IBM
8976 Wellington Road
Manassas, VA 20109

January 20, 2020

Gary Priscott
New York State Department of Environmental Remediation
1679 Route 11
Kirkwood, NY 13795

Re: Periodic Review Report and IC/EC Certification Submittal
IBM Gun Club, Former Burn Pit Area
Robinson Hill Road, Union, NY 13760
NYSDEC Site # C704044

Dear Mr. Priscott:

This letter serves to transmit copies of the Periodic Review Report and required IC/EC Certifications to the New York State Departments of Conservation (NYSDEC). The remedy performance monitoring work and the preparation of this report were completed by Sanborn, Head Engineering, P.C. (SHPC) in accordance with NYSDEC-approved Site Management Plan (SMP) for this project.

If you have any questions regarding the enclosed report, please contact me at 703-257-2580.

Very truly yours,

Stephen P Brown

Stephen Brown
IBM Program Manager

Enclosures: 2019 Periodic Review Report and Certification Form

cc: Kevin O'Hara (Binghamton Country Club)
Eamonn O'Neil (NYSDOH)
Maureen Schuck (NYSDOH)
Harry Warner (NYSDEC)

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Building Trust. Engineering Success.

20 Foundry Street
Concord, NH 03301

Stephen Brown, P.E.
IBM Corporate Environmental Affairs
8976 Wellington Road
Manassas, Virginia 20109

January 20, 2020
File No. 3526.05

Re: 2019 Periodic Review Report
IBM Gun Club – Former Burn Pit Area
Union, New York
BCP Agreement #C704044

Dear Mr. Brown:

The attached document comprises the Periodic Review Report (PRR) for 2019 for the above-referenced site. The PRR has been prepared on behalf of IBM by Sanborn, Head Engineering P.C. (SHPC) for submittal to the New York State Department of Environmental Conservation (NYSDEC) and Department of Health (NYSDOH), collectively the Agencies, in accordance with the requirements of the Site Management Plan of April 2016 (SMP). We understand that a copy of this PRR will be provided to the Binghamton Country Club (Country Club), who took ownership of the site at the end of 2015.

This report includes a comprehensive remedy evaluation, currently being conducted every two years, as well as the required annual Institutional and Engineering Controls Certification Form for the period from January 1 to December 31, 2019, which precedes the body of the PRR. For the PRR Certification, the items in boxes 1, 2, and 3 list the questions/statements that the Country Club as the site owner has certified by adding a signature in Box 6. The items in Box 2A are technical matters pertaining to past Remedial Investigation reporting that SHPC certifies as IBM's Designated Representative based on our site inspections conducted in 2019. Additionally, SHPC, as representative of the remedial party (IBM), has endorsed Box 7, certifying that the information provided in Box 4 (pertaining to ECs), and Box 5 (overall certification) is true.

For clarity, a tabular summary is provided below of the certification responsibilities of the Country Club, as site owner, and SHPC, as representative of the remedial party, IBM:

Binghamton Country Club	SHPC for IBM
▪ Box 1 and 2, Questions 1 through 6 – Institutional Controls ▪ Box 3 – Institutional Controls	▪ Box 2, Question 7 – Engineering Controls ▪ Box 2A, Questions 8 and 9 ▪ Box 4 ▪ Box 5 – Based on Country Club Certification of Boxes 1 through 3

If you have any questions or comments, please contact us. We appreciate the opportunity to provide service to you on this important project.

Very truly yours,
SANBORN, HEAD ENGINEERING, P.C.

David Shea, P.E.
Sr. Vice President

Erica M. Bosse, P.G.
Project Manager

Encl. Executed Certification Form
2019 Periodic Review Report

P:\3500s\3526.02\Source Files\2019 PRR\2019 SHPC PRR cover letter.docx

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. **C704044**

Site Name IBM Gun Club, Burn Pit

Site Address: Robinson Hill Road Zip Code: 13760
City/Town: Union
County: Broome
Site Acreage: 15.590

Reporting Period: January 1, 2019 to December 31, 2019

	YES	NO
1. Is the information above correct?	☑	☐
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?	☐	☑
3. Has there been any change of use at the site during this Reporting Period (see 6NYCRR 375-1.11(d))?	☐	☑
4. Have any federal, state, and/or local permits (e.g., building, discharge) been issued for or at the property during this Reporting Period?	☐	☑
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?	☐	☑

Box 2

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

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.

Not applicable

Signature of Owner, Remedial Party or Designated Representative — Date

Box 2A

		YES	NO
8.	Has any new information revealed that assumptions made in the Qualitative Exposure Assessment regarding offsite contamination are no longer valid?	☐	✓
	If you answered YES to question 8, include documentation or evidence that documentation has been previously submitted with this certification form.		
9.	Are the assumptions in the Qualitative Exposure Assessment still valid? (The Qualitative Exposure Assessment must be certified every five years)	✓	☐
	If you answered NO to question 9, the Periodic Review Report must include an updated Qualitative Exposure Assessment based on the new assumptions.		

SITE NO. C704044 **Box 3**

Description of Institutional Controls

Parcel	Owner	Institutional Control
126.18-1-20	Binghamton Country Club	Ground Water Use Restriction Soil Management Plan Landuse Restriction Monitoring Plan Site Management Plan O&M Plan

The site is covered by an Environmental Easement which calls for the adhearence to a Site Management Plan (SMP). The property is restricted from use as a farm and/or a livestock breeding facility via local odinance/zoning. Residential use is allowed throughout the property, except for within the capped area, where restricted residential use is allowed. Groundwater use restrictions apply throughout the site, and a requirement to assess and abate impacts, if any, for soil vapor contamination applies throughout the site as well. Off site property within the contaminated plume area is also controlled institutionally via agreement between IBM and the owners of the Broome County Country Club. This agreement restricts groundwater use in a manner consistent with the above, and similarly requires assessment and abatement, as needed, for soil vapor contamination.

Box 4

Description of Engineering Controls

Parcel	Engineering Control
126.18-1-20	Groundwater Treatment System Cover System Fencing/Access Control

The site contains a capped area that is covered via Environmental Easement and is managed through the SMP. Groundwater is being treated in-situ via an enhanced biological degradation system.

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
☑	☐

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
☑	☐

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.

Not applicable
____ ____________________
Signature of Owner, Remedial Party or Designated Representative Date

IC CERTIFICATIONS
SITE NO. C704044

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 Kevin P. O'Hara at 1401 Robinson Hill Rd, Endwell NY,
print name print business address

am certifying as Binghamton Country Club (Owner or Remedial Party)

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

KPOH 1/17/20

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

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 David Shea, P.E. at Sanborn Head Engineering, P.C., 20 Foundry St, Concord, NH 03301
print name / print business address

am certifying as a Professional Engineer for the IBM Corporation, Remedial Party
(~~Owner or~~ Remedial Party)

STATE OF NEW YORK
DAVID SHEA
70026
LICENSED PROFESSIONAL ENGINEER

David Shea

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

Stamp (Required for PE)

1/20/2020
Date

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2019 PERIODIC REVIEW REPORT

FORMER BURN PIT AREA

IBM Gun Club

Union, New York

NYSDEC Site # C704044

BCA Index # B7-0661004-05

Prepared for IBM Corporate Environmental Affairs

File No. 3526.05

January 2020

TABLE OF CONTENTS

EXECUTIVE SUMMARY 1

1.0 SITE OVERVIEW AND SUMMARY 2
- 1.1 Summary of Site Remedy 2
- 1.2 Remedial Action Performance Objectives and Measures of Success 4
- 1.3 Organization of the Report 4

2.0 SITE INSPECTIONS AND MAINTENANCE 4
- 2.1 Site Inspections 4
- 2.2 Routine Maintenance 6
- 2.3 Non-Routine Maintenance 6

3.0 REMEDY PERFORMANCE MONITORING RESULTS AND EVALUATION 6
- 3.1 Climatic and Water Level Conditions during the Monitoring Period 8
- 3.2 Quality Assurance and Assessment of Data Usability against Measurement Performance Criteria 9
- 3.3 Geochemical Conditions 10
  - 3.3.1 Total Organic Carbon (TOC) and Volatile Fatty Acids (VFAs) 11
  - 3.3.2 Inferred Geochemical Conditions 12
- 3.4 VOCs in Water Samples 13

4.0 SITE EVALUATION 18
- 4.1 Compliance with the Site Decision Document 18
- 4.2 Operation and Effectiveness of the Remedy 19
  - 4.2.1 Establishment and Maintenance of Geochemical Conditions throughout and outside of Primary Source Rock 19
  - 4.2.2 Reduction in TCE Prevalence and Concentration in the Injection Displacement Zone 20
  - 4.2.3 Reduction in Apparent Downgradient VOC Mass Discharge and Improvement in Downgradient Response to Injection 20
- 4.3 Evaluation of Possible Modifications to the Remedy and Performance Monitoring Program 22

5.0 CONCLUSIONS 23

TABLES

Table 1 Summary of Events during the Certification Period
Table 2 Summary of Groundwater Data – RI Site Contaminants
Table 3 Summary of Groundwater Data – Non-RI Site Contaminants
Table 4 Summary of Water Quality Data – Surface Water

FIGURES

Figure 1 Site Location Plan
Figure 2 Summary of Site Remedy
Figure 3 Monitoring Location Plan
Figure 4 Summary of Geochemical Conditions – Sulfate Reducing
Figure 5 Summary of Geochemical Conditions – Methanogenic Conditions
Figure 6 Key VOC Concentrations in Groundwater and Seeps - June 2019

EXHIBITS

Exhibit 1.1 Goals and Short-Term Measures of Success Outlined in the SMP…………………3
Exhibit 3.1 Precipitation Records 2018-2019……………………………………………………………7
Exhibit 3.2 Total Organic Carbon Data Recorded for Samples from Select Monitoring Wells………………………………………………………………………………………………10
Exhibit 3.3 Total Volatile Fatty Acids (VFA) Data Recorded for Samples from Select Monitoring Wells ……………………………………………………………………………11
Exhibit 3.4 Molar Concentrations of TCE and Breakdown Products for BP-2A……………..13
Exhibit 3.5 Molar Concentrations of TCE and Breakdown Products for Borehole B-9…..14
Exhibit 3.6 Molar Concentrations of TCE and Breakdown Products for BP-9A…………....15
Exhibit 3.7 Molar Concentrations of TCE and Breakdown Products for BP-39A…………..16
Exhibit 4.1 Tabular Summary of Order of Magnitude (Oom) TCE Reductions in Monitoring Locations within or Near the Injection Displacement Zone………19
Exhibit 4.2 Estimated VOC Mass Discharge in Units of Grams per Day (g/day) Based on Monitoring Data Recorded for Injection Boreholes B-4, B-7 and B-9…………20
Exhibit 4.3 TCE Concentrations Over Time in Four Downgradient Wells Located Proximate and South of the Property Boundary ….………………………………….…..21

APPENDICES

Appendix A Limitations

Appendix B Inspection and Maintenance Reports
- Appendix B.1 Site-Wide Inspection Report – September 2019
- Appendix B.2 Routine Maintenance Reports
- Appendix B.3 Non-Routine Maintenance Reports

Appendix C Field Sampling Documentation
- Appendix C.1 Summary of March 2019 Water Quality Monitoring
- Appendix C.2 Summary of June 2019 Water Quality Monitoring
- Appendix C.3 Summary of October 2019 Water Quality Monitoring

Appendix D Time Series Plots for Current Monitoring Locations

EXECUTIVE SUMMARY

This annual Periodic Review Report (PRR) for 2019 for the Former Burn Pit Area at the IBM Gun Club in the Town of Union, New York presents a comprehensive evaluation of the remedy and the required annual Institutional Controls/Engineering Controls (ICs/ECs) certification for the period from January 1 to December 31, 2019. The remedy is addressing the presence of volatile organic compounds (VOCs) in groundwater, principally trichloroethene (TCE) and its biochemical breakdown products. The remedy was constructed, initiated, and is being operated consistent with the Site-specific Decision Document and the Site Management Plan, and meets or exceeds the NYSDEC guidance for Green Remediation. Use of the Site and surrounding area are in accordance with the Environmental Easement.

The overall goals of the site remedy are to:

1. Reduce VOC contaminant source mass;
2. Substantially limit the transport of VOCs in groundwater from the source area; and
3. Enhance biochemical processes outside of the primary source area (downgradient) without accumulation of toxic breakdown products.

To achieve these goals, various in-situ measures, including a soil cap and soil fill, phytoremediation, and enhanced biochemical degradation were implemented beginning in 2013, with construction completed in 2014. The available performance monitoring data continue to indicate that the engineering controls are operating effectively and have generally met the short-term measures of success at the five-year mark (2019), while also making progress towards the overall long-term remedy performance goals, in that:

- The data indicate that biochemical degradation is proceeding throughout the primary source rock as evidenced by geochemical conditions favorable to VOC breakdown and the decreased proportion of the principal contaminant, trichloroethene (TCE);
- The data also indicate that the contaminant mass discharge from the rock mass serving as the primary source of VOCs in groundwater is largely controlled; and
- The data support in-situ destruction by biochemical degradation to non-toxic end products, with no significant adverse effects such as accumulation or downgradient transport of degradation products.

While the remedy continues to meet its short-term goals and is making progress on its long-term goals, the remedy is expected to operate for decades. At this time, no major modifications to the remedy are planned, but data and operations will continue to be analyzed for possible future improvements. An injection of edible oil, along with a phytoremediation assessment, are planned for 2020. Monitoring and reporting of performance will continue as required in the SMP.

Ownership of the Site was transferred from IBM to Binghamton Country Club (BCC) on December 30, 2015. IBM continues to manage the ECs and reporting, while BCC is responsible for compliance with the ICs. Since the ownership change, the site use has not changed, and all the ICs have been adhered to.

1.0 SITE OVERVIEW AND SUMMARY

This annual Periodic Review Report (PRR) for 2019 summarizes the operations, maintenance, and monitoring of the engineered remedy for the IBM Gun Club-Former Burn Pit Area (BPA), located in Broome County and the Town of Union, New York (the Site), as shown on the Site Location Plan included as Figure 1. This report includes a comprehensive remedy evaluation, currently being conducted every two years, as well as the required annual certification of the Institutional Controls and Engineering Controls (ICs/ECs) for the period from January 1 to December 31, 2019. The executed IC/EC Certification Form is attached to the beginning of this document.

To address the presence of volatile organic compounds (VOCs) in Site groundwater, principally trichloroethene (TCE) and its biochemical breakdown products, the engineered remedy is a combination of enhanced biochemical degradation, an engineered soil cap, and phytoremediation. Following remedy construction and implementation during 2013 and 2014, a Certificate of Completion (COC) for the Site was issued on November 12, 2014 by the New York State Department of Environmental Conservation (NYSDEC). Thus, the remedy has been in place for about 5 years.

This report and the work it summarizes were conducted in accordance with the amended Site Management Plan (SMP) of April 2016.[1] The SMP describes the approved program of routine and non-routine maintenance and performance monitoring, and the associated reporting. Table 1 lists the work events at the Site during 2019.

This work and report were completed on behalf of the International Business Machines Corporation (IBM) by Sanborn Head Engineering, P.C. (Sanborn Head). We understand that IBM will submit this report to NYSDEC and the New York State Department of Health (NYSDOH), referred to as the Departments. The report will also be provided to the Binghamton Country Club, the current owner of the Site.

1.1 Summary of Site Remedy

Figure 2 provides a summary of the remedy, which includes the following engineering control components (ECs), along with the institutional controls (ICs):

1. **An engineered soil cap** constructed of low-permeability, clean soil fill that provides a minimum of 2 feet of cover over near-surface soils that contain certain metals at concentrations above New York State (NYS) soil cleanup objectives (SCOs) established for residential property use (Residential SCOs).

---

1 Sanborn, Head & Associates, Inc., December 13, 2013, amended April 2016, Site Management Plan, Brownfield Cleanup Program, IBM Gun Club – Former Burn Pit Area, Union, New York, NYSDEC Site #C704044, BCA Index # B7-0661004-05.

2. **Placement and compaction of engineered soil fill within a topographic depression south of the BPA,** where VOC-containing groundwater had historically been observed to breakout to the ground surface as seasonal seeps and springs.

3. **Phytoremediation -** Establishment and maintenance of grass and tree cover to limit infiltration recharge to groundwater and enhance direct uptake of VOC-containing shallow groundwater, a process known as phytoremediation; and

4. **Enhanced biochemical degradation (EBD) –** The injection into the subsurface of engineered amendments (edible soybean oil) shown to enhance biochemical destruction of VOCs in site-specific pilot testing.

EBD and phytoremediation are intended to address the on-going presence of VOCs in groundwater and bedrock beneath the Site. Initiation of the EBD component of the remedy on a site-scale began in early December 2013 with the first introduction of edible oil as an electron donor amendment into the A-series boreholes. Cap construction and planting of trees and grass that constitute the phytoremediation component of the remedy was completed by June 2014.

The ICs established as a part of the remedy and adhered to during the certification period include:

- The property may only be used for restricted residential, commercial, and industrial uses within the deed restricted cap area. Residential, restricted residential, commercial, and industrial uses throughout the remainder of the Site are not precluded, although land use is subject to local zoning laws provided that the long-term ECs/ICs included in this SMP are employed;

- The property may not be used for a higher level of use, such as unrestricted use, without additional remediation and amendment of the Environmental Easement, as approved by NYSDEC;

- All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with the SMP;

- The use of the groundwater within and adjacent to the mapped plume as depicted on Figure 2, or as updated based on groundwater monitoring, is prohibited as a source of potable or process water, without treatment rendering it safe for intended use as determined by the NYSDOH or County DOH;

- A provision for evaluation of the potential for soil vapor intrusion for any buildings constructed on-site, as well as for those constructed off-site within the plume area, including provisions for implementing actions recommended to address exposures related to soil vapor intrusion; and

- Single family housing, vegetable gardens, and farming are prohibited on the deed restricted cap area. The remainder of the Site meets Residential Soil Cleanup Objectives and is therefore not subject to any restrictions on single family housing and gardening, although farming is prohibited.

1.2 Remedial Action Performance Objectives and Measures of Success

The performance goals of the remedy established in the Remedial Work Plan (RWP), and carried through the SMP, include short- and longer-term measures of success that are expected to require decades to complete. The performance goals and measures of success to be assessed in the short term, defined as 5 years or less, are shown in Exhibit 1.1. Given the site-scale implementation of the remedy in July 2014, performance monitoring was evaluated against the short-term measures noted in Exhibit 1.1 through 2019. A detailed description of the effectiveness of the remedy against performance objectives is provided in Section 4.2. While categorized as short-term goals, these performance measures will continue to be evaluated in the long-term.

Remedy Goals	***Short Term Measures of Success (Less than 5 years)***
1. Sustained enhanced biochemical degradation (EBD) throughout Primary Source Rock	*2 orders of magnitude sustained reduction in TCE concentrations in injection displacement zone*
2. Limit Mass Flux Out of Primary Source Rock	*Downgradient response without accumulation of toxic breakdown products*
3. Enhance biochemical processes outside primary source rock	

Exhibit 1.1 - Goals and Short-Term Measures of Success Outlined in the Site Management Plan

1.3 Organization of the Report

Section 2.0 reviews operations and maintenance compliance during the past year and provides the results of Site inspections. Section 3.0 describes compliance with the monitoring plan, and provides observations and an analysis of the data, as contained in Appendix C. This section also provides the comprehensive two-year performance evaluation of the engineering controls. Section 4.0 demonstrates the compliance of the remedy with the site-specific decision document and the assessment of the remedy against its goals outlined in Exhibit 1.1. It also presents and discusses the recommendations for future monitoring and possible modifications to the remedy. Finally, Section 5.0 presents the conclusions.

2.0 SITE INSPECTIONS AND MAINTENANCE

Table 1 provides a chronological summary of Site inspection, maintenance, and monitoring work conducted in 2019. Inspection and maintenance forms are provided in chronological order in Appendix B for completeness.

2.1 Site Inspections

In accordance with the SMP, the frequency of routine site-wide inspections was reduced to once per year starting in 2017. The annual inspection was conducted in September 2019. During the site-wide inspection, the condition of the Site was found to be consistent with the design intent of the ECs and use of the Site and surrounding area consistent with the ICs and the human exposure assessment on which the remedy is based. Inspection findings were documented on the inspection check list and summarized in a letter to IBM dated October 22, 2019, which was submitted to the Departments and included in Appendix B.1. Summary observations were as follows:

- The capped area remains intact with no evidence of settlement, cracking, animal burrows, or other breaches;
- The capped area is vegetated with well-established grass and tree cover. According to the National Weather Service, the region was subject to average to below average precipitation in the three months preceding the September 2019 inspection;
- Based on an assessment of tree growth and mortality conducted in September 2019, poplar poles appear to have grown to an average height of 18 to 22 feet, while cuttings have grown to an average of 6 to 8 feet. Tree mortality since initial planting is shown on the figure included in Appendix B.1 and ranged from 21% to 50% across nine areas, with Area 4 exhibiting the highest mortality and Area 7 the lowest. Further discussion is provided below.
- The grass in the capped area was cut in in June and September without damage to cap or underlying material;
- The soil fill in the seep area, which was observed to be creeping downhill towards the southern access road during the 2018 inspection, was not observed to have changed or worsened since the 2018 inspection. Tree and grass coverage are well established and there is no evidence of slope failure;
- There is still evidence of trespassing and that the bonfire gathering spot on the southwest side of the remedial area near monitoring well BP-10A is being utilized, but remains outside of the capped and fenced area, and there was less debris present than during previous inspections.

Under the SMP, IBM had proposed to replant as needed to bring the tree cover up to 75% of the initial planting density, allowing for 25% mortality. We note that 25% mortality or lower was an arbitrary threshold for success. Greater than 25% mortality does not necessarily mean the phytoremediation component is not effective. In fact, tree growth has been substantial at many locations, including within the former topographic depression downgradient and south of the capped area where VOC-containing groundwater historically broke out as seasonal seeps and springs. The seeps and springs in this area have largely been eliminated due to the engineered fill and tree planting. Furthermore, less than 25% overall mortality may not be realistic or achievable in areas that exhibit conditions that are not conducive to tree growth (e.g. shallow bedrock, encroachment of woody brush, poor water infiltration in the capped area), and re-planting may lead to the same result.

Overall site average mortality recorded in September 2019 was approximately 35%, compared to 31% at the September 2018 inspection. IBM elected not to conduct re-planting in 2019 given: 1) the continuing growth progress of live trees, 2) the apparent stabilization of overall average mortality around or below 30% in Areas 5, 6, 7, and some improvements compared to September 2018, 3) a good portion of the mortality is located in areas outside of the primary and secondary source rock (Areas 1, 4, and 9), and 4) replanting would require tracking of mechanized equipment across the cap area, which might damage the cap and live trees.

Possible alternate measures of phytoremediation effectiveness other than the 25% mortality threshold are discussed in Section 4.3.

2.2 Routine Maintenance

Routine maintenance conducted during the reporting period included grass cutting as documented in Appendix B.2. The grass was cut throughout the tree planting areas in June and September 2019 by Groundwater Sciences Corporation (GSC) under contract directly with IBM. Sanborn Head coordinated with GSC personnel to define approximate mowing boundaries, which are shown on a figure included in the routine maintenance report as Appendix B.2.

2.3 Non-Routine Maintenance

Select A- and B-series boreholes were redeveloped in September 2019, as documented in the non-routine maintenance report included as Appendix B.3. As described in the sampling reports included in Appendix C, the VOC and geochemical data for 2019 indicated a muted response to the injection of edible oil amendment in August 2017. Additionally, approximately 75% of injection boreholes were observed to not accept amendment as readily during 2017 injection activities. We noted that emplacement of the amendment into fractures possibly reduced the effective permeability; therefore, we targeted 21 boreholes for redevelopment along the A- and B-line that are typically used for injection.

Re-development methods are described in Appendix B.3 and generally consisted of evacuation of standing water and amendment from the borehole, addition of clean water, while alternating surging and jetting the borehole sides. Visual observations suggested that non-mobile viscous and solidified standing amendment was removed from the boreholes, although observations of water level recovery suggested the flow into the boreholes was not materially improved as a result of the re-development process.

3.0 REMEDY PERFORMANCE MONITORING RESULTS AND EVALUATION

The principal contaminants driving the need for remediation at this Site are chlorinated ethenes, primarily trichloroethene (TCE) and its biochemical breakdown products, cis-1,2 dichloroethene (cDCE) and vinyl chloride (VC). Other VOCs were found in soil, rock, and groundwater during remedial investigation work at the Site, but less frequently and at lower concentrations relative to applicable standards. They included chlorinated methanes, chlorinated ethanes, ketones, and petroleum hydrocarbons. VOCs were the only contaminants identified as contaminants of concern (COCs) for groundwater, soil, and rock media, and are the subject of remedy performance monitoring.[2] Figure 3 provides a plan view of the

[2] Sanborn Head & Associates, Inc., August 5, 2009, Report of Findings, Brownfield Cleanup Program Remedial Investigation, IBM Gun Club – Former Burn Pit Area, Union New York. Tables 2 and 3.

monitoring network. Time-series graphs of principal chlorinated ethenes at current monitoring locations are provided in Appendix D.
Tabular and graphic summaries of the field and laboratory data obtained from three performance monitoring events conducted in March, June, and September 2019, are included in Appendix C. The scope of each sampling event and any deviations from the intended scope are documented in memoranda reports included in this appendix.

Table 2 provides a summary of sample analytical data for VOCs identified as principal site contaminants during the Remedial Investigation (RI). The VOC data are tabulated for the last two years since the last comprehensive review, along with basic descriptive statistics for the period prior to 2010, including minimum, maximum, median, and mean concentrations for comparison. The pre-2010 statistics are based on data recorded during the RI and pre-remedy monitoring, which provide a baseline prior to startup of the site-scale remedy.

The data continue to support chlorinated ethenes as the principal contaminants. The presence of chlorinated methanes, aromatics, and ketones were generally detected at a lower frequency and largely found in injection boreholes and monitoring wells central to the primary source rock.

The presence of carbon tetrachloride, also identified during the RI as one of the key Site contaminants, was detected at 14 locations, with one sample above the applicable standard (GC-2A in June 2019). In comparison, during the first comprehensive review representing the period November 2014 through December 2015, carbon tetrachloride was detected at 43 locations, with two locations above the applicable standard. Carbon tetrachloride was detected at 26 locations exceeding the standard during the RI (2005-2009).

Table 3 presents a summary of compounds not classified as RI Site contaminants, but included in the analytical suite, if detected above the laboratory reporting limit. Non-RI Site contaminants are detected infrequently, often at estimated values below the laboratory quantitation limit (J-flagged). Among the compounds routinely monitored, no new compounds were detected for the first time during this reporting period, and no non-RI compounds were detected at levels above applicable groundwater standards.

Table 4 provides a summary of the concentrations of detected RI site contaminants in surface water. Current and historical seep locations are depicted on Figure 3. A new seep (119) was encountered at the base of the seep fill cap area for the first time in June 2018, likely due to the well-above average precipitation in summer of 2018. The concentration of cDCE exceeded the applicable standard in the sample collected from seep 119 in June 2019. Seep 119 was no longer present during sampling activities in September 2019. Further downgradient on the golf course, seep 118 had detections of TCE and cDCE above the reporting limits, but not above applicable standards.

Groundwater monitoring was conducted under a variety of climatic conditions and groundwater levels. Climatic conditions and groundwater level measurements recorded during the monitoring period were reviewed against historical averages to provide context for the findings discussed in the sections to follow.

3.1 Climatic and Water Level Conditions during the Monitoring Period

Exhibit 3.1, shown below, depicts the deviation from monthly average precipitation as a context for the monitoring over the last two years. As shown by the plot, generally above-average precipitation was recorded in calendar year 2018 and the summer of 2019. Monitoring events were conducted in March/April, June, and September in 2018 and 2019.

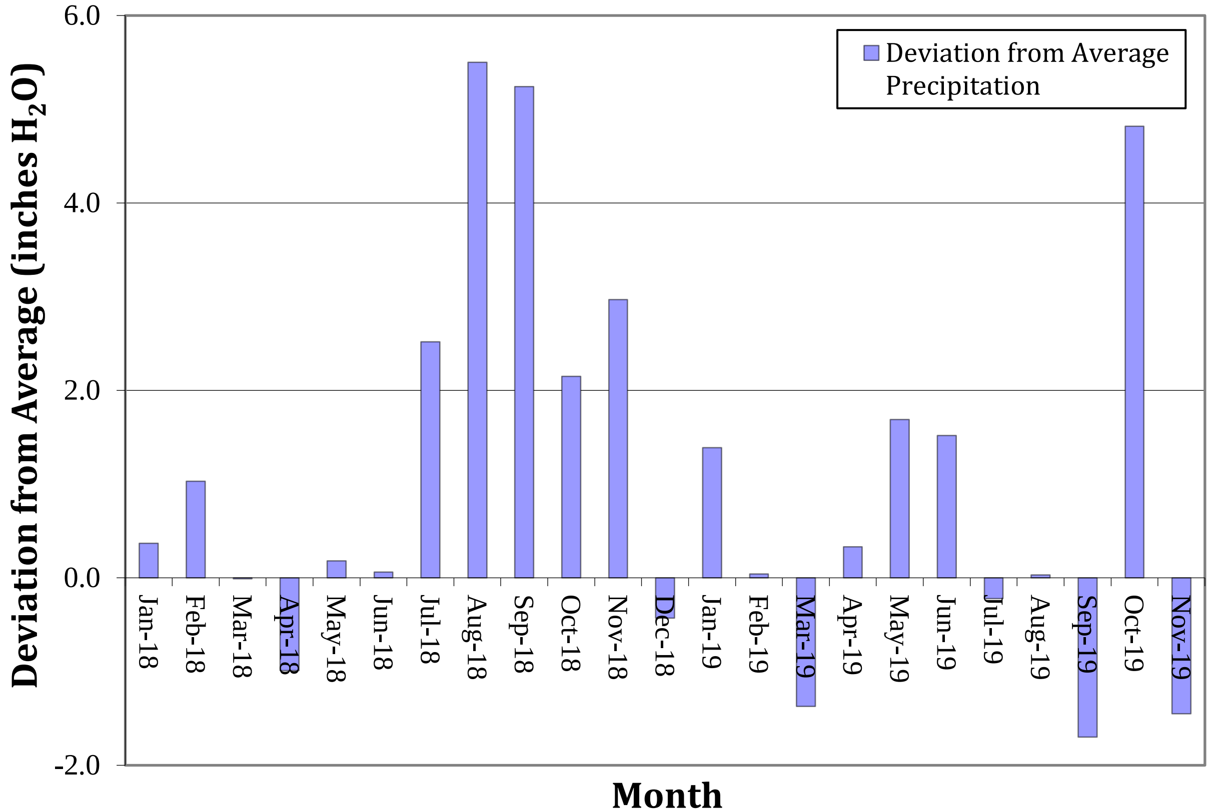

Exhibit 3.1 – Precipitation Records 2018-2019 - The data recorded in monitoring through 2019 were compared with monthly averages calculated from historical records from 1951 to 2004 at the Greater Binghamton Airport, located approximately 7 miles to the north of the Site.

Water level data is provided in the water quality reports in Appendix C. Seasonal fluctuations in water levels, driven by precipitation, infiltration, and uptake by trees, are apparent in most monitoring and injection locations. Seasonally high and low water levels are commonly observed during the spring and fall sampling events, respectively. As a generality, under higher water level conditions, a shift to more oxidizing geochemistry is expected due to infiltration of oxygen containing water, while more reducing geochemistry is expected under lower water conditions.

During the two-year reporting period, water levels from monitoring wells continue to reflect this seasonal pattern, and water levels continue to vary considerably. Water levels were observed to decline in monitoring wells between the A- and B-series injection wells following the construction of the cap through about 2015. Since that time, water levels have been stable to increasing, perhaps driven by wetter than average annual precipitation, especially in 2016 and 2018.

The trend for increasing saturated thickness observed in the B-series injection boreholes noted in previous comprehensive PRRs was also observed during this two-year reporting period, although saturated thicknesses have declined somewhat from the high observed just after the August 2017 injection. This observation may indicate continued reduced permeability due to displacement of fracture pore space with oil droplets and biological mass and/or could be a result of the relatively higher amount of precipitation over 2018 and 2019 compared to previous years.

Above average precipitation and higher water levels resulting in a shift to more oxidizing geochemistry may also help explain the muted response to the most recent injection event, further discussed in Sections 2.3 and 4.2.1.

3.2 Quality Assurance and Assessment of Data Usability against Measurement Performance Criteria

Quality control/quality assurance (QA/QC) samples generally included at least 10% field duplicates, 5% matrix spike/matrix spike duplicates (MS/MSD) for VOC samples, daily field blanks, and 10% equipment blanks when using non-dedicated equipment. Each cooler shipped with VOC samples included one trip blank and one temperature blank. Additional laboratory QA/QC program components included method blanks, laboratory control samples, and surrogates.

QA/QC results and observations were reviewed against the data quality objectives (DQOs) and measurement performance criteria outlined in Appendix J of the SMP. The review found that the data are considered usable for project objectives/decisions. Specific findings are summarized below:

- ***Blank Detections*** – 36 blanks were submitted during the 2-year reporting period, including equipment blanks, field blanks, and trip blanks. Among those, 13 had detections. The most common detections were acetone, bromodichloromethane, 2-butanone, methylene chloride, toluene, chloroform, and xylenes, which were generally below the practical quantitation limit (PQL) and flagged as an estimate. None of the principal chlorinated ethenes were detected in blanks.

- ***Field Duplicate Precision*** – Results for field duplicate samples were reviewed as a measure of precision by calculating the relative percent difference (%RPD) between the primary and duplicate sample. The DQO of +/-30% for field duplicates was generally met. Eighteen duplicate pairs were collected during the 2-year reporting period, and about 99% of the analytes met the DQO. Several VOCs were outside acceptable duplicate precision limits in one or more sample pairs, including cyclohexane, acetone, and methylcyclohexane. Key site VOCs cDCE and trans 1,2-dichloroethane (tDCE) were outside the DQO on 1 and 3 sample pairs, respectively. Percent recoveries outside the acceptable range were typically associated with J-flagged concentrations below the PQL and were not persistent across analytes or sample groups, and likely do not represent a systematic error associated with the sampling process.

- ***Accuracy and Bias via Matrix Spike Duplicates/Laboratory Control Samples*/Surrogate Spikes –** Laboratory accuracy/bias, the extent of agreement between the sample result and the true value of the analyte, is measured by several field and laboratory procedures, including the collection of matrix spike/matrix spike duplicate samples, and analysis of laboratory control samples (LCS) and surrogate spikes in the lab. They entail spiking the sample with a known quantity of the target analytes or "surrogate" analytes that act similarly to the target analytes. The known spiked concentration is compared to the analytical results and a %Recovery is calculated. Recoveries of surrogate spikes were within acceptable range. Approximately 95% of MS/MSD and LCS spike recoveries were within acceptable range. Among the 24 sample groups submitted since the last comprehensive review two years ago, three groups had recoveries of key VOCs above the acceptable range (potential high bias), while there were no results of key VOCs indicating potential low bias (below the acceptable range). Percent recoveries outside the acceptable range were not persistent across analytes or sample groups and likely do not represent a systematic error associated with the measurement process.

- ***Quantitation Limits and Sensitivity* –** Reporting limits were assessed by reviewing the compound quantitation limit against the compound-specific DQO target. Quantitation limits generally met DQOs for all compounds, except for samples that required dilution due to elevated concentrations of one or more key compounds or matrix interference/foaming. Results from injection boreholes were most likely to have elevated reporting limits due to high concentrations of VOCs and the presence of oil amendment that caused matrix interference. Sensitivity was also assessed by analysis of method blanks and continuing calibration verification (CCV). No analytes were detected in method blanks for the 24 sample groups. Continuing calibration drift exceeded acceptable levels for acetone in 5 samples collected in June 2018; the results were considered estimated. CCV was below acceptable limits for several other sample groups; however, the analytes were not detected (ND) in the sample. Sensitivity in this case is confirmed by analyzing a method detection limit standard, which confirmed the ND results for the affected sample batches.

In summary, laboratory data associated with monitoring from March 2018 through September 2019 were found to be usable for their intended purpose. Subject to data qualifying flags, all results were considered acceptable compared to the data quality objectives outlined in Appendix J of the SMP.

3.3 Geochemical Conditions

Consistent with prior reports, geochemical conditions were examined that are relevant to biochemical breakdown of the principal chlorinated VOCs (CVOCs) by reductive dehalogenation. These conditions, including electron donor levels, oxidation/reduction state, and general water quality parameters, are discussed below.

3.3.1 Total Organic Carbon (TOC) and Volatile Fatty Acids (VFAs)

TOC and VFAs must be present to drive biochemical breakdown of CVOCs by the process of reductive dechlorination. VFAs are produced from fermentation of the TOC in the oil amendment. The VFAs are then, in turn, broken down to free hydrogen that is used in reductive dechlorination. The purpose of periodic injection of oil amendment is to supply the TOC and VFAs needed to enhance the breakdown process.

Overall, the available data indicate that TOC and VFAs are present at sufficient concentrations to enhance biochemical degradation of CVOCs across both injection borehole lines (see Figures 3 in each of the Summary Reports presented in Appendix C.1, C.2., and C.3). Sufficient TOC is present over much of the primary source rock; however, certain locations, particularly between the two rows of injection boreholes and the area downgradient of injection row B exhibited relatively lower TOC concentrations, which may limit biochemical degradation in these areas.

Exhibits 3.2 and 3.3 below show the response of TOC and VFA concentrations, respectively, in monitoring wells compared to the last two injection events, denoted by the vertical black lines. TOC concentrations clearly increased at nearby monitoring locations BP-6A and BP-36A following the injection events, followed by declining concentrations consistent with consumption of amendment since the injection. In particular, TOC in BP-36A has declined to a concentration that may be less conducive to reductive dehalogenation, indicating another injection may be warranted.

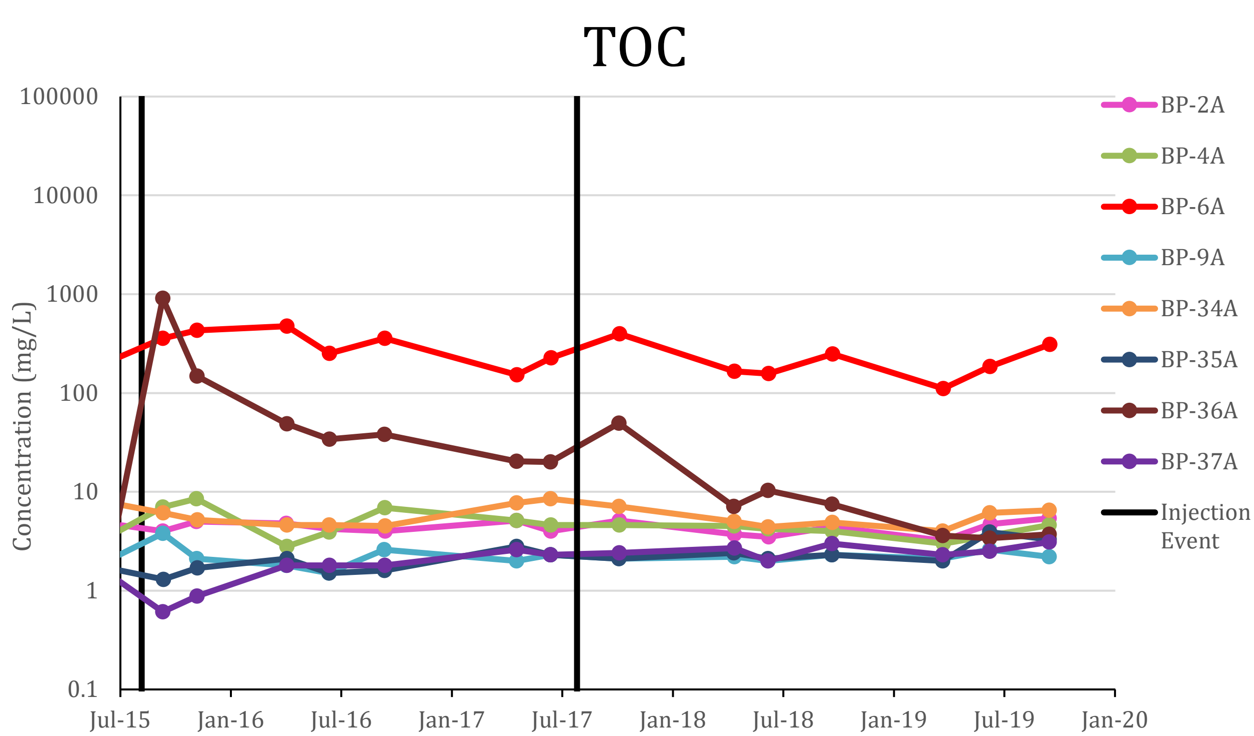

Exhibit 3.2 – Total Organic Carbon (TOC) Data Recorded for Samples from Select Monitoring Wells.

Similar to historical results, locations further downgradient of the injection lines exhibit stable TOC concentrations, but generally less than 10 mg/L. Concentrations above 4 mg/L are thought to be most conducive to reductive dehalogenation. Variability in downgradient transport of TOC is likely due to a combination of matrix diffusion, matrix sorption, variations in transmissivity, and biochemical consumption.

In Exhibit 3.3 below, VFA concentrations are shown to be generally declining since the most recent injection in August 2017. VFA concentrations above 1 mg/L are thought to be most conducive to reductive dehalogenation, with concentrations in BP-6A and BP-36A generally above that threshold since the most recent injection. Concentrations in those two wells fell to 1 mg/L or less in the September 2019 monitoring event, suggesting the possible need for another injection. Further downgradient monitoring wells BP-4A, BP-9A, BP-34A, BP-35A, and BP-37A continue to exhibit limited to no response to amendment injections and levels less than 1 mg/L.

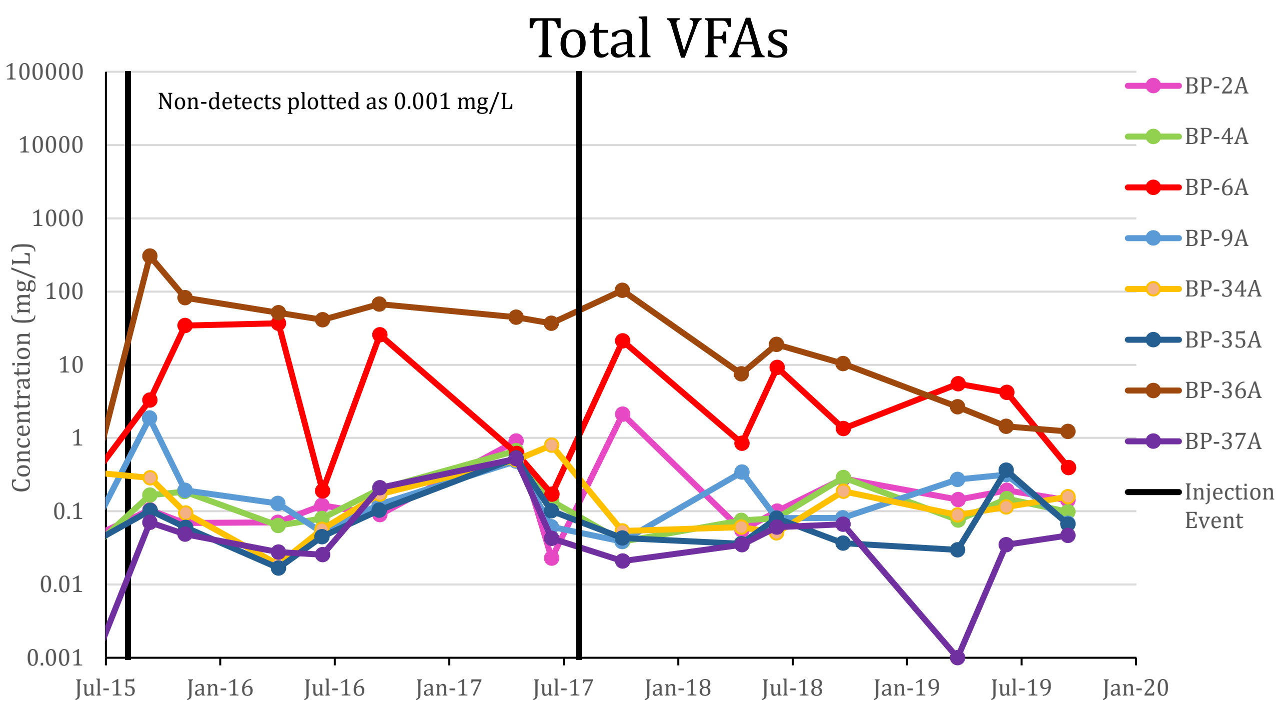

Exhibit 3.3 – Total Volatile Fatty Acids (VFA) Data Recorded for Samples from Select Monitoring Wells.

3.3.2 Inferred Geochemical Conditions

In field and lab testing, water quality was monitored for parameters such as dissolved oxygen (DO), oxidation/reduction potential (ORP), and concentrations of certain metals and cations to assess the oxidation/reduction state, or "redox" conditions, of the subsurface. Methanogenic and sulfate-reducing conditions are inferred by the presence of particularly elevated concentrations of methane and sulfide, respectively, in the water samples, and data for other geochemical indicators. Areas under sulfate-reducing and methanogenic conditions are inferred to be areas of enhanced reductive dechlorination.

Figure 4 depicts the inferred limits of sulfate-reducing conditions observed during performance monitoring in 2018 and 2019 (refer to Figure 3 in Appendices C.1, C.2, and C.3 for concentrations of various geochemical parameters in each of the 2019 sampling rounds). Typically, seasonally high-water levels observed during the spring sampling event corresponds to the smallest extent of sulfate-reducing conditions. During the last two years, the smallest area under reducing conditions was nonetheless observed to cover much of the primary source rock. At its largest extent, sulfate reducing conditions extended downgradient across the property boundary as far south as BP-39A for the first time suggesting an improvement in geochemical conditions that are conducive to reductive dehalogenation in this area.

Similarly, Figure 5 depicts the inferred limits of methanogenic conditions observed during the two-year reporting limit. Areas under methanogenic conditions are inferred to be most conducive to reductive dechlorination. Methanogenic conditions are inferred to be more stable in size and extent than sulfate-reducing conditions and support the presence of two active zones of reductive dichlorination perpendicular to groundwater flow at both the A- and B-series injection boreholes. As previously reported, methanogenic conditions are inferred to be smaller in footprint than pre-2016 conditions without an appreciable change from the August 2017 injection, consistent with the overall muted response observed from that injection. However, methanogenic conditions were observed as far downgradient as BP-38A to the south across the property boundary for the first time in 2019 monitoring.

Supporting data and tabular summaries of geochemical analyses are located in the sampling reports in Appendix C. Field screening data for pH, and lab analyses for sulfate, in groundwater samples from certain locations continue to indicate low pH (i.e., <6.3) and higher sulfate concentrations (>20 mg/L), both conditions that may somewhat limit microbial breakdown of chlorinated VOCs. Since the last comprehensive review two years ago, low pH conditions have been observed at certain monitoring locations in and outside the primary source rock, including BP-13A, a location within the injection zone, but primarily at locations along the periphery (BP-38A, BP-39A) or wells outside the primary source rock (BP-11A, BP-16A, BP-32A).

The presence of particularly elevated sulfate concentrations recorded in analysis of groundwater samples from BP-1A, BP-5A, and BP-6A indicates the potential for conditions that limit reductive dehalogenation. Sulfate concentrations in the thousands of mg/L may partially account for the continued elevated VOC concentrations in BP-6A, but VOC concentrations in monitoring wells further downgradient to the north, including BP-1A, BP-5A, which also exhibit elevated sulfate, are not increasing. Additionally, monitoring wells that exhibit pH or sulfate levels that suggest depressed microbial activity typically also simultaneously exhibit other geochemical indicators such as ORP and DO that would suggest more conducive conditions.

3.4 VOCs in Water Samples

As shown by the September 2019 pie charts on Figures 4 and 5, TCE is no longer the most prevalent chlorinated ethene found in groundwater samples collected from most locations within the primary source rock, with TCE molar fractions generally less than 50%, and the

remaining mass consisting of cDCE and terminal breakdown products (VC, ethene, and ethane). As previously reported, prior to the initiation of the remedy, TCE made up most of the chlorinated ethane mass, representing 85% to over 90% of the mass within the plume, with small amounts of cDCE and only traces of the terminal breakdown products.
As reflected in selected time-series line plots to follow (Exhibits 3.4-3.7), concentrations of the principal parent compound, TCE, continue to decline consistent with the objectives of the long-term remedy. The plots below represent a selection of representative monitoring locations and show molar concentrations of TCE, primary, and terminal breakdown products over the period spanning the last two injection events through September 2019.

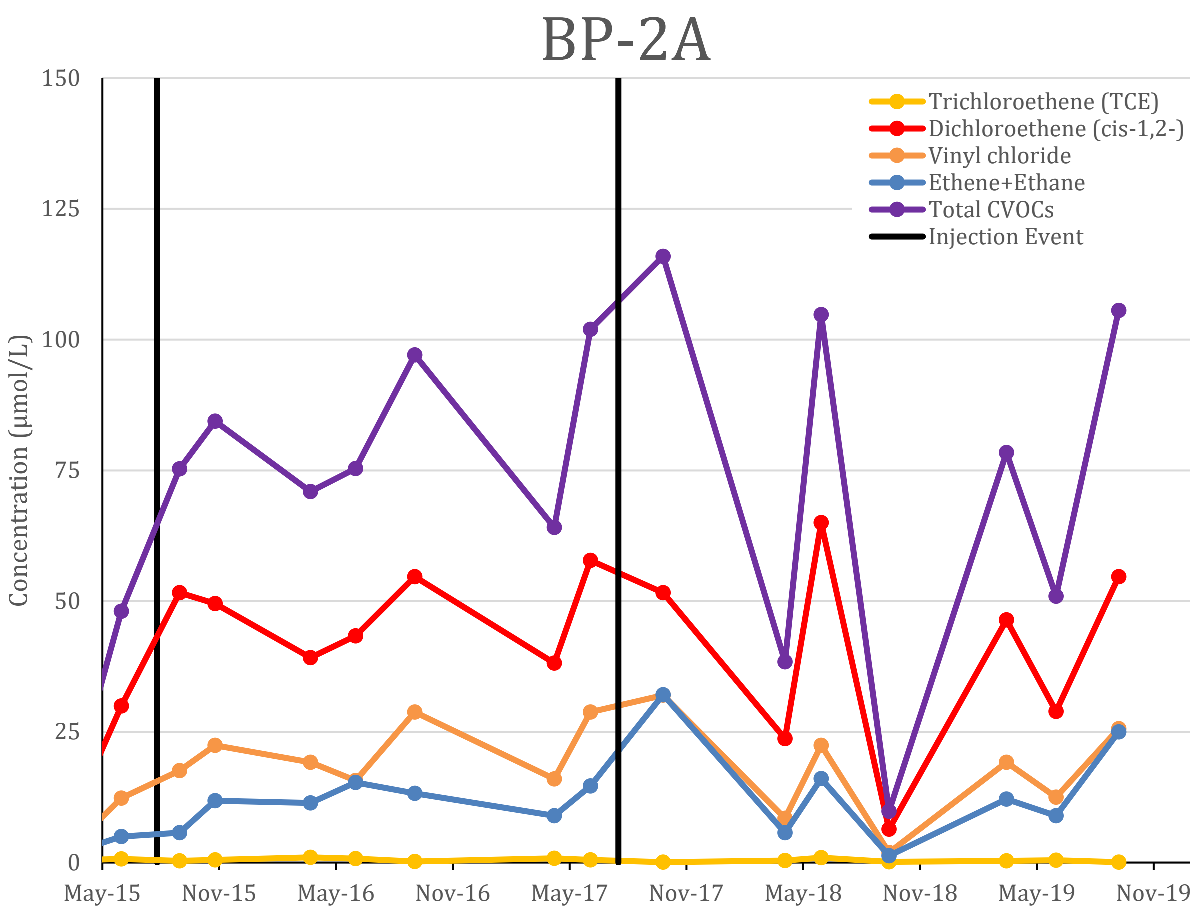

Exhibit 3.4 - Molar Concentrations of TCE and Breakdown Products for BP-2A

BP-2A is a location immediately adjacent to the A-series injection wells. The most recent data for BP-2A indicate that TCE concentrations represent less than 1% of the VOC mass at this location. The non-toxic terminal breakdown products ethene and ethane now represent about 25% of the molar mass and have been stable since the 2017 injection. The overall CVOC concentration has decreased from an historical high in October 2017, which was primarily driven by an increased prevalence of breakdown products, not TCE. Biodegradation appears to be progressing through completion, with about even proportions of both vinyl chloride and the terminal breakdown products.

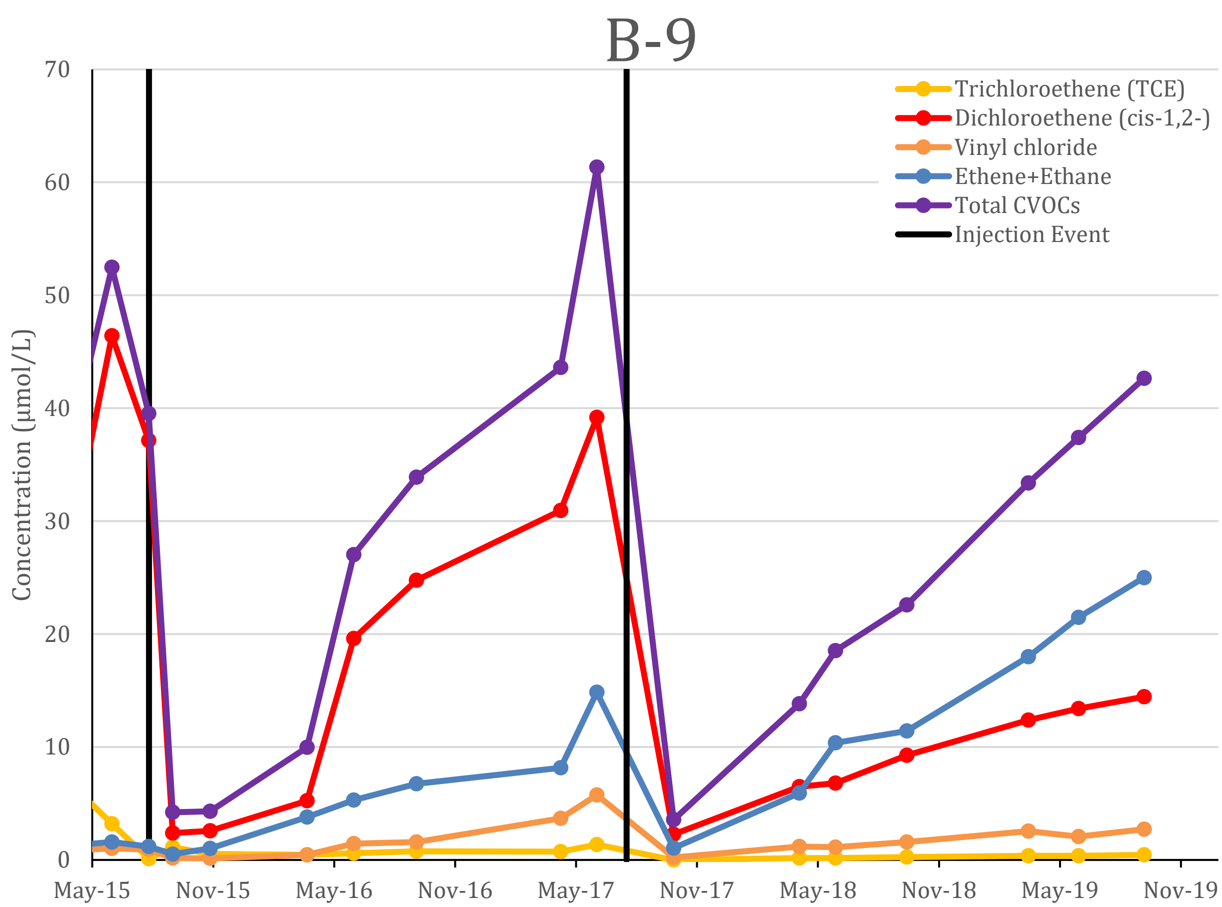

Exhibit 3.5 – Molar Concentrations of TCE and Breakdown Products for Injection Borehole B-9- a location in the B-series injection row exhibiting about twice the median transmissivity for the B-series boreholes.

