Essex-Hope Site, Jamestown, New York

2018 Annual Periodic Review Report

Final

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Essex Specialty Products, Inc.

Essex-Hope Site, Jamestown, New York

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Executive Summary

On behalf of Essex Specialty Products, Inc. (Essex), Jacobs Engineering Group, Inc. (Jacobs) has prepared this annual Periodic Review Report (PRR) for the ongoing remedial actions at the Essex-Hope site (the Site; see Figure 1-1) in Jamestown, New York (Site No. 907015) for calendar year 2018. Various constituents of concern have been detected in soil and groundwater at the Site, including:

- Chlorinated volatile organic compounds (CVOCs)
  - Trichloroethene (TCE)
  - cis-1,2-Dichloroethene (cis-1,2-DCE)
  - trans-1,2-DCE
  - Vinyl chloride
  - 1,1-Dichloroethene (1,1-DCE)
- Ketones
  - Acetone
  - 2-Butanone (also known as methyl ethyl ketone)
- Petroleum-related compounds
  - Cumene, benzene, toluene, ethylbenzene, and xylenes (CBTEX)
  - 1,2,4-trimethylbenzene (1,2,4-TMB) and 1,3,5-trimethylbenzene (1,3,5-TMB)
- Bis(2-ethylhexyl) phthalate
- Polychlorinated biphenyls

Operation, maintenance, and monitoring activities in 2018 conformed to those prescribed in the Site Management Plan (SMP; CH2M HILL Engineers, Inc. [CH2M][1], 2017a). Metal manufacturing operations by the current site owner involving the use of solvents continue to occur onsite. This PRR summarizes activities undertaken at the Site in 2018; the effectiveness of the remedial program; a demonstration of compliance with the major elements of the SMP (CH2M, 2017a); and recommendations for changes or future work.

Remedial actions have been undertaken at the Site in accordance with the 1994 Record of Decision (ROD). In addition to the actions taken as detailed in the ROD, supplemental investigations and pilot tests have been performed to date. Currently, active engineering controls (ECs) consist of the operation of two shallow and two deep recovery wells, a groundwater treatment system, asphalt and concrete caps, long-term groundwater monitoring, and a subslab depressurization system at the offsite residence. Institutional controls (ICs) exist in the form of a Declaration of Covenants and Restrictions. Figure 1-2 depicts the areas of remediation and the ICs/ECs at the Site.

In 2018, the IC/ECs continued to be operative, with the exception the SSDS at the offsite residence, which was shut down in mid-March 2018 due to its vacancy and subsequent shutdown of the power supply by the property owner. The residence is being inspected monthly to ensure it remains vacant. If the building becomes occupied, outreach will be performed to confirm the system is operational. Surficial cracks were observed over the asphalt and concrete caps at the North Parking Lot Sump (NPLS) Area in April 2018, and crack filling and sealing work was attempted in October 2018 but could not be completed due to weather. Crack filling and sealing work will resume in spring 2019. Discharges from the groundwater treatment system were monitored as required and did not exceed the Jamestown Board of Public Utilities discharge permit limits. The IC/ECs certification for 2018 is included in Appendix A.

Nonroutine groundwater sampling occurred at the Site in March, June, and November 2018. The March 2018 groundwater sampling was conducted as part of the 2017 Data Gap Investigation follow-up activities, and to monitor volatile organic compound (VOC) trends at select monitoring wells. In response to the New

[1] CH2M HILL Engineers, Inc. is now a wholly owned subsidiary of Jacobs Engineering Group Inc.

York State Department of Environmental Conservation (NYSDEC) letter dated March 28, 2018 requesting sampling of per- and polyfluoroalkyl substances (PFAS), a second non-routine groundwater sampling event was conducted at the Site in June 2018. PFAS were detected at various monitoring wells but did not exceed the U.S. Environmental Protection Agency (EPA) Drinking Water Health Advisory levels of 70 parts per trillion (ppt). In November 2018, as part of the annual groundwater sampling event, select wells were also sampled for 1,4-dioxane via Method 8270D SIM by isotope dilution as per NYSDEC's request via email dated August 15, 2018. 1,4-Dioxane was non-detect at all monitoring wells except for MW-118D where it was detected at a concentration of 0.418 micrograms per liter. Details and results of the non-routine sampling events are discussed in Section 2, *Remedy Performance, Effectiveness, and Protectiveness*.

An offsite vapor intrusion (VI) assessment was also conducted in 2018 to determine if VI associated with the CVOC plume from the Site could impact downgradient receptors. The assessment involved building inspections completed in April 2018 and subsequent subslab soil vapor and exterior soil vapor sampling completed in November and December 2018 at the properties adjacent to the Site, including H & H Metal Specialty, Inc., Johnson Machine & Fibre Products, and the respective adjacent streets. TCE and/or cis-1,2-DCE were detected in subslab soil vapor samples collected from the two facilities at concentrations greater than New York State Department of Health (NYSDOH) and/or EPA soil vapor screening criteria in various samples. Notification letters including subslab soil vapor results were provided to H & H Metal Specialty, Inc. and Johnson Machine & Fibre Products (current property owners/tenants) on January 18, 2019. The report summarizing this investigation, analytical results, and recommendations is included in Appendix B.

Shallow groundwater continues to be extracted from the NPLS Area where CVOC and CBTEX concentrations have generally declined. In 2018, 0.53-pound of VOCs was removed from the Shallow Water-bearing Zone (WBZ). CVOCs in the Shallow WBZ continue to be present outside the typical capture zones of the groundwater extraction and treatment system; however, the Shallow WBZ CVOCs and petroleum-constituent plumes have been substantially delineated; they do not appear to have migrated significantly; and the petroleum-constituents plumes do not extend significantly offsite.

In 2018, 204 pounds of VOCs were removed from the Deep WBZ, including acetone. VOCs were not detected above remedial action objectives (RAOs) in existing and newly installed sentinel wells. TCE, cis-1,2-DCE, vinyl chloride, and acetone remain in the Deep WBZ at concentrations above RAOs, although acetone concentrations continue to decrease. CVOC concentrations remain outside the capture zone of the current extraction system, and residual light non-aqueous phase liquid (LNAPL) continues to be present under the Plant 5 Building.

Results from the 2016 and 2017 Data Gap Investigations (CH2M, 2017b and 2018b, respectively), the 2017 Annual PRR (CH2M, 2018a), and routine and non-routine groundwater monitoring were used in 2018 to refine the conceptual site model, assess the current remedial system performance, and plan for potential future remedial activities. To expedite achieving RAOs, in 2019 Essex plans to perform a source evaluation to support selection of a remedial alternative or supplement to the existing remedies to mitigate impacts to soils and groundwater.

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Acronyms and Abbreviations

µg/L	microgram(s) per liter
AS	air sparging
AST	aboveground storage tank
bgs	below ground surface
BPU	Board of Public Utilities
CBTEX	cumene, benzene, toluene, ethylbenzene, and xylenes
CH2M	CH2M HILL Engineers, Inc.[2]
COC	constituent of concern
CPM	Custom Production Manufacturing Inc.
CVOC	chlorinated volatile organic compound
DCE	dichloroethene
EPA	U.S. Environmental Protection Agency
Essex	Essex Specialty Products, Inc.
GAC	granular-activated carbon
gpm	gallon(s) per minute
IC/EC	institutional control/engineering control
ISCO	in situ chemical oxidation
Jacobs	Jacobs Engineering Group Inc.
MW	monitoring well
NAPL	non-aqueous phase liquid
NPLS	north parking lot sump
NYSDEC	New York State Department of Environmental Conservation
O&M	operations and maintenance
PCB	polychlorinated biphenyl
PFAS	per- and polyfluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PMP	Performance Monitoring Plan
POTW	publicly owned treatment works
ppt	parts per trillion
PRR	Periodic Review Report
RAO	remedial action objective
RI	remedial investigation
ROD	Record of Decision

[2] CH2M HILL Engineers, Inc. is now a wholly owned subsidiary of Jacobs Engineering Group Inc.

RW	recovery well
SIM	selected ion monitoring
Site	Essex-Hope Site in Jamestown, New York
SMP	Site Management Plan
SSDS	subslab depressurization system
SVE	soil vapor extraction
SVOC	semivolatile organic compound
TCE	trichloroethene
TMB	trimethylbenzene
TTO	total toxic organic
URS	URS Corporation
UST	underground storage tank
VI	vapor intrusion
VOC	volatile organic compound
WBZ	water-bearing zone

1. Site Overview

On behalf of Essex Specialty Products, Inc. (Essex), Jacobs Engineering Group Inc. (Jacobs) has prepared this annual Periodic Review Report (PRR) for the ongoing remedial actions at the Essex-Hope Site (Site) in Jamestown, New York (Site No. 907015) from January 1 through December 31, 2018. The 1995 New York State Department of Environmental Conservation (NYSDEC) Order on Consent requires an annual report be prepared for site remedial actions and these reports have been submitted annually since 1997. Performance Monitoring Plans (PMPs) were submitted in 2008, 2011, and 2014 (URS Corporation [URS], 2008, 2011, 2014). A comprehensive Site Management Plan (SMP) was developed and submitted to NYSDEC in December 2017, in accordance with NYSDEC Division of Environmental Remediation *Technical Guidance for Site Investigation and Remediation* (DER-10), dated May 3, 2010 (CH2M, 2017a). The SMP addresses the means for implementing operation, maintenance, and monitoring of the institutional controls and engineering controls (IC/ECs) at the Site. The SMP includes an updated PMP based on the findings from the 2016 and 2017 Data Gap Investigations and was fully implemented and followed in 2018. This PRR includes an IC/EC Certification Form (Appendix A).

The Site is located at 125 Blackstone Avenue in Jamestown, New York, and comprises approximately 4.7 acres (Figure 1-1). The Site is in a highly industrialized area of the city. Custom Production Manufacturing Inc. (CPM) presently owns the Site. The Site consists of two main buildings, the Plant 5 Building on the northern side of the property and the West Building on the western side of the Site. The remainder of the Site includes paved areas, vegetated areas, a remedial system treatment building, and a Quonset hut. Metal manufacturing operations involving use of trichloroethene (TCE) and other solvents continue to occur onsite.

Various constituents of concern (COCs) are present in soil and groundwater, including:

- Chlorinated volatile organic compounds (CVOCs)
  - TCE
  - cis-1,2-Dichloroethene (cis-1,2-DCE)
  - trans-1,2-DCE
  - Vinyl chloride
  - 1,1-Dichloroethene (1,1-DCE)
- Ketones
  - Acetone
  - 2-Butanone (also known as methyl ethyl ketone)
- Petroleum-related compounds
  - Cumene, benzene, toluene, ethylbenzene, and xylenes (CBTEX)
  - 1,2,4-Trimethylbenzene (1,2,4-TMB) and 1,3,5 trimethylbenzene (1,3,5-TMB)
- Bis(2-ethylhexyl) phthalate
- Polychlorinated biphenyls (PCBs)

Three separate areas were identified in the early 1990s during remedial investigations (RIs) and subsequently became the focus of remedial actions (Figure 1-1):

1) PCB-contaminated soils and CVOCs in soils and shallow and deep groundwater were identified in the North Parking Lot Sump (NPLS) Area, located in a parking lot on the southern side of Hopkins Street.
2) Bis(2-ethylhexyl) phthalate-contaminated soils and petroleum-related compounds in soils and groundwater were found in the previously closed Underground Storage Tank (UST) Area, located south of the Plant 5 Building.
3) Petroleum-related compounds were identified in the Former Aboveground Storage Tank (AST)/UST Area soils and groundwater, located northwest of the West Building.

As the result of further delineation during supplemental investigation activities conducted since the March 1994 Record of Decision (ROD; NYSDEC, 1994), impacts to groundwater have been observed elsewhere at the Site and offsite. Table 1-1 summarizes the historically observed impacts at the Site.

The remedial systems at the Site were designed and constructed to address impacted groundwater and soil using a combination of soil vapor extraction (SVE), air sparging (AS), and a groundwater extraction and treatment system. Figure 1-2 depicts the areas of remediation and location of IC/ECs at the Site. The original remedial action implementation was conducted in 1996 and 1997, based on the March 1994 ROD (NYSDEC, 1994) and a 1995 Basis of Design Report (Dow Environmental Inc., 1995), and included the following:

- A groundwater extraction well network consisting of five shallow and two deep recovery wells for activated carbon groundwater treatment and discharge to the local publicly owned treatment works (POTW)
- Soil excavation in the NPLS Area to remove TCE- and PCB-impacted soil in the area of a former sump, and on the eastern side of the Former UST Area to remove bis(2-ethylhexyl) phthalate
- SVE wells in the vadose zone and AS wells in the Shallow Water-bearing Zone (WBZ) in the NPLS, Former AST/UST, and Former UST areas to remediate vadose zone soil and supplement the treatment of impacted groundwater via enhanced biodegradation and volatilization of organic constituents
- Capping with either asphalt or concrete in the NPLS, AST/UST, and UST areas to prevent dermal contact and particulate inhalation exposure, minimize leaching of volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs) into groundwater, and improve the efficiency of the SVE system
- Long-term monitoring of a network of monitoring wells across the Site

1.1 Geology and Hydrogeology

Updated cross-sections were developed as part of the 2016 and 2017 Data Gap Investigation Reports (CH2M, 2017b, 2018b) showing the relationships of the four primary stratigraphic units found at the Site, consisting of the following materials, in order of depth from the surface:

- Sand and gravel with occasional silt and fine-grained sands, generally classified as a silty sand with gravel extending to 10 to 15 feet below ground surface (bgs); although in the southwestern portion of the Site, observed thicknesses in some locations are less than 10 feet, and between 15 and 25 feet north of the Site and across the Former UST Area, adjacent to Bigelow Street (Figure 1-1)
- A shallow silty clay, generally ranging from 5 to 10 feet thick; however, it is absent or only several inches thick in various locations, including in portions of the NPLS Area
- A generally 15- to 20-foot-thick silt or silt with sand, and in some locations 45 feet thick
- A 40- to 50-foot-thick deep silty clay

The depth to water at the Site is generally 7 to 11 feet bgs, and impacted groundwater occurs in two hydrostratigraphic zones. The Shallow WBZ exists in the shallow sands and gravels under unconfined (water table) conditions. The Deep WBZ exists under confined to partially confined conditions in the fine-grained silt with sand and is separated in most areas from the Shallow WBZ by the shallow silty clay layer. Groundwater flow in both Shallow and Deep WBZs under non-pumping conditions is east to northeast. Groundwater levels in the Shallow WBZ have been observed to vary 1 to 3 feet between synoptic events.

1.2 Summary of Site Impacts

Site conditions are summarized in this section to provide background on the soil and groundwater impacts present at the Site as of 2017, to provide a basis for the 2018 results.

1.2.1 Soils

Soil conditions in the vadose zone (generally 0 to 10 feet bgs) in portions of the Site were assessed as part of the 2016 Data Gap Investigation. VOC concentrations greater than RAOs were observed in vadose zone soils in the former AST/UST Area and the NPLS Area in 2016 (CH2M, 2017b). Additional vadose zone soil samples were collected as part of the 2017 Data Gap Investigation to provide additional delineation of vadose zone soil impacts in the NPLS Area, assess vadose zone conditions in the eastern portion of the Former UST Area, and on the Hope Windows property near MW-104S.

Twenty-one samples were collected to assess vadose zone soil conditions against RAOs. Six of the 21 samples exceeded the RAOs for one or more site constituents in the southern portion of the NPLS Area and the Former AST/UST Area. These areas containing soil exceedances could serve as continuing sources of impact to groundwater, primarily by groundwater table fluctuations. Vertical leaching by infiltrating precipitation is expected to be minimal due to the low-permeability asphalt and concrete covers in these areas, as described in Section 3.2.3.

1.2.2 Shallow WBZ

As presented in the 2017 Data Gap Investigation Report (CH2M, 2018b), three distinct plumes in the shallow WBZ are present at and near the Site:

- A CVOC plume extending from the NPLS Area to offsite areas to the northeast, roughly parallel to Hopkins Avenue. In October 2017, the highest total CVOC concentration (753.7 micrograms per liter [µg/L]) in this plume was observed at MW-101S on the northern side of the Plant 5 Building, while the total CVOC concentration at MW-108S was 29.5 µg/L in March 2017.
- A petroleum-constituent plume located in the eastern Former UST area. In situ chemical oxidation (ISCO) injections were conducted in this area in November 2011, which resulted in an initial decline in COC concentrations, although COC concentrations subsequently rebounded. While CBTEX constituents are present in this plume, the highest concentrations are 1,2,4-TMB and 1,3,5-TMB, with the highest 1,2,4-TMB concentrations observed at MW-26S (3,900 µg/L in October 2017). Only relatively minor concentrations of petroleum-related constituents were present near the eastern and northern property boundaries at VP-6S and MW-27S in 2017, indicating only limited offsite migration has occurred.
- A petroleum-constituent plume is present predominantly underneath the West Building, with CBTEX constituents predominating, although 1,2,4-TMB and 1,3,5-TMB are also present. The highest CBTEX concentrations (9,092 µg/L) in 2017 were observed at MW-30S. Groundwater mounding under the West Building and Former UST Area, has caused some plume migration to the south and east near MW-117S, south of the West Building, which had a total CBTEX concentration of 188 µg/L in 2017.

Additionally, petroleum-constituents and CVOCs have been detected in the Former AST/UST Area. CBTEX concentrations ranged from 24.9 µg/L in February 2017 to 2.4 µg/L in August 2017. CVOC concentrations ranged from 0.92 µg/L in February 2017 to 94.6 µg/L in August 2017.

1.2.3 Deep WBZ

As described in the 2017 Data Gap Investigation Report, the predominant plume in the Deep WBZ consists of a CVOC plume extending from the NPLS Area under the Plant 5 Building and offsite to the northeast. Nonaqueous phase liquid (NAPL) containing CVOCs has historically been observed at PZ-4D under the Plant 5 Building, and the highest CVOC concentrations observed in 2017 were observed at MW-118D (adjacent to PZ-4D), with a reported total CVOC concentration of 243,832 µg/L in October 2017. CVOC impacts are also present offsite to the northeast with total CVOC concentrations up to 143,430 µg/L at MW-110D in 2017. An area of elevated acetone concentrations has also historically been present near RW-6D (19,000 µg/L in February 2017). MW-109D, MW-120D, and MW-121D were installed northeast of the Site to serve as sentinel wells to delineate this deep CVOC plume and monitor for its potential downgradient migration.

1.3 Major System Modifications

Modifications to the ROD-related remedial systems have been made and communicated to NYSDEC through previous reporting. In 2018, only one system modification took place, consisting of the shutdown of the subslab depressurization system (SSDS) at the offsite residence when it became vacant, around mid-March 2018. This was communicated to NYSDEC via email on April 26, 2018. The residence is being inspected monthly for changes in occupancy. If the building becomes occupied, outreach will be performed to confirm the system is operational.

1.4 Supplemental Remedial Activities and Investigations

From 2000 through 2017, multiple voluntary supplemental remedial actions have been implemented with NYSDEC's approval, as listed in Table 1-2 and depicted on Figure 1-2.

In 2018, in addition to routine performance monitoring, non-routine groundwater sampling (discussed in Section 2), and an offsite soil vapor investigation (Appendix B) were conducted.

1.5 Performance Criteria

The qualitative remedial action objectives (RAOs) for soil and groundwater at the Site as listed in the ROD dated March 11, 1994, are as follows:

- Eliminate the potential for direct human or animal contact with contaminated soils
- Mitigate the impacts of contaminated groundwater to the environment
- Mitigate, to the extent practicable, migration of contaminants from onsite areas to groundwater
- Provide for attainment of RAOs for groundwater and soil quality

The quantitative RAOs are the criteria to evaluate remediation effectiveness, which are included in the ROD and listed in Table 1-3. The depth to which soil RAOs are applicable was not specified in the ROD (NYSDEC, 1994), but the soil sampling plans in the PMPs produced by URS limited soil sampling to the shallowest 6 feet of soil in the vadose zone. The Covenant signed by CPM and NYSDEC in 2014 restricted use of the Site to industrial purposes (Essex and CPM, 2014).

The groundwater treatment system operates under a Jamestown Board of Public Utilities (BPU) pretreatment permit, first issued in 1996 and most recently renewed in November 2017, for discharge to the city sewer and POTW. Pretreatment effluent limitations are contained in the permit and are described in Section 5.2.2.

1.6 Document Organization

This PRR is divided into the following sections in accordance with NYSDEC guidance (NYSDEC, 2013):

- Executive Summary
- Section 1, Site Overview
- Section 2, Remedy Performance, Effectiveness, and Protectiveness
- Section 3, Institutional Controls/Engineering Controls Plan Compliance
- Section 4, Monitoring Plan Compliance
- Section 5, Operations and Maintenance Plan Compliance
- Section 6, Periodic Review Conclusions and Recommendations
- Section 7, References

Included as part of this PRR submission is the 2018 Offsite Vapor Intrusion Investigation Report (Appendix B; Jacobs, 2019). Supporting material in the form of tables, figures, and appendixes are presented at the end of this PRR.

2. Remedy Performance, Effectiveness, and Protectiveness

The remedial actions designed and installed in the mid-1990s were focused on remediating the NPLS, Former AST/UST, and Former UST areas. As summarized in Section 1, additional investigations have identified groundwater impacts in other areas onsite (West Building and Plant 5 Building) and offsite. Remedy performance, effectiveness, and protectiveness were assessed by evaluating historical monitoring data, including 2018 data for the groundwater extraction system and results from the 2016 and 2017 data gap investigations (CH2M, 2017b, 2018b), in comparison to the project RAOs. Hydraulic control exerted by the recovery wells was assessed by evaluating recovery well extraction rates, groundwater potentiometric surfaces, vertical gradients, and VOC concentration trends at existing and newly installed downgradient sentinel or observation monitoring wells.

This section includes an evaluation of the groundwater extraction and treatment system performance in terms of the hydraulic control exerted by the recovery wells on impacted groundwater, comparison of site groundwater data to RAOs, and evaluation of the effectiveness of the groundwater treatment system at removing contaminant mass. Non-routine groundwater sampling activities and results are also discussed herein. Figure 2-1 shows the updated monitoring well network used to evaluate groundwater levels and concentrations.

2.1 Non-Routine Groundwater Sampling

Non-routine groundwater sampling occurred at the site in March, June, and November 2018, as discussed in the following sections. Non-routine samples were collected from subsets of monitoring wells, selected to satisfy the specific goals of each event and/or parameter(s). Figure 2-2 shows the monitoring wells sampled during each non-routine event.

2.1.1 2017 Data Gap Investigation Follow-up

As a follow-up to the 2017 Data Gap Investigation activities (CH2M, 2018b), groundwater sampling for VOC analysis (via EPA Method 8260B) was conducted between March 19 and 21, 2018, at a subset of 11 monitoring wells installed in 2016 and 2017, as shown on Figure 2-2. Additional data points were required to develop trends at specific monitoring wells, which included MW-106D, MW-108S, MW-110D, MW-109D, MW-118D, MW-119D, MW-120D, MW-121D, MW-122D, MW-123D, and MW-13. Table 2-1 summarizes the detected groundwater sampling analytical results for this non-routine event. The supporting Laboratory Certificates of Analysis were included with the Semiannual Performance Monitoring Report (CH2M, 2018c), covering the January through June 2018 period. Updated trends are presented and discussed in Sections 2.3 and 2.4.

2.1.2 Per- and Polyfluoroalkyl Substances

In response to the NYSDEC letter dated March 28, 2018 requesting sampling of per- and polyfluoroalkyl substances (PFAS), a second non-routine groundwater sampling event was conducted at the site in June 2018. Upon NYSDEC's approval email on May 21, 2018, six sampling locations were chosen as representative monitoring wells located at the potential source (underneath West Building; MW-112S and MW-113D), downgradient (MW-19S and MW-19D) and upgradient (MW-116S and MW-115D) areas, encompassing both the Shallow and Deep WBZs. Sampling locations for PFAS analyses are also shown on Figure 2-2.

Groundwater sampling was conducted on June 27 and 28, 2018, in accordance with NYSDEC's *Groundwater Sampling for Emerging Contaminants (February 2018), and Collection of Groundwater Samples for Perfluorooctanoic Acid (PFOA) and Perfluorinated Compounds (PFCs) from Monitoring Wells Sample Protocol* (June 2016) documents. Samples were analyzed by Alpha Analytical, Inc. of Westborough, Massachusetts (certified by the National Environmental Laboratory Accreditation Program and listed on NYSDEC's laboratories certified for PFOA and PFOS in drinking water) via modified EPA Method 537.

Results from this sampling indicate that there are no exceedances of EPA Drinking Water Health Advisory levels of PFOS or PFOA, currently set at 70 parts per trillion (ppt). As the State of New York has not promulgated standards for these contaminants, the strictest (lowest) published screening levels for PFAS for other states (including Colorado, Connecticut, Massachusetts, Minnesota, Michigan, New Jersey, Oregon, and Texas) were referenced for comparison. PFAS analytical results at the sampled wells are also below these standards. Results of this sampling event were provided to NYSDEC in an email dated July 18, 2018 requesting that no further action be taken in terms of PFAS at the site. NYSDEC later indicated via email on July 25, 2018, that based on the PFAS sampling results it is likely that no further action will be required. Table 2-2 summarizes the groundwater sampling analytical results for this non-routine event. The supporting Laboratory Certificates of Analysis and associated Data Quality Evaluation report were included with the Semiannual Performance Monitoring Report (CH2M, 2018c), covering the January through June 2018 period.

2.1.3 1,4-Dioxane

NYSDEC indicated via email dated July 25, 2018, that based on the results from prior preliminary treatment system influent sampling, additional 1,4-dioxane sampling was required to reach a method detection limit of 0.35 µg/L. In response to NYSDEC's email, a subset of wells was chosen to be sampled were sampled as part of the annual groundwater sampling event conducted in November 2018. Six sampling locations were chosen as representative source, upgradient and downgradient groundwater wells, screened in the shallow and deep WBZs, including MW-108S, MW-109D, MW-115D, MW-117S, MW-118D, and RS-1S, as shown on Figure 2-2. The 1,4-dioxane analyses were conducted via Method 8270D Selected Ion Monitoring (SIM) by isotope dilution, as recommended by NYSDEC.

Results from this sampling, summarized in Table 2-3, indicate that five out of the six samples collected were below detection limits. The sample from MW-118D, located within the area of high TCE concentrations (source), had a 1,4-dioxane detection at 0.418 µg/L. Samples collected downgradient from MW-118D in the deep aquifer were non-detect (i.e. MW-108S and MW-109D). Results of this sampling event, inclusive of the supporting Laboratory Certificates of Analysis, were provided to NYSDEC in an email dated December 7, 2018 requesting that no further action be required for evaluating 1,4-dioxane at the site.

2.2 Hydraulic Control

A groundwater extraction and treatment system has been operational at the site since 1998, with the goal of mitigating migration of impacted groundwater from the site. This section summarizes pumping, potentiometric, and COC data to evaluate the hydraulic control exerted by the groundwater extraction system. Table 2-4 includes the results from the 2018 annual groundwater sampling event conducted in November 2018 as per the SMP. Mann-Kendall trend analysis results are included in Table 2-5 for wells with six or more results to statistically evaluate concentration trends. Appendix C contains the Mann-Kendall trend analysis source files.

2.2.1 Shallow Groundwater

2.2.1.1 Recovery Well Extraction Rates

Table 2-6 summarizes groundwater extraction rates and the operational percentages at each recovery well. Appendix D provides a graphical summary of annual extraction volumes and average annualized flow rates at each recovery well. Shallow WBZ recovery wells were operational 98 percent of the time at both RW-1S and RW-2S in 2018. During periods of operation, average flow rates ranged from 0.09 gallon per minute (gpm) for RW-1S to 1.12 gpm for RW-2S. Groundwater extraction rates in the Shallow WBZ are limited by the low saturated thickness, which cause frequent cycling of the pumps as the water level is quickly drawn down during pumping.

2.2.1.2 Groundwater Flow Conditions

Groundwater elevations were measured in March, June, August, and November 2018. A monitoring well inventory, including the 2018 water level measurements, is provided in Table 2-7. Appendix E contains shallow potentiometric surface maps from March, June, August, and November 2018. Shallow groundwater flow under non-pumping conditions is to the northeast toward the Chadakoin River. Impacted shallow groundwater is captured in portions of the NPLS Area by recovery wells RW-1S and RW-2S. A capture zone was observed encompassing most of the NPLS Area. Groundwater flow at the rest of the Site is generally to the northeast, although a persistent area of groundwater mounding is observed south of the Plant 5 Building and under the eastern portion of the West Building, causing localized radial flow. This area of groundwater mounding is near the 2015 dry well removal and paving extension area; the remedial action does not appear to have had a significant impact on the magnitude of the groundwater mound. Similar flow patterns were observed in 2017 and preceding years. Approximate capture zones are shown on the March, June, August, and November 2018 potentiometric maps provided in Appendix E.

2.2.1.3 Volatile Organic Compound Trends Outside Capture Zone

The shallow remedial recovery well system was designed to provide capture of onsite groundwater in the NPLS, Former AST/UST, and Former UST areas. The Former UST Area was addressed using other remedial actions and the recovery wells in that area were removed from service in 2002 as part of the UST removal. Select shallow WBZ wells are sampled annually to monitor potential downgradient migration of site-related constituents beyond current plume configurations and other monitor wells are sampled to monitor concentration trends within the current plume configurations but outside the typical hydraulic capture zones to evaluate how well the system is reducing contaminant migration.[3]

Shallow CVOC Plume

Monitoring wells MW-101S and MW-108S, are sampled annually to monitor potential CVOC plume migration beyond the typical shallow capture zone. MW-101S is located approximately 130 feet northeast of RW-2S, and MW-108S is approximately 565 feet northeast of RW-2S and offsite. Total CVOC groundwater concentration trends from November 2016 through November 2018 at MW-101S and MW-108S are shown on Figure 2-3. Total CVOC concentrations declined at MW-101S from 753.7 µg/L in October 2017 to 101.7 µg/L in November 2018. This decline in concentration suggests that the extraction wells are successfully minimizing migration from the NPLS Area. Total CVOC concentrations at MW-108S were 34.13 µg/L in November 2018 compared to 29.5 µg/L in March 2017, indicating that the plume is likely stable in this area. Mann-Kendall trend analyses will be conducted for MW-101S and MW-108S in future PRR reports once the required six sampling events have been completed for the analysis.

MW-104S, located north of the site on the Hope Windows property, is also monitored annually. The highest concentration of TCE (100 µg/L) in offsite portions of the shallow CVOC plume was detected in November 2018 at this well. TCE detected at this well may be related to a separate offsite release.

Eastern Former UST Area Petroleum Hydrocarbon Plume

MW-27S and VP-6S are monitored annually to evaluate potential offsite migration of the plume. Petroleum-constituent concentrations were either non-detect or below RAOs at these two wells. Mann-Kendall trend analysis at MW-27S indicates concentrations of CBTEX are stable (Table 2-5, Appendix C, and Figure 2-4). Mann-Kendall trend analyses will be conducted for 1,2,4-TMB concentrations at MW-27S and VP-6S in future PRR reports once six sampling events have been completed.

[3] The petroleum-constituent and CVOCs present in the Shallow WBZ at the Former AST/UST Area is hydraulically upgradient of the NPLS Area and within the typical hydraulic capture zone of RW-1S and RW-2S; therefore, downgradient contaminant migration from this area is not discussed in this section.

West Building Petroleum Hydrocarbon Plume

MW-20 and MW-23S are sampled annually to monitor potential plume migration to the northeast and MW-117S is sampled annually to monitor potential localized plume migration to the south. Petroleum-related constituents were not detected in any of these monitoring wells in November 2018 samples. In fact, CBTEX concentrations have declined at MW-117S from 3,478 µg/L in 2016 to non-detect in November 2018, and at MW-20 from 7,971 µg/L in March 2012 to non-detect in November 2018 (Figure 2-5). MW-20 and MW-23S exhibit decreasing trends from 2011 (post-ISCO treatment) to present. Mann-Kendall trend analyses will be conducted for MW-117S and MW-30S in future PRR reports once six sampling events have been completed.

2.2.2 Deep Groundwater

2.2.2.1 Recovery Well Extraction Rates

Table 2-6 summarizes flow rates for the deep recovery wells, and Appendix D provides a graphical summary of annual extraction volumes and average annualized flow rates at each recovery well. The percentage of time that each Deep WBZ recovery well was operational was 96 percent at both RW-2D and RW-6D. Average flow values during periods of operation ranged from 0.91 gpm at RW-6D to 2.30 gpm at RW-2D. Higher operational percentages, extractions volumes, and pumping rates were experienced in 2018, as compared to those in 2017, mainly due to limited system downtime.

2.2.2.2 Flow Conditions

Groundwater flow in the Deep WBZ under non-pumping conditions is to the north and east. Appendix E contains deep potentiometric surface maps from March, June, August, and November 2018. Pumping of the deep recovery wells RW-2D in the NPLS Area and RW-6D northeast of the Plant 5 Building resulted in a capture zone encompassing most of the site and portions of the areas east and north of the Site as noted during the March, June, August, and November 2018 water level events. Approximate capture zones are shown on the March, June, August, and November 2018 potentiometric maps (Appendix E).

2.2.2.3 Volatile Organic Compound Trends Outside Capture Zone

The Deep WBZ groundwater extraction system originally was designed to provide hydraulic capture and treatment of impacted groundwater in the NPLS Area. In 2007, RW-6D was installed outside the northeastern corner of the Plant 5 Building to capture impacts detected outside the NPLS Area. MW-25D, MW-16D, MW-109D, MW-120D, and MW-121D are monitored annually to evaluate potential downgradient or lateral plume migration to the northeast (Table 2-4).

CVOC concentrations in groundwater samples collected in October 2017 and November 2018 from these wells were non-detect for VOCs and/or did not exceed RAOs (TCE was detected in March 2018 at MW-120D at a concentration of 0.56 µg/L and vinyl chloride was detected in November 2018 at MW-16D at a concentration of 0.41 J µg/L). Therefore, the deep CVOC plume has been delineated to the northeast of the Site and remains within the limits of the monitoring well network.

MW-106D, MW-110D, and MW-122D are wells within the CVOC plume but outside the typical hydraulic capture zone. These wells are monitored annually to evaluate whether the hydraulic capture system is effectively minimizing downgradient migration of CVOCs and acetone within the plume (Table 2-4). CVOC concentrations at these wells were slightly higher than previous concentrations detected, with the exception of MW-122D (Figure 2-6). MW-122D was installed as a replacement well for PZ-7D in 2017; historical CVOC concentrations at PZ-7D in 2013 and 2014 (1,353 and 1,126 µg/L, respectively) were similar to those observed in 2018 at MW-122D (1,191 and 1,087 µg/L in March and November 2018, respectively). Acetone was not detected in any of the 2018 samples from these wells, indicating that the extraction wells are successfully limiting migration of this compound and/or that it is naturally degrading. Mann-Kendall trend analyses will be conducted for these wells in future PRR reports once six sampling events have been completed.

2.2.3 Vertical Gradients

Vertical gradients under pumping conditions are generally downward between the Shallow and Deep WBZs, and as expected, the largest vertical gradients are observed near extraction wells RW-2D and RW-6D (Table 2-8). While a downward vertical gradient indicates the possibility that contamination in the Shallow WBZ could migrate downward into the Deep WBZ, the presence of the shallow silty clay in most areas of the Site likely slows this migration. However, as discussed in the 2017 Data Gap Investigation Report (CH2M, 2018b), the shallow silty clay appears to be absent or thin in the western portion of the NPLS Area.

2.3 Evaluation of Remedial Effectiveness

2.3.1 Soils

Compliance soil sampling is not required as per the SMP (CH2M, 2017a). No soil sampling activities were conducted at the Site in 2018.

2.3.2 Shallow Groundwater

RW-1S and RW-2S recover groundwater from the NPLS Area, while RW-3S recovered groundwater in the Former AST/UST Area until August 2017, when it was permanently shut off. Tables 2-9 and 2-4 present the 2018 semiannual shallow recovery well sampling results and the November 2018 annual shallow monitoring well sampling results, respectively. Table 2-10 summarizes the 2018 detected concentrations of COCs in shallow groundwater, and the number of wells sampled with concentrations above and below the RAOs for CVOCs and petroleum-related compounds.

2.3.2.1 Shallow CVOC Plume

RW-1S and RW-2S in the NPLS Area are monitored semiannually to evaluate conditions in this area. These wells capture a portion of the shallow CVOC-impacted groundwater (Figure 2-7).[4] The following observations can be made:

- CVOC concentrations at RW-2S in 2018 were 56.3 µg/L in March and 59.8 µg/L in November, are one to three orders of magnitude lower than pre-remediation concentrations (410 to 10,100 µg/L) and exhibit a statistically significant decreasing trend from 1995 to present. While RW-2S continues to remove contaminant mass, CVOC concentrations in this well have become asymptotic and the Mann-Kendall trend analysis indicates that there is no significant trend in CVOC concentrations when only considering concentrations from 2009 to present (Table 2-5 and Appendix C).
- The highest concentrations of CVOCs (653 and 634 µg/L in March and November 2018, respectively) within the NPLS Area wells sampled in 2018 are present at RW-1S. Total CVOC concentrations have declined by about two orders of magnitude from the highest pre-remediation CVOC concentration (3,740 µg/L in August 1995), and exhibit a statistically significant decreasing trend for this period. CVOC concentrations have increased from historic low concentrations in 2014 and 2015. The higher concentrations observed at RW-1S are consistent with the well's location near the area of elevated soil CVOC detections delineated in 2016 and 2017.

As discussed in Section 2.2.1.3, CVOC concentrations in MW-101S downgradient of the NPLS Area were lower in 2018 than 2017, while concentrations in the most eastern offsite well, MW-108S, have been relatively steady.

[4] While concentration trends can be assessed at these extraction wells, the concentrations in these wells can be influenced by fluctuations in the capture zone radius and represent the combined effects of the plume concentrations within that capture zone radius. For example, at higher pumping rates a well will draw in water from a wider radius. If that wider radius intercepts an area of elevated concentrations, then the sample concentration should increase; conversely, if the wider radius intercepts mostly lower concentration water, the sample concentration at the extraction well should decrease.

Groundwater extraction at RW-1S and RW-2S continue to provide hydraulic capture and minimize downgradient migration of CVOCs (Figure 2-7), as evidenced by lower concentrations in 2018 at MW-101S. Outside the hydraulic capture zone, the shallow CVOC plume appears to be relatively stable, as shown by the relatively steady concentrations at MW-108S. There may be a separate, non-site-related source of TCE on the Hope Windows property near MW-104S that is contributing to the offsite CVOC plume.

2.3.2.2 Former UST/AST Area

RW-3S is monitored semiannually to evaluate conditions in the Former UST/AST Area. RW-3S is located in the Former AST/UST Area and was shut off in August 2017 due to low pumping rates, low contaminant recovery, and its position hydraulically upgradient of RW-1S and RW-2S. RW-3S concentration trends are depicted on Figure 2-8:

- CVOC concentrations at RW-3S, in the Former AST/UST Area, have fluctuated through time. The fluctuating concentrations are likely related to general variability in water levels and seasonal changes. Mann-Kendall trend analysis indicates that there is no significant trend in CVOC concentrations from 2006 to present (Table 2-5 and Appendix C).
- TCE (20 J and 8.1 µg/L in May and November 2018, respectively), and cis-1,2-DCE (7.8 J and 5.4 µg/L in May and November 2018, respectively) are the only VOCs that exceeded the RAOs at RW-3S in 2018.
- CBTEX levels at RW-3S have declined and remain under the respective RAOs from the August 2017 through the November 2018 semiannual recovery well sampling. Mann-Kendall trend analysis indicates that there is a stable trend in CBTEX concentrations from 1997 to present (Table 2-5 and Appendix C).
- No rebound in concentrations was observed following RW-3S shutoff in August 2017.

Based on the concentration trends at RW-3S, CVOCs in groundwater at the Former UST/AST Area continue to attenuate. Based on groundwater potentiometric maps, remaining impacts in this area may migrate towards the NPLS Area, where, if not yet attenuated, they would be captured by RW-1S and RW-2S.

Eastern Former UST Area Petroleum Hydrocarbon Plume

MW-26S is monitored annually to evaluate the highest concentrations areas of the petroleum-constituent plume in the eastern Former UST Area (Figure 2-4). The following observations can be made:

- 1,2,4-TMB was detected at a concentration of 4,500 J µg/L at MW-26S in 2018 (2,400 µg/L in duplicate sample), with lower concentrations of cumene, ethylbenzene, and total xylenes observed (total CBTEX of 874 µg/L). CBTEX concentrations in 2018 were lower than pre-ISCO treatment concentrations (2,038 µg/L in 2011); however, the Mann-Kendall trend analysis indicated there is a statistically stable trend (Table 2-5 and Appendix C). This is because CBTEX concentrations have increased at this well from 318.5 µg/L in 2015 to 874 µg/L in 2018. 1,2,4-TMB concentrations have been relatively steady, with a 2016 concentration of 3,800 µg/L.
- As discussed in Section 2.2.1.3, monitoring at VP-6S and MW-27S indicates that the plume has not migrated significantly offsite and concentration trends at MW-27S indicate that the plume has attenuated in this location.

In conclusion, the plume exists outside the Shallow WBZ capture zone, and concentrations at the most impacted well (MW-26S) have been steady to increasing; however, the plume has been attenuating at its eastern edge (MW-27S) and has not migrated to VP-6S to the northeast of MW-26S (Figure 2-4).

West Building Petroleum Hydrocarbon Plume

Groundwater under the West Building area migrates under natural gradient conditions to the east-northeast, with localized flow to the east and south near an area of groundwater mounding.

MW-30S is sampled annually to monitor COC concentrations in the most-impacted portion of this plume. Plume observations include:

- Concentrations of CBTEX at MW-30S increased from 9,237 µg/L in 2017 to 32,220 µg/L in 2018 and were similar to the 2016 concentration (33,877 µg/L, Figure 2-5). The concentration fluctuations may be related to groundwater table fluctuations, which decreased by approximately 9 inches in 2018 when compared to 2017 water levels.
- As discussed in Section 2.2.1.3, 2018 concentrations at MW-117S were non-detect and lower than previous reported concentrations in 2016 and 2017, indicating that the plume has attenuated in this location, south of the West Building (Figure 2-5). Petroleum-constituents were not detected at MW-20 and MW-23S to the northeast, indicating that the plume has not migrated to these locations.

Mann-Kendall trend analyses will be conducted for MW-30S and MW-117S in future PRRs once six sampling events for each well have been completed. In summary, while this plume is outside the Shallow WBZ capture zone, the plume concentrations are relatively steady, and the plume has attenuated to the south, and has not migrated significantly to the northeast.

2.3.3 Deep Groundwater

Table 2-11 contains the 2018 semiannual deep recovery well sampling results and Table 2-4 presents the 2018 annual deep monitoring well sampling results. Table 2-12 summarizes the 2018 detected concentrations of COCs in deep groundwater. Recovery wells RW-2D and RW-6D are monitored semi-annually to evaluate concentration trends in the NPLS area and the area northeast of the Plant 5 Building. Near the NPLS Area, monitoring wells MW-118D and MW-119D are monitored annually to evaluate concentration trends within the typical hydraulic capture zone (Figure 2-9). As discussed previously, MW-122D, MW-110D, and MW-106D are sampled annually to monitor conditions just outside the typical hydraulic capture zone. The following observations can be made:

- RW-2D, which recovers groundwater in the NPLS Area, had total CVOC concentrations of 8,770 µg/L (May 2018) and 5,843 µg/L (November 2018). As shown on Figure 2-9, these concentrations are similar to past concentrations, which have ranged from 4,719 to 14,539 µg/L since 2008. Total CVOC concentrations exhibit a statistically stable trend when considering all data collected from 1995 (before the groundwater extraction and treatment system was installed) to present, indicating that this well continues to steadily extract high concentration CVOCs from the vicinity.
- MW-118D, located under the western portion of the Plant 5 Building and near PZ-4D (which historically has had measurable NAPL), had total CVOC concentrations of 233,200 µg/L in March 2018 and 261,210 µg/L in November 2018, similar to the 2017 concentration of 243,832 µg/L.
- MW-119D, located north of the NPLS Area on the Hope Windows property, had total CVOC concentrations of 5,767 µg/L in March 2018 and 6,280 µg/L in November 2018 consistent with October 2017 results (4,685 µg/L).

These results indicate that while high concentrations are being extracted by RW-2D, significant concentrations remain at the source and near the NPLS Area. Mann-Kendall trend analyses will be conducted in future PRRs for MW-118D and MW-119D once six sampling events have been conducted at these wells.

Near the Plant 5 Building area and to the northeast, the following observations are made:

- RW-6D, which recovers groundwater from under the northeast corner of the Plant 5 Building and areas offsite to the east and north, had total CVOC concentrations of 45,652 and 31,651 µg/L in May and November 2018, similar to previous concentrations since well startup in 2009 (range of 16,688 µg/L to 56,571 µg/L, Figure 2-6). Mann-Kendall trend analysis from 2009 to present indicates an increasing CVOC concentration trend (Table 2-5 and Appendix C).
- Acetone concentrations at RW-6D continued to decline, with concentrations of 6,900 µg/L in May 2018 and 380 µg/L in November 2018 (Figure 2-6). These acetone concentrations are significantly

lower than the peak concentration of 138,000 µg/L in November 2014 and exhibit a decreasing trend for the 2014-2018 period.

- As discussed in Section 2.2.2.3, CVOC concentrations at MW-110D, MW-106D, and MW-122D, which are wells located at or just beyond the typical hydraulic capture zone, increased slightly in 2018.
- CVOCs have not been detected above RAOs at any of the downgradient sentinel wells.

While RW-2D and RW-6D have removed significant quantities of VOCs (Section 2.4.2), concentrations remain above RAOs and extend outside the typical capture zone of the current extraction system. CVOCs present in the Deep WBZ outside the capture zone are slowly migrating in the direction of groundwater flow to the northeast.

2.4 Mass Removal by Groundwater Extraction System

The groundwater extraction system performance also is evaluated by calculating the estimated mass of VOCs removed by the extraction and treatment system. Mass removal and extraction rates by well are presented in Appendix D and summarized below.

2.4.1 Shallow Groundwater

The total mass removed by the shallow extraction system consisting of recovery wells RW-1S and RW-2S was 0.53-pound in 2018, an increase from 0.38-pound removed in 2017. Individual mass removal values are provided in Table 2-13 and Appendix D. In total, the shallow groundwater extraction system has removed approximately 153 pounds of VOCs since 1998, with 86 percent of that mass removed between 1998 and 2002 mainly by RW-4S. The mass removal has decreased over time because of the decreasing VOC concentrations observed in the Shallow WBZ, the removal of RW-4S and RW-5S from the shallow extraction system in 2002, the removal of RW-3S in 2017, and decreasing groundwater extraction volumes. Mass removal by well through time is presented on Figure 2-10.

While the shallow extraction system exerts hydraulic control on the Shallow WBZ in the NPLS Area, mass removal continues to be low mainly because of the limited saturated thickness of the Shallow WBZ and low concentrations in extracted groundwater from RW-2S.

2.4.2 Deep Groundwater

The total mass removal by the deep groundwater extraction system consisting of recovery wells RW-2D and RW-6D was estimated at 204 pounds in 2018, representing an increase from the 2017 estimated mass removal of 117 pounds. This increase in mass removal is primarily related to the limited system downtime experienced throughout 2018 and improved pumping rates. Individual mass removal values are provided in Table 2-14 and Appendix D. As depicted on Figure 2-11, the total mass removed by the two deep recovery wells increased after RW-6D was installed, declined in 2016 and 2017 (primarily because acetone concentrations were decreasing), but increased in 2018 (because of improved pumping rates and uptime). In total, the deep groundwater extraction system has removed 2,577 pounds of VOCs since 1998, and 88 percent of the mass extraction has occurred since the 2009 addition of RW-6D to the system.

3. Institutional Controls/Engineering Controls Plan Compliance

IC/ECs are built into the project remedial action as part of the Operations and Maintenance (O&M) Plan, the SMP, and Deed Restrictions filed by CPM. IC/EC certifications are provided in Appendix A.

3.1 Institutional Controls

ICs in place at the Site include the 2017 O&M Plan (CH2M, 2017c), groundwater and land use restrictions, and building use restrictions included in a Declaration of Covenants and Restrictions (Covenant) filed at the Chautauqua County Office of Recorder of Deeds, Mayville, New York in 2014 (Essex and CPM, 2014).

The 2017 O&M Plan describes the procedures to operate and maintain the remedial systems at the Site, including the monitoring requirements and schedule of maintenance (CH2M, 2017c). Section 5, *Operations and Maintenance Plan Compliance*, presents the annual summary of system O&M activities.

CPM filed Deed Restrictions to establish permanent notifications in the Chautauqua County Office of Recorder of Deeds, Mayville, New York. The Covenant and the latest deed filing from 2014 are contained in Appendix A of the 2014 PRR (AECOM, 2015). Restrictions imposed by the Covenant, unless prior written approval is granted by NYSDEC, in part include restrictions on groundwater use without necessary treatment, restrict use of the Site to industrial purposes, require that ECs not be disturbed or interfered with, and restrict excavations which threaten the integrity of the ECs or result in an unacceptable human exposure to contaminated soils. These ICs remain fully in place and effective.

3.2 Engineering Controls

ECs have been implemented at the site as part of the NYSDEC Order on Consent (NYSDEC and Essex, 1995), which outlined the remedial actions pursuant to the 1994 ROD issued by NYSDEC (NYSDEC, 1994). The Site's IC/EC Certification Form is included in Appendix A. ECs stipulated in the ROD that are still in place and active at the Site are the following:

- The groundwater extraction and treatment system, presently consisting of two shallow and two deep recovery wells and activated carbon groundwater treatment with onsite discharge to the local POTW.
- Low-permeability asphalt and concrete covers are in the NPLS, Former UST, and Former AST/UST areas.
- A network of monitoring wells across the site (as designated in the SMP [CH2M, 2017a]) used to measure the effectiveness of the groundwater remedial activities. This monitoring well network was upgraded during the 2016 and 2017 Data Gap Investigations (see Figure 2-1).

Voluntary supplemental remedial activities were initiated in 2000, with NYSDEC's approval, to refine the delineation of subsurface constituents and evaluate potential remedial alternatives to enhance remedial effectiveness. A summary of the additional activities performed at the Site after the initial remedial actions is contained in Table 1-2 and depicted on Figure 1-2.

In November 2008, an SSDS was installed at 159 Hopkins Avenue to mitigate vapor intrusion (VI) concerns at a residence. Performance of the SSDS was evaluated in April 2017 and is described in Section 3.2.4. Additionally, dry wells in the Former UST Area were removed, and the area was paved with asphalt in 2015. This effort enhances the asphalt cover and reduces infiltration (Figure 2-1).

3.2.1 Groundwater Extraction and Treatment System

The performance of the groundwater extraction and treatment system was evaluated through the end of 2018 in accordance with the SMP (CH2M, 2017a) and the 2017 O&M Plan (CH2M, 2017c). This included monitoring groundwater levels to determine degree of capture, monitoring groundwater COC concentrations,

evaluating extraction well pumping rates and COC concentrations, providing routine maintenance and logging system performance, and conducting monthly sampling of the influent and effluent concentrations from the granular-activated carbon (GAC) treatment system.

Semiannual reports are submitted to the Jamestown BPU and NYSDEC. Performance information for the groundwater extraction and treatment system is discussed in Sections 2 and 5. Additionally, the groundwater extraction and treatment system is inspected semiannually in accordance with the O&M Plan (CH2M, 2017c). Appendix F contains the May and November 2018 groundwater extraction system inspection logs. Recovery wells RW-1S, RW-2S, and RW-2D were redeveloped in December 2018 as per the required annual redevelopment stipulated in the O&M Plan and SMP. RW-6D was not redeveloped, as the amount of disturbed silt within this extraction well has caused system issues during previous redevelopments.

Effectiveness of the groundwater extraction system is discussed in Section 2. As discussed in Section 5.2.2, the treatment system has successfully treated COCs to meet BPU permit requirements.

3.2.2 Monitoring Well Network

The monitoring well network for the Shallow WBZ was expanded by 18 wells in 2016 to enhance the capability to monitor the offsite CVOC plume and the petroleum-constituent plume beneath the West Building. Also, 12 new wells were installed in the Deep WBZ (five in 2016 and seven in 2017), to aid in delineating the Deep WBZ plume and provide additional locations to measure water levels to assist in capture zone assessment. Analytical results from the annual November 2018 groundwater sampling events are discussed in Section 2. Table 2-7 contains a complete monitoring well inventory, and Figure 2-1 shows the entire monitoring well network, including the recent additions.

3.2.3 Asphalt and Concrete Covers

The asphalt and concrete covers in the NPLS, Former AST/UST, and Former UST areas, shown on Figure 1-2, are monitored semiannually in accordance with the O&M Plan (CH2M, 2017c). In November 2015, an asphalt cover was placed in the Former UST Area following drywell removal activities (see Section 5.2.4). The covers were inspected on April 26 and November 7, 2018. Observations from these inspections include:

- **Asphalt cap at NPLS Area –** Up to 24-foot-long cracks transversal and longitudinal, up to 2 inches deep and 1 inch wide; 3-foot-diameter shallow pot hole repaired in June 2018, but signs of cracking/caving in observed.
- **Concrete cap at NPLS Area –** Up to 90-foot long shallow crack, up to 0.5-inch deep and 0.5-inch wide. Concrete joints (one every 60 feet) appear eroded and some have minor vegetation growing through.
- **Asphalt cap at AST/UST Area –** Small cracks (under 5 feet long), but with moderate vegetation growth at cracks and joints with well pads and asphalt patches.
- **Asphalt cap at UST Area –** Intact, with no visible cracks.

Appendix G contains the 2017 asphalt inspection logs. The cracks are relatively surficial and continue to be monitored for changes. Crack filling and sealing work was attempted in October 2018 but could not be completed due to cold/wet weather. Essex plans on conducting asphalt and concrete caps maintenance with crack filling and sealing at the NPLS and AST/UST areas in spring 2019.

3.2.4 Subslab Depressurization System

An SSDS (VI system) was installed in 2008 at the residential building at 159 Hopkins Avenue, northeast of the Site (Figure 1-2). The VI mitigation system was designed to operate 24 hours a day, 365 days a year. Annual inspections of the SSDS are conducted during the heating season and in accordance with the O&M Plan (CH2M, 2017c). On February 28, 2018, the system was found to be in good working condition. Appendix H contains the 2018 SSDS inspection log.

However, during a subsequent monthly check in March 2018, the SSDS was observed to have been shut down. Upon further investigation, it was determined that the residence had become vacant in mid-March 2018, and the power supply had been shut off by the property owner. The residence is being inspected on a monthly basis to ensure it remains vacant. If the building becomes occupied, outreach will be performed to confirm the system is operational.

4. Monitoring Plan Compliance

4.1 Components of the Monitoring Plan

In December 21, 2017, an SMP addressing the means for implementing operation, maintenance, and monitoring of the IC/ECs at the Site (CH2M, 2017a) was submitted to NYSDEC, and includes a revised annual groundwater sampling program based on the findings from the 2016 and 2017 Data Gap Investigations (CH2M, 2017b, 2018b). Monitoring wells to be sampled annually, and recovery wells to be sampled semiannually (in alternating seasons) are listed in Table 2-2 and shown on Figure 1-2. Routine monitoring of groundwater levels, COC concentrations, extraction well pumping rates and COC concentrations, routine maintenance and logging system performance, and monthly sampling of the influent and effluent concentrations from the GAC treatment system remained unchanged and performed at the same frequencies as done historically.

4.2 Summary of Monitoring Completed

4.2.1 Groundwater Water Levels

Groundwater elevations were measured on March 21, June 26, August 24, and November 2018. Water level measurement data collected in 2018 are provided in Table 2-7. Appendix E contains Shallow and Deep WBZ potentiometric surface maps for the 2018 synoptic water level events. Annual groundwater sampling monitoring wells included in the SMP were sampled from November 13 through 15, 2018. A total of 11 shallow-screened and 10 deep-screened monitoring wells were sampled during the annual sampling event in November 2018.

Monitoring well groundwater sample results are discussed in Sections 2.3.2 and 2.3.3. Recovery well sample results are included in Tables 2-9 and 2-11, and 2018 sitewide analytical results are summarized in Table 2-4.

4.2.2 Soil Sampling

Compliance soil sampling is not required as per the SMP (CH2M, 2017a). No soil sampling activities were conducted at the Site in 2018.

4.3 Comparisons with Remedial Objectives

Comparisons of monitoring data collected in 2018 against the 1994 ROD RAOs for soil and groundwater at the Site are as follows:

- **Eliminate the potential for direct human or animal contact with contaminated soils.** This has been addressed by the asphalt/concrete covers and impacted soil and AST/UST removals, and the 2014 Declaration of Covenants restricting excavation at the Site.
- **Mitigate the impacts of contaminated groundwater to the environment.** Groundwater impacts have been mitigated by the active ECs such as the groundwater extraction and treatment system, past remedial actions listed in Table 1-2.
- **Mitigate, to the extent practicable, migration of contaminants from onsite areas to groundwater.** Analysis of the capture zones produced by pumping of the recovery wells is provided in Section 2.3 and indicates that the groundwater extraction system provides some migration control of onsite groundwater to offsite areas.
- **Provide for attainment of RAOs for groundwater and soil quality.** The numerical criteria used to evaluate remediation effectiveness in soil and groundwater were prescribed by the ROD and are included in Table 1-3. Comparison to site-specific numerical RAOs is presented in Tables 2-1, 2-4, 2-9, 2-10, 2-11, and 2-12, and discussed in Section 2.3, and indicates that, although active remediation is ongoing, COCs remain in groundwater in the Shallow and Deep WBZs at concentrations above RAOs.

4.4 Monitoring Deficiencies

No deficiencies in complying with the SMP (CH2M, 2017a) were identified for 2018.

4.5 Conclusions and Recommendations for Changes

Activities required by the SMP were completed in 2018. No changes for the monitoring plan are recommended at this moment. Site monitoring activities in 2019 will be performed in compliance with the SMP.

5. Operations and Maintenance Plan Compliance

CH2M updated the O&M Plan in March 2017 from its original version (Radian Engineering Inc., 1998) and included it as an attachment in the previous annual PRR submission (CH2M, 2018a). The updated O&M Plan reflects current operational conditions and remedial components, ensures efficient operation of equipment and facilities, and helps maintain equipment in accordance with the latest manufacturers' recommendations, thereby minimizing replacement and repair costs.

The O&M Plan will be reviewed annually and updated as needed. For major changes in facilities, responsibilities, tasks, etc., the O&M Plan will be reissued with a revised tracking number and included as part of the corresponding annual PRR submission to NYSDEC. For non-substantive changes, changes will be tracked and summarized in this section; however, a full report will not be reissued.

5.1 Components of the Operations and Maintenance Plan

The routine maintenance and monitoring activities schedule, as set forth in the updated O&M Plan for the remedial treatment system, is presented in Table 5-1. Maintenance activities for the groundwater treatment system are performed as follows (and as necessary):

- Routine maintenance of the groundwater treatment system (biweekly or as needed)
- Semiannual recovery well inspection and maintenance and as needed
- Annual recovery well redevelopment
- Carbon vessels maintenance (backflushing, replacement, and cleaning) as required

Groundwater treatment system monitoring required by the updated O&M Plan includes:

- Routine flow readings of all recovery wells and total wastewater treatment system flow
- Monthly influent/effluent sampling and pH monitoring of the waste stream to monitor system performance and compliance with wastewater discharge permit requirements
- Monitoring water levels (quarterly), groundwater sampling of recovery wells (semiannually on alternating seasons), and select monitoring wells (annually)

Maintenance and monitoring activities are documented in the treatment plant operator's logbook and applicable maintenance and monitoring forms contained in the updated O&M Plan. A summary report (this report) is prepared annually, and analytical and operational data are provided to the Jamestown BPU and NYSDEC semiannually.

The asphalt and concrete surface areas are to be inspected semiannually for cracks and/or poor drainage, and monitoring wells are to be inspected during well monitoring events for well casing integrity, well cap and lock, and concrete base condition. Surficial cracks were observed in April 2018 and continue to be monitored for changes. Asphalt and concrete caps maintenance with crack filling and sealing at the NPLS and AST/UST areas is planned for spring 2019.

The SSDS installed in 2008 at a residence at 159 Hopkins Avenue was shut down in mid-March 2018. Monthly checks are to be made from the outside the residence to verify occupancy. If the residence becomes occupied again, routine O&M activities for the SSDS system will be resumed.

5.2 Operations, Maintenance, and Monitoring Completed

This section summarizes O&M performed at the Site in 2018.

5.2.1 Groundwater Extraction and Treatment System Operations and Maintenance

Routine maintenance (biweekly or as needed) consists of inspection/check of the system piping, pressure gauges, equalization tank including level probes, carbon vessels, and overall operations. Appendix D contains the groundwater extraction performance data.

Recovery well maintenance consists of annual well development, pump/meter disassembly inspection and cleaning, and level probe inspection/cleaning. Well redevelopment was completed in December 2018 at recovery wells RW-1S, RW-2S, and RW-2D. RW-6D was not redeveloped, as siltation and system issues were experienced in 2017 after this extraction well was redeveloped. Therefore, future redevelopment of RW-6D will be performed on a specific as-needed basis as opposed to annually.

Operational issues observed, and maintenance performed in 2018 included:

- The system was off from January 26 to 28, 2018, for approximately 44 hours due to high system pressures caused by a filter backup.
- All active recovery wells (RW-1S, RW-2S, RW-2D, and RW-6D) experienced other minor periodic shutdowns for mechanical and electrical repairs, equipment replacement, or maintenance.
- A total of approximately 293 cumulative hours of system downtime were experienced in 2018, including downtime during carbon change outs (below).

Jacobs conducted the following maintenance and improvements to the treatment system in 2018:

- GAC within the vessels was changed out on March 29 and November 7, 2018.
- The flow gauge at RW-6D was occasionally not registering flow during times of active groundwater extraction, even after maintenance was performed to the flow meter. The flow gauge was replaced with a new one on December 20, 2018.

The recovery wells were inspected on May 16 and November 7, 2018. RW-1S, RW-2S, and RW-2D were found to be in good condition with minimal sediment accumulation during the May inspection, and in generally fair condition with minimal to moderate sediment accumulation during the November 2018 inspection. RW-6D was found to be in good condition with significant sediment accumulation during both inspections; as noted earlier, development of RW-6D will be on an as needed basis going forward. Appendix F contains the groundwater extraction system inspection logs. Table 2-6 provides the percentage of time that the recovery wells were operational in 2018.

In 2012, the Jamestown BPU Water Division conducted a state-required analysis of commercial and industrial water connections to the BPU water system and backflow prevention devices. As part of the analysis, a Backflow Prevention Device Inventory Form was submitted in September 2012. In September 2013, a licensed plumber inspected site operations, and the building was deemed nonhazardous to the public water supply and exempt from a requirement to install a backflow prevention device. A Form for Backflow Prevention Device Exemption is required to be submitted annually to certify that none of the conditions at the building has changed since it was originally inspected. This form was submitted to the BPU Water Division in September 11, 2018 (Appendix I).

5.2.2 Groundwater Extraction and Treatment System Monitoring

Pursuant to the City of Jamestown BPU Industrial Wastewater Discharge Permit Number 26, renewed in November 2017, the pretreatment system is monitored monthly for pH and total toxic organic (TTO) VOCs to ensure compliance with the permit requirements. The TTO VOC discharge limit is 2,130 µg/L, and pH is required to be between 5.5 and 10 standard units. Recovery well and totalizer flow meter readings are collected during routine inspections. Average flow rates are calculated from these data. Additionally, influent/effluent sample collection was conducted monthly from January through December 2018.

Analytical results for influent (pre-carbon, before the treatment system), primary carbon effluent (collected after the first carbon vessel), and secondary carbon effluent (post-carbon, after both carbon vessels,

representative of effluent discharged to the POTW) are presented in Tables 5-2, 5-3, and 5-4. These results are reported to the Jamestown BPU semiannually. The 2018 semiannual BPU reports are contained in Appendix J.

Acetone is not included in the U.S. Environmental Protection Agency (EPA) TTO list contained in 40 *Code of Federal Regulations* 401, Part 15, *Toxic Pollutants*. In addition, acetone has been documented as not being a toxic compound for the biological treatment processes used at the Jamestown POTW. Consequently, acetone has not been reported as a TTO in the BPU semiannual reports since 2012; however, its concentrations are reported in the semiannual BPU reports for reference. Monthly results for post-carbon TTOs were all below the permit level of 2,130 µg/L in 2018.

As discussed in Sections 2.2.1.2 and 4.2.1, groundwater levels were measured at all monitoring wells in March, June, August, and November 2018 (Table 2-7 and Appendix E) to monitor capture and assess if the RAO to "*mitigate, to the extent practicable, migration of contaminants from onsite areas to groundwater*" is being achieved at the Site. Groundwater sampling of recovery wells was conducted in May and November 2018 (Tables 2-9 and 2-11). Annual groundwater sampling was conducted in November 2018, with non-routine groundwater sampling events conducted in March and June 2018 (Section 2.1). Results of groundwater monitoring activities were compared against the RAOs as described in Sections 2 and 4.

5.2.3 Monitoring Well Inspections

Monitoring wells were inspected during quarterly groundwater elevation measurement events. Well integrity issues, repairs, and abandonments were documented and are included in Table 2-7. Minor repairs to VP-6S, MW-122D, GP-4D, and HW-2 are planned for 2019.

5.2.4 Asphalt and Concrete Cover Inspection

The covers were inspected on April 26 and November 7, 2018. Several transversal and longitudinal cracks were identified over the asphalt and concrete caps at the NPLS Area, and fewer and smaller cracks were observed over the asphalt cap at the former AST/UST Area (detailed in Section 3.2.3). Essex plans on conducting asphalt and concrete caps maintenance with crack filling and sealing at the NPLS and AST/UST Areas in spring 2019. The concrete cover and asphalt inspection logs are provided in Appendix G.

5.2.5 Subslab Depressurization System

An inspection of the SSDS at the residential property at 159 Hopkins Avenue was conducted on February 28, 2018 and found the system to be in good operating condition. The vacuum gauge was observed to be in good condition with a reading of 0.5-inch of water column. Appendix H contains the SSDS inspection log.

Subsequently, in mid-March the property was vacated and electricity was shut off to the building, resulting in shutoff of the SSDS. Additional periodic checks continue to be made to ensure the residence continues to be vacant. If the building becomes occupied, O&M activities for the SSDS, as described in the SMP and O&M Plan will resume.

5.3 Evaluation of the Remedial Systems

Sections 2.2 and 2.3 provide an evaluation of the groundwater treatment system. The groundwater extraction and treatment system is generally operating as designed. As discussed in Sections 2.2.1 and 2.3.2, the low saturated thickness of the Shallow WBZ limits the flow rates at which the shallow recovery wells can be operated, and the mass removed by the shallow recovery wells has decreased. RW-6D experienced increased extraction rates in 2018 due to decreased shutdown time and limited operational issues.

Analytical results are evaluated in terms of remedial effectiveness in Sections 2.3.2 (Shallow WBZ) and 2.3.3 (Deep WBZ). The SSDS no longer requires operation, although periodic checks continue to be made to verify occupancy (Section 3.2.4), and the asphalt/concrete covers are in fair condition requiring crack filling and sealing, planned for spring 2019 (Section 3.2.3).

5.4 Operations and Maintenance Deficiencies

No deficiencies or non-compliance with the O&M Plan were identified in 2018.

5.5 Conclusions and Recommendations for Improvements

While the shallow extraction system exerts some hydraulic control on the Shallow and Deep WBZs in the NPLS and Former AST/UST areas, mass removal has been generally low, and concentrations of COCs above the RAOs remain in areas within and outside the current capture zones. Extraction rates are limited for the Shallow WBZ because of its low saturated thickness and extraction within the Deep WBZ is limited because of the fine-grained soils surrounding RW-6D. Nevertheless, extractions rates and volumes, and mass removal increased in 2018 as compared to 2016 and 2017. Improvements in the system metrics for this reporting period are predominately associated with decreased shutdown time and limited operational issues. Increases in performance are being achieved by weekly pump and flow meter maintenance, and as-needed equipment replacement.

Essex plans for 2019 include performing a source evaluation to support selection of a remedial alternative, or supplement to the existing remedies.

6. Periodic Review Conclusions and Recommendations

This section provides a summary of this PRR conclusions and recommendations derived from an evaluation of SMP compliance and of the performance and effectiveness of the ECs. Operation, maintenance, and monitoring activities have not changed since the last annual PRR of 2017 (CH2M, 2018a), and metal manufacturing operations involving the use of solvents continue to occur onsite, as stated in IC/ECs Certification form included in Appendix A.

6.1 Site Management Plan Compliance

This PRR demonstrates that the requirements of the current SMP elements have been achieved. Conclusions include:

- The remedial systems for groundwater extraction and treatment have continued to operate through 2018 with limited and intermittent shutdowns for routine maintenance/repairs.
- The groundwater treatment system has met monthly effluent limitations without any noncompliant discharges in 2018.
- Performance monitoring was performed as required by the SMP (CH2M, 2017a), including annual groundwater sampling of monitoring wells, semiannual sampling of recovery wells, and quarterly measurement of water levels. Routine soil sampling is not required as per the SMP.
- The O&M Plan was updated in 2016 and reviewed in 2017, and 2018. No additional updates were deemed necessary upon review in 2018.
- O&M monitoring and inspections were conducted, including quarterly groundwater elevation measurements; routine treatment system inspections including flow readings of all recovery wells and the treatment system totalizers; monthly influent/effluent sampling; maintenance of carbon vessels; and inspections of the monitoring and recovery wells, the asphalt/concrete covers, and the SSDS.
- The asphalt and concrete cracks observed over the NPLS Area are relatively surficial and continue to be monitored for changes. Crack filling and sealing work was attempted in October 2018 but could not be completed due to cold/wet weather. Essex plans to conduct asphalt and concrete caps maintenance with crack filling and sealing at the NPLS and AST/UST areas in spring 2019.
- Solvents continue to be used at Plant 5 and industrial operations (metal manufacturing) have not ceased, although the previously identified TCE containing drums were removed in 2018. As requested by NYSDEC, this report will continue to document TCE use at the facility.
- IC/ECs, including Deed Restrictions and Covenants and the groundwater extraction and treatment system, continue to be in force at the Site.

6.2 Performance and Effectiveness of the Remedy

The groundwater extraction and treatment system continues to operate at the site. The following conclusions were made regarding the performance and effectiveness of this remedy in the Shallow WBZ:

- VOC concentrations exceed RAOs in vadose zone soils at the Site, but exceedances are limited to two portions of the Site: the NPLS Area and the Former AST/UST Area where concentrations are low but still exceed RAOs. ECs at these locations include low-permeability asphalt caps; however, soils near the water table could serve as a continuing source when water levels fluctuate.
- In 2018, 0.53-pound of VOCs was recovered from the shallow groundwater system. Mass removal rate has declined from levels observed in the late 1990s and early 2000s because of the decreasing VOC concentrations observed in the Shallow WBZ, the removal of RW-4S and RW-5S from the shallow extraction system in 2002, the removal of RW-3S in 2017, and decreasing groundwater extraction volumes.
- Concentrations of TCE and its daughter products have declined in shallow groundwater since initiation of remedial activities in the late 1990s in the NPLS Area but remain above RAOs and have

decreased slightly in 2018 from 2017 conditions. The maximum concentrations recorded in 2018 were present at RW-1S, consistent with the well's location near the area of elevated soil CVOC detections delineated in 2016 and 2017. Nevertheless, Mann-Kendall trend analysis indicates that CVOC concentrations at RW-1S exhibit a decreasing trend from 1995 to present. Maximum concentrations that exceeded RAOs in 2018 at RW-1S are as follows:

  - TCE concentration of 260 µg/L at RW-1S
  - Cis-1,2-DCE concentration of 400 µg/L at RW-1S
  - Vinyl chloride concentration of 20 µg/L at RW-1S

- RW-1S and RW-2S provide capture of the Shallow WBZ in the NPLS Area. Outside the hydraulic capture zone, the shallow CVOC plume appears to be relatively stable, as shown by the relatively steady concentrations at MW-108S.
- Concentrations of VOCs at RW-3S (inactive since August 2017) have fluctuated over the years, and declined significantly in 2018 from 2017 concentrations, although with some VOCs remaining above RAOs. Mann-Kendall trend analysis indicates that there is no significant trend in CVOC concentrations from 2006 to present. Maximum concentrations that exceeded RAOs in 2018 at RW-3S are as follows:

  - TCE at 20 J µg/L
  - cis-1,2-DCE at 7.8 µg/L

Several areas of the Shallow WBZ impacted by COCs above RAOs exist outside the shallow extraction system capture zone. Specifically, these include:

- The petroleum-related compound plume in the Shallow WBZ under the eastern portion of the West Building has been delineated. There does not appear to be an offsite contribution and the plume has not migrated to sentinel wells MW-20 and MW-23S to the northeast. Maximum concentrations observed at MW-30S, the most impacted well in this area, include:

  - Ethylbenzene concentration of 7,600 µg/L.
  - Total xylenes concentration of 24,000 J µg/L.
  - Isopropylbenzene (cumene) concentration of 200 J µg/L.
  - Naphthalene concentration of 730 J µg/L.
  - 1,2,4-TMB, 1,3,5-TMB, n-propylbenzene, and sec- and tert-butylbenzene have also been detected above RAOs at MW-30S.

- Rebounding concentrations of petroleum-related compounds (approaching pre-ISCO concentrations) in the eastern side of the Former UST Area suggest additional source material is present in this area. Monitoring at sentinel wells MW-27S and VP-6S, to the east and northeast of the plume, indicates that the plume has been attenuating at its eastern edge and has not migrated significantly offsite. Maximum concentrations observed at MW-26S, the most impacted well in this area, include:

  - Ethylbenzene at 230 µg/L
  - Cumene at 130 µg/L
  - Total xylene at 440 µg/L
  - 1,2,4-TMB at 4,500 J µg/L
  - 1,3,5-TMB at 840 µg/L
  - n-Propylbenzene at 610 µg/L
  - Naphthalene at 85 µg/L

- TCE and cis-1,2-DCE exist offsite to the north and east of the site at concentrations above RAOs. Impacted groundwater in this area migrates to the east-northeast under natural gradient and natural attenuation conditions. CVOC concentrations declined significantly at MW-101S from 2017 conditions, possibly as a result of improved capture in the NPLS area, while CVOC concentrations at easternmost well MW-108S have been relatively stable.

The following conclusions were made regarding the performance and effectiveness of the remedy in the Deep WBZ:

- In 2018, 204 pounds of VOCs were removed from the Deep WBZ. Mass removal has been relatively steady since 2013, with declines in 2016 and 2017, and a significant increase in 2018 attributed to higher extraction volumes achieved through continued system maintenance and operations with limited shutdown periods.
- Concentrations of COCs in the Deep WBZ continue to exist at levels higher than site RAOs.
- Groundwater capture zones in the Deep WBZ appear to encompass the entire Site and portions of the offsite plume to the north and east of the Site.
- The TCE plume in the Deep WBZ extends northeast and CVOC concentrations exist offsite, outside the capture zone of the current extraction system. However, monitoring at sentinel wells MW-109D, MW-120D, and MW-121D indicate that the plume has not migrated to these wells. Maximum concentrations outside the Deep WBZ capture zone were observed at MW-110D, and include:
  - TCE at 140,000 µg/L
  - cis-1,2-DCE at 26,000 µg/L
  - Vinyl chloride at 440 µg/L
- Maximum concentrations in the Deep WBZ were TCE at 140,000 µg/L (MW-110D and MW-123D); cis-1,2-DCE at 200,000 µg/L (MW-118D); and vinyl chloride at 8,800 µg/L (MW-118D). The highest concentrations exist in the NPLS area and north and northeast of the Plant 5 Building.
- Acetone concentrations at RW-6D (6,900 µg/L in March 2018 and 380 J µg/L in November 2018) continue to decline, but remain above the NYSDEC ambient groundwater quality standard of 50 µg/L.
- Acetone was not detected in any of the 2018 samples from wells MW-106D, MW-110D, and MW-122D, indicating that the extraction wells are successfully limiting migration of this compound and/or that it is naturally degrading.
- The deep CVOC plume has been delineated to the northeast of the Site and remains within the limits of the monitoring well network.

Except for the partial extent of capture provided by the groundwater extraction and treatment system, the surficial cracks on the NPLS caps, and the SSDS shutdown due to inoccupancy, all other remedial actions undertaken at the Site, including the active EC/ICs continue to be effective.

6.3 Future Periodic Reviews

Operation, maintenance, and monitoring of the remedial systems will continue in 2018. Site monitoring activities in 2018 will be performed in compliance with the SMP. A source evaluation will be conducted in 2019 to support selection of a remedial alternative or supplement to the existing remedies to mitigate impacts to soils and groundwater.

Annual PRR reports will continue to be submitted until the Site achieves RAOs. The 2019 PRR will be submitted at the end of the first quarter of 2020.

7. References

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Tables

Table 1-1. Key Areas and Historically Observed Impacts

2018 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York

Area	Soil	Shallow Water-bearing Zone	Deep Water-bearing Zone
North Parking Lot Sump Area[a]	CVOCs CBTEX PCBs	CVOCs	CVOCs
Former Underground Storage Tank Area	CBTEX Bis(2-ethylhexyl)phthalate	CBTEX/TMB	None
Former Aboveground Storage Tank/ Underground Storage Tank Area[a]	CBTEX	CBTEX CVOCs	None
West Building[a]	None	CBTEX	CBTEX (minor)
Plant 5 Building	Not assessed	CVOCs (northern) CBTEX (southern)	CVOCs Acetone
Offsite North and East	Not assessed	CVOCs	CVOCs Acetone

[a] Observed impacts updated based on 2016 and 2017 Data Gap Investigation findings (CH2M, 2017, 2018).

CBTEX = cumene, benzene, toluene, ethylbenzene, and xylenes

CVOC = chlorinated volatile organic compound

PCB = polychlorinated biphenyl

TMB = 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene

CH2M HILL Engineers, Inc. (a wholly owned subsidiary of Jacobs Engineering Group Inc.). 2017. *2016 Data Gap Investigation Report for the Essex-Hope Site in Jamestown, New York*. March.

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Table 1-2. Summary of Site Investigations

2018 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York

Year	Investigation Name	Description	Consultant
1993	Phase I Remedial Investigation	• Further characterization of distribution of VOCs in groundwater to evaluate potential remedial options	O'Brien & Gere Engineers
1994	Phase II Remedial Investigation/ Feasibility Study	• Presentation of RI results and evaluation of potential remedial actions that may be implemented to satisfy the remedial action objectives for the Site	O'Brien & Gere Engineers
1995	Basis of Design	• Presentation of the physical, chemical, and regulatory basis for the design of remedial actions	Dow Environmental
1998	Remedial Action Closeout Report	• Description of the implementation of the various remedial systems at the Site	Radian Engineering
2000	Supplemental Investigations for SMAART Evaluations	• Assessment of remedial alternatives, including natural attenuation, in the Former AST/UST Area, and a ZVI permeable reactive wall in the NPLS Area	Radian International
2001	Plant 5 East Area and UST Area Investigations Report	• Investigation of the Former UST Area to determine if additional source existed • Investigation of the source and extent of vinyl chloride on the east side of the Plant 5 Building	URS
2004	UST Area and Groundwater Vinyl Chloride Investigations	• Investigation of VOCs contamination extent in the Former UST Area and vinyl chloride in the area east of the Plant 5 Building	URS
2006	UST Area and Offsite Groundwater Investigations	• Delineation of the southern VOC contamination extent in the Former UST Area • Determination of VOC contamination extent in groundwater north and east of the Site	URS
2008	Soil Vapor Sampling at 159 Hopkins Avenue	• Investigation of soil vapor conditions near a residence underlain by a TCE plume identified by the 2006 Offsite Groundwater Investigation	URS
2014	Draft West Area Site Investigation	• Delineation of CBTEX plume west of the Former UST Area under the West Building	URS
	Supplemental Offsite Investigation	• Evaluation and confirmation of the extent of offsite VOC contamination north and east of the Site • Completion of the western delineation of CBTEX contamination underneath the West Building	AECOM
2015	Soil Vapor Intrusion Investigation at the Plant 5 Building and West Building	• Assessment of presence of CBTEX contamination under the West Building and TCE and daughter products beneath the Plant 5 Building	URS
2016	Vapor Intrusion Investigation (HAPSITE)	• Assessment of potential for vapor intrusion against potential indoor sources in the Plant 5 Building	CH2M
	Data Gap Investigation	• Refinement of conceptual site model • Assessment of current remedial system performance • Planning for potential future remedial activities	CH2M
2017	159 Hopkins Avenue Mitigation System – Effectiveness Evaluation	• Collect additional data and observations to confirm the effectiveness of the subslab depressurization system at the residence	CH2M
	Data Gap Investigation	• Further refinement of conceptual site model • Additional planning for potential future remedial activities	CH2M
2018	Offsite Vapor Intrusion Investigation	• Collect external soil vapor and subslab vapor samples within the vicinity of the VOC plume to determine if vapor intrusion pathways with the potential of impacting downgradient receptors are present.	Jacobs Engineering Group

Table 1-2. Summary of Site Investigations

2018 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York

Year	Investigation Name	Description	Consultant

AST = aboveground storage tank
CBTEX = cumene (isopropylbenzene), benzene, toluene, ethylbenzene, and xylenes
HAPSITE = Hazardous Air Pollutants on Site (field portable gas chromatograph mass spectrometer)
NPLS = North Parking Lot Sump
SMAART = Systematic Application of Advanced Remedial Technologies
TCE = trichloroethene
UST = underground storage tank
VOC = volatile organic compound
ZVI = zero-valent iron

Table 1-3. Remedial Action Objectives

2018 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York

Media	Parameter	RAO from 1994 ROD
Soil	Total VOCs	10 ppm
	Each individual VOC	1 ppm
	Total SVOCs	500 ppm
	Each individual SVOC	50 ppm
	PCBs	10 ppm
Groundwater	Trans-1,2-DCE	5 ppb
	TCE	5 ppb
	Vinyl chloride	5 ppb
	Ethylbenzene	5 ppb
	Toluene	5 ppb
	Xylene	5 ppb
	PCB	0.1 ppb
	Other compounds	NYSDEC Ambient Groundwater Quality Standard[a]

[a] Current NYSDEC Ambient Groundwater Quality Standards for other compounds commonly found at the site include the following:

- Acetone = 50 µg/L
- Benzene = 1 µg/L
- cis-1,2-DCE = 5 µg/L
- 2-butanone (methyl ethyl ketone) = 50 µg/L
- 1,1-DCE = 5 µg/L
- Isopropylbenzene (cumene) = 5 µg/L
- 1,2,4-trimethylbenzene = 5 µg/L
- 1,3,5-trimethylbenzene = 5 µg/L

NYSDEC = New York State Department of Environmental Conservation
PCB = polychlorinated biphenyl
ppb = part(s) per billion
ppm = part(s) per million
RAO = remedial action objective
ROD = Record of Decision
SVOC = semivolatile organic compound
VOC = volatile organic compound

Table 2-1. March 2018 Non-Routine Groundwater Sampling – Detected VOCs

2018 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York

VOCs – Method 8260C (µg/L)	Site GW RAOs	MW-106D	MW-108S	MW-109D	MW-110D	MW-118D	MW-118D (Dup)	MW-119D	MW-120D	MW-121D	MW-122D	MW-123D	MW-123D (Dup)	MW-13
1,1-Dichloroethene	5	**28**	ND	ND	ND	ND	**300 J**	**12 J**	ND	ND	ND	**410 J**	**390 J**	ND
Benzene	1	**13 J**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethylene	5	**5,600**	**9.2**	ND	**24,000**	**180,000**	**180,000**	**5,000**	ND	ND	**90**	**87,000**	**83,000**	**0.99 J**
PCE	5	ND	**0.26 J**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	5	ND	ND	ND	ND	ND	ND	**95 J**	ND	ND	ND	ND	ND	ND
TCE	5	**1,400**	**33**	ND	**120,000**	**47,000**	**47,000**	**320**	**0.56**	ND	**1,100**	**140,000**	**140,000**	**1.6**
Vinyl chloride	5	**390 J**	ND	ND	**350 J**	**5,800 J**	**5,900 J**	**340 J**	ND	ND	**0.96 J**	**6,600 J**	**6,400 J**	ND

Notes:

Samples collected on March 19, 20, and 21, 2018. Only detected parameters are shown.

Results are shown in µg/L.

Bold values indicate detections above the laboratory MDL.

Shaded values indicate detections exceeding Site GW RAOs.

µg/L = microgram(s) per liter
J = Estimated value; the target analyte concentration is below the quantitation limit (RL), but above the MDL.
MDL = method detection limit
ND = Not detected above the respective laboratory MDL.
PCE = tetrachloroethylene
RL = reporting limit
Site GW RAOs = Site Groundwater Remedial Action Objectives
TCE = trichloroethylene
VOC = volatile organic compound

Table 2-2. June 2018 Non-Routine Groundwater Sampling – Detected PFAS/PFOS

2018 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York

PFAS/PFOS - Modified Method E537 (ng/L)	USEPA Drinking Water Health Advisory Level	Strictest State Screening Levels	MW-112S	MW-113D	MW-113D (Field Dup)	MW-115D	MW-116S	MW-19S	MW-19D
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	--	--	**3.83 J**	ND	ND	ND	ND	ND	ND
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	--	--	ND	ND	**0.745 J**	ND	ND	ND	ND
Perfluorobutane sulfonic acid (PFBS)	--	2,000 (MA, MN)	**0.981 J**	**0.628 J**	**0.772 J**	ND	**0.652 J**	**0.604 J**	ND
Perfluorobutanoic acid (PFBA)	--	7,000 (MN)	**4.73**	**9.92**	**9.42**	**1.81**	**5.3**	**4.68**	**2.55**
Perfluorodecanoic acid (PFDA)	--	370 (TX)	**3.02**	ND	ND	ND	ND	**2.26**	ND
Perfluoroheptane sulfonate (PFHpS)	--	--	ND	ND	ND	ND	ND	**0.321 J**	ND
Perfluoroheptanoic acid (PFHpA)	--	70 (CO, CT, MA)	**5.19**	**8.9**	**8.6**	ND	**3.62**	**2.59**	ND
Perfluorohexane sulfonic acid (PFHxS)	--	27 (MN)	**1.88 J**	**0.754 J**	**0.876 J**	ND	**1.79 J**	ND	ND
Perfluorohexanoic acid (PFHxA)	--	93 (TX)	**5.78**	**20.3**	**20.4**	ND	**5.57**	**2.98**	ND
Perfluorononanoic acid (PFNA)	--	10 (NJ)	**2.13**	**0.168 J**	**0.09 J**	ND	**0.456 J**	**1.42 J**	ND
Perfluorooctane sulfonamide (FOSA)	--	200 (OR)	**0.277 J**	ND	**0.231 J**	ND	ND	ND	ND
Perfluorooctane sulfonic acid (PFOS)	70	11 (MI)	**5.98**	ND	ND	ND	**7.03**	**4.74**	ND
Perfluorooctanoic acid (PFOA)	70	14 (NJ)	**13.1**	**11.8**	**10.8**	ND	**6.2**	**5.07**	**0.356 J**
Perfluoropentanoic acid (PFPeA)	--	93 (TX)	**4.58**	**30.4**	**29.9**	**1.26 J**	**7.58**	**3.92**	ND

Notes:

Samples collected on June 27 and 28, 2018. Only detected parameters are shown.

Results are shown in ng/L or parts per trillion.

Bold values indicate detections above the laboratory MDL.

No NYS promulgated values for PFAS. EPA drinking water health advisory levels and strictest state screening levels presented for comparison. Source of strictest state screening levels is ITRC PFAS Fact Sheet Table 4-1, updated July 16, 2018.

J = Estimated value; the target analyte concentration is below the quantitation limit (RL), but above the MDL.

MDL = method detection limit

ND = Not detected above the respective laboratory MDL.

ng/L = nanogram(s) per liter

PFAS = perfluoroalkylated substances

PFOS = perfluorooctane sulfonate

RL = reporting limit

Table 2-3. November 2018 Non-Routine Groundwater Sampling – 1,4-Dioxane Results
2018 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York

Location ID	Sample Date	1,4-Dioxane (µg/L)
MW-108S	11/14/2018	0.142 U
MW-108S (Dup)	11/14/2018	0.144 U
MW-109D	11/14/2018	0.150 U
MW-115D	11/14/2018	0.144 U
MW-117S	11/13/2018	0.144 U
MW-118D	11/15/2018	**0.418**
RW-1S	11/15/2018	0.153 U

Notes:
Detections in bold

µg/L = microgram(s) per liter
SIM = selective ion monitoring
U = Analyte not detected

Table 2-4. 2018 Annual Groundwater Sampling Results

2018 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York

Volatile Organic Compounds (Method 8260C) – µg/L	NYSDEC GWQS (µg/L)	MW-13 11/13/2018	MW-16D 11/14/2018	MW-20 11/15/2018	MW-23S 11/13/2018	MW-25D 11/13/2018	MW-26S 11/13/2018	MW-27S 11/13/2018	MW-30S 11/14/2018	MW-101S 11/14/2018	MW-104S 11/14/2018	MW-106D (Field Dup) 11/14/2018		MW-108S (Field Dup) 11/14/2018		MW-109D 11/14/2018	MW-110D 11/15/2018	MW-117S 11/13/2018	MW-118D 11/15/2018	MW-119D 3/20/2018	MW-119D 11/14/2018	MW-120D 11/15/2018	MW-121D 11/14/2018	MW-122D 11/13/2018	MW-123D 3/20/2018
1,1,1,2-Tetrachloroethane	5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
1,1,1-Trichloroethane	5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
1,1,2,2-Tetrachloroethane	5	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	10 UJ	0.5 UJ	50 UJ	0.5 UJ	0.5 UJ	50 UJ	25 UJ	0.5 UJ	0.5 UJ	0.5 UJ	500 UJ	0.5 UJ	1,000 UJ	20 U	25 UJ	0.5 UJ	0.5 UJ	5 UJ	1,000 U
1,1,2-Trichloroethane	1	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	30 U	1.5 U	150 U	1.5 U	1.5 U	150 U	75 U	1.5 U	1.5 U	1.5 U	1,500 U	1.5 U	3,000 U	60 U	75 U	1.5 U	1.5 U	15 U	3,000 U
1,1-Dichloroethane	5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
1,1-Dichloroethene	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	10 U	0.5 U	50 U	0.18 J	0.5 U	**56**	**56**	0.5 U	0.5 U	0.5 U	**170 J**	0.5 U	**410 J**	**12 J**	**13 J**	0.5 U	0.5 U	5 U	**390 J**
1,1-Dichloropropene	5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
1,2,3-Trichlorobenzene	5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
1,2,3-Trichloropropane	0.04	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
1,2,4-Trichlorobenzene	5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
1,2,4-Trimethylbenzene	5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	**2,400 J**	3.1	**900**	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
1,2-Dibromo-3-chloropropane	0.04	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ	50 UJ	2.5 UJ	250 UJ	2.5 UJ	2.5 UJ	250 UJ	120 UJ	2.5 UJ	2.5 UJ	2.5 UJ	2,500 UJ	2.5 UJ	5,000 UJ	100 UJ	120 UJ	2.5 UJ	2.5 UJ	25 UJ	5,000 UJ
1,2-Dibromoethane (ethylene dibromide)	0.0006	2 U	2 U	2 U	2 U	2 U	40 U	2 U	200 U	2 U	2 U	200 U	100 U	2 U	2 U	2 U	2,000 U	2 U	4,000 U	80 U	100 U	2 U	2 U	20 U	4,000 U
1,2-Dichlorobenzene	3	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
1,2-Dichloroethane	0.6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	10 U	0.5 U	50 U	0.5 U	0.5 U	50 U	25 U	0.5 U	0.5 U	0.5 U	500 U	0.5 U	1,000 U	20 U	25 U	0.5 U	0.5 U	5 U	1,000 U
1,2-Dichloroethene, total	5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	**26**	2.5 U	**7,900**	**7,700 J**	**5.8**	**5.8**	2.5 U	**26,000**	2.5 U	**200,000**	**5,100 J**	**5,500 J**	2.5 U	2.5 U	**96**	**83,000**
1,2-Dichloropropane	1	1 U	1 U	1 U	1 U	1 U	20 U	1 U	100 U	1 U	1 U	100 U	50 U	1 U	1 U	1 U	1,000 U	1 U	2,000 U	40 U	50 U	1 U	1 U	10 U	2,000 U
1,3,5-Trimethylbenzene (mesitylene)	5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	**800**	2.5 U	**180 J**	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
1,3-Dichlorobenzene	3	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
1,3-Dichloropropane	5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
1,3-Dichloropropene, total	0.4	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	10 U	0.5 U	50 U	0.5 U	0.5 U	50 U	25 U	0.5 U	0.5 U	0.5 U	500 U	0.5 U	1,000 U	20 U	25 U	0.5 U	0.5 U	5 U	1,000 U
1,4-Dichlorobenzene	3	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
1,4-Dioxane (p-dioxane)	NS	250 UJ	250 UJ	250 UJ	250 UJ	250 UJ	5,000 UJ	250 UJ	25,000 UJ	250 UJ	250 UJ	25,000 UJ	12,000 UJ	--	--	--	250,000 UJ	--	--	10,000 UJ	12,000 UJ	250 UJ	250 UJ	2,500 UJ	500,000 UJ
2,2-Dichloropropane	5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
2-Butanone (methyl ethyl ketone)	50	5 U	5 U	5 U	5 U	5 U	100 U	5 U	500 U	5 U	5 U	500 U	250 U	5 U	5 U	5 U	5,000 U	5 U	10,000 U	200 U	250 U	5 U	5 U	50 U	10,000 U
2-Chlorotoluene	5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
2-Hexanone	50	5 U	5 U	5 U	5 U	5 U	100 U	5 U	500 U	5 U	5 U	500 U	250 U	5 U	5 U	5 U	5,000 U	5 U	10,000 U	200 U	250 U	5 U	5 U	50 U	10,000 U
4-Chlorotoluene	5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
4-Methyl-2-pentanone	NS	5 U	5 U	5 U	5 U	5 U	100 U	5 U	500 U	5 U	5 U	500 U	250 U	5 U	5 U	5 U	5,000 U	5 U	10,000 U	200 U	250 U	5 U	5 U	50 U	10,000 U
Acetone	50	5 U	5 U	5 U	5 U	5 U	100 U	5 U	500 U	5 U	5 U	500 U	250 U	5 U	5 U	5 U	5,000 U	5 U	10,000 U	200 U	250 U	5 U	5 U	50 U	10,000 U
Benzene	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	10 U	0.5 U	50 U	0.5 U	0.5 U	**24 J**	**23 J**	0.5 U	0.5 U	0.5 U	500 U	0.5 U	1,000 U	20 U	25 U	0.5 U	0.5 U	5 U	1,000 U
Bromobenzene	5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
Bromochloromethane	5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
Bromodichloromethane	50	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	10 U	0.5 U	50 U	0.5 U	0.5 U	50 U	25 U	0.5 U	0.5 U	0.5 U	500 U	0.5 U	1,000 U	20 U	25 U	0.5 U	0.5 U	5 U	1,000 U
Bromoform	50	2 U	2 U	2 U	2 U	2 U	40 U	2 U	200 U	2 U	2 U	200 U	100 U	2 U	2 U	2 U	2,000 U	2 U	4,000 U	80 U	100 U	2 U	2 U	20 U	4,000 U
Bromomethane	5	2.5 UJ	2.5 U	2.5 U	2.5 UJ	2.5 UJ	50 UJ	2.5 UJ	250 U	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 UJ	5,000 U	100 UJ	120 U	2.5 U	2.5 U	25 UJ	5,000 UJ
Carbon disulfide	60	5 U	5 U	5 U	5 U	5 U	100 U	5 U	500 U	5 U	5 U	500 U	250 U	5 U	5 U	5 U	5,000 U	5 U	10,000 U	200 U	250 U	5 U	5 U	50 U	10,000 U
Carbon tetrachloride	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	10 U	0.5 U	50 U	0.5 U	0.5 U	50 U	25 U	0.5 U	0.5 U	0.5 U	500 U	0.5 U	1,000 U	20 U	25 U	0.5 U	0.5 U	5 U	1,000 U
Chlorobenzene	5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
Chlorodibromomethane	50	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	10 U	0.5 U	50 U	0.5 U	0.5 U	50 U	25 U	0.5 U	0.5 U	0.5 U	500 U	0.5 U	1,000 U	20 U	25 U	0.5 U	0.5 U	5 U	1,000 U
Chloroethane	5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 UJ	120 U	2.5 U	2.5 U	25 U	5,000 UJ
Chloroform	7	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
Chloromethane	5	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ	50 UJ	2.5 UJ	250 UJ	2.5 UJ	2.5 UJ	250 UJ	120 UJ	2.5 UJ	2.5 UJ	2.5 UJ	2,500 UJ	2.5 UJ	5,000 UJ	100 UJ	120 UJ	2.5 UJ	2.5 UJ	25 UJ	5,000 UJ
cis-1,2-Dichloroethene	5[a]	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	**26**	2.5 U	**7,900**	**7,700**	**5.8**	**5.8**	2.5 U	**26,000**	2.5 U	**200,000**	**5,000**	**5,400**	2.5 U	2.5 U	**96**	**83,000**
cis-1,3-Dichloropropene	0.4	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	10 U	0.5 U	50 U	0.5 U	0.5 U	50 U	25 U	0.5 U	0.5 U	0.5 U	500 U	0.5 U	1,000 U	20 U	25 U	0.5 U	0.5 U	5 U	1,000 U
Dibromomethane (methylene bromide)	5	5 U	5 U	5 U	5 U	5 U	100 U	5 U	500 U	5 U	5 U	500 U	250 U	5 U	5 U	5 U	5,000 U	5 U	10,000 U	200 U	250 U	5 U	5 U	50 U	10,000 U
Dichlorodifluoromethane	5	5 U	5 U	5 U	5 U	5 U	100 U	5 U	500 U	5 U	5 U	500 U	250 U	5 U	5 U	5 U	5,000 U	5 U	10,000 U	200 U	250 U	5 U	5 U	50 U	10,000 U
Dichloromethane	5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
Ethylbenzene	5[a]	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	**220**	2.5 U	**7,600**	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
Hexachlorobutadiene	0.5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
Isopropylbenzene (cumene)	5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	**130**	2.2 J	**200 J**	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
Naphthalene	10	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	**85**	2.5 U	**730**	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 UJ	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
n-Butylbenzene	5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U

Table 2-4. 2018 Annual Groundwater Sampling Results

2018 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York

Volatile Organic Compounds (Method 8260C) – µg/L	NYSDEC GWQS (µg/L)	MW-13 11/13/2018	MW-16D 11/14/2018	MW-20 11/15/2018	MW-23S 11/13/2018	MW-25D 11/13/2018	MW-26S 11/13/2018	MW-27S 11/13/2018	MW-30S 11/14/2018	MW-101S 11/14/2018	MW-104S 11/14/2018	MW-106D (Field Dup) 11/14/2018		MW-108S (Field Dup) 11/14/2018		MW-109D 11/14/2018	MW-110D 11/15/2018	MW-117S 11/13/2018	MW-118D 11/15/2018	MW-119D 3/20/2018	MW-119D 11/14/2018	MW-120D 11/15/2018	MW-121D 11/14/2018	MW-122D 11/13/2018	MW-123D 3/20/2018
n-Propylbenzene	5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	**590**	1.7 J	**140 J**	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
p-Isopropyltoluene	5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
sec-Butylbenzene	5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
Styrene	5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
tert-Butylbenzene	5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 UJ	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
tert-Butyl methyl ether	10	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
Tetrachloroethene	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	10 U	0.5 U	50 U	0.27 J	0.26 J	50 U	25 U	0.31 J	0.33 J	0.5 U	500 U	0.5 U	1,000 U	20 U	25 U	0.5 U	0.5 U	5 U	1,000 U
Toluene	5[a]	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
trans-1,2-Dichloroethene	5[a]	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	2.5 U	2.5 U	250 U	**40 J**	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	**95 J**	**97 J**	2.5 U	2.5 U	25 U	5,000 U
trans-1,3-Dichloropropene	0.4	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	10 U	0.5 U	50 U	0.5 U	0.5 U	50 U	25 U	0.5 U	0.5 U	0.5 U	500 U	0.5 U	1,000 U	20 U	25 U	0.5 U	0.5 U	5 U	1,000 U
Trichloroethene	5[a]	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	10 U	0.5 U	50 U	**75**	**100**	**5,500**	**5,400**	**28**	**28**	0.5 U	**140,000**	0.5 U	**52,000**	**320**	**400**	0.5 U	0.5 U	**990**	**140,000**
Trichlorofluoromethane	5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	250 U	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
Vinyl acetate	NS	5 U	5 U	5 U	5 U	5 U	100 U	5 U	500 U	5 U	5 U	500 U	250 U	5 U	5 U	5 U	5,000 U	5 U	10,000 U	200 UJ	250 U	5 U	5 U	50 U	10,000 UJ
Vinyl chloride	5[a]	1 UJ	0.41 J	1 U	1 UJ	1 UJ	20 UJ	1 UJ	100 U	0.2 J	1 U	**290**	**270**	1 U	1 U	1 U	**440 J**	1 UJ	**8,800**	**340 J**	**370**	1 U	1 U	0.86 J	**6,400 J**
Xylene, o	5[a]	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	50 U	2.5 U	**120 J**	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
Xylenes, m & p	5[a]	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	**430**	2.5 U	**24,000**	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U
Xylenes, total	5[a]	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	**430**	2.5 U	**24,000 J**	2.5 U	2.5 U	250 U	120 U	2.5 U	2.5 U	2.5 U	2,500 U	2.5 U	5,000 U	100 U	120 U	2.5 U	2.5 U	25 U	5,000 U

[a] Site groundwater RAOs set forth in the March 1994 Record of Decision.

Notes:

Exceedances of NYSDEC GWQS and RAOs in bold.

Non-detects are reported to the adjusted reporting limit.

µg/L = microgram(s) per liter

J = estimated detection

NS = no standard or guidance value established (TOGS 1.1.1)

NYSDEC GWQS = New York State Department of Environmental Conservation Ambient Groundwater Quality Standards and Guidance Values (TOGS 1.1.1)

RAO = remedial action objective

TOGS = Technical and Operational Guidance Series

U = analyte not detected

UJ = analyte not detected (estimated)

Table 2-5. Mann-Kendall Trend Evaluation Results

2018 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York

Aquifer/Plume	Parameter	Well	Well Type	Period	Total Samples	Last Result (µg/L)	Min Value (µg/L)	Max Value (µg/L)	CoV	S-value	Confidence Factor	Trend Analysis Result
Shallow CVOC	Total CVOCs	MW-101S	Plume	2016 to present (all data)	3	101	101	870	1.00	-3	--	--
		MW-104S	Plume	2016 to present (all data)	5	100	93.0	250	0.51	-2	--	--
		MW-108S	Plume	2016 to present (all data)	5	34.1	27.1	48.0	0.24	-2	--	--
		RW-1S	Plume	1995 to present (all data)	23	644	125	10,650	0.93	-147	> 99.9%	Decreasing
				2009 to present (last 10 years)	20	634	65	3,088	1.01	-48	93.6%	Prob. decreasing
		RW-2S	Plume	1995 to present (all data)	23	58.1	8.4	10,100	2.55	-67	99.5%	Decreasing
				2009 to present (last 10 years)	20	59.8	6.0	420	1.60	0	48.2%	No trend
Shallow Petroleum (West Building)	CBTEX	MW-117S	Plume	2016 to present (all data)	4	2.50	2.50	3,479	1.26	-6	--	--
		MW-20	Sentinel	1993 to present (all data)	18	ND	ND	84,203	2.02	-94	> 99.9%	Decreasing
				9/11 to present (post-ISCO)	11	ND	ND	7,971	2.13	-30	99.0%	Decreasing
		MW-23S	Sentinel	6/11 to present (all data)	11	ND	ND	258	1.54	-39	99.9%	Decreasing
				12/11 to present (post-ISCO)	10	ND	ND	258	1.80	-31	99.8%	Decreasing
		MW-30S	Plume	2014 to present (all data)	4	32,220	9,237	33,877	0.53	0	--	--
Shallow Petroleum (Eastern Former UST Area)	CBTEX	MW-26S	Plume	2011 to present (all data)	11	874	319	2,039	0.58	-17	89.1%	Stable
		MW-27S	Sentinel	2011 to present (all data)	11	2.20	2.20	923	0.97	-6	88.3%	Stable
		VP-6S	Sentinel	2017 to present (all data)	2	ND	ND	ND	0.00	0	--	--
	1,2,4-Trimethylbenzene	MW-26S	Plume	2016 to present (all data)	4	4,500	2,800	4,500	0.19	2	--	--
		MW-27S	Sentinel	2016 to present (all data)	3	3.10	3.10	25	--	--	--	--
		VP-6S	Sentinel	2017 to present (all data)	2	ND	ND	ND	0.00	0	--	--
Shallow Petroleum/CVOC (Former AST/UST Area)	CBTEX	RW-3S	Plume	1997 to present (all data)	22	0.35	0.35	22,007	1.11	-115	> 99.9%	Stable
				2017 to present (post-shutoff)	3	0.16	0.16	2.4	1.16	-3	--	--
	CVOCs	RW-3S	Plume	2006 to present (all data)	13	17.20	2.50	2,502	2.76	11	72.5%	No trend
				2017 to present (post-shutoff)	3	16.4	16.4	95.2	1.04	-3	--	--

Table 2-5. Mann-Kendall Trend Evaluation Results

2018 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York

Aquifer/Plume	Parameter	Well	Well Type	Period	Total Samples	Last Result (µg/L)	Min Value (µg/L)	Max Value (µg/L)	CoV	S-value	Confidence Factor	Trend Analysis Result
Deep CVOC	Total CVOCs	MW-106D	Plume	2016 to present (all data)	5	13746	3,908	13,746	0.51	6	--	--
		MW-109D	Sentinel	2017 to present (all data)	3	ND	ND	1.54	0.45	-2	--	--
		MW-110D	Plume	2016 to present (all data)	5	166,610	92,000	166,610	0.23	8	--	--
		MW-118D	Plume	2017 to present (all data)	3	261,210	233,200	261,210	0.06	1	--	--
		MW-119D	Sentinel	2017 to present (all data)	3	6,280	4,685	6,280	0.15	3	--	--
		MW-120D	Sentinel	2017 to present (all data)	5	ND	ND	1.60	0.88	-3	--	--
		MW-121D	Sentinel	2017 to present (all data)	3	ND	ND	0.30	0.69	1	--	--
		MW-122D	Plume	2017 to present (all data)	3	1,087	418	1,191	0.47	1	--	--
		RW-2D	Plume	1995 to present (all data)	23	7,307	2,901	18,587	0.40	-20	69.0%	Stable
				2009 to present (last 10 years)	20	5,843	4,719	14,539	0.24	-30	90.3%	Prob. decreasing
		RW-6D	Plume	2009 to present (all data)	22	31,651	16,688	51,182	0.27	71	97.6%	Increasing
	Acetone	RW-6D	Plume	2009 to present (all data)	22	380	60.8	138,000	0.95	6	55.5%	No trend
				2014 to present (since peak)	9	380	380	138,000	1.09	-34	> 99.9%	Decreasing

Notes:
Confidence Factor = confidence (in percent) that concentration is increasing (S>0) or decreasing (S<0)
While trends can be calculated with as little as four independent sampling events per well, only confidence factors and trends with six or more independent events are presented in this table
Methodology based on "MAROS: A decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales. *Groundwater* . 41 (3): 355-367, 2003.

-- = Not calculated due to lack of enough data points; six data points are required as a minimum to calculate confidence factors and trends.
µg/L = microgram(s) per liter
AST = aboveground storage tank
CBTEX = cumene, benzene, toluene, ethylbenzene, and xylene
CoV = coefficient of variation
CVOC = chlorinated volatile organic compound
ND = non-detect
S-value = Mann-Kendall statistic
UST = underground storage tank

Table 2-6. Recovery Well Extraction Rates and Operational Percentages

2018 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York

Well	Extraction Rates (gpm)			Percent Operational
	Minimum	Maximum	Average	
Shallow WBZ				
RW-1S	0.01	0.18	0.09	98%
RW-2S	0.21	1.73	1.12	98%
Deep WBZ				
RW-2D	0.04	2.86	2.30	96%
RW-6D	0.02	2.15	0.91	96%

Notes:

RW-3S was shut down in August 8, 2017, because of its historically low pumping rates and its hydraulic location (upgradient from RW-1S and RW-2S). This was proposed by CH2M in the 2016 Annual PRR (CH2M, 2017), and approved by NYSDEC via letter dated May 1, 2017.

All values based on weekly to biweekly totalizer flowmeter readings.

Average extraction rate is calculated only using data during periods of operation for each well (that is, calculations do not include periods of downtime).

Percent operational represents the percentage of the time that the well was operational (versus down for maintenance) in 2017.

gpm = gallon(s) per minute

WBZ = water-bearing zone

CH2M HILL Engineers, Inc. (a wholly owned subsidiary of Jacobs Engineering Group Inc.). 2017. *2016 Annual Periodic Review Report, Essex-Hope Site* . March.

Table 2-7. Monitoring Well Inventory and 2018 Groundwater Elevation Measurements

2018 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York

Monitoring Well ID	Northing	Easting	Top of Casing Elevation (feet AMSL)	Depth to Top of Screen (feet)	Depth to Bottom of Screen (feet)	Screened Zone	Groundwater Elevation (feet AMSL)				Monitoring Well Condition
							21-Mar-18	26-Jun-18	24-Aug-18	12-Nov-18	
GP-1S	769418.53	977328.64	1,278.34	8	12.8	Shallow	1,268.69	1,268.01	1,268.25	1,268.94	Good
GP-2D	769380.34	977348.27	1,278.03	30	34.8	Deep	1,266.43	1,264.44	1,264.62	1,266.08	Sediment above top of screen
GP-2S	769379.13	977344.67	1,277.97	2.6	12.6	Shallow	1,269.61	1,268.85	1,268.87	1,269.89	Good
GP-3D	769435.18	977388.08	1,278.15	34	38.8	Deep	1,265.91	1,263.21	1,263.36	1,264.85	Good
GP-3S	769439.01	977385.71	1,278.25	4	14	Shallow	1,268.01	1,266.91	1,267.06	1,268.16	Good
GP-4D	769400.36	977281.12	1,277.48	39	43.8	Deep	1,266.78	1,262.59	1,262.86	1,264.14	3 feet of sediment in well; no plug
GP-4S	769402.76	977283.85	1,277.43	10.8	15.8	Shallow	1,268.65	1,268.18	1,268.25	1,268.18	Good
GP-5D	769467.40	977309.00	1,276.30	36	40.8	Deep	--	--	1,276.30	--	Repaired in 2017; sediment above top of screen; no plug; PVC flooded up to TOC
GP-5S	769466.37	977307.37	1,276.79	7	11.8	Shallow	--	--	--	--	Destroyed
GP-7	769539.53	977376.36	1,276.17	9	14.8	Shallow	--	--	--	--	Could not locate
HW-1	769310.73	977237.35	1,278.46	--	--	--	--	--	--	--	PVC casing broken; could not locate in October 2017 to repair
HW-2	769407.31	977201.19	1,280.57	--	--	Shallow	1,268.69	--	1,268.42	1,268.87	Broken/rusted cap, no lock
HW-3	769259.85	977127.74	1,282.60	--	--	--	--	--	--	1,277.50	Good
HW-6	769321.82	977304.10	1,280.98	6	16	Shallow	1,269.43	1,268.68	1,269.01	1,269.65	Good
HW-6A	769317.15	977304.53	1,279.85	--	--	--	1,269.43	1,268.69	1,268.96	1,269.90	Good
HW-8	769356.63	977469.24	1,277.18	6	16	Shallow	1,270.66	1,269.60	1,270.03	1,270.63	Good
HW-9	769334.70	977479.33	1,280.35	6	16	Shallow	1,270.06	1,268.95	1,269.83	1,270.60	Good
HW-10	769233.13	977139.27	1,279.43	7	17	Shallow	--	1,270.18	1,270.43	1,270.48	Good
MW-1	769311.21	977562.85	1,280.10	15	20	Shallow	--	--	--	--	PVC casing pinched at 3 feet; could not repair
MW-10	769402.92	977316.21	1,277.28	8.5	18.5	Shallow	1,268.85	1,268.30	1,268.53	1,267.78	Good
MW-11	769378.08	977235.76	1,277.13	5	15	Shallow	1,268.38	1,266.33	1,266.71	1,268.83	Repaired
MW-11D	769381.99	977233.72	1,277.17	35	45	Deep	1,266.82	1,263.07	1,263.31	1,264.68	Good
MW-12	769328.16	977258.42	1,277.51	4	14	Shallow	1,269.11	1,268.21	1,268.81	1,269.34	Good
MW-13	769254.15	977431.38	1,277.65	8	18	Shallow	1,266.86	1,266.71	1,267.44	1,268.15	Repaired and re-developed in 2017
MW-14D	769491.93	977221.65	1,279.40	40	50	Deep	1,266.55	1,263.46	1,264.08	1,265.06	Good

Table 2-7. Monitoring Well Inventory and 2018 Groundwater Elevation Measurements

2018 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York

Monitoring Well ID	Northing	Easting	Top of Casing Elevation (feet AMSL)	Depth to Top of Screen (feet)	Depth to Bottom of Screen (feet)	Screened Zone	Groundwater Elevation (feet AMSL)				Monitoring Well Condition
							21-Mar-18	26-Jun-18	24-Aug-18	12-Nov-18	
MW-14S	769493.34	977227.86	1,279.64	10	20	Shallow	1,267.31	1,265.59	1,266.74	1,267.63	Good
MW-15D	769533.32	977340.57	1,278.90	34	44	Deep	1,265.13	1,263.00	1,263.60	1,264.90	Good
MW-15S	769538.87	977337.64	1,279.00	10	20	Shallow	1,266.28	1,265.00	1,265.55	1,266.95	Good
MW-16D	769618.24	977288.15	1,278.47	36	46	Deep	1,265.69	1,263.72	1,264.16	1,265.53	Good
MW-16S	769621.11	977287.09	1,278.74	7	17	Shallow	1,266.44	1,265.59	1,265.92	1,267.03	Good
MW-17	769386.50	977119.12	1,278.01	25	30	Deep	1,267.70	--	--	1,267.80	Sediment above top of screen
MW-18	769558.19	977549.59	1,275.05	5	15	Shallow	1,265.40	1,264.50	1,264.93	1,265.99	Good
MW-19D	769481.56	977468.50	1,275.64	34	44	Deep	1,264.49	1,262.33	1,263.34	1,264.44	Repaired
MW-19S	769486.62	977468.82	1,275.95	9	19	Shallow	1,265.98	1,264.51	1,265.50	1,266.53	Good
MW-2	769235.80	977145.80	1,279.09	6	16	Shallow	--	--	--	--	Abandoned
MW-20	769381.21	977365.24	1,278.10	6.5	11.5	Shallow	1,270.10	1,268.58	--	1,270.22	Good
MW-21D	769507.36	977414.36	1,275.61	31.5	41	Deep	1,265.99	1,264.76	1,265.81	1,264.85	Good
MW-22D	769584.11	977467.04	1,275.53	32.5	42	Deep	1,265.58	1,264.49	1,264.89	1,266.11	Good
MW-23D	769324.69	977431.09	1,277.36	28	37.5	Deep	1,266.95	1,264.96	1,266.06	1,266.65	Good
MW-23S	769330.65	977429.42	1,277.30	5	14.5	Shallow	1,270.75	1,269.55	1,270.16	1,270.78	Good
MW-24S	769295.26	977357.27	1,278.25	5	14.5	Shallow	1,269.92	1,269.20	1,269.90	1,270.25	Good
MW-25D	769596.57	977648.45	1,274.50	31	41	Deep	1,264.48	1,263.05	1,263.48	1,265.10	Good
MW-25S	769599.31	977655.01	1,274.30	7	17	Shallow	1,264.50	1,263.15	1,263.90	1,265.02	Good
MW-26S	769402.60	977514.59	1,277.09	5	15	Shallow	1,268.77	1,267.24	1,267.79	1,268.89	Good
MW-27S	769420.49	977594.25	1,276.46	10	20	Shallow	1,267.00	1,267.08	1,266.95	1,267.21	Good
MW-28S	769383.88	977607.30	1,276.87	7	17	Shallow	1,267.19	1,267.42	1,267.23	1,267.44	Good
MW-29S	769267.33	977370.58	1,278.35	4	14	Shallow	1,269.90	1,269.10	1,269.73	1,270.29	Good
MW-30S	769261.22	977342.56	1,278.47	10	16	Shallow	1,269.29	1,268.62	1,268.80	1,269.85	Good
MW-31S	769248.04	977369.79	1,278.29	10	15	Shallow	1,269.73	1,268.89	1,269.01	1,270.37	Good
MW-101S	769495.85	977385.68	1,275.68	8	18	Shallow	1,265.95	1,264.80	1,265.33	1,266.56	Good
MW-102S	769527.50	977462.33	1,275.43	9	14	Shallow	1,265.73	1,263.05	1,265.19	1,266.33	Good

Table 2-7. Monitoring Well Inventory and 2018 Groundwater Elevation Measurements

2018 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York

Monitoring Well ID	Northing	Easting	Top of Casing Elevation (feet AMSL)	Depth to Top of Screen (feet)	Depth to Bottom of Screen (feet)	Screened Zone	Groundwater Elevation (feet AMSL)				Monitoring Well Condition
							21-Mar-18	26-Jun-18	24-Aug-18	12-Nov-18	
MW-103S	769581.66	977463.10	1,275.32	8	18	Shallow	1,265.77	1,264.76	1,265.19	1,266.34	Good
MW-104S	769708.58	977409.23	1,279.22	9	14	Shallow	1,266.80	1,266.77	1,266.82	1,266.87	Good
MW-105S	769762.88	977561.18	1,278.79	8	18	Shallow	1,264.83	1,263.40	1,263.99	1,265.40	Good
MW-106S	769641.05	977554.52	1,275.29	10	15	Shallow	1,265.16	1,263.58	1,264.25	1,265.78	Good
MW-106D	769644.34	977553.22	1,275.19	24	34	Deep	1,264.43	1,262.96	1,263.40	1,264.93	Good
MW-107S	769669.94	977845.78	1,272.98	9	19	Shallow	1,263.52	1,261.91	1,262.29	1,264.12	Good
MW-108S	769725.67	977754.10	1,274.30	7	17	Shallow	1,263.60	1,261.91	1,262.36	1,264.28	Good
MW-109S	769813.86	977747.51	1,275.19	7	12	Shallow	1,263.64	--	--	1,263.98	Good
MW-109D	769810.78	977743.91	1,275.04	28	38	Deep	1,263.30	1,261.84	1,261.92	1,264.24	Good
MW-110D	769637.03	977446.46	1,275.75	28	38	Deep	1,264.91	1,263.18	1,263.71	1,265.23	Good
MW-111D	769320.09	977274.77	1,277.59	32	42	Deep	1,266.65	1,263.20	1,263.19	1,264.59	Good
MW-112S	769273.84	977338.29	1,278.59	6	16	Shallow	1,269.46	1,268.85	1,268.88	1,269.91	Good
MW-113D	769254.29	977349.06	1,278.47	29	39	Deep	1,267.05	1,265.50	1,265.63	1,267.00	Good
MW-114S	769203.86	977244.48	1,279.15	8	13	Shallow	1,269.32	1,268.94	1,268.86	1,274.93	Good
MW-115D	769212.79	977155.02	1,279.03	35	40	Deep	1,269.81	1,269.45	1,268.98	1,270.20	Good
MW-116S	769162.39	977173.32	1,278.91	8	13	Shallow	1,269.77	1,269.26	1,269.29	1,273.01	Good
MW-117S	769220.98	769220.98	1,278.14	6	16	Shallow	1,269.46	1,268.82	1,269.34	1,269.82	Good
MW-118D	769419.08	977325.34	1,278.15	24	34	Deep	1,265.59	1,264.56	1,265.05	1,266.20	Good
MW-119D	769496.13	977235.78	1,276.37	22	32	Deep	1,266.58	1,264.57	1,265.17	1,266.39	Good
MW-120D	769783.18	977493.70	1,277.60	28	38	Deep	1,264.35	1,262.76	1,263.05	1,264.95	Good
MW-121D	769891.60	977620.85	1,272.09	28	38	Deep	1,263.10	1,261.55	1,261.61	1,263.94	Good
MW-122D	769550.68	977553.25	1,275.07	22	32	Deep	1,264.74	1,263.42	1,263.87	1,265.47	Broken cover
MW-123D	769431.82	977294.35	1,276.86	25	35	Deep	1,266.66	1,263.66	1,263.81	1,265.56	Good
MW-4	769170.13	977100.42	1,280.70	13	18	Shallow	1,271.04	1,270.65	1,271.01	--	Good
MW-6	769420.79	977237.79	1,277.28	9.9	19.9	Shallow	1,268.19	1,266.16	1,266.51	1,269.68	Repaired in 2017
MW-7D	769437.24	977291.46	1,277.12	35	45	Deep	--	--	--	--	Abandoned

Table 2-7. Monitoring Well Inventory and 2018 Groundwater Elevation Measurements

2018 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York

Monitoring Well ID	Northing	Easting	Top of Casing Elevation (feet AMSL)	Depth to Top of Screen (feet)	Depth to Bottom of Screen (feet)	Screened Zone	Groundwater Elevation (feet AMSL)				Monitoring Well Condition
							21-Mar-18	26-Jun-18	24-Aug-18	12-Nov-18	
MW-7DD	769435.52	977293.59	1,277.09	90	100	Glacial Till	1,275.49	1,275.49	1,275.55	1,275.97	Good
MW-7S	769440.65	977291.06	1,277.04	10	20	Shallow	1,268.82	1,268.07	1,269.66	1,268.96	Repaired in 2017
MW-8	769407.61	977252.34	1,277.30	39.6	49.6	Deep	--	--	--	--	Abandoned
PZ-11D	769432.94	977590.25	1,276.14	21.3	41.3	Deep	--	--	--	--	Abandoned
PZ-1D	769442.95	977285.37	1,277.23	25	45	Deep	1,266.84	--	--	1,266.71	5 feet of sediment in well; no plug
PZ-1S	769443.57	977282.97	1,277.25	7	17	Shallow	1,268.60	--	--	1,268.82	6 feet of sediment in well; no plug
PZ-2D	769442.57	977286.80	1,277.14	25	45	Deep	1,259.89	--	--	1,257.19	Kink in casing; no plug
PZ-3D	769416.94	977325.13	1,278.35	20	40	Deep	1,266.66	1,265.29	1,265.47	--	8.5 feet of sediment in well; obstruction at well head
PZ-4D	769419.63	977320.19	1,278.24	25	45	Deep	1,260.04	--	--	1,260.22	6 feet of sediment in well
PZ-5D	769418.77	977464.00	1,275.88	21.5	41.5	Deep	1,265.48	1,266.97	1,265.46	1,266.18	Good
PZ-5S	769422.15	977463.92	1,275.92	5.5	12	Shallow	1,267.91	--	1,266.72	1,268.17	Good
PZ-6D	769456.59	977464.40	1,275.91	25.5	45.5	Deep	1,264.00	1,264.16	1,264.90	1,265.93	Good
PZ-6S	769459.23	977464.52	1,276.09	8.5	13.5	Shallow	1,267.19	1,265.19	1,265.76	1,267.67	Good
PZ-7D	769559.50	977553.39	1,275.19	22	42	Deep	--	--	--	--	Abandoned in 2017
RW-1D	769375.07	977258.14	1,275.87	32	57	Deep	1,266.67	1,262.67	1,262.86	--	Good
RW-1S	769386.12	977269.36	1,275.36	10.5	16	Shallow	1,264.51	1,265.83	1,265.57	1,265.16	Redeveloped
RW-2D	769444.16	977280.70	1,275.92	27	42	Deep	1,266.72	1,244.77	1,245.86	1,259.32	Repaired and redeveloped
RW-2S	769438.98	977265.94	1,275.89	10	15.5	Shallow	1,263.84	1,265.39	--	1,265.99	Repaired and redeveloped
RW-3S	769245.55	977167.43	1,277.72	9	13.5	Shallow	1,269.97	1,269.74	1,269.92	1,270.01	Redeveloped
RW-5S	769390.30	977475.71	1,276.83	7	10	Shallow	1,269.22	1,268.89	1,268.91	--	Good
RW-6D	769525.89	977464.22	1,274.95	--	--	Deep	1,251.65	1,242.85	1,246.69	1,270.35	Redeveloped
VP-1S	769423.04	977327.44	1,278.26	--	--	Shallow	--	--	--	--	Casing clogged
VP-2S	769410.90	977332.10	1,278.32	--	--	Shallow	--	--	--	--	Obstruction at 1 feet
VP-3S	769320.40	977328.50	--	--	--	Shallow	--	--	--	--	Obstruction at 1.3 feet
VP-4S	769357.39	977390.18	1,278.25	--	--	Shallow	--	--	--	1,267.00	Located, was buried with dirt/vegetation
VP-5D	769366.31	977241.12	1,277.53	12.5	34.3	Deep	--	--	--	--	Abandoned

Table 2-7. Monitoring Well Inventory and 2018 Groundwater Elevation Measurements

2018 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York

Monitoring Well ID	Northing	Easting	Top of Casing Elevation (feet AMSL)	Depth to Top of Screen (feet)	Depth to Bottom of Screen (feet)	Screened Zone	Groundwater Elevation (feet AMSL)				Monitoring Well Condition
							21-Mar-18	26-Jun-18	24-Aug-18	12-Nov-18	
VP-6D	769487.64	977538.82	1,276.11	29.5	39.5	Deep	1,265.41	1,264.17	1,265.48	1,266.83	Repaired and redeveloped in 2017
VP-6S	769483.33	977539.59	1,276.08	18.3	24	Shallow	1,273.33	1,266.30	1,265.73	1,266.28	Well manhole filled with water/sediment
VP-7D	769294.32	977519.73	1,278.22	20.4	39.3	Deep	1,265.57	1,266.51	1,267.17	1,269.52	Good
VP-8D	769465.51	977305.11	1,276.69	20	39	Deep	1,266.43	1,264.78	1,265.79	1,266.37	Good

* LNAPL was detected in PZ-4D in June and August 2018. Reported depths for March and December 2018 are depth to water, but have not been adjusted for product thickness because narrow diameter of well makes it difficult to get accurate LNAPL thickness with probe.

Notes:
All wells were located on the north edge of the steel casing.
Horizontal Datum: NY West State Plane Coordinate System, NAD83(2011), Epoch: 2010.00
Vertical Datum: NAVD88, Geoid12B, derived using OPUS Post processing and RTK GNSS to local NGS Benchmark U-88
To convert an NGVD29 elevation to and NAVD88 elevation, subtract 0.51 feet.
Blue shading indicates monitoring wells (total of 21) part of the Annual Performance Monitoring Well Program proposed in the 2017 Site Management Plan (CH2M, 2017a)
Green shading indicates monitoring wells that were identified as candidates for redevelopment or abandonment
Red shading indicates wells that were identified as candidates for abandonment

-- = data unavailable or unknown, or water level not measured (innaccessible or unable to locate during gauging activities)
AMSL = above mean sea level
VP = vapor probe
PVC = polyvinyl chloride
PZ = piezometer
MW = monitoring well
HW = monitoring well (Hope Well)
GP = geoprobe piezometer
RW = recovery well
LNAPL = light nonaqueous phase liquid

Table 2-8. 2018 Groundwater Vertical Gradients

2018 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York

Water-bearing Zone	Well	Mid-Screen Depth (feet bgs)	Groundwater Elevation (feet AMSL)			
			21-Mar-18	26-Jun-18	24-Aug-18	12-Dec-18
Shallow	**MW-7S**	**15.0**	1,268.82	1,268.07	1,269.66	1,268.96
Deep	**MW-7DD**	**40.0**	1,275.49	1,275.49	1,275.55	1,275.97
Vertical Gradient (ft/ft)			**0.27**	**0.30**	**0.24**	**0.28**
Shallow	**MW-11**	**10.0**	1,268.38	1,266.33	1,266.71	1,268.83
Deep	**MW-11D**	**40.0**	1,266.82	1,263.07	1,263.31	1,264.68
Vertical Gradient (ft/ft)			**0.05**	**0.11**	**0.11**	**0.14**
Shallow	**MW-14S**	**15.0**	1,267.31	1,265.59	1,266.74	1,267.63
Deep	**MW-14D**	**45.0**	1,266.55	1,263.46	1,264.08	1,265.06
Vertical Gradient (ft/ft)			**0.03**	**0.07**	**0.09**	**0.09**
Shallow	**MW-15S**	**15.0**	1,266.28	1,265.00	1,265.55	1,266.95
Deep	**MW-15D**	**39.0**	1,265.13	1,263.00	1,263.60	1,264.90
Vertical Gradient (ft/ft)			**0.05**	**0.08**	**0.08**	**0.09**
Shallow	**MW-16S**	**12.0**	1,266.44	1,265.59	1,265.92	1,267.03
Deep	**MW-16D**	**41.0**	1,265.69	1,263.72	1,264.16	1,265.53
Vertical Gradient (ft/ft)			**0.03**	**0.06**	**0.06**	**0.05**
Shallow	**MW-18**	**10.0**	1,265.40	1,264.50	1,264.93	1,265.99
Deep	**MW-122D**	**27.0**	1,264.74	1,263.42	1,263.87	1,265.47
Vertical Gradient (ft/ft)			**0.04**	**0.06**	**0.06**	**0.03**
Shallow	**MW-19S**	**14.0**	1,265.98	1,264.51	1,265.50	1,266.53
Deep	**MW-19D**	**39.0**	1,264.49	1,262.33	1,263.34	1,264.44
Vertical Gradient (ft/ft)			**0.06**	**0.09**	**0.09**	**0.08**
Shallow	**MW-23S**	**10.0**	1,270.75	1,269.55	1,270.16	1,270.78
Deep	**MW-23D**	**33.0**	1,266.95	1,264.96	1,266.06	1,266.65
Vertical Gradient (ft/ft)			**0.17**	**0.20**	**0.18**	**0.18**
Shallow	**MW-25S**	**12.0**	1,264.50	1,263.15	1,263.90	1,265.02
Deep	**MW-25D**	**36.0**	1,264.48	1,263.05	1,263.48	1,265.10
Vertical Gradient (ft/ft)			**0.00**	**0.00**	**0.02**	**0.00**

Water-bearing Zone	Well	Mid-Screen Depth (feet bgs)	Groundwater Elevation (feet AMSL)			
			21-Mar-18	26-Jun-18	24-Aug-18	12-Dec-18
Shallow	**GP-2S**	**7.6**	1,269.61	1,268.85	1,268.87	1,269.89
Deep	**GP-2D**	**32.5**	1,266.43	1,264.44	1,264.62	1,266.08
Vertical Gradient (ft/ft)			**0.13**	**0.18**	**0.17**	**0.15**
Shallow	**GP-3S**	**9.0**	1,268.01	1,266.91	1,267.06	1,268.16
Deep	**GP-3D**	**36.5**	1,265.91	1,263.21	1,263.36	1,264.85
Vertical Gradient (ft/ft)			**0.08**	**0.13**	**0.13**	**0.12**
Shallow	**GP-4S**	**13.3**	1,268.65	1,268.18	1,268.25	1,268.18
Deep	**GP-4D**	**41.5**	1,266.78	1,262.59	1,262.86	1,264.14
Vertical Gradient (ft/ft)			**0.07**	**0.20**	**0.19**	**0.14**
Shallow	**PZ-5S**	**8.8**	1,267.91	--	1,266.72	1,268.17
Deep	**PZ-5D**	**31.5**	1,265.48	1,266.97	1,265.46	1,266.18
Vertical Gradient (ft/ft)			**0.11**	**--**	**0.06**	**0.09**
Shallow	**PZ-6S**	**11.0**	1,267.19	1,265.19	1,265.76	1,267.67
Deep	**PZ-6D**	**35.5**	1,264.00	1,264.16	1,264.90	1,265.93
Vertical Gradient (ft/ft)			**0.13**	**0.04**	**0.04**	**0.07**
Shallow	**VP-6S**	**21.2**	1,273.33	1,266.30	1,265.73	1,266.28
Deep	**VP-6D**	**34.5**	1,265.41	1,264.17	1,265.48	1,266.83
Vertical Gradient (ft/ft)			**0.59**	**0.16**	**0.02**	**-0.04**
Shallow	**MW-106S**	**12.5**	1,265.16	1,263.58	1,264.25	1,265.78
Deep	**MW-106D**	**29.0**	1,264.43	1,262.96	1,263.40	1,264.93
Vertical Gradient (ft/ft)			**0.04**	**0.04**	**0.05**	**0.05**
Shallow	**MW-103S**	**13.0**	1,265.77	1,265.87	1,265.12	1,265.39
Deep	**MW-22D**	**37.0**	1,265.58	1,264.49	1,264.89	1,266.11
Vertical Gradient (ft/ft)			**0.008**	**0.06**	**0.01**	**-0.03**
Shallow	**MW-30S**	**13.0**	1,269.29	1,268.62	1,268.80	1,269.85
Deep	**MW-113D**	**34.0**	1,267.05	1,265.50	1,265.63	1,267.00
Vertical Gradient (ft/ft)			**0.11**	**0.15**	**0.15**	**0.14**

Notes:
Mid-screen depths are depth below ground surface in feet (at middle of the screen).
Positive gradient indicates downward gradient; negative gradient indicates upward gradient.

amsl = above mean sea level
bgs = below ground surface
ft/ft = feet per foot
NA = not available
NM = not measured

Table 2-9. Shallow WBZ Analytical Results – Recovery Wells

2018 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York

Volatile Organic Compounds (Method 8260C) – µg/L	NYSDEC GWQS (µg/L)	RW-1S		RW-2S		RW-3S	
		5/9/2018	11/14/2018	5/9/2018	11/14/2018	5/9/2018	11/14/2018
1,1,1,2-Tetrachloroethane	5	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
1,1,1-Trichloroethane	5	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
1,1,2,2-Tetrachloroethane	5	1.2 UJ	1.2 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U
1,1,2-Trichloroethane	1	3.8 U	3.8 U	1.5 U	1.5 U	1.5 U	1.5 U
1,1-Dichloroethane	5	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
1,1-Dichloroethene	5	**1.4**	**1.1 J**	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloropropene	5	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
1,2,3-Trichlorobenzene	5	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
1,2,3-Trichloropropane	0.04	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
1,2,4-Trichlorobenzene	5	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
1,2,4-Trimethylbenzene	5	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
1,2-Dibromo-3-chloropropane	0.04	6.2 UJ	6.2 U	2.5 UJ	2.5 U	2.5 UJ	2.5 U
1,2-Dibromoethane (ethylene dibromide)	0.0006	5 U	5 U	2 U	2 U	2 U	2 U
1,2-Dichlorobenzene	3	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
1,2-Dichloroethane	0.6	1.2 U	1.2 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	1	2.5 U	2.5 U	1 U	1 U	1 U	1 U
1,3,5-Trimethylbenzene (mesitylene)	5	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
1,3-Dichlorobenzene	3	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
1,3-Dichloropropane	5	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
1,3-Dichloropropene, total	0.4	1.2 U	1.2 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dichlorobenzene	3	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
1,4-Dioxane (p-dioxane)	NS	620 U	620 U	250 U	250 U	250 U	250 U
2,2-Dichloropropane	5	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
2-Butanone (methyl ethyl ketone)	50	12 U	12 U	5 U	5 U	5 U	5 U
2-Chlorotoluene	5	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
2-Hexanone	50	12 U	12 U	5 U	5 U	5 U	5 U
4-Chlorotoluene	5	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
4-Methyl-2-pentanone	NS	12 U	12 U	5 U	5 U	5 U	5 U
Acetone	50	12 U	12 U	5 U	**1.9 J**	5 U	**3.3 J**
Benzene	1	1.2 U	1.2 U	0.5 U	0.5 U	**0.54**	**0.16 J**
Bromobenzene	5	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
Bromochloromethane	5	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
Bromodichloromethane	50	1.2 U	1.2 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromoform	50	5 U	5 U	2 U	2 U	2 U	2 U
Bromomethane	5	6.2 UJ	6.2 U	2.5 UJ	2.5 U	2.5 UJ	2.5 U
Carbon disulfide	60	12 U	12 U	5 U	5 U	5 U	5 U
Carbon tetrachloride	5	1.2 U	1.2 U	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene	5	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
Chlorodibromomethane	50	1.2 U	1.2 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroethane	5	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
Chloroform	7	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
Chloromethane	5	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
cis-1,2-Dichloroethene	5*	**400**	**360**	**24**	**24**	**7.8**	**5.4**

Table 2-9. Shallow WBZ Analytical Results – Recovery Wells

2018 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York

Volatile Organic Compounds (Method 8260C) – µg/L	NYSDEC GWQS (µg/L)	RW-1S		RW-2S		RW-3S	
		5/9/2018	11/14/2018	5/9/2018	11/14/2018	5/9/2018	11/14/2018
cis-1,3-Dichloropropene	0.4	1.2 U	1.2 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromomethane (methylene bromide)	5	12 U	12 U	5 U	5 U	5 U	5 U
Dichlorodifluoromethane	5	12 U	12 U	5 U	5 U	5 U	5 U
Dichloromethane	5	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
Ethylbenzene	5*	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
Hexachlorobutadiene	0.5	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
Isopropylbenzene (cumene)	5	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
Naphthalene	10	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
n-Butylbenzene	5	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
n-Propylbenzene	5	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
p-Isopropyltoluene	5	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
sec-Butylbenzene	5	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
Styrene	5	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
tert-Butylbenzene	5	6.2 U	6.2 U	2.5 U	2.5 U	**1.5 J**	**1.1 J**
tert-Butyl methyl ether	10	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
Tetrachloroethene	5	1.2 U	1.2 U	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	5*	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
trans-1,2-Dichloroethene	5*	**1.8 J**	6.2 U	2.5 U	2.5 U	**0.79 J**	2.5 U
trans-1,3-Dichloropropene	0.4	1.2 U	1.2 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene	5*	**230 J**	**260**	**30 J**	**35**	**20 J**	**8.1**
Trichlorofluoromethane	5	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
Vinyl acetate	NS	12 U	12 U	5 U	5 U	5 U	5 U
Vinyl chloride	5*	**20**	**14**	**2.3**	**0.84 J**	**3.3**	**2.9**
Xylene, o	5*	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U
Xylenes, m & p	5*	6.2 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U

* Site groundwater RAOs set forth in the March 1994 Record of Decision.

Notes:

Exceedances of NYSDEC GWQS and RAOs in bold.

Non-detects are reported to the adjusted reporting limit.

µg/L = microgram(s) per liter

J = estimated detection

NS = no standard or guidance value established (TOGS 1.1.1)

NYSDEC GWQS = New York State Department of Environmental Conservation Ambient Groundwater Quality Standards and Guidance Values (TOGS 1.1.1)

RAO = remedial action objective

TOGS = Technical and Operational Guidance Series

U = analyte not detected

UJ = analyte not detected (estimated)

WBZ = water-bearing zone

Table 2-10. Summary of COCs in Shallow Groundwater

2018 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York

COC	RAO (µg/L)	Maximum Concentration (µg/L)	Number of Wells > RAO	Number of Wells < RAO[a]
Chlorinated VOCs				
Trichloroethene	5	260 (RW-1S)	6	8
cis-1,2-Dichloroethene	5	400 (RW-1S)	5	9
Vinyl chloride	5	20 (RW-1S)	1	13
Petroleum-related Compounds				
Isopropylbenzene (cumene)	5	200 J (MW-30S)	2	12
Ethylbenzene	5	7,600 (MW-30S)	2	12
Naphthalene	10	730 (MW-30S)	2	12
n-Propylbenzene	5	610 (MW-26S)	2	12
1,2,4-Trimethylbenzene	5	4,500 J (MW-26S)	2	12
1,3,5-Trimethylbenzene (mesitylene)	5	840 (MW-26S)	2	12
Xylenes, total	5	24,000 J (MW-30S)	2	12

[a] Well counts in this column include all non-detects, even those with reporting limits above the respective RAO.

Note:

A total of 14 monitoring/recovery wells (existing and newly installed) screened in the Shallow WBZ were sampled in 2018.

