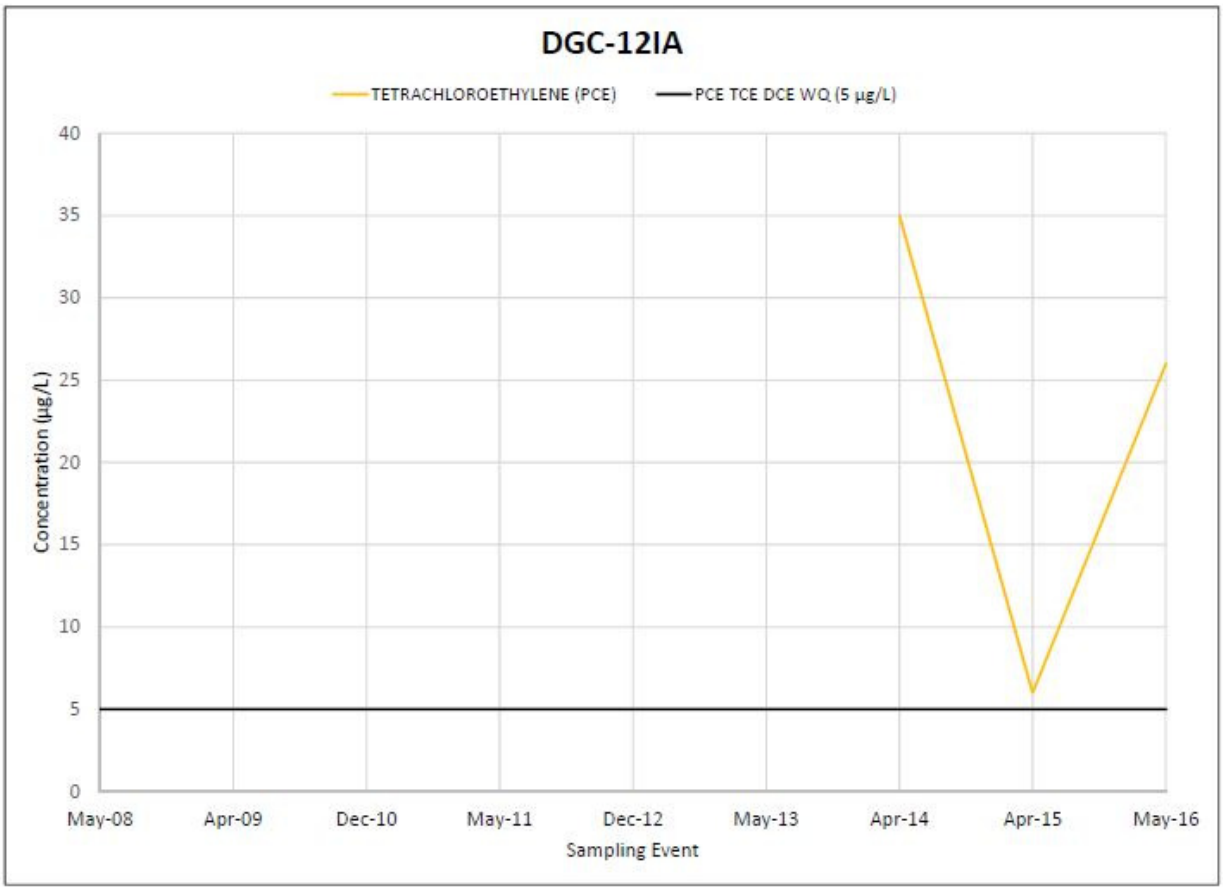
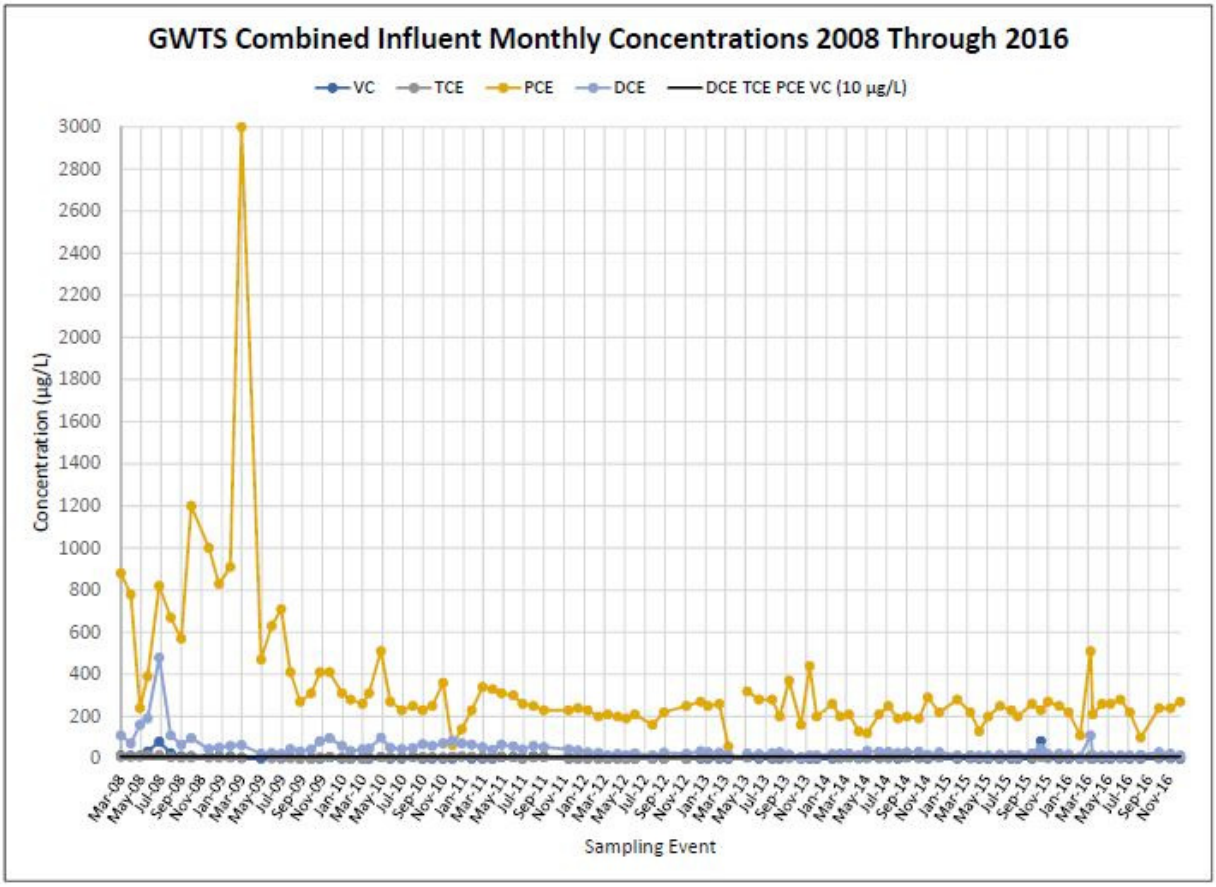