Injection borehole B-9 exhibits high transmissivity in comparison to what is observed in the other B-series boreholes. TCE has represented less than 30% of the molar mass at this location since the first B-series injection in July 2014, down from 90% pre-injection. This well responds quickly to injection events with steeply declining VOC concentrations, while the effects are transported downgradient relatively quickly compared to other, less transmissive injection boreholes, as evidenced by the steady, relatively rapid rebound of COVC concentrations in the months after injection. Of note, terminal breakdown products are now the most prevalent, making up at least 50% of the molar mass and surpassing the proportion of cDCE since June 2018.

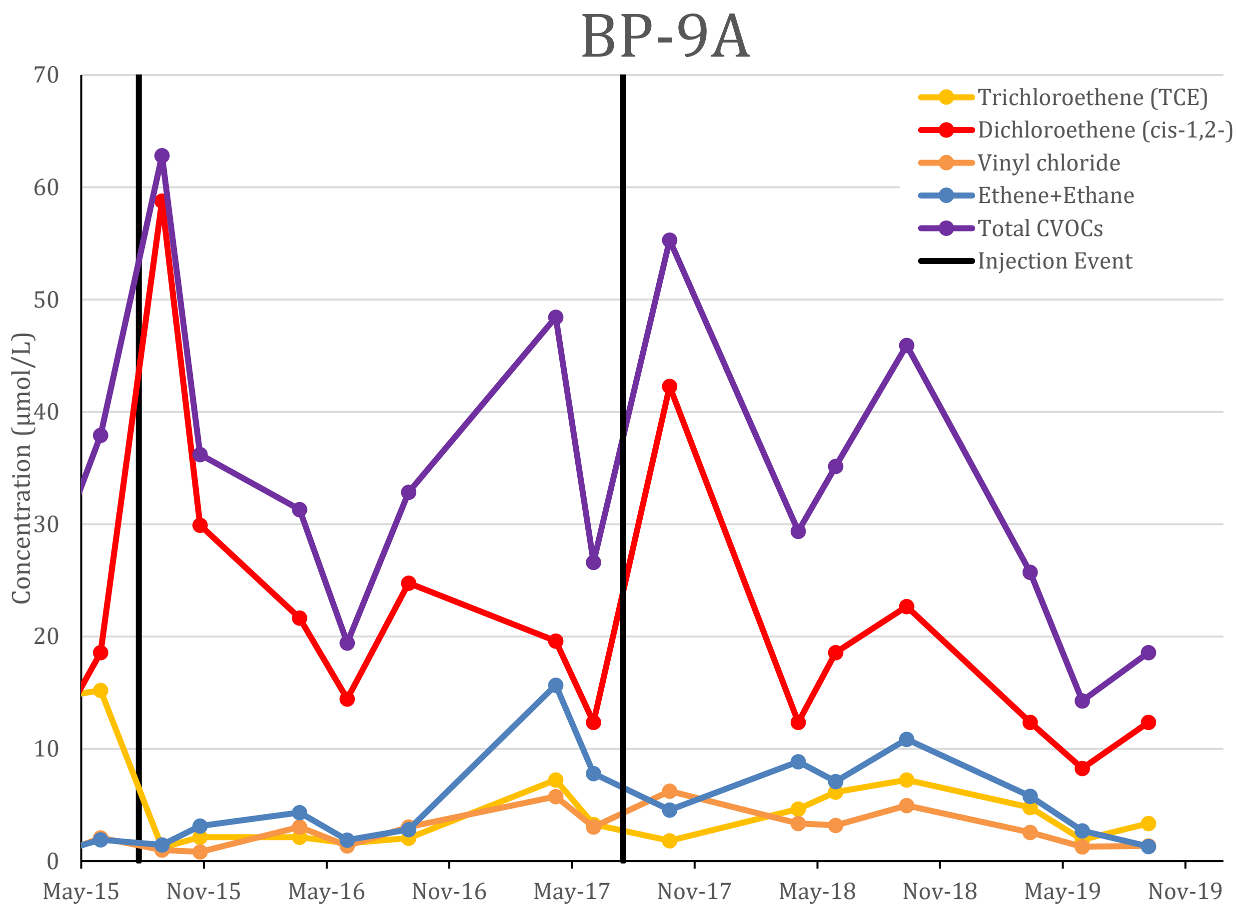

Exhibit 3.6 – Molar Concentrations of TCE and Breakdown Products for BP-9A

BP-9A is located about 60 feet downgradient of the B-series injection boreholes near the property boundary. Since the first B-series injection, cDCE is the most prevalent compound. Recent TCE concentrations are 1 to 1.5 orders of magnitude below the historical high. In the last two years, this pattern has continued. Terminal breakdown products have generally been the most prevalent breakdown product after cDCE since the August 2017 injection, making up about 20-30% of the molar mass. Depressed concentrations of TCE and elevated concentrations of breakdown products suggest transport of biodegradation products from the injection zone.

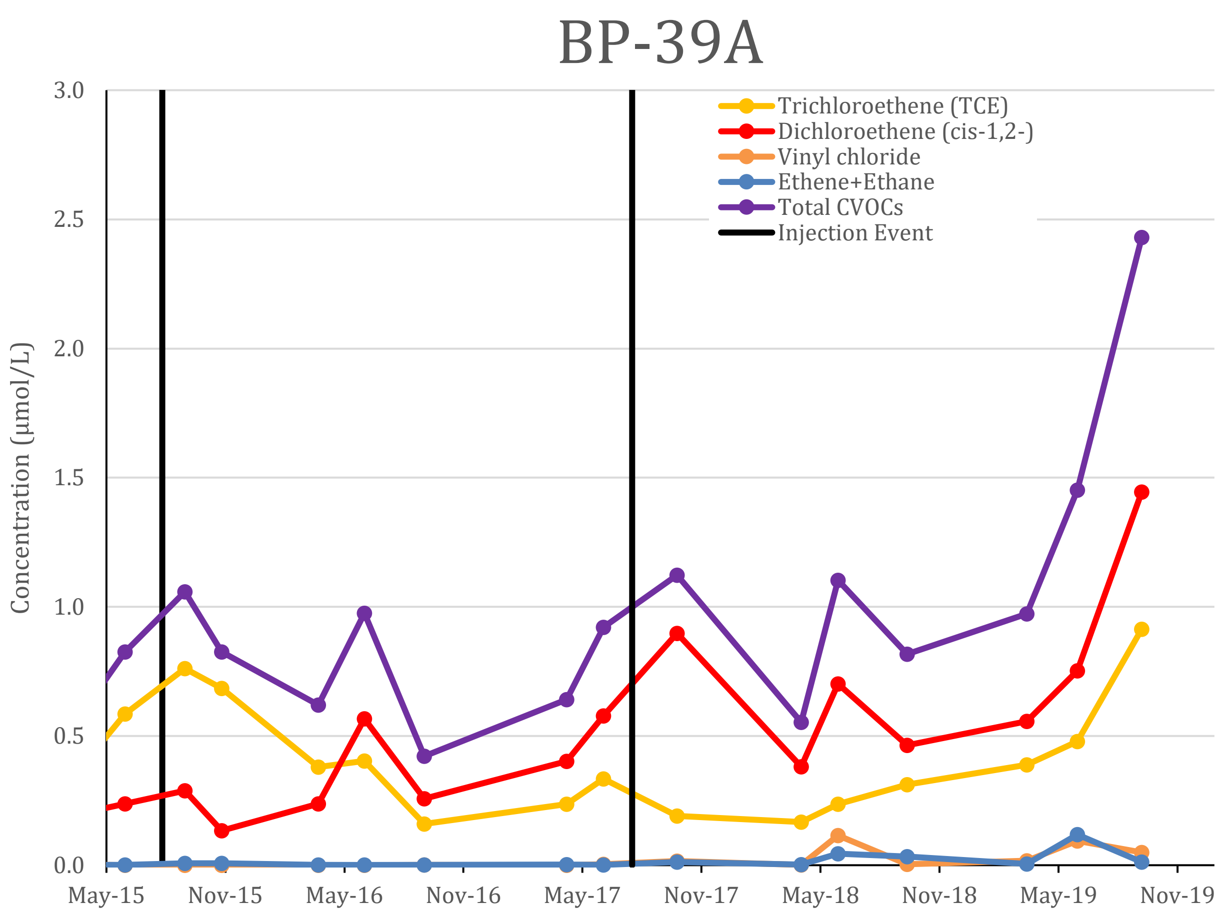

Exhibit 3.7 – Molar Concentrations of TCE and Breakdown Products for BP-39A

BP-39A is located about 80 feet south of the property boundary, or 150 feet downgradient of the B-series injection boreholes. Overall, the total CVOC concertation at BP-39A is about 1 order of magnitude lower than BP-9A. cDCE became more prevalent than TCE on a molar basis in June 2016, for the first time since site-wide injections began. The recent increase in total CVOC concentrations is driven by increasing cDCE and, to a lesser extent, TCE. As discussed in Section 3.3.2, sulfate-reducing conditions conducive to biodegradation were observed as far south as BP-39A for the first time since injections began. BP-39A is on the periphery of the primary source rock defined during the RI and increasing concentrations may reflect increased back diffusion and enhanced dissolution of the VOC mass due to the enhanced biochemical activity, and/or transport from higher concentration locations upgradient (e.g. BP-9A).

In the most recent monitoring round, the data indicate breakdown products make up about 62% and TCE represents about 38% of the molar mass. Increased CVOC concentrations are accompanied by slightly increasing terminal breakdown product concentrations, which had an historically high prevalence of about 8% by mass in June 2019.

We have noted in the 2019 sampling summary reports that there is indication of an increasing trend of VC at BP-39A. VC was infrequently detected at low levels through April 2018. It was

was detected at 7.2 µg/L in the June 2018 sample, which is an historical high for this VOC and exceeds the New York State Department of Environmental Conservation Class GA Groundwater quality standard of 2 µg/L. Since June 2018, VC has been detected in samples collected from BP-39A from each sampling round, at concentrations ranging from 0.2 to 5.9 µg/L. However, during this time, terminal breakdown products ethene and ethane, which had not typically been detected above the reporting limit at this well, have been detected consistently, suggesting biodegradation has not stalled at vinyl chloride, but that vinyl chloride may be travelling farther downgradient than previously, before being reduced or oxidized. Wells further downgradient on the golf course have not exhibited this trend.

The data for monitoring locations further downgradient to the south on the Binghamton Country Club property are depicted for key VOCs on Figure 6. The data continue to indicate water quality generally consistent with, or improved over, data from the previous two-year reporting period.

The overall findings of this review of data continue to suggest remediation progress is being made across the primary source rock at differing rates. Differences in transmissivity, groundwater flow conditions, and geochemical conditions likely account for the variability, but the net effect is that the proportion of TCE has decreased from 80-90% down to 50% to less than 1% of molar mass in groundwater samples collected across the Site. This reduction in TCE molar mass concentrations along with long-term sustained improvement of overall geochemical conditions verifies the on-going effectiveness of this remedial approach. As with any in-situ remedial project, there are areas where optimization may be helpful to further improve geochemical conditions, as further discussed in Section 4. The resulting decreases in mass discharge of TCE across the property boundary are discussed in Section 4.2.3, below.

4.0 SITE EVALUATION

4.1 Compliance with the Site Decision Document

The remedy was constructed and is being operated consistent with the site-specific Decision Document (SDD) issued by the NYSDEC Division of Remediation after the public comment period in December 2012.[3]

The remedy was designed, constructed, and is being operated consistent with the description of the selected remedy, and it is meeting or exceeding the requirements of the NYSDEC Green Remediation Guidance DER-31 referenced in the SDD. The daily operation of the remedy requires no non-renewable energy. The daily operations do not involve mechanical equipment that produce greenhouse gas emissions, but rather relies on native in-situ microorganisms and plants, and the use of edible soybean oil as an electron donor amendment. The project has improved wildlife habitat and enhanced the natural landscape through planting and maintenance of trees.

[3] New York State Department of Environmental Conservation, Division of Environmental Remediation, December 18, 2012, Decision Document, IBM Gun Club, Burn Pit, Brownfield Cleanup Program, Union, Broom County Site No C704044.

The remedy ECs and ICs outlined in the SDD have been in place for about five years and have been maintained in accordance with the approved SMP. The soil cap cover has been established and maintained as an engineering control, limiting human and biotic exposure to a small area of metals-containing soils. The condition of the cap and phytoremediation components has been systematically reviewed during site-wide inspections and found to be consistent with their design.

As outlined in Section 4.2 below, the remedy components of EBD and phytoremediation, which along with the cap serve as an engineered remedy for migration control and source reduction, have shown to be effective at addressing TCE and related compounds. In 2020, additional evaluation will be completed to assess the relative effectiveness of the phytoremediation component of the remedial approach in achieving remedy goals, and in evaluating whether the current site-wide inspection approach (e.g., tree count) should be updated to provide a more useful measure of demonstrating effectiveness.

Monitoring since the last PRR does not indicate any condition that would materially increase potential for human exposure. We have observed a reduced occurrence of seep and spring activity that historically brought VOC-containing water to the ground surface where direct human contact would have been possible. Access to the Site area where most of the source mass resides has largely been controlled by fencing and soil capping.

4.2 Operation and Effectiveness of the Remedy

The performance monitoring data indicate favorable remedy performance about 5 years into the implementation of the site-scale biochemical degradation component of the remedy. The data indicate progress consistent with expectations for a long-term remedy operation, as outlined in the Remedial Design and SMP. Some additional seep activity was observed in 2018 on the periphery of the seep cap area on the Gun Club property, likely due to well above average precipitation, but was not similarly observed in 2019 monitoring. As outlined below, after about 5 years, substantial progress has been made and maintained against the stated remedy goals and the related short-term measures of success (less than 5 years). Sections 4.2.1 through 4.2.3 elaborate on each of the remedy goals and short-term measures of success (less than 5 years).

4.2.1 Establishment and Maintenance of Geochemical Conditions throughout and outside of Primary Source Rock

As shown on Figures 4 and 5, and discussed in Section 3, geochemical conditions conducive to biochemical degradation by reductive dehalogenation have been established and maintained over the primary source and in areas downgradient (outside) the primary source rock. The more strongly reducing geochemical conditions have been observed to be contained largely within the primary source rock and been observed further downgradient, where moderately reducing geochemical conditions (sulfate-reducing) have been observed downgradient as far south as BP-39A. Additional evaluation of further improving geochemical conditions will be conducted in 2020.

As reported in the 2019 water quality monitoring reports, VOC and geochemical data suggested a muted response to the injection of edible oil amendment in August 2017. As presented in Section 2.3 above, the emplacement of oil emulsion into fractures may have reduced the effective water permeability and limited the effective porosity available to transmit groundwater flow. Filling of the fracture pore space with biological mass could also be expected to lower the effective permeability, retarding the downgradient geochemical response. As a result, the areas between injection rows A/B, and downgradient of row B, exhibit geochemical conditions that may benefit from more frequent and effective delivery of edible oil to the subsurface. Further description of plans for additional evaluation and system optimization are presented below. Nevertheless, while the effects of the 2017 injection have not been as pronounced as previous injections, the areas conducive to reductive dehalogenation have not materially decreased and are being maintained, indicating that sustained improvements in geochemical conditions outside and downgradient of the primary source rock continue, which is consistent with the remedy goals.

4.2.2 Reduction in TCE Prevalence and Concentration in the Injection Displacement Zone

As shown in Figures 4 and 5, and discussed in Section 3, TCE continues to represent less than 50% of the chlorinated ethene mass found in most of groundwater samples within the primary source rock. The progress made toward reduction of TCE concentrations discussed in the last comprehensive evaluation (2017 PRR) have been largely maintained.

As shown in Exhibit 4.1, progress has been made toward a 2 order-of-magnitude reduction in TCE concentrations within the injection displacement zones since beginning the site-scale remedy, which is one of the measures of short-term (5-years) success identified in the SMP. This assessment is based on average 2019 TCE concentrations from performance monitoring within and near (<50 feet) the injection displacement zone in comparison to data recorded in March 2012 if available, or another reasonable pre-injection monitoring result as a baseline. While the overall number of wells exhibiting reductions in TCE is similar to what was reported in the last comprehensive evaluation, individual wells may be categorized somewhat differently. This is consistent with the variable transport and changing geochemical conditions expected for a decades-long remedy.

Order of Magnitude Reduction				
<½	½ to 1	1 to 1.5	1.5 to 2	>2
BP-4A BP-34A BP-36A BP-37A	BP-9A B-4 B-9	BP-2A B-7		A-13 IB-7

Exhibit 4.1 Tabular Summary of Order of Magnitude (Oom) TCE Reductions in Monitoring Locations within or Adjacent to the Injection Displacement Zone

4.2.3 Reduction in Apparent Downgradient VOC Mass Discharge and Improvement in Downgradient Response to Injection

Downgradient mass discharge estimates are derived from ongoing monitoring of three of the B-series injection boreholes (B-4, B-7, and B-9), which represent a range of transmissivities across the B-line. A record of VOC mass discharge estimated from sampling of these three boreholes is shown in Exhibit 4.2 below.

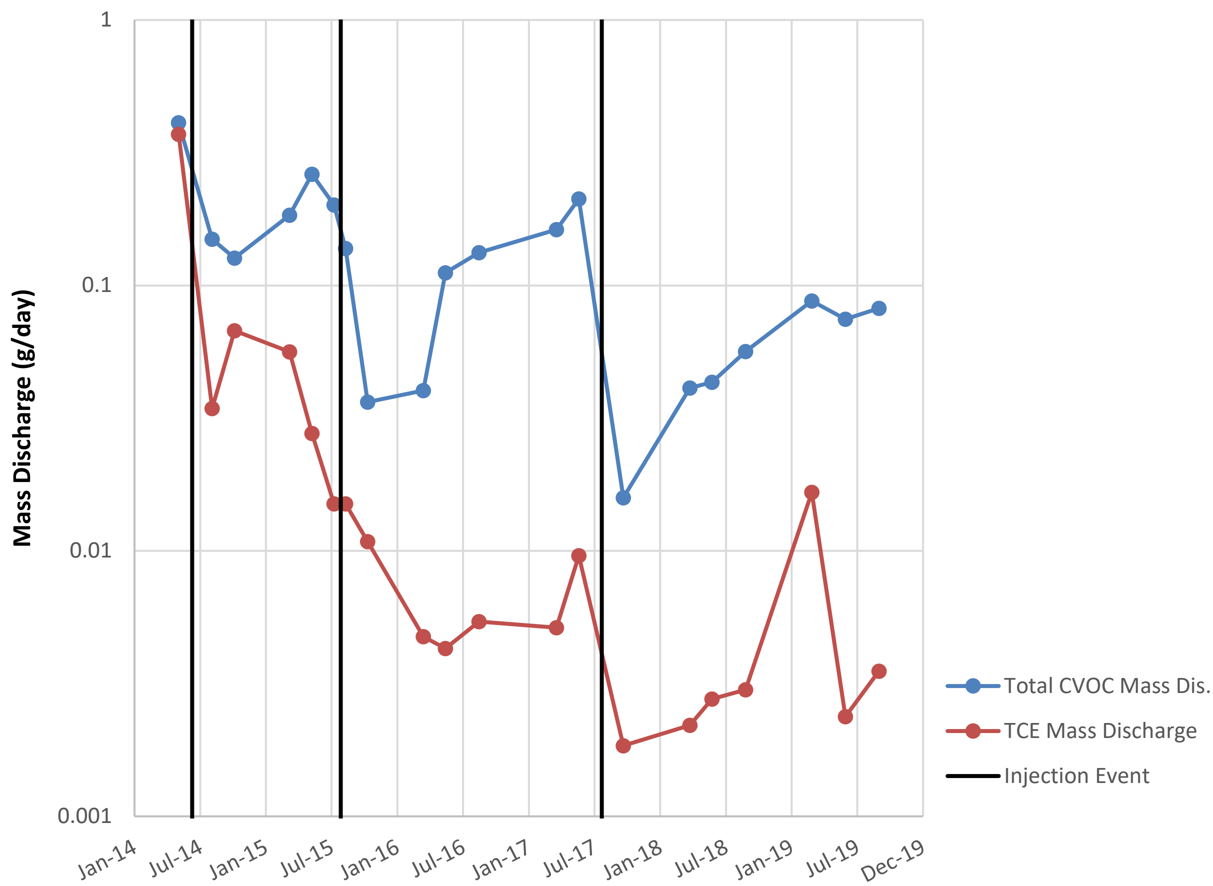

Exhibit 4.2 – Estimated VOC mass discharge in units of grams per day (g/day) based on monitoring data recorded for injection boreholes B-4, B-7, and B-9.

Data derived from sampling in the two years since the last comprehensive review indicate a sustained reduction in both total CVOC and TCE mass discharge. Following the August 2017 injection, mass discharge has increased slightly, but cumulative reductions from tenths of grams per day before injections began, to hundredths of grams per day in 2018 to 2019 continue to be realized.

The VOC mass discharge estimates continue to support the presence of an active zone of biodegradation perpendicular to groundwater flow at the B-line, which has reduced downgradient transport of VOC mass from the primary source rock by at least one order of magnitude.

Progressive reductions in TCE concentrations in wells further downgradient are apparent, as shown in Exhibit 4.3 below. One half to one order of magnitude reductions in TCE concentrations are observed in 3 out of the 4 wells shown below.

The apparent recent increase in TCE, cDCE, and VC concentrations at BP-39A is noted and described in Section 3.4 above; these conditions are generally attributed to back diffusion of VOCs from rock downgradient from the property line at a rate that is greater than the rate of contaminant reductions being achieved in this downgradient area. This well is farther downgradient from injection row B than the other three wells shown on Exhibit 4.3 and may be on the fringe of the extent of influence from injection row B. The generation and increasing concentrations of ethene and ethane at well BP-39A suggest that destruction of VC and other CVOCs is occurring in this area. However, as further described below, additional assessment of whether this process could be enhanced will be a focus of forthcoming work in 2020.

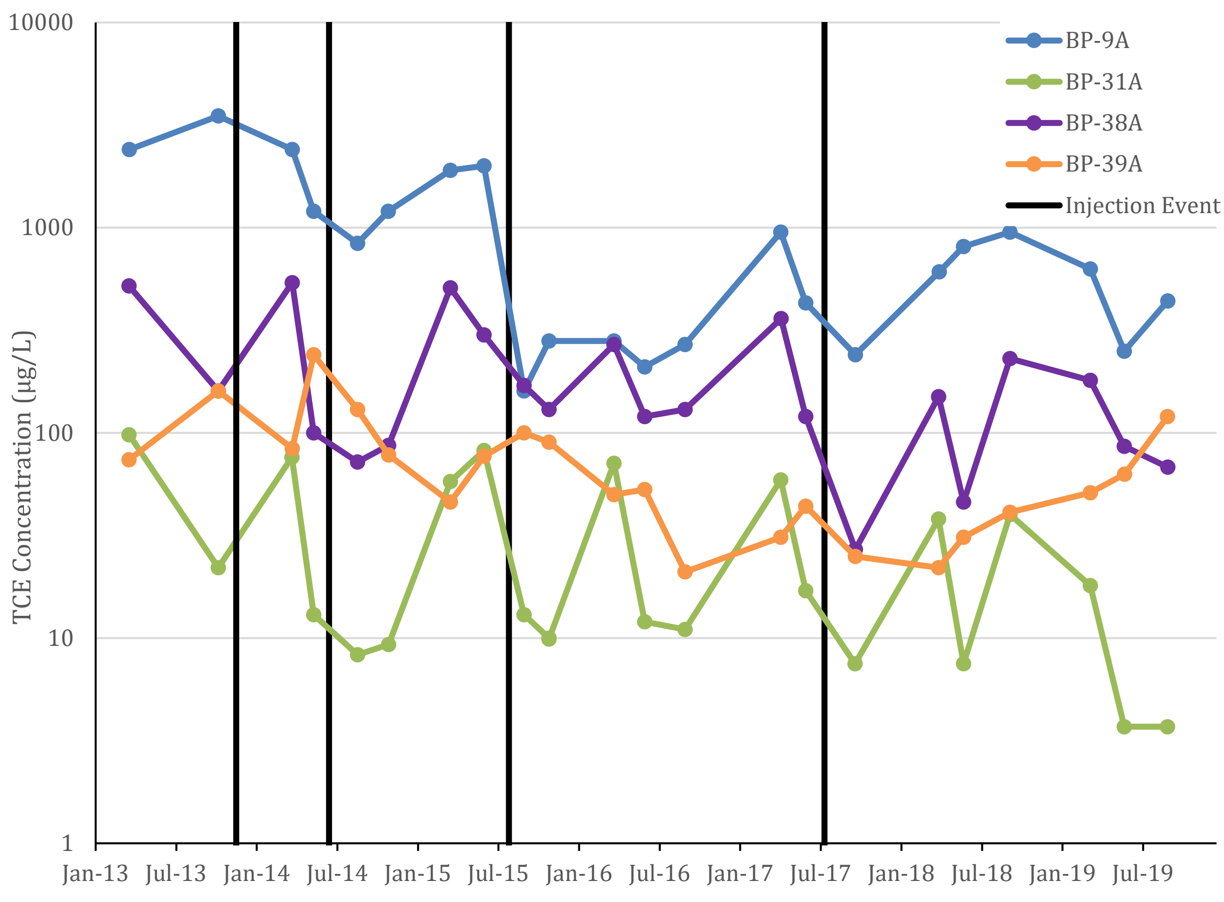

Exhibit 4.3 – TCE Concentrations Over Time in Four Downgradient Wells Located Proximate and South of the Property Boundary.

4.3 Evaluation of Possible Modifications to the Remedy and Performance Monitoring Program

The remedy operations, maintenance, monitoring, and reporting has been conducted in accordance with the SMP of April 2016. The tracking and analysis of the performance monitoring results will be continued following the current scope of monitoring.

Major remedy modifications and monitoring actions do not appear necessary at this time; however, slight adaptations to the in-situ remedial approach planned for 2020 are further discussed below.

EBD Remedy Plans

As usual, injection frequency, volumes, and techniques for the EBD remedy will continue to be reviewed and adapted with the goal of continually maintaining or enhancing performance. Based on the monitoring results from the 2018 to 2019 timeframe discussed above, an injection of edible oil injection is planned for 2020. Contingent upon the results from the 2020 injection and subsequent sampling, IBM will consider increasing the frequency of edible oil injections from bi-annual (i.e. every 2 years) to annual. Also, the addition of injection boreholes to further disperse amendment or specifically address higher concentration areas will be considered, particularly if there is evidence that the lower borehole transmissivities observed in the 2018 to 2019 period are preventing adequate delivery of edible oil to the subsurface.

Phytoremediation Remedy Plans

As previously reported in the 2015 and 2017 PRRs, fertilization efforts have been focused on establishing and maintaining the grass cover in the capped areas. Over the last several inspections, grass cover was found to be well established. IBM plans to sample topsoil in 2020 and analyze for the nutrient needs of the poplar plantings and fertilize as necessary. Additionally, alternate measures to evaluate phytoremediation effectiveness are planned. As discussed in Section 2.1, under the SMP, IBM had proposed to replant trees as needed to bring the tree cover up to 75% of the initial planting density, allowing for 25% mortality. However, the 25% threshold was arbitrary and may not be sustainable given the existence of conditions in certain planting areas that are not conducive to tree growth (e.g. shallow bedrock, encroachment of woody brush, poor infiltration in the capped area), and re-planting may lead to the same result.

In 2020, an assessment will be completed of the combined performance of the low permeability cover and phytoremediation measures in reducing infiltration and subsurface VOC concentrations. This assessment will evaluate whether there are alternative means of evaluating tree and grass cover health as it relates to the remedy, and how to more directly connect the desired outcomes (i.e., reducing infiltration and VOC mass flux) to the required on-going monitoring.

5.0 CONCLUSIONS

The operation of the former Burn Pit Site remedy in 2019 was conducted in compliance with the management requirements defined in the site-specific SMP. The remedy performance to date indicates the short-term measures of success at the five-year mark (2019) have generally been met, including reduction in TCE concentrations in the injection zone, and no significant adverse accumulation or downgradient transport of toxic breakdown products. These observations support the overall goals of the remedy, including sustaining enhanced biochemical degradation of contaminants in the primary source rock, limiting contaminant mass transport (flux) out of the primary source rock, and enhancing biochemical degradation processes beyond and downgradient of the primary source rock.

The timing of amendment injections for enhanced biochemical degradation will continue to be driven by analysis of the monitoring data. Based on geochemical conditions and VOC concentrations, an injection of edible oil amendment is planned for 2020. In addition to routine topsoil sampling and fertilization, alternate measures of phytoremediation effectiveness will also be assessed. At this time, no additional modifications to the remedy are planned, but data and operations will continue to be analyzed for possible future improvements.

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TABLES

Table 1
Summary of Events during the Certification Period
2019 Periodic Review Report
IBM Gun Club - Former Burn Pit Area
Union, New York

Event	Date	Type	Documentation Location
Spring 2019 Sampling	March 25-27, 2019	Performance Monitoring	Appendix C.1
Grass Mowing	June 2019	Routine Maintenenace	Appendix B.2.2
Summer 2019 Sampling	June 10-12, 2019	Performance Monitoring	Appendix C.2
Grass Mowing	September 2019	Routine Maintenenace	Appendix B.2.2
Fall 2019 Sampling	September 16-18, 2019	Performance Monitoring	Appendix C.3
Injection Borehole Redevelopment	September 23-26, 2019	Non-Routine Maintenenace	Appendix B.3
Site Wide Inspection	September 24, 2019	Site Inspection	Appendix B.1

Notes:
1. This table outlines the work events at the Site in 2019. Refer to the report text for further discussion.

Table 2
Summary of Groundwater Data - RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	A-13												B-4										
			Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19
			No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethenes																									
Trichloroethene (TCE)	5	Y	Not Installed						<250	<250	<100	<100	<100	<100	Not Installed						11	10	12	220	<50
Dichloroethene (cis-1,2-)	5	Y	Not Installed						32,000	24,000	9,800	21,000	21,000	7,300	Not Installed						33	35	39	53	33 J
Vinyl chloride	2	Y	Not Installed						4,200	2,400	1,500	4,000	2,500	1,600	Not Installed						3.2 J	2.4 J	2.6 J	12	<50
Dichloroethene (trans-1,2-)	5	Y	Not Installed						<250	71 J	30 J	48 J	54 J	21 J	Not Installed						1.1 J	<5	0.90 J	2.3 J	<50
Dichloroethene (1,1-)	5	Y	Not Installed						<250	<250	12 J	45 J	52 J	<100	Not Installed						<5	<5	<5	0.70 J	<50
Tetrachloroethene (PCE)	5	Y	Not Installed						<250	<250	<100	<100	<100	<100	Not Installed						<5	<5	<5	<5	<50
Chlorinated Methanes																									
Chloroform (Trichloromethane)	7	Y	Not Installed						120 J	130 J	73 J	140	130	86 J	Not Installed						<5	<5	<5	<5	<50
Carbon tetrachloride	5	Y	Not Installed						<250	<250	<100	<100	<100	<100	Not Installed						<5	<5	<5	<5	<50
Methylene Chloride (Dichloromethane)	5	Y	Not Installed						<250	<250	<100	<100	<100	<100	Not Installed						<5	<5	<5	<5	<50
Chlorinated Ethanes																									
Dichloroethane (1,2-)	0.6	Y	Not Installed						<250	<250	<100	<100	<100	<100	Not Installed						5.7	5.5	5.7	1.0 J	5.6 J
Trichloroethane (1,1,2-)	1	Y	Not Installed						<250	<250	<100	<100	<100	<100	Not Installed						<5	<5	<5	<5	<50
Ketones																									
Acetone	50	Y	Not Installed						<2500	<2500	<1000	<1000	<1000	<1000	Not Installed						<50	59	77	<50	250 J
Butanone (2-) (MEK)	50	Y	Not Installed						<2500	<2500	<1000	<1000	<1000	<1000	Not Installed						<50	39 J	72	<50	150 J
Methyl-2-pentanone (4-) (MIBK)	N/A	Y	Not Installed						<2500	<2500	<1000	<1000	<1000	<1000	Not Installed						<50	<50	<50	<50	<500
Aromatic/Aliphatic Petroleum Hydrocarbons																									
Toluene	5	Y	Not Installed						430	360	230	460	530	210	Not Installed						<5	<5	<5	<5	<50
Benzene	1	Y	Not Installed						<250	<250	<100	<100	<100	<100	Not Installed						<5	<5	0.50 J	1.8 J	<50
Xylene (m,p-)	5	Y	Not Installed						210 J	130 J	86 J	170	160	83 J	Not Installed						<5	<5	1.0 J	<5	<50
Xylene (o-)	5	Y	Not Installed						110 J	69 J	51 J	98 J	93 J	46 J	Not Installed						<5	<5	<5	<5	<50
Ethylbenzene	5	Y	Not Installed						65 J	<250	28 J	47 J	46 J	22 J	Not Installed						<5	<5	<5	<5	<50
Isopropylbenzene (Cumene)	5	Y	Not Installed						<250	<250	<100	<100	<100	<100	Not Installed						<5	<5	<5	<5	<50

Table 2
Summary of Groundwater Data - RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	**NY State Part 703 Standard (ug/l)**	**RI Site Contaminant?**	**B-4**	**B-7**												**B-9**										
			Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19
			Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethenes																										
Trichloroethene (TCE)	5	Y	<50	Not Installed						69	180	110	43 J	<1000	110 J	Not Installed						24	25	35	49	50
Dichloroethene (cis-1,2-)	5	Y	18 J	Not Installed						460	570	520	330	360 J	470	Not Installed						630	660	900	1,200	1,300
Vinyl chloride	2	Y	<50	Not Installed						76	63	62	<250	<1000	53 J	Not Installed						74	72	100	160	130
Dichloroethene (trans-1,2-)	5	Y	<50	Not Installed						2.7 J	3.0 J	2.5 J	<250	<1000	<250	Not Installed						<10	<10	2.4 J	3.5 J	3.6 J
Dichloroethene (1,1-)	5	Y	<50	Not Installed						1.1 J	1.5 J	1.2 J	<250	<1000	<250	Not Installed						<10	<10	<10	1.8 J	1.6 J
Tetrachloroethene (PCE)	5	Y	<50	Not Installed						<5	<5	<5	<250	<1000	<250	Not Installed						4.3 J	<10	<10	<10	<10
Chlorinated Methanes																										
Chloroform (Trichloromethane)	7	Y	<50	Not Installed						<5	<5	<5	<250	<1000	<250	Not Installed						<10	<10	<10	<10	<10
Carbon tetrachloride	5	Y	<50	Not Installed						<5	<5	<5	<250	<1000	<250	Not Installed						<10	<10	<10	<10	<10
Methylene Chloride (Dichloromethane)	5	Y	<50	Not Installed						<5	<5	2.5 J	<250	170 J	<250	Not Installed						<10	<10	2.2 J	<10	<10
Chlorinated Ethanes																										
Dichloroethane (1,2-)	0.6	Y	5.2 J	Not Installed						2.2 J	2.2 J	2.2 J	28 J	<1000	<250	Not Installed						<10	<10	1.4 J	2.0 J	1.6 J
Trichloroethane (1,1,2-)	1	Y	<50	Not Installed						<5	<5	<5	<250	<1000	<250	Not Installed						<10	<10	<10	<10	<10
Ketones																										
Acetone	50	Y	300 J	Not Installed						<50	<50	73	<2500	<10000	<2500	Not Installed						<100	77 J	140	170	200
Butanone (2-) (MEK)	50	Y	130 J	Not Installed						110	330	400	<2500	<10000	610 J	Not Installed						52 J	170	270	460	610
Methyl-2-pentanone (4-) (MIBK)	N/A	Y	<500	Not Installed						<50	<50	<50	<2500	<10000	<2500	Not Installed						<100	<100	<100	<100	<100
Aromatic/Aliphatic Petroleum Hydrocarbons																										
Toluene	5	Y	<50	Not Installed						<5	1.5 J	0.90 J	<250	<1000	<250	Not Installed						<10	<10	<10	<10	<10
Benzene	1	Y	<50	Not Installed						1.1 J	2.1 J	1.5 J	<250	<1000	<250	Not Installed						<10	<10	<10	<10	<10
Xylene (m,p-)	5	Y	<50	Not Installed						<5	2.1 J	1.2 J	<250	<1000	<250	Not Installed						<10	<10	<10	<10	<10
Xylene (o-)	5	Y	<50	Not Installed						<5	2.1 J	1.1 J	<250	<1000	<250	Not Installed						<10	<10	<10	<10	<10
Ethylbenzene	5	Y	<50	Not Installed						<5	1.1 J	0.60 J	<250	<1000	<250	Not Installed						<10	<10	<10	<10	<10
Isopropylbenzene (Cumene)	5	Y	<50	Not Installed						<5	1.8 J	0.90 J	<250	<1000	<250	Not Installed						<10	<10	<10	<10	<10

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2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	B-9	BP-1A												BP-2A									
			Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19
			Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethenes																									
Trichloroethene (TCE)	5	Y	62 J	9	9	7.9	83	210	98	120	17	97	110	180	150	12	12	330	1,000	2,400	1,100	49	120	22	42
Dichloroethene (cis-1,2-)	5	Y	1,400	9	9	6.4	30	91	42	130	18	180	130	160	170	12	12	1,800	5,500	13,000	6,000	2,300	6,300	620	4,500
Vinyl chloride	2	Y	170	9	9	0.3	6.2	41	14	24	2.4 J	25	25	7.3	0.80	12	11	<25	<910	1,700	<920	530	1,400	120	1,200
Dichloroethene (trans-1,2-)	5	Y	<100	9	8	<0.5	<0.7	3.7	<1.5	2.0	<2.5	2.1 J	2.7	1.9 J	0.70	12	10	<2.6	<17	66	<27	5.8 J	26	4.1	24
Dichloroethene (1,1-)	5	Y	<100	9	8	<0.2	<0.2	0.7	<0.4	0.60 J	<2.5	0.80 J	0.60 J	0.60 J	0.50 J	12	11	<2.7	<14	32	<16	<25	12 J	0.70 J	8.1
Tetrachloroethene (PCE)	5	Y	<100	9	0	<0.5	--	<1	--	<1	<2.5	<2.5	<2.5	<2.5	<0.5	12	1	<5	<38	50	<34	<25	<25	<2.5	<2.5
Chlorinated Methanes																									
Chloroform (Trichloromethane)	7	Y	<100	9	7	<0.2	<0.3	0.5	<0.3	<1	<2.5	<2.5	<2.5	<2.5	0.10 J	12	2	<1.2	<38	50	<34*	<25	<25	<2.5	<2.5
Carbon tetrachloride	5	Y	<100	9	0	<0.5	--	<1	--	<1	<2.5	<2.5	<2.5	<2.5	<0.5	12	0	<5	--	<50	--	<25	<25	<2.5	<2.5
Methylene Chloride (Dichloromethane)	5	Y	<100	9	0	<0.5	--	<1	--	<1	<2.5	<2.5	<2.5	0.40 J	<0.5	12	0	<5	--	<50	--	<25	<25	0.40 J	<2.5
Chlorinated Ethanes																									
Dichloroethane (1,2-)	0.6	Y	<100	9	9	0.1	2.2	2.9	1.9	1.8	<2.5	2.3 J	2.6	2.4 J	2.4	12	2	<1.1	<38	50	<34	<25	5.0 J	0.70 J	3.3
Trichloroethane (1,1,2-)	1	Y	<100	9	5	<0.1	<0.4	0.5	<0.3	<1	<2.5	<2.5	<2.5	<2.5	0.20 J	12	1	<2.9	<38	50	<34	<25	<25	<2.5	<2.5
Ketones																									
Acetone	50	Y	670 J	9	2	<5	<5	11	<5.8	<10	<25	<25	4.5 J	<25	1.5 J	12	0	<50	--	<500	--	<250	<250	13 J	7.7 J
Butanone (2-) (MEK)	50	Y	1,600	9	0	<5	--	<10	--	<10	<25	<25	<25	<25	<5	12	0	<50	--	<500	--	<250	<250	<25	<25
Methyl-2-pentanone (4-) (MIBK)	N/A	Y	<1000	9	0	<5	--	<10	--	<10	<25	<25	<25	<25	<5	12	0	<50	--	<500	--	<250	<250	<25	<25
Aromatic/Aliphatic Petroleum Hydrocarbons																									
Toluene	5	Y	<100	9	3	<0.1	<0.5	1	<0.4	<1	<2.5	<2.5	<2.5	0.60 J	<0.5	12	11	<6.7	<41	500	<88	12 J	35	1.7 J	32
Benzene	1	Y	<100	9	7	<0.2	<0.4	0.6	<0.4	0.40 J	<2.5	0.50 J	0.40 J	0.40 J	0.070 J	12	7	<1.2	<12	50	<23	<25	12 J	1.0 J	8.6
Xylene (m,p-)	5	Y	<100	9	4	<0.1	<0.5	2	<0.7	<1	<2.5	<2.5	<2.5	<2.5	<0.5	12	9	<2.2	<37	370	<65	<25	6.2 J	<2.5	5.3
Xylene (o-)	5	Y	<100	9	2	<0.1	<0.5	1	<0.5	<1	<2.5	<2.5	<2.5	<2.5	<0.5	12	8	<1.2	<25	170	<40	<25	<25	0.30 J	4.3
Ethylbenzene	5	Y	<100	9	3	<0.1	<0.5	1.4	<0.6	<1	<2.5	<2.5	<2.5	<2.5	<0.5	12	11	<2.3	<28	130	<34	<25	6.4 J	<2.5	5.8
Isopropylbenzene (Cumene)	5	Y	<100	9	2	<0.5	<0.5	1	<0.6	<1	<2.5	<2.5	<2.5	<2.5	<0.5	12	1	<5	<38	50	<35	<25	<25	<2.5	0.60 J

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2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	BP-2A		BP-4A									BP-4A			BP-5A						
			Jun '19	Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline						Apr '18
			Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)
Chlorinated Ethenes																							
Trichloroethene (TCE)	5	Y	61	11 J	9	9	100	210	330	230	240/220	220	240/240	210/220	190	290/250	7	7	2	5.3	23	7.2	20
Dichloroethene (cis-1,2-)	5	Y	2,800	5,300	9	9	4.9	6.1	42	11	73/59	67	110/110	51/52	49	110/120	7	7	1.5	2.2	8.4	2.9	23
Vinyl chloride	2	Y	780	1,600	9	8	<0.8	<2.5	17	<5.3	24/20	16	18/17	12/12	7.3	19/21	7	3	<0.3	<0.5	2.3	<0.7	<2.5
Dichloroethene (trans-1,2-)	5	Y	12 J	13 J	9	2	<0.1	<2.5	2.5	<1.6	1.8 J/1.3 J	4.4	1.3/1.5	2.0/2.2	5.3	2.6/2.6	7	1	<0.2	<0.5	0.5	<0.5	0.70 J
Dichloroethene (1,1-)	5	Y	4.2 J	6.9 J	9	7	<0.4	<0.7	2.5	<1.2	0.70 J/0.70 J	1.0	1.0 J/0.90 J	0.80 J/0.80 J	0.80 J	1.3/1.2	7	0	<0.5	--	<0.5	--	<2.5
Tetrachloroethene (PCE)	5	Y	<25	<25	9	2	<0.1	<2.5	2.5	<1.6	<2.5/<2.5	<0.5	0.1 J/<1	0.10 J/<1	0.10 J	<1/<1	7	0	<0.5	--	<0.5	--	<2.5
Chlorinated Methanes																							
Chloroform (Trichloromethane)	7	Y	<25	<25	9	4	<0.4	<0.8	2.5	<1.4	<2.5/<2.5	0.20 J	0.20 J/0.20 J	0.20 J/0.20 J	0.20 J	0.20 J/0.20 J	7	0	<0.5	--	<0.5	--	<2.5
Carbon tetrachloride	5	Y	<25	<25	9	5	<0.5	<0.9	2.5	<1.3	<2.5/<2.5	<0.5	<1/<1	<1/<1	<1	<1/<1	7	0	<0.5	--	<0.5	--	<2.5
Methylene Chloride (Dichloromethane)	5	Y	3.7 J	<25	9	0	<0.5	--	<2.5	--	<2.5/<2.5	<0.5	<1/<1	<1/<1	0.20 J	<1/<1	7	0	<0.5	--	<0.5	--	<2.5
Chlorinated Ethanes																							
Dichloroethane (1,2-)	0.6	Y	3.3 J	2.9 J	9	9	0.6	0.9	1.2	0.9	0.90 J/0.80 J	0.80	1.0 J/0.80 J	0.80 J/0.80 J	0.60 J	1.0/1.1	7	7	0.5	0.9	2.6	1.1	3.3
Trichloroethane (1,1,2-)	1	Y	<25	<25	9	0	<0.5	--	<2.5	--	<2.5/<2.5	<0.5	<1/<1	<1/<1	<1	<1/<1	7	0	<0.5	--	<0.5	--	<2.5
Ketones																							
Acetone	50	Y	<250	<250	9	0	<5	--	<25	--	<25/<25	<5	3.4 J/2.4 J	2.8 J/4.7 J	2.3 J	2.1 J/2.0 J	7	3	<3	<5	5.5	<4.6	<25
Butanone (2-) (MEK)	50	Y	<250	<250	9	0	<5	--	<25	--	<25/<25	<5	<10/<10	<10/<10	<10	<10/<10	7	0	<5	--	<5	--	<25
Methyl-2-pentanone (4-) (MIBK)	N/A	Y	<250	<250	9	0	<5	--	<25	--	<25/<25	<5	<10/<10	<10/<10	<10	<10/<10	7	0	<5	--	<5	--	<25
Aromatic/Aliphatic Petroleum Hydrocarbons																							
Toluene	5	Y	19 J	59	9	0	<0.5	--	<2.5	--	<2.5/<2.5	<0.5	<1/<1	<1/<1	<1	<1/<1	7	1	<0.2	<0.5	0.5	<0.5	<2.5
Benzene	1	Y	7.4 J	6.5 J	9	8	<0.4	<1.6	2.5	<1.5	2.1 J/1.8 J	2.4	2.4/2.3	1.8/1.8	1.8	2.8/2.8	7	2	<0.1	<0.5	0.9	<0.5	<2.5
Xylene (m,p-)	5	Y	<25	11 J	9	0	<0.5	--	<2.5	--	<2.5/<2.5	<0.5	<1/<1	<1/<1	<1	<1/<1	7	1	<0.2	<0.5	0.5	<0.5	<2.5
Xylene (o-)	5	Y	2.5 J	9.2 J	9	0	<0.5	--	<2.5	--	<2.5/<2.5	<0.5	<1/<1	<1/<1	<1	<1/<1	7	0	<0.5	--	<0.5	--	<2.5
Ethylbenzene	5	Y	3.1 J	12 J	9	0	<0.5	--	<2.5	--	<2.5/<2.5	<0.5	<1/<1	<1/<1	<1	<1/<1	7	0	<0.5	--	<0.5	--	<2.5
Isopropylbenzene (Cumene)	5	Y	<25	<25	9	0	<0.5	--	<2.5	--	<2.5/<2.5	<0.5	<1/<1	<1/<1	<1	<1/<1	7	0	<0.5	--	<0.5	--	<2.5

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2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	**NY State Part 703 Standard (ug/l)**	**RI Site Contaminant?**	**BP-5A**					**BP-6A**												**BP-7A**					
			Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline					
			Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean
Chlorinated Ethenes																									
Trichloroethene (TCE)	5	Y	29	33	22	30	9.7	0			4,900			45,000	52,000	6,000	20,000	62,000	4,200	10	0	<0.5	--	<0.5	--
Dichloroethene (cis-1,2-)	5	Y	32	47	29	34	33	0			180			18,000	25,000	47,000	48,000	44,000	63,000	10	0	<0.5	--	<0.5	--
Vinyl chloride	2	Y	<2.5	<2.5	0.80 J	<2.5	<2.5	0			47			220 J	480	2,800	2,200	1,400	8,100	10	0	<0.5	--	<0.5	--
Dichloroethene (trans-1,2-)	5	Y	0.70 J	0.70 J	0.40 J	1.8 J	0.40 J	0			<25			58 J	51 J	52 J	160 J	370	190 J	10	0	<0.5	--	<0.5	--
Dichloroethene (1,1-)	5	Y	<2.5	<2.5	<2.5	<2.5	<2.5	0			<25			<250	72 J	85 J	130 J	170 J	120 J	10	0	<0.5	--	<0.5	--
Tetrachloroethene (PCE)	5	Y	<2.5	<2.5	<2.5	<2.5	<2.5	0			<25			<250	<250	<250	<250	<250	<250	10	0	<0.5	--	<0.5	--
Chlorinated Methanes																									
Chloroform (Trichloromethane)	7	Y	<2.5	<2.5	<2.5	<2.5	<2.5	--	--	--	--	--	--	390	520	330	470	670	550	10	0	<0.5	--	<0.5	--
Carbon tetrachloride	5	Y	<2.5	<2.5	<2.5	<2.5	<2.5	--	--	--	--	--	--	<250	<250	<250	<250	<250	<250	10	0	<0.5	--	<0.5	--
Methylene Chloride (Dichloromethane)	5	Y	<2.5	<2.5	<2.5	0.40 J	<2.5	--	--	--	--	--	--	<250	<250	<250	<250	54 J	<250	10	0	<0.5	--	<0.5	--
Chlorinated Ethanes																									
Dichloroethane (1,2-)	0.6	Y	4.1	6.8	4.6	4.5	2.9	--	--	--	--	--	--	<250	62 J	49 J	74 J	68 J	67 J	10	0	<0.5	--	<0.5	--
Trichloroethane (1,1,2-)	1	Y	<2.5	<2.5	<2.5	<2.5	<2.5	--	--	--	--	--	--	<250	<250	<250	<250	<250	<250	10	0	<0.5	--	<0.5	--
Ketones																									
Acetone	50	Y	<25	<25	<25	<25	13 J	--	--	--	--	--	--	<2500	<2500	<2500	<2500	750 J	<2500	10	0	<5	--	<5	--
Butanone (2-) (MEK)	50	Y	<25	<25	<25	<25	<25	--	--	--	--	--	--	<2500	<2500	<2500	<2500	<2500	<2500	10	0	<5	--	<5	--
Methyl-2-pentanone (4-) (MIBK)	N/A	Y	<25	<25	<25	<25	<25	--	--	--	--	--	--	<2500	<2500	<2500	<2500	380 J	<2500	10	0	<5	--	<5	--
Aromatic/Aliphatic Petroleum Hydrocarbons																									
Toluene	5	Y	<2.5	<2.5	<2.5	<2.5	<2.5	--	--	--	--	--	--	<250	<250	<250	67 J	850	200 J	10	1	<0.3	<0.5	0.5	<0.5
Benzene	1	Y	<2.5	<2.5	<2.5	<2.5	<2.5	--	--	--	--	--	--	57 J	71 J	47 J	70 J	100 J	75 J	10	0	<0.5	--	<0.5	--
Xylene (m,p-)	5	Y	<2.5	<2.5	<2.5	<2.5	<2.5	--	--	--	--	--	--	<250	<250	<250	<250	110 J	<250	10	1	<0.3	<0.5	0.5	<0.5
Xylene (o-)	5	Y	<2.5	<2.5	<2.5	<2.5	<2.5	--	--	--	--	--	--	<250	<250	<250	<250	150 J	43 J	10	1	<0.1	<0.5	0.5	<0.5
Ethylbenzene	5	Y	<2.5	<2.5	<2.5	<2.5	<2.5	--	--	--	--	--	--	<250	<250	<250	<250	59 J	<250	10	0	<0.5	--	<0.5	--
Isopropylbenzene (Cumene)	5	Y	<2.5	<2.5	<2.5	<2.5	<2.5	--	--	--	--	--	--	<250	<250	<250	<250	<250	<250	10	0	<0.5	--	<0.5	--

Table 2
Summary of Groundwater Data - RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	BP-7A						BP-8A												BP-9A				
			Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline				
			Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.
Chlorinated Ethenes																									
Trichloroethene (TCE)	5	Y	--	<0.5	--	--	<0.5	--	7	7	1.1	10	18	9.7	--	20	--	--	18	--	9	9	890	2,800	7,000
Dichloroethene (cis-1,2-)	5	Y	--	<0.5	--	--	<0.5	--	7	5	<0.1	<0.3	0.6	<0.3	--	2.9	--	--	6.3	--	9	9	64	170	390
Vinyl chloride	2	Y	--	<0.5	--	--	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	9	5	<5	<10	30
Dichloroethene (trans-1,2-)	5	Y	--	<0.5	--	--	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	9	1	<3.1	<25	50
Dichloroethene (1,1-)	5	Y	--	<0.5	--	--	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	9	4	<2.4	<10	50
Tetrachloroethene (PCE)	5	Y	--	<0.5	--	--	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	9	0	<5	--	<50
Chlorinated Methanes																									
Chloroform (Trichloromethane)	7	Y	--	<0.5	--	--	<0.5	--	7	5	<0.1	<0.2	0.5	<0.2	--	0.30 J	--	--	0.20 J	--	9	9	4	9.9	68
Carbon tetrachloride	5	Y	--	<0.5	--	--	<0.5	--	7	4	<0.1	<0.2	0.5	<0.3	--	0.10 J	--	--	0.10 J	--	9	0	<5	--	<50
Methylene Chloride (Dichloromethane)	5	Y	--	<0.5	--	--	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	9	1	<5	<25	50
Chlorinated Ethanes																									
Dichloroethane (1,2-)	0.6	Y	--	<0.5	--	--	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--	0.050 J	--	9	9	5.9	20	32
Trichloroethane (1,1,2-)	1	Y	--	<0.5	--	--	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	9	0	<5	--	<50
Ketones																									
Acetone	50	Y	--	6.8	--	--	9.6	--	7	0	<5	--	<5	--	--	14	--	--	4.9 J	--	9	0	<50	--	<5,000
Butanone (2-) (MEK)	50	Y	--	<5	--	--	<5	--	7	0	<5	--	<5	--	--	<5	--	--	<5	--	9	0	<50	--	<500
Methyl-2-pentanone (4-) (MIBK)	N/A	Y	--	<5	--	--	<5	--	7	0	<5	--	<5	--	--	<5	--	--	<5	--	9	0	<50	--	<500
Aromatic/Aliphatic Petroleum Hydrocarbons																									
Toluene	5	Y	--	<0.5	--	--	<0.5	--	7	1	<0.2	<0.5	0.5	<0.5	--	<0.5	--	--	<0.5	--	9	0	<5	--	<50
Benzene	1	Y	--	<0.5	--	--	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	9	1	<3	<25	50
Xylene (m,p-)	5	Y	--	<0.5	--	--	<0.5	--	7	1	<0.2	<0.5	0.5	<0.5	--	<0.5	--	--	<0.5	--	9	0	<5	--	<50
Xylene (o-)	5	Y	--	<0.5	--	--	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	9	0	<5	--	<50
Ethylbenzene	5	Y	--	<0.5	--	--	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	9	0	<5	--	<50
Isopropylbenzene (Cumene)	5	Y	--	<0.5	--	--	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	9	0	<5	--	<50