µg/L = microgram(s) per liter
COC = constituent of concern
VOC = volatile organic compound
RAO = remedial action objective
WBZ = water-bearing zone

Table 2-11. Deep WBZ Analytical Results – Recovery Wells

2018 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York

Volatile Organic Compounds (Method 8260C) – µg/L	NYSDEC GWQS (µg/L)	RW-2D		RW-6D	
		5/9/2018	11/14/2018	5/9/2018	11/14/2018
1,1,1,2-Tetrachloroethane	5	120 U	62 U	250 U	500 U
1,1,1-Trichloroethane	5	120 U	62 U	250 U	500 U
1,1,2,2-Tetrachloroethane	5	25 UJ	12 U	50 UJ	100 U
1,1,2-Trichloroethane	1	75 U	38 U	150 U	300 U
1,1-Dichloroethane	5	120 U	62 U	250 U	500 U
1,1-Dichloroethene	5	**30**	**15**	**52**	**51 J**
1,1-Dichloropropene	5	120 U	62 U	250 U	500 U
1,2,3-Trichlorobenzene	5	120 U	62 U	250 U	500 U
1,2,3-Trichloropropane	0.04	120 U	62 U	250 U	500 U
1,2,4-Trichlorobenzene	5	120 U	62 U	250 U	500 U
1,2,4-Trimethylbenzene	5	120 U	62 U	250 U	500 U
1,2-Dibromo-3-chloropropane	0.04	120 UJ	62 U	250 UJ	500 U
1,2-Dibromoethane (ethylene dibromide)	0.0006	100 U	50 U	200 U	400 U
1,2-Dichlorobenzene	3	120 U	62 U	250 U	500 U
1,2-Dichloroethane	0.6	25 U	12 U	50 U	100 U
1,2-Dichloropropane	1	50 U	25 U	100 U	200 U
1,3,5-Trimethylbenzene (mesitylene)	5	120 U	62 U	250 U	500 U
1,3-Dichlorobenzene	3	120 U	62 U	250 U	500 U
1,3-Dichloropropane	5	120 U	62 U	250 U	500 U
1,3-Dichloropropene, total	0.4	25 U	12 U	50 U	100 U
1,4-Dichlorobenzene	3	120 U	62 U	250 U	500 U
1,4-Dioxane (p-dioxane)	NS	12,000 U	6,200 U	25,000 U	50,000 U
2,2-Dichloropropane	5	120 U	62 U	250 U	500 U
2-Butanone (methyl ethyl ketone)	50	250 U	120 U	500 U	1,000 U
2-Chlorotoluene	5	120 U	62 U	250 U	500 U
2-Hexanone	50	250 U	120 U	500 U	1,000 U
4-Chlorotoluene	5	120 U	62 U	250 U	500 U
4-Methyl-2-pentanone	NS	250 U	120 U	500 U	1,000 U
Acetone	50	250 U	120 U	**6,900**	**380 J**
Benzene	1	25 U	**5 J**	**57**	**42 J**
Bromobenzene	5	120 U	62 U	250 U	500 U
Bromochloromethane	5	120 U	62 U	250 U	500 U
Bromodichloromethane	50	25 U	12 U	50 U	100 U
Bromoform	50	100 U	50 U	200 U	400 U
Bromomethane	5	120 UJ	62 U	250 UJ	500 U
Carbon disulfide	60	250 U	120 U	500 U	1,000 U
Carbon tetrachloride	5	25 U	12 U	50 U	100 U
Chlorobenzene	5	120 U	62 U	250 U	500 U
Chlorodibromomethane	50	25 U	12 U	50 U	100 U
Chloroethane	5	120 U	62 U	250 U	500 U
Chloroform	7	120 U	62 U	250 U	500 U

Table 2-11. Deep WBZ Analytical Results – Recovery Wells

2018 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York

Volatile Organic Compounds (Method 8260C) – µg/L	NYSDEC GWQS (µg/L)	RW-2D		RW-6D	
		5/9/2018	11/14/2018	5/9/2018	11/14/2018
Chloromethane	5	120 U	62 U	250 U	500 U
cis-1,2-Dichloroethene	5[a]	**6,300**	**3,000**	**13,000**	**22,000**
cis-1,3-Dichloropropene	0.4	25 U	12 U	50 U	100 U
Dibromomethane (methylene bromide)	5	250 U	120 U	500 U	1,000 U
Dichlorodifluoromethane	5	250 U	120 U	500 U	1,000 U
Dichloromethane	5	120 U	62 U	250 U	500 U
Ethylbenzene	5[a]	120 U	62 U	250 U	500 U
Hexachlorobutadiene	0.5	120 U	62 U	250 U	500 U
Isopropylbenzene (cumene)	5	120 U	62 U	250 U	500 U
Naphthalene	10	120 U	62 U	250 U	500 U
n-Butylbenzene	5	120 U	62 U	250 U	500 U
n-Propylbenzene	5	120 U	62 U	250 U	500 U
p-Isopropyltoluene	5	120 U	62 U	250 U	500 U
sec-Butylbenzene	5	120 U	62 U	250 U	500 U
Styrene	5	120 U	62 U	250 U	500 U
tert-Butylbenzene	5	120 U	62 U	250 U	500 U
tert-Butyl methyl ether	10	120 U	62 U	250 U	500 U
Tetrachloroethene	5	25 U	12 U	50 U	100 U
Toluene	5[a]	120 U	62 U	250 U	500 U
trans-1,2-Dichloroethene	5[a]	120 U	**18 J**	250 U	500 U
trans-1,3-Dichloropropene	0.4	25 U	12 U	50 U	100 U
Trichloroethene	5[a]	**940 J**	**2,400**	**16,000 J**	**7,200**
Trichlorofluoromethane	5	120 U	62 U	250 U	500 U
Vinyl acetate	NS	250 U	120 U	500 U	1,000 U
Vinyl chloride	5[a]	**1,500**	**410**	**3,600**	**2,400**
Xylene, o	5[a]	120 U	62 U	250 U	500 U
Xylenes, m & p	5[a]	120 U	62 U	250 U	500 U

[a] Site groundwater RAOs set forth in the March 1994 Record of Decision.

Notes:

Exceedances of NYSDEC GWQS and RAOs in bold.

Non-detects are reported to the adjusted reporting limit.

µg/L = microgram(s) per liter

J = estimated detection

D = result from diluted analysis

NS = No standard or guidance value established (TOGS 1.1.1)

NYSDEC GWQS = New York State Department of Environmental Conservation Ambient Groundwater Quality Standards and Guidance Values (TOGS 1.1.1)

RAO = remedial action objective

TOGS = Technical and Operational Guidance Series

U = analyte not detected

UJ = analyte not detected (estimated)

WBZ = water-bearing zone

Table 2-12. Summary of COCs in Deep Groundwater

2018 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York

COC	RAO (µg/L)	Maximum Concentration (µg/L)	Number of Wells > RAO	Number of Wells < RAO[a]
Chlorinated VOCs				
Trichloroethene	5	140,000 (MW-110D, MW-123D)	8	5
1,1-Dichloroethene	5	410 J (MW-118D, MW-123D)	7	6
cis-1,2-Dichloroethene	5	200,000 (MW-118D)	8	5
trans-1,2-Dichloroethene	5	97 J (MW-119D)	3	10
Vinyl chloride	5	8,800 (MW-118D)	7	6
Ketones				
Acetone	50	6,900 (RW-6D)	1	12
Petroleum-related Compounds				
Benzene	1	57 (RW-6D)	3	10

[a] Well counts in this column include all non-detects, even those with reporting limits above the respective RAO.

Note:
A total of 13 monitoring/recovery wells (existing and newly installed) screened in the Deep WBZ were sampled in 2018.

µg/L = microgram(s) per liter
COC = compound of concern
VOC = volatile organic compund
RAO = remedial action objective
WBZ = water-bearing zone

Table 2-13. Shallow WBZ Recovery Well VOC Mass Extraction Summary

2018 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York

Well		Volume Extracted in 2018 (gallons)	Average Total VOC Concentrations in 2018 (µg/L)	Mass Removed in 2018 (pounds)	Total Mass Removed All-time (pounds)
RW-1S	2018 1st Half	25,709	653	0.14	**21.62**
	2018 2nd Half	20,986	635	0.11	
	Total	**46,695**	**644**	**0.25**	
RW-2S	2018 1st Half	297,262	56	0.14	**23.09**
	2018 2nd Half	271,769	62	0.14	
	Total	**569,031**	**59**	**0.28**	
Shallow WBZ Totals		**615,726**	**N/A**	**0.53**	**153**

Notes:

RW-4S and RW-5S removed approximately 107.94 and 0.65 pounds, respectively, from 1998–2002.

Totals may be slightly off individual values due to rounding.

RW-3S was shut down on August 8, 2017 because of its historically low pumping rates and its hydraulic location (upgradient from RW-1S and RW-2S). This was proposed by CH2M in the 2016 Annual PRR (CH2M, 2017), and approved by NYSDEC via letter dated May 1, 2017.

µg/L = microgram(s) per liter

VOC = volatile organic compound

WBZ = water-bearing zone

CH2M HILL Engineers, Inc. (a wholly owned subsidiary of Jacobs Engineering Group Inc.). 2017. *2016 Annual Periodic Review Report, Essex-Hope Site*. March.

Table 2-14. Deep WBZ Recovery Well Mass Extraction Summary

2018 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York

Well		Volume Extracted in 2018 (gallons)	Average Total VOC Concentrations in 2018 (µg/L)	Mass Removed in 2018 (pounds)	Total Mass Removed All-time (pounds)
RW-2D	2018 1st Half	522,666	8,770	38	**1,288**
	2018 2nd Half	617,135	5,848	30	
	Total	**1,139,801**	**7,309**	**68**	
RW-6D	2018 1st Half	250,346	39,609	83	**1,287**
	2018 2nd Half	197,775	32,073	53	
	Total	**448,121**	**35,841**	**136**	
Deep WBZ Totals		**1,587,922**	**N/A**	**204**	**2,577**

Notes:
1.56 pounds were removed by RW-1D in 1998 and 1999.
Totals may be slightly off individual values due to rounding.
Mass removal calculations include acetone, which is removed but not treated.

µg/L = microgram(s) per liter
VOC = volatile organic compound
WBZ = water-bearing zone

Table 5-1. Inspection, Maintenance, Monitoring, and Sampling Schedule

2018 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York

System	Routine (Biweekly or As Needed)	Monthly	Quarterly	Semiannual	Annual	As Required
GWE&T System Treatment Plant Building	• Cartridge filter inspection/ replacement (Section 2.4) • Inspect Carbon vessels (Section 2.4) • Check transfer pump-flow rate (Section 2.4) • Inspect piping/valves (Section 2.4) • Inspect storage tank (Section 2.4) • Record recovery well/system flow-rates (Section 5.1) • Record System pressure readings (Section 5.1)	• Obtain monthly samples and pH readings per Wastewater Discharge Permit (Section 5.1)				• Replace GAC (Section 2.4, Table 5.0) • Clean flow meters (Section 2.4) • Clean out storage tank (Section 2.4) • Backflush carbon vessels (Section 2.4)
GWE&T System Recovery Wells	• Confirm recovery wells are operating properly (Section 2.4)			• Inspection/maintenance (Section 2.4) • Obtain analytical samples per SMP (Section 5.1)	• Well redevelopment (Section 2.4)	• Flush piping system (Section 2.4) • Clean pumps/level controls (Section 2.4)
SSD/VIM System Residence at 159 Hopkington Avenue		• Monitor building occupancy and system operation (Section 4.3)			• Inspection/maintenance (Section 4.3)	• Maintenance (Section 4.3)
Asphalt & Concrete Caps				• Inspection (Section 3.2)		• Maintenance (Section 3.2)
Monitoring Well System			• Measure water levels (Section 5.2) • Inspect well integrity (Section 5.2)		• Obtain analytical samples in accordance with SMP (Section 5.2)	

Notes:

Sections and appendices referenced in this table pertain to the latest O&M Plan and/or SMP for the Site.

GAC = granular activated carbon

GWE&T = groundwater extraction and treatment

O&M = operations and maintenance

SMP = site management plan

SSD/VIM = subslab depressurization/vapor intrusion mitigation

Table 5-2. POTW Monthly Monitoring Summary – Detected Parameters in Pre-carbon Influent

2018 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York

Parameter	Sample Date / Results (µg/L)											
	January 11	February 16	March 9	April 12	May 10	June 7	July 10	August 7	September 13	October 4	November 14	December 6
1,1-Dichloroethene	23 J	10	20 J	20 J	23 J	15 J	16 J	14 J	21 J	22 J	17 J	14 J
Acetone	3,300	ND	3,300	1,600	1,800	1,200	1,000	780	350	140 J	130 J	ND
Benzene	17 J	3.9	17 J	16 J	18 J	13 J	15 J	13 J	16 J	15 J	12 J	12 J
cis-1,2-Dichloroethene	5,400	1,900	4,600	4,800	5,400	4,000	5,600	5,100	7,100	7,800	5,500	4,700
trans-1,2-Dichloroethene	ND	14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	4,600	1,500	4,600	4,700	5,400	3,600	3,600	3,900	4,000	2,800	3,900	2,900
Vinyl chloride	940	290	1,100	970	1,200	770	740	750	950	850	640	620
Pre-carbon total VOCs	**14,280**	**3,718**	**13,637**	**12,106**	**13,841**	**9,598**	**10,971**	**10,557**	**12,437**	**11,627**	**10,199**	**8,246**

Notes:
µg/L = microgram(s) per liter
D = sample results obtained from a dilution
E = Result exceeded calibration range.
J = Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.
ND = Not detected/detected below minimum laboratory reporting limit
VOC = volatile organic compound

Table 5-3. POTW Monthly Monitoring Summary – Detected Parameters in Primary Carbon Effluent

2018 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York

Parameter	Sample Date / Results (µg/L)											
	January 11	February 16	March 9	April 12	May 10	June 7	July 10	August 7	September 13	October 4	November 14	December 6
1,1-Dichloroethene	ND	ND	ND	ND	ND	2.2 J	ND	8.4 J	ND	ND	ND	ND
Acetone	19 J	ND	290	1,700	1,100	400	180 J	ND	ND	ND	2.5 J	ND
cis-1,2-Dichloroethene	ND	910	4,000	ND	3.5	750	3,200	5,400	1,400	7,700	21	16
Trichloroethene	ND	ND	13 J	ND	0.53	160	120	99	ND	ND	1.2	1
Vinyl chloride	970	1,200	860	2.3 J	550	1,700	1,000	750	1,800	1,100	3.5	3
Primary carbon total VOCs	**989**	**2,110**	**5,163**	**1,702**	**1,654**	**3,012**	**4,500**	**6,257**	**3,200**	**8,800**	**28**	**20**

Notes:
Primary carbon results represent effluent from the primary carbon vessel in the two carbon vessel system.

µg/L = microgram(s) per liter
D = Sample results obtained from a dilution
J = Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.
ND = Not detected/detected below minimum laboratory reporting limit
VOC = volatile organic compound

Table 5-4. POTW Monthly Monitoring Summary – Detected Parameters in Post-carbon Effluent

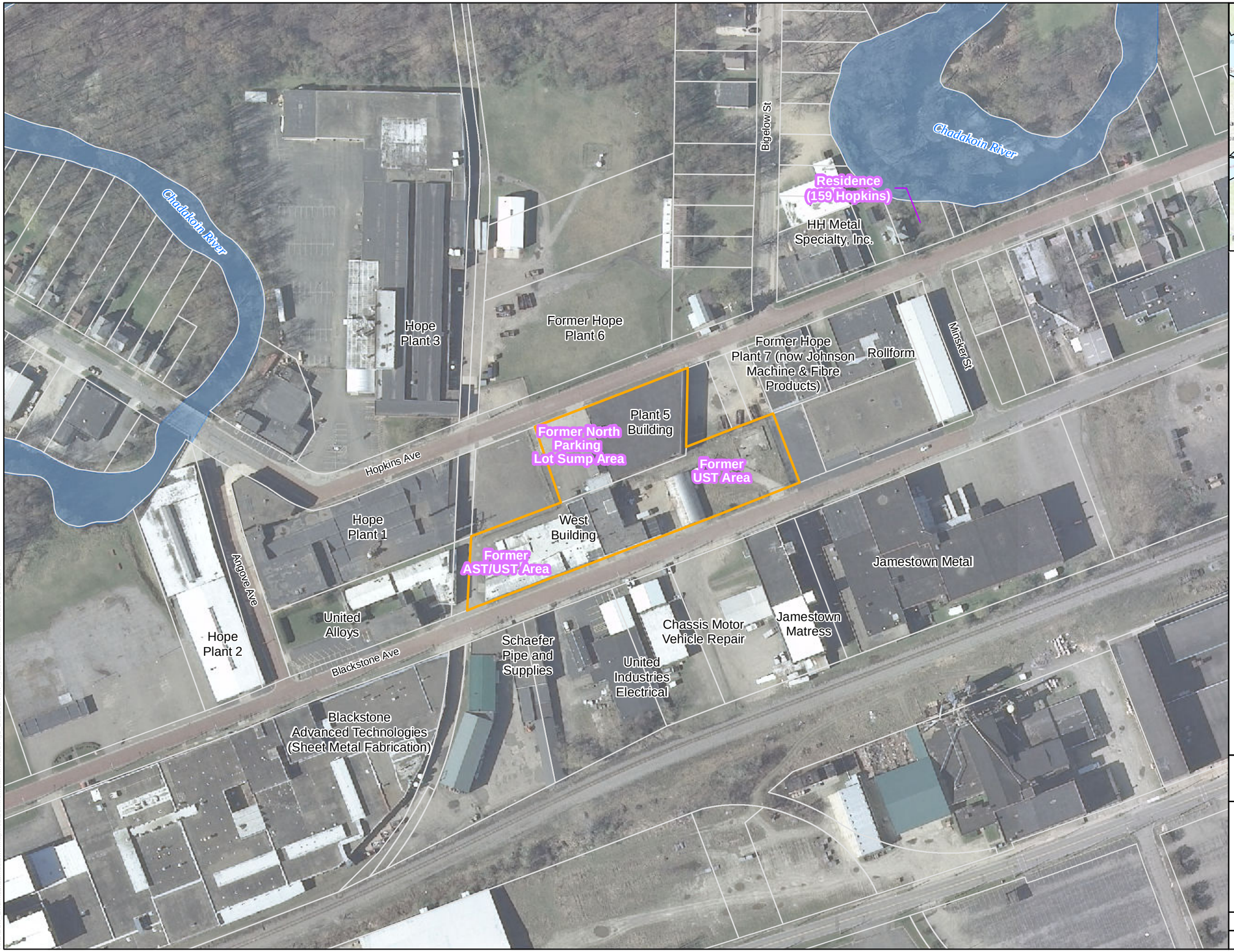
2018 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York

Parameter	Sample Date / Results (µg/L)											
	January 11	February 16	March 9	April 12	May 10	June 7	July 10	August 7	September 13	October 4	November 14	December 6
Acetone	9	ND	ND	70	ND	ND	6 J	ND	1.5 J	ND	2 J	ND
Carbon disulfide	ND	2.4 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	ND	ND	ND	ND	ND	ND	3.6 J	ND	5.6	12	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND	ND	0.9 J	0.71 J	ND	ND	ND	ND	100	53
Trichloroethene	0.28 J	0.21 J	ND	0.26 J	0.78	0.75	1.4 J	ND	0.38 J	ND	6	3.2
Vinyl chloride	3.6	590	1,200	0.08 J	0.19 J	1.9	550	1,500	140	930	2.8	1.2
Post-carbon total VOCs	**12.9**	**593**	**1,200**	**70**	**1.87**	**3.36**	**561**	**1,500**	**147**	**942**	**111**	**57**
Post-carbon TTOs	**3.88**	**590**	**1,200**	**0.34**	**1.87**	**3.36**	**555**	**1,500**	**146**	**942**	**109**	**57.4**

Notes:
Post-carbon results represent system effluent from the secondary carbon vessel to the POTW.
Post-carbon sample is a laboratory-prepared composite of four grab samples taken at 30-minute intervals.
POTW Discharge Limit = 2,130 µg/L TTOs

µg/L = microgram(s) per liter
D = sample results obtained from a dilution
F1 = MS and/or MSD recovery is outside acceptance limits.
J = Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.
ND = Not detected/detected below minimum laboratory reporting limit
TTOs = total toxic organics
VOC = volatile organic compound

Figures



Site Boundary

Chautauqua County Tax Parcels

Chadakoin River

N

BASE MAP SOURCE:
Imagery: Statewide Digitial Orthoimagery 2012 of Chautauqua County, New York Stat Gov 2012;
Tax Parcel Source: Chautauqua County Department of Information Services. Last updated July 7th, 2017.

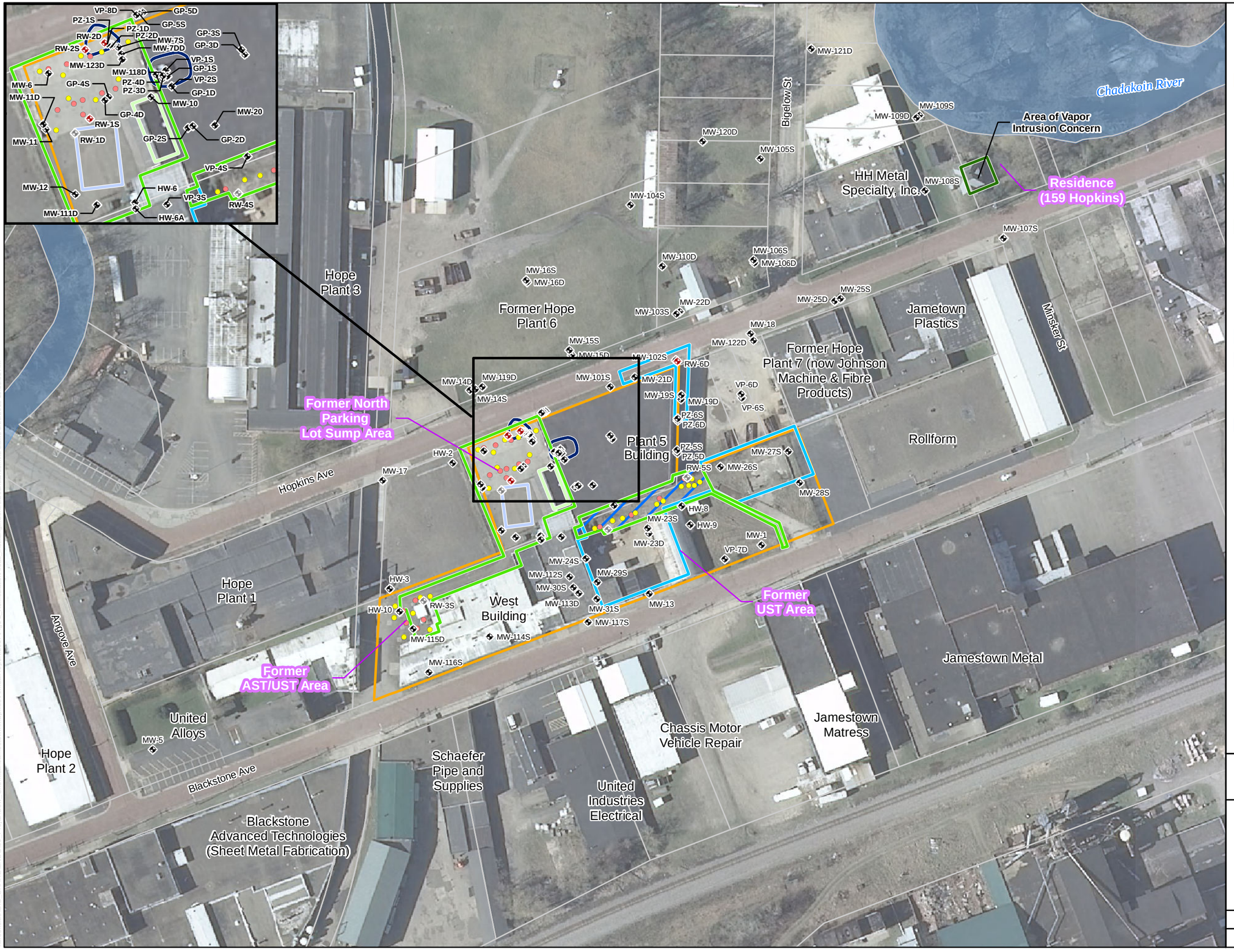
0 50 100 200

Scale in Feet

Essex Specialty Products, Inc	Essex/Hope Site, Jamestown, New York

FIGURE 1-1
Site Location and Layout Map
2018 Annual Periodic Review Report

CREATED BY: LA	JACOBS
REVIEWED BY: MV	



Essex Specialty Products, Inc

Essex/Hope Site, Jamestown, New York

FIGURE 1-2
Remediation Areas and Institutional and Engineering Control Boundaries
2018 Annual Periodic Review Report

CREATED BY: LA

REVIEWED BY: MV

JACOBS

Monitoring Well - Annual Sampling Program

Recovery Well - Semiannual Sampling (Alternating Seasons)

Monitoring Well

Site Boundary

Chautauqua County Tax Parcels

Chadakoin River

N

BASE MAP SOURCE:
Imagery: Statewide Digitial Orthoimagery 2012 of Chautauqua County, New York Stat Gov 2012;
Tax Parcel Source: Chautauqua County Department of Information Services. Last updated July 7th, 2017.

0 50 100 200

Scale in Feet

Essex Specialty Products, Inc	Essex/Hope Site, Jamestown, New York

FIGURE 2-1
Monitoring Well Network
2018 Annual Periodic Review Report

CREATED BY: LA	JACOBS
REVIEWED BY: MV	

Monitoring Well Sampled for VOCs in March 2018

Monitoring Well Sampled PFAS in June 2018

Recovery Well

Monitoring Well Sampled for 1,4-Dioxane in November 2018

Monitoring Well

Site Boundary

Chautauqua County Tax Parcels

Chadakoin River

Notes:
1. VOCs = Volatile organic compounds
2. PFAS = Per- and Polyfluoroalkyl Substances

N

BASE MAP SOURCE:
Imagery: Statewide Digitial Orthoimagery 2016 of Chautauqua County, New York Stat Gov 2016;
Tax Parcel Source: Chautauqua County Department of Information Services. Last updated July 7th, 2017.

0 50 100 200
Scale in Feet

Essex Specialty Products, Inc	Essex/Hope Site, Jamestown, New York

FIGURE 2-2
Non-Routine Groundwater Monitoring
2018 Annual Periodic Review Report

CREATED BY: SL	JACOBS
REVIEWED BY: LA	

\\brooksidefiles\GIS_SHARE\ENBG\00_Proj\D\Dow_Chemical\Jamestown\Mapfiles\AnnualReport\2018\Fig8_Non-RoutineGWSampling_Feb2019.mxd lallan 2/15/2019 2:14:00 PM

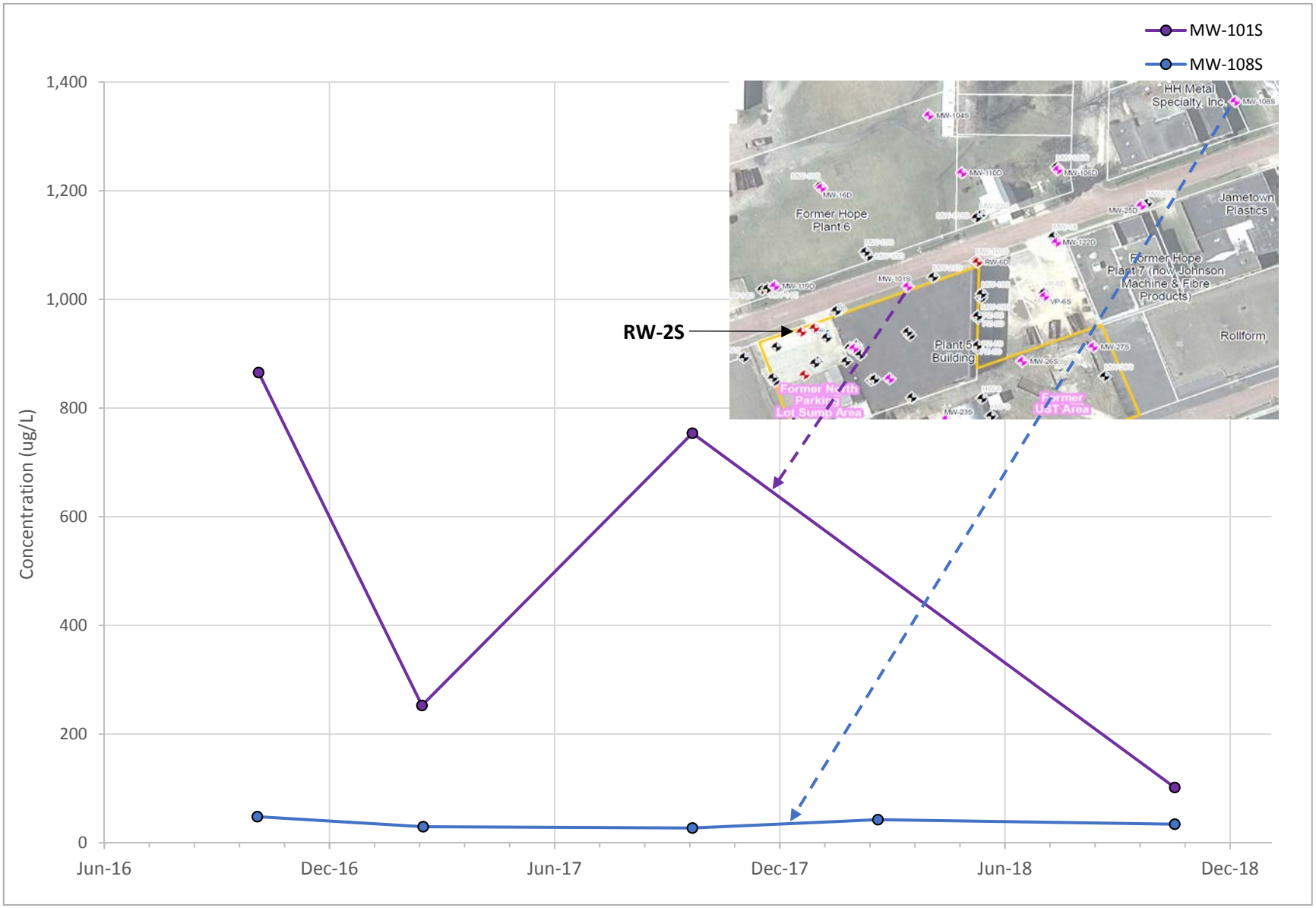


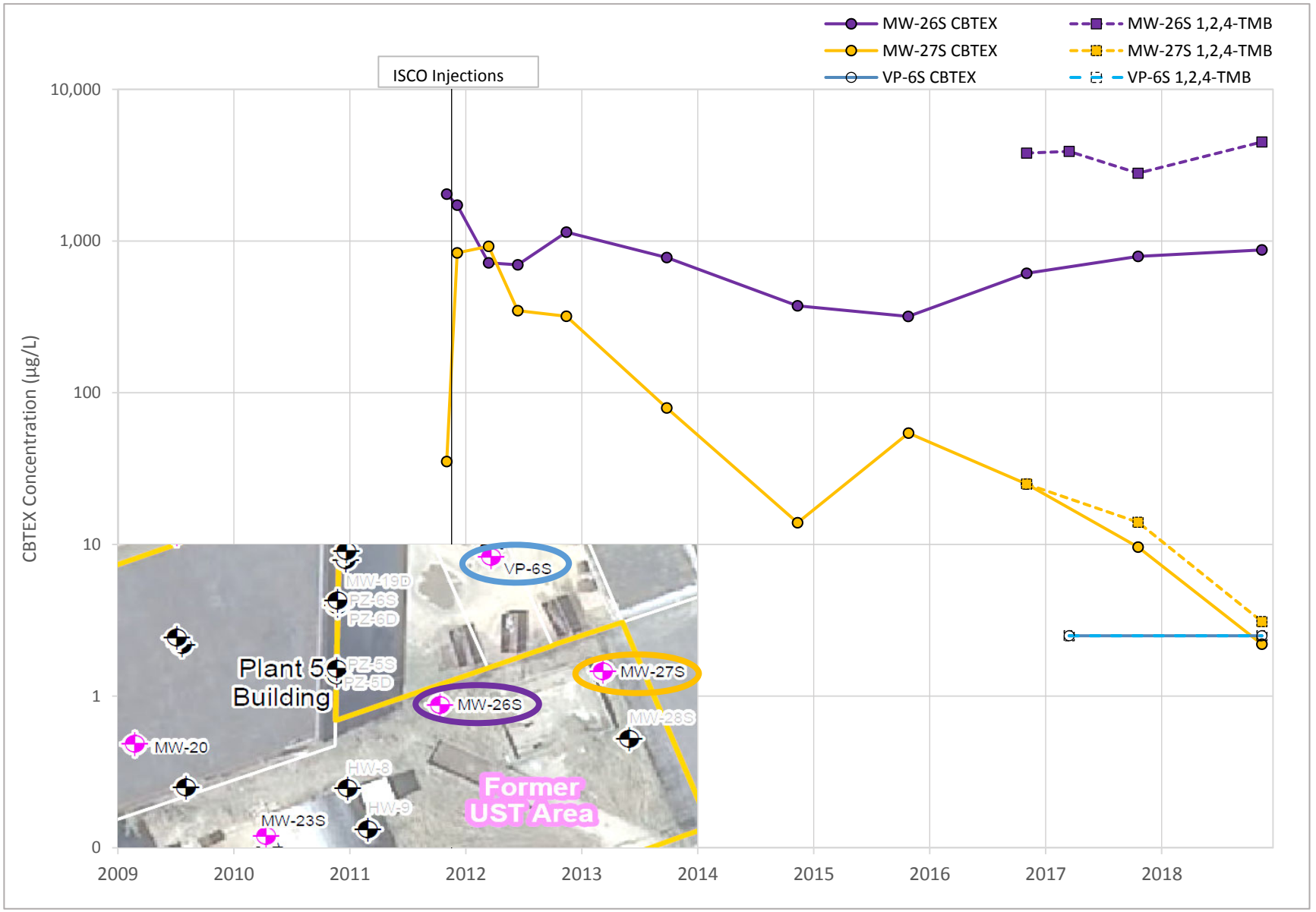
FIGURE 2-3

Total CVOC Groundwater Concentration Trends at MW-101S and MW-108S

2018 Annual Periodic Review Report

Essex-Hope Site, Jamestown, New York

JACOBS



Empty markers indicate non-detect results

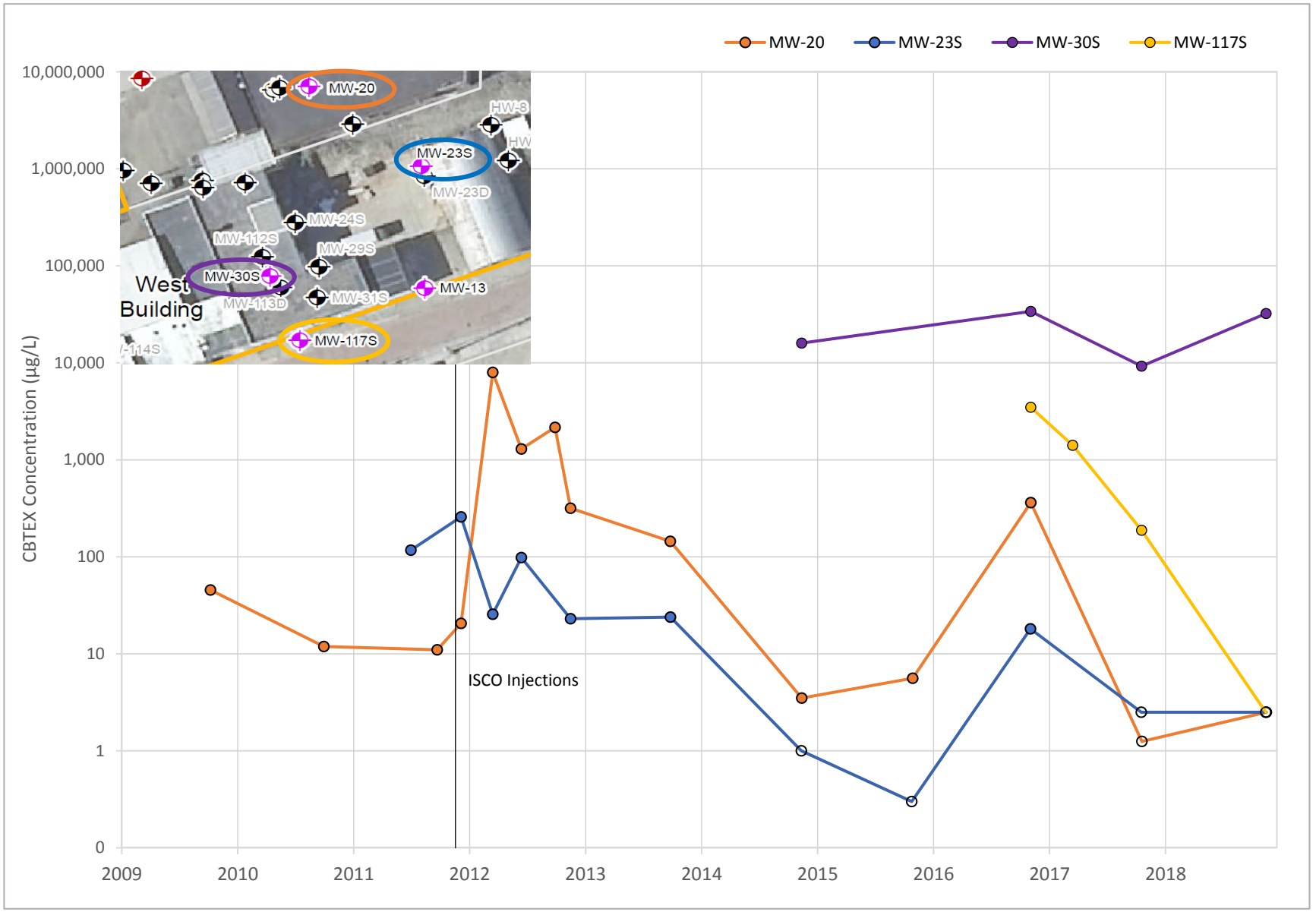
FIGURE 2-4

Shallow WBZ Total CBTEX and 1,2,4-TMB Concentration Trends, Former UST Area

2018 Annual Periodic Review Report

Essex-Hope Site, Jamestown, New York

JACOBS



Empty circles indicate non-detect results

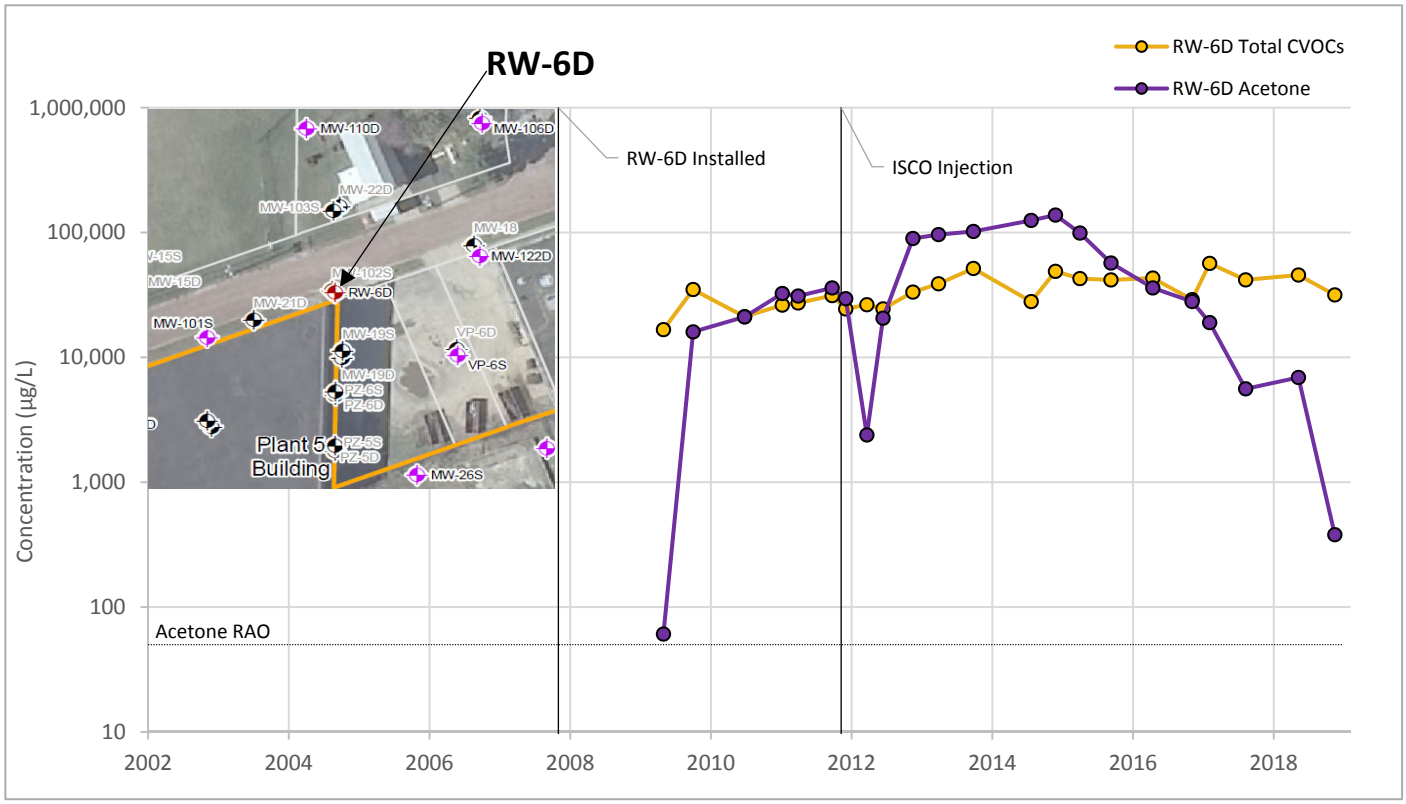
FIGURE 2-5

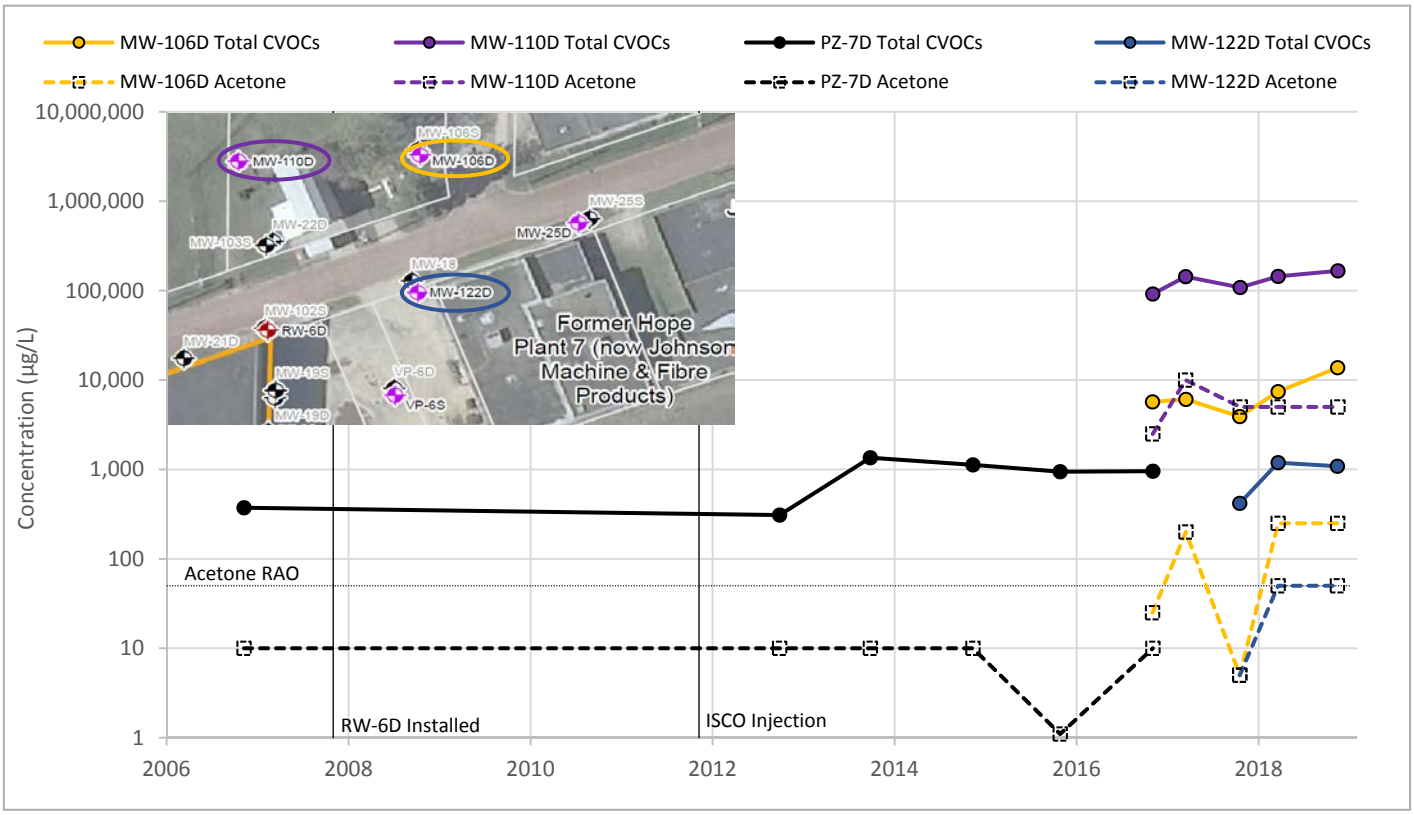
Shallow WBZ Total CBTEX Concentration Trends, West Building Area

2018 Annual Periodic Review Report

Essex-Hope Site, Jamestown, New York

JACOBS





Empty markers indicate non-detect results

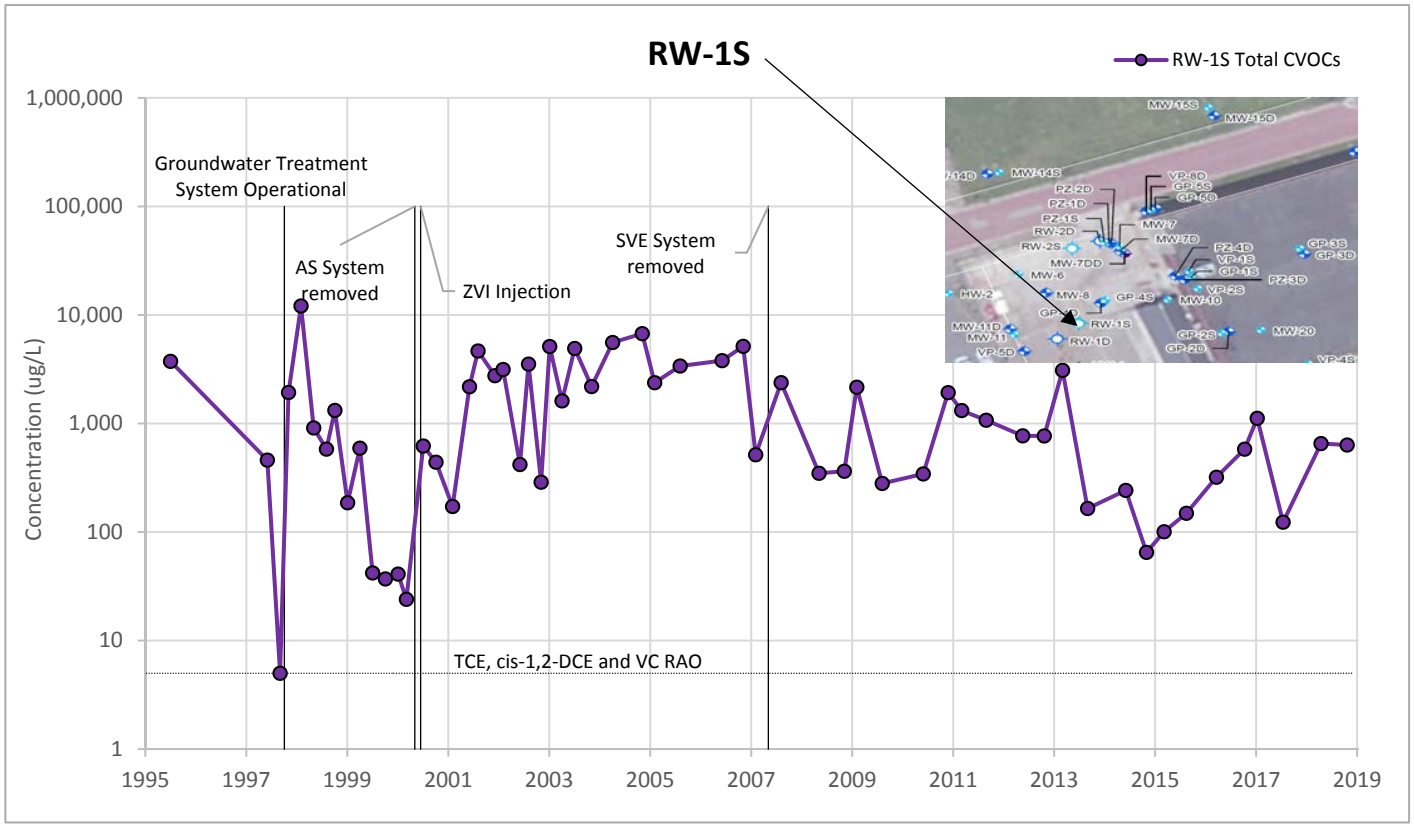
FIGURE 2-6

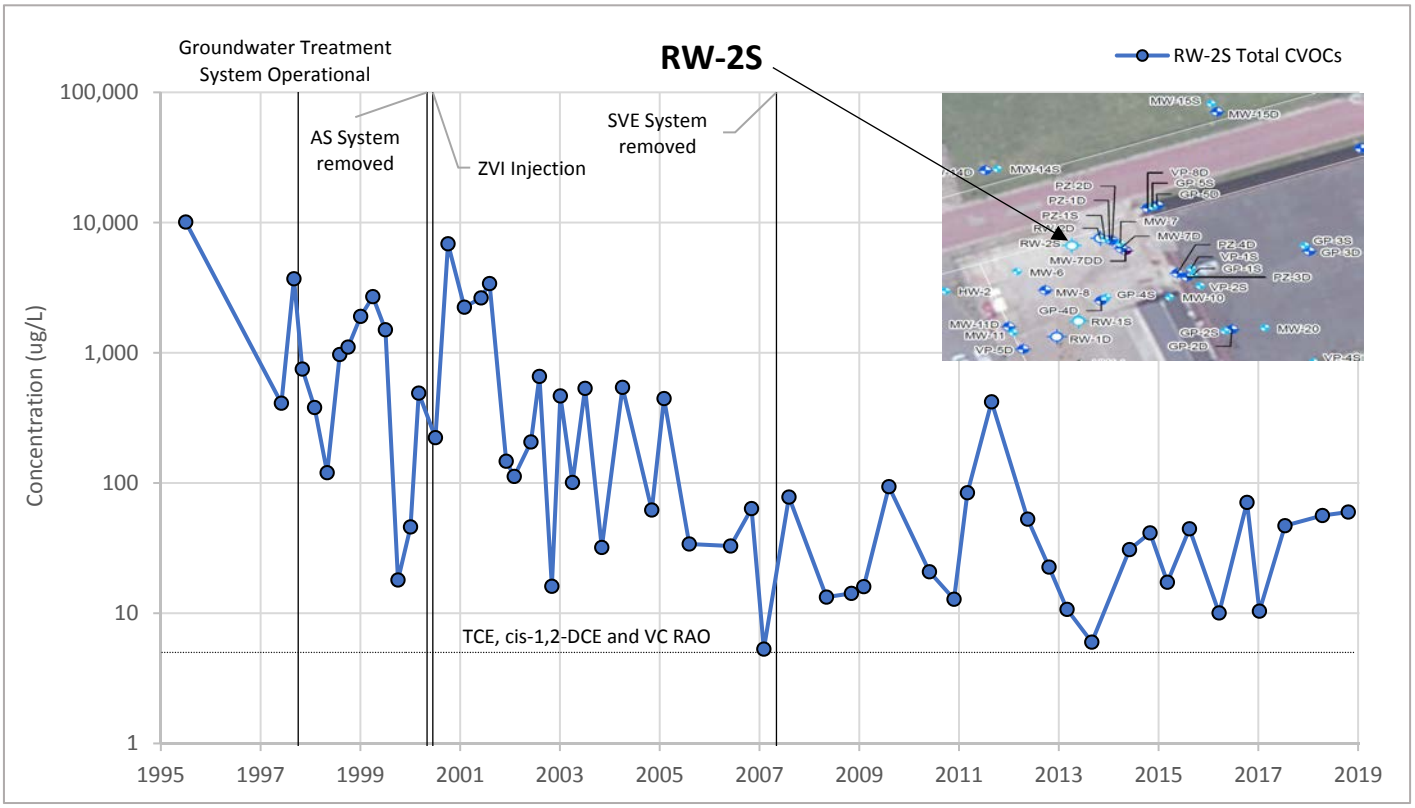
Deep WBZ Total CVOC and Acetone Concentration Trends, Plant 5 Building and Offsite

2018 Annual Periodic Review Report

Essex-Hope Site, Jamestown, New York

JACOBS





Empty circles indicate non-detect results

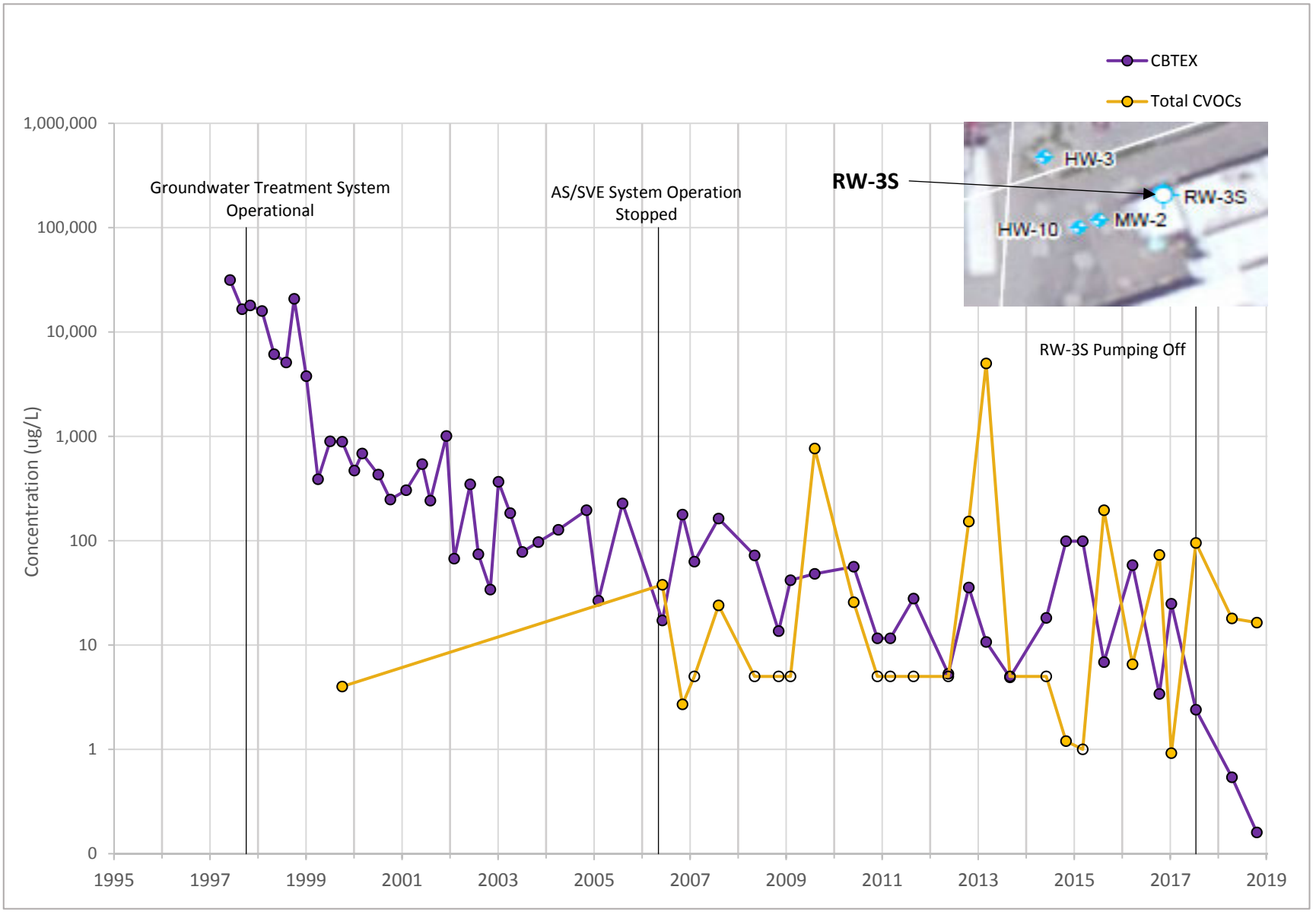
FIGURE 2-7

Total CVOC Groundwater Concentration Trends at RW-1S and RW-2S, NPLS Area

2018 Annual Periodic Review Report

Essex-Hope Site, Jamestown, New York

JACOBS



Empty circles indicate non-detect result

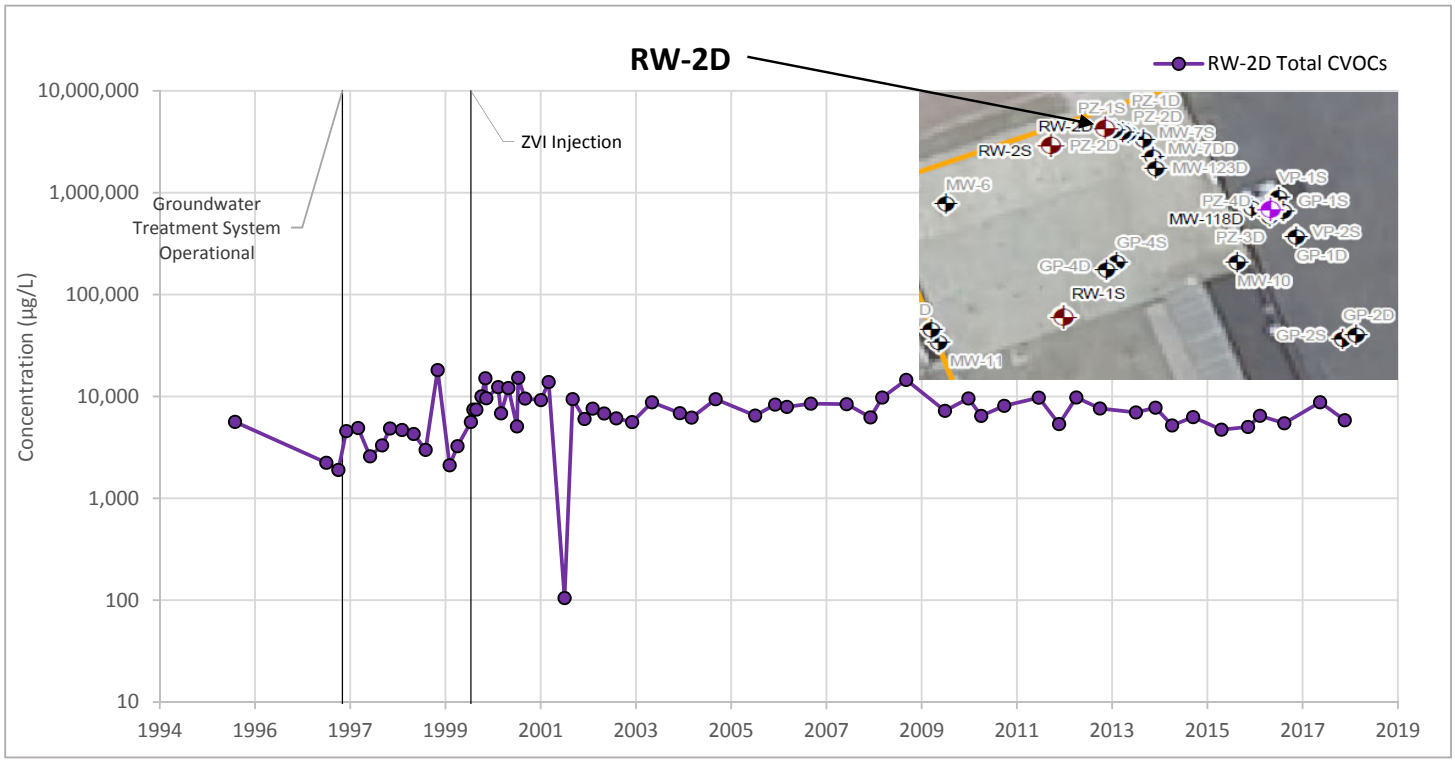
FIGURE 2-8

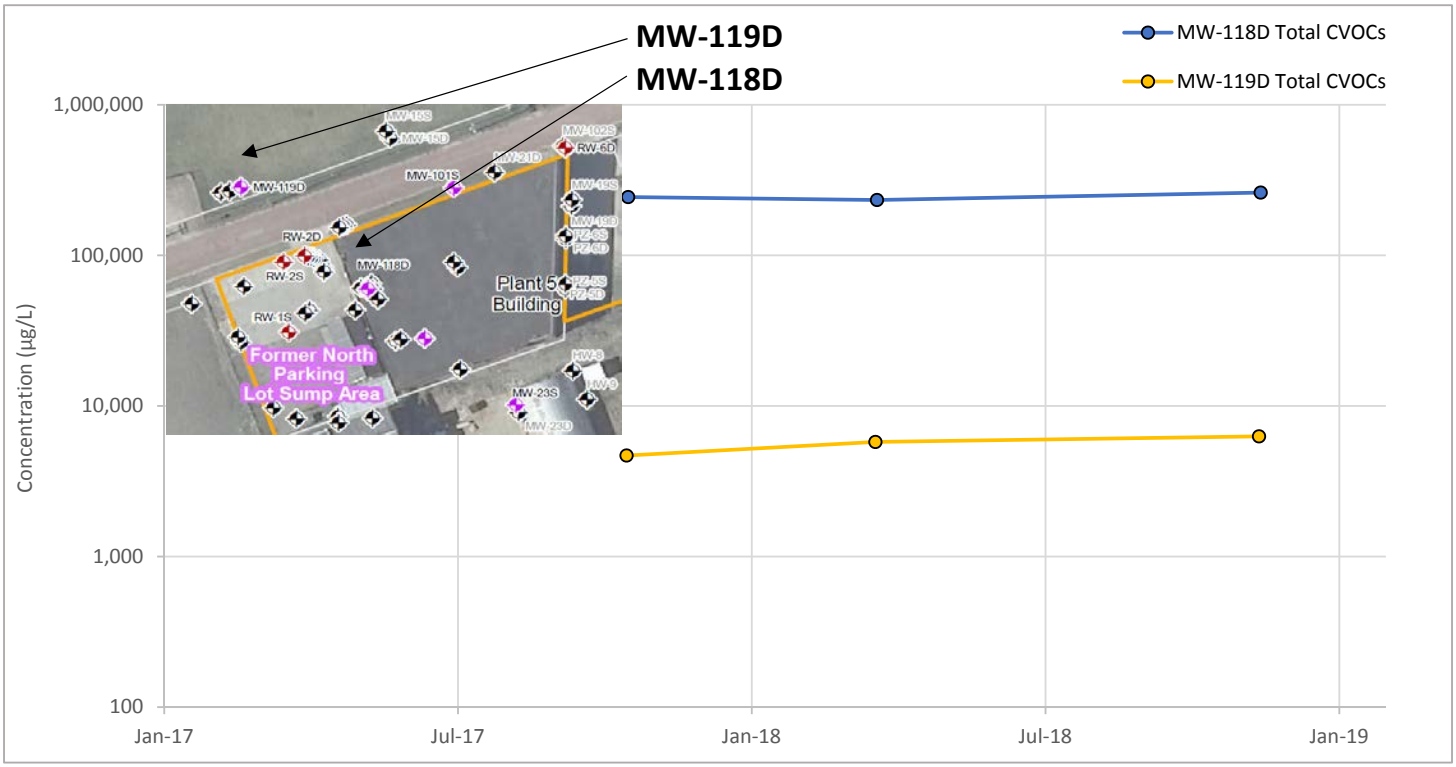
Total CVOC and CBTEX Groundwater Concentration Trends at RW-3S, Former AST/UST Area

2018 Annual Periodic Review Report

Essex-Hope Site, Jamestown, New York

JACOBS





1. Empty circles indicate non-detect results

FIGURE 2-9

Deep WBZ Total CVOCs Concentration Trends, NPLS Area

2018 Annual Periodic Review Report

Essex-Hope Site, Jamestown, New York

JACOBS

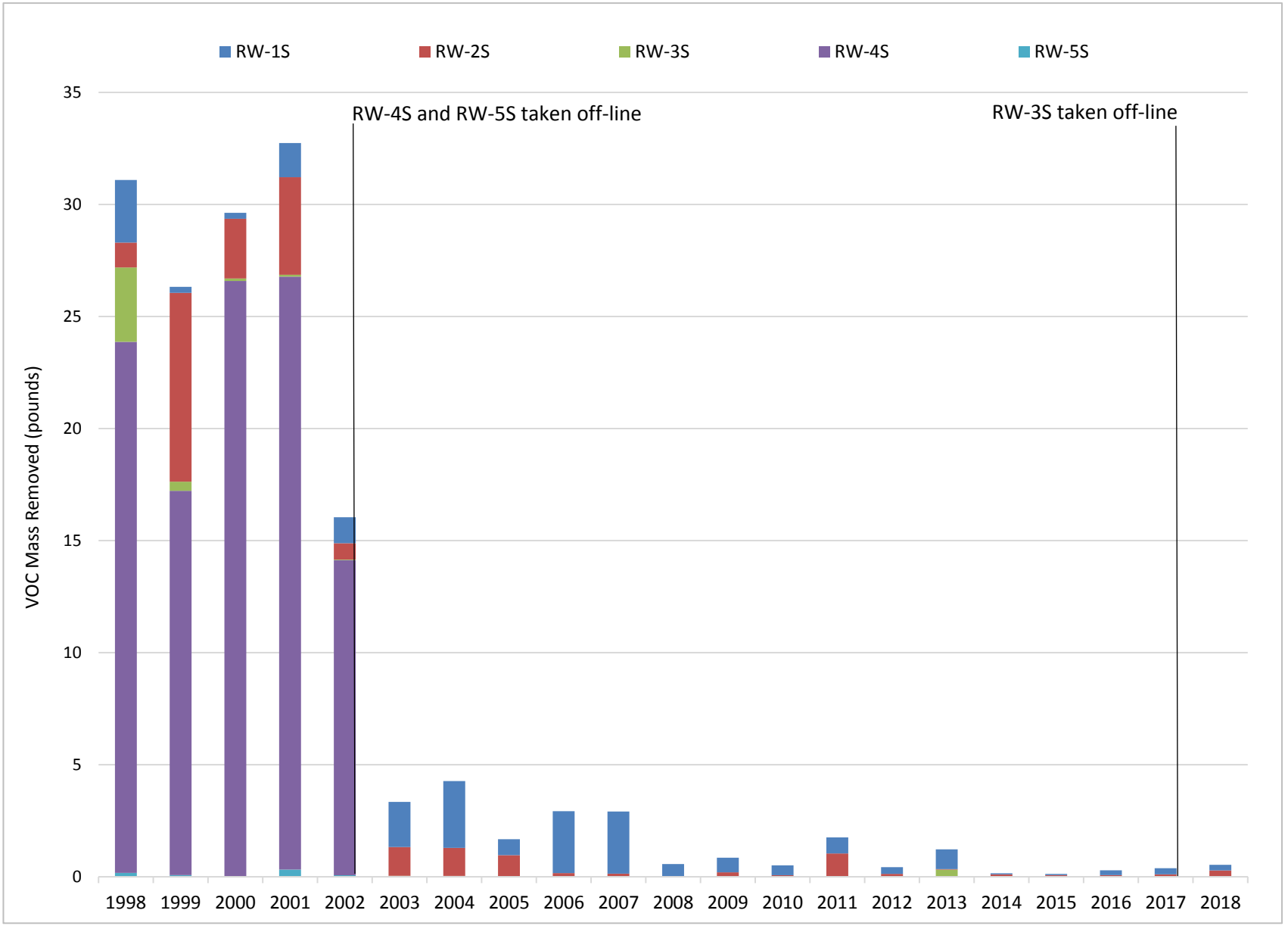


FIGURE 2-10

Shallow WBZ Groundwater Extraction System Mass Removal

2018 Annual Periodic Review Report

Essex-Hope Site, Jamestown, New York

Note:

RW-3S was shut down in August 8, 2017 because of its historically low pumping rates and its hydraulic location (upgradient from RW-1S and RW-2S). This was proposed by CH2M in the 2016 Annual Periodic Review Report (CH2M, 2017), and approved by NYSDEC via letter dated May 1, 2017.

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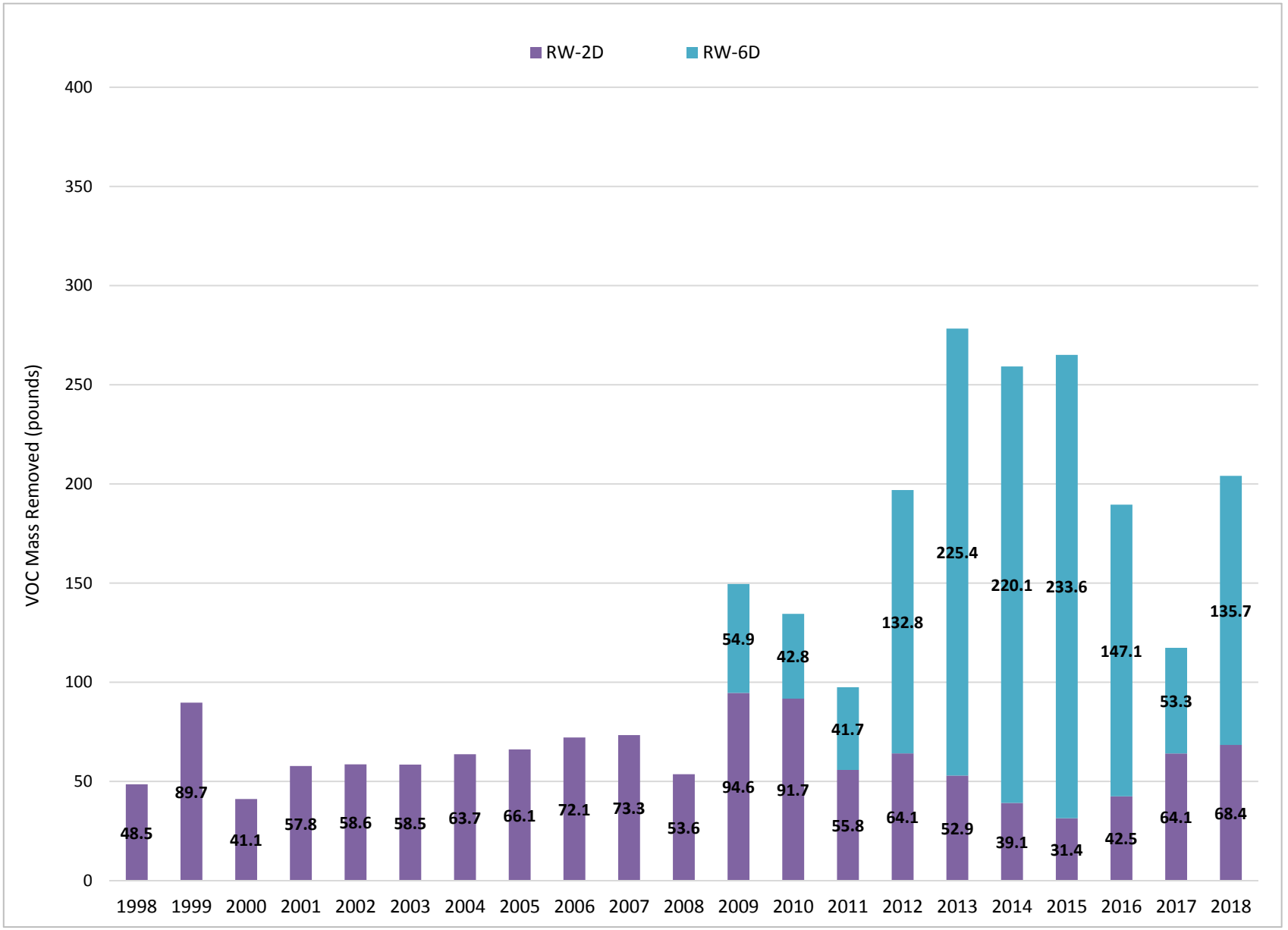

FIGURE 2-11

Deep WBZ Groundwater Extraction System Mass Removal

2018 Annual Periodic Review Report

Essex-Hope Site, Jamestown, New York

Notes:

Mass removed by RW-1D in 1998 and 1999 not available.

Mass removal calculations include Acetone, which is removed but not not treated.

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Appendix A
IC/EC Certifications

Enclosure 1

Certification Instructions

I. Verification of Site Details (Box 1 and Box 2):

Answer the three questions in the Verification of Site Details Section. The Owner and/or Qualified Environmental Professional (QEP) may include handwritten changes and/or other supporting documentation, as necessary.

II. Certification of Institutional Controls/ Engineering Controls (IC/ECs)(Boxes 3, 4, and 5)

1.1.1. Review the listed IC/ECs, confirming that all existing controls are listed, and that all existing controls are still applicable. If there is a control that is no longer applicable the Owner / Remedial Party should petition the Department separately to request approval to remove the control.

2. In Box 5, complete certifications for all Plan components, as applicable, by checking the corresponding checkbox.

3. If you cannot certify "YES" for each Control listed in Box 3 & Box 4, sign and date the form in Box 5. Attach supporting documentation that explains why the **Certification** cannot be rendered, as well as a plan of proposed corrective measures, and an associated schedule for completing the corrective measures. Note that this **Certification** form must be submitted even if an IC or EC cannot be certified; however, the certification process will not be considered complete until corrective action is completed.

If the Department concurs with the explanation, the proposed corrective measures, and the proposed schedule, a letter authorizing the implementation of those corrective measures will be issued by the Department's Project Manager. Once the corrective measures are complete, a new Periodic Review Report (with IC/EC Certification) must be submitted within 45 days to the Department. If the Department has any questions or concerns regarding the PRR and/or completion of the IC/EC Certification, the Project Manager will contact you.

III. IC/EC Certification by Signature (Box 6 and Box 7**):**

If you certified "YES" for each Control, please complete and sign the IC/EC Certifications page as follows:

- For the Institutional Controls on the use of the property, the certification statement in Box 6 shall be completed and may be made by the property owner or designated representative.

- For the Engineering Controls, the certification statement in Box 7 must be completed by a Professional Engineer or Qualified Environmental Professional, as noted on the form.

Enclosure 2
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Site Management Periodic Review Report Notice
Institutional and Engineering Controls Certification Form

Site Details **Box 1**

Site No. 907015

Site Name Essex; Hope Site

Site Address: 125 Blackstone Avenue Zip Code: 14701
City/Town: Jamestown
County: Chautauqua
Site Acreage: 4.700

Reporting Period: January 01, 2018 to December 31, 2018

	YES	NO
1. Is the information above correct?	X	
If NO, include handwritten above or on a separate sheet.		
2. Has some or all of the site property been sold, subdivided, merged, or undergone a tax map amendment during this Reporting Period?		X
3. Has there been any change of use at the site during this Reporting Period (see 6NYCRR 375-1.11(d))?		X
4. 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. 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 DO NOT COMPLETE THE REST OF THIS FORM. Otherwise continue.

A Corrective Measures Work Plan must be submitted along with this form to address these issues.

Signature of Owner, Remedial Party or Designated Representative Date

SITE NO. 907015 **Box 3**

Description of Institutional Controls

Parcel	Owner	Institutional Control
303-8-2	Custom Production Mfg. Inc.	O&M Plan Ground Water Use Restriction Landuse Restriction Building Use Restriction

Site in operation and maintenance (O&M) phase of remediation.
Declaration of Covenants and Restrictions filed with Chautauqua County on March 14, 2014
Prohibiton of groundwater use
Industrial use restriction
Adhere to O&M Plan

Box 4

Description of Engineering Controls

Parcel	Engineering Control
303-8-2	Groundwater Treatment System Vapor Intrusion Mitigation System Groundwater Containment Asphalt and Concrete Caps

Groundwater containment by recovery wells
Activated carbon Treatment
Discharge to POTW
One residential sub-slab mitigation system (temporarily off due residence being vacant and without power supply).

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;

   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
X	☐

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) access to the site will continue to be provided to the Department, to evaluate the remedy, including access to evaluate the continued maintenance of this Control;

   (d) nothing has occurred that would constitute a violation or failure to comply with the Site Management Plan for this Control; and

   (e) if a financial assurance mechanism is required by the oversight document for the site, the mechanism remains valid and sufficient for its intended purpose established in the document.

YES	NO
X	☐

IF THE ANSWER TO QUESTION 2 IS NO, sign and date below and DO NOT COMPLETE THE REST OF THIS FORM. Otherwise continue.

A Corrective Measures Work Plan must be submitted along with this form to address these issues.

_____	_____
Signature of Owner, Remedial Party or Designated Representative	Date

IC CERTIFICATIONS
SITE NO. 907015

Box 6

SITE OWNER OR DESIGNATED REPRESENTATIVE SIGNATURE

I certify that all information and statements in Boxes 1,2, and 3 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 **Timothy A. King** (print name) at **c/o The Dow Chemical Company, 2001 Union Carbide Dr., South Charlston, WV** (print business address),

am certifying as **Remedial Party (Essex Specialty)** (Owner or Remedial Party)

for the Site named in the Site Details Section of this form.

Signature of Owner, Remedial Party, or Designated Representative Rendering Certification

3/21/19
Date

IC/EC CERTIFICATIONS

Box 7

Professional Engineer Signature

I certify that all information in Boxes 4 and 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 Joseph J. Corrado, P.E. 083642 at 299 Madison Ave Morristown, NJ 07960,

print name — print business address

am certifying as a Professional Engineer for the Remedial Party (Essex Specialty)

(Owner or Remedial Party)

Signature of Professional Engineer, for the Owner or Remedial Party, Rendering Certification

Stamp (Required if Used)

Date 3/22/2019

Appendix B
Offsite Vapor Intrusion Investigation Report

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Essex-Hope Site
Jamestown, New York

Interim Offsite Vapor Intrusion Investigation Report

Final

March 2019

Essex Specialty Products, Inc.

Essex-Hope Site, Jamestown, New York

Project No:	703765CH.01.05
Document Title:	Interim Offsite Vapor Intrusion Investigation Report
Document No.:	GES0306190928BOS
Revision:	Final
Date:	March 2019
Client Name:	Essex Specialty Products, Inc.
Prepared By:	Jacobs Engineering Group Inc.
File Name:	Dow_VI_Investigation_Results_December2018_Essex-Hope_Site_March2019.docx

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www.jacobs.com

Document History and Status

Revision	Date	Description	By	Review	Approved

Contents

Appendixes

Tables

Figures

Acronyms and Abbreviations

µg/L	microgram per liter
µg/m^3	microgram per cubic meter
AST	aboveground storage tank
bgs	below ground surface
CBTEX	cumene, benzene, toluene, ethylbenzene, and xylenes
CH2M	CH2M HILL Engineers, Inc.[1]
COC	constituent of concern
CPM	Custom Production Manufacturing Inc.
CSM	conceptual site model
CVOC	chlorinated volatile organic compound
DCE	dichloroethene
EPA	U.S. Environmental Protection Agency
Essex	Essex Specialty Products, Inc.
FD	field duplicate
GC/MS	gas chromatography/mass spectrometry
H&H Metal	H&H Metal Specialty, Inc.
HQ	hazard quotient
HVAC	heating, ventilation, and air conditioning
JMF	Johnson Machine & Fibre Products
LCS/LCSD	laboratory control sample/laboratory control sample duplicate
mL/min	milliliters per minute
NPLS	north parking lot sump
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
O'Brien & Gere	O'Brien & Gere Engineers, Inc.
PARCC	precision, accuracy, representativeness, comparability and completeness
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PVC	polyvinyl chloride
QA	quality assurance
QC	quality control
RAO	remedial action objective
ROD	Record of Decision
Rollform	Rollform of Jamestown, Inc.

[1] CH2M HILL Engineers, Inc. is now a wholly owned subsidiary of Jacobs Engineering Group Inc.

RSL	regional screening level
SSC	soil screening criteria
SVE	soil vapor extraction
SVOC	semivolatile organic compound
TCA	trichloroethane
TCE	trichloroethene
THQ	target hazard quotient
TMB	trimethlybenzene
URS	URS Corporation
UST	underground storage tank
VI	vapor intrusion
VISL	vapor intrusion screening level
VOC	volatile organic compound
WBZ	water-bearing zone
WMS-SE	Waterloo Membrane Sampler

1. Introduction

This vapor intrusion (VI) report presents the details and results of the investigation activities that were performed to further evaluate the potential for VI at offsite buildings above or adjacent to the chlorinated solvent groundwater plume at the Essex-Hope State Superfund site located at 125 Blackstone Avenue in Jamestown, New York (the Site; Figure 1). The Site is listed under the New York Superfund Program (Site Number 907015) and managed by the New York State Department of Environmental Conservation (NYSDEC). A Record of Decision (ROD) was issued in 1994 requiring the implementation of remedial actions at the Site (NYSDEC, 1994).

This work was conducted from November through December 2018 in accordance with the NYSDEC-approved *Offsite Vapor Intrusion Investigation Work Plan, Essex-Hope Site in Jamestown, New York* (CH2M HILL Engineers, Inc. [CH2M], 2018a) and in response to agency comments (New York State Department of Health [NYSDOH], 2017a) on the *Vapor Intrusion Investigation Report, Essex-Hope Site in Jamestown, New York* (CH2M, 2016).

1.1 Scope and Purpose of this Investigation

This investigation was designed to collect additional data to determine if VI associated with the chlorinated volatile organic compound (CVOC) plume from the Site could impact downgradient receptors. Three businesses were selected for this VI investigation due to their proximity to trichloroethene (TCE) in the groundwater plume: Johnson Machine & Fibre Products (JMF), Rollform of Jamestown, Inc., and H&H Metal Specialty, Inc. (H&H Metal). Access to Rollform was denied by the business owner and therefore samples in that business were not included in this field investigation.

The site investigation strategy was influenced by the nature of the existing adjacent businesses—many are metal-working or plastics facilities that are expected to have current and/or historical uses of chlorinated solvents. Thus, external soil vapor and subslab vapor samples were used as initial investigation techniques. Although NYSDOH generally requires subslab vapor and indoor air for decision making related to the VI pathway, collection of external soil vapor in conjunction with subslab vapor improves the ability to distinguish sources attributable to Essex Specialty Products, Inc. (Essex) from other sources.

1.2 Regulatory Guidance

Guidance from the U.S. Environmental Protection Agency (EPA) and NYSDOH that is relevant to this report include:

- *OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air* (EPA, 2015)
- *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (NYSDOH, 2006)
- *DER-10 Technical Guidance for Site Investigation and Remediation* (NYSDEC, 2010)

Detected VOC concentrations in subslab soil vapor and exterior soil gas are evaluated against the following regulatory criteria:

- Calculated EPA commercial Vapor Intrusion Screening Levels (VISLs) (EPA, 2018).
- NYSDOH subslab vapor concentrations criteria per *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (NYSDOH, 2006) and the May 2017: *Updates to Soil Vapor / Indoor Air Decision Matrices* (NYSDOH, 2017b). Note that indoor air data are required to determine if any further action is needed per the NYSDOH decision matrices.

1.3 Site Background

The 4.7-acre site, which Custom Production Manufacturing Inc. (CPM) currently owns and occupies, is located at 125 Blackstone Avenue in Jamestown, New York (Figure 1). The site is in an industrialized area of the city that has seen various degrees of industrial use over the past 75 years. Contamination onsite is the result of historical practices conducted at the facility as discussed in a 1992 remedial investigation report (O'Brien & Gere Engineers, Inc. [O'Brien & Gere], 1992). TCE; cis-1,2-dichloroethene (cis-1,2-DCE); 1,2,4-trimethlybenzene (TMB); 1,3,5-TMB; vinyl chloride; ethylbenzene; and xylenes are the primary constituents of concern (COCs) in the shallow water bearing zone (WBZ) (7 to 20 feet below ground surface [bgs]). TCE; cis-1,2-DCE; vinyl chloride; and acetone are the primary COCs in the deep WBZ (30 to 50 feet bgs). Vadose zone soil COCs consist of volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and PCBs; particularly TCE, xylenes, p-isopropyltoluene, 1,2,4-trimethylbenzene (1,2,4-TMB), and 1,3,5-trimethylbenzene (1,3,5-TMB).

1.4 Historical Operations

Historically, two distinct operations occupied the site: Jamestown Finishes at the southern portion of the site (along Blackstone Avenue) and Hope's Windows in the northern portion (along Hopkins Avenue).

1.4.1 West Building and Former AST and UST Areas

The southern portion of the site is divided into the following subareas for describing the site history and COCs:

- West Building
- Former aboveground storage tank (AST) area
- Former underground storage tank (UST) area

The West Building was built in the early 1900s and subsequently was expanded several times. The West Building was used by a variety of owners/operators to produce paints, varnishes, and other industrial coatings under the name Jamestown Finishes or Jamestown Finishing Products (NYSDEC, 1994). The Former AST Area was northwest of the West Building. Soils and the Shallow WBZ in the West Building and Former AST areas historically have been impacted by cumene, benzene, toluene, ethylbenzene, and xylenes (CBTEX) and, to a lesser extent, TCE and daughter products cis-1,2-DCE and vinyl chloride. East of the West Building is the former UST area, which historically contained USTs for storage of acetone, xylenes, and other solvents used in the production of coatings. Historical impacts in this area included CBTEX in soils and CBTEX and 1,2,4-TMB and 1,3,5-TMB in the shallow WBZ.

1.4.2 Plant 5 Building and North Parking Lot

Hope's Windows previously occupied the northern portion of the site (along Hopkins Avenue). This portion of the site is divided into the following sub-areas for describing the site history and COCs:

- Plant 5 Building
- North Parking Lot

The Plant 5 Building was historically used for the manufacture of window screens until the early 1970s, when manufacturing switched to production of aluminum windows (McFarlene, 1991). The building was also used to store aluminum, and to cut, punch, notch, weld, and assemble aluminum parts.

A TCE degreaser and paint primer tank were present in the southwestern corner of the building but were both removed before Essex Chemical Company purchased the site in 1985. The TCE degreasing pit reportedly was cleaned and pumped to a sump in the North Parking Lot (west of the Plant 5 Building), which was reported to have an earthen bottom (The Dow Chemical Company, 1992). The sump and surrounding soils were excavated in the mid-1990s as one of the ROD remedies (NYSDEC, 1994).

Impacts to soil and groundwater have included polychlorinated biphenyls (PCBs) in soil in the North Parking Lot and TCE and its daughter products (herein referred to as CVOCs in soil, the Shallow WBZ, and the Deep WBZ under the North Parking Lot and the Plant 5 Building. Both shallow and deep groundwater impacts have been detected offsite, with shallow groundwater impacts extending offsite east along Hopkins Avenue and deep groundwater impacts extending offsite to the northeast.

After Essex purchased the Plant 5 Building in 1985, the building reportedly was used as a raw materials warehouse. The building has been used for light metals fabrication since CPM purchased the site in 2000. During a 2014 VI survey, numerous chemicals, including TCE, tetrachloroethene (PCE), petroleum distillates, methyl isobutyl ketone, toluene, methylene chloride, 1,1,1-trichloroethane (TCA), and acetone were observed stored at the facility (URS Corporation [URS], 2015).

1.5 Remedial Actions

Numerous remedial actions have been undertaken at the site in response to the 1994 ROD. Remedial actions have included a pump and treat system that continues to extract and treat shallow and deep groundwater; soil excavation in the North Parking Lot; air sparging of Shallow WBZ in the North Parking Lot, Former AST, and Former UST areas; and soil vapor extraction (SVE) of vadose zone soils in these same areas; the air sparge/SVE system has ceased operation. Supplemental and voluntary remedial actions implemented include removing the USTs and adjacent soil, conducting a pilot test of zero-valent iron injections in the North Parking Lot, installing a subslab vapor mitigation system at an offsite residence, and implementing in situ chemical oxidation injections in the Shallow WBZ in the Former UST Area and the Deep WBZ near the northeastern corner of the former Plant 5 Building in 2012 (VeruTEK Technologies, 2010; URS, 2012).

Currently, five operational recovery wells are part of the existing pump and treat system. Recovery wells are located in the North Parking Lot and downgradient along Hopkins Avenue.

1.6 Current Conditions in Shallow Groundwater

Shallow groundwater with COCs exceeding remedial action objectives (RAOs) exists onsite and offsite. In summary, Shallow WBZ exceedances consist of three distinct plumes: 1) the CVOC plumes (in the North Parking Lot Sump [NPLS] Area and offsite); 2) a petroleum-constituent plume (primarily CBTEX) under the West Building; and 3) a petroleum-constituent plume (primarily 1,2,4-TMB and 1,3,5-TMB) in the Former UST Area. Details of the current conditions are presented in the *2017 Annual Periodic Review Report, Essex-Hope Site, Jamestown, New York* (CH2M, 2018b). The ongoing pump-and-treat system for the Shallow WBZ consists of two operating recovery wells (RW-1S and RW-2S). RW-3S in the Former AST/UST Area was shut off in August 2017 due to declining concentrations.

The focus of this investigation is mainly on the offsite plume for TCE, cis-1,2-DCE, and vinyl chloride, which are found in shallow groundwater (which fluctuates seasonally between 8 to 12 feet bgs) north and east-northeast of the Site along Hopkins Avenue. The soil gas sampling and sewer sampling included in this current investigation also helps evaluate potential vadose zone and utility transport pathways.

The most recent groundwater COC concentrations from the 2017 sampling event (CH2M, 2018b) and November 2018 sampling event (report in progress) are presented on Figure 2. Table 1 presents the nearby monitoring well concentrations and a comparison to EPA commercial groundwater VISLs at a target risk for carcinogens (TCR) of 10^{-6} and a target hazard quotient for non-carcinogens (THQ) of 1 (EPA, 2018).

1.7 Inclusion Zone and Sampling Rationale

Sampling was conducted to evaluate potential VI in the offsite properties located near the CVOC groundwater plume. Vadose zone and sewer pipe transport were also assessed during this VI sampling event.

In the absence of a New York State groundwater screening level, the VI screening level of 7 micrograms per liter (µg/L) was calculated using the EPA vapor intrusion screening level (VISL) calculator (total cancer risk = 10^{-6}, hazard quotient [HQ] = 1 calculator version 3.5.1, which is based on the most recent regional screening levels at the time of workplan submittal [EPA, 2017]) for a commercial/industrial setting and the standard 100-foot buffer beyond the plume to define the inclusion zone. At least three industrial businesses that had not already been evaluated for VI were identified to be within the inclusion zone: JMF, Rollform, and H&H Metal. Access to Rollform was denied by the business owner and therefore planned sampling in that business was not included in the field investigation.

1.8 Constituents of Interest

Results from the updated conceptual site model (CSM; CH2M, 2018c) indicate TCE, cis-1,2-DCE, and vinyl chloride are the primary constituents of interest. However, several other chlorinated solvents were included for VOC fingerprinting to serve as additional lines of evidence in this investigation.

Target Compound List:
Trichloroethene
Tetrachloroethene (PCE)
cis-1,2-Dichloroethene (cis-1,2-DCE)
trans-1,2-Dichloroethene (trans-1,2-DCE)
1,1-Dichloroethene (1,1-DCE)
Vinyl chloride

2. Field Activities

An initial site walkthrough of properties and buildings proposed for VI sampling was conducted at the end of April 2018. Vapor intrusion investigation activities were conducted at the sites from November 6 through November 16, 2018, and December 11 through December 13, 2018. Procedures and methodology detailed in the work plan (CH2M, 2018a) were followed. The fieldwork consisted of the following activities:

- Updating building surveys at the two businesses that have allowed access
- Performing utility locates
- Conducting a shallow soil vapor survey (7-foot depth bgs)
- Installing and sampling subslab vapor probes
- Performing a preferential pathway assessment (sewer gas sampling at select utilities)

The following table summarizes the daily field activities:

Date	Activities Performed
April 27, 2018	• Performed building surveys
November 6-7, 2018	• Utility locate
November 12, 2018	• Deployed preferential pathway samplers • Began drilling/installing soil vapor probes (3 probes installed)
November 13, 2018	• Installed subslab probes in H&H Metals (7 probes installed) • Continued drilling and installing soil vapor probes (13 probes installed)
November 14, 2018	• Installed subslab probes in Johnson Machine (4 probes installed) • Sampled all 4 subslab probes in Johnson Machine (After waiting 3+ hours post installation) • Completed the installation of soil vapor probes (Cementing the finishes)
November 15, 2018	• Sampled all 7 subslab probes in H&H Metals
November 16, 2018	• Retrieved preferential pathway samples • Shipped sample canisters and sewer gas samples to respective laboratories
December 11-13, 2018	• Sampled 16 exterior soil vapor probes

The VI investigation field activities are detailed below.

2.1 Initial Site Walk/Building Surveys

On April 27, 2018, building surveys at H&H Metals and JMF were conducted to characterize the building; to understand the heating, ventilation, and air conditioning (HVAC) conditions; to evaluate floor plans and facility usage; to visually identify potential background CVOC sources; and to determine the optimal subslab sampling locations. Documentation was conducted using the questions listed in NYSDOH's building questionnaire (NYSDOH, 2006), and is included as Appendix A.

2.2 Utility Locate

On November 6 and 7, 2018, New York Leak Detection, Inc. performed a utility locate to clear the locations for 16 exterior soil vapor probes and 11 interior subslab vapor probes. Some locations were adjusted to accommodate nearby utilities. Final soil vapor and subslab vapor probe locations are presented on Figure 3. Details are included in the field report in Appendix B.

2.3 Preferential Pathway Assessment

A preferential pathway assessment was performed from November 12 through 16, 2018 in six different access points of sanitary and storm sewers (three in each) that pass through the area of the CVOC groundwater plume beneath Hopkins Avenue, Bigelow Street, and between the Site and the JMF and the Rollform businesses (Figure 4).

The depth to the water/wastewater in the sewer was measured with a laser distance finder in each manhole. Samples were collected using Waterloo Membrane Sampler (WMS-SE) passive samplers provided by Eurofins Air Toxics that were suspended via string approximately 2 feet above the water/wastewater's surface measured before deployment. The samplers were recovered from the sanitary sewers and storm sewers after 5 days to account for temporal variability. All six locations had little to no water at the bottom of the manhole. Weather varied throughout the sampling period from freezing rain to heavy snow.

The samples were shipped via FedEx to Eurofins Air Toxics (NYSDOH Environmental Laboratory Approval Program, New York Laboratory Identification Number 11291) to perform the TO-17 analysis. Preferential pathway samples were analyzed in accordance with *Compendium Method TO-17: Determination of VOCs in Ambient Air Using Active Sampling onto Sorbent Tubes (*Gas Chromatography/Mass Spectrometry [*GC/MS*]*)* (EPA, 1999a).

2.4 Subslab Vapor Survey

Subslab vapor probes were installed at 11 locations in the two business that have allowed access within the inclusion zone: JMF and H&H Metal. Subslab vapor probe locations are provided on Figure 3. On November 13, 2018, seven subslab vapor probes were installed at H&H Metal. These probes were sampled on November 15, 2018. On November 14, four subslab probes were installed and sampled at JMF.

Cox Colvin Vapor pins were installed into the boreholes that were drilled in the building floor, using an industrial hammer drill equipped with concrete masonry drill bits. The probes were allowed to equilibrate for at least 2 hours and then checked for leaks using helium during purging to ensure ambient air was not introduced along with the subslab vapor sample. Vapor samples were collected using 1-liter SUMMA canisters over a 5-minute period at 200 milliliters/minute (mL/min). Tables 2 and 3 summarize the sampling details. Following subslab soil vapor sample collection, the vapor pins were left in place and covered with a flush mount cap.

Samples were shipped via FedEx to Alpha Analytical (NYSDOH Environmental Laboratory Approval Program, New York Laboratory Identification Number 11627) to perform the TO-15 analysis. Alpha Analytical supplied batch-certified clean, evacuated, stainless-steel SUMMA canisters with individual tracking numbers and calibrated flow regulators. Soil vapor samples were analyzed in accordance with *Compendium Method TO-15: Determination of VOCs in Air Collected in Specially Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)* (EPA, 1999b). A 14-day turnaround time was requested for sample analysis.

2.5 Shallow Soil Vapor Survey

Soil vapor probes were installed at 16 of the proposed locations shown on Figure 3. The work plan proposed 17 soil vapor locations; however, several locations were on Rollform's property. These locations were moved off the Rollform property to nearby locations due to denied access. Proper coverage was obtained with 16 soil vapor probes, as opposed to 17 probes. The locations were selected to get spatial coverage above the groundwater inclusion zone and on readily accessible areas to the north and the east of the Site. Shallow soil vapor probes were installed from November 12 through 14, 2018 and sampled December 11 through 13, 2018.

Weather varied throughout the installation and sampling process. During the installation, temperatures were steadily in the -1-degree Celsius range and several feet of snow was received. Sampling was proposed for the week of November 26, 2018, but heavy rains postponed sampling to the week of December 10, 2018. Several inches of snow were on the ground during the sampling event and temperatures were steadily in the -7-degree Celsius range.

Semi-permanent probes were installed by a New York State licensed driller, Parratt Wolff, with a direct-push drilling rig at a depth of 1 foot above the shallow ground water table (7 feet bgs). The 6-inch-long, polyvinyl chloride (PVC) probes were placed in a 1-foot-long sand pack. The borehole was completed to ground surface with a 6-inch layer of dry bentonite powder, then hydrated bentonite, and a flush mount well cover.

The probes were checked for leaks using a helium filled shroud at the surface and a dielectric MGM-2002 field helium detector during purging to ensure ambient air was not introduced along with the soil vapor sample. Vapor samples were collected using 1-liter SUMMA canisters over a 5-minute period. Table 4 presents the sample details. Soil vapor probe installation logs are provided in Appendix C.

Samples were picked up by an Alpha courier and hand delivered to Alpha Analytical (NYSDOH Environmental Laboratory Approval Program, New York Laboratory Identification Number 11627) to perform the TO-15 analysis. Alpha Analytical supplied batch-certified clean, evacuated, stainless-steel SUMMA canisters with individual tracking numbers and calibrated flow regulators. Soil vapor samples were analyzed in accordance with *Compendium Method TO-15: Determination of VOCs in Air Collected in Specially Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)* (EPA, 1999b). A 14-day turnaround time was requested for sample analysis.

2.6 Quality Assurance/Quality Control

Quality assurance (QA)/quality control (QC) samples included duplicate samples collected at a 10 percent frequency (two soil vapor and two subslab vapor samples). For canister samples, the tubing from the field duplicate (FD) was connected to the parent canister using a “T” fixture, so the samples collected the same air from the probe once the valves were opened simultaneously. One trip blank sample was analyzed for the preferential pathway samples.

Samples were placed in appropriate shipping containers and shipped via overnight courier under standard chain-of-custody to the laboratory for analysis and/or picked up by a courier.

The analytical results were evaluated using the criteria of precision, accuracy, representativeness, comparability and completeness (PARCC) as described in the Quality Assurance Project Plan (QAPP; CH2M, 2018c). The samples were reported in three sample delivery groups identified as 1811372R1, L1847517, and L1851659. The sample delivery groups were assessed by reviewing the following:

- The chain-of-custody documentation
- Holding-time compliance
- Calibration
- Method blanks/field blanks
- Laboratory control spiking sample/laboratory control spiking sample duplicate (LCS/LCSD) recoveries and precision
- Internal standard recoveries
- Surrogate spike recoveries
- FD precision
- Required method QC samples at the specified frequencies.

During review, some discrepancies were noticed between the parent sample and the FDs in both SV-07 and SV-10, even though the canisters were linked together through a sample tee with a single flow controller. The project chemist investigated this issue with the laboratory. A thorough investigation of the certification and canister cleaning process, the gas used for cleaning the canisters and the prior detections in the canisters was conducted. Humidified ultra-pure nitrogen is used during the cleaning of the canisters. While reviewing the previous detections from prior use of the canisters for the compounds of concern at the site, it did not appear that previous detected concentrations would have affected the results.

The data quality review indicates that all data were considered valid. No severe QC issues were encountered, and no analytical data were rejected during the review process. Detailed summaries of the data quality review findings are provided in Appendix D. All analytical results, including those qualified during the data quality review, may be used to support project decisions.

3. Results

3.1 Initial Site Walk/Building Surveys

On April 27, 2018, building surveys at H&H Metals and JMF were conducted to characterize the building and to identify things such as soil vapor entry points or background indoor sources of VOCs that could potentially affect sampling results in relation to VI. The building surveys are presented in Appendix A.

3.1.1 H&H Metals

During the building survey, an onsite interview was conducted with Brian Ceci. H&H Metals was a metal fabrication facility that included welding, brazing and stamping. Operations in this building have recently ceased, and the building is currently unoccupied and for sale. Materials and equipment used in former operations are still present in the building. The building is a one-story slab on grade building. The building was constructed over several different phases and consists of five separately poured slabs ranging from 1920 through 1999. Indoor air in the building is recirculated by an HVAC system and blower in the manufacturing, welding and press room. There is potential substantial outdoor air infiltration from windows and doorways in the non-insulated areas. The roof leaks water during episodes of rain in the welding room and the former chimney is currently capped. Several potential soil vapor entry points were identified during the survey. There were several cracks identified in the floor in the welding and press rooms, utility trenches in the press room, floor drains in the bathrooms and manufacturing area, and a trench pit for a press that was filled with gravel and is approximately 5 feet deep and 4 feet long by 5 feet wide.

Chlorinated solvents may have been used during past operations; however, no products containing target compounds were identified during the building survey.

3.1.2 Johnson Machine & Fibre Products

Michael Marshall was interviewed during the building survey at JMF, a metal fabrication facility that is currently in operation. The building is a single-story slab on grade construction and approximately 30 years in age. Indoor air is recirculated by an HVAC system and blower in the manufacturing area and there is potential outdoor air infiltration from doors and windows. Several cracks were identified in the slab of the manufacturing area and there were floor drains identified in the bathroom and manufacturing area.

Solvent and lubricant odors were identified in the building during the building survey. Solvent use in the building was visible, however, no products containing the chlorinated target compounds were identified during the walk through.

3.2 Preferential Pathway Assessment

A preferential pathway assessment was performed at six access points to the sanitary and storm sewers, shown on Figure 4, that pass through an area of the Site within the extent of the CVOC groundwater plume beneath Hopkins Avenue, Bigelow Street, and between the Site and the JMF and the Rollform businesses. There are no established screening levels for preferential pathway samples, but when compared to the EPA VISLs for soil vapor, there were no exceedances. Results are shown in Table 5 and are discussed below.

- All storm drains (3) and one sanitary sewer (WMS-SE-06) had no detections of the target compounds.
- WMS-SE-02 had a cis-1,2-DCE concentration of 140 micrograms per cubic meter (µg/m^3), a TCE concentration of 94 µg/m^3, and a PCE concentration of 0.94 µg/m^3. All other target compounds were not detected. This location was a sanitary sewer located in the middle of Hopkins Avenue directly across from JMF.

- WMS-SE-04 had a had a cis-1,2-DCE concentration of 25 µg/m^3 and a TCE concentration of 26 µg/m^3. All other target compounds were not detected. This location was a sanitary sewer in the middle of Hopkins Avenue and at the intersection of Minsker Street.

3.3 Subslab Vapor Survey

Eleven subslab locations were sampled within the offsite properties referred to as H&H Metal and JMF facility. Detected VOC concentrations in sub-slab soil vapor were evaluated against the following criteria:

1) EPA commercial subslab VISLs at a TCR of 10^{-6} and a THQ of 1 (EPA, 2018).
2) NYSDOH subslab vapor concentrations criteria per *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (NYSDOH, 2006).

Laboratory analytical reports are provided in Appendix E. Notification letters were sent to the owners of H&H Metal (Dow, 2019a) and JMF (Dow, 2019b) directly by Dow on January 19, 2019, discussing the results of the subslab vapor survey within each building respectively. The notification letters are provided in Appendix F.

3.3.1 H&H Metal Specialty, Inc

Seven subslab locations were sampled within the H&H Metal facility as shown on Figure 5, with the respective results summarized on the figure and listed in Table 6. At the time of sampling, the facility was vacant and listed for sale. Cis-1,2-DCE, TCE, and PCE were detected at concentrations greater than NYSDOH and/or EPA soil vapor screening criteria in various samples. Only two subslab soil vapor sample results (HH-06 and HH-07) exceeded both the NYSDOH and EPA soil vapor screening criteria for TCE. The other target compounds were not detected in any of the seven sample locations (vinyl chloride, 1,1-DCE, trans-1,2-DCE).

3.3.2 Johnson Machine & Fibre Products

Four subslab locations were sampled within the JMF facility as shown on Figure 5, with the respective results listed in Table 7. At the time of sampling, the facility was occupied and in operation. Cis-1,2-DCE and/or TCE were detected at concentrations greater than the most conservative NYSDOH soil vapor screening criteria in all four samples collected within the facility. The other target compounds (vinyl chloride, 1,1-DCE, trans-1,2-DCE, and PCE) were not detected or were detected at concentrations lower than the screening levels. There are no sub-slab soil vapor sample results in exceedance of the EPA VISLs.

3.4 Shallow Soil Vapor Survey

Sixteen soil vapor probes were sampled at locations within the groundwater inclusion zone and on readily accessible areas to the north and the east of the Site as shown on Figure 6, with respective results presented on the figure and listed in Table 8. These probe sampling locations included locations bordering H&H Metal., JMF, and Rollform (not within the Rollform property boundaries).

Detected VOC concentrations in soil vapor were evaluated against the following criteria:

1) EPA commercial VISLs at a TCR of 10^{-6} and a THQ of 1 (EPA, 2018).

Five shallow vapor samples are in exceedance of the EPA soil vapor screening criteria, two samples are in exceedance for TCE, and three samples are in exceedance for vinyl chloride.

4. Data Evaluation

An evaluation of the subslab soil vapor, soil vapor, preferential pathway, and groundwater data are summarized below. The focus of the evaluation is on specific COCs that exceeded one or more of the screening levels, which include PCE, TCE, cis-1,2-DCE, and vinyl chloride. PCE is not considered a COC from the Essex site groundwater plume; however, it was detected at both properties in soil gas and is therefore evaluated as part of this section.

4.1 H&H Metals

H&H Metals is located in the northeastern extent of the groundwater plume. There are four shallow monitoring wells that surround the perimeter of the building: MW-105S, MW-109S, MW-108S, and MW-106S. Due to exceedances of TCE and vinyl chloride at one or more wells (Figure 2), this property was chosen to be evaluated for the potential for VI. Therefore, a total of seven subslab vapor probes were installed at H&H Metal. Additionally, a total of five exterior soil vapor samples were installed adjacent to the property (SV-05, SV-07, SV-11, SV-12, and SV-13) to be used as part of the evaluation. Based on this and the results detailed in Section 3, the following has been evaluated as part of the soil gas results:

4.1.1 TCE

- As detailed on Figure 2, TCE has historically been detected in groundwater at concentrations in exceedance of EPA groundwater VISL at two monitoring wells (MW-106S and MW-108S).
- TCE was only detected at three out of the five exterior soil vapor locations.
- Concentrations of TCE in subslab soil vapor exceeded the NYSDOH soil screening criteria (SSC) in all locations sampled at H&H Metals, and two locations (HH-06 and HH-07) also exceed the EPA VISL.

In summary, concentrations of TCE in the external soil vapor are generally lower than concentrations in subslab soil vapor beneath the buildings. It is unknown at this time whether this reflects a capping effect of the building on vapors moving up from groundwater or a release of TCE specific to H&H metals. Sampling of the soil vapor probes occurred after a week of heavy rain and intermittent snow storms. The ground was frozen and snow-covered for the sampling event. It is possible that due to these weather conditions and potentially saturated soils, soil vapor results were biased low and/or there may be additional subsurface sources near the building. The already planned second sampling round will provide insight into the effect of weather on soil gas concentrations.

4.1.2 Cis-1,2-DCE

- As detailed on Figure 2, cis-1,2-DCE has historically been detected at adjacent monitoring wells (MW-106S and MW-108S); however, there are no EPA groundwater VISLs for cis-1,2-DCE.
- At two out of five exterior soil vapor locations, cis-1,2-DCE was detected above laboratory detections limits; however, there are no soil vapor NYSDOH SSC for external soil gas or EPA VISLs for cis-1,2-DCE.
- Five out of seven subslab soil vapor samples at H&H Metals have concentrations of cis-1,2-DCE that exceed the NYSDOH SSC.

In summary, concentrations of cis-1,2-DCE in soil vapor are generally lower than concentrations in subslab soil vapor beneath the buildings. It is possible that due to weather conditions soil vapor results were biased low, and/or there may be additional subsurface sources near the building.

4.1.3 Vinyl Chloride

Vinyl chloride was detected at a nearby shallow monitoring well MW-106S at a concentration in exceedance of the EPA groundwater VISL and was subsequently detected at the immediately adjacent

soil gas (SV-07) above the applicable EPA soil vapor VISL. However, no other nearby monitoring wells or soil vapor probes had detections of vinyl chloride and vinyl chloride was not detected in subslab soil vapor beneath H&H Metals; therefore, it is not currently a VI concern. Vinyl chloride typically rapidly degrades under aerobic conditions in the vadose zone.

4.1.4 PCE

- As detailed on Figure 2, PCE was detected at MW-108S at low concentrations, below EPA VISLs, and at least 2 orders of magnitude lower than concentrations of TCE in shallow groundwater.
- PCE was detected at two out of five exterior soil vapor samples, generally in areas west of the H&H Metals. Results were below the EPA soil vapor VISL.
- PCE was detected in subslab vapor beneath H&H Metals in all but one location (HH-03). One location (HH-04) exceeded the NYSDOH SSC for PCE but not the EPA VISL.

PCE is not a COC from the Essex site groundwater plume. PCE was detected at much higher concentrations relative to TCE (within 1 order of magnitude) in many of the soil vapor and subslab soil vapor samples beneath both buildings. The presence of PCE (not a COC at the Site) and difference in the ratio of TCE to PCE in soil vapor and subslab soil vapor suggests the potential for other offsite sources of PCE.

4.2 Johnson Machine & Fibre Products

JMF is located above the southern edge of the groundwater plume. There are four shallow monitoring wells that surround the perimeter of the building: MW-25S, MW-18S, VP-6S, and MW-27S. Due to exceedances of TCE at one or more wells (Figure 2), this property was chosen to be evaluated for the potential for VI. Therefore, a total of four subslab vapor probes were installed at JMF. Additionally, a total of four exterior soil vapor samples were installed adjacent to the property (SV-08, SV-09, SV-10, and SV-11) to be used as part of the evaluation. Based on this and the results detailed in Section 3, the following has been evaluated as part of the soil gas results:

4.2.1 TCE

- As detailed on Figure 2, TCE has been detected in groundwater at concentrations in exceedance of EPA groundwater VISL at two monitoring wells (MW-18S and MW-25S).
- TCE was detected below the EPA soil vapor VISL at all four exterior soil vapor locations.
- TCE was detected in subslab soil vapor in exceedance of the NYSDOH SSC in all locations sampled at JMF; however, it was below the EPA subslab VISL.

Concentrations of TCE in the subslab soil vapor were greater than concentrations of TCE in all the nearby soil vapor probes, which was also the case at H&H Metals as stated above. This may reflect a capping effect of the building on vapors arising from groundwater temporal variability in external soil gas due to weather conditions and potentially saturated soils, and/or there may be additional subsurface sources near the building. The already planned second sampling round will provide insight into the effect of weather on soil gas concentrations.

4.2.2 Cis-1,2-DCE

- As detailed on Figures 2 and 6, cis-1,2-DCE has been detected in groundwater at two monitoring wells (MW-18S and MW-25S) and in exterior soil vapor at one location (SV-10); however, there are no groundwater or external soil vapor NYSDOH SSC or EPA VISLs for cis-1,2-DCE.
- Cis-1,2-DCE was detected in subslab soil vapor in exceedance of the NYSDOH SSC in all locations sampled at JMF, except for one (JMF-02), but was still detected in that location.

Concentrations of cis-1,2-DCE in soil vapor are generally lower than concentrations in subslab soil vapor beneath the building. As stated before, it is possible that due to weather conditions, soil vapor results were biased low and/or there may be additional subsurface sources near the two buildings.

4.2.3 Vinyl Chloride

Vinyl chloride was detected at a nearby shallow monitoring well MW-18S at a concentration well below the EPA groundwater VISL; however, it was detected in nearby soil vapor sample SV-10 (near southwest corner of the building) at a concentration exceeding the EPA soil vapor VISL. No other nearby monitoring wells or soil vapor probes had detections of vinyl chloride and vinyl chloride was not detected in subslab soil vapor beneath JMF; therefore, it is not currently a VI concern. Vinyl chloride is known to degrade readily in aerobic vadose zone soils.

4.2.4 PCE

As detailed in Section 4.1.4, PCE is not a COC at the Site and has not been detected in any of the four shallow monitoring wells surrounding JMF; however, it was detected in two nearby soil vapor samples and at three out of four subslab soil vapor locations. As all of these results were below the applicable NYSDOH SSC or EPA VISL, it is not currently a VI concern at JMF. These soil vapor results indicate there may be additional subsurface sources of PCE near the building.

4.3 Additional Observations

As shown on Figure 2 and detailed above, a shallow CVOC plume extends from the Site to the north and east, roughly parallel to Hopkins Avenue. The other exterior soil gas samples (not discussed above) were evaluated to understand the impacts that this plume has on soil gas and nature and extent of impacts. Of the other exterior soil vapor samples evaluated that were not immediately adjacent to H&H Metals and JMF, only two locations (of six) exceeded the EPA VISL. This included SV-01 (262 µg/m^3 of TCE) which is near the center of the groundwater plume and is more than 100 feet from any buildings and SV-16 (111 µg/m^3 of TCE). SV-16 is outside of the 100-foot groundwater inclusion zone and lower concentrations of TCE were observed in soil vapor samples collected closer to the groundwater plume (SV-13, SV-14, and SV-15). It is possible that there is another potential subsurface source of TCE near SV-16.

In addition to the elevated concentrations of PCE detected in soil vapor west of H&H Metals and JMF, PCE was also detected in SV-16. As stated above, PCE is not a contaminant of concern from the Site groundwater plume and is not detected in the closest upgradient groundwater well MW-107S. SV-16 sample also had an unusually high concentration of TCE. This adds additional evidence for potential other offsite sources of CVOCs.

Concentrations of target compounds in the sewer gas samples are relatively low and below EPA soil vapor commercial VISLs. Although soil vapor VISLs do not directly apply to sewer gas, they can be used as an indicator of relative strength. It is unlikely that these concentrations cause exceedances of applicable screening levels in indoor air due to dilution from potential points of entry into indoor air..

5. Conclusions and Recommendations

Based on the initial data evaluation, there is the potential for a complete VI pathway from the WBZ plume for site-related COCs, TCE, and cis-1,2-DCE. However, due to the presence of PCE in subsurface samples and the relatively low concentrations of TCE and cis-1,2-DCE in soil vapor, it is possible that additional sources of VOCs are present in the subsurface at adjacent sites. It is recommended that the 16 exterior soil probes and the sewer sampling locations undergo another full round of sampling in warmer and drier conditions (summer months) to confirm sampling results from this round of sampling and account for temporal variability. The following recommendations are being made for the two offsite buildings:

5.1 H&H Metals

Concentrations of TCE in subslab soil vapor exceeded the NYSDOH SSC in all locations sampled at H&H Metals, and two locations (HH-06 and HH-07) also exceed the EPA VISL. It is recommended that one additional round of sampling be conducted of the subslab soil vapor in the summer months to confirm results from this sampling event. Also, based on the results during the first round of sampling, indoor air sampling is proposed to evaluate if a complete VI pathway has occurred. This property is currently unoccupied and for sale and therefore there are currently no receptors; however, this allows for indoor air sampling to occur without manufacturing activities and less opportunity for interference from background indoor sources. A short work plan will be compiled to outline the indoor air sampling details and this sampling will be performed concurrently with the proposed additional subslab sampling event.

5.2 Johnson Machine & Fibre Products

Concentrations of TCE and cis-1,2-DCE in subslab soil vapor exceeded the NYSDOH SSC at JMF; however, no locations exceeded the EPA subslab VISLs. It is recommended that one additional round of sampling be conducted of the subslab soil vapor in the summer months to confirm results from this sampling event.

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Tables

Table 1. EPA Groundwater Vapor Intrusion Screening Level Comparison with Nearby Wells

Winter 2018/2019 Interim Offsite Vapor Intrusion Evaluation

Essex-Hope Site, Jamestown, New York

			RW-1S		RW-2S		RW-3S		MW-7S	MW-101S		MW-102S		MW-103S	MW-104S		MW-105S	
Cas #	**Parameter Name**	**EPA Groundwater VISL (µg/L)**	**2018**	**2017**	**2018**	**2017**	**2018**	**2017**	**2017**	**2018**	**2017**	**2017**	**2017 DUP**	**2017**	**2018**	**2017**	**2018**	**2017**
75-01-4	Vinyl chloride	2.5	**14**	**6**	**0.84 J**	**2**	**2.9**	**1.6**	1.0 UJ	**0.2 J**	**2.3 J**	**0.16 J**	**0.15 J**	**0.17 J**	ND	1.0 UJ	ND	ND
156-59-2	cis-1,2-Dichloroethene	NA	**360**	**91**	**24**	**31**	**5.4**	**37**	**14**	**26**	**240**	**44**	**45**	**70**	ND	**1.0 J**	ND	ND
79-01-6	Trichloroethene	7.4	**260**	**26**	**35**	**14**	**8.1**	**56**	**7.1**	**75**	**510**	**30**	**30**	**180**	**100**	**130**	ND	ND
127-18-4	Tetrachloroethene	65	ND	ND	ND	ND	ND	ND	ND	**0.27 J**	ND	ND	ND	ND	**0.26 J**	ND	ND	ND

Notes:

Exceedance of EPA Groundwater VISL

µg/L = micrograms per liter

EPA = U.S. Environmental Protection Agency

VISL = vapor intrusion screening level

Table 1. EPA Groundwater Vapor Intrusion Screening Level Comparison with Nearby Wells

Winter 2018/2019 Interim Offsite Vapor Intrusion Evaluation

Essex-Hope Site, Jamestown, New York

			MW-106S	MW-107S	MW-108S				MW-109S	MW-12	MW-13		MW-14S	MW-15S	MW-18S	MW-25S	MW-27S	
Cas #	Parameter Name	EPA Groundwater VISL (µg/L)	2017	2017	2018	2018 DUP	2017	2017 DUP	2017	2017	2018	2017	2017	2017	2017	2017	2018	2017
75-01-4	Vinyl chloride	2.5	**6.4**	ND	ND	ND	ND	ND	ND	1.0 UJ	ND	**1.3**	ND	1.0 UJ	**0.34 J**	ND	ND	ND
156-59-2	cis-1,2-Dichloroethene	NA	**11**	ND	**5.8**	**5.8**	**4.6**	**4.6**	ND	**37**	ND	**5.5**	**2.4 J**	**1.0 J**	**65**	**21**	ND	ND
79-01-6	Trichloroethene	7.4	**13**	ND	**28**	**28**	**22**	**22**	ND	**18**	ND	**22**	**14**	**5.6**	**190**	**82**	ND	ND
127-18-4	Tetrachloroethene	65	ND	ND	**0.31 J**	**0.33 J**	**0.48 J**	**0.48 J**	**0.26 J**	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes:

Exceedance of EPA Groundwater VISL

µg/L = micrograms per liter

EPA = U.S. Environmental Protection Agency

VISL = vapor intrusion screening level

Table 1. EPA Groundwater Vapor Intrusion Screening Level Comparison with Nearby Wells

Winter 2018/2019 Interim Offsite Vapor Intrusion Evaluation

Essex-Hope Site, Jamestown, New York

			VP-6S		GP-1S	HW-6	DPT-011	DPT-012
Cas #	Parameter Name	EPA Groundwater VISL (µg/L)	2018	2017	2017	2017	2017	2017
75-01-4	Vinyl chloride	2.5	ND	ND	**0.33 J**	**250**	ND	ND
156-59-2	cis-1,2-Dichloroethene	NA	ND	ND	**16**	**180**	**11**	ND
79-01-6	Trichloroethene	7.4	**0.31 J**	ND	**18**	ND	**21 J**	**6.0 J**
127-18-4	Tetrachloroethene	65	ND	ND	ND	ND	ND	ND

Notes:

Exceedance of EPA Groundwater VISL

µg/L = micrograms per liter

EPA = U.S. Environmental Protection Agency

VISL = vapor intrusion screening level

Table 2. Subslab Soil Gas Sampling Log—Winter 2018/2019 Interim Offsite Vapor Intrusion Investigation
HH Metal Specialty, Inc.
153 Hopkins Avenue
Essex-Hope Site, Jamestown, New York

Field ID	Purge and Sample Start Date	Purge Start Time	Purge Rate (mL/min)	Purge End Time	Helium Leak Check[1] (pass/fail)	Total VOCs in Purged Gas (ppm)	MultiRae from Purged Gas (%v)			Canister ID	Flow Controller ID	Flow Controller Rate	Sample Start Time	Initial Canister Pressure ("Hg)		Sample End Date	Sample End Time	Final Pressure ("Hg)		Lab Receipt Pressure ("Hg)
							Oxygen	Carbon Dioxide	H2S					On Can	Digital Gauge			On Can	Digital Gauge	
HH-01_20181115	11/13/2018	9:38	200	9:43	Pass	0.0	17.5	8	0	800	0852	5 min	9:46	-28.45	-29.10	11/13/18	9:51	-2.10	-2.19	-1.70
HH-02_20181115	11/13/2018	10:04	200	10:09	Pass	0.0	19.2	2	0	721	0670	5 min	10:13	-28.17	-28.69	11/13/18	10:17	-1.64	-1.76	-1.40
HH-03_20181115	11/13/2018	11:18	200	11:23	Pass	0.0	NM	NM	NM	824	652	5 min	11:29	-27.84	-28.61	11/13/18	11:34	-1.72	-1.73	-1.00
HH-04_20181115	11/13/2018	12:13	200	12:18	Pass	0	NM	NM	NM	2157	1051	5 min	12:25	-28.17	-29.09	11/13/18	12:32	-5.17	-4.69	-4.20
HH-04_20181115-FD										2162					-28.47				-4.60	-4.10
HH-05_20181115	11/13/2018	14:14	200	14:19	Pass	NM	NM	NM	NM	2175	653	5 min	14:28	-28.29	-29.17	11/13/18	14:33	-2.71	-2.69	-2.00
HH-06_20181115	11/13/2018	15:11	200	15:16	Pass	0	NM	NM	NM	848	668	5 min	15:19	-27.87	-28.42	11/13/18	15:24	-2.28	-2.24	-1.70
HH-07_20181115	11/13/2018	15:58	200	16:03	Pass	NM	NM	NM	NM	2532	666	5 min	16:09	-30.78	-29.13	11/13/18	16:14	-3.83	-1.30	-0.63

Notes:
ID = identification
mL/min = milliliters per minute
NM - not measured; purged gas was not measured with the multirae if there was insufficient volume of gas remaining after helium check.
%v = percent by volume
"Hg = inches of mercury
hr = hour
[1] = the subslab soil gas probes are Cox Colvin brand Vapor Pins and are leak tested with helium

Table 3. Subslab Soil Gas Sampling Log—Winter 2018/2019 Interim Offsite Vapor Intrusion Investigation
Johnson Machine & Fibre Products
142 Hopkins Avenue
Essex-Hope Site, Jamestown, New York

Field ID	Purge and Sample Start Date	Purge Start Time	Purge Rate (mL/min)	Purge End Time	Helium Leak Check[1] (pass/fail)	Total VOCs in Purged Gas (ppm)	MultiRae from Purged Gas (%v)			Canister ID	Flow Controller ID	Flow Controller Rate	Sample Start Time	Initial Canister Pressure ("Hg)		Sample End Date	Sample End Time	Final Pressure ("Hg)		Lab Receipt Pressure ("Hg)
							Oxygen	Carbon Dioxide	H2S					On Can	Digital Gauge			On Can	Digital Gauge	
JMF-01_20181114	11/14/2018	19:36	200	19:41	Pass	0.2	19.2	NM	NM	2499	0523	5 min	19:46	-28.71	-28.67	11/14/18	19:53	-4.82	-5.01	-4.9
JMF-01_20181114-FD										2529					-28.68				-4.88	-4.7
JMF-02_20181114	11/14/2018	16:45	200	16:50	Pass	0.1	NM	NM	NM	1502	654	5 min	16:58	-28.05	-28.41	11/14/18	17:03	-2.05	-1.67	-1.5
JMF-03_20181114	11/14/2018	17:52	200	17:57	Pass	0.2	16.6	NM	NM	2557	688	5 min	19:04	-29.17	-28.64	11/14/18	19:09	-3.30	-2.83	-2.8
JMF-04_20181114	11/14/2018	17:22	200	17:27	Pass	0.1	NM	NM	NM	716	0991	5 min	17:32	-28.58	-28.78	11/14/18	17:37	-2.06	-2.03	-2.3

Notes:
ID = identification

Table 4. Exterior Soil Vapor Sampling Log—Winter 2018/2019 Interim Offsite Vapor Intrusion Investigation
Essex-Hope Site, Jamestown, New York

Field ID	Purge and Sample Start Date	Purge Start Time	Purge Rate (mL/min)	Purge End Time	Helium Leak Check[1] (pass/fail)	Total VOCs in Purged Gas (ppm)	MultiRae from Purged Gas (%v)			Canister ID	Flow Controller ID	Flow Controller Rate	Sample Start Time	Initial Canister Pressure ("Hg)		Sample End Date	Sample End Time	Final Pressure ("Hg)		Lab Receipt Pressure ("Hg)
							Oxygen	Carbon Dioxide	H2S					On Can	Digital Gauge			On Can	Digital Gauge	
SV-01_20181211	12/11/2018	17:11	200	17:16	Pass	0.0	19.8	0	0	2396	0211	5 min	17:24	-28.86	-29.20	12/11/18	17:34	-3.65	-3.81	-2.40
SV-02_20181211	12/11/2018	15:49	200	15:54	Pass	0.0	20.2	0	0	803	0146	5 min	16:00	-28.56	-28.46	12/11/18	16:05	-2.81	-2.61	-1.30
SV-03_20181211	12/11/2018	15:06	200	15:11	Pass	0.0	20.2	0	0	683	0314	5 min	15:18	-28.27	-28.59	12/11/18	15:18	-3.54	-3.56	-2.40
SV-04_20181212	12/12/2018	9:19	200	9:24	Pass	0.0	20.9	0	0	567	0355	5 min	9:28	-28.55	-28.68	12/12/18	9:33	-2.89	-2.99	-1.80
SV-05_20181212	12/12/2018	10:37	200	10:42	Pass	0.0	19.9	0	0	872	0756	5 min	10:54	-28.51	-29.08	12/12/18	10:59	-2.53	-2.55	-1.50
SV-06_20181212	12/12/2018	9:55	200	10:00	Pass	0.0	20.5	0	0	2089	0126	5 min	10:04	-27.93	-28.83	12/12/18	10:07	-2.04	-2.30	-1.00
SV-07_20181212	12/12/2018	13:03	200	13:08	Pass	0.0	20.6	0	0	2163	0594	5 min	13:11	-28.35	-29.31	12/12/18	13:21	-3.29	-3.35	-2.20
SV-07_20181212-FD										2406		5 min			-29.08				-3.41	-2.20
SV-08_20181212	12/12/2018	14:23	200	14:28	Pass	0.0	20.9	0	0	2168	1010	5 min	14:32	-28.44	-29.07	12/12/18	14:37	-2.41	-2.36	-1.40
SV-09_20181212	12/12/2018	13:45	200	13:50	Pass	0.1	19.9	0	0	855	0377	5 min	13:54	-28.78	-29.00	12/12/18	13:59	-2.6	-2.27	-1.30
SV-10_20181213	12/13/2018	12:01	200	12:06	Pass	0.1	19.3	0	0	702	0546	5 min	12:09	-28.42	-28.95	12/13/18	12:17	-3.24	-3.22	-2.40
SV-10_20181213-FD			200		Pass					675		5 min			-28.85				-3.14	-2.30
SV-11_20181212	12/12/2018	14:58	200	15:03	Pass	0	NM	NM	NM	1918	0677	5 min	15:08	-28.10	-28.94	12/12/18	15:13	-1.66	-1.64	-0.59
SV-12_20181212	12/12/2018	15:36	200	15:41	Pass	0	NM	NM	NM	681	0934	5 min	15:45	-28.57	-28.79	12/12/18	15:50	-2.19	-2.07	-1.00
SV-13_20181212	12/12/2018	16:11	200	16:16	Pass	0.1	NM	NM	NM	886	0378	5 min	16:28	-28.05	-29.00	12/12/18	16:33	-2.31	-2.39	-1.20
SV-14_20181213	12/13/2018	10:17	200	10:22	Pass	0	20.9	0	0	1914	0224	5 min	10:26	-28.82	-29.00	12/13/18	10:31	-2.04	-1.77	-0.90
SV-15_20181213	12/13/2018	11:23	200	11:28	Pass	0	20.9	0	0	2404	0407	5 min	11:32	-28.17	-29.02	12/13/18	11:37	-3.34	-3.29	-2.50
SV-16_20181213	12/13/2018	10:49	200	10:54	Pass	0.1	20.4	0	0	2467	01123	5 min	10:59	-28.54	-29	12/13/18	11:04	-2.45	-2.47	-1.70

Notes:
ID = identification
mL/min = milliliters per minute
NM - not measured; purged gas was not measured with the multirae if there was insufficent volume of gas remaining after helium check.
%v = percent by volume
"Hg = inches of mercury
hr = hour
[1] = the subslab soil gas probes are Cox Colvin brand Vapor Pins and are leak tested in accordance with the Cox Colvin helium leak check test method

Table 5. Preferential Pathway Analytical Data—Winter 2018/2019 Interim Offsite Vapor Intrusion Investigation

Offsite Vapor Intrusion Investigation

Essex-Hope Site, Jamestown, New York

				WMS-SE-01		WMS-SE-02		WMS-SE-03		WMS-SE-04		WMS-SE-05		WMS-SE-06	
			Location Description	Storm sewer along Hopkins Ave, outside of Jamestown Machine		Sewer manhole in middle of Hopkins Ave, across from Jamestown Machine		Storm sewer on the corner of Hopkins Ave and Minsker Street		Sewer manhole in the middle of Hopkins Ave, intersection of Minsker Street		Storm sewer on Bigelow Street		Sewer manhole in middle of Bigelow Street	
			Sampler ID	1820-AN-R-085		1820-AN-R-084		1820-AN-R-081		1820-AN-R-086		1820-AN-R-082		1820-AN-R-087	
			Sample Deployment Date	11/12/2018		11/12/2018		11/12/2018		11/12/2018		11/12/2018		11/12/2018	
			Sample Retrieval Date	11/16/2018		11/16/2018		11/16/2018		11/16/2018		11/16/2018		11/16/2018	
				Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual
Cas #	**Parameter Name**	**EPA Soil Vapor VISL**	**Units**												
75-01-4	Vinyl Chloride	0.93	µg/m^3	30	U	30	U	31	U	31	U	31	U	31	U
75-35-4	1,1-Dichloroethene	29,000	µg/m^3	26	U	26	U	26	U	26	U	26	U	26	U
156-60-5	trans-1,2,-Dichloroethene	--	µg/m^3	11	U	11	U	11	U	12	U	12	U	12	U
156-59-2	cis-1,2-Dichloroethene	--	µg/m^3	4.8	U	**140**		4.8	U	**25**		4.9	U	4.9	U
79-01-6	Trichloroethene	100	µg/m^3	3.5	U	**94**		3.5	U	**26**		3.6	U	3.6	U
127-18-4	Tetrachloroethene	1,600	µg/m^3	2.3	U	**0.94**	J	2.4	U	2.4	U	2.4	U	2.4	U

Notes:

µg/m^3 = micrograms per cubic meter

Qual = Laboratory data qualifier

J = estimated value

U = not detected at the reporting limit

EPA Soil Vapor VISL: USEPA Commercial Soil Vapor Intrusion Screening Level, November, 2018

Bold results indicate detection of chemical above the detection limit.

Table 6. Subslab Analytical Results Table—Winter 2018/2019 Interim Offsite Vapor Intrusion Investigation
H&H Metal Specialty, Inc.
153 Hopkins Avenue
Essex-Hope Site, Jamestown, New York

						Location	HH-01		HH-02		HH-03		HH-04		HH-04		HH-05		HH-06		HH-07	
						Field Sample ID	HH-01-20181115		HH-02-20181115		HH-03-20181115		HH-04-20181115		HH-04-20181115-FD		HH-05-20181115		HH-06-20181115		HH-07-20181115	
						Sample Date	11/15/2018		11/15/2018		11/15/2018		11/15/2018				11/15/2018		11/15/2018		11/15/2018	
						Units	µg/m^3		µg/m^3		µg/m^3		µg/m^3		µg/m^3		µg/m^3		µg/m^3		µg/m^3	
		Sub-Slab Soil Vapor Screening Levels																				
Cas #	Parameter Name	NY-SSC-A	NY-SSC-B	NY-SSC-C	EPA VISL																	
75-01-4	Vinyl chloride			6	0.93		1.14	U	1.12	U	1.1	U	1.24	U	1.23	U	1.15	U	2.28	U	1.08	U
75-35-4	1,1-Dichloroethene	6			29,000		1.77	U	1.73	U	1.71	U	1.93	U	1.9	U	1.78	U	3.53	U	1.68	U
156-60-5	trans-1,2-Dichloroethene				NA		1.77	U	1.73	U	1.71	U	1.93	U	1.9	U	1.78	U	3.53	U	1.68	U
156-59-2	cis-1,2-Dichloroethene	6			NA		**11.8**		**6.9**		**7.33**		4.96		4.64		2.2		**26**		**6.98**	
79-01-6	Trichloroethene	6			100		**33**		**16.7**		**23.1**		**14.5**		**14**		**17**		**1320**		**473**	
127-18-4	Tetrachloroethene		100		1,600		24.4		43.5		2.93	U	**102**		**101**		31.3		9.9		4.58	

Notes:
NY-SSC-A: N Shaded and bold indicates the value is greater than or equal to either the USEPA VISL or the NEW York DOH Sub-slab Vapor Concentrations Criteria
NY-SSC-B: New York DOH Matrix B Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.
NY-SSC-C: New York DOH Matrix C Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.
EPA VISL: EPA Commercial Sub-slab Vapor Intrusion Screening Level, November, 2018
Exceeds NY-SSC, but indoor air data is required to determine if any further action is needed per the matrix.
Exceeds EPA Sub-slab Vapor Intrusion Screening Level
µg/m^3 = micrograms per cubic meter

Table 7. Subslab Soil Gas Analytical Data—Winter 2018/2019 Interim Offsite Vapor Intrusion Investigation
Johnson Machine & Fibre Products
142 Hopkins Avenue
Essex-Hope Site, Jamestown, New York

					Location	JMF-01				JMF-02		JMF-03		JMF-04	
					Field Sample ID	JMF-01_20181114		JMF-01_20181114-FD		JMF-02_20181114		JMF-03_20181114		JMF-04_20181114	
					Sample Date	11/15/2018				11/15/2018		11/15/2018		11/15/2018	
					Units	µg/m^3				µg/m^3		µg/m^3		µg/m^3	
		Sub-Slab Soil Vapor Screening Levels													
Cas #	Parameter Name	NY-SSC-A	NY-SSC-B	NY-SSC-C	EPA VISL										
75-01-4	Vinyl chloride			6	0.93	1.27	U	1.26	U	1.1	U	1.17	U	1.16	U
75-35-4	1,1-Dichloroethene	6			29,000	1.97	U	1.95	U	1.71	U	1.82	U	1.8	U
156-60-5	trans-1,2-Dichloroethene				NA	1.97	U	1.95	U	1.71	U	1.82	U	1.8	U
156-59-2	cis-1,2-Dichloroethene	6			NA	**6.78**		**6.22**		4.4		**11.2**		**8.45**	
79-01-6	Trichloroethene	6			100	**17.8**		**17.5**		**13**		**23.1**		**21.5**	
127-18-4	Tetrachloroethene		100		1,600	10.4		9.9		2.93	U	8.68		14.9	

Notes:
NY-SSC-A: New York DOH Matrix A Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.
NY-SSC-B: New York DOH Matrix B Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.
NY-SSC-C: New York DOH Matrix C Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.
EPA VISL: EPA Commercial Subslab Vapor Intrusion Screening Level, November, 2018
Exceeds NY-SSC, but indoor air data is required to determine if any further action is needed per the matrix.
Exceeds EPA Subslab Vapor Intrusion Screening Level
µg/m^3 = micrograms per cubic meter

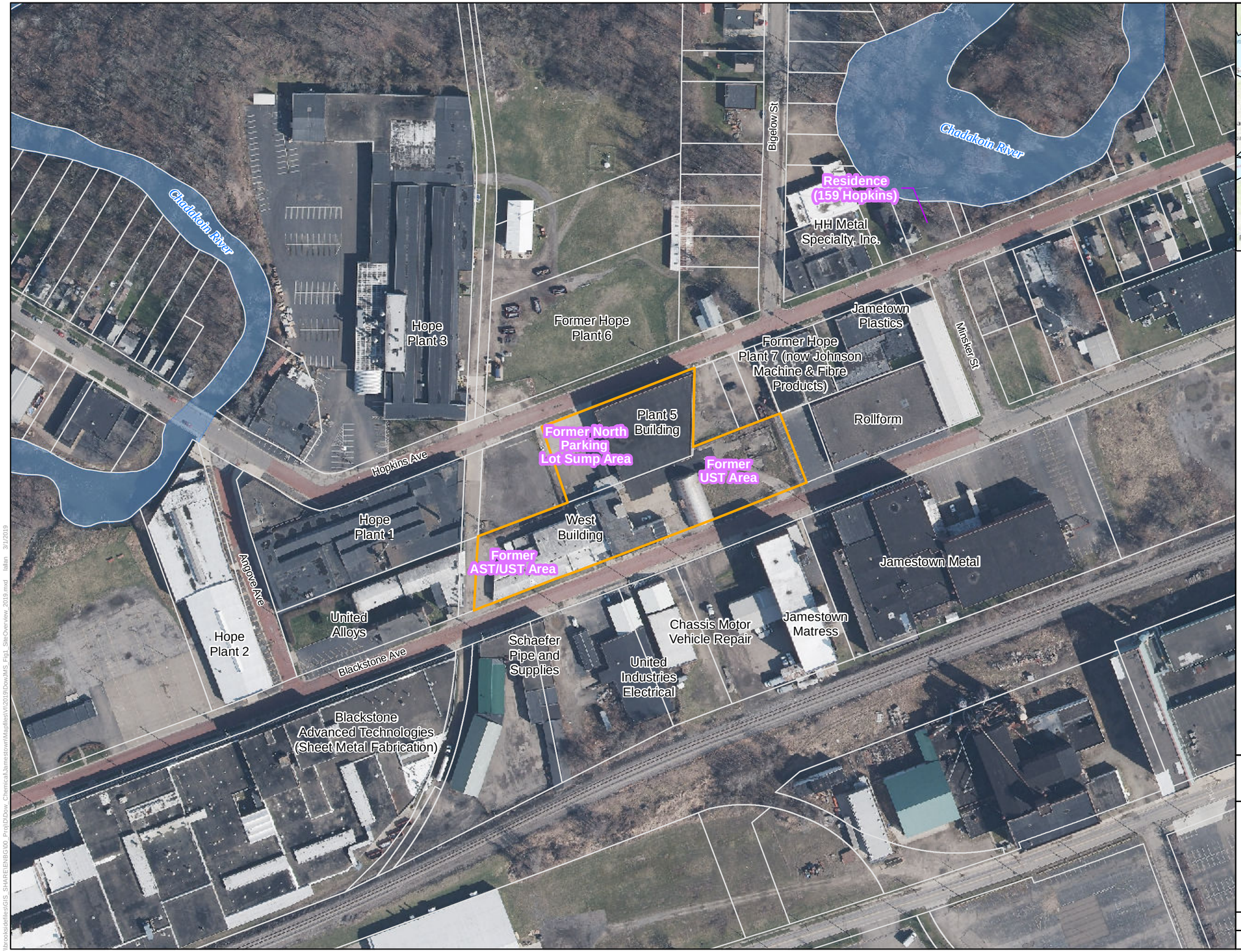
Table 8. Exterior Soil Vapor Probe Analytical Data—Winter 2018/2019 Interim Offsite Vapor Intrusion Investigation
Interim Offsite Vapor Intrusion Investigation
Essex-Hope Site, Jamestown, New York

		Location	SV-01		SV-02		SV-03		SV-04		SV-05		SV-06		SV-07			
		Field Sample ID	SV-01_20181211		SV-02_20181211		SV-03_20181211		SV-04_20181212		SV-05_20181212		SV-06_20181212		SV-07_20181212		SV-07_20181212-FD	
		Sample Date	12/11/2018		12/11/2018		12/11/2018		12/12/2018		12/12/2018		12/12/2018		12/12/2018			
		Units	µg/m^3		µg/m^3		µg/m^3		µg/m^3		µg/m^3		µg/m^3		µg/m^3			
Cas #	Parameter Name	EPA Soil Vapor VISL																
75-01-4	Vinyl chloride	0.93	ND		ND		ND		ND		ND		ND		**2.24**	J	ND	
75-35-4	1,1-Dichloroethene	29,000	ND		ND		ND		ND		ND		**2.53**		ND		ND	
156-60-5	trans-1,2-Dichloroethene	NA	ND		ND		ND		ND		ND		ND		ND		ND	
156-59-2	cis-1,2-Dichloroethene	NA	ND		ND		ND		ND		ND		ND		**5.71**	J	**3.68**	J
79-01-6	Trichloroethene	100	**262**		ND		ND		**3.27**		ND		**44.1**		**18.3**	J	**7.79**	J
127-18-4	Tetrachloroethene	1,600	**16.2**		**15.7**		**390**		ND		**16.3**		**7.05**		ND		**8.88**	J

		Location	SV-08		SV-09		SV-10				SV-11		SV-12		SV-13		SV-14		SV-15		SV-16	
		Field Sample ID	SV-08_20181212		SV-09_20181212		SV-10_20181213		SV-10_20181213-FD		SV-11_20181212		SV-12_20181212		SV-13_20181212		SV-14_20181213		SV-15_20181213		SV-16_20181213	
		Sample Date	12/12/2018		12/12/2018		12/13/2018				12/12/2018		12/12/2018		12/12/2018		12/13/2018		12/13/2018		12/13/2018	
		Units	µg/m^3		µg/m^3		µg/m^3				µg/m^3		µg/m^3		µg/m^3		µg/m^3		µg/m^3		µg/m^3	
Cas #	Parameter Name	EPA Soil Vapor VISL																				
75-01-4	Vinyl chloride	0.93	ND		ND		**3.02**	J	**6.03**	J	ND		ND		ND		ND		ND		ND	
75-35-4	1,1-Dichloroethene	29,000	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
156-60-5	trans-1,2-Dichloroethene	NA	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
156-59-2	cis-1,2-Dichloroethene	NA	ND		ND		**4.76**	J	**8.76**	J	ND		**1.72**		ND		**2.27**		**2.20**		**2.67**	
79-01-6	Trichloroethene	100	**2.71**		**8.81**		**5.75**	J	**10.5**	J	**4.77**		**6.45**		ND		**4.74**		ND		**111**	
127-18-4	Tetrachloroethene	1,600	ND		**3.57**		ND		**35.3**	J	ND		ND		ND		ND		ND		**6.63**	

Notes:
262 Exceeds EPA Vapor Intrusion Screening Level (for soil vapor)
USEPA Soil Vapor VISL: USEPA Vapor Intrusion Screening Level, November, 2018
Bold results indicate detection of chemical above the detection limit.
µg/m3 = micrograms per cubic meter
ND = not detected
EPA = U.S. Environmental Protection Agency

Figures



Site Boundary

Chautauqua County Tax Parcels

Chadakoin River

N

BASE MAP SOURCE:
Imagery: Statewide Digitial Orthoimagery 2012 of Chautauqua County, New York Stat Gov 2012; Tax Parcel Source: Chautauqua County Department of Information Services. Last updated July 7th, 2017.