DGC-12IA
TETRACHLOROETHYLENE (PCE)
PCE TCE DCE WQ (5 µg/L)
Concentration (µg/L)
40
35
30
25
20
15
10
5
0
May-08
Apr-09
Dec-10
May-11
Dec-12
May-13
Apr-14
Apr-15
May-16
Sampling Event

Figure 13


GWTS Combined Influent Monthly Concentrations 2008 Through 2016
VC
TCE
PCE
DCE
DCE TCE PCE VC (10 µg/L)
Concentration (µg/L)
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
Mar-08
May-08
Jul-08
Sep-08
Nov-08
Jan-09
Mar-09
May-09
Jul-09
Sep-09
Nov-09
Jan-10
Mar-10
May-10
Jul-10
Sep-10
Nov-10
Jan-11
Mar-11
May-11
Jul-11
Sep-11
Nov-11
Jan-12
Mar-12
May-12
Jul-12
Sep-12
Nov-12
Jan-13
Mar-13
May-13
Jul-13
Sep-13
Nov-13
Jan-14
Mar-14
May-14
Jul-14
Sep-14
Nov-14
Jan-15
Mar-15
May-15
Jul-15
Sep-15
Nov-15
Jan-16
Mar-16
May-16
Jul-16
Sep-16
Nov-16
Sampling Event