Table 2
Summary of Groundwater Data - RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	BP-9A							BP-10A												BP-11A			
				Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline			
			Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median
Chlorinated Ethenes																									
Trichloroethene (TCE)	5	Y	2,800	610	810	950	630	250	440	10	10	0.1	1.8	4	1.9	--	1.9	--	--	3.5	--	15	11	<0.5	<1.4
Dichloroethene (cis-1,2-)	5	Y	190	1,200	1,800	2,200	1,200	800	1,200	10	4	<0.1	<0.5	0.5	<0.4	--	0.70	--	--	1.3	--	15	0	<0.5	--
Vinyl chloride	2	Y	<14	210	200	310	160	81	86	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	15	0	<0.5	--
Dichloroethene (trans-1,2-)	5	Y	<21*	10	8.9 J	9.0 J	14	8.5 J	10	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	15	0	<0.5	--
Dichloroethene (1,1-)	5	Y	<17	4.5 J	5.9 J	7.8 J	5.6 J	2.8 J	5.3 J	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	15	0	<0.5	--
Tetrachloroethene (PCE)	5	Y	--	<10	<10	<10	<10	<10	<10	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	15	0	<0.5	--
Chlorinated Methanes																									
Chloroform (Trichloromethane)	7	Y	19	<10	2.4 J	2.6 J	<10	<10	<10	10	3	<0.1	<0.5	0.5	<0.4	--	<0.5	--	--	<0.5	--	15	0	<0.5	--
Carbon tetrachloride	5	Y	--	<10	<10	<10	<10	<10	<10	10	5	<0.1	<0.4	0.5	<0.3	--	<0.5	--	--	0.10 J	--	15	3	<0.1	<0.5
Methylene Chloride (Dichloromethane)	5	Y	<21	<10	<10	1.8 J	<10	1.6 J	<10	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	15	0	<0.5	--
Chlorinated Ethanes																									
Dichloroethane (1,2-)	0.6	Y	18	13	16	21	19	7.0 J	12	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	0.10 J	--	15	0	<0.5	--
Trichloroethane (1,1,2-)	1	Y	--	<10	<10	<10	<10	<10	<10	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	15	0	<0.5	--
Ketones																									
Acetone	50	Y	--	<100	<100	<100	<100	<100	<100	10	0	<5	--	<5	--	--	13	--	--	6.2	--	15	0	<5	--
Butanone (2-) (MEK)	50	Y	--	<100	<100	<100	<100	<100	<100	10	0	<5	--	<5	--	--	<5	--	--	<5	--	15	0	<5	--
Methyl-2-pentanone (4-) (MIBK)	N/A	Y	--	<100	<100	<100	<100	<100	<100	10	0	<5	--	<5	--	--	<5	--	--	<5	--	15	0	<5	--
Aromatic/Aliphatic Petroleum Hydrocarbons																									
Toluene	5	Y	--	<10	<10	<10	<10	<10	<10	10	1	<0.2	<0.5	0.5	<0.5	--	<0.5	--	--	<0.5	--	15	2	<0.1	<0.5
Benzene	1	Y	<21	2.8 J	3.5 J	4.1 J	2.8 J	1.5 J	2.2 J	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	15	0	<0.5	--
Xylene (m,p-)	5	Y	--	<10	<10	<10	<10	<10	<10	10	1	<0.2	<0.5	0.5	<0.5	--	<0.5	--	--	<0.5	--	15	2	<0.2	<0.5
Xylene (o-)	5	Y	--	<10	<10	<10	<10	<10	<10	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	15	0	<0.5	--
Ethylbenzene	5	Y	--	<10	<10	<10	<10	<10	<10	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	15	0	<0.5	--
Isopropylbenzene (Cumene)	5	Y	--	<10	<10	<10	<10	<10	<10	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	15	0	<0.5	--

Table 2
Summary of Groundwater Data - RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	BP-11A								BP-12A												BP-12D-P1		
					Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline		
			Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.
Chlorinated Ethenes																									
Trichloroethene (TCE)	5	Y	3.6	<1.6	--	3.4	--	--	1.8	--	10	10	1.9	3.7	8.6	4.6	--	0.40 J	--	--	0.30 J	--	12	0	<0.5
Dichloroethene (cis-1,2-)	5	Y	<0.5	--	--	<0.5	--	--	<0.5	--	10	9	<0.1	<0.25	0.5	<0.3	--	<0.5	--	--	<0.5	--	12	0	<0.5
Vinyl chloride	2	Y	<0.5	--	--	<0.5	--	--	<0.5	--	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	12	0	<0.5
Dichloroethene (trans-1,2-)	5	Y	<0.5	--	--	<0.5	--	--	<0.5	--	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	12	0	<0.5
Dichloroethene (1,1-)	5	Y	<0.5	--	--	<0.5	--	--	<0.5	--	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	12	0	<0.5
Tetrachloroethene (PCE)	5	Y	<0.5	--	--	<0.5	--	--	<0.5	--	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	12	0	<0.5
Chlorinated Methanes																									
Chloroform (Trichloromethane)	7	Y	<0.5	--	--	<0.5	--	--	<0.5	--	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	12	3	<0.1
Carbon tetrachloride	5	Y	0.5	<0.4	--	<0.5	--	--	<0.5	--	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	12	0	<0.5
Methylene Chloride (Dichloromethane)	5	Y	<0.5	--	--	<0.5	--	--	<0.5	--	10	1	<0.5	<0.5	0.9	<0.5	--	<0.5	--	--	<0.5	--	12	0	<0.5
Chlorinated Ethanes																									
Dichloroethane (1,2-)	0.6	Y	<0.5	--	--	<0.5	--	--	<0.5	--	10	10	0.2	0.3	0.4	0.3	--	<0.5	--	--	<0.5	--	12	0	<0.5
Trichloroethane (1,1,2-)	1	Y	<0.5	--	--	<0.5	--	--	<0.5	--	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	12	0	<0.5
Ketones																									
Acetone	50	Y	<5	--	--	5.0	--	--	8.3	--	10	2	<5	<5	7.4	<5.3	--	5.9	--	--	7.7	--	12	2	<3.1
Butanone (2-) (MEK)	50	Y	<5	--	--	<5	--	--	<5	--	10	1	<1.1	<5	5	<4.6	--	<5	--	--	<5	--	12	1	<1.4
Methyl-2-pentanone (4-) (MIBK)	N/A	Y	<5	--	--	<5	--	--	<5	--	10	0	<5	--	<5	--	--	<5	--	--	<5	--	12	0	<5
Aromatic/Aliphatic Petroleum Hydrocarbons																									
Toluene	5	Y	0.5	<0.5	--	<0.5	--	--	<0.5	--	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	12	9	0.5
Benzene	1	Y	<0.5	--	--	<0.5	--	--	<0.5	--	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	12	0	<0.5
Xylene (m,p-)	5	Y	0.5	<0.5	--	<0.5	--	--	<0.5	--	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	12	0	<0.5
Xylene (o-)	5	Y	<0.5	--	--	<0.5	--	--	<0.5	--	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	12	0	<0.5
Ethylbenzene	5	Y	<0.5	--	--	<0.5	--	--	<0.5	--	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	12	0	<0.5
Isopropylbenzene (Cumene)	5	Y	<0.5	--	--	<0.5	--	--	<0.5	--	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	12	0	<0.5

Table 2
Summary of Groundwater Data - RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	BP-12D-P1									BP-12D-P7												BP-13A	
			Pre-2010 Baseline			Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline	
			Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects
Chlorinated Ethenes																									
Trichloroethene (TCE)	5	Y	--	<0.5	--	--	<0.5	--	--	<0.5	--	10	0	<0.5	--	<1	--	--	<0.5	--	--	<0.5	--	8	8
Dichloroethene (cis-1,2-)	5	Y	--	<0.5	--	--	<0.5	--	--	<0.5	--	10	0	<0.5	--	<1	--	--	<0.5	--	--	<0.5	--	8	8
Vinyl chloride	2	Y	--	<0.5	--	--	<0.5	--	--	<0.5	--	10	0	<0.5	--	<1	--	--	<0.5	--	--	<0.5	--	8	1
Dichloroethene (trans-1,2-)	5	Y	--	<0.5	--	--	<0.5	--	--	<0.5	--	10	0	<0.5	--	<1	--	--	<0.5	--	--	<0.5	--	8	5
Dichloroethene (1,1-)	5	Y	--	<0.5	--	--	<0.5	--	--	<0.5	--	10	0	<0.5	--	<1	--	--	<0.5	--	--	<0.5	--	8	7
Tetrachloroethene (PCE)	5	Y	--	<0.5	--	--	<0.5	--	--	<0.5	--	10	0	<0.5	--	<1	--	--	<0.5	--	--	<0.5	--	8	0
Chlorinated Methanes																									
Chloroform (Trichloromethane)	7	Y	<0.5	0.5	<0.4	--	<0.5	--	--	<0.5	--	10	1	<0.2	<0.5	1	<0.5	--	<0.5	--	--	<0.5	--	8	8
Carbon tetrachloride	5	Y	--	<0.5	--	--	<0.5	--	--	<0.5	--	10	0	<0.5	--	<1	--	--	<0.5	--	--	<0.5	--	8	8
Methylene Chloride (Dichloromethane)	5	Y	--	<0.5	--	--	<0.5	--	--	<0.5	--	10	0	<0.5	--	<1	--	--	<0.5	--	--	<0.5	--	8	0
Chlorinated Ethanes																									
Dichloroethane (1,2-)	0.6	Y	--	<0.5	--	--	<0.5	--	--	<0.5	--	10	0	<0.5	--	<1	--	--	<0.5	--	--	<0.5	--	8	6
Trichloroethane (1,1,2-)	1	Y	--	<0.5	--	--	<0.5	--	--	<0.5	--	10	0	<0.5	--	<1	--	--	<0.5	--	--	<0.5	--	8	6
Ketones																									
Acetone	50	Y	<5	14	<5.6	--	<5	--	--	<5	--	10	1	<5	<5	10	<5.5	--	<5	--	--	<5	--	8	0
Butanone (2-) (MEK)	50	Y	<5	5	<4.7	--	<5	--	--	<5	--	10	4	<1	<5	10	<4	--	<5	--	--	<5	--	8	0
Methyl-2-pentanone (4-) (MIBK)	N/A	Y	--	<5	--	--	<5	--	--	<5	--	10	1	<2.4	<5	10	<5.2	--	<5	--	--	3.2 J	--	8	0
Aromatic/Aliphatic Petroleum Hydrocarbons																									
Toluene	5	Y	2.4	37	5.4	--	0.60	--	--	0.10 J	--	10	10	10	30	88	41	--	<0.5	--	--	0.40 J	--	8	1
Benzene	1	Y	--	<0.5	--	--	<0.5	--	--	<0.5	--	10	0	<0.5	--	<1	--	--	<0.5	--	--	<0.5	--	8	1
Xylene (m,p-)	5	Y	--	<0.5	--	--	<0.5	--	--	<0.5	--	10	0	<0.5	--	<1	--	--	<0.5	--	--	<0.5	--	8	0
Xylene (o-)	5	Y	--	<0.5	--	--	<0.5	--	--	<0.5	--	10	0	<0.5	--	<1	--	--	<0.5	--	--	<0.5	--	8	0
Ethylbenzene	5	Y	--	<0.5	--	--	<0.5	--	--	<0.5	--	10	0	<0.5	--	<1	--	--	<0.5	--	--	<0.5	--	8	0
Isopropylbenzene (Cumene)	5	Y	--	<0.5	--	--	<0.5	--	--	<0.5	--	10	0	<0.5	--	<1	--	--	<0.5	--	--	<0.5	--	8	0

Table 2
Summary of Groundwater Data - RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	BP-13A										BP-13D-P1											
			Pre-2010 Baseline				Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19
			Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethenes																								
Trichloroethene (TCE)	5	Y	46	120	140	110	12	81	46	19	33	25	5	5	17	89	130	89	--	53	--	--	74	--
Dichloroethene (cis-1,2-)	5	Y	2	5.5	14	6.2	0.20 J	3.7	1.4	0.80	1.0	1.5	5	5	5.2	23	26	23	--	45	--	--	61	--
Vinyl chloride	2	Y	<0.2	<0.5	2.5	<0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5	4	<0.5	<2	3	<2	--	2.4	--	--	5.3	--
Dichloroethene (trans-1,2-)	5	Y	<0.1	<0.2	2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5	4	<0.1	0.2	0.5	0.2	--	0.20 J	--	--	0.40 J	--
Dichloroethene (1,1-)	5	Y	<0.1	<0.3	2.5	<0.5	<0.5	<0.5	0.070 J	<0.5	<0.5	<0.5	5	5	0.2	0.5	0.6	0.5	--	0.30 J	--	--	0.50 J	--
Tetrachloroethene (PCE)	5	Y	<0.5	--	<2.5	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--
Chlorinated Methanes																								
Chloroform (Trichloromethane)	7	Y	0.6	0.9	1.3	0.9	0.20 J	0.80	0.40 J	0.20 J	0.40 J	0.50	5	5	0.2	0.85	1.2	0.9	--	0.10 J	--	--	0.20 J	--
Carbon tetrachloride	5	Y	0.9	1.2	2.3	1.4	0.90	2.1	1.1	0.60	1.6	0.90	5	4	<0.1	<0.3	0.5	<0.3	--	<0.5	--	--	0.10 J	--
Methylene Chloride (Dichloromethane)	5	Y	<0.5	--	<2.5	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5	0	<0.5	--	<0.5	--	--	<0.5	--	--	0.20 J	--
Chlorinated Ethanes																								
Dichloroethane (1,2-)	0.6	Y	<0.2	<0.25	2.5	<0.56	<0.5	<0.5	0.070 J	0.050 J	<0.5	0.060 J	5	5	0.2	0.45	0.5	0.5	--	0.30 J	--	--	0.30 J	--
Trichloroethane (1,1,2-)	1	Y	<0.2	<0.2	2.5	<0.5	<0.5	0.20 J	0.090 J	<0.5	0.090 J	0.090 J	5	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--
Ketones																								
Acetone	50	Y	<5	--	<25	--	<5	<5	<5	2.5 J	<5	<5	5	2	<3.5	<5	5	<5	--	<5	--	--	<5	--
Butanone (2-) (MEK)	50	Y	<5	--	<25	--	<5	<5	<5	<5	<5	<5	5	1	1.7	<5	5	<5	--	<5	--	--	<5	--
Methyl-2-pentanone (4-) (MIBK)	N/A	Y	<5	--	<25	--	<5	<5	<5	<5	<5	<5	5	1	<1	<5	5	<5	--	<5	--	--	<5	--
Aromatic/Aliphatic Petroleum Hydrocarbons																								
Toluene	5	Y	<0.1	<0.5	2.5	<0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5	5	24	41	78	41	--	3.8	--	--	3.5	--
Benzene	1	Y	<0.1	<0.5	2.5	<0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5	5	0.1	0.25	0.3	0.3	--	<0.5	--	--	0.10 J	--
Xylene (m,p-)	5	Y	<0.5	--	<2.5	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--
Xylene (o-)	5	Y	<0.5	--	<2.5	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5	1	<0.1	<0.5	0.5	<0.5	--	<0.5	--	--	<0.5	--
Ethylbenzene	5	Y	<0.5	--	<2.5	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--
Isopropylbenzene (Cumene)	5	Y	<0.5	--	<2.5	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--

Table 2
Summary of Groundwater Data - RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	BP-13D-P5												BP-14A										
			Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19
			No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethenes																									
Trichloroethene (TCE)	5	Y	10	9	0.5	<1.8	7.6	<1.9	--	0.40 J	--	--	0.40 J	--	4	4	0.3	0.3	0.3	0.3	--	0.30 J	--	--	0.50 J
Dichloroethene (cis-1,2-)	5	Y	10	9	0.6	<1.1	2.8	<1.1	--	1.4	--	--	1.0	--	4	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5
Vinyl chloride	2	Y	10	6	<0.1	<0.2	1	<0.3	--	0.40 J	--	--	0.30 J	--	4	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5
Dichloroethene (trans-1,2-)	5	Y	10	0	<0.5	--	<1	--	--	<0.5	--	--	<0.5	--	4	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5
Dichloroethene (1,1-)	5	Y	10	0	<0.5	--	<1	--	--	<0.5	--	--	<0.5	--	4	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5
Tetrachloroethene (PCE)	5	Y	10	0	<0.5	--	<1	--	--	<0.5	--	--	<0.5	--	4	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5
Chlorinated Methanes																									
Chloroform (Trichloromethane)	7	Y	10	3	0.2	<0.5	0.5	<0.5	--	<0.5	--	--	<0.5	--	4	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5
Carbon tetrachloride	5	Y	10	0	<0.5	--	<1	--	--	<0.5	--	--	<0.5	--	4	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5
Methylene Chloride (Dichloromethane)	5	Y	10	1	<0.2	<0.5	1	<0.5	--	<0.5	--	--	<0.5	--	4	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5
Chlorinated Ethanes																									
Dichloroethane (1,2-)	0.6	Y	10	1	0.5	<0.5	1	<0.5	--	<0.5	--	--	<0.5	--	4	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5
Trichloroethane (1,1,2-)	1	Y	10	0	<0.5	--	<1	--	--	<0.5	--	--	<0.5	--	4	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5
Ketones																									
Acetone	50	Y	10	7	<3.2	<6.7	28	<12	--	<5	--	--	<5	--	4	0	<5	--	<5	--	--	<5	--	--	<5
Butanone (2-) (MEK)	50	Y	10	10	1.2	9.9	51	17	--	<5	--	--	<5	--	4	0	<5	--	<5	--	--	<5	--	--	<5
Methyl-2-pentanone (4-) (MIBK)	N/A	Y	10	7	<1.5	<4.3	10	<4	--	<5	--	--	<5	--	4	0	<5	--	<5	--	--	<5	--	--	<5
Aromatic/Aliphatic Petroleum Hydrocarbons																									
Toluene	5	Y	10	10	55	80	180	76	--	4.8	--	--	3.8	--	4	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5
Benzene	1	Y	10	7	<0.1	<0.1	1	<0.2	--	0.10 J	--	--	0.10 J	--	4	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5
Xylene (m,p-)	5	Y	10	0	<0.5	--	<1	--	--	<0.5	--	--	<0.5	--	4	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5
Xylene (o-)	5	Y	10	0	<0.5	--	<1	--	--	<0.5	--	--	<0.5	--	4	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5
Ethylbenzene	5	Y	10	0	<0.5	--	<1	--	--	<0.5	--	--	<0.5	--	4	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5
Isopropylbenzene (Cumene)	5	Y	10	0	<0.5	--	<1	--	--	<0.5	--	--	<0.5	--	4	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5

Table 2
Summary of Groundwater Data - RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	BP-14A	BP-15D-P5												BP-16A									
			Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19
			Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethenes																									
Trichloroethene (TCE)	5	Y	--	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--
Dichloroethene (cis-1,2-)	5	Y	--	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--
Vinyl chloride	2	Y	--	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--
Dichloroethene (trans-1,2-)	5	Y	--	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--
Dichloroethene (1,1-)	5	Y	--	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--
Tetrachloroethene (PCE)	5	Y	--	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--
Chlorinated Methanes																									
Chloroform (Trichloromethane)	7	Y	--	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--
Carbon tetrachloride	5	Y	--	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--
Methylene Chloride (Dichloromethane)	5	Y	--	10	1	<0.2	<0.5	0.5	<0.5	--	<0.5	--	--	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--
Chlorinated Ethanes																									
Dichloroethane (1,2-)	0.6	Y	--	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--
Trichloroethane (1,1,2-)	1	Y	--	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--
Ketones																									
Acetone	50	Y	--	10	8	<3.9	<9.7	350	<47	--	<5	--	--	<5	--	7	0	<5	--	<5	--	--	5.4	--	--
Butanone (2-) (MEK)	50	Y	--	10	9	<1.1	<2.6	10	<3.5	--	<5	--	--	<5	--	7	0	<5	--	<5	--	--	<5	--	--
Methyl-2-pentanone (4-) (MIBK)	N/A	Y	--	10	1	<1.2	<5	5	<4.6	--	<5	--	--	<5	--	7	0	<5	--	<5	--	--	<5	--	--
Aromatic/Aliphatic Petroleum Hydrocarbons																									
Toluene	5	Y	--	10	10	13	38	50	35	--	<0.5	--	--	0.10 J	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--
Benzene	1	Y	--	10	6	<0.1	<0.3	0.8	<0.3	--	<0.5	--	--	0.10 J	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--
Xylene (m,p-)	5	Y	--	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--
Xylene (o-)	5	Y	--	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--
Ethylbenzene	5	Y	--	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--
Isopropylbenzene (Cumene)	5	Y	--	10	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--

Table 2
Summary of Groundwater Data - RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	**NY State Part 703 Standard (ug/l)**	**RI Site Contaminant?**	**BP-16A**		**BP-17A**												**BP-18A**								
			Jun '19	Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18
			Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethenes																									
Trichloroethene (TCE)	5	Y	<0.5	--	12	12	0.4	1	6.9	1.6	--	1.3	--	--	1.7	--	8	8	9.3	13	19	13	--	8.0/7.7	--
Dichloroethene (cis-1,2-)	5	Y	<0.5	--	12	7	<0.1	<0.4	0.5	<0.3	--	0.20 J	--	--	0.30 J	--	8	7	<0.1	<0.2	0.5	<0.2	--	0.20 J/0.10 J	--
Vinyl chloride	2	Y	<0.5	--	12	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	8	0	<0.5	--	<0.5	--	--	<0.5/<0.5	--
Dichloroethene (trans-1,2-)	5	Y	<0.5	--	12	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	8	0	<0.5	--	<0.5	--	--	<0.5/<0.5	--
Dichloroethene (1,1-)	5	Y	<0.5	--	12	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	8	0	<0.5	--	<0.5	--	--	<0.5/<0.5	--
Tetrachloroethene (PCE)	5	Y	<0.5	--	12	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	8	0	<0.5	--	<0.5	--	--	<0.5/<0.5	--
Chlorinated Methanes																									
Chloroform (Trichloromethane)	7	Y	<0.5	--	12	3	<0.1	<0.5	0.5	<0.4	--	<0.5	--	--	0.10 J	--	8	8	0.3	0.3	0.6	0.4	--	0.20 J/0.20 J	--
Carbon tetrachloride	5	Y	<0.5	--	12	2	<0.1	<0.5	0.5	<0.4	--	<0.5	--	--	<0.5	--	8	8	0.3	0.45	0.6	0.5	--	0.20 J/0.20 J	--
Methylene Chloride (Dichloromethane)	5	Y	<0.5	--	12	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	8	0	<0.5	--	<0.5	--	--	<0.5/<0.5	--
Chlorinated Ethanes																									
Dichloroethane (1,2-)	0.6	Y	<0.5	--	12	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	8	0	<0.5	--	<0.5	--	--	<0.5/<0.5	--
Trichloroethane (1,1,2-)	1	Y	<0.5	--	12	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	8	0	<0.5	--	<0.5	--	--	<0.5/<0.5	--
Ketones																									
Acetone	50	Y	6.0	--	12	0	<5	--	<5	--	--	7.5	--	--	1.6 J	--	8	0	<5	--	<5	--	--	4.9 J/4.5 J	--
Butanone (2-) (MEK)	50	Y	<5	--	12	0	<5	--	<5	--	--	<5	--	--	<5	--	8	0	<5	--	<5	--	--	<5/<5	--
Methyl-2-pentanone (4-) (MIBK)	N/A	Y	<5	--	12	0	<5	--	<5	--	--	<5	--	--	<5	--	8	0	<5	--	<5	--	--	<5/<5	--
Aromatic/Aliphatic Petroleum Hydrocarbons																									
Toluene	5	Y	<0.5	--	12	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	8	0	<0.5	--	<0.5	--	--	<0.5/<0.5	--
Benzene	1	Y	<0.5	--	12	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	8	0	<0.5	--	<0.5	--	--	<0.5/<0.5	--
Xylene (m,p-)	5	Y	<0.5	--	12	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	8	0	<0.5	--	<0.5	--	--	<0.5/<0.5	--
Xylene (o-)	5	Y	<0.5	--	12	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	8	0	<0.5	--	<0.5	--	--	<0.5/<0.5	--
Ethylbenzene	5	Y	<0.5	--	12	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	8	0	<0.5	--	<0.5	--	--	<0.5/<0.5	--
Isopropylbenzene (Cumene)	5	Y	<0.5	--	12	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	8	0	<0.5	--	<0.5	--	--	<0.5/<0.5	--

Table 2
Summary of Groundwater Data - RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	**NY State Part 703 Standard (ug/l)**	**RI Site Contaminant?**	**BP-18A**			**BP-19A**												**BP-20A**						
			Mar '19	Jun '19	Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline						Apr '18
			Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)
Chlorinated Ethenes																								
Trichloroethene (TCE)	5	Y	--	6.1/6.2	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	6	2.3	9.2	14	8.8	--
Dichloroethene (cis-1,2-)	5	Y	--	0.080 J/0.080 J	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--
Vinyl chloride	2	Y	--	<0.5/<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--
Dichloroethene (trans-1,2-)	5	Y	--	<0.5/<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--
Dichloroethene (1,1-)	5	Y	--	<0.5/<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--
Tetrachloroethene (PCE)	5	Y	--	<0.5/<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	2	<0.1	<0.5	0.5	<0.4	--
Chlorinated Methanes																								
Chloroform (Trichloromethane)	7	Y	--	0.10 J/0.10 J	--	6	2	<0.1	<0.5	0.5	<0.4	--	<0.5	--	--	<0.5	--	6	6	0.2	0.25	0.4	0.3	--
Carbon tetrachloride	5	Y	--	0.20 J/0.20 J	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	3	<0.2	<0.35	0.5	<1.7	--
Methylene Chloride (Dichloromethane)	5	Y	--	<0.5/<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--
Chlorinated Ethanes																								
Dichloroethane (1,2-)	0.6	Y	--	<0.5/<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--
Trichloroethane (1,1,2-)	1	Y	--	<0.5/<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--
Ketones																								
Acetone	50	Y	--	4.3 J/4.2 J	--	6	0	<5	--	<5	--	--	5.1	--	--	3.5 J	--	6	0	<5	--	<5	--	--
Butanone (2-) (MEK)	50	Y	--	<5/<5	--	6	0	<5	--	<5	--	--	<5	--	--	<5	--	6	0	<5	--	<5	--	--
Methyl-2-pentanone (4-) (MIBK)	N/A	Y	--	<5/<5	--	6	0	<5	--	<5	--	--	<5	--	--	<5	--	6	0	<5	--	<5	--	--
Aromatic/Aliphatic Petroleum Hydrocarbons																								
Toluene	5	Y	--	<0.5/<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--
Benzene	1	Y	--	<0.5/<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--
Xylene (m,p-)	5	Y	--	<0.5/<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--
Xylene (o-)	5	Y	--	<0.5/<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--
Ethylbenzene	5	Y	--	<0.5/<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--
Isopropylbenzene (Cumene)	5	Y	--	<0.5/<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--

Table 2
Summary of Groundwater Data - RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	BP-20A					BP-21A												BP-22A					
			Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline					
			Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean
Chlorinated Ethenes																									
Trichloroethene (TCE)	5	Y	2.5	--	--	2.1	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	4	0	<0.5	--	<0.5	--
Dichloroethene (cis-1,2-)	5	Y	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	4	0	<0.5	--	<0.5	--
Vinyl chloride	2	Y	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	4	0	<0.5	--	<0.5	--
Dichloroethene (trans-1,2-)	5	Y	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	4	0	<0.5	--	<0.5	--
Dichloroethene (1,1-)	5	Y	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	4	0	<0.5	--	<0.5	--
Tetrachloroethene (PCE)	5	Y	<0.5	--	--	0.080 J	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	4	0	<0.5	--	<0.5	--
Chlorinated Methanes																									
Chloroform (Trichloromethane)	7	Y	0.20 J	--	--	0.20 J	--	6	1	<0.4	<0.5	0.5	<0.5	--	<0.5	--	--	<0.5	--	4	2	<0.1	<0.5	0.5	<0.4
Carbon tetrachloride	5	Y	<0.5	--	--	0.070 J	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	4	0	<0.5	--	<0.5	--
Methylene Chloride (Dichloromethane)	5	Y	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	4	0	<0.5	--	<0.5	--
Chlorinated Ethanes																									
Dichloroethane (1,2-)	0.6	Y	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	4	0	<0.5	--	<0.5	--
Trichloroethane (1,1,2-)	1	Y	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	4	0	<0.5	--	<0.5	--
Ketones																									
Acetone	50	Y	6.1	--	--	4.5 J	--	6	1	<3.5	<5	5	<4.8	--	5.8	--	--	6.8	--	4	1	<5	<5	7.5	<5.6
Butanone (2-) (MEK)	50	Y	<5	--	--	<5	--	6	1	<1.2	<5	5	<4.4	--	<5	--	--	<5	--	4	0	<5	--	<5	--
Methyl-2-pentanone (4-) (MIBK)	N/A	Y	<5	--	--	<5	--	6	0	<5	--	<5	--	--	<5	--	--	<5	--	4	0	<5	--	<5	--
Aromatic/Aliphatic Petroleum Hydrocarbons																									
Toluene	5	Y	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	4	0	<0.5	--	<0.5	--
Benzene	1	Y	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	4	0	<0.5	--	<0.5	--
Xylene (m,p-)	5	Y	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	4	0	<0.5	--	<0.5	--
Xylene (o-)	5	Y	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	4	0	<0.5	--	<0.5	--
Ethylbenzene	5	Y	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	4	0	<0.5	--	<0.5	--
Isopropylbenzene (Cumene)	5	Y	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	4	0	<0.5	--	<0.5	--

Table 2
Summary of Groundwater Data - RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	BP-22A						BP-23A												BP-24A				
			Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline				
			Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.
Chlorinated Ethenes																									
Trichloroethene (TCE)	5	Y	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--	0.60	--	--	0.20 J	--	6	6	0.2	1.6	1.9
Dichloroethene (cis-1,2-)	5	Y	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	6	0.1	0.4	0.4
Vinyl chloride	2	Y	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5
Dichloroethene (trans-1,2-)	5	Y	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5
Dichloroethene (1,1-)	5	Y	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5
Tetrachloroethene (PCE)	5	Y	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5
Chlorinated Methanes																									
Chloroform (Trichloromethane)	7	Y	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	2	<0.2	<0.5	0.5
Carbon tetrachloride	5	Y	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5
Methylene Chloride (Dichloromethane)	5	Y	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5
Chlorinated Ethanes																									
Dichloroethane (1,2-)	0.6	Y	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5
Trichloroethane (1,1,2-)	1	Y	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5
Ketones																									
Acetone	50	Y	--	5.0 J	--	--	5.0	--	6	0	<5	--	<5	--	--	5.6	--	--	11	--	6	1	<3.6	<5	5
Butanone (2-) (MEK)	50	Y	--	<5	--	--	<5	--	6	0	<5	--	<5	--	--	<5	--	--	<5	--	6	0	<5	--	<5
Methyl-2-pentanone (4-) (MIBK)	N/A	Y	--	<5	--	--	<5	--	6	0	<5	--	<5	--	--	<5	--	--	<5	--	6	0	<5	--	<5
Aromatic/Aliphatic Petroleum Hydrocarbons																									
Toluene	5	Y	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5
Benzene	1	Y	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5
Xylene (m,p-)	5	Y	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5
Xylene (o-)	5	Y	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5
Ethylbenzene	5	Y	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5
Isopropylbenzene (Cumene)	5	Y	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	6	0	<0.5	--	<0.5

Table 2
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2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	BP-24A							BP-25A											
				Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19
			Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethenes																					
Trichloroethene (TCE)	5	Y	1.2	--	2.1/2.0	--	--	0.90/0.90	--	6	6	1.1	2.7	3.9	2.6	--	0.60	--	--	0.40 J	--
Dichloroethene (cis-1,2-)	5	Y	0.3	--	0.90/0.90	--	--	0.70/0.60	--	6	4	<0.1	<0.3	0.5	<0.3	--	<0.5	--	--	<0.5	--
Vinyl chloride	2	Y	--	--	<0.5/<0.5	--	--	<0.5/<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--
Dichloroethene (trans-1,2-)	5	Y	--	--	<0.5/<0.5	--	--	<0.5/<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--
Dichloroethene (1,1-)	5	Y	--	--	<0.5/<0.5	--	--	<0.5/<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--
Tetrachloroethene (PCE)	5	Y	--	--	<0.5/<0.5	--	--	<0.5/<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--
Chlorinated Methanes																					
Chloroform (Trichloromethane)	7	Y	<0.4	--	<0.5/<0.5	--	--	<0.5/<0.5	--	6	1	<0.1	<0.5	0.5	<0.4	--	<0.5	--	--	<0.5	--
Carbon tetrachloride	5	Y	--	--	<0.5/<0.5	--	--	<0.5/<0.5	--	6	1	<0.1	<0.5	0.5	<0.4	--	<0.5	--	--	<0.5	--
Methylene Chloride (Dichloromethane)	5	Y	--	--	<0.5/<0.5	--	--	<0.5/<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--
Chlorinated Ethanes																					
Dichloroethane (1,2-)	0.6	Y	--	--	<0.5/<0.5	--	--	<0.5/<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--
Trichloroethane (1,1,2-)	1	Y	--	--	<0.5/<0.5	--	--	<0.5/<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--
Ketones																					
Acetone	50	Y	<4.8	--	3.9 J/3.9 J	--	--	9.7/11	--	6	0	<5	--	<5	--	--	4.1 J	--	--	7.1	--
Butanone (2-) (MEK)	50	Y	--	--	<5/<5	--	--	<5/<5	--	6	0	<5	--	<5	--	--	<5	--	--	<5	--
Methyl-2-pentanone (4-) (MIBK)	N/A	Y	--	--	<5/<5	--	--	<5/<5	--	6	0	<5	--	<5	--	--	<5	--	--	<5	--
Aromatic/Aliphatic Petroleum Hydrocarbons																					
Toluene	5	Y	--	--	<0.5/<0.5	--	--	<0.5/<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--
Benzene	1	Y	--	--	<0.5/<0.5	--	--	<0.5/<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--
Xylene (m,p-)	5	Y	--	--	<0.5/<0.5	--	--	<0.5/<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--
Xylene (o-)	5	Y	--	--	<0.5/<0.5	--	--	<0.5/<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--
Ethylbenzene	5	Y	--	--	<0.5/<0.5	--	--	<0.5/<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--
Isopropylbenzene (Cumene)	5	Y	--	--	<0.5/<0.5	--	--	<0.5/<0.5	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--

Table 2
Summary of Groundwater Data - RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	BP-26A												BP-27A										
			Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19
			No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethenes																									
Trichloroethene (TCE)	5	Y	6	6	0.2	0.6	0.8	0.6	--	0.70	--	--	0.60	--	5	5	12	14	20	15	--	3.6	--	--	2.4
Dichloroethene (cis-1,2-)	5	Y	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	5	5	2.4	3.3	3.9	3.2	--	1.5	--	--	0.70
Vinyl chloride	2	Y	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	5	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5
Dichloroethene (trans-1,2-)	5	Y	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	5	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5
Dichloroethene (1,1-)	5	Y	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	5	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5
Tetrachloroethene (PCE)	5	Y	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	5	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5
Chlorinated Methanes																									
Chloroform (Trichloromethane)	7	Y	6	2	<0.1	<0.5	0.5	<0.4	--	<0.5	--	--	<0.5	--	5	5	0.3	0.3	0.5	0.3	--	0.20 J	--	--	0.10 J
Carbon tetrachloride	5	Y	6	6	0.1	0.5	0.6	0.5	--	0.40 J	--	--	0.40 J	--	5	5	0.4	0.4	0.5	0.4	--	0.20 J	--	--	0.20 J
Methylene Chloride (Dichloromethane)	5	Y	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	5	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5
Chlorinated Ethanes																									
Dichloroethane (1,2-)	0.6	Y	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	5	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5
Trichloroethane (1,1,2-)	1	Y	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	5	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5
Ketones																									
Acetone	50	Y	6	0	<5	--	<5	--	--	8.7	--	--	9.8	--	5	0	<5	--	<5	--	--	6.3	--	--	7.0
Butanone (2-) (MEK)	50	Y	6	0	<5	--	<5	--	--	<5	--	--	<5	--	5	0	<5	--	<5	--	--	<5	--	--	<5
Methyl-2-pentanone (4-) (MIBK)	N/A	Y	6	0	<5	--	<5	--	--	<5	--	--	<5	--	5	0	<5	--	<5	--	--	<5	--	--	<5
Aromatic/Aliphatic Petroleum Hydrocarbons																									
Toluene	5	Y	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	5	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5
Benzene	1	Y	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	5	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5
Xylene (m,p-)	5	Y	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	5	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5
Xylene (o-)	5	Y	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	5	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5
Ethylbenzene	5	Y	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	5	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5
Isopropylbenzene (Cumene)	5	Y	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	5	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5

Table 2
Summary of Groundwater Data - RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	**NY State Part 703 Standard (ug/l)**	**RI Site Contaminant?**	**BP-27A**	**BP-30A**												**BP-31A**								
			Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18
			Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethenes																								
Trichloroethene (TCE)	5	Y	--	6	6	8.6	48	64	41	--	9.0	--	--	8.3	--	8	8	0.3	2.4	38	11	38/38	7.5/7.4	40
Dichloroethene (cis-1,2-)	5	Y	--	6	6	0.2	1.7	2.5	1.5	--	3.2	--	--	2.1	--	8	2	<0.5	<0.5	1.4	<0.7	9.2/9.6	1.1/1.0	23
Vinyl chloride	2	Y	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	8	0	<0.5	--	<0.5	--	0.20 J/0.02 J	<0.5/<0.5	<0.5
Dichloroethene (trans-1,2-)	5	Y	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	8	0	<0.5	--	<0.5	--	<0.5/<0.5	<0.5/<0.5	0.080 J
Dichloroethene (1,1-)	5	Y	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	8	0	<0.5	--	<0.5	--	<0.5/<0.5	<0.5/<0.5	<0.5
Tetrachloroethene (PCE)	5	Y	--	6	6	0.5	5.1	6.4	4	--	0.90	--	--	0.90	--	8	3	<0.1	<0.5	2.2	<0.9	2.0/2.1	0.50/0.50	3.6
Chlorinated Methanes																								
Chloroform (Trichloromethane)	7	Y	--	6	6	0.1	0.55	0.8	0.5	--	0.20 J	--	--	0.10 J	--	8	4	<0.3	<0.5	0.5	<0.5	0.90/0.90	0.20 J/0.20 J	1.0
Carbon tetrachloride	5	Y	--	6	5	<0.3	<0.5	0.7	<0.5	--	<0.5	--	--	<0.5	--	8	2	<0.2	<0.5	0.5	<0.4	0.40 J/0.40 J	<0.5/<0.5	0.40 J
Methylene Chloride (Dichloromethane)	5	Y	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	8	0	<0.5	--	<0.5	--	<0.5/<0.5	<0.5/<0.5	<0.5
Chlorinated Ethanes																								
Dichloroethane (1,2-)	0.6	Y	--	6	4	<0.1	<0.25	0.5	<0.3	--	<0.5	--	--	0.050 J	--	8	4	<0.1	<0.45	0.5	<0.4	0.70/0.70	0.10 J/0.20 J	0.70
Trichloroethane (1,1,2-)	1	Y	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	8	0	<0.5	--	<0.5	--	<0.5/<0.5	<0.5/<0.5	<0.5
Ketones																								
Acetone	50	Y	--	6	0	<5	--	<5	--	--	6.2	--	--	7.1	--	8	0	<5	--	<5	--	<5/<5	<5/<5	<5
Butanone (2-) (MEK)	50	Y	--	6	0	<5	--	<5	--	--	<5	--	--	<5	--	8	0	<5	--	<5	--	<5/<5	<5/<5	<5
Methyl-2-pentanone (4-) (MIBK)	N/A	Y	--	6	0	<5	--	<5	--	--	<5	--	--	<5	--	8	0	<5	--	<5	--	<5/<5	<5/<5	<5
Aromatic/Aliphatic Petroleum Hydrocarbons																								
Toluene	5	Y	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	8	0	<0.5	--	<0.5	--	<0.5/<0.5	<0.5/<0.5	<0.5
Benzene	1	Y	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	8	0	<0.5	--	<0.5	--	<0.5/<0.5	<0.5/<0.5	<0.5
Xylene (m,p-)	5	Y	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	8	0	<0.5	--	<0.5	--	<0.5/<0.5	<0.5/<0.5	<0.5
Xylene (o-)	5	Y	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	8	0	<0.5	--	<0.5	--	<0.5/<0.5	<0.5/<0.5	<0.5
Ethylbenzene	5	Y	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	8	0	<0.5	--	<0.5	--	<0.5/<0.5	<0.5/<0.5	<0.5
Isopropylbenzene (Cumene)	5	Y	--	6	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	8	0	<0.5	--	<0.5	--	<0.5/<0.5	<0.5/<0.5	<0.5

Table 2
Summary of Groundwater Data - RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	BP-31A			BP-32A												BP-34A						
			Mar '19	Jun '19	Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline						Apr '18
			Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)
Chlorinated Ethenes																								
Trichloroethene (TCE)	5	Y	18/18	3.7/3.6	3.7	Not Installed						--	0.60	--	--	0.60	--	0	32,000					21,000
Dichloroethene (cis-1,2-)	5	Y	6.2/6.3	0.70/0.70	0.80	Not Installed						--	<0.5	--	--	<0.5	--	0	19,000					35,000
Vinyl chloride	2	Y	<0.5/<0.5	<0.5/<0.5	<0.5	Not Installed						--	<0.5	--	--	<0.5	--	0	400					<250
Dichloroethene (trans-1,2-)	5	Y	<0.5/<0.5	<0.5/<0.5	<0.5	Not Installed						--	<0.5	--	--	<0.5	--	0	120 J					<250
Dichloroethene (1,1-)	5	Y	<0.5/<0.5	<0.5/<0.5	<0.5	Not Installed						--	<0.5	--	--	<0.5	--	0	<250					78 J
Tetrachloroethene (PCE)	5	Y	1.3/1.3	0.40 J/0.40 J	0.40 J	Not Installed						--	<0.5	--	--	<0.5	--	0	<250					<250
Chlorinated Methanes																								
Chloroform (Trichloromethane)	7	Y	0.90/0.90	0.20 J/0.20 J	0.10 J	Not Installed						--	<0.5	--	--	<0.5	--	--	--	--	--	--	--	240 J
Carbon tetrachloride	5	Y	0.40 J/0.40 J	<0.5/<0.5	<0.5	Not Installed						--	<0.5	--	--	<0.5	--	--	--	--	--	--	--	<250
Methylene Chloride (Dichloromethane)	5	Y	<0.5/<0.5	<0.5/<0.5	<0.5	Not Installed						--	<0.5	--	--	<0.5	--	--	--	--	--	--	--	<250
Chlorinated Ethanes																								
Dichloroethane (1,2-)	0.6	Y	0.50 J/0.50	0.10 J/0.10 J	0.10 J	Not Installed						--	<0.5	--	--	<0.5	--	--	--	--	--	--	--	77 J
Trichloroethane (1,1,2-)	1	Y	<0.5/<0.5	<0.5/<0.5	<0.5	Not Installed						--	<0.5	--	--	<0.5	--	--	--	--	--	--	--	<250
Ketones																								
Acetone	50	Y	1.7 J/1.3 J	<5/<5	<5	Not Installed						--	6.6	--	--	5.1	--	--	--	--	--	--	--	<2500
Butanone (2-) (MEK)	50	Y	<5/<5	<5/<5	<5	Not Installed						--	<5	--	--	<5	--	--	--	--	--	--	--	<2500
Methyl-2-pentanone (4-) (MIBK)	N/A	Y	<5/<5	<5/<5	<5	Not Installed						--	<5	--	--	<5	--	--	--	--	--	--	--	<2500
Aromatic/Aliphatic Petroleum Hydrocarbons																								
Toluene	5	Y	<0.5/<0.5	<0.5/<0.5	<0.5	Not Installed						--	<0.5	--	--	<0.5	--	--	--	--	--	--	--	<250
Benzene	1	Y	<0.5/<0.5	<0.5/<0.5	<0.5	Not Installed						--	<0.5	--	--	<0.5	--	--	--	--	--	--	--	<250
Xylene (m,p-)	5	Y	<0.5/<0.5	<0.5/<0.5	<0.5	Not Installed						--	<0.5	--	--	<0.5	--	--	--	--	--	--	--	<250
Xylene (o-)	5	Y	<0.5/<0.5	<0.5/<0.5	<0.5	Not Installed						--	<0.5	--	--	<0.5	--	--	--	--	--	--	--	<250
Ethylbenzene	5	Y	<0.5/<0.5	<0.5/<0.5	<0.5	Not Installed						--	<0.5	--	--	<0.5	--	--	--	--	--	--	--	<250
Isopropylbenzene (Cumene)	5	Y	<0.5/<0.5	<0.5/<0.5	<0.5	Not Installed						--	<0.5	--	--	<0.5	--	--	--	--	--	--	--	<250

Table 2
Summary of Groundwater Data - RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	BP-34A					BP-35A												BP-36A				
			Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline				
			Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.
Chlorinated Ethenes																								
Trichloroethene (TCE)	5	Y	30,000	25,000	22,000	31,000	26,000	0			2,400			3,100	3,600/3,500	3,900	3,200	3,000/3,300	1,500	0			9,600	
Dichloroethene (cis-1,2-)	5	Y	54,000	36,000	58,000	62,000	58,000	0			830			4,500	5,400/5,200	6,500	5,100	4,600/5,000	6,200	0			230	
Vinyl chloride	2	Y	820	650	2,000	2,000	2,000	0			19 J			<50	<25/<50	<25	<25	<25/<25	5.3 J	0			21 J	
Dichloroethene (trans-1,2-)	5	Y	130 J	58 J	82 J	96 J	210 J	0			<25			<50	13 J/11 J	6.4 J	11 J	4.6 J/7.0 J	15 J	0			<25	
Dichloroethene (1,1-)	5	Y	110 J	73 J	130 J	170 J	130 J	0			<25			<50	7.2 J/<50	8.1 J	5.4 J	5.8 J/5.5 J	7.4 J	0			9.0 J	
Tetrachloroethene (PCE)	5	Y	<250	<250	<250	<250	<250	0			<25			<50	<25/<50	<25	<25	<25/<25	<25	0			<25	
Chlorinated Methanes																								
Chloroform (Trichloromethane)	7	Y	290	290	260	290	310	--	--	--	--	--	--	<50	<25/<50	<25	<25	<25/<25	<25	--	--	--	--	--
Carbon tetrachloride	5	Y	<250	<250	<250	<250	<250	--	--	--	--	--	--	<50	<25/<50	<25	<25	<25/<25	<25	--	--	--	--	--
Methylene Chloride (Dichloromethane)	5	Y	<250	<250	<250	<250	<250	--	--	--	--	--	--	<50	<25/<50	<25	<25	3.5 J/<25	<25	--	--	--	--	--
Chlorinated Ethanes																								
Dichloroethane (1,2-)	0.6	Y	90 J	81 J	100 J	100 J	100 J	--	--	--	--	--	--	<50	5.2 J/<50	6.5 J	5.5 J	5.5 J/5.0 J	7.8 J	--	--	--	--	--
Trichloroethane (1,1,2-)	1	Y	<250	<250	<250	<250	<250	--	--	--	--	--	--	<50	<25/<50	<25	<25	<25/<25	<25	--	--	--	--	--
Ketones																								
Acetone	50	Y	<2500	<2500	<2500	<2500	<2500	--	--	--	--	--	--	<500	<250/<500	<250	<250	<250/<250	<250	--	--	--	--	--
Butanone (2-) (MEK)	50	Y	<2500	<2500	<2500	<2500	<2500	--	--	--	--	--	--	<500	<250/<500	<250	<250	<250/<250	<250	--	--	--	--	--
Methyl-2-pentanone (4-) (MIBK)	N/A	Y	<2500	<2500	<2500	<2500	<2500	--	--	--	--	--	--	<500	<250/<500	<250	<250	<250/<250	<250	--	--	--	--	--
Aromatic/Aliphatic Petroleum Hydrocarbons																								
Toluene	5	Y	<250	<250	<250	69 J	35 J	--	--	--	--	--	--	<50	<25/<50	<25	<25	<25/<25	<25	--	--	--	--	--
Benzene	1	Y	<250	27 J	29 J	41 J	35 J	--	--	--	--	--	--	<50	<25/<50	<25	<25	<25/<25	<25	--	--	--	--	--
Xylene (m,p-)	5	Y	<250	<250	<250	<250	<250	--	--	--	--	--	--	<50	<25/<50	<25	<25	<25/<25	<25	--	--	--	--	--
Xylene (o-)	5	Y	<250	<250	41 J	110 J	43 J	--	--	--	--	--	--	<50	<25/<50	<25	<25	<25/<25	<25	--	--	--	--	--
Ethylbenzene	5	Y	<250	<250	<250	<250	<250	--	--	--	--	--	--	<50	<25/<50	<25	<25	<25/<25	<25	--	--	--	--	--
Isopropylbenzene (Cumene)	5	Y	<250	<250	<250	<250	<250	--	--	--	--	--	--	<50	<25/<50	<25	<25	<25/<25	<25	--	--	--	--	--

Table 2
Summary of Groundwater Data - RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	BP-36A							BP-37A											
				Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19
			Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethenes																					
Trichloroethene (TCE)	5	Y		2,600	1,400/1,600	2,500/2,400	3,000	4,800/5,000	1,300/1,300	0	23					8.7	11	12	13	9.5	12
Dichloroethene (cis-1,2-)	5	Y		5,500	8,200/7,600	9,900/9,600	4,800	4,600/4,500	12,000/12,000	0	1.2					1.1	1.4	1.6	3.7	6.7	1.5
Vinyl chloride	2	Y		670	680/620	1,200/1,300	540	460/440	820/790	0	0.1 J					<0.5	<0.5	<0.5	0.60	0.40 J	<0.5
Dichloroethene (trans-1,2-)	5	Y		10 J	68/43 J	21 J/21 J	15 J	15 J/16 J	65/65	0	<0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dichloroethene (1,1-)	5	Y		13 J	17 J/16 J	23 J/23 J	9.8 J	11 J/13 J	22 J/21 J	0	<0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethene (PCE)	5	Y		<50	<50/<50	<50/<50	<50	<50/<50	<50/<50	0	<0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorinated Methanes																					
Chloroform (Trichloromethane)	7	Y	--	130	110/110	72/71	80	70/70	15 J/14 J	--	--	--	--	--	--	0.30 J	0.50 J	0.60	0.60	0.60	0.80
Carbon tetrachloride	5	Y	--	<50	<50/<50	<50/<50	<50	<50/<50	<50/<50	--	--	--	--	--	--	0.10 J	0.20 J	0.10 J	0.20 J	0.10 J	0.20 J
Methylene Chloride (Dichloromethane)	5	Y	--	<50	<50/<50	<50/<50	<50	<50/7.8 J	<50/<50	--	--	--	--	--	--	<0.5	<0.5	<0.5	0.10 J	0.20 J	<0.5
Chlorinated Ethanes																					
Dichloroethane (1,2-)	0.6	Y	--	16 J	19 J/17 J	30 J/30 J	16 J	14 J/13 J	26 J/26 J	--	--	--	--	--	--	0.20 J	0.30 J	0.30 J	0.50	0.60	0.40 J
Trichloroethane (1,1,2-)	1	Y	--	<50	<50/<50	<50/<50	<50	<50/<50	<50/<50	--	--	--	--	--	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ketones																					
Acetone	50	Y	--	<500	<500/<500	<500/<500	<500	<500/<500	<500/<500	--	--	--	--	--	--	<5	<5	<5	3.2 J	<5	1.5 J
Butanone (2-) (MEK)	50	Y	--	<500	<500/<500	<500/<500	<500	<500/<500	<500/<500	--	--	--	--	--	--	<5	<5	<5	<5	<5	<5
Methyl-2-pentanone (4-) (MIBK)	N/A	Y	--	<500	<500/<500	<500/<500	<500	<500/<500	<500/<500	--	--	--	--	--	--	<5	<5	<5	<5	<5	<5
Aromatic/Aliphatic Petroleum Hydrocarbons																					
Toluene	5	Y	--	<50	<50/<50	<50/<50	<50	<50/<50	<50/<50	--	--	--	--	--	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzene	1	Y	--	<50	<50/<50	11 J/10 J	<50	<50/<50	9.8 J/10 J	--	--	--	--	--	--	<0.5	<0.5	0.10 J	<0.5	<0.5	<0.5
Xylene (m,p-)	5	Y	--	<50	<50/<50	<50/<50	<50	<50/<50	<50/<50	--	--	--	--	--	--	<0.5	0.10 J	0.10 J	<0.5	<0.5	<0.5
Xylene (o-)	5	Y	--	<50	<50/<50	<50/<50	<50	<50/<50	<50/<50	--	--	--	--	--	--	<0.5	<0.5	0.080 J	0.080 J	<0.5	<0.5
Ethylbenzene	5	Y	--	<50	<50/<50	<50/<50	<50	<50/<50	<50/<50	--	--	--	--	--	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Isopropylbenzene (Cumene)	5	Y	--	<50	<50/<50	<50/<50	<50	<50/<50	<50/<50	--	--	--	--	--	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Table 2
Summary of Groundwater Data - RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	BP-38A Pre-2010 Baseline No. Samples	Detects	Min.	Median	Max.	Mean	BP-38A Apr '18 Conc. (S/FD)	Jun '18 Conc. (S/FD)	Sep '18 Conc. (S/FD)	Mar '19 Conc. (S/FD)	Jun '19 Conc. (S/FD)	Sep '19 Conc. (S/FD)	BP-39A Pre-2010 Baseline No. Samples	Detects	Min.	Median	Max.	Mean	BP-39A Apr '18 Conc. (S/FD)	Jun '18 Conc. (S/FD)	Sep '18 Conc. (S/FD)	Mar '19 Conc. (S/FD)	Jun '19 Conc. (S/FD)
Chlorinated Ethenes																									
Trichloroethene (TCE)	5	Y	0	67					150	46	230	180	86	68	0	150					22	31	41	51	63
Dichloroethene (cis-1,2-)	5	Y	0	9.4					30	22	59	31	28	16	0	20					37	68	45	54	73
Vinyl chloride	2	Y	0	0.9					<1	0.10 J	1.6	<1	<1	<1	0	<0.5					0.10 J	7.2	0.20 J	1.1	5.9
Dichloroethene (trans-1,2-)	5	Y	0	0.1 J					<1	<0.5	0.50 J	0.10 J	<1	0.10 J	0	0.1 J					0.10 J	0.40 J	0.20 J	0.20 J	0.30 J
Dichloroethene (1,1-)	5	Y	0	<0.5					<1	<0.5	0.20 J	0.20 J	<1	<1	0	0.2 J					<0.5	0.20 J	0.080 J	0.20 J	0.30 J
Tetrachloroethene (PCE)	5	Y	0	<0.5					<1	<0.5	0.20 J	0.10 J	<1	<1	0	<0.5					<0.5	<0.5	0.060 J	<0.5	<0.5
Chlorinated Methanes																									
Chloroform (Trichloromethane)	7	Y	--	--	--	--	--	--	2.2	2.1	2.9	2.0	0.70 J	2.1	--	--	--	--	--	--	0.50 J	0.50	0.60	0.40 J	0.50
Carbon tetrachloride	5	Y	--	--	--	--	--	--	1.5	1.3	1.7	2.1	0.50 J	1.1	--	--	--	--	--	--	<0.5	<0.5	0.10 J	0.10 J	0.080 J
Methylene Chloride (Dichloromethane)	5	Y	--	--	--	--	--	--	<1	<0.5	<1	<1	0.20 J	<1	--	--	--	--	--	--	<0.5	0.20 J	0.10 J	0.10 J	0.090 J
Chlorinated Ethanes																									
Dichloroethane (1,2-)	0.6	Y	--	--	--	--	--	--	0.50 J	0.40 J	1.2	0.90 J	0.30 J	0.30 J	--	--	--	--	--	--	0.20 J	0.40 J	0.30 J	0.40 J	0.50 J
Trichloroethane (1,1,2-)	1	Y	--	--	--	--	--	--	<1	<0.5	<1	<1	<1	<1	--	--	--	--	--	--	<0.5	<0.5	<0.5	<0.5	<0.5
Ketones																									
Acetone	50	Y	--	--	--	--	--	--	<10	<5	1.9 J	2.8 J	<10	<10	--	--	--	--	--	--	<5	<5	<5	2.2 J	<5
Butanone (2-) (MEK)	50	Y	--	--	--	--	--	--	<10	<5	<10	<10	<10	<10	--	--	--	--	--	--	<5	<5	<5	<5	<5
Methyl-2-pentanone (4-) (MIBK)	N/A	Y	--	--	--	--	--	--	<10	<5	<10	<10	<10	<10	--	--	--	--	--	--	<5	<5	<5	<5	<5
Aromatic/Aliphatic Petroleum Hydrocarbons																									
Toluene	5	Y	--	--	--	--	--	--	<1	<0.5	<1	<1	<1	<1	--	--	--	--	--	--	<0.5	<0.5	<0.5	<0.5	<0.5
Benzene	1	Y	--	--	--	--	--	--	<1	<0.5	0.10 J	<1	<1	<1	--	--	--	--	--	--	<0.5	<0.5	<0.5	0.060 J	0.10 J
Xylene (m,p-)	5	Y	--	--	--	--	--	--	<1	<0.5	<1	<1	<1	<1	--	--	--	--	--	--	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (o-)	5	Y	--	--	--	--	--	--	<1	<0.5	<1	<1	<1	<1	--	--	--	--	--	--	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	5	Y	--	--	--	--	--	--	<1	<0.5	<1	<1	<1	<1	--	--	--	--	--	--	<0.5	<0.5	<0.5	<0.5	<0.5
Isopropylbenzene (Cumene)	5	Y	--	--	--	--	--	--	<1	<0.5	<1	<1	<1	<1	--	--	--	--	--	--	<0.5	<0.5	<0.5	<0.5	<0.5