0 50 100 200

Scale in Feet

Essex Specialty Products, Inc	Essex/Hope Site, Jamestown, New York

FIGURE 1
Site Location and Layout Map
Interim Off-site Intrusion Investigation

CREATED BY: LA	JACOBS
REVIEWED BY: MV	

\\Projects\efiles\GIS_SHARE\ENRG\00_Proj\Div\Dow_Chemical\Jamestown\Mapfiles\VI\2019\Dow\MS_Fig1_SiteOverview_2019.mxd lallen 3/1/2019

MW-15S	
Analytes	**2017**
Vinyl chloride	1.0 UJ
cis-1,2-Dichloroethene	**1.0 J**
Trichloroethene	**5.6**
Tetrachloroethene	ND

DPT-012 (11-15' bgs)	
Analytes	**2017**
Vinyl chloride	1.0 U
cis-1,2-Dichloroethene	2.5 U
Trichloroethene	**6.0 J**
Tetrachloroethene	ND

MW-104S		
Analytes	**2018**	**2017**
Vinyl chloride	ND	1.0 UJ
cis-1,2-Dichloroethene	ND	**1.0 J**
Trichloroethene	**100**	**130**
Tetrachloroethene	**0.26 J**	ND

DPT-011 (11-15' bgs)	
Analytes	**2017**
Vinyl chloride	1.0 U
cis-1,2-Dichloroethene	**11**
Trichloroethene	**21 J**
Tetrachloroethene	ND

MW-108S				
Analytes	**2018**		**2017**	
Vinyl chloride	ND	ND	1.0 U	1.0 U
cis-1,2-Dichloroethene	**5.8**	**5.8**	**4.6**	**4.6**
Trichloroethene	**28**	**28**	**22**	**22**
Tetrachloroethene	**0.31 J**	**0.33 J**	**0.48 J**	**0.48 J**

MW-7S	
Analytes	**2017**
Vinyl chloride	1.0 UJ
cis-1,2-Dichloroethene	**14**
Trichloroethene	**7.1**
Tetrachloroethene	ND

MW-106S	
Analytes	**2017**
Vinyl chloride	**6.4**
cis-1,2-Dichloroethene	**11**
Trichloroethene	**13**
Tetrachloroethene	ND

MW-14S	
Analytes	**2017**
Vinyl chloride	1.0 U
cis-1,2-Dichloroethene	**2.4 J**
Trichloroethene	**14**
Tetrachloroethene	ND

MW-103S	
Analytes	**2017**
Vinyl chloride	**0.17 J**
cis-1,2-Dichloroethene	**70**
Trichloroethene	**180**
Tetrachloroethene	ND

RW-2S		
Analytes	**2018**	**2017**
Vinyl chloride	**0.84 J**	**2**
cis-1,2-Dichloroethene	**24**	**31**
Trichloroethene	**35**	**14**
Tetrachloroethene	ND	ND

MW-25S	
Analytes	**2017**
Vinyl chloride	1.0 U
cis-1,2-Dichloroethene	**21**
Trichloroethene	**82**
Tetrachloroethene	ND

RW-1S		
Analytes	**2018**	**2017**
Vinyl chloride	**14**	**6**
cis-1,2-Dichloroethene	**360**	**91**
Trichloroethene	**260**	**26**
Tetrachloroethene	ND	ND

MW-18S	
Analytes	**2017**
Vinyl chloride	**0.34 J**
cis-1,2-Dichloroethene	**65**
Trichloroethene	**190**
Tetrachloroethene	ND

GP-1S	
Analytes	**2017**
Vinyl chloride	**0.33 J**
cis-1,2-Dichloroethene	**16**
Trichloroethene	**18**
Tetrachloroethene	ND

MW-102S		
Analytes	**2017**	**Dup**
Vinyl chloride	**0.16 J**	**0.15 J**
cis-1,2-Dichloroethene	**44**	**45**
Trichloroethene	**30**	**30**
Tetrachloroethene	ND	ND

RW-3S		
Analytes	**2018**	**2017**
Vinyl chloride	**2.9**	**1.6**
cis-1,2-Dichloroethene	**5.4**	**37**
Trichloroethene	**8.1**	**56**
Tetrachloroethene	ND	ND

MW-12	
Analytes	**2017**
Vinyl chloride	1.0 UJ
cis-1,2-Dichloroethene	**37**
Trichloroethene	**18**
Tetrachloroethene	ND

HW-6	
Analytes	**2017**
Vinyl chloride	**250**
cis-1,2-Dichloroethene	**180**
Trichloroethene	0.50 U
Tetrachloroethene	ND

MW-13		
Analytes	**2018**	**2017**
Vinyl chloride	ND	**1.3**
cis-1,2-Dichloroethene	ND	**5.5**
Trichloroethene	ND	**22**
Tetrachloroethene	ND	ND

MW-101S		
Analytes	**2018**	**2017**
Vinyl chloride	**0.2 J**	**2.3 J**
cis-1,2-Dichloroethene	**26**	**240**
Trichloroethene	**75**	**510**
Tetrachloroethene	**0.27 J**	ND

Chadakoin River
HH Metal Specialty, Inc.
Rollform
Former Hope Plant 7 (now Johnson Machine & Fibre Products)
Plant 5 Building
West Building
Former AST/UST Area
Former UST Area
NPLS Area
Bigelow St
Minsker St
Hopkins Ave
Blackstone Ave
DPT-13
MW-105S
MW-109S
MW-107S
MW-19S
VP-6S
DPT-22
MW-6
MW-27S
RW-5S
MW-26S
MW-28S
MW-20
HW-8
DPT-20
DPT-21
MW-23S
MW-24S
MW-112S
MW-29S
MW-30S
HW-10
MW-114S
MW-117S
MW-116S

Approximate Site Boundary
Chadakoin River

Shallow Sampling Points

Monitoring Well
Recovery Well
Direct Push Location

Samping Results

No exceedances of compounds

Parameter Name	USEPA GW VISL (ug/L)
Vinyl chloride	2.5
cis-1,2-Dichloroethene	NA
Trichloroethene	7.4
Tetrachloroethene	65

Notes:
1. Orange highlighted cells: Exceeds the USEPA Groundwater Vapor Intrusion Screening Levels (VISLs).
2. Bold results indicate detection of chemical above the detection limit.
3. Measurements in ug/L.
4. Most recent 2018 and 2017 results depicted (March, Aug, Sept, and Oct 2017, and Nov 2018).

Acronyms and Abbreviations:
; g = Microgram(s)
L = Liter
J = Estimated Value
U = Not Detected

N

BASE MAP SOURCE:

0 25 50 100
Scale in Feet

Essex Specialty Products, Inc

Essex/Hope Site, Jamestown, New York

FIGURE 2
Shallow WBZ Groundwater Results
Chlorinated VOCs
Interim Off-site Vapour Intrusion Investigation

CREATED BY: LA
REVIEWED BY: FR

JACOBS

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Soil Vapor Sample Location

Subslab Vapor Sample Location

Sanitary/Storm Sewer

Approximate Site Boundary

Parcels

Access to Rollform was Denied and therefore sampling has not been proposed at this time

Chadakoin River

N

BASE MAP SOURCE:

0 50 100 200

Scale in Feet

Essex Specialty Products, Inc	Essex/Hope Site, Jamestown, New York

FIGURE 3
Vapor Intrusion Investigation Locations
Interim Off-site Vapor Intrusion Investigation

CREATED BY: LA	JACOBS
REVIEWED BY: AS	

\\brooksidefiles\GIS_SHAREENGR\09_Proj\DD\Dow_Chemical\Jamestown\Mapfiles\VI\2019\DowJMS_Fig3_VI_InvestigationLocations_2019.mxd jallyn 3/1/2019

WMS-SE-05	
Analytes	**Results**
Vinyl Chloride	ND
1,1-Dichloroethene	ND
trans-1,2,-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
Trichloroethene	ND
Tetrachloroethene	ND

WMS-SE-06	
Analytes	**Results**
Vinyl Chloride	ND
1,1-Dichloroethene	ND
trans-1,2,-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
Trichloroethene	ND
Tetrachloroethene	ND

WMS-SE-02	
Analytes	**Results**
Vinyl Chloride	ND
1,1-Dichloroethene	ND
trans-1,2,-Dichloroethene	ND
cis-1,2-Dichloroethene	**140**
Trichloroethene	**94**
Tetrachloroethene	**0.94 J**

WMS-SE-01	
Analytes	**Results**
Vinyl Chloride	ND
1,1-Dichloroethene	ND
trans-1,2,-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
Trichloroethene	ND
Tetrachloroethene	ND

WMS-SE-04	
Analytes	**Results**
Vinyl Chloride	ND
1,1-Dichloroethene	ND
trans-1,2,-Dichloroethene	ND
cis-1,2-Dichloroethene	**25**
Trichloroethene	**26**
Tetrachloroethene	ND

WMS-SE-03	
Analytes	**Results**
Vinyl Chloride	ND
1,1-Dichloroethene	ND
trans-1,2,-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
Trichloroethene	ND
Tetrachloroethene	ND

Bigelow St

Chadakoin River

HH Metal Specialty, Inc.

159 Hopkins Avenue Residence

Minsker St

Rollform

Former Hope Plant 6

Former Hope Plant 7 (now Johnson Machine & Fibre Products)

Plant 5 Building

NPLS Area

Treatment Building

Former UST Area

SV-01 SV-02 SV-03 SV-04 SV-05 SV-06 SV-07 SV-08 SV-09 SV-10 SV-11 SV-12 SV-13 SV-14 SV-15 SV-16

HH-01 HH-02 HH-03 HH-04 HH-05 HH-06 HH-07

JMF-01 JMF-02 JMF-03 JMF-04

Sanitary Sewer Location
Storm Sewer Location
Soil Vapor Sample Location
Subslab Vapor Sample Location
Sanitary/Storm Sewer
Approximate Site Boundary
Parcels
Access to Rollform was Denied and therefore sampling has not been proposed at this time
Chadakoin River

Notes:
1. Yellow highlighted cells: Exceeds NYSDEC, but indoor air data is required to determine if any further action is needed per the matrix.
2. Red text within cells: Exceeds USEPA Subslab Vapor Intrusion Screening Level
3. Bold results indicate detection of chemical above detection limit.
4. Measurements in Bg/L (micrograms/liter).

N

BASE MAP SOURCE:

0 25 50 100
Scale in Feet

Essex Specialty Products, Inc

Essex/Hope Site, Jamestown, New York

FIGURE 4
Passive Sampler in Sewer Data
November 2018
Investigation Locations
Interim Off-site Vapor Intrusion Investigation

CREATED BY: LA
REVIEWED BY: AS

JACOBS

3/6/2019
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HH-01	
Analytes	
Vinyl chloride	1.14 U
1,1-Dichloroethene	1.77 U
trans-1,2-Dichloroethene	1.77 U
cis-1,2-Dichloroethene	**11.8**
Trichloroethene	**33**
Tetrachloroethene	24.4

HH-02	
Analytes	
Vinyl chloride	1.12 U
1,1-Dichloroethene	1.73 U
trans-1,2-Dichloroethene	1.73 U
cis-1,2-Dichloroethene	**6.9**
Trichloroethene	**16.7**
Tetrachloroethene	43.5

HH-03	
Analytes	
Vinyl chloride	1.1 U
1,1-Dichloroethene	1.71 U
trans-1,2-Dichloroethene	1.71 U
cis-1,2-Dichloroethene	**7.33**
Trichloroethene	**23.1**
Tetrachloroethene	2.93 U

HH-04		
Analytes		Duplicate
Vinyl chloride	1.24 U	1.23 U
1,1-Dichloroethene	1.93 U	1.9 U
trans-1,2-Dichloroethene	1.93 U	1.9 U
cis-1,2-Dichloroethene	4.96	4.64
Trichloroethene	**14.5**	**14**
Tetrachloroethene	**102**	**101**

HH-05	
Analytes	
Vinyl chloride	1.15 U
1,1-Dichloroethene	1.78 U
trans-1,2-Dichloroethene	1.78 U
cis-1,2-Dichloroethene	2.2
Trichloroethene	**17**
Tetrachloroethene	31.3

HH-06	
Analytes	
Vinyl chloride	2.28 U
1,1-Dichloroethene	3.53 U
trans-1,2-Dichloroethene	3.53 U
cis-1,2-Dichloroethene	**26**
Trichloroethene	**1320**
Tetrachloroethene	9.9

JMF-01		
Analytes		Duplicate
Vinyl chloride	1.27 U	1.26 U
1,1-Dichloroethene	1.97 U	1.95 U
trans-1,2-Dichloroethene	1.97 U	1.95 U
cis-1,2-Dichloroethene	**6.78**	**6.22**
Trichloroethene	**17.8**	**17.5**
Tetrachloroethene	10.4	9.9

HH-07	
Analytes	
Vinyl chloride	1.08 U
1,1-Dichloroethene	1.68 U
trans-1,2-Dichloroethene	1.68 U
cis-1,2-Dichloroethene	**6.98**
Trichloroethene	**473**
Tetrachloroethene	4.58

JMF-02	
Analytes	
Vinyl chloride	1.1 U
1,1-Dichloroethene	1.71 U
trans-1,2-Dichloroethene	1.71 U
cis-1,2-Dichloroethene	4.4
Trichloroethene	**13**
Tetrachloroethene	2.93 U

JMF-04	
Analytes	
Vinyl chloride	1.16 U
1,1-Dichloroethene	1.8 U
trans-1,2-Dichloroethene	1.8 U
cis-1,2-Dichloroethene	**8.45**
Trichloroethene	**21.5**
Tetrachloroethene	14.9

JMF-03	
Analytes	
Vinyl chloride	1.17 U
1,1-Dichloroethene	1.82 U
trans-1,2-Dichloroethene	1.82 U
cis-1,2-Dichloroethene	**11.2**
Trichloroethene	**23.1**
Tetrachloroethene	8.68

Soil Vapor Sample Location
Subslab Vapor Sample Location
Sanitary/Storm Sewer
Approximate Site Boundary
Parcels
Access to Rollform was Denied and therefore sampling has not been proposed at this time
Chadakoin River

Notes:
1. Orange highlighted cells: Exceeds NY-SSC, but indoor air data is required to determine if any further action is needed per the matrix.
2. Red text within cells: Exceeds USEPA Sub-slab Vapor Intrusion Screening Level
3. Bold results indicate detection of chemical above detection limit.

N

0 50 100 200
Scale in Feet

Essex Specialty Products, Inc	Essex/Hope Site, Jamestown, New York

FIGURE 5
Sub-Slab Analytical Results
November 2018
Investigation Locations
Interim Off-site Vapor Intrusion Investigation

CREATED BY: LA	JACOBS
REVIEWED BY: AS	

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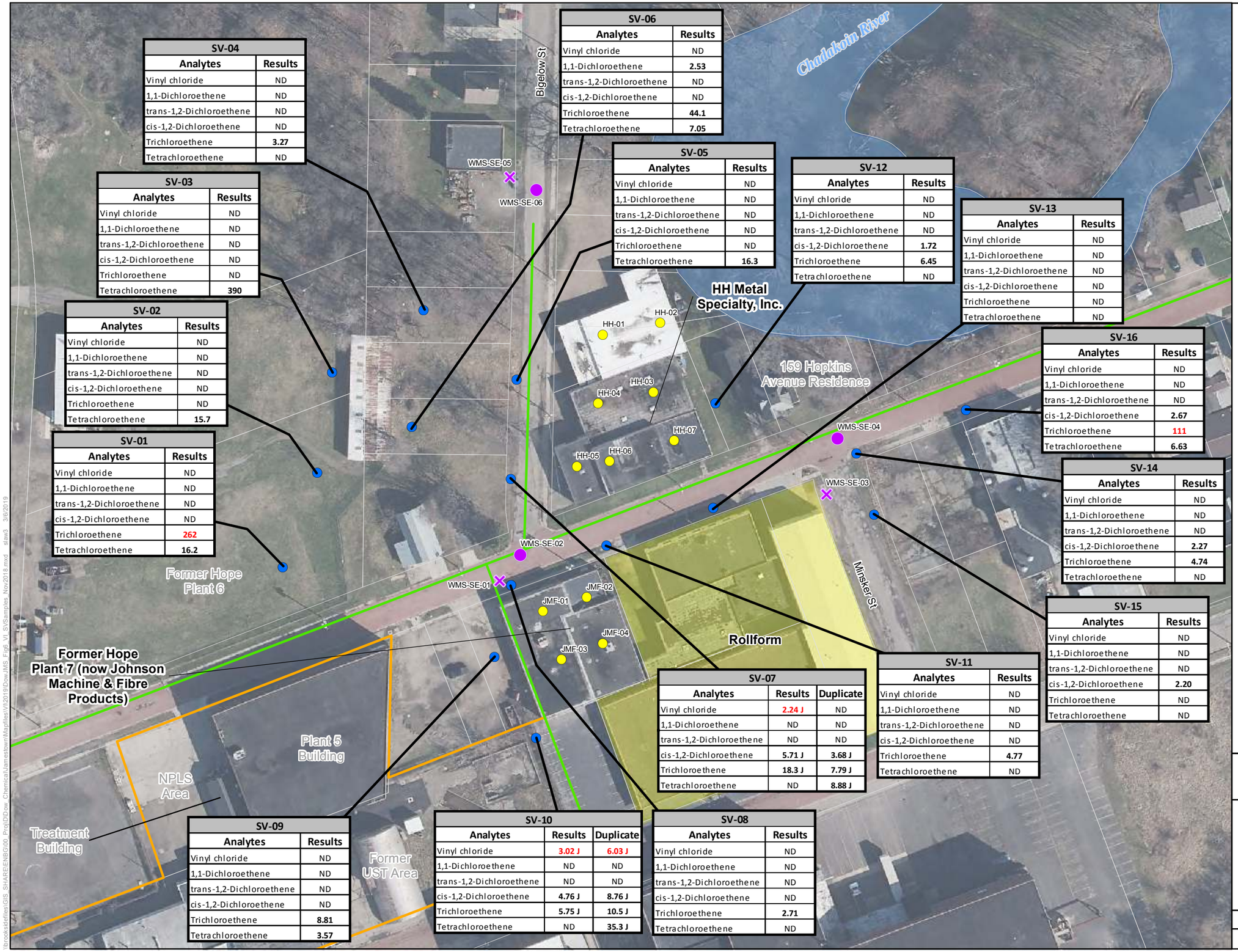


SV-04	
Analytes	**Results**
Vinyl chloride	ND
1,1-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
Trichloroethene	**3.27**
Tetrachloroethene	ND

SV-03	
Analytes	**Results**
Vinyl chloride	ND
1,1-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
Trichloroethene	ND
Tetrachloroethene	**390**

SV-02	
Analytes	**Results**
Vinyl chloride	ND
1,1-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
Trichloroethene	ND
Tetrachloroethene	**15.7**

SV-01	
Analytes	**Results**
Vinyl chloride	ND
1,1-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
Trichloroethene	**262**
Tetrachloroethene	**16.2**

SV-06	
Analytes	**Results**
Vinyl chloride	ND
1,1-Dichloroethene	**2.53**
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
Trichloroethene	**44.1**
Tetrachloroethene	**7.05**

SV-05	
Analytes	**Results**
Vinyl chloride	ND
1,1-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
Trichloroethene	ND
Tetrachloroethene	**16.3**

SV-12	
Analytes	**Results**
Vinyl chloride	ND
1,1-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	**1.72**
Trichloroethene	**6.45**
Tetrachloroethene	ND

SV-13	
Analytes	**Results**
Vinyl chloride	ND
1,1-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
Trichloroethene	ND
Tetrachloroethene	ND

SV-16	
Analytes	**Results**
Vinyl chloride	ND
1,1-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	**2.67**
Trichloroethene	**111**
Tetrachloroethene	**6.63**

SV-14	
Analytes	**Results**
Vinyl chloride	ND
1,1-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	**2.27**
Trichloroethene	**4.74**
Tetrachloroethene	ND

SV-15	
Analytes	**Results**
Vinyl chloride	ND
1,1-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	**2.20**
Trichloroethene	ND
Tetrachloroethene	ND

SV-07		
Analytes	**Results**	**Duplicate**
Vinyl chloride	**2.24 J**	ND
1,1-Dichloroethene	ND	ND
trans-1,2-Dichloroethene	ND	ND
cis-1,2-Dichloroethene	**5.71 J**	**3.68 J**
Trichloroethene	**18.3 J**	**7.79 J**
Tetrachloroethene	ND	**8.88 J**

SV-11	
Analytes	**Results**
Vinyl chloride	ND
1,1-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
Trichloroethene	**4.77**
Tetrachloroethene	ND

SV-09	
Analytes	**Results**
Vinyl chloride	ND
1,1-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
Trichloroethene	**8.81**
Tetrachloroethene	**3.57**

SV-10		
Analytes	**Results**	**Duplicate**
Vinyl chloride	**3.02 J**	**6.03 J**
1,1-Dichloroethene	ND	ND
trans-1,2-Dichloroethene	ND	ND
cis-1,2-Dichloroethene	**4.76 J**	**8.76 J**
Trichloroethene	**5.75 J**	**10.5 J**
Tetrachloroethene	ND	**35.3 J**

SV-08	
Analytes	**Results**
Vinyl chloride	ND
1,1-Dichloroethene	ND
trans-1,2-Dichloroethene	ND
cis-1,2-Dichloroethene	ND
Trichloroethene	**2.71**
Tetrachloroethene	ND

- Sanitary Sewer Location
- Storm Sewer Location
- Soil Vapor Sample Location
- Subslab Vapor Sample Location
- Sanitary/Storm Sewer
- Approximate Site Boundary
- Parcels
- Access to Rollform was Denied and therefore sampling has not been proposed at this time
- Chadakoin River

Notes:
1. Red text within cells: exceeds USEPA exterior soil vapor intrusion screening levels.
2. Bold results indicate detection of chemical above the detection limit.

N

0 25 50 100
Scale in Feet

Essex Specialty Products, Inc

Essex/Hope Site, Jamestown, New York

FIGURE 6
Exterior Soil IGas Analytical Results
Interim Off-Site Vapor Intrusion Investigation

CREATED BY: LA
REVIEWED BY: AS

JACOBS

\\brooksdatfiles\GIS_SHARE\ENG\09_Proj\DDow_Chemical\Jamestown\Mapfiles\V3\2019\Dow\IMS_Fig5_VI_SVSamples_Nov2018.mxd dlaw3 3/6/2019

Appendix A
Building Surveys

H+H METAL

OSR – 3

NEW YORK STATE DEPARTMENT OF HEALTH
INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY
CENTER FOR ENVIRONMENTAL HEALTH

This form must be completed for each residence involved in indoor air testing.

Preparer's Name M. VIDAL + JON GOWING Date/Time Prepared 4/27/2018

Preparer's Affiliation CH2M - JACOBS Phone No. 978-427-1801

Purpose of Investigation 2018 VI INVESTIGATION

1. OCCUPANT: H+H METAL SPECIALTY INC.

Interviewed: (Y) N

Last Name: CECI First Name: BRIAN

Address: 153 HOPKINS AVENUE, JAMESTOWN NY 14701

County: CHAUTAUQUA

Home Phone: N/A Office Phone: 716-665-2110

Number of ~~Occupants/persons~~ at this location 2-3 Age of Occupants 40-60
EMPLOYEES

2. OWNER OR LANDLORD: (Check if same as occupant ___)

Interviewed: Y (N)

Last Name: HARRIS First Name: SUSAN

Address: N/A - AT NURSING HOME

County: N/A

Home Phone: N/A Office Phone: N/A

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response)

Residential	School	Commercial/Multi-use
(Industrial)	Church	Other: ___

If the property is residential, type? (Circle appropriate response) N/A

Ranch	2-Family	3-Family
Raised Ranch	Split Level	Colonial
Cape Cod	Contemporary	Mobile Home
Duplex	Apartment House	Townhouses/Condos
Modular	Log Home	Other:_____

If multiple units, how many? N/A

If the property is commercial, type?

Business Type(s) METAL FABRICATION (WELDING, BRAZING, STAMPING)

Does it include residences (i.e., multi-use)? (Y) N If yes, how many? 1 (VACANT)

Other characteristics:

Number of floors 1 Building age BETWEEN 99 TO 19 YRS (SEE FLOOR PLA

Is the building insulated? (Y) / N How air tight? (Tight) / Average / Not Tight

OFFICE SPACE (NORTH SECTION) ONLY. OTHER SECTIONS ARE NOT INSULATED.

4. AIRFLOW

Use air current tubes or tracer smoke to evaluate airflow patterns and qualitatively describe:

Airflow between floors

N/A - ONE FLOOR ONLY

Airflow near source

NO SOURCE IDENTIFIED. INDOOR AIR IS RE-CIRCULATED BY HVAC SYSTEM AND BLOWER IN THE MANUFACTURING, WELDING AND PRESS ROOM AREAS.

Outdoor air infiltration

POTENTIAL OUTDOOR AIR INFILTRATION FROM WINDOWS/DOORWAYS IN THE NON-INSULATED AREAS; ROOF LEAKS IN WELDING ROOM. FORMER CHIMNEY IS CURRENTLY CAPPED.

Infiltration into air ducts

EXHAUSTS AND UNIT HEATERS STACKS APPEAR TO BE AIR-TIGHT.

5. BASEMENT AND CONSTRUCTION CHARACTERISTICS (Circle all that apply) - SLAB ON GRADE

a. Above grade construction:	wood frame	(concrete)	stone	brick
b. Basement type: N/A	full	crawlspace	slab	other _____
c. Basement floor: N/A	concrete	dirt	stone	other _____
d. Basement floor: N/A	uncovered	covered	covered with _____	
e. Concrete floor:	unsealed	(sealed) BUT HAS CRACKS, UTILITY TRENCHES, BOILER ROOM	sealed with _____	
f. Foundation walls:	poured	(block)	stone	other _____
g. Foundation walls:	unsealed	(sealed)	sealed with _____	
h. The basement is: N/A	wet	damp	dry	moldy
i. The basement is: N/A	finished	unfinished	partially finished	
j. Sump present?	Y (N)			
k. Water in sump?	Y / N / (not applicable)			

* WET + DAMP FLOOR AREAS IN WELDING AND PRESS ROOMS.

Basement/Lowest level depth below grade: 5.5 (feet) FORMER BOILER ROOM (~4' WIDE BY 5' LONG)

Identify potential soil vapor entry points and approximate size (e.g., cracks, utility ports, drains)

* FLOOR/CONCRETE CRACKS PRESENT IN WELDING + PRESS ROOMS (~2' TO 10' LONG)
* UTILITY TRENCHES IN PRESS ROOM (~9" DEEP)
* FORMER BOILER ROOM IN PRESS ROOM (~6'W x 5'L x 5.5' D)
* FLOOR DRAINS IN BATHROOMS AND MANUFACTURING AREA.
* TRENCH PIT FOR PRESS FILLED WITH GRAVEL (~5' DEEP)

6. HEATING, VENTING and AIR CONDITIONING (Circle all that apply)

Type of heating system(s) used in this building: (circle all that apply – note primary)

FORCED AIR UNIT HEATER (Hot air circulation)	(Heat pump) → OFFICE AREA ONLY	Hot water baseboard	
Space Heaters	Stream radiation	Radiant floor	
Electric baseboard	Wood stove	Outdoor wood boiler	Other _____

The primary type of fuel used is:

(Natural Gas) → UNIT HEATER	Fuel Oil	Kerosene
(Electric) → HEAT PUMP	Propane	Solar
Wood	Coal	

Domestic hot water tank fueled by: ELECTRIC (2 HOT WATER TANKS)

FORMER **Boiler/furnace located in:**	Basement	Outdoors	(Main Floor) L 5.5' BELOW GRADE	Other _____
Air conditioning:	(Central Air)	Window units	Open Windows	None

Are there air distribution ducts present? (Y) / N

Describe the supply and cold air return ductwork, and its condition where visible, including whether there is a cold air return and the tightness of duct joints. Indicate the locations on the floor plan diagram.

NOT VISIBLE IN OFFICE, CAFETERIA OR BATHROOMS.
HVAC SYSTEM, BLOWER, STACKS AND UNIT HEATERS APPEAR AIR-TIGHT.

7. OCCUPANCY ~ 2 PEOPLE, 40 HRS/WEEK EACH.

Is basement/lowest level occupied? Full-time Occasionally Seldom Almost Never

Level	**General Use of Each Floor (e.g., familyroom, bedroom, laundry, workshop, storage)**
Basement	N/A
1st Floor	OFFICE + WORKSHOP SPACES, INCLUDING 3 GARAGES.
2nd Floor	N/A
3rd Floor	N/A
4th Floor	N/A

8. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY

a. Is there an attached garage? (Y) N – 3 TOTAL

b. Does the garage have a separate heating unit? (Y) / N / NA

c. Are petroleum-powered machines or vehicles stored in the garage (e.g., lawnmower, atv, car) (Y) N / NA
Please specify TRUCKS, FORK LIFT, LAWN MOWERS

d. Has the building ever had a fire? Y / (N) When? _____

e. Is a kerosene or unvented gas space heater present? Y / (N) Where? _____

f. Is there a workshop or hobby/craft area? (Y) N Where & Type? MAJORITY OF BUILDING, METAL WELDING/FABRICATION

g. Is there smoking in the building? Y / (N) How frequently? _____

h. Have cleaning products been used recently? (Y) N When & Type? WEEKLY SPRAY 9, NICE N' EASY, WINDEX.

i. Have cosmetic products been used recently? Y / (N) When & Type? _____

j. Has painting/staining been done in the last 6 months? (Y) N Where & When? TOUCH-UPS ACROSS BUILDING

k. Is there new carpet, drapes or other textiles? (Y) N Where & When? 1+ YRS AGO

l. Have air fresheners been used recently? (Y) N When & Type? WOMEN'S BATHROOM

m. Is there a kitchen exhaust fan? (Y) N If yes, where vented? RECIRCULATED.

n. Is there a bathroom exhaust fan? (Y) N If yes, where vented? ROOF STACK

o. Is there a clothes dryer? Y (N) If yes, is it vented outside? Y / N

p. Has there been a pesticide application? Y (N) When & Type? _____

Are there odors in the building? (Y) N
If yes, please describe: WELDING FUMES, GRINDING DUST, SOLVENTS + LUBRICANTS ODORS

Do any of the building occupants use solvents at work? (Y) N - METAL FABRICATION PROCESS
(e.g., chemical manufacturing or laboratory, auto mechanic or auto body shop, painting, fuel oil delivery, boiler mechanic, pesticide application, cosmetologist

If yes, what types of solvents are used? * KENSOL 30 BY BRAD PEN
* L67 VARNISHING OIL BY PPG
* LUBRICANTS / ADHESIVES / GREASES / METAL PAINTS - COATINGS.

If yes, are their clothes washed at work? Y (N)

Do any of the building occupants regularly use or work at a dry-cleaning service? (Circle appropriate response)

Yes, use dry-cleaning regularly (weekly) (No)
Yes, use dry-cleaning infrequently (monthly or less) Unknown
Yes, work at a dry-cleaning service

Is there a radon mitigation system for the building/structure? (Y) N Date of Installation: BUT OFF SINCE 4/2018 → FOR RESIDENCE ONLY.
DUE TO VACANCY.
Is the system active or passive? (Active)/Passive

9. WATER AND SEWAGE

Water Supply: (Public Water) Drilled Well Driven Well Dug Well Other: _____

Sewage Disposal: (Public Sewer) Septic Tank Leach Field Dry Well Other: _____

10. RELOCATION INFORMATION (for oil spill residential emergency) BEING PURCHASED BUT NO CHANGES EXPETED IN USE/OCCUPANCY

a. Provide reasons why relocation is recommended: _____

N/A

b. Residents choose to: remain in home relocate to friends/family relocate to hotel/motel

c. Responsibility for costs associated with reimbursement explained? Y / N

d. Relocation package provided and explained to residents? Y / N

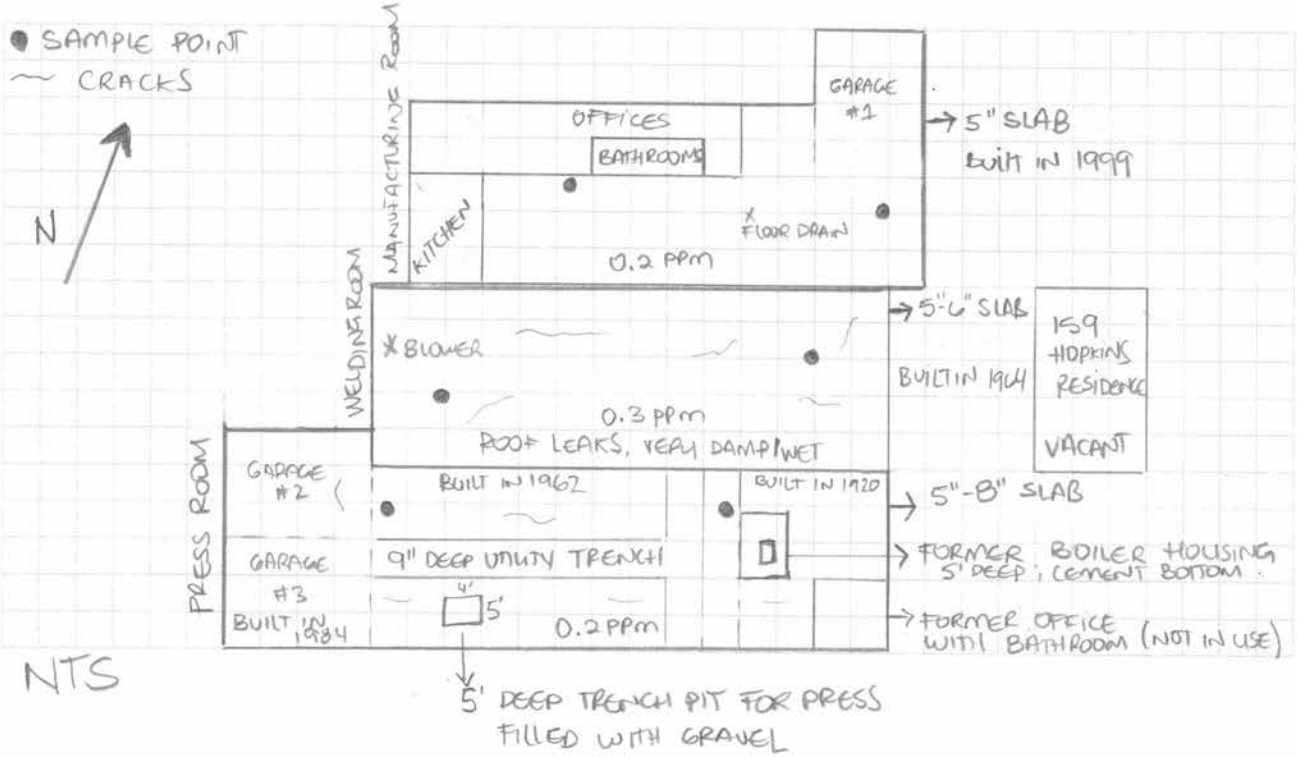
* RESIDENCE TO BE POTENTIALLY DEMOLISHED.

11. FLOOR PLANS

Draw a plan view sketch of the basement and first floor of the building. Indicate air sampling locations, possible indoor air pollution sources and PID meter readings. If the building does not have a basement, please note.

Basement: N/A

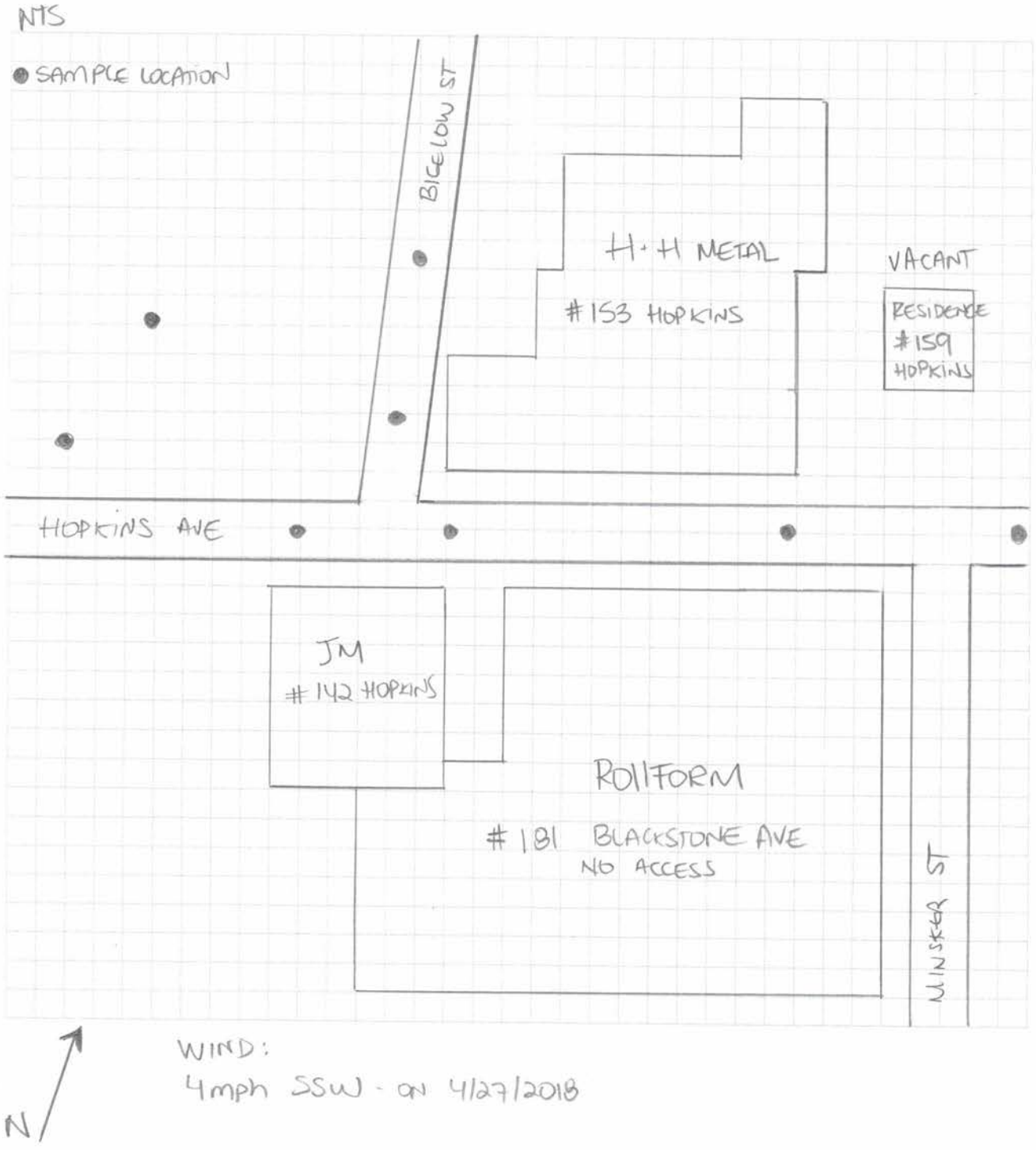
First Floor:



12. OUTDOOR PLOT

Draw a sketch of the area surrounding the building being sampled. If applicable, provide information on spill locations, potential air contamination sources (industries, gas stations, repair shops, landfills, etc.), outdoor air sampling location(s) and PID meter readings.

Also indicate compass direction, wind direction and speed during sampling, the locations of the well and septic system, if applicable, and a qualifying statement to help locate the site on a topographic map.



13. PRODUCT INVENTORY FORM

Make & Model of field instrument used: MINIRAE 2000 PHOTOIONIZATION DETECTOR (PID)

List specific products found in the residence that have the potential to affect indoor air quality.

Location	Product Description	Size (units) gallons	Condition*	Chemical Ingredients	Field Instrument Reading (units) PPM	Photo ** Y / N
PRESS ROOM	KENSOL 30	55	U	STODDARD SOLVENT, NONANE, TMB	1.2	N
	L 67	55	U	OIL, RESIN, SOLVENT, DRIERS	0.5	N
	USED HYDRAULIC OIL	55	U	OILS, BUTANOL, ESTERS, ADIPATES	0.5	N
	SOAP GILCITE WAX - PD 17	55	U	DRAWING + STAMPING COMPOUNDS	0.5	N
	MOBIL OIL 600 W	(12)-5gal	U	BASE OIL + ADDITIVES	0.3	N
	TRANSMISSION OIL ATF-4	10gal	U	MINERAL OIL, DISTILLATES + PARAFFINS	0.5	N
	SPRAY NINE HEAVY DUTY	1	U	C9-C10 ALCOHOLS, DYPROPYLENE GYCOL, MONONBUTYL ETHER	0.1	N
	PAINT STRIPPER, CEMENT, PAINT, ANTIFREEZE, MICE +	VARIOUS SIZES	U	VARIOUS INGREDIENTS	0.3	N
WELDING ROOM	USED DRAIN OIL EASY	55	U	* SEE "USED HYDRAULIC OIL"	0.5	N
	KESTER 959T SOLDERING FLUX	VARIOUS gallons	U	ROSIN, PROPANOL, SUCCINIC ACID	0.2	N
	STARTING FLUID	3 SPRAY CANS	U	HEPTANE, CO_2, ETHANOL, CHLOROETHANE, DIETHYL ETHER	0.1	N
	RUST TREATMENT	1 SPRAY CAN	U	ACETONE, PETRO GASES, FORMIC ACID, 2-BUTOXYETHANOL	0.1	N
	3M HI-STRENGTH 90 CONTACT ADHESIVE	2 SPRAY CAN	U	DIMETHYL ETHER, METHYL ACETATE CYCLOHEXANE, 1-1-DIFLUOROETHANE	0.1	N
MANUFACTURE ROOM	PROPANE GAS	2 small cylinders	U	PROPANE	0.3	N
	EMCO FINISHING PAINT	1	U	EPOXY RESINS	0.2	N
						N
GARAGES	PROPANE GAS	5 medium cylinders	U	PROPANE	0.3	N
	GASOLINE	1	U	GASOLINE	0.3	N

* Describe the condition of the product containers as **Unopened (UO), Used (U),** or **Deteriorated (D)**
** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.

OSR – 3

JOHNSON MACHINE

NEW YORK STATE DEPARTMENT OF HEALTH
INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY
CENTER FOR ENVIRONMENTAL HEALTH

This form must be completed for each residence involved in indoor air testing.

Preparer's Name M. VIDAL + J. GOWDY Date/Time Prepared 4/27/2018

Preparer's Affiliation CH2M - JACOBS Phone No. 978 427 1801

Purpose of Investigation 2018 VI INVESTIGATION

1. OCCUPANT: JOHNSON MACHINE + FIBRE PRODUCTS

Interviewed: (Y)/ N

Last Name: MARSHALL First Name: MICHAEL

Address: 142 HOPKINS AVENUE, JAMESTOWN NY 14701

County: CHAUTAUQUA

Home Phone: N/A Office Phone: 716-665-2003 x 205

Number of Occupants/persons at this location _____ Age of Occupants _____

2. OWNER OR LANDLORD: (Check if same as occupant ✓)

Interviewed: (Y)/ N

Last Name: _____ First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response)

Residential	School	Commercial/Multi-use
(Industrial)	Church	Other: _____

If the property is residential, type? (Circle appropriate response) N/A

Ranch	2-Family	3-Family
Raised Ranch	Split Level	Colonial
Cape Cod	Contemporary	Mobile Home
Duplex	Apartment House	Townhouses/Condos
Modular	Log Home	Other:_____

If multiple units, how many? N/A

If the property is commercial, type?

Business Type(s) METAL FABRICATION

Does it include residences (i.e., multi-use)? Y / (N) If yes, how many? N/A

Other characteristics:

Number of floors 1 Building age 30 YRS

Is the building insulated? (Y) / N How air tight? Tight / (Average) / Not Tight

L SOME SHALLOW CRACKS

4. AIRFLOW

Use air current tubes or tracer smoke to evaluate airflow patterns and qualitatively describe:

Airflow between floors

N/A - ONE FLOOR ONLY

Airflow near source

NO SOURCE IDENTIFIED. INDOOR AIR IS RECIRCULATED BY HVAC SYSTEM AND BLOWER IN MANUFACTURING AREA.

Outdoor air infiltration

POTENTIAL OUTDOOR AIR INFILTRATION FROM WINDOWS/DOORWAYS.

Infiltration into air ducts

EXPOSED AIR DUCTS APPEAR TO BE AIR-TIGHT

5. BASEMENT AND CONSTRUCTION CHARACTERISTICS (Circle all that apply) 6"-12" SLAB.

a. Above grade construction:	wood frame	(concrete)	stone	(brick)
b. Basement type: N/A	full	crawlspace	slab	other _____
c. Basement floor: N/A	concrete	dirt	stone	other _____
d. Basement floor: N/A	uncovered	covered	covered with _____	
e. Concrete floor:	unsealed	(sealed)	sealed with _____	
f. Foundation walls:	poured	(block)	stone	other _____
g. Foundation walls:	unsealed	(sealed)	sealed with _____	
h. The ~~basement~~ FIRST FLOOR is:	wet	damp	(dry)	moldy
i. The basement is: N/A	finished	unfinished	partially finished	
j. Sump present?	Y (N)			
k. Water in sump?	Y / N / (not applicable)			

Basement/Lowest level depth below grade: 1 (feet) - WHERE SLAB IS THICKEST

Identify potential soil vapor entry points and approximate size (e.g., cracks, utility ports, drains)

* SHALLOW SURFACE CRACKS IN MANUFACTURING AREA (~2'-5' LONG)
* FLOOR DRAINS IN BATHROOMS AND MANUFACTURING AREA.

6. HEATING, VENTING and AIR CONDITIONING (Circle all that apply)

Type of heating system(s) used in this building: (circle all that apply – note primary)

Hot air circulation	(Heat pump)	Hot water baseboard	
Space Heaters	Stream radiation	Radiant floor	
Electric baseboard	Wood stove	Outdoor wood boiler	Other _____

The primary type of fuel used is:

Natural Gas	Fuel Oil	Kerosene
(Electric)	Propane	Solar
Wood	Coal	

Domestic hot water tank fueled by: ELECTRIC

Boiler/furnace located in: Basement Outdoors Main Floor Other_____

Air conditioning: (Central Air) Window units Open Windows None

Are there air distribution ducts present? (Y) / N

Describe the supply and cold air return ductwork, and its condition where visible, including whether there is a cold air return and the tightness of duct joints. Indicate the locations on the floor plan diagram.

NOT VISIBLE IN OFFICE, KITCHEN OR BATHROOMS.
HVAC SYSTEM, BLOWER AND UNIT HEATERS APPEAR AIR-TIGHT.

7. OCCUPANCY ↱ AT LEAST 2 PEOPLE, 40 HRS/WEEK EACH.

Is basement/lowest level occupied? Full-time Occasionally Seldom Almost Never

Level	**General Use of Each Floor (e.g., familyroom, bedroom, laundry, workshop, storage)**
Basement	N/A
1st Floor	OFFICE + WORKSHOP.
2nd Floor	N/A
3rd Floor	N/A
4th Floor	N/A

8. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY

a. Is there an attached garage? (Y) N

b. Does the garage have a separate heating unit? Y (N) NA

c. Are petroleum-powered machines or vehicles stored in the garage (e.g., lawnmower, atv, car) (Y) N / NA Please specify VEHICLES

d. Has the building ever had a fire? Y / (N) When?

e. Is a kerosene or unvented gas space heater present? Y / (N) Where?

f. Is there a workshop or hobby/craft area? (Y) N Where & Type? MAJORITY OF BUILDING METAL FABRICATION

g. Is there smoking in the building? Y / (N) How frequently?

h. Have cleaning products been used recently? (Y) N When & Type? AT LEAST WEEKLY HOUSEHOLD + METAL CLEANING AGENTS.

i. Have cosmetic products been used recently? Y (N) When & Type?

j. Has painting/staining been done in the last 6 months? Y (N) Where & When? _____

k. Is there new carpet, drapes or other textiles? Y (N) Where & When? _____

l. Have air fresheners been used recently? Y / (N) When & Type? _____

m. Is there a kitchen exhaust fan? Y / (N) If yes, where vented? _____

n. Is there a bathroom exhaust fan? Y / (N) If yes, where vented? _____

o. Is there a clothes dryer? Y / (N) If yes, is it vented outside? Y / N

p. Has there been a pesticide application? Y / (N) When & Type? _____

Are there odors in the building? (Y) / N
If yes, please describe: SLIGHT SOLVENT + LUBRICANT ODORS

Do any of the building occupants use solvents at work? (Y) / N
(e.g., chemical manufacturing or laboratory, auto mechanic or auto body shop, painting, fuel oil delivery, boiler mechanic, pesticide application, cosmetologist

If yes, what types of solvents are used? CRYSTAL CLEAN MINERAL SPIRITS, COOLANTS

If yes, are their clothes washed at work? Y / (N)

Do any of the building occupants regularly use or work at a dry-cleaning service? (Circle appropriate response)

Yes, use dry-cleaning regularly (weekly) (No)
Yes, use dry-cleaning infrequently (monthly or less) Unknown
Yes, work at a dry-cleaning service

Is there a radon mitigation system for the building/structure? Y / (N) Date of Installation: _____
Is the system active or passive? Active/Passive

9. WATER AND SEWAGE

Water Supply: (Public Water) Drilled Well Driven Well Dug Well Other: _____

Sewage Disposal: (Public Sewer) Septic Tank Leach Field Dry Well Other: _____

10. RELOCATION INFORMATION (for oil spill residential emergency) N/A

a. Provide reasons why relocation is recommended: _____

b. Residents choose to: remain in home relocate to friends/family relocate to hotel/motel

c. Responsibility for costs associated with reimbursement explained? Y / N

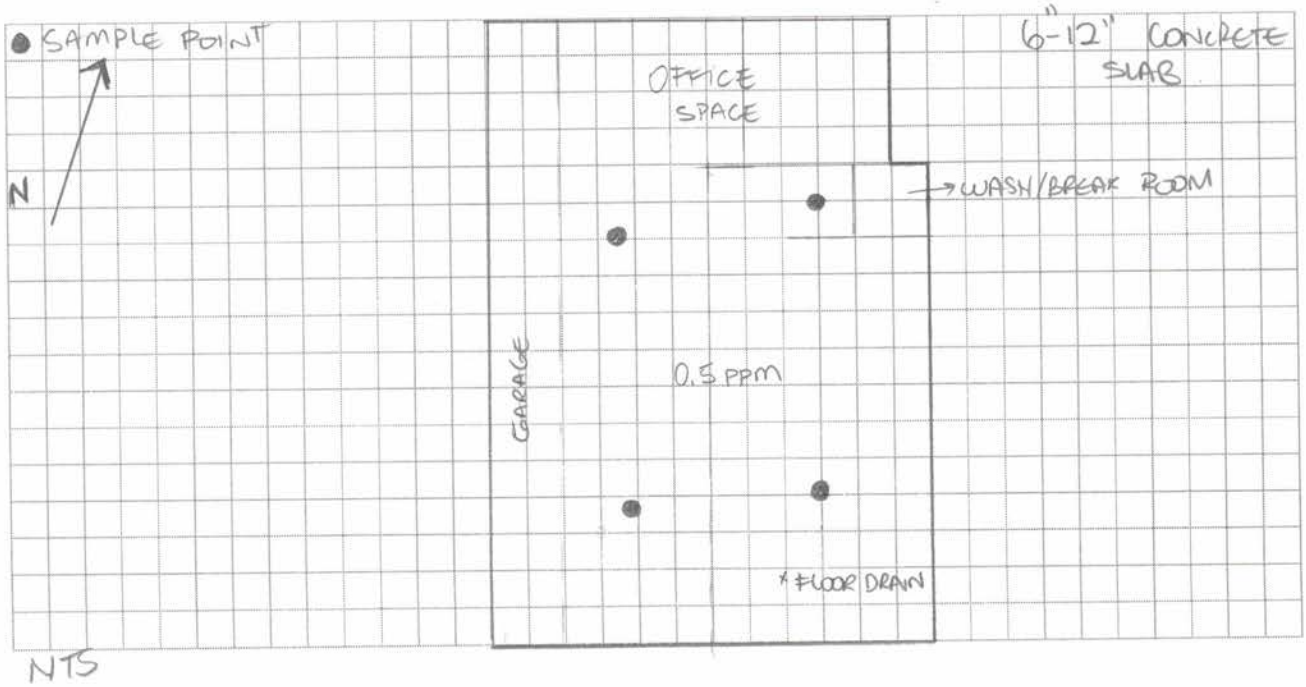
d. Relocation package provided and explained to residents? Y / N

11. FLOOR PLANS

Draw a plan view sketch of the basement and first floor of the building. Indicate air sampling locations, possible indoor air pollution sources and PID meter readings. If the building does not have a basement, please note.

Basement: NA

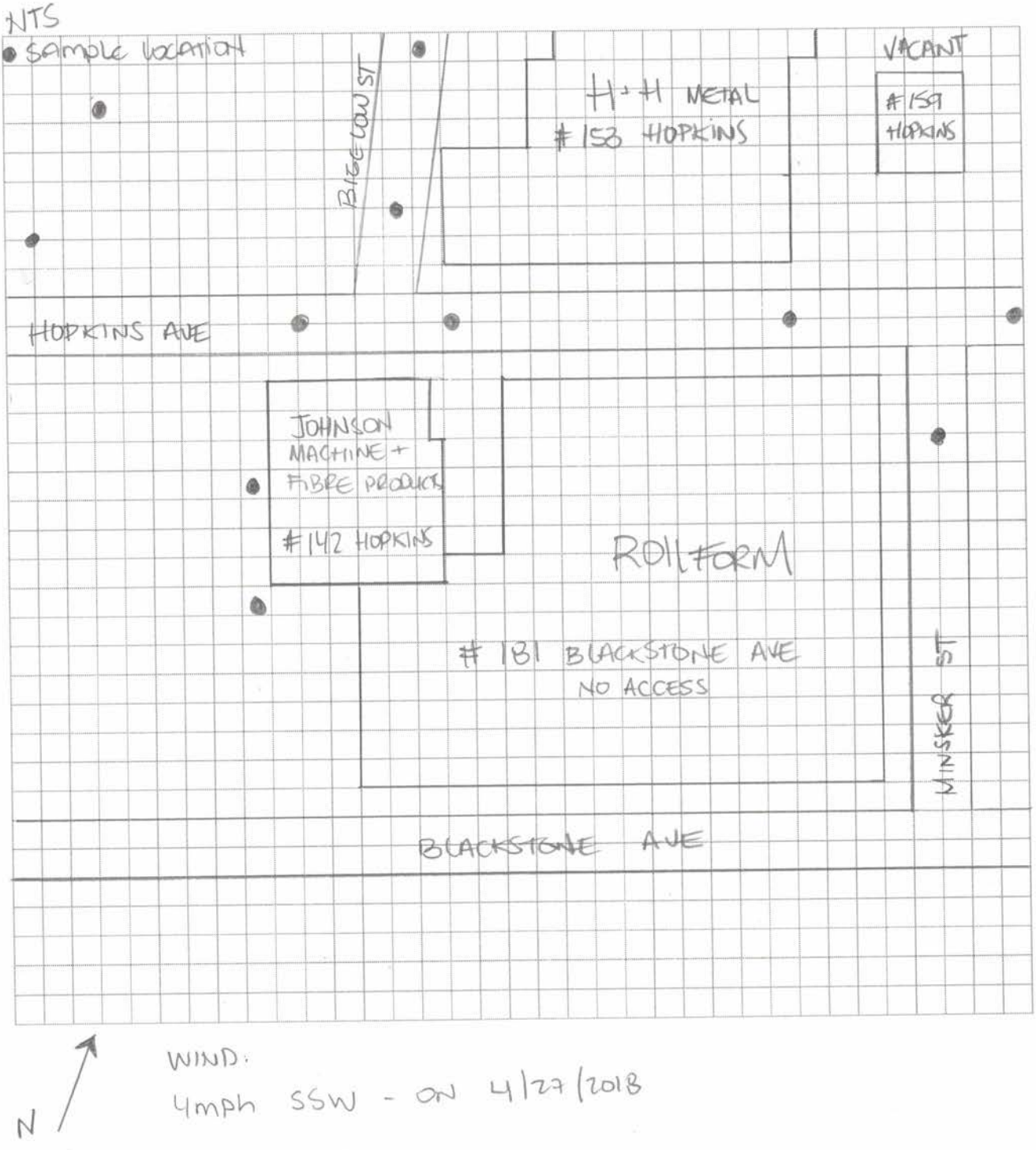
First Floor:



12. OUTDOOR PLOT

Draw a sketch of the area surrounding the building being sampled. If applicable, provide information on spill locations, potential air contamination sources (industries, gas stations, repair shops, landfills, etc.), outdoor air sampling location(s) and PID meter readings.

Also indicate compass direction, wind direction and speed during sampling, the locations of the well and septic system, if applicable, and a qualifying statement to help locate the site on a topographic map.



13. PRODUCT INVENTORY FORM

Make & Model of field instrument used: MINI RAE 2000 PHOTOIONIZATION DETECTOR (PID)

List specific products found in the residence that have the potential to affect indoor air quality.

Location	Product Description	Size (units) Gallons	Condition*	Chemical Ingredients	Field Instrument Reading (units) PPM	Photo ** Y / N
MANUFACTURING AREA	HOCUT WS 8900	(2) 55	U	METAL COOLANT: METHANOL, GLYCOLS, GLYCEROLS	0.5	N
	PROCUT 82	(2) 55	U	OIL BASED METAL CUTTING FLUID.	0.3	N
	CRYSTAL CLEAN 106	(2) 55	U	STODDARD SOLVENT	0.3	N
	UNMARKED LUBRICANT	5	U	BASE OIL + ADDITIVES	0.5	N
	UNMARKED HYDRAULIC OIL	(3) 55	U	OILS, BUTANOL, ESTERS, ADIPATES	0.1	N
	WOCOWAY 2 (15068)	(1) 55	U	LUBRICANT OIL	0.2	N

* Describe the condition of the product containers as **Unopened (UO), Used (U),** or **Deteriorated (D)**
** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.

Appendix B
Utility Locate Summary

NYLD Infrastructure

NEW YORK LEAK DETECTION, INC.
PO Box 269, Jamesville, NY 13078
315-469-4601 info@nyld.com

Field Report – Utility Location

Date(s) on site: 11/6/18 to 11/7/18

Technician: Nick Starr **Other Technicians on site:** N/A

Customer: Jacobs

Site Address: 126 Hopkins Avenue, Jamestown, NY

Contact Person: Jon Gowing **Phone:** 519-497-2011

Scope of Work: Utility Location Services -- The only details provided was a request for 3 days of utility location.

Type of Service: *mark all that apply*

☐ *Leak Detection*	☐ *Comprehensive Leak Survey*	☐ *Pressurized Pipe Inspection*
☐ *Infrastructure Assessment*	☒ *Utility Location/GPR*	☐ *Utility Mapping/AutoCAD*
☐ *EM Survey*	☐ *Video Inspection*	☐ *Valve Exercising*

Type of Equipment Used: *mark all that apply*

☐ *Profiler EMP 400*	☒ *RD8000 Pipe & Cable Locator*	☐ *MetroTech vLocPro2*
☐ *LC2500 Leak Correlator*	☒ *Noggin 250 MHz*	☐ *PosiTector UTG G3*
☐ *S-30 Surveyor*	☐ *Noggin 500 MHz*	☐ *Video Inspection Camera*
☐ *Sonde / Locatable Rodder*	☒ *Conquest 1000 MHz*	☐ *Helium # Bottles*
☐ *Leica Robotic Total Station*	☐ *Leica RTK GPS*	☐ *JD7 Investigator*
☐ *Valve Maintenance Trailer*	☐ *Thermal Imaging Camera*	☐ *ZCorr Data Loggers*

Marking Used: *mark all that apply*

☒ *Paint*	☐ *Flags*	☐ *Chalk/Marker*
☐ *Tape*	☐ *Updated Onsite Mapping*	☐ *Other _____*

NYLD **Infrastructure**

NEW YORK LEAK DETECTION, INC.
PO Box 269, Jamesville, NY 13078
315-469-4601 info@nyld.com

Field Report – Utility Location

Site Access/Safety Training: N/A **Expiration Date:** N/A

Ground Cover/Weather Conditions: 11/6 – Partly cloudy with some rain around 60 degrees. 11/7 – Sunny around 50 degrees.

Instructions from Onsite Contact: Clear 17 exterior boring locations and 11 interior boring locations.

Information Transfer:

☒ *Information relayed on site to:*

Jon Gowing

In addition to this field report, mark all that apply:

☐ *Hand drawn sketch*

☐ *Photographs*

☐ *Surveyed and AutoCAD Mapping by NYLD*

☐ *Maps updated onsite*

☐ *Surveyed by others*

Notes/Testing Results:

A visual inspection was performed in the area of concern to assess for utility structures. Utilizing the RD8000 in conductive, inductive, and power/radio modes, located and marked out utilities as shown in the area below. Additional confirmation performed with the Noggin using the 250 and/or 500 MHz antenna and the Conquest 1000 MHz. GPR signal reception varies depending upon soil conditions. Therefore, it is utilized in combination with various other geophysical tools for the most accurate verification of known/unknown utilities and/or structures.

Utilities were painted in appropriate color.

Various exterior boring locations were moved to accommodate utilities in proximity. The new locations were marked on site and relayed to site contact. All other exterior boring locations are deemed clear.

All interior sampling locations had rebar in the concrete. The rebar was marked out on site using both white paint and black electrical tape. The cleared location for drilling was given by a red box marked in paint. Drilling is advised to take place within the red box. All information regarding interior locations relayed to on site contact.

This report is back up to information relayed and marked on site at time of service. It is for informational purposes only.

Key

Blue	Water
Red	Power
Orange	Communications
Yellow	Gas/Flammable Fuel
White	Unknown
Green	Storm/Sanitary

NYLD **Infrastructure**

NEW YORK LEAK DETECTION, INC.
PO Box 269, Jamesville, NY 13078
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Field Report – Utility Location

NYLD Infrastructure

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PO Box 269, Jamesville, NY 13078
315-469-4601 info@nyld.com

Field Report – Utility Location

Subsurface Limitations

Utility locating is the art and science of using non-intrusive methods to search for, find and mark out buried, unseen conduits or other objects. There are innumerable variables involved in locating underground utilities, such as topography, size and complexity of job site, depth and proximity of buried utilities, above ground obstructions, short turnaround schedules, changes in the scope of work, lack of (or outdated) blueprints and adverse weather conditions.

New York Leak Detection, Inc. (NYLD) has made a substantial financial investment in crossover technologies and training to meet our clients' needs when locating and mapping utilities. However, due to unpredictable factors that may affect the results, NYLD makes no guarantee, expressed or implied, with respect to the completeness or accuracy of the information provided. Any use or reliance on the information or opinion is at the risk of the user and NYLD shall not be liable for any damage or injury arising out of the use or misuse of the information provided.

NYLD strives to provide the highest quality utility location services possible with the technical expertise of our field specialists and state-of-the-art equipment used. Every effort is made to provide our clients with the most accurate information possible without adverse consequences.

NYLD makes no guarantee that all subsurface utilities and obstructions will be detected. GPR signal penetration might not be sufficient to detect all utilities. NYLD is not responsible for detecting subsurface utilities and obstructions that normally cannot be detected by the methods employed or that cannot be detected because of site conditions. NYLD is not responsible for maintaining mark-outs after leaving the work area. Mark-outs made in inclement weather and in high traffic areas may not last. Surveyor assumes responsibility of picking up data on site.

Appendix C
Soil Vapor Probe Diagrams

JACOBS

SV-12

PROJECT NUMBER	PROBE NUMBER
703765 CH	SHEET 1 OF 1 DATE: 11/13/19

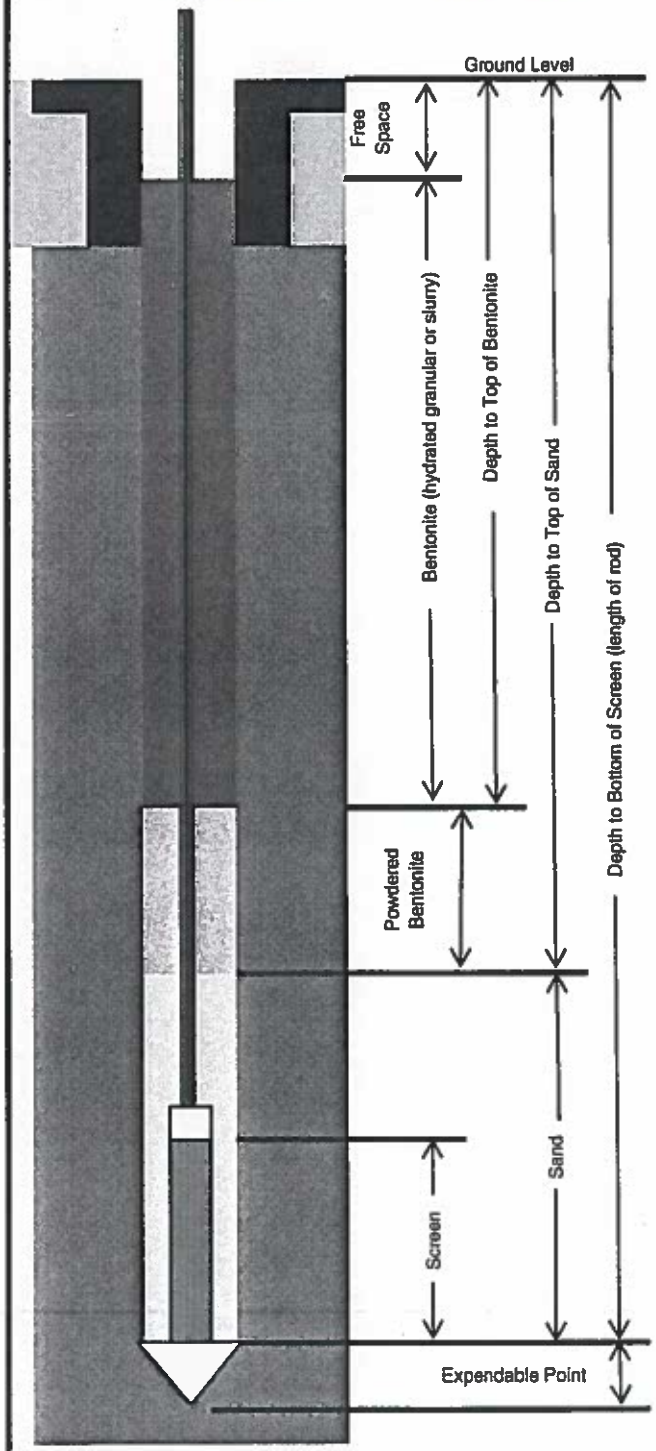
Soil Vapor Probe Diagram

PROJECT: Offsite VI investigation LOCATION: Jamestown NY

DRILLING CONTRACTOR: Parratt Wolff

DRILLING METHOD AND EQUIPMENT USED: Direct Push Geoprobe

START: 1340 END: 1350 Installer: J. Gawlik



Outer Diameter of Rod (in.)	2 1/4"
Depth to Bottom of Screen (ft)	7'
Length of Expendable Point (in.)	3"
Screen Diameter (in.) / Length (in.)	1/2"
Screen Mesh (in.)	Fine
Teflon Tubing Outer Diameter (in.)	0.25
Length of Sand Pack (in.)	12"
Depth to Top of Sand (ft)	6'
Length of Powdered Bentonite Seal (in.)	6"
Depth to Top of Powdered Bentonite (ft)	5.5'
Length of Bentonite (ft)	4'
Depth to Top of Bentonite (ft)	1'
Length of Free Space (in.)	1'
Flush Mount Diameter.	4"

Specifications (Quantity and Type)

Sand: Natural Sand (Sable) No 28

Bentonite: Enviro Plug Powdered No. 16

JACOBS

SV-14

PROJECT NUMBER	PROBE NUMBER
703765CH	SHEET 1 OF 1 DATE: 11/13/18

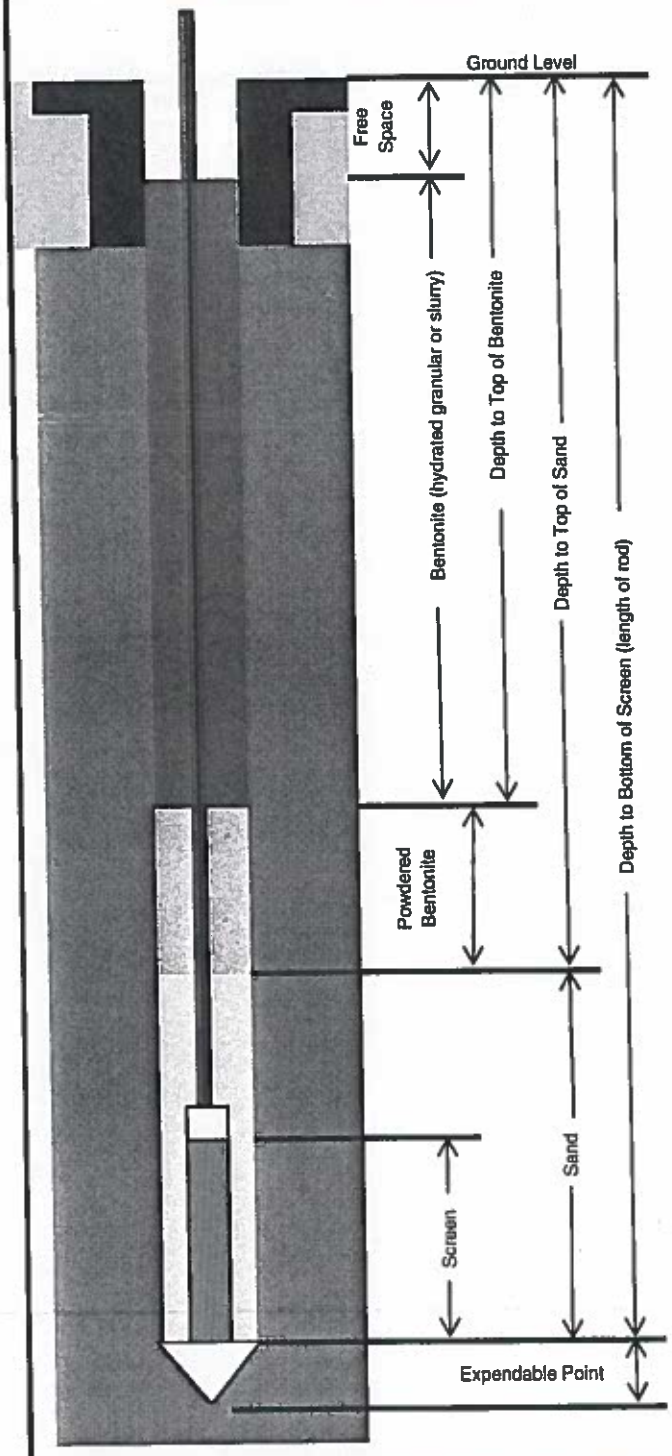
Soil Vapor Probe Diagram

PROJECT: offsite VI investigation LOCATION: Jamestown NY

DRILLING CONTRACTOR: Parratt Wolff

DRILLING METHOD AND EQUIPMENT USED: Direct Push Geoprobe

START: 1310 END: 1320 Installer: J. Gowing



Outer Diameter of Rod (in.)	2 1/4"
Depth to Bottom of Screen (ft)	7'
Length of Expendable Point (in.)	3"
Screen Diameter (in.) / Length (in.)	1/2"
Screen Mesh (in.)	Fine
Teflon Tubing Outer Diameter (in.)	0.25
Length of Sand Pack (in.)	12"
Depth to Top of Sand (ft)	6'
Length of Powdered Bentonite Seal (in.)	6"
Depth to Top of Powdered Bentonite (ft)	5.5'
Length of Bentonite (ft)	4'
Depth to Top of Bentonite (ft)	1'
Length of Free Space (in.)	1'
Flush Mount Diameter.	4"

Specifications (Quantity and Type)

Sand: Natural Sand (Sable) No. 28

Bentonite: Enviro Plug - Powdered No. 16

JACOBS

SV-15

PROJECT NUMBER	PROBE NUMBER
703765 CH	SHEET 1 OF 1 DATE: 11/13/18

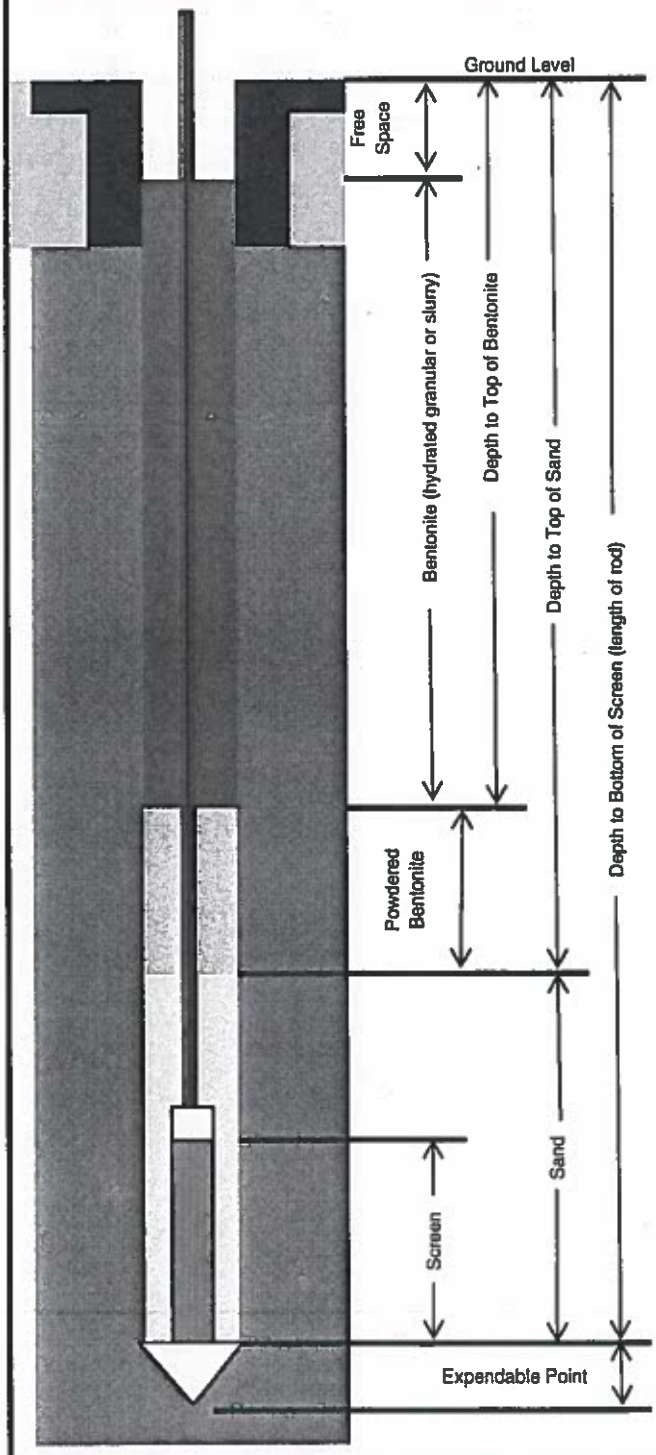
Soil Vapor Probe Diagram

PROJECT: offsite V1 investigation LOCATION: Jamestown NY

DRILLING CONTRACTOR: Parratt Wolff

DRILLING METHOD AND EQUIPMENT USED: Direct Push Geoprobe

START: 1355 END: 1410 Installer: J. Gaving



Outer Diameter of Rod (in.)	2 1/4"
Depth to Bottom of Screen (ft)	7'
Length of Expendable Point (in.)	3"
Screen Diameter (in.) / Length (in.)	1/2"
Screen Mesh (in.)	Fine
Teflon Tubing Outer Diameter (in.)	0.25
Length of Sand Pack (in.)	12"
Depth to Top of Sand (ft)	6'
Length of Powdered Bentonite Seal (in.)	6"
Depth to Top of Powdered Bentonite (ft)	5.5'
Length of Bentonite (ft)	4'
Depth to Top of Bentonite (ft)	1'
Length of Free Space (in.)	1'
Flush Mount Diameter.	4"

Specifications (Quantity and Type)

Sand: Natural Sand (Sable) (No 28)

Bentonite: Enviro Plug Powdered No. 16

JACOBS

SV-10

PROJECT NUMBER	PROBE NUMBER
703765 CH	SHEET 1 OF 1 DATE: 11/13/18

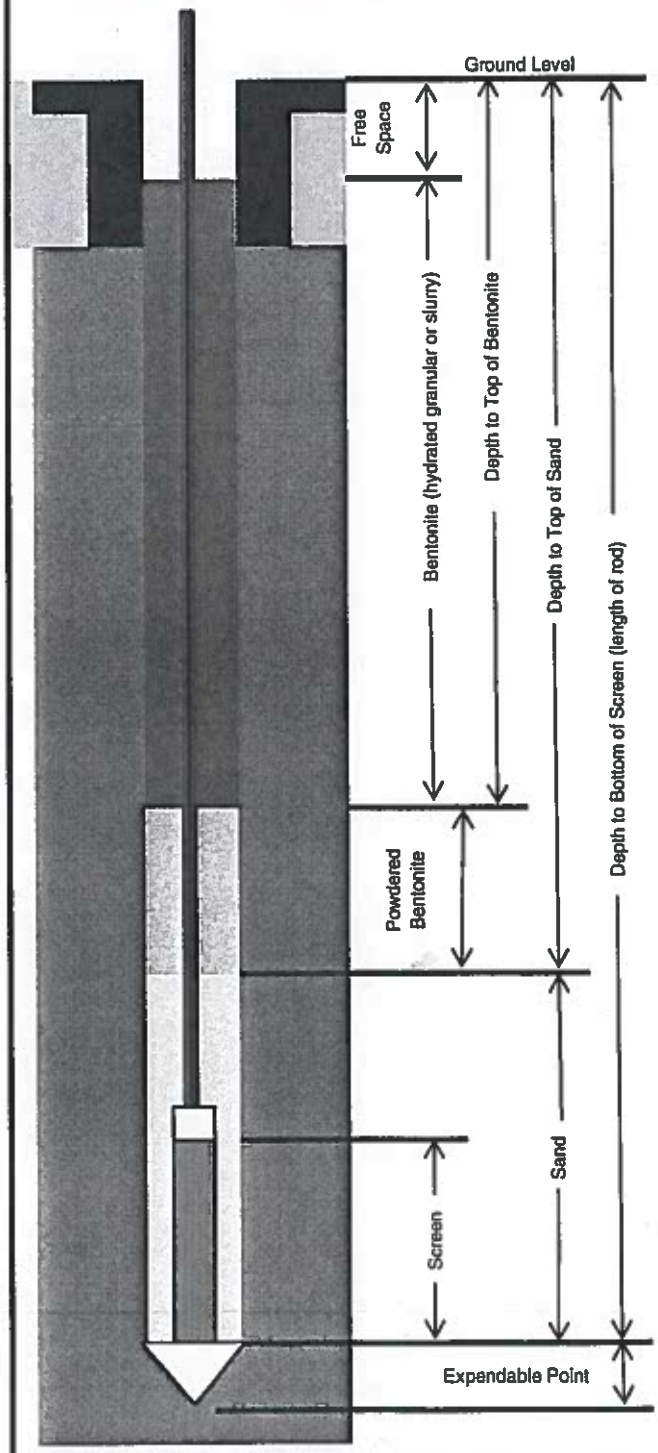
Soil Vapor Probe Diagram

PROJECT: Offsite VI Investigation LOCATION: Jamestown NY

DRILLING CONTRACTOR: Parratt Wolff

DRILLING METHOD AND EQUIPMENT USED: Direct Push Geoprobe

START: 1430 END: 1505 Installer: J. Gowing



Outer Diameter of Rod (in.)	2 1/4"
Depth to Bottom of Screen (ft)	7'
Length of Expendable Point (in.)	3"
Screen Diameter (in.) / Length (in.)	1/2"
Screen Mesh (in.)	fine
Teflon Tubing Outer Diameter (in.)	0.25
Length of Sand Pack (in.)	12"
Depth to Top of Sand (ft)	6'
Length of Powdered Bentonite Seal (in.)	6"
Depth to Top of Powdered Bentonite (ft)	5.5'
Length of Bentonite (ft)	4'
Depth to Top of Bentonite (ft)	1'
Length of Free Space (in.)	1'
Flush Mount Diameter.	4"

Specifications (Quantity and Type)

Sand: Natural Sand (No. 28)

Bentonite: Enviro Plug Powdered (No. 16).

JACOBS

SV-09

PROJECT NUMBER	PROBE NUMBER
703765 CH	SHEET 1 OF 1 DATE: 11/13/18

Soil Vapor Probe Diagram

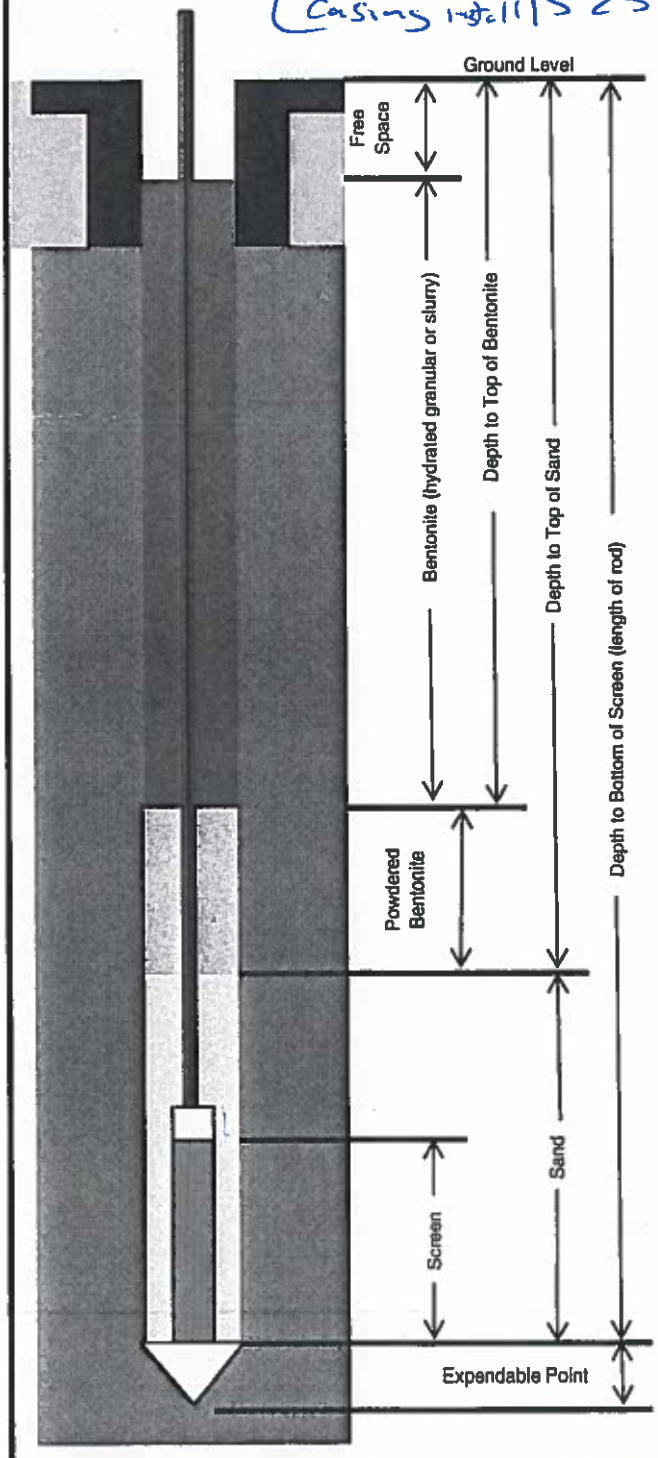
PROJECT: offsite VI investigation LOCATION: Jamestown NY

DRILLING CONTRACTOR: Parrat Wolff

DRILLING METHOD AND EQUIPMENT USED: Direct Push Geoprobe

START: 1125 END: 1140 Installer: J. Cowing

(Casing Install 1525)



Outer Diameter of Rod (in.)	2 1/4"
Depth to Bottom of Screen (ft)	7'
Length of Expendable Point (in.)	3"
Screen Diameter (in.) / Length (in.)	1/2"
Screen Mesh (in.)	Fine
Teflon Tubing Outer Diameter (in.)	0.25
Length of Sand Pack (in.)	12"
Depth to Top of Sand (ft)	6'
Length of Powdered Bentonite Seal (in.)	6"
Depth to Top of Powdered Bentonite (ft)	5.5'
Length of Bentonite (ft)	4'
Depth to Top of Bentonite (ft)	1'
Length of Free Space (in.)	1'
Flush Mount Diameter.	4"

Specifications (Quantity and Type)

Sand: Natural Sand (Sable) (No. 28)

Bentonite: ENVIRO Plug Powdered. (No. 16)

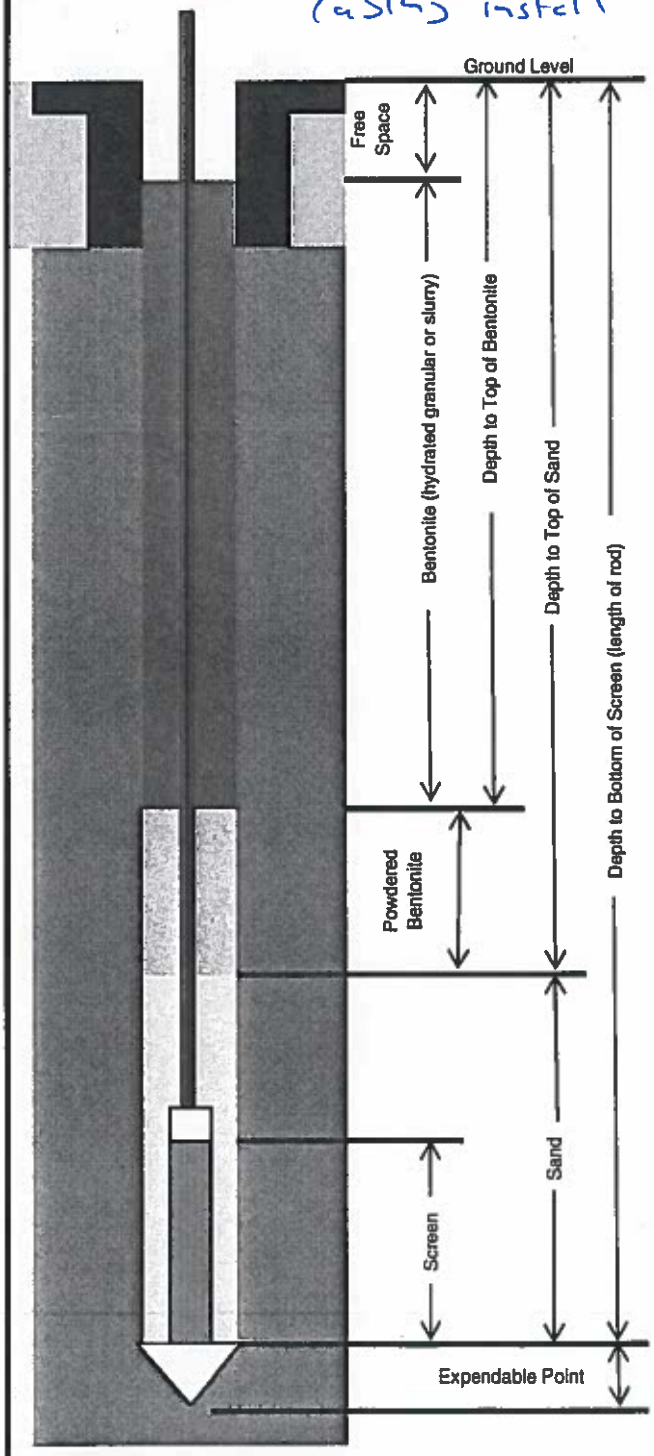
JACOBS

SV-08

PROJECT NUMBER	PROBE NUMBER
703765 CH	SHEET 1 OF 1 DATE: 11/15/18

Soil Vapor Probe Diagram

PROJECT: offsite VI investigation LOCATION: Jamestown NY
DRILLING CONTRACTOR: Parratt Wolff
DRILLING METHOD AND EQUIPMENT USED: Direct Push Geoprobe
START: 1145 END: 1155 Installer: J. Gowing
(casing install 1540)



Outer Diameter of Rod (in.)	2 1/4"
Depth to Bottom of Screen (ft)	7'
Length of Expendable Point (in.)	3"
Screen Diameter (in.) / Length (in.)	1/2"
Screen Mesh (in.)	Fine
Teflon Tubing Outer Diameter (in.)	0.25
Length of Sand Pack (in.)	12"
Depth to Top of Sand (ft)	6'
Length of Powdered Bentonite Seal (in.)	6"
Depth to Top of Powdered Bentonite (ft)	5.5'
Length of Bentonite (ft)	4'
Depth to Top of Bentonite (ft)	1'
Length of Free Space (in.)	1'
Flush Mount Diameter.	4"

Specifications (Quantity and Type)

Sand: Natural Sand (Sable) (No. 2S)

Bentonite: Enviro Plug Powdered (No. 16)

JACOBS

SV-11

PROJECT NUMBER	PROBE NUMBER
703765 CH	SHEET 1 OF 1 DATE: 11/15/18

Soil Vapor Probe Diagram

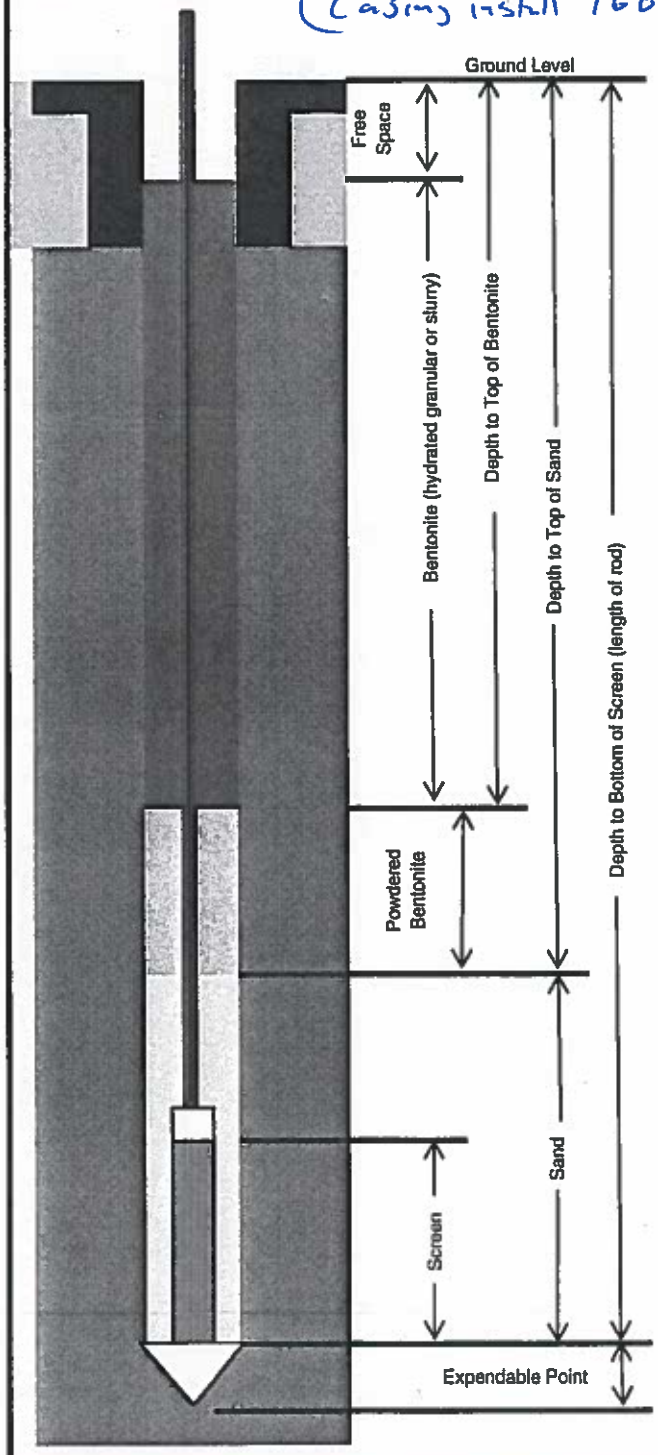
PROJECT: Offsite VI investigation LOCATION: Jamestown NY

DRILLING CONTRACTOR: Parratt Wolff

DRILLING METHOD AND EQUIPMENT USED: Direct Push Geoprobe

START: 1200 END: 1220 Installer: J. Gavins

(Casing install 1600)



Outer Diameter of Rod (in.)	2 1/4"
Depth to Bottom of Screen (ft)	7'
Length of Expendable Point (in.)	3"
Screen Diameter (in.) / Length (in.)	1/2"
Screen Mesh (in.)	Fine
Teflon Tubing Outer Diameter (in.)	0.25
Length of Sand Pack (in.)	12"
Depth to Top of Sand (ft)	6'
Length of Powdered Bentonite Seal (in.)	6"
Depth to Top of Powdered Bentonite (ft)	5.5'
Length of Bentonite (ft)	4'
Depth to Top of Bentonite (ft)	1'
Length of Free Space (in.)	1'
Flush Mount Diameter.	4"

Specifications (Quantity and Type)

Sand: Natural Sand (Sable) (No. 28)

Bentonite: Enviro Plug, Powdered (No. 16).

JACOBS

SV-13

PROJECT NUMBER	PROBE NUMBER
703765 CH	SHEET 1 OF 1 DATE: 11/15/18

Soil Vapor Probe Diagram

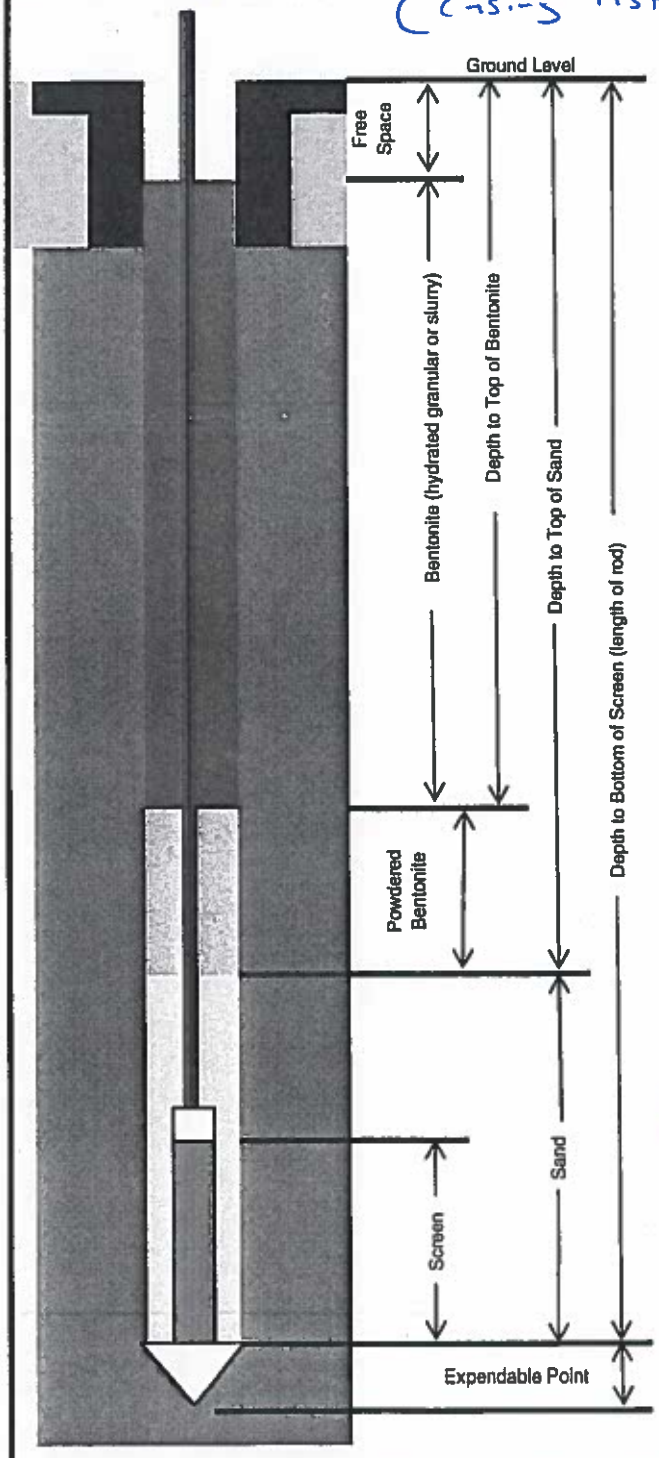
PROJECT: offsite VI Investigation LOCATION: Jamestown NY

DRILLING CONTRACTOR: Parratt Wolff

DRILLING METHOD AND EQUIPMENT USED: Direct Push Geoprobe

START: 1250 END: 1305 Installer: S. Gowing

(Casing Install 1620)



Outer Diameter of Rod (in.)	2 1/4 "
Depth to Bottom of Screen (ft)	7 '
Length of Expendable Point (in.)	3 "
Screen Diameter (in.) / Length (in.)	1/2 "
Screen Mesh (in.)	Fine
Teflon Tubing Outer Diameter (in.)	0.25
Length of Sand Pack (in.)	12 "
Depth to Top of Sand (ft)	6 '
Length of Powdered Bentonite Seal (in.)	6 "
Depth to Top of Powdered Bentonite (ft)	5.5 '
Length of Bentonite (ft)	4 '
Depth to Top of Bentonite (ft)	1 '
Length of Free Space (in.)	1 "
Flush Mount Diameter.	4 "

Specifications (Quantity and Type)

Sand: natural Sand (Sable) No. 28

Bentonite: Envirp Plug No. 16 (Powdered)

JACOBS

SV-16

PROJECT NUMBER	PROBE NUMBER
703765CH	SHEET 1 OF 1 DATE: 11/13/08

Soil Vapor Probe Diagram

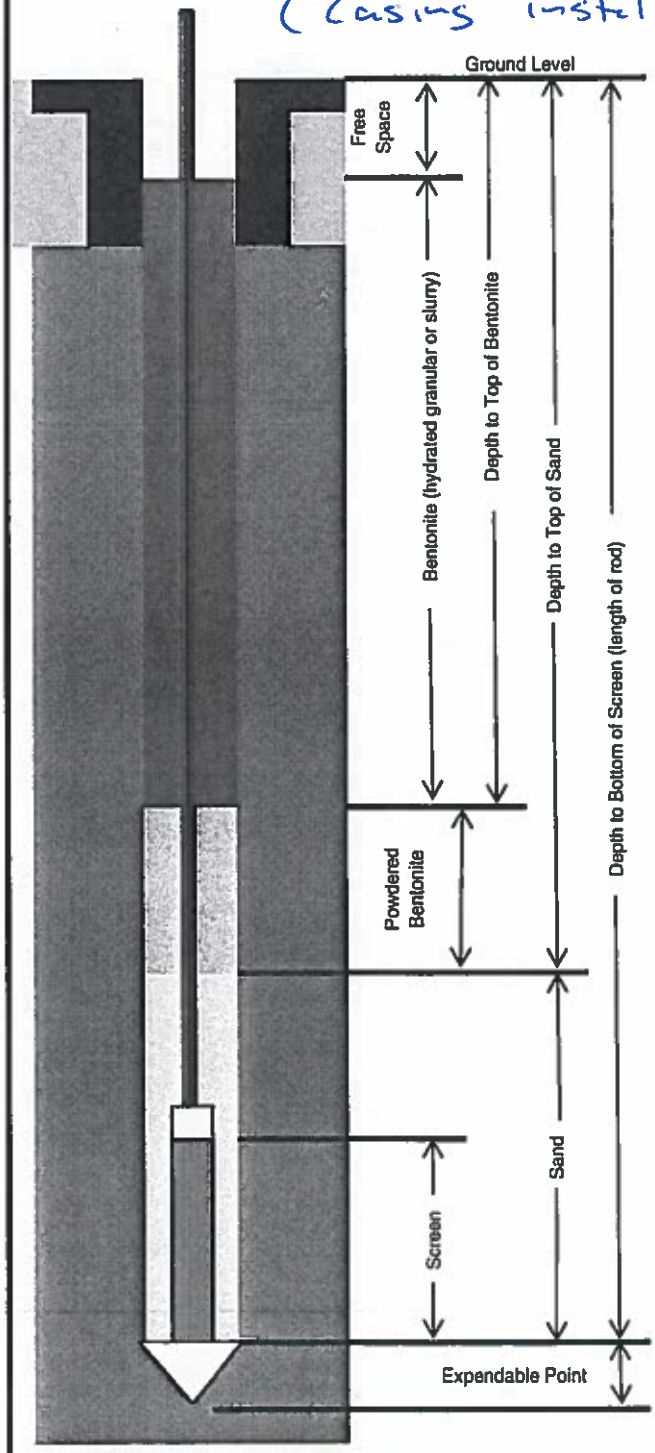
PROJECT: Offsite VI Investigation LOCATION: Jamestown NY

DRILLING CONTRACTOR: Parratt Wolff

DRILLING METHOD AND EQUIPMENT USED: Direct Push Geoprobe

START: 1320 END: 1335 Installer: J. Gowing

(Casing install 1640)



Outer Diameter of Rod (in.)	2 1/4"
Depth to Bottom of Screen (ft)	7'
Length of Expendable Point (in.)	3"
Screen Diameter (in.) / Length (in.)	1/2"
Screen Mesh (in.)	fine
Teflon Tubing Outer Diameter (in.)	0.25
Length of Sand Pack (in.)	12"
Depth to Top of Sand (ft)	6'
Length of Powdered Bentonite Seal (in.)	6"
Depth to Top of Powdered Bentonite (ft)	5.5'
Length of Bentonite (ft)	4'
Depth to Top of Bentonite (ft)	1'
Length of Free Space (in.)	1'
Flush Mount Diameter.	4"

Specifications (Quantity and Type)

Sand: Natural Sand (Sable) (No. 20)

Bentonite: Enviro Plug Powdered (No. 16)

JACOBS

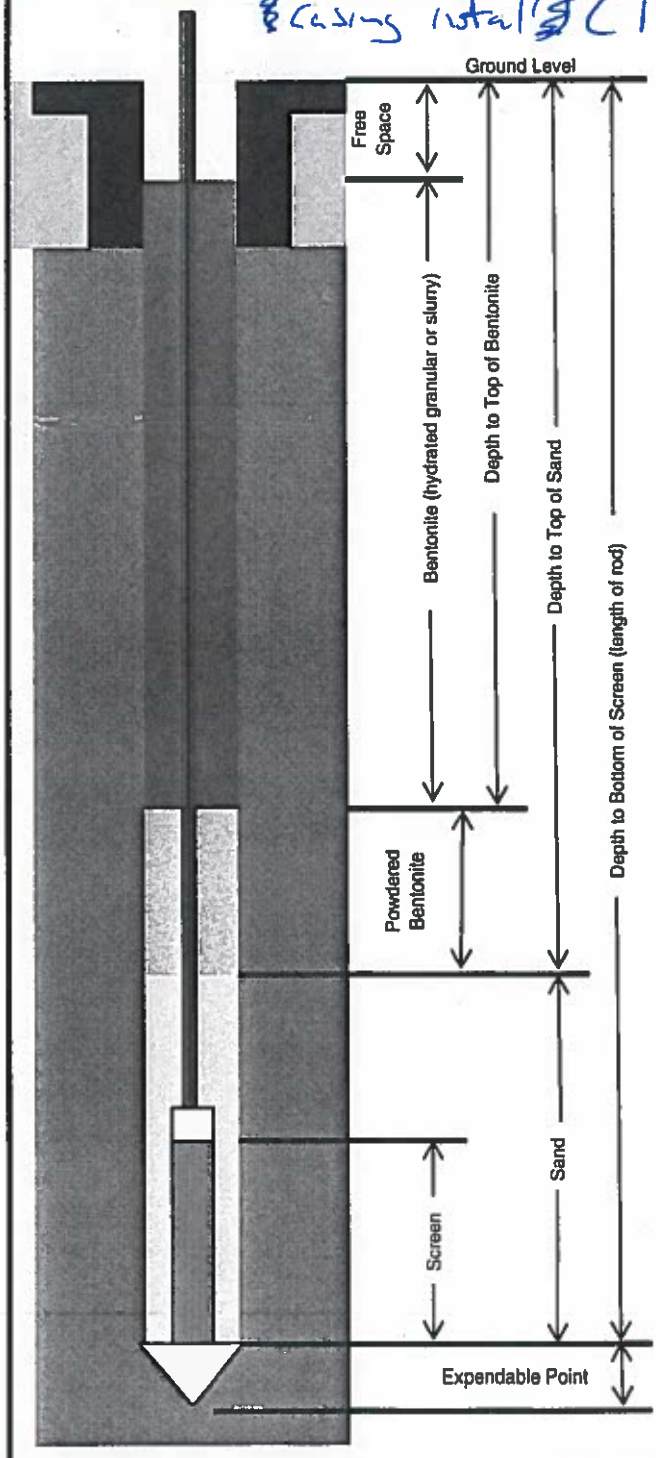
PROJECT NUMBER	PROBE NUMBER
703765 CH	SHEET 1 OF 1 DATE: 11/13/18

SV-04

Soil Vapor Probe Diagram

PROJECT: Offsite VI Investigation LOCATION: Jamestown NY
DRILLING CONTRACTOR: Parratt Wolff
DRILLING METHOD AND EQUIPMENT USED: Direct Push Geoprobe
START: 0830 END: 0850 Installer: J Fewing

Casing Install (1015)



Outer Diameter of Rod (in.)	2 1/4"
Depth to Bottom of Screen (ft)	7'
Length of Expendable Point (in.)	3"
Screen Diameter (in.) / Length (in.)	1/2"
Screen Mesh (in.)	Fine
Teflon Tubing Outer Diameter (in.)	0.25
Length of Sand Pack (in.)	12"
Depth to Top of Sand (ft)	6
Length of Powdered Bentonite Seal (in.)	6"
Depth to Top of Powdered Bentonite (ft)	5.5'
Length of Bentonite (ft)	4'
Depth to Top of Bentonite (ft)	1'
Length of Free Space (in.)	1'
Flush Mount Diameter.	4"

Specifications (Quantity and Type)

Sand: Natural Sand (Sable) (No. 70)

Bentonite: Enviro Plug Powdered (No. 1)

JACOBS

SV-05

PROJECT NUMBER	PROBE NUMBER
703765CH1	SHEET 1 OF 1 DATE: 11/13/18

Soil Vapor Probe Diagram

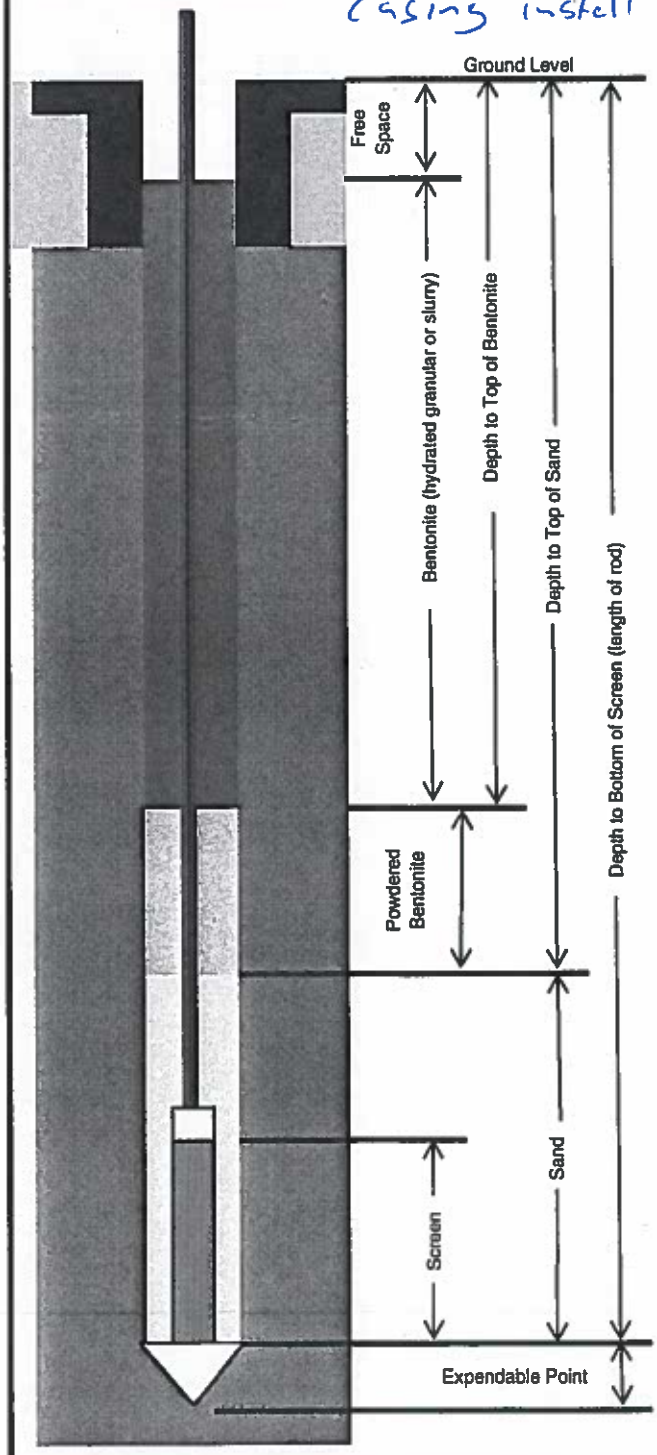
PROJECT: offsite Vi Investigation LOCATION: Jamestown NY

DRILLING CONTRACTOR: Parratt Wolff

DRILLING METHOD AND EQUIPMENT USED: Direct Push Geoprobe

START: 0850 END: 0910 Installer:

Casing install (1035)



Outer Diameter of Rod (in.)	2 1/4"
Depth to Bottom of Screen (ft)	7'
Length of Expendable Point (in.)	3"
Screen Diameter (in.) / Length (in.)	1/2"
Screen Mesh (in.)	Fine
Teflon Tubing Outer Diameter (in.)	0.25
Length of Sand Pack (in.)	12"
Depth to Top of Sand (ft)	6'
Length of Powdered Bentonite Seal (in.)	6"
Depth to Top of Powdered Bentonite (ft)	5.5'
Length of Bentonite (ft)	4'
Depth to Top of Bentonite (ft)	1'
Length of Free Space (in.)	1'
Flush Mount Diameter.	4"

Specifications (Quantity and Type)

Sand: Natural Sand (Sakrete) (No 28)

Bentonite: Envirp Plus Powdered (No 16)

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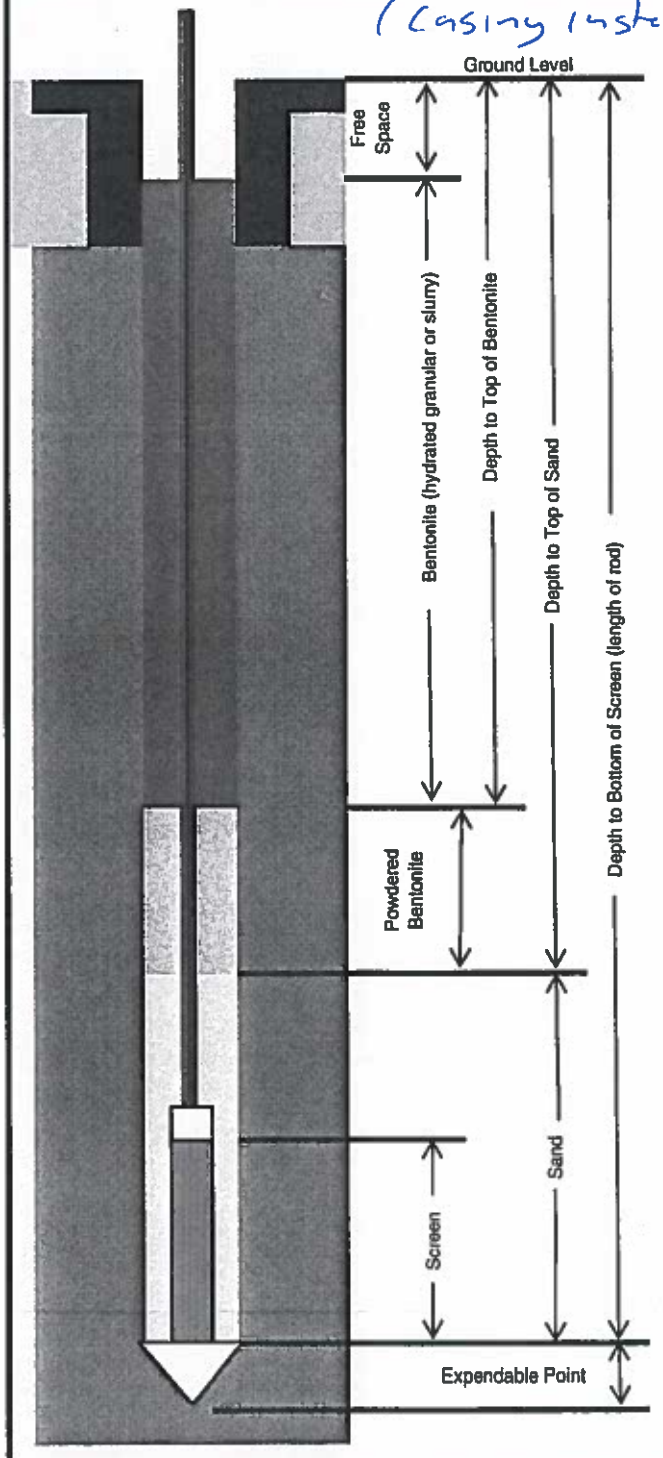
PROJECT NUMBER	PROBE NUMBER
703765 CH	SHEET 1 OF 1 DATE: 11/13/18

SV-06

Soil Vapor Probe Diagram

PROJECT: Offsite VI Investigation LOCATION: Jamestown NY
DRILLING CONTRACTOR: Parratt Wolff
DRILLING METHOD AND EQUIPMENT USED: Direct Push Geoprobe
START: 0915 END: 0930 Installer: J. Fleming

(Casing install 1055)



Outer Diameter of Rod (in.)	2 1/4"
Depth to Bottom of Screen (ft)	7'
Length of Expendable Point (in.)	3"
Screen Diameter (in.) / Length (in.)	1/2"
Screen Mesh (in.)	Fine
Teflon Tubing Outer Diameter (in.)	0.25
Length of Sand Pack (in.)	12"
Depth to Top of Sand (ft)	6'
Length of Powdered Bentonite Seal (in.)	6"
Depth to Top of Powdered Bentonite (ft)	5.5'
Length of Bentonite (ft)	4'
Depth to Top of Bentonite (ft)	1'
Length of Free Space (in.)	1'
Flush Mount Diameter.	4"

Specifications (Quantity and Type)

Sand: Natural Sand (Gable) (No. 78)

Bentonite: Envirp Plus Powdered (No 16)

JACOBS

SV-07

PROJECT NUMBER	PROBE NUMBER
703765 CH	SHEET 1 OF 1 DATE: 11/13/18

Soil Vapor Probe Diagram

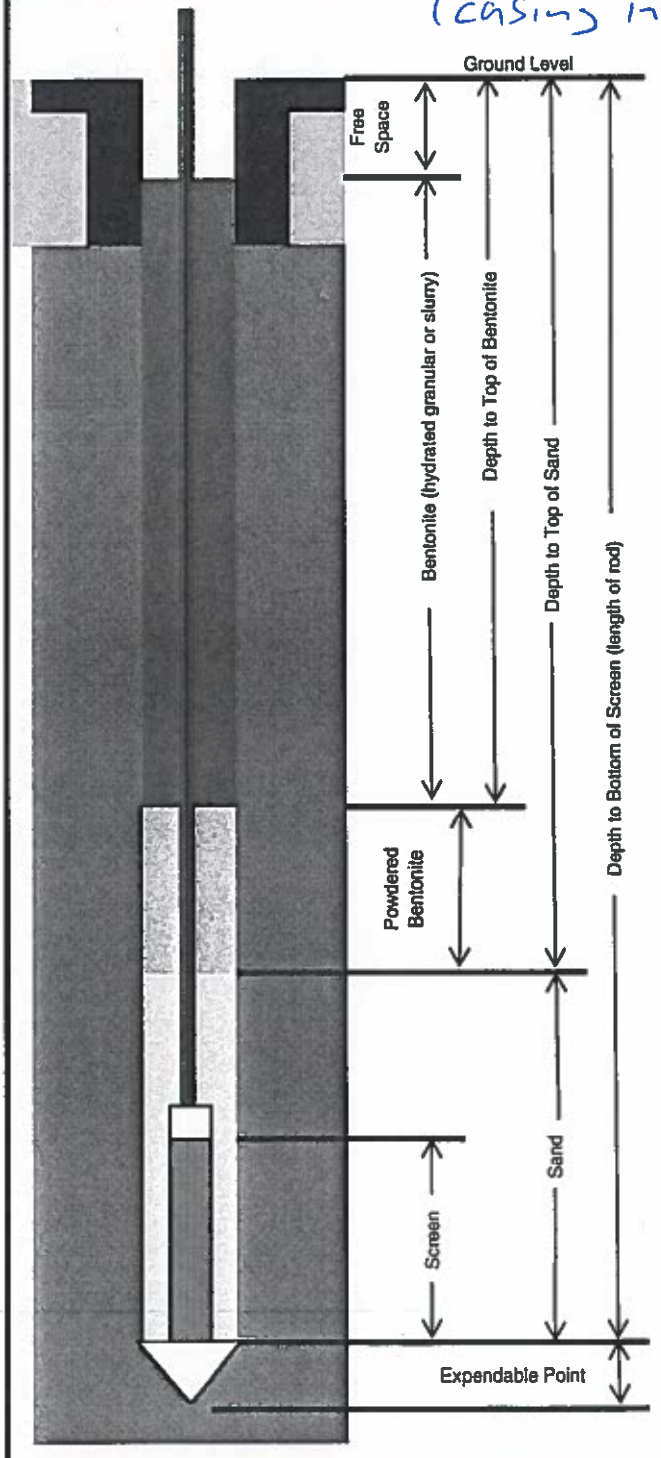
PROJECT: offsite VI Investigation LOCATION: Jamestown NY

DRILLING CONTRACTOR: Parratt Wolff

DRILLING METHOD AND EQUIPMENT USED: Direct Push Geoprobe

START: 0935 END: 0955 Installer:

(casing install 1115)



Outer Diameter of Rod (in.)	2 1/4"
Depth to Bottom of Screen (ft)	7'
Length of Expendable Point (in.)	3"
Screen Diameter (in.) / Length (in.)	1/2"
Screen Mesh (in.)	fine
Teflon Tubing Outer Diameter (in.)	0.25
Length of Sand Pack (in.)	12"
Depth to Top of Sand (ft)	6'
Length of Powdered Bentonite Seal (in.)	6"
Depth to Top of Powdered Bentonite (ft)	5.5'
Length of Bentonite (ft)	4'
Depth to Top of Bentonite (ft)	1'
Length of Free Space (in.)	1'
Flush Mount Diameter.	4"

Specifications (Quantity and Type)

Sand: Natural Sand (Sakle) (No 25)

Bentonite: Enviro Plus Powdered (No 16)

JACOBS

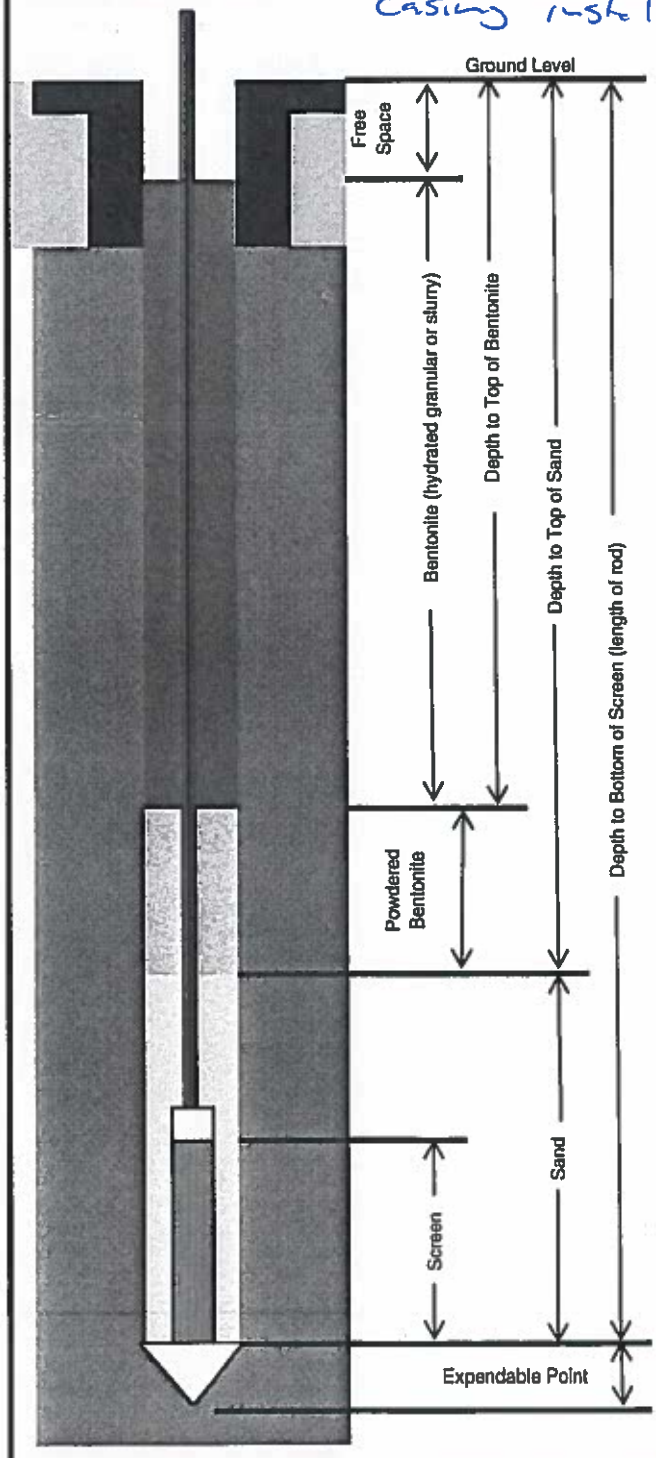
SV-01

PROJECT NUMBER	PROBE NUMBER
703765 CH	SHEET 1 OF 1 DATE: 11/12/18

Soil Vapor Probe Diagram

PROJECT: Offsite VI Investigation LOCATION: Jamestown NY
DRILLING CONTRACTOR: Pratt W&M
DRILLING METHOD AND EQUIPMENT USED: Direct Push Geoprobe
START: 1445 END: 1510 Installer: J. Gowing

Casing install (1515)



Outer Diameter of Rod (in.)	2 1/4 "
Depth to Bottom of Screen (ft)	7 '
Length of Expendable Point (in.)	3 "
Screen Diameter (in.) / Length (in.)	1/2 "
Screen Mesh (in.)	fine
Teflon Tubing Outer Diameter (in.)	0.25
Length of Sand Pack (in.)	12 "
Depth to Top of Sand (ft)	6 '
Length of Powdered Bentonite Seal (in.)	6 "
Depth to Top of Powdered Bentonite (ft)	5.5 '
Length of Bentonite (ft)	4 '
Depth to Top of Bentonite (ft)	1 '
Length of Free Space (in.)	1 "
Flush Mount Diameter.	4 "

Specifications (Quantity and Type)

Sand: natural Sand
Sable 28

Bentonite: Enviro Plug No. 16
(Powdered)

JACOBS

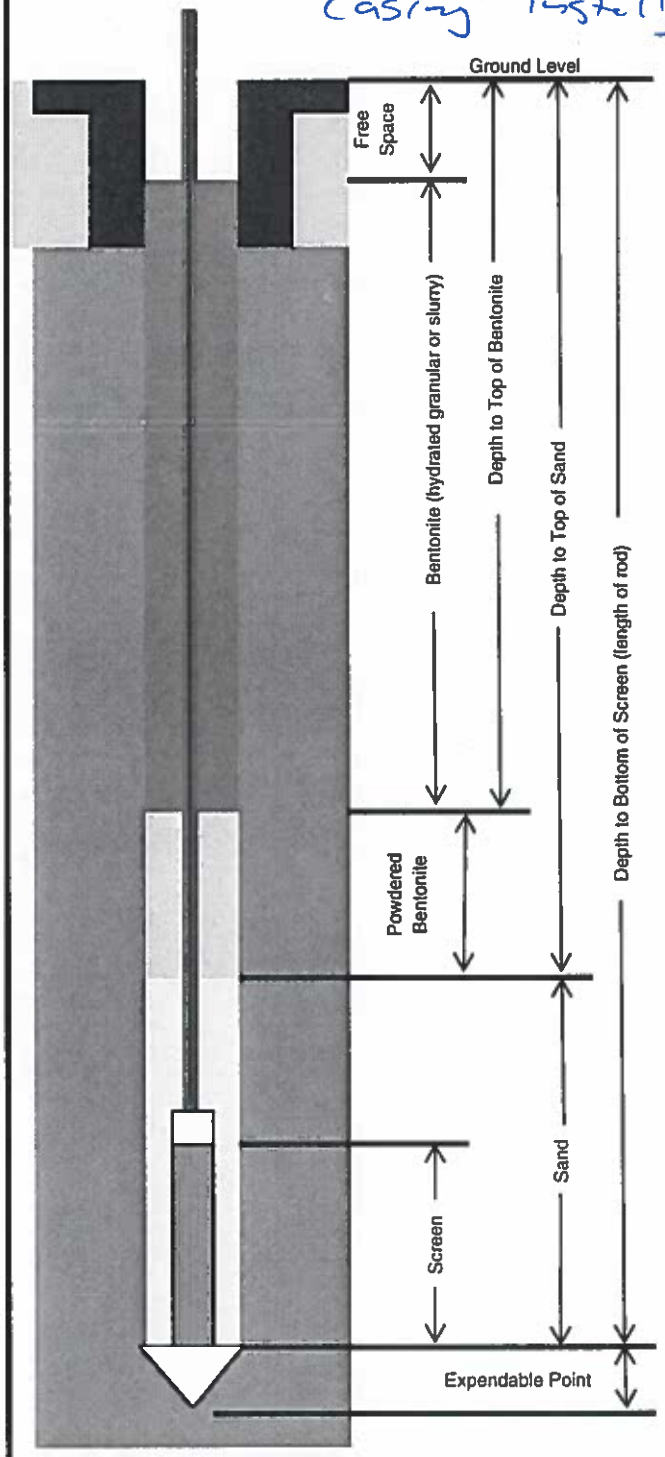
SV-02

PROJECT NUMBER	PROBE NUMBER
703765 CH	SHEET 1 OF 1 DATE: 11/12/2018

Soil Vapor Probe Diagram

PROJECT: offsite VI investigation LOCATION: Jamestown NY
DRILLING CONTRACTOR: Parratt Wolff
DRILLING METHOD AND EQUIPMENT USED: Direct Push Geoprobe
START: 1415 END: 1435 Installer: J Groves

Casing Install (1535)



Outer Diameter of Rod (in.)	2 1/4"
Depth to Bottom of Screen (ft)	7'
Length of Expendable Point (in.)	3"
Screen Diameter (in.) / Length (in.)	1/2"
Screen Mesh (in.)	Fine
Teflon Tubing Outer Diameter (in.)	0.25
Length of Sand Pack (in.)	12"
Depth to Top of Sand (ft)	6
Length of Powdered Bentonite Seal (in.)	6"
Depth to Top of Powdered Bentonite (ft)	5.5'
Length of Bentonite (ft)	4'
Depth to Top of Bentonite (ft)	1'
Length of Free Space (in.)	1'
Flush Mount Diameter	4"

Specifications (Quantity and Type)

Sand: (Sable) Natural Sand (20)

Bentonite: Envirco Plug No 16 (powdered)

JACOBS

~~P03~~ SV-03

PROJECT NUMBER	PROBE NUMBER
703765CH	SHEET 1 OF 1 DATE: 11/12/18

Soil Vapor Probe Diagram

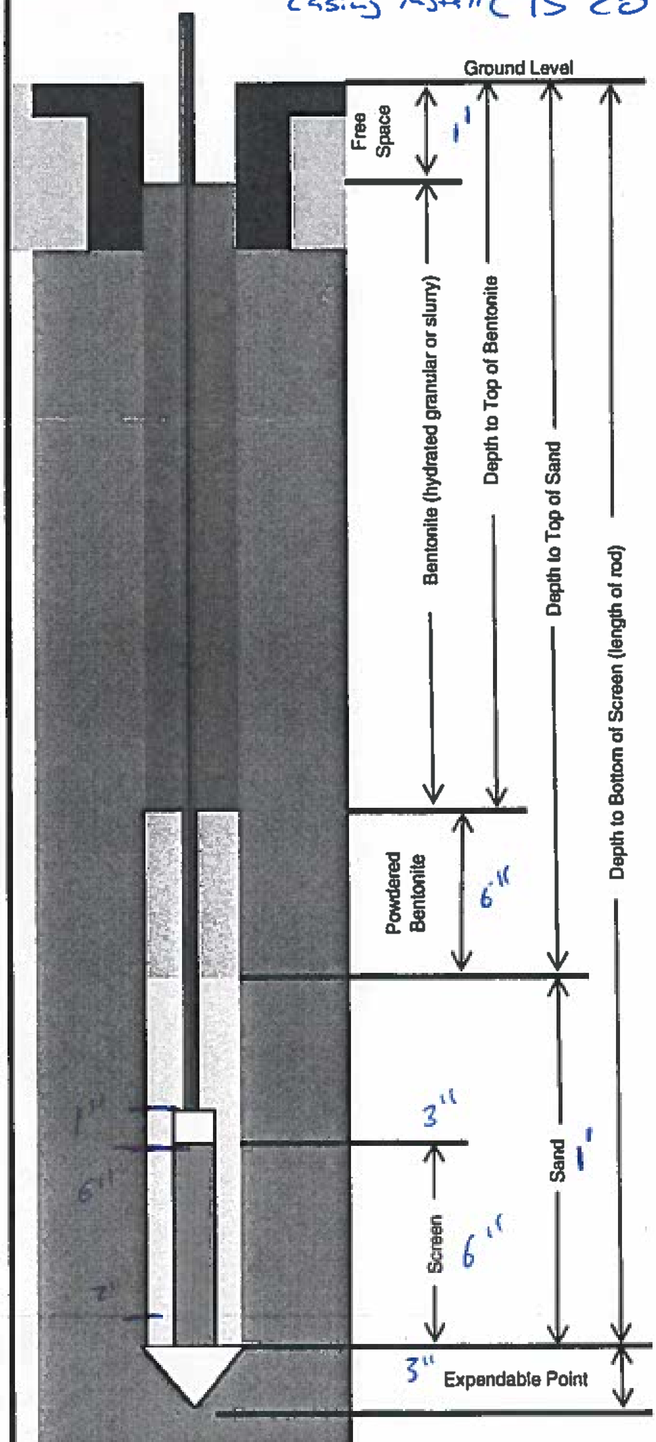
PROJECT: offsite Vapor Intrusion investigation LOCATION: Jamestown NY

DRILLING CONTRACTOR: Parratt Wolff

DRILLING METHOD AND EQUIPMENT USED: Direct Push Geoprobe

START: 1310 END: 1415 Installer: J. Gowing

Casing install (1520)



Outer Diameter of Rod (in.)	2 1/4"
Depth to Bottom of Screen (ft)	7'
Length of Expendable Point (in.)	~~4"~~ 3"
Screen Diameter (in.) / Length (in.)	1/2"
Screen Mesh (in.)	fine
Teflon Tubing Outer Diameter (in.)	0.25
Length of Sand Pack (in.)	12"
Depth to Top of Sand (ft)	6'
Length of Powdered Bentonite Seal (in.)	6"
Depth to Top of Powdered Bentonite (ft)	5.5"
Length of Bentonite (ft)	4'
Depth to Top of Bentonite (ft)	1'
Length of Free Space (in.)	1'
Flush Mount Diameter.	4"

Specifications (Quantity and Type)

Sand: Sable Natural Sand (28)

Bentonite: Enviro Plug No 16 (Powdered)

* Dipped adjacent well 10/15 will install to 7' bgs
approx 10' to water

Appendix D
Data Quality Evaluations

JACOBS®

Memorandum

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Subject **Data Quality Evaluation for the 2018 Vapor Intrusion Investigation, Dow Jamestown, New York**

Attention Union Carbine Corporation

From Jacobs

Date February 12, 2019

1. Introduction

The objective of this data quality evaluation (DQE) report is to assess the data quality of analytical results for air samples collected from the Dow Chemical Company (Dow) Jamestown Facility in Jamestown, New York. Jacobs collected samples November 14-15, 2018 and December 11-12, 2018. Guidance for this DQE report came from the following: *Quality Assurance Project Plan, Site Characterization Investigation Activities, Essex-Hope Site, Jamestown, New York, June 2016 (QAPP)*; *the QAPP Addendum, August 2018*; the *U.S. Environmental Protection Agency* (EPA) *National Functional Guidelines for Superfund Organic Methods Data Review,* January 2017*;* and, individual method requirements.

The analytical results were evaluated using the criteria of precision, accuracy, representativeness, comparability and completeness (PARCC) as described in the QAPP. This report is intended as a general data quality assessment designed to summarize data issues.

2. Analytical Data

Jacobs collected 16 soil vapor samples, 11 indoor air samples 2 soil vapor field duplicate samples (FD), 2 indoor air FDs and one trip blank (TB). The samples were reported in three sample delivery groups identified as 1811372R1, L1847517 and L1851659.

Samples were collected and delivered to Eurofins Air Toxics Laboratory in Folsom, California and Alpha Analytical Laboratory in Mansfield, Massachusetts. The samples were analyzed by one or more of the methods listed in Table 1.

Table 1. Analytical Parameters. 2018 Vapor Intrusion Investigation, Dow Jamestown, New York

Parameter	Method	Laboratory
Volatile Organic Compounds (VOC)	TO-15	Alpha
VOC	TO-17	Air Toxics

The sample delivery groups were assessed by reviewing the following: (1) the chain of custody documentation; (2) holding-time compliance; (3) calibration; (4) method blanks/field blanks; (5) laboratory control spiking sample/laboratory control spiking sample duplicate (LCS/LCSD) recoveries and precision; (6) internal standard recoveries; (7) surrogate spike recoveries; (8) FD precision, and (9) required method quality control (QC) samples at the specified frequencies.

Data flags were assigned according to the QAPP. Multiple flags are routinely applied to specific sample method/matrix/analyte combinations, but there will only be one final flag. A final flag is applied to the data and is the most conservative of the applied validation flags. The final flag also includes matrix and blank sample impacts.

The data flags are those listed in the QAPP and are defined below:

- J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- R = The sample result was rejected due to serious deficiencies in the ability to analyze the sample and meet the QC criteria. The presence or absence of the analyte could not be verified.
- U = The analyte was analyzed for but was not detected above the reported sample quantitation limit.
- UJ = The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

3. Findings

The overall summaries of the data validation are contained in the following sections. Qualified data are presented in Table 2.

4. Holding Time and Preservation

All holding time and preservation criteria were met.

5. Calibration

Initial and continuing calibration analyses were performed as required by the methods and acceptance criteria were met.

6. Method Blanks

Method blanks were analyzed at the required frequency and were free of contamination.

7. Laboratory Control Samples

LCS/LCSDs were analyzed as required and accuracy and precision criteria were met.

8. Surrogates

Surrogates were added to the samples and acceptance criteria were met.

9. Internal Standards

Internal standards were added to the samples and acceptance criteria were met.

10. Field Blanks

One TB was collected, analyzed and was free of contamination

11. Field Duplicates

FDs were collected, analyzed and precision criteria were met with the following exceptions:

- The relative percent differences (RPD) for several analytes exceeded criteria in FD pairs SV-07_20181212 -FD and SV-10_20181213/ SV-10_20181213-FD. The data were qualified as estimated detected and non-detected results and flagged “J” and “UJ”, respectively in the FD pairs.

12. Canister/Flow Controller Certifications

Jacobs collected the air samples in SUMMA canisters that were batch certified “clean” per project instructions before shipment to the project site.

13. Chain of Custody

Required procedures were followed and COCs were generally free of errors.

14. Overall Assessment

The goal of this assessment is to demonstrate that a sufficient number of representative samples were collected, and the resulting analytical data can be used to support the decision-making process. The following summary highlights the PARCC findings for the above-defined events:

Precision of the data was verified through the review of the field and laboratory data quality indicators that include: FD and LCS/LCSD RPDs. Precision was generally acceptable; however, a few analytes were qualified as estimated detected and non-detected results in four samples due to FD RPD issues. Data users should consider the impact to any result that is qualified as estimated as it may contain a bias which could affect the decision-making process.

Accuracy of the data was verified through the review calibration, LCS/LCSD, surrogate and internal standard recoveries, as well as the evaluation of method/field blank data. Accuracy was acceptable.