Table 2
Summary of Groundwater Data - RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	BP-39A	GC-1-P1												GC-1-P8									
			Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19
			Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethenes																									
Trichloroethene (TCE)	5	Y	120	11	11	22	33	72	44	--	5.9	--	--	63	--	11	11	0.2	0.4	6.7	0.4	--	0.20 J	--	--
Dichloroethene (cis-1,2-)	5	Y	140	11	11	3.2	12	16	12	--	26	--	--	62	--	11	11	1.5	16	23	17	--	0.80	--	--
Vinyl chloride	2	Y	3.1	11	0	<0.5	--	<0.5	--	--	6.1	--	--	5.3	--	11	1	<0.1	<0.5	1	<0.4	--	0.20 J	--	--
Dichloroethene (trans-1,2-)	5	Y	0.40 J	11	7	<0.1	<0.3	0.6	<0.3	--	0.20 J	--	--	0.30 J	--	11	9	<0.1	0.2	0.5	0.3	--	0.20 J	--	--
Dichloroethene (1,1-)	5	Y	0.50	11	0	<0.5	--	<0.5	--	--	<0.5	--	--	0.20 J	--	11	0	<0.5	--	<1	--	--	<0.5	--	--
Tetrachloroethene (PCE)	5	Y	0.080 J	11	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	11	0	<0.5	--	<1	--	--	<0.5	--	--
Chlorinated Methanes																									
Chloroform (Trichloromethane)	7	Y	0.90	11	10	<1.4	2.2	3.1	2.4	--	<0.5	--	--	0.20 J	--	11	3	<0.2	<0.5	1	<0.5	--	<0.5	--	--
Carbon tetrachloride	5	Y	0.10 J	11	11	0.9	2.7	3.7	2.7	--	<0.5	--	--	0.20 J	--	11	0	<0.5	--	<1	--	--	<0.5	--	--
Methylene Chloride (Dichloromethane)	5	Y	0.10 J	11	1	<0.2	<0.5	0.5	<0.5	--	<0.5	--	--	0.10 J	--	11	2	<0.2	<0.5	1	<0.4	--	<0.5	--	--
Chlorinated Ethanes																									
Dichloroethane (1,2-)	0.6	Y	0.80	11	11	1	1.7	2.6	1.9	--	1.4	--	--	2.2	--	11	10	<0.4	0.6	0.8	0.6	--	0.80	--	--
Trichloroethane (1,1,2-)	1	Y	<0.5	11	1	<0.1	<0.5	0.5	<0.4	--	<0.5	--	--	<0.5	--	11	0	<0.5	--	<1	--	--	<0.5	--	--
Ketones																									
Acetone	50	Y	<5	11	4	<3.6	<5	16	<4.7	--	<5	--	--	<5	--	11	11	12	21	210	42	--	<5	--	--
Butanone (2-) (MEK)	50	Y	<5	11	1	<1.5	<5	5	<5	--	<5	--	--	<5	--	11	10	<3.8	<4.4	12	<5.4	--	<5	--	--
Methyl-2-pentanone (4-) (MIBK)	N/A	Y	<5	11	1	<2.6	<5	5	<5	--	<5	--	--	<5	--	11	11	1.7	3.3	4.7	3.5	--	<5	--	--
Aromatic/Aliphatic Petroleum Hydrocarbons																									
Toluene	5	Y	<0.5	11	10	<0.2	<0.5	5.7	<0.8	--	<0.5	--	--	0.10 J	--	11	11	25	94	200	110	--	0.50	--	--
Benzene	1	Y	0.10 J	11	2	<0.1	<0.5	0.5	<0.5	--	0.10 J	--	--	0.30 J	--	11	11	0.1	<0.2	3.7	<0.2	--	0.20 J	--	--
Xylene (m,p-)	5	Y	<0.5	11	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	11	1	<0.1	<0.5	1	<0.4	--	0.10 J	--	--
Xylene (o-)	5	Y	<0.5	11	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	11	0	<0.5	--	<1	--	--	<0.5	--	--
Ethylbenzene	5	Y	<0.5	11	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	11	0	<0.5	--	<1	--	--	<0.5	--	--
Isopropylbenzene (Cumene)	5	Y	<0.5	11	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	11	0	<0.5	--	<1	--	--	0.10 J	--	--

Table 2
Summary of Groundwater Data - RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	GC-1-P8		GC-2A												IB-7								
			Jun '19	Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18
			Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethenes																									
Trichloroethene (TCE)	5	Y	0.20 J	--	7	7	2.2	3.1	3.4	2.9	--	6.2	--	--	5.2	--	0	750/760					0.60	0.50 J	0.40 J
Dichloroethene (cis-1,2-)	5	Y	0.90	--	7	7	0.1	0.1	0.2	0.1	--	0.90	--	--	0.90	--	0	250/250					26	8.5	2.8
Vinyl chloride	2	Y	0.10 J	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	0	23/23					15	5.5	0.90
Dichloroethene (trans-1,2-)	5	Y	0.20 J	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	0	9.7/9.6					0.50 J	0.30 J	0.20 J
Dichloroethene (1,1-)	5	Y	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	0	0.6 J/0.6 J					<0.5	<0.5	<0.5
Tetrachloroethene (PCE)	5	Y	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	0	<2.5/<2.5					<0.5	<0.5	<0.5
Chlorinated Methanes																									
Chloroform (Trichloromethane)	7	Y	<0.5	--	7	7	0.6	1.8	2.1	1.6	--	0.20 J	--	--	0.80	--	--	--	--	--	--	--	<0.5	<0.5	<0.5
Carbon tetrachloride	5	Y	<0.5	--	7	7	7.2	18	25	17	--	1.5	--	--	9.2	--	--	--	--	--	--	--	<0.5	<0.5	<0.5
Methylene Chloride (Dichloromethane)	5	Y	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	--	--	--	--	--	<0.5	<0.5	0.070 J
Chlorinated Ethanes																									
Dichloroethane (1,2-)	0.6	Y	1.0	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	--	--	--	--	--	0.60	0.40 J	0.30 J
Trichloroethane (1,1,2-)	1	Y	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	--	--	--	--	--	<0.5	<0.5	<0.5
Ketones																									
Acetone	50	Y	<5	--	7	5	<4.5	<5	29	<8.5	--	9.8	--	--	15	--	--	--	--	--	--	--	14	86	55
Butanone (2-) (MEK)	50	Y	<5	--	7	1	<1.7	<5	5	<4.5	--	<5	--	--	<5	--	--	--	--	--	--	--	22	35	33
Methyl-2-pentanone (4-) (MIBK)	N/A	Y	0.80 J	--	7	0	<5	--	<5	--	--	<5	--	--	<5	--	--	--	--	--	--	--	<5	<5	<5
Aromatic/Aliphatic Petroleum Hydrocarbons																									
Toluene	5	Y	0.50	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	--	--	--	--	--	18	12	12
Benzene	1	Y	0.30 J	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	--	--	--	--	--	0.50 J	0.40 J	0.20 J
Xylene (m,p-)	5	Y	0.10 J	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	--	--	--	--	--	40	24	16
Xylene (o-)	5	Y	<0.5	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	--	--	--	--	--	20	12	8.8
Ethylbenzene	5	Y	0.070 J	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	--	--	--	--	--	5.5	3.4	2.3
Isopropylbenzene (Cumene)	5	Y	0.20 J	--	7	0	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	--	--	--	--	--	0.30 J	0.20 J	0.20 J

Table 2
Summary of Groundwater Data - RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	IB-7		
			Mar '19	Jun '19	Sep '19
			Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethenes					
Trichloroethene (TCE)	5	Y	0.30 J	0.50 J	0.40 J
Dichloroethene (cis-1,2-)	5	Y	2.0	2.1	3.3
Vinyl chloride	2	Y	<0.5	<0.5	<0.5
Dichloroethene (trans-1,2-)	5	Y	0.20 J	0.20 J	0.70
Dichloroethene (1,1-)	5	Y	<0.5	<0.5	<0.5
Tetrachloroethene (PCE)	5	Y	<0.5	<0.5	<0.5
Chlorinated Methanes					
Chloroform (Trichloromethane)	7	Y	<0.5	<0.5	<0.5
Carbon tetrachloride	5	Y	<0.5	<0.5	<0.5
Methylene Chloride (Dichloromethane)	5	Y	0.080 J	<0.5	0.10 J
Chlorinated Ethanes					
Dichloroethane (1,2-)	0.6	Y	0.20 J	0.20 J	0.30 J
Trichloroethane (1,1,2-)	1	Y	<0.5	<0.5	<0.5
Ketones					
Acetone	50	Y	7.2	9.3	3.6 J
Butanone (2-) (MEK)	50	Y	0.80 J	1.3 J	0.90 J
Methyl-2-pentanone (4-) (MIBK)	N/A	Y	<5	<5	<5
Aromatic/Aliphatic Petroleum Hydrocarbons					
Toluene	5	Y	5.0	4.5	2.6
Benzene	1	Y	0.10 J	0.10 J	0.20 J
Xylene (m,p-)	5	Y	11	8.6	13
Xylene (o-)	5	Y	5.8	4.9	7.4
Ethylbenzene	5	Y	1.5	1.3	2.1
Isopropylbenzene (Cumene)	5	Y	0.10 J	0.090 J	0.10 J

Notes:

1. The table summarizes groundwater volatile organic compound concentrations in micrograms per liter (µg/L) for the principal site contaminants prior to 2010 (baseline period) and during the last two years of monitoring. Pre-2010 data were collected during the remedial investigation. Locations BP-6A, BP-34A through BP-40A, and IB-4 and IB-7 were all installed shortly before injections; therefore, baseline (Pre-2010) data reflect grab samples collected in May 2010, prior to the June 15 injection. All other data are from sampling conducted on the dates noted in the table.

2. For monitoring locations where an analyte was detected during one sample event or more during the baseline (pre-2010) period, the number of detects, minimum, median, maximum, and arithmetic mean concentrations were calculated using the detection limit as a value during sample events where the compound was not detected. If no detections are listed, the minimum and maximum concentrations represent the minimum and maximum detection limits observed for the compound at that particular monitoring location.

3. Gray shaded cells indicate detected concentrations or elevated laboratory reporting limits above NY State Groundwater Standard Maximum Contaminant Levels (MCLs), as established in Part 703, Surface Water and Groundwater Quality Standards.
Blank cells indicate that location was not sampled during the sampling event indicated.

'--' Indicates the median and mean values were not calculated because all samples were reported as below analytical detection limits.
"<" indicates that the laboratory data or calculated value includes one or more samples where analyte was below analytical detection limits.
"J" indicates that the laboratory data was below the lowest quantifiable limit and therefore estimated.
"Not Installed" indicate that the monitoring well was not installed at the time of sampling.

4. For the pre-2010 data, the median and mean values for wells BP-13D (all multi-level intervals) and GC-1 (all multi-level intervals) were calculated only using data that were collected between November 2007 and December 2008, whereas the number of detects, minimum, and maximum at reflect all available data.

5. Refer to the report text for further discussion.

Table 3
Summary of Groundwater Data - Non-RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	A-13						B-4						B-7					
			Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19
			Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethanes																				
Chloroethane	5	N	<250	<250	<100	<100	<100	<100	1.6 J	1.5 J	1.6 J	<5	<50	<50	<5	<5	<5	<250	<1000	<250
Aromatic/Aliphatic Petroleum Hydrocarbons																				
Cyclohexane	N/A	N	<250	<250	<100	<100	<100	<100	<5	<5	<5	<5	<50	<50	<5	3.9 J	2.0 J	<250	<1000	<250
Methylcyclohexane	N/A	N	<250	<250	<100	<100	<100	<100	<5	<5	<5	<5	<50	<50	<5	38	16	<250	<1000	25 J
Other VOCs																				
Hexanone (2-)	50	N	<2500	<2500	<1000	<1000	<1000	<1000	19 J	21 J	35 J	<50	73 J	<500	<50	<50	<50	<2500	<10000	<2500
Carbon disulfide	60	N	<500	<500	<200	<200	<200	<200	<10	<10	<10	<10	<100	<100	<10	<10	<10	<500	<2000	<500

Table 3
Summary of Groundwater Data - Non-RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	B-9						BP-1A						BP-2A					
			Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19
			Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethanes																				
Chloroethane	5	N	<10	<10	<10	<10	<10	<100	<1	<2.5	<2.5	<2.5	<2.5	<0.5	<25	<25	0.70 J	<2.5	<25	<25
Aromatic/Aliphatic Petroleum Hydrocarbons																				
Cyclohexane	N/A	N	<10	<10	<10	<10	<10	<100	<1	<2.5	<2.5	<2.5	<2.5	<0.5	<25	<25	<2.5	1.2 J	<25	<25
Methylcyclohexane	N/A	N	<10	<10	<10	<10	<10	<100	0.40 J	<2.5	0.50 J	0.50 J	<2.5	<0.5	<25	7.1 J	0.50 J	6.1	<25	9.5 J
Other VOCs																				
Hexanone (2-)	50	N	<100	<100	<100	15 J	18 J	<1000	<10	<25	<25	<25	<25	<5	<250	<250	<25	<25	<250	<250
Carbon disulfide	60	N	<20	<20	<20	<20	<20	<200	<2	<5	<5	<5	<5	<1	<50	<50	<5	<5	<50	<50

Table 3
Summary of Groundwater Data - Non-RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	BP-4A						BP-5A						BP-6A					
			Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19
			Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethanes																				
Chloroethane	5	N	<2.5/<2.5	<0.5	<1/<1	<1/<1	<1	<1/<1	0.80 J	1.0 J	1.3 J	1.1 J	0.80 J	0.50 J	<250	<250	<250	<250	<250	<250
Aromatic/Aliphatic Petroleum Hydrocarbons																				
Cyclohexane	N/A	N	<2.5/<2.5	0.20 J	0.20 J/0.20 J	0.20 J/0.20 J	0.10 J	0.20 J/0.20 J	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<250	<250	<250	<250	<250	<250
Methylcyclohexane	N/A	N	<2.5/<2.5	0.30 J	0.20 J/0.20 J	0.20 J/0.20 J	<1	0.30 J/0.20 J	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<250	<250	<250	<250	<250	<250
Other VOCs																				
Hexanone (2-)	50	N	<25/<25	<5	<10/<10	<10/<10	<10	<10/<10	<25	<25	<25	<25	<25	<25	<2500	<2500	<2500	<2500	<2500	<2500
Carbon disulfide	60	N	<5/<5	<1	<2/<2	<2/<2	<2	<2/<2	<5	<5	<5	<5	<5	<5	<500	<500	<500	<500	<500	<500

Table 3
Summary of Groundwater Data - Non-RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	BP-7A						BP-8A						BP-9A					
			Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19
			Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethanes																				
Chloroethane	5	N	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	<10	<10	2.2 J	2.2 J	<10	3.5 J
Aromatic/Aliphatic Petroleum Hydrocarbons																				
Cyclohexane	N/A	N	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	<10	<10	<10	<10	<10	<10
Methylcyclohexane	N/A	N	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	<10	<10	<10	<10	<10	<10
Other VOCs																				
Hexanone (2-)	50	N	--	<5	--	--	<5	--	--	<5	--	--	<5	--	<100	<100	<100	<100	<100	<100
Carbon disulfide	60	N	--	<1	--	--	<1	--	--	<1	--	--	<1	--	<20	<20	<20	<20	<20	<20

Table 3
Summary of Groundwater Data - Non-RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	BP-10A						BP-11A						BP-12A					
			Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19
			Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethanes																				
Chloroethane	5	N	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--
Aromatic/Aliphatic Petroleum Hydrocarbons																				
Cyclohexane	N/A	N	--	<0.5	--	--	<0.5	--	--	0.20 J	--	--	0.060 J	--	--	<0.5	--	--	<0.5	--
Methylcyclohexane	N/A	N	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--
Other VOCs																				
Hexanone (2-)	50	N	--	<5	--	--	<5	--	--	<5	--	--	<5	--	--	<5	--	--	<5	--
Carbon disulfide	60	N	--	<1	--	--	<1	--	--	<1	--	--	<1	--	--	<1	--	--	<1	--

Table 3
Summary of Groundwater Data - Non-RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	BP-12D-P1						BP-12D-P7						BP-13A					
			Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19
			Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethanes																				
Chloroethane	5	N	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Aromatic/Aliphatic Petroleum Hydrocarbons																				
Cyclohexane	N/A	N	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Methylcyclohexane	N/A	N	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Other VOCs																				
Hexanone (2-)	50	N	--	<5	--	--	<5	--	--	<5	--	--	<5	--	<5	<5	<5	<5	<5	<5
Carbon disulfide	60	N	--	<1	--	--	<1	--	--	<1	--	--	<1	--	<1	<1	<1	<1	<1	<1

Table 3
Summary of Groundwater Data - Non-RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	BP-13D-P1						BP-13D-P5						BP-14A					
			Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19
			Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethanes																				
Chloroethane	5	N	--	0.50 J	--	--	0.70	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--
Aromatic/Aliphatic Petroleum Hydrocarbons																				
Cyclohexane	N/A	N	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--
Methylcyclohexane	N/A	N	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--
Other VOCs																				
Hexanone (2-)	50	N	--	<5	--	--	<5	--	--	<5	--	--	<5	--	--	<5	--	--	<5	--
Carbon disulfide	60	N	--	<1	--	--	<1	--	--	<1	--	--	<1	--	--	<1	--	--	<1	--

Table 3
Summary of Groundwater Data - Non-RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	BP-15D-P5						BP-16A						BP-17A					
			Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19
			Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethanes																				
Chloroethane	5	N	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--
Aromatic/Aliphatic Petroleum Hydrocarbons																				
Cyclohexane	N/A	N	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	0.20 J	--	--	<0.5	--
Methylcyclohexane	N/A	N	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--
Other VOCs																				
Hexanone (2-)	50	N	--	<5	--	--	<5	--	--	<5	--	--	<5	--	--	<5	--	--	<5	--
Carbon disulfide	60	N	--	<1	--	--	<1	--	--	<1	--	--	<1	--	--	<1	--	--	<1	--

Table 3
Summary of Groundwater Data - Non-RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	BP-18A						BP-19A						BP-20A					
			Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19
			Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethanes																				
Chloroethane	5	N	--	<0.5/<0.5	--	--	<0.5/<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--
Aromatic/Aliphatic Petroleum Hydrocarbons																				
Cyclohexane	N/A	N	--	0.20 J/0.10 J	--	--	<0.5/<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--
Methylcyclohexane	N/A	N	--	<0.5/<0.5	--	--	<0.5/<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--
Other VOCs																				
Hexanone (2-)	50	N	--	<5/<5	--	--	<5/<5	--	--	<5	--	--	<5	--	--	<5	--	--	<5	--
Carbon disulfide	60	N	--	<1/<1	--	--	<1/<1	--	--	<1	--	--	<1	--	--	<1	--	--	<1	--

Table 3
Summary of Groundwater Data - Non-RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	BP-21A						BP-22A						BP-23A					
			Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19
			Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethanes																				
Chloroethane	5	N	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--
Aromatic/Aliphatic Petroleum Hydrocarbons																				
Cyclohexane	N/A	N	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--
Methylcyclohexane	N/A	N	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--
Other VOCs																				
Hexanone (2-)	50	N	--	<5	--	--	<5	--	--	<5	--	--	<5	--	--	<5	--	--	<5	--
Carbon disulfide	60	N	--	<1	--	--	<1	--	--	<1	--	--	<1	--	--	<1	--	--	<1	--

Table 3
Summary of Groundwater Data - Non-RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	BP-24A						BP-25A						BP-26A					
			Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19
			Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethanes																				
Chloroethane	5	N	--	<0.5/<0.5	--	--	<0.5/<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--
Aromatic/Aliphatic Petroleum Hydrocarbons																				
Cyclohexane	N/A	N	--	<0.5/<0.5	--	--	<0.5/<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--
Methylcyclohexane	N/A	N	--	<0.5/<0.5	--	--	<0.5/<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--
Other VOCs																				
Hexanone (2-)	50	N	--	<5/<5	--	--	<5/<5	--	--	<5	--	--	<5	--	--	<5	--	--	<5	--
Carbon disulfide	60	N	--	<1/<1	--	--	<1/<1	--	--	<1	--	--	<1	--	--	<1	--	--	<1	--

Table 3
Summary of Groundwater Data - Non-RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	BP-27A						BP-30A						BP-31A					
			Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19
			Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethanes																				
Chloroethane	5	N	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	<0.5/<0.5	<0.5/<0.5	0.070 J	<0.5/<0.5	<0.5/<0.5	<0.5
Aromatic/Aliphatic Petroleum Hydrocarbons																				
Cyclohexane	N/A	N	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	<0.5/<0.5	<0.5/<0.5	<0.5	<0.5/<0.5	<0.5/<0.5	<0.5
Methylcyclohexane	N/A	N	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--	<0.5/<0.5	<0.5/<0.5	<0.5	<0.5/<0.5	<0.5/<0.5	<0.5
Other VOCs																				
Hexanone (2-)	50	N	--	<5	--	--	<5	--	--	<5	--	--	<5	--	<5/<5	<5/<5	<5	<5/<5	<5/<5	<5
Carbon disulfide	60	N	--	<1	--	--	<1	--	--	<1	--	--	<1	--	<1/<1	<1/<1	<1	<1/<1	<1/<1	<1

Table 3
Summary of Groundwater Data - Non-RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	BP-32A						BP-34A						BP-35A					
			Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19
			Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethanes																				
Chloroethane	5	N	--	<0.5	--	--	<0.5	--	<250	<250	<250	<250	<250	<250	<50	<25/<50	<25	<25	<25/<25	<25
Aromatic/Aliphatic Petroleum Hydrocarbons																				
Cyclohexane	N/A	N	--	<0.5	--	--	<0.5	--	<250	<250	<250	<250	<250	<250	<50	<25/<50	<25	<25	<25/<25	<25
Methylcyclohexane	N/A	N	--	<0.5	--	--	<0.5	--	<250	<250	<250	<250	<250	<250	<50	<25/<50	<25	<25	<25/<25	<25
Other VOCs																				
Hexanone (2-)	50	N	--	<5	--	--	<5	--	<2500	<2500	<2500	<2500	<2500	<2500	<500	<250/<500	<250	<250	<250/<250	<250
Carbon disulfide	60	N	--	<1	--	--	<1	--	<500	<500	<500	<500	<500	<500	<100	<50/<100	<50	<50	<50/<50	<50

Table 3
Summary of Groundwater Data - Non-RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	BP-36A						BP-37A						BP-38A					
			Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19
			Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethanes																				
Chloroethane	5	N	<50	<50/<50	<50/<50	<50	<50/<50	<50/<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<1	<1	<1	<1
Aromatic/Aliphatic Petroleum Hydrocarbons																				
Cyclohexane	N/A	N	<50	<50/<50	<50/<50	<50	<50/<50	<50/<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<1	<1	<1	<1
Methylcyclohexane	N/A	N	<50	<50/<50	<50/<50	5.9 J	9.8 J/9.6 J	<50/<50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<1	<1	<1	<1
Other VOCs																				
Hexanone (2-)	50	N	<500	<500/<500	<500/<500	<500	<500/<500	<500/<500	<5	<5	<5	<5	<5	<5	<10	<5	<10	<10	<10	<10
Carbon disulfide	60	N	<100	<100/<100	<100/<100	<100	<100/<100	<100/<100	<1	<1	<1	<1	<1	<1	<2	<1	<2	<2	<2	<2

Table 3
Summary of Groundwater Data - Non-RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	BP-39A						GC-1-P1						GC-1-P8					
			Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19
			Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethanes																				
Chloroethane	5	N	<0.5	<0.5	0.10 J	0.070 J	<0.5	0.30 J	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--
Aromatic/Aliphatic Petroleum Hydrocarbons																				
Cyclohexane	N/A	N	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--
Methylcyclohexane	N/A	N	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--	<0.5	--	--	<0.5	--	--	<0.5	--	--	<0.5	--
Other VOCs																				
Hexanone (2-)	50	N	<5	<5	<5	<5	<5	<5	--	<5	--	--	<5	--	--	<5	--	--	<5	--
Carbon disulfide	60	N	<1	<1	<1	<1	<1	<1	--	<1	--	--	<1	--	--	<1	--	--	0.070 J	--

Table 3
Summary of Groundwater Data - Non-RI Site Contaminants
2019 Periodic Review Report
IBM Gun Club -Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	GC-2A						IB-7					
			Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19
			Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethanes														
Chloroethane	5	N	--	<0.5	--	--	<0.5	--	0.10 J	0.10 J	0.070 J	0.070 J	<0.5	0.10 J
Aromatic/Aliphatic Petroleum Hydrocarbons														
Cyclohexane	N/A	N	--	<0.5	--	--	<0.5	--	0.10 J	0.20 J	0.090 J	<0.5	<0.5	<0.5
Methylcyclohexane	N/A	N	--	<0.5	--	--	<0.5	--	0.60	0.30 J	0.10 J	0.10 J	0.080 J	0.10 J
Other VOCs														
Hexanone (2-)	50	N	--	<5	--	--	<5	--	<5	29	13	2.2 J	1.3 J	<5
Carbon disulfide	60	N	--	<1	--	--	<1	--	<1	<1	0.60 J	0.10 J	0.090 J	0.10 J

Notes:

1. The table summarizes groundwater volatile organic compound concentrations in micrograms per liter (µg/L) during the last two years of monitoring.

2. Gray shaded cells indicate detected concentrations or elevated laboratory reporting limits above NY State Groundwater Standard Maximum Contaminant Levels (MCLs), as established in Part 703, Surface Water and Groundwater Quality Standards.
Blank cells indicate that location was not sampled during the sampling event indicated.

"<" indicates that the laboratory data or calculated value includes

Table 4

Summary of Water Quality Data - Surface Water

2019 Periodic Review Report

IBM Gun Club - Former Burn Pit Area

Union, New York

Analyte	**NY State Part 703 Standard (ug/l)**	**RI Site Contaminant?**	**111**												**112**											
			Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19
			No. Collected Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Collected Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethenes																										
Trichloroethene (TCE)	5	Y	8	6	<0.1	0.40	1.2	0.49	0.50 J	0.80	0.60	0.30 J	0.40 J	0.30 J	6	6	0.20	2.2	2.6	1.7	--	1.3	0.30 J	0.20 J	0.70	0.60
Dichloroethene (cis-1,2-)	5	Y	8	0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	6	0	<0.5	<0.5	<0.5	<0.5	--	<0.5	<0.5	<0.5	<0.5	<0.5
Dichloroethene (trans-1,2-)	5	Y	8	0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	6	0	<0.5	<0.5	<0.5	<0.5	--	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorinated Methanes																										
Carbon tetrachloride	5	Y	8	0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	6	0	<0.5	<0.5	<0.5	<0.5	--	<0.5	<0.5	<0.5	<0.5	<0.5

Table 4
Summary of Water Quality Data - Surface Water
2019 Periodic Review Report
IBM Gun Club - Former Burn Pit Area
Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	113												118											
			Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19	Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19
			No. Collected Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	No. Collected Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethenes																										
Trichloroethene (TCE)	5	Y	6	5	<0.5	2.7	4.7	2.7	0.20 J	0.90	0.20 J	0.40 J	0.20 J	0.30 J	5	5	0.70	1.8	2.1	1.6	2.3	--	2.6	1.0	0.90	0.070 J
Dichloroethene (cis-1,2-)	5	Y	6	0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5	4	<0.5	0.60	0.70	0.58	4.2	--	2.2	1.0	1.5	0.060 J
Dichloroethene (trans-1,2-)	5	Y	6	0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5	0	<0.5	<0.5	<0.5	<0.5	<0.5	--	<0.5	<0.5	<0.5	<0.5
Chlorinated Methanes																										
Carbon tetrachloride	5	Y	6	0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5	2	<0.5	0.50	0.50	0.34	<0.5	--	0.10 J	<0.5	<0.5	<0.5

Table 4

Summary of Water Quality Data - Surface Water

2019 Periodic Review Report

IBM Gun Club - Former Burn Pit Area

Union, New York

Analyte	NY State Part 703 Standard (ug/l)	RI Site Contaminant?	119											
			Pre-2010 Baseline						Apr '18	Jun '18	Sep '18	Mar '19	Jun '19	Sep '19
			No. Collected Samples	Detects	Min.	Median	Max.	Mean	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)	Conc. (S/FD)
Chlorinated Ethenes														
Trichloroethene (TCE)	5	Y	Not present						--	0.30 J	0.20 J	1.3	1.1	--
Dichloroethene (cis-1,2-)	5	Y	Not present						--	4.6	1.1	3.3	5.7	--
Dichloroethene (trans-1,2-)	5	Y	Not present						--	0.10 J	0.10 J	0.10 J	0.20 J	--
Chlorinated Methanes														
Carbon tetrachloride	5	Y	Not present						--	<0.5	<0.5	<0.5	<0.5	--

Notes:

1. The table summarizes surface water chlorinated ethene and chlorinated methane concentrations in micrograms per liter (µg/L) for the principal site contaminants prior to 2010 (baseline period) and during the last two years of monitoring. Pre-2010 data was collected during the remedial investigation. All other data are from sampling conducted on the dates noted in the table. Some seeps with historical analytical results are not included in the table because they are no longer present. As stated in the SMP, the presence of historical or new surface water sampling locations is assessed each sampling round.

2. For surface water locations where an analyte was detected during one sample event or more in the baseline (pre-2010) period, the number of detects, minimum, median, maximum, and arithmetic mean concentrations were calculated including the detection limit as a value during sample events where the compound was not detected. If no detections are listed, the minimum and maximum concentrations represent the minimum and maximum detection limits observed for the compound at that particular monitoring location.

3. Gray shaded cells indicate mean values above NY State Groundwater Standard Maximum Contaminant Levels (MCLs), as established in Part 703, Surface Water and Groundwater Quality Standards. Blank cells indicate that location was not sampled during the sampling event indicated.

"<" indicates that calculated value includes at least sample where analyte was below analytical detection limits or that the result was below the analytical detection limit.
"J" indicates that the result is below the laboratory lowest quantifiable limit and estimated.

4. Refer the report text for further discussion.

FIGURES

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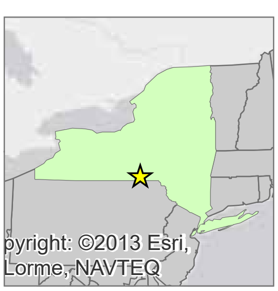
Last Edited By: clavack



Drawn By: E. Wright
Designed By: E. Bosse
Reviewed By: D. Shea
Project No: 3526.05
Date: January 2020

Miles
0.75 0.375 0 0.75 1.5

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Figure 1

Site Location Plan

2019 Periodic Review Report

IBM Gun Club - Former Burn Pit Area
Union , New York

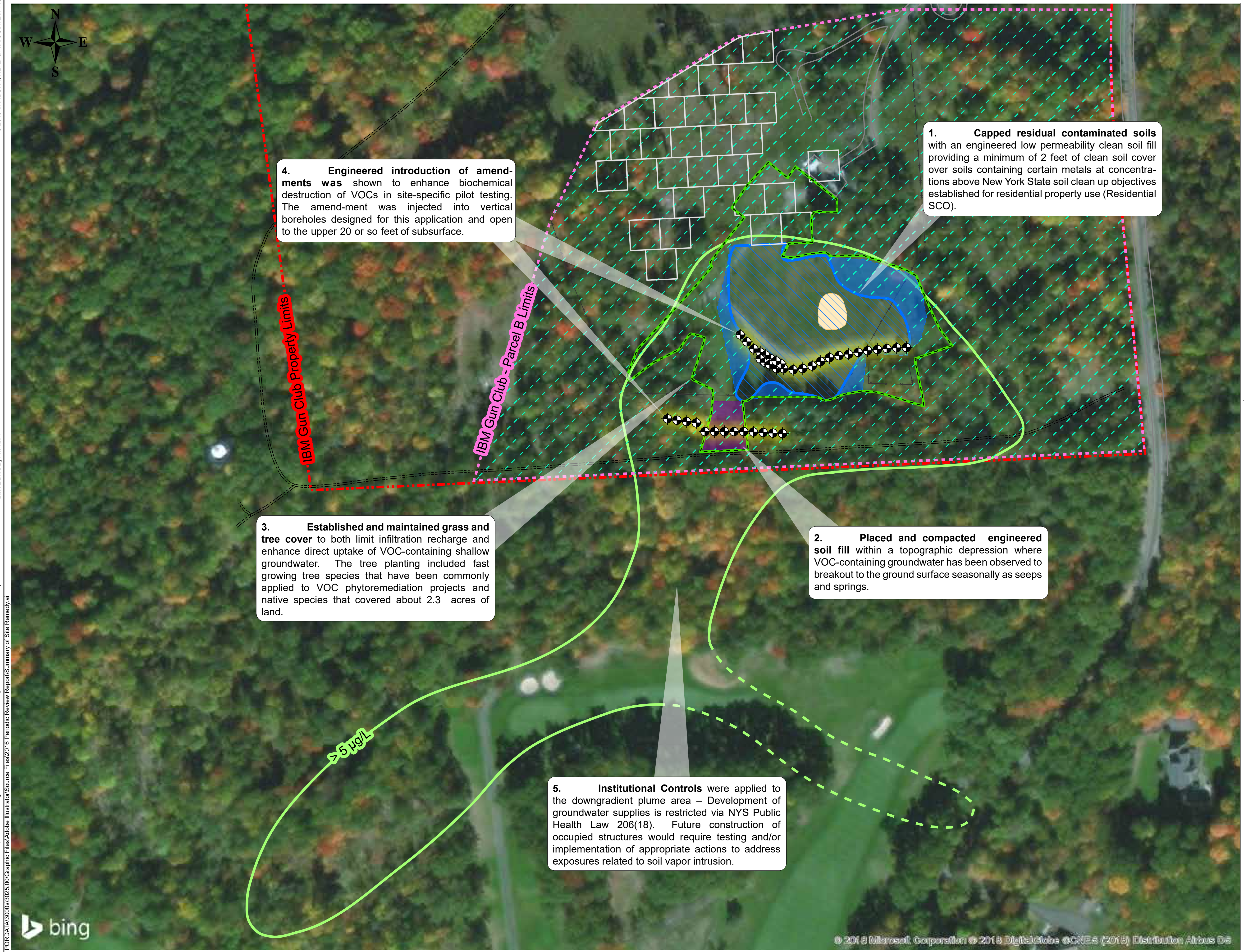

Figure 2

Summary of Site Remedy

2019 Periodic Review Report

IBM Gun Club - Former Burn Pit Area

Union, New York

Drawn By: E. Wright
Designed By: E. Bosse
Reviewed By: D. Shea
Project No: 3526.05
Date: January 2020

Figure Narrative

This figure summarizes the components of the site remedy at the IBM Former Burn Pit under the New York State Brownfield Cleanup Program. The remedy involved excavation and capping of surficial soils, enhancing in situ biochemical processes already active at the site, and the planting and maintenance of trees to enhance uptake of VOC-containing groundwater.

Please refer to the Periodic Review Report text for further discussion.

Legend

- Injection Boring Location
- Former Burn Pit Disposal Area
- Surveyed boundaries of Burn Pit Property (Parcel B). Entire parcel is subject to deed restrictions associated with groundwater development/use, and construction of human occupied structures.
- Area of property that meets Track 2 residential SCOs
- Historical (pre-remedy) inferred extent of TCE in groundwater exceeding NY Standard of 5 ug/L - dashed where less certain
- Limits of Tree Planting
- Track 4 Surficial Soil Remedy Area - 1.28 Acre area requiring two feet of Soil Fill Cap meeting soils standards for residential use (Residential Soil Cleanup Objectives or SCO). The area subject to the deed restriction is larger and more regular
- Approximate Limit of Soil Cap Extension - resulting from final grading of imported soils.
- Approximate limit of additional fill that caps a topographic depression where groundwater historically reached the ground surface as seeps and springs
- Surveyed limits of soil removal conducted under Interim Remedial Measure (IRM) in May 2012 to meet residential SCO

75 37.5 0 75 150 Feet

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Figure 3

Monitoring Location Plan

2019 Periodic Review Report

IBM Gun Club - Former Burn Pit Area

Union, New York

Drawn By: H. Pothier \ E. Wright
Designed By: E. Bosse
Reviewed By: D. Shea
Project No: 3526.05
Date: January 2020

Figure Narrative

This figure summarizes the locations of monitoring wells, multi-level monitoring systems, and surface water sampling points where depth to water is measured and water quality samples may be collected for field and analytical laboratory testing as part of routine and performance monitoring programs.

The locations of site features, including monitoring wells, seeps and springs, and culverts are based on field survey by Butler Land Surveying, LLC. of Little Meadows Pennsylvania in the period 2006 through 2012.

Refer to report text for further discussion.

Legend

- Parcel B Site Boundary
- Injection Borehole Location
- Observed Drainage Features (arrows indicate flow direction)
- Monitoring Well
- Multi-Level Monitoring Installation
- Surface Water Sampling Point
- Culvert
- Former Brun Pit Disposal Area

100 50 0 100 200 Feet

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Last Edited By: ewright

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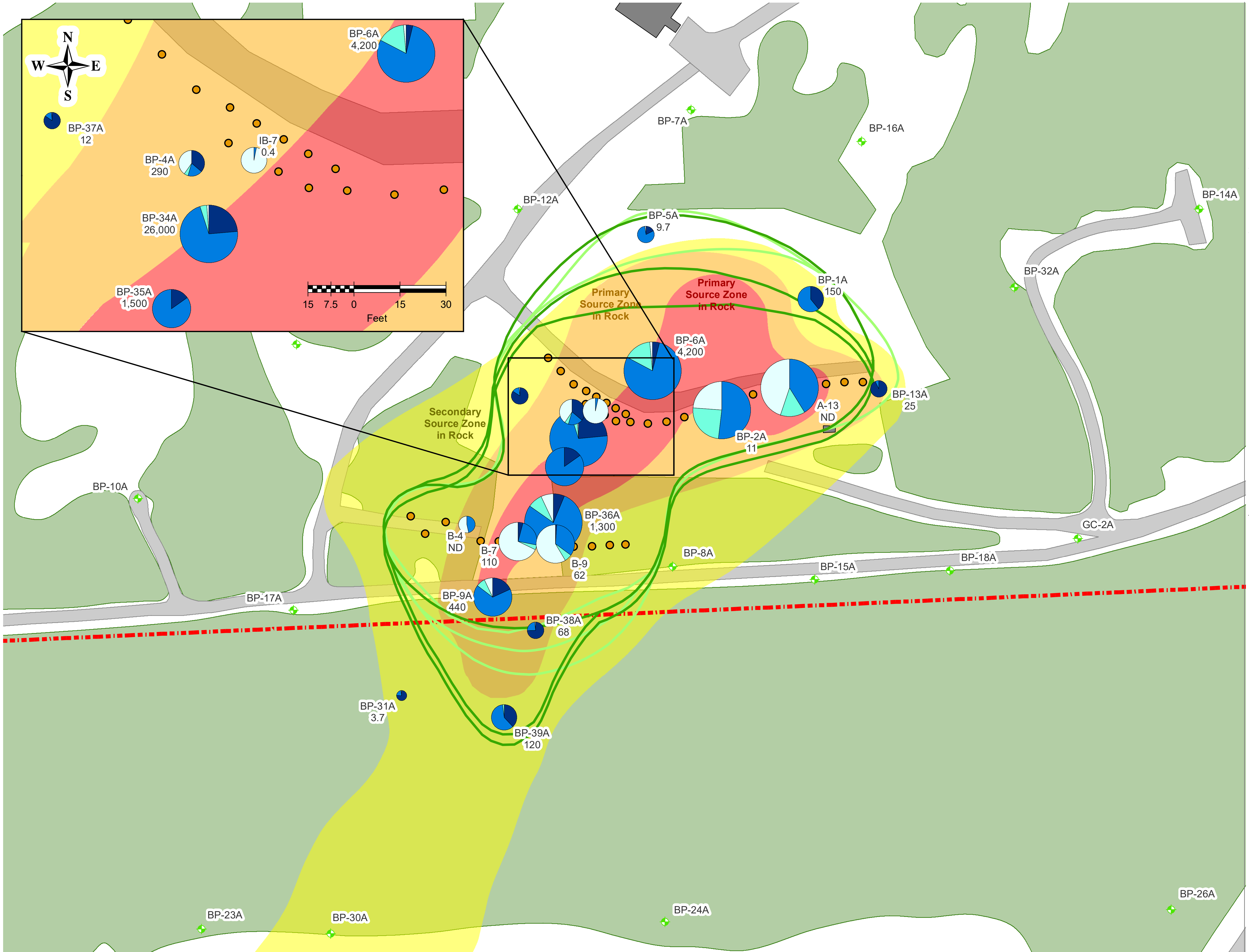

Figure 4

Summary of Geochemical Conditions - Sulfate Reducing Conditions

2019 Periodic Review Report

IBM Gun Club - Former Burn Pit Area

Union, New York

Drawn By:	H. Pothier \ E. Wright
Designed By:	E. Bosse
Reviewed By:	D. Shea
Project No:	3526.05
Date:	January 2020

Figure Narrative

This figure summarized the extent of inferred geochemical conditions as a measure of remedy performance over the two-year monitoring period. Maintenance of geochemical conditions is one of the engineering controls established to address migration in groundwater and VOC source mass over time.

The inferred geochemical conditions are based on observations of oxidation-reduction potential (ORP), methane, sulfide, ferrous and total iron, and nitrate. The assessment is based on data record in performance monitoring conducted in 2018 and 2019. Please refer to the report text sections 3.3 and 4.2 for additional details.

Legend

BP-34A 26,000 — Well Name and September 2019 TCE Concentrations in Groundwater (µg/L).

Inferred Extent of Sulfate-Reducing Conditions 2018

Inferred Extent of Sulfate-Reducing Conditions 2019

Parent VOC (Trichloroethene)

Primary Daughter Product (*cis*-1,2DCE)

Secondary Daughter Product (Vinyl Chloride)

Terminal Breakdown Products (Ethane, Ethene)

September 2019 Total Chlorinated Ethanes & Ethenes in Groundwater (µmol/L)

< 0.1

>0.1 to 1

>1 to 10

>10 to 100

>100

40 20 0 40 80 Feet

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Last Edited By: ewright

Path: P:\3500s\3526.02\Graphics Files\GIS\Figures\Periodic Review Rpt\2019 PRR GWQ_Sulfate.mxd

Figure 5

Summary of Geochemical Conditions - Methanogenic Conditions

2019 Periodic Review Report

IBM Gun Club - Former Burn Pit Area

Union, New York

Drawn By: H. Pothier \ E. Wright
Designed By: E. Bosse
Reviewed By: D. Shea
Project No: 3526.05
Date: January 2020

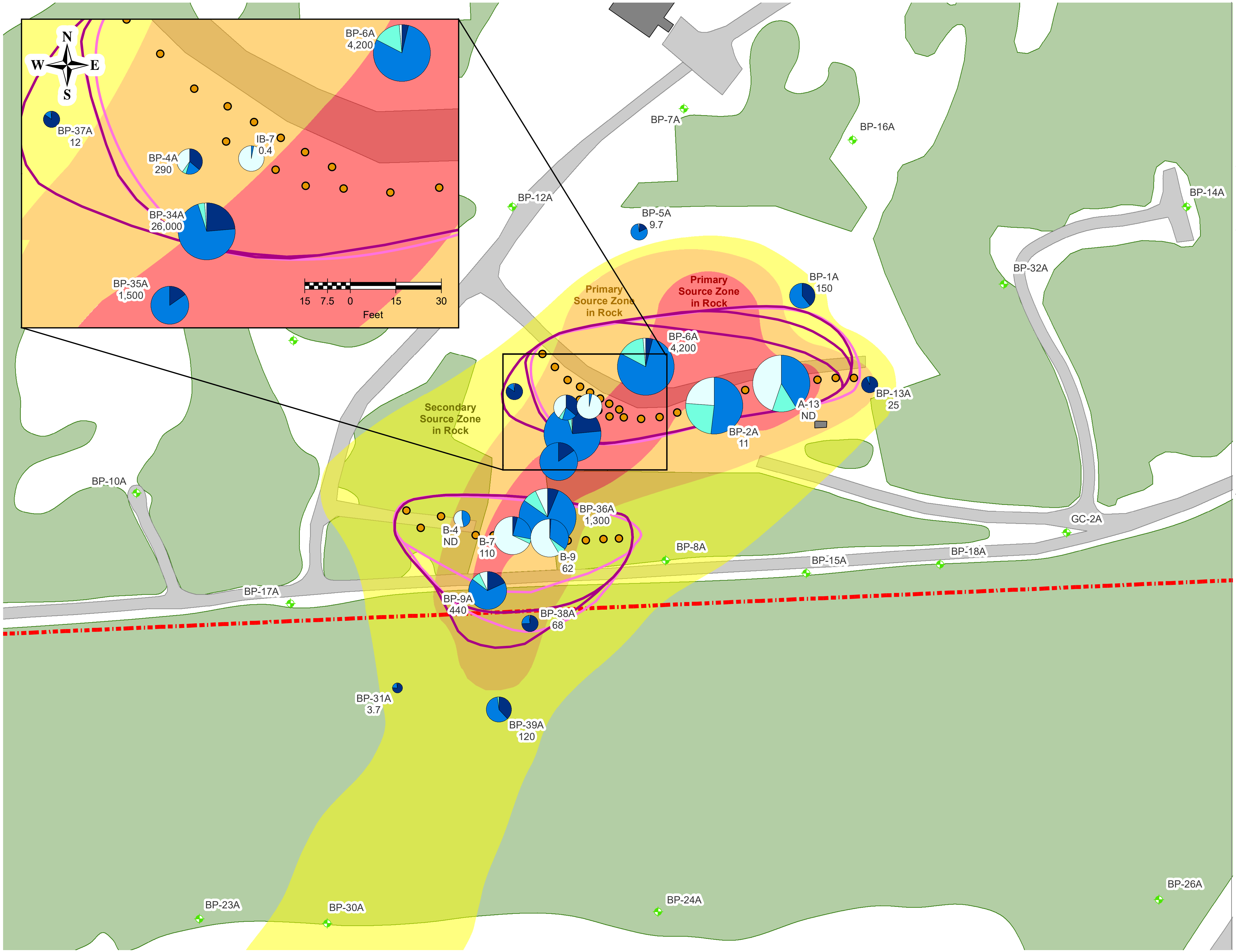

Figure Narrative

This figure summarized the extent of inferred geochemical conditions as a measure of remedy performance over the two-year monitoring period. Maintenance of geochemical conditions is one of the engineering controls established to address migration in groundwater and VOC source mass over time.

The inferred geochemical conditions are based on observations of oxidation-reduction potential (ORP), methane, sulfide, ferrous and total iron, and nitrate. The assessment is based on data record in performance monitoring conducted in 2018 and 2019. Please refer to the report text sections 3.3 and 4.2 for additional details.

Legend

BP-34A 26,000 — Well Name and September 2019 TCE Concentrations in Groundwater (µg/L).

Inferred Extent of Methanogenic Conditions 2018

Inferred Extent of Methanogenic Conditions 2019

Parent VOC (Trichloroethene)

Primary Daughter Product (*cis*-1,2DCE)

Secondary Daughter Product (Vinyl Chloride)

Terminal Breakdown Products (Ethane, Ethene)

September 2019 Total Chlorinated Ethanes & Ethenes in Groundwater (µmol/L)

< 0.1

>0.1 to 1

>1 to 10

>10 to 100

>100

40 20 0 40 80 Feet

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Figure 6

Groundwater Quality Conditions for Key Site VOCs - June 2019

2019 Periodic Review Report

IBM Gun Club - Former Burn Pit Area

Union, New York

Drawn By:	H. Pothier
Designed By:	E. Bosse
Reviewed By:	D. Shea
Project No:	3526.05
Date:	January 2020

Figure Narrative

This figure depicts groundwater data for key site VOCs from monitoring of water table wells in June 2019.

The data for TCE, selected breakdown products, and carbon tetrachloride are presented as pie diagrams. The wedges of each pie diagram represent concentrations expressed in micromoles per liter (µmol/L). The relative diameter of each pie diagram varies based on the sum of the VOCs in micrograms per liter (µg/L)at each location.

Refer to report text for further discussion.

Legend

Injection Boring

BP-34A
31,000 — Well Name and June 2019 TCE Concentrations in Groundwater (µg/L).

- Trichloroethene (TCE)
- *cis*-1,2 Dichloroethene (*cis*-1,2 DCE)
- Vinyl Chloride (VC)
- Carbon Tetrachloride (CCl4)

Total Chlorinated Ethenes and Carbon Tetrachloride in Groundwater (µg/L)

<10

Not detected above lab reporting limits

>10 to 100

>100 to 1,000

>1,000 to 10,000

>10,000

100 50 0 100 200

Feet

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Last Edited By: ewright

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APPENDIX A

LIMITATIONS

Appendix A
Limitations

1. The conclusions described in this report are based in part on the data obtained from a finite number of groundwater and surface water samples from widely spaced locations. The figures are intended to depict inferred conditions during a given period of time, consistent with available information. The actual conditions will vary from that shown, both spatially and temporally. Other interpretations are possible. If variations or other latent conditions then appear evident, it may be necessary to re-evaluate the conclusions of this report.

2. Water level measurements have been recorded at times and under conditions stated in the report. Note that fluctuations in the level of the groundwater may occur due to variations in rainfall and other factors not evident at the time measurements were made.

3. The conclusions contained in this report are based in part upon various types of chemical data as well as historical and hydrogeologic information developed by previous investigators. While Sanborn Head has reviewed that data available to us at the time the report was prepared and information as stated in this report, any of Sanborn Head's interpretations and conclusions that have relied on that information will be contingent on its validity. Sanborn Head has not performed an independent assessment of the reliability of the data; should additional chemical data, historical information, or hydrogeologic information become available in the future, such information should be reviewed by Sanborn Head and the interpretations and conclusions presented herein may be modified accordingly.

4. Sampling and quantitative laboratory testing was performed by others as part of the investigation as noted within the report. Where such analyses have been conducted by an outside laboratory, unless otherwise stated in the report, Sanborn Head has relied upon the data provided, and has not conducted an independent evaluation of the reliability of these data. Moreover, it should be noted that variations in the types and concentrations of contaminants and variations in their distribution within groundwater and surface water may occur due to the passage of time, seasonal water table fluctuations, recharge events, and other factors.

5. This report has been prepared for the exclusive use of the IBM Corporation for specific application to the former IBM Gun Club in accordance with generally accepted hydrogeologic practices. No warranty, expressed or implied, is made. The contents of this report should not be relied on by any other party without the express written consent of Sanborn Head.

6. In preparing this report, Sanborn Head has endeavored to conform to generally accepted practices of other consultants undertaking similar studies at the same time and in the same geographical area. Sanborn Head has attempted to observe a degree of care and skill generally exercised by the technical community under similar circumstances and conditions.

7. The analyses and recommendations contained in this report are based on the data obtained from the referenced explorations. The explorations indicate subsurface conditions only at the specific locations and times, and only to the depths penetrated. They do not necessarily reflect strata variations that may exist between such locations. The validity of the recommendations is based in part on assumptions and inference Sanborn Head has made about conditions at the site. Such assumptions may be confirmed only during further investigation or remediation. If subsurface conditions different from those described become evident, the recommendations in this report must be re-evaluated.