Representativeness of the data was verified through the sample’s collection, storage and preservation procedures and the verification of holding-time compliance. No issues were reported for sample collection and storage procedures. The data were reported from analyses within the EPA recommended holding time.

Comparability of the data was verified through the use of standard EPA analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.

Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid.

The data can be used for project decisions taking into consideration the validation flags applied to the samples.

Table 2. Data Qualification Summary. 2018 Vapor Intrusion Investigation, Dow Jamestown, New York

Field ID	Method	Analyte	Units	Final Result	Validation Flag	Validation Reason
SV-07_20181212	TO-15	Tetrachloroethene	µg/m3	3.07	UJ	FD>RPD
SV-07_20181212	TO-15	Trichloroethene	µg/m3	18.3	J	FD>RPD
SV-07_20181212	TO-15	Vinyl chloride	µg/m3	2.24	J	FD>RPD
SV-07_20181212	TO-15	cis-1,2-Dichloroethene	µg/m3	5.71	J	FD>RPD

Table 2. Data Qualification Summary. 2018 Vapor Intrusion Investigation, Dow Jamestown, New York

Field ID	Method	Analyte	Units	Final Result	Validation Flag	Validation Reason
SV-07_20181212-FD	TO-15	Tetrachloroethene	µg/m3	8.88	J	FD>RPD
SV-07_20181212-FD	TO-15	Trichloroethene	µg/m3	7.79	J	FD>RPD
SV-07_20181212-FD	TO-15	Vinyl chloride	µg/m3	1.16	UJ	FD>RPD
SV-07_20181212-FD	TO-15	cis-1,2-Dichloroethene	µg/m3	3.68	J	FD>RPD
SV-10_20181213	TO-15	Tetrachloroethene	µg/m3	3.08	UJ	FD>RPD
SV-10_20181213	TO-15	Trichloroethene	µg/m3	5.75	J	FD>RPD
SV-10_20181213	TO-15	Vinyl chloride	µg/m3	3.02	J	FD>RPD
SV-10_20181213	TO-15	cis-1,2-Dichloroethene	µg/m3	4.76	J	FD>RPD
SV-10_20181213-FD	TO-15	Tetrachloroethene	µg/m3	35.3	J	FD>RPD
SV-10_20181213-FD	TO-15	Trichloroethene	µg/m3	10.5	J	FD>RPD
SV-10_20181213-FD	TO-15	Vinyl chloride	µg/m3	6.03	J	FD>RPD
SV-10_20181213-FD	TO-15	cis-1,2-Dichloroethene	µg/m3	8.76	J	FD>RPD
Validation Reasons:						
FD>RPD	The relative percent difference exceeded criteria in the FD pair					

Note:
µg/m3 = micrograms per cubic meter

15. References

CH2M HILL. 2018. *Quality Assurance Project Plan Addendum for the Site Characterization Investigation Activities, Essex-Hope Site, Jamestown, New York*. Prepared for Essex Specialty Products, Inc. August.

USEPA. 2017. *USEPA National Functional Guidelines for Organic Superfund Methods*

Data Review. OLEM 9355.0-136. EPA-540-R-2017-002. January.

CH2M HILL. 2016. *Quality Assurance Project Plan for the Site Characterization Investigation Activities, Essex-Hope Site, Jamestown, New York*. Prepared for Union Carbide Corporation. June.

Appendix E
Laboratory Analytical Reports

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12/12/2018
Ms. Shane Lowe
CH2M Hill
300 Hunter Ave
Suite 305
St. Louis MO 63124

Project Name: Essex - Hope
Project #: 703765CH.01.03
Workorder #: 1811372R1

Dear Ms. Shane Lowe

The following report includes the data for the above referenced project for sample(s) received on 11/19/2018 at Air Toxics Ltd.

The data and associated QC analyzed by Passive S.E. WMS are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Eurofins Air Toxics Inc. for your air analysis needs. Eurofins Air Toxics Inc. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Brian Whittaker at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Brian Whittaker

Project Manager

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WORK ORDER #: 1811372R1

Work Order Summary

CLIENT:	Ms. Shane Lowe CH2M Hill 300 Hunter Ave Suite 305 St. Louis, MO 63124	**BILL TO:**	Ms. Shane Lowe CH2M Hill 300 Hunter Ave Suite 305 St. Louis, MO 63124
PHONE:	(314)-421-0900	**P.O. #**	PN 703765CH.01.04
FAX:		**PROJECT #**	703765CH.01.03 Essex - Hope
DATE RECEIVED:	11/19/2018	**CONTACT:**	Brian Whittaker
DATE COMPLETED:	12/11/2018		
DATE REISSUED:	12/12/2018		

FRACTION #	NAME	TEST
01A	WMS-SE-01	Passive S.E. WMS
02A	WMS-SE-02	Passive S.E. WMS
03A	WMS-SE-03	Passive S.E. WMS
04A	WMS-SE-04	Passive S.E. WMS
05A	WMS-SE-05	Passive S.E. WMS
06A	WMS-SE-06	Passive S.E. WMS
07A	TB-111618	Passive S.E. WMS
08A	Lab Blank	Passive S.E. WMS
09A	LCS	Passive S.E. WMS
09AA	LCSD	Passive S.E. WMS

CERTIFIED BY: Heidi Hayes

Technical Director

DATE: 12/12/18

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
WMS Passive SE by Mod EPA TO-17
CH2M Hill
Workorder# 1811372R1

Seven WMS-SE samples were received on November 19, 2018. The laboratory analyzed the charcoal sorbent bed of the passive sampler following modified method EPA TO-17. The VOCs were chemically extracted using carbon disulfide and an aliquot of the extract was injected into a GC/MS for identification and quantification of volatile organic compounds (VOCs).

The mass of each target compound adsorbed by the sampler was converted to units of concentration using the sample deployment time and the sampling rate for each VOC. If sampling rates were calculated by the lab or the manufacturer, the concentration result has been flagged as an estimated value. Results are not corrected for desorption efficiency.

Please note that 1,1,2,2-Tetrachloroethane (1,1,2,2-PCA) can degrade into Trichloroethene (TCE) during storage on the charcoal-based sorbent used in the WMS device. Samples containing 1,1,2,2-PCA may yield reduced concentrations of 1,1,2,2-PCA and elevated concentrations of TCE.

The reference method used for this procedure is EPA TO-17, which describes the collection of VOCs in ambient air using sorbents and analysis by GC/MS. Because TO-17 describes active sample collection using a pump and thermal desorption as the preparation step, several modifications are required. Modifications to TO-17 are listed in the table below:

Requirement	***TO-17***	***ATL Modifications***
Sample Collection	Pump pulls measured air volume through sorbent tube	VOCs in air adsorbed onto sorbent bed passively through diffusion
Sample Preparation	Thermal extraction	Solvent extraction
Sorbent tube conditioning	Condition newly packed tubes prior to use	Charcoal-based sorbent is a single use media and conditioning is conducted by vendor.
Instrumentation	Thermal desorption introduction system	Liquid injection introduction system
Internal Standard	Gas-phase internal standard introduced on the tube or focusing trap during analysis	Liquid-phase internal standard introduced on the tube at the time of extraction
Media and sample storage	<4 deg C, 30 days	Media shelf life is determined by vendor; sample hold-time is 6 months for the RAD130 and WMS. Sample preservation requirements are storage in a cool, solvent-free refrigerator and optional use of ice during shipping.
Internal Standard Recovery	+/-40% of daily CCV area	-50% to +100% of daily CCV area

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

To calculate ug/m3 concentrations in the Lab Blank and Trip Blank, a sampling duration of 5468 minutes was applied. The assumed temperature used for the uptake rate is listed on the data page. If the field temperatures were provided, the rate was adjusted in the same manner as the field samples.

The workorder was reissued on 12/12/2018 to report estimated values for target compound hits that are below the reporting limit but greater than the method detection limit.

Definition of Data Qualifying Flags

Ten qualifiers may have been used on the data analysis sheets and indicate as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

C - Estimated concentration due to calculated sampling rate

CN - See case narrative explanation.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

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Summary of Detected Compounds
VOC BY PASSIVE SAMPLER - GC/MS

Client Sample ID: WMS-SE-01

Lab ID#: 1811372R1-01A

No Detections Were Found.

Client Sample ID: WMS-SE-02

Lab ID#: 1811372R1-02A

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
cis-1,2-Dichloroethene	0.050	4.8	1.4	140
Trichloroethene	0.050	3.5	1.3	94
Tetrachloroethene	0.050	2.3	0.020 J	0.94 J

Client Sample ID: WMS-SE-03

Lab ID#: 1811372R1-03A

No Detections Were Found.

Client Sample ID: WMS-SE-04

Lab ID#: 1811372R1-04A

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
cis-1,2-Dichloroethene	0.050	4.8	0.26	25
Trichloroethene	0.050	3.6	0.36	26

Client Sample ID: WMS-SE-05

Lab ID#: 1811372R1-05A

No Detections Were Found.

Client Sample ID: WMS-SE-06

Lab ID#: 1811372R1-06A

No Detections Were Found.

Client Sample ID: TB-111618

Lab ID#: 1811372R1-07A

No Detections Were Found.

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Client Sample ID: WMS-SE-01

Lab ID#: 1811372R1-01A

VOC BY PASSIVE SAMPLER - GC/MS

File Name:	**9121113simr1**	**Date of Collection: 11/16/18 10:08:00 A**	
Dil. Factor:	**1.00**	**Date of Analysis: 12/11/18 12:17 PM**	
		Date of Extraction: 12/11/18	

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Vinyl Chloride	0.20	30	Not Detected	Not Detected
1,1-Dichloroethene	0.20	26	Not Detected	Not Detected
trans-1,2-Dichloroethene	0.10	11	Not Detected	Not Detected
cis-1,2-Dichloroethene	0.050	4.8	Not Detected	Not Detected
Trichloroethene	0.050	3.5	Not Detected	Not Detected
Tetrachloroethene	0.050	2.3	Not Detected	Not Detected

Results of ND are equal to a "U" qualifier flag and were Not Detected at the RL.
Temperature = 77.0F , duration time = 5468 minutes.
Container Type: WMS-SE

Surrogates	%Recovery	Method Limits
Toluene-d8	111	70-130

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Client Sample ID: WMS-SE-02

Lab ID#: 1811372R1-02A

VOC BY PASSIVE SAMPLER - GC/MS

File Name:	**9121114simr1**	**Date of Collection: 11/16/18 10:10:00 A**	
Dil. Factor:	**1.00**	**Date of Analysis: 12/11/18 12:39 PM**	
		Date of Extraction: 12/11/18	

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Vinyl Chloride	0.20	30	Not Detected	Not Detected
1,1-Dichloroethene	0.20	26	Not Detected	Not Detected
trans-1,2-Dichloroethene	0.10	11	Not Detected	Not Detected
cis-1,2-Dichloroethene	0.050	4.8	1.4	140
Trichloroethene	0.050	3.5	1.3	94
Tetrachloroethene	0.050	2.3	0.020 J	0.94 J

J = Estimated value.

Results of ND are equal to a "U" qualifier flag and were Not Detected at the RL.
Temperature = 77.0F , duration time = 5465 minutes.
Container Type: WMS-SE

Surrogates	%Recovery	Method Limits
Toluene-d8	111	70-130

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Client Sample ID: WMS-SE-03

Lab ID#: 1811372R1-03A

VOC BY PASSIVE SAMPLER - GC/MS

File Name:	**9121115simr1**	**Date of Collection: 11/16/18 10:16:00 A**
Dil. Factor:	**1.00**	**Date of Analysis: 12/11/18 01:01 PM**
		Date of Extraction: 12/11/18

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Vinyl Chloride	0.20	31	Not Detected	Not Detected
1,1-Dichloroethene	0.20	26	Not Detected	Not Detected
trans-1,2-Dichloroethene	0.10	11	Not Detected	Not Detected
cis-1,2-Dichloroethene	0.050	4.8	Not Detected	Not Detected
Trichloroethene	0.050	3.5	Not Detected	Not Detected
Tetrachloroethene	0.050	2.4	Not Detected	Not Detected

Results of ND are equal to a "U" qualifier flag and were Not Detected at the RL.
Temperature = 77.0F , duration time = 5441 minutes.
Container Type: WMS-SE

Surrogates	%Recovery	Method Limits
Toluene-d8	113	70-130

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Client Sample ID: WMS-SE-04

Lab ID#: 1811372R1-04A

VOC BY PASSIVE SAMPLER - GC/MS

File Name:	**9121116simr1**	**Date of Collection: 11/16/18 10:17:00 A**	
Dil. Factor:	**1.00**	**Date of Analysis: 12/11/18 01:24 PM**	
		Date of Extraction: 12/11/18	

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Vinyl Chloride	0.20	31	Not Detected	Not Detected
1,1-Dichloroethene	0.20	26	Not Detected	Not Detected
trans-1,2-Dichloroethene	0.10	12	Not Detected	Not Detected
cis-1,2-Dichloroethene	0.050	4.8	0.26	25
Trichloroethene	0.050	3.6	0.36	26
Tetrachloroethene	0.050	2.4	Not Detected	Not Detected

Results of ND are equal to a "U" qualifier flag and were Not Detected at the RL.
Temperature = 77.0F , duration time = 5417 minutes.
Container Type: WMS-SE

Surrogates	%Recovery	Method Limits
Toluene-d8	111	70-130

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Client Sample ID: WMS-SE-05

Lab ID#: 1811372R1-05A

VOC BY PASSIVE SAMPLER - GC/MS

File Name:	**9121117simr1**	**Date of Collection: 11/16/18 10:03:00 A**	
Dil. Factor:	**1.00**	**Date of Analysis: 12/11/18 01:46 PM**	
		Date of Extraction: 12/11/18	

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Vinyl Chloride	0.20	31	Not Detected	Not Detected
1,1-Dichloroethene	0.20	26	Not Detected	Not Detected
trans-1,2-Dichloroethene	0.10	12	Not Detected	Not Detected
cis-1,2-Dichloroethene	0.050	4.9	Not Detected	Not Detected
Trichloroethene	0.050	3.6	Not Detected	Not Detected
Tetrachloroethene	0.050	2.4	Not Detected	Not Detected

Results of ND are equal to a "U" qualifier flag and were Not Detected at the RL.
Temperature = 77.0F , duration time = 5371 minutes.
Container Type: WMS-SE

Surrogates	%Recovery	Method Limits
Toluene-d8	113	70-130

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Client Sample ID: WMS-SE-06

Lab ID#: 1811372R1-06A

VOC BY PASSIVE SAMPLER - GC/MS

File Name:	**9121118simr1**	**Date of Collection: 11/16/18 9:58:00 AM**	
Dil. Factor:	**1.00**	**Date of Analysis: 12/11/18 02:09 PM**	
		Date of Extraction: 12/11/18	

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Vinyl Chloride	0.20	31	Not Detected	Not Detected
1,1-Dichloroethene	0.20	26	Not Detected	Not Detected
trans-1,2-Dichloroethene	0.10	12	Not Detected	Not Detected
cis-1,2-Dichloroethene	0.050	4.9	Not Detected	Not Detected
Trichloroethene	0.050	3.6	Not Detected	Not Detected
Tetrachloroethene	0.050	2.4	Not Detected	Not Detected

Results of ND are equal to a "U" qualifier flag and were Not Detected at the RL.
Temperature = 77.0F , duration time = 5373 minutes.
Container Type: WMS-SE

Surrogates	%Recovery	Method Limits
Toluene-d8	110	70-130

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Client Sample ID: TB-111618

Lab ID#: 1811372R1-07A

VOC BY PASSIVE SAMPLER - GC/MS

File Name:	**9121112simr1**	**Date of Collection: 11/16/18**	
Dil. Factor:	**1.00**	**Date of Analysis: 12/11/18 11:54 AM**	
		Date of Extraction: 12/11/18	

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Vinyl Chloride	0.20	30	Not Detected	Not Detected
1,1-Dichloroethene	0.20	26	Not Detected	Not Detected
trans-1,2-Dichloroethene	0.10	11	Not Detected	Not Detected
cis-1,2-Dichloroethene	0.050	4.8	Not Detected	Not Detected
Trichloroethene	0.050	3.5	Not Detected	Not Detected
Tetrachloroethene	0.050	2.3	Not Detected	Not Detected

Results of ND are equal to a "U" qualifier flag and were Not Detected at the RL.
Temperature = 77.0F , duration time = 5468 minutes.
Container Type: WMS-SE

Surrogates	%Recovery	Method Limits
Toluene-d8	113	70-130

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Client Sample ID: Lab Blank

Lab ID#: 1811372R1-08A

VOC BY PASSIVE SAMPLER - GC/MS

File Name:	**9121110simr1**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 12/11/18 11:07 AM**	
		Date of Extraction: 12/11/18	

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Vinyl Chloride	0.20	30	Not Detected	Not Detected
1,1-Dichloroethene	0.20	26	Not Detected	Not Detected
trans-1,2-Dichloroethene	0.10	11	Not Detected	Not Detected
cis-1,2-Dichloroethene	0.050	4.8	Not Detected	Not Detected
Trichloroethene	0.050	3.5	Not Detected	Not Detected
Tetrachloroethene	0.050	2.3	Not Detected	Not Detected

Results of ND are equal to a "U" qualifier flag and were Not Detected at the RL.
Temperature = 77.0F , duration time = 5468 minutes.
Container Type: WMS-SE

Surrogates	%Recovery	Method Limits
Toluene-d8	112	70-130

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Client Sample ID: LCS

Lab ID#: 1811372R1-09A

VOC BY PASSIVE SAMPLER - GC/MS

File Name:	**9121108sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 12/11/18 10:22 AM**	
		Date of Extraction: 12/11/18	

Compound	%Recovery	Method Limits
Vinyl Chloride	100	50-140
1,1-Dichloroethene	129	70-130
trans-1,2-Dichloroethene	116	70-130
cis-1,2-Dichloroethene	107	70-130
Trichloroethene	115	70-130
Tetrachloroethene	107	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	111	70-130

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Client Sample ID: LCSD

Lab ID#: 1811372R1-09AA

VOC BY PASSIVE SAMPLER - GC/MS

File Name:	**9121109sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 12/11/18 10:45 AM**	
		Date of Extraction: 12/11/18	

Compound	%Recovery	Method Limits
Vinyl Chloride	112	50-140
1,1-Dichloroethene	129	70-130
trans-1,2-Dichloroethene	113	70-130
cis-1,2-Dichloroethene	107	70-130
Trichloroethene	115	70-130
Tetrachloroethene	108	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	110	70-130

ANALYTICAL REPORT

Lab Number:	L1847517
Client:	Jacobs 18 Tremont Street Suite 700 Boston, MA 02108
ATTN:	Kyle Block
Phone:	(617) 523-2260
Project Name:	ESSEX/HOP
Project Number:	703765CH.01.03
Report Date:	12/05/18

Certifications & Approvals: MA (M-MA030), NH NELAP (2062), CT (PH-0141), DoD (L2474), FL (E87814), IL (200081), LA (85084), ME (MA00030), MD (350), NJ (MA015), NY (11627), NC (685), OH (CL106), PA (68-02089), RI (LAO00299), TX (T104704419), VT (VT-0015), VA (460194), WA (C954), US Army Corps of Engineers, USDA (Permit #P330-17-00150), USFWS (Permit #206964).

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com

Project Name: ESSEX/HOP
Project Number: 703765CH.01.03

Lab Number: L1847517
Report Date: 12/05/18

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1847517-01	JMF-01-20181114	SOIL_VAPOR	JAMESTOWN, NY	11/14/18 19:53	11/19/18
L1847517-02	JMF-01-20181114-FD	SOIL_VAPOR	JAMESTOWN, NY	11/14/18 19:53	11/19/18
L1847517-03	JMF-02-20181114	SOIL_VAPOR	JAMESTOWN, NY	11/14/18 17:03	11/19/18
L1847517-04	JMF-03-20181114	SOIL_VAPOR	JAMESTOWN, NY	11/14/18 19:09	11/19/18
L1847517-05	JMF-04-20181114	SOIL_VAPOR	JAMESTOWN, NY	11/14/18 17:37	11/19/18
L1847517-06	HH-01-20181115	SOIL_VAPOR	JAMESTOWN, NY	11/15/18 09:51	11/19/18
L1847517-07	HH-02-20181115	SOIL_VAPOR	JAMESTOWN, NY	11/15/18 10:17	11/19/18
L1847517-08	HH-03-20181115	SOIL_VAPOR	JAMESTOWN, NY	11/15/18 11:34	11/19/18
L1847517-09	HH-04-20181115	SOIL_VAPOR	JAMESTOWN, NY	11/15/18 12:32	11/19/18
L1847517-10	HH-04-20181115-FD	SOIL_VAPOR	JAMESTOWN, NY	11/15/18 12:32	11/19/18
L1847517-11	HH-05-20181115	SOIL_VAPOR	JAMESTOWN, NY	11/15/18 14:33	11/19/18
L1847517-12	HH-06-20181115	SOIL_VAPOR	JAMESTOWN, NY	11/15/18 15:24	11/19/18
L1847517-13	HH-07-20181115	SOIL_VAPOR	JAMESTOWN, NY	11/15/18 16:14	11/19/18

Project Name: ESSEX/HOP
Project Number: 703765CH.01.03

Lab Number: L1847517
Report Date: 12/05/18

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY
For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

Project Name:	ESSEX/HOP	**Lab Number:**	L1847517
Project Number:	703765CH.01.03	**Report Date:**	12/05/18

Case Narrative (continued)

Volatile Organics in Air

Canisters were released from the laboratory on November 7, 2018. The canister certification results are provided as an addendum.

L1847517-01 through -13: Prior to sample analysis, the canisters were pressurized with UHP Nitrogen due to canister size. The pressurization resulted in a dilution of the samples. The reporting limits have been elevated accordingly.

L1847517-12: The sample has elevated detection limits due to the dilution required by the elevated concentrations of target compounds in the sample.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Christopher J. Anderson

Title: Technical Director/Representative Date: 12/05/18

AIR

Project Name: ESSEX/HOP
Project Number: 703765CH.01.03

Lab Number: L1847517
Report Date: 12/05/18

SAMPLE RESULTS

Lab ID: L1847517-01 D
Client ID: JMF-01-20181114
Sample Location: JAMESTOWN, NY

Date Collected: 11/14/18 19:53
Date Received: 11/19/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/03/18 17:03
Analyst: EW

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	ND	0.496	--	ND	1.27	--		2.479
1,1-Dichloroethene	ND	0.496	--	ND	1.97	--		2.479
trans-1,2-Dichloroethene	ND	0.496	--	ND	1.97	--		2.479
cis-1,2-Dichloroethene	1.71	0.496	--	6.78	1.97	--		2.479
Trichloroethene	3.31	0.496	--	17.8	2.67	--		2.479
Tetrachloroethene	1.54	0.496	--	10.4	3.36	--		2.479

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	105		60-140
Bromochloromethane	106		60-140
chlorobenzene-d5	107		60-140

Project Name: ESSEX/HOP
Project Number: 703765CH.01.03
Lab Number: L1847517
Report Date: 12/05/18

SAMPLE RESULTS

Lab ID: L1847517-02 D
Client ID: JMF-01-20181114-FD
Sample Location: JAMESTOWN, NY

Date Collected: 11/14/18 19:53
Date Received: 11/19/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/03/18 17:43
Analyst: EW

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	ND	0.493	--	ND	1.26	--		2.467
1,1-Dichloroethene	ND	0.493	--	ND	1.95	--		2.467
trans-1,2-Dichloroethene	ND	0.493	--	ND	1.95	--		2.467
cis-1,2-Dichloroethene	1.57	0.493	--	6.22	1.95	--		2.467
Trichloroethene	3.26	0.493	--	17.5	2.65	--		2.467
Tetrachloroethene	1.46	0.493	--	9.90	3.34	--		2.467

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-Difluorobenzene	104		60-140
Bromochloromethane	103		60-140
chlorobenzene-d5	106		60-140

Project Name: ESSEX/HOP
Project Number: 703765CH.01.03
Lab Number: L1847517
Report Date: 12/05/18

SAMPLE RESULTS

Lab ID: L1847517-03 D
Client ID: JMF-02-20181114
Sample Location: JAMESTOWN, NY

Date Collected: 11/14/18 17:03
Date Received: 11/19/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/03/18 19:02
Analyst: EW

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	ND	0.432	--	ND	1.10	--		2.161
1,1-Dichloroethene	ND	0.432	--	ND	1.71	--		2.161
trans-1,2-Dichloroethene	ND	0.432	--	ND	1.71	--		2.161
cis-1,2-Dichloroethene	1.11	0.432	--	4.40	1.71	--		2.161
Trichloroethene	2.41	0.432	--	13.0	2.32	--		2.161
Tetrachloroethene	ND	0.432	--	ND	2.93	--		2.161

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	102		60-140
Bromochloromethane	102		60-140
chlorobenzene-d5	105		60-140

Project Name: ESSEX/HOP
Project Number: 703765CH.01.03

Lab Number: L1847517
Report Date: 12/05/18

SAMPLE RESULTS

Lab ID: L1847517-04 D
Client ID: JMF-03-20181114
Sample Location: JAMESTOWN, NY

Date Collected: 11/14/18 19:09
Date Received: 11/19/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/03/18 19:41
Analyst: EW

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	ND	0.459	--	ND	1.17	--		2.297
1,1-Dichloroethene	ND	0.459	--	ND	1.82	--		2.297
trans-1,2-Dichloroethene	ND	0.459	--	ND	1.82	--		2.297
cis-1,2-Dichloroethene	2.82	0.459	--	11.2	1.82	--		2.297
Trichloroethene	4.30	0.459	--	23.1	2.47	--		2.297
Tetrachloroethene	1.28	0.459	--	8.68	3.11	--		2.297

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	103		60-140
Bromochloromethane	102		60-140
chlorobenzene-d5	105		60-140

Project Name: ESSEX/HOP
Project Number: 703765CH.01.03
Lab Number: L1847517
Report Date: 12/05/18

SAMPLE RESULTS

Lab ID: L1847517-05 D
Client ID: JMF-04-20181114
Sample Location: JAMESTOWN, NY

Date Collected: 11/14/18 17:37
Date Received: 11/19/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/03/18 20:21
Analyst: EW

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	ND	0.454	--	ND	1.16	--		2.269
1,1-Dichloroethene	ND	0.454	--	ND	1.80	--		2.269
trans-1,2-Dichloroethene	ND	0.454	--	ND	1.80	--		2.269
cis-1,2-Dichloroethene	2.13	0.454	--	8.45	1.80	--		2.269
Trichloroethene	4.00	0.454	--	21.5	2.44	--		2.269
Tetrachloroethene	2.20	0.454	--	14.9	3.08	--		2.269

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	102		60-140
Bromochloromethane	102		60-140
chlorobenzene-d5	104		60-140

Project Name: ESSEX/HOP
Project Number: 703765CH.01.03

Lab Number: L1847517
Report Date: 12/05/18

SAMPLE RESULTS

Lab ID: L1847517-06 D
Client ID: HH-01-20181115
Sample Location: JAMESTOWN, NY

Date Collected: 11/15/18 09:51
Date Received: 11/19/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/03/18 21:00
Analyst: EW

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	ND	0.447	--	ND	1.14	--		2.233
1,1-Dichloroethene	ND	0.447	--	ND	1.77	--		2.233
trans-1,2-Dichloroethene	ND	0.447	--	ND	1.77	--		2.233
cis-1,2-Dichloroethene	2.98	0.447	--	11.8	1.77	--		2.233
Trichloroethene	6.14	0.447	--	33.0	2.40	--		2.233
Tetrachloroethene	3.60	0.447	--	24.4	3.03	--		2.233

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	102		60-140
Bromochloromethane	101		60-140
chlorobenzene-d5	104		60-140

Project Name: ESSEX/HOP
Project Number: 703765CH.01.03

Lab Number: L1847517
Report Date: 12/05/18

SAMPLE RESULTS

Lab ID: L1847517-07 D
Client ID: HH-02-20181115
Sample Location: JAMESTOWN, NY

Date Collected: 11/15/18 10:17
Date Received: 11/19/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/03/18 21:39
Analyst: EW

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	ND	0.437	--	ND	1.12	--		2.185
1,1-Dichloroethene	ND	0.437	--	ND	1.73	--		2.185
trans-1,2-Dichloroethene	ND	0.437	--	ND	1.73	--		2.185
cis-1,2-Dichloroethene	1.74	0.437	--	6.90	1.73	--		2.185
Trichloroethene	3.10	0.437	--	16.7	2.35	--		2.185
Tetrachloroethene	6.41	0.437	--	43.5	2.96	--		2.185

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	101		60-140
Bromochloromethane	100		60-140
chlorobenzene-d5	104		60-140

Project Name: ESSEX/HOP
Project Number: 703765CH.01.03
Lab Number: L1847517
Report Date: 12/05/18

SAMPLE RESULTS

Lab ID: L1847517-08 D
Client ID: HH-03-20181115
Sample Location: JAMESTOWN, NY

Date Collected: 11/15/18 11:34
Date Received: 11/19/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/03/18 22:19
Analyst: EW

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	ND	0.432	--	ND	1.10	--		2.161
1,1-Dichloroethene	ND	0.432	--	ND	1.71	--		2.161
trans-1,2-Dichloroethene	ND	0.432	--	ND	1.71	--		2.161
cis-1,2-Dichloroethene	1.85	0.432	--	7.33	1.71	--		2.161
Trichloroethene	4.30	0.432	--	23.1	2.32	--		2.161
Tetrachloroethene	ND	0.432	--	ND	2.93	--		2.161

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	103		60-140
Bromochloromethane	101		60-140
chlorobenzene-d5	104		60-140

Project Name: ESSEX/HOP
Project Number: 703765CH.01.03
Lab Number: L1847517
Report Date: 12/05/18

SAMPLE RESULTS

Lab ID: L1847517-09 D
Client ID: HH-04-20181115
Sample Location: JAMESTOWN, NY

Date Collected: 11/15/18 12:32
Date Received: 11/19/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/03/18 22:58
Analyst: EW

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	ND	0.487	--	ND	1.24	--		2.435
1,1-Dichloroethene	ND	0.487	--	ND	1.93	--		2.435
trans-1,2-Dichloroethene	ND	0.487	--	ND	1.93	--		2.435
cis-1,2-Dichloroethene	1.25	0.487	--	4.96	1.93	--		2.435
Trichloroethene	2.69	0.487	--	14.5	2.62	--		2.435
Tetrachloroethene	15.1	0.487	--	102	3.30	--		2.435

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	101		60-140
Bromochloromethane	100		60-140
chlorobenzene-d5	103		60-140

Project Name: ESSEX/HOP
Project Number: 703765CH.01.03
Lab Number: L1847517
Report Date: 12/05/18

SAMPLE RESULTS

Lab ID: L1847517-10 D
Client ID: HH-04-20181115-FD
Sample Location: JAMESTOWN, NY

Date Collected: 11/15/18 12:32
Date Received: 11/19/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/03/18 23:38
Analyst: EW

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	ND	0.480	--	ND	1.23	--		2.398
1,1-Dichloroethene	ND	0.480	--	ND	1.90	--		2.398
trans-1,2-Dichloroethene	ND	0.480	--	ND	1.90	--		2.398
cis-1,2-Dichloroethene	1.17	0.480	--	4.64	1.90	--		2.398
Trichloroethene	2.60	0.480	--	14.0	2.58	--		2.398
Tetrachloroethene	14.9	0.480	--	101	3.25	--		2.398

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	102		60-140
Bromochloromethane	101		60-140
chlorobenzene-d5	105		60-140

Project Name: ESSEX/HOP
Project Number: 703765CH.01.03
Lab Number: L1847517
Report Date: 12/05/18

SAMPLE RESULTS

Lab ID: L1847517-11 D
Client ID: HH-05-20181115
Sample Location: JAMESTOWN, NY

Date Collected: 11/15/18 14:33
Date Received: 11/19/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/04/18 00:17
Analyst: EW

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	ND	0.449	--	ND	1.15	--		2.244
1,1-Dichloroethene	ND	0.449	--	ND	1.78	--		2.244
trans-1,2-Dichloroethene	ND	0.449	--	ND	1.78	--		2.244
cis-1,2-Dichloroethene	0.554	0.449	--	2.20	1.78	--		2.244
Trichloroethene	3.17	0.449	--	17.0	2.41	--		2.244
Tetrachloroethene	4.61	0.449	--	31.3	3.04	--		2.244

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	101		60-140
Bromochloromethane	100		60-140
chlorobenzene-d5	105		60-140

Project Name: ESSEX/HOP
Project Number: 703765CH.01.03

Lab Number: L1847517
Report Date: 12/05/18

SAMPLE RESULTS

Lab ID: L1847517-12 D
Client ID: HH-06-20181115
Sample Location: JAMESTOWN, NY

Date Collected: 11/15/18 15:24
Date Received: 11/19/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/04/18 00:54
Analyst: EW

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	ND	0.890	--	ND	2.28	--		4.451
1,1-Dichloroethene	ND	0.890	--	ND	3.53	--		4.451
trans-1,2-Dichloroethene	ND	0.890	--	ND	3.53	--		4.451
cis-1,2-Dichloroethene	6.56	0.890	--	26.0	3.53	--		4.451
Trichloroethene	246	0.890	--	1320	4.78	--		4.451
Tetrachloroethene	1.46	0.890	--	9.90	6.04	--		4.451

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	102		60-140
Bromochloromethane	100		60-140
chlorobenzene-d5	105		60-140

Project Name: ESSEX/HOP
Project Number: 703765CH.01.03

Lab Number: L1847517
Report Date: 12/05/18

SAMPLE RESULTS

Lab ID: L1847517-13 D
Client ID: HH-07-20181115
Sample Location: JAMESTOWN, NY

Date Collected: 11/15/18 16:14
Date Received: 11/19/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/04/18 01:34
Analyst: EW

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	ND	0.424	--	ND	1.08	--		2.122
1,1-Dichloroethene	ND	0.424	--	ND	1.68	--		2.122
trans-1,2-Dichloroethene	ND	0.424	--	ND	1.68	--		2.122
cis-1,2-Dichloroethene	1.76	0.424	--	6.98	1.68	--		2.122
Trichloroethene	88.0	0.424	--	473	2.28	--		2.122
Tetrachloroethene	0.675	0.424	--	4.58	2.88	--		2.122

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	102		60-140
Bromochloromethane	100		60-140
chlorobenzene-d5	105		60-140

Project Name: ESSEX/HOP
Project Number: 703765CH.01.03
Lab Number: L1847517
Report Date: 12/05/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 12/03/18 15:04

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab for sample(s): 01-13 Batch: WG1185068-4								
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1
trans-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
Trichloroethene	ND	0.200	--	ND	1.07	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1

Lab Control Sample Analysis

Batch Quality Control

Project Name: ESSEX/HOP

Project Number: 703765CH.01.03

Lab Number: L1847517

Report Date: 12/05/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-13 Batch: WG1185068-3								
Vinyl chloride	82		-		70-130	-		
1,1-Dichloroethene	118		-		70-130	-		
trans-1,2-Dichloroethene	119		-		70-130	-		
cis-1,2-Dichloroethene	124		-		70-130	-		
Trichloroethene	110		-		70-130	-		
Tetrachloroethene	128		-		70-130	-		

Lab Duplicate Analysis
Batch Quality Control

Project Name: ESSEX/HOP
Project Number: 703765CH.01.03

Lab Number: L1847517
Report Date: 12/05/18

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-13 QC Batch ID: WG1185068-5 QC Sample: L1847517-02 Client ID: JMF-01-20181114-FD						
Vinyl chloride	ND	ND	ppbV	NC		25
1,1-Dichloroethene	ND	ND	ppbV	NC		25
trans-1,2-Dichloroethene	ND	ND	ppbV	NC		25
cis-1,2-Dichloroethene	1.57	1.48	ppbV	6		25
Trichloroethene	3.26	3.15	ppbV	3		25
Tetrachloroethene	1.46	1.41	ppbV	3		25

Project Name: ESSEX/HOP

Lab Number: L1847517

Project Number: 703765CH.01.03

Report Date: 12/05/18

Canister and Flow Controller Information

Samplenum	Client ID	Media ID	Media Type	Date Prepared	Bottle Order	Cleaning Batch ID	Can Leak Check	Initial Pressure (in. Hg)	Pressure on Receipt (in. Hg)	Flow Controler Leak Chk	Flow Out mL/min	Flow In mL/min	% RPD
L1847517-01	JMF-01-20181114	2499	1.0L Can	11/07/18	277167	L1842636-02	Pass	-29.7	-4.9	-	-	-	-
L1847517-02	JMF-01-20181114-FD	0523	SV200	11/07/18	277167		-	-	-	Pass	226	226	0
L1847517-02	JMF-01-20181114-FD	2529	1.0L Can	11/07/18	277167	L1839361-04	Pass	-29.6	-4.7	-	-	-	-
L1847517-03	JMF-02-20181114	0654	SV200	11/07/18	277167		-	-	-	Pass	227	209	8
L1847517-03	JMF-02-20181114	1502	1.0L Can	11/07/18	277167	L1838497-02	Pass	-29.4	-1.5	-	-	-	-
L1847517-04	JMF-03-20181114	0688	SV200	11/07/18	277167		-	-	-	Pass	230	212	8
L1847517-04	JMF-03-20181114	2557	1.0L Can	11/07/18	277167	L1835794-02	Pass	-30.0	-2.8	-	-	-	-
L1847517-05	JMF-04-20181114	0991	SV200	11/07/18	277167		-	-	-	Pass	227	203	11
L1847517-05	JMF-04-20181114	716	1.0L Can	11/07/18	277167	L1840402-01	Pass	-29.7	-2.3	-	-	-	-
L1847517-06	HH-01-20181115	0852	SV200	11/07/18	277167		-	-	-	Pass	230	208	10
L1847517-06	HH-01-20181115	800	1.0L Can	11/07/18	277167	L1843299-02	Pass	-29.5	-1.7	-	-	-	-
L1847517-07	HH-02-20181115	0670	SV200	11/07/18	277167		-	-	-	Pass	230	207	11
L1847517-07	HH-02-20181115	721	1.0L Can	11/07/18	277167	L1844397-02	Pass	-29.4	-1.4	-	-	-	-
L1847517-08	HH-03-20181115	0652	SV200	11/07/18	277167		-	-	-	Pass	228	207	10
L1847517-08	HH-03-20181115	824	1.0L Can	11/07/18	277167	L1844032-01	Pass	-29.6	-1.0	-	-	-	-

Project Name: ESSEX/HOP

Project Number: 703765CH.01.03

Lab Number: L1847517

Report Date: 12/05/18

Canister and Flow Controller Information

Samplenum	Client ID	Media ID	Media Type	Date Prepared	Bottle Order	Cleaning Batch ID	Can Leak Check	Initial Pressure (in. Hg)	Pressure on Receipt (in. Hg)	Flow Controler Leak Chk	Flow Out mL/min	Flow In mL/min	% RPD
L1847517-09	HH-04-20181115	2157	1.0L Can	11/07/18	277167	L1840402-01	Pass	-29.5	-4.2	-	-	-	-
L1847517-10	HH-04-20181115-FD	01051	SV200	11/07/18	277167		-	-	-	Pass	225	225	0
L1847517-10	HH-04-20181115-FD	2162	1.0L Can	11/07/18	277167	L1838227-02	Pass	-29.4	-4.1	-	-	-	-
L1847517-11	HH-05-20181115	0653	SV200	11/07/18	277167		-	-	-	Pass	220	200	10
L1847517-11	HH-05-20181115	2175	1.0L Can	11/07/18	277167	L1840402-01	Pass	-29.9	-2.0	-	-	-	-
L1847517-12	HH-06-20181115	0668	SV200	11/07/18	277167		-	-	-	Pass	227	211	7
L1847517-12	HH-06-20181115	848	1.0L Can	11/07/18	277167	L1835794-02	Pass	-29.7	-1.7	-	-	-	-
L1847517-13	HH-07-20181115	0666	SV200	11/07/18	277167		-	-	-	Pass	227	211	7
L1847517-13	HH-07-20181115	2532	1.0L Can	11/07/18	277167	L1840402-01	Pass	-29.9	-0.63	-	-	-	-

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1835794
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1835794-02
Client ID: CAN 2089 SHELF 17
Sample Location:

Date Collected: 09/10/18 16:00
Date Received: 09/11/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 09/13/18 00:30
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Chlorodifluoromethane	ND	0.200	--	ND	0.707	--		1
Propylene	ND	0.500	--	ND	0.861	--		1
Propane	ND	0.500	--	ND	0.902	--		1
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.200	--	ND	1.40	--		1
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,3-Butadiene	ND	0.200	--	ND	0.442	--		1
Butane	ND	0.200	--	ND	0.475	--		1
Bromomethane	ND	0.200	--	ND	0.777	--		1
Chloroethane	ND	0.200	--	ND	0.528	--		1
Ethanol	ND	5.00	--	ND	9.42	--		1
Dichlorofluoromethane	ND	0.200	--	ND	0.842	--		1
Vinyl bromide	ND	0.200	--	ND	0.874	--		1
Acrolein	ND	0.500	--	ND	1.15	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Trichlorofluoromethane	ND	0.200	--	ND	1.12	--		1
Isopropanol	ND	0.500	--	ND	1.23	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
Pentane	ND	0.200	--	ND	0.590	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1
Tertiary butyl Alcohol	ND	0.500	--	ND	1.52	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
3-Chloropropene	ND	0.200	--	ND	0.626	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1835794
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1835794-02
Client ID: CAN 2089 SHELF 17
Sample Location:

Date Collected: 09/10/18 16:00
Date Received: 09/11/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Carbon disulfide	ND	0.200	--	ND	0.623	--		1
Freon-113	ND	0.200	--	ND	1.53	--		1
trans-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
1,1-Dichloroethane	ND	0.200	--	ND	0.809	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
Vinyl acetate	ND	1.00	--	ND	3.52	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
Ethyl Acetate	ND	0.500	--	ND	1.80	--		1
Chloroform	ND	0.200	--	ND	0.977	--		1
Tetrahydrofuran	ND	0.500	--	ND	1.47	--		1
2,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
1,2-Dichloroethane	ND	0.200	--	ND	0.809	--		1
n-Hexane	ND	0.200	--	ND	0.705	--		1
Diisopropyl ether	ND	0.200	--	ND	0.836	--		1
tert-Butyl Ethyl Ether	ND	0.200	--	ND	0.836	--		1
1,1,1-Trichloroethane	ND	0.200	--	ND	1.09	--		1
1,1-Dichloropropene	ND	0.200	--	ND	0.908	--		1
Benzene	ND	0.200	--	ND	0.639	--		1
Carbon tetrachloride	ND	0.200	--	ND	1.26	--		1
Cyclohexane	ND	0.200	--	ND	0.688	--		1
tert-Amyl Methyl Ether	ND	0.200	--	ND	0.836	--		1
Dibromomethane	ND	0.200	--	ND	1.42	--		1
1,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
Bromodichloromethane	ND	0.200	--	ND	1.34	--		1
1,4-Dioxane	ND	0.200	--	ND	0.721	--		1
Trichloroethene	ND	0.200	--	ND	1.07	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1835794
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1835794-02
Client ID: CAN 2089 SHELF 17
Sample Location:

Date Collected: 09/10/18 16:00
Date Received: 09/11/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
2,2,4-Trimethylpentane	ND	0.200	--	ND	0.934	--		1
Methyl Methacrylate	ND	0.500	--	ND	2.05	--		1
Heptane	ND	0.200	--	ND	0.820	--		1
cis-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
1,1,2-Trichloroethane	ND	0.200	--	ND	1.09	--		1
Toluene	ND	0.200	--	ND	0.754	--		1
1,3-Dichloropropane	ND	0.200	--	ND	0.924	--		1
2-Hexanone	ND	0.200	--	ND	0.820	--		1
Dibromochloromethane	ND	0.200	--	ND	1.70	--		1
1,2-Dibromoethane	ND	0.200	--	ND	1.54	--		1
Butyl acetate	ND	0.500	--	ND	2.38	--		1
Octane	ND	0.200	--	ND	0.934	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1
1,1,1,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
Chlorobenzene	ND	0.200	--	ND	0.921	--		1
Ethylbenzene	ND	0.200	--	ND	0.869	--		1
p/m-Xylene	ND	0.400	--	ND	1.74	--		1
Bromoform	ND	0.200	--	ND	2.07	--		1
Styrene	ND	0.200	--	ND	0.852	--		1
1,1,2,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
o-Xylene	ND	0.200	--	ND	0.869	--		1
1,2,3-Trichloropropane	ND	0.200	--	ND	1.21	--		1
Nonane	ND	0.200	--	ND	1.05	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
Bromobenzene	ND	0.200	--	ND	0.793	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1835794
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1835794-02
Client ID: CAN 2089 SHELF 17
Sample Location:

Date Collected: 09/10/18 16:00
Date Received: 09/11/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
2-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
n-Propylbenzene	ND	0.200	--	ND	0.983	--		1
4-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
4-Ethyltoluene	ND	0.200	--	ND	0.983	--		1
1,3,5-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
tert-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
Decane	ND	0.200	--	ND	1.16	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
1,4-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2-Dibromo-3-chloropropane	ND	0.200	--	ND	1.93	--		1
Undecane	ND	0.200	--	ND	1.28	--		1
Dodecane	ND	0.200	--	ND	1.39	--		1
1,2,4-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Naphthalene	ND	0.200	--	ND	1.05	--		1
1,2,3-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Hexachlorobutadiene	ND	0.200	--	ND	2.13	--		1

	Results	Qualifier	Units	RDL	Dilution Factor
Tentatively Identified Compounds					

No Tentatively Identified Compounds

Project Name: BATCH CANISTER CERTIFICATION **Lab Number:** L1835794

Project Number: CANISTER QC BAT **Report Date:** 12/05/18

Air Canister Certification Results

Lab ID: L1835794-02
Client ID: CAN 2089 SHELF 17
Sample Location:

Date Collected: 09/10/18 16:00
Date Received: 09/11/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-Difluorobenzene	95		60-140
Bromochloromethane	95		60-140
chlorobenzene-d5	93		60-140

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1835794
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1835794-02
Client ID: CAN 2089 SHELF 17
Sample Location:

Date Collected: 09/10/18 16:00
Date Received: 09/11/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 09/13/18 00:30
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air by SIM - Mansfield Lab								
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.050	--	ND	0.349	--		1
Vinyl chloride	ND	0.020	--	ND	0.051	--		1
1,3-Butadiene	ND	0.020	--	ND	0.044	--		1
Bromomethane	ND	0.020	--	ND	0.078	--		1
Chloroethane	ND	0.100	--	ND	0.264	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Trichlorofluoromethane	ND	0.050	--	ND	0.281	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
1,1-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
Freon-113	ND	0.050	--	ND	0.383	--		1
trans-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
1,1-Dichloroethane	ND	0.020	--	ND	0.081	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Chloroform	ND	0.020	--	ND	0.098	--		1
1,2-Dichloroethane	ND	0.020	--	ND	0.081	--		1
1,1,1-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Benzene	ND	0.100	--	ND	0.319	--		1
Carbon tetrachloride	ND	0.020	--	ND	0.126	--		1
1,2-Dichloropropane	ND	0.020	--	ND	0.092	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1835794
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1835794-02
Client ID: CAN 2089 SHELF 17
Sample Location:

Date Collected: 09/10/18 16:00
Date Received: 09/11/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
Bromodichloromethane	ND	0.020	--	ND	0.134	--		1
1,4-Dioxane	ND	0.100	--	ND	0.360	--		1
Trichloroethene	ND	0.020	--	ND	0.107	--		1
cis-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
1,1,2-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Toluene	ND	0.050	--	ND	0.188	--		1
Dibromochloromethane	ND	0.020	--	ND	0.170	--		1
1,2-Dibromoethane	ND	0.020	--	ND	0.154	--		1
Tetrachloroethene	ND	0.020	--	ND	0.136	--		1
1,1,1,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
Chlorobenzene	ND	0.100	--	ND	0.461	--		1
Ethylbenzene	ND	0.020	--	ND	0.087	--		1
p/m-Xylene	ND	0.040	--	ND	0.174	--		1
Bromoform	ND	0.020	--	ND	0.207	--		1
Styrene	ND	0.020	--	ND	0.085	--		1
1,1,2,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
o-Xylene	ND	0.020	--	ND	0.087	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
4-Ethyltoluene	ND	0.020	--	ND	0.098	--		1
1,3,5-Trimethybenzene	ND	0.020	--	ND	0.098	--		1
1,2,4-Trimethylbenzene	ND	0.020	--	ND	0.098	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
1,4-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1835794
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1835794-02
Client ID: CAN 2089 SHELF 17
Sample Location:

Date Collected: 09/10/18 16:00
Date Received: 09/11/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Naphthalene	ND	0.050	--	ND	0.262	--		1
1,2,3-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Hexachlorobutadiene	ND	0.050	--	ND	0.533	--		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	90		60-140
bromochloromethane	93		60-140
chlorobenzene-d5	88		60-140

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1838227
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1838227-02
Client ID: CAN 2162 SHELF 11
Sample Location:

Date Collected: 09/24/18 16:00
Date Received: 09/25/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 09/27/18 21:46
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Chlorodifluoromethane	ND	0.200	--	ND	0.707	--		1
Propylene	ND	0.500	--	ND	0.861	--		1
Propane	ND	0.500	--	ND	0.902	--		1
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.200	--	ND	1.40	--		1
Methanol	ND	5.00	--	ND	6.55	--		1
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,3-Butadiene	ND	0.200	--	ND	0.442	--		1
Butane	ND	0.200	--	ND	0.475	--		1
Bromomethane	ND	0.200	--	ND	0.777	--		1
Chloroethane	ND	0.200	--	ND	0.528	--		1
Ethanol	ND	5.00	--	ND	9.42	--		1
Dichlorofluoromethane	ND	0.200	--	ND	0.842	--		1
Vinyl bromide	ND	0.200	--	ND	0.874	--		1
Acrolein	ND	0.500	--	ND	1.15	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Acetonitrile	ND	0.200	--	ND	0.336	--		1
Trichlorofluoromethane	ND	0.200	--	ND	1.12	--		1
Isopropanol	ND	0.500	--	ND	1.23	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
Pentane	ND	0.200	--	ND	0.590	--		1
Ethyl ether	ND	0.200	--	ND	0.606	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1838227
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1838227-02
Client ID: CAN 2162 SHELF 11
Sample Location:

Date Collected: 09/24/18 16:00
Date Received: 09/25/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Tertiary butyl Alcohol	ND	0.500	--	ND	1.52	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
3-Chloropropene	ND	0.200	--	ND	0.626	--		1
Carbon disulfide	ND	0.200	--	ND	0.623	--		1
Freon-113	ND	0.200	--	ND	1.53	--		1
trans-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
1,1-Dichloroethane	ND	0.200	--	ND	0.809	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
Vinyl acetate	ND	1.00	--	ND	3.52	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
Ethyl Acetate	ND	0.500	--	ND	1.80	--		1
Chloroform	ND	0.200	--	ND	0.977	--		1
Tetrahydrofuran	ND	0.500	--	ND	1.47	--		1
2,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
1,2-Dichloroethane	ND	0.200	--	ND	0.809	--		1
n-Hexane	ND	0.200	--	ND	0.705	--		1
Diisopropyl ether	ND	0.200	--	ND	0.836	--		1
tert-Butyl Ethyl Ether	ND	0.200	--	ND	0.836	--		1
1,1,1-Trichloroethane	ND	0.200	--	ND	1.09	--		1
1,1-Dichloropropene	ND	0.200	--	ND	0.908	--		1
Benzene	ND	0.200	--	ND	0.639	--		1
Carbon tetrachloride	ND	0.200	--	ND	1.26	--		1
Cyclohexane	ND	0.200	--	ND	0.688	--		1
tert-Amyl Methyl Ether	ND	0.200	--	ND	0.836	--		1
Dibromomethane	ND	0.200	--	ND	1.42	--		1
1,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1838227
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1838227-02
Client ID: CAN 2162 SHELF 11
Sample Location:

Date Collected: 09/24/18 16:00
Date Received: 09/25/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Bromodichloromethane	ND	0.200	--	ND	1.34	--		1
1,4-Dioxane	ND	0.200	--	ND	0.721	--		1
Trichloroethene	ND	0.200	--	ND	1.07	--		1
2,2,4-Trimethylpentane	ND	0.200	--	ND	0.934	--		1
Methyl Methacrylate	ND	0.500	--	ND	2.05	--		1
Heptane	ND	0.200	--	ND	0.820	--		1
cis-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
1,1,2-Trichloroethane	ND	0.200	--	ND	1.09	--		1
Toluene	ND	0.200	--	ND	0.754	--		1
1,3-Dichloropropane	ND	0.200	--	ND	0.924	--		1
2-Hexanone	ND	0.200	--	ND	0.820	--		1
Dibromochloromethane	ND	0.200	--	ND	1.70	--		1
1,2-Dibromoethane	ND	0.200	--	ND	1.54	--		1
Butyl acetate	ND	0.500	--	ND	2.38	--		1
Octane	ND	0.200	--	ND	0.934	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1
1,1,1,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
Chlorobenzene	ND	0.200	--	ND	0.921	--		1
Ethylbenzene	ND	0.200	--	ND	0.869	--		1
p/m-Xylene	ND	0.400	--	ND	1.74	--		1
Bromoform	ND	0.200	--	ND	2.07	--		1
Styrene	ND	0.200	--	ND	0.852	--		1
1,1,2,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
o-Xylene	ND	0.200	--	ND	0.869	--		1
1,2,3-Trichloropropane	ND	0.200	--	ND	1.21	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1838227
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1838227-02
Client ID: CAN 2162 SHELF 11
Sample Location:

Date Collected: 09/24/18 16:00
Date Received: 09/25/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Nonane	ND	0.200	--	ND	1.05	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
Bromobenzene	ND	0.200	--	ND	0.793	--		1
2-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
n-Propylbenzene	ND	0.200	--	ND	0.983	--		1
4-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
4-Ethyltoluene	ND	0.200	--	ND	0.983	--		1
1,3,5-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
tert-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
Decane	ND	0.200	--	ND	1.16	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
1,4-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2-Dibromo-3-chloropropane	ND	0.200	--	ND	1.93	--		1
Undecane	ND	0.200	--	ND	1.28	--		1
Dodecane	ND	0.200	--	ND	1.39	--		1
1,2,4-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Naphthalene	ND	0.200	--	ND	1.05	--		1
1,2,3-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Hexachlorobutadiene	ND	0.200	--	ND	2.13	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1838227
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1838227-02
Client ID: CAN 2162 SHELF 11
Sample Location:

Date Collected: 09/24/18 16:00
Date Received: 09/25/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								

	Results	Qualifier	Units	RDL	Dilution Factor
Tentatively Identified Compounds					
Cyclotrisiloxane, Hexamethyl-	1.3	NJ	ppbV		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-Difluorobenzene	94		60-140
Bromochloromethane	97		60-140
chlorobenzene-d5	93		60-140

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1838227
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1838227-02
Client ID: CAN 2162 SHELF 11
Sample Location:

Date Collected: 09/24/18 16:00
Date Received: 09/25/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 09/27/18 21:46
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air by SIM - Mansfield Lab								
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.050	--	ND	0.349	--		1
Vinyl chloride	ND	0.020	--	ND	0.051	--		1
1,3-Butadiene	ND	0.020	--	ND	0.044	--		1
Bromomethane	ND	0.020	--	ND	0.078	--		1
Chloroethane	ND	0.100	--	ND	0.264	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Trichlorofluoromethane	ND	0.050	--	ND	0.281	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
1,1-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
Freon-113	ND	0.050	--	ND	0.383	--		1
trans-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
1,1-Dichloroethane	ND	0.020	--	ND	0.081	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
2-Butanone	ND	0.500	--	ND	1.47	--	J	1
cis-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Chloroform	ND	0.020	--	ND	0.098	--		1
1,2-Dichloroethane	ND	0.020	--	ND	0.081	--		1
1,1,1-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Benzene	ND	0.100	--	ND	0.319	--		1
Carbon tetrachloride	ND	0.020	--	ND	0.126	--		1
1,2-Dichloropropane	ND	0.020	--	ND	0.092	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1838227
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1838227-02
Client ID: CAN 2162 SHELF 11
Sample Location:

Date Collected: 09/24/18 16:00
Date Received: 09/25/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
Bromodichloromethane	ND	0.020	--	ND	0.134	--		1
1,4-Dioxane	ND	0.100	--	ND	0.360	--		1
Trichloroethene	ND	0.020	--	ND	0.107	--		1
cis-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
1,1,2-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Toluene	ND	0.050	--	ND	0.188	--		1
Dibromochloromethane	ND	0.020	--	ND	0.170	--		1
1,2-Dibromoethane	ND	0.020	--	ND	0.154	--		1
Tetrachloroethene	ND	0.020	--	ND	0.136	--		1
1,1,1,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
Chlorobenzene	ND	0.100	--	ND	0.461	--		1
Ethylbenzene	ND	0.020	--	ND	0.087	--		1
p/m-Xylene	ND	0.040	--	ND	0.174	--		1
Bromoform	ND	0.020	--	ND	0.207	--		1
Styrene	ND	0.020	--	ND	0.085	--		1
1,1,2,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
o-Xylene	ND	0.020	--	ND	0.087	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
4-Ethyltoluene	ND	0.020	--	ND	0.098	--		1
1,3,5-Trimethybenzene	ND	0.020	--	ND	0.098	--		1
1,2,4-Trimethylbenzene	ND	0.020	--	ND	0.098	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
1,4-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1838227
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1838227-02
Client ID: CAN 2162 SHELF 11
Sample Location:

Date Collected: 09/24/18 16:00
Date Received: 09/25/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Naphthalene	ND	0.050	--	ND	0.262	--		1
1,2,3-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Hexachlorobutadiene	ND	0.050	--	ND	0.533	--		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	93		60-140
bromochloromethane	97		60-140
chlorobenzene-d5	94		60-140

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1838497
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1838497-02
Client ID: CAN 1502 SHELF 20
Sample Location:

Date Collected: 09/25/18 16:00
Date Received: 09/26/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 09/27/18 23:04
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Chlorodifluoromethane	ND	0.200	--	ND	0.707	--		1
Propylene	ND	0.500	--	ND	0.861	--		1
Propane	ND	0.500	--	ND	0.902	--		1
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.200	--	ND	1.40	--		1
Methanol	ND	5.00	--	ND	6.55	--		1
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,3-Butadiene	ND	0.200	--	ND	0.442	--		1
Butane	ND	0.200	--	ND	0.475	--		1
Bromomethane	ND	0.200	--	ND	0.777	--		1
Chloroethane	ND	0.200	--	ND	0.528	--		1
Ethanol	ND	5.00	--	ND	9.42	--		1
Dichlorofluoromethane	ND	0.200	--	ND	0.842	--		1
Vinyl bromide	ND	0.200	--	ND	0.874	--		1
Acrolein	ND	0.500	--	ND	1.15	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Acetonitrile	ND	0.200	--	ND	0.336	--		1
Trichlorofluoromethane	ND	0.200	--	ND	1.12	--		1
Isopropanol	ND	0.500	--	ND	1.23	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
Pentane	ND	0.200	--	ND	0.590	--		1
Ethyl ether	ND	0.200	--	ND	0.606	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1838497
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1838497-02
Client ID: CAN 1502 SHELF 20
Sample Location:

Date Collected: 09/25/18 16:00
Date Received: 09/26/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Tertiary butyl Alcohol	ND	0.500	--	ND	1.52	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
3-Chloropropene	ND	0.200	--	ND	0.626	--		1
Carbon disulfide	ND	0.200	--	ND	0.623	--		1
Freon-113	ND	0.200	--	ND	1.53	--		1
trans-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
1,1-Dichloroethane	ND	0.200	--	ND	0.809	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
Vinyl acetate	ND	1.00	--	ND	3.52	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
Ethyl Acetate	ND	0.500	--	ND	1.80	--		1
Chloroform	ND	0.200	--	ND	0.977	--		1
Tetrahydrofuran	ND	0.500	--	ND	1.47	--		1
2,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
1,2-Dichloroethane	ND	0.200	--	ND	0.809	--		1
n-Hexane	ND	0.200	--	ND	0.705	--		1
Diisopropyl ether	ND	0.200	--	ND	0.836	--		1
tert-Butyl Ethyl Ether	ND	0.200	--	ND	0.836	--		1
1,1,1-Trichloroethane	ND	0.200	--	ND	1.09	--		1
1,1-Dichloropropene	ND	0.200	--	ND	0.908	--		1
Benzene	ND	0.200	--	ND	0.639	--		1
Carbon tetrachloride	ND	0.200	--	ND	1.26	--		1
Cyclohexane	ND	0.200	--	ND	0.688	--		1
tert-Amyl Methyl Ether	ND	0.200	--	ND	0.836	--		1
Dibromomethane	ND	0.200	--	ND	1.42	--		1
1,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1838497
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1838497-02
Client ID: CAN 1502 SHELF 20
Sample Location:

Date Collected: 09/25/18 16:00
Date Received: 09/26/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Bromodichloromethane	ND	0.200	--	ND	1.34	--		1
1,4-Dioxane	ND	0.200	--	ND	0.721	--		1
Trichloroethene	ND	0.200	--	ND	1.07	--		1
2,2,4-Trimethylpentane	ND	0.200	--	ND	0.934	--		1
Methyl Methacrylate	ND	0.500	--	ND	2.05	--		1
Heptane	ND	0.200	--	ND	0.820	--		1
cis-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
1,1,2-Trichloroethane	ND	0.200	--	ND	1.09	--		1
Toluene	ND	0.200	--	ND	0.754	--		1
1,3-Dichloropropane	ND	0.200	--	ND	0.924	--		1
2-Hexanone	ND	0.200	--	ND	0.820	--		1
Dibromochloromethane	ND	0.200	--	ND	1.70	--		1
1,2-Dibromoethane	ND	0.200	--	ND	1.54	--		1
Butyl acetate	ND	0.500	--	ND	2.38	--		1
Octane	ND	0.200	--	ND	0.934	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1
1,1,1,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
Chlorobenzene	ND	0.200	--	ND	0.921	--		1
Ethylbenzene	ND	0.200	--	ND	0.869	--		1
p/m-Xylene	ND	0.400	--	ND	1.74	--		1
Bromoform	ND	0.200	--	ND	2.07	--		1
Styrene	ND	0.200	--	ND	0.852	--		1
1,1,2,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
o-Xylene	ND	0.200	--	ND	0.869	--		1
1,2,3-Trichloropropane	ND	0.200	--	ND	1.21	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1838497
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1838497-02
Client ID: CAN 1502 SHELF 20
Sample Location:

Date Collected: 09/25/18 16:00
Date Received: 09/26/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Nonane	ND	0.200	--	ND	1.05	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
Bromobenzene	ND	0.200	--	ND	0.793	--		1
2-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
n-Propylbenzene	ND	0.200	--	ND	0.983	--		1
4-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
4-Ethyltoluene	ND	0.200	--	ND	0.983	--		1
1,3,5-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
tert-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
Decane	ND	0.200	--	ND	1.16	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
1,4-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2-Dibromo-3-chloropropane	ND	0.200	--	ND	1.93	--		1
Undecane	ND	0.200	--	ND	1.28	--		1
Dodecane	ND	0.200	--	ND	1.39	--		1
1,2,4-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Naphthalene	ND	0.200	--	ND	1.05	--		1
1,2,3-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Hexachlorobutadiene	ND	0.200	--	ND	2.13	--		1

Project Name: BATCH CANISTER CERTIFICATION **Lab Number:** L1838497

Project Number: CANISTER QC BAT **Report Date:** 12/05/18

Air Canister Certification Results

Lab ID: L1838497-02
Client ID: CAN 1502 SHELF 20
Sample Location:

Date Collected: 09/25/18 16:00
Date Received: 09/26/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								

	Results	Qualifier	Units	RDL	Dilution Factor
Tentatively Identified Compounds					

No Tentatively Identified Compounds

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-Difluorobenzene	93		60-140
Bromochloromethane	97		60-140
chlorobenzene-d5	91		60-140

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1838497
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1838497-02
Client ID: CAN 1502 SHELF 20
Sample Location:

Date Collected: 09/25/18 16:00
Date Received: 09/26/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 09/27/18 23:04
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air by SIM - Mansfield Lab								
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.050	--	ND	0.349	--		1
Vinyl chloride	ND	0.020	--	ND	0.051	--		1
1,3-Butadiene	ND	0.020	--	ND	0.044	--		1
Bromomethane	ND	0.020	--	ND	0.078	--		1
Chloroethane	ND	0.100	--	ND	0.264	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Trichlorofluoromethane	ND	0.050	--	ND	0.281	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
1,1-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
Freon-113	ND	0.050	--	ND	0.383	--		1
trans-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
1,1-Dichloroethane	ND	0.020	--	ND	0.081	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Chloroform	ND	0.020	--	ND	0.098	--		1
1,2-Dichloroethane	ND	0.020	--	ND	0.081	--		1
1,1,1-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Benzene	ND	0.100	--	ND	0.319	--		1
Carbon tetrachloride	ND	0.020	--	ND	0.126	--		1
1,2-Dichloropropane	ND	0.020	--	ND	0.092	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1838497
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1838497-02
Client ID: CAN 1502 SHELF 20
Sample Location:

Date Collected: 09/25/18 16:00
Date Received: 09/26/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
Bromodichloromethane	ND	0.020	--	ND	0.134	--		1
1,4-Dioxane	ND	0.100	--	ND	0.360	--		1
Trichloroethene	ND	0.020	--	ND	0.107	--		1
cis-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
1,1,2-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Toluene	ND	0.050	--	ND	0.188	--		1
Dibromochloromethane	ND	0.020	--	ND	0.170	--		1
1,2-Dibromoethane	ND	0.020	--	ND	0.154	--		1
Tetrachloroethene	ND	0.020	--	ND	0.136	--	J	1
1,1,1,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
Chlorobenzene	ND	0.100	--	ND	0.461	--		1
Ethylbenzene	ND	0.020	--	ND	0.087	--		1
p/m-Xylene	ND	0.040	--	ND	0.174	--		1
Bromoform	ND	0.020	--	ND	0.207	--		1
Styrene	ND	0.020	--	ND	0.085	--		1
1,1,2,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
o-Xylene	ND	0.020	--	ND	0.087	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
4-Ethyltoluene	ND	0.020	--	ND	0.098	--		1
1,3,5-Trimethybenzene	ND	0.020	--	ND	0.098	--		1
1,2,4-Trimethylbenzene	ND	0.020	--	ND	0.098	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
1,4-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1838497
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1838497-02
Client ID: CAN 1502 SHELF 20
Sample Location:

Date Collected: 09/25/18 16:00
Date Received: 09/26/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Naphthalene	ND	0.050	--	ND	0.262	--	J	1
1,2,3-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Hexachlorobutadiene	ND	0.050	--	ND	0.533	--		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	93		60-140
bromochloromethane	97		60-140
chlorobenzene-d5	92		60-140

Project Name: INDIV. CANISTER CERTIFICATION
Project Number: CANISTER QC INDIV

Lab Number: L1839361
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1839361-04
Client ID: CAN 2529
Sample Location:

Date Collected: 09/30/18 12:00
Date Received: 10/01/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 10/02/18 22:01
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Chlorodifluoromethane	ND	0.200	--	ND	0.707	--		1
Propylene	ND	0.500	--	ND	0.861	--		1
Propane	ND	0.500	--	ND	0.902	--		1
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.200	--	ND	1.40	--		1
Methanol	ND	5.00	--	ND	6.55	--		1
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,3-Butadiene	ND	0.200	--	ND	0.442	--		1
Butane	ND	0.200	--	ND	0.475	--		1
Bromomethane	ND	0.200	--	ND	0.777	--		1
Chloroethane	ND	0.200	--	ND	0.528	--		1
Ethanol	ND	5.00	--	ND	9.42	--		1
Dichlorofluoromethane	ND	0.200	--	ND	0.842	--		1
Vinyl bromide	ND	0.200	--	ND	0.874	--		1
Acrolein	ND	0.500	--	ND	1.15	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Acetonitrile	ND	0.200	--	ND	0.336	--		1
Trichlorofluoromethane	ND	0.200	--	ND	1.12	--		1
Isopropanol	ND	0.500	--	ND	1.23	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
Pentane	ND	0.200	--	ND	0.590	--		1
Ethyl ether	ND	0.200	--	ND	0.606	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1

Project Name: INDIV. CANISTER CERTIFICATION
Project Number: CANISTER QC INDIV

Lab Number: L1839361
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1839361-04
Client ID: CAN 2529
Sample Location:

Date Collected: 09/30/18 12:00
Date Received: 10/01/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Tertiary butyl Alcohol	ND	0.500	--	ND	1.52	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
3-Chloropropene	ND	0.200	--	ND	0.626	--		1
Carbon disulfide	ND	0.200	--	ND	0.623	--		1
Freon-113	ND	0.200	--	ND	1.53	--		1
trans-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
1,1-Dichloroethane	ND	0.200	--	ND	0.809	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
Vinyl acetate	ND	1.00	--	ND	3.52	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
Ethyl Acetate	ND	0.500	--	ND	1.80	--		1
Chloroform	ND	0.200	--	ND	0.977	--		1
Tetrahydrofuran	ND	0.500	--	ND	1.47	--		1
2,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
1,2-Dichloroethane	ND	0.200	--	ND	0.809	--		1
n-Hexane	ND	0.200	--	ND	0.705	--		1
Diisopropyl ether	ND	0.200	--	ND	0.836	--		1
tert-Butyl Ethyl Ether	ND	0.200	--	ND	0.836	--		1
1,1,1-Trichloroethane	ND	0.200	--	ND	1.09	--		1
1,1-Dichloropropene	ND	0.200	--	ND	0.908	--		1
Benzene	ND	0.200	--	ND	0.639	--		1
Carbon tetrachloride	ND	0.200	--	ND	1.26	--		1
Cyclohexane	ND	0.200	--	ND	0.688	--		1
tert-Amyl Methyl Ether	ND	0.200	--	ND	0.836	--		1
Dibromomethane	ND	0.200	--	ND	1.42	--		1
1,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1

Project Name: INDIV. CANISTER CERTIFICATION **Lab Number:** L1839361

Project Number: CANISTER QC INDIV **Report Date:** 12/05/18

Air Canister Certification Results

Lab ID: L1839361-04
Client ID: CAN 2529
Sample Location:

Date Collected: 09/30/18 12:00
Date Received: 10/01/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Bromodichloromethane	ND	0.200	--	ND	1.34	--		1
1,4-Dioxane	ND	0.200	--	ND	0.721	--		1
Trichloroethene	ND	0.200	--	ND	1.07	--		1
2,2,4-Trimethylpentane	ND	0.200	--	ND	0.934	--		1
Methyl Methacrylate	ND	0.500	--	ND	2.05	--		1
Heptane	ND	0.200	--	ND	0.820	--		1
cis-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
1,1,2-Trichloroethane	ND	0.200	--	ND	1.09	--		1
Toluene	ND	0.200	--	ND	0.754	--		1
1,3-Dichloropropane	ND	0.200	--	ND	0.924	--		1
2-Hexanone	ND	0.200	--	ND	0.820	--		1
Dibromochloromethane	ND	0.200	--	ND	1.70	--		1
1,2-Dibromoethane	ND	0.200	--	ND	1.54	--		1
Butyl acetate	ND	0.500	--	ND	2.38	--		1
Octane	ND	0.200	--	ND	0.934	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1
1,1,1,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
Chlorobenzene	ND	0.200	--	ND	0.921	--		1
Ethylbenzene	ND	0.200	--	ND	0.869	--		1
p/m-Xylene	ND	0.400	--	ND	1.74	--		1
Bromoform	ND	0.200	--	ND	2.07	--		1
Styrene	ND	0.200	--	ND	0.852	--		1
1,1,2,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
o-Xylene	ND	0.200	--	ND	0.869	--		1
1,2,3-Trichloropropane	ND	0.200	--	ND	1.21	--		1

Project Name: INDIV. CANISTER CERTIFICATION
Project Number: CANISTER QC INDIV

Lab Number: L1839361
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1839361-04
Client ID: CAN 2529
Sample Location:

Date Collected: 09/30/18 12:00
Date Received: 10/01/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Nonane	ND	0.200	--	ND	1.05	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
Bromobenzene	ND	0.200	--	ND	0.793	--		1
2-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
n-Propylbenzene	ND	0.200	--	ND	0.983	--		1
4-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
4-Ethyltoluene	ND	0.200	--	ND	0.983	--		1
1,3,5-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
tert-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
Decane	ND	0.200	--	ND	1.16	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
1,4-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2-Dibromo-3-chloropropane	ND	0.200	--	ND	1.93	--		1
Undecane	ND	0.200	--	ND	1.28	--		1
Dodecane	ND	0.200	--	ND	1.39	--		1
1,2,4-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Naphthalene	ND	0.200	--	ND	1.05	--		1
1,2,3-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Hexachlorobutadiene	ND	0.200	--	ND	2.13	--		1

Project Name: INDIV. CANISTER CERTIFICATION
Project Number: CANISTER QC INDIV
Lab Number: L1839361
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1839361-04
Client ID: CAN 2529
Sample Location:

Date Collected: 09/30/18 12:00
Date Received: 10/01/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								

	Results	Qualifier	Units	RDL	Dilution Factor
Tentatively Identified Compounds					

No Tentatively Identified Compounds

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-Difluorobenzene	83		60-140
Bromochloromethane	85		60-140
chlorobenzene-d5	83		60-140

Project Name: INDIV. CANISTER CERTIFICATION
Project Number: CANISTER QC INDIV

Lab Number: L1839361
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1839361-04
Client ID: CAN 2529
Sample Location:

Date Collected: 09/30/18 12:00
Date Received: 10/01/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 10/02/18 22:01
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air by SIM - Mansfield Lab								
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.500	--	ND	0.500	--		1
Freon-114	ND	0.050	--	ND	0.349	--		1
Vinyl chloride	ND	0.020	--	ND	0.051	--		1
1,3-Butadiene	ND	0.020	--	ND	0.044	--		1
Bromomethane	ND	0.020	--	ND	0.078	--		1
Chloroethane	ND	0.100	--	ND	0.264	--		1
Acetone	ND	2.00	--	ND	2.38	--		1
Trichlorofluoromethane	ND	0.050	--	ND	0.281	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
1,1-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
Freon-113	ND	0.050	--	ND	0.383	--		1
trans-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
1,1-Dichloroethane	ND	0.020	--	ND	0.081	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
2-Butanone	ND	0.500	--	ND	1.47	--	J	1
cis-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Chloroform	ND	0.020	--	ND	0.098	--		1
1,2-Dichloroethane	ND	0.020	--	ND	0.081	--		1
1,1,1-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Benzene	ND	0.100	--	ND	0.319	--		1
Carbon tetrachloride	ND	0.020	--	ND	0.126	--		1
1,2-Dichloropropane	ND	0.020	--	ND	0.092	--		1

Project Name: INDIV. CANISTER CERTIFICATION
Project Number: CANISTER QC INDIV

Lab Number: L1839361
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1839361-04
Client ID: CAN 2529
Sample Location:

Date Collected: 09/30/18 12:00
Date Received: 10/01/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
Bromodichloromethane	ND	0.020	--	ND	0.134	--		1
1,4-Dioxane	ND	0.100	--	ND	0.360	--		1
Trichloroethene	ND	0.020	--	ND	0.107	--		1
cis-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
1,1,2-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Toluene	ND	0.050	--	ND	0.188	--		1
Dibromochloromethane	ND	0.020	--	ND	0.170	--		1
1,2-Dibromoethane	ND	0.020	--	ND	0.154	--		1
Tetrachloroethene	ND	0.020	--	ND	0.136	--		1
1,1,1,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
Chlorobenzene	ND	0.100	--	ND	0.461	--		1
Ethylbenzene	ND	0.020	--	ND	0.087	--		1
p/m-Xylene	ND	0.040	--	ND	0.174	--		1
Bromoform	ND	0.020	--	ND	0.207	--		1
Styrene	ND	0.020	--	ND	0.085	--		1
1,1,2,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
o-Xylene	ND	0.020	--	ND	0.087	--		1
Isopropylbenzene	ND	0.500	--	ND	0.983	--		1
1,3,5-Trimethybenzene	ND	0.020	--	ND	0.098	--		1
1,2,4-Trimethylbenzene	ND	0.020	--	ND	0.098	--		1
1,3-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
1,4-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
sec-Butylbenzene	ND	0.500	--	ND	1.10	--		1
p-Isopropyltoluene	ND	0.500	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1

Project Name: INDIV. CANISTER CERTIFICATION
Project Number: CANISTER QC INDIV

Lab Number: L1839361
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1839361-04
Client ID: CAN 2529
Sample Location:

Date Collected: 09/30/18 12:00
Date Received: 10/01/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
n-Butylbenzene	ND	0.500	--	ND	1.10	--		1
1,2,4-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Naphthalene	ND	0.050	--	ND	0.262	--		1
1,2,3-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Hexachlorobutadiene	ND	0.050	--	ND	0.533	--		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	90		60-140
bromochloromethane	92		60-140
chlorobenzene-d5	88		60-140

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1840402
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1840402-01
Client ID: CAN 716 SHELF 14
Sample Location:

Date Collected: 10/05/18 09:00
Date Received: 10/05/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 10/05/18 20:50
Analyst: RY

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Chlorodifluoromethane	ND	0.200	--	ND	0.707	--		1
Propylene	ND	0.500	--	ND	0.861	--		1
Propane	ND	0.500	--	ND	0.902	--		1
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.200	--	ND	1.40	--		1
Methanol	ND	5.00	--	ND	6.55	--		1
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,3-Butadiene	ND	0.200	--	ND	0.442	--		1
Butane	ND	0.200	--	ND	0.475	--		1
Bromomethane	ND	0.200	--	ND	0.777	--		1
Chloroethane	ND	0.200	--	ND	0.528	--		1
Ethanol	ND	5.00	--	ND	9.42	--		1
Dichlorofluoromethane	ND	0.200	--	ND	0.842	--		1
Vinyl bromide	ND	0.200	--	ND	0.874	--		1
Acrolein	ND	0.500	--	ND	1.15	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Acetonitrile	ND	0.200	--	ND	0.336	--		1
Trichlorofluoromethane	ND	0.200	--	ND	1.12	--		1
Isopropanol	ND	0.500	--	ND	1.23	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
Pentane	ND	0.200	--	ND	0.590	--		1
Ethyl ether	ND	0.200	--	ND	0.606	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1840402
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1840402-01
Client ID: CAN 716 SHELF 14
Sample Location:

Date Collected: 10/05/18 09:00
Date Received: 10/05/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Tertiary butyl Alcohol	ND	0.500	--	ND	1.52	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
3-Chloropropene	ND	0.200	--	ND	0.626	--		1
Carbon disulfide	ND	0.200	--	ND	0.623	--		1
Freon-113	ND	0.200	--	ND	1.53	--		1
trans-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
1,1-Dichloroethane	ND	0.200	--	ND	0.809	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
Vinyl acetate	ND	1.00	--	ND	3.52	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
Ethyl Acetate	ND	0.500	--	ND	1.80	--		1
Chloroform	ND	0.200	--	ND	0.977	--		1
Tetrahydrofuran	ND	0.500	--	ND	1.47	--		1
2,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
1,2-Dichloroethane	ND	0.200	--	ND	0.809	--		1
n-Hexane	ND	0.200	--	ND	0.705	--		1
Diisopropyl ether	ND	0.200	--	ND	0.836	--		1
tert-Butyl Ethyl Ether	ND	0.200	--	ND	0.836	--		1
1,1,1-Trichloroethane	ND	0.200	--	ND	1.09	--		1
1,1-Dichloropropene	ND	0.200	--	ND	0.908	--		1
Benzene	ND	0.200	--	ND	0.639	--		1
Carbon tetrachloride	ND	0.200	--	ND	1.26	--		1
Cyclohexane	ND	0.200	--	ND	0.688	--		1
tert-Amyl Methyl Ether	ND	0.200	--	ND	0.836	--		1
Dibromomethane	ND	0.200	--	ND	1.42	--		1
1,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1840402
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1840402-01
Client ID: CAN 716 SHELF 14
Sample Location:

Date Collected: 10/05/18 09:00
Date Received: 10/05/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Bromodichloromethane	ND	0.200	--	ND	1.34	--		1
1,4-Dioxane	ND	0.200	--	ND	0.721	--		1
Trichloroethene	ND	0.200	--	ND	1.07	--		1
2,2,4-Trimethylpentane	ND	0.200	--	ND	0.934	--		1
Methyl Methacrylate	ND	0.500	--	ND	2.05	--		1
Heptane	ND	0.200	--	ND	0.820	--		1
cis-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
1,1,2-Trichloroethane	ND	0.200	--	ND	1.09	--		1
Toluene	ND	0.200	--	ND	0.754	--		1
1,3-Dichloropropane	ND	0.200	--	ND	0.924	--		1
2-Hexanone	ND	0.200	--	ND	0.820	--		1
Dibromochloromethane	ND	0.200	--	ND	1.70	--		1
1,2-Dibromoethane	ND	0.200	--	ND	1.54	--		1
Butyl acetate	ND	0.500	--	ND	2.38	--		1
Octane	ND	0.200	--	ND	0.934	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1
1,1,1,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
Chlorobenzene	ND	0.200	--	ND	0.921	--		1
Ethylbenzene	ND	0.200	--	ND	0.869	--		1
p/m-Xylene	ND	0.400	--	ND	1.74	--		1
Bromoform	ND	0.200	--	ND	2.07	--		1
Styrene	ND	0.200	--	ND	0.852	--		1
1,1,2,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
o-Xylene	ND	0.200	--	ND	0.869	--		1
1,2,3-Trichloropropane	ND	0.200	--	ND	1.21	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1840402
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1840402-01
Client ID: CAN 716 SHELF 14
Sample Location:

Date Collected: 10/05/18 09:00
Date Received: 10/05/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Nonane	ND	0.200	--	ND	1.05	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
Bromobenzene	ND	0.200	--	ND	0.793	--		1
2-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
n-Propylbenzene	ND	0.200	--	ND	0.983	--		1
4-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
4-Ethyltoluene	ND	0.200	--	ND	0.983	--		1
1,3,5-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
tert-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
Decane	ND	0.200	--	ND	1.16	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
1,4-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2-Dibromo-3-chloropropane	ND	0.200	--	ND	1.93	--		1
Undecane	ND	0.200	--	ND	1.28	--		1
Dodecane	ND	0.200	--	ND	1.39	--		1
1,2,4-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Naphthalene	ND	0.200	--	ND	1.05	--		1
1,2,3-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Hexachlorobutadiene	ND	0.200	--	ND	2.13	--		1

Project Name: BATCH CANISTER CERTIFICATION **Lab Number:** L1840402

Project Number: CANISTER QC BAT **Report Date:** 12/05/18

Air Canister Certification Results

Lab ID: L1840402-01
Client ID: CAN 716 SHELF 14
Sample Location:

Date Collected: 10/05/18 09:00
Date Received: 10/05/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								

	Results	Qualifier	Units	RDL	Dilution Factor
Tentatively Identified Compounds					

No Tentatively Identified Compounds

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-Difluorobenzene	91		60-140
Bromochloromethane	94		60-140
chlorobenzene-d5	87		60-140

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1840402
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1840402-01
Client ID: CAN 716 SHELF 14
Sample Location:

Date Collected: 10/05/18 09:00
Date Received: 10/05/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 10/05/18 20:50
Analyst: RY

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air by SIM - Mansfield Lab								
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.050	--	ND	0.349	--		1
Vinyl chloride	ND	0.020	--	ND	0.051	--		1
1,3-Butadiene	ND	0.020	--	ND	0.044	--		1
Bromomethane	ND	0.020	--	ND	0.078	--		1
Chloroethane	ND	0.100	--	ND	0.264	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Trichlorofluoromethane	ND	0.050	--	ND	0.281	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
1,1-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
Freon-113	ND	0.050	--	ND	0.383	--		1
trans-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
1,1-Dichloroethane	ND	0.020	--	ND	0.081	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Chloroform	ND	0.020	--	ND	0.098	--		1
1,2-Dichloroethane	ND	0.020	--	ND	0.081	--		1
1,1,1-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Benzene	ND	0.100	--	ND	0.319	--		1
Carbon tetrachloride	ND	0.020	--	ND	0.126	--		1
1,2-Dichloropropane	ND	0.020	--	ND	0.092	--		1

Project Name: BATCH CANISTER CERTIFICATION **Lab Number:** L1840402

Project Number: CANISTER QC BAT **Report Date:** 12/05/18

Air Canister Certification Results

Lab ID: L1840402-01
Client ID: CAN 716 SHELF 14
Sample Location:

Date Collected: 10/05/18 09:00
Date Received: 10/05/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
Bromodichloromethane	ND	0.020	--	ND	0.134	--		1
1,4-Dioxane	ND	0.100	--	ND	0.360	--		1
Trichloroethene	ND	0.020	--	ND	0.107	--		1
cis-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--	J	1
trans-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
1,1,2-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Toluene	ND	0.050	--	ND	0.188	--		1
Dibromochloromethane	ND	0.020	--	ND	0.170	--		1
1,2-Dibromoethane	ND	0.020	--	ND	0.154	--		1
Tetrachloroethene	0.043	0.020	--	0.292	0.136	--		1
1,1,1,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
Chlorobenzene	ND	0.100	--	ND	0.461	--		1
Ethylbenzene	ND	0.020	--	ND	0.087	--		1
p/m-Xylene	ND	0.040	--	ND	0.174	--		1
Bromoform	ND	0.020	--	ND	0.207	--		1
Styrene	ND	0.020	--	ND	0.085	--		1
1,1,2,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
o-Xylene	ND	0.020	--	ND	0.087	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
4-Ethyltoluene	ND	0.020	--	ND	0.098	--		1
1,3,5-Trimethybenzene	ND	0.020	--	ND	0.098	--		1
1,2,4-Trimethylbenzene	ND	0.020	--	ND	0.098	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
1,4-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1840402
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1840402-01
Client ID: CAN 716 SHELF 14
Sample Location:

Date Collected: 10/05/18 09:00
Date Received: 10/05/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Naphthalene	ND	0.050	--	ND	0.262	--		1
1,2,3-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Hexachlorobutadiene	ND	0.050	--	ND	0.533	--		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	93		60-140
bromochloromethane	95		60-140
chlorobenzene-d5	92		60-140

Project Name: BATCH CANISTER CERTIFICATION **Lab Number:** L1842636

Project Number: CANISTER QC BAT **Report Date:** 12/05/18

Air Canister Certification Results

Lab ID: L1842636-02
Client ID: CAN 2499 SHELF 15
Sample Location:

Date Collected: 10/18/18 16:00
Date Received: 10/19/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 10/19/18 20:36
Analyst: RY

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Chlorodifluoromethane	ND	0.200	--	ND	0.707	--		1
Propylene	ND	0.500	--	ND	0.861	--		1
Propane	ND	0.500	--	ND	0.902	--		1
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.200	--	ND	1.40	--		1
Methanol	ND	5.00	--	ND	6.55	--		1
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,3-Butadiene	ND	0.200	--	ND	0.442	--		1
Butane	ND	0.200	--	ND	0.475	--		1
Bromomethane	ND	0.200	--	ND	0.777	--		1
Chloroethane	ND	0.200	--	ND	0.528	--		1
Ethanol	ND	5.00	--	ND	9.42	--		1
Dichlorofluoromethane	ND	0.200	--	ND	0.842	--		1
Vinyl bromide	ND	0.200	--	ND	0.874	--		1
Acrolein	ND	0.500	--	ND	1.15	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Acetonitrile	ND	0.200	--	ND	0.336	--		1
Trichlorofluoromethane	ND	0.200	--	ND	1.12	--		1
Isopropanol	ND	0.500	--	ND	1.23	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
Pentane	ND	0.200	--	ND	0.590	--		1
Ethyl ether	ND	0.200	--	ND	0.606	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1842636
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1842636-02
Client ID: CAN 2499 SHELF 15
Sample Location:

Date Collected: 10/18/18 16:00
Date Received: 10/19/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Tertiary butyl Alcohol	ND	0.500	--	ND	1.52	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
3-Chloropropene	ND	0.200	--	ND	0.626	--		1
Carbon disulfide	ND	0.200	--	ND	0.623	--		1
Freon-113	ND	0.200	--	ND	1.53	--		1
trans-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
1,1-Dichloroethane	ND	0.200	--	ND	0.809	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
Vinyl acetate	ND	1.00	--	ND	3.52	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
Ethyl Acetate	ND	0.500	--	ND	1.80	--		1
Chloroform	ND	0.200	--	ND	0.977	--		1
Tetrahydrofuran	ND	0.500	--	ND	1.47	--		1
2,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
1,2-Dichloroethane	ND	0.200	--	ND	0.809	--		1
n-Hexane	ND	0.200	--	ND	0.705	--		1
Diisopropyl ether	ND	0.200	--	ND	0.836	--		1
tert-Butyl Ethyl Ether	ND	0.200	--	ND	0.836	--		1
1,1,1-Trichloroethane	ND	0.200	--	ND	1.09	--		1
1,1-Dichloropropene	ND	0.200	--	ND	0.908	--		1
Benzene	ND	0.200	--	ND	0.639	--		1
Carbon tetrachloride	ND	0.200	--	ND	1.26	--		1
Cyclohexane	ND	0.200	--	ND	0.688	--		1
tert-Amyl Methyl Ether	ND	0.200	--	ND	0.836	--		1
Dibromomethane	ND	0.200	--	ND	1.42	--		1
1,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1842636
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1842636-02
Client ID: CAN 2499 SHELF 15
Sample Location:

Date Collected: 10/18/18 16:00
Date Received: 10/19/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Bromodichloromethane	ND	0.200	--	ND	1.34	--		1
1,4-Dioxane	ND	0.200	--	ND	0.721	--		1
Trichloroethene	ND	0.200	--	ND	1.07	--		1
2,2,4-Trimethylpentane	ND	0.200	--	ND	0.934	--		1
Methyl Methacrylate	ND	0.500	--	ND	2.05	--		1
Heptane	ND	0.200	--	ND	0.820	--		1
cis-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
1,1,2-Trichloroethane	ND	0.200	--	ND	1.09	--		1
Toluene	ND	0.200	--	ND	0.754	--		1
1,3-Dichloropropane	ND	0.200	--	ND	0.924	--		1
2-Hexanone	ND	0.200	--	ND	0.820	--		1
Dibromochloromethane	ND	0.200	--	ND	1.70	--		1
1,2-Dibromoethane	ND	0.200	--	ND	1.54	--		1
Butyl acetate	ND	0.500	--	ND	2.38	--		1
Octane	ND	0.200	--	ND	0.934	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1
1,1,1,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
Chlorobenzene	ND	0.200	--	ND	0.921	--		1
Ethylbenzene	ND	0.200	--	ND	0.869	--		1
p/m-Xylene	ND	0.400	--	ND	1.74	--		1
Bromoform	ND	0.200	--	ND	2.07	--		1
Styrene	ND	0.200	--	ND	0.852	--		1
1,1,2,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
o-Xylene	ND	0.200	--	ND	0.869	--		1
1,2,3-Trichloropropane	ND	0.200	--	ND	1.21	--		1

Project Name: BATCH CANISTER CERTIFICATION **Lab Number:** L1842636

Project Number: CANISTER QC BAT **Report Date:** 12/05/18

Air Canister Certification Results

Lab ID: L1842636-02
Client ID: CAN 2499 SHELF 15
Sample Location:

Date Collected: 10/18/18 16:00
Date Received: 10/19/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Nonane	ND	0.200	--	ND	1.05	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
Bromobenzene	ND	0.200	--	ND	0.793	--		1
2-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
n-Propylbenzene	ND	0.200	--	ND	0.983	--		1
4-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
4-Ethyltoluene	ND	0.200	--	ND	0.983	--		1
1,3,5-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
tert-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
Decane	ND	0.200	--	ND	1.16	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
1,4-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2-Dibromo-3-chloropropane	ND	0.200	--	ND	1.93	--		1
Undecane	ND	0.200	--	ND	1.28	--		1
Dodecane	ND	0.200	--	ND	1.39	--		1
1,2,4-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Naphthalene	ND	0.200	--	ND	1.05	--		1
1,2,3-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Hexachlorobutadiene	ND	0.200	--	ND	2.13	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1842636
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1842636-02
Client ID: CAN 2499 SHELF 15
Sample Location:

Date Collected: 10/18/18 16:00
Date Received: 10/19/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								

	Results	Qualifier	Units	RDL	Dilution Factor
Tentatively Identified Compounds					

No Tentatively Identified Compounds

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-Difluorobenzene	91		60-140
Bromochloromethane	96		60-140
chlorobenzene-d5	88		60-140

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1842636
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1842636-02
Client ID: CAN 2499 SHELF 15
Sample Location:

Date Collected: 10/18/18 16:00
Date Received: 10/19/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 10/19/18 20:36
Analyst: RY

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air by SIM - Mansfield Lab								
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.050	--	ND	0.349	--		1
Vinyl chloride	ND	0.020	--	ND	0.051	--		1
1,3-Butadiene	ND	0.020	--	ND	0.044	--		1
Bromomethane	ND	0.020	--	ND	0.078	--		1
Chloroethane	ND	0.100	--	ND	0.264	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Trichlorofluoromethane	ND	0.050	--	ND	0.281	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
1,1-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
Freon-113	ND	0.050	--	ND	0.383	--		1
trans-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
1,1-Dichloroethane	ND	0.020	--	ND	0.081	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
2-Butanone	ND	0.500	--	ND	1.47	--	J	1
cis-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Chloroform	ND	0.020	--	ND	0.098	--		1
1,2-Dichloroethane	ND	0.020	--	ND	0.081	--		1
1,1,1-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Benzene	ND	0.100	--	ND	0.319	--		1
Carbon tetrachloride	ND	0.020	--	ND	0.126	--		1
1,2-Dichloropropane	ND	0.020	--	ND	0.092	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1842636
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1842636-02
Client ID: CAN 2499 SHELF 15
Sample Location:

Date Collected: 10/18/18 16:00
Date Received: 10/19/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
Bromodichloromethane	ND	0.020	--	ND	0.134	--		1
1,4-Dioxane	ND	0.100	--	ND	0.360	--		1
Trichloroethene	ND	0.020	--	ND	0.107	--		1
cis-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
1,1,2-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Toluene	ND	0.050	--	ND	0.188	--		1
Dibromochloromethane	ND	0.020	--	ND	0.170	--		1
1,2-Dibromoethane	ND	0.020	--	ND	0.154	--		1
Tetrachloroethene	ND	0.020	--	ND	0.136	--		1
1,1,1,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
Chlorobenzene	ND	0.100	--	ND	0.461	--		1
Ethylbenzene	ND	0.020	--	ND	0.087	--		1
p/m-Xylene	ND	0.040	--	ND	0.174	--		1
Bromoform	ND	0.020	--	ND	0.207	--		1
Styrene	ND	0.020	--	ND	0.085	--		1
1,1,2,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
o-Xylene	ND	0.020	--	ND	0.087	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
4-Ethyltoluene	ND	0.020	--	ND	0.098	--		1
1,3,5-Trimethybenzene	ND	0.020	--	ND	0.098	--		1
1,2,4-Trimethylbenzene	ND	0.020	--	ND	0.098	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
1,4-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1842636
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1842636-02
Client ID: CAN 2499 SHELF 15
Sample Location:

Date Collected: 10/18/18 16:00
Date Received: 10/19/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Naphthalene	ND	0.050	--	ND	0.262	--		1
1,2,3-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Hexachlorobutadiene	ND	0.050	--	ND	0.533	--		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	93		60-140
bromochloromethane	96		60-140
chlorobenzene-d5	88		60-140

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1843299
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1843299-02
Client ID: CAN 800 SHELF 9
Sample Location:

Date Collected: 10/23/18 16:00
Date Received: 10/24/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 10/24/18 19:22
Analyst: RY

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Chlorodifluoromethane	ND	0.200	--	ND	0.707	--		1
Propylene	ND	0.500	--	ND	0.861	--		1
Propane	ND	0.500	--	ND	0.902	--		1
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.200	--	ND	1.40	--		1
Methanol	ND	5.00	--	ND	6.55	--		1
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,3-Butadiene	ND	0.200	--	ND	0.442	--		1
Butane	ND	0.200	--	ND	0.475	--		1
Bromomethane	ND	0.200	--	ND	0.777	--		1
Chloroethane	ND	0.200	--	ND	0.528	--		1
Ethanol	ND	5.00	--	ND	9.42	--		1
Dichlorofluoromethane	ND	0.200	--	ND	0.842	--		1
Vinyl bromide	ND	0.200	--	ND	0.874	--		1
Acrolein	ND	0.500	--	ND	1.15	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Acetonitrile	ND	0.200	--	ND	0.336	--		1
Trichlorofluoromethane	ND	0.200	--	ND	1.12	--		1
Isopropanol	ND	0.500	--	ND	1.23	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
Pentane	ND	0.200	--	ND	0.590	--		1
Ethyl ether	ND	0.200	--	ND	0.606	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1843299
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1843299-02
Client ID: CAN 800 SHELF 9
Sample Location:

Date Collected: 10/23/18 16:00
Date Received: 10/24/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Tertiary butyl Alcohol	ND	0.500	--	ND	1.52	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
3-Chloropropene	ND	0.200	--	ND	0.626	--		1
Carbon disulfide	ND	0.200	--	ND	0.623	--		1
Freon-113	ND	0.200	--	ND	1.53	--		1
trans-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
1,1-Dichloroethane	ND	0.200	--	ND	0.809	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
Vinyl acetate	ND	1.00	--	ND	3.52	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
Ethyl Acetate	ND	0.500	--	ND	1.80	--		1
Chloroform	ND	0.200	--	ND	0.977	--		1
Tetrahydrofuran	ND	0.500	--	ND	1.47	--		1
2,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
1,2-Dichloroethane	ND	0.200	--	ND	0.809	--		1
n-Hexane	ND	0.200	--	ND	0.705	--		1
Diisopropyl ether	ND	0.200	--	ND	0.836	--		1
tert-Butyl Ethyl Ether	ND	0.200	--	ND	0.836	--		1
1,1,1-Trichloroethane	ND	0.200	--	ND	1.09	--		1
1,1-Dichloropropene	ND	0.200	--	ND	0.908	--		1
Benzene	ND	0.200	--	ND	0.639	--		1
Carbon tetrachloride	ND	0.200	--	ND	1.26	--		1
Cyclohexane	ND	0.200	--	ND	0.688	--		1
tert-Amyl Methyl Ether	ND	0.200	--	ND	0.836	--		1
Dibromomethane	ND	0.200	--	ND	1.42	--		1
1,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1843299
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1843299-02
Client ID: CAN 800 SHELF 9
Sample Location:

Date Collected: 10/23/18 16:00
Date Received: 10/24/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Bromodichloromethane	ND	0.200	--	ND	1.34	--		1
1,4-Dioxane	ND	0.200	--	ND	0.721	--		1
Trichloroethene	ND	0.200	--	ND	1.07	--		1
2,2,4-Trimethylpentane	ND	0.200	--	ND	0.934	--		1
Methyl Methacrylate	ND	0.500	--	ND	2.05	--		1
Heptane	ND	0.200	--	ND	0.820	--		1
cis-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
1,1,2-Trichloroethane	ND	0.200	--	ND	1.09	--		1
Toluene	ND	0.200	--	ND	0.754	--		1
1,3-Dichloropropane	ND	0.200	--	ND	0.924	--		1
2-Hexanone	ND	0.200	--	ND	0.820	--		1
Dibromochloromethane	ND	0.200	--	ND	1.70	--		1
1,2-Dibromoethane	ND	0.200	--	ND	1.54	--		1
Butyl acetate	ND	0.500	--	ND	2.38	--		1
Octane	ND	0.200	--	ND	0.934	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1
1,1,1,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
Chlorobenzene	ND	0.200	--	ND	0.921	--		1
Ethylbenzene	ND	0.200	--	ND	0.869	--		1
p/m-Xylene	ND	0.400	--	ND	1.74	--		1
Bromoform	ND	0.200	--	ND	2.07	--		1
Styrene	ND	0.200	--	ND	0.852	--		1
1,1,2,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
o-Xylene	ND	0.200	--	ND	0.869	--		1
1,2,3-Trichloropropane	ND	0.200	--	ND	1.21	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1843299
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1843299-02
Client ID: CAN 800 SHELF 9
Sample Location:

Date Collected: 10/23/18 16:00
Date Received: 10/24/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Nonane	ND	0.200	--	ND	1.05	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
Bromobenzene	ND	0.200	--	ND	0.793	--		1
2-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
n-Propylbenzene	ND	0.200	--	ND	0.983	--		1
4-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
4-Ethyltoluene	ND	0.200	--	ND	0.983	--		1
1,3,5-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
tert-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
Decane	ND	0.200	--	ND	1.16	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
1,4-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2-Dibromo-3-chloropropane	ND	0.200	--	ND	1.93	--		1
Undecane	ND	0.200	--	ND	1.28	--		1
Dodecane	ND	0.200	--	ND	1.39	--		1
1,2,4-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Naphthalene	ND	0.200	--	ND	1.05	--		1
1,2,3-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Hexachlorobutadiene	ND	0.200	--	ND	2.13	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1843299
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1843299-02
Client ID: CAN 800 SHELF 9
Sample Location:

Date Collected: 10/23/18 16:00
Date Received: 10/24/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								

	Results	Qualifier	Units	RDL	Dilution Factor
Tentatively Identified Compounds					

No Tentatively Identified Compounds

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-Difluorobenzene	90		60-140
Bromochloromethane	93		60-140
chlorobenzene-d5	92		60-140

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1843299
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1843299-02
Client ID: CAN 800 SHELF 9
Sample Location:

Date Collected: 10/23/18 16:00
Date Received: 10/24/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 10/24/18 19:22
Analyst: RY

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air by SIM - Mansfield Lab								
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.050	--	ND	0.349	--		1
Vinyl chloride	ND	0.020	--	ND	0.051	--		1
1,3-Butadiene	ND	0.020	--	ND	0.044	--		1
Bromomethane	ND	0.020	--	ND	0.078	--		1
Chloroethane	ND	0.100	--	ND	0.264	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Trichlorofluoromethane	ND	0.050	--	ND	0.281	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
1,1-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
Freon-113	ND	0.050	--	ND	0.383	--		1
trans-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
1,1-Dichloroethane	ND	0.020	--	ND	0.081	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Chloroform	ND	0.020	--	ND	0.098	--		1
1,2-Dichloroethane	ND	0.020	--	ND	0.081	--		1
1,1,1-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Benzene	ND	0.100	--	ND	0.319	--		1
Carbon tetrachloride	ND	0.020	--	ND	0.126	--		1
1,2-Dichloropropane	ND	0.020	--	ND	0.092	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1843299
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1843299-02
Client ID: CAN 800 SHELF 9
Sample Location:

Date Collected: 10/23/18 16:00
Date Received: 10/24/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
Bromodichloromethane	ND	0.020	--	ND	0.134	--		1
1,4-Dioxane	ND	0.100	--	ND	0.360	--		1
Trichloroethene	ND	0.020	--	ND	0.107	--		1
cis-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
1,1,2-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Toluene	ND	0.050	--	ND	0.188	--		1
Dibromochloromethane	ND	0.020	--	ND	0.170	--		1
1,2-Dibromoethane	ND	0.020	--	ND	0.154	--		1
Tetrachloroethene	ND	0.020	--	ND	0.136	--		1
1,1,1,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
Chlorobenzene	ND	0.100	--	ND	0.461	--		1
Ethylbenzene	ND	0.020	--	ND	0.087	--		1
p/m-Xylene	ND	0.040	--	ND	0.174	--		1
Bromoform	ND	0.020	--	ND	0.207	--		1
Styrene	ND	0.020	--	ND	0.085	--		1
1,1,2,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
o-Xylene	ND	0.020	--	ND	0.087	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
4-Ethyltoluene	ND	0.020	--	ND	0.098	--		1
1,3,5-Trimethybenzene	ND	0.020	--	ND	0.098	--		1
1,2,4-Trimethylbenzene	ND	0.020	--	ND	0.098	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
1,4-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1843299
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1843299-02
Client ID: CAN 800 SHELF 9
Sample Location:

Date Collected: 10/23/18 16:00
Date Received: 10/24/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Naphthalene	ND	0.050	--	ND	0.262	--		1
1,2,3-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Hexachlorobutadiene	ND	0.050	--	ND	0.533	--		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	90		60-140
bromochloromethane	94		60-140
chlorobenzene-d5	93		60-140

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1844032
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1844032-01
Client ID: CAN 824 SHELF 10
Sample Location:

Date Collected: 10/26/18 16:00
Date Received: 10/29/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 10/30/18 20:43
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Chlorodifluoromethane	ND	0.200	--	ND	0.707	--		1
Propylene	ND	0.500	--	ND	0.861	--		1
Propane	ND	0.500	--	ND	0.902	--		1
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.200	--	ND	1.40	--		1
Methanol	ND	5.00	--	ND	6.55	--		1
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,3-Butadiene	ND	0.200	--	ND	0.442	--		1
Butane	ND	0.200	--	ND	0.475	--		1
Bromomethane	ND	0.200	--	ND	0.777	--		1
Chloroethane	ND	0.200	--	ND	0.528	--		1
Ethanol	ND	5.00	--	ND	9.42	--		1
Dichlorofluoromethane	ND	0.200	--	ND	0.842	--		1
Vinyl bromide	ND	0.200	--	ND	0.874	--		1
Acrolein	ND	0.500	--	ND	1.15	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Acetonitrile	ND	0.200	--	ND	0.336	--		1
Trichlorofluoromethane	ND	0.200	--	ND	1.12	--		1
Isopropanol	ND	0.500	--	ND	1.23	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
Pentane	ND	0.200	--	ND	0.590	--		1
Ethyl ether	ND	0.200	--	ND	0.606	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1844032
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1844032-01
Client ID: CAN 824 SHELF 10
Sample Location:

Date Collected: 10/26/18 16:00
Date Received: 10/29/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Tertiary butyl Alcohol	ND	0.500	--	ND	1.52	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
3-Chloropropene	ND	0.200	--	ND	0.626	--		1
Carbon disulfide	ND	0.200	--	ND	0.623	--		1
Freon-113	ND	0.200	--	ND	1.53	--		1
trans-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
1,1-Dichloroethane	ND	0.200	--	ND	0.809	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
Vinyl acetate	ND	1.00	--	ND	3.52	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
Ethyl Acetate	ND	0.500	--	ND	1.80	--		1
Chloroform	ND	0.200	--	ND	0.977	--		1
Tetrahydrofuran	ND	0.500	--	ND	1.47	--		1
2,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
1,2-Dichloroethane	ND	0.200	--	ND	0.809	--		1
n-Hexane	ND	0.200	--	ND	0.705	--		1
Diisopropyl ether	ND	0.200	--	ND	0.836	--		1
tert-Butyl Ethyl Ether	ND	0.200	--	ND	0.836	--		1
1,1,1-Trichloroethane	ND	0.200	--	ND	1.09	--		1
1,1-Dichloropropene	ND	0.200	--	ND	0.908	--		1
Benzene	ND	0.200	--	ND	0.639	--		1
Carbon tetrachloride	ND	0.200	--	ND	1.26	--		1
Cyclohexane	ND	0.200	--	ND	0.688	--		1
tert-Amyl Methyl Ether	ND	0.200	--	ND	0.836	--		1
Dibromomethane	ND	0.200	--	ND	1.42	--		1
1,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1844032
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1844032-01
Client ID: CAN 824 SHELF 10
Sample Location:

Date Collected: 10/26/18 16:00
Date Received: 10/29/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Bromodichloromethane	ND	0.200	--	ND	1.34	--		1
1,4-Dioxane	ND	0.200	--	ND	0.721	--		1
Trichloroethene	ND	0.200	--	ND	1.07	--		1
2,2,4-Trimethylpentane	ND	0.200	--	ND	0.934	--		1
Methyl Methacrylate	ND	0.500	--	ND	2.05	--		1
Heptane	ND	0.200	--	ND	0.820	--		1
cis-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
1,1,2-Trichloroethane	ND	0.200	--	ND	1.09	--		1
Toluene	ND	0.200	--	ND	0.754	--		1
1,3-Dichloropropane	ND	0.200	--	ND	0.924	--		1
2-Hexanone	ND	0.200	--	ND	0.820	--		1
Dibromochloromethane	ND	0.200	--	ND	1.70	--		1
1,2-Dibromoethane	ND	0.200	--	ND	1.54	--		1
Butyl acetate	ND	0.500	--	ND	2.38	--		1
Octane	ND	0.200	--	ND	0.934	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1
1,1,1,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
Chlorobenzene	ND	0.200	--	ND	0.921	--		1
Ethylbenzene	ND	0.200	--	ND	0.869	--		1
p/m-Xylene	ND	0.400	--	ND	1.74	--		1
Bromoform	ND	0.200	--	ND	2.07	--		1
Styrene	ND	0.200	--	ND	0.852	--		1
1,1,2,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
o-Xylene	ND	0.200	--	ND	0.869	--		1
1,2,3-Trichloropropane	ND	0.200	--	ND	1.21	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1844032
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1844032-01
Client ID: CAN 824 SHELF 10
Sample Location:

Date Collected: 10/26/18 16:00
Date Received: 10/29/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Nonane	ND	0.200	--	ND	1.05	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
Bromobenzene	ND	0.200	--	ND	0.793	--		1
2-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
n-Propylbenzene	ND	0.200	--	ND	0.983	--		1
4-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
4-Ethyltoluene	ND	0.200	--	ND	0.983	--		1
1,3,5-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
tert-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
Decane	ND	0.200	--	ND	1.16	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
1,4-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2-Dibromo-3-chloropropane	ND	0.200	--	ND	1.93	--		1
Undecane	ND	0.200	--	ND	1.28	--		1
Dodecane	ND	0.200	--	ND	1.39	--		1
1,2,4-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Naphthalene	ND	0.200	--	ND	1.05	--		1
1,2,3-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Hexachlorobutadiene	ND	0.200	--	ND	2.13	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1844032
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1844032-01
Client ID: CAN 824 SHELF 10
Sample Location:

Date Collected: 10/26/18 16:00
Date Received: 10/29/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								

	Results	Qualifier	Units	RDL	Dilution Factor
Tentatively Identified Compounds					

No Tentatively Identified Compounds

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-Difluorobenzene	92		60-140
Bromochloromethane	98		60-140
chlorobenzene-d5	86		60-140

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1844032
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1844032-01
Client ID: CAN 824 SHELF 10
Sample Location:

Date Collected: 10/26/18 16:00
Date Received: 10/29/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 10/30/18 20:43
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air by SIM - Mansfield Lab								
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.050	--	ND	0.349	--		1
Vinyl chloride	ND	0.020	--	ND	0.051	--		1
1,3-Butadiene	ND	0.020	--	ND	0.044	--		1
Bromomethane	ND	0.020	--	ND	0.078	--		1
Chloroethane	ND	0.100	--	ND	0.264	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Trichlorofluoromethane	ND	0.050	--	ND	0.281	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
1,1-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
Freon-113	ND	0.050	--	ND	0.383	--		1
trans-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
1,1-Dichloroethane	ND	0.020	--	ND	0.081	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Chloroform	ND	0.020	--	ND	0.098	--		1
1,2-Dichloroethane	ND	0.020	--	ND	0.081	--		1
1,1,1-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Benzene	ND	0.100	--	ND	0.319	--		1
Carbon tetrachloride	ND	0.020	--	ND	0.126	--		1
1,2-Dichloropropane	ND	0.020	--	ND	0.092	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1844032
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1844032-01
Client ID: CAN 824 SHELF 10
Sample Location:

Date Collected: 10/26/18 16:00
Date Received: 10/29/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
Bromodichloromethane	ND	0.020	--	ND	0.134	--		1
1,4-Dioxane	ND	0.100	--	ND	0.360	--		1
Trichloroethene	ND	0.020	--	ND	0.107	--		1
cis-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
1,1,2-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Toluene	ND	0.050	--	ND	0.188	--		1
Dibromochloromethane	ND	0.020	--	ND	0.170	--		1
1,2-Dibromoethane	ND	0.020	--	ND	0.154	--		1
Tetrachloroethene	ND	0.020	--	ND	0.136	--		1
1,1,1,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
Chlorobenzene	ND	0.100	--	ND	0.461	--		1
Ethylbenzene	ND	0.020	--	ND	0.087	--		1
p/m-Xylene	ND	0.040	--	ND	0.174	--		1
Bromoform	ND	0.020	--	ND	0.207	--		1
Styrene	ND	0.020	--	ND	0.085	--		1
1,1,2,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
o-Xylene	ND	0.020	--	ND	0.087	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
4-Ethyltoluene	ND	0.020	--	ND	0.098	--		1
1,3,5-Trimethybenzene	ND	0.020	--	ND	0.098	--		1
1,2,4-Trimethylbenzene	ND	0.020	--	ND	0.098	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
1,4-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1844032
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1844032-01
Client ID: CAN 824 SHELF 10
Sample Location:

Date Collected: 10/26/18 16:00
Date Received: 10/29/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Naphthalene	ND	0.050	--	ND	0.262	--		1
1,2,3-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Hexachlorobutadiene	ND	0.050	--	ND	0.533	--		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	90		60-140
bromochloromethane	95		60-140
chlorobenzene-d5	87		60-140

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1844397
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1844397-02
Client ID: CAN 721 SHELF 15
Sample Location:

Date Collected: 10/30/18 16:00
Date Received: 10/31/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 10/31/18 21:50
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Chlorodifluoromethane	ND	0.200	--	ND	0.707	--		1
Propylene	ND	0.500	--	ND	0.861	--		1
Propane	ND	0.500	--	ND	0.902	--		1
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.200	--	ND	1.40	--		1
Methanol	ND	5.00	--	ND	6.55	--		1
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,3-Butadiene	ND	0.200	--	ND	0.442	--		1
Butane	ND	0.200	--	ND	0.475	--		1
Bromomethane	ND	0.200	--	ND	0.777	--		1
Chloroethane	ND	0.200	--	ND	0.528	--		1
Ethanol	ND	5.00	--	ND	9.42	--		1
Dichlorofluoromethane	ND	0.200	--	ND	0.842	--		1
Vinyl bromide	ND	0.200	--	ND	0.874	--		1
Acrolein	ND	0.500	--	ND	1.15	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Acetonitrile	ND	0.200	--	ND	0.336	--		1
Trichlorofluoromethane	ND	0.200	--	ND	1.12	--		1
Isopropanol	ND	0.500	--	ND	1.23	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
Pentane	ND	0.200	--	ND	0.590	--		1
Ethyl ether	ND	0.200	--	ND	0.606	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1844397
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1844397-02
Client ID: CAN 721 SHELF 15
Sample Location:

Date Collected: 10/30/18 16:00
Date Received: 10/31/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Tertiary butyl Alcohol	ND	0.500	--	ND	1.52	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
3-Chloropropene	ND	0.200	--	ND	0.626	--		1
Carbon disulfide	ND	0.200	--	ND	0.623	--		1
Freon-113	ND	0.200	--	ND	1.53	--		1
trans-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
1,1-Dichloroethane	ND	0.200	--	ND	0.809	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
Vinyl acetate	ND	1.00	--	ND	3.52	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
Ethyl Acetate	ND	0.500	--	ND	1.80	--		1
Chloroform	ND	0.200	--	ND	0.977	--		1
Tetrahydrofuran	ND	0.500	--	ND	1.47	--		1
2,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
1,2-Dichloroethane	ND	0.200	--	ND	0.809	--		1
n-Hexane	ND	0.200	--	ND	0.705	--		1
Diisopropyl ether	ND	0.200	--	ND	0.836	--		1
tert-Butyl Ethyl Ether	ND	0.200	--	ND	0.836	--		1
1,1,1-Trichloroethane	ND	0.200	--	ND	1.09	--		1
1,1-Dichloropropene	ND	0.200	--	ND	0.908	--		1
Benzene	ND	0.200	--	ND	0.639	--		1
Carbon tetrachloride	ND	0.200	--	ND	1.26	--		1
Cyclohexane	ND	0.200	--	ND	0.688	--		1
tert-Amyl Methyl Ether	ND	0.200	--	ND	0.836	--		1
Dibromomethane	ND	0.200	--	ND	1.42	--		1
1,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1844397
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1844397-02
Client ID: CAN 721 SHELF 15
Sample Location:

Date Collected: 10/30/18 16:00
Date Received: 10/31/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Bromodichloromethane	ND	0.200	--	ND	1.34	--		1
1,4-Dioxane	ND	0.200	--	ND	0.721	--		1
Trichloroethene	ND	0.200	--	ND	1.07	--		1
2,2,4-Trimethylpentane	ND	0.200	--	ND	0.934	--		1
Methyl Methacrylate	ND	0.500	--	ND	2.05	--		1
Heptane	ND	0.200	--	ND	0.820	--		1
cis-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
1,1,2-Trichloroethane	ND	0.200	--	ND	1.09	--		1
Toluene	ND	0.200	--	ND	0.754	--		1
1,3-Dichloropropane	ND	0.200	--	ND	0.924	--		1
2-Hexanone	ND	0.200	--	ND	0.820	--		1
Dibromochloromethane	ND	0.200	--	ND	1.70	--		1
1,2-Dibromoethane	ND	0.200	--	ND	1.54	--		1
Butyl acetate	ND	0.500	--	ND	2.38	--		1
Octane	ND	0.200	--	ND	0.934	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1
1,1,1,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
Chlorobenzene	ND	0.200	--	ND	0.921	--		1
Ethylbenzene	ND	0.200	--	ND	0.869	--		1
p/m-Xylene	ND	0.400	--	ND	1.74	--		1
Bromoform	ND	0.200	--	ND	2.07	--		1
Styrene	ND	0.200	--	ND	0.852	--		1
1,1,2,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
o-Xylene	ND	0.200	--	ND	0.869	--		1
1,2,3-Trichloropropane	ND	0.200	--	ND	1.21	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1844397
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1844397-02
Client ID: CAN 721 SHELF 15
Sample Location:

Date Collected: 10/30/18 16:00
Date Received: 10/31/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Nonane	ND	0.200	--	ND	1.05	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
Bromobenzene	ND	0.200	--	ND	0.793	--		1
2-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
n-Propylbenzene	ND	0.200	--	ND	0.983	--		1
4-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
4-Ethyltoluene	ND	0.200	--	ND	0.983	--		1
1,3,5-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
tert-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
Decane	ND	0.200	--	ND	1.16	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
1,4-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2-Dibromo-3-chloropropane	ND	0.200	--	ND	1.93	--		1
Undecane	ND	0.200	--	ND	1.28	--		1
Dodecane	ND	0.200	--	ND	1.39	--		1
1,2,4-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Naphthalene	ND	0.200	--	ND	1.05	--		1
1,2,3-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Hexachlorobutadiene	ND	0.200	--	ND	2.13	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1844397
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1844397-02
Client ID: CAN 721 SHELF 15
Sample Location:

Date Collected: 10/30/18 16:00
Date Received: 10/31/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								

	Results	Qualifier	Units	RDL	Dilution Factor
Tentatively Identified Compounds					

No Tentatively Identified Compounds

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-Difluorobenzene	83		60-140
Bromochloromethane	90		60-140
chlorobenzene-d5	88		60-140

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1844397
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1844397-02
Client ID: CAN 721 SHELF 15
Sample Location:

Date Collected: 10/30/18 16:00
Date Received: 10/31/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 10/31/18 21:50
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air by SIM - Mansfield Lab								
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.050	--	ND	0.349	--		1
Vinyl chloride	ND	0.020	--	ND	0.051	--		1
1,3-Butadiene	ND	0.020	--	ND	0.044	--		1
Bromomethane	ND	0.020	--	ND	0.078	--		1
Chloroethane	ND	0.100	--	ND	0.264	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Trichlorofluoromethane	ND	0.050	--	ND	0.281	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
1,1-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
Freon-113	ND	0.050	--	ND	0.383	--		1
trans-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
1,1-Dichloroethane	ND	0.020	--	ND	0.081	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Chloroform	ND	0.020	--	ND	0.098	--		1
1,2-Dichloroethane	ND	0.020	--	ND	0.081	--		1
1,1,1-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Benzene	ND	0.100	--	ND	0.319	--		1
Carbon tetrachloride	ND	0.020	--	ND	0.126	--		1
1,2-Dichloropropane	ND	0.020	--	ND	0.092	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1844397
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1844397-02
Client ID: CAN 721 SHELF 15
Sample Location:

Date Collected: 10/30/18 16:00
Date Received: 10/31/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
Bromodichloromethane	ND	0.020	--	ND	0.134	--		1
1,4-Dioxane	ND	0.100	--	ND	0.360	--		1
Trichloroethene	ND	0.020	--	ND	0.107	--		1
cis-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
1,1,2-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Toluene	ND	0.050	--	ND	0.188	--		1
Dibromochloromethane	ND	0.020	--	ND	0.170	--		1
1,2-Dibromoethane	ND	0.020	--	ND	0.154	--		1
Tetrachloroethene	ND	0.020	--	ND	0.136	--		1
1,1,1,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
Chlorobenzene	ND	0.100	--	ND	0.461	--		1
Ethylbenzene	ND	0.020	--	ND	0.087	--		1
p/m-Xylene	ND	0.040	--	ND	0.174	--		1
Bromoform	ND	0.020	--	ND	0.207	--		1
Styrene	ND	0.020	--	ND	0.085	--		1
1,1,2,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
o-Xylene	ND	0.020	--	ND	0.087	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
4-Ethyltoluene	ND	0.020	--	ND	0.098	--		1
1,3,5-Trimethybenzene	ND	0.020	--	ND	0.098	--		1
1,2,4-Trimethylbenzene	ND	0.020	--	ND	0.098	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
1,4-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1844397
Report Date: 12/05/18

Air Canister Certification Results

Lab ID: L1844397-02
Client ID: CAN 721 SHELF 15
Sample Location:

Date Collected: 10/30/18 16:00
Date Received: 10/31/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Naphthalene	ND	0.050	--	ND	0.262	--		1
1,2,3-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Hexachlorobutadiene	ND	0.050	--	ND	0.533	--		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	86		60-140
bromochloromethane	94		60-140
chlorobenzene-d5	91		60-140

Project Name: ESSEX/HOP
Project Number: 703765CH.01.03

Lab Number: L1847517
Report Date: 12/05/18

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
N/A	Present/Intact

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1847517-01A	Canister - 1 Liter	N/A	NA			Y	Present/Intact		TO15-LL(30)
L1847517-02A	Canister - 1 Liter	N/A	NA			Y	Present/Intact		TO15-LL(30)
L1847517-03A	Canister - 1 Liter	N/A	NA			Y	Present/Intact		TO15-LL(30)
L1847517-04A	Canister - 1 Liter	N/A	NA			Y	Present/Intact		TO15-LL(30)
L1847517-05A	Canister - 1 Liter	N/A	NA			Y	Present/Intact		TO15-LL(30)
L1847517-06A	Canister - 1 Liter	N/A	NA			Y	Present/Intact		TO15-LL(30)
L1847517-07A	Canister - 1 Liter	N/A	NA			Y	Present/Intact		TO15-LL(30)
L1847517-08A	Canister - 1 Liter	N/A	NA			Y	Present/Intact		TO15-LL(30)
L1847517-09A	Canister - 1 Liter	N/A	NA			Y	Present/Intact		TO15-LL(30)
L1847517-10A	Canister - 1 Liter	N/A	NA			Y	Present/Intact		TO15-LL(30)
L1847517-11A	Canister - 1 Liter	N/A	NA			Y	Present/Intact		TO15-LL(30)
L1847517-12A	Canister - 1 Liter	N/A	NA			Y	Present/Intact		TO15-LL(30)
L1847517-13A	Canister - 1 Liter	N/A	NA			Y	Present/Intact		TO15-LL(30)

*Values in parentheses indicate holding time in days

Project Name:	ESSEX/HOP	**Lab Number:**	L1847517
Project Number:	703765CH.01.03	**Report Date:**	12/05/18

GLOSSARY

Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample¿s toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

1	- The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Report Format: Data Usability Report

Project Name:	ESSEX/HOP	**Lab Number:**	L1847517
Project Number:	703765CH.01.03	**Report Date:**	12/05/18

Data Qualifiers

A - Spectra identified as "Aldol Condensation Product".

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

ND - Not detected at the reporting limit (RL) for the sample.

Report Format: Data Usability Report

Project Name:	ESSEX/HOP	**Lab Number:**	L1847517
Project Number:	703765CH.01.03	**Report Date:**	12/05/18

REFERENCES

48 Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air. Second Edition. EPA/625/R-96/010b, January 1999.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.

EPA 6860: SCM: Perchlorate

SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

AIR ANALYSIS

PAGE 1 OF 2

CHAIN OF CUSTODY

320 Forbes Blvd, Mansfield, MA 02048
TEL: 508-822-9300 FAX: 508-822-3288

Date Rec'd in Lab: 11/19/18

ALPHA Job #: L1847517

Client Information

Client: Jacobs / CH2M
Address: 18 Tremont Street
Boston, MA
Phone: 617-963-3129
Fax:
Email: Kyle.Block@Jacobs.com

☐ These samples have been previously analyzed by Alpha

Project Information

Project Name: Essex / Hope
Project Location: Jamestown, NY
Project #: 703765CH.01.03
Project Manager: Kyle Block
ALPHA Quote #:

Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved!)
14-Day
Date Due: Time:

Report Information - Data Deliverables

☐ FAX
☐ ADEx
Criteria Checker:
(Default based on Regulatory Criteria Indicated)
Other Formats:
☐ EMAIL (standard pdf report)
☐ Additional Deliverables:
Report to: (if different than Project Manager)

Billing Information

☐ Same as Client info PO #:
See PO

Regulatory Requirements/Report Limits

State/Fed	Program	Res / Comm

Other Project Specific Requirements/Comments:

Project-Specific Target Compound List: ☐

All Columns Below Must Be Filled Out

ALPHA Lab ID (Lab Use Only)	Sample ID	COLLECTION End Date	Start Time	End Time	Initial Vacuum	Final Vacuum	Sample Matrix*	Sampler's Initials	Can Size	I D Can	I D - Flow Controller	TO-15	TO-15 SIM	APH (Subset Non-petroleum HCs ☐)	Fixed Gases	Sulfides & Mercaptans by TO-15	Sample Comments (i.e. PID)
47517.01	JMF-01_20181114	11/14/18	1946	1953	-28.67	-5.01	SV	AS	1L	2499	0523	X					
-02	JMF-01_20181114-FD	11/14/18	1946	1953	-28.68	-4.88	SV	AS	1L	2529	0523	X					
-03	JMF-02_20181114	11/14/18	1658	1703	-28.41	-1.67	SV	AS	1L	1502	0654	X					
-04	JMF-03_20181114	11/14/18	1904	1909	-28.64	-2.83	SV	AS	1L	2557	0688	X					
-05	JMF-04_20181114	11/14/18	1732	1737	-28.78	-2.03	SV	AS	1L	716	0991	X					
-06	HH-01_20181115	11/15/18	0946	0951	-29.10	-2.19	SV	AS	1L	800	0852	X					
-07	HH-02_20181115	11/15/18	1013	1017	-28.69	-1.76	SV	AS	1L	721	0670	X					
-08	HH-03_20181115	11/15/18	1129	1134	-28.61	-1.73	SV	AS	1L	824	0652	X					
-09	HH-04_20181115	11/15/18	1225	1232	-29.09	-4.69	SV	AS	1L	2157	01051	X					
-10	HH-04_20181115-FD	11/15/18	1225	1232	-28.47	-4.60	SV	AS	1L	2162	01051	X					

*SAMPLE MATRIX CODES
AA = Ambient Air (Indoor/Outdoor)
SV = Soil Vapor/Landfill Gas/SVE
Other = Please Specify

Container Type

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions.
See reverse side.

Relinquished By:	Date/Time	Received By:	Date/Time:
	11/15/18 1200	FedEx	11/19/18 9:52

AIR ANALYSIS

PAGE 2 OF 2

ALPHA ANALYTICAL — CHAIN OF CUSTODY

320 Forbes Blvd, Mansfield, MA 02048
TEL: 508-822-9300 FAX: 508-822-3288

Date Rec'd in Lab: 11/19/18

ALPHA Job #: L1847517

Client Information

Client: Jacobs / CH2M
Address: 18 Tremont Street
Boston, MA
Phone: 617-963-3129
Fax:
Email: Kyle.Block@Jacobs.com
☐ These samples have been previously analyzed by Alpha

Project Information

Project Name: Essex-Hope
Project Location: Jamestown, NY
Project #: 703765CH.01.03
Project Manager: Kyle Block
ALPHA Quote #:

Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved)
14-DAY
Date Due: Time:

Report Information - Data Deliverables

☐ FAX
☐ ADEx
Criteria Checker:
(Default based on Regulatory Criteria Indicated)
Other Formats:
☐ EMAIL (standard pdf report)
☐ Additional Deliverables:
Report to: (if different than Project Manager)

Billing Information

☐ Same as Client info PO #:
See PO

Regulatory Requirements/Report Limits

State/Fed	Program	Res / Comm

Other Project Specific Requirements/Comments:

Project-Specific Target Compound List: ☐

All Columns Below Must Be Filled Out

ALPHA Lab ID (Lab Use Only)	Sample ID	COLLECTION End Date	Start Time	End Time	Initial Vacuum	Final Vacuum	Sample Matrix*	Sampler's Initials	Can Size	ID Can	ID - Flow Controller	TO-15	TO-15 SIM	APH	Fixed Gases	Sulfides & Mercaptans by TO-15	☐	Sample Comments (i.e. PID)
-11	HH-05_20181115	11/15/18	1428	1433	-29.17	-2.69	SV	AS	1L	2175	0653	X						
-12	HH-06_20181115	11/15/18	1519	1524	-28.42	-2.24	SV	AS	1L	849	0668	X						
-13	HH-07_20181115	11/15/18	1609	1614	-29.13	-1.30	SV	AS	1L	2532	0666	X						

*SAMPLE MATRIX CODES
AA = Ambient Air (Indoor/Outdoor)
SV = Soil Vapor/Landfill Gas/SVE
Other = Please Specify

Container Type

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

Relinquished By:	Date/Time	Received By:	Date/Time:
[signature]	11/15/18 1200	FedEx [signature]	11/19/18 9:32

Form No: 101-02 Rev: (25-Sep-15)

ANALYTICAL REPORT

Lab Number:	L1851659
Client:	Jacobs 18 Tremont Street Suite 700 Boston, MA 02108
ATTN:	Kyle Block
Phone:	(617) 523-2260
Project Name:	ESSEX/HOPE
Project Number:	703765CH.01.03
Report Date:	01/02/19

Certifications & Approvals: MA (M-MA030), NH NELAP (2062), CT (PH-0141), DoD (L2474), FL (E87814), IL (200081), LA (85084), ME (MA00030), MD (350), NJ (MA015), NY (11627), NC (685), OH (CL106), PA (68-02089), RI (LAO00299), TX (T104704419), VT (VT-0015), VA (460194), WA (C954), US Army Corps of Engineers, USDA (Permit #P330-17-00150), USFWS (Permit #206964).

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com

Project Name: ESSEX/HOPE
Project Number: 703765CH.01.03

Lab Number: L1851659
Report Date: 01/02/19

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1851659-01	SV-01_20181211	SOIL_VAPOR	JAMESTOWN, NY	12/11/18 17:34	12/13/18
L1851659-02	SV-02_20181211	SOIL_VAPOR	JAMESTOWN, NY	12/11/18 16:05	12/13/18
L1851659-03	SV-03_20181211	SOIL_VAPOR	JAMESTOWN, NY	12/11/18 15:22	12/13/18
L1851659-04	SV-04_20181212	SOIL_VAPOR	JAMESTOWN, NY	12/12/18 09:33	12/13/18
L1851659-05	SV-05_20181212	SOIL_VAPOR	JAMESTOWN, NY	12/12/18 10:59	12/13/18
L1851659-06	SV-06_20181212	SOIL_VAPOR	JAMESTOWN, NY	12/12/18 10:07	12/13/18
L1851659-07	SV-07_20181212	SOIL_VAPOR	JAMESTOWN, NY	12/12/18 13:21	12/13/18
L1851659-08	SV-07_20181212-FD	SOIL_VAPOR	JAMESTOWN, NY	12/12/18 13:21	12/13/18
L1851659-09	SV-08_20181212	SOIL_VAPOR	JAMESTOWN, NY	12/12/18 14:37	12/13/18
L1851659-10	SV-09_20181212	SOIL_VAPOR	JAMESTOWN, NY	12/12/18 13:59	12/13/18
L1851659-11	SV-10_20181213	SOIL_VAPOR	JAMESTOWN, NY	12/13/18 12:17	12/13/18
L1851659-12	SV-10_20181213-FD	SOIL_VAPOR	JAMESTOWN, NY	12/13/18 12:17	12/13/18
L1851659-13	SV-11_20181212	SOIL_VAPOR	JAMESTOWN, NY	12/12/18 15:13	12/13/18
L1851659-14	SV-12_20181212	SOIL_VAPOR	JAMESTOWN, NY	12/12/18 15:50	12/13/18
L1851659-15	SV-13_20181212	SOIL_VAPOR	JAMESTOWN, NY	12/12/18 16:33	12/13/18
L1851659-16	SV-14_20181212	SOIL_VAPOR	JAMESTOWN, NY	12/13/18 10:31	12/13/18
L1851659-17	SV-15_20181212	SOIL_VAPOR	JAMESTOWN, NY	12/13/18 11:37	12/13/18
L1851659-18	SV-16_20181212	SOIL_VAPOR	JAMESTOWN, NY	12/13/18 11:04	12/13/18

Project Name: ESSEX/HOPE
Project Number: 703765CH.01.03

Lab Number: L1851659
Report Date: 01/02/19

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY
For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

Project Name: ESSEX/HOPE
Project Number: 703765CH.01.03

Lab Number: L1851659
Report Date: 01/02/19

Case Narrative (continued)

Volatile Organics in Air

Canisters were released from the laboratory on December 10, 2018. The canister certification results are provided as an addendum.

L1851659-17 & -18: Prior to sample analysis, the canisters were pressurized with UHP Nitrogen due to canister size. The pressurization resulted in a dilution of the samples. The reporting limits have been elevated accordingly.

WG1193633-5: Prior to sample analysis, the canisters were pressurized with UHP Nitrogen due to canister size. The pressurization resulted in a dilution of the sample. The reporting limits have been elevated accordingly.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Christopher J. Anderson

Title: Technical Director/Representative Date: 01/02/19

AIR

Project Name: ESSEX/HOPE
Project Number: 703765CH.01.03
Lab Number: L1851659
Report Date: 01/02/19

SAMPLE RESULTS

Lab ID: L1851659-01 D
Client ID: SV-01_20181211
Sample Location: JAMESTOWN, NY

Date Collected: 12/11/18 17:34
Date Received: 12/13/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/28/18 15:50
Analyst: MB

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	ND	0.454	--	ND	1.16	--		2.269
1,1-Dichloroethene	ND	0.454	--	ND	1.80	--		2.269
trans-1,2-Dichloroethene	ND	0.454	--	ND	1.80	--		2.269
cis-1,2-Dichloroethene	ND	0.454	--	ND	1.80	--		2.269
Trichloroethene	48.8	0.454	--	262	2.44	--		2.269
Tetrachloroethene	2.39	0.454	--	16.2	3.08	--		2.269

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-Difluorobenzene	101		60-140
Bromochloromethane	102		60-140
chlorobenzene-d5	96		60-140

Project Name: ESSEX/HOPE
Project Number: 703765CH.01.03
Lab Number: L1851659
Report Date: 01/02/19

SAMPLE RESULTS

Lab ID: L1851659-02 D
Client ID: SV-02_20181211
Sample Location: JAMESTOWN, NY

Date Collected: 12/11/18 16:05
Date Received: 12/13/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/28/18 16:25
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	ND	0.438	--	ND	1.12	--		2.193
1,1-Dichloroethene	ND	0.438	--	ND	1.74	--		2.193
trans-1,2-Dichloroethene	ND	0.438	--	ND	1.74	--		2.193
cis-1,2-Dichloroethene	ND	0.438	--	ND	1.74	--		2.193
Trichloroethene	ND	0.438	--	ND	2.35	--		2.193
Tetrachloroethene	2.31	0.438	--	15.7	2.97	--		2.193

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	91		60-140
Bromochloromethane	93		60-140
chlorobenzene-d5	89		60-140

Project Name: ESSEX/HOPE
Project Number: 703765CH.01.03
Lab Number: L1851659
Report Date: 01/02/19

SAMPLE RESULTS

Lab ID: L1851659-03 D
Client ID: SV-03_20181211
Sample Location: JAMESTOWN, NY

Date Collected: 12/11/18 15:22
Date Received: 12/13/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/28/18 17:34
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	ND	0.455	--	ND	1.16	--		2.277
1,1-Dichloroethene	ND	0.455	--	ND	1.80	--		2.277
trans-1,2-Dichloroethene	ND	0.455	--	ND	1.80	--		2.277
cis-1,2-Dichloroethene	ND	0.455	--	ND	1.80	--		2.277
Trichloroethene	ND	0.455	--	ND	2.45	--		2.277
Tetrachloroethene	57.5	0.455	--	390	3.09	--		2.277

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	88		60-140
Bromochloromethane	89		60-140
chlorobenzene-d5	88		60-140

Project Name: ESSEX/HOPE
Project Number: 703765CH.01.03
Lab Number: L1851659
Report Date: 01/02/19

SAMPLE RESULTS

Lab ID: L1851659-04 D
Client ID: SV-04_20181212
Sample Location: JAMESTOWN, NY

Date Collected: 12/12/18 09:33
Date Received: 12/13/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/28/18 18:09
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	ND	0.444	--	ND	1.13	--		2.218
1,1-Dichloroethene	ND	0.444	--	ND	1.76	--		2.218
trans-1,2-Dichloroethene	ND	0.444	--	ND	1.76	--		2.218
cis-1,2-Dichloroethene	ND	0.444	--	ND	1.76	--		2.218
Trichloroethene	0.608	0.444	--	3.27	2.39	--		2.218
Tetrachloroethene	ND	0.444	--	ND	3.01	--		2.218

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	88		60-140
Bromochloromethane	91		60-140
chlorobenzene-d5	87		60-140

Project Name: ESSEX/HOPE
Project Number: 703765CH.01.03

Lab Number: L1851659
Report Date: 01/02/19

SAMPLE RESULTS

Lab ID: L1851659-05 D
Client ID: SV-05_20181212
Sample Location: JAMESTOWN, NY

Date Collected: 12/12/18 10:59
Date Received: 12/13/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/28/18 18:43
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	ND	0.421	--	ND	1.08	--		2.106
1,1-Dichloroethene	ND	0.421	--	ND	1.67	--		2.106
trans-1,2-Dichloroethene	ND	0.421	--	ND	1.67	--		2.106
cis-1,2-Dichloroethene	ND	0.421	--	ND	1.67	--		2.106
Trichloroethene	ND	0.421	--	ND	2.26	--		2.106
Tetrachloroethene	2.40	0.421	--	16.3	2.85	--		2.106

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	89		60-140
Bromochloromethane	89		60-140
chlorobenzene-d5	85		60-140

Project Name: ESSEX/HOPE
Project Number: 703765CH.01.03
Lab Number: L1851659
Report Date: 01/02/19

SAMPLE RESULTS

Lab ID: L1851659-06 D
Client ID: SV-06_20181212
Sample Location: JAMESTOWN, NY

Date Collected: 12/12/18 10:07
Date Received: 12/13/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/28/18 19:17
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	ND	0.435	--	ND	1.11	--		2.177
1,1-Dichloroethene	0.638	0.435	--	2.53	1.72	--		2.177
trans-1,2-Dichloroethene	ND	0.435	--	ND	1.72	--		2.177
cis-1,2-Dichloroethene	ND	0.435	--	ND	1.72	--		2.177
Trichloroethene	8.21	0.435	--	44.1	2.34	--		2.177
Tetrachloroethene	1.04	0.435	--	7.05	2.95	--		2.177

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	88		60-140
Bromochloromethane	88		60-140
chlorobenzene-d5	87		60-140

Project Name: ESSEX/HOPE
Project Number: 703765CH.01.03
Lab Number: L1851659
Report Date: 01/02/19

SAMPLE RESULTS

Lab ID: L1851659-07 D
Client ID: SV-07_20181212
Sample Location: JAMESTOWN, NY

Date Collected: 12/12/18 13:21
Date Received: 12/13/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/28/18 19:51
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	0.877	0.452	--	2.24	1.16	--		2.26
1,1-Dichloroethene	ND	0.452	--	ND	1.79	--		2.26
trans-1,2-Dichloroethene	ND	0.452	--	ND	1.79	--		2.26
cis-1,2-Dichloroethene	1.44	0.452	--	5.71	1.79	--		2.26
Trichloroethene	3.41	0.452	--	18.3	2.43	--		2.26
Tetrachloroethene	ND	0.452	--	ND	3.07	--		2.26

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	86		60-140
Bromochloromethane	87		60-140
chlorobenzene-d5	83		60-140

Project Name: ESSEX/HOPE
Project Number: 703765CH.01.03
Lab Number: L1851659
Report Date: 01/02/19

SAMPLE RESULTS

Lab ID: L1851659-08 D
Client ID: SV-07_20181212-FD
Sample Location: JAMESTOWN, NY

Date Collected: 12/12/18 13:21
Date Received: 12/13/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/28/18 20:26
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	ND	0.453	--	ND	1.16	--		2.267
1,1-Dichloroethene	ND	0.453	--	ND	1.80	--		2.267
trans-1,2-Dichloroethene	ND	0.453	--	ND	1.80	--		2.267
cis-1,2-Dichloroethene	0.929	0.453	--	3.68	1.80	--		2.267
Trichloroethene	1.45	0.453	--	7.79	2.43	--		2.267
Tetrachloroethene	1.31	0.453	--	8.88	3.07	--		2.267

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	86		60-140
Bromochloromethane	88		60-140
chlorobenzene-d5	82		60-140

Project Name: ESSEX/HOPE
Project Number: 703765CH.01.03

Lab Number: L1851659
Report Date: 01/02/19

SAMPLE RESULTS

Lab ID: L1851659-09 D
Client ID: SV-08_20181212
Sample Location: JAMESTOWN, NY

Date Collected: 12/12/18 14:37
Date Received: 12/13/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/28/18 21:00
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	ND	0.437	--	ND	1.12	--		2.185
1,1-Dichloroethene	ND	0.437	--	ND	1.73	--		2.185
trans-1,2-Dichloroethene	ND	0.437	--	ND	1.73	--		2.185
cis-1,2-Dichloroethene	ND	0.437	--	ND	1.73	--		2.185
Trichloroethene	0.505	0.437	--	2.71	2.35	--		2.185
Tetrachloroethene	ND	0.437	--	ND	2.96	--		2.185

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	86		60-140
Bromochloromethane	89		60-140
chlorobenzene-d5	82		60-140

Project Name: ESSEX/HOPE
Project Number: 703765CH.01.03
Lab Number: L1851659
Report Date: 01/02/19

SAMPLE RESULTS

Lab ID: L1851659-10 D
Client ID: SV-09_20181212
Sample Location: JAMESTOWN, NY

Date Collected: 12/12/18 13:59
Date Received: 12/13/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/28/18 21:34
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	ND	0.432	--	ND	1.10	--		2.161
1,1-Dichloroethene	ND	0.432	--	ND	1.71	--		2.161
trans-1,2-Dichloroethene	ND	0.432	--	ND	1.71	--		2.161
cis-1,2-Dichloroethene	ND	0.432	--	ND	1.71	--		2.161
Trichloroethene	1.64	0.432	--	8.81	2.32	--		2.161
Tetrachloroethene	0.527	0.432	--	3.57	2.93	--		2.161

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	85		60-140
Bromochloromethane	88		60-140
chlorobenzene-d5	83		60-140

Project Name: ESSEX/HOPE
Project Number: 703765CH.01.03
Lab Number: L1851659
Report Date: 01/02/19

SAMPLE RESULTS

Lab ID: L1851659-11 D
Client ID: SV-10_20181213
Sample Location: JAMESTOWN, NY

Date Collected: 12/13/18 12:17
Date Received: 12/13/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/28/18 22:09
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	1.18	0.454	--	3.02	1.16	--		2.269
1,1-Dichloroethene	ND	0.454	--	ND	1.80	--		2.269
trans-1,2-Dichloroethene	ND	0.454	--	ND	1.80	--		2.269
cis-1,2-Dichloroethene	1.20	0.454	--	4.76	1.80	--		2.269
Trichloroethene	1.07	0.454	--	5.75	2.44	--		2.269
Tetrachloroethene	ND	0.454	--	ND	3.08	--		2.269

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	88		60-140
Bromochloromethane	95		60-140
chlorobenzene-d5	86		60-140

Project Name: ESSEX/HOPE
Project Number: 703765CH.01.03
Lab Number: L1851659
Report Date: 01/02/19

SAMPLE RESULTS

Lab ID: L1851659-12 D
Client ID: SV-10_20181213-FD
Sample Location: JAMESTOWN, NY

Date Collected: 12/13/18 12:17
Date Received: 12/13/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/28/18 22:43
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	2.36	0.454	--	6.03	1.16	--		2.269
1,1-Dichloroethene	ND	0.454	--	ND	1.80	--		2.269
trans-1,2-Dichloroethene	ND	0.454	--	ND	1.80	--		2.269
cis-1,2-Dichloroethene	2.21	0.454	--	8.76	1.80	--		2.269
Trichloroethene	1.96	0.454	--	10.5	2.44	--		2.269
Tetrachloroethene	5.21	0.454	--	35.3	3.08	--		2.269

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	86		60-140
Bromochloromethane	93		60-140
chlorobenzene-d5	83		60-140

Project Name: ESSEX/HOPE
Project Number: 703765CH.01.03

Lab Number: L1851659
Report Date: 01/02/19

SAMPLE RESULTS

Lab ID: L1851659-13 D
Client ID: SV-11_20181212
Sample Location: JAMESTOWN, NY

Date Collected: 12/12/18 15:13
Date Received: 12/13/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/28/18 23:18
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	ND	0.430	--	ND	1.10	--		2.152
1,1-Dichloroethene	ND	0.430	--	ND	1.70	--		2.152
trans-1,2-Dichloroethene	ND	0.430	--	ND	1.70	--		2.152
cis-1,2-Dichloroethene	ND	0.430	--	ND	1.70	--		2.152
Trichloroethene	0.887	0.430	--	4.77	2.31	--		2.152
Tetrachloroethene	ND	0.430	--	ND	2.92	--		2.152

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	85		60-140
Bromochloromethane	87		60-140
chlorobenzene-d5	78		60-140

Project Name: ESSEX/HOPE
Project Number: 703765CH.01.03

Lab Number: L1851659
Report Date: 01/02/19

SAMPLE RESULTS

Lab ID: L1851659-14 D
Client ID: SV-12_20181212
Sample Location: JAMESTOWN, NY

Date Collected: 12/12/18 15:50
Date Received: 12/13/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/28/18 23:52
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	ND	0.432	--	ND	1.10	--		2.161
1,1-Dichloroethene	ND	0.432	--	ND	1.71	--		2.161
trans-1,2-Dichloroethene	ND	0.432	--	ND	1.71	--		2.161
cis-1,2-Dichloroethene	0.434	0.432	--	1.72	1.71	--		2.161
Trichloroethene	1.20	0.432	--	6.45	2.32	--		2.161
Tetrachloroethene	ND	0.432	--	ND	2.93	--		2.161

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	84		60-140
Bromochloromethane	87		60-140
chlorobenzene-d5	81		60-140

Project Name: ESSEX/HOPE
Project Number: 703765CH.01.03
Lab Number: L1851659
Report Date: 01/02/19

SAMPLE RESULTS

Lab ID: L1851659-15 D
Client ID: SV-13_20181212
Sample Location: JAMESTOWN, NY

Date Collected: 12/12/18 16:33
Date Received: 12/13/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/29/18 00:27
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	ND	0.438	--	ND	1.12	--		2.193
1,1-Dichloroethene	ND	0.438	--	ND	1.74	--		2.193
trans-1,2-Dichloroethene	ND	0.438	--	ND	1.74	--		2.193
cis-1,2-Dichloroethene	ND	0.438	--	ND	1.74	--		2.193
Trichloroethene	ND	0.438	--	ND	2.35	--		2.193
Tetrachloroethene	ND	0.438	--	ND	2.97	--		2.193

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	86		60-140
Bromochloromethane	90		60-140
chlorobenzene-d5	85		60-140

Project Name: ESSEX/HOPE
Project Number: 703765CH.01.03
Lab Number: L1851659
Report Date: 01/02/19

SAMPLE RESULTS

Lab ID: L1851659-16 D
Client ID: SV-14_20181212
Sample Location: JAMESTOWN, NY

Date Collected: 12/13/18 10:31
Date Received: 12/13/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/29/18 01:01
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	ND	0.429	--	ND	1.10	--		2.146
1,1-Dichloroethene	ND	0.429	--	ND	1.70	--		2.146
trans-1,2-Dichloroethene	ND	0.429	--	ND	1.70	--		2.146
cis-1,2-Dichloroethene	0.573	0.429	--	2.27	1.70	--		2.146
Trichloroethene	0.882	0.429	--	4.74	2.31	--		2.146
Tetrachloroethene	ND	0.429	--	ND	2.91	--		2.146

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	83		60-140
Bromochloromethane	87		60-140
chlorobenzene-d5	84		60-140

Project Name: ESSEX/HOPE
Project Number: 703765CH.01.03
Lab Number: L1851659
Report Date: 01/02/19

SAMPLE RESULTS

Lab ID: L1851659-17 D
Client ID: SV-15_20181212
Sample Location: JAMESTOWN, NY

Date Collected: 12/13/18 11:37
Date Received: 12/13/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/29/18 00:13
Analyst: EW

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	ND	0.444	--	ND	1.13	--		2.218
1,1-Dichloroethene	ND	0.444	--	ND	1.76	--		2.218
trans-1,2-Dichloroethene	ND	0.444	--	ND	1.76	--		2.218
cis-1,2-Dichloroethene	0.554	0.444	--	2.20	1.76	--		2.218
Trichloroethene	ND	0.444	--	ND	2.39	--		2.218
Tetrachloroethene	ND	0.444	--	ND	3.01	--		2.218

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	95		60-140
Bromochloromethane	98		60-140
chlorobenzene-d5	93		60-140

Project Name: ESSEX/HOPE
Project Number: 703765CH.01.03
Lab Number: L1851659
Report Date: 01/02/19

SAMPLE RESULTS

Lab ID: L1851659-18 D
Client ID: SV-16_20181212
Sample Location: JAMESTOWN, NY

Date Collected: 12/13/18 11:04
Date Received: 12/13/18
Field Prep: Not Specified

Sample Depth:
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/29/18 01:31
Analyst: EW

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Vinyl chloride	ND	0.444	--	ND	1.13	--		2.218
1,1-Dichloroethene	ND	0.444	--	ND	1.76	--		2.218
trans-1,2-Dichloroethene	ND	0.444	--	ND	1.76	--		2.218
cis-1,2-Dichloroethene	0.674	0.444	--	2.67	1.76	--		2.218
Trichloroethene	20.6	0.444	--	111	2.39	--		2.218
Tetrachloroethene	0.978	0.444	--	6.63	3.01	--		2.218

Internal Standard	**% Recovery**	**Qualifier**	**Acceptance Criteria**
1,4-Difluorobenzene	91		60-140
Bromochloromethane	94		60-140
chlorobenzene-d5	90		60-140

Project Name: ESSEX/HOPE
Project Number: 703765CH.01.03
Lab Number: L1851659
Report Date: 01/02/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 12/28/18 13:40

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab for sample(s): 01-16 Batch: WG1193607-4								
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1
trans-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
Trichloroethene	ND	0.200	--	ND	1.07	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1

Project Name: ESSEX/HOPE
Project Number: 703765CH.01.03
Lab Number: L1851659
Report Date: 01/02/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 12/28/18 14:50

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab for sample(s): 17-18 Batch: WG1193633-4								
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1
trans-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
Trichloroethene	ND	0.200	--	ND	1.07	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1

Lab Control Sample Analysis

Batch Quality Control

Project Name: ESSEX/HOPE

Project Number: 703765CH.01.03

Lab Number: L1851659

Report Date: 01/02/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-16 Batch: WG1193607-3								
Vinyl chloride	91		-		70-130	-		
1,1-Dichloroethene	88		-		70-130	-		
trans-1,2-Dichloroethene	84		-		70-130	-		
cis-1,2-Dichloroethene	86		-		70-130	-		
Trichloroethene	93		-		70-130	-		
Tetrachloroethene	73		-		70-130	-		

Lab Control Sample Analysis

Batch Quality Control

Project Name: ESSEX/HOPE

Project Number: 703765CH.01.03

Lab Number: L1851659

Report Date: 01/02/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 17-18 Batch: WG1193633-3								
Vinyl chloride	121		-		70-130	-		
1,1-Dichloroethene	116		-		70-130	-		
trans-1,2-Dichloroethene	115		-		70-130	-		
cis-1,2-Dichloroethene	107		-		70-130	-		
Trichloroethene	91		-		70-130	-		
Tetrachloroethene	92		-		70-130	-		

Lab Duplicate Analysis
Batch Quality Control

Project Name: ESSEX/HOPE
Project Number: 703765CH.01.03

Lab Number: L1851659
Report Date: 01/02/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-16 QC Batch ID: WG1193607-5 QC Sample: L1851659-02 Client ID: SV-02_20181211						
Vinyl chloride	ND	ND	ppbV	NC		25
1,1-Dichloroethene	ND	ND	ppbV	NC		25
trans-1,2-Dichloroethene	ND	ND	ppbV	NC		25
cis-1,2-Dichloroethene	ND	ND	ppbV	NC		25
Trichloroethene	ND	ND	ppbV	NC		25
Tetrachloroethene	2.31	2.26	ppbV	2		25
Volatile Organics in Air - Mansfield Lab Associated sample(s): 17-18 QC Batch ID: WG1193633-5 QC Sample: L1851659-17 Client ID: SV-15_20181212						
Vinyl chloride	ND	ND	ppbV	NC		25
1,1-Dichloroethene	ND	ND	ppbV	NC		25
trans-1,2-Dichloroethene	ND	ND	ppbV	NC		25
cis-1,2-Dichloroethene	0.554	0.550	ppbV	1		25
Trichloroethene	ND	ND	ppbV	NC		25
Tetrachloroethene	ND	ND	ppbV	NC		25

Project Name: ESSEX/HOPE

Lab Number: L1851659

Project Number: 703765CH.01.03

Report Date: 01/02/19

Canister and Flow Controller Information

Samplenum	Client ID	Media ID	Media Type	Date Prepared	Bottle Order	Cleaning Batch ID	Can Leak Check	Initial Pressure (in. Hg)	Pressure on Receipt (in. Hg)	Flow Controler Leak Chk	Flow Out mL/min	Flow In mL/min	% RPD
L1851659-01	SV-01_20181211	0211	Flow 2	12/10/18	280786		-	-	-	Pass	200	92	74
L1851659-01	SV-01_20181211	2396	1.0L Can	12/10/18	280786	L1832965-02	Pass	-29.6	-2.4	-	-	-	-
L1851659-02	SV-02_20181211	0146	Flow 1	12/10/18	280786		-	-	-	Pass	200	221	10
L1851659-02	SV-02_20181211	803	1.0L Can	12/10/18	280786	L1848624-02	Pass	-29.6	-1.3	-	-	-	-
L1851659-03	SV-03_20181211	0314	Flow 3	12/10/18	280786		-	-	-	Pass	200	209	4
L1851659-03	SV-03_20181211	683	1.0L Can	12/10/18	280786	L1836539-02	Pass	-29.6	-2.4	-	-	-	-
L1851659-04	SV-04_20181212	0355	Flow 3	12/10/18	280786		-	-	-	Pass	200	200	0
L1851659-04	SV-04_20181212	567	1.0L Can	12/10/18	280786	L1849158-02	Pass	-29.6	-1.8	-	-	-	-
L1851659-05	SV-05_20181212	0756	Flow 3	12/10/18	280786		-	-	-	Pass	200	200	0
L1851659-05	SV-05_20181212	872	1.0L Can	12/10/18	280786	L1849355-02	Pass	-29.6	-1.5	-	-	-	-
L1851659-06	SV-06_20181212	0126	Flow 1	12/10/18	280786		-	-	-	Pass	200	340	52
L1851659-06	SV-06_20181212	2089	1.0L Can	12/10/18	280786	L1849158-02	Pass	-29.1	-1.0	-	-	-	-
L1851659-07	SV-07_20181212	0594	Flow 5	12/10/18	280786		-	-	-	Pass	200	192	4
L1851659-07	SV-07_20181212	2163	1.0L Can	12/10/18	280786	L1834244-02	Pass	-29.6	-2.2	-	-	-	-
L1851659-08	SV-07_20181212-FD	2406	1.0L Can	12/10/18	280786		Pass	-29.6	-2.2	-	-	-	-

Project Name: ESSEX/HOPE

Lab Number: L1851659

Project Number: 703765CH.01.03

Report Date: 01/02/19

Canister and Flow Controller Information

Samplenum	Client ID	Media ID	Media Type	Date Prepared	Bottle Order	Cleaning Batch ID	Can Leak Check	Initial Pressure (in. Hg)	Pressure on Receipt (in. Hg)	Flow Controler Leak Chk	Flow Out mL/min	Flow In mL/min	% RPD
L1851659-09	SV-08_20181212	01010	Flow 2	12/10/18	280786		-	-	-	Pass	200	200	0
L1851659-09	SV-08_20181212	2168	1.0L Can	12/10/18	280786	L1846293-02	Pass	-29.6	-1.4	-	-	-	-
L1851659-10	SV-09_20181212	0377	Flow 2	12/10/18	280786		-	-	-	Pass	200	204	2
L1851659-10	SV-09_20181212	855	1.0L Can	12/10/18	280786	L1849179-02	Pass	-29.6	-1.3	-	-	-	-
L1851659-11	SV-10_20181213	702	1.0L Can	12/10/18	280786	L1849179-02	Pass	-29.6	-2.4	-	-	-	-
L1851659-12	SV-10_20181213-FD	0546	Flow 4	12/10/18	280786		-	-	-	Pass	200	200	0
L1851659-12	SV-10_20181213-FD	675	1.0L Can	12/10/18	280786	L1849355-02	Pass	-29.6	-2.3	-	-	-	-
L1851659-13	SV-11_20181212	0677	Flow 3	12/10/18	280786		-	-	-	Pass	200	205	2
L1851659-13	SV-11_20181212	1918	1.0L Can	12/10/18	280786	L1849158-02	Pass	-29.8	-0.59	-	-	-	-
L1851659-14	SV-12_20181212	0934	Flow 3	12/10/18	280786		-	-	-	Pass	200	204	2
L1851659-14	SV-12_20181212	681	1.0L Can	12/10/18	280786	L1849046-02	Pass	-29.6	-1.0	-	-	-	-
L1851659-15	SV-13_20181212	0378	Flow 5	12/10/18	280786		-	-	-	Pass	200	200	0
L1851659-15	SV-13_20181212	886	1.0L Can	12/10/18	280786	L1849179-02	Pass	-29.6	-1.2	-	-	-	-
L1851659-16	SV-14_20181212	0224	Flow 2	12/10/18	280786		-	-	-	Pass	200	206	3
L1851659-16	SV-14_20181212	1914	1.0L Can	12/10/18	280786	L1849355-02	Pass	-29.5	-0.90	-	-	-	-

Project Name: ESSEX/HOPE

Project Number: 703765CH.01.03

Lab Number: L1851659

Report Date: 01/02/19

Canister and Flow Controller Information

Samplenum	Client ID	Media ID	Media Type	Date Prepared	Bottle Order	Cleaning Batch ID	Can Leak Check	Initial Pressure (in. Hg)	Pressure on Receipt (in. Hg)	Flow Controler Leak Chk	Flow Out mL/min	Flow In mL/min	% RPD
L1851659-17	SV-15_20181212	0407	Flow 2	12/10/18	280786		-	-	-	Pass	200	204	2
L1851659-17	SV-15_20181212	2404	1.0L Can	12/10/18	280786	L1849355-02	Pass	-29.6	-2.5	-	-	-	-
L1851659-18	SV-16_20181212	01123	Flow 1	12/10/18	280786		-	-	-	Pass	200	203	1
L1851659-18	SV-16_20181212	2467	1.0L Can	12/10/18	280786	L1849355-02	Pass	-29.7	-1.7	-	-	-	-

Project Name: BATCH CANISTER CERTIFICATION **Lab Number:** L1832965

Project Number: CANISTER QC BAT **Report Date:** 01/02/19

Air Canister Certification Results

Lab ID: L1832965-02
Client ID: CAN 2396 SHELF 15
Sample Location:

Date Collected: 08/21/18 16:00
Date Received: 08/22/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 08/22/18 19:22
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Chlorodifluoromethane	ND	0.200	--	ND	0.707	--		1
Propylene	ND	0.500	--	ND	0.861	--		1
Propane	ND	0.500	--	ND	0.902	--		1
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.200	--	ND	1.40	--		1
Methanol	ND	5.00	--	ND	6.55	--		1
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,3-Butadiene	ND	0.200	--	ND	0.442	--		1
Butane	ND	0.200	--	ND	0.475	--		1
Bromomethane	ND	0.200	--	ND	0.777	--		1
Chloroethane	ND	0.200	--	ND	0.528	--		1
Ethanol	ND	5.00	--	ND	9.42	--		1
Dichlorofluoromethane	ND	0.200	--	ND	0.842	--		1
Vinyl bromide	ND	0.200	--	ND	0.874	--		1
Acrolein	ND	0.500	--	ND	1.15	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Acetonitrile	ND	0.200	--	ND	0.336	--		1
Trichlorofluoromethane	ND	0.200	--	ND	1.12	--		1
Isopropanol	ND	0.500	--	ND	1.23	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
Pentane	ND	0.200	--	ND	0.590	--		1
Ethyl ether	ND	0.200	--	ND	0.606	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1832965
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1832965-02
Client ID: CAN 2396 SHELF 15
Sample Location:

Date Collected: 08/21/18 16:00
Date Received: 08/22/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Tertiary butyl Alcohol	ND	0.500	--	ND	1.52	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
3-Chloropropene	ND	0.200	--	ND	0.626	--		1
Carbon disulfide	ND	0.200	--	ND	0.623	--		1
Freon-113	ND	0.200	--	ND	1.53	--		1
trans-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
1,1-Dichloroethane	ND	0.200	--	ND	0.809	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
Vinyl acetate	ND	1.00	--	ND	3.52	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
Ethyl Acetate	ND	0.500	--	ND	1.80	--		1
Chloroform	ND	0.200	--	ND	0.977	--		1
Tetrahydrofuran	ND	0.500	--	ND	1.47	--		1
2,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
1,2-Dichloroethane	ND	0.200	--	ND	0.809	--		1
n-Hexane	ND	0.200	--	ND	0.705	--		1
Diisopropyl ether	ND	0.200	--	ND	0.836	--		1
tert-Butyl Ethyl Ether	ND	0.200	--	ND	0.836	--		1
1,1,1-Trichloroethane	ND	0.200	--	ND	1.09	--		1
1,1-Dichloropropene	ND	0.200	--	ND	0.908	--		1
Benzene	ND	0.200	--	ND	0.639	--		1
Carbon tetrachloride	ND	0.200	--	ND	1.26	--		1
Cyclohexane	ND	0.200	--	ND	0.688	--		1
tert-Amyl Methyl Ether	ND	0.200	--	ND	0.836	--		1
Dibromomethane	ND	0.200	--	ND	1.42	--		1
1,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1

Project Name: BATCH CANISTER CERTIFICATION **Lab Number:** L1832965

Project Number: CANISTER QC BAT **Report Date:** 01/02/19

Air Canister Certification Results

Lab ID: L1832965-02
Client ID: CAN 2396 SHELF 15
Sample Location:

Date Collected: 08/21/18 16:00
Date Received: 08/22/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Bromodichloromethane	ND	0.200	--	ND	1.34	--		1
1,4-Dioxane	ND	0.200	--	ND	0.721	--		1
Trichloroethene	ND	0.200	--	ND	1.07	--		1
2,2,4-Trimethylpentane	ND	0.200	--	ND	0.934	--		1
Methyl Methacrylate	ND	0.500	--	ND	2.05	--		1
Heptane	ND	0.200	--	ND	0.820	--		1
cis-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
1,1,2-Trichloroethane	ND	0.200	--	ND	1.09	--		1
Toluene	ND	0.200	--	ND	0.754	--		1
1,3-Dichloropropane	ND	0.200	--	ND	0.924	--		1
2-Hexanone	ND	0.200	--	ND	0.820	--		1
Dibromochloromethane	ND	0.200	--	ND	1.70	--		1
1,2-Dibromoethane	ND	0.200	--	ND	1.54	--		1
Butyl acetate	ND	0.500	--	ND	2.38	--		1
Octane	ND	0.200	--	ND	0.934	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1
1,1,1,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
Chlorobenzene	ND	0.200	--	ND	0.921	--		1
Ethylbenzene	ND	0.200	--	ND	0.869	--		1
p/m-Xylene	ND	0.400	--	ND	1.74	--		1
Bromoform	ND	0.200	--	ND	2.07	--		1
Styrene	ND	0.200	--	ND	0.852	--		1
1,1,2,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
o-Xylene	ND	0.200	--	ND	0.869	--		1
1,2,3-Trichloropropane	ND	0.200	--	ND	1.21	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1832965
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1832965-02
Client ID: CAN 2396 SHELF 15
Sample Location:

Date Collected: 08/21/18 16:00
Date Received: 08/22/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Nonane	ND	0.200	--	ND	1.05	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
Bromobenzene	ND	0.200	--	ND	0.793	--		1
2-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
n-Propylbenzene	ND	0.200	--	ND	0.983	--		1
4-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
4-Ethyltoluene	ND	0.200	--	ND	0.983	--		1
1,3,5-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
tert-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
Decane	ND	0.200	--	ND	1.16	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
1,4-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2-Dibromo-3-chloropropane	ND	0.200	--	ND	1.93	--		1
Undecane	ND	0.200	--	ND	1.28	--		1
Dodecane	ND	0.200	--	ND	1.39	--		1
1,2,4-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Naphthalene	ND	0.200	--	ND	1.05	--		1
1,2,3-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Hexachlorobutadiene	ND	0.200	--	ND	2.13	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1832965
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1832965-02
Client ID: CAN 2396 SHELF 15
Sample Location:

Date Collected: 08/21/18 16:00
Date Received: 08/22/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								

	Results	Qualifier	Units	RDL	Dilution Factor
Tentatively Identified Compounds					

No Tentatively Identified Compounds

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-Difluorobenzene	88		60-140
Bromochloromethane	90		60-140
chlorobenzene-d5	89		60-140

Project Name: BATCH CANISTER CERTIFICATION **Lab Number:** L1832965

Project Number: CANISTER QC BAT **Report Date:** 01/02/19

Air Canister Certification Results

Lab ID: L1832965-02
Client ID: CAN 2396 SHELF 15
Sample Location:

Date Collected: 08/21/18 16:00
Date Received: 08/22/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 08/22/18 19:22
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air by SIM - Mansfield Lab								
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.050	--	ND	0.349	--		1
Vinyl chloride	ND	0.020	--	ND	0.051	--		1
1,3-Butadiene	ND	0.020	--	ND	0.044	--		1
Bromomethane	ND	0.020	--	ND	0.078	--		1
Chloroethane	ND	0.100	--	ND	0.264	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Trichlorofluoromethane	ND	0.050	--	ND	0.281	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
1,1-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
Freon-113	ND	0.050	--	ND	0.383	--		1
trans-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
1,1-Dichloroethane	ND	0.020	--	ND	0.081	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Chloroform	ND	0.020	--	ND	0.098	--		1
1,2-Dichloroethane	ND	0.020	--	ND	0.081	--		1
1,1,1-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Benzene	ND	0.100	--	ND	0.319	--		1
Carbon tetrachloride	ND	0.020	--	ND	0.126	--		1
1,2-Dichloropropane	ND	0.020	--	ND	0.092	--		1

Project Name: BATCH CANISTER CERTIFICATION **Lab Number:** L1832965

Project Number: CANISTER QC BAT **Report Date:** 01/02/19

Air Canister Certification Results

Lab ID: L1832965-02
Client ID: CAN 2396 SHELF 15
Sample Location:

Date Collected: 08/21/18 16:00
Date Received: 08/22/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
Bromodichloromethane	ND	0.020	--	ND	0.134	--		1
1,4-Dioxane	ND	0.100	--	ND	0.360	--		1
Trichloroethene	ND	0.020	--	ND	0.107	--		1
cis-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
1,1,2-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Toluene	ND	0.050	--	ND	0.188	--		1
Dibromochloromethane	ND	0.020	--	ND	0.170	--		1
1,2-Dibromoethane	ND	0.020	--	ND	0.154	--		1
Tetrachloroethene	0.061	0.020	--	0.414	0.136	--		1
1,1,1,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
Chlorobenzene	ND	0.100	--	ND	0.461	--		1
Ethylbenzene	ND	0.020	--	ND	0.087	--		1
p/m-Xylene	ND	0.040	--	ND	0.174	--		1
Bromoform	ND	0.020	--	ND	0.207	--		1
Styrene	ND	0.020	--	ND	0.085	--		1
1,1,2,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
o-Xylene	ND	0.020	--	ND	0.087	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
4-Ethyltoluene	ND	0.020	--	ND	0.098	--		1
1,3,5-Trimethybenzene	ND	0.020	--	ND	0.098	--		1
1,2,4-Trimethylbenzene	ND	0.020	--	ND	0.098	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
1,4-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1832965
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1832965-02
Client ID: CAN 2396 SHELF 15
Sample Location:

Date Collected: 08/21/18 16:00
Date Received: 08/22/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Naphthalene	ND	0.050	--	ND	0.262	--		1
1,2,3-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Hexachlorobutadiene	ND	0.050	--	ND	0.533	--		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	89		60-140
bromochloromethane	93		60-140
chlorobenzene-d5	90		60-140

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1834244
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1834244-02
Client ID: CAN 2163 SHELF 7
Sample Location:

Date Collected: 08/29/18 16:00
Date Received: 08/30/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 08/30/18 20:10
Analyst: RY

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Chlorodifluoromethane	ND	0.200	--	ND	0.707	--		1
Propylene	ND	0.500	--	ND	0.861	--		1
Propane	ND	0.500	--	ND	0.902	--		1
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.200	--	ND	1.40	--		1
Methanol	ND	5.00	--	ND	6.55	--		1
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,3-Butadiene	ND	0.200	--	ND	0.442	--		1
Butane	ND	0.200	--	ND	0.475	--		1
Bromomethane	ND	0.200	--	ND	0.777	--		1
Chloroethane	ND	0.200	--	ND	0.528	--		1
Ethanol	ND	5.00	--	ND	9.42	--		1
Dichlorofluoromethane	ND	0.200	--	ND	0.842	--		1
Vinyl bromide	ND	0.200	--	ND	0.874	--		1
Acrolein	ND	0.500	--	ND	1.15	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Acetonitrile	ND	0.200	--	ND	0.336	--		1
Trichlorofluoromethane	ND	0.200	--	ND	1.12	--		1
Isopropanol	ND	0.500	--	ND	1.23	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
Pentane	ND	0.200	--	ND	0.590	--		1
Ethyl ether	ND	0.200	--	ND	0.606	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1834244
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1834244-02
Client ID: CAN 2163 SHELF 7
Sample Location:

Date Collected: 08/29/18 16:00
Date Received: 08/30/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Tertiary butyl Alcohol	ND	0.500	--	ND	1.52	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
3-Chloropropene	ND	0.200	--	ND	0.626	--		1
Carbon disulfide	ND	0.200	--	ND	0.623	--		1
Freon-113	ND	0.200	--	ND	1.53	--		1
trans-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
1,1-Dichloroethane	ND	0.200	--	ND	0.809	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
Vinyl acetate	ND	1.00	--	ND	3.52	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
Ethyl Acetate	ND	0.500	--	ND	1.80	--		1
Chloroform	ND	0.200	--	ND	0.977	--		1
Tetrahydrofuran	ND	0.500	--	ND	1.47	--		1
2,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
1,2-Dichloroethane	ND	0.200	--	ND	0.809	--		1
n-Hexane	ND	0.200	--	ND	0.705	--		1
Diisopropyl ether	ND	0.200	--	ND	0.836	--		1
tert-Butyl Ethyl Ether	ND	0.200	--	ND	0.836	--		1
1,1,1-Trichloroethane	ND	0.200	--	ND	1.09	--		1
1,1-Dichloropropene	ND	0.200	--	ND	0.908	--		1
Benzene	ND	0.200	--	ND	0.639	--		1
Carbon tetrachloride	ND	0.200	--	ND	1.26	--		1
Cyclohexane	ND	0.200	--	ND	0.688	--		1
tert-Amyl Methyl Ether	ND	0.200	--	ND	0.836	--		1
Dibromomethane	ND	0.200	--	ND	1.42	--		1
1,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1834244
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1834244-02
Client ID: CAN 2163 SHELF 7
Sample Location:

Date Collected: 08/29/18 16:00
Date Received: 08/30/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Bromodichloromethane	ND	0.200	--	ND	1.34	--		1
1,4-Dioxane	ND	0.200	--	ND	0.721	--		1
Trichloroethene	ND	0.200	--	ND	1.07	--		1
2,2,4-Trimethylpentane	ND	0.200	--	ND	0.934	--		1
Methyl Methacrylate	ND	0.500	--	ND	2.05	--		1
Heptane	ND	0.200	--	ND	0.820	--		1
cis-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
1,1,2-Trichloroethane	ND	0.200	--	ND	1.09	--		1
Toluene	ND	0.200	--	ND	0.754	--		1
1,3-Dichloropropane	ND	0.200	--	ND	0.924	--		1
2-Hexanone	ND	0.200	--	ND	0.820	--		1
Dibromochloromethane	ND	0.200	--	ND	1.70	--		1
1,2-Dibromoethane	ND	0.200	--	ND	1.54	--		1
Butyl acetate	ND	0.500	--	ND	2.38	--		1
Octane	ND	0.200	--	ND	0.934	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1
1,1,1,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
Chlorobenzene	ND	0.200	--	ND	0.921	--		1
Ethylbenzene	ND	0.200	--	ND	0.869	--		1
p/m-Xylene	ND	0.400	--	ND	1.74	--		1
Bromoform	ND	0.200	--	ND	2.07	--		1
Styrene	ND	0.200	--	ND	0.852	--		1
1,1,2,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
o-Xylene	ND	0.200	--	ND	0.869	--		1
1,2,3-Trichloropropane	ND	0.200	--	ND	1.21	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1834244
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1834244-02
Client ID: CAN 2163 SHELF 7
Sample Location:

Date Collected: 08/29/18 16:00
Date Received: 08/30/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Nonane	ND	0.200	--	ND	1.05	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
Bromobenzene	ND	0.200	--	ND	0.793	--		1
2-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
n-Propylbenzene	ND	0.200	--	ND	0.983	--		1
4-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
4-Ethyltoluene	ND	0.200	--	ND	0.983	--		1
1,3,5-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
tert-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
Decane	ND	0.200	--	ND	1.16	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
1,4-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2-Dibromo-3-chloropropane	ND	0.200	--	ND	1.93	--		1
Undecane	ND	0.200	--	ND	1.28	--		1
Dodecane	ND	0.200	--	ND	1.39	--		1
1,2,4-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Naphthalene	ND	0.200	--	ND	1.05	--		1
1,2,3-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Hexachlorobutadiene	ND	0.200	--	ND	2.13	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1834244
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1834244-02
Client ID: CAN 2163 SHELF 7
Sample Location:

Date Collected: 08/29/18 16:00
Date Received: 08/30/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								

	Results	Qualifier	Units	RDL	Dilution Factor
Tentatively Identified Compounds					

No Tentatively Identified Compounds

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-Difluorobenzene	90		60-140
Bromochloromethane	92		60-140
chlorobenzene-d5	95		60-140

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1834244
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1834244-02
Client ID: CAN 2163 SHELF 7
Sample Location:

Date Collected: 08/29/18 16:00
Date Received: 08/30/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 08/30/18 20:10
Analyst: RY

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air by SIM - Mansfield Lab								
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.050	--	ND	0.349	--		1
Vinyl chloride	ND	0.020	--	ND	0.051	--		1
1,3-Butadiene	ND	0.020	--	ND	0.044	--		1
Bromomethane	ND	0.020	--	ND	0.078	--		1
Chloroethane	ND	0.100	--	ND	0.264	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Trichlorofluoromethane	ND	0.050	--	ND	0.281	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
1,1-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
Freon-113	ND	0.050	--	ND	0.383	--		1
trans-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
1,1-Dichloroethane	ND	0.020	--	ND	0.081	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Chloroform	ND	0.020	--	ND	0.098	--		1
1,2-Dichloroethane	ND	0.020	--	ND	0.081	--		1
1,1,1-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Benzene	ND	0.100	--	ND	0.319	--		1
Carbon tetrachloride	ND	0.020	--	ND	0.126	--		1
1,2-Dichloropropane	ND	0.020	--	ND	0.092	--		1

Project Name: BATCH CANISTER CERTIFICATION **Lab Number:** L1834244

Project Number: CANISTER QC BAT **Report Date:** 01/02/19

Air Canister Certification Results

Lab ID: L1834244-02
Client ID: CAN 2163 SHELF 7
Sample Location:

Date Collected: 08/29/18 16:00
Date Received: 08/30/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
Bromodichloromethane	ND	0.020	--	ND	0.134	--		1
1,4-Dioxane	ND	0.100	--	ND	0.360	--		1
Trichloroethene	ND	0.020	--	ND	0.107	--		1
cis-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
1,1,2-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Toluene	ND	0.050	--	ND	0.188	--		1
Dibromochloromethane	ND	0.020	--	ND	0.170	--		1
1,2-Dibromoethane	ND	0.020	--	ND	0.154	--		1
Tetrachloroethene	ND	0.020	--	ND	0.136	--		1
1,1,1,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
Chlorobenzene	ND	0.100	--	ND	0.461	--		1
Ethylbenzene	ND	0.020	--	ND	0.087	--		1
p/m-Xylene	ND	0.040	--	ND	0.174	--		1
Bromoform	ND	0.020	--	ND	0.207	--		1
Styrene	ND	0.020	--	ND	0.085	--		1
1,1,2,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
o-Xylene	ND	0.020	--	ND	0.087	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
4-Ethyltoluene	ND	0.020	--	ND	0.098	--		1
1,3,5-Trimethybenzene	ND	0.020	--	ND	0.098	--		1
1,2,4-Trimethylbenzene	ND	0.020	--	ND	0.098	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
1,4-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1834244
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1834244-02
Client ID: CAN 2163 SHELF 7
Sample Location:

Date Collected: 08/29/18 16:00
Date Received: 08/30/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Naphthalene	ND	0.050	--	ND	0.262	--		1
1,2,3-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Hexachlorobutadiene	ND	0.050	--	ND	0.533	--		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	90		60-140
bromochloromethane	91		60-140
chlorobenzene-d5	88		60-140

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1836539
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1836539-02
Client ID: CAN 683 SHELF 11
Sample Location:

Date Collected: 09/13/18 16:00
Date Received: 09/14/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 09/14/18 17:43
Analyst: RY

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Chlorodifluoromethane	ND	0.200	--	ND	0.707	--		1
Propylene	ND	0.500	--	ND	0.861	--		1
Propane	ND	0.500	--	ND	0.902	--		1
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.200	--	ND	1.40	--		1
Methanol	ND	5.00	--	ND	6.55	--		1
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,3-Butadiene	ND	0.200	--	ND	0.442	--		1
Butane	ND	0.200	--	ND	0.475	--		1
Bromomethane	ND	0.200	--	ND	0.777	--		1
Chloroethane	ND	0.200	--	ND	0.528	--		1
Ethanol	ND	5.00	--	ND	9.42	--		1
Dichlorofluoromethane	ND	0.200	--	ND	0.842	--		1
Vinyl bromide	ND	0.200	--	ND	0.874	--		1
Acrolein	ND	0.500	--	ND	1.15	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Acetonitrile	ND	0.200	--	ND	0.336	--		1
Trichlorofluoromethane	ND	0.200	--	ND	1.12	--		1
Isopropanol	ND	0.500	--	ND	1.23	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
Pentane	ND	0.200	--	ND	0.590	--		1
Ethyl ether	ND	0.200	--	ND	0.606	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1836539
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1836539-02
Client ID: CAN 683 SHELF 11
Sample Location:

Date Collected: 09/13/18 16:00
Date Received: 09/14/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Tertiary butyl Alcohol	ND	0.500	--	ND	1.52	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
3-Chloropropene	ND	0.200	--	ND	0.626	--		1
Carbon disulfide	ND	0.200	--	ND	0.623	--		1
Freon-113	ND	0.200	--	ND	1.53	--		1
trans-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
1,1-Dichloroethane	ND	0.200	--	ND	0.809	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
Vinyl acetate	ND	1.00	--	ND	3.52	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
Ethyl Acetate	ND	0.500	--	ND	1.80	--		1
Chloroform	ND	0.200	--	ND	0.977	--		1
Tetrahydrofuran	ND	0.500	--	ND	1.47	--		1
2,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
1,2-Dichloroethane	ND	0.200	--	ND	0.809	--		1
n-Hexane	ND	0.200	--	ND	0.705	--		1
Diisopropyl ether	ND	0.200	--	ND	0.836	--		1
tert-Butyl Ethyl Ether	ND	0.200	--	ND	0.836	--		1
1,1,1-Trichloroethane	ND	0.200	--	ND	1.09	--		1
1,1-Dichloropropene	ND	0.200	--	ND	0.908	--		1
Benzene	ND	0.200	--	ND	0.639	--		1
Carbon tetrachloride	ND	0.200	--	ND	1.26	--		1
Cyclohexane	ND	0.200	--	ND	0.688	--		1
tert-Amyl Methyl Ether	ND	0.200	--	ND	0.836	--		1
Dibromomethane	ND	0.200	--	ND	1.42	--		1
1,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1

Project Name: BATCH CANISTER CERTIFICATION **Lab Number:** L1836539

Project Number: CANISTER QC BAT **Report Date:** 01/02/19

Air Canister Certification Results

Lab ID: L1836539-02
Client ID: CAN 683 SHELF 11
Sample Location:

Date Collected: 09/13/18 16:00
Date Received: 09/14/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Bromodichloromethane	ND	0.200	--	ND	1.34	--		1
1,4-Dioxane	ND	0.200	--	ND	0.721	--		1
Trichloroethene	ND	0.200	--	ND	1.07	--		1
2,2,4-Trimethylpentane	ND	0.200	--	ND	0.934	--		1
Methyl Methacrylate	ND	0.500	--	ND	2.05	--		1
Heptane	ND	0.200	--	ND	0.820	--		1
cis-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
1,1,2-Trichloroethane	ND	0.200	--	ND	1.09	--		1
Toluene	ND	0.200	--	ND	0.754	--		1
1,3-Dichloropropane	ND	0.200	--	ND	0.924	--		1
2-Hexanone	ND	0.200	--	ND	0.820	--		1
Dibromochloromethane	ND	0.200	--	ND	1.70	--		1
1,2-Dibromoethane	ND	0.200	--	ND	1.54	--		1
Butyl acetate	ND	0.500	--	ND	2.38	--		1
Octane	ND	0.200	--	ND	0.934	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1
1,1,1,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
Chlorobenzene	ND	0.200	--	ND	0.921	--		1
Ethylbenzene	ND	0.200	--	ND	0.869	--		1
p/m-Xylene	ND	0.400	--	ND	1.74	--		1
Bromoform	ND	0.200	--	ND	2.07	--		1
Styrene	ND	0.200	--	ND	0.852	--		1
1,1,2,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
o-Xylene	ND	0.200	--	ND	0.869	--		1
1,2,3-Trichloropropane	ND	0.200	--	ND	1.21	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1836539
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1836539-02
Client ID: CAN 683 SHELF 11
Sample Location:

Date Collected: 09/13/18 16:00
Date Received: 09/14/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Nonane	ND	0.200	--	ND	1.05	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
Bromobenzene	ND	0.200	--	ND	0.793	--		1
2-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
n-Propylbenzene	ND	0.200	--	ND	0.983	--		1
4-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
4-Ethyltoluene	ND	0.200	--	ND	0.983	--		1
1,3,5-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
tert-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
Decane	ND	0.200	--	ND	1.16	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
1,4-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2-Dibromo-3-chloropropane	ND	0.200	--	ND	1.93	--		1
Undecane	ND	0.200	--	ND	1.28	--		1
Dodecane	ND	0.200	--	ND	1.39	--		1
1,2,4-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Naphthalene	ND	0.200	--	ND	1.05	--		1
1,2,3-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Hexachlorobutadiene	ND	0.200	--	ND	2.13	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1836539
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1836539-02
Client ID: CAN 683 SHELF 11
Sample Location:

Date Collected: 09/13/18 16:00
Date Received: 09/14/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								

	Results	Qualifier	Units	RDL	Dilution Factor
Tentatively Identified Compounds					
Silanol, Trimethyl-	1.0	NJ	ppbV		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-Difluorobenzene	96		60-140
Bromochloromethane	112		60-140
chlorobenzene-d5	96		60-140

Project Name: BATCH CANISTER CERTIFICATION **Lab Number:** L1836539

Project Number: CANISTER QC BAT **Report Date:** 01/02/19

Air Canister Certification Results

Lab ID: L1836539-02
Client ID: CAN 683 SHELF 11
Sample Location:

Date Collected: 09/13/18 16:00
Date Received: 09/14/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 09/14/18 17:43
Analyst: RY

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air by SIM - Mansfield Lab								
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.050	--	ND	0.349	--		1
Vinyl chloride	ND	0.020	--	ND	0.051	--		1
1,3-Butadiene	ND	0.020	--	ND	0.044	--		1
Bromomethane	ND	0.020	--	ND	0.078	--		1
Chloroethane	ND	0.100	--	ND	0.264	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Trichlorofluoromethane	ND	0.050	--	ND	0.281	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
1,1-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
Freon-113	ND	0.050	--	ND	0.383	--		1
trans-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
1,1-Dichloroethane	ND	0.020	--	ND	0.081	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Chloroform	ND	0.020	--	ND	0.098	--		1
1,2-Dichloroethane	ND	0.020	--	ND	0.081	--		1
1,1,1-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Benzene	ND	0.100	--	ND	0.319	--		1
Carbon tetrachloride	ND	0.020	--	ND	0.126	--		1
1,2-Dichloropropane	ND	0.020	--	ND	0.092	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1836539
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1836539-02
Client ID: CAN 683 SHELF 11
Sample Location:

Date Collected: 09/13/18 16:00
Date Received: 09/14/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
Bromodichloromethane	ND	0.020	--	ND	0.134	--		1
1,4-Dioxane	ND	0.100	--	ND	0.360	--		1
Trichloroethene	ND	0.020	--	ND	0.107	--		1
cis-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
1,1,2-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Toluene	ND	0.050	--	ND	0.188	--		1
Dibromochloromethane	ND	0.020	--	ND	0.170	--		1
1,2-Dibromoethane	ND	0.020	--	ND	0.154	--		1
Tetrachloroethene	ND	0.020	--	ND	0.136	--		1
1,1,1,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
Chlorobenzene	ND	0.100	--	ND	0.461	--		1
Ethylbenzene	ND	0.020	--	ND	0.087	--		1
p/m-Xylene	ND	0.040	--	ND	0.174	--		1
Bromoform	ND	0.020	--	ND	0.207	--		1
Styrene	ND	0.020	--	ND	0.085	--		1
1,1,2,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
o-Xylene	ND	0.020	--	ND	0.087	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
4-Ethyltoluene	ND	0.020	--	ND	0.098	--		1
1,3,5-Trimethybenzene	ND	0.020	--	ND	0.098	--		1
1,2,4-Trimethylbenzene	ND	0.020	--	ND	0.098	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
1,4-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1836539
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1836539-02
Client ID: CAN 683 SHELF 11
Sample Location:

Date Collected: 09/13/18 16:00
Date Received: 09/14/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Naphthalene	ND	0.050	--	ND	0.262	--		1
1,2,3-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Hexachlorobutadiene	ND	0.050	--	ND	0.533	--		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	95		60-140
bromochloromethane	112		60-140
chlorobenzene-d5	95		60-140

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1846293
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1846293-02
Client ID: CAN 2168 SHELF 17
Sample Location:

Date Collected: 11/09/18 07:30
Date Received: 11/12/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 11/12/18 18:56
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Chlorodifluoromethane	ND	0.200	--	ND	0.707	--		1
Propylene	ND	0.500	--	ND	0.861	--		1
Propane	ND	0.500	--	ND	0.902	--		1
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.200	--	ND	1.40	--		1
Methanol	ND	5.00	--	ND	6.55	--		1
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,3-Butadiene	ND	0.200	--	ND	0.442	--		1
Butane	ND	0.200	--	ND	0.475	--		1
Bromomethane	ND	0.200	--	ND	0.777	--		1
Chloroethane	ND	0.200	--	ND	0.528	--		1
Ethanol	ND	5.00	--	ND	9.42	--		1
Dichlorofluoromethane	ND	0.200	--	ND	0.842	--		1
Vinyl bromide	ND	0.200	--	ND	0.874	--		1
Acrolein	ND	0.500	--	ND	1.15	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Acetonitrile	ND	0.200	--	ND	0.336	--		1
Trichlorofluoromethane	ND	0.200	--	ND	1.12	--		1
Isopropanol	ND	0.500	--	ND	1.23	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
Pentane	ND	0.200	--	ND	0.590	--		1
Ethyl ether	ND	0.200	--	ND	0.606	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1846293
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1846293-02
Client ID: CAN 2168 SHELF 17
Sample Location:

Date Collected: 11/09/18 07:30
Date Received: 11/12/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Tertiary butyl Alcohol	ND	0.500	--	ND	1.52	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
3-Chloropropene	ND	0.200	--	ND	0.626	--		1
Carbon disulfide	ND	0.200	--	ND	0.623	--		1
Freon-113	ND	0.200	--	ND	1.53	--		1
trans-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
1,1-Dichloroethane	ND	0.200	--	ND	0.809	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
Vinyl acetate	ND	1.00	--	ND	3.52	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
Ethyl Acetate	ND	0.500	--	ND	1.80	--		1
Chloroform	ND	0.200	--	ND	0.977	--		1
Tetrahydrofuran	ND	0.500	--	ND	1.47	--		1
2,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
1,2-Dichloroethane	ND	0.200	--	ND	0.809	--		1
n-Hexane	ND	0.200	--	ND	0.705	--		1
Diisopropyl ether	ND	0.200	--	ND	0.836	--		1
tert-Butyl Ethyl Ether	ND	0.200	--	ND	0.836	--		1
1,1,1-Trichloroethane	ND	0.200	--	ND	1.09	--		1
1,1-Dichloropropene	ND	0.200	--	ND	0.908	--		1
Benzene	ND	0.200	--	ND	0.639	--		1
Carbon tetrachloride	ND	0.200	--	ND	1.26	--		1
Cyclohexane	ND	0.200	--	ND	0.688	--		1
tert-Amyl Methyl Ether	ND	0.200	--	ND	0.836	--		1
Dibromomethane	ND	0.200	--	ND	1.42	--		1
1,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1

Project Name: BATCH CANISTER CERTIFICATION **Lab Number:** L1846293

Project Number: CANISTER QC BAT **Report Date:** 01/02/19

Air Canister Certification Results

Lab ID: L1846293-02
Client ID: CAN 2168 SHELF 17
Sample Location:

Date Collected: 11/09/18 07:30
Date Received: 11/12/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Bromodichloromethane	ND	0.200	--	ND	1.34	--		1
1,4-Dioxane	ND	0.200	--	ND	0.721	--		1
Trichloroethene	ND	0.200	--	ND	1.07	--		1
2,2,4-Trimethylpentane	ND	0.200	--	ND	0.934	--		1
Methyl Methacrylate	ND	0.500	--	ND	2.05	--		1
Heptane	ND	0.200	--	ND	0.820	--		1
cis-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
1,1,2-Trichloroethane	ND	0.200	--	ND	1.09	--		1
Toluene	ND	0.200	--	ND	0.754	--		1
1,3-Dichloropropane	ND	0.200	--	ND	0.924	--		1
2-Hexanone	ND	0.200	--	ND	0.820	--		1
Dibromochloromethane	ND	0.200	--	ND	1.70	--		1
1,2-Dibromoethane	ND	0.200	--	ND	1.54	--		1
Butyl acetate	ND	0.500	--	ND	2.38	--		1
Octane	ND	0.200	--	ND	0.934	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1
1,1,1,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
Chlorobenzene	ND	0.200	--	ND	0.921	--		1
Ethylbenzene	ND	0.200	--	ND	0.869	--		1
p/m-Xylene	ND	0.400	--	ND	1.74	--		1
Bromoform	ND	0.200	--	ND	2.07	--		1
Styrene	ND	0.200	--	ND	0.852	--		1
1,1,2,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
o-Xylene	ND	0.200	--	ND	0.869	--		1
1,2,3-Trichloropropane	ND	0.200	--	ND	1.21	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1846293
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1846293-02
Client ID: CAN 2168 SHELF 17
Sample Location:

Date Collected: 11/09/18 07:30
Date Received: 11/12/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Nonane	ND	0.200	--	ND	1.05	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
Bromobenzene	ND	0.200	--	ND	0.793	--		1
2-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
n-Propylbenzene	ND	0.200	--	ND	0.983	--		1
4-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
4-Ethyltoluene	ND	0.200	--	ND	0.983	--		1
1,3,5-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
tert-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
Decane	ND	0.200	--	ND	1.16	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
1,4-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2-Dibromo-3-chloropropane	ND	0.200	--	ND	1.93	--		1
Undecane	ND	0.200	--	ND	1.28	--		1
Dodecane	ND	0.200	--	ND	1.39	--		1
1,2,4-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Naphthalene	ND	0.200	--	ND	1.05	--		1
1,2,3-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Hexachlorobutadiene	ND	0.200	--	ND	2.13	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1846293
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1846293-02
Client ID: CAN 2168 SHELF 17
Sample Location:

Date Collected: 11/09/18 07:30
Date Received: 11/12/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								

	Results	Qualifier	Units	RDL	Dilution Factor
Tentatively Identified Compounds					
Ethene, chlorotrifluoro-	1.4	NJ	ppbV		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-Difluorobenzene	79		60-140
Bromochloromethane	88		60-140
chlorobenzene-d5	93		60-140

Project Name: BATCH CANISTER CERTIFICATION **Lab Number:** L1846293

Project Number: CANISTER QC BAT **Report Date:** 01/02/19

Air Canister Certification Results

Lab ID: L1846293-02
Client ID: CAN 2168 SHELF 17
Sample Location:

Date Collected: 11/09/18 07:30
Date Received: 11/12/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 11/12/18 18:56
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air by SIM - Mansfield Lab								
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.050	--	ND	0.349	--		1
Vinyl chloride	ND	0.020	--	ND	0.051	--		1
1,3-Butadiene	ND	0.020	--	ND	0.044	--		1
Bromomethane	ND	0.020	--	ND	0.078	--		1
Chloroethane	ND	0.100	--	ND	0.264	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Trichlorofluoromethane	ND	0.050	--	ND	0.281	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
1,1-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
Freon-113	0.085	0.050	--	0.651	0.383	--		1
trans-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
1,1-Dichloroethane	ND	0.020	--	ND	0.081	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Chloroform	ND	0.020	--	ND	0.098	--		1
1,2-Dichloroethane	ND	0.020	--	ND	0.081	--		1
1,1,1-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Benzene	ND	0.100	--	ND	0.319	--		1
Carbon tetrachloride	ND	0.020	--	ND	0.126	--		1
1,2-Dichloropropane	ND	0.020	--	ND	0.092	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1846293
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1846293-02
Client ID: CAN 2168 SHELF 17
Sample Location:

Date Collected: 11/09/18 07:30
Date Received: 11/12/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
Bromodichloromethane	ND	0.020	--	ND	0.134	--		1
1,4-Dioxane	ND	0.100	--	ND	0.360	--		1
Trichloroethene	ND	0.020	--	ND	0.107	--		1
cis-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
1,1,2-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Toluene	ND	0.050	--	ND	0.188	--		1
Dibromochloromethane	ND	0.020	--	ND	0.170	--		1
1,2-Dibromoethane	ND	0.020	--	ND	0.154	--		1
Tetrachloroethene	ND	0.020	--	ND	0.136	--		1
1,1,1,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
Chlorobenzene	ND	0.100	--	ND	0.461	--		1
Ethylbenzene	ND	0.020	--	ND	0.087	--		1
p/m-Xylene	ND	0.040	--	ND	0.174	--		1
Bromoform	ND	0.020	--	ND	0.207	--		1
Styrene	ND	0.020	--	ND	0.085	--		1
1,1,2,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
o-Xylene	ND	0.020	--	ND	0.087	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
4-Ethyltoluene	ND	0.020	--	ND	0.098	--		1
1,3,5-Trimethybenzene	ND	0.020	--	ND	0.098	--		1
1,2,4-Trimethylbenzene	ND	0.020	--	ND	0.098	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
1,4-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1846293
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1846293-02
Client ID: CAN 2168 SHELF 17
Sample Location:

Date Collected: 11/09/18 07:30
Date Received: 11/12/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Naphthalene	ND	0.050	--	ND	0.262	--		1
1,2,3-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Hexachlorobutadiene	ND	0.050	--	ND	0.533	--		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	79		60-140
bromochloromethane	93		60-140
chlorobenzene-d5	80		60-140

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1848624
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1848624-02
Client ID: CAN 803 SHELF 15
Sample Location:

Date Collected: 11/28/18 16:00
Date Received: 11/29/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 11/29/18 10:15
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Chlorodifluoromethane	ND	0.200	--	ND	0.707	--		1
Propylene	ND	0.500	--	ND	0.861	--		1
Propane	ND	0.500	--	ND	0.902	--		1
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.200	--	ND	1.40	--		1
Methanol	ND	5.00	--	ND	6.55	--		1
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,3-Butadiene	ND	0.200	--	ND	0.442	--		1
Butane	ND	0.200	--	ND	0.475	--		1
Bromomethane	ND	0.200	--	ND	0.777	--		1
Chloroethane	ND	0.200	--	ND	0.528	--		1
Ethanol	ND	5.00	--	ND	9.42	--		1
Dichlorofluoromethane	ND	0.200	--	ND	0.842	--		1
Vinyl bromide	ND	0.200	--	ND	0.874	--		1
Acrolein	ND	0.500	--	ND	1.15	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Acetonitrile	ND	0.200	--	ND	0.336	--		1
Trichlorofluoromethane	ND	0.200	--	ND	1.12	--		1
Isopropanol	ND	0.500	--	ND	1.23	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
Pentane	ND	0.200	--	ND	0.590	--		1
Ethyl ether	ND	0.200	--	ND	0.606	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1848624
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1848624-02
Client ID: CAN 803 SHELF 15
Sample Location:

Date Collected: 11/28/18 16:00
Date Received: 11/29/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Tertiary butyl Alcohol	ND	0.500	--	ND	1.52	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
3-Chloropropene	ND	0.200	--	ND	0.626	--		1
Carbon disulfide	ND	0.200	--	ND	0.623	--		1
Freon-113	ND	0.200	--	ND	1.53	--		1
trans-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
1,1-Dichloroethane	ND	0.200	--	ND	0.809	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
Vinyl acetate	ND	1.00	--	ND	3.52	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
Ethyl Acetate	ND	0.500	--	ND	1.80	--		1
Chloroform	ND	0.200	--	ND	0.977	--		1
Tetrahydrofuran	ND	0.500	--	ND	1.47	--		1
2,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
1,2-Dichloroethane	ND	0.200	--	ND	0.809	--		1
n-Hexane	ND	0.200	--	ND	0.705	--		1
Diisopropyl ether	ND	0.200	--	ND	0.836	--		1
tert-Butyl Ethyl Ether	ND	0.200	--	ND	0.836	--		1
1,1,1-Trichloroethane	ND	0.200	--	ND	1.09	--		1
1,1-Dichloropropene	ND	0.200	--	ND	0.908	--		1
Benzene	ND	0.200	--	ND	0.639	--		1
Carbon tetrachloride	ND	0.200	--	ND	1.26	--		1
Cyclohexane	ND	0.200	--	ND	0.688	--		1
tert-Amyl Methyl Ether	ND	0.200	--	ND	0.836	--		1
Dibromomethane	ND	0.200	--	ND	1.42	--		1
1,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1

Project Name: BATCH CANISTER CERTIFICATION **Lab Number:** L1848624

Project Number: CANISTER QC BAT **Report Date:** 01/02/19

Air Canister Certification Results

Lab ID: L1848624-02
Client ID: CAN 803 SHELF 15
Sample Location:

Date Collected: 11/28/18 16:00
Date Received: 11/29/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Bromodichloromethane	ND	0.200	--	ND	1.34	--		1
1,4-Dioxane	ND	0.200	--	ND	0.721	--		1
Trichloroethene	ND	0.200	--	ND	1.07	--		1
2,2,4-Trimethylpentane	ND	0.200	--	ND	0.934	--		1
Methyl Methacrylate	ND	0.500	--	ND	2.05	--		1
Heptane	ND	0.200	--	ND	0.820	--		1
cis-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
1,1,2-Trichloroethane	ND	0.200	--	ND	1.09	--		1
Toluene	ND	0.200	--	ND	0.754	--		1
1,3-Dichloropropane	ND	0.200	--	ND	0.924	--		1
2-Hexanone	ND	0.200	--	ND	0.820	--		1
Dibromochloromethane	ND	0.200	--	ND	1.70	--		1
1,2-Dibromoethane	ND	0.200	--	ND	1.54	--		1
Butyl acetate	ND	0.500	--	ND	2.38	--		1
Octane	ND	0.200	--	ND	0.934	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1
1,1,1,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
Chlorobenzene	ND	0.200	--	ND	0.921	--		1
Ethylbenzene	ND	0.200	--	ND	0.869	--		1
p/m-Xylene	ND	0.400	--	ND	1.74	--		1
Bromoform	ND	0.200	--	ND	2.07	--		1
Styrene	ND	0.200	--	ND	0.852	--		1
1,1,2,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
o-Xylene	ND	0.200	--	ND	0.869	--		1
1,2,3-Trichloropropane	ND	0.200	--	ND	1.21	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1848624
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1848624-02
Client ID: CAN 803 SHELF 15
Sample Location:

Date Collected: 11/28/18 16:00
Date Received: 11/29/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Nonane	ND	0.200	--	ND	1.05	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
Bromobenzene	ND	0.200	--	ND	0.793	--		1
2-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
n-Propylbenzene	ND	0.200	--	ND	0.983	--		1
4-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
4-Ethyltoluene	ND	0.200	--	ND	0.983	--		1
1,3,5-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
tert-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
Decane	ND	0.200	--	ND	1.16	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
1,4-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2-Dibromo-3-chloropropane	ND	0.200	--	ND	1.93	--		1
Undecane	ND	0.200	--	ND	1.28	--		1
Dodecane	ND	0.200	--	ND	1.39	--		1
1,2,4-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Naphthalene	ND	0.200	--	ND	1.05	--		1
1,2,3-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Hexachlorobutadiene	ND	0.200	--	ND	2.13	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1848624
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1848624-02
Client ID: CAN 803 SHELF 15
Sample Location:

Date Collected: 11/28/18 16:00
Date Received: 11/29/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								

	Results	Qualifier	Units	RDL	Dilution Factor
Tentatively Identified Compounds					

No Tentatively Identified Compounds

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-Difluorobenzene	70		60-140
Bromochloromethane	80		60-140
chlorobenzene-d5	73		60-140

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1848624
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1848624-02
Client ID: CAN 803 SHELF 15
Sample Location:

Date Collected: 11/28/18 16:00
Date Received: 11/29/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 11/29/18 10:15
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air by SIM - Mansfield Lab								
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.050	--	ND	0.349	--		1
Vinyl chloride	ND	0.020	--	ND	0.051	--		1
1,3-Butadiene	ND	0.020	--	ND	0.044	--		1
Bromomethane	ND	0.020	--	ND	0.078	--		1
Chloroethane	ND	0.100	--	ND	0.264	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Trichlorofluoromethane	ND	0.050	--	ND	0.281	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
1,1-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
Freon-113	ND	0.050	--	ND	0.383	--		1
trans-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
1,1-Dichloroethane	ND	0.020	--	ND	0.081	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Chloroform	ND	0.020	--	ND	0.098	--		1
1,2-Dichloroethane	ND	0.020	--	ND	0.081	--		1
1,1,1-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Benzene	ND	0.100	--	ND	0.319	--		1
Carbon tetrachloride	ND	0.020	--	ND	0.126	--		1
1,2-Dichloropropane	ND	0.020	--	ND	0.092	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1848624
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1848624-02
Client ID: CAN 803 SHELF 15
Sample Location:

Date Collected: 11/28/18 16:00
Date Received: 11/29/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
Bromodichloromethane	ND	0.020	--	ND	0.134	--		1
1,4-Dioxane	ND	0.100	--	ND	0.360	--		1
Trichloroethene	ND	0.020	--	ND	0.107	--		1
cis-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
1,1,2-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Toluene	ND	0.050	--	ND	0.188	--		1
Dibromochloromethane	ND	0.020	--	ND	0.170	--		1
1,2-Dibromoethane	ND	0.020	--	ND	0.154	--		1
Tetrachloroethene	ND	0.020	--	ND	0.136	--		1
1,1,1,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
Chlorobenzene	ND	0.100	--	ND	0.461	--		1
Ethylbenzene	ND	0.020	--	ND	0.087	--		1
p/m-Xylene	ND	0.040	--	ND	0.174	--		1
Bromoform	ND	0.020	--	ND	0.207	--		1
Styrene	ND	0.020	--	ND	0.085	--		1
1,1,2,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
o-Xylene	ND	0.020	--	ND	0.087	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
4-Ethyltoluene	ND	0.020	--	ND	0.098	--		1
1,3,5-Trimethybenzene	ND	0.020	--	ND	0.098	--		1
1,2,4-Trimethylbenzene	ND	0.020	--	ND	0.098	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
1,4-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1848624
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1848624-02
Client ID: CAN 803 SHELF 15
Sample Location:

Date Collected: 11/28/18 16:00
Date Received: 11/29/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Naphthalene	ND	0.050	--	ND	0.262	--		1
1,2,3-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Hexachlorobutadiene	ND	0.050	--	ND	0.533	--		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	72		60-140
bromochloromethane	80		60-140
chlorobenzene-d5	76		60-140

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1849046
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849046-02
Client ID: CAN 681 SHLEF 16
Sample Location:

Date Collected: 11/30/18 09:00
Date Received: 11/30/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 11/30/18 20:28
Analyst: RY

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Chlorodifluoromethane	ND	0.200	--	ND	0.707	--		1
Propylene	ND	0.500	--	ND	0.861	--		1
Propane	ND	0.500	--	ND	0.902	--		1
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.200	--	ND	1.40	--		1
Methanol	ND	5.00	--	ND	6.55	--		1
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,3-Butadiene	ND	0.200	--	ND	0.442	--		1
Butane	ND	0.200	--	ND	0.475	--		1
Bromomethane	ND	0.200	--	ND	0.777	--		1
Chloroethane	ND	0.200	--	ND	0.528	--		1
Ethanol	ND	5.00	--	ND	9.42	--		1
Dichlorofluoromethane	ND	0.200	--	ND	0.842	--		1
Vinyl bromide	ND	0.200	--	ND	0.874	--		1
Acrolein	ND	0.500	--	ND	1.15	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Acetonitrile	ND	0.200	--	ND	0.336	--		1
Trichlorofluoromethane	ND	0.200	--	ND	1.12	--		1
Isopropanol	ND	0.500	--	ND	1.23	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
Pentane	ND	0.200	--	ND	0.590	--		1
Ethyl ether	ND	0.200	--	ND	0.606	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1849046
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849046-02
Client ID: CAN 681 SHLEF 16
Sample Location:

Date Collected: 11/30/18 09:00
Date Received: 11/30/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Tertiary butyl Alcohol	ND	0.500	--	ND	1.52	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
3-Chloropropene	ND	0.200	--	ND	0.626	--		1
Carbon disulfide	ND	0.200	--	ND	0.623	--		1
Freon-113	ND	0.200	--	ND	1.53	--		1
trans-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
1,1-Dichloroethane	ND	0.200	--	ND	0.809	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
Vinyl acetate	ND	1.00	--	ND	3.52	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
Ethyl Acetate	ND	0.500	--	ND	1.80	--		1
Chloroform	ND	0.200	--	ND	0.977	--		1
Tetrahydrofuran	ND	0.500	--	ND	1.47	--		1
2,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
1,2-Dichloroethane	ND	0.200	--	ND	0.809	--		1
n-Hexane	ND	0.200	--	ND	0.705	--		1
Diisopropyl ether	ND	0.200	--	ND	0.836	--		1
tert-Butyl Ethyl Ether	ND	0.200	--	ND	0.836	--		1
1,1,1-Trichloroethane	ND	0.200	--	ND	1.09	--		1
1,1-Dichloropropene	ND	0.200	--	ND	0.908	--		1
Benzene	ND	0.200	--	ND	0.639	--		1
Carbon tetrachloride	ND	0.200	--	ND	1.26	--		1
Cyclohexane	ND	0.200	--	ND	0.688	--		1
tert-Amyl Methyl Ether	ND	0.200	--	ND	0.836	--		1
Dibromomethane	ND	0.200	--	ND	1.42	--		1
1,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1849046
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849046-02
Client ID: CAN 681 SHLEF 16
Sample Location:

Date Collected: 11/30/18 09:00
Date Received: 11/30/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Bromodichloromethane	ND	0.200	--	ND	1.34	--		1
1,4-Dioxane	ND	0.200	--	ND	0.721	--		1
Trichloroethene	ND	0.200	--	ND	1.07	--		1
2,2,4-Trimethylpentane	ND	0.200	--	ND	0.934	--		1
Methyl Methacrylate	ND	0.500	--	ND	2.05	--		1
Heptane	ND	0.200	--	ND	0.820	--		1
cis-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
1,1,2-Trichloroethane	ND	0.200	--	ND	1.09	--		1
Toluene	ND	0.200	--	ND	0.754	--		1
1,3-Dichloropropane	ND	0.200	--	ND	0.924	--		1
2-Hexanone	ND	0.200	--	ND	0.820	--		1
Dibromochloromethane	ND	0.200	--	ND	1.70	--		1
1,2-Dibromoethane	ND	0.200	--	ND	1.54	--		1
Butyl acetate	ND	0.500	--	ND	2.38	--		1
Octane	ND	0.200	--	ND	0.934	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1
1,1,1,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
Chlorobenzene	ND	0.200	--	ND	0.921	--		1
Ethylbenzene	ND	0.200	--	ND	0.869	--		1
p/m-Xylene	ND	0.400	--	ND	1.74	--		1
Bromoform	ND	0.200	--	ND	2.07	--		1
Styrene	ND	0.200	--	ND	0.852	--		1
1,1,2,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
o-Xylene	ND	0.200	--	ND	0.869	--		1
1,2,3-Trichloropropane	ND	0.200	--	ND	1.21	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1849046
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849046-02
Client ID: CAN 681 SHLEF 16
Sample Location:

Date Collected: 11/30/18 09:00
Date Received: 11/30/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Nonane	ND	0.200	--	ND	1.05	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
Bromobenzene	ND	0.200	--	ND	0.793	--		1
2-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
n-Propylbenzene	ND	0.200	--	ND	0.983	--		1
4-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
4-Ethyltoluene	ND	0.200	--	ND	0.983	--		1
1,3,5-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
tert-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
Decane	ND	0.200	--	ND	1.16	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
1,4-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2-Dibromo-3-chloropropane	ND	0.200	--	ND	1.93	--		1
Undecane	ND	0.200	--	ND	1.28	--		1
Dodecane	ND	0.200	--	ND	1.39	--		1
1,2,4-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Naphthalene	ND	0.200	--	ND	1.05	--		1
1,2,3-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Hexachlorobutadiene	ND	0.200	--	ND	2.13	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1849046
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849046-02
Client ID: CAN 681 SHLEF 16
Sample Location:

Date Collected: 11/30/18 09:00
Date Received: 11/30/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								

	Results	Qualifier	Units	RDL	Dilution Factor
Tentatively Identified Compounds					

No Tentatively Identified Compounds

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-Difluorobenzene	92		60-140
Bromochloromethane	95		60-140
chlorobenzene-d5	93		60-140

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1849046
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849046-02
Client ID: CAN 681 SHLEF 16
Sample Location:

Date Collected: 11/30/18 09:00
Date Received: 11/30/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 11/30/18 20:28
Analyst: RY

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air by SIM - Mansfield Lab								
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.050	--	ND	0.349	--		1
Vinyl chloride	ND	0.020	--	ND	0.051	--		1
1,3-Butadiene	ND	0.020	--	ND	0.044	--		1
Bromomethane	ND	0.020	--	ND	0.078	--		1
Chloroethane	ND	0.100	--	ND	0.264	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Trichlorofluoromethane	ND	0.050	--	ND	0.281	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
1,1-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
Freon-113	ND	0.050	--	ND	0.383	--		1
trans-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
1,1-Dichloroethane	ND	0.020	--	ND	0.081	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Chloroform	ND	0.020	--	ND	0.098	--		1
1,2-Dichloroethane	ND	0.020	--	ND	0.081	--		1
1,1,1-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Benzene	ND	0.100	--	ND	0.319	--		1
Carbon tetrachloride	ND	0.020	--	ND	0.126	--		1
1,2-Dichloropropane	ND	0.020	--	ND	0.092	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1849046
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849046-02
Client ID: CAN 681 SHLEF 16
Sample Location:

Date Collected: 11/30/18 09:00
Date Received: 11/30/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
Bromodichloromethane	ND	0.020	--	ND	0.134	--		1
1,4-Dioxane	ND	0.100	--	ND	0.360	--		1
Trichloroethene	ND	0.020	--	ND	0.107	--		1
cis-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
1,1,2-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Toluene	ND	0.050	--	ND	0.188	--		1
Dibromochloromethane	ND	0.020	--	ND	0.170	--		1
1,2-Dibromoethane	ND	0.020	--	ND	0.154	--		1
Tetrachloroethene	ND	0.020	--	ND	0.136	--		1
1,1,1,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
Chlorobenzene	ND	0.100	--	ND	0.461	--		1
Ethylbenzene	ND	0.020	--	ND	0.087	--		1
p/m-Xylene	ND	0.040	--	ND	0.174	--		1
Bromoform	ND	0.020	--	ND	0.207	--		1
Styrene	ND	0.020	--	ND	0.085	--		1
1,1,2,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
o-Xylene	ND	0.020	--	ND	0.087	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
4-Ethyltoluene	ND	0.020	--	ND	0.098	--		1
1,3,5-Trimethybenzene	ND	0.020	--	ND	0.098	--		1
1,2,4-Trimethylbenzene	ND	0.020	--	ND	0.098	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
1,4-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1849046
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849046-02
Client ID: CAN 681 SHLEF 16
Sample Location:

Date Collected: 11/30/18 09:00
Date Received: 11/30/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Naphthalene	ND	0.050	--	ND	0.262	--		1
1,2,3-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Hexachlorobutadiene	ND	0.050	--	ND	0.533	--		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	93		60-140
bromochloromethane	95		60-140
chlorobenzene-d5	94		60-140

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1849158
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849158-02
Client ID: CAN 1918 SHELF 15
Sample Location:

Date Collected: 11/29/18 16:00
Date Received: 12/01/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 12/01/18 18:19
Analyst: EW

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Chlorodifluoromethane	ND	0.200	--	ND	0.707	--		1
Propylene	ND	0.500	--	ND	0.861	--		1
Propane	ND	0.500	--	ND	0.902	--		1
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.200	--	ND	1.40	--		1
Methanol	ND	5.00	--	ND	6.55	--		1
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,3-Butadiene	ND	0.200	--	ND	0.442	--		1
Butane	ND	0.200	--	ND	0.475	--		1
Bromomethane	ND	0.200	--	ND	0.777	--		1
Chloroethane	ND	0.200	--	ND	0.528	--		1
Ethanol	ND	5.00	--	ND	9.42	--		1
Dichlorofluoromethane	ND	0.200	--	ND	0.842	--		1
Vinyl bromide	ND	0.200	--	ND	0.874	--		1
Acrolein	ND	0.500	--	ND	1.15	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Acetonitrile	ND	0.200	--	ND	0.336	--		1
Trichlorofluoromethane	ND	0.200	--	ND	1.12	--		1
Isopropanol	ND	0.500	--	ND	1.23	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
Pentane	ND	0.200	--	ND	0.590	--		1
Ethyl ether	ND	0.200	--	ND	0.606	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1849158
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849158-02
Client ID: CAN 1918 SHELF 15
Sample Location:

Date Collected: 11/29/18 16:00
Date Received: 12/01/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Tertiary butyl Alcohol	ND	0.500	--	ND	1.52	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
3-Chloropropene	ND	0.200	--	ND	0.626	--		1
Carbon disulfide	ND	0.200	--	ND	0.623	--		1
Freon-113	ND	0.200	--	ND	1.53	--		1
trans-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
1,1-Dichloroethane	ND	0.200	--	ND	0.809	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
Vinyl acetate	ND	1.00	--	ND	3.52	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
Ethyl Acetate	ND	0.500	--	ND	1.80	--		1
Chloroform	ND	0.200	--	ND	0.977	--		1
Tetrahydrofuran	ND	0.500	--	ND	1.47	--		1
2,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
1,2-Dichloroethane	ND	0.200	--	ND	0.809	--		1
n-Hexane	ND	0.200	--	ND	0.705	--		1
Diisopropyl ether	ND	0.200	--	ND	0.836	--		1
tert-Butyl Ethyl Ether	ND	0.200	--	ND	0.836	--		1
1,1,1-Trichloroethane	ND	0.200	--	ND	1.09	--		1
1,1-Dichloropropene	ND	0.200	--	ND	0.908	--		1
Benzene	ND	0.200	--	ND	0.639	--		1
Carbon tetrachloride	ND	0.200	--	ND	1.26	--		1
Cyclohexane	ND	0.200	--	ND	0.688	--		1
tert-Amyl Methyl Ether	ND	0.200	--	ND	0.836	--		1
Dibromomethane	ND	0.200	--	ND	1.42	--		1
1,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1

Project Name: BATCH CANISTER CERTIFICATION **Lab Number:** L1849158

Project Number: CANISTER QC BAT **Report Date:** 01/02/19

Air Canister Certification Results

Lab ID: L1849158-02
Client ID: CAN 1918 SHELF 15
Sample Location:

Date Collected: 11/29/18 16:00
Date Received: 12/01/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Bromodichloromethane	ND	0.200	--	ND	1.34	--		1
1,4-Dioxane	ND	0.200	--	ND	0.721	--		1
Trichloroethene	ND	0.200	--	ND	1.07	--		1
2,2,4-Trimethylpentane	ND	0.200	--	ND	0.934	--		1
Methyl Methacrylate	ND	0.500	--	ND	2.05	--		1
Heptane	ND	0.200	--	ND	0.820	--		1
cis-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
1,1,2-Trichloroethane	ND	0.200	--	ND	1.09	--		1
Toluene	ND	0.200	--	ND	0.754	--		1
1,3-Dichloropropane	ND	0.200	--	ND	0.924	--		1
2-Hexanone	ND	0.200	--	ND	0.820	--		1
Dibromochloromethane	ND	0.200	--	ND	1.70	--		1
1,2-Dibromoethane	ND	0.200	--	ND	1.54	--		1
Butyl acetate	ND	0.500	--	ND	2.38	--		1
Octane	ND	0.200	--	ND	0.934	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1
1,1,1,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
Chlorobenzene	ND	0.200	--	ND	0.921	--		1
Ethylbenzene	ND	0.200	--	ND	0.869	--		1
p/m-Xylene	ND	0.400	--	ND	1.74	--		1
Bromoform	ND	0.200	--	ND	2.07	--		1
Styrene	ND	0.200	--	ND	0.852	--		1
1,1,2,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
o-Xylene	ND	0.200	--	ND	0.869	--		1
1,2,3-Trichloropropane	ND	0.200	--	ND	1.21	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1849158
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849158-02
Client ID: CAN 1918 SHELF 15
Sample Location:

Date Collected: 11/29/18 16:00
Date Received: 12/01/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Nonane	ND	0.200	--	ND	1.05	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
Bromobenzene	ND	0.200	--	ND	0.793	--		1
2-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
n-Propylbenzene	ND	0.200	--	ND	0.983	--		1
4-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
4-Ethyltoluene	ND	0.200	--	ND	0.983	--		1
1,3,5-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
tert-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
Decane	ND	0.200	--	ND	1.16	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
1,4-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2-Dibromo-3-chloropropane	ND	0.200	--	ND	1.93	--		1
Undecane	ND	0.200	--	ND	1.28	--		1
Dodecane	ND	0.200	--	ND	1.39	--		1
1,2,4-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Naphthalene	ND	0.200	--	ND	1.05	--		1
1,2,3-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Hexachlorobutadiene	ND	0.200	--	ND	2.13	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1849158
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849158-02
Client ID: CAN 1918 SHELF 15
Sample Location:

Date Collected: 11/29/18 16:00
Date Received: 12/01/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								

	Results	Qualifier	Units	RDL	Dilution Factor
Tentatively Identified Compounds					

No Tentatively Identified Compounds

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-Difluorobenzene	95		60-140
Bromochloromethane	97		60-140
chlorobenzene-d5	94		60-140

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1849158
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849158-02
Client ID: CAN 1918 SHELF 15
Sample Location:

Date Collected: 11/29/18 16:00
Date Received: 12/01/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 12/01/18 18:19
Analyst: EW

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air by SIM - Mansfield Lab								
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.050	--	ND	0.349	--		1
Vinyl chloride	ND	0.020	--	ND	0.051	--		1
1,3-Butadiene	ND	0.020	--	ND	0.044	--		1
Bromomethane	ND	0.020	--	ND	0.078	--		1
Chloroethane	ND	0.100	--	ND	0.264	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Trichlorofluoromethane	ND	0.050	--	ND	0.281	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
1,1-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
Freon-113	ND	0.050	--	ND	0.383	--		1
trans-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
1,1-Dichloroethane	ND	0.020	--	ND	0.081	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Chloroform	ND	0.020	--	ND	0.098	--		1
1,2-Dichloroethane	ND	0.020	--	ND	0.081	--		1
1,1,1-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Benzene	ND	0.100	--	ND	0.319	--		1
Carbon tetrachloride	ND	0.020	--	ND	0.126	--		1
1,2-Dichloropropane	ND	0.020	--	ND	0.092	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1849158
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849158-02
Client ID: CAN 1918 SHELF 15
Sample Location:

Date Collected: 11/29/18 16:00
Date Received: 12/01/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
Bromodichloromethane	ND	0.020	--	ND	0.134	--		1
1,4-Dioxane	ND	0.100	--	ND	0.360	--		1
Trichloroethene	ND	0.020	--	ND	0.107	--		1
cis-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
1,1,2-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Toluene	ND	0.050	--	ND	0.188	--		1
Dibromochloromethane	ND	0.020	--	ND	0.170	--		1
1,2-Dibromoethane	ND	0.020	--	ND	0.154	--		1
Tetrachloroethene	ND	0.020	--	ND	0.136	--		1
1,1,1,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
Chlorobenzene	ND	0.100	--	ND	0.461	--		1
Ethylbenzene	ND	0.020	--	ND	0.087	--		1
p/m-Xylene	ND	0.040	--	ND	0.174	--		1
Bromoform	ND	0.020	--	ND	0.207	--		1
Styrene	ND	0.020	--	ND	0.085	--		1
1,1,2,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
o-Xylene	ND	0.020	--	ND	0.087	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
4-Ethyltoluene	ND	0.020	--	ND	0.098	--		1
1,3,5-Trimethybenzene	ND	0.020	--	ND	0.098	--		1
1,2,4-Trimethylbenzene	ND	0.020	--	ND	0.098	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
1,4-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1849158
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849158-02
Client ID: CAN 1918 SHELF 15
Sample Location:

Date Collected: 11/29/18 16:00
Date Received: 12/01/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Naphthalene	ND	0.050	--	ND	0.262	--		1
1,2,3-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Hexachlorobutadiene	ND	0.050	--	ND	0.533	--		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	97		60-140
bromochloromethane	99		60-140
chlorobenzene-d5	97		60-140

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1849179
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849179-02
Client ID: CAN 855 SHELF 8
Sample Location:

Date Collected: 12/01/18 16:00
Date Received: 12/03/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 12/03/18 16:41
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Chlorodifluoromethane	ND	0.200	--	ND	0.707	--		1
Propylene	ND	0.500	--	ND	0.861	--		1
Propane	ND	0.500	--	ND	0.902	--		1
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.200	--	ND	1.40	--		1
Methanol	ND	5.00	--	ND	6.55	--		1
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,3-Butadiene	ND	0.200	--	ND	0.442	--		1
Butane	ND	0.200	--	ND	0.475	--		1
Bromomethane	ND	0.200	--	ND	0.777	--		1
Chloroethane	ND	0.200	--	ND	0.528	--		1
Ethanol	ND	5.00	--	ND	9.42	--		1
Dichlorofluoromethane	ND	0.200	--	ND	0.842	--		1
Vinyl bromide	ND	0.200	--	ND	0.874	--		1
Acrolein	ND	0.500	--	ND	1.15	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Acetonitrile	ND	0.200	--	ND	0.336	--		1
Trichlorofluoromethane	ND	0.200	--	ND	1.12	--		1
Isopropanol	ND	0.500	--	ND	1.23	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
Pentane	ND	0.200	--	ND	0.590	--		1
Ethyl ether	ND	0.200	--	ND	0.606	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1849179
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849179-02
Client ID: CAN 855 SHELF 8
Sample Location:

Date Collected: 12/01/18 16:00
Date Received: 12/03/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Tertiary butyl Alcohol	ND	0.500	--	ND	1.52	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
3-Chloropropene	ND	0.200	--	ND	0.626	--		1
Carbon disulfide	ND	0.200	--	ND	0.623	--		1
Freon-113	ND	0.200	--	ND	1.53	--		1
trans-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
1,1-Dichloroethane	ND	0.200	--	ND	0.809	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
Vinyl acetate	ND	1.00	--	ND	3.52	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
Ethyl Acetate	ND	0.500	--	ND	1.80	--		1
Chloroform	ND	0.200	--	ND	0.977	--		1
Tetrahydrofuran	ND	0.500	--	ND	1.47	--		1
2,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
1,2-Dichloroethane	ND	0.200	--	ND	0.809	--		1
n-Hexane	ND	0.200	--	ND	0.705	--		1
Diisopropyl ether	ND	0.200	--	ND	0.836	--		1
tert-Butyl Ethyl Ether	ND	0.200	--	ND	0.836	--		1
1,1,1-Trichloroethane	ND	0.200	--	ND	1.09	--		1
1,1-Dichloropropene	ND	0.200	--	ND	0.908	--		1
Benzene	ND	0.200	--	ND	0.639	--		1
Carbon tetrachloride	ND	0.200	--	ND	1.26	--		1
Cyclohexane	ND	0.200	--	ND	0.688	--		1
tert-Amyl Methyl Ether	ND	0.200	--	ND	0.836	--		1
Dibromomethane	ND	0.200	--	ND	1.42	--		1
1,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1849179
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849179-02
Client ID: CAN 855 SHELF 8
Sample Location:

Date Collected: 12/01/18 16:00
Date Received: 12/03/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Bromodichloromethane	ND	0.200	--	ND	1.34	--		1
1,4-Dioxane	ND	0.200	--	ND	0.721	--		1
Trichloroethene	ND	0.200	--	ND	1.07	--		1
2,2,4-Trimethylpentane	ND	0.200	--	ND	0.934	--		1
Methyl Methacrylate	ND	0.500	--	ND	2.05	--		1
Heptane	ND	0.200	--	ND	0.820	--		1
cis-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
1,1,2-Trichloroethane	ND	0.200	--	ND	1.09	--		1
Toluene	ND	0.200	--	ND	0.754	--		1
1,3-Dichloropropane	ND	0.200	--	ND	0.924	--		1
2-Hexanone	ND	0.200	--	ND	0.820	--		1
Dibromochloromethane	ND	0.200	--	ND	1.70	--		1
1,2-Dibromoethane	ND	0.200	--	ND	1.54	--		1
Butyl acetate	ND	0.500	--	ND	2.38	--		1
Octane	ND	0.200	--	ND	0.934	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1
1,1,1,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
Chlorobenzene	ND	0.200	--	ND	0.921	--		1
Ethylbenzene	ND	0.200	--	ND	0.869	--		1
p/m-Xylene	ND	0.400	--	ND	1.74	--		1
Bromoform	ND	0.200	--	ND	2.07	--		1
Styrene	ND	0.200	--	ND	0.852	--		1
1,1,2,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
o-Xylene	ND	0.200	--	ND	0.869	--		1
1,2,3-Trichloropropane	ND	0.200	--	ND	1.21	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1849179
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849179-02
Client ID: CAN 855 SHELF 8
Sample Location:

Date Collected: 12/01/18 16:00
Date Received: 12/03/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Nonane	ND	0.200	--	ND	1.05	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
Bromobenzene	ND	0.200	--	ND	0.793	--		1
2-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
n-Propylbenzene	ND	0.200	--	ND	0.983	--		1
4-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
4-Ethyltoluene	ND	0.200	--	ND	0.983	--		1
1,3,5-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
tert-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
Decane	ND	0.200	--	ND	1.16	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
1,4-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2-Dibromo-3-chloropropane	ND	0.200	--	ND	1.93	--		1
Undecane	ND	0.200	--	ND	1.28	--		1
Dodecane	ND	0.200	--	ND	1.39	--		1
1,2,4-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Naphthalene	ND	0.200	--	ND	1.05	--		1
1,2,3-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Hexachlorobutadiene	ND	0.200	--	ND	2.13	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1849179
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849179-02
Client ID: CAN 855 SHELF 8
Sample Location:

Date Collected: 12/01/18 16:00
Date Received: 12/03/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								

	Results	Qualifier	Units	RDL	Dilution Factor
Tentatively Identified Compounds					

No Tentatively Identified Compounds

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-Difluorobenzene	93		60-140
Bromochloromethane	95		60-140
chlorobenzene-d5	92		60-140

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1849179
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849179-02
Client ID: CAN 855 SHELF 8
Sample Location:

Date Collected: 12/01/18 16:00
Date Received: 12/03/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 12/03/18 16:41
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air by SIM - Mansfield Lab								
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.050	--	ND	0.349	--		1
Vinyl chloride	ND	0.020	--	ND	0.051	--		1
1,3-Butadiene	ND	0.020	--	ND	0.044	--		1
Bromomethane	ND	0.020	--	ND	0.078	--		1
Chloroethane	ND	0.100	--	ND	0.264	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Trichlorofluoromethane	ND	0.050	--	ND	0.281	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
1,1-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
Freon-113	ND	0.050	--	ND	0.383	--		1
trans-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
1,1-Dichloroethane	ND	0.020	--	ND	0.081	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Chloroform	ND	0.020	--	ND	0.098	--		1
1,2-Dichloroethane	ND	0.020	--	ND	0.081	--		1
1,1,1-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Benzene	ND	0.100	--	ND	0.319	--		1
Carbon tetrachloride	ND	0.020	--	ND	0.126	--		1
1,2-Dichloropropane	ND	0.020	--	ND	0.092	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1849179
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849179-02
Client ID: CAN 855 SHELF 8
Sample Location:

Date Collected: 12/01/18 16:00
Date Received: 12/03/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
Bromodichloromethane	ND	0.020	--	ND	0.134	--		1
1,4-Dioxane	ND	0.100	--	ND	0.360	--		1
Trichloroethene	ND	0.020	--	ND	0.107	--		1
cis-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
1,1,2-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Toluene	ND	0.050	--	ND	0.188	--		1
Dibromochloromethane	ND	0.020	--	ND	0.170	--		1
1,2-Dibromoethane	ND	0.020	--	ND	0.154	--		1
Tetrachloroethene	ND	0.020	--	ND	0.136	--		1
1,1,1,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
Chlorobenzene	ND	0.100	--	ND	0.461	--		1
Ethylbenzene	ND	0.020	--	ND	0.087	--		1
p/m-Xylene	ND	0.040	--	ND	0.174	--		1
Bromoform	ND	0.020	--	ND	0.207	--		1
Styrene	ND	0.020	--	ND	0.085	--		1
1,1,2,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
o-Xylene	ND	0.020	--	ND	0.087	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
4-Ethyltoluene	ND	0.020	--	ND	0.098	--		1
1,3,5-Trimethybenzene	ND	0.020	--	ND	0.098	--		1
1,2,4-Trimethylbenzene	ND	0.020	--	ND	0.098	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
1,4-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1849179
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849179-02
Client ID: CAN 855 SHELF 8
Sample Location:

Date Collected: 12/01/18 16:00
Date Received: 12/03/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Naphthalene	ND	0.050	--	ND	0.262	--		1
1,2,3-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Hexachlorobutadiene	ND	0.050	--	ND	0.533	--		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	94		60-140
bromochloromethane	100		60-140
chlorobenzene-d5	95		60-140

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1849355
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849355-02
Client ID: CAN 872 SHELF 11
Sample Location:

Date Collected: 12/03/18 16:00
Date Received: 12/04/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 12/04/18 17:12
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air - Mansfield Lab								
Chlorodifluoromethane	ND	0.200	--	ND	0.707	--		1
Propylene	ND	0.500	--	ND	0.861	--		1
Propane	ND	0.500	--	ND	0.902	--		1
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.200	--	ND	1.40	--		1
Methanol	ND	5.00	--	ND	6.55	--		1
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,3-Butadiene	ND	0.200	--	ND	0.442	--		1
Butane	ND	0.200	--	ND	0.475	--		1
Bromomethane	ND	0.200	--	ND	0.777	--		1
Chloroethane	ND	0.200	--	ND	0.528	--		1
Ethanol	ND	5.00	--	ND	9.42	--		1
Dichlorofluoromethane	ND	0.200	--	ND	0.842	--		1
Vinyl bromide	ND	0.200	--	ND	0.874	--		1
Acrolein	ND	0.500	--	ND	1.15	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Acetonitrile	ND	0.200	--	ND	0.336	--		1
Trichlorofluoromethane	ND	0.200	--	ND	1.12	--		1
Isopropanol	ND	0.500	--	ND	1.23	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
Pentane	ND	0.200	--	ND	0.590	--		1
Ethyl ether	ND	0.200	--	ND	0.606	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1849355
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849355-02
Client ID: CAN 872 SHELF 11
Sample Location:

Date Collected: 12/03/18 16:00
Date Received: 12/04/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Tertiary butyl Alcohol	ND	0.500	--	ND	1.52	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
3-Chloropropene	ND	0.200	--	ND	0.626	--		1
Carbon disulfide	ND	0.200	--	ND	0.623	--		1
Freon-113	ND	0.200	--	ND	1.53	--		1
trans-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
1,1-Dichloroethane	ND	0.200	--	ND	0.809	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
Vinyl acetate	ND	1.00	--	ND	3.52	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
Ethyl Acetate	ND	0.500	--	ND	1.80	--		1
Chloroform	ND	0.200	--	ND	0.977	--		1
Tetrahydrofuran	ND	0.500	--	ND	1.47	--		1
2,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
1,2-Dichloroethane	ND	0.200	--	ND	0.809	--		1
n-Hexane	ND	0.200	--	ND	0.705	--		1
Diisopropyl ether	ND	0.200	--	ND	0.836	--		1
tert-Butyl Ethyl Ether	ND	0.200	--	ND	0.836	--		1
1,1,1-Trichloroethane	ND	0.200	--	ND	1.09	--		1
1,1-Dichloropropene	ND	0.200	--	ND	0.908	--		1
Benzene	ND	0.200	--	ND	0.639	--		1
Carbon tetrachloride	ND	0.200	--	ND	1.26	--		1
Cyclohexane	ND	0.200	--	ND	0.688	--		1
tert-Amyl Methyl Ether	ND	0.200	--	ND	0.836	--		1
Dibromomethane	ND	0.200	--	ND	1.42	--		1
1,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1849355
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849355-02
Client ID: CAN 872 SHELF 11
Sample Location:

Date Collected: 12/03/18 16:00
Date Received: 12/04/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Bromodichloromethane	ND	0.200	--	ND	1.34	--		1
1,4-Dioxane	ND	0.200	--	ND	0.721	--		1
Trichloroethene	ND	0.200	--	ND	1.07	--		1
2,2,4-Trimethylpentane	ND	0.200	--	ND	0.934	--		1
Methyl Methacrylate	ND	0.500	--	ND	2.05	--		1
Heptane	ND	0.200	--	ND	0.820	--		1
cis-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
1,1,2-Trichloroethane	ND	0.200	--	ND	1.09	--		1
Toluene	ND	0.200	--	ND	0.754	--		1
1,3-Dichloropropane	ND	0.200	--	ND	0.924	--		1
2-Hexanone	ND	0.200	--	ND	0.820	--		1
Dibromochloromethane	ND	0.200	--	ND	1.70	--		1
1,2-Dibromoethane	ND	0.200	--	ND	1.54	--		1
Butyl acetate	ND	0.500	--	ND	2.38	--		1
Octane	ND	0.200	--	ND	0.934	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1
1,1,1,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
Chlorobenzene	ND	0.200	--	ND	0.921	--		1
Ethylbenzene	ND	0.200	--	ND	0.869	--		1
p/m-Xylene	ND	0.400	--	ND	1.74	--		1
Bromoform	ND	0.200	--	ND	2.07	--		1
Styrene	ND	0.200	--	ND	0.852	--		1
1,1,2,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
o-Xylene	ND	0.200	--	ND	0.869	--		1
1,2,3-Trichloropropane	ND	0.200	--	ND	1.21	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1849355
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849355-02
Client ID: CAN 872 SHELF 11
Sample Location:

Date Collected: 12/03/18 16:00
Date Received: 12/04/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								
Nonane	ND	0.200	--	ND	1.05	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
Bromobenzene	ND	0.200	--	ND	0.793	--		1
2-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
n-Propylbenzene	ND	0.200	--	ND	0.983	--		1
4-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
4-Ethyltoluene	ND	0.200	--	ND	0.983	--		1
1,3,5-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
tert-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
Decane	ND	0.200	--	ND	1.16	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
1,4-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2-Dibromo-3-chloropropane	ND	0.200	--	ND	1.93	--		1
Undecane	ND	0.200	--	ND	1.28	--		1
Dodecane	ND	0.200	--	ND	1.39	--		1
1,2,4-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Naphthalene	ND	0.200	--	ND	1.05	--		1
1,2,3-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Hexachlorobutadiene	ND	0.200	--	ND	2.13	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1849355
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849355-02
Client ID: CAN 872 SHELF 11
Sample Location:

Date Collected: 12/03/18 16:00
Date Received: 12/04/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air - Mansfield Lab								

	Results	Qualifier	Units	RDL	Dilution Factor
Tentatively Identified Compounds					

No Tentatively Identified Compounds

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-Difluorobenzene	93		60-140
Bromochloromethane	96		60-140
chlorobenzene-d5	95		60-140

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1849355
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849355-02
Client ID: CAN 872 SHELF 11
Sample Location:

Date Collected: 12/03/18 16:00
Date Received: 12/04/18
Field Prep: Not Specified

Sample Depth:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 12/04/18 17:12
Analyst: MB

	ppbV			ug/m3				
Parameter	**Results**	**RL**	**MDL**	**Results**	**RL**	**MDL**	**Qualifier**	**Dilution Factor**
Volatile Organics in Air by SIM - Mansfield Lab								
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.050	--	ND	0.349	--		1
Vinyl chloride	ND	0.020	--	ND	0.051	--		1
1,3-Butadiene	ND	0.020	--	ND	0.044	--		1
Bromomethane	ND	0.020	--	ND	0.078	--		1
Chloroethane	ND	0.100	--	ND	0.264	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Trichlorofluoromethane	ND	0.050	--	ND	0.281	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
1,1-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
Freon-113	ND	0.050	--	ND	0.383	--		1
trans-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
1,1-Dichloroethane	ND	0.020	--	ND	0.081	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Chloroform	ND	0.020	--	ND	0.098	--		1
1,2-Dichloroethane	ND	0.020	--	ND	0.081	--		1
1,1,1-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Benzene	ND	0.100	--	ND	0.319	--		1
Carbon tetrachloride	ND	0.020	--	ND	0.126	--		1
1,2-Dichloropropane	ND	0.020	--	ND	0.092	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT

Lab Number: L1849355
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849355-02
Client ID: CAN 872 SHELF 11
Sample Location:

Date Collected: 12/03/18 16:00
Date Received: 12/04/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
Bromodichloromethane	ND	0.020	--	ND	0.134	--		1
1,4-Dioxane	ND	0.100	--	ND	0.360	--		1
Trichloroethene	ND	0.020	--	ND	0.107	--		1
cis-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
1,1,2-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Toluene	ND	0.050	--	ND	0.188	--		1
Dibromochloromethane	ND	0.020	--	ND	0.170	--		1
1,2-Dibromoethane	ND	0.020	--	ND	0.154	--		1
Tetrachloroethene	ND	0.020	--	ND	0.136	--		1
1,1,1,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
Chlorobenzene	ND	0.100	--	ND	0.461	--		1
Ethylbenzene	ND	0.020	--	ND	0.087	--		1
p/m-Xylene	ND	0.040	--	ND	0.174	--		1
Bromoform	ND	0.020	--	ND	0.207	--		1
Styrene	ND	0.020	--	ND	0.085	--		1
1,1,2,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
o-Xylene	ND	0.020	--	ND	0.087	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
4-Ethyltoluene	ND	0.020	--	ND	0.098	--		1
1,3,5-Trimethybenzene	ND	0.020	--	ND	0.098	--		1
1,2,4-Trimethylbenzene	ND	0.020	--	ND	0.098	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
1,4-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1

Project Name: BATCH CANISTER CERTIFICATION
Project Number: CANISTER QC BAT
Lab Number: L1849355
Report Date: 01/02/19

Air Canister Certification Results

Lab ID: L1849355-02
Client ID: CAN 872 SHELF 11
Sample Location:

Date Collected: 12/03/18 16:00
Date Received: 12/04/18
Field Prep: Not Specified

Sample Depth:

Parameter	ppbV Results	ppbV RL	ppbV MDL	ug/m3 Results	ug/m3 RL	ug/m3 MDL	Qualifier	Dilution Factor
Volatile Organics in Air by SIM - Mansfield Lab								
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Naphthalene	ND	0.050	--	ND	0.262	--		1
1,2,3-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Hexachlorobutadiene	ND	0.050	--	ND	0.533	--		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	94		60-140
bromochloromethane	95		60-140
chlorobenzene-d5	96		60-140

Project Name: ESSEX/HOPE
Project Number: 703765CH.01.03

Lab Number: L1851659
Report Date: 01/02/19

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
N/A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1851659-01A	Canister - 1 Liter	N/A	NA			Y	Absent		TO15-LL(30)
L1851659-02A	Canister - 1 Liter	N/A	NA			Y	Absent		TO15-LL(30)
L1851659-03A	Canister - 1 Liter	N/A	NA			Y	Absent		TO15-LL(30)
L1851659-04A	Canister - 1 Liter	N/A	NA			Y	Absent		TO15-LL(30)
L1851659-05A	Canister - 1 Liter	N/A	NA			Y	Absent		TO15-LL(30)
L1851659-06A	Canister - 1 Liter	N/A	NA			Y	Absent		TO15-LL(30)
L1851659-07A	Canister - 1 Liter	N/A	NA			Y	Absent		TO15-LL(30)
L1851659-08A	Canister - 1 Liter	N/A	NA			Y	Absent		TO15-LL(30)
L1851659-09A	Canister - 1 Liter	N/A	NA			Y	Absent		TO15-LL(30)
L1851659-10A	Canister - 1 Liter	N/A	NA			Y	Absent		TO15-LL(30)
L1851659-11A	Canister - 1 Liter	N/A	NA			Y	Absent		TO15-LL(30)
L1851659-12A	Canister - 1 Liter	N/A	NA			Y	Absent		TO15-LL(30)
L1851659-13A	Canister - 1 Liter	N/A	NA			Y	Absent		TO15-LL(30)
L1851659-14A	Canister - 1 Liter	N/A	NA			Y	Absent		TO15-LL(30)
L1851659-15A	Canister - 1 Liter	N/A	NA			Y	Absent		TO15-LL(30)
L1851659-16A	Canister - 1 Liter	N/A	NA			Y	Absent		TO15-LL(30)
L1851659-17A	Canister - 1 Liter	N/A	NA			Y	Absent		TO15-LL(30)
L1851659-18A	Canister - 1 Liter	N/A	NA			Y	Absent		TO15-LL(30)

*Values in parentheses indicate holding time in days

Project Name:	ESSEX/HOPE	**Lab Number:**	L1851659
Project Number:	703765CH.01.03	**Report Date:**	01/02/19

GLOSSARY

Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample¿s toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

1	- The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Report Format: Data Usability Report

Project Name:	ESSEX/HOPE	**Lab Number:**	L1851659
Project Number:	703765CH.01.03	**Report Date:**	01/02/19

Data Qualifiers

A - Spectra identified as "Aldol Condensation Product".

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

ND - Not detected at the reporting limit (RL) for the sample.

Report Format: Data Usability Report

REFERENCES

48 Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air. Second Edition. EPA/625/R-96/010b, January 1999.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.

EPA 6860: SCM: Perchlorate

SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

AIR ANALYSIS

PAGE 1 OF 2

CHAIN OF CUSTODY

ALPHA ANALYTICAL
320 Forbes Blvd, Mansfield, MA 02048
TEL: 508-822-9300 FAX: 508-822-3288

Date Rec'd in Lab: 12/14/18

ALPHA Job #: L1851659

Client Information

Client: Jacobs / CH2M
Address: 18 Tremont Street
Boston, MA 02108
Phone: 617-963-3129
Fax:
Email: Kyle.Block@Jacobs.com

☐ These samples have been previously analyzed by Alpha

Project Information

Project Name: Essex - Hope
Project Location: Jamestown, NY
Project #: 703765CH.01.03
Project Manager: Kyle Block
ALPHA Quote #:

Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved)
14-Day
Date Due: Time:

Report Information - Data Deliverables

☐ FAX
☐ ADEx
Criteria Checker:
(Default based on Regulatory Criteria Indicated)
Other Formats:
☐ EMAIL (standard pdf report)
☐ Additional Deliverables:
Report to: (if different than Project Manager)

Billing Information

☐ Same as Client info PO #:
See PO

Regulatory Requirements/Report Limits

State/Fed	Program	Res / Comm

Other Project Specific Requirements/Comments:

Project-Specific Target Compound List: ☐

All Columns Below Must Be Filled Out

ALPHA Lab ID (Lab Use Only)	Sample ID	COLLECTION End Date	Start Time	End Time	Initial Vacuum	Final Vacuum	Sample Matrix*	Sampler's Initials	Can Size	I D Can	I D - Flow Controller	TO-15	TO-15 SIM	APH Subset Non-petroleum HCs ☐	Fixed Gases	Sulfides & Mercaptans by TO-15	Sample Comments (i.e. PID)
51659.01	SV-01_20181211	12/11/18	1724	1734	-29.20	-3.81	SV	AS	1L	2396	0211	X					
.02	SV-02_20181211	12/11/18	1600	1605	-28.46	-2.61	SV	AS	1L	803	0146	X					
.03	SV-03_20181211	12/11/18	1518	1522	-28.59	-3.56	SV	AS	1L	683	0314	X					
.04	SV-04_20181212	12/12/18	0928	0933	-28.68	-2.99	SV	AS	1L	567	0355	X					
.05	SV-05_20181212	12/12/18	1054	1059	-29.98	-2.55	SV	AS	1L	872	0756	X					
.06	SV-06_20181212	12/12/18	1004	1007	-28.83	-2.30	SV	AS	1L	2089	0126	X					
.07	SV-07_20181212	12/12/18	1311	1321	-29.31	-3.35	SV	AS	1L	1163	0594	X					
.08	SV-07_20181212-FD	12/12/18	1311	1321	-29.08	-3.41	SV	AS	1L	2406	0594	X					
.09	SV-08_20181212	12/12/18	1432	1437	-29.07	-2.36	SV	AS	1L	2168	01010	X					
.10	SV-09_20181212	12/12/18	1354	1359	-29.00	-2.27	SV	AS	1L	855	0377	X					

*SAMPLE MATRIX CODES
AA = Ambient Air (Indoor/Outdoor)
SV = Soil Vapor/Landfill Gas/SVE
Other = Please Specify

Container Type

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

Relinquished By:	Date/Time	Received By:	Date/Time:
AAL	12/13/18 1410	AAL	12/13/18 @ 1410
	12/13/18 1620		12/13/18 1620
	12/14/18 0620		12/14/18 0630

AIR ANALYSIS

PAGE 2 OF 2

CHAIN OF CUSTODY

320 Forbes Blvd, Mansfield, MA 02048
TEL: 508-822-9300 FAX: 508-822-3288

Date Rec'd in Lab: 12/14/18

ALPHA Job #: L1851659

Client Information

Client: Jacobs / CH2M
Address: 18 Tremont Street
Boston, MA 02108
Phone: 617-963-3129
Fax:
Email: Kyle.Block@Jacobs.com
☐ These samples have been previously analyzed by Alpha

Project Information

Project Name: Essex - Hope
Project Location: Jamestown, NY
Project #: 703765CH.01.03
Project Manager: Kyle Block
ALPHA Quote #:

Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved!)
14-Day
Date Due: Time:

Report Information - Data Deliverables

☐ FAX
☐ ADEx
Criteria Checker:
(Default based on Regulatory Criteria Indicated)
Other Formats:
☐ EMAIL (standard pdf report)
☐ Additional Deliverables:
Report to: (if different than Project Manager)

Billing Information

☐ Same as Client info PO #:
See PO

Regulatory Requirements/Report Limits

State/Fed	Program	Res / Comm

Other Project Specific Requirements/Comments:

Project-Specific Target Compound List: ☐

All Columns Below Must Be Filled Out

ALPHA Lab ID (Lab Use Only)	Sample ID	COLLECTION End Date	Start Time	End Time	Initial Vacuum	Final Vacuum	Sample Matrix*	Sampler's Initials	Can Size	ID Can	ID - Flow Controller	TO-15	TO-15 SIM	APH (Subtract Non-petroleum HCs ☐)	Fixed Gases	Sulfides & Mercaptans by TO-15	Sample Comments (i.e. PID)
51659.11	SV-10_20181213	12/13/18	1209	1217	-28.95	-3.22	SV	AS	1L	702	~~675~~ 0546	X					
.12	SV-10_20181213-FD	12/13/18	1209	1217	-28.85	-3.14	SV	AS	1L	675	0546	X					
.13	SV-11_20181212	12/12/18	1508	1513	-28.94	-1.64	SV	AS	1L	418	0677	X					
.14	SV-12_20181212	12/12/18	1545	1550	-28.79	-2.07	SV	AS	1L	681	0934	X					
.15	SV-13_20181212	12/12/18	1628	1633	-29.00	-2.39	SV	AS	1L	886	0378	X					
.16	SV-14_20181213	12/13/18	1026	1031	-29.00	-1.77	SV	AS	1L	1914	0224	X					
.17	SV-15_20181213	12/13/18	1132	1137	-29.02	-3.29	SV	AS	1L	2404	0407	X					
.18	SV-16_20181213	12/13/18	1059	1104	-29.00	-2.47	SV	AS	1L	2467	0123	X					

*SAMPLE MATRIX CODES

AA = Ambient Air (Indoor/Outdoor)
SV = Soil Vapor/Landfill Gas/SVE
Other = Please Specify

Container Type

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

Relinquished By:	Date/Time	Received By:	Date/Time:
AAL	12/13/18 1410	AAL	12/13/18 @1410
	12/13/18/1620		12/13/18 1620
	12/14/18 0620		12/14/18 0620

Appendix F
Notification Letters

The Dow Chemical Company
P.O. Box 8361
South Charleston, WV 25303-8361
USA

January 18, 2019

Mr. Barry Harris
H & H Metal Specialty, Inc.
153 Hopkins Avenue
Jamestown, New York 14701

Subject: Results of the Soil Vapor Intrusion Evaluation Conducted at 153 Hopkins Avenue

Dear Mr. Harris:

This letter has been prepared to provide the results of the soil vapor intrusion (SVI) evaluation performed on November 14, 2018, at 153 Hopkins Avenue. Additional soil vapor samples necessary to perform a SVI pathway assessment were collected between December 11 and 13, 2018 along the adjacent streets. The work was performed in association with ongoing investigations related to the Essex-Hope Superfund Site (Site ID No. 907015). This evaluation was performed with cooperation from the New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH).

The sub-slab vapor sampling data were reviewed for accuracy, and validation of these results was completed on January 14, 2019. The results from samples collected from 153 Hopkins Avenue are included in Table 1 and the locations of the samples collected are provided on Figure 1. The results were screened against NYSDOH sub-slab vapor concentration criteria (which do not account for the differences between residences and commercial buildings) to determine if further action is needed. Results were also compared against calculated U.S. Environmental Protection Agency (EPA) commercial sub-slab vapor intrusion screening levels (VISLs). Certain chemicals were detected in sub-slab soil vapor at the property. This letter is being provided in accordance with NYSDEC Law Article 27-2405 to provide timely notification. These results are being further evaluated to determine if additional actions are necessary.

Results and Evaluation

Sub-slab soil vapor samples were collected within the H & H Metal Specialty, Inc. facility in November 2018 following the completion of building surveys conducted in April 2018. The surveys attempted to inventory chemicals present in the sampling areas that have the potential to affect air sample results. A summary of volatile organic compounds (VOCs) detected in the November 2018 sub-slab soil vapor samples is presented in Table 1; the sampling locations are identified on Figure 1.

Detected VOC concentrations in sub-slab vapor soil are evaluated against the following criteria (see Table 1):

1. Calculated EPA commercial VISLs (EPA, 2018).
2. NYSDOH sub-slab vapor concentrations criteria per *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (NYSDOH, 2006). A copy of the NYSDOH soil vapor/indoor air decision matrices is included in Attachment 1. Note that indoor air data are required to determine if any further action is needed per the NYSDOH decision matrices.

Comparison to EPA VISLs and NYSDOH Air Guideline Values

Seven sub-slab locations were sampled within the H & H Metal Specialty, Inc. facility as shown on Figure 1, with the respective results listed in Table 1. At the time of sampling, the facility was vacant. Cis-1,2-dichloroethene (cis-1,2-DCE), trichloroethene (TCE), and tetrachloroethene (PCE) were detected at concentrations greater than the most conservative NYSDOH and/or EPA soil vapor screening criteria in various samples. Only two sub-slab soil vapor sample results (HH-06 and HH-07) are in exceedance of both

the NYSDOH and calculated EPA soil vapor screening criteria for TCE. No other substances were detected. Additional information on the chemicals of concern detected at the property is presented in Attachment 1.

Summary and Conclusions

Investigation activities conducted in November and December 2018 identified TCE, cis-1,2-DCE, and PCE in sub-slab soil vapor at concentrations greater than NYSDOH and/or calculated EPA soil vapor screening criteria. A comprehensive SVI pathway assessment is currently being performed and will be presented to NYSDEC and NYSDOH. We will inform you of any potential additional sampling efforts required to complete the SVI study at your facility.

We appreciate your cooperation for the duration of this project. If you would like to discuss these results, please contact me at 304.747.3763.

Sincerely,

Tim King
Authorized Representative

Enclosures
Table 1 – Detected Concentrations of Volatile Organic Compounds in Sub-slab Soil Vapor
Figure 1 – Soil Vapor Intrusion Investigation Locations
Attachment 1 – NYSDOH Fact Sheets and Information

References

New York State Department of Health (NYSDOH). 2006. *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*. October. Updated May 2017.

U.S. Environmental Protection Agency (EPA). 2013. *Office of Solid Waste and Emergency Response (OSWER) Final Guidance for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Sources to Indoor Air*. External Review Draft. April 11.

U.S. Environmental Protection Agency (EPA). 2018. VISL Calculator for Commercial Sub-slab Vapor Intrusion Screening Level. November. https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-level-calculator.

Table

TABLE 1
Detected Concentrations of Volatile Organic Compounds in Sub-slab Soil Vapor
153 Hopkins Avenue

LOCATION						HH-01-20181115		HH-02-20181115		HH-03-20181115		HH-04-20181115		HH-04-20181115-FD		HH-05-20181115		HH-06-20181115		HH-07-20181115	
SAMPLING DATE						11/15/2018		11/15/2018		11/15/2018		11/15/2018		11/15/2018		11/15/2018		11/15/2018		11/15/2018	
SCREENING CRITERIA	NY-SSC-A	NY-SSC-B	NY-SSC-C	USEPA VISL	Units	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual
Volatile Organic Compounds (VOCs)																					
Vinyl chloride	--	--	6	93	µg/m^3	1.14	U	1.12	U	1.1	U	1.24	U	1.23	U	1.15	U	2.28	U	1.08	U
1,1-Dichloroethene	6	--	--	29,000	µg/m^3	1.77	U	1.73	U	1.71	U	1.93	U	1.9	U	1.78	U	3.53	U	1.68	U
trans-1,2-Dichloroethene	--	--	--	NA	µg/m^3	1.77	U	1.73	U	1.71	U	1.93	U	1.9	U	1.78	U	3.53	U	1.68	U
cis-1,2-Dichloroethene	6	--	--	NA	µg/m^3	**11.8**		**6.9**		**7.33**		**4.96**		**4.64**		**2.2**		**26**		**6.98**	
Trichloroethene	6	--	--	100	µg/m^3	**33**		**16.7**		**23.1**		**14.5**		**14**		**17**		**1320**		**473**	
Tetrachloroethene	--	100	--	1,600	µg/m^3	**24.4**		**43.5**		2.93	U	**102**		**101**		**31.3**		**9.9**		**4.58**	

Notes:
µg/m^3 = micrograms per cubic meter
FD = Field Duplicate Sample
U = Not detected at the reported detection limit for the sample.
NY-SSC-A: NYSDOH Matrix A Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, updated May 2017.
NY-SSC-B: NYSDOH Matrix B Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, updated May 2017.
NY-SSC-C: NYSDOH Matrix C Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, updated May 2017.
EPA VISL: Calculated EPA Commercial Sub-slab Vapor Intrusion Screening Level, November, 2018 (TCR = 1x10-6 ; Q=1) available at https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-level-calculator
Bold results indicate detection of chemical above the detection limit
Exceeds NY-SSC
Exceeds EPA Sub-slab Vapor Intrusion Screening Level

Figure

Sanitary Sewer Location

Storm Sewer Location

Soil Vapor Sample Location

Subslab Vapor Sample Location

Sanitary/Storm Sewer

Approximate Site Boundary

Parcels

Access to Rollform was Denied and therefore sampling has not been proposed at this time

Chadakoin River

Notes:
1. Yellow highlighted cells: Exceeds NY-SSC, but indoor air data is required to determine if any further action is needed per the matrix.
2. Red text within cells: Exceeds USEPA Sub-slab Vapor Intrusion Screening Level

N

BASE MAP SOURCE:

0 25 50 100

Scale in Feet

Essex Specialty Products, Inc	Essex/Hope Site, Jamestown, New York

FIGURE 1
Soil Vapor Intrusion Investigation Locations
Off-site Vapor Intrusion Investigation Work Plan

CREATED BY: LA	JACOBS
REVIEWED BY: AS	

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Attachment 1
NYSDOH Fact Sheets and Information

Bureau of Toxic Substance Assessment
New York State Department of Health
August 2015

IMPORTANT INFORMATION ON TRICHLOROETHENE (TCE) IN INDOOR AND OUTDOOR AIR[1]

Trichloroethene (TCE)

Trichloroethene (also known as trichloroethylene or TCE) is a human-made chemical. It is volatile, meaning it readily evaporates at room temperature into the air, where you can sometimes smell it. It is used as a solvent to remove grease from metal, a paint stripper, an adhesive solvent, an ingredient in paints and varnishes, and in the manufacture of other chemicals and products (for example, furniture and electric/electronic equipment).

Exposure to TCE

People may be exposed to TCE in air, water, and food, or when TCE or material containing TCE (for example, soil) gets on the skin. For most people, almost all TCE exposure is from indoor air.

Sources of TCE in Air

TCE may get into indoor air when TCE-containing products (for example, glues, adhesives, paint removers, spot removers, and metal cleaners) are used. Another source could be evaporation from contaminated well water that is used for household purposes. TCE may enter homes through soil vapor intrusion, which occurs when TCE evaporates from contaminated groundwater, enters soil vapor (air spaces between soil particles), and migrates through cracks or other openings in the foundation and into the building. TCE gets into outdoor air when it is released from industrial facilities and when it evaporates from areas where chemical wastes are stored or disposed.

Levels Typically Found in Air

The background indoor air levels of TCE in homes and office buildings not near known environmental sources of TCE are almost always 1 microgram per cubic meter of air (1 mcg/m^3) or less. Background outdoor air levels also are almost always 1 mcg/m3 or less.

Health Risks Associated with Exposure to TCE

Most people, if exposed to TCE, are exposed to air levels much lower than those known to cause health effects in humans (for example, workplace air levels 90,000 to 800,000 mcg/m^3). TCE exposure can cause effects on the central nervous system, liver, kidneys, and immune system of humans. TCE exposure is

[1] For a more technical discussion of this information, see the fact sheet "Trichloroethene (TCE) In Indoor and Outdoor Air" available at http://www.health.ny.gov/environmental/chemicals/trichloroethene/.

associated with reproductive effects in men and women, and may affect fetal development during pregnancy. However, the studies suggest, but do not prove, that the reproductive and developmental effects were caused by TCE, and not by some other factor. The United States Environmental Protection Agency (USEPA) classifies TCE as a chemical that causes cancer in humans by all routes of exposure. Whether a person experiences a health effect depends on how much of the chemical he or she is exposed to, how often the exposure occurs, and how long the exposures last. Individual characteristics such as age, health, lifestyle, and genetics also play a role.

The New York State Department of Health (NYSDOH) Guideline for TCE in Air

NYSDOH recommends that TCE levels in air not exceed 2 mcg/m^3. This replaces the previous guideline of 5 mcg/m^3. The guideline was set at an air level that is lower than levels known to cause, or suspected of causing, health effects in humans, including sensitive populations (for example, children, pregnant women) and animals. The guideline is based on the assumption that people are continuously exposed to TCE in air all day, every day for months or as long as a lifetime. Continuous exposure is rarely true for most people, who, if exposed, are more likely to be exposed for a part of the day, part of a week, or part of their lifetime.

The guideline is used to help guide decisions regarding the urgency of efforts to reduce TCE exposure. At TCE air levels above the guideline, the higher the level, the greater the urgency to take action to reduce exposure. But as with any chemical in indoor air, the NYSDOH always recommends taking action to reduce exposure when the air concentration of a chemical is above background, even if it is below the guideline.

Indoor air concentrations substantially above the guideline clearly indicate a significant TCE source and the need for action to reduce exposure. In particular, NYSDOH has concerns about exposure during pregnancy, particularly during the first trimester, to air concentrations higher than 20 mcg/m^3 because the major steps of heart development occur during this period and TCE may be a risk factor for fetal heart defects in humans. Thus, NYSDOH recommends taking immediate and effective action to reduce exposure when an air concentration is equal to, or above 20 mcg/m^3. In all cases, the specific recommended action depends on a case-by-case evaluation of the situation.

Concerns about Exposure to TCE

Most people, if exposed to TCE, are exposed to air levels much lower than those known to cause health effects in humans. However, if you are concerned that you, your children, or others have been exposed to TCE, discuss your symptoms/signs with your health care provider. There are special tests to measure TCE and related chemicals in your blood, breath, or urine, and your health care provider can compare the results to those of people without known exposure to TCE or to workers with high exposure to TCE.

Questions

If you have any questions about the information in this fact sheet, would like to know more about TCE, or are concerned that you may be exposed to elevated levels of TCE, please call the New York State Department of Health at 1-518-402-7800 or 1-800-458-1158, send an e-mail to btsa@health.ny.gov, or write to the following address.

New York State Department of Health
Bureau of Toxic Substance Assessment
Corning Tower, Room 1743
Empire State Plaza,
Albany, NY 12237

TETRACHLOROETHENE (PERC) IN INDOOR AND OUTDOOR AIR

SEPTEMBER 2013 FACT SHEET

This fact sheet answers questions about a chemical called tetrachloroethene (PERC), which is widely used to dry-clean clothes. It provides information on health effects seen in humans exposed to PERC in air. It also provides information about the New York State Department of Health's new guideline of 30 micrograms of PERC per cubic meter of air (30 mcg/m^3) or 0.03 milligrams of PERC per cubic meter of air (0.03 mg/m^3). The fact sheet focuses on the health risks from air exposures because most of the PERC released into the environment goes into air.

Prepared by

Bureau of Toxic Substance Assessment
New York State Department of Health

1. WHAT IS TETRACHLOROETHENE (PERC)?

Tetrachloroethene is a manufactured chemical that is widely used in the dry-cleaning of fabrics, including clothes. It is also used for degreasing metal parts and in manufacturing other chemicals. Tetrachloroethene is found in consumer products, including some paint and spot removers, water repellents, brake and wood cleaners, glues, and suede protectors. Other names for tetrachloroethene include PERC, tetrachloroethylene, perchloroethylene, and PCE. PERC is a commonly used name and will be used in the rest of the fact sheet.

PERC is a nonflammable, colorless liquid at room temperature. It readily evaporates into air and has an ether-like odor. Because most people stop noticing the odor of PERC in air after a short time, odor is not a reliable warning signal of PERC exposure.

2. HOW CAN I BE EXPOSED TO PERC?

People may be exposed to PERC in air, water, and food. Exposure can also occur when PERC or material containing PERC (for example, soil) gets on the skin. For most people, almost all exposure is from PERC in air.

PERC gets into outdoor and indoor air by evaporation from industrial or dry-cleaning operations and from areas where chemical wastes are stored or disposed. People living in homes located near these operations may be exposed to higher levels of PERC than the general population not living near such operations. Groundwater near these areas may become contaminated if PERC is improperly dumped or leaks into the ground. People may be exposed if they drink the contaminated water. They also may be exposed if PERC evaporates from contaminated drinking water into indoor air during cooking and washing. PERC may evaporate from contaminated groundwater and soil into the indoor air of buildings above the contaminated area. PERC also may evaporate from dry-cleaned clothes into indoor air or may get into indoor air after PERC-containing products, such as spot removers, are used. Indoor air PERC levels may get high if PERC-containing products are used in poorly ventilated areas.

3. HOW DOES PERC ENTER AND LEAVE MY BODY?

When people inhale air containing PERC, the PERC is taken into the body through the lungs and passed into the blood, which carries it to all parts of the body. A large fraction of this PERC is exhaled, unchanged, through the lungs into the air. Some of this PERC is stored in the body (for example, in fat, the liver, and the brain) and some is broken down in the liver to other compounds and eliminated in urine. PERC can also be found in breastmilk. Once exposure stops, most of the PERC and its breakdown products leave the body in several days. However, it may take several weeks for all of the PERC and its breakdown products to leave the body.

4. WHAT KINDS OF HEALTH EFFECTS CAN BE CAUSED BY EXPOSURE TO PERC IN AIR?

In humans, PERC may affect the central nervous system, the liver, kidneys, blood, immune system, and perhaps the reproductive system. The available data are insufficient to draw conclusions regarding effects of PERC exposure on development in infants and children.

For all health effects, the potential for an increased health risk depends on several factors, including the amount of exposure, the frequency of exposures, and the duration of the exposures. It also depends on the characteristics of the exposed person, such as age, sex, diet, family traits, lifestyle, genetic background, the presence of other chemicals in their body (e.g., alcohol, prescription drugs), and general state of health. Although difficult to quantify, these differences can affect how people will respond to a given exposure. This is known as sensitivity. Differences in sensitivity should be kept in mind when reading the following information on the human health effects of PERC.

Short-Term Exposure - Studies with volunteers show that exposure of eight hours or less to 700,000 micrograms per cubic meter of air (mcg/m^3) cause central nervous system symptoms such as dizziness, headache, sleepiness, lightheadedness, and poor balance. Exposure to 350,000 mcg/m^3 for four hours affected the nerves of the visual system and reduced scores on certain behavioral tests (which, for example, measure the speed and accuracy of a person's response to something they see on a computer screen). These effects were mild and disappeared soon after exposure ended.

Long-Term Exposure - Numerous studies of dry-cleaning workers indicate that long-term exposure (7 to 20 years, for example) to workplace air levels (41,000 mcg/m^3 to 120,000 mcg/m^3) caused reduced scores on neurobehavioral or color vision tests, increased levels of biochemical indicators of liver or kidney damage, reduced red blood cells, and blood and immune system effects [increased white blood cells and blood levels of a certain type of antibody (immunoglobulin E)]. The effects were mild and required special tests to be detected. It is not known how long these effects last.

The New York State Department of Health (NYSDOH, 2010) measured visual function [visual contrast sensitivity (VCS); color vision][1] in adults and children living in the apartments located in buildings with or without a dry-cleaner using PERC and also measured PERC indoor air levels. PERC levels were higher in the indoor air of apartments in buildings with dry-cleaners. Elevated indoor air PERC levels were associated with a slightly increased risk for children to have decreased VCS scores. The effect of PERC on VCS scores was most noticeable in a small group of children living in buildings with co-located dry cleaners using PERC. In those apartments, indoor air PERC levels ranged from 127 to 710 mcg/m^3, with a 50th percentile[2] (also known as the median) level of 340 mcg/m^3. For affected children (7 years mean duration of residency), the decrease was very small and occurred for only one eye in one of five tests. Mean VCS test scores were still within a normal range. Therefore, the risk for decreased VCS scores among affected children is considered to be small. Elevated indoor air PERC levels were not associated with effects on adult VCS scores, or with color vision of either children or adults. The observed associations between elevated indoor air PERC levels and children's VCS suggests that indoor air PERC levels in the range detected may have subtle effects on the brain.

A few epidemiological studies showed positive associations between workplace PERC exposure and reproductive effects (increased risk of spontaneous abortion, sperm disorders, and reduced fertility or delayed conception). Data on workplace air levels were not reported or were limited; however, workplace air levels during the times these studies were conducted were considerably higher than those typically found in indoor or outdoor air. These data suggest, but do not prove, that the reproductive effects were caused by PERC and not by some other factor or factors.

Lastly, epidemiological studies provide a pattern of evidence for a positive association between PERC exposure in the workplace and several types of cancer, specifically bladder cancer, non-Hodgkin lymphoma, and multiple myeloma. These associations were observed in studies with high quality assessments of the likelihood of PERC only exposures. However, data on PERC workplace air levels were not reported, but measurements from other studies indicate that workplace air levels during the times the workers were exposed were considerably higher than those typically found in indoor or outdoor air. Moreover, it is unlikely that the associations were dependent, totally or in part, on factors other than PERC exposures, such as common lifestyle factors as smoking or drinking alcohol. Data from more limited studies suggest that other types of cancer (esophageal, kidney, lung, liver, cervical, and breast cancer) are associated with PERC exposure. In laboratory studies, PERC caused cancer in rats and mice when they ingested or inhaled high doses almost daily for a lifetime. Based on human and animal data, the United States Environmental Protection Agency (USEPA) classifies PERC as “likely to be carcinogenic in humans by all routes of exposure.”

[1] VCS is a measure of a person's ability to distinguish the contrast between a viewed object and its background. It is easier to detect images of high contrast (e.g., a black cat on snow) than low contrast (e.g., a white cat on snow).

[2] Half the results are less than or equal to this value and half are above this value.

5. WHAT ARE BACKGROUND LEVELS FOR PERC IN OUTDOOR AND INDOOR AIR IN AREAS THAT ARE NOT NEAR A KNOWN ENVIRONMENTAL SOURCE OF PERC?

Various studies provide data on background levels of PERC in outdoor and indoor air. The New York State Department of Environmental Conservation collects data on outdoor air levels of air toxics under the Toxics Monitoring System (also known as Volatile Organics Network). The monitoring sites were selected to provide air quality data from the state's urban, industrial, residential, and rural areas. Based on 5882 samples collected across the state during 1999 to 2008, the 50th percentile (median) and 95th percentile[3] PERC levels were 0.41 mcg/m^3 and 4.8 mcg/m^3, respectively. NYSDOH (2005) conducted a study between 1997 and 2005 on the occurrence of volatile organic chemicals, including PERC, in the indoor and outdoor air of about 100 homes across the state (excluding New York City). Two outdoor samples were collected just outside each home for a total of 200 samples. The 50th percentile and 95th percentile PERC levels were less than 0.25 mcg/m^3 and 1.6 mcg/m^3, respectively. Finally, the 50th percentile and 95% percentile PERC levels in 587 outdoor air samples collected in 1999 - 2011 during the investigation of NYS remedial sites not known to have nor suspected to have sources of PERC were 0.52 mcg/m^3 and 2.6 mcg/m^3, respectively (NYSDOH, 2013b). Collectively, these three data sets, particularly given the low 95% percentile level in the large dataset from the Toxics Monitoring System, indicate that fewer than 5% of the background PERC levels in outdoor air are above 10 mcg/m^3.

The NYSDOH, the USEPA, and others have collected and analyzed information on PERC levels in indoor air. The table below contains the results from air samples collected inside of buildings that were not near known sources of PERC and other chemicals (for example, a home not known to be near a chemical spill, a hazardous waste site, a dry-cleaner, or a factory). The five studies that reported 90th percentile PERC air levels indicate that fewer than 10% of the background PERC levels in indoor air are above 10 mcg/m^3. In addition, the results for six of the eight studies that reported 95th percentiles and contained most of the samples indicate that fewer than 5% of the background PERC levels in indoor air are above 10 mcg/m^3. The other two studies (NYSDOH, 2009, 2013b; USEPA, 2001, 2013) indicate that fewer than 5% of the background indoor air levels are above 20 mcg/m^3.

[3] 95% of the results are less than or equal to this value.

Background Indoor Air Levels in US Buildings (1990-2013).

Study Description (and Sampling Years)	No. of Samples	Air Level Percentiles (mcg/m^3)			Reference
		50th (median)	90th [A]	95th	
Residential Buildings					
13 studies on residential properties (number NR[B]) in North America (1990-2005)	2312[C]	ND[D] - 2.2 (range)[E]	ND[D] - 7 (range)[E]	4.1 - 9.5 (range)[E]	USEPA (2011); also see Dawson & McAlary (2009)
screening study of households (284) in urban or non-urban areas of MN (1997)	284	1.4	NR[B]	4.9	Adgate et al. (2004)
subset of the screened households (101) in MN (1997)	101	1.3	NR[B]	5.2	
single family homes (about 100) heated with fuel oil from across NYS (excluding NYC) (1997-2003)	400	0.34	2.9	3.9	NYSDOH (2005, 2013a)[F]
households (about 100 each) in Elizabeth, NJ, Houston, TX, and Los Angeles, CA (1999-2001)	554	0.56	NR[B]	6.0	Weisel et al. (2005)
apartments (61) in NYC building **without** a co-located dry-cleaner (2001-2003)	61	2.2	8.5	19.09	NYSDOH (2009, 2013b)
Office Buildings					
public & commercial office buildings (70) in US (1994-1996)	209	1.5	9.3	18	USEPA (2001, 2013)
Mixed-Use Buildings					
buildings (number NR[B]) near NYS remedial sites not known nor suspected to have sources of PERC (1999-2011)	1625	0.72	2.8	6.6	NYSDOH (2013b)

[A] 90% of the results are less than or equal to this value.
[B] NR: not reported.
[C] Total number of samples, but number of samples associated with each percentile range is less than 2312, but was not reported.
[D] ND: not detected.
[E] The range from 13, 8, and 5 studies that reported the 50th, 90th, and 95th percentiles, respectively.
[F] One of the 13 studies included in USEPA (2011) and Dawson & McAlary (2009).

6. WHAT IS THE NEW YORK STATE DEPARTMENT OF HEALTH'S NEW GUIDELINE FOR PERC IN AIR?

After consideration of the potential health effects of PERC, background levels of PERC in air, and analytical techniques (the ability and reliability of methods to measure PERC in air), NYSDOH recommends that the average air level not exceed 30 mcg/m^3. This determination considered continuous, lifetime exposure and sensitive people. Three other ways of expressing the new guideline are 0.03 milligrams per cubic meter of air (0.03 mg/m^3), 4.4 parts per billion (ppb) or 0.0044 parts per million (ppm). This replaces the old guideline of 100 mcg/m^3.

An air guideline of 30 mcg/m^3 is below the PERC air levels known to cause noncancer effects, including developmental and reproductive effects, in humans and animals, and should be protective against those effects. It is lower than the USEPA's (2012) reference concentration (RfC)[4] for PERC of 40 mcg/m^3. The estimated excess cancer risk associated with lifetime, continuous exposure to 30 mcg/m^3 is about one-in-one-hundred thousand.

[4] The reference concentration is an estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime.

Decisions about whether to take actions to further reduce exposure are generally made on a case-by-case basis at this level of risk.

However, NYSDOH recommends that reasonable and practical actions should be taken to reduce PERC exposure whenever air levels are above background. The purpose of the guideline is to help guide decisions about the urgency of the actions to reduce PERC exposure. The urgency to initiate these actions and to determine, in a timely manner, whether they have reduced exposure, increases with indoor air levels, particularly when air levels are above the guideline.

Indoor air levels substantially above the guideline indicate a significant PERC source and may require more immediate remedial action. NYSDOH has concerns about lengthy exposure (months to years) to air levels higher than 300 mcg/m^3 because the results of a recent NYSDOH study suggested that indoor air PERC levels in apartments (median value of 340 mcg/m^3) may have subtle effects on the nervous system (vision function) of children (NYSDOH, 2010 at http://www.health.ny.gov/environmental/investigations/perc/info_sheet.htm). Thus, NYSDOH recommends taking immediate and effective action to reduce exposure when an air level is equal to or above 300 mcg/m^3. In all cases, the specific corrective actions to be taken depend on a case-by-case evaluation of the situation. The goal of the recommended actions is to reduce PERC levels in indoor air to as close to background as practical.

7. WHY DID NEW YORK STATE DEPARTMENT OF HEALTH REDUCE THE GUIDELINE FOR PERC IN AIR FROM 100 MCG/M^3 TO 30 MCG/M^3?

The guideline of 100 mcg/m^3 was issued in 1997 and was based on the toxicological data available at the time. Since then, many new toxicity studies have been published and the USEPA has completed a comprehensive, state-of-the-science, peer-reviewed risk assessment of PERC. Based on the risk assessment, the USEPA recommended values for evaluating the potential for noncancer and cancer effects from exposure to PERC in air [a RfC (40 mcg/m^3) and an air level (4 mcg/m^3) associated with an estimated excess cancer risk of one-in-one million, assuming continuous, lifetime exposure]. NYSDOH staff reviewed the USEPA risk assessment and determined that the recommended values are scientifically robust and should replace the values derived in 1997. The USEPA publication of its RfC (40 mcg/m^3) necessitated a re-evaluation of the health-protectiveness of the old NYSDOH guideline (100 mcg/m^3) because it has been the past practice of NYSDOH to set guidelines at air levels that are equal to or less than a RfC. Consequently, the guideline was reduced to 30 mcg/m^3 after consideration of new toxicity data (e.g., NYSDOH, 2010) and the USEPA risk assessment.

8. SHOULD I BE CONCERNED ABOUT HEALTH EFFECTS IF I AM EXPOSED TO AN AIR LEVEL SLIGHTLY ABOVE THE GUIDELINE?

The guideline is not a bright line between PERC levels that cause health effects and those that do not. The differences between exposure at the guideline and exposure levels known to cause effects in humans and animals are large. Thus, exposure to levels above but near the guideline will not cause health effects in most, if not all, people. In addition, the guideline is based on the assumption that people are continuously exposed to PERC in air all day, every day for as long as a lifetime. Continuous exposure is rarely true for most people, who, if exposed, are more likely to be exposed for a part of the day and part of their lifetime.

9. IS THERE A TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO PERC?

PERC levels can be measured in the breath for weeks following a high exposure to PERC because it is stored in body fat and is slowly released into the bloodstream and then exhaled in the breath. PERC can be measured in blood. Also, breakdown products of PERC can be detected in the blood and urine for several days after exposure to PERC. Because exposure to other chemicals can produce the same breakdown products in the urine and blood as PERC, the tests for breakdown products cannot determine if you have been exposed only to PERC. Although the tests can show if PERC levels in the body are elevated compared to background levels, they

cannot conclusively determine when and for how long a person was exposed, what the source of that exposure was, or whether or not the person will develop adverse health effects.

10. WHEN SHOULD MY CHILDREN OR I SEE A PHYSICIAN?

If you believe you or your children have symptoms that you think are caused by PERC exposure, you and your children should see a physician. You should tell the physician about the symptoms and about when, how, and for how long you think you and/or your children were exposed to PERC.

11. WHERE CAN I GET MORE INFORMATION?

If you have any questions about the information in this fact sheet, would like to know more about PERC, or are concerned that you may be exposed to elevated levels of PERC, please call the New York State Department of Health at 518-402-7800 or 1-800-458-1158, send an e-mail to btsa@health.state.ny.us, or write to us at the following address.