P:\3500s\3526.02\Source Files\2019 PRR\Appendices\App. A - Limitations\20200110 App A Limitations.docx

APPENDIX B

INSPECTION AND MAINTENANCE REPORTS

APPENDIX B.1

SITE-WIDE INSPECTION REPORT – SEPTEMBER 2019

SANBORN | HEAD ENGINEERING
Building Trust. Engineering Success.

20 Foundry Street
Concord, NH 03301

Stephen Brown, P.E.
IBM Corporation
8976 Wellington Road
Manassas, VA 20109

October 22, 2019
File No. 3526.05

Re: Site-Wide Inspection – September 2019
IBM Gun Club – Former Burn Pit Area
Union, New York
NYSDEC Site #C704044 (BCA Index #B7-0661004-05)

Dear Mr. Brown:

This letter transmits the findings of the 2019 Site-Wide Inspection completed for the IBM Gun Club, Former Burn Pit Area (Site). Site-wide inspections under the Site Management Plan (SMP) are being conducted annually. This inspection report will also be included with the next Periodic Review Report required by the SMP, due in January 2020.

BACKGROUND AND SCOPE

The Site-Wide Inspection was conducted in accordance with the Monitoring Plan included as Section 3.0 of the SMP using the Site Wide Inspection Checklist included as Appendix K.1 of that document. The inspection included visual review of the condition of the soil cap that covers contaminated soils, and the soil fill placed within the area of historical seeps. The site inspection was conducted on September 24, 2019 and included:

- A review of the Site, and conditions on lands downgradient of the Site, related to compliance with the Institutional Controls (ICs) outlined in SMP Section 2.3 and the Environmental Easement;

- A visual review of the cover system associated with the deed restricted area as outlined in SMP Section 3.2, and seep fill area, to observe for settlement, erosion, or other conditions that could be considered detrimental to the effectiveness of these components of the Engineering Control (EC) remedy;

- A review of the conditions of tree plantings and grass cover that constitute the phytoremediation component of the EC remedy as described under SMP Section 4.2.1. During this visit, we conducted a general reconnaissance and a comprehensive tree mortality survey.

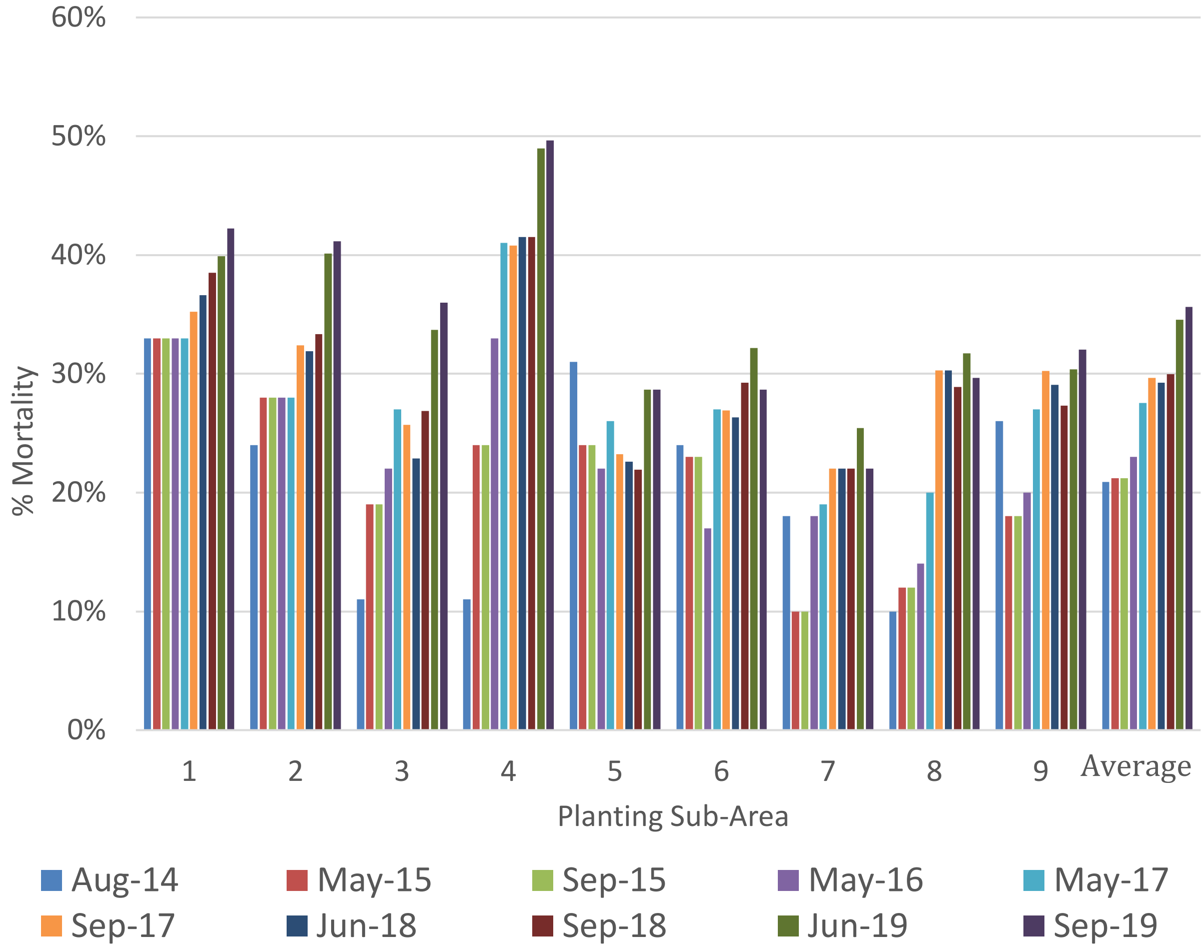
In addition, we reviewed general Site conditions related to site fencing, security, and the list of notifications required under the SMP. The findings and observations from this visit are noted in the inspection checklist included as Attachment A. An annotated inspection figure is included as Attachment B, and photos are included in Attachment C.

SUMMARY OF FINDINGS

In general, as outlined in the attached checklist, the inspection found the condition of the Site to be consistent with the design intent of the ECs, and the use of the Site and surrounding area is consistent with the ICs and the human exposure assessment on which the remedy is based. Summary observations are as follows:

- The capped area remains intact with no evidence of settlement, cracking, animal burrows, or other breaches;
- The capped area is vegetated with well-established grass and tree cover. According to the National Weather Service, the region was subject to average to below average precipitation in the three months preceding the September 2019 inspection;
- Poplar trees initially planted as tree poles appear to have grown several feet since September 2018 to an average height of 18 to 22 feet, while poplar trees initially planted as cuttings have grown 1 to 2 feet to an average of 6 to 8 feet. Tree mortality compared to initial planting in 2013 is shown in Exhibit 1 below and on the attached figure (Attachment B) and ranged from 21% to 50%, with Area 4 exhibiting the highest mortality and Area 7 the lowest. Further discussion is provided in the Closing below;

Exhibit 1: Summary of tree mortality percentage



- The soil fill in the seep area was observed to be creeping downhill towards the southern access road during the 2018 inspection. Conditions were not observed to have changed or worsened since the 2018 inspection. Tree and grass coverage are well established and there is no evidence of slope failure. We will continue to monitor the slope;

- Evidence remains that the bonfire gathering spot near outside the site fence and near monitoring well BP-10A is being utilized, but there was less debris present compared to previous inspections.

CLOSING

Under the SMP, IBM had proposed to replant trees as needed to bring the tree cover up to 75% of the initial planting density, allowing for 25% mortality. Overall site average mortality recorded in September 2019 was approximately 35%, compared to 35% in June 2019 and 31% at the last inspection in September 2018. We still do not think that replanting of trees is warranted at this time given: 1) the continuing growth progress of live trees, 2) the apparent stabilization of overall average mortality around or below 30% in Areas 5, 6, 7, and 8, as shown in the above histogram, with some improvements compared to last September and June, 3) a good portion of the mortality is located in areas outside of the primary and secondary source rock (Areas 1, 4, and 9), and 4) replanting would require tracking of mechanized equipment across the cap area, which might damage the cap and live trees.

We note also that less than 25% mortality may not be achievable in areas that exhibit conditions that are not conducive to tree growth (e.g. shallow bedrock, encroachment of woody brush, poor infiltration in the capped area), and re-planting may lead to the same result. For example, the highest tree mortality is observed in Area 4, which has the highest proportion of other native woody bushes and trees and is often shaded.

If you have any questions, please contact us. We appreciate the opportunity to provide service to IBM on this important project.

Very truly yours,
SANBORN, HEAD ENGINEERING, P.C.

David Shea, P.E.
Principal

Erica M. Bosse
Project Manager
Sanborn, Head & Associates, Inc.

EMB/DS: ds

Encl. Attachment A - Site Wide Inspection Checklist
Attachment B - Annotated Site Inspection Map
Attachment C - Photographs

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Attachment A
Site Wide Inspection Checklist - September 2019
IBM Gun Club - Former Burn Pit Area
NYSDEC Site No. C704044

Part 1: General Information

Site Name: IBM Gun Club, Former Burn Pit Area

Date of Inspection: September 24, 2019

Summary of Remedy:

-Capping the primary VOC source area and residual surficial soils with an engineered low permeability clean soil fill;

-Placement and compaction of engineered soil fill within a topographic depression south of the Burn Pit Area;

-Phytoremediation - establishing and maintaining grass and tree cover to limit infiltration recharge and enhance direct uptake of VOC-containing shallow groundwater; and

-Enhanced biochemical degradation - engineered introduction of amendments shown to enhance biochemical destruction of VOCs.

Part 2: Inspection Specifics

Inspector: Erica Bosse

Title: Project Manager

Inspector Contact Information: Sanborn Head Engineering, P.C./Sanborn, Head & Associates, Inc.

Type of Inspection:

Site-wide inspection	☑
Soil cover system monitoring	☑
Routine well inventory and review	☑
Routine phytoremediation monitoring	☑
Non-routine storm event or other emergency	☐
Non-routine EC failure/ performance modifications	☐

Remarks

Weather/ Temperature: Partly cloudy/showers, 70s, humid

Part 3: On-site Documents & Records Verification

	Readily Available	Up-to-date	Location/ remarks
Daily access/security logs	☑	☑	Red binder in site trailer
Site Management Plan	☑	☑	Filing cabinet
Health & Safety Plan	☑	☑	Appendix of Site Management Plan
Current underground injection control permit	☐	☐	N/A
Monitoring records	☑	☐	Current through 2018
Routine maintenance reports	☑	☐	Current through 2018
Non-routine maintenance reports	☑	☐	Current through 2018
Site-wide inspection reports	☑	☐	Current through 2018

Part 4: Review of Institutional Controls (SMP Section 2.3)

	True	False	Not Applicable
The property is only used for restricted residential, commercial, and industrial uses within the Track 4 Cleanup area;	☑	☐	☐
The property is only used for residential, restricted residential, commercial, and industrial uses throughout the remainder of the site;	☑	☐	☐
The property is not used for a higher level use, such as unrestricted use without additional remediation and amendment of the Easement with approval by NYSDEC;	☑	☐	☐
Activities on the property that will disturb remaining contaminated material conducted in accordance with the SMP;	☑	☐	☐
The use of groundwater within and adjacent to the currently established plume or updated plume based on groundwater monitoring is prohibited as a source of potable or process water, without necessary water quality treatment	☑	☐	☐
Any buildings developed within the Track 4 Cleanup area evaluated for vapor intrusion, and any potential impacts that are identified are monitored or mitigated	☑	☐	☐
No vegetable gardens or farming within the Track 4 Cleanup area	☑	☐	☐

Narrative/ Other Notes:

The site remains undeveloped with no buildings and is not used for agriculture.

Part 5: Review of Engineering Controls

5a: Soil Cover System Monitoring - Deed Restricted Area (SMP Section 3.2)

Monuments and Signage

- ☐ Damaged/missing signage
- ☐ Damaged monuments
- ☐ Location(s) shown on map
- ☑ Photo-documented

Remarks: Signage is as constructed, bollards could use a coat of paint.

Settlement (Low spots)

- ☐ Location(s) shown on map
- ☐ Photo-documented
- ☑ Settlement not evident

Approx. ft^2 ______
Depth ______
Remarks None observed

Cracks

- ☐ Location(s) shown on map
- ☐ Photo-documented
- ☑ Cracking not evident

Length ______
Width ______
Depth ______

Remarks None observed

Erosion

- ☐ Location(s) shown on map
- ☐ Photo-documented
- ☑ Erosion not evident

Approx. ft^2 ______
Depth ______
Remarks ______

Holes

- ☐ Location(s) shown on map
- ☐ Photo-documented
- ☑ Holes not evident

Approx. ft^2 ______
Depth ______
Remarks None observed

Vegetative Cover

- ☑ Photo-documented
- ☑ Grass properly established
- ☐ No signs of stress

Remarks No major bare areas observed.

Wet Areas/Water Damage **None apparent**

- ☐ Wet areas — Approx. ft^2 ______
- ☐ Ponding — Approx. ft^2 ______
- ☐ Seeps — Approx. ft^2 ______
- ☐ Soft subgrade — Approx. ft^2 ______

- ☑ Shown on site map
- ☑ Photo-documented
- ☐ Wet areas not evident

Remarks No evidence of water damage.

Slope Instability **None apparent**

- ☐ Location(s) shown on map
- ☐ Photo-documented
- ☑ Slope instability not evident

Approx. ft^2 ______

Remarks None observed

Narrative/ other notes:

The grass is well established. Mowing is conducted twice per year.

A review of rainfall records for Binghamton, NY (National Climatic Data Center) indicate that precipitation was generally average to slightly above average in 2019. Rainfall in July and August 2019 was just about average, while September totals were approximately 1.7" below average.

5b: Soil Fill - Seep Area

Settlement (Low spots)

- ☐ Location(s) shown on map — Approx. ft^2 ____
- ☐ Photo-documented — Depth ____
- ☑ Settlement not evident — Remarks None observed

Cracks

- ☐ Location(s) shown on map — Length ____
- ☐ Photo-documented — Width ____
- ☑ Cracking not evident — Depth ____

Remarks None observed

Erosion

- ☐ Location(s) shown on map — Approx. ft^2 ____
- ☐ Photo-documented — Depth ____
- ☑ Erosion not evident — Remarks None observed

Holes

- ☐ Location(s) shown on map — Approx. ft^2 ____
- ☐ Photo-documented — Depth ____
- ☑ Holes not evident — Remarks None observed

Vegetative Cover

- ☑ Photo-documented
- ☑ Grass properly established — Remarks ____
- ☐ No signs of stress

Wet Areas/Water Damage **None apparent**

- ☐ Wet areas — Approx. ft^2 ____ — ☑ Shown on site map
- ☐ Ponding — Approx. ft^2 ____ — ☑ Photo-documented
- ☐ Seeps — Approx. ft^2 ____ — ☐ Wet areas not evident
- ☐ Soft subgrade — Approx. ft^2 ____ — Remarks The seep at the base of the capped

area was observed to be dry during sampling the week before the inspection and at the time of the inspection.

Slope Instability

- ☑ Location shown on map
- ☑ Photo-documented
- ☐ Slope instability not evident

Approx. ft^2 __________

Remarks __________

Narrative / other notes: There is some evidence that soil fill in the seep area is creeping down hill towards the southern access road. A silt fence present as the base of the seep area since construction is partially covered by soil material from above. It did not appear to have worsened/changed since the September 2018 inspection.

5c: Phytoremediation\Tree Condition (SMP Section 4.2.1)

Area	Type	Measure	Value	% Mortality
Area #1 ☑ Photo Mark Map ☑	Poles	Representative height	12-18'	40%
		Representative canopy width		
	Cuttings	Representative height	6-8'	
		Representative canopy width		
Area #2 ☑ Photo Mark Map ☑	Poles	Representative height	12-18'	41%
		Representative canopy width		
	Cuttings	Representative height	6-8'	
		Representative canopy width		
Area #3 ☑ Photo Mark Map ☑	Poles	Representative height	12-18'	36%
		Representative canopy width		
	Cuttings	Representative height	6-8'	
		Representative canopy width		
Area #4 ☑ Photo Mark Map ☑	Poles	Representative height	8-10'	50%
		Representative canopy width		
	Cuttings	Representative height	6-8'	
		Representative canopy width		
Area #5 ☑ Photo Mark Map ☑	Poles	Representative height	12-16'	29%
		Representative canopy width		
	Cuttings	Representative height	6-8'	
		Representative canopy width		

Attachment A
Site Wide Inspection Checklist - September 2019
IBM Gun Club - Former Burn Pit Area
NYSDEC Site No. C704044

Area	Type	Measure	Value	% Mortality
Area #6 ☑ Photo Mark Map ☑	Poles	Representative height	18-25'	29%
		Representative canopy width		
	Cuttings	Representative height	6-8'	
		Representative canopy width		
Area #7 ☑ Photo Mark Map ☑	Poles	Representative height	14-18'	21%
		Representative canopy width		
	Cuttings	Representative height	N/A	
		Representative canopy width		
Area #8 ☑ Photo Mark Map ☑	Poles	Representative height	18-25'	30%
		Representative canopy width		
	Cuttings	Representative height	N/A	
		Representative canopy width		
Area #9 ☑ Photo Mark Map ☑	Poles	Representative height	14-18'	32%
		Representative canopy width		
	Cuttings	Representative height	N/A	
		Representative canopy width		

Narrative / other notes:

On average, both poles and cuttings were observed to have grown 2-4 ft since the September 2018 inspection.
Poplar tree mortality by area ranged from 21% to 50% with a median of about 35%, which is unchanged since 2018.
Estimated tree mortalities exceeded the 25% threshold specified in the SMP in most areas, but seem to have currently stablized at or below 30% in Areas 5 through 8. Compared to 2018, mortality increased in Areas 1, 2, 3, 4, 5 and 9, while improved in Areas 6, 7, and 8. Mortality may be explained by sun exposure, depth to rock/planting depth, and possible gas generation downgradient of pilot test injection boreholes. Plantings along the periphery of the capped area/near the natural tree line were observed to be crowded out shaded by exisiting woody bushes and trees, especially in Areas 3, 4, 5, and 8.

Part 6: Review of Monitoring and Injection Well Network Inspection

Conditions consistent with Monitoring and Injection Well Inspection Checklist ☑

List deviations, if any: The comprehensive well inspection was completed in June 2019, conditions were observed to be similar in September 2019.

Seep Area Monitoring

Seep area dry ☐ New seeps/ springs/ wet areas observed? ☐

Remarks No new seeps observed.

Narrative / other notes:

Part 7 - Review of Access/General Site Conditions

Condition of fencing Fence panels intact around entire perimeter. Barbed wire brackets had fallen in two spots

Remarks One small tree is resting on the fence in the NW corner of the larger parcel, no fence damage was observed.

Condition of monuments and signage Intact as constructed

Remarks

Obvious signs of vandalism/trespassing? Bonfire area still present outside the perimeter fence, does not appear

Remarks to be as active as in the past. Continued vandalism to the former Gun Club building outside the perimeter fence.

Condition of access roads and lanes Intact as constructed. Starting to get overgrown. Gravel access roads

Remarks in capped area mostly grassed over.

Investigation derived waste

Frac Tank/ Water Tank

- ☐ N/A
- ☑ Good condition
- ☐ Needs maintenance

Remarks About 100 gallons of sampling purge water in Tote #1.

Approximate volume generated since last inspection 100

	Yes	No
Documentation of IDW analytical results readily available	☐	☑

Location/ Remarks September 2019 purge water sample indicated levels of VOCs below the detection limits and could be discharged to the ground. Purge water was discharged to the ground on a separate trip to the site in October 2019.

Narrative / other notes:

Attachment A
Site Wide Inspection Checklist - September 2019
IBM Gun Club - Former Burn Pit Area
NYSDEC Site No. C704044

Part #8 Notifications

We are not aware of any planned change in use by the Binghamton Country Club

	Not Applicable	Yes	No
A. 60-day advance notice of any proposed changes in site use	☑	☐	☐
B. 7-day advance notice of proposed ground-intrusive activities	☑	☐	☐
C. 48-hour notice of any damage or defect to the engineering controls	☑	☐	☐
D. Verbal notice by noon the following day of any emergency (fire, flood, etc.) that reduces the effectiveness of engineering controls	☑	☐	☐
E. Follow-up status report on emergency actions within 45 days	☑	☐	☐
F. 60-day advance notice of any change in site ownership	☑	☐	☐
G. New owner's contact information confirmed in writing within 15 days of ownership change	☑	☐	☐

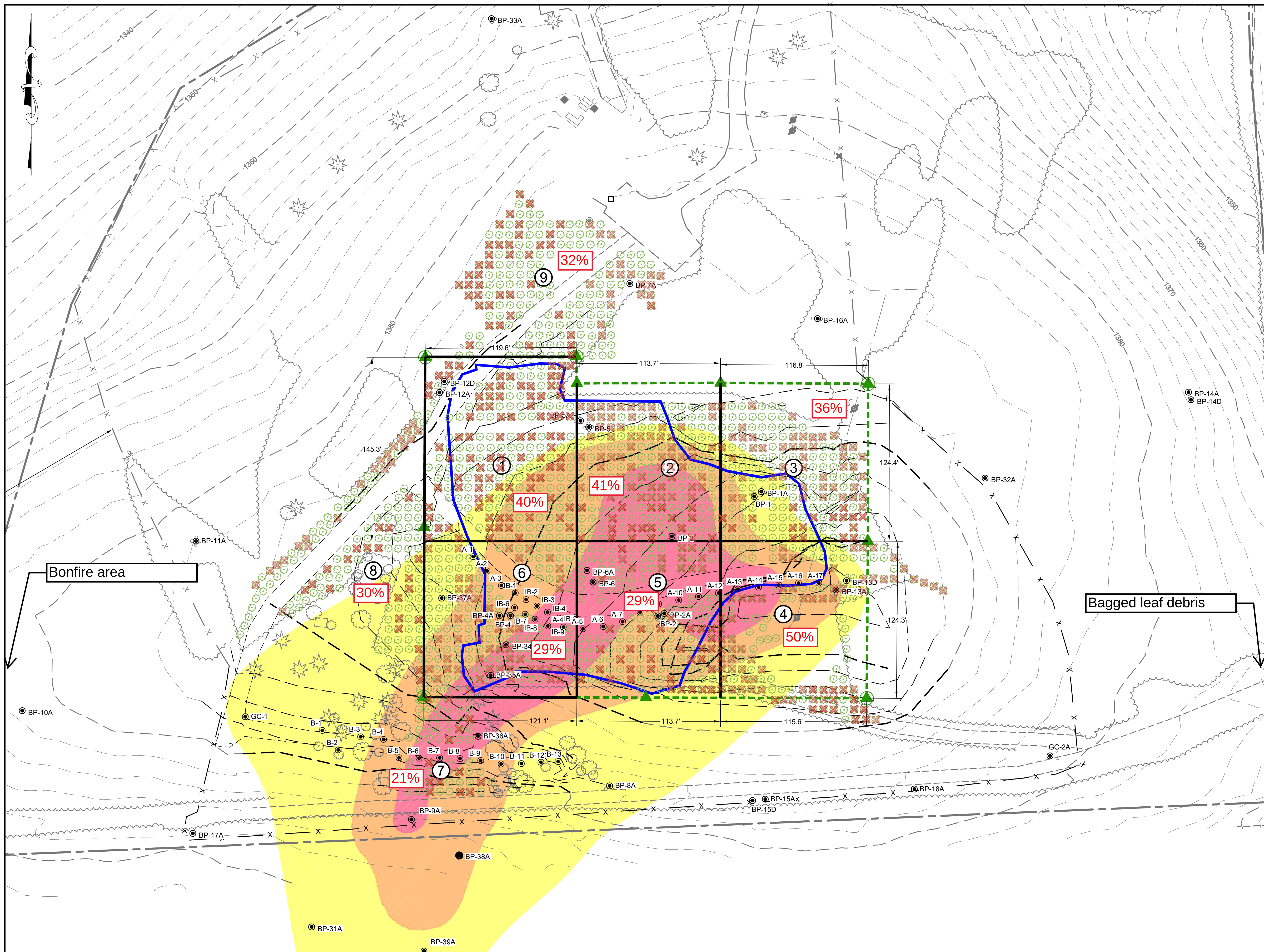
Part #9 Action Items

	Action Item	Proposed time frame
Routine maintenance	GSC to mow grass	Spring 2020
Non-routine maintenance	Repair BP-15A PVC riser	Next time drill rig is on site
	Repair GC-2A bollard	Next time drill rig is on site
	Paint bollards	2020
Other	Update documentation	Next time on site

Attachment B

Annual Site-Wide Inspection, Conducted September 24, 2019

Conducted by Erica Bosse



NOTES:

1. THIS FIGURE IS INTENDED TO ACCOMPANY THE SITE-WIDE INSPECTION CHECKLIST AND WILL BE USED TO MARK CONDITIONS OF NOTE RECORDED ON THE INSPECTION CHECKLIST FORM. THE SITE WIDE INSPECTION IS REQUIRED AS AN ELEMENT OF THE REMEDIAL PROGRAM AT THE IBM GUN CLUB, BURN PIT UNDER THE NEW YORK STATE BROWNFIELD CLEANUP PROGRAM ADMINISTERED BY NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION. THE SITE IS IN THE PROCESS OF BEING REMEDIATED IN ACCORDANCE WITH BROWNFIELD CLEANUP AGREEMENT #C7044, WHICH WAS EXECUTED ON AUGUST 26, 2005 AND LAST AMENDED ON APRIL 26, 2012.
2. REFER TO THE SITE MANAGEMENT PLAN AND FINAL ENGINEERING REPORT FOR ADDITIONAL NOTES AND LEGEND INFORMATION.

LEGEND

1350	EXISTING 10-FOOT CONTOUR
	EXISTING 2-FOOT CONTOUR
1380	AS-BUILT 10-FOOT CONTOUR
	AS-BUILT 2-FOOT CONTOUR
X	EXISTING CHAIN-LINK FENCE
X	AS-BUILT CHAIN-LINK FENCE
	EXISTING TREE LINE
	EXISTING UTILITY LINE
	EXISTING EDGE OF PAVED ROAD
	EXISTING EDGE OF GRAVEL PATH
	AS-BUILT EDGE OF GRAVEL PATH
	SURVEYED EXTENT OF MARKER LAYER
BP-6	EXISTING MONITORING WELL LOCATION AND DESIGNATION
IB-4	EXISTING INJECTION WELL LOCATION AND DESIGNATION
A-1	AS-BUILT INJECTION WELL LOCATION AND DESIGNATION
	DEED RESTRICTION BOUNDARY
	MONUMENT TO DOCUMENT DEED RESTRICTED AREA
	MONUMENT TO DOCUMENT DEED RESTRICTED AREA WITH SIGNAGE INSTALLED
	SURVEYED TREE PLANTING LIMITS
3	PHYTOREMEDIATION AREA BOUNDARY AND DESIGNATION
	PRIMARY SOURCE ROCK
	SECONDARY SOURCE ROCK
	LOCATION OF DEAD POPLAR CUTTING (INSIDE CAP AREA) AND POPLAR POLE (OUTSIDE CAP AREA)
27%	TREE MORTALITY

SANBORN | HEAD ENGINEERING

GRAPHICAL SCALE

60' 30' 0 60' 120'

NO.	DATE	DESCRIPTION	BY

DRAWN BY: E. WRIGHT
DESIGNED BY: J. SANBORN
REVIEWED BY: D. SHEA
PROJECT MGR: E. BOSSE
PIC: D. SHEA
DATE: OCTOBER 2019

SITE WIDE INSPECTION MEMO
IBM GUN CLUB - FORMER BURN PIT AREA
UNION, NEW YORK

SITE MANAGEMENT PLAN

PROJECT NUMBER: 3526.05

FIGURE NUMBER: 1

ATTACHMENT C
INSPECTION PHOTOGRAPHS

Photo 1: Tree and grass cover looking north across Phytoremediation Area 1.

Photo 2: Tree and grass cover looking in Phytoremediation Areas 2 and3, looking northeast.

Photo 3: Tree and grass cover looking west across Phytoremediation Area 3.

Photo 4: Phytoremediation Area 4, looking SW towards Area 5.

Photo 5: Looking SE towards the A-series injection boreholes in Phytoremediation Area 4.

Photo 6: Looking west along the cap access road towards Phytoremediation Area 5.

Photo 7: Looking north from Phytoremediation Area 7 to Area 6.

Photo 8: Phytoremediation Area 7 looking north from the B-series injection boreholes.

Photo 9: Phytoremediation Area 8 looking west from Area 6.

Photo 10: Phytoremediation Area 9 looking NE from the gravel cap access road.

Photo 11: Southern gravel access road, looking east from approximately BP-15/BP-15D.

Photo 12: Evidence of trespassing/leaf dumping near the entrance to the southern access road at Robinson Hill Road.

Photo 13: Looking NW at the bonfire area outside the perimeter fence to the west.

Photo 14: Wood debris pile located in the bonfire area.

APPENDIX B.2

ROUTINE MAINTENANCE REPORTS

Appendix B.2
Routine Maintenance Report Form
IBM Gun Club - Former Burn Pit Area
BCP Site No. C704044

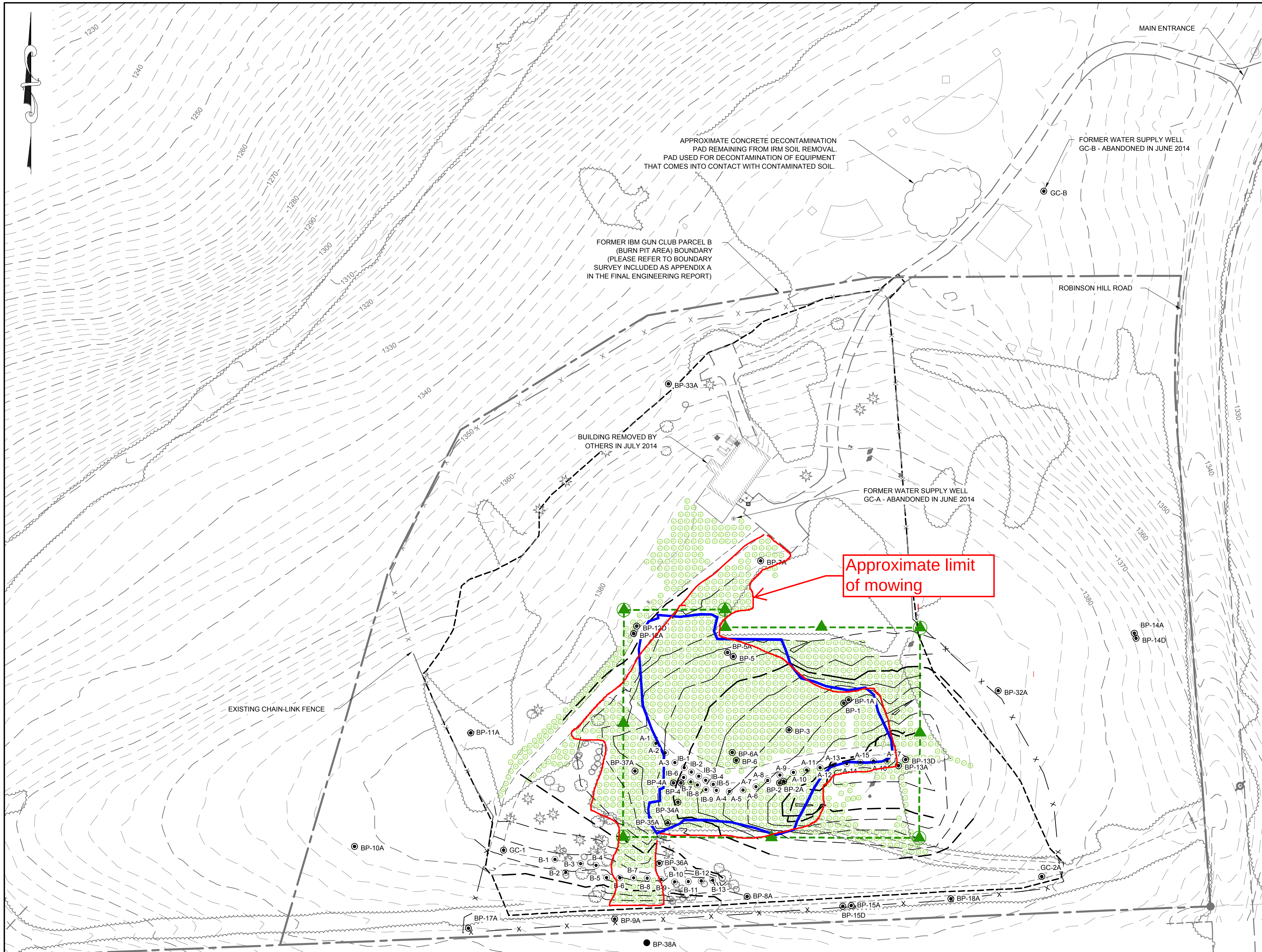
Field Representative:	Erica Bosse (Sanborn Head)	Position: Project Manager
Company:	Bruce Spence (Groundwater Sciences)	
System Type (circle one)	Monitoring Well Injection Well Soil Fill in Seep Area	Soil Cap Phytoremediation

Maintenance activities:

Sanborn Head coordinated with Groundwater Sciences personnel to mow the grass within the area of tree planting in June and September 2019. We provided a marked-up field sketch of the areas to mow, but were not present at the time of mowing. In visits to the site after mowing, it was observed that mowing was completed with no damage to the capped area.

Modifications to the system: None

Field Representative Date Erica Bosse 9/13/2019	Attachments: ☐ None ☐ Photographs ☒ Field Sketch ☐ Invoices/ Receipts ☐ Other	SANBORN HEAD
Reviewed By Date David Shea 9/13/2019		



NOTES:

1. WITH THE EXCEPTION OF THE FEATURES IDENTIFIED UNDER NOTE 3, THE BASE MAP WAS DEVELOPED FROM THE FOLLOWING SURVEY DATA MERGED BY SANBORN, HEAD & ASSOCIATES, INC. (SANBORN HEAD):

   A. WITHIN THE LIMITS SHOWN ON THE PLAN VIEW FIGURE AS DENOTED IN THE LEGEND THE TOPOGRAPHY AND SITE FEATURES REFLECT FIELD GROUND SURVEY DOCUMENTED ON A PLAN ENTITLED "TOPOGRAPHIC SURVEY OF FORMER IBM GUN CLUB", PREPARED BY BUTLER LAND SURVEYING, LLC (BUTLER) OF LITTLE MEADOWS, PENNSYLVANIA AND PROVIDED TO SANBORN HEAD IN DIGITAL FORMAT. TOPOGRAPHY REPRESENTS SITE CONDITIONS ON MARCH 28, 2012. ORIGINAL SCALE: 1" = 50'. THE MARCH 2012 SURVEY WAS CONDUCTED TO OBTAIN REFINED TOPOGRAPHIC DATA FOR THE AREA THAT WILL BE AFFECTED BY SOIL EXCAVATION AND CAPPING AND TO ESTABLISH PROJECT BENCHMARKS.

   B. OUTSIDE THE AREA OF MARCH 2012 FIELD SURVEY THE TOPOGRAPHY AND SITE FEATURES ARE FROM A PHOTOGRAMMETRIC SURVEY PLAN PREPARED BY BUTLER AND PROVIDED TO SANBORN HEAD IN DIGITAL FORMAT. THE PHOTOGRAMMETRIC MANUSCRIPT DATED AUGUST 11, 2008 WAS BASED ON AERIAL PHOTOGRAPHY FLOWN IN AUGUST, 2007.

   C. AS-BUILT CONTOURS WERE DEVELOPED BY KEYSTONE ASSOCIATES OF BINGHAMTON, NEW YORK AND WERE BASED ON FIELD SURVEYS CONDUCTED BY KEYSTONE ON OCTOBER 29 AND 30 AND NOVEMBER 7, 2013, AND JUNE 24, 2014.

2. THE VERTICAL DATUM IS BASED ON THE NAVD OF 1988 AND THE HORIZONTAL DATUM IS BASED ON THE NEW YORK STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE. THE APPROXIMATE GLOBAL COORDINATES FOR THE SITE ARE: LONGITUDE - W76° 0' 20", LATITUDE - N42° 7' 57.6".

3. THE EXTENT OF THE MARKER LAYER WAS SURVEYED BY KEYSTONE ASSOCIATES OF BINGHAMTON, NY ON SEPTEMBER 18, 2013. THE REMAINING AS-BUILT FEATURES WERE SURVEYED BY KEYSTONE ON OCTOBER 29 AND 30, 2013 AND NOVEMBER 7, 2013.

LEGEND

1350	EXISTING 10-FOOT CONTOUR
	EXISTING 2-FOOT CONTOUR
1380	AS-BUILT 10-FOOT CONTOUR
	AS-BUILT 2-FOOT CONTOUR
X	EXISTING CHAIN-LINK FENCE
X	AS-BUILT CHAIN-LINK FENCE
	EXISTING TREE LINE
	EXISTING UTILITY LINE
	APPROXIMATE LIMIT OF MARCH 2012 FIELD SURVEY (SEE NOTE 1A)
	EXISTING EDGE OF PAVED ROAD
	EXISTING EDGE OF GRAVEL PATH
	AS-BUILT EDGE OF GRAVEL PATH
	SURVEYED EXTENT OF MARKER LAYER
BP-6	EXISTING MONITORING WELL LOCATION AND DESIGNATION
IB-4	EXISTING INJECTION WELL LOCATION AND DESIGNATION
A-1	AS-BUILT INJECTION WELL LOCATION AND DESIGNATION
	DEED RESTRICTION BOUNDARY
	MONUMENT TO DOCUMENT DEED RESTRICTED AREA
	MONUMENT TO DOCUMENT DEED RESTRICTED AREA WITH SIGNAGE INSTALLED
	SURVEYED TREE PLANTING LIMITS

SANBORN HEAD ENGINEERING

GRAPHICAL SCALE

60' 30' 0 60' 120'

NO.	DATE	DESCRIPTION	BY

DRAWN BY: M. HILDENBRAND
DESIGNED BY: J. SANBORN
REVIEWED BY: D. CARR
PROJECT MGR: E. BRADSTREET
PIC: D. SHEA
DATE: OCTOBER 2014

FINAL ENGINEERING REPORT
IBM GUN CLUB - FORMER BURN PIT AREA
UNION, NEW YORK

LOCATION PLAN

PROJECT NUMBER: 63526.00

FIGURE NUMBER: 4

APPENDIX B.3

NON-ROUTINE MAINTENANCE REPORTS

Appendix B.3

Non-Routine Maintenance Report Form

IBM Gun Club - Former Burn Pit Area

BCP Site No. C704044

Field Representative:	Paula Pryor	Position: Field Representative
Company:	Sanborn Head	Date: 9/23 to 9/26/2019
System Type (circle one)	Monitoring Well Injection Well Soil Fill in Seep Area	Soil Cap Phytoremediation

Borehole redevelopment is detailed in the attached letter report

Modifications to the system:

No permanent or infrastructure modifications to the system were made.

Field Representative Pal J Py Paula Pryor	Attachments: ☐ None ☐ Photographs ☐ Field Sketch ☐ Invoices/ Receipts ☒ Other October 29, 2019 Injection Borehole Redevelopment Letter Report	SANBORN HEAD
Reviewed By Erica Bosse Erica Bosse		

SANBORN | HEAD
Building Trust. Engineering Success.

Stephen Brown, P.E.
IBM Corporation
8976 Wellington Road
Manassas, VA 20109

October 29, 2019
File No. 3526.03

Re: Injection Borehole Redevelopment
Former Burn Pit Area, IBM Gun Club
Union, New York

Dear Mr. Brown:

This letter presents the scope of work and results of injection borehole redevelopment at the former IBM Gun Club, Burn Pit Area (Site). As previously discussed in the March 2019 performance testing report,[1] the VOC and geochemical data indicate a muted response to the August 2017 injection of edible oil amendment, which has been generally less impactful than previous injection events. In response, a scope of work[2] was developed to re-develop select boreholes in both lines of injection wells to enhance transmissivity and effectiveness of future injections.

WORK SCOPE

We targeted 21 injection boreholes[3] for redevelopment located in the A- and B-line that are typically used for injection, shown on Figure 1. In general, re-development activities followed the procedures outlined in the August 2019 Work Plan. In summary, the work consisted of:

- Approximately 1,900 gallons of supplemental water was used to jet the inside of the injection boreholes in the A- and B-lines. About 2,500 gallons of fluid (a mixture of groundwater, amendment, and supplemental treated water[4]) was removed from the boreholes during the redevelopment process, which included: initial purge of standing fluid in the borehole, surging with a surge block, and additional purges and surges after the boreholes were jetted with the supplemental water.

- Typically, a Mini-Typhoon Sampling Pump was used to purge fluid from the boreholes. At locations where the fluid was too viscous or had numerous solidified pieces of

1 Sanborn, Head & Associates, Inc., May 20, 2019, *Summary of March 2019 Water Quality Monitoring, IBM Gun Club – Former Burn Pit area, Union, New York, NYSDEC Site No. C704044*

2 Sanborn, Head & Associates, Inc., August 8, 2019, *Injection Borehole Redevelopment Work Plan, Former Burn Pit Area, IBM Gun Club, Union, New York*

3 A-1, A-2, A-3, A-4, A-5, A-6, A-7, A-8, A-9, A-10, A-12, A-13, A-14, A-15, B-4, B-5, B-6, B-7, B-8, B-9, B-10

4 The use of GAC treated groundwater from the Adams Avenue GTF in Endicott, New York is generally devoid of oxygen and chlorine found in potable municipal water, both of which suppress subsurface biological activity.

amendment to use the Mini-Typhoon, a water transfer pump ("trash" pump) was used for the initial purge.

- At locations where a hard amendment blockage prevented the pump intake from reaching the bottom of the borehole, supplemental water was added, and the surge block used to break up the material.

- Jetting of boreholes was completed using a pressure washer with an attachment to jet water horizontally into the borehole sidewall. The jet was raised and lowered through the entire length of the borehole (including steel casing) until the fluid level reached the top of casing.

- Turbidity was measured after each surging interval while the standing fluid column was being evacuated. The presence of suspended amendment resulted in higher than the target turbidity of 100 NTU outlined in the work plan. Based on observations in the field, the target turbidity was adjusted to 500 NTU.

- Water generated during development activities was containerized in a frac tank temporarily staged on site, pending analytical results for disposal.

Development activities were recorded on the field sheets included as Attachment A.

SUMMARY OF RESULTS

Table 1 summarizes observations during redevelopment activities: pre- and post-depth to bottom measurements, pre- and post-turbidity measurement, recharge rates, and visual observations as lines of evidence supporting the effectiveness of redevelopment. In general, observations suggest that re-development was effective in removing solidified and viscous amendment residue that was not mobile from the borehole column.

Depth to bottom measurements were tracked as an indicator of the presence of sediment at the bottom of the boreholes. The depth to bottom increased for many of the boreholes, but on the order of tenths of a foot or less, suggesting that excess sediment had not accumulated at the bottom of the boreholes.

Turbidity was also measured during re-development activities. The turbidity in all re-developed boreholes started out at greater than 1,000 NTU. Improvement in turbidity was observed in 20 of 21 boreholes during re-development. The turbidity at A-15 did not improve after repeated surging and jetting cycles.

The rate of water level recovery after the borehole was evacuated for the final time was compared to the initial 2013 development recovery. Recovery rates (e.g. feet of water recovery per hour) were several orders of magnitude below those observed in 2013 before any amendment was introduced into the borehole. It is possible that injected amendment has solidified in the formation fractures out of reach of the redevelopment actions, thereby reducing transmissivity and water level recovery rates.

During historical hydraulic testing, the highest transmissivity was observed in injection boreholes A-13, A-15, B-9, and B-10, which also corresponded to locations that have accepted amendment more readily during injection activities. Except for A-13, observations of recovery during redevelopment did not seem to correspond to those locations' historically favorable performance. The recovery rate recorded in A-13 in 2019 was within the same order of magnitude recorded during the 2013 development recovery. Additionally, limited solidified or sludgy amendment was observed on the surface of A-13 before redevelopment began. Recovery rate and/or turbidity measurements in other historically well-performing boreholes were not appreciably different from low-performing locations.

CONCLUSION

Visual observations suggest that non-mobile viscous and solidified standing amendment was removed from the boreholes. Hydraulic observations suggest the flow into the boreholes is less than that observed in 2013 before any amendment was introduced, but 2019 recovery rates can represent a new benchmark to compare future hydraulic testing. Routine monitoring will be conducted in April 2020. We will consider the results of that monitoring with the comprehensive review of the 2018-2019 data presented in the next Periodic Review Report, due to the Agencies in January 2020, and generate recommendations for the next injection or additional development techniques.

Please contact us if you have any questions or comments.

Very truly yours,
SANBORN, HEAD & ASSOCIATES, INC.

David Shea

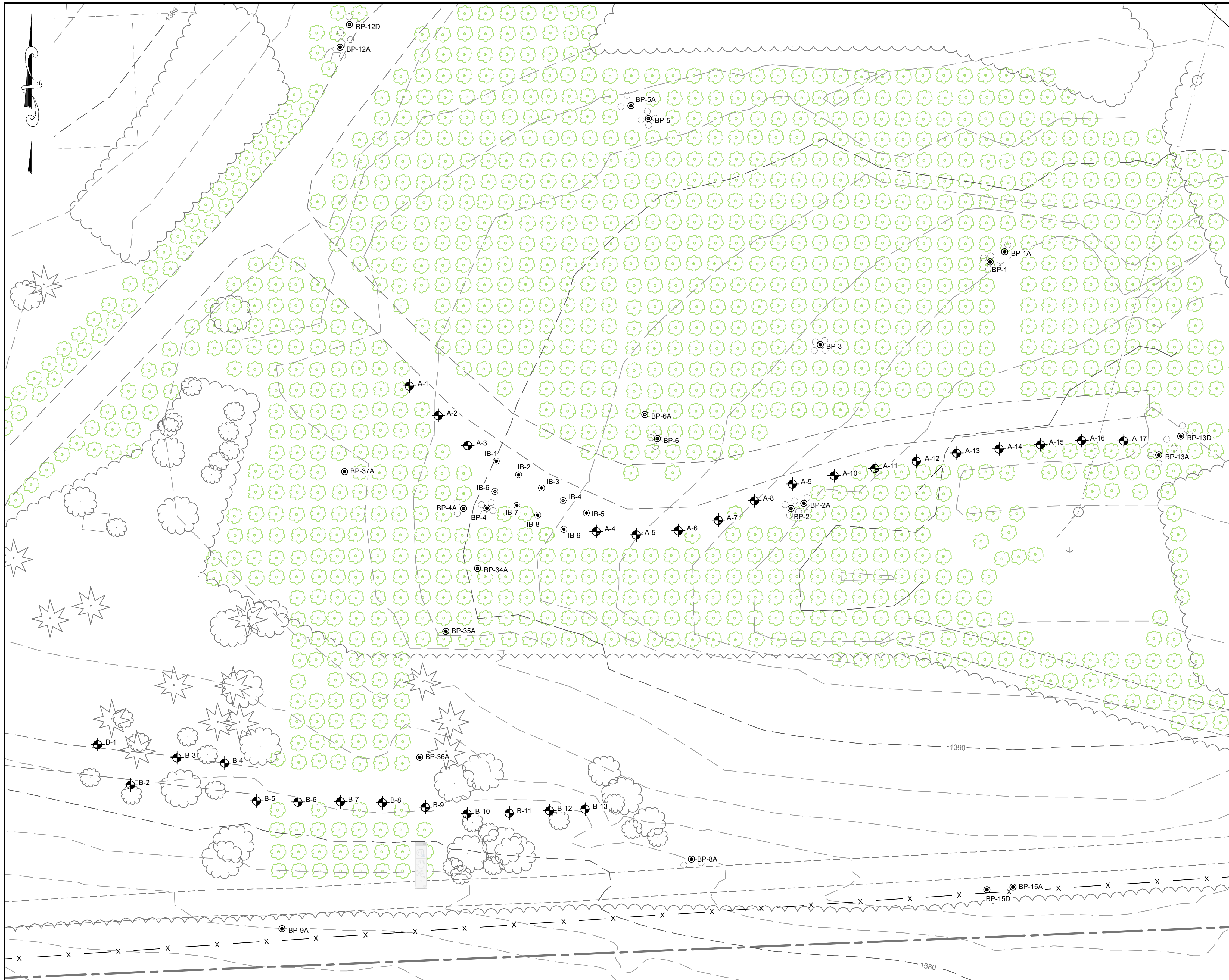
Erica Bosse

David Shea, P.E.
Sr. Vice President

Erica M. Bosse, P.G.
Project Manager

EMB/DS: emb

Encl. Figure 1 – Exploration Location Plan
Table 1 – Summary of Injection Borehole Redevelopment
Attachment A – Field Forms



LEGEND

A-11	INJECTION BORING LOCATION AND DESIGNATION
BP-1A	MONITORING WELL LOCATION AND DESIGNATION
	SURVEYED TREE PLANTING LIMITS
	EDGE OF ACCESS LANE

SANBORN HEAD ENGINEERING

GRAPHICAL SCALE

20' 10' 0 20' 40'

NO.	DATE	DESCRIPTION	BY

DRAWN BY: E. WRIGHT
DESIGNED BY: E. WRIGHT
REVIEWED BY: D. SHEA
PROJECT MGR: E. BOSSE
PIC: D. SHEA
DATE: JULY 2019

BROWNFIELD CLEANUP PROGRAM REMEDY
IBM GUN CLUB - FORMER BURN PIT AREA
UNION, NEW YORK

PROJECT NUMBER: 3526.03

INJECTION BORINGS

SHEET NUMBER: 1

Table 1
Summary of Injection Borehole Redevelopment
Former IBM Gun Club
Union, New York

Location	Water added (gal)	Fluid Purged (gal)	Depth to Bottom (ft bTOC)		Turbidity (NTU)		Recovery Rate (ft/hr)		Notes
			Pre-Redevelopment	Post-Redevelopment	Pre-Redevelopment	Post-Redevelopment	2013 Development	2019 Redevelopment	
A-1	46	50	13.39	13.47	>1000	376	0.00	0.03	Able to tag hard bottom after redevelopment. Surged twice for 12 to 14 minutes. Removed solid amendment pieces and sludge from borehole and jetted borehole sides.
A-2	87	106	14.5	14.5	>1000	539	0.00	0.03	Able to tag hard bottom after redevelopment. Surged three times for a total of 64 minutes. Removed solid amendment sludge from borehole and jetted borehole sides.
A-3	71	85	17.29	17.43	>1000	577	0.12	0.001	Broke through solid amendment obstruction present below the water level. Surged twice for 13 to 17 minutes. Skimmed floating solid amendment and sludge and jetted borehole sides. Noticeably less solid amendment on surface after redevelopment. Some material present on bottom unable to be retrieved.
A-4	94	128	21.82	21.65	>1000	446	0.75	0.001	Broke through solid amendment obstruction present below the water level. Surged twice for 12 to 16 minutes. Skimmed floating solid amendment and jetted borehole sides. Less remnant solid amendment on surface after redevelopment.
A-5	170	211	22.8	22.8	>1000	190	0.05	0.001	Surged once for 6 minutes and jetted borehole sides twice. Skimmed solid amendment off water surface. Noticeably less solid amendment on surface after redevelopment.
A-6	118	161	22.18	22.18	>1000	430	0.00	0.0004	Broke through solid amendment obstruction present above the water level. Surged once for 11 minutes. Skimmed floating solid amendment and sludge and jetted borehole sides. Noticeably less solid amendment on surface after redevelopment.
A-7	152	180	21.41	21.45	>1000	188	0.00	0.003	Broke through solid amendment obstruction present below the water level. Surged twice for 14 minuets each. Skimmed floating solid amendment and sludge and jetted borehole sides. Noticeably less solid amendment on surface after redevelopment.
A-8	131	168	19.85	19.88	>1000	150	0.30	0.0003	Solid amendment pieces on surface before redevelopment. Surged twice for 14 to 17 minutes and jetted borehole sides three times. Skimmed solid amendment and sludge off water surface.
A-9	110	145	19.37	19.45	>1000	130	0.60	0.001	Solid amendment pieces and sludge on surface before redevelopment. Surged twice for 13 minutes each time and jetted borehole sides twice times. Skimmed solid amendment and sludge off water surface. Noticeable less solid amendment noted on surface after redevelopment.
A-10	56	96	19.41	19.45	>1000	442	1.05	0.001	Amendment sludge on surface before redevelopment. Surged twice for 10 to 16 minutes and jetted borehole sides once. Skimmed solid amendment and sludge off water surface.
A-12	80	99	19.98	20.23	>1000	196	0.00	0.0005	Little solid amendment on surface before development. Surged twice for 24 to 28 minutes and jetted borehole sides once. Skimmed solid amendment and sludge off water surface. Water level observed to fall the first time fresh water was added.
A-13	90	95	19.74	19.65	>1000	783	0.80	0.105	Little solid amendment on surface before development. Surged twice for 13 to 20 minutes and jetted borehole sides once. Not much solid amendment or sludge to skim off surface. Water level visibly dropping during surging.

Table 1
Summary of Injection Borehole Redevelopment
Former IBM Gun Club
Union, New York

Location	Water added (gal)	Fluid Purged (gal)	Depth to Bottom (ft bTOC)		Turbidity (NTU)		Recovery Rate (ft/hr)		Notes
			Pre-Redevelopment	Post-Redevelopment	Pre-Redevelopment	Post-Redevelopment	2013 Development	2019 Redevelopment	
A-14	63	74	18.45	18.42	>1000	315	0.50	0.002	Solid amendment pieces on surface before redevelopment. Surged once for 13 minutes and jetted borehole sides for 10 minutes. . Skimmed solid amendment off water surface.
A-15	99	113	17.98	17.93	>1000	>1000	0.75	0.0005	Broke through solid amendment obstruction present above the water level. Surged twice for 14 to 17 minutes. Skimmed floating solid amendment and sludge and jetted borehole sides. Noticeably less solid amendment on surface after redevelopment. Some material present on bottom unable to be retrieved.
B-4	115	147	19.45	19.32	>1000	735	0.60	0.02	Solid amendment pieces on surface before redevelopment. Surged once for 17 minutes and jetted borehole sides three times. Skimmed solid amendment off water surface. Some material present on bottom unable to be retrieved.
B-5	69	101	20.07	19.92	>1000	322	0.65	0.01	Solid amendment pieces on surface before redevelopment. Surged once for 15 minutes and jetted borehole sides twice. Skimmed solid amendment off water surface. Some material present on bottom unable to be retrieved.
B-6	73	100	21.3	21.38	>1000	382	0.52	0.01	Solid amendment pieces on surface before redevelopment. Surged once for 19 minutes and jetted borehole sides twice. Skimmed solid amendment off water surface.
B-7	114	153	22.49	22.58	>1000	395	0.00	0.01	Solid amendment pieces and sludge on surface before redevelopment. Surged three times for 10 to 19 minutes and jetted borehole sides three times. Skimmed solid amendment and sludge off water surface.
B-8	55	95	20.94	20.98	>1000	405	0.50	0.01	Solid amendment pieces on surface before redevelopment. Surged twice for 10 minutes each. Skimmed solid amendment pieces and sludge from borehole and jetted borehole sides. Able to tag hard bottom after redevelopment.
B-9	78	102	20.71	20.71	>1000	146	0.35	0.003	Solid amendment pieces on surface before redevelopment. Surged twice for 12 to 14 minutes and jetted borehole sides twice. Skimmed solid amendment off water surface.
B-10	64	99	20.3	20.31	>1000	375	1.45	0.02	Solid amendment pieces on surface before redevelopment. Surged twice for 10 to 11 minutes and jetted borehole sides twice. Skimmed solid amendment off water surface.