New York State Department of Health
Bureau of Toxic Substance Assessment
Corning Tower, Room 1743
Empire State Plaza,
Albany, NY 12237

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New York State Department of Health
Tenant Notification Fact Sheet for 1,2-Dichloroethene (1,2-DCE)

This fact sheet is provided to fulfill New York State Department of Health (NYS DOH) requirements for preparation of generic fact sheets under Article 27 (Title 24, Section 27-2405) of the Environmental Conservation Law.

1,2-Dichloroethene (1,2-DCE)

1,2-Dichloroethene (also known as 1,2-dichloroethylene or 1,2-DCE) is a man-made volatile organic chemical. Its primary uses are as an industrial solvent and as an intermediate to make other chemicals. 1,2-Dichloroethene is also a breakdown product of trichloroethene in the environment. 1,2-Dichloroethene has two forms called *cis*-1,2-dichloroethene and *trans*-1,2-dichloroethene.

Sources of 1,2-DCE in Indoor Air

No household products are known to contain 1,2-DCE. One possible source of 1,2-DCE in indoor air is evaporation from contaminated well water that is used for household purposes. 1,2-DCE may also enter homes through soil vapor intrusion, which occurs when the chemical evaporates from groundwater, enters soil vapor (air spaces between soil particles), and migrates through building foundations into the building's indoor air. 1,2-DCE has also been found at low concentrations in outdoor air, which can also be a source of the chemical in indoor air.

Levels Typically Found in Air

The NYS DOH reviewed and compiled information from studies in New York State as well as from homes and office buildings across the United States on typical levels of 1,2-DCE in indoor and outdoor air. Levels of 1,2-DCE in the indoor air of homes and office settings and in outdoor air are expected to be less than 1 microgram per cubic meter (mcg/m^3).

Health Risks Associated with Exposure

There is limited information on the health effects of long term exposure to high levels of 1,2-DCE in humans. Some humans exposed to large amounts of this chemical over short periods of time have had nervous system effects including weakness, drowsiness, nausea, dizziness and loss of consciousness. Exposure to high concentrations of 1,2-DCE causes adverse effects on the liver, blood and immune system of laboratory animals. Taken together, the human and animal data suggest that long term human exposure to 1,2-DCE may increase the risk for changes in the blood, and for liver, immune system and nervous system toxicity.

Studies that evaluate whether exposure to 1,2-DCE can cause cancer in humans or laboratory animals are not available.

NYS DOH Air Guideline

The NYS DOH has not established a chemical-specific guideline for 1,2-DCE in air. However, NYS DOH guidance for 1,2-DCE and other air contaminants is that reasonable and practical actions should be taken to reduce 1,2-DCE exposure when indoor air levels are above those typically found in indoor air. The urgency to take actions increases as indoor air levels increase. The 1,2-DCE exposure

levels that cause health effects in animals or humans are many times higher than levels typically found in indoor air.

Ways to Limit Exposure to 1,2-DCE in Indoor Air

In all cases, the specific actions to limit exposure to 1,2-DCE in indoor air depend on a case-by-case evaluation of the situation. Maintaining adequate ventilation will usually help reduce indoor air levels of the chemical. A sub-slab depressurization system can reduce the amount of 1,2-DCE entering indoor air by soil vapor intrusion. Use of an activated carbon filter on the water supply can reduce the amount of the chemical in contaminated well water that could evaporate into indoor air.

Reportable Detection Level

The reportable detection level for a chemical can vary depending on the analytical method used, the laboratory performing the analysis, and several other factors. Most laboratories that use the analytical methods recommended by the NYS DOH for measuring 1,2-DCE in air (and approved by the National Environmental Laboratory Accreditation Conference or New York State's Environmental Laboratory Approval Program) can routinely detect the chemical at concentrations below 1 mcg/m^3.

Additional Information

Additional information on 1,2-DCE, ways to reduce exposure, indoor air contamination resulting from soil vapor intrusion, indoor and outdoor air levels and the Environmental Conservation Law can be found on the NYS DOH website at **www.health.state.ny.us/environmental/indoors/air/contaminants/**.

If you have further questions about 1,2-DCE and the information in this fact sheet, please call the NYS DOH at 1-518-402-7800 or 1-800-458-1158 (extension 2-7800), e-mail to **ceheduc@health.state.ny.us**, or write to the following address:

New York State Department of Health
Center for Environmental Health
Outreach and Education Group
Empire State Plaza-Corning Tower, Room 1642
Albany, New York 12237

New York State Department of Health
January, 2014

Soil Vapor / Indoor Air Matrix A
May 2017

Analytes Assigned:
Trichloroethene (TCE), *cis*-1,2-Dichloroethene (*c*12-DCE), 1,1-Dichloroethene (11-DCE), Carbon Tetrachloride

	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m^3)		
SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m^3)	< 0.2	0.2 to < 1	1 and above
< 6	1. No further action	2. No Further Action	3. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
6 to < 60	4. No further action	5. MONITOR	6. MITIGATE
60 and above	7. MITIGATE	8. MITIGATE	9. MITIGATE

No further action: No additional actions are recommended to address human exposures.

Identify Source(s) and Resample or Mitigate: We recommend that reasonable and practical actions be taken to identify the source(s) affecting the indoor air quality and that actions be implemented to reduce indoor air concentrations to within background ranges. For example, if an indoor or outdoor air source is identified, we recommend the appropriate party implement actions to reduce the levels. In the event that indoor or outdoor sources are not readily identified or confirmed, resampling (which might include additional sub-slab vapor and indoor air sampling locations) is recommended to demonstrate that SVI mitigation actions are not needed. Based on the information available, mitigation might also be recommended when soil vapor intrusion cannot be ruled out.

Monitor: We recommend monitoring (sampling on a recurring basis), including but not necessarily limited to sub-slab vapor, basement air and outdoor air sampling, to determine whether concentrations in the indoor air or sub-slab vapor have changed and/or to evaluate temporal influences. Monitoring might also be recommended to determine whether existing building conditions (e.g., positive pressure heating, ventilation and air-conditioning systems) are maintaining the desired mitigation endpoint and to determine whether changes are needed. The type and frequency of monitoring is determined based on site-, building- and analyte-specific information, taking into account applicable environmental data and building operating conditions. Monitoring is an interim measure required to evaluate exposures related to soil vapor intrusion until contaminated environmental media are remediated.

Mitigate: We recommend mitigation to minimize current or potential exposures associated with soil vapor intrusion. The most common mitigation methods are sealing preferential pathways in conjunction with installing a sub-slab depressurization system and changing the pressurization of the building in conjunction with monitoring. The type, or combination of types, of mitigation is determined on a building-specific basis, taking into account building construction and operating conditions. Mitigation is considered a temporary measure implemented to address exposures related to soil vapor intrusion until contaminated environmental media are remediated.

These general recommendations are made with consideration being given to the additional notes on page 2.

ADDITIONAL NOTES FOR MATRIX A

This matrix summarizes actions recommended to address current and potential exposures related to soil vapor intrusion. To use the matrix appropriately as a tool in the decision-making process, the following should be noted:

[1] The matrix is generic. As such, it may be appropriate to modify a recommended action to accommodate analyte-specific, building-specific conditions (e.g., dirt floor in basement, crawl spaces, thick slabs, current occupancy, etc.), and/or factors provided in Section 3.2 of the guidance (e.g., current land use, environmental conditions, etc.). For example, collection of additional samples may be recommended when the matrix indicates "no further action" for a particular building, but the results of adjacent buildings (especially sub-slab vapor results) indicate a need to take actions to address exposures related to soil vapor intrusion. Mitigation might be recommended when the results of multiple contaminants indicate monitoring is recommended. Proactive actions may be proposed at any time. For example, the party implementing the actions may decide to install sub-slab depressurization systems on buildings where the matrix indicates "no further action" or "monitoring." Such an action might be undertaken for reasons other than public health (e.g., seeking community acceptance, reducing costs, etc.). However, actions implemented *in lieu* of sampling will typically be expected to be captured in the final engineering report and site management plan, and might not rule out the need for post-implementation sampling (e.g., to document effectiveness or to support terminating the action).

[2] Actions provided in the matrix are specific to addressing human exposures. Implementation of these actions does not preclude investigating possible sources of soil vapor contamination, nor does it preclude remediating contaminated soil vapor or the source of soil vapor contamination.

[3] Appropriate care should be taken during all aspects of sample collection to ensure that high quality data are obtained. Since the data are being used in the decision-making process, the laboratory analyzing the environmental samples must have current Environmental Laboratory Approval Program (ELAP) certification for the appropriate analyte and environmental matrix combinations. Furthermore, samples should be analyzed by methods that can achieve a minimum reporting limit of 0.20 microgram per cubic meter for indoor and outdoor air samples. For sub-slab vapor samples and dirt floor soil vapor samples, a minimum reporting limit of 1 microgram per cubic meter is recommended.

[4] Sub-slab vapor and indoor air samples are typically collected when the likelihood of soil vapor intrusion is considered to be the greatest (i.e., worst-case conditions). If samples are collected at other times (typically, samples collected outside of the heating season), then resampling during worst-case conditions might be appropriate to verify that actions taken to address exposures related to soil vapor intrusion are protective of human health.

[5] When current exposures are attributed to sources other than soil vapor intrusion, the agencies should be given documentation (e.g., applicable environmental data, completed indoor air sampling questionnaire, digital photographs, etc.) to support a proposed action other than that provided in the matrix box and to support agency assessment and follow-up.

[6] The party responsible for implementing the recommended actions will differ depending upon several factors, including but not limited to the following: the identified source of the volatile chemicals, the environmental remediation program, and analyte-specific, site-specific and building-specific factors.

Soil Vapor / Indoor Air Matrix B
May 2017

Analytes Assigned:
Tetrachloroethene (PCE), 1,1,1-Trichloroethane (111-TCA), Methylene Chloride

	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m^3)		
SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m^3)	< 3	3 to < 10	10 and above
< 100	1. No further action	2. No Further Action	3. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
100 to < 1,000	4. No further action	5. MONITOR	6. MITIGATE
1,000 and above	7. MITIGATE	8. MITIGATE	9. MITIGATE

No further action: No additional actions are recommended to address human exposures.

Identify Source(s) and Resample or Mitigate: We recommend that reasonable and practical actions be taken to identify the source(s) affecting the indoor air quality and that actions be implemented to reduce indoor air concentrations to within background ranges. For example, if an indoor or outdoor air source is identified, we recommend the appropriate party implement actions to reduce the levels. In the event that indoor or outdoor sources are not readily identified or confirmed, resampling (which might include additional sub-slab vapor and indoor air sampling locations) is recommended to demonstrate that SVI mitigation actions are not needed. Based on the information available, mitigation might also be recommended when soil vapor intrusion cannot be ruled out.

Monitor: We recommend monitoring (sampling on a recurring basis), including but not necessarily limited to sub-slab vapor, basement air and outdoor air sampling, to determine whether concentrations in the indoor air or sub-slab vapor have changed and/or to evaluate temporal influences. Monitoring might also be recommended to determine whether existing building conditions (e.g., positive pressure heating, ventilation and air-conditioning systems) are maintaining the desired mitigation endpoint and to determine whether changes are needed. The type and frequency of monitoring is determined based on site-, building- and analyte-specific information, taking into account applicable environmental data and building operating conditions. Monitoring is an interim measure required to evaluate exposures related to soil vapor intrusion until contaminated environmental media are remediated.

Mitigate: We recommend mitigation to minimize current or potential exposures associated with soil vapor intrusion. The most common mitigation methods are sealing preferential pathways in conjunction with installing a sub-slab depressurization system and changing the pressurization of the building in conjunction with monitoring. The type, or combination of types, of mitigation is determined on a building-specific basis, taking into account building construction and operating conditions. Mitigation is considered a temporary measure implemented to address exposures related to soil vapor intrusion until contaminated environmental media are remediated.

These general recommendations are made with consideration being given to the additional notes on page 2.

ADDITIONAL NOTES FOR MATRIX B

This matrix summarizes actions recommended to address current and potential exposures related to soil vapor intrusion. To use the matrix appropriately as a tool in the decision-making process, the following should be noted:

[1] The matrix is generic. As such, it may be appropriate to modify a recommended action to accommodate analyte-specific, building-specific conditions (e.g., dirt floor in basement, crawl spaces, thick slabs, current occupancy, etc.), and/or factors provided in Section 3.2 of the guidance (e.g., current land use, environmental conditions, etc.). For example, collection of additional samples may be recommended when the matrix indicates "no further action" for a particular building, but the results of adjacent buildings (especially sub-slab vapor results) indicate a need to take actions to address exposures related to soil vapor intrusion. Mitigation might be recommended when the results of multiple contaminants indicate monitoring is recommended. Proactive actions may be proposed at any time. For example, the party implementing the actions may decide to install sub-slab depressurization systems on buildings where the matrix indicates "no further action" or "monitoring." Such an action might be undertaken for reasons other than public health (e.g., seeking community acceptance, reducing costs, etc.). However, actions implemented *in lieu* of sampling will typically be expected to be captured in the final engineering report and site management plan, and might not rule out the need for post-implementation sampling (e.g., to document effectiveness or to support terminating the action).

[2] Actions provided in the matrix are specific to addressing human exposures. Implementation of these actions does not preclude investigating possible sources of soil vapor contamination, nor does it preclude remediating contaminated soil vapor or the source of soil vapor contamination.

[3] Appropriate care should be taken during all aspects of sample collection to ensure that high quality data are obtained. Since the data are being used in the decision-making process, the laboratory analyzing the environmental samples must have current Environmental Laboratory Approval Program (ELAP) certification for the appropriate analyte and environmental matrix combinations. Furthermore, samples should be analyzed by methods that can achieve a minimum reporting limit of 1 microgram per cubic meter for indoor and outdoor air samples. For sub-slab vapor samples and dirt floor soil vapor samples, a minimum reporting limit of 1 microgram per cubic meter is recommended.

[4] Sub-slab vapor and indoor air samples are typically collected when the likelihood of soil vapor intrusion is considered to be the greatest (i.e., worst-case conditions). If samples are collected at other times (typically, samples collected outside of the heating season), then resampling during worst-case conditions might be appropriate to verify that actions taken to address exposures related to soil vapor intrusion are protective of human health.

[5] When current exposures are attributed to sources other than soil vapor intrusion, the agencies should be given documentation (e.g., applicable environmental data, completed indoor air sampling questionnaire, digital photographs, etc.) to support a proposed action other than that provided in the matrix box and to support agency assessment and follow-up.

[6] The party responsible for implementing the recommended actions will differ depending upon several factors, including but not limited to the following: the identified source of the volatile chemicals, the environmental remediation program, and analyte-specific, site-specific and building-specific factors.

Soil Vapor/Indoor Air Matrix C

May 2017

Analytes Assigned:
Vinyl Chloride

	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m^3)	
SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m^3)	< 0.2	0.2 and above
< 6	1. No further action	2. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
6 to < 60	3. MONITOR	4. MITIGATE
60 and above	5. MITIGATE	6. MITIGATE

No further action: No additional actions are recommended to address human exposures.

Identify Source(s) and Resample or Mitigate: We recommend that reasonable and practical actions be taken to identify the source(s) affecting the indoor air quality and that actions be implemented to reduce indoor air concentrations to within background ranges. For example, if an indoor or outdoor air source is identified, we recommend the appropriate party implement actions to reduce the levels. In the event that indoor or outdoor sources are not readily identified or confirmed, resampling (which might include additional sub-slab vapor and indoor air sampling locations) is recommended to demonstrate that SVI mitigation actions are not needed. Based on the information available, mitigation might also be recommended when soil vapor intrusion cannot be ruled out.

Monitor: We recommend monitoring (sampling on a recurring basis), including but not necessarily limited to sub-slab vapor, basement air and outdoor air sampling, to determine whether concentrations in the indoor air or sub-slab vapor have changed and/or to evaluate temporal influences. Monitoring might also be recommended to determine whether existing building conditions (e.g., positive pressure heating, ventilation and air-conditioning systems) are maintaining the desired mitigation endpoint and to determine whether changes are needed. The type and frequency of monitoring is determined based on site-, building- and analyte-specific information, taking into account applicable environmental data and building operating conditions. Monitoring is an interim measure required to evaluate exposures related to soil vapor intrusion until contaminated environmental media are remediated.

Mitigate: We recommend mitigation to minimize current or potential exposures associated with soil vapor intrusion. The most common mitigation methods are sealing preferential pathways in conjunction with installing a sub-slab depressurization system and changing the pressurization of the building in conjunction with monitoring. The type, or combination of types, of mitigation is determined on a building-specific basis, taking into account building construction and operating conditions. Mitigation is considered a temporary measure implemented to address exposures related to soil vapor intrusion until contaminated environmental media are remediated.

These general recommendations are made with consideration being given to the additional notes on page 2.

ADDITIONAL NOTES FOR MATRIX C

This matrix summarizes actions recommended to address current and potential exposures related to soil vapor intrusion. To use the matrix appropriately as a tool in the decision-making process, the following should be noted:

[1] The matrix is generic. As such, it may be appropriate to modify a recommended action to accommodate analyte-specific, building-specific conditions (e.g., dirt floor in basement, crawl spaces, thick slabs, current occupancy, etc.), and/or factors provided in Section 3.2 of the guidance (e.g., current land use, environmental conditions, etc.). For example, collection of additional samples may be recommended when the matrix indicates "no further action" for a particular building, but the results of adjacent buildings (especially sub-slab vapor results) indicate a need to take actions to address exposures related to soil vapor intrusion. Mitigation might be recommended when the results of multiple contaminants indicate monitoring is recommended. Proactive actions may be proposed at any time. For example, the party implementing the actions may decide to install sub-slab depressurization systems on buildings where the matrix indicates "no further action" or "monitoring." Such an action might be undertaken for reasons other than public health (e.g., seeking community acceptance, reducing costs, etc.). However, actions implemented *in lieu* of sampling will typically be expected to be captured in the final engineering report and site management plan, and might not rule out the need for post-implementation sampling (e.g., to document effectiveness or to support terminating the action).

[2] Actions provided in the matrix are specific to addressing human exposures. Implementation of these actions does not preclude investigating possible sources of soil vapor contamination, nor does it preclude remediating contaminated soil vapor or the source of soil vapor contamination.

[3] Appropriate care should be taken during all aspects of sample collection to ensure that high quality data are obtained. Since the data are being used in the decision-making process, the laboratory analyzing the environmental samples must have current Environmental Laboratory Approval Program (ELAP) certification for the appropriate analyte and environmental matrix combinations. Furthermore, samples should be analyzed by methods that can achieve a minimum reporting limit of 0.20 microgram per cubic meter for indoor and outdoor air samples. For sub-slab vapor samples and dirt floor soil vapor samples, a minimum reporting limit of 1 microgram per cubic meter is recommended.

[4] Sub-slab vapor and indoor air samples are typically collected when the likelihood of soil vapor intrusion is considered to be the greatest (i.e., worst-case conditions). If samples are collected at other times (typically, samples collected outside of the heating season), then resampling during worst-case conditions might be appropriate to verify that actions taken to address exposures related to soil vapor intrusion are protective of human health.

[5] When current exposures are attributed to sources other than soil vapor intrusion, the agencies should be given documentation (e.g., applicable environmental data, completed indoor air sampling questionnaire, digital photographs, etc.) to support a proposed action other than that provided in the matrix box and to support agency assessment and follow-up.

[6] The party responsible for implementing the recommended actions will differ depending upon several factors, including but not limited to the following: the identified source of the volatile chemicals, the environmental remediation program, and analyte-specific, site-specific and building-specific factors.

The Dow Chemical Company
P.O. Box 8361
South Charleston, WV 25303-8361
USA

January 18, 2019

Mr. Michael Marshall
Johnson Machine & Fibre Products
142 Hopkins Avenue
Jamestown, New York 14701

Subject: Results of the Soil Vapor Intrusion Sampling Conducted at 142 Hopkins Avenue

Dear Mr. Marshall:

This letter has been prepared to provide the results of the soil vapor intrusion (SVI) evaluation performed on November 14, 2018 at 142 Hopkins Avenue. Additional soil vapor samples necessary to perform a SVI pathway assessment were collected between December 11 and 13, 2018 along the adjacent streets. The work was performed in association with ongoing investigations related to the Essex-Hope Superfund Site (Site ID No. 907015). This evaluation was performed with cooperation from the New York State Department of Environmental Conservation (NYSDEC) and New York State Department of Health (NYSDOH).

The sub-slab vapor sampling data were reviewed for accuracy, and validation of these results was completed on January 14, 2019. The results from samples collected from 142 Hopkins Avenue are included in Table 1 and the locations of the samples collected are provided on Figure 1. The results were screened against NYSDOH sub-slab vapor concentration criteria (which do not account for the differences between residences and commercial buildings) to determine if further action is needed. Results were also compared against calculated U.S. Environmental Protection Agency (EPA) commercial sub-slab vapor intrusion screening levels (VISLs).

Certain chemicals were detected in sub-slab soil vapor at the property. This letter is being provided in accordance with NYSDEC Law Article 27-2405 to provide timely notification. These results are being further evaluated to determine if additional actions are necessary.

Results and Evaluation

Sub-slab soil vapor samples were collected within the Johnson Machine & Fibre Products facility in November 2018 following the completion of building surveys conducted in April 2018. The surveys attempted to inventory chemicals present in the sampling areas that have the potential to affect air sample results. A summary of volatile organic compounds (VOCs) detected in the November 2018 sub-slab soil vapor samples is presented in Table 1; the sampling locations are identified on Figure 1.

Detected VOC concentrations in sub-slab vapor soil are evaluated against the following criteria (see Table 1):

1. Calculated EPA commercial VISLs (EPA, 2018).
2. NYSDOH sub-slab vapor concentrations criteria per *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (NYSDOH, 2006). A copy of the NYSDOH soil vapor/indoor air decision matrices is included in Attachment 1. Note that indoor air data are required to determine if any further action is needed as per the NYSDOH decision matrices.

Comparison to EPA VISLs and NYSDOH Air Guideline Values

Four sub-slab locations were sampled within the Johnson Machine & Fibre Products facility as shown on Figure 1, with the respective results listed in Table 1. At the time of sampling, the facility was occupied and in operation. Cis-1,2-dichloroethene (cis-1,2-DCE) and/or trichloroethene (TCE) were detected at concentrations greater than the most conservative NYSDOH soil vapor screening criteria at all four samples

collected directly beneath your facility. All other measured chemicals were not detected or were detected in concentrations under the applicable screening levels, as is the case for tetrachloroethene (PCE). There were no sub-slab soil vapor sample results in exceedance of the calculated EPA VISLs. Additional information on the chemicals of concern detected at the property is presented in Attachment 1.

Summary and Conclusions

Investigation activities conducted in November and December 2018 identified TCE and cis-1,2-DCE in sub-slab soil vapor at concentrations greater than NYSDOH soil vapor screening criteria. A comprehensive SVI pathway assessment is currently being performed and will be presented to NYSDEC and NYSDOH. We will inform you of any potential additional sampling efforts required to complete the SVI study at your facility.

We appreciate your cooperation for the duration of this project. If you would like to discuss these results, please contact me at 304.747.3763.

Sincerely,

Tim King
Authorized Representative

Enclosures
Table 1 – Detected Concentrations of Volatile Organic Compounds in Sub-slab Soil Vapor
Figure 1 – Soil Vapor Intrusion Investigation Locations
Attachment 1 – NYSDOH Fact Sheets and Information

References

New York State Department of Health (NYSDOH). 2006. *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*. October. Updated May 2017.

U.S. Environmental Protection Agency (EPA). 2013. *Office of Solid Waste and Emergency Response (OSWER) Final Guidance for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Sources to Indoor Air*. External Review Draft. April 11.

U.S. Environmental Protection Agency (EPA). 2018. VISLs Calculator for Commercial Sub-slab Vapor Intrusion Screening Level. November. https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-level-calculator.

Table

TABLE 1

Detected Concentrations of Volatile Organic Compounds in Sub-slab Soil Vapor

142 Hopkins Avenue

LOCATION						JMF-01-20181114		JMF-01-20181114-FD		JMF-02-20181114		JMF-03-20181114		JMF-04-20181114	
SAMPLING DATE						11/14/2018		11/14/2018		11/14/2018		11/14/2018		11/14/2018	
SCREENING CRITERIA	NY-SSC-A	NY-SSC-B	NY-SSC-C	USEPA VISL	Units	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual
Volatile Organic Compounds (VOCs)															
Vinyl chloride	--	--	6	93	µg/m^3	1.27	U	1.26	U	1.1	U	1.17	U	1.16	U
1,1-Dichloroethene	6	--	--	29,000	µg/m^3	1.97	U	1.95	U	1.71	U	1.82	U	1.8	U
trans-1,2-Dichloroethene	--	--	--	--	µg/m^3	1.97	U	1.95	U	1.71	U	1.82	U	1.8	U
cis-1,2-Dichloroethene	6	--	--	--	µg/m^3	**6.78**		**6.22**		**4.4**		**11.2**		**8.45**	
Trichloroethene	6	--	--	100	µg/m^3	**17.8**		**17.5**		**13**		**23.1**		**21.5**	
Tetrachloroethene	--	100	--	1,600	µg/m^3	**10.4**		**9.9**		2.93	U	**8.68**		**14.9**	

Notes:

µg/m^3 = micrograms per cubic meter

FD = Field Duplicate Sample

Qual = Laboratory data qualifier

U = Not detected at the reported detection limit for the sample.

NY-SSC-A: NYSDOH Matrix A Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, updated May 2017.

NY-SSC-B: NYSDOH Matrix B Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, updated May 2017.

NY-SSC-C: NYSDOH Matrix C Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, updated May 2017.

EPA VISL: Calculated EPA Commercial Sub-slab Vapor Intrusion Screening Level, November, 2018 (TCR = 1x10-6 ; Q=1) available at https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-level-calculator

Bold results indicate detection of chemical above the detection limit.

Exceeds NY-SSC

Figure

Sanitary Sewer Location

Storm Sewer Location

Soil Vapor Sample Location

Subslab Vapor Sample Location

Sanitary/Storm Sewer

Approximate Site Boundary

Parcels

Access to Rollform was Denied and therefore sampling has not been proposed at this time

Chadakoin River

Notes:
1. Yellow highlighted cells: Exceeds NY-SSC, but indoor air data is required to determine if any further action is needed per the matrix.
2. Red text within cells: Exceeds USEPA Sub-slab Vapor Intrusion Screening Level

N

BASE MAP SOURCE:

0 25 50 100

Scale in Feet

Essex Specialty Products, Inc	Essex/Hope Site, Jamestown, New York

FIGURE 1
Soil Vapor Intrusion Investigation Locations
Off-site Vapor Intrusion Investigation Work Plan

CREATED BY: LA	JACOBS
REVIEWED BY: AS	

\\hrocksitefiles\GIS_SHARE\ENVIRO\100_Proj\DI\Dow_Chemical\Jamestown\Mapfiles\VI\2019\DoubleMS_FigX_VI_SewerGas_AnalyticalData_Nov2018.mxd lallan 1/8/2019

Attachment 1
NYSDOH Fact Sheets and Information

Bureau of Toxic Substance Assessment
New York State Department of Health
August 2015

IMPORTANT INFORMATION ON TRICHLOROETHENE (TCE) IN INDOOR AND OUTDOOR AIR[1]

Trichloroethene (TCE)

Trichloroethene (also known as trichloroethylene or TCE) is a human-made chemical. It is volatile, meaning it readily evaporates at room temperature into the air, where you can sometimes smell it. It is used as a solvent to remove grease from metal, a paint stripper, an adhesive solvent, an ingredient in paints and varnishes, and in the manufacture of other chemicals and products (for example, furniture and electric/electronic equipment).

Exposure to TCE

People may be exposed to TCE in air, water, and food, or when TCE or material containing TCE (for example, soil) gets on the skin. For most people, almost all TCE exposure is from indoor air.

Sources of TCE in Air

TCE may get into indoor air when TCE-containing products (for example, glues, adhesives, paint removers, spot removers, and metal cleaners) are used. Another source could be evaporation from contaminated well water that is used for household purposes. TCE may enter homes through soil vapor intrusion, which occurs when TCE evaporates from contaminated groundwater, enters soil vapor (air spaces between soil particles), and migrates through cracks or other openings in the foundation and into the building. TCE gets into outdoor air when it is released from industrial facilities and when it evaporates from areas where chemical wastes are stored or disposed.

Levels Typically Found in Air

The background indoor air levels of TCE in homes and office buildings not near known environmental sources of TCE are almost always 1 microgram per cubic meter of air (1 mcg/m^3) or less. Background outdoor air levels also are almost always 1 mcg/m3 or less.

Health Risks Associated with Exposure to TCE

Most people, if exposed to TCE, are exposed to air levels much lower than those known to cause health effects in humans (for example, workplace air levels 90,000 to 800,000 mcg/m^3). TCE exposure can cause effects on the central nervous system, liver, kidneys, and immune system of humans. TCE exposure is

[1] For a more technical discussion of this information, see the fact sheet "Trichloroethene (TCE) In Indoor and Outdoor Air" available at http://www.health.ny.gov/environmental/chemicals/trichloroethene/.

associated with reproductive effects in men and women, and may affect fetal development during pregnancy. However, the studies suggest, but do not prove, that the reproductive and developmental effects were caused by TCE, and not by some other factor. The United States Environmental Protection Agency (USEPA) classifies TCE as a chemical that causes cancer in humans by all routes of exposure. Whether a person experiences a health effect depends on how much of the chemical he or she is exposed to, how often the exposure occurs, and how long the exposures last. Individual characteristics such as age, health, lifestyle, and genetics also play a role.

The New York State Department of Health (NYSDOH) Guideline for TCE in Air

NYSDOH recommends that TCE levels in air not exceed 2 mcg/m^3. This replaces the previous guideline of 5 mcg/m^3. The guideline was set at an air level that is lower than levels known to cause, or suspected of causing, health effects in humans, including sensitive populations (for example, children, pregnant women) and animals. The guideline is based on the assumption that people are continuously exposed to TCE in air all day, every day for months or as long as a lifetime. Continuous exposure is rarely true for most people, who, if exposed, are more likely to be exposed for a part of the day, part of a week, or part of their lifetime.

The guideline is used to help guide decisions regarding the urgency of efforts to reduce TCE exposure. At TCE air levels above the guideline, the higher the level, the greater the urgency to take action to reduce exposure. But as with any chemical in indoor air, the NYSDOH always recommends taking action to reduce exposure when the air concentration of a chemical is above background, even if it is below the guideline.

Indoor air concentrations substantially above the guideline clearly indicate a significant TCE source and the need for action to reduce exposure. In particular, NYSDOH has concerns about exposure during pregnancy, particularly during the first trimester, to air concentrations higher than 20 mcg/m^3 because the major steps of heart development occur during this period and TCE may be a risk factor for fetal heart defects in humans. Thus, NYSDOH recommends taking immediate and effective action to reduce exposure when an air concentration is equal to, or above 20 mcg/m^3. In all cases, the specific recommended action depends on a case-by-case evaluation of the situation.

Concerns about Exposure to TCE

Most people, if exposed to TCE, are exposed to air levels much lower than those known to cause health effects in humans. However, if you are concerned that you, your children, or others have been exposed to TCE, discuss your symptoms/signs with your health care provider. There are special tests to measure TCE and related chemicals in your blood, breath, or urine, and your health care provider can compare the results to those of people without known exposure to TCE or to workers with high exposure to TCE.

Questions

If you have any questions about the information in this fact sheet, would like to know more about TCE, or are concerned that you may be exposed to elevated levels of TCE, please call the New York State Department of Health at 1-518-402-7800 or 1-800-458-1158, send an e-mail to btsa@health.ny.gov, or write to the following address.

New York State Department of Health
Bureau of Toxic Substance Assessment
Corning Tower, Room 1743
Empire State Plaza,
Albany, NY 12237

New York State Department of Health
Tenant Notification Fact Sheet for 1,2-Dichloroethene (1,2-DCE)

This fact sheet is provided to fulfill New York State Department of Health (NYS DOH) requirements for preparation of generic fact sheets under Article 27 (Title 24, Section 27-2405) of the Environmental Conservation Law.

1,2-Dichloroethene (1,2-DCE)

1,2-Dichloroethene (also known as 1,2-dichloroethylene or 1,2-DCE) is a man-made volatile organic chemical. Its primary uses are as an industrial solvent and as an intermediate to make other chemicals. 1,2-Dichloroethene is also a breakdown product of trichloroethene in the environment. 1,2-Dichloroethene has two forms called *cis*-1,2-dichloroethene and *trans*-1,2-dichloroethene.

Sources of 1,2-DCE in Indoor Air

No household products are known to contain 1,2-DCE. One possible source of 1,2-DCE in indoor air is evaporation from contaminated well water that is used for household purposes. 1,2-DCE may also enter homes through soil vapor intrusion, which occurs when the chemical evaporates from groundwater, enters soil vapor (air spaces between soil particles), and migrates through building foundations into the building's indoor air. 1,2-DCE has also been found at low concentrations in outdoor air, which can also be a source of the chemical in indoor air.

Levels Typically Found in Air

The NYS DOH reviewed and compiled information from studies in New York State as well as from homes and office buildings across the United States on typical levels of 1,2-DCE in indoor and outdoor air. Levels of 1,2-DCE in the indoor air of homes and office settings and in outdoor air are expected to be less than 1 microgram per cubic meter (mcg/m^3).

Health Risks Associated with Exposure

There is limited information on the health effects of long term exposure to high levels of 1,2-DCE in humans. Some humans exposed to large amounts of this chemical over short periods of time have had nervous system effects including weakness, drowsiness, nausea, dizziness and loss of consciousness. Exposure to high concentrations of 1,2-DCE causes adverse effects on the liver, blood and immune system of laboratory animals. Taken together, the human and animal data suggest that long term human exposure to 1,2-DCE may increase the risk for changes in the blood, and for liver, immune system and nervous system toxicity.

Studies that evaluate whether exposure to 1,2-DCE can cause cancer in humans or laboratory animals are not available.

NYS DOH Air Guideline

The NYS DOH has not established a chemical-specific guideline for 1,2-DCE in air. However, NYS DOH guidance for 1,2-DCE and other air contaminants is that reasonable and practical actions should be taken to reduce 1,2-DCE exposure when indoor air levels are above those typically found in indoor air. The urgency to take actions increases as indoor air levels increase. The 1,2-DCE exposure

levels that cause health effects in animals or humans are many times higher than levels typically found in indoor air.

Ways to Limit Exposure to 1,2-DCE in Indoor Air

In all cases, the specific actions to limit exposure to 1,2-DCE in indoor air depend on a case-by-case evaluation of the situation. Maintaining adequate ventilation will usually help reduce indoor air levels of the chemical. A sub-slab depressurization system can reduce the amount of 1,2-DCE entering indoor air by soil vapor intrusion. Use of an activated carbon filter on the water supply can reduce the amount of the chemical in contaminated well water that could evaporate into indoor air.

Reportable Detection Level

The reportable detection level for a chemical can vary depending on the analytical method used, the laboratory performing the analysis, and several other factors. Most laboratories that use the analytical methods recommended by the NYS DOH for measuring 1,2-DCE in air (and approved by the National Environmental Laboratory Accreditation Conference or New York State's Environmental Laboratory Approval Program) can routinely detect the chemical at concentrations below 1 mcg/m^3.

Additional Information

Additional information on 1,2-DCE, ways to reduce exposure, indoor air contamination resulting from soil vapor intrusion, indoor and outdoor air levels and the Environmental Conservation Law can be found on the NYS DOH website at **www.health.state.ny.us/environmental/indoors/air/contaminants/**.

If you have further questions about 1,2-DCE and the information in this fact sheet, please call the NYS DOH at 1-518-402-7800 or 1-800-458-1158 (extension 2-7800), e-mail to **ceheduc@health.state.ny.us**, or write to the following address:

New York State Department of Health
Center for Environmental Health
Outreach and Education Group
Empire State Plaza-Corning Tower, Room 1642
Albany, New York 12237

New York State Department of Health
January, 2014

Soil Vapor / Indoor Air Matrix A
May 2017

Analytes Assigned:
Trichloroethene (TCE), *cis*-1,2-Dichloroethene (*c*12-DCE), 1,1-Dichloroethene (11-DCE), Carbon Tetrachloride

	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m^3)		
SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m^3)	< 0.2	0.2 to < 1	1 and above
< 6	1. No further action	2. No Further Action	3. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
6 to < 60	4. No further action	5. MONITOR	6. MITIGATE
60 and above	7. MITIGATE	8. MITIGATE	9. MITIGATE

No further action: No additional actions are recommended to address human exposures.

Identify Source(s) and Resample or Mitigate: We recommend that reasonable and practical actions be taken to identify the source(s) affecting the indoor air quality and that actions be implemented to reduce indoor air concentrations to within background ranges. For example, if an indoor or outdoor air source is identified, we recommend the appropriate party implement actions to reduce the levels. In the event that indoor or outdoor sources are not readily identified or confirmed, resampling (which might include additional sub-slab vapor and indoor air sampling locations) is recommended to demonstrate that SVI mitigation actions are not needed. Based on the information available, mitigation might also be recommended when soil vapor intrusion cannot be ruled out.

Monitor: We recommend monitoring (sampling on a recurring basis), including but not necessarily limited to sub-slab vapor, basement air and outdoor air sampling, to determine whether concentrations in the indoor air or sub-slab vapor have changed and/or to evaluate temporal influences. Monitoring might also be recommended to determine whether existing building conditions (e.g., positive pressure heating, ventilation and air-conditioning systems) are maintaining the desired mitigation endpoint and to determine whether changes are needed. The type and frequency of monitoring is determined based on site-, building- and analyte-specific information, taking into account applicable environmental data and building operating conditions. Monitoring is an interim measure required to evaluate exposures related to soil vapor intrusion until contaminated environmental media are remediated.

Mitigate: We recommend mitigation to minimize current or potential exposures associated with soil vapor intrusion. The most common mitigation methods are sealing preferential pathways in conjunction with installing a sub-slab depressurization system and changing the pressurization of the building in conjunction with monitoring. The type, or combination of types, of mitigation is determined on a building-specific basis, taking into account building construction and operating conditions. Mitigation is considered a temporary measure implemented to address exposures related to soil vapor intrusion until contaminated environmental media are remediated.

These general recommendations are made with consideration being given to the additional notes on page 2.

ADDITIONAL NOTES FOR MATRIX A

This matrix summarizes actions recommended to address current and potential exposures related to soil vapor intrusion. To use the matrix appropriately as a tool in the decision-making process, the following should be noted:

[1] The matrix is generic. As such, it may be appropriate to modify a recommended action to accommodate analyte-specific, building-specific conditions (e.g., dirt floor in basement, crawl spaces, thick slabs, current occupancy, etc.), and/or factors provided in Section 3.2 of the guidance (e.g., current land use, environmental conditions, etc.). For example, collection of additional samples may be recommended when the matrix indicates "no further action" for a particular building, but the results of adjacent buildings (especially sub-slab vapor results) indicate a need to take actions to address exposures related to soil vapor intrusion. Mitigation might be recommended when the results of multiple contaminants indicate monitoring is recommended. Proactive actions may be proposed at any time. For example, the party implementing the actions may decide to install sub-slab depressurization systems on buildings where the matrix indicates "no further action" or "monitoring." Such an action might be undertaken for reasons other than public health (e.g., seeking community acceptance, reducing costs, etc.). However, actions implemented *in lieu* of sampling will typically be expected to be captured in the final engineering report and site management plan, and might not rule out the need for post-implementation sampling (e.g., to document effectiveness or to support terminating the action).

[2] Actions provided in the matrix are specific to addressing human exposures. Implementation of these actions does not preclude investigating possible sources of soil vapor contamination, nor does it preclude remediating contaminated soil vapor or the source of soil vapor contamination.

[3] Appropriate care should be taken during all aspects of sample collection to ensure that high quality data are obtained. Since the data are being used in the decision-making process, the laboratory analyzing the environmental samples must have current Environmental Laboratory Approval Program (ELAP) certification for the appropriate analyte and environmental matrix combinations. Furthermore, samples should be analyzed by methods that can achieve a minimum reporting limit of 0.20 microgram per cubic meter for indoor and outdoor air samples. For sub-slab vapor samples and dirt floor soil vapor samples, a minimum reporting limit of 1 microgram per cubic meter is recommended.

[4] Sub-slab vapor and indoor air samples are typically collected when the likelihood of soil vapor intrusion is considered to be the greatest (i.e., worst-case conditions). If samples are collected at other times (typically, samples collected outside of the heating season), then resampling during worst-case conditions might be appropriate to verify that actions taken to address exposures related to soil vapor intrusion are protective of human health.

[5] When current exposures are attributed to sources other than soil vapor intrusion, the agencies should be given documentation (e.g., applicable environmental data, completed indoor air sampling questionnaire, digital photographs, etc.) to support a proposed action other than that provided in the matrix box and to support agency assessment and follow-up.

[6] The party responsible for implementing the recommended actions will differ depending upon several factors, including but not limited to the following: the identified source of the volatile chemicals, the environmental remediation program, and analyte-specific, site-specific and building-specific factors.

Soil Vapor / Indoor Air Matrix B
May 2017

Analytes Assigned:
Tetrachloroethene (PCE), 1,1,1-Trichloroethane (111-TCA), Methylene Chloride

	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m^3)		
SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m^3)	< 3	3 to < 10	10 and above
< 100	1. No further action	2. No Further Action	3. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
100 to < 1,000	4. No further action	5. MONITOR	6. MITIGATE
1,000 and above	7. MITIGATE	8. MITIGATE	9. MITIGATE

No further action: No additional actions are recommended to address human exposures.

Identify Source(s) and Resample or Mitigate: We recommend that reasonable and practical actions be taken to identify the source(s) affecting the indoor air quality and that actions be implemented to reduce indoor air concentrations to within background ranges. For example, if an indoor or outdoor air source is identified, we recommend the appropriate party implement actions to reduce the levels. In the event that indoor or outdoor sources are not readily identified or confirmed, resampling (which might include additional sub-slab vapor and indoor air sampling locations) is recommended to demonstrate that SVI mitigation actions are not needed. Based on the information available, mitigation might also be recommended when soil vapor intrusion cannot be ruled out.

Monitor: We recommend monitoring (sampling on a recurring basis), including but not necessarily limited to sub-slab vapor, basement air and outdoor air sampling, to determine whether concentrations in the indoor air or sub-slab vapor have changed and/or to evaluate temporal influences. Monitoring might also be recommended to determine whether existing building conditions (e.g., positive pressure heating, ventilation and air-conditioning systems) are maintaining the desired mitigation endpoint and to determine whether changes are needed. The type and frequency of monitoring is determined based on site-, building- and analyte-specific information, taking into account applicable environmental data and building operating conditions. Monitoring is an interim measure required to evaluate exposures related to soil vapor intrusion until contaminated environmental media are remediated.

Mitigate: We recommend mitigation to minimize current or potential exposures associated with soil vapor intrusion. The most common mitigation methods are sealing preferential pathways in conjunction with installing a sub-slab depressurization system and changing the pressurization of the building in conjunction with monitoring. The type, or combination of types, of mitigation is determined on a building-specific basis, taking into account building construction and operating conditions. Mitigation is considered a temporary measure implemented to address exposures related to soil vapor intrusion until contaminated environmental media are remediated.

These general recommendations are made with consideration being given to the additional notes on page 2.

ADDITIONAL NOTES FOR MATRIX B

This matrix summarizes actions recommended to address current and potential exposures related to soil vapor intrusion. To use the matrix appropriately as a tool in the decision-making process, the following should be noted:

[1] The matrix is generic. As such, it may be appropriate to modify a recommended action to accommodate analyte-specific, building-specific conditions (e.g., dirt floor in basement, crawl spaces, thick slabs, current occupancy, etc.), and/or factors provided in Section 3.2 of the guidance (e.g., current land use, environmental conditions, etc.). For example, collection of additional samples may be recommended when the matrix indicates "no further action" for a particular building, but the results of adjacent buildings (especially sub-slab vapor results) indicate a need to take actions to address exposures related to soil vapor intrusion. Mitigation might be recommended when the results of multiple contaminants indicate monitoring is recommended. Proactive actions may be proposed at any time. For example, the party implementing the actions may decide to install sub-slab depressurization systems on buildings where the matrix indicates "no further action" or "monitoring." Such an action might be undertaken for reasons other than public health (e.g., seeking community acceptance, reducing costs, etc.). However, actions implemented *in lieu* of sampling will typically be expected to be captured in the final engineering report and site management plan, and might not rule out the need for post-implementation sampling (e.g., to document effectiveness or to support terminating the action).

[2] Actions provided in the matrix are specific to addressing human exposures. Implementation of these actions does not preclude investigating possible sources of soil vapor contamination, nor does it preclude remediating contaminated soil vapor or the source of soil vapor contamination.

[3] Appropriate care should be taken during all aspects of sample collection to ensure that high quality data are obtained. Since the data are being used in the decision-making process, the laboratory analyzing the environmental samples must have current Environmental Laboratory Approval Program (ELAP) certification for the appropriate analyte and environmental matrix combinations. Furthermore, samples should be analyzed by methods that can achieve a minimum reporting limit of 1 microgram per cubic meter for indoor and outdoor air samples. For sub-slab vapor samples and dirt floor soil vapor samples, a minimum reporting limit of 1 microgram per cubic meter is recommended.

[4] Sub-slab vapor and indoor air samples are typically collected when the likelihood of soil vapor intrusion is considered to be the greatest (i.e., worst-case conditions). If samples are collected at other times (typically, samples collected outside of the heating season), then resampling during worst-case conditions might be appropriate to verify that actions taken to address exposures related to soil vapor intrusion are protective of human health.

[5] When current exposures are attributed to sources other than soil vapor intrusion, the agencies should be given documentation (e.g., applicable environmental data, completed indoor air sampling questionnaire, digital photographs, etc.) to support a proposed action other than that provided in the matrix box and to support agency assessment and follow-up.

[6] The party responsible for implementing the recommended actions will differ depending upon several factors, including but not limited to the following: the identified source of the volatile chemicals, the environmental remediation program, and analyte-specific, site-specific and building-specific factors.

Soil Vapor/Indoor Air Matrix C

May 2017

Analytes Assigned:
Vinyl Chloride

	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m^3)	
SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m^3)	< 0.2	0.2 and above
< 6	1. No further action	2. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
6 to < 60	3. MONITOR	4. MITIGATE
60 and above	5. MITIGATE	6. MITIGATE

No further action: No additional actions are recommended to address human exposures.

Identify Source(s) and Resample or Mitigate: We recommend that reasonable and practical actions be taken to identify the source(s) affecting the indoor air quality and that actions be implemented to reduce indoor air concentrations to within background ranges. For example, if an indoor or outdoor air source is identified, we recommend the appropriate party implement actions to reduce the levels. In the event that indoor or outdoor sources are not readily identified or confirmed, resampling (which might include additional sub-slab vapor and indoor air sampling locations) is recommended to demonstrate that SVI mitigation actions are not needed. Based on the information available, mitigation might also be recommended when soil vapor intrusion cannot be ruled out.

Monitor: We recommend monitoring (sampling on a recurring basis), including but not necessarily limited to sub-slab vapor, basement air and outdoor air sampling, to determine whether concentrations in the indoor air or sub-slab vapor have changed and/or to evaluate temporal influences. Monitoring might also be recommended to determine whether existing building conditions (e.g., positive pressure heating, ventilation and air-conditioning systems) are maintaining the desired mitigation endpoint and to determine whether changes are needed. The type and frequency of monitoring is determined based on site-, building- and analyte-specific information, taking into account applicable environmental data and building operating conditions. Monitoring is an interim measure required to evaluate exposures related to soil vapor intrusion until contaminated environmental media are remediated.

Mitigate: We recommend mitigation to minimize current or potential exposures associated with soil vapor intrusion. The most common mitigation methods are sealing preferential pathways in conjunction with installing a sub-slab depressurization system and changing the pressurization of the building in conjunction with monitoring. The type, or combination of types, of mitigation is determined on a building-specific basis, taking into account building construction and operating conditions. Mitigation is considered a temporary measure implemented to address exposures related to soil vapor intrusion until contaminated environmental media are remediated.

These general recommendations are made with consideration being given to the additional notes on page 2.

ADDITIONAL NOTES FOR MATRIX C

This matrix summarizes actions recommended to address current and potential exposures related to soil vapor intrusion. To use the matrix appropriately as a tool in the decision-making process, the following should be noted:

[1] The matrix is generic. As such, it may be appropriate to modify a recommended action to accommodate analyte-specific, building-specific conditions (e.g., dirt floor in basement, crawl spaces, thick slabs, current occupancy, etc.), and/or factors provided in Section 3.2 of the guidance (e.g., current land use, environmental conditions, etc.). For example, collection of additional samples may be recommended when the matrix indicates "no further action" for a particular building, but the results of adjacent buildings (especially sub-slab vapor results) indicate a need to take actions to address exposures related to soil vapor intrusion. Mitigation might be recommended when the results of multiple contaminants indicate monitoring is recommended. Proactive actions may be proposed at any time. For example, the party implementing the actions may decide to install sub-slab depressurization systems on buildings where the matrix indicates "no further action" or "monitoring." Such an action might be undertaken for reasons other than public health (e.g., seeking community acceptance, reducing costs, etc.). However, actions implemented *in lieu* of sampling will typically be expected to be captured in the final engineering report and site management plan, and might not rule out the need for post-implementation sampling (e.g., to document effectiveness or to support terminating the action).

[2] Actions provided in the matrix are specific to addressing human exposures. Implementation of these actions does not preclude investigating possible sources of soil vapor contamination, nor does it preclude remediating contaminated soil vapor or the source of soil vapor contamination.

[3] Appropriate care should be taken during all aspects of sample collection to ensure that high quality data are obtained. Since the data are being used in the decision-making process, the laboratory analyzing the environmental samples must have current Environmental Laboratory Approval Program (ELAP) certification for the appropriate analyte and environmental matrix combinations. Furthermore, samples should be analyzed by methods that can achieve a minimum reporting limit of 0.20 microgram per cubic meter for indoor and outdoor air samples. For sub-slab vapor samples and dirt floor soil vapor samples, a minimum reporting limit of 1 microgram per cubic meter is recommended.

[4] Sub-slab vapor and indoor air samples are typically collected when the likelihood of soil vapor intrusion is considered to be the greatest (i.e., worst-case conditions). If samples are collected at other times (typically, samples collected outside of the heating season), then resampling during worst-case conditions might be appropriate to verify that actions taken to address exposures related to soil vapor intrusion are protective of human health.

[5] When current exposures are attributed to sources other than soil vapor intrusion, the agencies should be given documentation (e.g., applicable environmental data, completed indoor air sampling questionnaire, digital photographs, etc.) to support a proposed action other than that provided in the matrix box and to support agency assessment and follow-up.

[6] The party responsible for implementing the recommended actions will differ depending upon several factors, including but not limited to the following: the identified source of the volatile chemicals, the environmental remediation program, and analyte-specific, site-specific and building-specific factors.

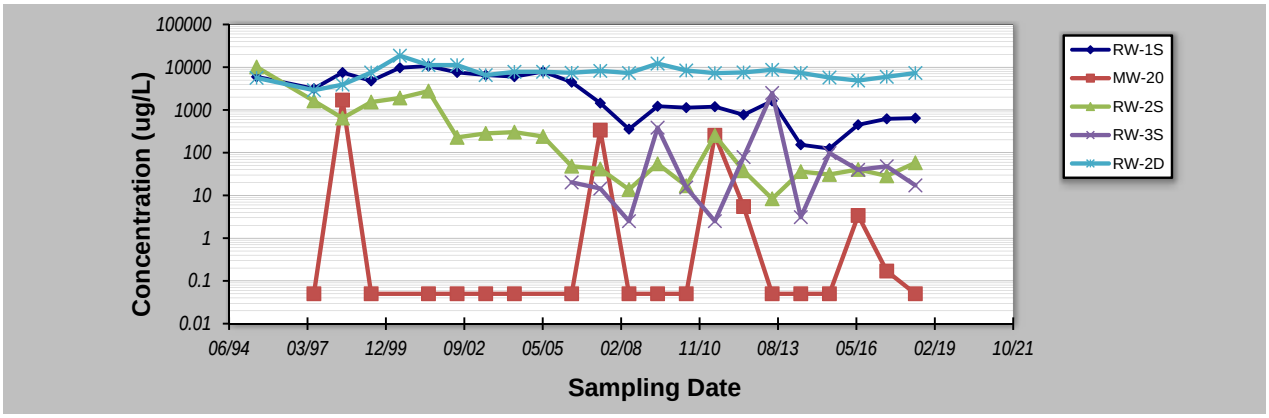
Appendix C
Mann-Kendall Trend Analyses

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 27-Feb-19
Facility Name: Hope-Essex
Conducted By: David Mitchell

Job ID: Total CVOC-Average Annual (long records)
Constituent: Total CVOCs
Concentration Units: ug/L

Sampling Point ID:	RW-1S	MW-20	RW-2S	RW-3S	RW-2D		
Sampling Event	Sampling Date	TOTAL CVOCS CONCENTRATION (ug/L)						
1	1-Jun-95	5,973		10,100		5,632		
2	1-Jun-97	3,152	0.05	1,620		2,901		
3	1-Jun-98	7,516	1,700	644		3,911		
4	1-Jun-99	4,792	0.05	1,531		7,530		
5	1-Jun-00	9,718		1,907		18,587		
6	1-Jun-01	10,650	0.05	2,759		11,212		
7	1-Jun-02	7,551	0.05	228		11,212		
8	1-Jun-03	6,538	0.05	283		6,523		
9	1-Jun-04	6,008	0.05	302		7,805		
10	1-Jun-05	7,903		240		7,800		
11	1-Jun-06	4,468	0.05	48.2	20.3	7,407		
12	1-Jun-07	1,447	337	41.7	14.5	8,196		
13	1-Jun-08	356	0.05	13.8	2.50	7,317		
14	1-Jun-09	1,221	0.05	54.9	385	12,148		
15	1-Jun-10	1,134	0.05	16.8	15.4	8,392		
16	1-Jun-11	1,194	255	252	2.50	7,270		
17	1-Jun-12	769	5.50	37.7	78.8	7,543		
18	1-Jun-13	1,626	0.05	8.35	2,502	8,693		
19	1-Jun-14	153	0.05	36.1	3.10	7,365		
20	1-Jun-15	125	0.05	30.9	98.4	5,731		
21	1-Jun-16	450	3.40	40.5	39.8	4,869		
22	1-Jun-17	620	0.17	28.7	48.1	5,957		
23	1-Jun-18	644	0.05	58.1	17.2	7,307		
24								
25								
Coefficient of Variation:		0.93	2.80	2.55	2.76	0.40		
Mann-Kendall Statistic (S):		-147	16	-67	11	-20		
Confidence Factor:		>99.9%	72.9%	99.5%	72.5%	69.0%		
Concentration Trend:		Decreasing	No Trend	Decreasing	No Trend	Stable		



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

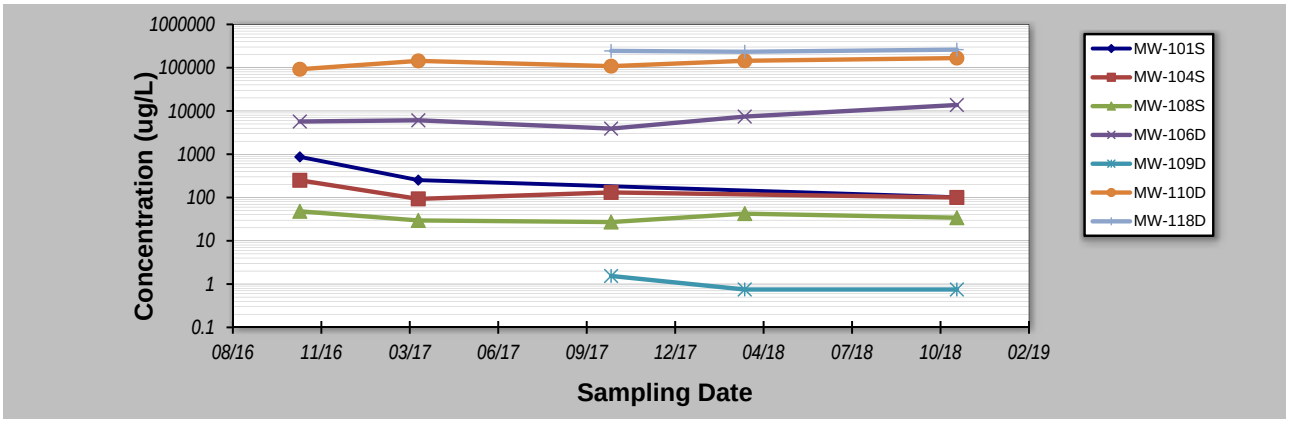
4 Due to large number of data, concentrations were averaged on an annual basis

5 Values shown in red are non-detect. All ND results were re-censored to the same value below the lowest detected concentrations

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	27-Feb-19	Job ID:	CVOC-recent
Facility Name:	Hope-Essex	Constituent:	Total CVOCs
Conducted By:	David Mitchell	Concentration Units:	ug/L

Sampling Point ID:	MW-101S	MW-104S	MW-108S	MW-106D	MW-109D	MW-110D	MW-118D
Sampling Event	Sampling Date	TOTAL CVOCS CONCENTRATION (ug/L)						
1	1-Nov-16	870	250	48.0	5,700		92,000	
2	15-Mar-17	253	93.0	29.5	6,084		143,430	
3	19-Oct-17		131	27.1	3,908	1.54	108,500	243,832
4	19-Mar-18			42.5	7,418	0.75	144,350	233,200
5	14-Nov-18	101	100	34.1	13,746	0.75	166,610	261,210
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		1.00	0.51	0.24	0.51	0.45	0.23	0.06
Mann-Kendall Statistic (S):		-3	-2	-2	6	-2	8	1
Confidence Factor:			62.5%	59.2%	88.3%		95.8%	
Concentration Trend:			Stable	Stable	No Trend		Increasing	



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
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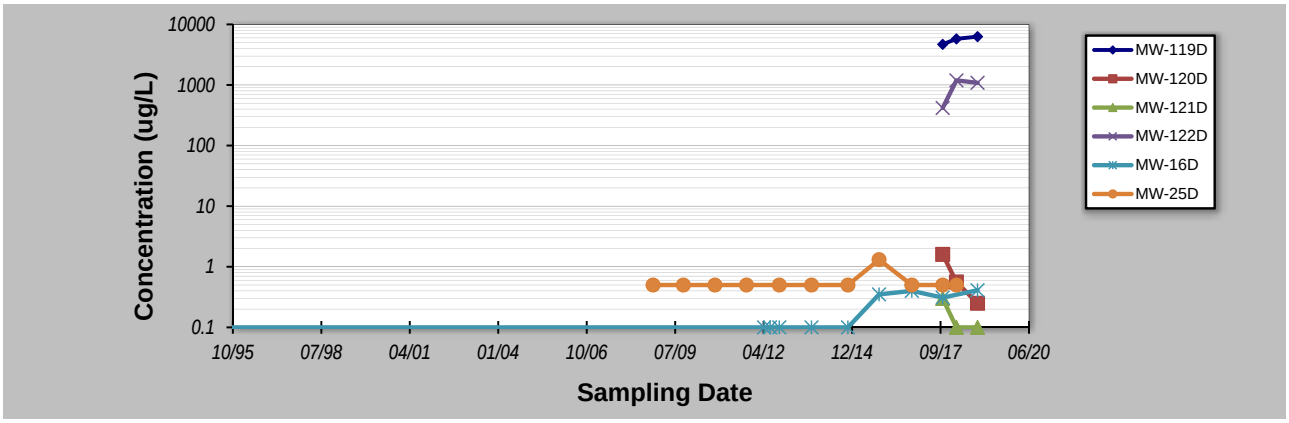
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: **27-Feb-19**
Facility Name: **Hope-Essex**
Conducted By: **David Mitchell**

Job ID: **Additional Wells**
Constituent: **Total CVOCs**
Concentration Units: **ug/L**

Sampling Point ID:	MW-119D	MW-120D	MW-121D	MW-122D	MW-16D	MW-25D	
Sampling Event	Sampling Date	TOTAL CVOCS CONCENTRATION (ug/L)						
1	1-Aug-95					0.10		
2	29-Oct-08						0.50	
3	6-Oct-09						0.50	
4	28-Sep-10						0.50	
5	20-Sep-11						0.50	
6	5-Apr-12					0.10		
7	12-Jun-12					0.10		
8	25-Sep-12					0.10	0.50	
9	24-Sep-13					0.10	0.50	
10	10-Nov-14					0.10	0.50	
11	27-Oct-15					0.35	1.31	
12	1-Nov-16					0.40	0.50	
13	16-Oct-17	4,685	1.60	0.30	418	0.31	0.50	
14	20-Mar-18	5,767	0.56	0.10	1,191		0.50	
15	14-Nov-18	6,280	0.25	0.10	1,087	0.41		
16								
17								
18								
19								
20								
Coefficient of Variation:		0.15	0.88	0.69	0.47	0.68	0.43	
Mann-Kendall Statistic (S):		3	-3	-2	1	26	4	
Confidence Factor:						98.9%	59.0%	
Concentration Trend:						Increasing	No Trend	



Notes:

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2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.
4. Values shown in red are non-detect. All ND results were re-censored to the same value below the lowest detected concentrations

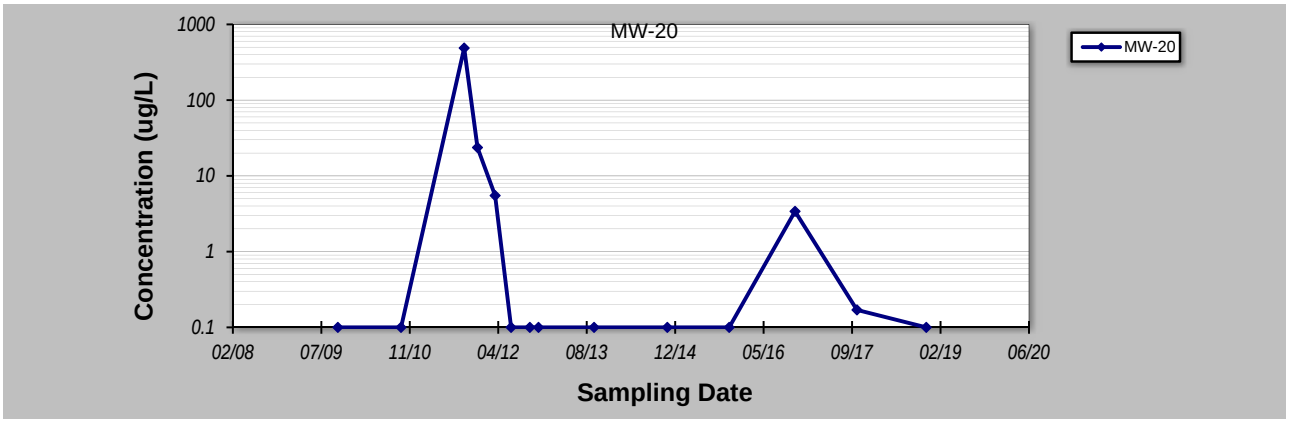
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: **27-Feb-19**
Facility Name: **Hope-Essex**
Conducted By: **David Mitchell**

Job ID: **Shallow CVOC-last 10 years**
Constituent: **Total CVOCs**
Concentration Units: **ug/L**

Sampling Point ID: **MW-20**

Sampling Event	Sampling Date	TOTAL CVOCS CONCENTRATION (ug/L)
1	7-Oct-09	0.10
2	29-Sep-10	0.10
3	21-Sep-11	487
4	5-Dec-11	23.7
5	14-Mar-12	5.50
6	12-Jun-12	0.10
7	26-Sep-12	0.10
8	14-Nov-12	0.10
9	24-Sep-13	0.10
10	12-Nov-14	0.10
11	28-Oct-15	0.10
12	3-Nov-16	3.40
13	19-Oct-17	0.17
14	15-Nov-18	0.10
15		
16		
17		
18		
19		
20		
Coefficient of Variation:		**3.49**
Mann-Kendall Statistic (S):		**-11**
Confidence Factor:		**70.5%**
Concentration Trend:		No Trend



Notes:

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2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.
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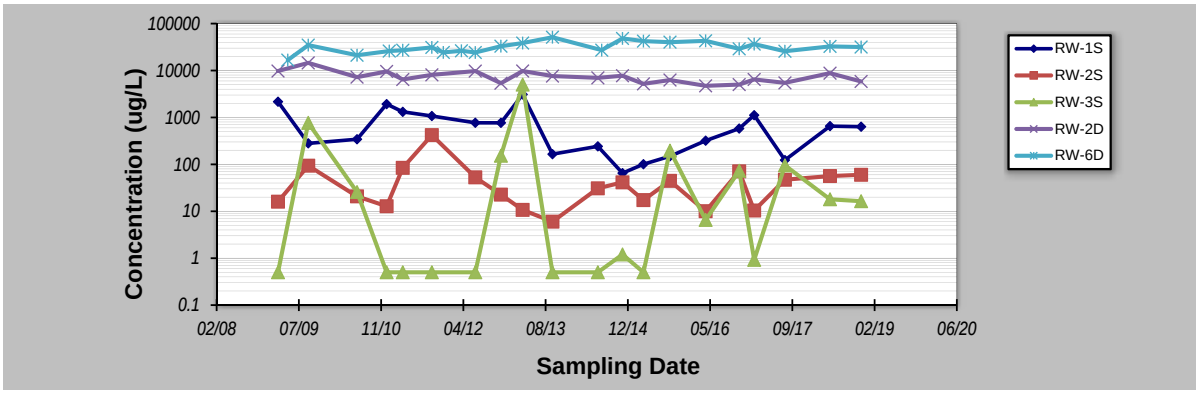
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	27-Feb-19	Job ID:	CVOC-last 10 years
Facility Name:	Hope-Essex	Constituent:	Total CVOCs
Conducted By:	David Mitchell	Concentration Units:	ug/L

Sampling Point ID:	RW-1S	RW-2S	RW-3S	RW-2D	RW-6D		
Sampling Event	Sampling Date	TOTAL CVOCS CONCENTRATION (ug/L)						
1	1-Mar-09	2,161	16.0	0.50	9,757			
2	29-Apr-09					16,688		
3	1-Sep-09	280	93.7	765	14,539	34,815		
4	24-Jun-10	343	20.8	25.7	7,227	21,184		
5	21-Dec-10	1,925	12.8	0.50	9,558			
6	6-Jan-11					26,000		
7	29-Mar-11	1,316	84.2	0.50	6,448	27,062		
8	22-Sep-11	1,072	420	0.50	8,093	31,050		
9	1-Dec-11					24,297		
10	20-Mar-12					26,369		
11	12-Jun-12	770	52.8	0.50	9,729	24,200		
12	15-Nov-12	768	22.6	153	5,357	32,995		
13	27-Mar-13	3,088	10.7	5,000	9,767	38,499		
14	24-Sep-13	165	6.00	0.50	7,620	51,182		
15	27-Jun-14	242	30.8	0.50	6,973			
16	21-Jul-14					27,156		
17	24-Nov-14	65.0	41.4	1.20	7,757	48,268		
18	31-Mar-15	101	17.3	0.50	5,192	42,306		
19	9-Sep-15	149	44.5	196	6,271	40,212		
20	13-Apr-16	320	10.1	6.54	4,719	42,958		
21	3-Nov-16	580	71.0	73.0	5,018	28,996		
22	2-Feb-17	1,117	10.4	0.92	6,460	36,571		
23	8-Aug-17	123	47.0	95.2	5,454	25,742		
24	9-May-18	653	56.3	18.0	8,770	32,652		
25	14-Nov-18	634	59.8	16.4	5,843	31,651		
26								
27								
28								
29								
30								
Coefficient of Variation:		1.01	1.60	3.57	0.24	0.27		
Mann-Kendall Statistic (S):		-48	0	33	-30	71		
Confidence Factor:		93.6%	48.2%	92.4%	90.3%	97.6%		
Concentration Trend:		Prob. Decreasing	No Trend	Prob. Increasing	Prob. Decreasing	Increasing		



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.
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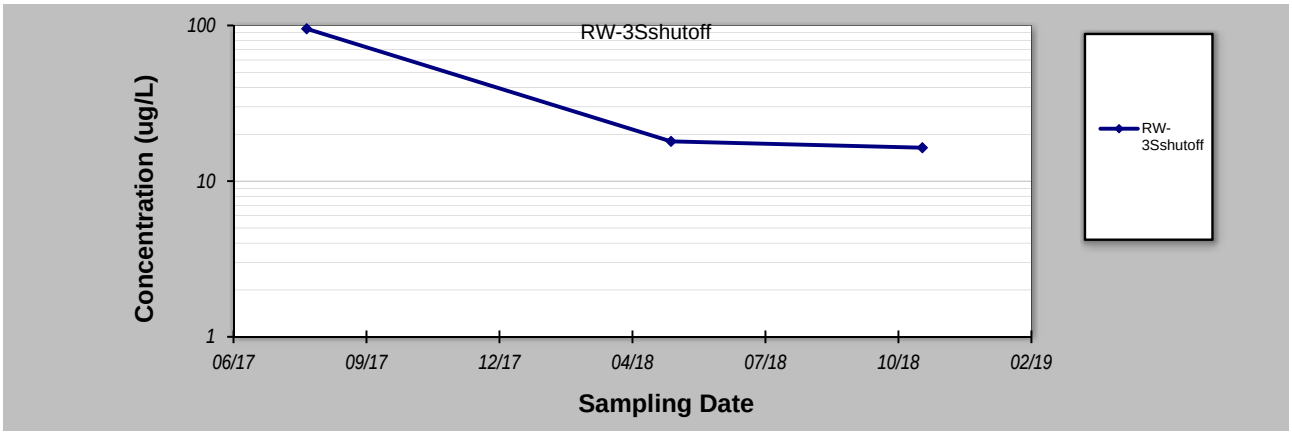
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: **27-Feb-19**
Facility Name: **Hope-Essex**
Conducted By: **David Mitchell**

Job ID: **RW3S since shutoff**
Constituent: **Total CVOCs**
Concentration Units: **ug/L**

Sampling Point ID: **RW-3Sshutoff**

Sampling Event	Sampling Date	TOTAL CVOCS CONCENTRATION (ug/L)
1	8-Aug-17	95.2
2	9-May-18	18.0
3	14-Nov-18	16.4
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
Coefficient of Variation:		1.04
Mann-Kendall Statistic (S):		-3
Confidence Factor:		
Concentration Trend:		



Notes:

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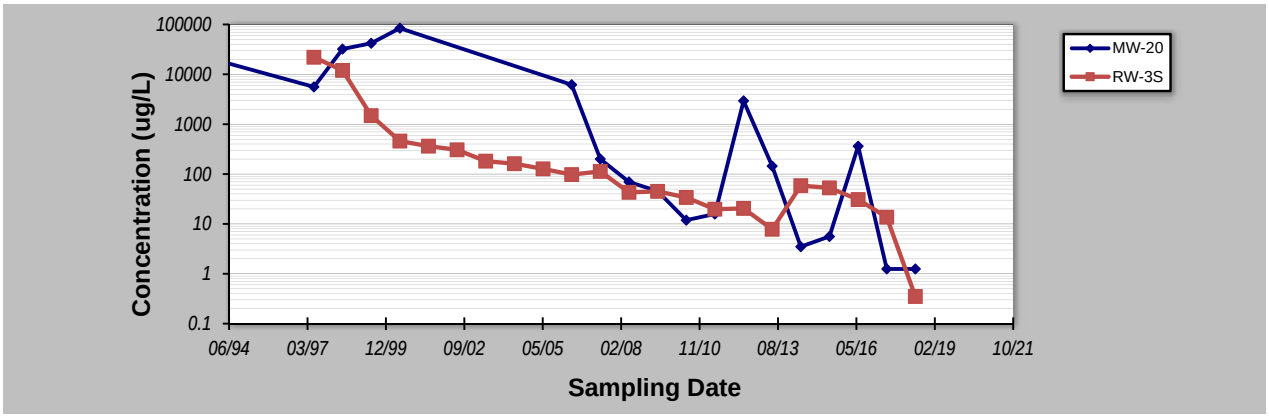
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: **27-Feb-19**
Facility Name: **Hope-Essex**
Conducted By: **David Mitchell**

Job ID: **Total CBTEX-Average Annual (long records)**
Constituent: **Total CBTEX**
Concentration Units: **ug/L**

Sampling Point ID:	MW-20	RW-3S					
Sampling Event	Sampling Date	TOTAL CBTEX CONCENTRATION (ug/L)						
1	1-Jun-93	23,890						
2	1-Jun-97	5,599	22,007					
3	1-Jun-98	32,153	11,984					
4	1-Jun-99	42,040	1,486					
5	1-Jun-00	84,203	458					
6	1-Jun-01		363					
7	1-Jun-02		306					
8	1-Jun-03		181					
9	1-Jun-04		162					
10	1-Jun-05		127					
11	1-Jun-06	6,182	97.6					
12	1-Jun-07	200	113					
13	1-Jun-08	69.5	43.0					
14	1-Jun-09	45.5	45.0					
15	1-Jun-10	11.9	34.0					
16	1-Jun-11	15.8	19.8					
17	1-Jun-12	2,936	20.5					
18	1-Jun-13	145	7.80					
19	1-Jun-14	3.50	58.6					
20	1-Jun-15	5.60	52.9					
21	1-Jun-16	362	30.9					
22	1-Jun-17	1.25	13.6					
23	1-Jun-18	1.25	0.35					
24								
25								
Coefficient of Variation:		**2.02**	**1.11**					
Mann-Kendall Statistic (S):		**-94**	**-115**					
Confidence Factor:		**>99.9%**	**>99.9%**					
Concentration Trend:		Decreasing	Decreasing					



Notes:

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4. Due to large number of data, concentrations were averaged on an annual basis
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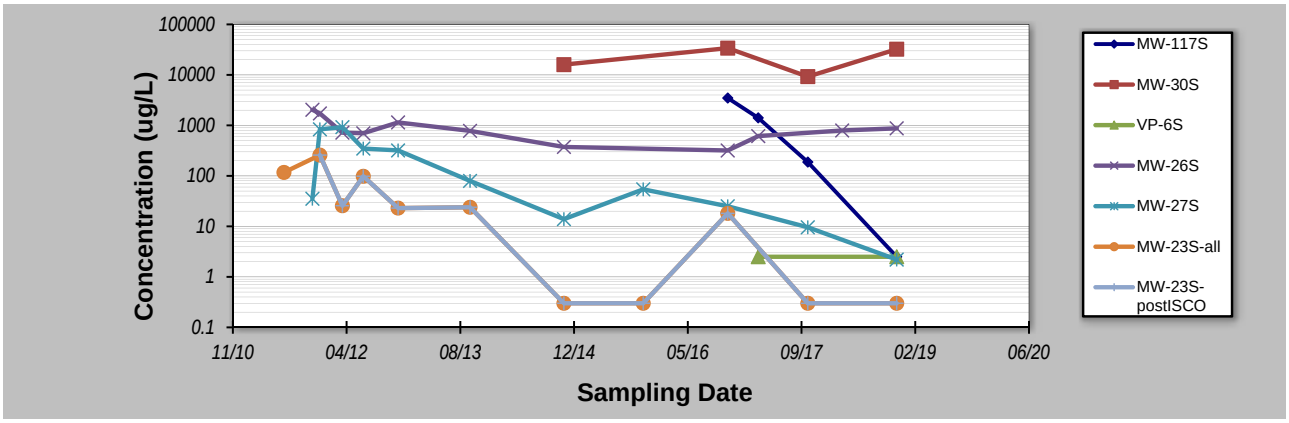
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: **27-Feb-19**
Facility Name: **Hope-Essex**
Conducted By: **David Mitchell**

Job ID:
Constituent: **Total CBTEX**
Concentration Units: **ug/L**

Sampling Point ID:	MW-117S	MW-30S	VP-6S	MW-26S	MW-27S	MW-23S-all	MW-23S-postISCO
Sampling Event	Sampling Date	TOTAL CBTEX CONCENTRATION (ug/L)						
1	30-Jun-11						117	
2	2-Nov-11				2,039	35.2		
3	5-Dec-11				1,725	836	258	258
4	13-Mar-12				719	923	25.6	25.6
5	13-Jun-12				697	348	98.2	98.2
6	13-Nov-12				1,145	319	23.0	23.0
7	25-Sep-13				779	79.4	23.9	23.9
8	12-Nov-14		15,956		374	13.9	0.30	0.30
9	27-Oct-15					54.2	0.30	0.30
10	1-Nov-16	3,479	33,877		319	25.0	18.1	18.1
11	15-Mar-17	1,409		2.50	613			
12	19-Oct-17	187.6	9,237			9.60	0.30	0.30
13	19-Mar-18				792			
14	14-Nov-18	2.50	32,220	2.50	874	2.20	0.30	0.30
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		1.26	0.53	0.00	0.58	0.97	1.54	1.80
Mann-Kendall Statistic (S):		-6	0	0	-17	-6	-39	-31
Confidence Factor:		95.8%	37.5%		89.1%	88.3%	99.9%	99.8%
Concentration Trend:		Decreasing	Stable		Stable	Stable	Decreasing	Decreasing



Notes:

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3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.
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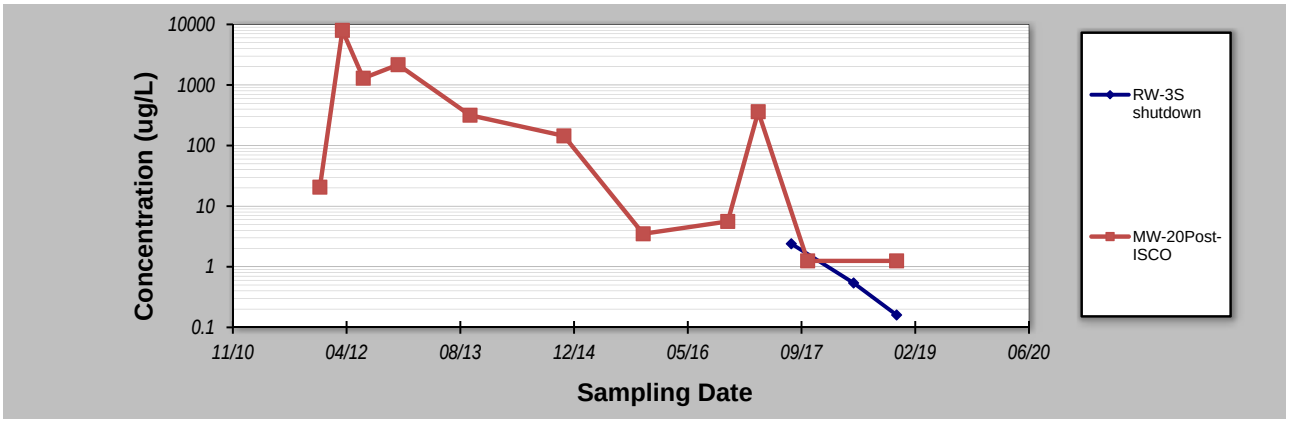
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: **27-Feb-19**
Facility Name: **Hope-Essex**
Conducted By: **David Mitchell**

Job ID: **RW-3S After Shutoff, MW-20 after 2011 ISCO**
Constituent: **Total CBTEX**
Concentration Units: **ug/L**

Sampling Point ID:	RW-3S shutdown	MW-20Post-ISCO					
Sampling Event	Sampling Date	TOTAL CBTEX CONCENTRATION (ug/L)						
1	5-Dec-11		20.6					
2	13-Mar-12		7,971					
3	13-Jun-12		1,294					
4	13-Nov-12		2,161					
5	25-Sep-13		317					
6	12-Nov-14		145					
7	27-Oct-15		3.50					
8	1-Nov-16		5.60					
9	15-Mar-17		362					
10	8-Aug-17	2.40						
11	19-Oct-17		1.25					
12	9-May-18	0.54						
13	14-Nov-18	0.16	1.25					
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		**1.16**	**2.13**					
Mann-Kendall Statistic (S):		**-3**	**-30**					
Confidence Factor:			**99.0%**					
Concentration Trend:			Decreasing					



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

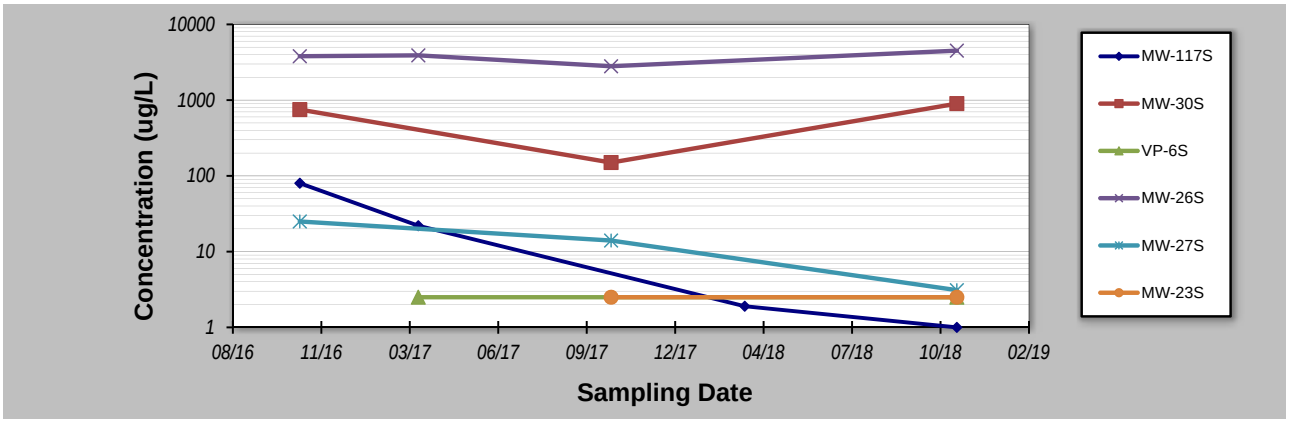
4 Values shown in red are non-detect. All ND results were re-censored to the same value below the lowest detected concentrations

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: **27-Feb-19**
Facility Name: **Hope-Essex**
Conducted By: **David Mitchell**

Job ID:
Constituent: **1,2,4-Trimethylbenzene**
Concentration Units: **ug/L**

Sampling Point ID:	MW-117S	MW-30S	VP-6S	MW-26S	MW-27S	MW-23S	
Sampling Event	Sampling Date	1,2,4-TRIMETHYLBENZENE CONCENTRATION (ug/L)						
1	1-Nov-16	80.0	750		3,800	25.0		
2	15-Mar-17	22.0		2.50	3,900			
3	19-Oct-17		150		2,800	14.0	2.50	
4	19-Mar-18	1.90						
5	14-Nov-18	1.00	900	2.50	4,500	3.10	2.50	
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		1.42	0.66	0.00	0.19		0.00	
Mann-Kendall Statistic (S):		-6	1	0	2		0	
Confidence Factor:		95.8%			62.5%			
Concentration Trend:		Decreasing			No Trend			



Notes:

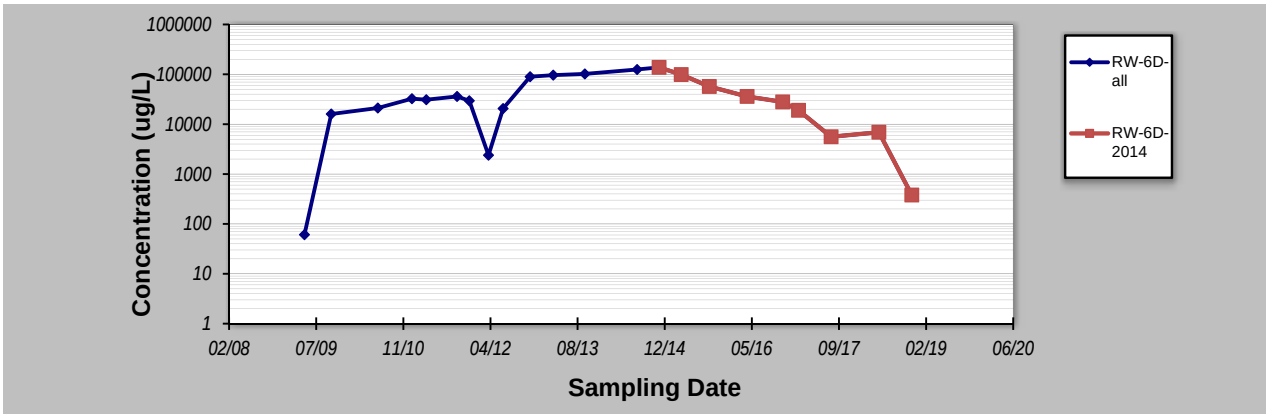
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.
4. Values shown in red are non-detect. All ND results were re-censored to the same value below the lowest detected concentrations

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: **27-Feb-19**
Facility Name: **Hope-Essex**
Conducted By: **David Mitchell**

Job ID: **RW-6D - last 10 years and since 2014**
Constituent: **Acetone**
Concentration Units: **ug/L**

Sampling Point ID:	RW-6D-all	RW-6D-2014					
Sampling Event	Sampling Date	ACETONE CONCENTRATION (ug/L)						
1	29-Apr-09	60.8						
2	30-Sep-09	16,000						
3	24-Jun-10	21,100						
4	6-Jan-11	32,500						
5	29-Mar-11	31,000						
6	22-Sep-11	36,000						
7	1-Dec-11	29,500						
8	20-Mar-12	2,390						
9	12-Jun-12	20,600						
10	14-Nov-12	89,600						
11	27-Mar-13	96,300						
12	24-Sep-13	102,000						
13	21-Jul-14	125,000						
14	24-Nov-14	138,000	138,000					
15	31-Mar-15	99,000	99,000					
16	9-Sep-15	57,000	57,000					
17	13-Apr-16	36,000	36,000					
18	3-Nov-16	28,000	28,000					
19	2-Feb-17	19,000	19,000					
20	8-Aug-17	5,600	5,600					
21	9-May-18	6,900	6,900					
22	14-Nov-18	380	380					
23								
24								
25								
Coefficient of Variation:		**0.95**	**1.09**					
Mann-Kendall Statistic (S):		**6**	**-34**					
Confidence Factor:		**55.5%**	**>99.9%**					
Concentration Trend:		No Trend	Decreasing					

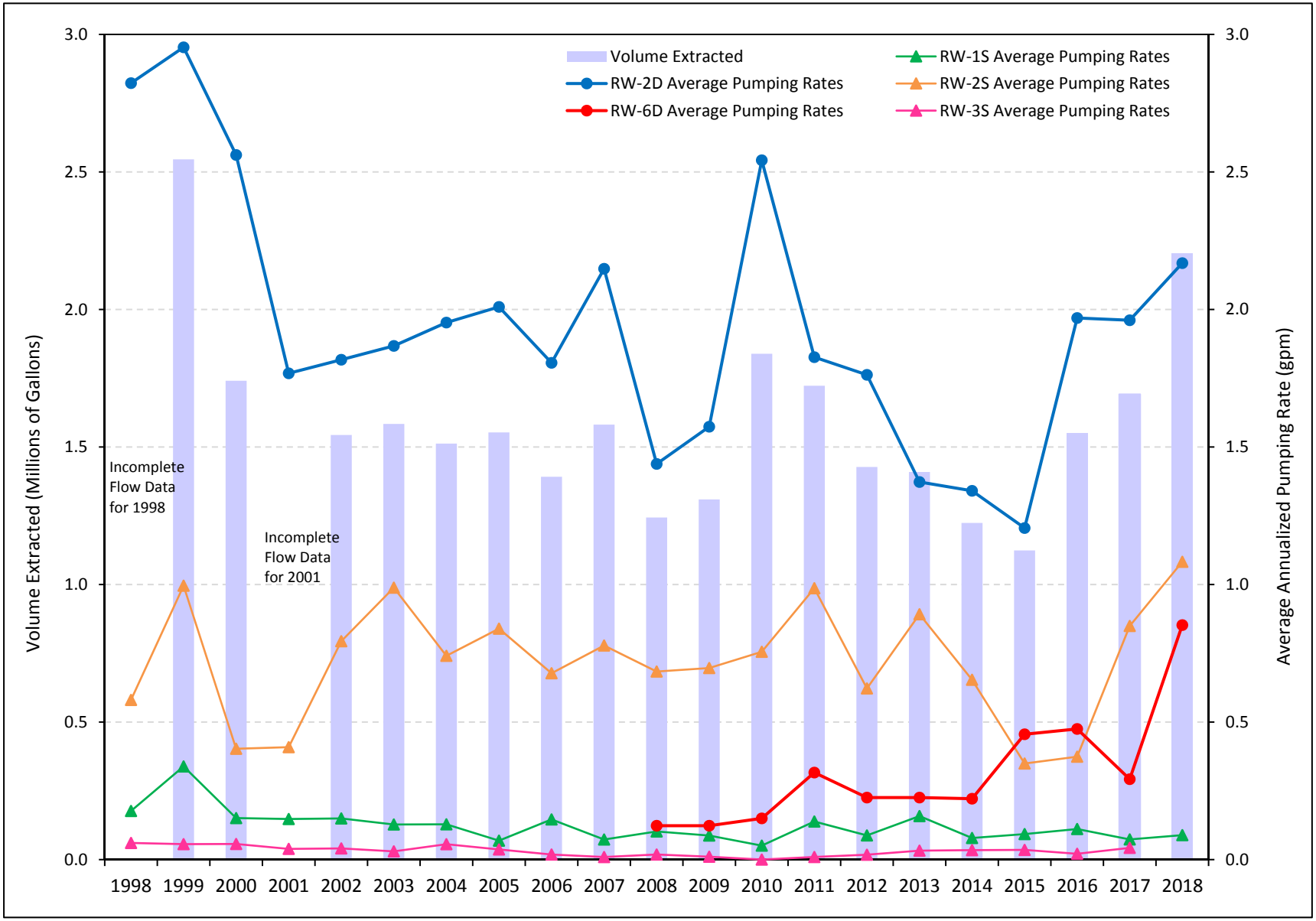


Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

Appendix D
Groundwater Extraction Monitoring Data

Appendix D1
Groundwater Extraction System Data



Notes:

1. Volume extracted in 2018 includes January through June data only.
2. Pumping rates for 2018 were averaged over 365-day reporting period.
3. RW-3S was taken off-line in August 2017

FIGURE D1

Annual Groundwater Extraction by Recovery Well

2018 Annual Periodic Review Report

Essex/Hope Site, Jamestown, New York

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Appendix D2
Recovery Well Performance Data

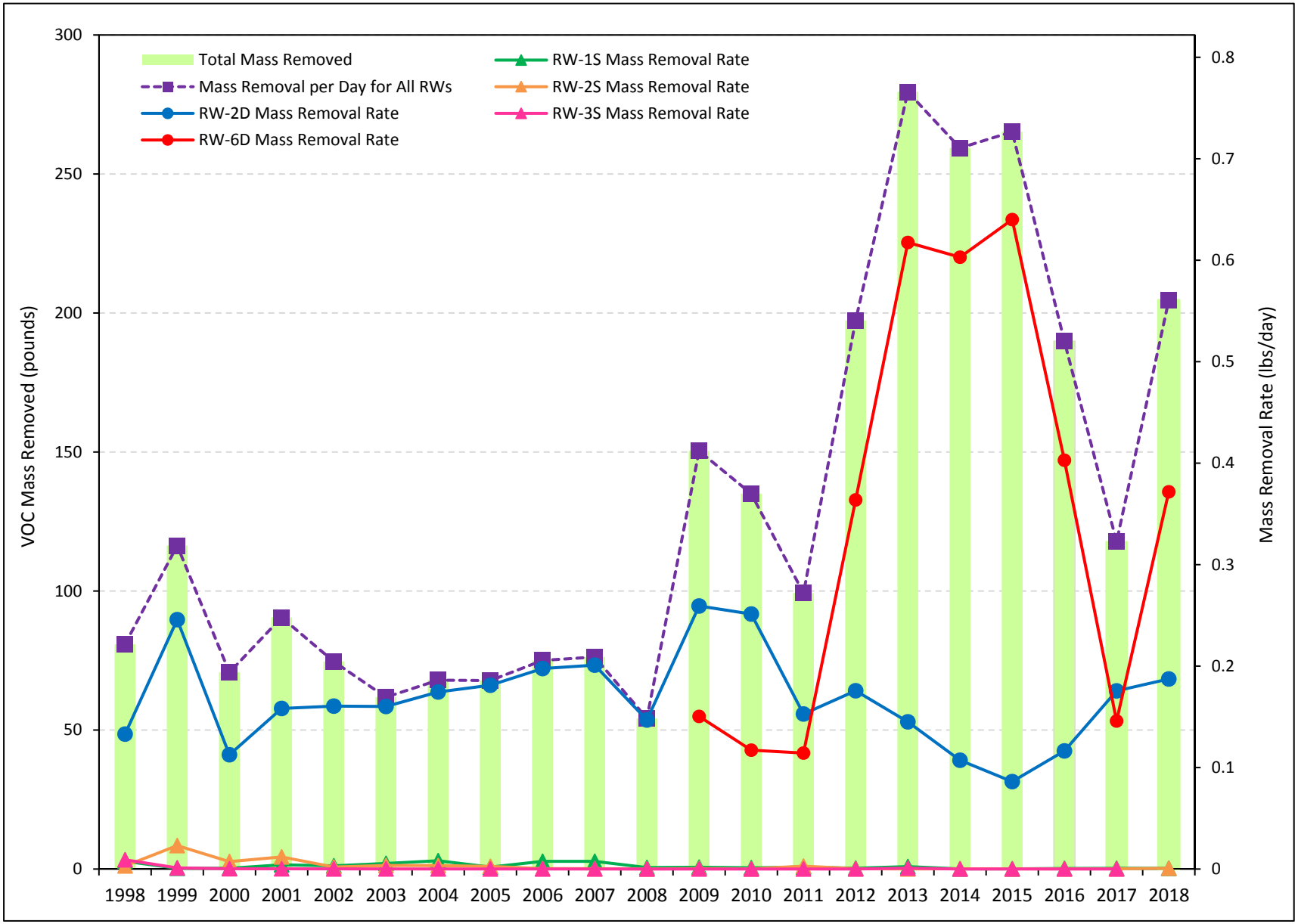


FIGURE D2

Annual VOC Mass Removed by Well

2018 Annual Periodic Review Report

Essex/Hope Site, Jamestown, New York

Notes:

1. Mass removal calculations include acetone, which is removed but not not treated.
2. VOC Mass Removed in 2018 includes January through December data.
3. RW-3S was taken off-line in August 2017.

RW = recovery well; VOC = volatile organic compound

JACOBS®

Appendix E
Groundwater Potentiometric Surface Maps

MW-109S
1263.64

Chadakoin River

Short St

MW-105S
1264.83

MW-108S
1263.6

MW-104S
1266.8

Bigelow Ave

1264

MW-107S
1263.52

1266.5

MW-106S
1265.16

MW-16S
1266.44

1264.5

1265

MW-25S
1264.5

MW-103S
1265.77

Hopkins Ave

MW-18
1265.4

Minsker St

1265.5

MW-15S
1266.28

MW-102S
1265.73

MW-14S
1267.31

MW-101S
1265.95

MW-19S
1265.98

VP-6S
1273.33

GP-5S
NM

1266.5

1266

PZ-6S
1267.19

PZ-1S
1268.6

MW-7S
1268.82

GP-3S
1268.01

1267

PZ-5S
1267.91

1267.5

MW-27S
1267

MW-6
1268.19

RW-2S

VP-1S
NM

GP-1S
1268.69

HW-2
1268.69

GP-4S
1268.65

1268

1268.5

MW-26S
1268.77

RW-5S
1269.22

VP-2S
NM

MW-20
1270.1

1269

MW-28S
1267.19

MW-11
1268.38

MW-10
1268.85

RW-1S

1270

VP-4S
NM

GP-2S
1269.61

HW-8
1270.66

1270.5

MW-12
1269.11

MW-23S
1270.75

HW-9
1270.06

HW-6
1269.43

MW-1
NM

VP-3S
NM

MW-24S
1269.92

1269.5

MW-112S
1269.46

MW-29S
1269.9

MW-13
1266.86

Blackstone Ave

MW-30S
1269.29

MW-31S
1269.73

RW-3S
1269.97

1269.5

HW-10
NM

MW-114S
1269.32

1270

MW-4
1271.04

1270.5

MW-116S
1269.77

1271

N

Type

- Monitoring Well
- Piezometer
- Recovery Well
- Inactive Recovery Well
- Groundwater Elevation Contour (Dashed where inferred)
- Chautauqua County Tax Parcels
- Extent of Capture Zone
- Approximate Site Boundary
- Chadakoin River

Note:
1. All elevations are in feet above mean sea level, NAVD88.
2. March 2018 pumping rates (gpm):
RW-1S: 0.12
RW-2S: 1.14
3. gpm = gallons per minute
4. VP-6S water level appears to be anomalous, not included in contouring.

BASE MAP SOURCE:
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

0 25 50 100
Scale in Feet

Essex Specialty Products, Inc	Essex/Hope Site, Jamestown, New York

FIGURE E1
Shallow WBZ Potentiometric Surface Map
March 21st, 2018
2018 Annual Periodic Review Report

CREATED BY: SL
REVIEWED BY: DM

JACOBS

MW-121D
1263.10

MW-109D
1263.30

MW-120D
1264.35

Short St

Bigelow Ave

Minsker St

MW-106D
1264.43

MW-110D
1264.91

MW-16D
1265.69

MW-22D
1265.58

MW-25D
1264.48

MW-122D
1264.74

MW-15D
1265.13

RW-6D

MW-21D
1265.99

MW-14D
1266.55

MW-119D
1266.58

MW-19D
1264.49

VP-6D
1265.41

VP-8D
1266.43

GP-5D
NM

PZ-1D
1266.84

PZ-2D
1259.89

RW-2D

GP-3D
1265.91

PZ-6D
1264.00

Hopkins Ave

MW-118D
1265.59

MW-123D
1266.66

PZ-4D
1260.04

PZ-3D
1266.66

GP-1D
NM

PZ-5D
1265.48

MW-17
1267.70

MW-11D
1266.82

GP-4D
1266.78

GP-2D
1266.43

RW-1D
1266.67

MW-111D
1266.65

MW-23D
1266.95

VP-7D
1265.57

Blackstone Ave

MW-113D
1267.05

MW-115D
1269.81

1265
1264.5
1265.5
1264
1263.5
1266
1266.5
1267
1267.5
1268
1268.5
1269
1269.5

Type

- Monitoring Well
- Piezometer
- Inactive Recovery Well
- Active Recovery Well
- Groundwater Elevation Contour (Dashed where inferred)
- Extent of Capture Zone
- Approximate Site Boundary
- Chautauqua County Tax Parcels

Note:
1. All elevations are in feet above mean sea level, NAVD88.
2. March 2018 pumping rates (gpm):
RW-2D: 2.34
RW-6D: 0.86
3. gpm = gallons per minute
4. PZ-2D and PZ-4D appear to have anomalous water levels, not included in contouring.

N

BASE MAP SOURCE:
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

0 25 50 100
Scale in Feet

Essex Specialty Products, Inc	Essex/Hope Site, Jamestown, New York

FIGURE E2
Deep WBZ Potentiometric Surface Map
March 21st, 2018
2018 Annual Periodic Review Report

CREATED BY: SL	JACOBS
REVIEWED BY: DM	

MW-109S
Dry

MW-105S
1263.4

MW-108S
1261.91

MW-107S
1261.91

MW-104S
1266.77

MW-106S
1263.58

MW-16S
1265.59

MW-103S
1264.76

MW-25S
1263.15

MW-15S
1265

MW-102S
1263.05

MW-18
1264.5

MW-14S
1265.59

MW-101S
1264.8

MW-19S
1264.51

GP-5S
NM

PZ-6S
1265.19

VP-6S
1266.3

RW-2S

PZ-1S
NM

VP-1S
NM

MW-6
1266.16

MW-7S
1268.07

GP-1S
1268.01

GP-3S
1266.91

PZ-5S
NM

MW-27S
1267.08

HW-2
NM

VP-2S
NM

MW-26S
1267.24

GP-4S
1268.18

GP-2S
1268.85

MW-28S
1267.42

MW-11
1266.33

MW-10
1268.3

MW-20
1268.58

RW-5S
1268.89

RW-1S

VP-4S
NM

HW-8
1269.6

HW-9
1268.95

VP-3S
NM

MW-12
1268.21

MW-23S
1269.55

HW-6
1268.68

MW-24S
1269.2

MW-1
NM

MW-112S
1268.85

MW-29S
1269.1

RW-3S
1269.74

MW-30S
1268.62

MW-13
1266.71

HW-10
1270.18

MW-31S
1268.89

MW-114S
1268.94

MW-4
1270.65

MW-116S
1269.26

1266.5
1266
1265.5
1265
1263.5
1263
1264
1264.5
1266.5
1267
1262.5
1262
1269
1267.5
1268
1269.5
1270
1270.5

Short St
Bigelow Ave
Minster St
Hopkins Ave
Blackstone Ave

Monitoring Well
Piezometer
Active Recovery Well
Inactive Recovery Well
Groundwater Elevation Contour (Dashed where inferred)
Chautauqua County Tax Parcels
Extent of Capture Zone
Chadakoin River
Approximate Site Boundary

Note:
1. All elevations are in feet above mean sea level, NAVD88.
2. June 2018 pumping rates (gpm):
RW-1S: 0.06
RW-2S: 0.37
3. gpm = gallons per minute

N

BASE MAP SOURCE:
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

0 25 50 100
Scale in Feet

Essex Specialty Products, Inc	Essex/Hope Site, Jamestown, New York

FIGURE E3
Shallow WBZ Potentiometric Surface Map
June 26th, 2018
2018 Annual Periodic Review Report

CREATED BY: SL	JACOBS
REVIEWED BY: DM	

Inactive Recovery Well

Monitoring Well

Piezometer

Active Recovery Well

Groundwater Elevation Contour (Dashed where inferred)

Extent of Capture Zone

Approximate Site Boundary

Chautauqua County Tax Parcels

Note:
1. All elevations are in feet above mean sea level, NAVD88.
2. June 2018 pumping rates (gpm):
RW-2D: 2.54
RW-6D: 2.06
3. gpm = gallons per minute
4. MW-14D, PZ-3D, and MW-123D water level appears anomalous, not included in contours.

N

BASE MAP SOURCE:
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

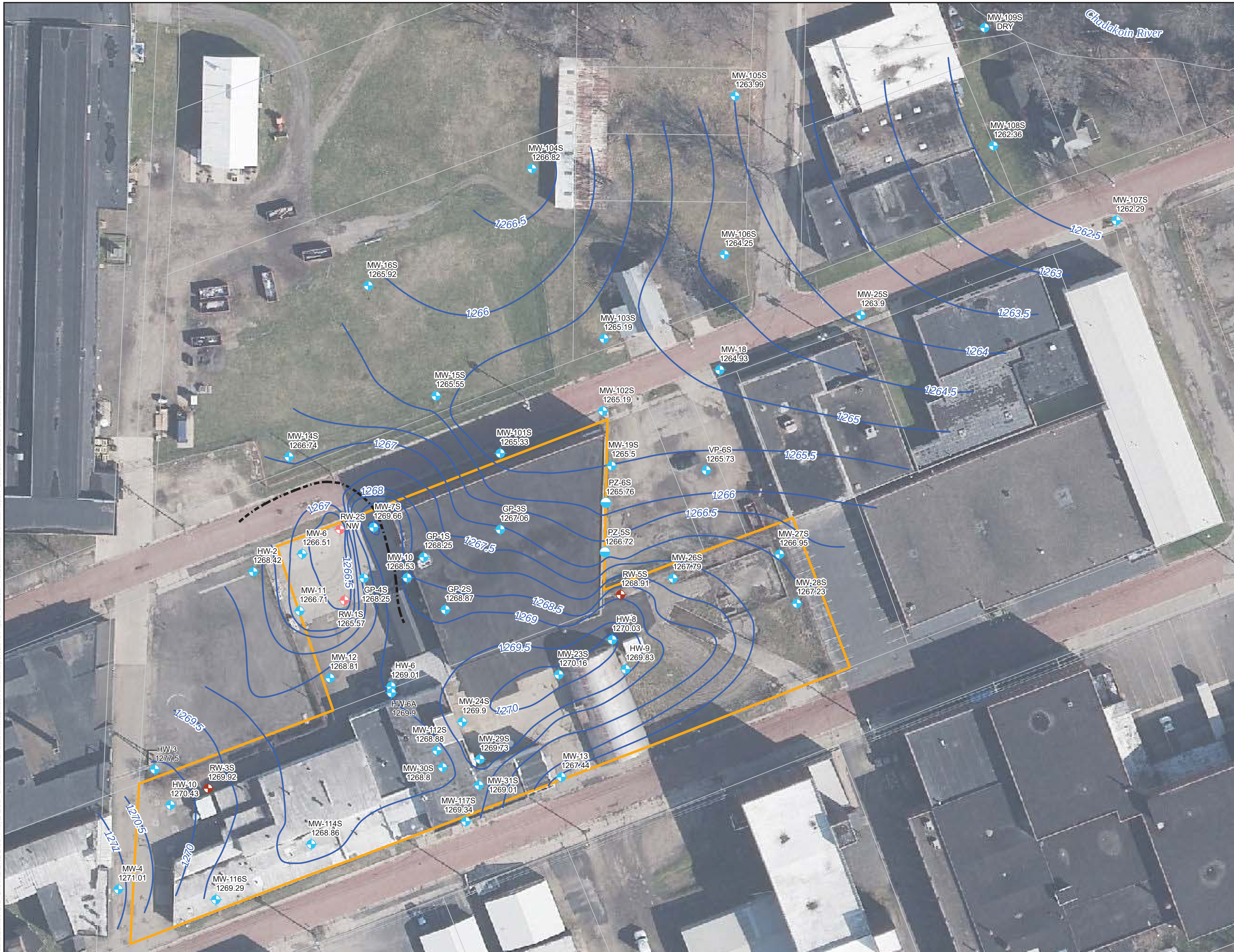
0 25 50 100
Scale in Feet

Essex Specialty Products, Inc	Essex/Hope Site, Jamestown, New York

FIGURE E4
Deep WBZ Potentiometric Surface Map
June 26th, 2018
2018 Annual Periodic Review Report

CREATED BY: SL	JACOBS
REVIEWED BY: DM	

\\Pro\civilfiles\GIS_SHARED\ENGC\00_Proj\Dow_Chemical\Jamestown\Maps\files\Sept\Annual\RAR2018_Jan2June\Fig7_Deep_Potentio_Surface_Map_June2018.mxd elew3 8/17/2018 11:23:05 AM



Shallow Groundwater Sample Locations

- Monitoring Well
- Piezometer
- Recovery Well - Inactive
- Recovery Well - Active
- Groundwater Elevation Contour (Dashed where inferred)
- Extent of Capture Zone
- Parcels
- Approximate Site Boundary

Notes:
1. All elevations are in feet above mean sea level, NAVD88.
2. August 2018 pumping rates (gpm):
RW-1S: 0.014
RW-2S: 0.257
3. gpm = gallons per minute
4. NM = Not Measured
5. Elevation at HW-3 appears to be anomalous, not included in contouring
6. Groundwater elevations at active extraction wells included for reference but not included in contouring.

N

BASE MAP SOURCE:

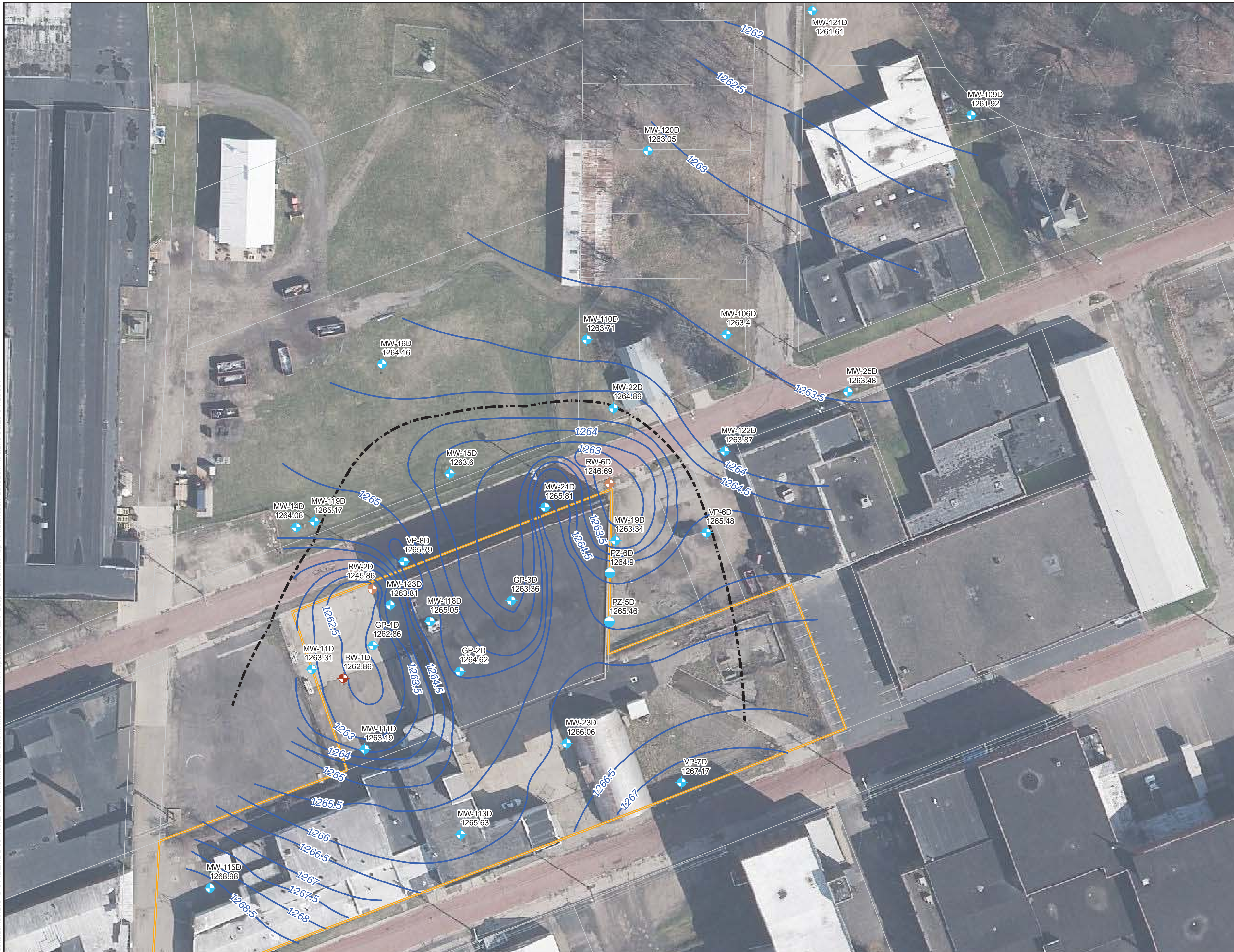
0 25 50 100
Scale in Feet

Essex Specialty Products, Inc	Essex/Hope Site, Jamestown, New York

FIGURE E5
Shallow WBZ Potentiometric Surface Map
August 24th, 2018
2018 Annual Periodic Review Report

CREATED BY: LA
REVIEWED BY: MV

JACOBS



Deep Groundwater Sample Locations

- Monitoring Well
- Piezometer
- Recovery Well - Inactive
- Recovery Well - Active
- Groundwater Elevation Contour (Dashed where inferred)
- Extent of Capture Zone
- Parcels
- Approximate Site Boundary

Notes:
1. All elevations are in feet above mean sea level, NAVD88.
2. August 2018 pumping rates (gpm):
RW-2D: 2.418
RW-6D: 2.035
3. gpm = gallons per minute
4. MW-14D water elevation appears to be anomalous, not included in contouring
5. Groundwater elevations at active extraction wells included for reference but not included in contouring

N

BASE MAP SOURCE:

0 25 50 100
Scale in Feet

Essex Specialty Products, Inc	Essex/Hope Site, Jamestown, New York

FIGURE E6
Deep WBZ Potentiometric Surface Map
August 24th, 2018
2018 Annual Periodic Review Report

CREATED BY: LA
REVIEWED BY: MV

JACOBS

Shallow Groundwater Sample Locations

- Monitoring Well
- Piezometer
- Recovery Well - Inactive
- Recovery Well - Active
- Groundwater Elevation Contour (Dashed where inferred)
- Extent of Capture Zone
- Parcels
- Approximate Site Boundary

Notes:
1. All elevations are in feet above mean sea level, NAVD88.
2. December 2018 pumping rates (gpm):
RW-1S: 0.120
RW-2S: 1.627
3. gpm = gallons per minute
4. NM = Not Measured
5. VP-4S, HW-3, and MW-114S water levels appear to be anomalous and were not included in contouring.
6. Groundwater elevations at active extraction wells included for reference but not included in contouring.

Essex Specialty Products, Inc	Essex/Hope Site, Jamestown, New York

FIGURE E7
Shallow WBZ Potentiometric Surface Map
November 12th, 2018
2018 Annual Periodic Review Report

CREATED BY: LA
REVIEWED BY: MV

JACOBS

Deep Groundwater Sample Locations

- Monitoring Well
- Piezometer
- Recovery Well - Active
- Recovery Well - Inactive
- Groundwater Elevation Contour (Dashed where inferred)
- Extent of Capture Zone
- Parcels
- Approximate Site Boundary

Notes:
1. All elevations are in feet above mean sea level, NAVD88.
2. November 2018 pumping rates (gpm):
RW-2D: 2.855
RW-6D: 0.730
3. gpm = gallons per minute
4. NM = not measures
5. Elevations at MW-14D, PZ-1D, PZ-2D, PZ-4D appear to be anomalous, not included in contouring.
6. Groundwater elevations at active extraction wells included for reference but not included in contouring.

N

BASE MAP SOURCE:

0 25 50 100
Scale in Feet

Essex Specialty Products, Inc	Essex/Hope Site, Jamestown, New York

FIGURE E8
Deep WBZ Potentiometric Surface Map
November 12th, 2018
2018 Annual Periodic Review Report

CREATED BY: LA
REVIEWED BY: MV

JACOBS

Appendix F
Groundwater Extraction System Inspection Logs

JACOBS®

Groundwater Extraction System Inspection Log
Dow Jamestown, New York

Inspection Date and Time: 5/16/2018

Inspected By: T. Pendry

Recovery Well RW-1S			
Pump Condition:	Good	Fair	Poor
Motor Condition:	Good	Fair	Poor
Level Control Condition:	Good	Fair	Poor
Sediment Accumulation:	Significant	Moderate	Minimal/None
Notes/Recommended Repairs:	none required		

Recovery Well RW-2S			
Pump Condition:	Good	Fair	Poor
Motor Condition:	Good	Fair	Poor
Level Control Condition:	Good	Fair	Poor
Sediment Accumulation:	Significant	Moderate	Minimal/None
Notes/Recommended Repairs:	none required		

Recovery Well RW-2D			
Pump Condition:	Good	Fair	Poor
Motor Condition:	Good	Fair	Poor
Level Control Condition:	Good	Fair	Poor
Sediment Accumulation:	Significant	Moderate	Minimal/None
Notes/Recommended Repairs:	none required		

Recovery Well RW-6D			
Pump Condition:	Good	Fair	Poor
Motor Condition:	Good	Fair	Poor
Level Control Condition:	Good	Fair	Poor
Sediment Accumulation:	Significant	Moderate	Minimal/None
Notes/Recommended Repa	Keep pump operating to avoid sediment settling around pump		

JACOBS®

Groundwater Extraction System Inspection Log
Dow Jamestown, New York

Inspection Date and Time: 11/7/2018

Inspected By: T. Pendry

Recovery Well RW-1S				
Pump Condition:	Good	Fair	Poor	
Motor Condition:	Good	Fair	Poor	
Level Control Condition:	Good	Fair	Poor	
Sediment Accumulation:	Significant	Moderate	Minimal/None	
Notes/Recommended Repairs:	none required			

Recovery Well RW-2S				
Pump Condition:	Good	Fair	Poor	
Motor Condition:	Good	Fair	Poor	
Level Control Condition:	Good	Fair	Poor	
Sediment Accumulation:	Significant	Moderate	Minimal/None	
Notes/Recommended Repairs:	none required			

Recovery Well RW-2D				
Pump Condition:	Good	Fair	Poor	
Motor Condition:	Good	Fair	Poor	
Level Control Condition:	Good	Fair	Poor	
Sediment Accumulation:	Significant	Moderate	Minimal/None	
Notes/Recommended Repairs:	none required			

Recovery Well RW-6D				
Pump Condition:	Good	Fair	Poor	
Motor Condition:	Good	Fair	Poor	
Level Control Condition:	Good	Fair	Poor	
Sediment Accumulation:	Significant	Moderate	Minimal/None	
Notes/Recommended Repa	Keep pump operating to avoid sediment settling around pump			

Appendix G
Asphalt Inspection Logs

JACOBS

Asphalt and Concrete Cap Inspection Log
Dow Jamestown, New York

Inspection Date(s) and Time(s): April 26, 2018 - 15:00

Inspected By: J. Gowing & M. Vidal

Cap Description

Typical asphalt caps consist of NYSDOT Type 3 binder and Type 7 wear coarse - approximately 3.5 in thick combined. Located at the southern portion of former NPLS Area and AST/UST and UST Areas.

Typical concrete cap consist of 4500 psi, 28 day compressive strength concrete - up to 8 in thick. Located at the northern portion of former NPLS Area.

Cap Conditions (cracks, poor drainage areas, etc.)

Alsphalt cap at NPLS Area - up to 24 ft long cracks, up to 2 in deep and 1 in wide; 3 ft diameter pot hole.
Several cracks were identified, transversal and longitudinal; some with vegetation growth.

Concrete cap at NPLS Area - up to 90 ft long shallow crack, up to 0.5 in deep and 0.5 in wide. Concrete joints (one every 60 ft) appear eroded and some have minor vegetation growth.

Asphalt cap at AST/UST Area - Small cracks (under 5 ft long), but with moderate vegetation growth at cracks and joints with well pads and asphalt patches.

Asphalt cap at UST Area - intact, no visible cracks

Repairs Recommended

Recommend performing crack sealing work at at the NPLS Area and AST/UST Area asphalt and concrete caps.
Areas should be prepped prior to sealing by removing weeds and vegetation growing through cracks.

Photo(s)

Alsphalt cap at NPLS Area:

Concrete cap at NPLS Area:

Asphalt cap at AST/UST Area:

Asphalt cap at UST Area:

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Asphalt and Concrete Cap Inspection Log
Dow Jamestown, New York

Inspection Date(s) and Time(s): November 7, 2018 - 15:30

Inspected By: T. Pendry

Cap Description
Typical asphalt caps consist of NYSDOT Type 3 binder and Type 7 wear coarse - approximately 3.5 in thick combined. Located at the southern portion of former NPLS Area and AST/UST and UST Areas. Typical concrete cap consist of 4500 psi, 28 day compressive strength concrete - up to 8 in thick. Located at the northern portion of former NPLS Area.
Cap Conditions (cracks, poor drainage areas, etc.)
Alsphalt cap at NPLS Area - up to 24 ft long cracks, up to 2 in deep and 1 in wide; 3 ft diameter pot hole repaired in June, but signs of cracking/caving in observed. Several cracks were identified, transversal and longitudinal; some with vegetation growth. **Concrete cap at NPLS Area** - up to 90 ft long shallow crack, up to 0.5 in deep and 0.5 in wide. Concrete joints (one every 60 ft) appear eroded and some have minor vegetation growth. **Asphalt cap at AST/UST Area** - Small cracks (under 5 ft long), but with moderate vegetation growth at cracks and joints with well pads and asphalt patches
Repairs Recommended
Crack filling and seal coating scheduled for Spring 2019

Appendix H
SSDS Inspection Log

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Vapor Intrusion Mitigation System Inspection Log
Dow Jamestown, New York

Inspection Date(s) and Time(s): 2/28/2018

Inspected By: Travis Pendry

Address: 159 Hopkins Avenue Residence

Occupants: 2

Radon System Description
Exterior mounted RADONAWAY GP-501 fan, max 4.2 wci static pressure, with exhaust vent to roofline. 1 - Exterior on/off switch 1 - 3" PVC manifolded air line connecting all suction cavities 4 - Suction cavities - strategic spacing at four corners of basement 1 - U-tube manometer - suction riser
Property/Basement Conditions
Very dirty. Strong cat urine and feces odor. Cobwebs
Radon System Condition (piping, floor seals, outside riser pipe and blower)
Vacuum gauge(s) pressure: 0.5 in of wc Radon system working and no deficiencies noted
Photo(s)

Appendix I
Backflow Prevention Exemption Certification

Jamestown Board of Public Utilities
Water Division
PO Box 700
Jamestown, NY 14702-0700
tlinamen@jamestownbpu.com

Backflow Prevention Device Exemption Renewal Form

THIS FORM IS TO BE FILLED OUT BY THE PROPERTY OWNER

If an exemption from having to install a backflow prevention device is approved by this office, the property owner of that facility must complete and send us this form **each year**. It serves as an assurance by the property owner that **none** of the conditions of his or her building have changed since it was initially inspected and approved as non-hazardous to the Jamestown BPU public water system. Please submit this report to Terri Linamen at the Jamestown Board of Public Utilities Water Department by either mail or email.

Most Recently Assigned Approval # : **1273-1017**

Facility Name:	Essex Specialty Products	Contact Person:	Kyle Block/Jacobs
Service Address:	126 Hopkins Avenue	Contact Phone #:	617-626-7013
Mailing Address:	126 Hopkins Avenue	Email Address:	kyle.block@jacobs.com

By signing below, you are confirming that none of the conditions listed on the initial *Form for Backflow Prevention Device Exemption* have changed, and therefore, your facility can still be deemed non-hazardous and exempt from having to install a backflow prevention device. You are additionally agreeing that if the ownership of the property were to change, you will inform the new owner of their responsibility of completing and sending in this renewal form annually.

Property Owner's Name: Timothy King / The Dow Chemical Company

Owner's Mailing Address: 2001 Union Carbide Drive, South Charleston, WV 25303

Owner's Phone Number: 304-747-3763

Owner's Signature:

Date: 9/11/18

From: Brenda Wagner <bwagner@jamestownbpu.com>
Sent: Friday, September 14, 2018 9:55 AM
To: Block, Kyle/BOS <Kyle.Block@jacobs.com>
Subject: [EXTERNAL] Backflow Exemption Renewal 2018

Dear Kyle,

Thank you for sending in the annual *Backflow Prevention Device Exemption Renewal Form* for Essex Specialty Products at 126 Hopkins Ave. The exemption from having to install a backflow prevention device at this facility remains in effect. Your updated Approval # for this year is as follows:

Approval #: **1273-0918**

The first four digits of your Approval # are unique to your facility, while the last four digits indicate the month and year that the exemption was renewed. Please remember that the property owner must complete and send in the attached *Backflow Prevention Device Exemption Renewal Form* to this office every year since the date that the exemption was last approved. For instance, if your Approval # is 0000-0918, your exemption was last approved in September of 2018 and needs to be renewed again by September of 2019.

The Renewal Form serves as an assurance by the property owner that none of the conditions of the building have changed since it was initially inspected and approved as non-hazardous to the BPU public water system. An updated Approval # will be assigned to your facility each year, so please keep track of it in your records. Please make note of when your exemption is due to be renewed each year. If you become overdue for renewing your exemption, a reminder letter will be sent to you. If you fail to renew your exemption after that point, however, it will result in the loss of your exemption and the need to install the appropriate backflow prevention device at your facility.

The Renewal Form can also be found on the BPU website (www.jamestownbpu.com under Quick Links < Cross Connection & Backflow Prevention). If you have any questions, please contact my office at (716) 661-1606 or tlinamen@jamestownbpu.com. Thank you very much for your time and attention to this matter.

Sincerely,

Terri Linamen
Water Distribution Supervisor

Phone –716-661-1606
Fax – 716-661-1617
www.jamestownbpu.com

Appendix J
Semiannual BPU Reports

18 Tremont Street, Suite 700
Boston, MA 02108-2307
United States
T +1.617.523.2002
F +1.617.723.9036
www.jacobs.com

Mr. Michael V. Saar, P.E.
Water Resources Manager
Division of Wastewater/Solid Waste
City of Jamestown Board of Public Utilities
P.O. Box 700
Jamestown, NY 14702-0700

July 30, 2018

Subject: Essex/Hope Jamestown Site, 125 Blackstone Ave, Jamestown, NY 14701
Semiannual Self-Monitoring Report for January through June 2018
City of Jamestown Board of Public Utilities (BPU) Permit No. 26

Dear Mr. Saar,

Jacobs Engineering Group, Inc. (Jacobs) has prepared this Semiannual Self-Monitoring Report involving the Essex Specialty Products, Inc. facility in Jamestown, New York (Essex/Hope site), which is classified as a Significant Industrial User subject to Categorical Pretreatment Standards. This report has been prepared in accordance with the requirements set forth in the City of Jamestown BPU Industrial Wastewater Discharge Permit No. 26 (included as Attachment 1), renewed on November 4, 2017, and with 40 Code of Federal Regulations (CFR) § 403.12, covering the period from January 1, 2018, through June 30, 2018.

Self-monitoring reporting requirements applicable to the Essex/Hope site are detailed in Table 1 (attached), and include the following:

- Monthly concentrations of Total Toxic Organics (TTOs) in discharge to the publicly owned treatment works (POTW)
- Monthly pH measurements of discharge to the POTW
- Monthly flow rate measurements of discharge to the POTW
- Estimated daily average and maximum flow rates

Monthly discharge flow totals for the reporting period ranged from 152,446 to 245,203 gallons. These monthly discharge flows were consistently higher compared to those in previous reporting periods because of the limited amount of shutdown time during the current reporting period. Daily average flow rates shown in Table 1 were estimated based on totalizer readings for volume of water discharged at the beginning and end of each month. Daily maximum flow rates were estimated to be 20 percent greater than daily averages.

Acetone is not considered a TTO; however, for informational purposes only, the total mass of this constituent discharged per month to the POTW is also included in Table 1. Acetone mass in the discharge for this reporting period corresponds to approximately 0.1 pound.

No noncompliance events occurred between January 1, 2018, and June 30, 2018. The treatment system was shut down for approximately 209 cumulative hours, primarily between late March and early April,

because the system was shut off for a granular activated carbon (GAC) change out performed on March 29, 2018, and subsequent required carbon hydration time.

A City of Jamestown BPU representative was onsite on June 14, 2018, to collect samples from the system effluent discharged to the POTW, and noted no issues.

The supporting Laboratory Certificates of Analysis for the reported concentrations of volatile organic compounds performed by Alpha Analytical, Inc. (Westborough, Massachusetts) are included as Attachment 2.

We trust that this submittal satisfies the reporting requirements pursuant to 40 CFR § 403.12. Please contact me at 617.626.7013 should you have any questions or comments regarding the Essex/Hope site.

Regards

Jacobs Engineering Group, Inc.

Kyle Block
Project Manager

Copies to: Tim King (Essex/Hope)
Maurice Moore (NYSDEC)

Attachments: Table 1 January – June 2018 Post Carbon (Effluent) Monitoring Data
City of Jamestown BPU Industrial Wastewater Discharge Permit Number 26
Laboratory Analytical Reports – January, February, March, April, May, and June 2018

Table

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Table 1. January - June 2018 Post Carbon (Effluent) Monitoring Data

Semiannual Self-monitoring Report for January through June 2018, Essex/Hope Site, Jamestown, New York

Reporting Requirements for Pre-Treated Discharge (System Effluent to POTW)	Units	Industrial Wastewater Discharge Permit #26 Effluent Limits	January	February	March	April	May	June
POTW Discharge Analytical Data								
Total TTOs	µg/L	2,130	3.9	592.6	1,200	0.3	1.9	3.4
Detected TTO Compounds	--	Report	Trichloroethene, Vinyl Chloride	Carbon disulfide, Trichloroethene, Vinyl Chloride	Vinyl Chloride	Trichloroethene, Vinyl Chloride	cis-1,2-Dichloroethene, Trichloroethene, Vinyl Chloride	cis-1,2-Dichloroethene, Trichloroethene, Vinyl Chloride
pH	Standard units	5.5 to 10	6.85	6.58	6.61	6.70	6.85	7.46
			7.09	6.74	6.75	6.58	6.93	6.83
			6.91	6.79	6.83	6.83	6.97	6.76
			6.89	6.86	6.88	6.96	7.01	6.89
Acetone Discharged	Pounds	No limit	0.0	0.0	0.0	0.1	0.0	0.0
POTW Discharge Flow Data								
Monthly Total Flow	US gallons	Report	184,271	194,787	245,203	152,446	182,324	214,819
Average Daily Flow	US gallons	Report	5,944	6,717	11,676	5,082	5,698	10,229
Maximum Daily Flow	US gallons	Report	7,133	8,060	14,012	6,098	6,837	12,275

1. Jamestown BPU Industrial Wastewater Discharge Permit No. 26 was renewed in November 2017, effective November 4, 2017, through November 3, 2022.
2. VOCs sample is a laboratory-prepared composite of four grab samples collected from the pretreatment system discharge to the POTW at 30-minute intervals.
3. pH measurements recorded are concurrent with the time of each post-carb (effluent) grab sample.
4. Maximum Daily Flow is estimated to be 20 percent greater than Average Daily Flow.
5. System granular activated carbon was changed out on March 29, 2018.

µg/L = micrograms per liter
POTW = publicly owned treatment works
TTO = Total Toxic Organics
VOCs = volatile organic compounds

Attachment 1
City of Jamestown BPU Industrial Wastewater Treatment Permit

JAMESTOWN BOARD OF PUBLIC UTILITIES

PO Box 700
Jamestown, NY 14702-0700
Phone (716) 661-1673
Fax (716) 661-1617

ELECTRIC
DISTRICT HEAT
WATER
WASTEWATER
SOLID WASTE

November 2, 2017

Mr. Kyle Block
CH2M
18 Tremont St
Boston, MA 02108

Dear Mr. Block:

Please find enclosed a copy of your firm's renewed Industrial Waste Discharge Permit governing the wastewater discharge (s) from your facility to the Jamestown Publicly Owned Treatment Works (POTW). The effective dates of the permit are shown on the first page of the permit. This permit is subject to change should there be any additions and/or deletions made to the industrial pretreatment programs as established by the Environmental Protection Agency.

Please review your permit carefully as it may include changes from your previous permit. Should you have any questions or comments concerning your permit, please do not hesitate to contact this office.

Sincerely,

Michael V Saar, P.E.
Deputy General Manager

CITY OF JAMESTOWN
BOARD OF PUBLIC UTILITIES
INDUSTRIAL WASTEWATER DISCHARGE PERMIT

PERMIT NUMBER	26
INDUSTRY NAME	Essex Specialty Products, Inc
INDUSTRY ADDRESS	124 Blackstone Avenue, Jamestown
SIC NUMBER	Groundwater Remediation
DATE ISSUED	11/4/17
EXPIRATION DATE	11/3/22

Essex Specialty Products, Inc. as a Significant Industrial User (SIU) of the City of Jamestown Publicly Owned Treatment Works (POTW), is hereby issued an industrial wastewater discharge permit pursuant to Chapter 24A of the Jamestown City Code (Jamestown Sewer Use Ordinance) and also with any applicable provisions of federal or state law(s) or regulation(s). Said permit shall be effective for a period of five years from the date of issuance hereof.

This permit is granted in accordance with the application filed on March 12,1996 and notice of process modifications submitted on N/A and in conformity with the plans, specifications, semi-annual self monitoring reports, and other data submitted to the City in support of the above application, all of which are filed with and considered as part of this permit, together with the following named conditions and requirements:

Effective this 4th day of November , 2017
To expire the 3th day of November , 2022

Deputy General Manager - Board of Public Utilities

RIGHT OF ENTRY

The permittee shall allow duly authorized employees or representatives of the City to enter the permittee's premises for the purpose of inspection, observation, measurement, sampling, and testing in accordance with Article VIII of the Jamestown Sewer Use Ordinance.

SAMPLING MANHOLE REQUIREMENTS

If, in the opinion of the General Manager, there are not adequate facilities for the acquisition of representative samples and accurate flow measurements, the General Manager may require that a sampling manhole with flow measuring device be installed by the permittee at his expense. This sampling manhole shall be approved by this office before installation. The permittee shall be responsible for all maintenance of the sampling manhole and calibration of the monitoring equipment.

BOARD OF PUBLIC UTILITES MONITORING

Compliance with the Jamestown Sewer Use Ordinance will be monitored via wastewater discharge monitoring. The City of Jamestown will monitor each SIU four times per year. Results will be transmitted to each SIU.

SELF MONITORING

Essex Specialty Products, Inc. must conduct monthly self-monitoring and report results to the City in accordance with applicable federal and local regulations. Monthly reports are due each **August 1** (including months January through June) and **February 1** (including months July through December). Essex Specialty Products, Inc. must notify the City of any violation of its self-monitoring within 24 hours. Such notification shall include a phone call followed up by a letter. All permit limits set forth in this permit are enforceable effluent limitations.

MONITORING LOCATION
SAMPLING VALVE

PARAMETER	SAMPLE	LOCAL
	Monthly	LIMIT
		MG/L
PH (4 grabs)	X	5.5-10.0
TSS (comp)		350
OIL & GREASE		100
CADMIUM (comp)		0.30
CHROMIUM (comp)		4.00
COPPER (comp)		1.25
LEAD (comp)		0.30
NICKEL (comp)		0.90
SILVER (comp)		0.20
ZINC (comp)		3.00
CYANIDE (comp)		0.65
Volatile Organics (4 grabs)	X	2.13

Notes :

1. Samples should be taken as **composites** of at least 4 grab samples collected during a typical production day except for pH. Four separate samples must be taken and **individually analyzed for pH.**
2. All analysis shall be preformed by a New York State Department of Health Certified Environmental Laboratory.
3. All analysis shall be performed in accordance with the latest edition of the following references:
   a. Standard Methods for the Examination of Water and Wastewater
   b. Method for Chemical Analysis of Water and Wastes, USEPA, technology Transfer, 1983

PROHIBITED DISCHARGES

The following should not be introduced into the City Sewer system:

(1) Pollutants which create a fire or explosion hazard in the POTW, including, but not limited to, wastestreams with a closed cup flashpoint of less than 140 degrees Fahrenheit or 60 degrees Centigrade using the test methods specified in 40 CFR 261.21.
(2) Pollutants which will cause corrosive structural damage to the POTW, but in no case Discharges with pH lower than **5.5** or greater than **10.0**;
(3) Solid or viscous pollutants in amounts which will cause obstruction to the flow in the POTW resulting in Interference;
(4) Any pollutant, including oxygen demanding pollutants (BOD, etc.) released in a Discharge at a flow rate and/or pollutant concentration which will cause Interference with the POTW.
(5) Heat in amounts which will inhibit biological activity in the POTW resulting in Interference, but in no case heat in such quantities that the temperature at the POTW Treatment Plant exceeds 40 deg.C (104 deg.F) unless the Approval Authority, upon request of the POTW, approves alternate temperature limits.
(6) Petroleum oil, non-biodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through;
(7) Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity that may cause acute worker health and safety problems;
(8) Any trucked or hauled pollutants, except at discharge points designated by the POTW.
(9) The discharge of concentrated solutions without pretreatment is strictly prohibited. Any request to discharge such wastes must be submitted to this office and is subject to the approval of the General Manager on a case by case basis.
10) Any water or waste containing fats, wax, grease, oils, or oil products, whether emulsified or not, in excess of **100 mg/l**.

HAZARDOUS WASTE DISCHARGE NOTIFICATION

For discharges of listed and characteristic hazardous wastes which are not already reported in periodic self-monitoring reports and which exceed 15 kilograms per month, the regulations require that all industrial users notify USEPA, NYSDEC, and the City of Jamestown as to the constituents of these wastes and the anticipated discharge volume of such wastes on both a monthly and an annual basis.

CHANGE IN WASTEWATER DISCHARGE

All discharges authorized herein shall comply with the terms and conditions of this permit. Any industrial facility expansions, production increases, or process modifications which result in new, different, or increased discharges of pollutants must be reported by submission of a new industrial waste disposal questionnaire. This permit may be modified to specify and limit any pollutants not previously limited. The discharge of any pollutant more frequently than or at a level in excess of that specified and authorized by this permit shall constitute a violation of the terms and conditions of this permit.

RECORDKEEPING

The permittee shall retain all records of monitoring activities and results (whether or not required by this permit) for a minimum of 3 years. These records shall be made available for inspection and copying to duly authorized employees or representatives of the City. This period of retention shall be extended during any unresolved litigation.

PERMIT MODIFICATIONS

After sufficient notice to the permittee, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including, but not limited to, the following:

(a) Violation of any terms or conditions of this permit.
(b) A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.
(c) If an effluent standard is established under any state or federal law for a pollutant which is present in the discharge and such standard or prohibition s more stringent that any limitation for such pollutant in this permit.

PERMIT TRANSFER

Sewer Use Permits are issued to a specific User for a specific operation. A wastewater discharge permit shall not be reassigned or, transferred, or sold to a new owner, new User, different premise, or a new or changed operation without the approval of the City. Any succeeding Owner or User shall also comply with the terms and conditions of the existing permit.

NOTICE OF NON-COMPLIANCE

The permittee shall notify the operator of the Jamestown Wastewater Treatment Plant **immediately,** by telephone (665-3980), so that the operator can take the necessary steps to prevent damage to the wastewater treatment process and equipment in the event the permittee:

(1) Does not comply with or will be unable to comply with any daily maximum effluent limitation specified in this permit.
(2) Discharges or may discharge any wastewater which may cause a slug loading to the Jamestown Wastewater Treatment Plant. This includes wastewater which may cause pass through or interference with wastewater treatment plant operations.
(3) Discharges or may discharge any material or wastewater which is prohibited from discharge as described in the City of Jamestown Local Sewer Use Ordinance or this permit.

These non-complying discharges or possible discharges may be due to:

Breakdown of industrial wastewater pretreatment equipment;
Accidents caused by human error or negligence; or
Other causes, such as acts of nature.

The General Manager shall be notified by telephone within 24 hours, and in writing within five (5) days and said notification shall include the following pertinent information:

(1) A description of the non-complying discharge;
(2) Cause of non-compliance;
(3) Anticipated time the condition of non-compliance is expected to continue, or if such condition has been corrected, the duration of the period of non-compliance;
(4) Steps taken by the permittee to reduce and eliminate the non-complying discharge; and
(5) Steps to be taken by the permittee to prevent reoccurrence of the condition of non-compliance.

The permittee must also repeat sampling for all parameters exceeding discharge limitations and submit the results of the repeat analysis within thirty (30) days of the violation(s).

Nothing in this permit shall be construed to relieve the permittee from the penalties for non-compliance of this permit for any reason subject to Article (IX) (Penalties) of the Jamestown Sewer Ordinance.

SCHEDULE OF COMPLIANCE

The permittee shall comply with the following schedule if the present discharge does not conform to the effluent limitations described within this permit:

a. By _____ the permittee shall have a registered Professional Engineer contact this office.
b. By _____ the permittee shall complete an engineering report and submit it to this office.
c. By_____ the permittee shall complete final plans and specifications for pretreatment facilities and submit them to this office for review and approval.
d. By _____ the permittee shall start construction of its approved pretreatment facilities.
e. By _____ the permittee shall complete construction of the pretreatment facilities.
f. By _____ the permittee shall attain operational levels required to achieve the effluent limits specified within this permit.

CIVIL AND CRIMINAL PENALTIES

A permittee found violating applicable local, state or federal regulations may be subject to administrative penalties, civil action, and/or criminal prosecution. If administrative penalties are warranted, a fine in an amount not exceeding $1000.00 per day per violation may be assessed. If criminal penalties are assessed, a fine in an amount not exceeding $1,000.00 per violation per day may be assessed, imprisonment for not more than 6 months, or both. Any person violating applicable local, state or federal regulations that results in expense, loss or damage to the City and its property shall be liable for all costs.

Attachment 2
Laboratory Analytical Reports
January, February, March, April, May, and June 2018

ANALYTICAL REPORT

Lab Number:	L1801047
Client:	CH2MHILL 18 Tremont Street Suite 700 Boston, MA 02108
ATTN:	Kyle Block
Phone:	(617) 523-2260
Project Name:	ESSEX/HOPE
Project Number:	699900.01.RT.OM
Report Date:	01/18/18

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), NJ NELAP (MA935), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-14-00197).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1801047
Report Date: 01/18/18

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1801047-01	PRE-CARB_20180111	WATER	JAMESTOWN, NY	01/11/18 07:45	01/11/18
L1801047-02	PRIMARY-EFF_20180111	WATER	JAMESTOWN, NY	01/11/18 07:55	01/11/18
L1801047-03	POST-CARB_20180111	WATER	JAMESTOWN, NY	01/11/18 09:30	01/11/18
L1801047-04	TRIP BLANK	WATER	JAMESTOWN, NY	01/11/18 00:00	01/11/18
L1801047-05	COMPOSITE POST-CARB_20180111-GRABS 1-4	WATER	JAMESTOWN, NY	01/11/18 09:30	01/11/18

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1801047
Report Date: 01/18/18

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY
For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

Project Name:	ESSEX/HOPE	**Lab Number:**	L1801047
Project Number:	699900.01.RT.OM	**Report Date:**	01/18/18

Case Narrative (continued)

Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

Volatile Organics

L1801047-01 and -02: The sample has elevated detection limits due to the dilution required by the elevated concentrations of target compounds in the sample.

The initial calibration, associated with L1801047-01 through -04, did not meet the method required minimum response factor for the calibration standards for acetone, 2-butanone, 4-methyl-2-pentanone, bromochloromethane, 1,2,3-trichlorobenzene, and 1,4-dioxane, and utilized a quadratic fit for bromomethane.

The continuing calibration, associated with L1801047-01 through -04, did not meet the method required minimum response factor for acetone, 2-butanone, 4-methyl-2-pentanone, bromochloromethane, 1,2,3-trichlorobenzene, and 1,4-dioxane.

The WG1081367-2 continuing calibration verification standard has the percent deviation for 2,2-dichloropropane (24%) and 1,2,3-trichlorobenzene (33%) above the 20% CCV criteria, but within overall method allowances.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Kelly Stenstrom

Title: Technical Director/Representative Date: 01/18/18

ORGANICS

VOLATILES

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM
Lab Number: L1801047
Report Date: 01/18/18

SAMPLE RESULTS

Lab ID: L1801047-01 D
Client ID: PRE-CARB_20180111
Sample Location: JAMESTOWN, NY

Date Collected: 01/11/18 07:45
Date Received: 01/11/18
Field Prep: Not Specified

Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 01/16/18 14:01
Analyst: AD

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	120	35.	50
1,1-Dichloroethane	ND		ug/l	120	35.	50
Chloroform	ND		ug/l	120	35.	50
Carbon tetrachloride	ND		ug/l	25	6.7	50
1,2-Dichloropropane	ND		ug/l	50	6.8	50
Dibromochloromethane	ND		ug/l	25	7.4	50
1,1,2-Trichloroethane	ND		ug/l	75	25.	50
Tetrachloroethene	ND		ug/l	25	9.0	50
Chlorobenzene	ND		ug/l	120	35.	50
Trichlorofluoromethane	ND		ug/l	120	35.	50
1,2-Dichloroethane	ND		ug/l	25	6.6	50
1,1,1-Trichloroethane	ND		ug/l	120	35.	50
Bromodichloromethane	ND		ug/l	25	9.6	50
trans-1,3-Dichloropropene	ND		ug/l	25	8.2	50
cis-1,3-Dichloropropene	ND		ug/l	25	7.2	50
1,3-Dichloropropene, Total	ND		ug/l	25	7.2	50
1,1-Dichloropropene	ND		ug/l	120	35.	50
Bromoform	ND		ug/l	100	32.	50
1,1,2,2-Tetrachloroethane	ND		ug/l	25	8.4	50
Benzene	17	J	ug/l	25	8.0	50
Toluene	ND		ug/l	120	35.	50
Ethylbenzene	ND		ug/l	120	35.	50
Chloromethane	ND		ug/l	120	35.	50
Bromomethane	ND		ug/l	120	35.	50
Vinyl chloride	940		ug/l	50	3.6	50
Chloroethane	ND		ug/l	120	35.	50
1,1-Dichloroethene	23	J	ug/l	25	8.4	50
trans-1,2-Dichloroethene	ND		ug/l	120	35.	50
Trichloroethene	4600		ug/l	25	8.8	50
1,2-Dichlorobenzene	ND		ug/l	120	35.	50

Project Name: ESSEX/HOPE **Lab Number:** L1801047

Project Number: 699900.01.RT.OM **Report Date:** 01/18/18

SAMPLE RESULTS

Lab ID: L1801047-01 D Date Collected: 01/11/18 07:45

Client ID: PRE-CARB_20180111 Date Received: 01/11/18

Sample Location: JAMESTOWN, NY Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,3-Dichlorobenzene	ND		ug/l	120	35.	50
1,4-Dichlorobenzene	ND		ug/l	120	35.	50
Methyl tert butyl ether	ND		ug/l	120	35.	50
p/m-Xylene	ND		ug/l	120	35.	50
o-Xylene	ND		ug/l	120	35.	50
Xylenes, Total	ND		ug/l	120	35.	50
cis-1,2-Dichloroethene	5400		ug/l	120	35.	50
1,2-Dichloroethene, Total	5400		ug/l	120	35.	50
Dibromomethane	ND		ug/l	250	50.	50
1,2,3-Trichloropropane	ND		ug/l	120	35.	50
Styrene	ND		ug/l	120	35.	50
Dichlorodifluoromethane	ND		ug/l	250	50.	50
Acetone	3300		ug/l	250	73.	50
Carbon disulfide	ND		ug/l	250	50.	50
2-Butanone	ND		ug/l	250	97.	50
Vinyl acetate	ND		ug/l	250	50.	50
4-Methyl-2-pentanone	ND		ug/l	250	50.	50
2-Hexanone	ND		ug/l	250	50.	50
Bromochloromethane	ND		ug/l	120	35.	50
2,2-Dichloropropane	ND		ug/l	120	35.	50
1,2-Dibromoethane	ND		ug/l	100	32.	50
1,3-Dichloropropane	ND		ug/l	120	35.	50
1,1,1,2-Tetrachloroethane	ND		ug/l	120	35.	50
Bromobenzene	ND		ug/l	120	35.	50
n-Butylbenzene	ND		ug/l	120	35.	50
sec-Butylbenzene	ND		ug/l	120	35.	50
tert-Butylbenzene	ND		ug/l	120	35.	50
o-Chlorotoluene	ND		ug/l	120	35.	50
p-Chlorotoluene	ND		ug/l	120	35.	50
1,2-Dibromo-3-chloropropane	ND		ug/l	120	35.	50
Hexachlorobutadiene	ND		ug/l	120	35.	50
Isopropylbenzene	ND		ug/l	120	35.	50
p-Isopropyltoluene	ND		ug/l	120	35.	50
Naphthalene	ND		ug/l	120	35.	50
n-Propylbenzene	ND		ug/l	120	35.	50
1,2,3-Trichlorobenzene	ND		ug/l	120	35.	50
1,2,4-Trichlorobenzene	ND		ug/l	120	35.	50
1,3,5-Trimethylbenzene	ND		ug/l	120	35.	50
1,2,4-Trimethylbenzene	ND		ug/l	120	35.	50

Project Name: ESSEX/HOPE **Lab Number:** L1801047

Project Number: 699900.01.RT.OM **Report Date:** 01/18/18

SAMPLE RESULTS

Lab ID: L1801047-01 D
Client ID: PRE-CARB_20180111
Sample Location: JAMESTOWN, NY

Date Collected: 01/11/18 07:45
Date Received: 01/11/18
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,4-Dioxane	ND		ug/l	12000	3000	50

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	98		70-130
Toluene-d8	100		70-130
4-Bromofluorobenzene	95		70-130
Dibromofluoromethane	98		70-130

Project Name: ESSEX/HOPE **Lab Number:** L1801047

Project Number: 699900.01.RT.OM **Report Date:** 01/18/18

SAMPLE RESULTS

Lab ID: L1801047-02 D
Client ID: PRIMARY-EFF_20180111
Sample Location: JAMESTOWN, NY

Date Collected: 01/11/18 07:55
Date Received: 01/11/18
Field Prep: Not Specified

Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 01/16/18 16:56
Analyst: AD

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	25	7.0	10
1,1-Dichloroethane	ND		ug/l	25	7.0	10
Chloroform	ND		ug/l	25	7.0	10
Carbon tetrachloride	ND		ug/l	5.0	1.3	10
1,2-Dichloropropane	ND		ug/l	10	1.4	10
Dibromochloromethane	ND		ug/l	5.0	1.5	10
1,1,2-Trichloroethane	ND		ug/l	15	5.0	10
Tetrachloroethene	ND		ug/l	5.0	1.8	10
Chlorobenzene	ND		ug/l	25	7.0	10
Trichlorofluoromethane	ND		ug/l	25	7.0	10
1,2-Dichloroethane	ND		ug/l	5.0	1.3	10
1,1,1-Trichloroethane	ND		ug/l	25	7.0	10
Bromodichloromethane	ND		ug/l	5.0	1.9	10
trans-1,3-Dichloropropene	ND		ug/l	5.0	1.6	10
cis-1,3-Dichloropropene	ND		ug/l	5.0	1.4	10
1,3-Dichloropropene, Total	ND		ug/l	5.0	1.4	10
1,1-Dichloropropene	ND		ug/l	25	7.0	10
Bromoform	ND		ug/l	20	6.5	10
1,1,2,2-Tetrachloroethane	ND		ug/l	5.0	1.7	10
Benzene	ND		ug/l	5.0	1.6	10
Toluene	ND		ug/l	25	7.0	10
Ethylbenzene	ND		ug/l	25	7.0	10
Chloromethane	ND		ug/l	25	7.0	10
Bromomethane	ND		ug/l	25	7.0	10
Vinyl chloride	970		ug/l	10	0.71	10
Chloroethane	ND		ug/l	25	7.0	10
1,1-Dichloroethene	ND		ug/l	5.0	1.7	10
trans-1,2-Dichloroethene	ND		ug/l	25	7.0	10
Trichloroethene	ND		ug/l	5.0	1.8	10
1,2-Dichlorobenzene	ND		ug/l	25	7.0	10

Project Name: ESSEX/HOPE **Lab Number:** L1801047

Project Number: 699900.01.RT.OM **Report Date:** 01/18/18

SAMPLE RESULTS

Lab ID: L1801047-02 D Date Collected: 01/11/18 07:55

Client ID: PRIMARY-EFF_20180111 Date Received: 01/11/18

Sample Location: JAMESTOWN, NY Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,3-Dichlorobenzene	ND		ug/l	25	7.0	10
1,4-Dichlorobenzene	ND		ug/l	25	7.0	10
Methyl tert butyl ether	ND		ug/l	25	7.0	10
p/m-Xylene	ND		ug/l	25	7.0	10
o-Xylene	ND		ug/l	25	7.0	10
Xylenes, Total	ND		ug/l	25	7.0	10
cis-1,2-Dichloroethene	ND		ug/l	25	7.0	10
1,2-Dichloroethene, Total	ND		ug/l	25	7.0	10
Dibromomethane	ND		ug/l	50	10.	10
1,2,3-Trichloropropane	ND		ug/l	25	7.0	10
Styrene	ND		ug/l	25	7.0	10
Dichlorodifluoromethane	ND		ug/l	50	10.	10
Acetone	19	J	ug/l	50	15.	10
Carbon disulfide	ND		ug/l	50	10.	10
2-Butanone	ND		ug/l	50	19.	10
Vinyl acetate	ND		ug/l	50	10.	10
4-Methyl-2-pentanone	ND		ug/l	50	10.	10
2-Hexanone	ND		ug/l	50	10.	10
Bromochloromethane	ND		ug/l	25	7.0	10
2,2-Dichloropropane	ND		ug/l	25	7.0	10
1,2-Dibromoethane	ND		ug/l	20	6.5	10
1,3-Dichloropropane	ND		ug/l	25	7.0	10
1,1,1,2-Tetrachloroethane	ND		ug/l	25	7.0	10
Bromobenzene	ND		ug/l	25	7.0	10
n-Butylbenzene	ND		ug/l	25	7.0	10
sec-Butylbenzene	ND		ug/l	25	7.0	10
tert-Butylbenzene	ND		ug/l	25	7.0	10
o-Chlorotoluene	ND		ug/l	25	7.0	10
p-Chlorotoluene	ND		ug/l	25	7.0	10
1,2-Dibromo-3-chloropropane	ND		ug/l	25	7.0	10
Hexachlorobutadiene	ND		ug/l	25	7.0	10
Isopropylbenzene	ND		ug/l	25	7.0	10
p-Isopropyltoluene	ND		ug/l	25	7.0	10
Naphthalene	ND		ug/l	25	7.0	10
n-Propylbenzene	ND		ug/l	25	7.0	10
1,2,3-Trichlorobenzene	ND		ug/l	25	7.0	10
1,2,4-Trichlorobenzene	ND		ug/l	25	7.0	10
1,3,5-Trimethylbenzene	ND		ug/l	25	7.0	10
1,2,4-Trimethylbenzene	ND		ug/l	25	7.0	10

Project Name: ESSEX/HOPE **Lab Number:** L1801047

Project Number: 699900.01.RT.OM **Report Date:** 01/18/18

SAMPLE RESULTS

Lab ID: L1801047-02 D Date Collected: 01/11/18 07:55

Client ID: PRIMARY-EFF_20180111 Date Received: 01/11/18

Sample Location: JAMESTOWN, NY Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,4-Dioxane	ND		ug/l	2500	610	10

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	97		70-130
Toluene-d8	102		70-130
4-Bromofluorobenzene	99		70-130
Dibromofluoromethane	98		70-130

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM
Lab Number: L1801047
Report Date: 01/18/18

SAMPLE RESULTS

Lab ID: L1801047-03
Client ID: POST-CARB_20180111
Sample Location: JAMESTOWN, NY

Date Collected: 01/11/18 09:30
Date Received: 01/11/18
Field Prep: Not Specified

Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 01/16/18 16:21
Analyst: AD

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	2.5	0.70	1
1,1-Dichloroethane	ND		ug/l	2.5	0.70	1
Chloroform	ND		ug/l	2.5	0.70	1
Carbon tetrachloride	ND		ug/l	0.50	0.13	1
1,2-Dichloropropane	ND		ug/l	1.0	0.14	1
Dibromochloromethane	ND		ug/l	0.50	0.15	1
1,1,2-Trichloroethane	ND		ug/l	1.5	0.50	1
Tetrachloroethene	ND		ug/l	0.50	0.18	1
Chlorobenzene	ND		ug/l	2.5	0.70	1
Trichlorofluoromethane	ND		ug/l	2.5	0.70	1
1,2-Dichloroethane	ND		ug/l	0.50	0.13	1
1,1,1-Trichloroethane	ND		ug/l	2.5	0.70	1
Bromodichloromethane	ND		ug/l	0.50	0.19	1
trans-1,3-Dichloropropene	ND		ug/l	0.50	0.16	1
cis-1,3-Dichloropropene	ND		ug/l	0.50	0.14	1
1,3-Dichloropropene, Total	ND		ug/l	0.50	0.14	1
1,1-Dichloropropene	ND		ug/l	2.5	0.70	1
Bromoform	ND		ug/l	2.0	0.65	1
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	0.17	1
Benzene	ND		ug/l	0.50	0.16	1
Toluene	ND		ug/l	2.5	0.70	1
Ethylbenzene	ND		ug/l	2.5	0.70	1
Chloromethane	ND		ug/l	2.5	0.70	1
Bromomethane	ND		ug/l	2.5	0.70	1
Vinyl chloride	3.6		ug/l	1.0	0.07	1
Chloroethane	ND		ug/l	2.5	0.70	1
1,1-Dichloroethene	ND		ug/l	0.50	0.17	1
trans-1,2-Dichloroethene	ND		ug/l	2.5	0.70	1
Trichloroethene	0.28	J	ug/l	0.50	0.18	1
1,2-Dichlorobenzene	ND		ug/l	2.5	0.70	1

Project Name: ESSEX/HOPE **Lab Number:** L1801047

Project Number: 699900.01.RT.OM **Report Date:** 01/18/18

SAMPLE RESULTS

Lab ID: L1801047-03 Date Collected: 01/11/18 09:30

Client ID: POST-CARB_20180111 Date Received: 01/11/18

Sample Location: JAMESTOWN, NY Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,3-Dichlorobenzene	ND		ug/l	2.5	0.70	1
1,4-Dichlorobenzene	ND		ug/l	2.5	0.70	1
Methyl tert butyl ether	ND		ug/l	2.5	0.70	1
p/m-Xylene	ND		ug/l	2.5	0.70	1
o-Xylene	ND		ug/l	2.5	0.70	1
Xylenes, Total	ND		ug/l	2.5	0.70	1
cis-1,2-Dichloroethene	ND		ug/l	2.5	0.70	1
1,2-Dichloroethene, Total	ND		ug/l	2.5	0.70	1
Dibromomethane	ND		ug/l	5.0	1.0	1
1,2,3-Trichloropropane	ND		ug/l	2.5	0.70	1
Styrene	ND		ug/l	2.5	0.70	1
Dichlorodifluoromethane	ND		ug/l	5.0	1.0	1
Acetone	9.0		ug/l	5.0	1.5	1
Carbon disulfide	ND		ug/l	5.0	1.0	1
2-Butanone	ND		ug/l	5.0	1.9	1
Vinyl acetate	ND		ug/l	5.0	1.0	1
4-Methyl-2-pentanone	ND		ug/l	5.0	1.0	1
2-Hexanone	ND		ug/l	5.0	1.0	1
Bromochloromethane	ND		ug/l	2.5	0.70	1
2,2-Dichloropropane	ND		ug/l	2.5	0.70	1
1,2-Dibromoethane	ND		ug/l	2.0	0.65	1
1,3-Dichloropropane	ND		ug/l	2.5	0.70	1
1,1,1,2-Tetrachloroethane	ND		ug/l	2.5	0.70	1
Bromobenzene	ND		ug/l	2.5	0.70	1
n-Butylbenzene	ND		ug/l	2.5	0.70	1
sec-Butylbenzene	ND		ug/l	2.5	0.70	1
tert-Butylbenzene	ND		ug/l	2.5	0.70	1
o-Chlorotoluene	ND		ug/l	2.5	0.70	1
p-Chlorotoluene	ND		ug/l	2.5	0.70	1
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	0.70	1
Hexachlorobutadiene	ND		ug/l	2.5	0.70	1
Isopropylbenzene	ND		ug/l	2.5	0.70	1
p-Isopropyltoluene	ND		ug/l	2.5	0.70	1
Naphthalene	ND		ug/l	2.5	0.70	1
n-Propylbenzene	ND		ug/l	2.5	0.70	1
1,2,3-Trichlorobenzene	ND		ug/l	2.5	0.70	1
1,2,4-Trichlorobenzene	ND		ug/l	2.5	0.70	1
1,3,5-Trimethylbenzene	ND		ug/l	2.5	0.70	1
1,2,4-Trimethylbenzene	ND		ug/l	2.5	0.70	1

Project Name: ESSEX/HOPE **Lab Number:** L1801047

Project Number: 699900.01.RT.OM **Report Date:** 01/18/18

SAMPLE RESULTS

Lab ID: L1801047-03 Date Collected: 01/11/18 09:30

Client ID: POST-CARB_20180111 Date Received: 01/11/18

Sample Location: JAMESTOWN, NY Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,4-Dioxane	ND		ug/l	250	61.	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	98		70-130
Toluene-d8	98		70-130
4-Bromofluorobenzene	100		70-130
Dibromofluoromethane	101		70-130

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM
Lab Number: L1801047
Report Date: 01/18/18

SAMPLE RESULTS

Lab ID: L1801047-04
Client ID: TRIP BLANK
Sample Location: JAMESTOWN, NY

Date Collected: 01/11/18 00:00
Date Received: 01/11/18
Field Prep: Not Specified

Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 01/16/18 12:51
Analyst: PD

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	2.5	0.70	1
1,1-Dichloroethane	ND		ug/l	2.5	0.70	1
Chloroform	ND		ug/l	2.5	0.70	1
Carbon tetrachloride	ND		ug/l	0.50	0.13	1
1,2-Dichloropropane	ND		ug/l	1.0	0.14	1
Dibromochloromethane	ND		ug/l	0.50	0.15	1
1,1,2-Trichloroethane	ND		ug/l	1.5	0.50	1
Tetrachloroethene	ND		ug/l	0.50	0.18	1
Chlorobenzene	ND		ug/l	2.5	0.70	1
Trichlorofluoromethane	ND		ug/l	2.5	0.70	1
1,2-Dichloroethane	ND		ug/l	0.50	0.13	1
1,1,1-Trichloroethane	ND		ug/l	2.5	0.70	1
Bromodichloromethane	ND		ug/l	0.50	0.19	1
trans-1,3-Dichloropropene	ND		ug/l	0.50	0.16	1
cis-1,3-Dichloropropene	ND		ug/l	0.50	0.14	1
1,3-Dichloropropene, Total	ND		ug/l	0.50	0.14	1
1,1-Dichloropropene	ND		ug/l	2.5	0.70	1
Bromoform	ND		ug/l	2.0	0.65	1
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	0.17	1
Benzene	ND		ug/l	0.50	0.16	1
Toluene	ND		ug/l	2.5	0.70	1
Ethylbenzene	ND		ug/l	2.5	0.70	1
Chloromethane	ND		ug/l	2.5	0.70	1
Bromomethane	ND		ug/l	2.5	0.70	1
Vinyl chloride	ND		ug/l	1.0	0.07	1
Chloroethane	ND		ug/l	2.5	0.70	1
1,1-Dichloroethene	ND		ug/l	0.50	0.17	1
trans-1,2-Dichloroethene	ND		ug/l	2.5	0.70	1
Trichloroethene	ND		ug/l	0.50	0.18	1
1,2-Dichlorobenzene	ND		ug/l	2.5	0.70	1

Project Name: ESSEX/HOPE **Lab Number:** L1801047

Project Number: 699900.01.RT.OM **Report Date:** 01/18/18

SAMPLE RESULTS

Lab ID: L1801047-04 Date Collected: 01/11/18 00:00

Client ID: TRIP BLANK Date Received: 01/11/18

Sample Location: JAMESTOWN, NY Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,3-Dichlorobenzene	ND		ug/l	2.5	0.70	1
1,4-Dichlorobenzene	ND		ug/l	2.5	0.70	1
Methyl tert butyl ether	ND		ug/l	2.5	0.70	1
p/m-Xylene	ND		ug/l	2.5	0.70	1
o-Xylene	ND		ug/l	2.5	0.70	1
Xylenes, Total	ND		ug/l	2.5	0.70	1
cis-1,2-Dichloroethene	ND		ug/l	2.5	0.70	1
1,2-Dichloroethene, Total	ND		ug/l	2.5	0.70	1
Dibromomethane	ND		ug/l	5.0	1.0	1
1,2,3-Trichloropropane	ND		ug/l	2.5	0.70	1
Styrene	ND		ug/l	2.5	0.70	1
Dichlorodifluoromethane	ND		ug/l	5.0	1.0	1
Acetone	ND		ug/l	5.0	1.5	1
Carbon disulfide	ND		ug/l	5.0	1.0	1
2-Butanone	ND		ug/l	5.0	1.9	1
Vinyl acetate	ND		ug/l	5.0	1.0	1
4-Methyl-2-pentanone	ND		ug/l	5.0	1.0	1
2-Hexanone	ND		ug/l	5.0	1.0	1
Bromochloromethane	ND		ug/l	2.5	0.70	1
2,2-Dichloropropane	ND		ug/l	2.5	0.70	1
1,2-Dibromoethane	ND		ug/l	2.0	0.65	1
1,3-Dichloropropane	ND		ug/l	2.5	0.70	1
1,1,1,2-Tetrachloroethane	ND		ug/l	2.5	0.70	1
Bromobenzene	ND		ug/l	2.5	0.70	1
n-Butylbenzene	ND		ug/l	2.5	0.70	1
sec-Butylbenzene	ND		ug/l	2.5	0.70	1
tert-Butylbenzene	ND		ug/l	2.5	0.70	1
o-Chlorotoluene	ND		ug/l	2.5	0.70	1
p-Chlorotoluene	ND		ug/l	2.5	0.70	1
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	0.70	1
Hexachlorobutadiene	ND		ug/l	2.5	0.70	1
Isopropylbenzene	ND		ug/l	2.5	0.70	1
p-Isopropyltoluene	ND		ug/l	2.5	0.70	1
Naphthalene	ND		ug/l	2.5	0.70	1
n-Propylbenzene	ND		ug/l	2.5	0.70	1
1,2,3-Trichlorobenzene	ND		ug/l	2.5	0.70	1
1,2,4-Trichlorobenzene	ND		ug/l	2.5	0.70	1
1,3,5-Trimethylbenzene	ND		ug/l	2.5	0.70	1
1,2,4-Trimethylbenzene	ND		ug/l	2.5	0.70	1

Project Name: ESSEX/HOPE
Lab Number: L1801047
Project Number: 699900.01.RT.OM
Report Date: 01/18/18

SAMPLE RESULTS

Lab ID: L1801047-04
Client ID: TRIP BLANK
Sample Location: JAMESTOWN, NY
Date Collected: 01/11/18 00:00
Date Received: 01/11/18
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,4-Dioxane	ND		ug/l	250	61.	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	99		70-130
Toluene-d8	98		70-130
4-Bromofluorobenzene	96		70-130
Dibromofluoromethane	99		70-130

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1801047
Report Date: 01/18/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 01/16/18 12:17
Analyst: PD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-04 Batch: WG1081367-5					
Methylene chloride	ND		ug/l	2.5	0.70
1,1-Dichloroethane	ND		ug/l	2.5	0.70
Chloroform	ND		ug/l	2.5	0.70
Carbon tetrachloride	ND		ug/l	0.50	0.13
1,2-Dichloropropane	ND		ug/l	1.0	0.14
Dibromochloromethane	ND		ug/l	0.50	0.15
1,1,2-Trichloroethane	ND		ug/l	1.5	0.50
Tetrachloroethene	ND		ug/l	0.50	0.18
Chlorobenzene	ND		ug/l	2.5	0.70
Trichlorofluoromethane	ND		ug/l	2.5	0.70
1,2-Dichloroethane	ND		ug/l	0.50	0.13
1,1,1-Trichloroethane	ND		ug/l	2.5	0.70
Bromodichloromethane	ND		ug/l	0.50	0.19
trans-1,3-Dichloropropene	ND		ug/l	0.50	0.16
cis-1,3-Dichloropropene	ND		ug/l	0.50	0.14
1,3-Dichloropropene, Total	ND		ug/l	0.50	0.14
1,1-Dichloropropene	ND		ug/l	2.5	0.70
Bromoform	ND		ug/l	2.0	0.65
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	0.17
Benzene	ND		ug/l	0.50	0.16
Toluene	ND		ug/l	2.5	0.70
Ethylbenzene	ND		ug/l	2.5	0.70
Chloromethane	ND		ug/l	2.5	0.70
Bromomethane	ND		ug/l	2.5	0.70
Vinyl chloride	ND		ug/l	1.0	0.07
Chloroethane	ND		ug/l	2.5	0.70
1,1-Dichloroethene	ND		ug/l	0.50	0.17
trans-1,2-Dichloroethene	ND		ug/l	2.5	0.70
Trichloroethene	ND		ug/l	0.50	0.18

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1801047
Report Date: 01/18/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 01/16/18 12:17
Analyst: PD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-04 Batch: WG1081367-5					
1,2-Dichlorobenzene	ND		ug/l	2.5	0.70
1,3-Dichlorobenzene	ND		ug/l	2.5	0.70
1,4-Dichlorobenzene	ND		ug/l	2.5	0.70
Methyl tert butyl ether	ND		ug/l	2.5	0.70
p/m-Xylene	ND		ug/l	2.5	0.70
o-Xylene	ND		ug/l	2.5	0.70
Xylenes, Total	ND		ug/l	2.5	0.70
cis-1,2-Dichloroethene	ND		ug/l	2.5	0.70
1,2-Dichloroethene, Total	ND		ug/l	2.5	0.70
Dibromomethane	ND		ug/l	5.0	1.0
1,2,3-Trichloropropane	ND		ug/l	2.5	0.70
Styrene	ND		ug/l	2.5	0.70
Dichlorodifluoromethane	ND		ug/l	5.0	1.0
Acetone	ND		ug/l	5.0	1.5
Carbon disulfide	ND		ug/l	5.0	1.0
2-Butanone	ND		ug/l	5.0	1.9
Vinyl acetate	ND		ug/l	5.0	1.0
4-Methyl-2-pentanone	ND		ug/l	5.0	1.0
2-Hexanone	ND		ug/l	5.0	1.0
Bromochloromethane	ND		ug/l	2.5	0.70
2,2-Dichloropropane	ND		ug/l	2.5	0.70
1,2-Dibromoethane	ND		ug/l	2.0	0.65
1,3-Dichloropropane	ND		ug/l	2.5	0.70
1,1,1,2-Tetrachloroethane	ND		ug/l	2.5	0.70
Bromobenzene	ND		ug/l	2.5	0.70
n-Butylbenzene	ND		ug/l	2.5	0.70
sec-Butylbenzene	ND		ug/l	2.5	0.70
tert-Butylbenzene	ND		ug/l	2.5	0.70
o-Chlorotoluene	ND		ug/l	2.5	0.70

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM
Lab Number: L1801047
Report Date: 01/18/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 01/16/18 12:17
Analyst: PD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-04 Batch: WG1081367-5					
p-Chlorotoluene	ND		ug/l	2.5	0.70
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	0.70
Hexachlorobutadiene	ND		ug/l	2.5	0.70
Isopropylbenzene	ND		ug/l	2.5	0.70
p-Isopropyltoluene	ND		ug/l	2.5	0.70
Naphthalene	ND		ug/l	2.5	0.70
n-Propylbenzene	ND		ug/l	2.5	0.70
1,2,3-Trichlorobenzene	ND		ug/l	2.5	0.70
1,2,4-Trichlorobenzene	ND		ug/l	2.5	0.70
1,3,5-Trimethylbenzene	ND		ug/l	2.5	0.70
1,2,4-Trimethylbenzene	ND		ug/l	2.5	0.70
1,4-Dioxane	ND		ug/l	250	61.

Surrogate	%Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	98		70-130
Toluene-d8	97		70-130
4-Bromofluorobenzene	99		70-130
Dibromofluoromethane	99		70-130

Lab Control Sample Analysis
Batch Quality Control

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1801047
Report Date: 01/18/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-04 Batch: WG1081367-3 WG1081367-4								
Methylene chloride	100		100		70-130	0		20
1,1-Dichloroethane	100		100		70-130	0		20
Chloroform	100		100		70-130	0		20
Carbon tetrachloride	110		100		63-132	10		20
1,2-Dichloropropane	100		110		70-130	10		20
Dibromochloromethane	100		98		63-130	2		20
1,1,2-Trichloroethane	100		100		70-130	0		20
Tetrachloroethene	110		110		70-130	0		20
Chlorobenzene	100		100		75-130	0		20
Trichlorofluoromethane	110		110		62-150	0		20
1,2-Dichloroethane	99		98		70-130	1		20
1,1,1-Trichloroethane	110		110		67-130	0		20
Bromodichloromethane	100		100		67-130	0		20
trans-1,3-Dichloropropene	100		99		70-130	1		20
cis-1,3-Dichloropropene	100		100		70-130	0		20
1,1-Dichloropropene	120		110		70-130	9		20
Bromoform	95		93		54-136	2		20
1,1,2,2-Tetrachloroethane	100		100		67-130	0		20
Benzene	110		110		70-130	0		20
Toluene	110		100		70-130	10		20
Ethylbenzene	110		110		70-130	0		20
Chloromethane	130		130		64-130	0		20
Bromomethane	100		110		39-139	10		20

Lab Control Sample Analysis
Batch Quality Control

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1801047
Report Date: 01/18/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-04 Batch: WG1081367-3 WG1081367-4								
Vinyl chloride	120		110		55-140	9		20
Chloroethane	100		110		55-138	10		20
1,1-Dichloroethene	110		110		61-145	0		20
trans-1,2-Dichloroethene	110		100		70-130	10		20
Trichloroethene	110		110		70-130	0		20
1,2-Dichlorobenzene	100		100		70-130	0		20
1,3-Dichlorobenzene	100		100		70-130	0		20
1,4-Dichlorobenzene	100		100		70-130	0		20
Methyl tert butyl ether	100		100		63-130	0		20
p/m-Xylene	110		105		70-130	5		20
o-Xylene	105		105		70-130	0		20
cis-1,2-Dichloroethene	100		110		70-130	10		20
Dibromomethane	100		100		70-130	0		20
1,2,3-Trichloropropane	96		97		64-130	1		20
Styrene	105		105		70-130	0		20
Dichlorodifluoromethane	110		110		36-147	0		20
Acetone	100		100		58-148	0		20
Carbon disulfide	110		110		51-130	0		20
2-Butanone	99		100		63-138	1		20
Vinyl acetate	100		97		70-130	3		20
4-Methyl-2-pentanone	92		97		59-130	5		20
2-Hexanone	92		95		57-130	3		20
Bromochloromethane	110		110		70-130	0		20

Lab Control Sample Analysis
Batch Quality Control

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1801047
Report Date: 01/18/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-04 Batch: WG1081367-3 WG1081367-4								
2,2-Dichloropropane	110		110		63-133	0		20
1,2-Dibromoethane	100		100		70-130	0		20
1,3-Dichloropropane	100		100		70-130	0		20
1,1,1,2-Tetrachloroethane	99		99		64-130	0		20
Bromobenzene	100		100		70-130	0		20
n-Butylbenzene	120		110		53-136	9		20
sec-Butylbenzene	120		110		70-130	9		20
tert-Butylbenzene	110		110		70-130	0		20
o-Chlorotoluene	100		100		70-130	0		20
p-Chlorotoluene	100		100		70-130	0		20
1,2-Dibromo-3-chloropropane	86		91		41-144	6		20
Hexachlorobutadiene	120		120		63-130	0		20
Isopropylbenzene	110		110		70-130	0		20
p-Isopropyltoluene	110		110		70-130	0		20
Naphthalene	95		94		70-130	1		20
n-Propylbenzene	110		110		69-130	0		20
1,2,3-Trichlorobenzene	86		87		70-130	1		20
1,2,4-Trichlorobenzene	100		100		70-130	0		20
1,3,5-Trimethylbenzene	110		100		64-130	10		20
1,2,4-Trimethylbenzene	100		100		70-130	0		20
1,4-Dioxane	118		114		56-162	3		20

Lab Control Sample Analysis

Batch Quality Control

Project Name: ESSEX/HOPE

Project Number: 699900.01.RT.OM

Lab Number: L1801047

Report Date: 01/18/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-04 Batch: WG1081367-3 WG1081367-4								

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
1,2-Dichloroethane-d4	95		96		70-130
Toluene-d8	100		100		70-130
4-Bromofluorobenzene	100		100		70-130
Dibromofluoromethane	96		98		70-130

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1801047
Report Date: 01/18/18

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1801047-01A	Vial HCl preserved	A	NA		3.9	Y	Absent		NYTCL-8260(14)
L1801047-01B	Vial HCl preserved	A	NA		3.9	Y	Absent		NYTCL-8260(14)
L1801047-01C	Vial HCl preserved	A	NA		3.9	Y	Absent		NYTCL-8260(14)
L1801047-02A	Vial HCl preserved	A	NA		3.9	Y	Absent		NYTCL-8260(14)
L1801047-02B	Vial HCl preserved	A	NA		3.9	Y	Absent		NYTCL-8260(14)
L1801047-02C	Vial HCl preserved	A	NA		3.9	Y	Absent		NYTCL-8260(14)
L1801047-03A	Vial HCl preserved split	A	NA		3.9	Y	Absent		NYTCL-8260(14)
L1801047-03B	Vial HCl preserved split	A	NA		3.9	Y	Absent		NYTCL-8260(14)
L1801047-03C	Vial HCl preserved split	A	NA		3.9	Y	Absent		NYTCL-8260(14)
L1801047-03D	Vial HCl preserved split	A	NA		3.9	Y	Absent		NYTCL-8260(14)
L1801047-04A	Vial HCl preserved	A	NA		3.9	Y	Absent		NYTCL-8260(14)
L1801047-04B	Vial HCl preserved	A	NA		3.9	Y	Absent		NYTCL-8260(14)
L1801047-05A	Vial HCl preserved	A	NA		3.9	Y	Absent		COMP-VOA()
L1801047-05A1	Vial HCl preserved	A	NA		3.9	Y	Absent		COMP-VOA()
L1801047-05A2	Vial HCl preserved	A	NA		3.9	Y	Absent		COMP-VOA()
L1801047-05B	Vial HCl preserved	A	NA		3.9	Y	Absent		COMP-VOA()
L1801047-05B1	Vial HCl preserved	A	NA		3.9	Y	Absent		COMP-VOA()
L1801047-05B2	Vial HCl preserved	A	NA		3.9	Y	Absent		COMP-VOA()
L1801047-05C	Vial HCl preserved	A	NA		3.9	Y	Absent		COMP-VOA()
L1801047-05C1	Vial HCl preserved	A	NA		3.9	Y	Absent		COMP-VOA()
L1801047-05C2	Vial HCl preserved	A	NA		3.9	Y	Absent		COMP-VOA()
L1801047-05D	Vial HCl preserved	A	NA		3.9	Y	Absent		COMP-VOA()
L1801047-05D1	Vial HCl preserved	A	NA		3.9	Y	Absent		COMP-VOA()

*Values in parentheses indicate holding time in days

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1801047
Report Date: 01/18/18

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1801047-05D2	Vial HCl preserved	A	NA		3.9	Y	Absent		COMP-VOA()

*Values in parentheses indicate holding time in days

Project Name:	ESSEX/HOPE	**Lab Number:**	L1801047
Project Number:	699900.01.RT.OM	**Report Date:**	01/18/18

GLOSSARY

Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

1	- The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A	- Spectra identified as "Aldol Condensation Product".
B	- The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related

Report Format: DU Report with 'J' Qualifiers

Project Name:	ESSEX/HOPE	**Lab Number:**	L1801047
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Data Qualifiers

projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

J - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

ND - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

Report Format: DU Report with 'J' Qualifiers

Project Name:	ESSEX/HOPE	**Lab Number:**	L1801047
Project Number:	699900.01.RT.OM	**Report Date:**	01/18/18

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
EPA 300: DW: Bromide
EPA 6860: SCM: Perchlorate
EPA 9010: NPW and SCM: Amenable Cyanide Distillation
SM4500: NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, EPA 351.1, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D.**
EPA 624: Volatile Halocarbons & Aromatics,
EPA 608: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Be, Cd, Cr, Cu, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

NEW YORK CHAIN OF CUSTODY

ALPHA

Westborough, MA 01581
8 Walkup Dr.
TEL: 508-898-9220
FAX: 508-898-9193

Mansfield, MA 02048
320 Forbes Blvd
TEL: 508-822-9300
FAX: 508-822-3288

Service Centers
Mahwah, NJ 07430: 35 Whitney Rd, Suite 5
Albany, NY 12205: 14 Walker Way
Tonawanda, NY 14150: 275 Cooper Ave, Suite 105

Page 1 of 1

Date Rec'd in Lab: 1/12/18

ALPHA Job #: L1801047

Project Information
Project Name: Essex/Hope
Project Location: Jamestown NY
Project # 699900.01.RT.005
(Use Project name as Project #) ☐
Project Manager: Kyle Block
ALPHAQuote #:

Turn-Around Time
Standard ☒ Due Date:
Rush (only if pre approved) ☐ # of Days:

Client Information
Client: Chazen Mc Williams
Address: 18 Tremont St Boston MA
Phone:
Fax:
Email: kyle.block@chazen

Deliverables
☐ ASP-A ☐ ASP-B
☐ EQuIS (1 File) ☐ EQuIS (4 File)
☐ Other

Billing Information
☒ Same as Client Info
PO #

Regulatory Requirement
☐ NY TOGS ☐ NY Part 375
☐ AWQ Standards ☐ NY CP-51
☐ NY Restricted Use ☐ Other
☐ NY Unrestricted Use
☐ NYC Sewer Discharge

Disposal Site Information
Please identify below location of applicable disposal facilities.
Disposal Facility:
☐ NJ ☒ NY
☐ Other:

These samples have been previously analyzed by Alpha ☒

Other project specific requirements/comments:
Please Composite all 4 Post-CARB Samples
3. Report QS Post-CARB- 20180111

Please specify Metals or TAL.

ANALYSIS
VOCs 8260

Sample Filtration
☐ Done
☐ Lab to do
Preservation
☐ Lab to do
(Please Specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	VOCs	Sample Specific Comments	Total Bottle
01047.01	Pre-CARB_20180111	01/11/18	0745	GW	JRG	X		3
.02	Primary-Eff_20180111		0755			X		3
.03	Post-CARB_20180111_1		0800			X		3
.04	Post-CARB_20180111_2		0830			X		3
.05	Post-CARB_20180111_3		0900			X		3
.06	Post-CARB_20180111_4		0930			X		3
.07	TRIP BLANK	—	—	—	—	X		2

Preservative Code:
A = None
B = HCl
C = HNO_3
D = H_2SO_4
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
K/E = Zn Ac/NaOH
O = Other

Container Code
P = Plastic
A = Amber Glass
V = Vial
G = Glass
B = Bacteria Cup
C = Cube
O = Other
E = Encore
D = BOD Bottle

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Container Type: V
Preservative: B

Relinquished By:	Date/Time	Received By:	Date/Time
	1/11/18 @ 1303	Joaquim Tilley (AAL)	1/11/18 13:08
Jon Gorin			
Joaquim Tilley	1/11/18 13:08		1/12/18 01:30

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. BY EXECUTING THIS COC, THE CLIENT HAS READ AND AGREES TO BE BOUND BY ALPHA'S TERMS & CONDITIONS. (See reverse side.)

Form No: 01-25 HC (rev. 30-Sept-2013)

ANALYTICAL REPORT

Lab Number:	L1805542
Client:	CH2MHILL 18 Tremont Street Suite 700 Boston, MA 02108
ATTN:	Kyle Block
Phone:	(617) 523-2260
Project Name:	ESSEX/HOPE
Project Number:	699900.01.RT.OM
Report Date:	02/22/18

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), NJ NELAP (MA935), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-14-00197).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1805542
Report Date: 02/22/18

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1805542-01	PRE-CARB_20180216	WATER	JAMESTOWN, NY	02/16/18 07:40	02/16/18
L1805542-02	PRIMARY-EFF_20180216	WATER	JAMESTOWN, NY	02/16/18 07:50	02/16/18
L1805542-03	POST-CARB_20180216	WATER	JAMESTOWN, NY	02/16/18 08:00	02/16/18
L1805542-04	TRIP BLANK	WATER	JAMESTOWN, NY	02/16/18 08:30	02/16/18
L1805542-05	COMPOSITE POST-CARB_20180216_GRABS 1-4	WATER	JAMESTOWN, NY	02/16/18 09:00	02/16/18

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1805542
Report Date: 02/22/18

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY
For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

Project Name:	ESSEX/HOPE	**Lab Number:**	L1805542
Project Number:	699900.01.RT.OM	**Report Date:**	02/22/18

Case Narrative (continued)

Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

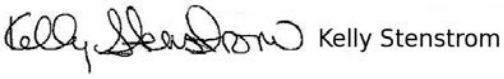
Volatile Organics

L1805542-01 and -02: The sample has elevated detection limits due to the dilution required by the elevated concentrations of target compounds in the sample.

L1805542-01 and -03: The sample was re-analyzed on dilution in order to quantify the results within the calibration range. The result(s) should be considered estimated, and are qualified with an E flag, for any compound(s) that exceeded the calibration range in the initial analysis. The re-analysis was performed only for the compound(s) that exceeded the calibration range.

The WG1091137-3/-4 LCS/LCSD recoveries, associated with L1805542-01 through -04, are above the individual acceptance criteria for naphthalene (LCS 140%) and 1,2,3-trichlorobenzene (170%/160%), but within the overall method allowances. The results of the associated samples are reported.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:  Kelly Stenstrom

Title: Technical Director/Representative Date: 02/22/18

ORGANICS

VOLATILES

Project Name: ESSEX/HOPE
Lab Number: L1805542
Project Number: 699900.01.RT.OM
Report Date: 02/22/18

SAMPLE RESULTS

Lab ID: L1805542-01 D2
Client ID: PRE-CARB_20180216
Sample Location: JAMESTOWN, NY
Sample Depth:
Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 02/20/18 22:59
Analyst: PD

Date Collected: 02/16/18 07:40
Date Received: 02/16/18
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Trichloroethene	1500		ug/l	5.0	1.8	10
cis-1,2-Dichloroethene	1900		ug/l	25	7.0	10
1,2-Dichloroethene, Total	1900		ug/l	6.2	1.8	10

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	106		70-130
Toluene-d8	98		70-130
4-Bromofluorobenzene	100		70-130
Dibromofluoromethane	102		70-130

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM
Lab Number: L1805542
Report Date: 02/22/18

SAMPLE RESULTS

Lab ID: L1805542-01 D
Client ID: PRE-CARB_20180216
Sample Location: JAMESTOWN, NY
Sample Depth:
Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 02/20/18 19:27
Analyst: PD

Date Collected: 02/16/18 07:40
Date Received: 02/16/18
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	6.2	1.8	2.5
1,1-Dichloroethane	ND		ug/l	6.2	1.8	2.5
Chloroform	ND		ug/l	6.2	1.8	2.5
Carbon tetrachloride	ND		ug/l	1.2	0.34	2.5
1,2-Dichloropropane	ND		ug/l	2.5	0.34	2.5
Dibromochloromethane	ND		ug/l	1.2	0.37	2.5
1,1,2-Trichloroethane	ND		ug/l	3.8	1.2	2.5
Tetrachloroethene	ND		ug/l	1.2	0.45	2.5
Chlorobenzene	ND		ug/l	6.2	1.8	2.5
Trichlorofluoromethane	ND		ug/l	6.2	1.8	2.5
1,2-Dichloroethane	ND		ug/l	1.2	0.33	2.5
1,1,1-Trichloroethane	ND		ug/l	6.2	1.8	2.5
Bromodichloromethane	ND		ug/l	1.2	0.48	2.5
trans-1,3-Dichloropropene	ND		ug/l	1.2	0.41	2.5
cis-1,3-Dichloropropene	ND		ug/l	1.2	0.36	2.5
1,3-Dichloropropene, Total	ND		ug/l	1.2	0.36	2.5
1,1-Dichloropropene	ND		ug/l	6.2	1.8	2.5
Bromoform	ND		ug/l	5.0	1.6	2.5
1,1,2,2-Tetrachloroethane	ND		ug/l	1.2	0.42	2.5
Benzene	3.9		ug/l	1.2	0.40	2.5
Toluene	ND		ug/l	6.2	1.8	2.5
Ethylbenzene	ND		ug/l	6.2	1.8	2.5
Chloromethane	ND		ug/l	6.2	1.8	2.5
Bromomethane	ND		ug/l	6.2	1.8	2.5
Vinyl chloride	290		ug/l	2.5	0.18	2.5
Chloroethane	ND		ug/l	6.2	1.8	2.5
1,1-Dichloroethene	10		ug/l	1.2	0.42	2.5
trans-1,2-Dichloroethene	14		ug/l	6.2	1.8	2.5
Trichloroethene	1200	E	ug/l	1.2	0.44	2.5

Project Name: ESSEX/HOPE **Lab Number:** L1805542

Project Number: 699900.01.RT.OM **Report Date:** 02/22/18

SAMPLE RESULTS

Lab ID: L1805542-01 D
Client ID: PRE-CARB_20180216
Sample Location: JAMESTOWN, NY
Sample Depth:

Date Collected: 02/16/18 07:40
Date Received: 02/16/18
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,2-Dichlorobenzene	ND		ug/l	6.2	1.8	2.5
1,3-Dichlorobenzene	ND		ug/l	6.2	1.8	2.5
1,4-Dichlorobenzene	ND		ug/l	6.2	1.8	2.5
Methyl tert butyl ether	ND		ug/l	6.2	1.8	2.5
p/m-Xylene	ND		ug/l	6.2	1.8	2.5
o-Xylene	ND		ug/l	6.2	1.8	2.5
Xylenes, Total	ND		ug/l	6.2	1.8	2.5
cis-1,2-Dichloroethene	1400	E	ug/l	6.2	1.8	2.5
Dibromomethane	ND		ug/l	12	2.5	2.5
1,2,3-Trichloropropane	ND		ug/l	6.2	1.8	2.5
Styrene	ND		ug/l	6.2	1.8	2.5
Dichlorodifluoromethane	ND		ug/l	12	2.5	2.5
Acetone	ND		ug/l	12	3.6	2.5
Carbon disulfide	ND		ug/l	12	2.5	2.5
2-Butanone	ND		ug/l	12	4.8	2.5
Vinyl acetate	ND		ug/l	12	2.5	2.5
4-Methyl-2-pentanone	ND		ug/l	12	2.5	2.5
2-Hexanone	ND		ug/l	12	2.5	2.5
Bromochloromethane	ND		ug/l	6.2	1.8	2.5
2,2-Dichloropropane	ND		ug/l	6.2	1.8	2.5
1,2-Dibromoethane	ND		ug/l	5.0	1.6	2.5
1,3-Dichloropropane	ND		ug/l	6.2	1.8	2.5
1,1,1,2-Tetrachloroethane	ND		ug/l	6.2	1.8	2.5
Bromobenzene	ND		ug/l	6.2	1.8	2.5
n-Butylbenzene	ND		ug/l	6.2	1.8	2.5
sec-Butylbenzene	ND		ug/l	6.2	1.8	2.5
tert-Butylbenzene	ND		ug/l	6.2	1.8	2.5
o-Chlorotoluene	ND		ug/l	6.2	1.8	2.5
p-Chlorotoluene	ND		ug/l	6.2	1.8	2.5
1,2-Dibromo-3-chloropropane	ND		ug/l	6.2	1.8	2.5
Hexachlorobutadiene	ND		ug/l	6.2	1.8	2.5
Isopropylbenzene	ND		ug/l	6.2	1.8	2.5
p-Isopropyltoluene	ND		ug/l	6.2	1.8	2.5
Naphthalene	ND		ug/l	6.2	1.8	2.5
n-Propylbenzene	ND		ug/l	6.2	1.8	2.5
1,2,3-Trichlorobenzene	ND		ug/l	6.2	1.8	2.5
1,2,4-Trichlorobenzene	ND		ug/l	6.2	1.8	2.5
1,3,5-Trimethylbenzene	ND		ug/l	6.2	1.8	2.5

Project Name: ESSEX/HOPE **Lab Number:** L1805542

Project Number: 699900.01.RT.OM **Report Date:** 02/22/18

SAMPLE RESULTS

Lab ID: L1805542-01 D
Client ID: PRE-CARB_20180216
Sample Location: JAMESTOWN, NY
Sample Depth:

Date Collected: 02/16/18 07:40
Date Received: 02/16/18
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,2,4-Trimethylbenzene	ND		ug/l	6.2	1.8	2.5
1,4-Dioxane	ND		ug/l	620	150	2.5

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	102		70-130
Toluene-d8	99		70-130
4-Bromofluorobenzene	97		70-130
Dibromofluoromethane	101		70-130

Project Name: ESSEX/HOPE **Lab Number:** L1805542

Project Number: 699900.01.RT.OM **Report Date:** 02/22/18

SAMPLE RESULTS

Lab ID: L1805542-02 D
Client ID: PRIMARY-EFF_20180216
Sample Location: JAMESTOWN, NY
Sample Depth:
Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 02/20/18 21:48
Analyst: PD

Date Collected: 02/16/18 07:50
Date Received: 02/16/18
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	25	7.0	10
1,1-Dichloroethane	ND		ug/l	25	7.0	10
Chloroform	ND		ug/l	25	7.0	10
Carbon tetrachloride	ND		ug/l	5.0	1.3	10
1,2-Dichloropropane	ND		ug/l	10	1.4	10
Dibromochloromethane	ND		ug/l	5.0	1.5	10
1,1,2-Trichloroethane	ND		ug/l	15	5.0	10
Tetrachloroethene	ND		ug/l	5.0	1.8	10
Chlorobenzene	ND		ug/l	25	7.0	10
Trichlorofluoromethane	ND		ug/l	25	7.0	10
1,2-Dichloroethane	ND		ug/l	5.0	1.3	10
1,1,1-Trichloroethane	ND		ug/l	25	7.0	10
Bromodichloromethane	ND		ug/l	5.0	1.9	10
trans-1,3-Dichloropropene	ND		ug/l	5.0	1.6	10
cis-1,3-Dichloropropene	ND		ug/l	5.0	1.4	10
1,3-Dichloropropene, Total	ND		ug/l	5.0	1.4	10
1,1-Dichloropropene	ND		ug/l	25	7.0	10
Bromoform	ND		ug/l	20	6.5	10
1,1,2,2-Tetrachloroethane	ND		ug/l	5.0	1.7	10
Benzene	ND		ug/l	5.0	1.6	10
Toluene	ND		ug/l	25	7.0	10
Ethylbenzene	ND		ug/l	25	7.0	10
Chloromethane	ND		ug/l	25	7.0	10
Bromomethane	ND		ug/l	25	7.0	10
Vinyl chloride	1200		ug/l	10	0.71	10
Chloroethane	ND		ug/l	25	7.0	10
1,1-Dichloroethene	ND		ug/l	5.0	1.7	10
trans-1,2-Dichloroethene	ND		ug/l	25	7.0	10
Trichloroethene	ND		ug/l	5.0	1.8	10

Project Name: ESSEX/HOPE **Lab Number:** L1805542

Project Number: 699900.01.RT.OM **Report Date:** 02/22/18

SAMPLE RESULTS

Lab ID: L1805542-02 D
Client ID: PRIMARY-EFF_20180216
Sample Location: JAMESTOWN, NY
Sample Depth:

Date Collected: 02/16/18 07:50
Date Received: 02/16/18
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,2-Dichlorobenzene	ND		ug/l	25	7.0	10
1,3-Dichlorobenzene	ND		ug/l	25	7.0	10
1,4-Dichlorobenzene	ND		ug/l	25	7.0	10
Methyl tert butyl ether	ND		ug/l	25	7.0	10
p/m-Xylene	ND		ug/l	25	7.0	10
o-Xylene	ND		ug/l	25	7.0	10
Xylenes, Total	ND		ug/l	25	7.0	10
cis-1,2-Dichloroethene	910		ug/l	25	7.0	10
1,2-Dichloroethene, Total	910		ug/l	25	7.0	10
Dibromomethane	ND		ug/l	50	10.	10
1,2,3-Trichloropropane	ND		ug/l	25	7.0	10
Styrene	ND		ug/l	25	7.0	10
Dichlorodifluoromethane	ND		ug/l	50	10.	10
Acetone	ND		ug/l	50	15.	10
Carbon disulfide	ND		ug/l	50	10.	10
2-Butanone	ND		ug/l	50	19.	10
Vinyl acetate	ND		ug/l	50	10.	10
4-Methyl-2-pentanone	ND		ug/l	50	10.	10
2-Hexanone	ND		ug/l	50	10.	10
Bromochloromethane	ND		ug/l	25	7.0	10
2,2-Dichloropropane	ND		ug/l	25	7.0	10
1,2-Dibromoethane	ND		ug/l	20	6.5	10
1,3-Dichloropropane	ND		ug/l	25	7.0	10
1,1,1,2-Tetrachloroethane	ND		ug/l	25	7.0	10
Bromobenzene	ND		ug/l	25	7.0	10
n-Butylbenzene	ND		ug/l	25	7.0	10
sec-Butylbenzene	ND		ug/l	25	7.0	10
tert-Butylbenzene	ND		ug/l	25	7.0	10
o-Chlorotoluene	ND		ug/l	25	7.0	10
p-Chlorotoluene	ND		ug/l	25	7.0	10
1,2-Dibromo-3-chloropropane	ND		ug/l	25	7.0	10
Hexachlorobutadiene	ND		ug/l	25	7.0	10
Isopropylbenzene	ND		ug/l	25	7.0	10
p-Isopropyltoluene	ND		ug/l	25	7.0	10
Naphthalene	ND		ug/l	25	7.0	10
n-Propylbenzene	ND		ug/l	25	7.0	10
1,2,3-Trichlorobenzene	ND		ug/l	25	7.0	10
1,2,4-Trichlorobenzene	ND		ug/l	25	7.0	10

Project Name: ESSEX/HOPE **Lab Number:** L1805542

Project Number: 699900.01.RT.OM **Report Date:** 02/22/18

SAMPLE RESULTS

Lab ID: L1805542-02 D
Client ID: PRIMARY-EFF_20180216
Sample Location: JAMESTOWN, NY
Sample Depth:

Date Collected: 02/16/18 07:50
Date Received: 02/16/18
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,3,5-Trimethylbenzene	ND		ug/l	25	7.0	10
1,2,4-Trimethylbenzene	ND		ug/l	25	7.0	10
1,4-Dioxane	ND		ug/l	2500	610	10

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	107		70-130
Toluene-d8	98		70-130
4-Bromofluorobenzene	98		70-130
Dibromofluoromethane	103		70-130

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM
Lab Number: L1805542
Report Date: 02/22/18

SAMPLE RESULTS

Lab ID: L1805542-03
Client ID: POST-CARB_20180216
Sample Location: JAMESTOWN, NY
Sample Depth:
Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 02/20/18 18:52
Analyst: PD

Date Collected: 02/16/18 08:00
Date Received: 02/16/18
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	2.5	0.70	1
1,1-Dichloroethane	ND		ug/l	2.5	0.70	1
Chloroform	ND		ug/l	2.5	0.70	1
Carbon tetrachloride	ND		ug/l	0.50	0.13	1
1,2-Dichloropropane	ND		ug/l	1.0	0.14	1
Dibromochloromethane	ND		ug/l	0.50	0.15	1
1,1,2-Trichloroethane	ND		ug/l	1.5	0.50	1
Tetrachloroethene	ND		ug/l	0.50	0.18	1
Chlorobenzene	ND		ug/l	2.5	0.70	1
Trichlorofluoromethane	ND		ug/l	2.5	0.70	1
1,2-Dichloroethane	ND		ug/l	0.50	0.13	1
1,1,1-Trichloroethane	ND		ug/l	2.5	0.70	1
Bromodichloromethane	ND		ug/l	0.50	0.19	1
trans-1,3-Dichloropropene	ND		ug/l	0.50	0.16	1
cis-1,3-Dichloropropene	ND		ug/l	0.50	0.14	1
1,3-Dichloropropene, Total	ND		ug/l	0.50	0.14	1
1,1-Dichloropropene	ND		ug/l	2.5	0.70	1
Bromoform	ND		ug/l	2.0	0.65	1
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	0.17	1
Benzene	ND		ug/l	0.50	0.16	1
Toluene	ND		ug/l	2.5	0.70	1
Ethylbenzene	ND		ug/l	2.5	0.70	1
Chloromethane	ND		ug/l	2.5	0.70	1
Bromomethane	ND		ug/l	2.5	0.70	1
Vinyl chloride	560	E	ug/l	1.0	0.07	1
Chloroethane	ND		ug/l	2.5	0.70	1
1,1-Dichloroethene	ND		ug/l	0.50	0.17	1
trans-1,2-Dichloroethene	ND		ug/l	2.5	0.70	1
Trichloroethene	0.21	J	ug/l	0.50	0.18	1

Project Name: ESSEX/HOPE **Lab Number:** L1805542

Project Number: 699900.01.RT.OM **Report Date:** 02/22/18

SAMPLE RESULTS

Lab ID: L1805542-03 Date Collected: 02/16/18 08:00

Client ID: POST-CARB_20180216 Date Received: 02/16/18

Sample Location: JAMESTOWN, NY Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,2-Dichlorobenzene	ND		ug/l	2.5	0.70	1
1,3-Dichlorobenzene	ND		ug/l	2.5	0.70	1
1,4-Dichlorobenzene	ND		ug/l	2.5	0.70	1
Methyl tert butyl ether	ND		ug/l	2.5	0.70	1
p/m-Xylene	ND		ug/l	2.5	0.70	1
o-Xylene	ND		ug/l	2.5	0.70	1
Xylenes, Total	ND		ug/l	2.5	0.70	1
cis-1,2-Dichloroethene	ND		ug/l	2.5	0.70	1
1,2-Dichloroethene, Total	ND		ug/l	2.5	0.70	1
Dibromomethane	ND		ug/l	5.0	1.0	1
1,2,3-Trichloropropane	ND		ug/l	2.5	0.70	1
Styrene	ND		ug/l	2.5	0.70	1
Dichlorodifluoromethane	ND		ug/l	5.0	1.0	1
Acetone	ND		ug/l	5.0	1.5	1
Carbon disulfide	2.4	J	ug/l	5.0	1.0	1
2-Butanone	ND		ug/l	5.0	1.9	1
Vinyl acetate	ND		ug/l	5.0	1.0	1
4-Methyl-2-pentanone	ND		ug/l	5.0	1.0	1
2-Hexanone	ND		ug/l	5.0	1.0	1
Bromochloromethane	ND		ug/l	2.5	0.70	1
2,2-Dichloropropane	ND		ug/l	2.5	0.70	1
1,2-Dibromoethane	ND		ug/l	2.0	0.65	1
1,3-Dichloropropane	ND		ug/l	2.5	0.70	1
1,1,1,2-Tetrachloroethane	ND		ug/l	2.5	0.70	1
Bromobenzene	ND		ug/l	2.5	0.70	1
n-Butylbenzene	ND		ug/l	2.5	0.70	1
sec-Butylbenzene	ND		ug/l	2.5	0.70	1
tert-Butylbenzene	ND		ug/l	2.5	0.70	1
o-Chlorotoluene	ND		ug/l	2.5	0.70	1
p-Chlorotoluene	ND		ug/l	2.5	0.70	1
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	0.70	1
Hexachlorobutadiene	ND		ug/l	2.5	0.70	1
Isopropylbenzene	ND		ug/l	2.5	0.70	1
p-Isopropyltoluene	ND		ug/l	2.5	0.70	1
Naphthalene	ND		ug/l	2.5	0.70	1
n-Propylbenzene	ND		ug/l	2.5	0.70	1
1,2,3-Trichlorobenzene	ND		ug/l	2.5	0.70	1
1,2,4-Trichlorobenzene	ND		ug/l	2.5	0.70	1

Project Name: ESSEX/HOPE **Lab Number:** L1805542

Project Number: 699900.01.RT.OM **Report Date:** 02/22/18

SAMPLE RESULTS

Lab ID: L1805542-03 Date Collected: 02/16/18 08:00

Client ID: POST-CARB_20180216 Date Received: 02/16/18

Sample Location: JAMESTOWN, NY Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,3,5-Trimethylbenzene	ND		ug/l	2.5	0.70	1
1,2,4-Trimethylbenzene	ND		ug/l	2.5	0.70	1
1,4-Dioxane	ND		ug/l	250	61.	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	103		70-130
Toluene-d8	98		70-130
4-Bromofluorobenzene	97		70-130
Dibromofluoromethane	101		70-130

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM
Lab Number: L1805542
Report Date: 02/22/18

SAMPLE RESULTS

Lab ID: L1805542-03 D
Client ID: POST-CARB_20180216
Sample Location: JAMESTOWN, NY
Sample Depth:
Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 02/20/18 22:24
Analyst: PD

Date Collected: 02/16/18 08:00
Date Received: 02/16/18
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Vinyl chloride	590		ug/l	5.0	0.36	5

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	105		70-130
Toluene-d8	98		70-130
4-Bromofluorobenzene	98		70-130
Dibromofluoromethane	101		70-130

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM
Lab Number: L1805542
Report Date: 02/22/18

SAMPLE RESULTS

Lab ID: L1805542-04
Client ID: TRIP BLANK
Sample Location: JAMESTOWN, NY
Sample Depth:
Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 02/20/18 18:16
Analyst: PD

Date Collected: 02/16/18 08:30
Date Received: 02/16/18
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	2.5	0.70	1
1,1-Dichloroethane	ND		ug/l	2.5	0.70	1
Chloroform	ND		ug/l	2.5	0.70	1
Carbon tetrachloride	ND		ug/l	0.50	0.13	1
1,2-Dichloropropane	ND		ug/l	1.0	0.14	1
Dibromochloromethane	ND		ug/l	0.50	0.15	1
1,1,2-Trichloroethane	ND		ug/l	1.5	0.50	1
Tetrachloroethene	ND		ug/l	0.50	0.18	1
Chlorobenzene	ND		ug/l	2.5	0.70	1
Trichlorofluoromethane	ND		ug/l	2.5	0.70	1
1,2-Dichloroethane	ND		ug/l	0.50	0.13	1
1,1,1-Trichloroethane	ND		ug/l	2.5	0.70	1
Bromodichloromethane	ND		ug/l	0.50	0.19	1
trans-1,3-Dichloropropene	ND		ug/l	0.50	0.16	1
cis-1,3-Dichloropropene	ND		ug/l	0.50	0.14	1
1,3-Dichloropropene, Total	ND		ug/l	0.50	0.14	1
1,1-Dichloropropene	ND		ug/l	2.5	0.70	1
Bromoform	ND		ug/l	2.0	0.65	1
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	0.17	1
Benzene	ND		ug/l	0.50	0.16	1
Toluene	ND		ug/l	2.5	0.70	1
Ethylbenzene	ND		ug/l	2.5	0.70	1
Chloromethane	ND		ug/l	2.5	0.70	1
Bromomethane	ND		ug/l	2.5	0.70	1
Vinyl chloride	ND		ug/l	1.0	0.07	1
Chloroethane	ND		ug/l	2.5	0.70	1
1,1-Dichloroethene	ND		ug/l	0.50	0.17	1
trans-1,2-Dichloroethene	ND		ug/l	2.5	0.70	1
Trichloroethene	ND		ug/l	0.50	0.18	1

Project Name: ESSEX/HOPE **Lab Number:** L1805542

Project Number: 699900.01.RT.OM **Report Date:** 02/22/18

SAMPLE RESULTS

Lab ID: L1805542-04 Date Collected: 02/16/18 08:30

Client ID: TRIP BLANK Date Received: 02/16/18

Sample Location: JAMESTOWN, NY Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,2-Dichlorobenzene	ND		ug/l	2.5	0.70	1
1,3-Dichlorobenzene	ND		ug/l	2.5	0.70	1
1,4-Dichlorobenzene	ND		ug/l	2.5	0.70	1
Methyl tert butyl ether	ND		ug/l	2.5	0.70	1
p/m-Xylene	ND		ug/l	2.5	0.70	1
o-Xylene	ND		ug/l	2.5	0.70	1
Xylenes, Total	ND		ug/l	2.5	0.70	1
cis-1,2-Dichloroethene	ND		ug/l	2.5	0.70	1
1,2-Dichloroethene, Total	ND		ug/l	2.5	0.70	1
Dibromomethane	ND		ug/l	5.0	1.0	1
1,2,3-Trichloropropane	ND		ug/l	2.5	0.70	1
Styrene	ND		ug/l	2.5	0.70	1
Dichlorodifluoromethane	ND		ug/l	5.0	1.0	1
Acetone	ND		ug/l	5.0	1.5	1
Carbon disulfide	ND		ug/l	5.0	1.0	1
2-Butanone	ND		ug/l	5.0	1.9	1
Vinyl acetate	ND		ug/l	5.0	1.0	1
4-Methyl-2-pentanone	ND		ug/l	5.0	1.0	1
2-Hexanone	ND		ug/l	5.0	1.0	1
Bromochloromethane	ND		ug/l	2.5	0.70	1
2,2-Dichloropropane	ND		ug/l	2.5	0.70	1
1,2-Dibromoethane	ND		ug/l	2.0	0.65	1
1,3-Dichloropropane	ND		ug/l	2.5	0.70	1
1,1,1,2-Tetrachloroethane	ND		ug/l	2.5	0.70	1
Bromobenzene	ND		ug/l	2.5	0.70	1
n-Butylbenzene	ND		ug/l	2.5	0.70	1
sec-Butylbenzene	ND		ug/l	2.5	0.70	1
tert-Butylbenzene	ND		ug/l	2.5	0.70	1
o-Chlorotoluene	ND		ug/l	2.5	0.70	1
p-Chlorotoluene	ND		ug/l	2.5	0.70	1
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	0.70	1
Hexachlorobutadiene	ND		ug/l	2.5	0.70	1
Isopropylbenzene	ND		ug/l	2.5	0.70	1
p-Isopropyltoluene	ND		ug/l	2.5	0.70	1
Naphthalene	ND		ug/l	2.5	0.70	1
n-Propylbenzene	ND		ug/l	2.5	0.70	1
1,2,3-Trichlorobenzene	ND		ug/l	2.5	0.70	1
1,2,4-Trichlorobenzene	ND		ug/l	2.5	0.70	1

Project Name: ESSEX/HOPE
Lab Number: L1805542
Project Number: 699900.01.RT.OM
Report Date: 02/22/18

SAMPLE RESULTS

Lab ID: L1805542-04
Client ID: TRIP BLANK
Sample Location: JAMESTOWN, NY
Sample Depth:

Date Collected: 02/16/18 08:30
Date Received: 02/16/18
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,3,5-Trimethylbenzene	ND		ug/l	2.5	0.70	1
1,2,4-Trimethylbenzene	ND		ug/l	2.5	0.70	1
1,4-Dioxane	ND		ug/l	250	61.	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	102		70-130
Toluene-d8	97		70-130
4-Bromofluorobenzene	96		70-130
Dibromofluoromethane	102		70-130

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1805542
Report Date: 02/22/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 02/20/18 17:41
Analyst: PD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-04 Batch: WG1091137-5					
Methylene chloride	ND		ug/l	2.5	0.70
1,1-Dichloroethane	ND		ug/l	2.5	0.70
Chloroform	ND		ug/l	2.5	0.70
Carbon tetrachloride	ND		ug/l	0.50	0.13
1,2-Dichloropropane	ND		ug/l	1.0	0.14
Dibromochloromethane	ND		ug/l	0.50	0.15
1,1,2-Trichloroethane	ND		ug/l	1.5	0.50
Tetrachloroethene	ND		ug/l	0.50	0.18
Chlorobenzene	ND		ug/l	2.5	0.70
Trichlorofluoromethane	ND		ug/l	2.5	0.70
1,2-Dichloroethane	ND		ug/l	0.50	0.13
1,1,1-Trichloroethane	ND		ug/l	2.5	0.70
Bromodichloromethane	ND		ug/l	0.50	0.19
trans-1,3-Dichloropropene	ND		ug/l	0.50	0.16
cis-1,3-Dichloropropene	ND		ug/l	0.50	0.14
1,3-Dichloropropene, Total	ND		ug/l	0.50	0.14
1,1-Dichloropropene	ND		ug/l	2.5	0.70
Bromoform	ND		ug/l	2.0	0.65
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	0.17
Benzene	ND		ug/l	0.50	0.16
Toluene	ND		ug/l	2.5	0.70
Ethylbenzene	ND		ug/l	2.5	0.70
Chloromethane	ND		ug/l	2.5	0.70
Bromomethane	ND		ug/l	2.5	0.70
Vinyl chloride	ND		ug/l	1.0	0.07
Chloroethane	ND		ug/l	2.5	0.70
1,1-Dichloroethene	ND		ug/l	0.50	0.17
trans-1,2-Dichloroethene	ND		ug/l	2.5	0.70
Trichloroethene	ND		ug/l	0.50	0.18

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1805542
Report Date: 02/22/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 02/20/18 17:41
Analyst: PD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-04 Batch: WG1091137-5					
1,2-Dichlorobenzene	ND		ug/l	2.5	0.70
1,3-Dichlorobenzene	ND		ug/l	2.5	0.70
1,4-Dichlorobenzene	ND		ug/l	2.5	0.70
Methyl tert butyl ether	ND		ug/l	2.5	0.70
p/m-Xylene	ND		ug/l	2.5	0.70
o-Xylene	ND		ug/l	2.5	0.70
Xylenes, Total	ND		ug/l	2.5	0.70
cis-1,2-Dichloroethene	ND		ug/l	2.5	0.70
1,2-Dichloroethene, Total	ND		ug/l	2.5	0.70
Dibromomethane	ND		ug/l	5.0	1.0
1,2,3-Trichloropropane	ND		ug/l	2.5	0.70
Styrene	ND		ug/l	2.5	0.70
Dichlorodifluoromethane	ND		ug/l	5.0	1.0
Acetone	ND		ug/l	5.0	1.5
Carbon disulfide	ND		ug/l	5.0	1.0
2-Butanone	ND		ug/l	5.0	1.9
Vinyl acetate	ND		ug/l	5.0	1.0
4-Methyl-2-pentanone	ND		ug/l	5.0	1.0
2-Hexanone	ND		ug/l	5.0	1.0
Bromochloromethane	ND		ug/l	2.5	0.70
2,2-Dichloropropane	ND		ug/l	2.5	0.70
1,2-Dibromoethane	ND		ug/l	2.0	0.65
1,3-Dichloropropane	ND		ug/l	2.5	0.70
1,1,1,2-Tetrachloroethane	ND		ug/l	2.5	0.70
Bromobenzene	ND		ug/l	2.5	0.70
n-Butylbenzene	ND		ug/l	2.5	0.70
sec-Butylbenzene	ND		ug/l	2.5	0.70
tert-Butylbenzene	ND		ug/l	2.5	0.70
o-Chlorotoluene	ND		ug/l	2.5	0.70

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM
Lab Number: L1805542
Report Date: 02/22/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 02/20/18 17:41
Analyst: PD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-04 Batch: WG1091137-5					
p-Chlorotoluene	ND		ug/l	2.5	0.70
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	0.70
Hexachlorobutadiene	ND		ug/l	2.5	0.70
Isopropylbenzene	ND		ug/l	2.5	0.70
p-Isopropyltoluene	ND		ug/l	2.5	0.70
Naphthalene	ND		ug/l	2.5	0.70
n-Propylbenzene	ND		ug/l	2.5	0.70
1,2,3-Trichlorobenzene	ND		ug/l	2.5	0.70
1,2,4-Trichlorobenzene	ND		ug/l	2.5	0.70
1,3,5-Trimethylbenzene	ND		ug/l	2.5	0.70
1,2,4-Trimethylbenzene	ND		ug/l	2.5	0.70
1,4-Dioxane	ND		ug/l	250	61.

Surrogate	%Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	104		70-130
Toluene-d8	97		70-130
4-Bromofluorobenzene	98		70-130
Dibromofluoromethane	102		70-130

Lab Control Sample Analysis
Batch Quality Control

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1805542
Report Date: 02/22/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-04 Batch: WG1091137-3 WG1091137-4								
Methylene chloride	99		96		70-130	3		20
1,1-Dichloroethane	100		94		70-130	6		20
Chloroform	99		94		70-130	5		20
Carbon tetrachloride	100		96		63-132	4		20
1,2-Dichloropropane	100		97		70-130	3		20
Dibromochloromethane	98		93		63-130	5		20
1,1,2-Trichloroethane	100		94		70-130	6		20
Tetrachloroethene	100		95		70-130	5		20
Chlorobenzene	100		95		75-130	5		20
Trichlorofluoromethane	97		96		62-150	1		20
1,2-Dichloroethane	99		95		70-130	4		20
1,1,1-Trichloroethane	100		95		67-130	5		20
Bromodichloromethane	100		95		67-130	5		20
trans-1,3-Dichloropropene	100		94		70-130	6		20
cis-1,3-Dichloropropene	100		98		70-130	2		20
1,1-Dichloropropene	100		96		70-130	4		20
Bromoform	86		82		54-136	5		20
1,1,2,2-Tetrachloroethane	100		96		67-130	4		20
Benzene	100		96		70-130	4		20
Toluene	100		96		70-130	4		20
Ethylbenzene	100		100		70-130	0		20
Chloromethane	110		100		64-130	10		20
Bromomethane	74		75		39-139	1		20

Lab Control Sample Analysis
Batch Quality Control

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1805542
Report Date: 02/22/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-04 Batch: WG1091137-3 WG1091137-4								
Vinyl chloride	100		98		55-140	2		20
Chloroethane	100		98		55-138	2		20
1,1-Dichloroethene	99		96		61-145	3		20
trans-1,2-Dichloroethene	100		94		70-130	6		20
Trichloroethene	100		94		70-130	6		20
1,2-Dichlorobenzene	100		96		70-130	4		20
1,3-Dichlorobenzene	98		94		70-130	4		20
1,4-Dichlorobenzene	100		95		70-130	5		20
Methyl tert butyl ether	100		97		63-130	3		20
p/m-Xylene	105		100		70-130	5		20
o-Xylene	105		100		70-130	5		20
cis-1,2-Dichloroethene	98		94		70-130	4		20
Dibromomethane	100		96		70-130	4		20
1,2,3-Trichloropropane	97		93		64-130	4		20
Styrene	110		105		70-130	5		20
Dichlorodifluoromethane	94		89		36-147	5		20
Acetone	120		110		58-148	9		20
Carbon disulfide	100		94		51-130	6		20
2-Butanone	120		110		63-138	9		20
Vinyl acetate	100		97		70-130	3		20
4-Methyl-2-pentanone	100		97		59-130	3		20
2-Hexanone	98		110		57-130	12		20
Bromochloromethane	100		99		70-130	1		20

Lab Control Sample Analysis
Batch Quality Control

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1805542
Report Date: 02/22/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-04 Batch: WG1091137-3 WG1091137-4								
2,2-Dichloropropane	100		93		63-133	7		20
1,2-Dibromoethane	97		96		70-130	1		20
1,3-Dichloropropane	99		95		70-130	4		20
1,1,1,2-Tetrachloroethane	100		93		64-130	7		20
Bromobenzene	97		93		70-130	4		20
n-Butylbenzene	110		99		53-136	11		20
sec-Butylbenzene	110		99		70-130	11		20
tert-Butylbenzene	100		96		70-130	4		20
o-Chlorotoluene	98		93		70-130	5		20
p-Chlorotoluene	98		93		70-130	5		20
1,2-Dibromo-3-chloropropane	95		88		41-144	8		20
Hexachlorobutadiene	120		110		63-130	9		20
Isopropylbenzene	100		96		70-130	4		20
p-Isopropyltoluene	110		99		70-130	11		20
Naphthalene	**140**	Q	130		70-130	7		20
n-Propylbenzene	100		98		69-130	2		20
1,2,3-Trichlorobenzene	**170**	Q	**160**	Q	70-130	6		20
1,2,4-Trichlorobenzene	110		100		70-130	10		20
1,3,5-Trimethylbenzene	100		96		64-130	4		20
1,2,4-Trimethylbenzene	100		96		70-130	4		20
1,4-Dioxane	156		134		56-162	15		20

Lab Control Sample Analysis

Batch Quality Control

Project Name: ESSEX/HOPE

Project Number: 699900.01.RT.OM

Lab Number: L1805542

Report Date: 02/22/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-04 Batch: WG1091137-3 WG1091137-4								

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
1,2-Dichloroethane-d4	103		102		70-130
Toluene-d8	98		99		70-130
4-Bromofluorobenzene	97		99		70-130
Dibromofluoromethane	101		101		70-130

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1805542
Report Date: 02/22/18

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1805542-01A	Vial HCl preserved	A	NA		2.2	Y	Absent		NYTCL-8260(14)
L1805542-01B	Vial HCl preserved	A	NA		2.2	Y	Absent		NYTCL-8260(14)
L1805542-01C	Vial HCl preserved	A	NA		2.2	Y	Absent		NYTCL-8260(14)
L1805542-02A	Vial HCl preserved	A	NA		2.2	Y	Absent		NYTCL-8260(14)
L1805542-02B	Vial HCl preserved	A	NA		2.2	Y	Absent		NYTCL-8260(14)
L1805542-02C	Vial HCl preserved	A	NA		2.2	Y	Absent		NYTCL-8260(14)
L1805542-03X	Vial HCl preserved split	A	NA		2.2	Y	Absent		NYTCL-8260(14)
L1805542-03Y	Vial HCl preserved split	A	NA		2.2	Y	Absent		NYTCL-8260(14)
L1805542-03Z	Vial HCl preserved split	A	NA		2.2	Y	Absent		NYTCL-8260(14)
L1805542-04A	Vial HCl preserved	A	NA		2.2	Y	Absent		NYTCL-8260(14)
L1805542-04B	Vial HCl preserved	A	NA		2.2	Y	Absent		NYTCL-8260(14)
L1805542-05A	Vial HCl preserved	A	NA		2.2	Y	Absent		COMP-VOA()
L1805542-05A1	Vial HCl preserved	A	NA		2.2	Y	Absent		COMP-VOA()
L1805542-05A2	Vial HCl preserved	A	NA		2.2	Y	Absent		COMP-VOA()
L1805542-05B	Vial HCl preserved	A	NA		2.2	Y	Absent		COMP-VOA()
L1805542-05B1	Vial HCl preserved	A	NA		2.2	Y	Absent		COMP-VOA()
L1805542-05B2	Vial HCl preserved	A	NA		2.2	Y	Absent		COMP-VOA()
L1805542-05C	Vial HCl preserved	A	NA		2.2	Y	Absent		COMP-VOA()
L1805542-05C1	Vial HCl preserved	A	NA		2.2	Y	Absent		COMP-VOA()
L1805542-05C2	Vial HCl preserved	A	NA		2.2	Y	Absent		COMP-VOA()
L1805542-05D	Vial HCl preserved	A	NA		2.2	Y	Absent		COMP-VOA()
L1805542-05D1	Vial HCl preserved	A	NA		2.2	Y	Absent		COMP-VOA()
L1805542-05D2	Vial HCl preserved	A	NA		2.2	Y	Absent		COMP-VOA()

*Values in parentheses indicate holding time in days

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1805542
Report Date: 02/22/18

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)

*Values in parentheses indicate holding time in days

Project Name:	ESSEX/HOPE	**Lab Number:**	L1805542
Project Number:	699900.01.RT.OM	**Report Date:**	02/22/18

GLOSSARY

Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

1	- The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A	- Spectra identified as "Aldol Condensation Product".
B	- The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related

Report Format: DU Report with 'J' Qualifiers

Project Name:	ESSEX/HOPE	**Lab Number:**	L1805542
Project Number:	699900.01.RT.OM	**Report Date:**	02/22/18

Data Qualifiers

projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

J - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

ND - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

Report Format: DU Report with 'J' Qualifiers

Project Name:	ESSEX/HOPE	**Lab Number:**	L1805542
Project Number:	699900.01.RT.OM	**Report Date:**	02/22/18

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
EPA 300: DW: Bromide
EPA 6860: SCM: Perchlorate
EPA 9010: NPW and SCM: Amenable Cyanide Distillation
SM4500: NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, EPA 351.1, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D.**
EPA 624: Volatile Halocarbons & Aromatics,
EPA 608: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Be, Cd, Cr, Cu, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

NEW YORK CHAIN OF CUSTODY

ALPHA ANALYTICAL

Westborough, MA 01581 — 8 Walkup Dr. — TEL: 508-898-9220 — FAX: 508-898-9193

Mansfield, MA 02048 — 320 Forbes Blvd — TEL: 508-822-9300 — FAX: 508-822-3288

Service Centers
Mahwah, NJ 07430: 35 Whitney Rd, Suite 5
Albany, NY 12205: 14 Walker Way
Tonawanda, NY 14150: 275 Cooper Ave, Suite 105

Page 1 of 1

Date Rec'd in Lab: 2/17/18

ALPHA Job #: L1805542

Client Information
Client: CHZM Hill
Address: 1 Lo Tremont St Boston MA
Phone:
Fax:
Email: Kyle.Block@chzm

Project Information
Project Name: Essex / Hope
Project Location: Jamestown NY
Project #: 699900.01.RT.000
(Use Project name as Project #)
Project Manager: Kyle Block
ALPHAQuote #:

Turn-Around Time
Standard [X] Due Date:
Rush (only if pre approved) [ ] # of Days:

Deliverables
[ ] ASP-A [ ] ASP-B
[ ] EQuIS (1 File) [ ] EQuIS (4 File)
[ ] Other

Regulatory Requirement
[ ] NY TOGS [ ] NY Part 375
[ ] AWQ Standards [ ] NY CP-51
[ ] NY Restricted Use [ ] Other
[ ] NY Unrestricted Use
[ ] NYC Sewer Discharge

Billing Information
[X] Same as Client Info
PO #

Disposal Site Information
Please identify below location of applicable disposal facilities.
Disposal Facility:
[ ] NJ [X] NY
[ ] Other:

These samples have been previously analyzed by Alpha [ ]

Other project specific requirements/comments:
Please composite all 4 Post CARB Samples
3 Report as Post-CARB_20180216

Please specify Metals or TAL.

ANALYSIS
VOCs 8260

Sample Filtration
[ ] Done
[ ] Lab to do
Preservation
[ ] Lab to do
(Please Specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	VOCs 8260	Sample Specific Comments	Total Bottle
05542-01	Pre-Carb_20180216	2/16/18	0740	GW	JRG	X		3
-02	Primary-Eff-20180216		0750			X		3
-03,05	Post-CARB_20180216_1		0800			X		3
-03,05	Post-CARB_20180216_2		0830			X		3
-03,05	Post-CARB_20180216_3		0900			X		3
-03,05	Post-CARB_20180216_4		0930			X		3
-04	TRIP BLANK		—	—	—	X		2

Preservative Code:
A = None
B = HCl
C = HNO_3
D = H_2SO_4
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
K/E = Zn Ac/NaOH
O = Other

Container Code
P = Plastic
A = Amber Glass
V = Vial
G = Glass
B = Bacteria Cup
C = Cube
O = Other
E = Encore
D = BOD Bottle

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Container Type: ✓
Preservative: B

Relinquished By:	Date/Time	Received By:	Date/Time
	2/16/18 1030	JM AL AAL	2/16/18 10:30
JM AL AAL	2/16/18 10:30		2/17/18 0032

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. BY EXECUTING THIS COC, THE CLIENT HAS READ AND AGREES TO BE BOUND BY ALPHA'S TERMS & CONDITIONS. (See reverse side.)

Form No: 01-25 HC (rev. 30-Sept-2013)

ANALYTICAL REPORT

Lab Number:	L1808189
Client:	CH2MHILL 18 Tremont Street Suite 700 Boston, MA 02108
ATTN:	Kyle Block
Phone:	(617) 523-2260
Project Name:	ESSEX/HOPE
Project Number:	699900.01.RT.OM
Report Date:	03/15/18

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), NJ NELAP (MA935), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-14-00197).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1808189
Report Date: 03/15/18

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1808189-01	PRE-CARB_20180309	WATER	JAMESTOWN, NY	03/09/18 07:45	03/09/18
L1808189-02	PRIMARY-EFF_20180309	WATER	JAMESTOWN, NY	03/09/18 07:50	03/09/18
L1808189-03	POST-CARB_20180309	WATER	JAMESTOWN, NY	03/09/18 09:30	03/09/18
L1808189-04	TRIP BLANK	WATER	JAMESTOWN, NY	03/09/18 00:00	03/09/18
L1808189-05	COMPOSITE POST-CARB_20180309_GRABS 1-4	WATER	JAMESTOWN, NY	03/09/18 09:30	03/09/18

Project Name:	ESSEX/HOPE	**Lab Number:**	L1808189
Project Number:	699900.01.RT.OM	**Report Date:**	03/15/18

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY

For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

Project Name:	ESSEX/HOPE	**Lab Number:**	L1808189
Project Number:	699900.01.RT.OM	**Report Date:**	03/15/18

Case Narrative (continued)

Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

Volatile Organics

L1808189-01, -02, and -03: The sample has elevated detection limits due to the dilution required by the elevated concentrations of target compounds in the sample.

The WG1097380-3/-4 LCS/LCSD recoveries, associated with L1808189-01 and -04, are above the individual acceptance criteria for chloromethane (150%/150%), acetone (LCS 150%), 2-butanone (LCS 150%), naphthalene (140%/140%), and 1,2,3-trichlorobenzene (140%/160%), but within the overall method allowances. The results of the associated samples are reported.

The WG1097380-8/-9 LCS/LCSD recoveries, associated with L1808189-02 and -03, are above the individual acceptance criteria for chloromethane (150%/140%), 2-butanone (150%/140%), naphthalene (LCS 140%), and 1,2,3-trichlorobenzene (150%/150%), but within the overall method allowances. The results of the associated samples are reported.

The initial calibration, associated with L1808189-01 through -04, did not meet the method required minimum response factor for the calibration standards for acetone, 2-butanone, 4-methyl-2-pentanone, bromochloromethane, and 1,4-dioxane.

The continuing calibrations, associated with L1808189-01 through -04, did not meet the method required minimum response factor for acetone, 2-butanone, 4-methyl-2-pentanone, and 1,4-dioxane.

The initial calibration verification standard has the percent deviation for dichlorodifluoromethane (70%D) above the 30% ICV criteria, but within overall method allowances.

WG1097380-2: The continuing calibration verification standard has the percent deviation for carbon tetrachloride (29%D), trichlorofluoromethane (28%D), chloromethane (42%D), vinyl chloride (23%D), dichlorodifluoromethane (34%D), acetone (22%D), 2-butanone (38%D), vinyl acetate (34%D), and 2-hexanone (31%D) above the 20% CCV criteria, but within overall method allowances.

WG1097380-7: The continuing calibration verification standard has the percent deviation for carbon tetrachloride (28%D), trichlorofluoromethane (25%D), dichlorodifluoromethane (23%D), acetone

Project Name:	ESSEX/HOPE	**Lab Number:**	L1808189
Project Number:	699900.01.RT.OM	**Report Date:**	03/15/18

Case Narrative (continued)

(33%D), 2-butanone (44%D), vinyl acetate (34%D), 4-methyl-2-pentanone (21%D), 2-hexanone (31%D), 2,2-dichloropropane (22%D), and 1,4-dioxane (35%D) above the 20% CCV criteria, but within overall method allowances.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Kelly Stenstrom

Title: Technical Director/Representative Date: 03/15/18

ORGANICS

VOLATILES

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM
Lab Number: L1808189
Report Date: 03/15/18

SAMPLE RESULTS

Lab ID: L1808189-01 D
Client ID: PRE-CARB_20180309
Sample Location: JAMESTOWN, NY
Sample Depth:
Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 03/14/18 23:55
Analyst: PD

Date Collected: 03/09/18 07:45
Date Received: 03/09/18
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	120	35.	50
1,1-Dichloroethane	ND		ug/l	120	35.	50
Chloroform	ND		ug/l	120	35.	50
Carbon tetrachloride	ND		ug/l	25	6.7	50
1,2-Dichloropropane	ND		ug/l	50	6.8	50
Dibromochloromethane	ND		ug/l	25	7.4	50
1,1,2-Trichloroethane	ND		ug/l	75	25.	50
Tetrachloroethene	ND		ug/l	25	9.0	50
Chlorobenzene	ND		ug/l	120	35.	50
Trichlorofluoromethane	ND		ug/l	120	35.	50
1,2-Dichloroethane	ND		ug/l	25	6.6	50
1,1,1-Trichloroethane	ND		ug/l	120	35.	50
Bromodichloromethane	ND		ug/l	25	9.6	50
trans-1,3-Dichloropropene	ND		ug/l	25	8.2	50
cis-1,3-Dichloropropene	ND		ug/l	25	7.2	50
1,3-Dichloropropene, Total	ND		ug/l	25	7.2	50
1,1-Dichloropropene	ND		ug/l	120	35.	50
Bromoform	ND		ug/l	100	32.	50
1,1,2,2-Tetrachloroethane	ND		ug/l	25	8.4	50
Benzene	17	J	ug/l	25	8.0	50
Toluene	ND		ug/l	120	35.	50
Ethylbenzene	ND		ug/l	120	35.	50
Chloromethane	ND		ug/l	120	35.	50
Bromomethane	ND		ug/l	120	35.	50
Vinyl chloride	1100		ug/l	50	3.6	50
Chloroethane	ND		ug/l	120	35.	50
1,1-Dichloroethene	20	J	ug/l	25	8.4	50
trans-1,2-Dichloroethene	ND		ug/l	120	35.	50
Trichloroethene	4600		ug/l	25	8.8	50

Project Name: ESSEX/HOPE **Lab Number:** L1808189

Project Number: 699900.01.RT.OM **Report Date:** 03/15/18

SAMPLE RESULTS

Lab ID: L1808189-01 D
Client ID: PRE-CARB_20180309
Sample Location: JAMESTOWN, NY
Sample Depth:

Date Collected: 03/09/18 07:45
Date Received: 03/09/18
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,2-Dichlorobenzene	ND		ug/l	120	35.	50
1,3-Dichlorobenzene	ND		ug/l	120	35.	50
1,4-Dichlorobenzene	ND		ug/l	120	35.	50
Methyl tert butyl ether	ND		ug/l	120	35.	50
p/m-Xylene	ND		ug/l	120	35.	50
o-Xylene	ND		ug/l	120	35.	50
Xylenes, Total	ND		ug/l	120	35.	50
cis-1,2-Dichloroethene	4600		ug/l	120	35.	50
1,2-Dichloroethene, Total	4600		ug/l	120	35.	50
Dibromomethane	ND		ug/l	250	50.	50
1,2,3-Trichloropropane	ND		ug/l	120	35.	50
Styrene	ND		ug/l	120	35.	50
Dichlorodifluoromethane	ND		ug/l	250	50.	50
Acetone	3300		ug/l	250	73.	50
Carbon disulfide	ND		ug/l	250	50.	50
2-Butanone	ND		ug/l	250	97.	50
Vinyl acetate	ND		ug/l	250	50.	50
4-Methyl-2-pentanone	ND		ug/l	250	50.	50
2-Hexanone	ND		ug/l	250	50.	50
Bromochloromethane	ND		ug/l	120	35.	50
2,2-Dichloropropane	ND		ug/l	120	35.	50
1,2-Dibromoethane	ND		ug/l	100	32.	50
1,3-Dichloropropane	ND		ug/l	120	35.	50
1,1,1,2-Tetrachloroethane	ND		ug/l	120	35.	50
Bromobenzene	ND		ug/l	120	35.	50
n-Butylbenzene	ND		ug/l	120	35.	50
sec-Butylbenzene	ND		ug/l	120	35.	50
tert-Butylbenzene	ND		ug/l	120	35.	50
o-Chlorotoluene	ND		ug/l	120	35.	50
p-Chlorotoluene	ND		ug/l	120	35.	50
1,2-Dibromo-3-chloropropane	ND		ug/l	120	35.	50
Hexachlorobutadiene	ND		ug/l	120	35.	50
Isopropylbenzene	ND		ug/l	120	35.	50
p-Isopropyltoluene	ND		ug/l	120	35.	50
Naphthalene	ND		ug/l	120	35.	50
n-Propylbenzene	ND		ug/l	120	35.	50
1,2,3-Trichlorobenzene	ND		ug/l	120	35.	50
1,2,4-Trichlorobenzene	ND		ug/l	120	35.	50

Project Name: ESSEX/HOPE **Lab Number:** L1808189

Project Number: 699900.01.RT.OM **Report Date:** 03/15/18

SAMPLE RESULTS

Lab ID: L1808189-01 D
Client ID: PRE-CARB_20180309
Sample Location: JAMESTOWN, NY
Sample Depth:

Date Collected: 03/09/18 07:45
Date Received: 03/09/18
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,3,5-Trimethylbenzene	ND		ug/l	120	35.	50
1,2,4-Trimethylbenzene	ND		ug/l	120	35.	50
1,4-Dioxane	ND		ug/l	12000	3000	50

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	109		70-130
Toluene-d8	94		70-130
4-Bromofluorobenzene	91		70-130
Dibromofluoromethane	102		70-130

Project Name: ESSEX/HOPE **Lab Number:** L1808189

Project Number: 699900.01.RT.OM **Report Date:** 03/15/18

SAMPLE RESULTS

Lab ID: L1808189-02 D
Client ID: PRIMARY-EFF_20180309
Sample Location: JAMESTOWN, NY
Sample Depth:
Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 03/15/18 12:27
Analyst: PD

Date Collected: 03/09/18 07:50
Date Received: 03/09/18
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	100	28.	40
1,1-Dichloroethane	ND		ug/l	100	28.	40
Chloroform	ND		ug/l	100	28.	40
Carbon tetrachloride	ND		ug/l	20	5.4	40
1,2-Dichloropropane	ND		ug/l	40	5.5	40
Dibromochloromethane	ND		ug/l	20	6.0	40
1,1,2-Trichloroethane	ND		ug/l	60	20.	40
Tetrachloroethene	ND		ug/l	20	7.2	40
Chlorobenzene	ND		ug/l	100	28.	40
Trichlorofluoromethane	ND		ug/l	100	28.	40
1,2-Dichloroethane	ND		ug/l	20	5.3	40
1,1,1-Trichloroethane	ND		ug/l	100	28.	40
Bromodichloromethane	ND		ug/l	20	7.7	40
trans-1,3-Dichloropropene	ND		ug/l	20	6.6	40
cis-1,3-Dichloropropene	ND		ug/l	20	5.8	40
1,3-Dichloropropene, Total	ND		ug/l	20	5.8	40
1,1-Dichloropropene	ND		ug/l	100	28.	40
Bromoform	ND		ug/l	80	26.	40
1,1,2,2-Tetrachloroethane	ND		ug/l	20	6.7	40
Benzene	ND		ug/l	20	6.4	40
Toluene	ND		ug/l	100	28.	40
Ethylbenzene	ND		ug/l	100	28.	40
Chloromethane	ND		ug/l	100	28.	40
Bromomethane	ND		ug/l	100	28.	40
Vinyl chloride	860		ug/l	40	2.8	40
Chloroethane	ND		ug/l	100	28.	40
1,1-Dichloroethene	ND		ug/l	20	6.8	40
trans-1,2-Dichloroethene	ND		ug/l	100	28.	40
Trichloroethene	13	J	ug/l	20	7.0	40

Project Name: ESSEX/HOPE **Lab Number:** L1808189

Project Number: 699900.01.RT.OM **Report Date:** 03/15/18

SAMPLE RESULTS

Lab ID: L1808189-02 D
Client ID: PRIMARY-EFF_20180309
Sample Location: JAMESTOWN, NY
Sample Depth:

Date Collected: 03/09/18 07:50
Date Received: 03/09/18
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,2-Dichlorobenzene	ND		ug/l	100	28.	40
1,3-Dichlorobenzene	ND		ug/l	100	28.	40
1,4-Dichlorobenzene	ND		ug/l	100	28.	40
Methyl tert butyl ether	ND		ug/l	100	28.	40
p/m-Xylene	ND		ug/l	100	28.	40
o-Xylene	ND		ug/l	100	28.	40
Xylenes, Total	ND		ug/l	100	28.	40
cis-1,2-Dichloroethene	4000		ug/l	100	28.	40
1,2-Dichloroethene, Total	4000		ug/l	100	28.	40
Dibromomethane	ND		ug/l	200	40.	40
1,2,3-Trichloropropane	ND		ug/l	100	28.	40
Styrene	ND		ug/l	100	28.	40
Dichlorodifluoromethane	ND		ug/l	200	40.	40
Acetone	290		ug/l	200	58.	40
Carbon disulfide	ND		ug/l	200	40.	40
2-Butanone	ND		ug/l	200	78.	40
Vinyl acetate	ND		ug/l	200	40.	40
4-Methyl-2-pentanone	ND		ug/l	200	40.	40
2-Hexanone	ND		ug/l	200	40.	40
Bromochloromethane	ND		ug/l	100	28.	40
2,2-Dichloropropane	ND		ug/l	100	28.	40
1,2-Dibromoethane	ND		ug/l	80	26.	40
1,3-Dichloropropane	ND		ug/l	100	28.	40
1,1,1,2-Tetrachloroethane	ND		ug/l	100	28.	40
Bromobenzene	ND		ug/l	100	28.	40
n-Butylbenzene	ND		ug/l	100	28.	40
sec-Butylbenzene	ND		ug/l	100	28.	40
tert-Butylbenzene	ND		ug/l	100	28.	40
o-Chlorotoluene	ND		ug/l	100	28.	40
p-Chlorotoluene	ND		ug/l	100	28.	40
1,2-Dibromo-3-chloropropane	ND		ug/l	100	28.	40
Hexachlorobutadiene	ND		ug/l	100	28.	40
Isopropylbenzene	ND		ug/l	100	28.	40
p-Isopropyltoluene	ND		ug/l	100	28.	40
Naphthalene	ND		ug/l	100	28.	40
n-Propylbenzene	ND		ug/l	100	28.	40
1,2,3-Trichlorobenzene	ND		ug/l	100	28.	40
1,2,4-Trichlorobenzene	ND		ug/l	100	28.	40

Project Name: ESSEX/HOPE **Lab Number:** L1808189

Project Number: 699900.01.RT.OM **Report Date:** 03/15/18

SAMPLE RESULTS

Lab ID: L1808189-02 D
Client ID: PRIMARY-EFF_20180309
Sample Location: JAMESTOWN, NY
Sample Depth:

Date Collected: 03/09/18 07:50
Date Received: 03/09/18
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,3,5-Trimethylbenzene	ND		ug/l	100	28.	40
1,2,4-Trimethylbenzene	ND		ug/l	100	28.	40
1,4-Dioxane	ND		ug/l	10000	2400	40

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	111		70-130
Toluene-d8	94		70-130
4-Bromofluorobenzene	89		70-130
Dibromofluoromethane	101		70-130

Project Name: ESSEX/HOPE **Lab Number:** L1808189

Project Number: 699900.01.RT.OM **Report Date:** 03/15/18

SAMPLE RESULTS

Lab ID: L1808189-03 D
Client ID: POST-CARB_20180309
Sample Location: JAMESTOWN, NY
Sample Depth:
Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 03/15/18 13:02
Analyst: PD

Date Collected: 03/09/18 09:30
Date Received: 03/09/18
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	25	7.0	10
1,1-Dichloroethane	ND		ug/l	25	7.0	10
Chloroform	ND		ug/l	25	7.0	10
Carbon tetrachloride	ND		ug/l	5.0	1.3	10
1,2-Dichloropropane	ND		ug/l	10	1.4	10
Dibromochloromethane	ND		ug/l	5.0	1.5	10
1,1,2-Trichloroethane	ND		ug/l	15	5.0	10
Tetrachloroethene	ND		ug/l	5.0	1.8	10
Chlorobenzene	ND		ug/l	25	7.0	10
Trichlorofluoromethane	ND		ug/l	25	7.0	10
1,2-Dichloroethane	ND		ug/l	5.0	1.3	10
1,1,1-Trichloroethane	ND		ug/l	25	7.0	10
Bromodichloromethane	ND		ug/l	5.0	1.9	10
trans-1,3-Dichloropropene	ND		ug/l	5.0	1.6	10
cis-1,3-Dichloropropene	ND		ug/l	5.0	1.4	10
1,3-Dichloropropene, Total	ND		ug/l	5.0	1.4	10
1,1-Dichloropropene	ND		ug/l	25	7.0	10
Bromoform	ND		ug/l	20	6.5	10
1,1,2,2-Tetrachloroethane	ND		ug/l	5.0	1.7	10
Benzene	ND		ug/l	5.0	1.6	10
Toluene	ND		ug/l	25	7.0	10
Ethylbenzene	ND		ug/l	25	7.0	10
Chloromethane	ND		ug/l	25	7.0	10
Bromomethane	ND		ug/l	25	7.0	10
Vinyl chloride	1200		ug/l	10	0.71	10
Chloroethane	ND		ug/l	25	7.0	10
1,1-Dichloroethene	ND		ug/l	5.0	1.7	10
trans-1,2-Dichloroethene	ND		ug/l	25	7.0	10
Trichloroethene	ND		ug/l	5.0	1.8	10

Project Name: ESSEX/HOPE **Lab Number:** L1808189

Project Number: 699900.01.RT.OM **Report Date:** 03/15/18

SAMPLE RESULTS

Lab ID: L1808189-03 D
Client ID: POST-CARB_20180309
Sample Location: JAMESTOWN, NY
Sample Depth:

Date Collected: 03/09/18 09:30
Date Received: 03/09/18
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,2-Dichlorobenzene	ND		ug/l	25	7.0	10
1,3-Dichlorobenzene	ND		ug/l	25	7.0	10
1,4-Dichlorobenzene	ND		ug/l	25	7.0	10
Methyl tert butyl ether	ND		ug/l	25	7.0	10
p/m-Xylene	ND		ug/l	25	7.0	10
o-Xylene	ND		ug/l	25	7.0	10
Xylenes, Total	ND		ug/l	25	7.0	10
cis-1,2-Dichloroethene	ND		ug/l	25	7.0	10
1,2-Dichloroethene, Total	ND		ug/l	25	7.0	10
Dibromomethane	ND		ug/l	50	10.	10
1,2,3-Trichloropropane	ND		ug/l	25	7.0	10
Styrene	ND		ug/l	25	7.0	10
Dichlorodifluoromethane	ND		ug/l	50	10.	10
Acetone	ND		ug/l	50	15.	10
Carbon disulfide	ND		ug/l	50	10.	10
2-Butanone	ND		ug/l	50	19.	10
Vinyl acetate	ND		ug/l	50	10.	10
4-Methyl-2-pentanone	ND		ug/l	50	10.	10
2-Hexanone	ND		ug/l	50	10.	10
Bromochloromethane	ND		ug/l	25	7.0	10
2,2-Dichloropropane	ND		ug/l	25	7.0	10
1,2-Dibromoethane	ND		ug/l	20	6.5	10
1,3-Dichloropropane	ND		ug/l	25	7.0	10
1,1,1,2-Tetrachloroethane	ND		ug/l	25	7.0	10
Bromobenzene	ND		ug/l	25	7.0	10
n-Butylbenzene	ND		ug/l	25	7.0	10
sec-Butylbenzene	ND		ug/l	25	7.0	10
tert-Butylbenzene	ND		ug/l	25	7.0	10
o-Chlorotoluene	ND		ug/l	25	7.0	10
p-Chlorotoluene	ND		ug/l	25	7.0	10
1,2-Dibromo-3-chloropropane	ND		ug/l	25	7.0	10
Hexachlorobutadiene	ND		ug/l	25	7.0	10
Isopropylbenzene	ND		ug/l	25	7.0	10
p-Isopropyltoluene	ND		ug/l	25	7.0	10
Naphthalene	ND		ug/l	25	7.0	10
n-Propylbenzene	ND		ug/l	25	7.0	10
1,2,3-Trichlorobenzene	ND		ug/l	25	7.0	10
1,2,4-Trichlorobenzene	ND		ug/l	25	7.0	10

Project Name: ESSEX/HOPE **Lab Number:** L1808189

Project Number: 699900.01.RT.OM **Report Date:** 03/15/18

SAMPLE RESULTS

Lab ID: L1808189-03 D
Client ID: POST-CARB_20180309
Sample Location: JAMESTOWN, NY
Sample Depth:

Date Collected: 03/09/18 09:30
Date Received: 03/09/18
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,3,5-Trimethylbenzene	ND		ug/l	25	7.0	10
1,2,4-Trimethylbenzene	ND		ug/l	25	7.0	10
1,4-Dioxane	ND		ug/l	2500	610	10

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	110		70-130
Toluene-d8	94		70-130
4-Bromofluorobenzene	91		70-130
Dibromofluoromethane	101		70-130

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM
Lab Number: L1808189
Report Date: 03/15/18

SAMPLE RESULTS

Lab ID: L1808189-04
Client ID: TRIP BLANK
Sample Location: JAMESTOWN, NY
Sample Depth:
Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 03/14/18 22:09
Analyst: PD

Date Collected: 03/09/18 00:00
Date Received: 03/09/18
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	2.5	0.70	1
1,1-Dichloroethane	ND		ug/l	2.5	0.70	1
Chloroform	ND		ug/l	2.5	0.70	1
Carbon tetrachloride	ND		ug/l	0.50	0.13	1
1,2-Dichloropropane	ND		ug/l	1.0	0.14	1
Dibromochloromethane	ND		ug/l	0.50	0.15	1
1,1,2-Trichloroethane	ND		ug/l	1.5	0.50	1
Tetrachloroethene	ND		ug/l	0.50	0.18	1
Chlorobenzene	ND		ug/l	2.5	0.70	1
Trichlorofluoromethane	ND		ug/l	2.5	0.70	1
1,2-Dichloroethane	ND		ug/l	0.50	0.13	1
1,1,1-Trichloroethane	ND		ug/l	2.5	0.70	1
Bromodichloromethane	ND		ug/l	0.50	0.19	1
trans-1,3-Dichloropropene	ND		ug/l	0.50	0.16	1
cis-1,3-Dichloropropene	ND		ug/l	0.50	0.14	1
1,3-Dichloropropene, Total	ND		ug/l	0.50	0.14	1
1,1-Dichloropropene	ND		ug/l	2.5	0.70	1
Bromoform	ND		ug/l	2.0	0.65	1
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	0.17	1
Benzene	ND		ug/l	0.50	0.16	1
Toluene	ND		ug/l	2.5	0.70	1
Ethylbenzene	ND		ug/l	2.5	0.70	1
Chloromethane	ND		ug/l	2.5	0.70	1
Bromomethane	ND		ug/l	2.5	0.70	1
Vinyl chloride	ND		ug/l	1.0	0.07	1
Chloroethane	ND		ug/l	2.5	0.70	1
1,1-Dichloroethene	ND		ug/l	0.50	0.17	1
trans-1,2-Dichloroethene	ND		ug/l	2.5	0.70	1
Trichloroethene	ND		ug/l	0.50	0.18	1

Project Name: ESSEX/HOPE **Lab Number:** L1808189

Project Number: 699900.01.RT.OM **Report Date:** 03/15/18

SAMPLE RESULTS

Lab ID: L1808189-04 Date Collected: 03/09/18 00:00

Client ID: TRIP BLANK Date Received: 03/09/18

Sample Location: JAMESTOWN, NY Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,2-Dichlorobenzene	ND		ug/l	2.5	0.70	1
1,3-Dichlorobenzene	ND		ug/l	2.5	0.70	1
1,4-Dichlorobenzene	ND		ug/l	2.5	0.70	1
Methyl tert butyl ether	ND		ug/l	2.5	0.70	1
p/m-Xylene	ND		ug/l	2.5	0.70	1
o-Xylene	ND		ug/l	2.5	0.70	1
Xylenes, Total	ND		ug/l	2.5	0.70	1
cis-1,2-Dichloroethene	ND		ug/l	2.5	0.70	1
1,2-Dichloroethene, Total	ND		ug/l	2.5	0.70	1
Dibromomethane	ND		ug/l	5.0	1.0	1
1,2,3-Trichloropropane	ND		ug/l	2.5	0.70	1
Styrene	ND		ug/l	2.5	0.70	1
Dichlorodifluoromethane	ND		ug/l	5.0	1.0	1
Acetone	ND		ug/l	5.0	1.5	1
Carbon disulfide	ND		ug/l	5.0	1.0	1
2-Butanone	ND		ug/l	5.0	1.9	1
Vinyl acetate	ND		ug/l	5.0	1.0	1
4-Methyl-2-pentanone	ND		ug/l	5.0	1.0	1
2-Hexanone	ND		ug/l	5.0	1.0	1
Bromochloromethane	ND		ug/l	2.5	0.70	1
2,2-Dichloropropane	ND		ug/l	2.5	0.70	1
1,2-Dibromoethane	ND		ug/l	2.0	0.65	1
1,3-Dichloropropane	ND		ug/l	2.5	0.70	1
1,1,1,2-Tetrachloroethane	ND		ug/l	2.5	0.70	1
Bromobenzene	ND		ug/l	2.5	0.70	1
n-Butylbenzene	ND		ug/l	2.5	0.70	1
sec-Butylbenzene	ND		ug/l	2.5	0.70	1
tert-Butylbenzene	ND		ug/l	2.5	0.70	1
o-Chlorotoluene	ND		ug/l	2.5	0.70	1
p-Chlorotoluene	ND		ug/l	2.5	0.70	1
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	0.70	1
Hexachlorobutadiene	ND		ug/l	2.5	0.70	1
Isopropylbenzene	ND		ug/l	2.5	0.70	1
p-Isopropyltoluene	ND		ug/l	2.5	0.70	1
Naphthalene	ND		ug/l	2.5	0.70	1
n-Propylbenzene	ND		ug/l	2.5	0.70	1
1,2,3-Trichlorobenzene	ND		ug/l	2.5	0.70	1
1,2,4-Trichlorobenzene	ND		ug/l	2.5	0.70	1

Project Name: ESSEX/HOPE **Lab Number:** L1808189

Project Number: 699900.01.RT.OM **Report Date:** 03/15/18

SAMPLE RESULTS

Lab ID: L1808189-04 Date Collected: 03/09/18 00:00

Client ID: TRIP BLANK Date Received: 03/09/18

Sample Location: JAMESTOWN, NY Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,3,5-Trimethylbenzene	ND		ug/l	2.5	0.70	1
1,2,4-Trimethylbenzene	ND		ug/l	2.5	0.70	1
1,4-Dioxane	ND		ug/l	250	61.	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	108		70-130
Toluene-d8	94		70-130
4-Bromofluorobenzene	90		70-130
Dibromofluoromethane	100		70-130

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1808189
Report Date: 03/15/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 03/15/18 11:51
Analyst: PD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 02-03 Batch: WG1097380-10					
Methylene chloride	ND		ug/l	2.5	0.70
1,1-Dichloroethane	ND		ug/l	2.5	0.70
Chloroform	ND		ug/l	2.5	0.70
Carbon tetrachloride	ND		ug/l	0.50	0.13
1,2-Dichloropropane	ND		ug/l	1.0	0.14
Dibromochloromethane	ND		ug/l	0.50	0.15
1,1,2-Trichloroethane	ND		ug/l	1.5	0.50
Tetrachloroethene	ND		ug/l	0.50	0.18
Chlorobenzene	ND		ug/l	2.5	0.70
Trichlorofluoromethane	ND		ug/l	2.5	0.70
1,2-Dichloroethane	ND		ug/l	0.50	0.13
1,1,1-Trichloroethane	ND		ug/l	2.5	0.70
Bromodichloromethane	ND		ug/l	0.50	0.19
trans-1,3-Dichloropropene	ND		ug/l	0.50	0.16
cis-1,3-Dichloropropene	ND		ug/l	0.50	0.14
1,3-Dichloropropene, Total	ND		ug/l	0.50	0.14
1,1-Dichloropropene	ND		ug/l	2.5	0.70
Bromoform	ND		ug/l	2.0	0.65
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	0.17
Benzene	ND		ug/l	0.50	0.16
Toluene	ND		ug/l	2.5	0.70
Ethylbenzene	ND		ug/l	2.5	0.70
Chloromethane	ND		ug/l	2.5	0.70
Bromomethane	ND		ug/l	2.5	0.70
Vinyl chloride	ND		ug/l	1.0	0.07
Chloroethane	ND		ug/l	2.5	0.70
1,1-Dichloroethene	ND		ug/l	0.50	0.17
trans-1,2-Dichloroethene	ND		ug/l	2.5	0.70
Trichloroethene	ND		ug/l	0.50	0.18

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1808189
Report Date: 03/15/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 03/15/18 11:51
Analyst: PD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 02-03 Batch: WG1097380-10					
1,2-Dichlorobenzene	ND		ug/l	2.5	0.70
1,3-Dichlorobenzene	ND		ug/l	2.5	0.70
1,4-Dichlorobenzene	ND		ug/l	2.5	0.70
Methyl tert butyl ether	ND		ug/l	2.5	0.70
p/m-Xylene	ND		ug/l	2.5	0.70
o-Xylene	ND		ug/l	2.5	0.70
Xylenes, Total	ND		ug/l	2.5	0.70
cis-1,2-Dichloroethene	ND		ug/l	2.5	0.70
1,2-Dichloroethene, Total	ND		ug/l	2.5	0.70
Dibromomethane	ND		ug/l	5.0	1.0
1,2,3-Trichloropropane	ND		ug/l	2.5	0.70
Styrene	ND		ug/l	2.5	0.70
Dichlorodifluoromethane	ND		ug/l	5.0	1.0
Acetone	ND		ug/l	5.0	1.5
Carbon disulfide	ND		ug/l	5.0	1.0
2-Butanone	ND		ug/l	5.0	1.9
Vinyl acetate	ND		ug/l	5.0	1.0
4-Methyl-2-pentanone	ND		ug/l	5.0	1.0
2-Hexanone	ND		ug/l	5.0	1.0
Bromochloromethane	ND		ug/l	2.5	0.70
2,2-Dichloropropane	ND		ug/l	2.5	0.70
1,2-Dibromoethane	ND		ug/l	2.0	0.65
1,3-Dichloropropane	ND		ug/l	2.5	0.70
1,1,1,2-Tetrachloroethane	ND		ug/l	2.5	0.70
Bromobenzene	ND		ug/l	2.5	0.70
n-Butylbenzene	ND		ug/l	2.5	0.70
sec-Butylbenzene	ND		ug/l	2.5	0.70
tert-Butylbenzene	ND		ug/l	2.5	0.70
o-Chlorotoluene	ND		ug/l	2.5	0.70

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1808189
Report Date: 03/15/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 03/15/18 11:51
Analyst: PD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 02-03 Batch: WG1097380-10					
p-Chlorotoluene	ND		ug/l	2.5	0.70
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	0.70
Hexachlorobutadiene	ND		ug/l	2.5	0.70
Isopropylbenzene	ND		ug/l	2.5	0.70
p-Isopropyltoluene	ND		ug/l	2.5	0.70
Naphthalene	ND		ug/l	2.5	0.70
n-Propylbenzene	ND		ug/l	2.5	0.70
1,2,3-Trichlorobenzene	ND		ug/l	2.5	0.70
1,2,4-Trichlorobenzene	ND		ug/l	2.5	0.70
1,3,5-Trimethylbenzene	ND		ug/l	2.5	0.70
1,2,4-Trimethylbenzene	ND		ug/l	2.5	0.70
1,4-Dioxane	ND		ug/l	250	61.

Surrogate	%Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	110		70-130
Toluene-d8	93		70-130
4-Bromofluorobenzene	90		70-130
Dibromofluoromethane	101		70-130

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1808189
Report Date: 03/15/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 03/14/18 21:33
Analyst: AD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01,04 Batch: WG1097380-5					
Methylene chloride	ND		ug/l	2.5	0.70
1,1-Dichloroethane	ND		ug/l	2.5	0.70
Chloroform	ND		ug/l	2.5	0.70
Carbon tetrachloride	ND		ug/l	0.50	0.13
1,2-Dichloropropane	ND		ug/l	1.0	0.14
Dibromochloromethane	ND		ug/l	0.50	0.15
1,1,2-Trichloroethane	ND		ug/l	1.5	0.50
Tetrachloroethene	ND		ug/l	0.50	0.18
Chlorobenzene	ND		ug/l	2.5	0.70
Trichlorofluoromethane	ND		ug/l	2.5	0.70
1,2-Dichloroethane	ND		ug/l	0.50	0.13
1,1,1-Trichloroethane	ND		ug/l	2.5	0.70
Bromodichloromethane	ND		ug/l	0.50	0.19
trans-1,3-Dichloropropene	ND		ug/l	0.50	0.16
cis-1,3-Dichloropropene	ND		ug/l	0.50	0.14
1,3-Dichloropropene, Total	ND		ug/l	0.50	0.14
1,1-Dichloropropene	ND		ug/l	2.5	0.70
Bromoform	ND		ug/l	2.0	0.65
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	0.17
Benzene	ND		ug/l	0.50	0.16
Toluene	ND		ug/l	2.5	0.70
Ethylbenzene	ND		ug/l	2.5	0.70
Chloromethane	ND		ug/l	2.5	0.70
Bromomethane	ND		ug/l	2.5	0.70
Vinyl chloride	ND		ug/l	1.0	0.07
Chloroethane	ND		ug/l	2.5	0.70
1,1-Dichloroethene	ND		ug/l	0.50	0.17
trans-1,2-Dichloroethene	ND		ug/l	2.5	0.70
Trichloroethene	ND		ug/l	0.50	0.18

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1808189
Report Date: 03/15/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 03/14/18 21:33
Analyst: AD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01,04 Batch: WG1097380-5					
1,2-Dichlorobenzene	ND		ug/l	2.5	0.70
1,3-Dichlorobenzene	ND		ug/l	2.5	0.70
1,4-Dichlorobenzene	ND		ug/l	2.5	0.70
Methyl tert butyl ether	ND		ug/l	2.5	0.70
p/m-Xylene	ND		ug/l	2.5	0.70
o-Xylene	ND		ug/l	2.5	0.70
Xylenes, Total	ND		ug/l	2.5	0.70
cis-1,2-Dichloroethene	ND		ug/l	2.5	0.70
1,2-Dichloroethene, Total	ND		ug/l	2.5	0.70
Dibromomethane	ND		ug/l	5.0	1.0
1,2,3-Trichloropropane	ND		ug/l	2.5	0.70
Styrene	ND		ug/l	2.5	0.70
Dichlorodifluoromethane	ND		ug/l	5.0	1.0
Acetone	ND		ug/l	5.0	1.5
Carbon disulfide	ND		ug/l	5.0	1.0
2-Butanone	ND		ug/l	5.0	1.9
Vinyl acetate	ND		ug/l	5.0	1.0
4-Methyl-2-pentanone	ND		ug/l	5.0	1.0
2-Hexanone	ND		ug/l	5.0	1.0
Bromochloromethane	ND		ug/l	2.5	0.70
2,2-Dichloropropane	ND		ug/l	2.5	0.70
1,2-Dibromoethane	ND		ug/l	2.0	0.65
1,3-Dichloropropane	ND		ug/l	2.5	0.70
1,1,1,2-Tetrachloroethane	ND		ug/l	2.5	0.70
Bromobenzene	ND		ug/l	2.5	0.70
n-Butylbenzene	ND		ug/l	2.5	0.70
sec-Butylbenzene	ND		ug/l	2.5	0.70
tert-Butylbenzene	ND		ug/l	2.5	0.70
o-Chlorotoluene	ND		ug/l	2.5	0.70

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM
Lab Number: L1808189
Report Date: 03/15/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 03/14/18 21:33
Analyst: AD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01,04 Batch: WG1097380-5					
p-Chlorotoluene	ND		ug/l	2.5	0.70
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	0.70
Hexachlorobutadiene	ND		ug/l	2.5	0.70
Isopropylbenzene	ND		ug/l	2.5	0.70
p-Isopropyltoluene	ND		ug/l	2.5	0.70
Naphthalene	ND		ug/l	2.5	0.70
n-Propylbenzene	ND		ug/l	2.5	0.70
1,2,3-Trichlorobenzene	0.74	J	ug/l	2.5	0.70
1,2,4-Trichlorobenzene	ND		ug/l	2.5	0.70
1,3,5-Trimethylbenzene	ND		ug/l	2.5	0.70
1,2,4-Trimethylbenzene	ND		ug/l	2.5	0.70
1,4-Dioxane	ND		ug/l	250	61.

Surrogate	%Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	108		70-130
Toluene-d8	94		70-130
4-Bromofluorobenzene	92		70-130
Dibromofluoromethane	99		70-130

Lab Control Sample Analysis
Batch Quality Control

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1808189
Report Date: 03/15/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01,04 Batch: WG1097380-3 WG1097380-4								
Methylene chloride	100		100		70-130	0		20
1,1-Dichloroethane	120		120		70-130	0		20
Chloroform	100		100		70-130	0		20
Carbon tetrachloride	120		110		63-132	9		20
1,2-Dichloropropane	120		120		70-130	0		20
Dibromochloromethane	100		100		63-130	0		20
1,1,2-Trichloroethane	100		98		70-130	2		20
Tetrachloroethene	120		110		70-130	9		20
Chlorobenzene	100		100		75-130	0		20
Trichlorofluoromethane	120		110		62-150	9		20
1,2-Dichloroethane	110		110		70-130	0		20
1,1,1-Trichloroethane	110		100		67-130	10		20
Bromodichloromethane	100		100		67-130	0		20
trans-1,3-Dichloropropene	93		92		70-130	1		20
cis-1,3-Dichloropropene	100		100		70-130	0		20
1,1-Dichloropropene	110		110		70-130	0		20
Bromoform	93		88		54-136	6		20
1,1,2,2-Tetrachloroethane	100		94		67-130	6		20
Benzene	110		100		70-130	10		20
Toluene	100		100		70-130	0		20
Ethylbenzene	110		110		70-130	0		20
Chloromethane	**150**	Q	**150**	Q	64-130	0		20
Bromomethane	72		73		39-139	1		20

Lab Control Sample Analysis
Batch Quality Control

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1808189
Report Date: 03/15/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01,04 Batch: WG1097380-3 WG1097380-4								
Vinyl chloride	130		130		55-140	0		20
Chloroethane	120		120		55-138	0		20
1,1-Dichloroethene	110		110		61-145	0		20
trans-1,2-Dichloroethene	100		100		70-130	0		20
Trichloroethene	100		100		70-130	0		20
1,2-Dichlorobenzene	110		100		70-130	10		20
1,3-Dichlorobenzene	110		110		70-130	0		20
1,4-Dichlorobenzene	110		110		70-130	0		20
Methyl tert butyl ether	100		99		63-130	1		20
p/m-Xylene	120		115		70-130	4		20
o-Xylene	120		115		70-130	4		20
cis-1,2-Dichloroethene	110		100		70-130	10		20
Dibromomethane	100		100		70-130	0		20
1,2,3-Trichloropropane	96		93		64-130	3		20
Styrene	120		120		70-130	0		20
Dichlorodifluoromethane	130		130		36-147	0		20
Acetone	**150**	Q	130		58-148	14		20
Carbon disulfide	110		110		51-130	0		20
2-Butanone	**150**	Q	130		63-138	14		20
Vinyl acetate	130		120		70-130	8		20
4-Methyl-2-pentanone	120		110		59-130	9		20
2-Hexanone	130		120		57-130	8		20
Bromochloromethane	120		120		70-130	0		20

Lab Control Sample Analysis
Batch Quality Control

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1808189
Report Date: 03/15/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01,04 Batch: WG1097380-3 WG1097380-4								
2,2-Dichloropropane	77		78		63-133	1		20
1,2-Dibromoethane	100		100		70-130	0		20
1,3-Dichloropropane	100		100		70-130	0		20
1,1,1,2-Tetrachloroethane	110		100		64-130	10		20
Bromobenzene	110		110		70-130	0		20
n-Butylbenzene	110		100		53-136	10		20
sec-Butylbenzene	120		120		70-130	0		20
tert-Butylbenzene	120		110		70-130	9		20
o-Chlorotoluene	100		99		70-130	1		20
p-Chlorotoluene	100		97		70-130	3		20
1,2-Dibromo-3-chloropropane	95		93		41-144	2		20
Hexachlorobutadiene	120		110		63-130	9		20
Isopropylbenzene	110		110		70-130	0		20
p-Isopropyltoluene	120		120		70-130	0		20
Naphthalene	**140**	Q	**140**	Q	70-130	0		20
n-Propylbenzene	110		110		69-130	0		20
1,2,3-Trichlorobenzene	**140**	Q	**160**	Q	70-130	13		20
1,2,4-Trichlorobenzene	120		110		70-130	9		20
1,3,5-Trimethylbenzene	110		110		64-130	0		20
1,2,4-Trimethylbenzene	110		110		70-130	0		20
1,4-Dioxane	136		124		56-162	9		20

Lab Control Sample Analysis

Batch Quality Control

Project Name: ESSEX/HOPE

Project Number: 699900.01.RT.OM

Lab Number: L1808189

Report Date: 03/15/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01,04 Batch: WG1097380-3 WG1097380-4								

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
1,2-Dichloroethane-d4	106		105		70-130
Toluene-d8	93		94		70-130
4-Bromofluorobenzene	91		91		70-130
Dibromofluoromethane	100		99		70-130

Lab Control Sample Analysis
Batch Quality Control

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1808189
Report Date: 03/15/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 02-03 Batch: WG1097380-8 WG1097380-9								
Methylene chloride	110		110		70-130	0		20
1,1-Dichloroethane	120		120		70-130	0		20
Chloroform	110		100		70-130	10		20
Carbon tetrachloride	120		110		63-132	9		20
1,2-Dichloropropane	120		120		70-130	0		20
Dibromochloromethane	110		100		63-130	10		20
1,1,2-Trichloroethane	100		96		70-130	4		20
Tetrachloroethene	120		110		70-130	9		20
Chlorobenzene	110		100		75-130	10		20
Trichlorofluoromethane	110		110		62-150	0		20
1,2-Dichloroethane	120		120		70-130	0		20
1,1,1-Trichloroethane	110		100		67-130	10		20
Bromodichloromethane	110		100		67-130	10		20
trans-1,3-Dichloropropene	100		95		70-130	5		20
cis-1,3-Dichloropropene	110		110		70-130	0		20
1,1-Dichloropropene	110		110		70-130	0		20
Bromoform	91		90		54-136	1		20
1,1,2,2-Tetrachloroethane	98		98		67-130	0		20
Benzene	110		110		70-130	0		20
Toluene	100		100		70-130	0		20
Ethylbenzene	110		110		70-130	0		20
Chloromethane	**150**	Q	**140**	Q	64-130	7		20
Bromomethane	75		74		39-139	1		20

Lab Control Sample Analysis
Batch Quality Control

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1808189
Report Date: 03/15/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 02-03 Batch: WG1097380-8 WG1097380-9								
Vinyl chloride	130		130		55-140	0		20
Chloroethane	120		120		55-138	0		20
1,1-Dichloroethene	110		100		61-145	10		20
trans-1,2-Dichloroethene	110		100		70-130	10		20
Trichloroethene	110		100		70-130	10		20
1,2-Dichlorobenzene	110		110		70-130	0		20
1,3-Dichlorobenzene	110		110		70-130	0		20
1,4-Dichlorobenzene	110		110		70-130	0		20
Methyl tert butyl ether	100		98		63-130	2		20
p/m-Xylene	120		120		70-130	0		20
o-Xylene	120		115		70-130	4		20
cis-1,2-Dichloroethene	100		100		70-130	0		20
Dibromomethane	110		100		70-130	10		20
1,2,3-Trichloropropane	94		94		64-130	0		20
Styrene	125		120		70-130	4		20
Dichlorodifluoromethane	120		110		36-147	9		20
Acetone	130		130		58-148	0		20
Carbon disulfide	110		110		51-130	0		20
2-Butanone	**150**	Q	**140**	Q	63-138	7		20
Vinyl acetate	130		120		70-130	8		20
4-Methyl-2-pentanone	120		110		59-130	9		20
2-Hexanone	120		110		57-130	9		20
Bromochloromethane	120		120		70-130	0		20

Lab Control Sample Analysis
Batch Quality Control

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1808189
Report Date: 03/15/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 02-03 Batch: WG1097380-8 WG1097380-9								
2,2-Dichloropropane	110		100		63-133	10		20
1,2-Dibromoethane	100		100		70-130	0		20
1,3-Dichloropropane	100		97		70-130	3		20
1,1,1,2-Tetrachloroethane	110		110		64-130	0		20
Bromobenzene	110		110		70-130	0		20
n-Butylbenzene	110		110		53-136	0		20
sec-Butylbenzene	120		120		70-130	0		20
tert-Butylbenzene	120		110		70-130	9		20
o-Chlorotoluene	100		100		70-130	0		20
p-Chlorotoluene	100		100		70-130	0		20
1,2-Dibromo-3-chloropropane	94		94		41-144	0		20
Hexachlorobutadiene	130		120		63-130	8		20
Isopropylbenzene	120		110		70-130	9		20
p-Isopropyltoluene	120		120		70-130	0		20
Naphthalene	**140**	Q	130		70-130	7		20
n-Propylbenzene	110		110		69-130	0		20
1,2,3-Trichlorobenzene	**150**	Q	**150**	Q	70-130	0		20
1,2,4-Trichlorobenzene	120		120		70-130	0		20
1,3,5-Trimethylbenzene	120		110		64-130	9		20
1,2,4-Trimethylbenzene	110		110		70-130	0		20
1,4-Dioxane	130		142		56-162	9		20

Lab Control Sample Analysis

Batch Quality Control

Project Name: ESSEX/HOPE

Project Number: 699900.01.RT.OM

Lab Number: L1808189

Report Date: 03/15/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits

Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 02-03 Batch: WG1097380-8 WG1097380-9

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
1,2-Dichloroethane-d4	108		110		70-130
Toluene-d8	95		94		70-130
4-Bromofluorobenzene	92		92		70-130
Dibromofluoromethane	101		101		70-130

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1808189
Report Date: 03/15/18

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1808189-01A	Vial HCl preserved	A	NA		3.1	Y	Absent		NYTCL-8260(14)
L1808189-01B	Vial HCl preserved	A	NA		3.1	Y	Absent		NYTCL-8260(14)
L1808189-01C	Vial HCl preserved	A	NA		3.1	Y	Absent		NYTCL-8260(14)
L1808189-02A	Vial HCl preserved	A	NA		3.1	Y	Absent		NYTCL-8260(14)
L1808189-02B	Vial HCl preserved	A	NA		3.1	Y	Absent		NYTCL-8260(14)
L1808189-02C	Vial HCl preserved	A	NA		3.1	Y	Absent		NYTCL-8260(14)
L1808189-03X	Vial HCl preserved split	A	NA		3.1	Y	Absent		NYTCL-8260(14)
L1808189-03Y	Vial HCl preserved split	A	NA		3.1	Y	Absent		NYTCL-8260(14)
L1808189-03Z	Vial HCl preserved split	A	NA		3.1	Y	Absent		NYTCL-8260(14)
L1808189-04A	Vial HCl preserved	A	NA		3.1	Y	Absent		NYTCL-8260(14)
L1808189-04B	Vial HCl preserved	A	NA		3.1	Y	Absent		NYTCL-8260(14)
L1808189-05A	Vial HCl preserved	A	NA		3.1	Y	Absent		COMP-VOA()
L1808189-05A1	Vial HCl preserved	A	NA		3.1	Y	Absent		COMP-VOA()
L1808189-05A2	Vial HCl preserved	A	NA		3.1	Y	Absent		COMP-VOA()
L1808189-05B	Vial HCl preserved	A	NA		3.1	Y	Absent		COMP-VOA()
L1808189-05B1	Vial HCl preserved	A	NA		3.1	Y	Absent		COMP-VOA()
L1808189-05B2	Vial HCl preserved	A	NA		3.1	Y	Absent		COMP-VOA()
L1808189-05C	Vial HCl preserved	A	NA		3.1	Y	Absent		COMP-VOA()
L1808189-05C1	Vial HCl preserved	A	NA		3.1	Y	Absent		COMP-VOA()
L1808189-05C2	Vial HCl preserved	A	NA		3.1	Y	Absent		COMP-VOA()
L1808189-05D	Vial HCl preserved	A	NA		3.1	Y	Absent		COMP-VOA()
L1808189-05D1	Vial HCl preserved	A	NA		3.1	Y	Absent		COMP-VOA()
L1808189-05D2	Vial HCl preserved	A	NA		3.1	Y	Absent		COMP-VOA()

*Values in parentheses indicate holding time in days

Project Name: ESSEX/HOPE
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Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)

*Values in parentheses indicate holding time in days

Project Name:	ESSEX/HOPE	**Lab Number:**	L1808189
Project Number:	699900.01.RT.OM	**Report Date:**	03/15/18

GLOSSARY

Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

1	- The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A	- Spectra identified as "Aldol Condensation Product".
B	- The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related

Report Format: DU Report with 'J' Qualifiers

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Data Qualifiers

projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

J - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

ND - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

Report Format: DU Report with 'J' Qualifiers

Project Name:	ESSEX/HOPE	**Lab Number:**	L1808189
Project Number:	699900.01.RT.OM	**Report Date:**	03/15/18

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
EPA 300: DW: Bromide
EPA 6860: SCM: Perchlorate
EPA 9010: NPW and SCM: Amenable Cyanide Distillation
SM4500: NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, EPA 351.1, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D.**
EPA 624: Volatile Halocarbons & Aromatics,
EPA 608: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Be, Cd, Cr, Cu, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

NEW YORK CHAIN OF CUSTODY

ALPHA ANALYTICAL

Westborough, MA 01581
8 Walkup Dr.
TEL: 508-898-9220
FAX: 508-898-9193

Mansfield, MA 02048
320 Forbes Blvd
TEL: 508-822-9300
FAX: 508-822-3288

Service Centers
Mahwah, NJ 07430: 35 Whitney Rd, Suite 5
Albany, NY 12205: 14 Walker Way
Tonawanda, NY 14150: 275 Cooper Ave, Suite 105

Page 1 of 1

Date Rec'd in Lab: 3/10/18

ALPHA Job #: L1808189

Client Information
Client: CHA / Jacobs
Address: 18 Fremont St
Boston MA
Phone:
Fax:
Email: Kyle.Block@cha

Project Information
Project Name: Essex / Hope
Project Location: Jamestown NY
Project #: 699900.01.RT.OM
(Use Project name as Project #)
Project Manager: Kyle Block
ALPHAQuote #:

Turn-Around Time
Standard [X] Due Date:
Rush (only if pre approved) [ ] # of Days:

Deliverables
[ ] ASP-A [ ] ASP-B
[ ] EQuIS (1 File) [ ] EQuIS (4 File)
[ ] Other

Regulatory Requirement
[ ] NY TOGS [ ] NY Part 375
[ ] AWQ Standards [ ] NY CP-51
[ ] NY Restricted Use [ ] Other
[ ] NY Unrestricted Use
[ ] NYC Sewer Discharge

Billing Information
[X] Same as Client Info
PO #

Disposal Site Information
Please identify below location of applicable disposal facilities.
Disposal Facility:
[ ] NJ [X] NY
[ ] Other:

These samples have been previously analyzed by Alpha [X]

Other project specific requirements/comments:
Composite all 4 Post CARB Samples & Report as Post-CARB_20180309

Please specify Metals or TAL.

ANALYSIS
8260 VOC

Sample Filtration
[ ] Done
[ ] Lab to do
Preservation
[ ] Lab to do
(Please Specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	8260 VOC	Sample Specific Comments	Total Bottle
0818901	Pre-CARB-20180309	0745	3/9/18	GW	JRG	X		3
-02	Rainy-EFF-20180309	0750				X		3
-03,-05	Post-CARB-20180309-1	0800				X		3
-03,-05	Post-CARB-20180309-2	0830				X		3
-03,-05	Post-CARB-20180309-3	0900				X		3
-03,-05	Post-CARB-20180309-4	0930				X		3
-04	TRIP BLANK	—	—	—	—	X		1

Preservative Code:
A = None
B = HCl
C = HNO_3
D = H_2SO_4
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
K/E = Zn Ac/NaOH
O = Other

Container Code
P = Plastic
A = Amber Glass
V = Vial
G = Glass
B = Bacteria Cup
C = Cube
O = Other
E = Encore
D = BOD Bottle

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Container Type	V	
Preservative	B	

Relinquished By:	Date/Time	Received By:	Date/Time
	3/09/2018		3/9/18 1005
Jon Gumo			
	3/9/18 1220		3/10/18 0120

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. BY EXECUTING THIS COC, THE CLIENT HAS READ AND AGREES TO BE BOUND BY ALPHA'S TERMS & CONDITIONS. (See reverse side.)

Form No: 01-25 HC (rev. 30-Sept-2013)

ANALYTICAL REPORT

Lab Number:	L1812853
Client:	CH2MHILL 18 Tremont Street Suite 700 Boston, MA 02108
ATTN:	Kyle Block
Phone:	(617) 523-2260
Project Name:	ESSEX/HOPE
Project Number:	699900.01.RT.OM
Report Date:	04/18/18

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), NJ NELAP (MA935), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-14-00197).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1812853
Report Date: 04/18/18

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1812853-01	PRE-CARB_20180412	WATER	JAMESTOWN, NY	04/12/18 11:40	04/12/18
L1812853-02	PRIMARY-EFFLUENT-20180412	WATER	JAMESTOWN, NY	04/12/18 11:50	04/12/18
L1812853-03	POST-CARB-20180412	WATER	JAMESTOWN, NY	04/12/18 13:30	04/12/18
L1812853-04	COMPOSITE OF POST-CARB 20180412-1,-2,-3,-4	WATER	JAMESTOWN, NY	04/12/18 13:30	04/12/18
L1812853-05	TRIP BLANK	WATER	JAMESTOWN, NY	04/12/18 00:00	04/12/18

Project Name:	ESSEX/HOPE	**Lab Number:**	L1812853
Project Number:	699900.01.RT.OM	**Report Date:**	04/18/18

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY

For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

Project Name:	ESSEX/HOPE	**Lab Number:**	L1812853
Project Number:	699900.01.RT.OM	**Report Date:**	04/18/18

Case Narrative (continued)

Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

Volatile Organics

L1812853-01 and -02: The sample has elevated detection limits due to the dilution required by the elevated concentrations of target compounds in the sample.

The WG1107198-3 LCS recovery, associated with L1812853-01, -02, -03 and -05, is above the individual acceptance criteria for Hexachlorobutadiene (140%), but within the overall method allowances. The results of the associated samples are reported.

The initial calibration, associated with L1812853-01, -02, -03 and -05, did not meet the method required minimum response factor for the calibration standards for Bromomethane, Acetone, Bromochloromethane, 2-Butanone, Trichloroethene, Dibromomethane, 1,4-Dioxane, 4-Methyl-2-pentanone, 2-Hexanone and 1,2-Dibromo-3-chloropropane.

The initial calibration verification standard has the percent deviation for Dichlorodifluoromethane (69%D), Chloromethane (49%), Vinyl chloride (45%), Bromomethane (40%) and Chloroethane (31%) above the 30% ICV criteria but within overall method allowances.