SANBORN HEAD

Location:	A-1	**Depth to: Water (ft TOC)**	7.29	**Initial Depth to Bottom (ft TOC):**	13.39
Date:	9/23/2019	**Logged by:**	PJP / EMB	**Measurement Devices:**	Bosch GLM50 Laser Measurer Hach 2100P

Time Interval	DTW (ft TOC)	Water Added (gal)	Approximate Pumping Rate (gal/min)	Pumping Duration (min)	Approximate Volume Purged (gal)	Turbidity (NTU)	Comments
11:09 - 11:14	9.49	0	1.1	5	6	NM	Solidified amendment on fluid surface. Purge with whale pump.
11:16 - 11:43	9.05	—	—	—	—	—	Jet pump repair. Brown solid amendment
11:43 - 11:51	0.29	23	2.9	8	0	NM	Jet borehole. Skim solid amendment off surface.
11:55 - 12:07	1.15	—	—	—	—	—	Surge with PVC plunger.
12:08 - 12:21	9.39	0	1.7	13	22	>1000	Purge with whale pump to nearly dry. Well recharged slowly.
12:22 - 12:28	0.37	24	3.9	6	0	NM	Jet. Skim solid amendment off surface.
12:29 - 12:43	0.53	—	—	—	—	—	Surge with PVC plunger.
12:43 - 12:55	9.418	0	1.9	12	23	376	Purge with whale pump.
13:27	9.406	—	—	—	—	—	Recovery
13:33	9.399	—	—	—	—	—	Recovery
13:45	9.390	—	—	—	—	—	Recovery
13:57	9.383	—	—	—	—	—	Recovery
14:17	9.368	—	—	—	—	—	Recovery
14:36	9.360	—	—	—	—	—	Recovery
14:53	9.353	—	—	—	—	—	Recovery
15:21	9.337	—	—	—	—	—	Recovery
15:57	9.340	—	—	—	—	—	Recovery
16:24	9.325	—	—	—	—	—	Recovery
16:52	9.316	—	—	—	—	—	Recovery
9/24/2019 7:50	9.246	—	—	—	—	—	Recovery
9/24/2019 16:48	9.236	—	—	—	—	—	Recovery
9/25/2019 9:20	9.231	—	—	—	—	—	Recovery
9/25/2019 17:35	9.219	—	—	—	—	—	Recovery
9/26/2019 17:18	9.208	—	—	—	—	—	Recovery
Total Inj. (gal):	46	**Total Pumped (gal):**	50		**Post-DTB (ft TOC):**	13.47	Hard bottom tagged. Noticeably less solid amendment on surface.

Summary of Monitoring Well Development

SANBORN HEAD

Location:	A-2	**Depth to: Amendment (ft TOC)**	6.32	**Initial Depth to Bottom (ft TOC):**	14.50
Date:	9/23/2019	**Logged by:**	PJP / EMB	**Measurement Devices:**	Bosch GLM50 Laser Measurer Hach 2100P

Time Interval	DTW (ft TOC)	Water Added (gal)	Approximate Pumping Rate (gal/min)	Pumping Duration (min)	Approximate Volume Purged (gal)	Turbidity (NTU)	Comments
13:00 - 13:03	7.85	0	1.3	3	4	>1000	Solid amendment on fluid surface. Purge with whale pump.
13:04 - 13:09	0.38	19	3.9	5	0	NM	Jet. Gray froth / slime at surface, some solid pieces.
13:09 - 13:22	0.49	—	—	—	—	—	Surge
13:22 - 13:43	12.98	0	1.6	21	33	>1000	Purge with whale pump. Purge water is gray.
13:43 - 13:50	0.00	34	4.8	7	0	NM	Jet. Gray froth.
13:50 - 14:03	0.50	—	—	—	—	—	Surge
14:04 - 14:26	13.44	0	1.5	22	34	>1000	Purge with whale pump
14:27 - 14:34	0.42	34	4.9	7	0	NM	Jet. Gray frothy water.
14:34 - 14:47	0.47	—	—	—	—	—	Surge
14:47 - 15:16	14.04	0	1.2	29	35	539	Purge with whale pump.
15:32	14.009	—	—	—	—	—	Recovery
15:57	14.013	—	—	—	—	—	Recovery
16:24	13.986	—	—	—	—	—	Recovery
16:52	13.974	—	—	—	—	—	Recovery
9/24/2019 7:45	13.486	—	—	—	—	—	Recovery
9/24/2019 16:48	13.231	—	—	—	—	—	Recovery
9/25/2019 9:20	12.567	—	—	—	—	—	Recovery
9/25/2019 17:33	12.276	—	—	—	—	—	Recovery
9/26/2019 17:17	11.364	—	—	—	—	—	Recovery
Total Inj. (gal):	87	**Total Pumped (gal):**	106		**Post-DTB (ft TOC):**	14.50	Hard bottom.

Summary of Monitoring Well Development

SANBORN HEAD	Location: A-3	Depth to: Amendment (ft TOC)	10.20	Initial Depth to Bottom (ft TOC):	17.29, A
	Date: 9/23/2019	Logged by:	PJP / EMB	Measurement Devices:	Bosch GLM50 Laser Measurer Hach 2100P

Time Interval	DTW (ft TOC)	Water Added (gal)	Approximate Pumping Rate (gal/min)	Pumping Duration (min)	Approximate Volume Purged (gal)	Turbidity (NTU)	Comments
—	—	—	—	—	—	—	Hard amendment blockage at 11.80' TOC.
15:19 - 15:25	11.13	0	0.4	6	2	>1000	Whale pump purge fluid resting on hard amendment surface. Pump unable to go past surface.
15:26 - 15:28	7.77	9	4.4	2	0	NM	Jet to clear hard amendment obstruction.
15:29 - 15:41	9.72	0	0.4	12	5	>1000	Purge with whale pump
15:41 - 15:48	0.37	24	3.5	7	0	NM	Jet. Brownish-red froth & floating solid amendment
15:51 - 16:08	0.89	—	—	—	—	—	Skim solids off surface. Surge
16:08 - 16:41	14.70	0	1.1	33	36	875	Purge with whale pump
16:41 - 16:49	0.24	38	4.7	8	0	NM	Jet
16:50 - 17:03	0.54	—	—	—	—	—	Skim solids off surface. Surge
17:04 - 17:31	16.45	0	1.5	27	42	577	Purge with whale pump.
9/24/2019 7:45	16.429	—	—	—	—	—	Recovery
9/24/2019 16:49	16.419	—	—	—	—	—	Recovery
9/25/2019 9:21	16.422	—	—	—	—	—	Recovery
9/25/2019 17:33	16.420	—	—	—	—	—	Recovery
9/26/2019 17:16	16.406	—	—	—	—	—	Recovery
Total Inj. (gal):	71	**Total Pumped (gal):**	85		**Post-DTB (ft TOC):**	17.43	Noticeably less solid amendment on suface. Some material present on bottom unable to be retrieved.

Summary of Monitoring Well Development

SANBORN HEAD

Location:	A-4	**Depth to: Amendment (ft TOC)**	9.99	**Initial Depth to Bottom (ft TOC):**	21.82, A
Date:	9/24/2019	**Logged by:**	PJP	**Measurement Devices:**	Bosch GLM50 Laser Measurer Hach 2100P

Time Interval	DTW (ft TOC)	Water Added (gal)	Approximate Pumping Rate (gal/min)	Pumping Duration (min)	Approximate Volume Purged (gal)	Turbidity (NTU)	Comments
—	—	—	—	—	—	—	Solid amendment obstruction at 10.88' TOC.
7:50 - 10:56	14.27	15	1.0	186, B	31	>1000	Whale pump & pressure washer failed when attempting to break through amendment obstruction using jet-purge-surge sequence. Values are estimates from multiple failed attempts.
14:23 - 14:29	0.00	37	6.2	6	0	NM	Jet
14:29 - 14:45	0.66	—	—	—	—	—	Skim solid amendment off surface. Surge. Light brown froth.
15:24 - 15:26	16.58	0	20.8	2	42	>1000	Purge with trash pump
15:28 - 15:37	0.22	43	4.7	9	0	NM	Jet. Light brown froth.
15:37 - 15:49	—	—	—	—	—	—	Surge
15:49 - 16:15	21.45	0	2.1	26	55	446	Purge with whale pump
16:35	21.442	—	—	—	—	—	Recovery
17:00	21.710	—	—	—	—	—	Recovery
9/25/2019 9:20	21.413	—	—	—	—	—	Recovery
9/25/2019 17:32	21.407	—	—	—	—	—	Recovery
9/26/2019 7:20	21.419	—	—	—	—	—	Recovery
9/26/2019 17:15	21.404	—	—	—	—	—	Recovery
Total Inj. (gal):	94	**Total Pumped (gal):**	128		**Post-DTB (ft TOC):**	21.65	Less remanent solid amendment on surface.

Summary of Monitoring Well Development

SANBORN HEAD

Location:	A-5	**Depth to: Amendment (ft TOC)**	6.95	**Initial Depth to Bottom (ft TOC):**	22.80
Date:	9/24/2019	**Logged by:**	PJP	**Measurement Devices:**	Bosch GLM50 Laser Measurer Hach 2100P

Time Interval	DTW (ft TOC)	Water Added (gal)	Approximate Pumping Rate (gal/min)	Pumping Duration (min)	Approximate Volume Purged (gal)	Turbidity (NTU)	Comments
11:42 - 12:23	8.88	0	0.1	41	5	>1000	Solidified amendment on surface. Purge with whale pump & sump pump. Equipment clogged during purge.
12:42 - 12:43	0.00	23	23.2	1	0	NM	Add fresh water to skim amendment. No jets used.
12:48 - 13:17	15.90	0	1.4	29	41	>1000	Purge with sump pump. Brownish-red with white amendment chunks.
13:18 - 13:20	0.00	41	20.7	2	0	NM	Add fresh water to skim solid amendment off surface. No jets used.
14:08 - 14:11	20.55	0	17.9	3	54	>1000	Purge using trash pump. White amendment chunks in purge water
14:13 - 14:21	0.39	53	6.6	8	0	NM	Jet
14:23 - 14:29	0.39	—	—	—	—	—	Surge
14:31 - 14:34	20.38	0	17.4	3	52	>1000	Purge using trash pump.
14:35 - 14:47	0.12	53	4.4	12	0	NM	Jet
14:51 - 15:28	22.43	0	1.6	37	58	190	Purge with whale pump. V. few white amendment chunks
16:20	22.417	—	—	—	—	—	Recovery
16:35	22.414	—	—	—	—	—	Recovery
9/25/2019 9:21	22.398	—	—	—	—	—	Recovery
9/25/2019 17:31	22.399	—	—	—	—	—	Recovery
9/26/2019 7:21	22.391	—	—	—	—	—	Recovery
9/26/2019 17:12	22.390	—	—	—	—	—	Recovery
Total Inj. (gal):	170	**Total Pumped (gal):**	211		**Post-DTB (ft TOC):**	22.80	Noticeably less solid amendment noted on surface

Summary of Monitoring Well Development

SANBORN HEAD			Location:	A-6	Depth to: Amendment (ft TOC)	6.02	Initial Depth to Bottom (ft TOC):	22.18
			Date:	9/24/2019	Logged by:	PJP	Measurement Devices:	Bosch GLM50 Laser Measurer Hach 2100P

Time Interval	DTW (ft TOC)	Water Added (gal)	Approximate Pumping Rate (gal/min)	Pumping Duration (min)	Approximate Volume Purged (gal)	Turbidity (NTU)	Comments
15:46 - 15:47	0.15	15	7.7	2	0	NM	Hard amendment plug at 6.02' TOC. Used surge block to remove. Added fresh water, skim solid amendment off surface. Brown-red-orange solid chunks, white clay-like amendment.
15:50 - 15:52	21.38	0	27.7	2	55	>1000	Purge with trash pump.
15:52 - 16:05	0.00	56	4.3	13	0	NM	Jet
16:05 - 16:16	—	—	—	—	—	—	Skim solid amendment off surface. Surge
16:17 - 16:20	18.42	0	16.0	3	48	>1000	Purge with trash pump.
16:21 - 16:29	0.27	47	5.9	8	0	NM	Jet. Light brown froth.
16:32 - 17:00	22.41	0	2.1	28	58	430	Purge with whale pump
9/25/2019 9:23	21.679	—	—	—	—	—	Recovery
9/25/2019 17:30	21.677	—	—	—	—	—	Recovery
9/26/2019 7:25	21.678	—	—	—	—	—	Recovery
9/26/2019 17:12	21.666	—	—	—	—	—	Recovery
Total Inj. (gal):	118	**Total Pumped (gal):**	161		**Post-DTB (ft TOC):**	22.18	Noticeably less solid amendment noted on surface

Summary of Monitoring Well Development

SANBORN HEAD

Location:	A-7	**Depth to: Amendment, A. (ft TOC)**	9.94	**Initial Depth to Bottom (ft TOC):**	21.41
Date:	9/25/2019	**Logged by:**	PJP	**Measurement Devices:**	Bosch GLM50 Laser Measurer Hach 2100P

Time Interval	DTW (ft TOC)	Water Added (gal)	Approximate Pumping Rate (gal/min)	Pumping Duration (min)	Approximate Volume Purged (gal)	Turbidity (NTU)	Comments
7:28 - 7:30	0.05	26	12.9	2	0	NM	Hard amendment obstruction. Add fresh water and break up obstruction.
7:32 - 7:34	17.28	0	22.5	2	45	>1000	Purge with trash pump. White amendment at surface
7:37 - 7:45	0.23	45	5.6	8	0	NM	Jet. Brownish froth & white amendment
7:50 - 8:04	—	—	—	—	—	—	Skim solid amendment off surface. Surge
8:22 - 8:24	10.97	0	14.0	2	28	>1000	Purge with trash pump.
8:26 - 8:31	0.39	28	5.5	5	0	NM	Jet. Brownish froth & solid amendment.
8:37 - 9:05	21.11	0	1.3	42	54	>1000	Purge with whale pump.
9:31 - 9:42	0.32	54	4.9	11	0	NM	Jet. Light brown froth & less solid amendment
9:50 - 10:04	—	—	—	—	—	—	Skim solid amendment off surface. Surge
10:05 - 11:19	20.71	0	0.7	74	53	188	Purge with whale pump. Grayish water.
11:40	20.707	—	—	—	—	—	Recovery
12:16	20.703	—	—	—	—	—	Recovery
15:21	20.695	—	—	—	—	—	Recovery
17:29	20.692	—	—	—	—	—	Recovery
9/26/2019 7:26	20.686	—	—	—	—	—	Recovery
9/26/2019 17:11	20.680						
Total Inj. (gal):	152	**Total Pumped (gal):**	180		**Post-DTB (ft TOC):**	21.45	Noticeably less solid amendment noted on surface

Summary of Monitoring Well Development

SANBORN HEAD	Location:	A-8	Depth to: Amendment (ft TOC)	4.83	Initial Depth to Bottom (ft TOC):	19.85
	Date:	9/25/2019	Logged by:	PJP	Measurement Devices:	Bosch GLM50 Laser Measurer Hach 2100P

Time Interval	DTW (ft TOC)	Water Added (gal)	Approximate Pumping Rate (gal/min)	Pumping Duration (min)	Approximate Volume Purged (gal)	Turbidity (NTU)	Comments
7:50 - 7:52	0.12	12	6.1	2	0	NM	Add fresh water. Brown-white solid amendment
8:08 - 8:10	12.35	0	16.0	2	32	>1000	Purge with trash pump. Dark gray slime on hose
8:12 - 8:19	0.45	31	4.4	7	0	NM	Jet. Dark brown solid amendment
8:20 - 8:37	—	—	—	—	—	—	Skim surface. Surge
8:41 - 8:44	14.43	0	12.2	3	36	>1000	Purge with trash pump.
9:04 - 9:11	0.23	37	5.3	7	0	NM	Jet. Grayish-brown solid amendment
9:14 - 9:24	—	—	—	—	—	—	Skim surface. Surge
9:24 - 9:49	19.56	0	2.0	25	50	832	Purge with whale pump
10:08 - 10:18	0.30	50	5.0	10	0	NM	Jet
10:20 - 10:34	0.63	—	—	—	—	—	Skim surface. Surge
11:20 - 12:20	19.58	0	0.8	60	49	150	Purge with whale pump. Light brown froth, grayish water
15:20	19.573	—	—	—	—	—	Recovery
17:28	19.573	—	—	—	—	—	Recovery
9/26/2019 7:25	19.568	—	—	—	—	—	Recovery
9/26/2019 17:09	19.558	—	—	—	—	—	Recovery
Total Inj. (gal):	131	**Total Pumped (gal):**	168		**Post-DTB (ft TOC):**	19.88	

Summary of Monitoring Well Development

SANBORN HEAD

Location:	A-9	**Depth to: Amendment (ft TOC)**	5.91	**Initial Depth to Bottom (ft TOC):**	19.37
Date:	9/25/2019	**Logged by:**	PJP	**Measurement Devices:**	Bosch GLM50 Laser Measurer Hach 2100P

Time Interval	DTW (ft TOC)	Water Added (gal)	Approximate Pumping Rate (gal/min)	Pumping Duration (min)	Approximate Volume Purged (gal)	Turbidity (NTU)	Comments
9:06 - 9:07	0.37	14	14.5	1	0	NM	Solid amendment on surface. Add fresh water. Reddish brown tar-like solid amendment skimmed off surface. Water underneath visually clear
9:08 - 9:10	—	—	—	—	—	—	Skim surface. Surge
9:12 - 9:14	19.14	0	24.5	2	49	>1000	Purge with trash pump
9:14 - 9:28	0.40	49	3.5	14	0	NM	Jet. Brown mud-like solid amendment
9:29 - 9:42	—	—	—	—	—	—	Skim surface. Surge
9:45 - 9:48	18.27	0	15.5	3	47	>1000	Purge with trash pump
9:57 - 10:05	0.30	47	5.9	8	0	NM	Jet. Visually clear. Few white amendment chunks
10:07 - 10:20	—	—	—	—	—	—	Skim surface. Surge
10:34 - 11:19	19.19	0	1.1	45	49	130	Purge with whale pump
11:40	19.186	—	—	—	—	—	Recovery
12:16	19.184	—	—	—	—	—	Recovery
15:20	19.182	—	—	—	—	—	Recovery
17:27	19.180	—	—	—	—	—	Recovery
9/26/2019 7:21	19.175	—	—	—	—	—	Recovery
9/26/2019 17:09	19.171	—	—	—	—	—	Recovery
Total Inj. (gal):	110	**Total Pumped (gal):**	145		**Post-DTB (ft TOC):**	19.45	Noticeably less solid amendment noted on surface

Summary of Monitoring Well Development

SANBORN HEAD	Location:	A-10	Depth to: Amendment (ft TOC)	2.45, A	Initial Depth to Bottom (ft TOC):	19.41
	Date:	9/25/2019	Logged by:	PJP	Measurement Devices:	Bosch GLM50 Laser Measurer Hach 2100P

Time Interval	DTW (ft TOC)	Water Added (gal)	Approximate Pumping Rate (gal/min)	Pumping Duration (min)	Approximate Volume Purged (gal)	Turbidity (NTU)	Comments
							Reddish-brown-orange viscous fluid.
10:40 - 10:41	0.00	6	>6	<1	0	NM	Add fresh water
10:41 - 10:57	1.27	—	—	—	—	—	Skim surface. Surge
12:04 - 12:07	19.21	0	15.6	3	47	>1000	Purge with trash pump.
13:08 - 13:21	0.341	49	3.8	13	0	NM	Jet. Dark brown solid amendment at surface.
13:24 - 13:34	—	—	—	—	—	—	Skim surface. Surge
13:34 - 14:04	19.217	0	1.6	30	49	442	Purge with whale pump.
15:18	19.211	—	—	—	—	—	Recovery
17:26	19.211	—	—	—	—	—	Recovery
9/26/2019 7:21	19.201	—	—	—	—	—	Recovery
9/26/2019 17:08	19.201	—	—	—	—	—	Recovery
Total Inj. (gal):	56	**Total Pumped (gal):**	96		**Post-DTB (ft TOC):**	19.45	

Summary of Monitoring Well Development

SANBORN HEAD	Location:	A-12	Depth to: Amendment (ft TOC)	11.80	Initial Depth to Bottom (ft TOC):	19.98
	Date:	9/25/2019	Logged by:	PJP	Measurement Devices:	Bosch GLM50 Laser Measurer Hach 2100P

Time Interval	DTW (ft TOC)	Water Added (gal)	Approximate Pumping Rate (gal/min)	Pumping Duration (min)	Approximate Volume Purged (gal)	Turbidity (NTU)	Comments
11:03 - 11:08	0.745	29	5.8	5	0	NM	Little solid amendment on surface. Fresh water added. Grayish brown froth / amendment mixture. WL observed to fall after adding water.
11:29 - 11:57	1.24	—	—	—	—	—	Skim surface. Surge
12:00 - 12:03	19.77	0	16.1	3	48	>1000	Purge with trash pump
13:25 - 13:34	0.293	51	5.6	9	0	NM	Jet. Brownish gray mud-like froth.
13:40 - 14:04	—	—	—	—	—	—	Skim Surface. Surge
14:05 - 14:35	19.75	0	1.7	30	51	196	Purge with whale pump
15:16	19.734	—	—	—	—	—	Recovery
17:25	19.742	—	—	—	—	—	Recovery
9/26/2019 7:20	19.726	—	—	—	—	—	Recovery
9/26/2019 17:08	19.728	—	—	—	—	—	Recovery
Total Inj. (gal):	80	**Total Pumped (gal):**	99		**Post-DTB (ft TOC):**	20.23	

Summary of Monitoring Well Development

SANBORN | HEAD

Location:	A-13	**Depth to: Amendment (ft TOC)**	17.24	**Initial Depth to Bottom (ft TOC):**	19.74
Date:	9/25/2019	**Logged by:**	PJP	**Measurement Devices:**	Bosch GLM50 Laser Measurer Hach 2100P

Time Interval	DTW (ft TOC)	Water Added (gal)	Approximate Pumping Rate (gal/min)	Pumping Duration (min)	Approximate Volume Purged (gal)	Turbidity (NTU)	Comments
14:08	—	—	—	—	—	—	PDB removed, emptied, and bagged.
14:15 - 14:31	1.27	42	2.6	16	0	NM	Add water due to low fluid level.
14:31 - 14:44	8.97	—	—	—	—	—	Surge. WL visibily decreasing
15:01 - 15:38	19.38	0	1.3	37	47	>1000	Purge with whale pump.
15:55 - 16:09	0.83	48	3.5	14	0	NM	Jet.
16:14 - 16:34	—	—	—	—	—	—	Surge
16:34 - 16:56	19.26	0	2.2	22	48	783	Purge with whale pump. Discussed with EMB: cease development despite turbidity >500 NTU because well recovers and appears relatively productive.
17:06	18.984	—	—	—	—	—	Recovery. PDB redeployed.
17:15	18.814	—	—	—	—	—	Recovery
17:22	18.683	—	—	—	—	—	Recovery
9/26/2019 7:20	17.489	—	—	—	—	—	Recovery
9/26/2019 17:07	17.485	—	—	—	—	—	Recovery
Total Inj. (gal):	90	**Total Pumped (gal):**	95		**Post-DTB (ft TOC):**	19.65	

Summary of Monitoring Well Development

SANBORN HEAD

Location:	A-14	**Depth to: Amendment (ft TOC)**	8.52	**Initial Depth to Bottom (ft TOC):**	18.45
Date:	9/25/2019	**Logged by:**	PJP	**Measurement Devices:**	Bosch GLM50 Laser Measurer Hach 2100P

Time Interval	DTW (ft TOC)	Water Added (gal)	Approximate Pumping Rate (gal/min)	Pumping Duration (min)	Approximate Volume Purged (gal)	Turbidity (NTU)	Comments
14:51 - 14:56	16.38	0	4.1	5	21	NM	Solid amendment pieces on surface. Purge with trash pump.
14:56 - 14:57	11.48	13	12.8	1	0	NM	Add fresh water.
14:57 - 15:05	12.00	0	0.2	8	1	NM	Purge with trash pump; trash pump fails.
15:34 - 15:36	17.59	5	7.3	2	15	NM	Purge with trash pump; Primed with ~5 gal fresh water
15:45 - 15:55	0.28	45	4.5	10	0	NM	Jet
15:55 - 16:08	—	—	—	—	—	NM	Skim surface. Surge
16:08 - 16:43	14.80	0	1.1	35	38	315	Purge with whale pump
17:00	14.755	—	—	—	—	—	Recovery
17:21	14.736	—	—	—	—	—	Recovery
9/26/2019 7:20	14.725	—	—	—	—	—	Recovery
9/26/2019 17:06	14.725	—	—	—	—	—	Recovery
Total Inj. (gal):	63	**Total Pumped (gal):**	74		**Post-DTB (ft TOC):**	18.42	

Summary of Monitoring Well Development

SANBORN HEAD

Location:	A-15	**Depth to: Amendment (ft TOC)**	11.81
Date:	9/25-26/2019	**Logged by:**	PJP
Initial Depth to Bottom (ft TOC):	17.98	**Measurement Devices:**	Bosch GLM50 Laser Measurer Hach 2100P

Time Interval	DTW (ft TOC)	Water Added (gal)	Approximate Pumping Rate (gal/min)	Pumping Duration (min)	Approximate Volume Purged (gal)	Turbidity (NTU)	Comments
16:37 - 16:43	0.30	30	5.0	6	0	NM	Hard amendment blockage at 10.95' TOC. Jet to remove
16:43 - 16:57	—	—	—	—	—	—	Skim surface, brown frothy fluid. Surge
17:04 - 17:15	10.85	0	2.5	11	28	>1000	Purge with whale pump.
9/26/2019 7:17	10.86	—	—	—	—	—	Initial WL.
7:23 - 7:29	0.39	27	4.6	6	0.00	NM	Jet. Brown frothy fluid.
7:29 - 7:46	—	—	—	—	—	—	Skim surface. Surge
7:46 - 8:06	16.12	0	2.1	20	41	>1000	Purge with whale pump.
8:07 - 8:13	0.21	42	6.9	6	0	NM	Jet. Brown frothy fluid.
8:15 - 8:33	17.3600	0	2.5	18	45	>1000	Purge with whale pump
17:06	17.356	—	—	—	—	—	Recovery
Total Inj. (gal):	99	**Total Pumped (gal):**	113		**Post-DTB (ft TOC):**	17.93	Gunk observed at bottom of well.

SANBORN HEAD

Location:	B-4	**Depth to: Amendment (ft TOC)**	6.87	**Initial Depth to Bottom (ft TOC):**	19.45
Date:	9/26/2019	**Logged by:**	PJP	**Measurement Devices:**	Bosch GLM50 Laser Measurer Hach 2100P

Time Interval	DTW (ft TOC)	Water Added (gal)	Approximate Pumping Rate (gal/min)	Pumping Duration (min)	Approximate Volume Purged (gal)	Turbidity (NTU)	Comments
13:30	—	—	—	—	—	—	Solid amendment pieces on surface. Hard bottom tagged. PDB removed, emptied, and bagged.
14:11 - 14:15	0.30	17	4.3	4	0	NM	Jet. White-tan foam.
14:26 - 14:28	18.85	0	24.2	2	48	>1000	Purge with trash pump.
14:37 - 14:42	0.26	49	9.7	5	0	NM	Jet.
14:53 - 15:10	—	—	—	—	—	—	Skim surface. Surge
15:12 - 15:54	19.08	0	1.2	42	49	719	Purge with whale pump
16:05 - 16:12	0.32	49	7.0	7	0	NM	Jet
16:14 - 16:38	19.22	0	2.1	24	49	735	Purge with whale pump
16:52	19.216	—	—	—	—	—	Recovery. PDB redeployed.
Total Inj. (gal):	115	**Total Pumped (gal):**	147		**Post-DTB (ft TOC):**	19.32	

Summary of Monitoring Well Development

SANBORN HEAD	Location:	B-5	Depth to: Amendment, A. (ft TOC)	7.50	Initial Depth to Bottom (ft TOC):	20.07
	Date:	9/26/2019	Logged by:	PJP	Measurement Devices:	Bosch GLM50 Laser Measurer Hach 2100P

Time Interval	DTW (ft TOC)	Water Added (gal)	Approximate Pumping Rate (gal/min)	Pumping Duration (min)	Approximate Volume Purged (gal)	Turbidity (NTU)	Comments
14:03 - 14:09	0.23	19	3.2	6	0	NM	Solid amendment pieces on surface. Hard Bottom. Jet. Tan foam / froth and solid amendment pieces skimmed from surface
14:22 - 14:24	19.34	0	24.9	2	50	>1000	Purge with trash pump
14:29 - 14:37	0.21	50	6.2	8	0	NM	Jet. Tan-white-sl.gray foam / froth
14:37 - 14:52	—	—	—	—	—	—	Skim surface. Surge
14:56 - 15:27	19.65	0	1.6	31	51	322	Purge with whale pump
16:31	19.636	—	—	—	—	—	Recovery
Total Inj. (gal):	69	**Total Pumped (gal):**	101		**Post-DTB (ft TOC):**	19.92	

Summary of Monitoring Well Development

SANBORN | HEAD

Location:	B-6	**Depth to: Amendment, A. (ft TOC)**	7.74
Date:	9/26/2019	**Logged by:**	PJP
Initial Depth to Bottom (ft TOC):	21.30	**Measurement Devices:**	Bosch GLM50 Laser Measurer Hach 2100P

Time Interval	DTW (ft TOC)	Water Added (gal)	Approximate Pumping Rate (gal/min)	Pumping Duration (min)	Approximate Volume Purged (gal)	Turbidity (NTU)	Comments
13:11 - 13:14	0.48	19	6.3	3	0	NM	Solid amendment pieces on surface. Jet. Tan-brown-pink floating pieces/ froth
13:21 - 13:23	21.08	0	26.9	2	54	>1000	Purge with trash pump
13:24 - 13:33	0.28	54	6.0	9	0	NM	Jet. White foam / froth, "snow"-like; few solid pieces
13:51 - 14:10	—	—	—	—	—	—	Skim surface. Surge
14:21 - 14:52	17.90	0	1.5	31	46	382	Purge with whale pump. White aggregating "flakes" observed.
16:30	17.879	—	—	—	—	—	Recovery
Total Inj. (gal):	73	**Total Pumped (gal):**	100		**Post-DTB (ft TOC):**	21.38	

Summary of Monitoring Well Development

SANBORN | HEAD

Location:	B-7	**Depth to: Amendment (ft TOC)**	6.95	**Initial Depth to Bottom (ft TOC):**	22.49
Date:	9/26/2019	**Logged by:**	PJP	**Measurement Devices:**	Bosch GLM50 Laser Measurer Hach 2100P

Time Interval	DTW (ft TOC)	Water Added (gal)	Approximate Pumping Rate (gal/min)	Pumping Duration (min)	Approximate Volume Purged (gal)	Turbidity (NTU)	Comments
10:30	—	—	—	—	—	—	PDB removed, emptied, and bagged.
10:30 - 10:35	1.90	13	2.6	5	0	NM	Jet. Tan-white solid amendment pieces / froth / gunk.
10:35 - 10:45	—	—	—	—	—	—	Skim surface. Surge.
10:45 - 10:47	20.04	0	23.7	2	47	>1000	Purge with trash pump.
11:04 - 11:12	0.72	50	6.3	8	0	NM	Jet. Tan-white solid amendment pieces / froth / gunk.
11:51 - 12:10	—	—	—	—	—	—	Skim surface. Surge.
12:17 - 12:45	19.42	0	1.7	28	49	>1000	Purge with whale pump
13:02 - 13:10	0.24	50	6.3	8	0	NM	Jet. Tan-white-brown amendment pieces / froth / gunk.
13:12 - 13:24	—	—	—	—	—	—	Skim surface. Surge.
13:28 - 13:58	22.16	0	1.9	30	57	395	Purge with whale pump. PDB redeployed.
16:28	22.140	—	—	—	—	—	Recovery
Total Inj. (gal):	114	**Total Pumped (gal):**	153		**Post-DTB (ft TOC):**	22.58	

Summary of Monitoring Well Development

SANBORN HEAD

Location:	B-8	**Depth to: Amendment (ft TOC)**	5.01	**Initial Depth to Bottom (ft TOC):**	20.94
Date:	9/26/2019	**Logged by:**	PJP	**Measurement Devices:**	Bosch GLM50 Laser Measurer Hach 2100P

Time Interval	DTW (ft TOC)	Water Added (gal)	Approximate Pumping Rate (gal/min)	Pumping Duration (min)	Approximate Volume Purged (gal)	Turbidity (NTU)	Comments
10:23 - 10:29	0.41	12	2.0	6	0	NM	Solid amendment pieces on surface. Jet. Brown fluid with white amendment chunks.
10:29 - 10:39	—	—	—	—	—	—	Skim surface. Surge
10:44 - 10:46	16.77	0	21.3	2	43	>1000	Purge with trash pump
10:57 - 11:04	0.33	43	6.1	7	0	NM	Jet.
11:40 - 11:50	—	—	—	—	—	—	Skim surface. Surge
11:51 - 12:15	20.52	0	2.2	24	53	405	Purge with whale pump
16:27	20.461	—	—	—	—	—	Recovery
Total Inj. (gal):	55	**Total Pumped (gal):**	95		**Post-DTB (ft TOC):**	20.98	Hard bottom.

Summary of Monitoring Well Development

SANBORN | HEAD

Location:	B-9	**Depth to: Amendment (ft TOC)**	10.99	**Initial Depth to Bottom (ft TOC):**	20.71
Date:	9/26/2019	**Logged by:**	PJP	**Measurement Devices:**	Bosch GLM50 Laser Measurer Hach 2100P

Time Interval	DTW (ft TOC)	Water Added (gal)	Approximate Pumping Rate (gal/min)	Pumping Duration (min)	Approximate Volume Purged (gal)	Turbidity (NTU)	Comments
9:17	—	—	—	—	—	—	PDB removed, emptied, and bagged. Solid amendment pieces on surface
9:23 - 9:29	0.28	28	4.7	6	0	NM	Jet. White-brown froth & solid amendment pieces
9:33 - 9:47	—	—	—	—	—	—	Skim surface. Surge
9:50 - 9:52	19.82	0	25.5	2	51	>1000	Purge with trash pump
9:57 - 10:05	0.79	50	6.2	8	0	NM	Jet. Brown solid amendment pieces with white amendment chunks
10:08 - 10:20	—	—	—	—	—	—	Skim surface. Surge
10:22 - 10:55	20.22	0	1.5	33	51	146	Purge with whale pump
12:37	20.232	—	—	—	—	—	Recovery. PDB redeployed empty.
16:26	20.219	—	—	—	—	—	Recovery.
Total Inj. (gal):	78	**Total Pumped (gal):**	102		**Post-DTB (ft TOC):**	20.71	

SANBORN HEAD

Location: B-10	**Depth to: Amendment (ft TOC)** 6.50	**Initial Depth to Bottom (ft TOC):** 20.30	
Date: 9/26/2019	**Logged by:** PJP	**Measurement Devices:** Bosch GLM50 Laser Measurer Hach 2100P	

Time Interval	DTW (ft TOC)	Water Added (gal)	Approximate Pumping Rate (gal/min)	Pumping Duration (min)	Approximate Volume Purged (gal)	Turbidity (NTU)	Comments
9:17 - 9:22	0.33	16	3.2	5	0	NM	Solid amendment pieces on surface. Jet. Depth to amendment in B-11 = 7.24'TOC.
9:23 - 9:33	—	—	—	—	—	—	White-tan froth. Skim surface. Surge
9:34 - 9:36	18.94	0	24.3	2	49	>1000	Purge with trash pump. B-11 = 7.61'TOC
9:37 - 9:49	0.52	48	4.0	12	0	NM	Jet. White-gray froth.
9:51 - 10:02	—	—	—	—	—	—	Skim surface. Surge. B-11 = 6.61'TOC
10:04 - 10:30	19.77	0	1.9	26	50	375	Purge with whale pump.
11:08	19.714	—	—	—	—	—	Recovery. B-11 = 7.25'TOC
12:37	19.652	—	—	—	—	—	Recovery. B-11 = 7.241'TOC
16:26	19.587	—	—	—	—	—	Recovery.
Total Inj. (gal):	64	**Total Pumped (gal):**	99		**Post-DTB (ft TOC):**	20.31	

APPENDIX C

FIELD SAMPLING DOCUMENTATION

APPENDIX C.1

SUMMARY OF MARCH 2019 WATER QUALITY MONITORING

8976 Wellington Road
Manassas, VA 20109

May 20, 2019

Gary Priscott
New York State Department of Environmental Conservation
1679 Route 11
Kirkwood, NY 13795

Re: Summary of March 2019 Water Quality Monitoring
IBM Gun Club, Former Burn Pit Area
Robinson Hill Road, Union, NY 13760
NYSDEC Site # C704044

Dear Mr. Priscott:

This letter serves to transmit copies of the Summary of March 2019 Water Quality Monitoring report. The remedy performance monitoring work and the preparation of this report were completed on behalf of IBM Corporation by Sanborn, Head Engineering, P.C. (SHPC) in accordance with NYSDEC-approved Site Management Plan (SMP) for this project.

If you have any questions regarding the enclosed report, please contact me at 703-257-2585.

Very truly yours,

Linda Daubert

Linda Daubert
IBM Program Manager

Enclosures: Summary of March 2019 Water Quality Monitoring

cc: Kevin O'Hara (Binghamton Country Club)
Eamonn O'Neil (NYSDOH)
Maureen Schuck (NYSDOH)
Harry Warner (NYSDEC)

SUMMARY OF MARCH 2019 WATER QUALITY MONITORING

IBM Gun Club – Former Burn Pit Area
Union, New York
NYSDEC Site No. C704044

INTRODUCTION

This report summarizes the scope and results of remedy performance monitoring conducted in March 2019 on behalf of IBM by Sanborn Head. It describes the sampling event and provides tabular and graphical summaries of the field and laboratory data. The field work was conducted during the week of March 25, 2019 in general accordance with the scope and procedures described in Appendix J of the Site Management Plan (SMP)[1].

This report will be included as a component of the annual Periodic Review Report, due in January 2020, and has been prepared consistent with the Monitoring Reporting Requirements described in Section 3.6 of the SMP.

SCOPE OF WORK

The scope of work included:

- Limited groundwater elevation survey. The monitoring network is shown on Figure 1;
- Water quality sampling and laboratory analysis associated with the performance monitoring program; and
- Water quality parameter field screening.

Groundwater Elevation Survey

From March 25 to 27, 2019, the depths to water in monitoring wells and injection boreholes were gauged in accordance with procedures described in Appendix G of the SMP. Based on the depth to water data and survey information, groundwater elevations were calculated for each location. Groundwater levels in March 2019 continued to be elevated by several feet above historical conditions, similar to observations made during September 2018 monitoring. Groundwater levels likely continued to be elevated due to above-average rainfall during the fall months followed by spring snow melt. According to the National Weather Service, the Binghamton area recorded precipitation of 10.4 inches above average in September through November 2018, and precipitation of 0.4 inches below average in December 2018 through March 2019. Depth to water measurements and groundwater elevations are summarized on Table 1. Inferred groundwater elevation contours are shown on Figure 2.

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1 Site Management Plan – April 2016 Revision, Brownfield Cleanup Program, IBM Gun Club – Former Burn Pit area, Union, New York, NYSDEC Site #C704044, BCA Index #B7-0661004-05, prepared on behalf of IBM by Sanborn, Head & Associates, Inc., April 25, 2016.

Water Quality Sampling

The scope of sampling as originally planned is included as Table 2. The scope was modified as follows:

- Samples were collected for laboratory geochemical analysis instead of in-situ field geochemical testing to improve efficiency; and
- The seep sampling location 119 noted adjacent to BP-9A during the October 2017 sampling round was sampled this round.

Exhibit 1 below summarizes the sampling methods used during the monitoring event. The quality assurance/quality control (QA/QC) samples collected for VOC analysis are summarized in Exhibit 2. Samples (including QA/QC samples) submitted for off-site laboratory analysis or field screening are tabulated in Exhibit 3. Laboratory and field analytical data are summarized in Table 3.

Exhibit 1 Summary of Sampling Methods

Sample Method	Number of Locations Sampled
Modified Low-Flow	14
Submerged Container (surface water)	5
Passive Diffusion Bag	5
FLUTE® Purge	0
Bailer	0
Purge Water Tote Sample	0

Exhibit 2 Summary of QA/QC Samples for VOC analysis

Total Sample Locations	24
Duplicate Samples	2
Matrix Spikes	1
Matrix Spike Duplicates	1
Field Blanks	2
Equipment Blanks	1
Trip Blanks	1

Exhibit 3 Summary of Analytical Type

Sample Type – Off-Site Laboratory	Laboratory	Number of Samples
VOCs	Eurofins	32
Total Organic Carbon	Eurofins	21
Geochemical Analyses	Eurofins	14
Volatile Fatty Acids	Pace	21
Light Gases (Ethane, Ethene, and Methane)	Pace	21

Equipment Calibration

Exhibit 4 below summarizes the field instruments utilized during field sampling. The instruments were calibrated each morning and a calibration check was performed at the end of each day. Calibration records are kept on file and available upon request.

Exhibit 4 Summary of Field Instrumentation

INSTRUMENT	FIELD PARAMETER
YSI Water Quality Parameter Probe	Temperature, pH, Specific Conductance, Dissolved Oxygen, and Oxidation-reduction Potential
HACH 2100P Turbidimeter	Turbidity

SUMMARY OF RESULTS

Geochemical and VOC Results

A summary of the groundwater quality data and inferences is presented on Figure 2. Figure 3 is an interactive PDF presenting the geochemical data used to infer the geochemical conditions shown on Figure 2. Field sampling records and analytical laboratory reports are kept on file and available upon request.

Enhanced biochemical degradation of VOCs in groundwater is being monitored by: 1) tracking changes in concentration of the parent contaminant compound, trichloroethene (TCE), 2) tracking the presence of breakdown products of TCE, including the terminal breakdown products ethene and ethane, and 3) tracking the presence of geochemical conditions favorable to biochemical conditions by reductive dehalogenation.

The field and laboratory data for March 2019 reflect conditions approximately 19 months after the last injection of edible oil amendment in August 2017. The results indicate remedy performance generally consistent with project performance goals established in the SMP, with some indications of potential changes noted below. Geochemical conditions generally remain within ranges that are favorable for reductive dehalogenation over most of the primary source area; however, as discussed in previous sampling reports, the most recent injection did not have as strong an affect as previous injections.

As shown on Figure 2, the overall area of sulfate-reducing conditions, which are marginally conducive to reductive dehalogenation, and the overall area of methanogenic conditions, which are more conducive to reductive dehalogenation, are comparable to previous monitoring in September 2018. Figure 3 (the interactive PDF) presents the geochemical data used to infer the limits of sulfate-reduction and methanogenesis shown on Figure 2.

Depicted below in Exhibit 5 are the March 2019 monitoring results for select key parameters in comparison to the previous monitoring results of September 2018. TCE and terminal breakdown product (ethene and ethane) concentrations are stable or have exhibited a favorable change in 63% and 47% of sampled wells, respectively, which is similar in magnitude for stable or improving concentrations observed in September 2018.

Exhibit 5: March 2019 Results Compared to September 2018

Analyte	TCE ug/L	Ethene+Ethane ug/L	TOC mg/L	ORP mV	DO mg/L
Injection Boreholes					
IB-7	0.30	23	77		
A-13	<100	3,300	56		
B-4	220	16	470		
B-7	43	331	3,100		
B-9	49	510	3,400		
Injection Displacement Zone					
BP-2A	42	340	3.2	-110	0.23
BP-4A	220	62	3.0	-7.3	0.16
BP-13A	19	<0.1	0.81	140	2.9
BP-36A	3,000	410	3.6	-220	0.12
Downgradient - on site					
BP-1A	110	9.8	10	56	0.40
BP-5A	22	0.017	19	94	4.0
BP-6A	20,000	100	110	-120	0.12
BP-9A	630	160	2.1	-28	0.39
BP-34A	22,000	550	4.0	43	0.24
BP-35A	3,200	0.055	2.0	72	5.9
BP-37A	13	0.69	2.3	34	0.55
Downgradient - off site					
BP-31A	18	<0.1	0.78	42	3.1
BP-38A	180	<0.1	1.6	180	8.4
BP-39A	51	0.17	1.5	170	0.79

Favorable Change	≥ 10% decline	≥ 10% increase	≥ 10% increase	≥ 10% decline	≥ 10% decline
Number of Wells	9	6	0	8	12
Stable	0 to ± 10%	0 to ± 10%	0 to ± 10%	0 to ± 10%	0 to ± 10%
Number of Wells	3	3	2	4	0
Unfavorable Change	≥ 10% increase	≥ 10% decline	≥ 10% decline	≥ 10% increase	≥ 10% increase
Number of Wells	7	10	17	2	2

Concentrations shown from March 2019 sampling event, rounded to 2 sig. figures.

Blank cell indicates lack of data in one or both events.

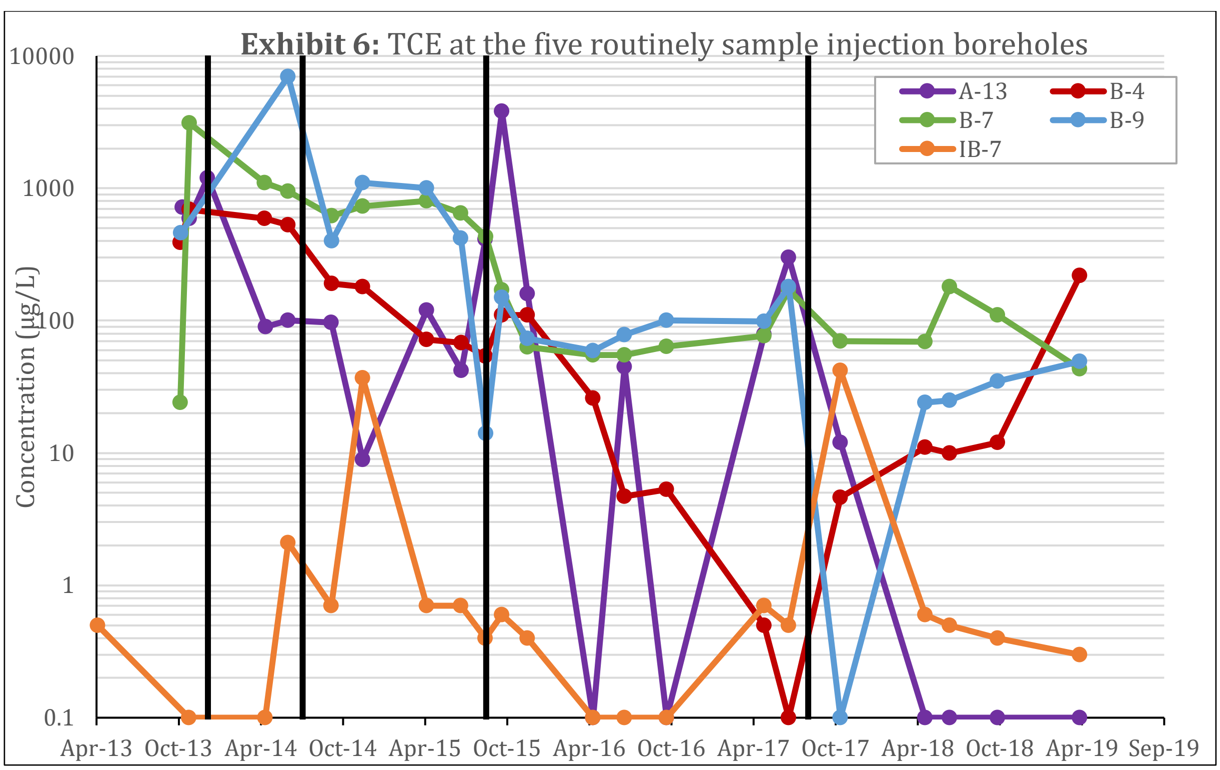
Exhibit 5 also summarizes results for total organic carbon (TOC) and geochemical data for oxidation-reduction potential (ORP) and dissolved oxygen (DO). The data indicate that 12 wells show a favorable or stable ORP change, compared to 9 wells in September. Twelve wells also show a favorable or stable DO change, compared to six wells in June.

TOC concentrations greater than the 100 milligrams per liter (mg/L) threshold to support biological degradation were measured at 3 of the 5 sampled injection boreholes. TOC levels declined by 10 percent or more at 4 of the 5 sampled injection boreholes and at 13 of the 14 sampled monitoring wells within the injection displacement zone and further downgradient. The decreasing trend in TOC concentrations suggests continued consumption and downgradient dispersal of amendment. Consistent with historical monitoring, the highest TOC concentration observed in downgradient monitoring wells was at BP-6A, where TOC was reported at 110 mg/L.

The average groundwater temperature decreased from 15.2°C in September 2018 to 6.0°C in March 2019, consistent with past spring monitoring. Groundwater temperature above 10°C is thought to be most conducive to microbial activity.

Overall, the VOC and geochemical data continue to indicate a muted response to the injection of edible oil amendment in August 2017, which has been generally less impactful than previous injection events. As noted in previous reports, emplacement of the oil emulsion into the fractures has possibly reduced the effective water permeability and contact with VOC-containing groundwater. We are planning redevelopment and purging of injection boreholes in Q2 or Q3 2019.

Exhibit 6 below shows the TCE concentrations for the five injection boreholes that are routinely sampled. Most of these injection boreholes continue to exhibit overall order of magnitude or greater decreases in TCE concentrations compared to historical high concentrations; however, since the August 2017 injection, the TCE concentrations trends have been variable.



Note: Non-detects are plotted as 0.1 µg/L. The vertical black lines indicate amendment injections conducted in December 2013, July 2014, August 2015, and August 2017.

Possible indication of increasing concentration trends and/or historical high concentrations of vinyl chloride have been observed in several monitoring wells starting in June 2018:

- **BP-39A:** Possible indication of increasing trend of vinyl chloride based on the detection of 7.2 µg/L in June 2018, which exceeded the New York State Department of Environmental Conservation Class GA Groundwater quality standard of 2 µg/L. In September 2018 and March 2019, vinyl chloride was detected at 0.2 and 1.1 µg/L, respectively. However, during this time, terminal breakdown products ethene and ethane, which had not typically been detected above the reporting limit at this well, have been detected consistently, suggesting biodegradation has not stalled at vinyl chloride;

- **BP-34A**: Historically high concentration of vinyl chloride (2,000 µg/L) observed in March 2019, compared to a previous high of 1,400 µg/L in April and June 2017. Elevated vinyl chloride concentrations are accompanied by increasing ethene and ethane concentrations, suggesting biodegradation is not stalled; and

- **BP-6A:** Historically high concentration of 2,800 ug/l in September 2018 has decreased to 2,200 ug/l in the most recent monitoring. Elevated vinyl chloride concentrations are accompanied by increasing ethene and ethane concentrations, suggesting biodegradation is not stalled.

The production of vinyl chloride does not appear to be driving greater mass flux across the property line based on further downgradient monitoring results.

The next performance monitoring event will be conducted in June 2019.

Attachments:

Table 1	Summary of Water Level Data
Table 2	Scope of Performance Monitoring
Table 3	Summary of March 2019 Performance Monitoring
Figure 1	Monitoring Location Plan
Figure 2	Summary of March 2019 Groundwater Quality Conditions
Figure 3	Summary of Geochemical Conditions

P:\3500s\3526.02\Source Files\201903 Trip Report\201905 March WQ Memo.docx

Table 1
Summary of March 2019 Water Level Data
Summary Trip Report
IBM Gun Club - Former Burn Pit Area
Union, New York

Well Location	Reference Elevation (ft amsl)	Depth to Water (ft bgs)	Equivalent Potentiometric Elevation (ft amsl)
A-1	1391.11	4.28	1386.83
A-2	1390.68	4.50	1386.18
A-3	1392.74	9.48	1383.26
A-4	1397.56	8.55	1389.01
A-5	1397.40	5.99	1391.41
A-6	1397.86	4.93	1392.93
A-7	1397.28	8.72	1388.56
A-8	1396.81	3.99	1392.82
A-9	1396.47	5.07	1391.40
A-10	1396.06	2.12	1393.94
A-11	1395.73	9.16	1386.57
A-12	1395.59	11.52	1384.07
A-13	1394.25	16.69	1377.56
A-14	1394.61	8.18	1386.43
A-15	1393.47	11.04	1382.43
A-16	1398.14	10.22	1387.92
A-17	1395.48	10.03	1385.45
B-1	1385.26	6.34	1378.92
B-2	1384.71	5.97	1378.74
B-3	1385.48	3.88	1381.60
B-4	1385.03	3.74	1381.29
B-5	1383.99	6.10	1377.89
B-6	1384.48	6.21	1378.27
B-7	1385.33	6.44	1378.89
B-8	1384.90	4.18	1380.72
B-9	1385.21	10.76	1374.45
B-10	1384.69	4.44	1380.25
B-11	1384.40	4.78	1379.62
B-12	1383.87	4.70	1379.17
B-13	1384.50	3.11	1381.39
BP-1A	1395.67	12.26	1383.41
BP-2A	1396.89	10.89	1386.00
BP-4A	1391.96	11.40	1380.56
BP-5A	1391.09	13.43	1377.66
BP-6A	1393.95	14.31	1379.64
BP-7A	1388.89	9.55	1379.34
BP-8A	1384.53	7.22	1377.31
BP-9A	1379.17	10.31	1368.86
BP-10A	1381.74	10.30	1371.44
BP-11A	1384.80	11.77	1373.03
BP-12A	1386.64	13.18	1373.46
BP-13A	1398.89	10.78	1388.11
BP-14A	1379.46	27.66	1351.80
BP-15A	1388.32	16.72	1371.60
BP-16A	1389.69	10.03	1379.66
BP-17A	1376.30	9.41	1366.89

Table 1
Summary of March 2019 Water Level Data
Summary Trip Report
IBM Gun Club - Former Burn Pit Area
Union, New York

Well Location	Reference Elevation (ft amsl)	Depth to Water (ft bgs)	Equivalent Potentiometric Elevation (ft amsl)
BP-18A	1386.54	14.15	1372.39
BP-19A	1309.40	20.13	1289.27
BP-20A	1274.60	5.99	1268.61
BP-21A	1244.29	4.03	1240.26
BP-22A	1242.90	5.62	1237.28
BP-23A	1333.39	11.02	1322.37
BP-24A	1338.73	11.47	1327.26
BP-25A	1301.92	2.85	1299.07
BP-26A	1336.96	8.90	1328.06
BP-27A	1299.96	1.47	1298.49
BP-30A	1336.20	9.84	1326.36
BP-31A	1369.63	10.08	1359.55
BP-32A	1389.58	8.48	1381.10
BP-34A	1392.55	10.71	1381.84
BP-35A	1391.75	12.88	1378.87
BP-36A	1383.68	10.55	1373.13
BP-37A	1389.92	7.60	1382.32
BP-38A	1375.10	9.41	1365.69
BP-39A	1370.17	6.89	1363.28
GC-2A	1383.32	11.89	1371.43
IB-1	1392.20	6.06	1386.14
IB-2	1393.47	7.33	1386.14
IB-3	1393.07	10.93	1382.14
IB-4	1393.78	7.60	1386.18
IB-5	1393.88	10.60	1383.28
IB-6	1393.05	6.91	1386.14
IB-7	1393.23	7.03	1386.20
IB-8	1393.43	9.90	1383.53
IB-9	1393.62	7.46	1386.16

Notes:

1. This table summarizes depth to water measurements and calculated water table elevations recorded during the March 2019 performance monitoring round on March 25-27, 2019. Measurements were collected relative to the marked reference point at each location using a QED MP30 water level meter.

2. Abbreviations
ft amsl = feet above mean sea level
ft bgs = feet below ground surface

Table 2
Summary of Routine and Performance Monitoring Program
IBM Gun Club - Former Burn Pit Area
Union, New York

Monitoring Type	Monitoring Location	Monitoring Location Type	Sample Method				Analytical Laboratory									Field Screening
			Low Flow	PDBs	Nitrogen Purge	Surface Water	VOCs	Light Gasses	TOC	VFAs	Total Iron	Ferrous Iron	Nitrate	Sufate	Sulfide	Water Quality Parameters
Routine Monitoring (Annually in June)	BP-7A	Monitoring Well		x			x									x
	BP-8A	Monitoring Well		x			x									x
	BP-10A	Monitoring Well		x			x									x
	BP-11A	Monitoring Well		x			x									x
	BP-12A	Monitoring Well		x			x									x
	BP-14A	Monitoring Well		x			x									x
	BP-16A	Monitoring Well		x			x									x
	BP-17A	Monitoring Well		x			x									x
	BP-18A	Monitoring Well		x			x									x
	BP-19A	Monitoring Well		x			x									x
	BP-20A	Monitoring Well		x			x									x
	BP-21A	Monitoring Well		x			x									x
	BP-22A	Monitoring Well		x			x									x
	BP-23A	Monitoring Well		x			x									x
	BP-24A	Monitoring Well		x			x									x
	BP-25A	Monitoring Well		x			x									x
	BP-26A	Monitoring Well		x			x									x
	BP-27A	Monitoring Well		x			x									x
	BP-30A	Monitoring Well		x			x									x
	BP-32A	Monitoring Well		x			x									x
	GC-2A	Monitoring Well		x			x									x
	GC-1, P-1	Multi-Depth			x		x									x
	GC-1, P-8	Multi-Depth			x		x									x
	BP-12D, P1	Multi-Depth			x		x									x
	BP-12D, P7	Multi-Depth			x		x									x
	BP-13D, P1	Multi-Depth			x		x									x
	BP-13D, P5	Multi-Depth			x		x									x
	BP-15D, P1	Multi-Depth			x		x									x
	BP-15D, P5	Multi-Depth			x		x									x
Performance Monitoring (3x/year in April, June, and Sept/October)	IB-7	Injection Borehole		x			x	x	x	x						
	A-13	Injection Borehole		x			x	x	x	x						
	B-4	Injection Borehole		x			x	x	x	x						
	B-7	Injection Borehole		x			x	x	x	x						
	B-9	Injection Borehole		x			x	x	x	x						
	BP-1A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-2A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-4A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-5A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-6A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-9A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-13A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-31A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-34A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-35A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-36A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-37A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-38A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-39A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	111	Seep/spring				x	x									x
	112	Seep/spring				x	x									x
	113	Seep/spring				x	x									x
	118	Seep/spring				x	x									x
	SW-Z	Seep/spring				x	x									x
		Total	**14**	**26**	**8**	**5**	**53**	**19**	**19**	**19**	**14**	**14**	**14**	**14**	**14**	**48**

Notes:
1. This table is intended to summarize the programs of routine and performance monitoring for remedy operations at the IBM Gun Club - Former Burn Pit Area starting in 2016. Additional monitoring points may be sampled based on field observations. "SW-Z" serves as a placeholder for sampling any on-site seep or spring that can be reasonably sampled. The table summarizes sample method, analytical laboratory analysis, and field screening.

2. Sample method:
"Low Flow" indicates samples will be collected by bladder pump using low flow techniques.
"PDBs" indicates that the well has sufficient water column to sample with passive diffusion bags - if conditions are observed to be different than anticipated, sampling will proceed using low flow techniques.
"Nitrogen purge" indicates that sample will be collected by purging the multi-level port with nitrogen (multi-level systems only).
"Surface water" samples will be collected using a clean glass vial.

3. Analytical laboratory samples:
"VOCs" indicates volatile organic compounds.
"Light gasses" includes methane, ethene and ethane.
"TOC" indicates total organic carbon.
"VFAs" indicates volatile fatty acids.

4. " Water quality parameters" indicates screening during well purging and water quality sampling by multi-parameter probes, e.g. by YSI® 556 multi-Probe meter or similar and HACH® turbidity meter or similar (low flow, multi-level system, bailer, and surface water sampling) or by water quality parameter sounding (PDB sampling). The water quality parameters may include temperature, specific conductance, oxidation-reduction potential, dissolved oxygen, pH, and turbidity. In addition surface water samples will include water clarity descriptors (transparency, translucence, or opaqueness, and color).

TABLE 3
SUMMARY OF MARCH 2019 PERFORMANCE MONITORING
Summary Trip Report
IBM Gun Club - Former Burn Pit Area
Union, New York

Analyte Name	Unit	BP-1A	BP-2A	BP-4A	BP-4A	BP-5A	BP-6A	BP-9A	BP-13A	BP-31A	BP-31A	BP-34A	BP-35A	BP-36A	BP-37A	BP-38A	BP-39A	A-13	B-4
		BP-1A	BP-2A	BP-4A	BP-4A_FD	BP-5A	BP-6A	BP-9A	BP-13A	BP-31A	BP-31A_FD	BP-34A	BP-35A	BP-36A	BP-37A	BP-38A	BP-39A	A-13	B-4
		Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	PDB	PDB
		S	S	S	FD	S	S	S	S	S	FD	S	S	S	S	S	S	S	S
	Unit	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/26/2019	3/27/2019	3/26/2019	3/26/2019	3/26/2019	3/26/2019	3/26/2019	3/26/2019	3/26/2019	3/26/2019	3/27/2019	3/27/2019
VOLATILE ORGANIC COMPOUNDS (VOCs)																			
Trichloroethene (TCE)	µg/l	**110**	**42**	**210**	**220**	**22**	**20,000**	**630**	**19**	**18**	**18**	**22,000**	**3,200**	**3,000**	**13**	**180**	**51**	<100	**220**
Dichloroethene (cis-1,2-)	µg/l	**130**	**4,500**	**51**	**52**	**29**	**48,000**	**1,200**	**0.80**	**6.2**	**6.3**	**58,000**	**5,100**	**4,800**	**3.7**	**31**	**54**	**21,000**	**53**
Dichloroethene (trans-1,2-)	µg/l	**2.7**	**24**	**2.0**	**2.2**	**0.40 J**	**160 J**	**14**	<0.5	<0.5	<0.5	**82 J**	**11 J**	**15 J**	<0.5	**0.10 J**	**0.20 J**	**48 J**	**2.3 J**
Dichloroethene (1,1-)	µg/l	**0.60 J**	**8.1**	**0.80 J**	**0.80 J**	<2.5	**130 J**	**5.6 J**	<0.5	<0.5	<0.5	**130 J**	**5.4 J**	**9.8 J**	<0.5	**0.20 J**	**0.20 J**	**45 J**	**0.70 J**
Tetrachloroethene (PCE)	µg/l	<2.5	<2.5	**0.10 J**	<1	<2.5	<250	<10	<0.5	**1.3**	**1.3**	<250	<25	<50	<0.5	**0.10 J**	<0.5	<100	<5
Vinyl chloride	µg/l	**25**	**1,200**	**12**	**12**	**0.80 J**	**2,200**	**160**	<0.5	<0.5	<0.5	**2,000**	<25	**540**	**0.60**	<1	**1.1**	**4,000**	**12**
LIGHT GASSES																			
Ethane	µg/l	**2.9**	**0.46**	**39**	**38**	**0.017 J**	**0.58**	**24**	<0.1	<0.1	<0.1	**25**	**0.055 J**	**41**	**0.46**	<0.1	**0.13**	**140**	**10**
Ethene	µg/l	**6.9**	**340**	**23**	**21**	<0.1	**100**	**140**	<0.1	<0.1	<0.1	**520**	<0.1	**370**	**0.23**	<0.1	**0.035 J**	**3,200**	**6.4**
Methane	µg/l	**230**	**1,100**	**4,900**	**4,700**	**0.73**	**42**	**8,300**	**0.90**	<0.5	<0.5	**6,500**	**0.50 J**	**8,900**	**1,300**	<0.5	**19**	**7,800**	**24,000**
MOLAR CONCENTRATION																			
Trichloroethene (TCE)	µmol/l	0.84	0.32	1.6	1.7	0.17	150	4.8	0.14	0.14	0.14	170	24	23	0.099	1.4	0.39	ND	1.7
Dichloroethene (cis-1,2-)	µmol/l	1.3	46	0.53	0.54	0.30	500	12	0.0083	0.064	0.065	600	53	50	0.038	0.32	0.56	220	0.55
Dichloroethene (trans-1,2-)	µmol/l	0.028	0.25	0.021	0.023	0.0041	1.7	0.14	ND	ND	ND	0.85	0.11	0.15	ND	0.0010	0.0021	0.50	0.024
Dichloroethene (1,1-)	µmol/l	0.0062	0.084	0.0083	0.0083	ND	1.3	0.058	ND	ND	ND	1.3	0.056	0.10	ND	0.0021	0.0021	0.46	0.0072
Tetrachloroethene (PCE)	µmol/l	ND	ND	0.00060	ND	ND	ND	ND	ND	0.0078	0.0078	ND	ND	ND	ND	0.0006	ND	ND	ND
Vinyl chloride	µmol/l	0.40	19	0.19	0.19	0.013	35	2.6	ND	ND	ND	32	ND	8.6	0.0096	ND	0.018	64	0.19
Ethane	µmol/l	0.096	0.015	1.3	1.3	0.00057	0.019	0.80	ND	ND	ND	0.83	0.0018	1.4	0.015	ND	0.0043	4.7	0.33
Ethene	µmol/l	0.25	12	0.82	0.75	ND	3.6	5.0	ND	ND	ND	19	ND	13	0.0082	ND	0.0012	110	0.23
Total	µmol/l	3.0	78	4.5	4.4	0.48	580	26	0.15	0.21	0.21	820	160	160	0.17	1.7	0.97	400	3.0
MOLAR PERCENTAGE																			
TCE	%	28	0.41	36	38	35	26	19	95	66	65	21	15	14	58	81	40	ND	56
DCEs	%	47	60	12	13	63	87	49	5.4	31	31	73	33	31	22	19	58	55	19
VC	%	14	24	4.3	4.3	2.6	6.1	10	ND	ND	ND	3.9	ND	5.4	5.6	ND	1.8	16	6.4
Ethane+Ethene	%	12	15	47	45	0.12	0.62	23	ND	ND	ND	2.4	0.0011	9.1	14	ND	0.57	29	19
VOLATILE FATTY ACIDS																			
Acetic Acid	mg/l	**0.054 J**	**0.054 J**	**0.046 J**	**0.029 J**	**0.039 J**	**0.34 J**	**0.23**	<0.1	<0.1	**0.029 J**	**0.041 J**	**0.029 J**	**2.6**	<0.1	**0.032 J**	<0.1	**170**	**300**
Butyric Acid	mg/l	**0.052 J**	**0.031 J**	**0.015 J**	**0.015 J**	**0.016 J**	**0.18 J**	**0.027 J**	<0.1	<0.1	<0.1	**0.020 J**	<0.1	**0.067 J**	<0.1	<0.1	<0.1	**5.4**	**44**
Hexanoic Acid	mg/l	**0.052 J**	<0.2	<0.2	<0.2	**0.030 J**	<2	<0.2	<0.2	<0.2	<0.2	**0.027 J**	<0.2	<0.2	<0.2	<0.2	<0.2	**0.93**	**12**
i-Hexanoic Acid	mg/l	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	**0.68**	**0.2 J**
i-Pentanoic Acid	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	**0.23 J**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.58**	**6.2**
Lactic Acid	mg/l	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<2
Pentanoic Acid	mg/l	**0.20**	**0.036 J**	<0.1	<0.1	<0.1	**0.25 J**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.68**	**31**
Propionic Acid	mg/l	**0.026 J**	**0.022 J**	**0.014 J**	**0.012 J**	**0.010 J**	**0.12 J**	**0.015 J**	<0.1	<0.1	<0.1	<0.1	<0.1	**0.0079 J**	<0.1	<0.1	<0.1	**4.6**	**130**
Pyruvic Acid	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	**4.4**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**1.9**	**61**
OTHER LABORATORY DATA																			
Carbon Tetrachloride	µg/l	<2.5	<2.5	<1	<1	<2.5	<250	<10	**0.60**	**0.40 J**	**0.40 J**	<250	<25	<50	**0.20 J**	**2.1**	**0.10 J**	<100	<5
Total Organic Carbon	mg/l	**10**	**3.2**	**3.0**	**3.0**	**19**	**110**	**2.1**	**0.81 J**	**0.78 J**	**0.65 J**	**4.0**	**2.0**	**3.6**	**2.3**	**1.6**	**1.5**	**56**	**470**
WATER QUALITY PROBE DATA																			
Temperature	°C	**6.9**	**7.6**	**6.7**	–	**3.7**	**6.2**	**5.4**	**5.4**	**3.9**	–	**7.0**	**7.3**	**7.3**	**6.5**	**6.4**	**3.9**	–	–
Specific Conductance	uS/cm	**1,900**	**8.5**	**640**	–	**1,500**	**4,600**	**450**	**91**	**250**	–	**1,100**	**810**	**650**	**600**	**190**	**130**	–	–
pH	s.u.	**7.0**	**6.7**	**7.4**	–	**6.8**	**7.1**	**7.6**	**6.1**	**6.9**	–	**7.3**	**7.5**	**7.1**	**6.9**	**6.2**	**6.0**	–	–
Oxidation/Reduction Potential	mV	**56**	**-110**	**-7.3**	–	**94**	**-120**	**-28**	**140**	**42**	–	**43**	**72**	**-220**	**34**	**180**	**170**	–	–
Dissolved Oxygen	mg/l	**0.40**	**0.23**	**0.16**	–	**4.0**	**0.12**	**0.39**	**2.9**	**3.1**	–	**0.24**	**5.9**	**0.12**	**0.55**	**8.4**	**0.79**	–	–
Turbidity	NTU	**1.6**	**1.9**	**0.42**	–	**5.4**	**22**	**2.4**	**6.3**	**4.5**	–	**2.1**	**5.4**	**3.7**	**4.5**	**2.3**	**1.5**	–	–
GEOCHEMISTRY																			
Iron	mg/l	**0.29**	**8.0**	<0.2	–	**0.11 J**	**7.0**	**0.13 J**	**0.11 J**	**0.12 J**	–	**0.16 J**	**0.26**	**1.8**	**0.20 J**	**0.044 J**	**0.056 J**	–	–
Iron - Ferrous	mg/l	**0.18**	**9.2**	**0.022 J**	–	**0.064 J**	**6.6**	**0.10 J**	<0.1	<0.1	–	**0.041 J**	**0.032 J**	**2.3**	**0.14**	<0.1	**0.022 J**	–	–
Nitrate	mg/l	<0.5	<0.5	<0.5	–	<0.5	<0.5	<0.5	<0.5	<0.5	–	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	–	–
Sulfate	mg/l	**170**	**44**	**29**	–	**400**	**1,300**	**20**	**12**	**17**	–	**28**	**24**	**8.9**	**8.6**	**14**	**13**	–	–
Sulfide	µg/l	<0.3	<0.3	<0.3	–	<0.3	<0.3	<0.3	<0.3	<0.3	–	<0.3	<0.3	**0.51**	<0.3	<0.3	<0.3	–	–

TABLE 3
SUMMARY OF MARCH 2019 PERFORMANCE MONITORING
Summary Trip Report
IBM Gun Club - Former Burn Pit Area
Union, New York

Analyte Name	Unit	B-7	B-9	IB-7	111	112	113	118	119
		B-7	B-9	IB-7	111	112	113	118	119
		PDB	PDB	PDB	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
		S	S	S	S	S	S	S	S
		3/27/2019	3/27/2019	3/27/2019	3/25/2019	3/25/2019	3/25/2019	3/25/2019	3/25/2019
VOLATILE ORGANIC COMPOUNDS (VOCs)									
Trichloroethene (TCE)	µg/l	**43 J**	**49**	**0.30 J**	**0.30 J**	**0.20 J**	**0.40 J**	**1.0**	**1.3**
Dichloroethene (cis-1,2-)	µg/l	**330**	**1,200**	**2.0**	<0.5	<0.5	<0.5	**1.0**	**3.3**
Dichloroethene (trans-1,2-)	µg/l	<250	**3.5 J**	**0.20 J**	<0.5	<0.5	<0.5	<0.5	**0.10 J**
Dichloroethene (1,1-)	µg/l	<250	**1.8 J**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethene (PCE)	µg/l	<250	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Vinyl chloride	µg/l	<250	**160**	<0.5	<0.5	<0.5	<0.5	<0.5	**1.6**
LIGHT GASSES									
Ethane	µg/l	**41**	**16**	**23**	–	–	–	–	–
Ethene	µg/l	**290**	**490**	**0.41**	–	–	–	–	–
Methane	µg/l	**16,000**	**13,000**	**24,000**	–	–	–	–	–
MOLAR CONCENTRATION									
Trichloroethene (TCE)	µmol/l	0.33	0.37	0.0023	0.0023	0.0015	0.0030	0.0076	0.0099
Dichloroethene (cis-1,2-)	µmol/l	3.4	12	0.021	ND	ND	ND	0.010	0.034
Dichloroethene (trans-1,2-)	µmol/l	ND	0.036	0.0021	ND	ND	ND	ND	0.0010
Dichloroethene (1,1-)	µmol/l	ND	0.019	ND	ND	ND	ND	ND	ND
Tetrachloroethene (PCE)	µmol/l	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl chloride	µmol/l	ND	2.6	ND	ND	ND	ND	ND	0.026
Ethane	µmol/l	1.4	0.53	0.76	–	–	–	–	–
Ethene	µmol/l	10	17	0.015	–	–	–	–	–
Total	µmol/l	15	33	0.80	0.0023	0.0015	0.0030	0.018	0.071
MOLAR PERCENTAGE									
TCE	%	2.1	1.1	0.28	100	100	100	42	14
DCEs	%	22	37	2.8	ND	ND	ND	58	50
VC	%	ND	7.7	ND	ND	ND	ND	ND	36
Ethane+Ethene	%	76	54	97	–	–	–	–	–
VOLATILE FATTY ACIDS									
Acetic Acid	mg/l	**690**	**1,500**	**0.73**	–	–	–	–	–
Butyric Acid	mg/l	**370**	**340**	**0.064 J**	–	–	–	–	–
Hexanoic Acid	mg/l	**150**	**50**	**0.054 J**	–	–	–	–	–
i-Hexanoic Acid	mg/l	**4.5**	**1.4 J**	<0.2	–	–	–	–	–
i-Pentanoic Acid	mg/l	**6 J**	**13**	<0.1	–	–	–	–	–
Lactic Acid	mg/l	<20	<20	<0.2	–	–	–	–	–
Pentanoic Acid	mg/l	**290**	**620**	**0.015 J**	–	–	–	–	–
Propionic Acid	mg/l	**380**	**2,500**	**0.021 J**	–	–	–	–	–
Pyruvic Acid	mg/l	**120**	**56**	**0.0098 J**	–	–	–	–	–
OTHER LABORATORY DATA									
Carbon Tetrachloride	µg/l	<250	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Organic Carbon	mg/l	**3,100**	**3,400**	**77**	–	–	–	–	–
WATER QUALITY PROBE DATA									
Temperature	°C	–	–	–	**4.9**	**4.4**	**4.8**	**4.8**	**4.7**
Specific Conductance	uS/cm	–	–	–	**92**	**110**	**170**	**210**	**560**
pH	s.u.	–	–	–	**7.0**	**7.0**	**7.0**	**7.3**	**6.9**
Oxidation/Reduction Potential	mV	–	–	–	**31**	**30**	**31**	**18**	**-17**
Dissolved Oxygen	mg/l	–	–	–	**11**	**10**	**9.5**	**10**	**2.7**
Turbidity	NTU	–	–	–	**200**	**150**	**340**	**310**	**18**
GEOCHEMISTRY									
Iron	mg/l	–	–	–	–	–	–	–	–
Iron - Ferrous	mg/l	–	–	–	–	–	–	–	–
Nitrate	mg/l	–	–	–	–	–	–	–	–
Sulfate	mg/l	–	–	–	–	–	–	–	–
Sulfide	µg/l	–	–	–	–	–	–	–	–

Notes:

1. The table summarizes samples collected during the week of March 25, 2019 as part of performance monitoring at the IBM Gun Club former Burn Pit Area. Samples were analyzed both in the field and at fixed analytical laboratories as indicated on the table.

2. Analytical laboratory analysis was performed by Eurofins Lancaster Laboratories of Lancaster, Pennsylvania (Lancaster) and/or Pace Analytical (formerly Microseeps, Inc.) of Pittsburgh, Pennsylvania (Pace). Results are recorded in units indicated on the table. Detections of compounds are emboldened.

3. Definitions:
"S" indicates primary sample
"FD" indicates field duplicate
"PDB" indicates the sample was collected via a passive diffusion bag
"–" indicates the compounds were not analyzed for that particular sample.
"<" indicates the result was below the analytical detection limit.
"J" indicates that the laboratory data was below the lowest quantifiable limit and therefore estimated.
"ND" indicates that results were not detected above the analytical reporting limit or the calibration range of the field screening device.

4. Refer to the report text for further discussion. The sample plan can be referenced in Table 2 and the Site Management Plan.

Last Edited By: hpothier

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Figure 1

Monitoring Location Plan

IBM Gun Club - Former Burn Pit Area

Union, New York

Drawn By:	H. Pothier
Designed By:	E. Bosse
Reviewed By:	D. Shea
Project No:	3526.05
Date:	May 2019

Figure Narrative

This figure summarizes the locations of monitoring wells, multi-level monitoring systems, and surface water sampling points where depth to water is measured and water quality samples may be collected for field and analytical laboratory testing as part of routine and performance monitoring programs. The figure also depicts monitoring wells where dedicated water quality probes have been deployed to continuously monitor for temperature, specific conductance, oxidation-reduction potential, dissolved oxygen and pH.

The locations of site features, including monitoring wells, seeps and springs, and culverts are based on field survey by Butler Land Surveying, LLC. of Little Meadows Pennsylvania in the period 2006 through 2012.

Refer to report text for further discussion.

Legend

- Parcel B Site Boundary
- Pilot Test Injection Borehole
- Proposed Injection Borehole
- Observed Drainage Features (arrows indicate flow direction)
- BP-5A Dedicated Water Quality Parameter Probe
- Monitoring Well
- Multi-Level Monitoring Installation
- Surface Water Sampling Point
- Culvert

100 50 0 100 200 Feet

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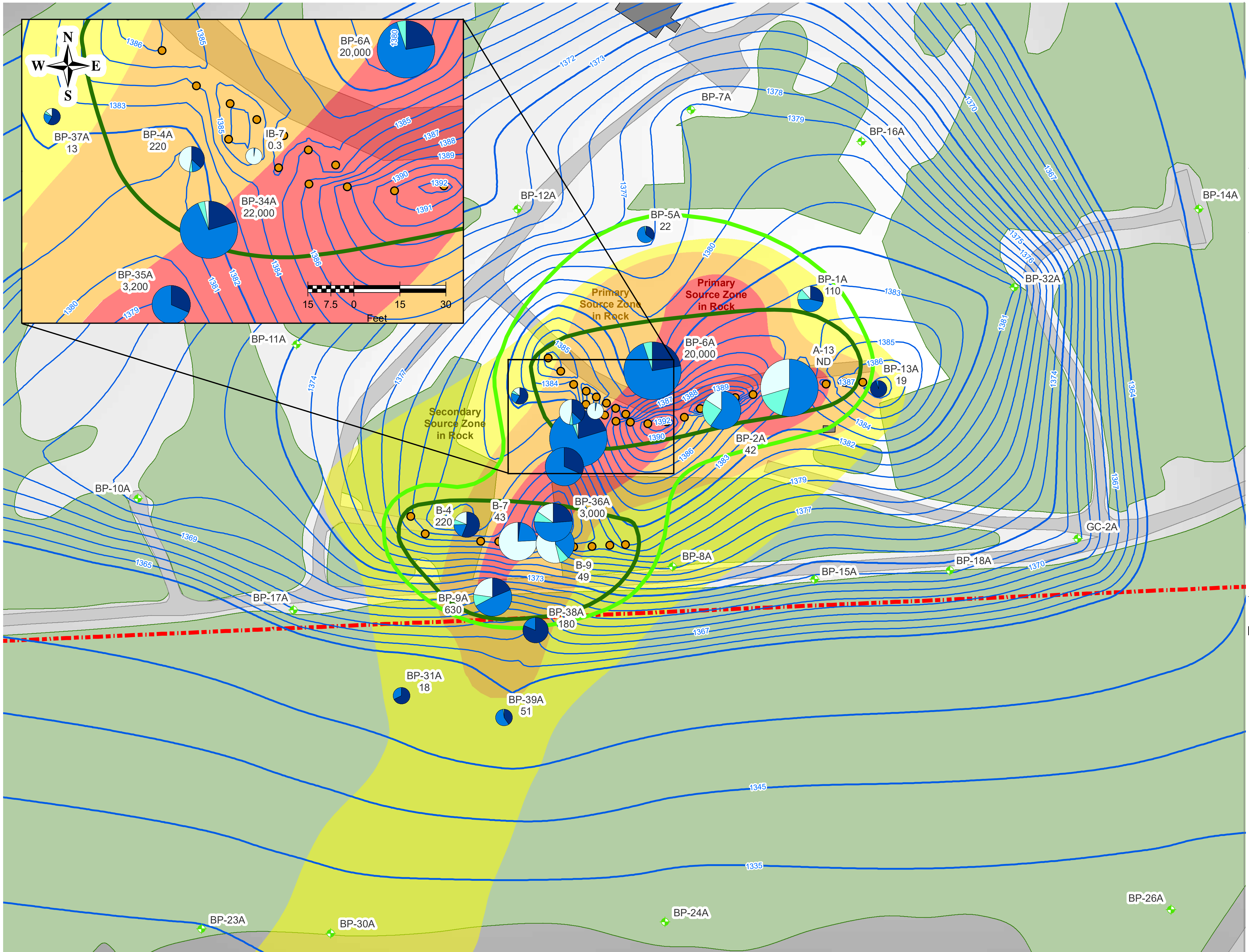

Figure 2
Summary of March 2019 Groundwater Quality Conditions

IBM Gun Club - Former Burn Pit Area

Union, New York

Drawn By:	H. Pothier
Designed By:	E. Bosse
Reviewed By:	D. Shea
Project No:	3526.05
Date:	May 2019

Figure Narrative

This figure shows groundwater quality data and inference based on monitoring conducted March 25-27, 2019.

The groundwater data for site key VOCs including TCE, cDCE, vinyl chloride, and ethane/ethene from water table monitoring wells are presented as pie diagrams. The wedges of each pie diagram represent concentrations of the four compounds expressed in micromoles per liter (umol/L). The relative diameter of each pie diagram varies based on the sum of the five VOCs and tDCE at each location.

The inferred sulfate-reducing and methanogenic conditions are based on observations of oxidation-reduction potential (ORP), methane, sulfide, ferrous and total iron, and nitrate. Methanogenic conditions are characterized by methane concentrations ≥ 20 µg/L, sulfate reducing by sulfide ≥ 50 µg/L, iron reducing by Fe(II)/Fe(tot) ≥ 0.7 mg/L, and nitrate reduction by nitrate <1 mg/L. ORP is generally expected to be <200 for iron reduction, <100 for sulfate reduction, and <0 for methanogenic conditions. See Figure 3 for geochemical data.

Not all geochemical conditions are satisfied within the areas shown for sulfate-reducing and methanogenic conditions. The inferred areas assume the presence of a transition zone between sulfate-reducing and methanogenic, and the position and size of these zones are based on judgement of the combined data. Other interpretations are possible.

Refer to the report text for further discussion.

Legend

BP-34A 22,000 — Well Name and March 2019 TCE Concentrations in Groundwater (µg/L).

Inferred Groundwater Contour March 2019

Inferred Methanogenic Conditions

Inferred Sulfate-Reducing Conditions

Parent VOC (Trichloroethene)

Primary Daughter Product (*cis*-1,2DCE)

Secondary Daughter Product (Vinyl Chloride)

Terminal Breakdown Products (Ethane, Ethene)

Total Chlorinated Ethanes & Ethenes in Groundwater (µmol/L)

< 0.1

>0.1 to 1

>1 to 10

>10 to 100

>100

40 20 0 40 80

Feet

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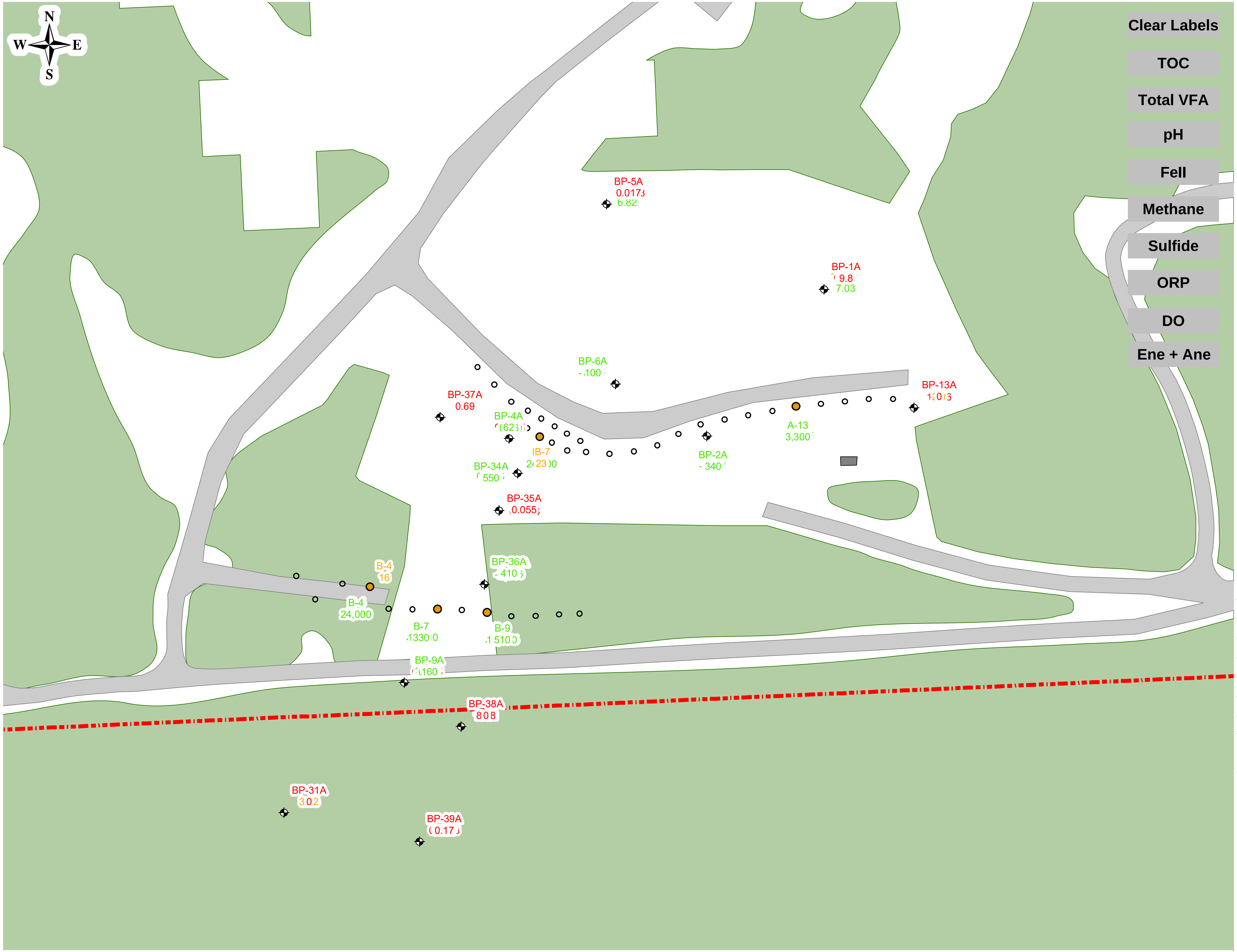

Figure 3

March 2019 Assessment of Reducing Conditions

IBM Gun Club - Former Burn Pit Area

Union, New York

Drawn By: H. Pothier
Designed By: E. Bosse
Reviewed By: D. Shea
Project No: 3526.05
Date: May 2019

Figure Narrative

This figure is intended to assess multiple lines of evidence to assess what proportion of the primary and secondary source rock are under sulfate reducing and methanogenic conditions. Green labels indicate conditions conducive to reductive dehalogenation. Orange labels indicate reductive dehalogenation may be possible, but conditions are less conducive. Red labels indicate conditions where reductive dehalogenation is less likely.

Posted data is from the March 2019 sampling round.

Legend

DO mg/L	>5	2-5	<=2
ORP mV	>100	0-100	<=0
Sulfide µg/L	<10	10-50	>=50
Methane µg/L	<0.5	0.5-20	>=20
FeII mg/L	<1		>=1
pH SU	<6.3 or >7.5		6.3-7.5
Total VFA mg/L	<1		>=1
TOC mg/L	<4		>=4
Ethane + Ethene µg/L	<10	10-50	>=50

30 15 0 30 60
Feet

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APPENDIX C.2

SUMMARY OF JUNE 2019 WATER QUALITY MONITORING

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Building Trust. Engineering Success.

Linda Daubert, P.E.
IBM Corporation
8976 Wellington Road
Manassas, VA 20109

August 1, 2019
File No. 3526.05

Re: Summary of June 2019 Water Quality Monitoring
IBM Gun Club – Former Burn Pit Area
Union, New York
NYSDEC Site #C704044 (BCA Index #B7-0661004-05)

Dear Ms. Daubert:

This letter report summarizes the scope and results of remedy performance monitoring conducted in June 2019 on behalf of IBM by Sanborn Head. It describes the sampling event and provides tabular and figure summaries of the field and laboratory data. The field work was conducted during the week of June 10, 2019 in general accordance with the scope and procedures described in Appendix J of the Site Management Plan (SMP)[1].

This letter report will be included as a component of the annual Periodic Review Report, due in January 2020, and it has been prepared consistent with the Monitoring Reporting Requirements described in Section 3.6 of the SMP.

SCOPE OF WORK

The scope of work included:

- Comprehensive groundwater elevation survey. The monitoring network is shown on Figure 1;
- Annual well inspection including depth-to-bottom measurements;
- Water quality sampling and laboratory analysis associated with the performance monitoring program; and
- Water quality parameter field screening.

Groundwater Elevation Survey

From June 10 to 12, 2019, the depths to water in monitoring wells and injection boreholes were gauged in accordance with procedures described in Appendix G of the SMP. Based on the depth to water data and survey information, groundwater elevations were calculated

1 Site Management Plan – April 2016 Revision, Brownfield Cleanup Program, IBM Gun Club – Former Burn Pit area, Union, New York, NYSDEC Site #C704044, BCA Index #B7-0661004-05, prepared on behalf of IBM by Sanborn, Head & Associates, Inc., April 25, 2016.

for each location. Depth to water measurements and groundwater elevations are summarized on Table 1. Inferred groundwater elevation contours are shown on Figure 2. Groundwater levels in June 2019 continue to be elevated above historical conditions, likely due to above-average rainfall and snow melt during the spring months. According to the National Weather Service, the Binghamton area recorded precipitation of 3.5 inches above average in April 2019 through June 2019.

Water Quality Sampling

The scope of sampling as originally planned is included as Table 2. The scope was modified as follows:

- Samples were collected for laboratory geochemical analysis instead of in-situ field geochemical testing to improve efficiency;
- Due to lack of water, the sample from BP-14A was collected with a dedicated bailer instead of using low-flow sampling techniques;
- Like past years, multi-level Flute sampler port BP-15D, P1 (18-25 feet below ground surface [ft bgs]) was found to be dry and could not be sampled; and
- No new on-site seeps/springs were observed. The seep sampling location 119 first noted adjacent to BP-9A in 2017 was sampled this round.

Exhibit 1 below summarizes the sampling methods used during the monitoring event. The quality assurance/quality control (QA/QC) samples collected for VOC analysis are summarized in Exhibit 2. Samples (including QA/QC samples) submitted for off-site laboratory analysis or field screening are tabulated in Exhibit 3. Laboratory and field analytical data are summarized in Table 3.

Exhibit 1 Summary of Sampling Methods

Sample Method	Number of Locations Sampled
Modified Low-Flow	14
Submerged Container (surface water)	5
Passive Diffusion Bag	25
FLUTE® Purge	7
Bailer	1
Purge Water Tote Sample	0

Exhibit 2 Summary of QA/QC Samples for VOC analysis

Total Sample Locations	52
Duplicate Samples	5
Matrix Spikes	2
Matrix Spike Duplicates	2
Field Blanks	3
Equipment Blanks	1
Trip Blanks	3

Exhibit 3 Summary of Analytical Type

Sample Type – Off-Site Laboratory	Laboratory	Number of Samples
VOCs	Eurofins	69
Total Organic Carbon	Eurofins	22
Geochemical Analyses	Eurofins	14
Volatile Fatty Acids	Pace	22
Light Gases (Ethane, Ethene, and Methane)	Pace	22

Equipment Calibration

Exhibit 4 below summarizes the field instruments utilized during field sampling. The instruments were calibrated each morning and a calibration check was performed at the end of each day.

Exhibit 4 Summary of Field Instrumentation

INSTRUMENT	FIELD PARAMETER
YSI Water Quality Parameter Probe	Temperature, pH, Specific Conductance, Dissolved Oxygen, and Oxidation-reduction Potential
HACH 2100P Turbidimeter	Turbidity

SUMMARY OF RESULTS

Geochemical and VOC Results

A summary of the groundwater quality data and inferences is presented on Figure 2. A figure depicting the entire monitoring area, including the area south into the golf course, and summarizing key site VOCs plus carbon tetrachloride, is provided as Figure 3. Figure 4 is an interactive PDF presenting the geochemical data used to infer the geochemical conditions shown on Figure 2. Field sampling records and analytical laboratory reports are kept on file and available upon request.

Enhanced biochemical degradation of VOCs in groundwater is being monitored by: 1) tracking changes in concentration of the parent contaminant compound, trichloroethene (TCE), 2) tracking the presence of breakdown products of TCE, including the terminal breakdown products ethene and ethane, and 3) tracking the presence of geochemical conditions favorable to biochemical conditions by reductive dehalogenation.

The field and laboratory data for June 2019 reflect conditions approximately 2 years after the last injection of edible oil amendment (i.e., electron donor to facilitate reductive dechlorination) in August 2017. The results indicate remedy performance generally consistent with project performance goals established in the SMP, with some indications of potential changes noted below. Geochemical conditions generally remain within ranges that are favorable for reductive dechlorination over most of the source area; however, as discussed in recent sampling reports, the August 2017 injection did not have as strong an affect as previous injections.

As shown on Figure 2, the overall area of sulfate-reducing conditions, which are marginally conducive to reductive dechlorination, is slightly larger in size to that of the previous monitoring in March 2019, extending south across the property boundary to encompass well BP-39A. The overall area of methanogenic conditions, which are more conducive to reductive dechlorination, are comparable to previous monitoring in March 2019. Figure 4 (the interactive PDF) presents the geochemical data used to infer the limits of sulfate-reduction and methanogenesis shown on Figure 2.

Exhibit 5 below presents the June 2019 monitoring results for select key parameters in comparison to the previous monitoring results of March 2019. TCE and terminal breakdown product (ethene and ethane) concentrations have exhibited a favorable change or remained stable in 53% and 68% of sampled wells, respectively, which is similar in magnitude for improving or stable concentrations observed in March 2019. The geochemical data for oxidation-reduction potential (ORP) and dissolved oxygen (DO) indicate that 6 wells show a favorable or stable ORP change, compared to 12 wells in March. Five wells show a favorable or stable DO change, compared to the 12 wells with an observed favorable/stable change in March. Total organic carbon (TOC) concentrations greater than the 100 milligrams per liter (mg/l) threshold for biological degradation were measured at 3 of the 5 sampled injection boreholes. TOC levels at monitoring wells within the injection displacement zone and further downgradient were much lower, except for BP-6A.

Exhibit 5: June 2019 Results Compared to March 2019

Analyte	TCE	Ethene+Ethane	TOC	ORP	DO
	ug/L	ug/L	mg/L	mV	mg/L
Injection Boreholes					
IB-7	0.50	30	73		
A-13	<100	4,000	69		
B-4	<50	12	5,900		
B-7	<1000	410	7,800		
B-9	50	600	5,000		
Injection Displacement Zone					
BP-2A	61	250	4.7	-66	0.39
BP-4A	190	71	3.6	-33	0.22
BP-13A	33	0.024	2.2	200	1.3
BP-36A	5,000	310	3.4	-62	0.27
Downgradient - on site					
BP-1A	180	0.21	16	220	5.3
BP-5A	30	0.061	21	190	2.4
BP-6A	62,000	140	190	-62	0.30
BP-9A	250	77	2.6	-49	3.8
BP-34A	31,000	800	6.1	46	0.31
BP-35A	3,300	0.076	3.9	75	2.1
BP-37A	9.5	0.52	2.5	86	0.47
Downgradient - off site					
BP-31A	3.7	<0.1	1.0	130	7.3
BP-38A	86	<0.1	2.7	57	4.1
BP-39A	63	3.4	2.0	80	0.94

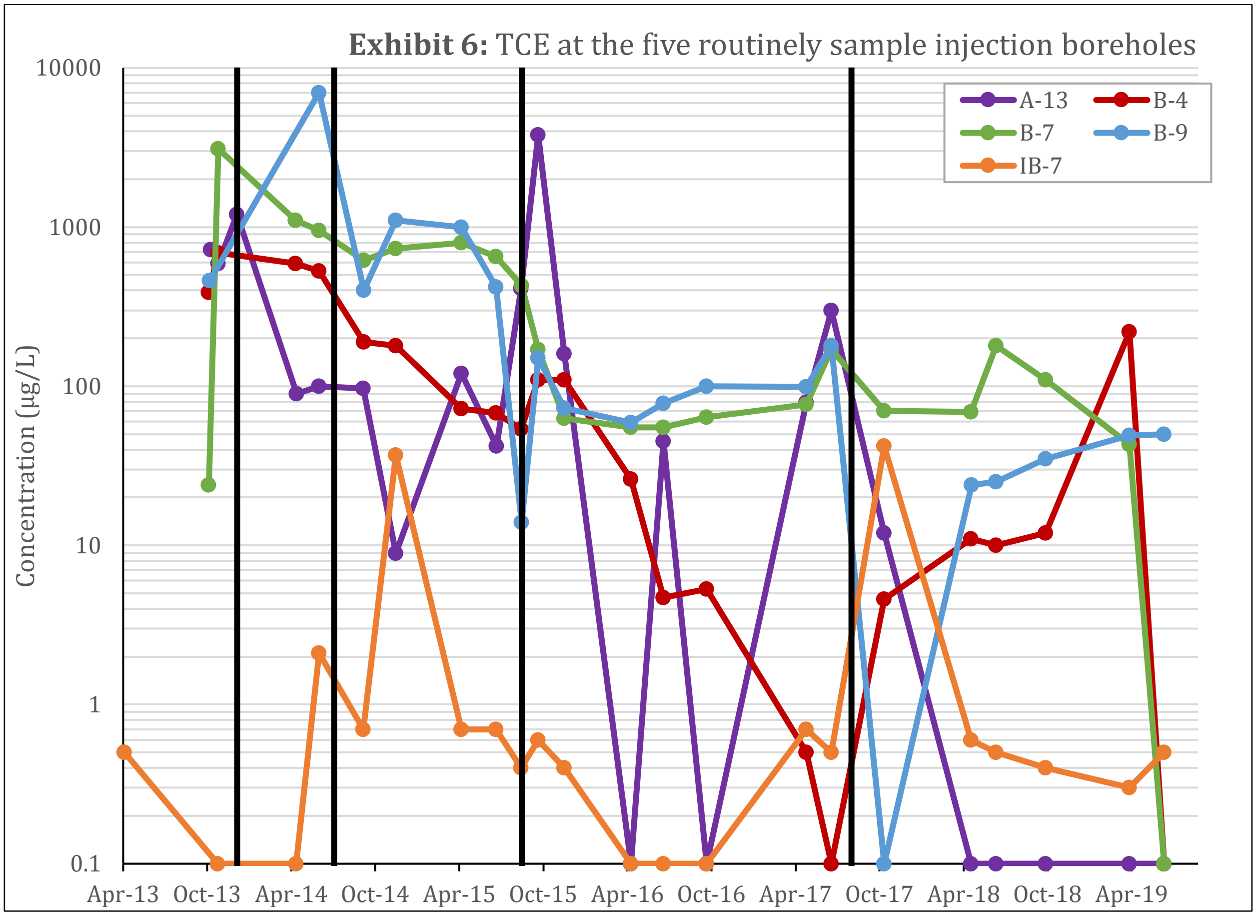
Favorable Change	≥ 10% decline	≥ 10% increase	≥ 10% increase	≥ 10% decline	≥ 10% decline
Number of Wells	6	9	15	4	5
Stable	0 to ± 10%	0 to ± 10%	0 to ± 10%	0 to ± 10%	0 to ± 10%
Number of Wells	4	4	4	2	0
Unfavorable Change	≥ 10% increase	≥ 10% decline	≥ 10% decline	≥ 10% increase	≥ 10% increase
Number of Wells	9	6	0	8	9

Concentrations shown from June 2019 sampling event, rounded to 2 sig. figures.
Blank cell indicates lack of data in one or both events.

The marginal improvement of geochemical conditions conducive to reductive dechlorination observed in June is consistent with past June monitoring events conducted during warmer weather. The average groundwater temperature increased from 5.7°C in March 2019 to 10.8°C in June 2019. Groundwater temperatures in June 2019 are more favorable to microbial activity than those during the March 2019 monitoring event.

Overall, the VOC and geochemical data continue to indicate a muted response to the injection of edible oil amendment in August 2017. As noted in previous reports, emplacement of the oil emulsion into the fractures has possibly reduced the effective water permeability and contact with VOC-containing groundwater. We are preparing an injection borehole re-development program to be conducted in September 2019.

Exhibit 6 below shows the TCE concentrations for the five injection boreholes that are routinely sampled. Most of these injection boreholes continue to exhibit order of magnitude or greater decreases in TCE concentrations compared to historical high concentrations. Since the August 2017 injection, no apparent trend has been observed in the routinely sampled injection boreholes. However, we note TCE was not detected in B-7 for the first time since the injections began. TCE was also not detected in B-4 for the first time since the August 2017 injection.



Note: Non-detects are plotted as 0.1 µg/L. The vertical black lines indicate site-scale amendment injections conducted in December 2013, July 2014, August 2015, and August 2017.

We note there is an indication of an increasing trend of vinyl chloride at BP-39A located across the former Gun Club property line. Vinyl chloride was detected at 5.9 µg/L in the June 2019 sample which exceeds the New York State Department of Environmental Conservation Class GA Groundwater quality standard of 2 µg/L. However, terminal breakdown products ethene and ethane were also detected at a historical high combined concentration of 3.4 µg/L in June 2019. This suggests that biodegradation has not stalled at vinyl chloride, but that vinyl chloride may be travelling farther downgradient than previously, before being reduced or oxidized. Vinyl chloride was also present in on-site wells located between the A-line and B-line injection boreholes, including an historical high concentration of 2,000 µg/L in BP-34A, which was also accompanied by historically high concentrations of terminal breakdown products. More production of vinyl chloride associated with TCE breakdown near the injection boreholes may be driving greater vinyl chloride mass flux across the property line.

The analytical data for key VOCs on Figure 3 for most monitoring locations farther downgradient to the south on the Binghamton Country Club property (e.g. BP-23A, BP-24A, BP-30A) indicate water quality generally consistent, or improved, as compared to the last sampling conducted at these locations in June 2018, and vinyl chloride was not detected in any of these farther downgradient wells. Carbon tetrachloride continues to be monitored and is included on Figure 3 and Table 3 as a key site VOC identified during the remedial investigation. It continues to be detected in several locations (BP-13A, BP-38A, GC-2A) at stable or decreasing concentrations compared to past monitoring.

Sampling results from the multilevel monitoring installations (e.g., GC-1, P8 [90 to 97 ft bgs] and BP-15D, P5 [119 to 126 ft bgs]), which screen productive fracture zones between the primary source rock and residential water supplies, continue to not indicate any adverse change in water quality.

The next performance monitoring event will be conducted in the fall along with the annual site-wide inspection.

Please contact us if you have any questions.

Very truly yours,
SANBORN, HEAD ENGINEERING, P.C.

David Shea

David Shea, P.E.
Principal

Erica Bosse

Erica M. Bosse, P.G.
Project Manager

JMC/EMB/DS:jmc

Encl.	Table 1	Summary of June 2019 Water Level Data
	Table 2	Scope of Routine and Performance Monitoring Program
	Table 3	Summary of June 2019 Performance Monitoring
	Figure 1	Monitoring Location Plan
	Figure 2	Summary of June 2019 Groundwater Quality Conditions
	Figure 3	Groundwater Quality Conditions for Key Site VOCs – June 2019
	Figure 4	June 2019 Assessment of Reducing Conditions

Table 1

Summary of June 2019 Water Level Data

Summary Trip Report

IBM Gun Club - Former Burn Pit Area

Union, New York

Well Location	Reference Elevation (ft amsl)	Depth to Water (ft bgs)	Equivalent Potentiometric Elevation (ft amsl)
A-1	1391.11	5.22	1385.89
A-10	1396.06	2.22	1393.84
A-11	1395.73	9.36	1386.37
A-12	1395.59	11.09	1384.50
A-13	1394.25	17.16	1377.09
A-14	1394.61	7.95	1386.66
A-15	1393.47	10.91	1382.56
A-16	1398.14	7.67	1390.47
A-17	1395.48	9.74	1385.74
A-2	1390.68	3.78	1386.90
A-3	1392.74	9.58	1383.16
A-4	1397.56	9.41	1388.15
A-5	1397.40	6.72	1390.68
A-6	1397.86	5.08	1392.78
A-7	1397.28	9.11	1388.17
A-8	1396.81	4.29	1392.52
A-9	1396.47	5.40	1391.07
B-1	1385.26	7.82	1377.44
B-10	1384.69	4.88	1379.81
B-11	1384.40	5.21	1379.19
B-12	1383.87	5.02	1378.85
B-13	1384.50	5.79	1378.71
B-2	1384.71	7.10	1377.61
B-3	1385.48	4.32	1381.16
B-4	1385.03	4.65	1380.38
B-5	1383.99	6.10	1377.89
B-6	1384.48	6.08	1378.40
B-7	1385.33	6.51	1378.82
B-8	1384.90	4.44	1380.46
B-9	1385.21	10.55	1374.66
BP-1A	1395.67	14.82	1380.85
BP-2A	1396.89	11.14	1385.75
BP-4A	1391.96	12.14	1379.82
BP-5A	1391.09	14.05	1377.04
BP-6A	1393.95	13.06	1380.89
BP-7A	1388.89	12.85	1376.04
BP-8A	1384.53	13.11	1371.42
BP-9A	1379.17	12.12	1367.05
BP-10A	1381.74	14.14	1367.60
BP-11A	1384.80	12.68	1372.12
BP-12A	1386.64	14.93	1371.71
BP-13A	1398.89	12.17	1386.72
BP-14A	1379.46	27.37	1352.09
BP-15A	1388.32	>16.92	<1371.40

Table 1
Summary of June 2019 Water Level Data
Summary Trip Report
IBM Gun Club - Former Burn Pit Area
Union, New York

Well Location	Reference Elevation (ft amsl)	Depth to Water (ft bgs)	Equivalent Potentiometric Elevation (ft amsl)
BP-16A	1389.69	13.37	1376.32
BP-17A	1376.30	12.65	1363.65
BP-18A	1386.54	15.70	1370.84
BP-19A	1309.40	21.03	1288.37
BP-20A	1274.60	6.06	1268.54
BP-21A	1244.29	4.99	1239.30
BP-22A	1242.90	5.38	1237.52
BP-23A	1333.39	13.02	1320.37
BP-24A	1338.73	15.29	1323.44
BP-25A	1301.92	2.28	1299.64
BP-26A	1336.96	13.41	1323.55
BP-27A	1299.96	1.15	1298.81
BP-30A	1336.20	13.33	1322.87
BP-31A	1369.63	12.58	1357.05
BP-32A	1389.58	10.48	1379.10
BP-34A	1392.55	11.14	1381.41
BP-35A	1391.75	13.74	1378.01
BP-36A	1383.68	12.05	1371.63
BP-37A	1389.92	8.67	1381.25
BP-38A	1375.10	11.07	1364.03
BP-39A	1370.17	8.87	1361.30
BP-12D Port 1	1388.19	Dry	
BP-12D Port 2	1388.19	32.54	1355.65
BP-12D Port 3	1388.19	61.45	1326.74
BP-12D Port 4	1388.19	63.75	1324.44
BP-12D Port 5	1388.19	63.33	1324.86
BP-12D Port 6	1388.19	63.32	1324.87
BP-12D Port 7	1388.19	63.26	1324.93
BP-13D Port 1	1400.09	33.42	1366.67
BP-13D Port 2	1400.09	32.94	1367.15
BP-13D Port 3	1400.09	70.92	1329.17
BP-13D Port 4	1400.09	84.28	1315.81
BP-13D Port 5	1400.09	84.26	1315.83
BP-13D Port 6	1400.09	84.29	1315.80
BP-13D Port 7	1400.09	84.35	1315.74
BP-14D Port 1	1378.07	51.55	1326.52
BP-14D Port 2	1378.07	57.02	1321.05
BP-14D Port 3	1378.07	66.82	1311.25
BP-14D Port 4	1378.07	66.88	1311.19
BP-14D Port 5	1378.07	66.89	1311.18
BP-14D Port 6	1378.07	66.80	1311.27
BP-15D Port 1	1388.36	Dry	
BP-15D Port 2	1388.36	66.70	1321.66
BP-15D Port 3	1388.36	35.12	1353.24

Table 1
Summary of June 2019 Water Level Data
Summary Trip Report
IBM Gun Club - Former Burn Pit Area
Union, New York

Well Location	Reference Elevation (ft amsl)	Depth to Water (ft bgs)	Equivalent Potentiometric Elevation (ft amsl)
BP-15D Port 4	1388.36	35.50	1352.86
BP-15D Port 5	1388.36	70.01	1318.35
BP-15D Port 6	1388.36	72.51	1315.85
BP-15D Port 7	1388.36	73.83	1314.53
GC-1 Port 1	1385.22	13.82	1371.40
GC-1 Port 2	1385.22	13.88	1371.34
GC-1 Port 3	1385.22	13.90	1371.32
GC-1 Port 4	1385.22	26.24	1358.98
GC-1 Port 5	1385.22	51.31	1333.91
GC-1 Port 6	1385.22	51.35	1333.87
GC-1 Port 7	1385.22	60.77	1324.45
GC-1 Port 8	1385.22	60.78	1324.44
GC-2A	1383.32	14.27	1369.05
IB-1	1392.20	6.56	1385.64
IB-2	1393.47	7.81	1385.66
IB-3	1393.07	10.76	1382.31
IB-4	1393.78	8.09	1385.69
IB-5	1393.88	10.51	1383.37
IB-6	1393.05	7.40	1385.65
IB-7	1393.23	7.55	1385.68
IB-8	1393.43	9.85	1383.58
IB-9	1393.62	7.95	1385.67

Notes:

1. This table summarizes depth to water measurements and calculated water table elevations recorded during the June 2019 performance monitoring round on June 10-12, 2019. Measurements were collected relative to the marked reference point at each location using a QED MP30 water level meter.