The continuing calibration verification standard WG1107198-2 has the percent deviation for Dichlorodifluoromethane (36%D), Bromomethane (37%D), Acetone (21%) and 1,4-Dioxane (41%) above the 20% CCV criteria, but within overall method allowances.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Michelle M. Morris

Title: Technical Director/Representative Date: 04/18/18

ORGANICS

VOLATILES

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM
Lab Number: L1812853
Report Date: 04/18/18

SAMPLE RESULTS

Lab ID: L1812853-01 D
Client ID: PRE-CARB_20180412
Sample Location: JAMESTOWN, NY

Date Collected: 04/12/18 11:40
Date Received: 04/12/18
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 04/16/18 22:00
Analyst: AD

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	120	35.	50
1,1-Dichloroethane	ND		ug/l	120	35.	50
Chloroform	ND		ug/l	120	35.	50
Carbon tetrachloride	ND		ug/l	25	6.7	50
1,2-Dichloropropane	ND		ug/l	50	6.8	50
Dibromochloromethane	ND		ug/l	25	7.4	50
1,1,2-Trichloroethane	ND		ug/l	75	25.	50
Tetrachloroethene	ND		ug/l	25	9.0	50
Chlorobenzene	ND		ug/l	120	35.	50
Trichlorofluoromethane	ND		ug/l	120	35.	50
1,2-Dichloroethane	ND		ug/l	25	6.6	50
1,1,1-Trichloroethane	ND		ug/l	120	35.	50
Bromodichloromethane	ND		ug/l	25	9.6	50
trans-1,3-Dichloropropene	ND		ug/l	25	8.2	50
cis-1,3-Dichloropropene	ND		ug/l	25	7.2	50
1,3-Dichloropropene, Total	ND		ug/l	25	7.2	50
1,1-Dichloropropene	ND		ug/l	120	35.	50
Bromoform	ND		ug/l	100	32.	50
1,1,2,2-Tetrachloroethane	ND		ug/l	25	8.4	50
Benzene	16	J	ug/l	25	8.0	50
Toluene	ND		ug/l	120	35.	50
Ethylbenzene	ND		ug/l	120	35.	50
Chloromethane	ND		ug/l	120	35.	50
Bromomethane	ND		ug/l	120	35.	50
Vinyl chloride	970		ug/l	50	3.6	50
Chloroethane	ND		ug/l	120	35.	50
1,1-Dichloroethene	20	J	ug/l	25	8.4	50
trans-1,2-Dichloroethene	ND		ug/l	120	35.	50

Project Name: ESSEX/HOPE **Lab Number:** L1812853

Project Number: 699900.01.RT.OM **Report Date:** 04/18/18

SAMPLE RESULTS

Lab ID: L1812853-01 D
Client ID: PRE-CARB_20180412
Sample Location: JAMESTOWN, NY

Date Collected: 04/12/18 11:40
Date Received: 04/12/18
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Trichloroethene	4700		ug/l	25	8.8	50
1,2-Dichlorobenzene	ND		ug/l	120	35.	50
1,3-Dichlorobenzene	ND		ug/l	120	35.	50
1,4-Dichlorobenzene	ND		ug/l	120	35.	50
Methyl tert butyl ether	ND		ug/l	120	35.	50
p/m-Xylene	ND		ug/l	120	35.	50
o-Xylene	ND		ug/l	120	35.	50
Xylenes, Total	ND		ug/l	120	35.	50
cis-1,2-Dichloroethene	4800		ug/l	120	35.	50
1,2-Dichloroethene, Total	4800		ug/l	120	35.	50
Dibromomethane	ND		ug/l	250	50.	50
1,2,3-Trichloropropane	ND		ug/l	120	35.	50
Styrene	ND		ug/l	120	35.	50
Dichlorodifluoromethane	ND		ug/l	250	50.	50
Acetone	1600		ug/l	250	73.	50
Carbon disulfide	ND		ug/l	250	50.	50
2-Butanone	ND		ug/l	250	97.	50
Vinyl acetate	ND		ug/l	250	50.	50
4-Methyl-2-pentanone	ND		ug/l	250	50.	50
2-Hexanone	ND		ug/l	250	50.	50
Bromochloromethane	ND		ug/l	120	35.	50
2,2-Dichloropropane	ND		ug/l	120	35.	50
1,2-Dibromoethane	ND		ug/l	100	32.	50
1,3-Dichloropropane	ND		ug/l	120	35.	50
1,1,1,2-Tetrachloroethane	ND		ug/l	120	35.	50
Bromobenzene	ND		ug/l	120	35.	50
n-Butylbenzene	ND		ug/l	120	35.	50
sec-Butylbenzene	ND		ug/l	120	35.	50
tert-Butylbenzene	ND		ug/l	120	35.	50
o-Chlorotoluene	ND		ug/l	120	35.	50
p-Chlorotoluene	ND		ug/l	120	35.	50
1,2-Dibromo-3-chloropropane	ND		ug/l	120	35.	50
Hexachlorobutadiene	ND		ug/l	120	35.	50
Isopropylbenzene	ND		ug/l	120	35.	50
p-Isopropyltoluene	ND		ug/l	120	35.	50
Naphthalene	ND		ug/l	120	35.	50
n-Propylbenzene	ND		ug/l	120	35.	50

Project Name: ESSEX/HOPE **Lab Number:** L1812853

Project Number: 699900.01.RT.OM **Report Date:** 04/18/18

SAMPLE RESULTS

Lab ID: L1812853-01 D
Client ID: PRE-CARB_20180412
Sample Location: JAMESTOWN, NY

Date Collected: 04/12/18 11:40
Date Received: 04/12/18
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,2,3-Trichlorobenzene	ND		ug/l	120	35.	50
1,2,4-Trichlorobenzene	ND		ug/l	120	35.	50
1,3,5-Trimethylbenzene	ND		ug/l	120	35.	50
1,2,4-Trimethylbenzene	ND		ug/l	120	35.	50
1,4-Dioxane	ND		ug/l	12000	3000	50

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	98		70-130
Toluene-d8	99		70-130
4-Bromofluorobenzene	97		70-130
Dibromofluoromethane	93		70-130

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM
Lab Number: L1812853
Report Date: 04/18/18

SAMPLE RESULTS

Lab ID: L1812853-02 D
Client ID: PRIMARY-EFFLUENT-20180412
Sample Location: JAMESTOWN, NY

Date Collected: 04/12/18 11:50
Date Received: 04/12/18
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 04/16/18 21:03
Analyst: AD

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	50	14.	20
1,1-Dichloroethane	ND		ug/l	50	14.	20
Chloroform	ND		ug/l	50	14.	20
Carbon tetrachloride	ND		ug/l	10	2.7	20
1,2-Dichloropropane	ND		ug/l	20	2.7	20
Dibromochloromethane	ND		ug/l	10	3.0	20
1,1,2-Trichloroethane	ND		ug/l	30	10.	20
Tetrachloroethene	ND		ug/l	10	3.6	20
Chlorobenzene	ND		ug/l	50	14.	20
Trichlorofluoromethane	ND		ug/l	50	14.	20
1,2-Dichloroethane	ND		ug/l	10	2.6	20
1,1,1-Trichloroethane	ND		ug/l	50	14.	20
Bromodichloromethane	ND		ug/l	10	3.8	20
trans-1,3-Dichloropropene	ND		ug/l	10	3.3	20
cis-1,3-Dichloropropene	ND		ug/l	10	2.9	20
1,3-Dichloropropene, Total	ND		ug/l	10	2.9	20
1,1-Dichloropropene	ND		ug/l	50	14.	20
Bromoform	ND		ug/l	40	13.	20
1,1,2,2-Tetrachloroethane	ND		ug/l	10	3.3	20
Benzene	ND		ug/l	10	3.2	20
Toluene	ND		ug/l	50	14.	20
Ethylbenzene	ND		ug/l	50	14.	20
Chloromethane	ND		ug/l	50	14.	20
Bromomethane	ND		ug/l	50	14.	20
Vinyl chloride	2.3	J	ug/l	20	1.4	20
Chloroethane	ND		ug/l	50	14.	20
1,1-Dichloroethene	ND		ug/l	10	3.4	20
trans-1,2-Dichloroethene	ND		ug/l	50	14.	20

Project Name: ESSEX/HOPE **Lab Number:** L1812853

Project Number: 699900.01.RT.OM **Report Date:** 04/18/18

SAMPLE RESULTS

Lab ID: L1812853-02 D Date Collected: 04/12/18 11:50

Client ID: PRIMARY-EFFLUENT-20180412 Date Received: 04/12/18

Sample Location: JAMESTOWN, NY Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Trichloroethene	ND		ug/l	10	3.5	20
1,2-Dichlorobenzene	ND		ug/l	50	14.	20
1,3-Dichlorobenzene	ND		ug/l	50	14.	20
1,4-Dichlorobenzene	ND		ug/l	50	14.	20
Methyl tert butyl ether	ND		ug/l	50	14.	20
p/m-Xylene	ND		ug/l	50	14.	20
o-Xylene	ND		ug/l	50	14.	20
Xylenes, Total	ND		ug/l	50	14.	20
cis-1,2-Dichloroethene	ND		ug/l	50	14.	20
1,2-Dichloroethene, Total	ND		ug/l	50	14.	20
Dibromomethane	ND		ug/l	100	20.	20
1,2,3-Trichloropropane	ND		ug/l	50	14.	20
Styrene	ND		ug/l	50	14.	20
Dichlorodifluoromethane	ND		ug/l	100	20.	20
Acetone	1700		ug/l	100	29.	20
Carbon disulfide	ND		ug/l	100	20.	20
2-Butanone	ND		ug/l	100	39.	20
Vinyl acetate	ND		ug/l	100	20.	20
4-Methyl-2-pentanone	ND		ug/l	100	20.	20
2-Hexanone	ND		ug/l	100	20.	20
Bromochloromethane	ND		ug/l	50	14.	20
2,2-Dichloropropane	ND		ug/l	50	14.	20
1,2-Dibromoethane	ND		ug/l	40	13.	20
1,3-Dichloropropane	ND		ug/l	50	14.	20
1,1,1,2-Tetrachloroethane	ND		ug/l	50	14.	20
Bromobenzene	ND		ug/l	50	14.	20
n-Butylbenzene	ND		ug/l	50	14.	20
sec-Butylbenzene	ND		ug/l	50	14.	20
tert-Butylbenzene	ND		ug/l	50	14.	20
o-Chlorotoluene	ND		ug/l	50	14.	20
p-Chlorotoluene	ND		ug/l	50	14.	20
1,2-Dibromo-3-chloropropane	ND		ug/l	50	14.	20
Hexachlorobutadiene	ND		ug/l	50	14.	20
Isopropylbenzene	ND		ug/l	50	14.	20
p-Isopropyltoluene	ND		ug/l	50	14.	20
Naphthalene	ND		ug/l	50	14.	20
n-Propylbenzene	ND		ug/l	50	14.	20

Project Name: ESSEX/HOPE **Lab Number:** L1812853

Project Number: 699900.01.RT.OM **Report Date:** 04/18/18

SAMPLE RESULTS

Lab ID: L1812853-02 D
Client ID: PRIMARY-EFFLUENT-20180412
Sample Location: JAMESTOWN, NY

Date Collected: 04/12/18 11:50
Date Received: 04/12/18
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,2,3-Trichlorobenzene	ND		ug/l	50	14.	20
1,2,4-Trichlorobenzene	ND		ug/l	50	14.	20
1,3,5-Trimethylbenzene	ND		ug/l	50	14.	20
1,2,4-Trimethylbenzene	ND		ug/l	50	14.	20
1,4-Dioxane	ND		ug/l	5000	1200	20

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	101		70-130
Toluene-d8	98		70-130
4-Bromofluorobenzene	97		70-130
Dibromofluoromethane	93		70-130

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM
Lab Number: L1812853
Report Date: 04/18/18

SAMPLE RESULTS

Lab ID: L1812853-03
Client ID: POST-CARB-20180412
Sample Location: JAMESTOWN, NY
Date Collected: 04/12/18 13:30
Date Received: 04/12/18
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 04/16/18 22:56
Analyst: PD

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	2.5	0.70	1
1,1-Dichloroethane	ND		ug/l	2.5	0.70	1
Chloroform	ND		ug/l	2.5	0.70	1
Carbon tetrachloride	ND		ug/l	0.50	0.13	1
1,2-Dichloropropane	ND		ug/l	1.0	0.14	1
Dibromochloromethane	ND		ug/l	0.50	0.15	1
1,1,2-Trichloroethane	ND		ug/l	1.5	0.50	1
Tetrachloroethene	ND		ug/l	0.50	0.18	1
Chlorobenzene	ND		ug/l	2.5	0.70	1
Trichlorofluoromethane	ND		ug/l	2.5	0.70	1
1,2-Dichloroethane	ND		ug/l	0.50	0.13	1
1,1,1-Trichloroethane	ND		ug/l	2.5	0.70	1
Bromodichloromethane	ND		ug/l	0.50	0.19	1
trans-1,3-Dichloropropene	ND		ug/l	0.50	0.16	1
cis-1,3-Dichloropropene	ND		ug/l	0.50	0.14	1
1,3-Dichloropropene, Total	ND		ug/l	0.50	0.14	1
1,1-Dichloropropene	ND		ug/l	2.5	0.70	1
Bromoform	ND		ug/l	2.0	0.65	1
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	0.17	1
Benzene	ND		ug/l	0.50	0.16	1
Toluene	ND		ug/l	2.5	0.70	1
Ethylbenzene	ND		ug/l	2.5	0.70	1
Chloromethane	ND		ug/l	2.5	0.70	1
Bromomethane	ND		ug/l	2.5	0.70	1
Vinyl chloride	0.08	J	ug/l	1.0	0.07	1
Chloroethane	ND		ug/l	2.5	0.70	1
1,1-Dichloroethene	ND		ug/l	0.50	0.17	1
trans-1,2-Dichloroethene	ND		ug/l	2.5	0.70	1

Project Name: ESSEX/HOPE **Lab Number:** L1812853

Project Number: 699900.01.RT.OM **Report Date:** 04/18/18

SAMPLE RESULTS

Lab ID: L1812853-03 Date Collected: 04/12/18 13:30

Client ID: POST-CARB-20180412 Date Received: 04/12/18

Sample Location: JAMESTOWN, NY Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Trichloroethene	0.26	J	ug/l	0.50	0.18	1
1,2-Dichlorobenzene	ND		ug/l	2.5	0.70	1
1,3-Dichlorobenzene	ND		ug/l	2.5	0.70	1
1,4-Dichlorobenzene	ND		ug/l	2.5	0.70	1
Methyl tert butyl ether	ND		ug/l	2.5	0.70	1
p/m-Xylene	ND		ug/l	2.5	0.70	1
o-Xylene	ND		ug/l	2.5	0.70	1
Xylenes, Total	ND		ug/l	2.5	0.70	1
cis-1,2-Dichloroethene	ND		ug/l	2.5	0.70	1
1,2-Dichloroethene, Total	ND		ug/l	2.5	0.70	1
Dibromomethane	ND		ug/l	5.0	1.0	1
1,2,3-Trichloropropane	ND		ug/l	2.5	0.70	1
Styrene	ND		ug/l	2.5	0.70	1
Dichlorodifluoromethane	ND		ug/l	5.0	1.0	1
Acetone	70		ug/l	5.0	1.5	1
Carbon disulfide	ND		ug/l	5.0	1.0	1
2-Butanone	ND		ug/l	5.0	1.9	1
Vinyl acetate	ND		ug/l	5.0	1.0	1
4-Methyl-2-pentanone	ND		ug/l	5.0	1.0	1
2-Hexanone	ND		ug/l	5.0	1.0	1
Bromochloromethane	ND		ug/l	2.5	0.70	1
2,2-Dichloropropane	ND		ug/l	2.5	0.70	1
1,2-Dibromoethane	ND		ug/l	2.0	0.65	1
1,3-Dichloropropane	ND		ug/l	2.5	0.70	1
1,1,1,2-Tetrachloroethane	ND		ug/l	2.5	0.70	1
Bromobenzene	ND		ug/l	2.5	0.70	1
n-Butylbenzene	ND		ug/l	2.5	0.70	1
sec-Butylbenzene	ND		ug/l	2.5	0.70	1
tert-Butylbenzene	ND		ug/l	2.5	0.70	1
o-Chlorotoluene	ND		ug/l	2.5	0.70	1
p-Chlorotoluene	ND		ug/l	2.5	0.70	1
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	0.70	1
Hexachlorobutadiene	ND		ug/l	2.5	0.70	1
Isopropylbenzene	ND		ug/l	2.5	0.70	1
p-Isopropyltoluene	ND		ug/l	2.5	0.70	1
Naphthalene	ND		ug/l	2.5	0.70	1
n-Propylbenzene	ND		ug/l	2.5	0.70	1

Project Name: ESSEX/HOPE **Lab Number:** L1812853

Project Number: 699900.01.RT.OM **Report Date:** 04/18/18

SAMPLE RESULTS

Lab ID: L1812853-03 Date Collected: 04/12/18 13:30

Client ID: POST-CARB-20180412 Date Received: 04/12/18

Sample Location: JAMESTOWN, NY Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,2,3-Trichlorobenzene	ND		ug/l	2.5	0.70	1
1,2,4-Trichlorobenzene	ND		ug/l	2.5	0.70	1
1,3,5-Trimethylbenzene	ND		ug/l	2.5	0.70	1
1,2,4-Trimethylbenzene	ND		ug/l	2.5	0.70	1
1,4-Dioxane	ND		ug/l	250	61.	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	97		70-130
Toluene-d8	99		70-130
4-Bromofluorobenzene	97		70-130
Dibromofluoromethane	91		70-130

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM
Lab Number: L1812853
Report Date: 04/18/18

SAMPLE RESULTS

Lab ID: L1812853-05
Client ID: TRIP BLANK
Sample Location: JAMESTOWN, NY
Date Collected: 04/12/18 00:00
Date Received: 04/12/18
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 04/16/18 22:28
Analyst: AD

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	2.5	0.70	1
1,1-Dichloroethane	ND		ug/l	2.5	0.70	1
Chloroform	ND		ug/l	2.5	0.70	1
Carbon tetrachloride	ND		ug/l	0.50	0.13	1
1,2-Dichloropropane	ND		ug/l	1.0	0.14	1
Dibromochloromethane	ND		ug/l	0.50	0.15	1
1,1,2-Trichloroethane	ND		ug/l	1.5	0.50	1
Tetrachloroethene	ND		ug/l	0.50	0.18	1
Chlorobenzene	ND		ug/l	2.5	0.70	1
Trichlorofluoromethane	ND		ug/l	2.5	0.70	1
1,2-Dichloroethane	ND		ug/l	0.50	0.13	1
1,1,1-Trichloroethane	ND		ug/l	2.5	0.70	1
Bromodichloromethane	ND		ug/l	0.50	0.19	1
trans-1,3-Dichloropropene	ND		ug/l	0.50	0.16	1
cis-1,3-Dichloropropene	ND		ug/l	0.50	0.14	1
1,3-Dichloropropene, Total	ND		ug/l	0.50	0.14	1
1,1-Dichloropropene	ND		ug/l	2.5	0.70	1
Bromoform	ND		ug/l	2.0	0.65	1
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	0.17	1
Benzene	ND		ug/l	0.50	0.16	1
Toluene	ND		ug/l	2.5	0.70	1
Ethylbenzene	ND		ug/l	2.5	0.70	1
Chloromethane	ND		ug/l	2.5	0.70	1
Bromomethane	ND		ug/l	2.5	0.70	1
Vinyl chloride	ND		ug/l	1.0	0.07	1
Chloroethane	ND		ug/l	2.5	0.70	1
1,1-Dichloroethene	ND		ug/l	0.50	0.17	1
trans-1,2-Dichloroethene	ND		ug/l	2.5	0.70	1

Project Name: ESSEX/HOPE **Lab Number:** L1812853

Project Number: 699900.01.RT.OM **Report Date:** 04/18/18

SAMPLE RESULTS

Lab ID: L1812853-05 Date Collected: 04/12/18 00:00

Client ID: TRIP BLANK Date Received: 04/12/18

Sample Location: JAMESTOWN, NY Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Trichloroethene	ND		ug/l	0.50	0.18	1
1,2-Dichlorobenzene	ND		ug/l	2.5	0.70	1
1,3-Dichlorobenzene	ND		ug/l	2.5	0.70	1
1,4-Dichlorobenzene	ND		ug/l	2.5	0.70	1
Methyl tert butyl ether	ND		ug/l	2.5	0.70	1
p/m-Xylene	ND		ug/l	2.5	0.70	1
o-Xylene	ND		ug/l	2.5	0.70	1
Xylenes, Total	ND		ug/l	2.5	0.70	1
cis-1,2-Dichloroethene	ND		ug/l	2.5	0.70	1
1,2-Dichloroethene, Total	ND		ug/l	2.5	0.70	1
Dibromomethane	ND		ug/l	5.0	1.0	1
1,2,3-Trichloropropane	ND		ug/l	2.5	0.70	1
Styrene	ND		ug/l	2.5	0.70	1
Dichlorodifluoromethane	ND		ug/l	5.0	1.0	1
Acetone	2.1	J	ug/l	5.0	1.5	1
Carbon disulfide	ND		ug/l	5.0	1.0	1
2-Butanone	ND		ug/l	5.0	1.9	1
Vinyl acetate	ND		ug/l	5.0	1.0	1
4-Methyl-2-pentanone	ND		ug/l	5.0	1.0	1
2-Hexanone	ND		ug/l	5.0	1.0	1
Bromochloromethane	ND		ug/l	2.5	0.70	1
2,2-Dichloropropane	ND		ug/l	2.5	0.70	1
1,2-Dibromoethane	ND		ug/l	2.0	0.65	1
1,3-Dichloropropane	ND		ug/l	2.5	0.70	1
1,1,1,2-Tetrachloroethane	ND		ug/l	2.5	0.70	1
Bromobenzene	ND		ug/l	2.5	0.70	1
n-Butylbenzene	ND		ug/l	2.5	0.70	1
sec-Butylbenzene	ND		ug/l	2.5	0.70	1
tert-Butylbenzene	ND		ug/l	2.5	0.70	1
o-Chlorotoluene	ND		ug/l	2.5	0.70	1
p-Chlorotoluene	ND		ug/l	2.5	0.70	1
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	0.70	1
Hexachlorobutadiene	ND		ug/l	2.5	0.70	1
Isopropylbenzene	ND		ug/l	2.5	0.70	1
p-Isopropyltoluene	ND		ug/l	2.5	0.70	1
Naphthalene	ND		ug/l	2.5	0.70	1
n-Propylbenzene	ND		ug/l	2.5	0.70	1

Project Name: ESSEX/HOPE **Lab Number:** L1812853

Project Number: 699900.01.RT.OM **Report Date:** 04/18/18

SAMPLE RESULTS

Lab ID: L1812853-05 Date Collected: 04/12/18 00:00

Client ID: TRIP BLANK Date Received: 04/12/18

Sample Location: JAMESTOWN, NY Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,2,3-Trichlorobenzene	ND		ug/l	2.5	0.70	1
1,2,4-Trichlorobenzene	ND		ug/l	2.5	0.70	1
1,3,5-Trimethylbenzene	ND		ug/l	2.5	0.70	1
1,2,4-Trimethylbenzene	ND		ug/l	2.5	0.70	1
1,4-Dioxane	ND		ug/l	250	61.	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	97		70-130
Toluene-d8	99		70-130
4-Bromofluorobenzene	97		70-130
Dibromofluoromethane	92		70-130

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1812853
Report Date: 04/18/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 04/16/18 20:34
Analyst: AD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-03,05 Batch: WG1107198-5					
Methylene chloride	ND		ug/l	2.5	0.70
1,1-Dichloroethane	ND		ug/l	2.5	0.70
Chloroform	ND		ug/l	2.5	0.70
Carbon tetrachloride	ND		ug/l	0.50	0.13
1,2-Dichloropropane	ND		ug/l	1.0	0.14
Dibromochloromethane	ND		ug/l	0.50	0.15
1,1,2-Trichloroethane	ND		ug/l	1.5	0.50
Tetrachloroethene	ND		ug/l	0.50	0.18
Chlorobenzene	ND		ug/l	2.5	0.70
Trichlorofluoromethane	ND		ug/l	2.5	0.70
1,2-Dichloroethane	ND		ug/l	0.50	0.13
1,1,1-Trichloroethane	ND		ug/l	2.5	0.70
Bromodichloromethane	ND		ug/l	0.50	0.19
trans-1,3-Dichloropropene	ND		ug/l	0.50	0.16
cis-1,3-Dichloropropene	ND		ug/l	0.50	0.14
1,3-Dichloropropene, Total	ND		ug/l	0.50	0.14
1,1-Dichloropropene	ND		ug/l	2.5	0.70
Bromoform	ND		ug/l	2.0	0.65
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	0.17
Benzene	ND		ug/l	0.50	0.16
Toluene	ND		ug/l	2.5	0.70
Ethylbenzene	ND		ug/l	2.5	0.70
Chloromethane	ND		ug/l	2.5	0.70
Bromomethane	ND		ug/l	2.5	0.70
Vinyl chloride	ND		ug/l	1.0	0.07
Chloroethane	ND		ug/l	2.5	0.70
1,1-Dichloroethene	ND		ug/l	0.50	0.17
trans-1,2-Dichloroethene	ND		ug/l	2.5	0.70
Trichloroethene	ND		ug/l	0.50	0.18

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM
Lab Number: L1812853
Report Date: 04/18/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 04/16/18 20:34
Analyst: AD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-03,05 Batch: WG1107198-5					
1,2-Dichlorobenzene	ND		ug/l	2.5	0.70
1,3-Dichlorobenzene	ND		ug/l	2.5	0.70
1,4-Dichlorobenzene	ND		ug/l	2.5	0.70
Methyl tert butyl ether	ND		ug/l	2.5	0.70
p/m-Xylene	ND		ug/l	2.5	0.70
o-Xylene	ND		ug/l	2.5	0.70
Xylenes, Total	ND		ug/l	2.5	0.70
cis-1,2-Dichloroethene	ND		ug/l	2.5	0.70
1,2-Dichloroethene, Total	ND		ug/l	2.5	0.70
Dibromomethane	ND		ug/l	5.0	1.0
1,2,3-Trichloropropane	ND		ug/l	2.5	0.70
Styrene	ND		ug/l	2.5	0.70
Dichlorodifluoromethane	ND		ug/l	5.0	1.0
Acetone	ND		ug/l	5.0	1.5
Carbon disulfide	ND		ug/l	5.0	1.0
2-Butanone	ND		ug/l	5.0	1.9
Vinyl acetate	ND		ug/l	5.0	1.0
4-Methyl-2-pentanone	ND		ug/l	5.0	1.0
2-Hexanone	ND		ug/l	5.0	1.0
Bromochloromethane	ND		ug/l	2.5	0.70
2,2-Dichloropropane	ND		ug/l	2.5	0.70
1,2-Dibromoethane	ND		ug/l	2.0	0.65
1,3-Dichloropropane	ND		ug/l	2.5	0.70
1,1,1,2-Tetrachloroethane	ND		ug/l	2.5	0.70
Bromobenzene	ND		ug/l	2.5	0.70
n-Butylbenzene	ND		ug/l	2.5	0.70
sec-Butylbenzene	ND		ug/l	2.5	0.70
tert-Butylbenzene	ND		ug/l	2.5	0.70
o-Chlorotoluene	ND		ug/l	2.5	0.70

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM
Lab Number: L1812853
Report Date: 04/18/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 04/16/18 20:34
Analyst: AD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-03,05 Batch: WG1107198-5					
p-Chlorotoluene	ND		ug/l	2.5	0.70
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	0.70
Hexachlorobutadiene	ND		ug/l	2.5	0.70
Isopropylbenzene	ND		ug/l	2.5	0.70
p-Isopropyltoluene	ND		ug/l	2.5	0.70
Naphthalene	ND		ug/l	2.5	0.70
n-Propylbenzene	ND		ug/l	2.5	0.70
1,2,3-Trichlorobenzene	ND		ug/l	2.5	0.70
1,2,4-Trichlorobenzene	ND		ug/l	2.5	0.70
1,3,5-Trimethylbenzene	ND		ug/l	2.5	0.70
1,2,4-Trimethylbenzene	ND		ug/l	2.5	0.70
1,4-Dioxane	ND		ug/l	250	61.

Surrogate	%Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	100		70-130
Toluene-d8	99		70-130
4-Bromofluorobenzene	96		70-130
Dibromofluoromethane	93		70-130

Lab Control Sample Analysis
Batch Quality Control

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1812853
Report Date: 04/18/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-03,05 Batch: WG1107198-3 WG1107198-4								
Methylene chloride	88		85		70-130	3		20
1,1-Dichloroethane	93		87		70-130	7		20
Chloroform	89		85		70-130	5		20
Carbon tetrachloride	91		85		63-132	7		20
1,2-Dichloropropane	95		91		70-130	4		20
Dibromochloromethane	92		91		63-130	1		20
1,1,2-Trichloroethane	95		94		70-130	1		20
Tetrachloroethene	99		94		70-130	5		20
Chlorobenzene	95		91		75-130	4		20
Trichlorofluoromethane	95		88		62-150	8		20
1,2-Dichloroethane	94		91		70-130	3		20
1,1,1-Trichloroethane	92		87		67-130	6		20
Bromodichloromethane	90		88		67-130	2		20
trans-1,3-Dichloropropene	96		93		70-130	3		20
cis-1,3-Dichloropropene	91		89		70-130	2		20
1,1-Dichloropropene	94		88		70-130	7		20
Bromoform	86		86		54-136	0		20
1,1,2,2-Tetrachloroethane	96		96		67-130	0		20
Benzene	94		89		70-130	5		20
Toluene	95		91		70-130	4		20
Ethylbenzene	94		88		70-130	7		20
Chloromethane	91		84		64-130	8		20
Bromomethane	78		71		39-139	9		20

Lab Control Sample Analysis
Batch Quality Control

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1812853
Report Date: 04/18/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-03,05 Batch: WG1107198-3 WG1107198-4								
Vinyl chloride	93		85		55-140	9		20
Chloroethane	89		84		55-138	6		20
1,1-Dichloroethene	94		87		61-145	8		20
trans-1,2-Dichloroethene	94		87		70-130	8		20
Trichloroethene	93		87		70-130	7		20
1,2-Dichlorobenzene	95		94		70-130	1		20
1,3-Dichlorobenzene	96		94		70-130	2		20
1,4-Dichlorobenzene	95		92		70-130	3		20
Methyl tert butyl ether	88		88		63-130	0		20
p/m-Xylene	95		90		70-130	5		20
o-Xylene	90		90		70-130	0		20
cis-1,2-Dichloroethene	92		86		70-130	7		20
Dibromomethane	94		93		70-130	1		20
1,2,3-Trichloropropane	100		96		64-130	4		20
Styrene	90		90		70-130	0		20
Dichlorodifluoromethane	67		61		36-147	9		20
Acetone	88		99		58-148	12		20
Carbon disulfide	91		84		51-130	8		20
2-Butanone	96		94		63-138	2		20
Vinyl acetate	83		82		70-130	1		20
4-Methyl-2-pentanone	96		96		59-130	0		20
2-Hexanone	110		110		57-130	0		20
Bromochloromethane	92		91		70-130	1		20

Lab Control Sample Analysis
Batch Quality Control

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1812853
Report Date: 04/18/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-03,05 Batch: WG1107198-3 WG1107198-4								
2,2-Dichloropropane	100		94		63-133	6		20
1,2-Dibromoethane	97		96		70-130	1		20
1,3-Dichloropropane	97		97		70-130	0		20
1,1,1,2-Tetrachloroethane	95		92		64-130	3		20
Bromobenzene	98		97		70-130	1		20
n-Butylbenzene	97		91		53-136	6		20
sec-Butylbenzene	96		91		70-130	5		20
tert-Butylbenzene	97		92		70-130	5		20
o-Chlorotoluene	93		89		70-130	4		20
p-Chlorotoluene	96		91		70-130	5		20
1,2-Dibromo-3-chloropropane	89		92		41-144	3		20
Hexachlorobutadiene	**140**	Q	120		63-130	15		20
Isopropylbenzene	97		92		70-130	5		20
p-Isopropyltoluene	98		93		70-130	5		20
Naphthalene	90		91		70-130	1		20
n-Propylbenzene	97		92		69-130	5		20
1,2,3-Trichlorobenzene	97		95		70-130	2		20
1,2,4-Trichlorobenzene	100		100		70-130	0		20
1,3,5-Trimethylbenzene	96		91		64-130	5		20
1,2,4-Trimethylbenzene	97		92		70-130	5		20
1,4-Dioxane	98		112		56-162	13		20

Lab Control Sample Analysis
Batch Quality Control

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1812853
Report Date: 04/18/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-03,05 Batch: WG1107198-3 WG1107198-4								

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
1,2-Dichloroethane-d4	97		97		70-130
Toluene-d8	100		99		70-130
4-Bromofluorobenzene	98		98		70-130
Dibromofluoromethane	94		94		70-130

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1812853
Report Date: 04/18/18

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1812853-01A	Vial HCl preserved	A	NA		2.7	Y	Absent		NYTCL-8260(14)
L1812853-01B	Vial HCl preserved	A	NA		2.7	Y	Absent		NYTCL-8260(14)
L1812853-01C	Vial HCl preserved	A	NA		2.7	Y	Absent		NYTCL-8260(14)
L1812853-02A	Vial HCl preserved	A	NA		2.7	Y	Absent		NYTCL-8260(14)
L1812853-02B	Vial HCl preserved	A	NA		2.7	Y	Absent		NYTCL-8260(14)
L1812853-02C	Vial HCl preserved	A	NA		2.7	Y	Absent		NYTCL-8260(14)
L1812853-03X	Vial HCl preserved split	A	NA		2.7	Y	Absent		NYTCL-8260(14)
L1812853-03Y	Vial HCl preserved split	A	NA		2.7	Y	Absent		NYTCL-8260(14)
L1812853-03Z	Vial HCl preserved split	A	NA		2.7	Y	Absent		NYTCL-8260(14)
L1812853-04A	Vial HCl preserved	A	NA		2.7	Y	Absent		COMP-VOA()
L1812853-04B	Vial HCl preserved	A	NA		2.7	Y	Absent		COMP-VOA()
L1812853-04C	Vial HCl preserved	A	NA		2.7	Y	Absent		COMP-VOA()
L1812853-04D	Vial HCl preserved	A	NA		2.7	Y	Absent		COMP-VOA()
L1812853-04E	Vial HCl preserved	A	NA		2.7	Y	Absent		COMP-VOA()
L1812853-04F	Vial HCl preserved	A	NA		2.7	Y	Absent		COMP-VOA()
L1812853-04G	Vial HCl preserved	A	NA		2.7	Y	Absent		COMP-VOA()
L1812853-04H	Vial HCl preserved	A	NA		2.7	Y	Absent		COMP-VOA()
L1812853-04I	Vial HCl preserved	A	NA		2.7	Y	Absent		COMP-VOA()
L1812853-04J	Vial HCl preserved	A	NA		2.7	Y	Absent		COMP-VOA()
L1812853-04K	Vial HCl preserved	A	NA		2.7	Y	Absent		COMP-VOA()
L1812853-04L	Vial HCl preserved	A	NA		2.7	Y	Absent		COMP-VOA()
L1812853-05A	Vial HCl preserved	A	NA		2.7	Y	Absent		NYTCL-8260(14)

*Values in parentheses indicate holding time in days

Project Name:	ESSEX/HOPE	**Lab Number:**	L1812853
Project Number:	699900.01.RT.OM	**Report Date:**	04/18/18

GLOSSARY

Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

1	- The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A	- Spectra identified as "Aldol Condensation Product".
B	- The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related

Report Format: DU Report with 'J' Qualifiers

Project Name:	ESSEX/HOPE	**Lab Number:**	L1812853
Project Number:	699900.01.RT.OM	**Report Date:**	04/18/18

Data Qualifiers

projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

J - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

ND - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

Report Format: DU Report with 'J' Qualifiers

Project Name:	ESSEX/HOPE	**Lab Number:**	L1812853
Project Number:	699900.01.RT.OM	**Report Date:**	04/18/18

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
EPA 300: DW: Bromide
EPA 6860: SCM: Perchlorate
EPA 9010: NPW and SCM: Amenable Cyanide Distillation
SM4500: NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, EPA 351.1, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D.**
EPA 624: Volatile Halocarbons & Aromatics,
EPA 608: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Be, Cd, Cr, Cu, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

NEW YORK CHAIN OF CUSTODY

ALPHA

Westborough, MA 01581
8 Walkup Dr.
TEL: 508-898-9220
FAX: 508-898-9193

Mansfield, MA 02048
320 Forbes Blvd
TEL: 508-822-9300
FAX: 508-822-3288

Service Centers
Mahwah, NJ 07430: 35 Whitney Rd, Suite 5
Albany, NY 12205: 14 Walker Way
Tonawanda, NY 14150: 275 Cooper Ave, Suite 105

Page 1 of 1

Date Rec'd in Lab: 4/13/18

ALPHA Job #: L1812853

Client Information

Client: CH2M / JACOBS
Address: 18 Tremont Street , Suite 700
Boston, MA 02108
Phone: (617) 626-7013
Fax:
Email: Kyle.Block@CH2M.com

Project Information

Project Name: Essex / Hope
Project Location: Jamestown, NY
Project # 699900.01.RT.OM
(Use Project name as Project #) ☐
Project Manager: Kyle Block
ALPHAQuote #:

Turn-Around Time

Standard ☒ Due Date:
Rush (only if pre approved) ☐ # of Days:

Deliverables

☐ ASP-A ☐ ASP-B
☐ EQuIS (1 File) ☐ EQuIS (4 File)
☐ Other

Billing Information

☒ Same as Client Info
PO # 4506819019

Regulatory Requirement

☐ NY TOGS ☐ NY Part 375
☐ AWQ Standards ☐ NY CP-51
☐ NY Restricted Use ☐ Other
☐ NY Unrestricted Use
☐ NYC Sewer Discharge

Disposal Site Information

Please identify below location of applicable disposal facilities.

Disposal Facility:
☐ NJ ☒ NY
☐ Other:

These samples have been previously analyzed by Alpha ☐

Other project specific requirements/comments:

Composite all 4 Post-carb samples and report as 'Post-Carb- 20180412

Please specify Metals or TAL.

ANALYSIS

Sample Filtration
☐ Done
☐ Lab to do
Preservation
☐ Lab to do
(Please Specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	VOCs by 8260	Sample Specific Comments	Total Bottle
12853-01	Pre-Carb- 20180412	4/12/18	1140	GW	TP	X		3
02	Primary-Effluent- 20180412		1150	GW				3
03/04	Post-Carb- 20180412 - 1		1200	GW				3
	Post-Carb- 20180412 - 2		1230	GW				3
	Post-Carb- 20180412 - 3		1300	GW				3
	Post-Carb- 20180412 - 4	↓	1330	GW	↓	↓		3
05	Trip Blank	—	—	DI	—			2

Container Type: V
Preservative: B

Preservative Code:
A = None
B = HCl
C = HNO_3
D = H_2SO_4
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
K/E = Zn Ac/NaOH
O = Other

Container Code
P = Plastic
A = Amber Glass
V = Vial
G = Glass
B = Bacteria Cup
C = Cube
O = Other
E = Encore
D = BOD Bottle

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Relinquished By:	Date/Time	Received By:	Date/Time
T-Pendley	4/12/18 14:45	JM AL AAL	4/12/18 14:45
JM AL AAL	4/12/18 16:40		4/13/18 01:30

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. BY EXECUTING THIS COC, THE CLIENT HAS READ AND AGREES TO BE BOUND BY ALPHA'S TERMS & CONDITIONS. (See reverse side.)

Form No: 01-25 HC (rev. 30-Sept-2013)

ANALYTICAL REPORT

Lab Number:	L1817077
Client:	CH2MHILL 18 Tremont Street Suite 700 Boston, MA 02108
ATTN:	Kyle Block
Phone:	(617) 523-2260
Project Name:	ESSEX/HOPE
Project Number:	699900.01.RT.OM
Report Date:	05/16/18

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-17-00196).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1817077
Report Date: 05/16/18

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1817077-01	PRE-CARB_20180510	WATER	JAMESTOWN, NY	05/10/18 07:40	05/10/18
L1817077-02	PRIMARY-EFFLUENT-20180510	WATER	JAMESTOWN, NY	05/10/18 07:50	05/10/18
L1817077-03	POST-CARB-20180510	WATER	JAMESTOWN, NY	05/10/18 09:00	05/10/18
L1817077-04	COMPOSITE OF POST-CARB 20180510-1,-2,-3,-4	WATER	JAMESTOWN, NY	05/10/18 09:00	05/10/18
L1817077-05	TRIP BLANK	WATER	JAMESTOWN, NY	05/10/18 00:00	05/10/18

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1817077
Report Date: 05/16/18

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY
For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

Project Name:	ESSEX/HOPE	**Lab Number:**	L1817077
Project Number:	699900.01.RT.OM	**Report Date:**	05/16/18

Case Narrative (continued)

Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

Volatile Organics

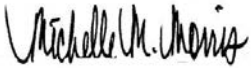
L1817077-01: The sample has elevated detection limits due to the dilution required by the elevated concentrations of target compounds in the sample.

L1817077-02: The sample was re-analyzed on dilution in order to quantify the results within the calibration range. The result(s) should be considered estimated, and are qualified with an E flag, for any compound(s) that exceeded the calibration range in the initial analysis. The re-analysis was performed only for the compound(s) that exceeded the calibration range.

The initial calibration, associated with L1817077-01, -02, -03 and -05, did not meet the method required minimum response factor for the calibration standards for bromomethane, acetone, bromochloromethane, 2-butanone, trichloroethene, dibromomethane, 1,4-dioxane, 4-Methyl-2-pentanone, 2-Hexanone, 1,1,2,2-tetrachloroethane and 1,2-Dibromo-3-chloropropane.

The continuing calibration, associated with L1817077-01, -02, -03 and -05, did not meet the method required minimum response factor for bromomethane, bromochloromethane, 2-butanone, trichloroethene, dibromomethane, 4-Methyl-2-pentanone, 2-Hexanone, 1,1,2,2-tetrachloroethane and 1,2-Dibromo-3-chloropropane.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:  Michelle M. Morris

Title: Technical Director/Representative Date: 05/16/18

ORGANICS

VOLATILES

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM
Lab Number: L1817077
Report Date: 05/16/18

SAMPLE RESULTS

Lab ID: L1817077-01 D
Client ID: PRE-CARB_20180510
Sample Location: JAMESTOWN, NY

Date Collected: 05/10/18 07:40
Date Received: 05/10/18
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 05/13/18 14:58
Analyst: KD

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	120	35.	50
1,1-Dichloroethane	ND		ug/l	120	35.	50
Chloroform	ND		ug/l	120	35.	50
Carbon tetrachloride	ND		ug/l	25	6.7	50
1,2-Dichloropropane	ND		ug/l	50	6.8	50
Dibromochloromethane	ND		ug/l	25	7.4	50
1,1,2-Trichloroethane	ND		ug/l	75	25.	50
Tetrachloroethene	ND		ug/l	25	9.0	50
Chlorobenzene	ND		ug/l	120	35.	50
Trichlorofluoromethane	ND		ug/l	120	35.	50
1,2-Dichloroethane	ND		ug/l	25	6.6	50
1,1,1-Trichloroethane	ND		ug/l	120	35.	50
Bromodichloromethane	ND		ug/l	25	9.6	50
trans-1,3-Dichloropropene	ND		ug/l	25	8.2	50
cis-1,3-Dichloropropene	ND		ug/l	25	7.2	50
1,3-Dichloropropene, Total	ND		ug/l	25	7.2	50
1,1-Dichloropropene	ND		ug/l	120	35.	50
Bromoform	ND		ug/l	100	32.	50
1,1,2,2-Tetrachloroethane	ND		ug/l	25	8.4	50
Benzene	18	J	ug/l	25	8.0	50
Toluene	ND		ug/l	120	35.	50
Ethylbenzene	ND		ug/l	120	35.	50
Chloromethane	ND		ug/l	120	35.	50
Bromomethane	ND		ug/l	120	35.	50
Vinyl chloride	1200		ug/l	50	3.6	50
Chloroethane	ND		ug/l	120	35.	50
1,1-Dichloroethene	23	J	ug/l	25	8.4	50
trans-1,2-Dichloroethene	ND		ug/l	120	35.	50

Project Name: ESSEX/HOPE **Lab Number:** L1817077

Project Number: 699900.01.RT.OM **Report Date:** 05/16/18

SAMPLE RESULTS

Lab ID: L1817077-01 D
Client ID: PRE-CARB_20180510
Sample Location: JAMESTOWN, NY

Date Collected: 05/10/18 07:40
Date Received: 05/10/18
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Trichloroethene	5400		ug/l	25	8.8	50
1,2-Dichlorobenzene	ND		ug/l	120	35.	50
1,3-Dichlorobenzene	ND		ug/l	120	35.	50
1,4-Dichlorobenzene	ND		ug/l	120	35.	50
Methyl tert butyl ether	ND		ug/l	120	35.	50
p/m-Xylene	ND		ug/l	120	35.	50
o-Xylene	ND		ug/l	120	35.	50
Xylenes, Total	ND		ug/l	120	35.	50
cis-1,2-Dichloroethene	5400		ug/l	120	35.	50
1,2-Dichloroethene, Total	5400		ug/l	120	35.	50
Dibromomethane	ND		ug/l	250	50.	50
1,2,3-Trichloropropane	ND		ug/l	120	35.	50
Styrene	ND		ug/l	120	35.	50
Dichlorodifluoromethane	ND		ug/l	250	50.	50
Acetone	1800		ug/l	250	73.	50
Carbon disulfide	ND		ug/l	250	50.	50
2-Butanone	ND		ug/l	250	97.	50
Vinyl acetate	ND		ug/l	250	50.	50
4-Methyl-2-pentanone	ND		ug/l	250	50.	50
2-Hexanone	ND		ug/l	250	50.	50
Bromochloromethane	ND		ug/l	120	35.	50
2,2-Dichloropropane	ND		ug/l	120	35.	50
1,2-Dibromoethane	ND		ug/l	100	32.	50
1,3-Dichloropropane	ND		ug/l	120	35.	50
1,1,1,2-Tetrachloroethane	ND		ug/l	120	35.	50
Bromobenzene	ND		ug/l	120	35.	50
n-Butylbenzene	ND		ug/l	120	35.	50
sec-Butylbenzene	ND		ug/l	120	35.	50
tert-Butylbenzene	ND		ug/l	120	35.	50
o-Chlorotoluene	ND		ug/l	120	35.	50
p-Chlorotoluene	ND		ug/l	120	35.	50
1,2-Dibromo-3-chloropropane	ND		ug/l	120	35.	50
Hexachlorobutadiene	ND		ug/l	120	35.	50
Isopropylbenzene	ND		ug/l	120	35.	50
p-Isopropyltoluene	ND		ug/l	120	35.	50
Naphthalene	ND		ug/l	120	35.	50
n-Propylbenzene	ND		ug/l	120	35.	50

Project Name: ESSEX/HOPE **Lab Number:** L1817077

Project Number: 699900.01.RT.OM **Report Date:** 05/16/18

SAMPLE RESULTS

Lab ID: L1817077-01 D
Client ID: PRE-CARB_20180510
Sample Location: JAMESTOWN, NY

Date Collected: 05/10/18 07:40
Date Received: 05/10/18
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,2,3-Trichlorobenzene	ND		ug/l	120	35.	50
1,2,4-Trichlorobenzene	ND		ug/l	120	35.	50
1,3,5-Trimethylbenzene	ND		ug/l	120	35.	50
1,2,4-Trimethylbenzene	ND		ug/l	120	35.	50
1,4-Dioxane	ND		ug/l	12000	3000	50

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	103		70-130
Toluene-d8	100		70-130
4-Bromofluorobenzene	97		70-130
Dibromofluoromethane	97		70-130

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM
Lab Number: L1817077
Report Date: 05/16/18

SAMPLE RESULTS

Lab ID: L1817077-02
Client ID: PRIMARY-EFFLUENT-20180510
Sample Location: JAMESTOWN, NY
Date Collected: 05/10/18 07:50
Date Received: 05/10/18
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 05/13/18 13:44
Analyst: KD

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	2.5	0.70	1
1,1-Dichloroethane	ND		ug/l	2.5	0.70	1
Chloroform	ND		ug/l	2.5	0.70	1
Carbon tetrachloride	ND		ug/l	0.50	0.13	1
1,2-Dichloropropane	ND		ug/l	1.0	0.14	1
Dibromochloromethane	ND		ug/l	0.50	0.15	1
1,1,2-Trichloroethane	ND		ug/l	1.5	0.50	1
Tetrachloroethene	ND		ug/l	0.50	0.18	1
Chlorobenzene	ND		ug/l	2.5	0.70	1
Trichlorofluoromethane	ND		ug/l	2.5	0.70	1
1,2-Dichloroethane	ND		ug/l	0.50	0.13	1
1,1,1-Trichloroethane	ND		ug/l	2.5	0.70	1
Bromodichloromethane	ND		ug/l	0.50	0.19	1
trans-1,3-Dichloropropene	ND		ug/l	0.50	0.16	1
cis-1,3-Dichloropropene	ND		ug/l	0.50	0.14	1
1,3-Dichloropropene, Total	ND		ug/l	0.50	0.14	1
1,1-Dichloropropene	ND		ug/l	2.5	0.70	1
Bromoform	ND		ug/l	2.0	0.65	1
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	0.17	1
Benzene	ND		ug/l	0.50	0.16	1
Toluene	ND		ug/l	2.5	0.70	1
Ethylbenzene	ND		ug/l	2.5	0.70	1
Chloromethane	ND		ug/l	2.5	0.70	1
Bromomethane	ND		ug/l	2.5	0.70	1
Vinyl chloride	570	E	ug/l	1.0	0.07	1
Chloroethane	ND		ug/l	2.5	0.70	1
1,1-Dichloroethene	ND		ug/l	0.50	0.17	1
trans-1,2-Dichloroethene	ND		ug/l	2.5	0.70	1

Project Name: ESSEX/HOPE **Lab Number:** L1817077

Project Number: 699900.01.RT.OM **Report Date:** 05/16/18

SAMPLE RESULTS

Lab ID: L1817077-02 Date Collected: 05/10/18 07:50

Client ID: PRIMARY-EFFLUENT-20180510 Date Received: 05/10/18

Sample Location: JAMESTOWN, NY Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Trichloroethene	0.53		ug/l	0.50	0.18	1
1,2-Dichlorobenzene	ND		ug/l	2.5	0.70	1
1,3-Dichlorobenzene	ND		ug/l	2.5	0.70	1
1,4-Dichlorobenzene	ND		ug/l	2.5	0.70	1
Methyl tert butyl ether	ND		ug/l	2.5	0.70	1
p/m-Xylene	ND		ug/l	2.5	0.70	1
o-Xylene	ND		ug/l	2.5	0.70	1
Xylenes, Total	ND		ug/l	2.5	0.70	1
cis-1,2-Dichloroethene	3.5		ug/l	2.5	0.70	1
1,2-Dichloroethene, Total	3.5		ug/l	2.5	0.70	1
Dibromomethane	ND		ug/l	5.0	1.0	1
1,2,3-Trichloropropane	ND		ug/l	2.5	0.70	1
Styrene	ND		ug/l	2.5	0.70	1
Dichlorodifluoromethane	ND		ug/l	5.0	1.0	1
Acetone	1200	E	ug/l	5.0	1.5	1
Carbon disulfide	ND		ug/l	5.0	1.0	1
2-Butanone	ND		ug/l	5.0	1.9	1
Vinyl acetate	ND		ug/l	5.0	1.0	1
4-Methyl-2-pentanone	ND		ug/l	5.0	1.0	1
2-Hexanone	ND		ug/l	5.0	1.0	1
Bromochloromethane	ND		ug/l	2.5	0.70	1
2,2-Dichloropropane	ND		ug/l	2.5	0.70	1
1,2-Dibromoethane	ND		ug/l	2.0	0.65	1
1,3-Dichloropropane	ND		ug/l	2.5	0.70	1
1,1,1,2-Tetrachloroethane	ND		ug/l	2.5	0.70	1
Bromobenzene	ND		ug/l	2.5	0.70	1
n-Butylbenzene	ND		ug/l	2.5	0.70	1
sec-Butylbenzene	ND		ug/l	2.5	0.70	1
tert-Butylbenzene	ND		ug/l	2.5	0.70	1
o-Chlorotoluene	ND		ug/l	2.5	0.70	1
p-Chlorotoluene	ND		ug/l	2.5	0.70	1
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	0.70	1
Hexachlorobutadiene	ND		ug/l	2.5	0.70	1
Isopropylbenzene	ND		ug/l	2.5	0.70	1
p-Isopropyltoluene	ND		ug/l	2.5	0.70	1
Naphthalene	ND		ug/l	2.5	0.70	1
n-Propylbenzene	ND		ug/l	2.5	0.70	1

Project Name: ESSEX/HOPE **Lab Number:** L1817077

Project Number: 699900.01.RT.OM **Report Date:** 05/16/18

SAMPLE RESULTS

Lab ID: L1817077-02 Date Collected: 05/10/18 07:50

Client ID: PRIMARY-EFFLUENT-20180510 Date Received: 05/10/18

Sample Location: JAMESTOWN, NY Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,2,3-Trichlorobenzene	ND		ug/l	2.5	0.70	1
1,2,4-Trichlorobenzene	ND		ug/l	2.5	0.70	1
1,3,5-Trimethylbenzene	ND		ug/l	2.5	0.70	1
1,2,4-Trimethylbenzene	ND		ug/l	2.5	0.70	1
1,4-Dioxane	ND		ug/l	250	61.	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	105		70-130
Toluene-d8	100		70-130
4-Bromofluorobenzene	97		70-130
Dibromofluoromethane	96		70-130

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM
Lab Number: L1817077
Report Date: 05/16/18

SAMPLE RESULTS

Lab ID: L1817077-02 D
Client ID: PRIMARY-EFFLUENT-20180510
Sample Location: JAMESTOWN, NY

Date Collected: 05/10/18 07:50
Date Received: 05/10/18
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 05/13/18 18:18
Analyst: KD

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Vinyl chloride	550		ug/l	25	1.8	25
Acetone	1100		ug/l	120	36.	25

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	106		70-130
Toluene-d8	100		70-130
4-Bromofluorobenzene	96		70-130
Dibromofluoromethane	96		70-130

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM
Lab Number: L1817077
Report Date: 05/16/18

SAMPLE RESULTS

Lab ID: L1817077-03
Client ID: POST-CARB-20180510
Sample Location: JAMESTOWN, NY
Date Collected: 05/10/18 09:00
Date Received: 05/10/18
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 05/13/18 17:53
Analyst: KD

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	2.5	0.70	1
1,1-Dichloroethane	ND		ug/l	2.5	0.70	1
Chloroform	ND		ug/l	2.5	0.70	1
Carbon tetrachloride	ND		ug/l	0.50	0.13	1
1,2-Dichloropropane	ND		ug/l	1.0	0.14	1
Dibromochloromethane	ND		ug/l	0.50	0.15	1
1,1,2-Trichloroethane	ND		ug/l	1.5	0.50	1
Tetrachloroethene	ND		ug/l	0.50	0.18	1
Chlorobenzene	ND		ug/l	2.5	0.70	1
Trichlorofluoromethane	ND		ug/l	2.5	0.70	1
1,2-Dichloroethane	ND		ug/l	0.50	0.13	1
1,1,1-Trichloroethane	ND		ug/l	2.5	0.70	1
Bromodichloromethane	ND		ug/l	0.50	0.19	1
trans-1,3-Dichloropropene	ND		ug/l	0.50	0.16	1
cis-1,3-Dichloropropene	ND		ug/l	0.50	0.14	1
1,3-Dichloropropene, Total	ND		ug/l	0.50	0.14	1
1,1-Dichloropropene	ND		ug/l	2.5	0.70	1
Bromoform	ND		ug/l	2.0	0.65	1
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	0.17	1
Benzene	ND		ug/l	0.50	0.16	1
Toluene	ND		ug/l	2.5	0.70	1
Ethylbenzene	ND		ug/l	2.5	0.70	1
Chloromethane	ND		ug/l	2.5	0.70	1
Bromomethane	ND		ug/l	2.5	0.70	1
Vinyl chloride	0.19	J	ug/l	1.0	0.07	1
Chloroethane	ND		ug/l	2.5	0.70	1
1,1-Dichloroethene	ND		ug/l	0.50	0.17	1
trans-1,2-Dichloroethene	ND		ug/l	2.5	0.70	1

Project Name: ESSEX/HOPE **Lab Number:** L1817077

Project Number: 699900.01.RT.OM **Report Date:** 05/16/18

SAMPLE RESULTS

Lab ID: L1817077-03 Date Collected: 05/10/18 09:00

Client ID: POST-CARB-20180510 Date Received: 05/10/18

Sample Location: JAMESTOWN, NY Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Trichloroethene	0.78		ug/l	0.50	0.18	1
1,2-Dichlorobenzene	ND		ug/l	2.5	0.70	1
1,3-Dichlorobenzene	ND		ug/l	2.5	0.70	1
1,4-Dichlorobenzene	ND		ug/l	2.5	0.70	1
Methyl tert butyl ether	ND		ug/l	2.5	0.70	1
p/m-Xylene	ND		ug/l	2.5	0.70	1
o-Xylene	ND		ug/l	2.5	0.70	1
Xylenes, Total	ND		ug/l	2.5	0.70	1
cis-1,2-Dichloroethene	0.90	J	ug/l	2.5	0.70	1
1,2-Dichloroethene, Total	0.90	J	ug/l	2.5	0.70	1
Dibromomethane	ND		ug/l	5.0	1.0	1
1,2,3-Trichloropropane	ND		ug/l	2.5	0.70	1
Styrene	ND		ug/l	2.5	0.70	1
Dichlorodifluoromethane	ND		ug/l	5.0	1.0	1
Acetone	ND		ug/l	5.0	1.5	1
Carbon disulfide	ND		ug/l	5.0	1.0	1
2-Butanone	ND		ug/l	5.0	1.9	1
Vinyl acetate	ND		ug/l	5.0	1.0	1
4-Methyl-2-pentanone	ND		ug/l	5.0	1.0	1
2-Hexanone	ND		ug/l	5.0	1.0	1
Bromochloromethane	ND		ug/l	2.5	0.70	1
2,2-Dichloropropane	ND		ug/l	2.5	0.70	1
1,2-Dibromoethane	ND		ug/l	2.0	0.65	1
1,3-Dichloropropane	ND		ug/l	2.5	0.70	1
1,1,1,2-Tetrachloroethane	ND		ug/l	2.5	0.70	1
Bromobenzene	ND		ug/l	2.5	0.70	1
n-Butylbenzene	ND		ug/l	2.5	0.70	1
sec-Butylbenzene	ND		ug/l	2.5	0.70	1
tert-Butylbenzene	ND		ug/l	2.5	0.70	1
o-Chlorotoluene	ND		ug/l	2.5	0.70	1
p-Chlorotoluene	ND		ug/l	2.5	0.70	1
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	0.70	1
Hexachlorobutadiene	ND		ug/l	2.5	0.70	1
Isopropylbenzene	ND		ug/l	2.5	0.70	1
p-Isopropyltoluene	ND		ug/l	2.5	0.70	1
Naphthalene	ND		ug/l	2.5	0.70	1
n-Propylbenzene	ND		ug/l	2.5	0.70	1

Project Name: ESSEX/HOPE **Lab Number:** L1817077

Project Number: 699900.01.RT.OM **Report Date:** 05/16/18

SAMPLE RESULTS

Lab ID: L1817077-03 Date Collected: 05/10/18 09:00

Client ID: POST-CARB-20180510 Date Received: 05/10/18

Sample Location: JAMESTOWN, NY Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,2,3-Trichlorobenzene	ND		ug/l	2.5	0.70	1
1,2,4-Trichlorobenzene	ND		ug/l	2.5	0.70	1
1,3,5-Trimethylbenzene	ND		ug/l	2.5	0.70	1
1,2,4-Trimethylbenzene	ND		ug/l	2.5	0.70	1
1,4-Dioxane	ND		ug/l	250	61.	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	104		70-130
Toluene-d8	101		70-130
4-Bromofluorobenzene	96		70-130
Dibromofluoromethane	95		70-130

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM
Lab Number: L1817077
Report Date: 05/16/18

SAMPLE RESULTS

Lab ID: L1817077-05
Client ID: TRIP BLANK
Sample Location: JAMESTOWN, NY
Date Collected: 05/10/18 00:00
Date Received: 05/10/18
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 05/13/18 12:29
Analyst: KD

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	2.5	0.70	1
1,1-Dichloroethane	ND		ug/l	2.5	0.70	1
Chloroform	ND		ug/l	2.5	0.70	1
Carbon tetrachloride	ND		ug/l	0.50	0.13	1
1,2-Dichloropropane	ND		ug/l	1.0	0.14	1
Dibromochloromethane	ND		ug/l	0.50	0.15	1
1,1,2-Trichloroethane	ND		ug/l	1.5	0.50	1
Tetrachloroethene	ND		ug/l	0.50	0.18	1
Chlorobenzene	ND		ug/l	2.5	0.70	1
Trichlorofluoromethane	ND		ug/l	2.5	0.70	1
1,2-Dichloroethane	ND		ug/l	0.50	0.13	1
1,1,1-Trichloroethane	ND		ug/l	2.5	0.70	1
Bromodichloromethane	ND		ug/l	0.50	0.19	1
trans-1,3-Dichloropropene	ND		ug/l	0.50	0.16	1
cis-1,3-Dichloropropene	ND		ug/l	0.50	0.14	1
1,3-Dichloropropene, Total	ND		ug/l	0.50	0.14	1
1,1-Dichloropropene	ND		ug/l	2.5	0.70	1
Bromoform	ND		ug/l	2.0	0.65	1
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	0.17	1
Benzene	ND		ug/l	0.50	0.16	1
Toluene	ND		ug/l	2.5	0.70	1
Ethylbenzene	ND		ug/l	2.5	0.70	1
Chloromethane	ND		ug/l	2.5	0.70	1
Bromomethane	ND		ug/l	2.5	0.70	1
Vinyl chloride	ND		ug/l	1.0	0.07	1
Chloroethane	ND		ug/l	2.5	0.70	1
1,1-Dichloroethene	ND		ug/l	0.50	0.17	1
trans-1,2-Dichloroethene	ND		ug/l	2.5	0.70	1

Project Name: ESSEX/HOPE **Lab Number:** L1817077

Project Number: 699900.01.RT.OM **Report Date:** 05/16/18

SAMPLE RESULTS

Lab ID: L1817077-05 Date Collected: 05/10/18 00:00

Client ID: TRIP BLANK Date Received: 05/10/18

Sample Location: JAMESTOWN, NY Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Trichloroethene	ND		ug/l	0.50	0.18	1
1,2-Dichlorobenzene	ND		ug/l	2.5	0.70	1
1,3-Dichlorobenzene	ND		ug/l	2.5	0.70	1
1,4-Dichlorobenzene	ND		ug/l	2.5	0.70	1
Methyl tert butyl ether	ND		ug/l	2.5	0.70	1
p/m-Xylene	ND		ug/l	2.5	0.70	1
o-Xylene	ND		ug/l	2.5	0.70	1
Xylenes, Total	ND		ug/l	2.5	0.70	1
cis-1,2-Dichloroethene	ND		ug/l	2.5	0.70	1
1,2-Dichloroethene, Total	ND		ug/l	2.5	0.70	1
Dibromomethane	ND		ug/l	5.0	1.0	1
1,2,3-Trichloropropane	ND		ug/l	2.5	0.70	1
Styrene	ND		ug/l	2.5	0.70	1
Dichlorodifluoromethane	ND		ug/l	5.0	1.0	1
Acetone	ND		ug/l	5.0	1.5	1
Carbon disulfide	ND		ug/l	5.0	1.0	1
2-Butanone	ND		ug/l	5.0	1.9	1
Vinyl acetate	ND		ug/l	5.0	1.0	1
4-Methyl-2-pentanone	ND		ug/l	5.0	1.0	1
2-Hexanone	ND		ug/l	5.0	1.0	1
Bromochloromethane	ND		ug/l	2.5	0.70	1
2,2-Dichloropropane	ND		ug/l	2.5	0.70	1
1,2-Dibromoethane	ND		ug/l	2.0	0.65	1
1,3-Dichloropropane	ND		ug/l	2.5	0.70	1
1,1,1,2-Tetrachloroethane	ND		ug/l	2.5	0.70	1
Bromobenzene	ND		ug/l	2.5	0.70	1
n-Butylbenzene	ND		ug/l	2.5	0.70	1
sec-Butylbenzene	ND		ug/l	2.5	0.70	1
tert-Butylbenzene	ND		ug/l	2.5	0.70	1
o-Chlorotoluene	ND		ug/l	2.5	0.70	1
p-Chlorotoluene	ND		ug/l	2.5	0.70	1
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	0.70	1
Hexachlorobutadiene	ND		ug/l	2.5	0.70	1
Isopropylbenzene	ND		ug/l	2.5	0.70	1
p-Isopropyltoluene	ND		ug/l	2.5	0.70	1
Naphthalene	ND		ug/l	2.5	0.70	1
n-Propylbenzene	ND		ug/l	2.5	0.70	1

Project Name: ESSEX/HOPE
Lab Number: L1817077
Project Number: 699900.01.RT.OM
Report Date: 05/16/18

SAMPLE RESULTS

Lab ID: L1817077-05
Client ID: TRIP BLANK
Sample Location: JAMESTOWN, NY

Date Collected: 05/10/18 00:00
Date Received: 05/10/18
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,2,3-Trichlorobenzene	ND		ug/l	2.5	0.70	1
1,2,4-Trichlorobenzene	ND		ug/l	2.5	0.70	1
1,3,5-Trimethylbenzene	ND		ug/l	2.5	0.70	1
1,2,4-Trimethylbenzene	ND		ug/l	2.5	0.70	1
1,4-Dioxane	ND		ug/l	250	61.	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	104		70-130
Toluene-d8	100		70-130
4-Bromofluorobenzene	96		70-130
Dibromofluoromethane	96		70-130

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1817077
Report Date: 05/16/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 05/13/18 11:39
Analyst: KD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-03,05 Batch: WG1115605-5					
Methylene chloride	ND		ug/l	2.5	0.70
1,1-Dichloroethane	ND		ug/l	2.5	0.70
Chloroform	ND		ug/l	2.5	0.70
Carbon tetrachloride	ND		ug/l	0.50	0.13
1,2-Dichloropropane	ND		ug/l	1.0	0.14
Dibromochloromethane	ND		ug/l	0.50	0.15
1,1,2-Trichloroethane	ND		ug/l	1.5	0.50
Tetrachloroethene	ND		ug/l	0.50	0.18
Chlorobenzene	ND		ug/l	2.5	0.70
Trichlorofluoromethane	ND		ug/l	2.5	0.70
1,2-Dichloroethane	ND		ug/l	0.50	0.13
1,1,1-Trichloroethane	ND		ug/l	2.5	0.70
Bromodichloromethane	ND		ug/l	0.50	0.19
trans-1,3-Dichloropropene	ND		ug/l	0.50	0.16
cis-1,3-Dichloropropene	ND		ug/l	0.50	0.14
1,3-Dichloropropene, Total	ND		ug/l	0.50	0.14
1,1-Dichloropropene	ND		ug/l	2.5	0.70
Bromoform	ND		ug/l	2.0	0.65
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	0.17
Benzene	ND		ug/l	0.50	0.16
Toluene	ND		ug/l	2.5	0.70
Ethylbenzene	ND		ug/l	2.5	0.70
Chloromethane	ND		ug/l	2.5	0.70
Bromomethane	ND		ug/l	2.5	0.70
Vinyl chloride	ND		ug/l	1.0	0.07
Chloroethane	ND		ug/l	2.5	0.70
1,1-Dichloroethene	ND		ug/l	0.50	0.17
trans-1,2-Dichloroethene	ND		ug/l	2.5	0.70
Trichloroethene	ND		ug/l	0.50	0.18

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1817077
Report Date: 05/16/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 05/13/18 11:39
Analyst: KD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-03,05 Batch: WG1115605-5					
1,2-Dichlorobenzene	ND		ug/l	2.5	0.70
1,3-Dichlorobenzene	ND		ug/l	2.5	0.70
1,4-Dichlorobenzene	ND		ug/l	2.5	0.70
Methyl tert butyl ether	ND		ug/l	2.5	0.70
p/m-Xylene	ND		ug/l	2.5	0.70
o-Xylene	ND		ug/l	2.5	0.70
Xylenes, Total	ND		ug/l	2.5	0.70
cis-1,2-Dichloroethene	ND		ug/l	2.5	0.70
1,2-Dichloroethene, Total	ND		ug/l	2.5	0.70
Dibromomethane	ND		ug/l	5.0	1.0
1,2,3-Trichloropropane	ND		ug/l	2.5	0.70
Styrene	ND		ug/l	2.5	0.70
Dichlorodifluoromethane	ND		ug/l	5.0	1.0
Acetone	ND		ug/l	5.0	1.5
Carbon disulfide	ND		ug/l	5.0	1.0
2-Butanone	ND		ug/l	5.0	1.9
Vinyl acetate	ND		ug/l	5.0	1.0
4-Methyl-2-pentanone	ND		ug/l	5.0	1.0
2-Hexanone	ND		ug/l	5.0	1.0
Bromochloromethane	ND		ug/l	2.5	0.70
2,2-Dichloropropane	ND		ug/l	2.5	0.70
1,2-Dibromoethane	ND		ug/l	2.0	0.65
1,3-Dichloropropane	ND		ug/l	2.5	0.70
1,1,1,2-Tetrachloroethane	ND		ug/l	2.5	0.70
Bromobenzene	ND		ug/l	2.5	0.70
n-Butylbenzene	ND		ug/l	2.5	0.70
sec-Butylbenzene	ND		ug/l	2.5	0.70
tert-Butylbenzene	ND		ug/l	2.5	0.70
o-Chlorotoluene	ND		ug/l	2.5	0.70

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM
Lab Number: L1817077
Report Date: 05/16/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 05/13/18 11:39
Analyst: KD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-03,05 Batch: WG1115605-5					
p-Chlorotoluene	ND		ug/l	2.5	0.70
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	0.70
Hexachlorobutadiene	ND		ug/l	2.5	0.70
Isopropylbenzene	ND		ug/l	2.5	0.70
p-Isopropyltoluene	ND		ug/l	2.5	0.70
Naphthalene	ND		ug/l	2.5	0.70
n-Propylbenzene	ND		ug/l	2.5	0.70
1,2,3-Trichlorobenzene	0.71	J	ug/l	2.5	0.70
1,2,4-Trichlorobenzene	ND		ug/l	2.5	0.70
1,3,5-Trimethylbenzene	ND		ug/l	2.5	0.70
1,2,4-Trimethylbenzene	ND		ug/l	2.5	0.70
1,4-Dioxane	ND		ug/l	250	61.

Surrogate	%Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	101		70-130
Toluene-d8	100		70-130
4-Bromofluorobenzene	97		70-130
Dibromofluoromethane	96		70-130

Lab Control Sample Analysis
Batch Quality Control

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1817077
Report Date: 05/16/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-03,05 Batch: WG1115605-3 WG1115605-4								
Methylene chloride	92		92		70-130	0		20
1,1-Dichloroethane	94		94		70-130	0		20
Chloroform	92		94		70-130	2		20
Carbon tetrachloride	90		89		63-132	1		20
1,2-Dichloropropane	92		93		70-130	1		20
Dibromochloromethane	86		85		63-130	1		20
1,1,2-Trichloroethane	100		98		70-130	2		20
Tetrachloroethene	99		98		70-130	1		20
Chlorobenzene	95		96		75-130	1		20
Trichlorofluoromethane	100		100		62-150	0		20
1,2-Dichloroethane	96		95		70-130	1		20
1,1,1-Trichloroethane	94		93		67-130	1		20
Bromodichloromethane	89		88		67-130	1		20
trans-1,3-Dichloropropene	86		84		70-130	2		20
cis-1,3-Dichloropropene	86		86		70-130	0		20
1,1-Dichloropropene	96		97		70-130	1		20
Bromoform	80		78		54-136	3		20
1,1,2,2-Tetrachloroethane	93		91		67-130	2		20
Benzene	92		92		70-130	0		20
Toluene	95		96		70-130	1		20
Ethylbenzene	95		96		70-130	1		20
Chloromethane	94		92		64-130	2		20
Bromomethane	110		110		39-139	0		20

Lab Control Sample Analysis
Batch Quality Control

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1817077
Report Date: 05/16/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-03,05 Batch: WG1115605-3 WG1115605-4								
Vinyl chloride	96		96		55-140	0		20
Chloroethane	100		110		55-138	10		20
1,1-Dichloroethene	95		94		61-145	1		20
trans-1,2-Dichloroethene	96		96		70-130	0		20
Trichloroethene	90		90		70-130	0		20
1,2-Dichlorobenzene	96		95		70-130	1		20
1,3-Dichlorobenzene	96		96		70-130	0		20
1,4-Dichlorobenzene	96		96		70-130	0		20
Methyl tert butyl ether	86		83		63-130	4		20
p/m-Xylene	100		100		70-130	0		20
o-Xylene	95		100		70-130	5		20
cis-1,2-Dichloroethene	91		92		70-130	1		20
Dibromomethane	91		91		70-130	0		20
1,2,3-Trichloropropane	97		94		64-130	3		20
Styrene	95		95		70-130	0		20
Dichlorodifluoromethane	93		88		36-147	6		20
Acetone	81		78		58-148	4		20
Carbon disulfide	92		90		51-130	2		20
2-Butanone	96		93		63-138	3		20
Vinyl acetate	98		96		70-130	2		20
4-Methyl-2-pentanone	82		82		59-130	0		20
2-Hexanone	81		79		57-130	3		20
Bromochloromethane	94		92		70-130	2		20

Lab Control Sample Analysis
Batch Quality Control

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1817077
Report Date: 05/16/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-03,05 Batch: WG1115605-3 WG1115605-4								
2,2-Dichloropropane	89		88		63-133	1		20
1,2-Dibromoethane	92		91		70-130	1		20
1,3-Dichloropropane	95		95		70-130	0		20
1,1,1,2-Tetrachloroethane	90		90		64-130	0		20
Bromobenzene	94		94		70-130	0		20
n-Butylbenzene	98		98		53-136	0		20
sec-Butylbenzene	96		96		70-130	0		20
tert-Butylbenzene	95		95		70-130	0		20
o-Chlorotoluene	95		96		70-130	1		20
p-Chlorotoluene	95		96		70-130	1		20
1,2-Dibromo-3-chloropropane	79		73		41-144	8		20
Hexachlorobutadiene	110		100		63-130	10		20
Isopropylbenzene	95		96		70-130	1		20
p-Isopropyltoluene	97		97		70-130	0		20
Naphthalene	110		100		70-130	10		20
n-Propylbenzene	96		97		69-130	1		20
1,2,3-Trichlorobenzene	120		110		70-130	9		20
1,2,4-Trichlorobenzene	100		100		70-130	0		20
1,3,5-Trimethylbenzene	96		96		64-130	0		20
1,2,4-Trimethylbenzene	94		96		70-130	2		20
1,4-Dioxane	134		122		56-162	9		20

Lab Control Sample Analysis

Batch Quality Control

Project Name: ESSEX/HOPE

Project Number: 699900.01.RT.OM

Lab Number: L1817077

Report Date: 05/16/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits

Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-03,05 Batch: WG1115605-3 WG1115605-4

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
1,2-Dichloroethane-d4	105		103		70-130
Toluene-d8	101		101		70-130
4-Bromofluorobenzene	97		97		70-130
Dibromofluoromethane	98		97		70-130

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1817077
Report Date: 05/16/18

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1817077-01A	Vial HCl preserved	A	NA		2.2	Y	Absent		NYTCL-8260(14)
L1817077-01B	Vial HCl preserved	A	NA		2.2	Y	Absent		NYTCL-8260(14)
L1817077-01C	Vial HCl preserved	A	NA		2.2	Y	Absent		NYTCL-8260(14)
L1817077-02A	Vial HCl preserved	A	NA		2.2	Y	Absent		NYTCL-8260(14)
L1817077-02B	Vial HCl preserved	A	NA		2.2	Y	Absent		NYTCL-8260(14)
L1817077-02C	Vial HCl preserved	A	NA		2.2	Y	Absent		NYTCL-8260(14)
L1817077-03X	Vial HCl preserved split	A	NA		2.2	Y	Absent		NYTCL-8260(14)
L1817077-03Y	Vial HCl preserved split	A	NA		2.2	Y	Absent		NYTCL-8260(14)
L1817077-03Z	Vial HCl preserved split	A	NA		2.2	Y	Absent		NYTCL-8260(14)
L1817077-04A	Vial HCl preserved	A	NA		2.2	Y	Absent		COMP-VOA()
L1817077-04B	Vial HCl preserved	A	NA		2.2	Y	Absent		COMP-VOA()
L1817077-04C	Vial HCl preserved	A	NA		2.2	Y	Absent		COMP-VOA()
L1817077-04D	Vial HCl preserved	A	NA		2.2	Y	Absent		COMP-VOA()
L1817077-04E	Vial HCl preserved	A	NA		2.2	Y	Absent		COMP-VOA()
L1817077-04F	Vial HCl preserved	A	NA		2.2	Y	Absent		COMP-VOA()
L1817077-04G	Vial HCl preserved	A	NA		2.2	Y	Absent		COMP-VOA()
L1817077-04H	Vial HCl preserved	A	NA		2.2	Y	Absent		COMP-VOA()
L1817077-04I	Vial HCl preserved	A	NA		2.2	Y	Absent		COMP-VOA()
L1817077-04J	Vial HCl preserved	A	NA		2.2	Y	Absent		COMP-VOA()
L1817077-04K	Vial HCl preserved	A	NA		2.2	Y	Absent		COMP-VOA()
L1817077-04L	Vial HCl preserved	A	NA		2.2	Y	Absent		COMP-VOA()
L1817077-05A	Vial HCl preserved	A	NA		2.2	Y	Absent		NYTCL-8260(14)

*Values in parentheses indicate holding time in days

Project Name:	ESSEX/HOPE	**Lab Number:**	L1817077
Project Number:	699900.01.RT.OM	**Report Date:**	05/16/18

GLOSSARY

Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

1	- The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A	- Spectra identified as "Aldol Condensation Product".
B	- The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related

Report Format: DU Report with 'J' Qualifiers

Project Name:	ESSEX/HOPE	**Lab Number:**	L1817077
Project Number:	699900.01.RT.OM	**Report Date:**	05/16/18

Data Qualifiers

projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

J - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

ND - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

Report Format: DU Report with 'J' Qualifiers

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
EPA 300: DW: Bromide
EPA 6860: SCM: Perchlorate
EPA 9010: NPW and SCM: Amenable Cyanide Distillation
SM4500: NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, EPA 351.1, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D.**
EPA 624: Volatile Halocarbons & Aromatics,
EPA 608: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Be, Cd, Cr, Cu, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

NEW YORK CHAIN OF CUSTODY

ALPHA ANALYTICAL

Westborough, MA 01581
8 Walkup Dr.
TEL: 508-898-9220
FAX: 508-898-9193

Mansfield, MA 02048
320 Forbes Blvd
TEL: 508-822-9300
FAX: 508-822-3288

Service Centers
Mahwah, NJ 07430: 35 Whitney Rd, Suite 5
Albany, NY 12205: 14 Walker Way
Tonawanda, NY 14150: 275 Cooper Ave, Suite 105

Page 1 of 1

Date Rec'd in Lab: 5/11/18

ALPHA Job #: L1817077

Client Information

Client: CH2MHILL / JACOBS
Address: 18 Tremont St
Boston MA
Phone:
Fax:
Email: Kyle.Block@CH2M

Project Information

Project Name: ESSEX / HOPE
Project Location: JAMESTOWN NY
Project # 699900.01.RT.000
(Use Project name as Project #) ☐
Project Manager: Kyle Block
ALPHAQuote #:

Turn-Around Time

Standard ☒ Due Date:
Rush (only if pre approved) ☐ # of Days:

Deliverables

☐ ASP-A ☐ ASP-B
☐ EQuIS (1 File) ☐ EQuIS (4 File)
☐ Other

Billing Information

☒ Same as Client Info
PO #

Regulatory Requirement

☐ NY TOGS ☐ NY Part 375
☐ AWQ Standards ☐ NY CP-51
☐ NY Restricted Use ☐ Other
☐ NY Unrestricted Use
☐ NYC Sewer Discharge

Disposal Site Information

Please identify below location of applicable disposal facilities.
Disposal Facility:
☐ NJ ☒ NY
☐ Other:

These samples have been previously analyzed by Alpha ☐

Other project specific requirements/comments:

Composite all 4 Post CARB Samples & Report as POST-CARB_20180510

Please specify Metals or TAL.

ANALYSIS

VOC 8260

Sample Filtration
☐ Done
☐ Lab to do
Preservation
☐ Lab to do
(Please Specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	VOC 8260	Sample Specific Comments	Total Bottle
17077-01	Pre-Carb_20180510	05/10/18	0740	GW	JRG	X		3
-02	Primary-Eff-20180510	05/10/18	0750			X		3
-03	POST-CARB_20180510_1	05/10/18	0800			X		3
-04	POST-CARB_20180510_2	05/10/18	0830			X		3
-05	POST-CARB_20180510_3	05/10/18	0900			X		3
-06	POST-CARB_20180510_4	05/10/18	1000			X		3
-07	TRIP BLANK					X		1

Preservative Code:
A = None
B = HCl
C = HNO_3
D = H_2SO_4
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
K/E = Zn Ac/NaOH
O = Other

Container Code
P = Plastic
A = Amber Glass
V = Vial
G = Glass
B = Bacteria Cup
C = Cube
O = Other
E = Encore
D = BOD Bottle

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Container Type
Preservative

Relinquished By:	Date/Time	Received By:	Date/Time
AMC	5/10/18 @ 1045	AMC	5/10/18 10:45
AMC	5/10/18 12:30		5/11/18 08:00

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. BY EXECUTING THIS COC, THE CLIENT HAS READ AND AGREES TO BE BOUND BY ALPHA'S TERMS & CONDITIONS. (See reverse side.)

Form No: 01-25 HC (rev. 30-Sept-2013)

ANALYTICAL REPORT

Lab Number:	L1821136
Client:	CH2MHILL 18 Tremont Street Suite 700 Boston, MA 02108
ATTN:	Kyle Block
Phone:	(617) 523-2260
Project Name:	ESSEX/HOPE
Project Number:	699900.01.RT.OM
Report Date:	06/13/18

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-17-00196).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1821136
Report Date: 06/13/18

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1821136-01	PRE-CARB_20180607	WATER	JAMESTOWN, NY	06/07/18 08:00	06/07/18
L1821136-02	PRIMARY-EFF-20180607	WATER	JAMESTOWN, NY	06/07/18 08:05	06/07/18
L1821136-03	POST-CARB-20180607	WATER	JAMESTOWN, NY	06/07/18 09:40	06/07/18
L1821136-04	COMPOSITE OF POST-CARB 20180607-1,-2,-3,-4	WATER	JAMESTOWN, NY	06/07/18 09:40	06/07/18
L1821136-05	TRIP BLANK	WATER	JAMESTOWN, NY	06/07/18 00:00	06/07/18

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1821136
Report Date: 06/13/18

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY
For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

Project Name:	ESSEX/HOPE	**Lab Number:**	L1821136
Project Number:	699900.01.RT.OM	**Report Date:**	06/13/18

Case Narrative (continued)

Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

Volatile Organics

L1821136-01 and -02: The sample has elevated detection limits due to the dilution required by the elevated concentrations of target compounds in the sample.

L1821136-05: The Trip Blank has a result for trichloroethene present above the reporting limit. The sample was verified as being labeled correctly by the laboratory and the previous analysis showed there was no potential for carry over.

The WG1125100-3/-4 LCS/LCSD RPDs, associated with L1821136-01, -02, -03 and -05, are above the acceptance criteria for 1,1-dichloroethene (30%), carbon disulfide (36%), naphthalene (21%), 1,2,3-trichlorobenzene (22%) and 1,4-dioxane (35%).

The initial calibration, associated with L1821136-01, -02, -03 and -05, did not meet the method required minimum response factor for the calibration standards for bromodichloromethane, cis-1,3-dichloropropene, bromomethane, chloroethane, trichloroethene, dibromomethane, 2-butanone, 4-methyl-2-pentanone, 2-hexanone, bromochloromethane and 1,4-dioxane.

The continuing calibration, associated with L1821136-01, -02, -03 and -05, did not meet the method required minimum response factor for bromomethane, chloroethane, bromochloromethane, 2-butanone, trichloroethene, dibromomethane, 1,4-dioxane, 4-methyl-2-pentanone and 2-hexanone.

The WG1125100-2 continuing calibration verification standard has the percent deviation for 1,4-dioxane (41%D), naphthalene (28%) and 1,2,3-trichlorobenzene (23%) above the 20% CCV criteria, but within overall method allowances.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Michelle M. Morris

Title: Technical Director/Representative Date: 06/13/18

ORGANICS

VOLATILES

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM
Lab Number: L1821136
Report Date: 06/13/18

SAMPLE RESULTS

Lab ID: L1821136-01 D
Client ID: PRE-CARB_20180607
Sample Location: JAMESTOWN, NY

Date Collected: 06/07/18 08:00
Date Received: 06/07/18
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 06/12/18 12:02
Analyst: NLK

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	100	28.	40
1,1-Dichloroethane	ND		ug/l	100	28.	40
Chloroform	ND		ug/l	100	28.	40
Carbon tetrachloride	ND		ug/l	20	5.4	40
1,2-Dichloropropane	ND		ug/l	40	5.5	40
Dibromochloromethane	ND		ug/l	20	6.0	40
1,1,2-Trichloroethane	ND		ug/l	60	20.	40
Tetrachloroethene	ND		ug/l	20	7.2	40
Chlorobenzene	ND		ug/l	100	28.	40
Trichlorofluoromethane	ND		ug/l	100	28.	40
1,2-Dichloroethane	ND		ug/l	20	5.3	40
1,1,1-Trichloroethane	ND		ug/l	100	28.	40
Bromodichloromethane	ND		ug/l	20	7.7	40
trans-1,3-Dichloropropene	ND		ug/l	20	6.6	40
cis-1,3-Dichloropropene	ND		ug/l	20	5.8	40
1,3-Dichloropropene, Total	ND		ug/l	20	5.8	40
1,1-Dichloropropene	ND		ug/l	100	28.	40
Bromoform	ND		ug/l	80	26.	40
1,1,2,2-Tetrachloroethane	ND		ug/l	20	6.7	40
Benzene	13	J	ug/l	20	6.4	40
Toluene	ND		ug/l	100	28.	40
Ethylbenzene	ND		ug/l	100	28.	40
Chloromethane	ND		ug/l	100	28.	40
Bromomethane	ND		ug/l	100	28.	40
Vinyl chloride	770		ug/l	40	2.8	40
Chloroethane	ND		ug/l	100	28.	40
1,1-Dichloroethene	15	J	ug/l	20	6.8	40
trans-1,2-Dichloroethene	ND		ug/l	100	28.	40

Project Name: ESSEX/HOPE **Lab Number:** L1821136

Project Number: 699900.01.RT.OM **Report Date:** 06/13/18

SAMPLE RESULTS

Lab ID: L1821136-01 D
Client ID: PRE-CARB_20180607
Sample Location: JAMESTOWN, NY

Date Collected: 06/07/18 08:00
Date Received: 06/07/18
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Trichloroethene	3600		ug/l	20	7.0	40
1,2-Dichlorobenzene	ND		ug/l	100	28.	40
1,3-Dichlorobenzene	ND		ug/l	100	28.	40
1,4-Dichlorobenzene	ND		ug/l	100	28.	40
Methyl tert butyl ether	ND		ug/l	100	28.	40
p/m-Xylene	ND		ug/l	100	28.	40
o-Xylene	ND		ug/l	100	28.	40
Xylenes, Total	ND		ug/l	100	28.	40
cis-1,2-Dichloroethene	4000		ug/l	100	28.	40
1,2-Dichloroethene, Total	4000		ug/l	100	28.	40
Dibromomethane	ND		ug/l	200	40.	40
1,2,3-Trichloropropane	ND		ug/l	100	28.	40
Styrene	ND		ug/l	100	28.	40
Dichlorodifluoromethane	ND		ug/l	200	40.	40
Acetone	1200		ug/l	200	58.	40
Carbon disulfide	ND		ug/l	200	40.	40
2-Butanone	ND		ug/l	200	78.	40
Vinyl acetate	ND		ug/l	200	40.	40
4-Methyl-2-pentanone	ND		ug/l	200	40.	40
2-Hexanone	ND		ug/l	200	40.	40
Bromochloromethane	ND		ug/l	100	28.	40
2,2-Dichloropropane	ND		ug/l	100	28.	40
1,2-Dibromoethane	ND		ug/l	80	26.	40
1,3-Dichloropropane	ND		ug/l	100	28.	40
1,1,1,2-Tetrachloroethane	ND		ug/l	100	28.	40
Bromobenzene	ND		ug/l	100	28.	40
n-Butylbenzene	ND		ug/l	100	28.	40
sec-Butylbenzene	ND		ug/l	100	28.	40
tert-Butylbenzene	ND		ug/l	100	28.	40
o-Chlorotoluene	ND		ug/l	100	28.	40
p-Chlorotoluene	ND		ug/l	100	28.	40
1,2-Dibromo-3-chloropropane	ND		ug/l	100	28.	40
Hexachlorobutadiene	ND		ug/l	100	28.	40
Isopropylbenzene	ND		ug/l	100	28.	40
p-Isopropyltoluene	ND		ug/l	100	28.	40
Naphthalene	ND		ug/l	100	28.	40
n-Propylbenzene	ND		ug/l	100	28.	40

Project Name: ESSEX/HOPE **Lab Number:** L1821136

Project Number: 699900.01.RT.OM **Report Date:** 06/13/18

SAMPLE RESULTS

Lab ID: L1821136-01 D
Client ID: PRE-CARB_20180607
Sample Location: JAMESTOWN, NY

Date Collected: 06/07/18 08:00
Date Received: 06/07/18
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,2,3-Trichlorobenzene	ND		ug/l	100	28.	40
1,2,4-Trichlorobenzene	ND		ug/l	100	28.	40
1,3,5-Trimethylbenzene	ND		ug/l	100	28.	40
1,2,4-Trimethylbenzene	ND		ug/l	100	28.	40
1,4-Dioxane	ND		ug/l	10000	2400	40

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	96		70-130
Toluene-d8	99		70-130
4-Bromofluorobenzene	102		70-130
Dibromofluoromethane	98		70-130

Project Name: ESSEX/HOPE **Lab Number:** L1821136

Project Number: 699900.01.RT.OM **Report Date:** 06/13/18

SAMPLE RESULTS

Lab ID: L1821136-02 D
Client ID: PRIMARY-EFF-20180607
Sample Location: JAMESTOWN, NY

Date Collected: 06/07/18 08:05
Date Received: 06/07/18
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 06/12/18 15:48
Analyst: MKS

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	25	7.0	10
1,1-Dichloroethane	ND		ug/l	25	7.0	10
Chloroform	ND		ug/l	25	7.0	10
Carbon tetrachloride	ND		ug/l	5.0	1.3	10
1,2-Dichloropropane	ND		ug/l	10	1.4	10
Dibromochloromethane	ND		ug/l	5.0	1.5	10
1,1,2-Trichloroethane	ND		ug/l	15	5.0	10
Tetrachloroethene	ND		ug/l	5.0	1.8	10
Chlorobenzene	ND		ug/l	25	7.0	10
Trichlorofluoromethane	ND		ug/l	25	7.0	10
1,2-Dichloroethane	ND		ug/l	5.0	1.3	10
1,1,1-Trichloroethane	ND		ug/l	25	7.0	10
Bromodichloromethane	ND		ug/l	5.0	1.9	10
trans-1,3-Dichloropropene	ND		ug/l	5.0	1.6	10
cis-1,3-Dichloropropene	ND		ug/l	5.0	1.4	10
1,3-Dichloropropene, Total	ND		ug/l	5.0	1.4	10
1,1-Dichloropropene	ND		ug/l	25	7.0	10
Bromoform	ND		ug/l	20	6.5	10
1,1,2,2-Tetrachloroethane	ND		ug/l	5.0	1.7	10
Benzene	ND		ug/l	5.0	1.6	10
Toluene	ND		ug/l	25	7.0	10
Ethylbenzene	ND		ug/l	25	7.0	10
Chloromethane	ND		ug/l	25	7.0	10
Bromomethane	ND		ug/l	25	7.0	10
Vinyl chloride	1700		ug/l	10	0.71	10
Chloroethane	ND		ug/l	25	7.0	10
1,1-Dichloroethene	2.2	J	ug/l	5.0	1.7	10
trans-1,2-Dichloroethene	ND		ug/l	25	7.0	10

Project Name: ESSEX/HOPE **Lab Number:** L1821136

Project Number: 699900.01.RT.OM **Report Date:** 06/13/18

SAMPLE RESULTS

Lab ID: L1821136-02 D
Client ID: PRIMARY-EFF-20180607
Sample Location: JAMESTOWN, NY

Date Collected: 06/07/18 08:05
Date Received: 06/07/18
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Trichloroethene	160		ug/l	5.0	1.8	10
1,2-Dichlorobenzene	ND		ug/l	25	7.0	10
1,3-Dichlorobenzene	ND		ug/l	25	7.0	10
1,4-Dichlorobenzene	ND		ug/l	25	7.0	10
Methyl tert butyl ether	ND		ug/l	25	7.0	10
p/m-Xylene	ND		ug/l	25	7.0	10
o-Xylene	ND		ug/l	25	7.0	10
Xylenes, Total	ND		ug/l	25	7.0	10
cis-1,2-Dichloroethene	750		ug/l	25	7.0	10
1,2-Dichloroethene, Total	750		ug/l	25	7.0	10
Dibromomethane	ND		ug/l	50	10.	10
1,2,3-Trichloropropane	ND		ug/l	25	7.0	10
Styrene	ND		ug/l	25	7.0	10
Dichlorodifluoromethane	ND		ug/l	50	10.	10
Acetone	400		ug/l	50	15.	10
Carbon disulfide	ND		ug/l	50	10.	10
2-Butanone	ND		ug/l	50	19.	10
Vinyl acetate	ND		ug/l	50	10.	10
4-Methyl-2-pentanone	ND		ug/l	50	10.	10
2-Hexanone	ND		ug/l	50	10.	10
Bromochloromethane	ND		ug/l	25	7.0	10
2,2-Dichloropropane	ND		ug/l	25	7.0	10
1,2-Dibromoethane	ND		ug/l	20	6.5	10
1,3-Dichloropropane	ND		ug/l	25	7.0	10
1,1,1,2-Tetrachloroethane	ND		ug/l	25	7.0	10
Bromobenzene	ND		ug/l	25	7.0	10
n-Butylbenzene	ND		ug/l	25	7.0	10
sec-Butylbenzene	ND		ug/l	25	7.0	10
tert-Butylbenzene	ND		ug/l	25	7.0	10
o-Chlorotoluene	ND		ug/l	25	7.0	10
p-Chlorotoluene	ND		ug/l	25	7.0	10
1,2-Dibromo-3-chloropropane	ND		ug/l	25	7.0	10
Hexachlorobutadiene	ND		ug/l	25	7.0	10
Isopropylbenzene	ND		ug/l	25	7.0	10
p-Isopropyltoluene	ND		ug/l	25	7.0	10
Naphthalene	ND		ug/l	25	7.0	10
n-Propylbenzene	ND		ug/l	25	7.0	10

Project Name: ESSEX/HOPE **Lab Number:** L1821136

Project Number: 699900.01.RT.OM **Report Date:** 06/13/18

SAMPLE RESULTS

Lab ID: L1821136-02 D
Client ID: PRIMARY-EFF-20180607
Sample Location: JAMESTOWN, NY

Date Collected: 06/07/18 08:05
Date Received: 06/07/18
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,2,3-Trichlorobenzene	ND		ug/l	25	7.0	10
1,2,4-Trichlorobenzene	ND		ug/l	25	7.0	10
1,3,5-Trimethylbenzene	ND		ug/l	25	7.0	10
1,2,4-Trimethylbenzene	ND		ug/l	25	7.0	10
1,4-Dioxane	ND		ug/l	2500	610	10

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	98		70-130
Toluene-d8	98		70-130
4-Bromofluorobenzene	102		70-130
Dibromofluoromethane	99		70-130

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM
Lab Number: L1821136
Report Date: 06/13/18

SAMPLE RESULTS

Lab ID: L1821136-03
Client ID: POST-CARB-20180607
Sample Location: JAMESTOWN, NY
Date Collected: 06/07/18 09:40
Date Received: 06/07/18
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 06/12/18 11:12
Analyst: NLK

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	2.5	0.70	1
1,1-Dichloroethane	ND		ug/l	2.5	0.70	1
Chloroform	ND		ug/l	2.5	0.70	1
Carbon tetrachloride	ND		ug/l	0.50	0.13	1
1,2-Dichloropropane	ND		ug/l	1.0	0.14	1
Dibromochloromethane	ND		ug/l	0.50	0.15	1
1,1,2-Trichloroethane	ND		ug/l	1.5	0.50	1
Tetrachloroethene	ND		ug/l	0.50	0.18	1
Chlorobenzene	ND		ug/l	2.5	0.70	1
Trichlorofluoromethane	ND		ug/l	2.5	0.70	1
1,2-Dichloroethane	ND		ug/l	0.50	0.13	1
1,1,1-Trichloroethane	ND		ug/l	2.5	0.70	1
Bromodichloromethane	ND		ug/l	0.50	0.19	1
trans-1,3-Dichloropropene	ND		ug/l	0.50	0.16	1
cis-1,3-Dichloropropene	ND		ug/l	0.50	0.14	1
1,3-Dichloropropene, Total	ND		ug/l	0.50	0.14	1
1,1-Dichloropropene	ND		ug/l	2.5	0.70	1
Bromoform	ND		ug/l	2.0	0.65	1
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	0.17	1
Benzene	ND		ug/l	0.50	0.16	1
Toluene	ND		ug/l	2.5	0.70	1
Ethylbenzene	ND		ug/l	2.5	0.70	1
Chloromethane	ND		ug/l	2.5	0.70	1
Bromomethane	ND		ug/l	2.5	0.70	1
Vinyl chloride	1.9		ug/l	1.0	0.07	1
Chloroethane	ND		ug/l	2.5	0.70	1
1,1-Dichloroethene	ND		ug/l	0.50	0.17	1
trans-1,2-Dichloroethene	ND		ug/l	2.5	0.70	1

Project Name: ESSEX/HOPE **Lab Number:** L1821136

Project Number: 699900.01.RT.OM **Report Date:** 06/13/18

SAMPLE RESULTS

Lab ID: L1821136-03 Date Collected: 06/07/18 09:40

Client ID: POST-CARB-20180607 Date Received: 06/07/18

Sample Location: JAMESTOWN, NY Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Trichloroethene	0.75		ug/l	0.50	0.18	1
1,2-Dichlorobenzene	ND		ug/l	2.5	0.70	1
1,3-Dichlorobenzene	ND		ug/l	2.5	0.70	1
1,4-Dichlorobenzene	ND		ug/l	2.5	0.70	1
Methyl tert butyl ether	ND		ug/l	2.5	0.70	1
p/m-Xylene	ND		ug/l	2.5	0.70	1
o-Xylene	ND		ug/l	2.5	0.70	1
Xylenes, Total	ND		ug/l	2.5	0.70	1
cis-1,2-Dichloroethene	0.71	J	ug/l	2.5	0.70	1
1,2-Dichloroethene, Total	0.71	J	ug/l	2.5	0.70	1
Dibromomethane	ND		ug/l	5.0	1.0	1
1,2,3-Trichloropropane	ND		ug/l	2.5	0.70	1
Styrene	ND		ug/l	2.5	0.70	1
Dichlorodifluoromethane	ND		ug/l	5.0	1.0	1
Acetone	ND		ug/l	5.0	1.5	1
Carbon disulfide	ND		ug/l	5.0	1.0	1
2-Butanone	ND		ug/l	5.0	1.9	1
Vinyl acetate	ND		ug/l	5.0	1.0	1
4-Methyl-2-pentanone	ND		ug/l	5.0	1.0	1
2-Hexanone	ND		ug/l	5.0	1.0	1
Bromochloromethane	ND		ug/l	2.5	0.70	1
2,2-Dichloropropane	ND		ug/l	2.5	0.70	1
1,2-Dibromoethane	ND		ug/l	2.0	0.65	1
1,3-Dichloropropane	ND		ug/l	2.5	0.70	1
1,1,1,2-Tetrachloroethane	ND		ug/l	2.5	0.70	1
Bromobenzene	ND		ug/l	2.5	0.70	1
n-Butylbenzene	ND		ug/l	2.5	0.70	1
sec-Butylbenzene	ND		ug/l	2.5	0.70	1
tert-Butylbenzene	ND		ug/l	2.5	0.70	1
o-Chlorotoluene	ND		ug/l	2.5	0.70	1
p-Chlorotoluene	ND		ug/l	2.5	0.70	1
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	0.70	1
Hexachlorobutadiene	ND		ug/l	2.5	0.70	1
Isopropylbenzene	ND		ug/l	2.5	0.70	1
p-Isopropyltoluene	ND		ug/l	2.5	0.70	1
Naphthalene	ND		ug/l	2.5	0.70	1
n-Propylbenzene	ND		ug/l	2.5	0.70	1

Project Name: ESSEX/HOPE **Lab Number:** L1821136

Project Number: 699900.01.RT.OM **Report Date:** 06/13/18

SAMPLE RESULTS

Lab ID: L1821136-03 Date Collected: 06/07/18 09:40

Client ID: POST-CARB-20180607 Date Received: 06/07/18

Sample Location: JAMESTOWN, NY Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,2,3-Trichlorobenzene	ND		ug/l	2.5	0.70	1
1,2,4-Trichlorobenzene	ND		ug/l	2.5	0.70	1
1,3,5-Trimethylbenzene	ND		ug/l	2.5	0.70	1
1,2,4-Trimethylbenzene	ND		ug/l	2.5	0.70	1
1,4-Dioxane	ND		ug/l	250	61.	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	97		70-130
Toluene-d8	100		70-130
4-Bromofluorobenzene	101		70-130
Dibromofluoromethane	97		70-130

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM
Lab Number: L1821136
Report Date: 06/13/18

SAMPLE RESULTS

Lab ID: L1821136-05
Client ID: TRIP BLANK
Sample Location: JAMESTOWN, NY
Date Collected: 06/07/18 00:00
Date Received: 06/07/18
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 06/12/18 10:46
Analyst: NLK

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	2.5	0.70	1
1,1-Dichloroethane	ND		ug/l	2.5	0.70	1
Chloroform	ND		ug/l	2.5	0.70	1
Carbon tetrachloride	ND		ug/l	0.50	0.13	1
1,2-Dichloropropane	ND		ug/l	1.0	0.14	1
Dibromochloromethane	ND		ug/l	0.50	0.15	1
1,1,2-Trichloroethane	ND		ug/l	1.5	0.50	1
Tetrachloroethene	ND		ug/l	0.50	0.18	1
Chlorobenzene	ND		ug/l	2.5	0.70	1
Trichlorofluoromethane	ND		ug/l	2.5	0.70	1
1,2-Dichloroethane	ND		ug/l	0.50	0.13	1
1,1,1-Trichloroethane	ND		ug/l	2.5	0.70	1
Bromodichloromethane	ND		ug/l	0.50	0.19	1
trans-1,3-Dichloropropene	ND		ug/l	0.50	0.16	1
cis-1,3-Dichloropropene	ND		ug/l	0.50	0.14	1
1,3-Dichloropropene, Total	ND		ug/l	0.50	0.14	1
1,1-Dichloropropene	ND		ug/l	2.5	0.70	1
Bromoform	ND		ug/l	2.0	0.65	1
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	0.17	1
Benzene	ND		ug/l	0.50	0.16	1
Toluene	ND		ug/l	2.5	0.70	1
Ethylbenzene	ND		ug/l	2.5	0.70	1
Chloromethane	ND		ug/l	2.5	0.70	1
Bromomethane	ND		ug/l	2.5	0.70	1
Vinyl chloride	0.40	J	ug/l	1.0	0.07	1
Chloroethane	ND		ug/l	2.5	0.70	1
1,1-Dichloroethene	ND		ug/l	0.50	0.17	1
trans-1,2-Dichloroethene	ND		ug/l	2.5	0.70	1

Project Name: ESSEX/HOPE **Lab Number:** L1821136

Project Number: 699900.01.RT.OM **Report Date:** 06/13/18

SAMPLE RESULTS

Lab ID: L1821136-05 Date Collected: 06/07/18 00:00

Client ID: TRIP BLANK Date Received: 06/07/18

Sample Location: JAMESTOWN, NY Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Trichloroethene	2.2		ug/l	0.50	0.18	1
1,2-Dichlorobenzene	ND		ug/l	2.5	0.70	1
1,3-Dichlorobenzene	ND		ug/l	2.5	0.70	1
1,4-Dichlorobenzene	ND		ug/l	2.5	0.70	1
Methyl tert butyl ether	ND		ug/l	2.5	0.70	1
p/m-Xylene	ND		ug/l	2.5	0.70	1
o-Xylene	ND		ug/l	2.5	0.70	1
Xylenes, Total	ND		ug/l	2.5	0.70	1
cis-1,2-Dichloroethene	1.0	J	ug/l	2.5	0.70	1
1,2-Dichloroethene, Total	1.0	J	ug/l	2.5	0.70	1
Dibromomethane	ND		ug/l	5.0	1.0	1
1,2,3-Trichloropropane	ND		ug/l	2.5	0.70	1
Styrene	ND		ug/l	2.5	0.70	1
Dichlorodifluoromethane	ND		ug/l	5.0	1.0	1
Acetone	ND		ug/l	5.0	1.5	1
Carbon disulfide	ND		ug/l	5.0	1.0	1
2-Butanone	ND		ug/l	5.0	1.9	1
Vinyl acetate	ND		ug/l	5.0	1.0	1
4-Methyl-2-pentanone	ND		ug/l	5.0	1.0	1
2-Hexanone	ND		ug/l	5.0	1.0	1
Bromochloromethane	ND		ug/l	2.5	0.70	1
2,2-Dichloropropane	ND		ug/l	2.5	0.70	1
1,2-Dibromoethane	ND		ug/l	2.0	0.65	1
1,3-Dichloropropane	ND		ug/l	2.5	0.70	1
1,1,1,2-Tetrachloroethane	ND		ug/l	2.5	0.70	1
Bromobenzene	ND		ug/l	2.5	0.70	1
n-Butylbenzene	ND		ug/l	2.5	0.70	1
sec-Butylbenzene	ND		ug/l	2.5	0.70	1
tert-Butylbenzene	ND		ug/l	2.5	0.70	1
o-Chlorotoluene	ND		ug/l	2.5	0.70	1
p-Chlorotoluene	ND		ug/l	2.5	0.70	1
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	0.70	1
Hexachlorobutadiene	ND		ug/l	2.5	0.70	1
Isopropylbenzene	ND		ug/l	2.5	0.70	1
p-Isopropyltoluene	ND		ug/l	2.5	0.70	1
Naphthalene	ND		ug/l	2.5	0.70	1
n-Propylbenzene	ND		ug/l	2.5	0.70	1

Project Name: ESSEX/HOPE **Lab Number:** L1821136

Project Number: 699900.01.RT.OM **Report Date:** 06/13/18

SAMPLE RESULTS

Lab ID: L1821136-05 Date Collected: 06/07/18 00:00

Client ID: TRIP BLANK Date Received: 06/07/18

Sample Location: JAMESTOWN, NY Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
1,2,3-Trichlorobenzene	ND		ug/l	2.5	0.70	1
1,2,4-Trichlorobenzene	ND		ug/l	2.5	0.70	1
1,3,5-Trimethylbenzene	ND		ug/l	2.5	0.70	1
1,2,4-Trimethylbenzene	ND		ug/l	2.5	0.70	1
1,4-Dioxane	ND		ug/l	250	61.	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	96		70-130
Toluene-d8	99		70-130
4-Bromofluorobenzene	102		70-130
Dibromofluoromethane	97		70-130

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1821136
Report Date: 06/13/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 06/12/18 10:21
Analyst: PD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-03,05 Batch: WG1125100-5					
Methylene chloride	ND		ug/l	2.5	0.70
1,1-Dichloroethane	ND		ug/l	2.5	0.70
Chloroform	ND		ug/l	2.5	0.70
Carbon tetrachloride	ND		ug/l	0.50	0.13
1,2-Dichloropropane	ND		ug/l	1.0	0.14
Dibromochloromethane	ND		ug/l	0.50	0.15
1,1,2-Trichloroethane	ND		ug/l	1.5	0.50
Tetrachloroethene	ND		ug/l	0.50	0.18
Chlorobenzene	ND		ug/l	2.5	0.70
Trichlorofluoromethane	ND		ug/l	2.5	0.70
1,2-Dichloroethane	ND		ug/l	0.50	0.13
1,1,1-Trichloroethane	ND		ug/l	2.5	0.70
Bromodichloromethane	ND		ug/l	0.50	0.19
trans-1,3-Dichloropropene	ND		ug/l	0.50	0.16
cis-1,3-Dichloropropene	ND		ug/l	0.50	0.14
1,3-Dichloropropene, Total	ND		ug/l	0.50	0.14
1,1-Dichloropropene	ND		ug/l	2.5	0.70
Bromoform	ND		ug/l	2.0	0.65
1,1,2,2-Tetrachloroethane	ND		ug/l	0.50	0.17
Benzene	ND		ug/l	0.50	0.16
Toluene	ND		ug/l	2.5	0.70
Ethylbenzene	ND		ug/l	2.5	0.70
Chloromethane	ND		ug/l	2.5	0.70
Bromomethane	ND		ug/l	2.5	0.70
Vinyl chloride	ND		ug/l	1.0	0.07
Chloroethane	ND		ug/l	2.5	0.70
1,1-Dichloroethene	ND		ug/l	0.50	0.17
trans-1,2-Dichloroethene	ND		ug/l	2.5	0.70
Trichloroethene	ND		ug/l	0.50	0.18

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1821136
Report Date: 06/13/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 06/12/18 10:21
Analyst: PD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-03,05 Batch: WG1125100-5					
1,2-Dichlorobenzene	ND		ug/l	2.5	0.70
1,3-Dichlorobenzene	ND		ug/l	2.5	0.70
1,4-Dichlorobenzene	ND		ug/l	2.5	0.70
Methyl tert butyl ether	ND		ug/l	2.5	0.70
p/m-Xylene	ND		ug/l	2.5	0.70
o-Xylene	ND		ug/l	2.5	0.70
Xylenes, Total	ND		ug/l	2.5	0.70
cis-1,2-Dichloroethene	ND		ug/l	2.5	0.70
1,2-Dichloroethene, Total	ND		ug/l	2.5	0.70
Dibromomethane	ND		ug/l	5.0	1.0
1,2,3-Trichloropropane	ND		ug/l	2.5	0.70
Styrene	ND		ug/l	2.5	0.70
Dichlorodifluoromethane	ND		ug/l	5.0	1.0
Acetone	ND		ug/l	5.0	1.5
Carbon disulfide	ND		ug/l	5.0	1.0
2-Butanone	ND		ug/l	5.0	1.9
Vinyl acetate	ND		ug/l	5.0	1.0
4-Methyl-2-pentanone	ND		ug/l	5.0	1.0
2-Hexanone	ND		ug/l	5.0	1.0
Bromochloromethane	ND		ug/l	2.5	0.70
2,2-Dichloropropane	ND		ug/l	2.5	0.70
1,2-Dibromoethane	ND		ug/l	2.0	0.65
1,3-Dichloropropane	ND		ug/l	2.5	0.70
1,1,1,2-Tetrachloroethane	ND		ug/l	2.5	0.70
Bromobenzene	ND		ug/l	2.5	0.70
n-Butylbenzene	ND		ug/l	2.5	0.70
sec-Butylbenzene	ND		ug/l	2.5	0.70
tert-Butylbenzene	ND		ug/l	2.5	0.70
o-Chlorotoluene	ND		ug/l	2.5	0.70

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM
Lab Number: L1821136
Report Date: 06/13/18

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 06/12/18 10:21
Analyst: PD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01-03,05 Batch: WG1125100-5					
p-Chlorotoluene	ND		ug/l	2.5	0.70
1,2-Dibromo-3-chloropropane	ND		ug/l	2.5	0.70
Hexachlorobutadiene	ND		ug/l	2.5	0.70
Isopropylbenzene	ND		ug/l	2.5	0.70
p-Isopropyltoluene	ND		ug/l	2.5	0.70
Naphthalene	ND		ug/l	2.5	0.70
n-Propylbenzene	ND		ug/l	2.5	0.70
1,2,3-Trichlorobenzene	ND		ug/l	2.5	0.70
1,2,4-Trichlorobenzene	ND		ug/l	2.5	0.70
1,3,5-Trimethylbenzene	ND		ug/l	2.5	0.70
1,2,4-Trimethylbenzene	ND		ug/l	2.5	0.70
1,4-Dioxane	ND		ug/l	250	61.
Tentatively Identified Compounds					
No Tentatively Identified Compounds	ND		ug/l		

Surrogate	%Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	98		70-130
Toluene-d8	97		70-130
4-Bromofluorobenzene	101		70-130
Dibromofluoromethane	97		70-130

Lab Control Sample Analysis
Batch Quality Control

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1821136
Report Date: 06/13/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-03,05 Batch: WG1125100-3 WG1125100-4								
Methylene chloride	91		79		70-130	14		20
1,1-Dichloroethane	90		84		70-130	7		20
Chloroform	90		85		70-130	6		20
Carbon tetrachloride	92		85		63-132	8		20
1,2-Dichloropropane	92		87		70-130	6		20
Dibromochloromethane	80		76		63-130	5		20
1,1,2-Trichloroethane	95		89		70-130	7		20
Tetrachloroethene	91		84		70-130	8		20
Chlorobenzene	91		86		75-130	6		20
Trichlorofluoromethane	85		77		62-150	10		20
1,2-Dichloroethane	88		83		70-130	6		20
1,1,1-Trichloroethane	90		83		67-130	8		20
Bromodichloromethane	90		84		67-130	7		20
trans-1,3-Dichloropropene	82		77		70-130	6		20
cis-1,3-Dichloropropene	94		86		70-130	9		20
1,1-Dichloropropene	92		85		70-130	8		20
Bromoform	76		71		54-136	7		20
1,1,2,2-Tetrachloroethane	91		85		67-130	7		20
Benzene	92		86		70-130	7		20
Toluene	91		85		70-130	7		20
Ethylbenzene	90		84		70-130	7		20
Chloromethane	98		91		64-130	7		20
Bromomethane	98		94		39-139	4		20

Lab Control Sample Analysis
Batch Quality Control

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1821136
Report Date: 06/13/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-03,05 Batch: WG1125100-3 WG1125100-4								
Vinyl chloride	99		92		55-140	7		20
Chloroethane	87		80		55-138	8		20
1,1-Dichloroethene	93		69		61-145	**30**	Q	20
trans-1,2-Dichloroethene	93		86		70-130	8		20
Trichloroethene	87		83		70-130	5		20
1,2-Dichlorobenzene	95		87		70-130	9		20
1,3-Dichlorobenzene	95		87		70-130	9		20
1,4-Dichlorobenzene	94		87		70-130	8		20
Methyl tert butyl ether	93		85		63-130	9		20
p/m-Xylene	95		90		70-130	5		20
o-Xylene	95		90		70-130	5		20
cis-1,2-Dichloroethene	93		88		70-130	6		20
Dibromomethane	90		85		70-130	6		20
1,2,3-Trichloropropane	89		83		64-130	7		20
Styrene	95		90		70-130	5		20
Dichlorodifluoromethane	99		90		36-147	10		20
Acetone	79		76		58-148	4		20
Carbon disulfide	98		68		51-130	**36**	Q	20
2-Butanone	85		82		63-138	4		20
Vinyl acetate	92		85		70-130	8		20
4-Methyl-2-pentanone	83		79		59-130	5		20
2-Hexanone	84		76		57-130	10		20
Bromochloromethane	94		87		70-130	8		20

Lab Control Sample Analysis
Batch Quality Control

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1821136
Report Date: 06/13/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-03,05 Batch: WG1125100-3 WG1125100-4								
2,2-Dichloropropane	95		85		63-133	11		20
1,2-Dibromoethane	92		88		70-130	4		20
1,3-Dichloropropane	91		87		70-130	4		20
1,1,1,2-Tetrachloroethane	92		87		64-130	6		20
Bromobenzene	94		86		70-130	9		20
n-Butylbenzene	98		89		53-136	10		20
sec-Butylbenzene	96		89		70-130	8		20
tert-Butylbenzene	97		89		70-130	9		20
o-Chlorotoluene	90		87		70-130	3		20
p-Chlorotoluene	95		87		70-130	9		20
1,2-Dibromo-3-chloropropane	74		66		41-144	11		20
Hexachlorobutadiene	110		90		63-130	20		20
Isopropylbenzene	97		88		70-130	10		20
p-Isopropyltoluene	99		90		70-130	10		20
Naphthalene	86		70		70-130	**21**	Q	20
n-Propylbenzene	94		86		69-130	9		20
1,2,3-Trichlorobenzene	100		80		70-130	**22**	Q	20
1,2,4-Trichlorobenzene	98		82		70-130	18		20
1,3,5-Trimethylbenzene	97		88		64-130	10		20
1,2,4-Trimethylbenzene	97		90		70-130	7		20
1,4-Dioxane	80		56		56-162	**35**	Q	20

Lab Control Sample Analysis

Batch Quality Control

Project Name: ESSEX/HOPE

Project Number: 699900.01.RT.OM

Lab Number: L1821136

Report Date: 06/13/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits

Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-03,05 Batch: WG1125100-3 WG1125100-4

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
1,2-Dichloroethane-d4	95		96		70-130
Toluene-d8	99		99		70-130
4-Bromofluorobenzene	102		100		70-130
Dibromofluoromethane	98		98		70-130

Project Name: ESSEX/HOPE
Project Number: 699900.01.RT.OM

Lab Number: L1821136
Report Date: 06/13/18

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1821136-01A	Vial HCl preserved	A	NA		2.6	Y	Absent		NYTCL-8260(14)
L1821136-01B	Vial HCl preserved	A	NA		2.6	Y	Absent		NYTCL-8260(14)
L1821136-01C	Vial HCl preserved	A	NA		2.6	Y	Absent		NYTCL-8260(14)
L1821136-02A	Vial HCl preserved	A	NA		2.6	Y	Absent		NYTCL-8260(14)
L1821136-02B	Vial HCl preserved	A	NA		2.6	Y	Absent		NYTCL-8260(14)
L1821136-02C	Vial HCl preserved	A	NA		2.6	Y	Absent		NYTCL-8260(14)
L1821136-03X	Vial HCl preserved	A	NA		2.6	Y	Absent		NYTCL-8260(14)
L1821136-03Y	Vial HCl preserved	A	NA		2.6	Y	Absent		NYTCL-8260(14)
L1821136-03Z	Vial HCl preserved	A	NA		2.6	Y	Absent		NYTCL-8260(14)
L1821136-04A	Vial HCl preserved	A	NA		2.6	Y	Absent		COMP-VOA()
L1821136-04B	Vial HCl preserved	A	NA		2.6	Y	Absent		COMP-VOA()
L1821136-04C	Vial HCl preserved	A	NA		2.6	Y	Absent		COMP-VOA()
L1821136-04D	Vial HCl preserved	A	NA		2.6	Y	Absent		COMP-VOA()
L1821136-04E	Vial HCl preserved	A	NA		2.6	Y	Absent		COMP-VOA()
L1821136-04F	Vial HCl preserved	A	NA		2.6	Y	Absent		COMP-VOA()
L1821136-04G	Vial HCl preserved	A	NA		2.6	Y	Absent		COMP-VOA()
L1821136-04H	Vial HCl preserved	A	NA		2.6	Y	Absent		COMP-VOA()
L1821136-04I	Vial HCl preserved	A	NA		2.6	Y	Absent		COMP-VOA()
L1821136-04J	Vial HCl preserved	A	NA		2.6	Y	Absent		COMP-VOA()
L1821136-04K	Vial HCl preserved	A	NA		2.6	Y	Absent		COMP-VOA()
L1821136-04L	Vial HCl preserved	A	NA		2.6	Y	Absent		COMP-VOA()
L1821136-05A	Vial HCl preserved	A	NA		2.6	Y	Absent		NYTCL-8260(14)

*Values in parentheses indicate holding time in days

Project Name:	ESSEX/HOPE	**Lab Number:**	L1821136
Project Number:	699900.01.RT.OM	**Report Date:**	06/13/18

GLOSSARY

Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

1	- The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A	- Spectra identified as "Aldol Condensation Product".
B	- The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related

Report Format: DU Report with 'J' Qualifiers

Project Name:	ESSEX/HOPE	**Lab Number:**	L1821136
Project Number:	699900.01.RT.OM	**Report Date:**	06/13/18

Data Qualifiers

projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

J - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

ND - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

Report Format: DU Report with 'J' Qualifiers

Project Name:	ESSEX/HOPE	**Lab Number:**	L1821136
Project Number:	699900.01.RT.OM	**Report Date:**	06/13/18

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
EPA 300: DW: Bromide
EPA 6860: SCM: Perchlorate
EPA 9010: NPW and SCM: Amenable Cyanide Distillation
SM4500: NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, EPA 351.1, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D.**
EPA 624: Volatile Halocarbons & Aromatics,
EPA 608: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Be, Cd, Cr, Cu, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

NEW YORK CHAIN OF CUSTODY

ALPHA ANALYTICAL

Westborough, MA 01581 — 8 Walkup Dr. — TEL: 508-898-9220 — FAX: 508-898-9193

Mansfield, MA 02048 — 320 Forbes Blvd — TEL: 508-822-9300 — FAX: 508-822-3288

Service Centers
Mahwah, NJ 07430: 35 Whitney Rd, Suite 5
Albany, NY 12205: 14 Walker Way
Tonawanda, NY 14150: 275 Cooper Ave, Suite 105

Page 1 of 1

Date Rec'd in Lab: 6/8/18

ALPHA Job #: L1821136

Client Information

Client: CH2M Hill / Jacobs
Address: 1 Tremont St Boston MA
Phone:
Fax:
Email: Kyle.Block@CH2M

Project Information

Project Name: ESSEX / Hope
Project Location: Amesbury
Project #: 699906.01.RT.001
(Use Project name as Project #) ☐
Project Manager: Kyle Block
ALPHAQuote #:

Turn-Around Time

Standard ☐ Due Date:
Rush (only if pre approved) ☐ # of Days:

Deliverables

☐ ASP-A ☐ ASP-B
☐ EQuIS (1 File) ☐ EQuIS (4 File)
☐ Other

Billing Information

☒ Same as Client Info
PO #

Regulatory Requirement

☐ NY TOGS ☐ NY Part 375
☐ AWQ Standards ☐ NY CP-51
☐ NY Restricted Use ☐ Other
☐ NY Unrestricted Use
☐ NYC Sewer Discharge

Disposal Site Information

Please identify below location of applicable disposal facilities.
Disposal Facility:
☐ NJ ☒ NY
☐ Other:

☐ These samples have been previously analyzed by Alpha

Other project specific requirements/comments:
Composite all 4 Post CARB Samples Report as Post-CARB-20180607

Please specify Metals or TAL.

ANALYSIS

VOC 8260

Sample Filtration
☐ Done
☐ Lab to do
Preservation
☐ Lab to do
(Please Specify below)

Total # Bottles

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	VOC 8260	Sample Specific Comments	Total # Bottles
21136 - 01	Pre-Carb-20180607	6/7/18	0800			X		3
02	Primary-Eff-20180607		0805			X		3
03	Post-CARB-20180607-1		0810			X		3
03 04	Post-CARB-20180607-2		0840			X		3
03 05	Post-CARB-20180607-3		0910			X		3
03 06	Post-CARB-20180607-4		0940			X		3
03	TRIP BLANK		—			X		2

Preservative Code:
A = None
B = HCl
C = HNO_3
D = H_2SO_4
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
K/E = Zn Ac/NaOH
O = Other

Container Code
P = Plastic
A = Amber Glass
V = Vial
G = Glass
B = Bacteria Cup
C = Cube
O = Other
E = Encore
D = BOD Bottle

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Container Type	V									
Preservative	B									

Relinquished By:	Date/Time	Received By:	Date/Time
	06/07/18 0945	AOL	6/7/18 0945
Josh Gowing			
AOL	6/7/18 1150		6/8/18 1130

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. BY EXECUTING THIS COC, THE CLIENT HAS READ AND AGREES TO BE BOUND BY ALPHA'S TERMS & CONDITIONS. (See reverse side.)

Form No: 01-25 HC (rev. 30-Sept-2013)

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Mr. Michael V. Saar, P.E.
Water Resources Manager
Division of Wastewater/Solid Waste
City of Jamestown Board of Public Utilities
P.O. Box 700
Jamestown, NY 14702-0700

January 15, 2019

Subject: Essex-Hope Jamestown Site, 125 Blackstone Ave, Jamestown, NY 14701
Semiannual Self-Monitoring Report for July through December 2018
City of Jamestown Board of Public Utilities (BPU) Permit No. 26

Dear Mr. Saar,

Jacobs Engineering Group Inc. (Jacobs) has prepared this Semiannual Self-Monitoring Report on behalf of the Essex Specialty Products, Inc. facility in Jamestown, New York (Essex-Hope site), which is classified as a Significant Industrial User subject to Categorical Pretreatment Standards. This report has been prepared in accordance with 40 *Code of Federal Regulations* (CFR) § 403.12, and the requirements set forth in the City of Jamestown BPU Industrial Wastewater Discharge Permit No. 26 (renewed on November 4, 2017 and included as Attachment 1). This report summarizes groundwater treatment operations and metrics completed between July 1 and December 31, 2018.

Self-monitoring reporting requirements applicable to the Essex-Hope site are detailed in Table 1 (attached), and include the following:

- Monthly concentrations of Total Toxic Organics (TTOs) in discharge to the publicly owned treatment works (POTW)
- Monthly pH measurements of discharge to the POTW
- Monthly flow rate measurements of discharge to the POTW
- Estimated daily average and maximum flow rates

Monthly discharge flow totals for the reporting period ranged from 165,634 to 196,160 gallons. These monthly discharge flows were consistently higher compared to those in previous reporting periods because of the limited amount of shutdown time during the current reporting period. Daily average flow rates shown in Table 1 were estimated based on totalizer readings for volume of water discharged at the beginning and end of each month. Daily maximum flow rates were estimated to be 20 percent greater than daily averages.

Acetone is not considered a TTO; however, for informational purposes only, the total mass of this constituent discharged per month to the POTW is also included in Table 1. Acetone mass in the discharge for this reporting period corresponds to approximately 0.01 pound.

No noncompliance events occurred between July 1 and December 31, 2018. The treatment system was shut down for approximately 190 consecutive hours for a granular activated carbon (GAC) changeout performed on November 7, 2018, and subsequent required carbon hydration time.

The supporting Laboratory Certificates of Analysis for the reported concentrations of volatile organic compounds performed by Alpha Analytical, Inc. (Westborough, Massachusetts) are included as Attachment 2.

We trust that this submittal satisfies the reporting requirements pursuant to 40 CFR § 403.12. Please contact me at 617.626.7013 should you have any questions or comments regarding the Essex-Hope site.

Regards

Jacobs Engineering Group Inc.

Kyle Block
Project Manager

Copies to: Tim King (Essex-Hope)
Maurice Moore (NYSDEC)

Attachments: Table 1 July – December 2018 Post-Carbon (Effluent) Monitoring Data
City of Jamestown BPU Industrial Wastewater Discharge Permit Number 26
Laboratory Analytical Reports – July, August, September, October, November, and December 2018

Table

Table 1. July – December 2018 Post-Carbon (Effluent) Monitoring Data

Semiannual Self-Monitoring Report for July through December 2018, Essex-Hope Site, Jamestown, New York

Reporting Requirements for Pre-Treated Discharge (System Effluent to POTW)	Units	Industrial Wastewater Discharge Permit #26 Effluent Limits	July	August	September	October	November	December
POTW Discharge Analytical Data								
Total TTOs	µg/L	2,130	555	1,500	146	942	108.8	57.4
Detected TTO Compounds	--	Report	Chloroethane, Trichloroethene, Vinyl Chloride	Vinyl Chloride	Chloroethane, Trichloroethene, Vinyl Chloride	Chloroethane, Vinyl Chloride	cis-1,2-Dichloroethene, Trichloroethene, Vinyl Chloride	cis-1,2-Dichloroethene, Trichloroethene, Vinyl Chloride
pH	Standard units	5.5 to 10	7.06	6.65	6.78	6.77	6.76	7.11
			6.89	6.77	6.77	6.8	6.79	6.69
			6.95	6.80	6.85	6.78	6.85	6.74
			7.12	6.95	6.83	6.82	6.91	6.78
Acetone Discharged	Pounds	No limit	0.008	0	0.002	0	0.003	0
POTW Discharge Flow Data								
Monthly Total Flow	US gallons	Report	165,634	174,477	186,897	196,160	182,590	194,693
Average Daily Flow	US gallons	Report	5,712	4,847	6,922	7,265	5,072	6,714
Maximum Daily Flow	US gallons	Report	6,854	5,816	8,307	8,718	6,086	8,056

Notes:

1. Jamestown BPU Industrial Wastewater Discharge Permit No. 26 was renewed in November 2017, effective November 4, 2017, through November 3, 2022.
2. VOCs sample is a laboratory-prepared composite of four grab samples collected from the pretreatment system discharge to the POTW at 30-minute intervals.
3. pH measurements recorded are concurrent with the time of each post-carb (effluent) grab sample.
4. Maximum Daily Flow is estimated to be 20 percent greater than Average Daily Flow.
5. System granular activated carbon was changed out on November 7, 2018.

µg/L = micrograms per liter

POTW = publicly owned treatment works

TTO = Total Toxic Organic

VOC = volatile organic compound

Attachment 1
City of Jamestown BPU Industrial Wastewater Treatment Permit

JAMESTOWN BOARD OF PUBLIC UTILITIES

PO Box 700
Jamestown, NY 14702-0700
Phone (716) 661-1673
Fax (716) 661-1617

ELECTRIC
DISTRICT HEAT
WATER
WASTEWATER
SOLID WASTE

November 2, 2017

Mr. Kyle Block
CH2M
18 Tremont St
Boston, MA 02108

Dear Mr. Block:

Please find enclosed a copy of your firm's renewed Industrial Waste Discharge Permit governing the wastewater discharge (s) from your facility to the Jamestown Publicly Owned Treatment Works (POTW). The effective dates of the permit are shown on the first page of the permit. This permit is subject to change should there be any additions and/or deletions made to the industrial pretreatment programs as established by the Environmental Protection Agency.

Please review your permit carefully as it may include changes from your previous permit. Should you have any questions or comments concerning your permit, please do not hesitate to contact this office.

Sincerely,

Michael V Saar, P.E.
Deputy General Manager

CITY OF JAMESTOWN
BOARD OF PUBLIC UTILITIES
INDUSTRIAL WASTEWATER DISCHARGE PERMIT

PERMIT NUMBER	26
INDUSTRY NAME	Essex Specialty Products, Inc
INDUSTRY ADDRESS	124 Blackstone Avenue, Jamestown
SIC NUMBER	Groundwater Remediation
DATE ISSUED	11/4/17
EXPIRATION DATE	11/3/22

Essex Specialty Products, Inc. as a Significant Industrial User (SIU) of the City of Jamestown Publicly Owned Treatment Works (POTW), is hereby issued an industrial wastewater discharge permit pursuant to Chapter 24A of the Jamestown City Code (Jamestown Sewer Use Ordinance) and also with any applicable provisions of federal or state law(s) or regulation(s). Said permit shall be effective for a period of five years from the date of issuance hereof.

This permit is granted in accordance with the application filed on March 12,1996 and notice of process modifications submitted on N/A and in conformity with the plans, specifications, semi-annual self monitoring reports, and other data submitted to the City in support of the above application, all of which are filed with and considered as part of this permit, together with the following named conditions and requirements:

Effective this 4th day of November , 2017
To expire the 3th day of November , 2022

Deputy General Manager - Board of Public Utilities

RIGHT OF ENTRY

The permittee shall allow duly authorized employees or representatives of the City to enter the permittee's premises for the purpose of inspection, observation, measurement, sampling, and testing in accordance with Article VIII of the Jamestown Sewer Use Ordinance.

SAMPLING MANHOLE REQUIREMENTS

If, in the opinion of the General Manager, there are not adequate facilities for the acquisition of representative samples and accurate flow measurements, the General Manager may require that a sampling manhole with flow measuring device be installed by the permittee at his expense. This sampling manhole shall be approved by this office before installation. The permittee shall be responsible for all maintenance of the sampling manhole and calibration of the monitoring equipment.

BOARD OF PUBLIC UTILITES MONITORING

Compliance with the Jamestown Sewer Use Ordinance will be monitored via wastewater discharge monitoring. The City of Jamestown will monitor each SIU four times per year. Results will be transmitted to each SIU.

SELF MONITORING

Essex Specialty Products, Inc. must conduct monthly self-monitoring and report results to the City in accordance with applicable federal and local regulations. Monthly reports are due each **August 1** (including months January through June) and **February 1** (including months July through December). Essex Specialty Products, Inc. must notify the City of any violation of its self-monitoring within 24 hours. Such notification shall include a phone call followed up by a letter. All permit limits set forth in this permit are enforceable effluent limitations.

MONITORING LOCATION
SAMPLING VALVE

PARAMETER	SAMPLE	LOCAL
	Monthly	LIMIT
		MG/L
PH (4 grabs)	X	5.5-10.0
TSS (comp)		350
OIL & GREASE		100
CADMIUM (comp)		0.30
CHROMIUM (comp)		4.00
COPPER (comp)		1.25
LEAD (comp)		0.30
NICKEL (comp)		0.90
SILVER (comp)		0.20
ZINC (comp)		3.00
CYANIDE (comp)		0.65
Volatile Organics (4 grabs)	X	2.13

Notes :

1. Samples should be taken as **composites** of at least 4 grab samples collected during a typical production day except for pH. Four separate samples must be taken and **individually analyzed for pH.**
2. All analysis shall be preformed by a New York State Department of Health Certified Environmental Laboratory.
3. All analysis shall be performed in accordance with the latest edition of the following references:
   a. Standard Methods for the Examination of Water and Wastewater
   b. Method for Chemical Analysis of Water and Wastes, USEPA, technology Transfer, 1983

PROHIBITED DISCHARGES

The following should not be introduced into the City Sewer system:

(1) Pollutants which create a fire or explosion hazard in the POTW, including, but not limited to, wastestreams with a closed cup flashpoint of less than 140 degrees Fahrenheit or 60 degrees Centigrade using the test methods specified in 40 CFR 261.21.
(2) Pollutants which will cause corrosive structural damage to the POTW, but in no case Discharges with pH lower than **5.5** or greater than **10.0**;
(3) Solid or viscous pollutants in amounts which will cause obstruction to the flow in the POTW resulting in Interference;
(4) Any pollutant, including oxygen demanding pollutants (BOD, etc.) released in a Discharge at a flow rate and/or pollutant concentration which will cause Interference with the POTW.
(5) Heat in amounts which will inhibit biological activity in the POTW resulting in Interference, but in no case heat in such quantities that the temperature at the POTW Treatment Plant exceeds 40 deg.C (104 deg.F) unless the Approval Authority, upon request of the POTW, approves alternate temperature limits.
(6) Petroleum oil, non-biodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through;
(7) Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity that may cause acute worker health and safety problems;
(8) Any trucked or hauled pollutants, except at discharge points designated by the POTW.
(9) The discharge of concentrated solutions without pretreatment is strictly prohibited. Any request to discharge such wastes must be submitted to this office and is subject to the approval of the General Manager on a case by case basis.
10) Any water or waste containing fats, wax, grease, oils, or oil products, whether emulsified or not, in excess of **100 mg/l**.

HAZARDOUS WASTE DISCHARGE NOTIFICATION

For discharges of listed and characteristic hazardous wastes which are not already reported in periodic self-monitoring reports and which exceed 15 kilograms per month, the regulations require that all industrial users notify USEPA, NYSDEC, and the City of Jamestown as to the constituents of these wastes and the anticipated discharge volume of such wastes on both a monthly and an annual basis.

CHANGE IN WASTEWATER DISCHARGE

All discharges authorized herein shall comply with the terms and conditions of this permit. Any industrial facility expansions, production increases, or process modifications which result in new, different, or increased discharges of pollutants must be reported by submission of a new industrial waste disposal questionnaire. This permit may be modified to specify and limit any pollutants not previously limited. The discharge of any pollutant more frequently than or at a level in excess of that specified and authorized by this permit shall constitute a violation of the terms and conditions of this permit.

RECORDKEEPING

The permittee shall retain all records of monitoring activities and results (whether or not required by this permit) for a minimum of 3 years. These records shall be made available for inspection and copying to duly authorized employees or representatives of the City. This period of retention shall be extended during any unresolved litigation.

PERMIT MODIFICATIONS

After sufficient notice to the permittee, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including, but not limited to, the following:

(a) Violation of any terms or conditions of this permit.
(b) A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.
(c) If an effluent standard is established under any state or federal law for a pollutant which is present in the discharge and such standard or prohibition s more stringent that any limitation for such pollutant in this permit.

PERMIT TRANSFER

Sewer Use Permits are issued to a specific User for a specific operation. A wastewater discharge permit shall not be reassigned or, transferred, or sold to a new owner, new User, different premise, or a new or changed operation without the approval of the City. Any succeeding Owner or User shall also comply with the terms and conditions of the existing permit.

NOTICE OF NON-COMPLIANCE

The permittee shall notify the operator of the Jamestown Wastewater Treatment Plant **immediately,** by telephone (665-3980), so that the operator can take the necessary steps to prevent damage to the wastewater treatment process and equipment in the event the permittee:

(1) Does not comply with or will be unable to comply with any daily maximum effluent limitation specified in this permit.
(2) Discharges or may discharge any wastewater which may cause a slug loading to the Jamestown Wastewater Treatment Plant. This includes wastewater which may cause pass through or interference with wastewater treatment plant operations.
(3) Discharges or may discharge any material or wastewater which is prohibited from discharge as described in the City of Jamestown Local Sewer Use Ordinance or this permit.

These non-complying discharges or possible discharges may be due to:

Breakdown of industrial wastewater pretreatment equipment;
Accidents caused by human error or negligence; or
Other causes, such as acts of nature.

The General Manager shall be notified by telephone within 24 hours, and in writing within five (5) days and said notification shall include the following pertinent information:

(1) A description of the non-complying discharge;
(2) Cause of non-compliance;
(3) Anticipated time the condition of non-compliance is expected to continue, or if such condition has been corrected, the duration of the period of non-compliance;
(4) Steps taken by the permittee to reduce and eliminate the non-complying discharge; and
(5) Steps to be taken by the permittee to prevent reoccurrence of the condition of non-compliance.

The permittee must also repeat sampling for all parameters exceeding discharge limitations and submit the results of the repeat analysis within thirty (30) days of the violation(s).

Nothing in this permit shall be construed to relieve the permittee from the penalties for non-compliance of this permit for any reason subject to Article (IX) (Penalties) of the Jamestown Sewer Ordinance.

SCHEDULE OF COMPLIANCE

The permittee shall comply with the following schedule if the present discharge does not conform to the effluent limitations described within this permit:

a. By _____ the permittee shall have a registered Professional Engineer contact this office.
b. By _____ the permittee shall complete an engineering report and submit it to this office.
c. By_____ the permittee shall complete final plans and specifications for pretreatment facilities and submit them to this office for review and approval.
d. By _____ the permittee shall start construction of its approved pretreatment facilities.
e. By _____ the permittee shall complete construction of the pretreatment facilities.
f. By _____ the permittee shall attain operational levels required to achieve the effluent limits specified within this permit.

CIVIL AND CRIMINAL PENALTIES

A permittee found violating applicable local, state or federal regulations may be subject to administrative penalties, civil action, and/or criminal prosecution. If administrative penalties are warranted, a fine in an amount not exceeding $1000.00 per day per violation may be assessed. If criminal penalties are assessed, a fine in an amount not exceeding $1,000.00 per violation per day may be assessed, imprisonment for not more than 6 months, or both. Any person violating applicable local, state or federal regulations that results in expense, loss or damage to the City and its property shall be liable for all costs.

Attachment 2
Laboratory Analytical Reports
July, August, September, October, November, and December 2018 **(CD)**