2. Abbreviations
ft amsl = feet above mean sea level
ft bgs = feet below ground surface

Table 2
Summary of Routine and Performance Monitoring Program
IBM Gun Club - Former Burn Pit Area
Union, New York

Monitoring Type	Monitoring Location	Monitoring Location Type	Sample Method				Analytical Laboratory									Field Screening
			Low Flow	PDBs	Nitrogen Purge	Surface Water	VOCs	Light Gasses	TOC	VFAs	Total Iron	Ferrous Iron	Nitrate	Sufate	Sulfide	Water Quality Parameters
Routine Monitoring (Annually in June)	BP-7A	Monitoring Well		x			x									x
	BP-8A	Monitoring Well		x			x									x
	BP-10A	Monitoring Well		x			x									x
	BP-11A	Monitoring Well		x			x									x
	BP-12A	Monitoring Well		x			x									x
	BP-14A	Monitoring Well		x			x									x
	BP-16A	Monitoring Well		x			x									x
	BP-17A	Monitoring Well		x			x									x
	BP-18A	Monitoring Well		x			x									x
	BP-19A	Monitoring Well		x			x									x
	BP-20A	Monitoring Well		x			x									x
	BP-21A	Monitoring Well		x			x									x
	BP-22A	Monitoring Well		x			x									x
	BP-23A	Monitoring Well		x			x									x
	BP-24A	Monitoring Well		x			x									x
	BP-25A	Monitoring Well		x			x									x
	BP-26A	Monitoring Well		x			x									x
	BP-27A	Monitoring Well		x			x									x
	BP-30A	Monitoring Well		x			x									x
	BP-32A	Monitoring Well		x			x									x
	GC-2A	Monitoring Well		x			x									x
	GC-1, P-1	Multi-Depth			x		x									x
	GC-1, P-8	Multi-Depth			x		x									x
	BP-12D, P1	Multi-Depth			x		x									x
	BP-12D, P7	Multi-Depth			x		x									x
	BP-13D, P1	Multi-Depth			x		x									x
	BP-13D, P5	Multi-Depth			x		x									x
	BP-15D, P1	Multi-Depth			x		x									x
	BP-15D, P5	Multi-Depth			x		x									x
Performance Monitoring (3x/year in April, June, and Sept/October)	IB-7	Injection Borehole		x			x	x	x	x						
	A-13	Injection Borehole		x			x	x	x	x						
	B-4	Injection Borehole		x			x	x	x	x						
	B-7	Injection Borehole		x			x	x	x	x						
	B-9	Injection Borehole		x			x	x	x	x						
	BP-1A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-2A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-4A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-5A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-6A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-9A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-13A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-31A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-34A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-35A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-36A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-37A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-38A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-39A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	111	Seep/spring				x	x									x
	112	Seep/spring				x	x									x
	113	Seep/spring				x	x									x
	118	Seep/spring				x	x									x
	SW-Z	Seep/spring				x	x									x
		Total	**14**	**26**	**8**	**5**	**53**	**19**	**19**	**19**	**14**	**14**	**14**	**14**	**14**	**48**

Notes:
1. This table is intended to summarize the programs of routine and performance monitoring for remedy operations at the IBM Gun Club - Former Burn Pit Area starting in 2016. Additional monitoring points may be sampled based on field observations. "SW-Z" serves as a placeholder for sampling any on-site seep or spring that can be reasonably sampled. The table summarizes sample method, analytical laboratory analysis, and field screening.

2. Sample method:
"Low Flow" indicates samples will be collected by bladder pump using low flow techniques.
"PDBs" indicates that the well has sufficient water column to sample with passive diffusion bags - if conditions are observed to be different than anticipated, sampling will proceed using low flow techniques.
"Nitrogen purge" indicates that sample will be collected by purging the multi-level port with nitrogen (multi-level systems only).
"Surface water" samples will be collected using a clean glass vial.

3. Analytical laboratory samples:
"VOCs" indicates volatile organic compounds.
"Light gasses" includes methane, ethene and ethane.
"TOC" indicates total organic carbon.
"VFAs" indicates volatile fatty acids.

4. " Water quality parameters" indicates screening during well purging and water quality sampling by multi-parameter probes, e.g. by YSI® 556 multi-Probe meter or similar and HACH® turbidity meter or similar (low flow, multi-level system, bailer, and surface water sampling) or by water quality parameter sounding (PDB sampling). The water quality parameters may include temperature, specific conductance, oxidation-reduction potential, dissolved oxygen, pH, and turbidity. In addition surface water samples will include water clarity descriptors (transparency, translucence, or opaqueness, and color).

TABLE 3
SUMMARY OF JUNE 2019 PERFORMANCE MONITORING
Summary Trip Report
IBM Gun Club - Former Burn Pit Area
Union, New York

Analyte Name	Unit	BP-1A	BP-2A	BP-4A	BP-5A	BP-6A	BP-7A	BP-8A	BP-9A	BP-10A	BP-11A	BP-12A	BP-13A	BP-14A	BP-16A	BP-17A	BP-18A	BP-18A	BP-19A
		BP-1A	BP-2A	BP-4A	BP-5A	BP-6A	BP-7A	BP-8A	BP-9A	BP-10A	BP-11A	BP-12A	BP-13A	BP-14A	BP-16A	BP-17A	BP-18A	BP-18A_FD	BP-19A
		Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	PDB	PDB	Low Flow	PDB	PDB	PDB	Low Flow	PDB	PDB	Low Flow	PDB	PDB	PDB
		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	FD	S
	Unit	6/12/2019	6/12/2019	6/12/2019	6/12/2019	6/12/2019	6/11/2019	6/11/2019	6/11/2019	6/11/2019	6/11/2019	6/11/2019	6/12/2019	6/11/2019	6/11/2019	6/11/2019	6/11/2019	6/11/2019	6/12/2019
VOLATILE ORGANIC COMPOUNDS (VOCs)																			
Trichloroethene (TCE)	µg/l	**180**	**61**	**190**	**30**	**62,000**	<0.5	**18**	**250**	**3.5**	**1.8**	**0.30 J**	**33**	**0.50 J**	<0.5	**1.7**	**6.1**	**6.2**	<0.5
Dichloroethene (cis-1,2-)	µg/l	**160**	**2,800**	**49**	**34**	**44,000**	<0.5	**6.3**	**800**	**1.3**	<0.5	<0.5	**1.0**	<0.5	<0.5	**0.30 J**	**0.080 J**	**0.080 J**	<0.5
Dichloroethene (trans-1,2-)	µg/l	**1.9 J**	**12 J**	**5.3**	**1.8 J**	**370**	<0.5	<0.5	**8.5 J**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dichloroethene (1,1-)	µg/l	**0.60 J**	**4.2 J**	**0.80 J**	<2.5	**170 J**	<0.5	<0.5	**2.8 J**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethene (PCE)	µg/l	<2.5	<25	**0.10 J**	<2.5	<250	<0.5	<0.5	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Vinyl chloride	µg/l	**7.3**	**780**	**7.3**	<2.5	**1,400**	<0.5	<0.5	**81**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
LIGHT GASSES																			
Ethane	µg/l	**0.14**	**0.85**	**48**	**0.029 J**	**1.5**	–	–	**16**	–	–	–	**0.014 J**	–	–	–	–	–	–
Ethene	µg/l	**0.069 J**	**250**	**23**	**0.032 J**	**140**	–	–	**61**	–	–	–	**0.0096 J**	–	–	–	–	–	–
Methane	µg/l	**1.8**	**1000**	**6,400**	**0.93**	**120**	–	–	**5,500**	–	–	–	**0.35 J**	–	–	–	–	–	–
MOLAR CONCENTRATION																			
Trichloroethene (TCE)	µmol/l	1.4	0.46	1.4	0.23	470	ND	0.14	1.9	0.027	0.014	0.0023	0.25	0.0038	ND	0.013	0.046	0.047	ND
Dichloroethene (cis-1,2-)	µmol/l	1.7	29	0.51	0.35	450	ND	0.065	8.3	0.013	ND	ND	0.010	ND	ND	0.0031	0.00083	0.00083	ND
Dichloroethene (trans-1,2-)	µmol/l	0.020	0.12	0.055	0.019	3.8	ND	ND	0.088	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichloroethene (1,1-)	µmol/l	0.0062	0.043	0.0083	ND	1.8	ND	ND	0.029	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene (PCE)	µmol/l	ND	ND	0.00060	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl chloride	µmol/l	0.12	12	0.12	ND	22	ND	ND	1.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethane	µmol/l	0.0047	0.028	1.6	0.0010	0.050	–	–	0.53	–	–	–	0.00047	–	–	–	–	–	–
Ethene	µmol/l	0.0025	8.9	0.82	0.0011	5.0	–	–	2.2	–	–	–	0.00034	–	–	–	–	–	–
Total	µmol/l	3.2	51	4.5	0.60	950	ND	0.20	14	0.040	0.014	0.0023	0.26	0.0038	ND	0.016	0.047	0.048	ND
MOLAR PERCENTAGE																			
TCE	%	43	0.91	32	38	49	ND	68	13	67	100	100	96	100	ND	81	98	98	ND
DCEs	%	53	57	12	62	48	ND	32	59	33	ND	ND	3.9	ND	ND	19	1.7	1.7	ND
VC	%	3.7	25	2.6	ND	2.4	ND	ND	9.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethane+Ethene	%	0.22	18	53	0.35	0.53	–	–	19	–	–	–	0.31	–	–	–	–	–	–
VOLATILE FATTY ACIDS																			
Acetic Acid	mg/l	**0.32**	**0.090 J**	**0.077 J**	**0.049 J**	**1.4**	–	–	**0.26**	–	–	–	**0.048 J**	–	–	–	–	–	–
Butyric Acid	mg/l	**0.038 J**	**0.018 J**	**0.020 J**	<0.1	**0.25 J**	–	–	**0.024 J**	–	–	–	<0.1	–	–	–	–	–	–
Hexanoic Acid	mg/l	**0.037 J**	**0.031 J**	<0.2	**0.057 J**	**0.12 J**	–	–	<0.2	–	–	–	<0.2	–	–	–	–	–	–
i-Hexanoic Acid	mg/l	<0.2	<0.2	<0.2	<0.2	<2	–	–	<0.2	–	–	–	<0.2	–	–	–	–	–	–
i-Pentanoic Acid	mg/l	<0.1	<0.1	<0.1	<0.1	**0.36 J**	–	–	<0.1	–	–	–	<0.1	–	–	–	–	–	–
Lactic Acid	mg/l	<0.2	<0.2	<0.2	<0.2	<2	–	–	<0.2	–	–	–	<0.2	–	–	–	–	–	–
Pentanoic Acid	mg/l	**0.053 J**	**0.021 J**	**0.011 J**	<0.1	**1.2**	–	–	<0.1	–	–	–	<0.1	–	–	–	–	–	–
Propionic Acid	mg/l	**0.20**	**0.032 J**	**0.033 J**	**0.021 J**	**0.26 J**	–	–	**0.018 J**	–	–	–	**0.0082 J**	–	–	–	–	–	–
Pyruvic Acid	mg/l	**0.014 J**	<0.1	**0.0079 J**	**0.021 J**	**0.62 J**	–	–	**0.014 J**	–	–	–	<0.1	–	–	–	–	–	–
OTHER LABORATORY DATA																			
Carbon Tetrachloride	µg/l	<2.5	<25	<1	<2.5	<250	<0.5	**0.10 J**	<10	**0.10 J**	<0.5	<0.5	**1.6**	<0.5	<0.5	<0.5	**0.20 J**	**0.20 J**	<0.5
Total Organic Carbon	mg/l	**16**	**4.7**	**3.6**	**21**	**190**	–	–	**2.6**	–	–	–	**2.2**	–	–	–	–	–	–
WATER QUALITY PROBE DATA																			
Temperature	°C	**12**	**14**	**14**	**13**	**12**	**8.2**	**8.7**	**12**	**8.1**	**8.2**	**8.8**	**10**	**9.0**	**8.3**	**8.7**	**8.1**	–	**8.4**
Specific Conductance	uS/cm	**2,000**	**820**	**590**	**1,400**	**4,000**	**80**	**120**	**470**	**100**	**97**	**270**	**64**	**110**	**31**	**210**	**130**	–	**68**
pH	s.u.	**7.1**	**6.9**	**7.5**	**6.8**	**7.0**	**6.4**	**6.5**	**7.1**	**6.7**	**6.0**	**6.8**	**5.8**	**6.6**	**5.9**	**7.2**	**6.4**	–	**6.5**
Oxidation/Reduction Potential	mV	**220**	**-66**	**-33**	**190**	**-62**	**190**	**170**	**-49**	**62**	**19**	**190**	**200**	**180**	**200**	**-2.9**	**180**	–	**110**
Dissolved Oxygen	mg/l	**5.3**	**0.39**	**0.22**	**2.4**	**0.30**	**6.7**	**5.4**	**3.8**	**2.0**	**4.0**	**5.2**	**1.3**	**7.0**	**7.0**	**2.1**	**4.5**	–	**9.1**
Turbidity	NTU	**0.40**	**1.2**	**0.30**	**0.40**	**4.5**	–	–	**6.0**	–	–	–	**1.4**	–	–	–	–	–	–
FIELD CHEMISTRY																			
Iron	mg/l	**0.25**	**8.6**	<0.04	**0.076 J**	**4.3**	–	–	**0.22**	–	–	–	**0.077 J**	–	–	–	–	–	–
Iron - Ferrous	mg/l	**0.041 J**	**10**	**0.040 J**	**0.026 J**	**4.4**	–	–	**0.16**	–	–	–	**0.034 J**	–	–	–	–	–	–
Nitrate	mg/l	<0.25	<0.25	<0.25	<0.25	<0.25	–	–	<0.25	–	–	–	<0.25	–	–	–	–	–	–
Sulfate	mg/l	**200**	**22**	**29**	**430**	**2,000**	–	–	**24**	–	–	–	**9.4**	–	–	–	–	–	–
Sulfide	µg/l	<0.1	**0.11 J**	<0.1	<0.1	<0.1	–	–	<0.1	–	–	–	<0.1	–	–	–	–	–	–

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Analyte Name	Unit	BP-20A	BP-21A	BP-22A	BP-23A	BP-24A	BP-24A	BP-25A	BP-26A	BP-27A	BP-30A	BP-31A	BP-31A	BP-32A	BP-34A	BP-35A	BP-35A	BP-36A	BP-36A
		BP-20A	BP-21A	BP-22A	BP-23A	BP-24A	BP-24A_FD	BP-25A	BP-26A	BP-27A	BP-30A	BP-31A	BP-31A_FD	BP-32A	BP-34A	BP-35A	BP-35A_FD	BP-36A	BP-36A_FD
		PDB	PDB	PDB	PDB	PDB	PDB	PDB	PDB	PDB	PDB	Low Flow	Low Flow	PDB	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow
		S	S	S	S	S	FD	S	S	S	S	S	FD	S	S	S	FD	S	FD
	Unit	6/12/2019	6/12/2019	6/12/2019	6/12/2019	6/12/2019	6/12/2019	6/12/2019	6/12/2019	6/12/2019	6/12/2019	6/11/2019	6/11/2019	6/11/2019	6/11/2019	6/12/2018	6/11/2019	6/11/2019	6/11/2019
VOLATILE ORGANIC COMPOUNDS (VOCs)																			
Trichloroethene (TCE)	µg/l	**2.1**	<0.5	<0.5	**0.20 J**	**0.90**	**0.90**	**0.40 J**	**0.60**	**2.4**	**8.3**	**3.7**	**3.6**	**0.60**	**31,000**	**3,000**	**3,300**	**4,800**	**5,000**
Dichloroethene (cis-1,2-)	µg/l	<0.5	<0.5	<0.5	<0.5	**0.70**	**0.60**	<0.5	<0.5	**0.70**	**2.1**	**0.70**	**0.70**	<0.5	**62,000**	**4,600**	**5,000**	**4,600**	**4,500**
Dichloroethene (trans-1,2-)	µg/l	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**96 J**	**4.6 J**	**7.0 J**	**15 J**	**16 J**
Dichloroethene (1,1-)	µg/l	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**170 J**	**5.8 J**	**5.5 J**	**11 J**	**13 J**
Tetrachloroethene (PCE)	µg/l	**0.080 J**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**0.90**	**0.40 J**	**0.40 J**	<0.5	<250	<25	<25	<50	<50
Vinyl chloride	µg/l	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**2,000**	<25	<25	**460**	**440**
LIGHT GASSES																			
Ethane	µg/l	–	–	–	–	–	–	–	–	–	–	<0.1	<0.1	–	**26**	**0.049 J**	**0.048 J**	**34**	**23**
Ethene	µg/l	–	–	–	–	–	–	–	–	–	–	<0.1	<0.1	–	**770**	**0.027 J**	**0.013 J**	**280**	**210**
Methane	µg/l	–	–	–	–	–	–	–	–	–	–	**0.10 J**	**0.10 J**	–	**8,100**	**0.42 J**	**0.33 J**	**9,000**	**6,500**
MOLAR CONCENTRATION																			
Trichloroethene (TCE)	µmol/l	0.016	ND	ND	0.0015	0.0068	0.0068	0.0030	0.0046	0.018	0.063	0.028	0.027	0.0046	236	23	25	37	38
Dichloroethene (cis-1,2-)	µmol/l	ND	ND	ND	ND	0.0072	0.0062	ND	ND	0.0072	0.022	0.0072	0.0072	ND	640	47	52	47	46
Dichloroethene (trans-1,2-)	µmol/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.99	0.047	0.072	0.15	0.17
Dichloroethene (1,1-)	µmol/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.8	0.060	0.057	0.11	0.13
Tetrachloroethene (PCE)	µmol/l	0.00048	ND	ND	ND	ND	ND	ND	ND	ND	0.0054	0.0024	0.0024	ND	ND	ND	ND	ND	ND
Vinyl chloride	µmol/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	32	ND	ND	7.4	7.0
Ethane	µmol/l	–	–	–	–	–	–	–	–	–	–	ND	ND	–	0.86	0.0016	0.0016	1.1	0.76
Ethene	µmol/l	–	–	–	–	–	–	–	–	–	–	ND	ND	–	27	0.00096	0.00046	10.0	7.5
Total	µmol/l	0.016	ND	ND	0.0015	0.014	0.013	0.0030	0.0046	0.025	0.090	0.038	0.037	0.0046	940	70	77	100	100
MOLAR PERCENTAGE																			
TCE	%	97	ND	ND	100	49	53	100	100	72	70	75	74	100	25	32	33	37	38
DCEs	%	ND	ND	ND	ND	51	47	ND	ND	28	24	19	19	ND	68	68	67	48	47
VC	%	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.4	ND	ND	7.4	7.0
Ethane+Ethene	%	–	–	–	–	–	–	–	–	–	–	ND	ND	–	3.0	0.0037	0.0027	11	8.3
VOLATILE FATTY ACIDS																			
Acetic Acid	mg/l	–	–	–	–	–	–	–	–	–	–	**0.038 J**	**0.037 J**	–	**0.072 J**	**0.21**	**0.19**	**1.4**	**1.3**
Butyric Acid	mg/l	–	–	–	–	–	–	–	–	–	–	<0.1	<0.1	–	<0.1	**0.031 J**	**0.028 J**	**0.030 J**	**0.028 J**
Hexanoic Acid	mg/l	–	–	–	–	–	–	–	–	–	–	<0.2	<0.2	–	**0.033 J**	**0.024 J**	**0.033 J**	<0.2	<0.2
i-Hexanoic Acid	mg/l	–	–	–	–	–	–	–	–	–	–	<0.2	<0.2	–	<0.2	<0.2	<0.2	<0.2	<0.2
i-Pentanoic Acid	mg/l	–	–	–	–	–	–	–	–	–	–	<0.1	<0.1	–	<0.1	<0.1	<0.1	<0.1	<0.1
Lactic Acid	mg/l	–	–	–	–	–	–	–	–	–	–	<0.2	<0.2	–	<0.2	<0.2	<0.2	<0.2	<0.2
Pentanoic Acid	mg/l	–	–	–	–	–	–	–	–	–	–	<0.1	<0.1	–	**0.0087 J**	<0.1	<0.1	<0.1	<0.1
Propionic Acid	mg/l	–	–	–	–	–	–	–	–	–	–	**0.0088 J**	**0.0045 J**	–	<0.1	**0.098 J**	**0.086 J**	**0.0056 J**	**0.0048 J**
Pyruvic Acid	mg/l	–	–	–	–	–	–	–	–	–	–	<0.1	<0.1	–	<0.1	<0.1	<0.1	<0.1	<0.1
OTHER LABORATORY DATA																			
Carbon Tetrachloride	µg/l	**0.070 J**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**0.40 J**	**0.20 J**	<0.5	<0.5	<0.5	<0.5	<250	<25	<25	<50	<50
Total Organic Carbon	mg/l	–	–	–	–	–	–	–	–	–	–	**1.0**	**1.0**	–	**6.1**	**3.9**	**3.9**	**3.4**	**3.4**
WATER QUALITY PROBE DATA																			
Temperature	°C	**9.6**	**8.4**	**8.4**	**8.7**	**9.2**	–	**8.9**	**8.4**	**9.7**	**9.0**	**10**	–	**8.7**	**10**	**13**	–	**11**	–
Specific Conductance	uS/cm	**110**	**390**	**540**	**180**	**110**	–	**200**	**170**	**160**	**220**	**370**	–	**86**	**1,000**	**890**	–	**630**	–
pH	s.u.	**6.0**	**7.3**	**7.4**	**7.4**	**6.5**	–	**7.1**	**6.3**	**6.3**	**6.9**	**7.1**	–	**6.4**	**6.9**	**6.9**	–	**6.8**	–
Oxidation/Reduction Potential	mV	**140**	**120**	**120**	**150**	**160**	–	**130**	**160**	**150**	**160**	**130**	–	**180**	**46**	**75**	–	**-62**	–
Dissolved Oxygen	mg/l	**0.49**	**0.72**	**0.40**	**0.51**	**2.0**	–	**0.50**	**5.5**	**1.0**	**0.86**	**7.3**	–	**2.7**	**0.31**	**2.1**	–	**0.27**	–
Turbidity	NTU	–	–	–	–	–	–	–	–	–	–	**3.9**	–	–	**2.5**	**1.2**	–	**1.4**	–
FIELD CHEMISTRY																			
Iron	mg/l	–	–	–	–	–	–	–	–	–	–	**0.091 J**	–	–	**0.12 J**	**0.18 J**	–	**0.99**	–
Iron - Ferrous	mg/l	–	–	–	–	–	–	–	–	–	–	<0.015	–	–	**0.13**	**0.031 J**	–	**1.1**	–
Nitrate	mg/l	–	–	–	–	–	–	–	–	–	–	<0.25	–	–	<0.25	<0.25	–	<0.25	–
Sulfate	mg/l	–	–	–	–	–	–	–	–	–	–	**27**	–	–	**36**	**31**	–	**14**	–
Sulfide	µg/l	–	–	–	–	–	–	–	–	–	–	<0.1	–	–	<0.1	<0.1	–	**0.21 J**	–

TABLE 3
SUMMARY OF JUNE 2019 PERFORMANCE MONITORING
Summary Trip Report
IBM Gun Club - Former Burn Pit Area
Union, New York

Analyte Name		BP-37A	BP-38A	BP-39A	GC-2A	A-13	B-4	B-7	B-9	IB-7	GC-1 Port 1	GC-1 Port 8	BP-12D Port 1	BP-12D Port 7	BP-13D Port 1	BP-13D Port 5	BP-15D Port 5
		BP-37A	BP-38A	BP-39A	GC-2A	A-13	B-4	B-7	B-9	IB-7	GC-1,P1	GC1,P8	BP-12D,P1	BP-12D,P7	BP-13D,P1	BP-13D,P5	BP-15D,P5
		Low Flow	Low Flow	Low Flow	PDB	PDB	PDB	PDB	PDB	PDB	FLUTe	FLUTe	FLUTe	FLUTe	FLUTe	FLUTe	FLUTe
		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	Unit	6/11/2019	6/11/2019	6/11/2019	6/11/2019	6/10/2019	6/10/2019	6/10/2019	6/10/2019	6/10/2019	6/12/2019	6/12/2019	6/12/2019	6/12/2019	6/12/2019	6/12/2019	6/12/2019
VOLATILE ORGANIC COMPOUNDS (VOCs)																	
Trichloroethene (TCE)	µg/l	**9.5**	**86**	**63**	**5.2**	<100	<50	<1000	**50**	**0.50 J**	**63**	**0.20 J**	<0.5	<0.5	**74**	**0.40 J**	<0.5
Dichloroethene (cis-1,2-)	µg/l	**6.7**	**28**	**73**	**0.90**	**21,000**	**33 J**	**360 J**	**1,300**	**2.1**	**62**	**0.90**	<0.5	<0.5	**61**	**1.0**	<0.5
Dichloroethene (trans-1,2-)	µg/l	<0.5	<1	**0.30 J**	<0.5	**54 J**	<50	<1000	**3.6 J**	**0.20 J**	**0.30 J**	**0.20 J**	<0.5	<0.5	**0.40 J**	<0.5	<0.5
Dichloroethene (1,1-)	µg/l	<0.5	<1	**0.30 J**	<0.5	**52 J**	<50	<1000	**1.6 J**	<0.5	**0.20 J**	<0.5	<0.5	<0.5	**0.50 J**	<0.5	<0.5
Tetrachloroethene (PCE)	µg/l	<0.5	<1	<0.5	<0.5	<100	<50	<1000	<10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Vinyl chloride	µg/l	**0.40 J**	<1	**5.9**	<0.5	**2,500**	<50	<1000	**130**	<0.5	**5.3**	**0.10 J**	<0.5	<0.5	**5.3**	**0.30 J**	<0.5
LIGHT GASSES																	
Ethane	µg/l	**0.29**	**0.006 J**	**0.67**	–	**130**	**6.2**	**56**	**24**	**30**	–	–	–	–	–	–	–
Ethene	µg/l	**0.23**	**0.0075 J**	**2.7**	–	**3,900**	**5.8**	**350**	**580**	**0.16**	–	–	–	–	–	–	–
Methane	µg/l	**780**	**0.30 J**	**210**	–	**7,800**	**31,000**	**20,000**	**15,000**	**30,000**	–	–	–	–	–	–	–
MOLAR CONCENTRATION																	
Trichloroethene (TCE)	µmol/l	0.072	0.65	0.48	0.040	ND	ND	ND	0.38	0.0038	0.48	0.0015	ND	ND	0.56	0.0030	ND
Dichloroethene (cis-1,2-)	µmol/l	0.069	0.29	0.75	0.0093	220	0.34	3.7	13	0.022	0.64	0.0093	ND	ND	0.63	0.010	ND
Dichloroethene (trans-1,2-)	µmol/l	ND	ND	0.0031	ND	0.56	ND	ND	0.037	0.0021	0.0031	0.0021	ND	ND	0.0041	ND	ND
Dichloroethene (1,1-)	µmol/l	ND	ND	0.0031	ND	0.54	ND	ND	0.017	ND	0.0021	ND	ND	ND	0.0052	ND	ND
Tetrachloroethene (PCE)	µmol/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl chloride	µmol/l	0.0064	ND	0.094	ND	40	ND	ND	2.1	ND	0.085	0.0016	ND	ND	0.085	0.0048	ND
Ethane	µmol/l	0.0096	0.00020	0.022	–	4.3	0.21	1.9	0.80	1.0	–	–	–	–	–	–	–
Ethene	µmol/l	0.0082	0.00027	0.096	–	140	0.21	12	21	0.0057	–	–	–	–	–	–	–
Total	µmol/l	0.17	0.94	1.5	0.049	400	0.75	18	37	1.0	1.2	0.014	ND	ND	1.3	0.018	ND
MOLAR PERCENTAGE																	
TCE	%	44	69	33	81	ND	ND	ND	1.0	0.37	40	11	ND	ND	44	17	ND
DCEs	%	42	31	52	19	55	45	21	36	2.3	53	78	ND	ND	50	57	ND
VC	%	3.9	ND	6.5	ND	10.0	ND	ND	5.6	ND	7.0	11	ND	ND	6.6	26	ND
Ethane+Ethene	%	11	0.049	8.2	–	36	55	79	57	97	–	–	–	–	–	–	–
VOLATILE FATTY ACIDS																	
Acetic Acid	mg/l	**0.034 J**	<0.1	**0.079 J**	–	**93**	**440**	**740**	**1,500**	**0.14**	–	–	–	–	–	–	–
Butyric Acid	mg/l	<0.1	<0.1	<0.1	–	**4.9**	**31**	**390**	**330**	**0.013 J**	–	–	–	–	–	–	–
Hexanoic Acid	mg/l	<0.2	<0.2	<0.2	–	**0.85**	**4.2**	**160**	**54**	**0.060 J**	–	–	–	–	–	–	–
i-Hexanoic Acid	mg/l	<0.2	<0.2	<0.2	–	**0.12 J**	**0.19 J**	**0.98 J**	<2	<0.2	–	–	–	–	–	–	–
i-Pentanoic Acid	mg/l	<0.1	<0.1	<0.1	–	**0.51**	**6.4**	**8.1 J**	**13**	<0.1	–	–	–	–	–	–	–
Lactic Acid	mg/l	<0.2	<0.2	<0.2	–	<2	<20	<20	<20	<0.2	–	–	–	–	–	–	–
Pentanoic Acid	mg/l	<0.1	<0.1	<0.1	–	**0.61**	**15**	**310**	**630**	<0.1	–	–	–	–	–	–	–
Propionic Acid	mg/l	<0.1	<0.1	<0.1	–	**4.2**	**120**	**400**	**2,500**	<0.1	–	–	–	–	–	–	–
Pyruvic Acid	mg/l	<0.1	<0.1	<0.1	–	**1.8**	**48**	**140**	**59**	<0.1	–	–	–	–	–	–	–
OTHER LABORATORY DATA																	
Carbon Tetrachloride	µg/l	**0.10 J**	**0.50 J**	**0.080 J**	**9.2**	<100	<50	<1000	<10	<0.5	**0.20 J**	<0.5	<0.5	<0.5	**0.10 J**	<0.5	<0.5
Total Organic Carbon	mg/l	**2.5**	**2.7**	**2.0**	–	**69**	**5,900**	**7,800**	**5,000**	**73**	–	–	–	–	–	–	–
WATER QUALITY PROBE DATA																	
Temperature	°C	**15**	**12**	**13**	**8.0**	–	–	–	–	–	**13**	**13**	**11**	**13**	**13**	**14**	**13**
Specific Conductance	uS/cm	**670**	**190**	**120**	**59**	–	–	–	–	–	**380**	**400**	**360**	**970**	**330**	**450**	**500**
pH	s.u.	**6.2**	**6.1**	**5.8**	**6.3**	–	–	–	–	–	**7.0**	**7.2**	**7.9**	**7.8**	**7.9**	**7.9**	**8.0**
Oxidation/Reduction Potential	mV	**86**	**57**	**80**	**180**	–	–	–	–	–	**100**	**-40**	**-30**	**-54**	**3.8**	**-63**	**18**
Dissolved Oxygen	mg/l	**0.47**	**4.1**	**0.94**	**4.7**	–	–	–	–	–	**1.6**	**2.1**	**0.66**	**1.0**	**2.9**	**1.7**	**1.0**
Turbidity	NTU	**0.70**	**0.60**	**1.2**	–	–	–	–	–	–	–	–	–	–	–	–	–
FIELD CHEMISTRY																	
Iron	mg/l	**0.076 J**	**0.062 J**	**0.042 J**	–	–	–	–	–	–	–	–	–	–	–	–	–
Iron - Ferrous	mg/l	**0.037 J**	<0.015	<0.015	–	–	–	–	–	–	–	–	–	–	–	–	–
Nitrate	mg/l	<0.25	<0.25	<0.25	–	–	–	–	–	–	–	–	–	–	–	–	–
Sulfate	mg/l	**7.5**	**11**	**10**	–	–	–	–	–	–	–	–	–	–	–	–	–
Sulfide	µg/l	<0.1	<0.1	<0.1	–	–	–	–	–	–	–	–	–	–	–	–	–

TABLE 3
SUMMARY OF JUNE 2019 PERFORMANCE MONITORING
Summary Trip Report
IBM Gun Club - Former Burn Pit Area
Union, New York

Analyte Name	Unit	111	112	113	118	119
		111	112	113	118	119
		Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
		S	S	S	S	S
		6/12/2019	6/12/2019	6/12/2019	6/12/2019	6/12/2019
VOLATILE ORGANIC COMPOUNDS (VOCs)						
Trichloroethene (TCE)	µg/l	**0.40 J**	**0.70**	**0.20 J**	**0.90**	**1.1**
Dichloroethene (cis-1,2-)	µg/l	<0.5	<0.5	<0.5	**1.5**	**5.7**
Dichloroethene (trans-1,2-)	µg/l	<0.5	<0.5	<0.5	<0.5	**0.20 J**
Dichloroethene (1,1-)	µg/l	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethene (PCE)	µg/l	<0.5	<0.5	<0.5	<0.5	<0.5
Vinyl chloride	µg/l	<0.5	<0.5	<0.5	<0.5	**1.2**
LIGHT GASSES						
Ethane	µg/l	–	–	–	–	–
Ethene	µg/l	–	–	–	–	–
Methane	µg/l	–	–	–	–	–
MOLAR CONCENTRATION						
Trichloroethene (TCE)	µmol/l	0.0030	0.0053	0.0015	0.0068	0.0084
Dichloroethene (cis-1,2-)	µmol/l	ND	ND	ND	0.015	0.059
Dichloroethene (trans-1,2-)	µmol/l	ND	ND	ND	ND	0.0021
Dichloroethene (1,1-)	µmol/l	ND	ND	ND	ND	ND
Tetrachloroethene (PCE)	µmol/l	ND	ND	ND	ND	ND
Vinyl chloride	µmol/l	ND	ND	ND	ND	0.019
Ethane	µmol/l	–	–	–	–	–
Ethene	µmol/l	–	–	–	–	–
Total	µmol/l	0.0030	0.0053	0.0015	0.022	0.088
MOLAR PERCENTAGE						
TCE	%	100	100	100	31	9.5
DCEs	%	ND	ND	ND	69	69
VC	%	ND	ND	ND	ND	22
Ethane+Ethene	%	–	–	–	–	–
VOLATILE FATTY ACIDS						
Acetic Acid	mg/l	–	–	–	–	–
Butyric Acid	mg/l	–	–	–	–	–
Hexanoic Acid	mg/l	–	–	–	–	–
i-Hexanoic Acid	mg/l	–	–	–	–	–
i-Pentanoic Acid	mg/l	–	–	–	–	–
Lactic Acid	mg/l	–	–	–	–	–
Pentanoic Acid	mg/l	–	–	–	–	–
Propionic Acid	mg/l	–	–	–	–	–
Pyruvic Acid	mg/l	–	–	–	–	–
OTHER LABORATORY DATA						
Carbon Tetrachloride	µg/l	<0.5	<0.5	<0.5	<0.5	<0.5
Total Organic Carbon	mg/l	–	–	–	–	–
WATER QUALITY PROBE DATA						
Temperature	°C	**11**	**12**	**13**	**15**	**14**
Specific Conductance	uS/cm	**70**	**94**	**140**	**170**	**450**
pH	s.u.	**6.5**	**6.7**	**7.1**	**7.1**	**6.8**
Oxidation/Reduction Potential	mV	**120**	**110**	**120**	**140**	**-53**
Dissolved Oxygen	mg/l	**7.7**	**9.3**	**8.1**	**7.4**	**2.3**
Turbidity	NTU	**140**	**37**	**14**	**21**	**3.1**
FIELD CHEMISTRY						
Iron	mg/l	–	–	–	–	–
Iron - Ferrous	mg/l	–	–	–	–	–
Nitrate	mg/l	–	–	–	–	–
Sulfate	mg/l	–	–	–	–	–
Sulfide	µg/l	–	–	–	–	–

Notes:

1. The table summarizes samples collected during the week of June 10, 2019 as part of performance monitoring at the IBM Gun Club former Burn Pit Area. Samples were analyzed both in the field and at fixed analytical laboratories as indicated on the table.

2. Analytical laboratory analysis was performed by Eurofins Lancaster Laboratories of Lancaster, Pennsylvania (Lancaster) and/or Pace Analytical (formerly Microseeps, Inc.) of Pittsburgh, Pennsylvania (Pace). Results are recorded in units indicated on the table. Detections of compounds are emboldened.

3. Definitions:
"S" indicates primary sample
"FD" indicates field duplicate
"PDB" indicates the sample was collected via a passive diffusion bag
"–" indicates the compounds were not analyzed for that particular sample.
"<" indicates the result was below the analytical detection limit.
"J" indicates that the laboratory data was below the lowest quantifiable limit and therefore estimated.
">" indicates results were over the calibration range and should be considered estimated.
"ND" indicates that results were not detected above the analytical reporting limit or the calibration range of the field screening device.

4. Refer to the report text for further discussion. The sample plan can be referenced in Table 2 and the Site Management Plan.

Figure 1

Monitoring Location Plan

IBM Gun Club - Former Burn Pit Area

Union, New York

Drawn By:	H. Pothier
Designed By:	E. Bosse
Reviewed By:	D. Shea
Project No:	3526.05
Date:	August 2019

Figure Narrative

This figure summarizes the locations of monitoring wells, multi-level monitoring systems, and surface water sampling points where depth to water is measured and water quality samples may be collected for field and analytical laboratory testing as part of routine and performance monitoring programs. The figure also depicts monitoring wells where dedicated water quality probes have been deployed to continuously monitor for temperature, specific conductance, oxidation-reduction potential, dissolved oxygen and pH.

The locations of site features, including monitoring wells, seeps and springs, and culverts are based on field survey by Butler Land Surveying, LLC. of Little Meadows Pennsylvania in the period 2006 through 2012.

Refer to report text for further discussion.

Legend

- Parcel B Site Boundary
- Injection Borehole
- Observed Drainage Features (arrows indicate flow direction)
- Monitoring Well
- Multi-Level Monitoring Installation
- Surface Water Sampling Point
- Culvert

100 50 0 100 200 Feet

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Last Edited By: hpothier

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Last Edited By: hpothier

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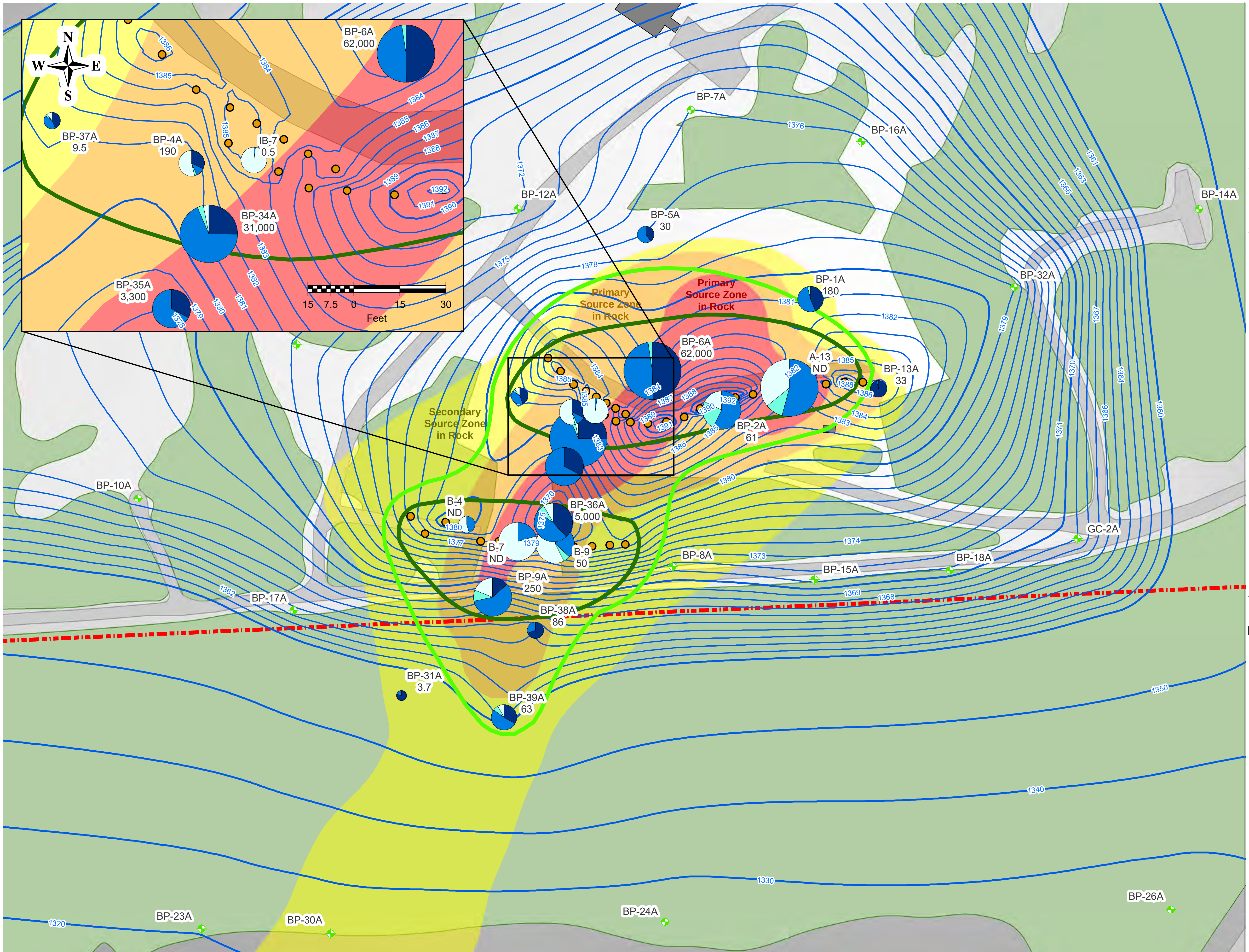

Figure 2

Summary of June 2019 Groundwater Quality Conditions

IBM Gun Club - Former Burn Pit Area

Union, New York

Drawn By: H. Pothier
Designed By: E. Bosse
Reviewed By: D. Shea
Project No: 3526.05
Date: August 2019

Figure Narrative

This figure shows groundwater quality data and inference based on monitoring conducted June 10-12, 2019.

The groundwater data for site key VOCs including TCE, cDCE, vinyl chloride, and ethane/ethene from water table monitoring wells are presented as pie diagrams. The wedges of each pie diagram represent concentrations of the four compounds expressed in micromoles per liter (umol/L). The relative diameter of each pie diagram varies based on the sum of the five VOCs and tDCE at each location.

The inferred sulfate-reducing and methanogenic conditions are based on observations of oxidation-reduction potential (ORP), methane, sulfide, ferrous and total iron, and nitrate. Methanogenic conditions are characterized by methane concentrations ≥ 20 µg/L, sulfate reducing by sulfide ≥ 50 µg/L, iron reducing by Fe(II)/Fe(tot) ≥ 0.7 mg/L, and nitrate reduction by nitrate <1 mg/L. ORP is generally expected to be <200 for iron reduction, <100 for sulfate reduction, and <0 for methanogenic conditions. See Figure 3 for geochemical data.

Not all geochemical conditions are satisfied within the areas shown for sulfate-reducing and methanogenic conditions. The inferred areas assume the presence of a transition zone between sulfate-reducing and methanogenic, and the position and size of these zones are based on judgement of the combined data. Other interpretations are possible.

Refer to the report text for further discussion.

Legend

BP-34A 22,000 — Well Name and June 2019 TCE Concentrations in Groundwater (µg/L).

Inferred Groundwater Contour June 2019

Inferred Methanogenic Conditions

Inferred Sulfate-Reducing Conditions

Parent VOC (Trichloroethene)

Primary Daughter Product (*cis*-1,2DCE)

Secondary Daughter Product (Vinyl Chloride)

Terminal Breakdown Products (Ethane, Ethene)

Total Chlorinated Ethanes & Ethenes in Groundwater (µmol/L)

< 0.1

>0.1 to 1

>1 to 10

>10 to 100

>100

40 20 0 40 80

Feet

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Figure 3

Groundwater Quality Conditions for Key Site VOCs - June 2019

IBM Gun Club - Former Burn Pit Area

Union, New York

Drawn By:	H. Pothier
Designed By:	E. Bosse
Reviewed By:	D. Shea
Project No:	3526.05
Date:	August 2019

Figure Narrative

This figure depicts groundwater data for key site VOCs from monitoring of water table wells in June 2019.

The data for TCE, selected breakdown products, and carbon tetrachloride are presented as pie diagrams. The wedges of each pie diagram represent concentrations expressed in micrograms per liter (ug/L). The relative diameter of each pie diagram varies based on the sum of the VOCs at each location.

Refer to report text for further discussion.

Legend

Injection Boring

BP-34A 31,000 — Well Name and June 2019 TCE Concentrations in Groundwater (µg/L).

- Trichloroethene (TCE)
- *cis*-1,2 Dichloroethene (*cis*-1,2 DCE)
- Vinyl Chloride (VC)
- Carbon Tetrachloride (CCl4)

Total Chlorinated Ethenes and Carbon Tetrachloride in Groundwater (µg/L)

<10

Not detected above lab reporting limits

>10 to 100

>100 to 1,000

>1,000 to 10,000

>10,000

100 50 0 100 200

Feet

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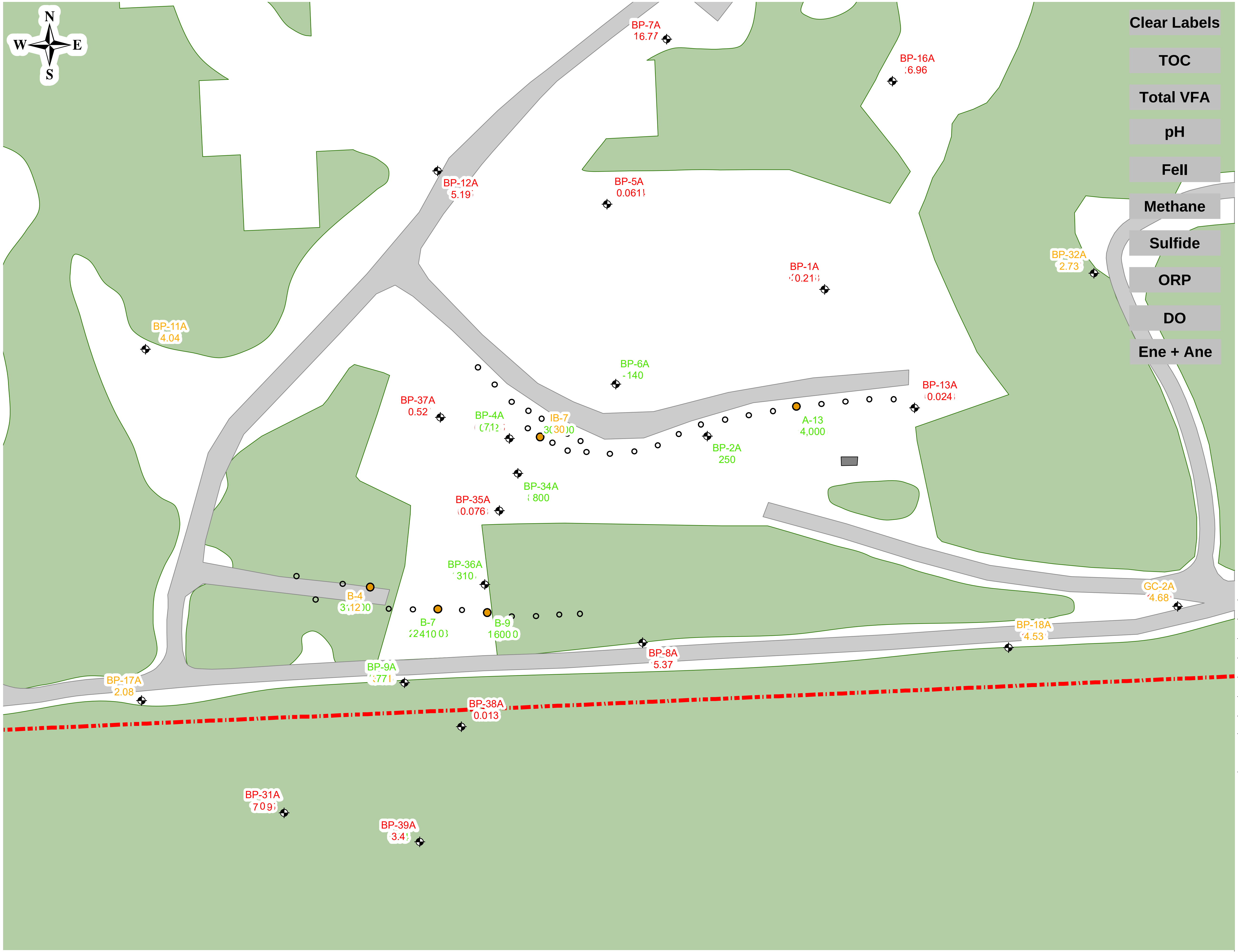

Figure 4

June 2019 Assessment of Reducing Conditions

IBM Gun Club - Former Burn Pit Area

Union, New York

Drawn By: H. Pothier
Designed By: E. Bosse
Reviewed By: D. Shea
Project No: 3526.05
Date: August 2019

Figure Narrative

This figure is intended to assess multiple lines of evidence to assess what proportion of the primary and secondary source rock are under sulfate reducing and methanogenic conditions. Green labels indicate conditions conducive to reductive dehalogenation. Orange labels indicate reductive dehalogenation may be possible, but conditions are less conducive. Red labels indicate conditions where reductive dehalogenation is less likely.

Posted data is from the June 2019 sampling round.

Legend

DO mg/L	>5	2-5	<=2
ORP mV	>100	0-100	<=0
Sulfide µg/L	<10	10-50	>=50
Methane µg/L	<0.5	0.5-20	>=20
FeII mg/L	<1		>=1
pH SU	<6.3 or >7.5		6.3-7.5
Total VFA mg/L	<1		>=1
TOC mg/L	<4		>=4
Ethane + Ethene µg/L	<10	10-50	>=50

30 15 0 30 60
Feet

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APPENDIX C.3

SUMMARY OF OCTOBER 2019
WATER QUALITY MONITORING

8976 Wellington Road
Manassas, VA 20109

October 23, 2019

Gary Priscott
New York State Department of Environmental Conservation
1679 Route 11
Kirkwood, NY 13795

Re: Summary of September 2019 Water Quality Monitoring
IBM Gun Club, Former Burn Pit Area
Robinson Hill Road, Union, NY 13760
NYSDEC Site # C704044

Dear Mr. Priscott:

This letter serves to transmit copies of the Summary of September 2019 Water Quality Monitoring report. The remedy performance monitoring work and the preparation of this report were completed on behalf of IBM Corporation by Sanborn, Head Engineering, P.C. (SHPC) in accordance with NYSDEC-approved Site Management Plan (SMP) for this project.

If you have any questions regarding the enclosed report, please contact me at 703-257-2580.

Very truly yours,

Stephen P Brown

Stephen Brown
IBM Program Manager

Enclosures: Summary of September 2019 Water Quality Monitoring

cc: Kevin O'Hara (Binghamton Country Club)
Eamonn O'Neil (NYSDOH)
Maureen Schuck (NYSDOH)
Harry Warner (NYSDEC)

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Stephen Brown, P.E.
IBM Corporation
8976 Wellington Road
Manassas, VA 20109

October 23, 2019
File No. 3526.05

Re: Summary of September 2019 Water Quality Monitoring
IBM Gun Club – Former Burn Pit Area
Union, New York
NYSDEC Site #C704044 (BCA Index #B7-0661004-05)

Dear Mr. Brown:

This letter report summarizes the scope and results of remedy performance monitoring conducted in September 2019 on behalf of IBM by Sanborn Head. It describes the sampling event and provides tabular and graphical summaries of the field and laboratory data. The field work was conducted during the week of September 16, 2019 in general accordance with the scope and procedures described in Appendix J of the Site Management Plan (SMP).[1]

This letter report will be included as a component of the annual Periodic Review Report, due in January 2020, and it has been prepared consistent with the Monitoring Reporting Requirements described in Section 3.6 of the SMP.

SCOPE OF WORK

The scope of work included:

- Limited groundwater elevation survey. The monitoring network is shown on Figure 1;
- Water quality sampling and laboratory analysis associated with the performance monitoring program; and
- Water quality parameter field screening.

Groundwater Elevation Survey

From September 16 to 18, 2019, the depths to water in monitoring wells and injection boreholes were gauged in accordance with procedures described in Appendix G of the SMP. Based on the depth to water data and survey information, groundwater elevations were calculated for each location. Groundwater levels in September 2019 were similar to historical measurements, and lower than the elevated levels observed during the wetter

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1 Site Management Plan – April 2016 Revision, Brownfield Cleanup Program, IBM Gun Club – Former Burn Pit area, Union, New York, NYSDEC Site #C704044, BCA Index #B7-0661004-05, prepared on behalf of IBM by Sanborn, Head & Associates, Inc., April 25, 2016.

than average 2018. According to the National Weather Service, the Binghamton area recorded precipitation of 1.9 inches below average in July through September 2019, and precipitation of 2.2 inches above average in March through June of 2019. Depth to water measurements and groundwater elevations are summarized on Table 1. Inferred groundwater elevation contours are shown on Figure 2.

Water Quality Sampling

The scope of sampling as originally planned is included as Table 2. The scope was modified as follows:

- Samples were collected for laboratory geochemical analysis instead of in-situ field geochemical testing to improve efficiency.

Exhibit 1 below summarizes the sampling methods used during the monitoring event. The quality assurance/quality control (QA/QC) samples collected for VOC analysis are summarized in Exhibit 2. Samples (including QA/QC samples) submitted for off-site laboratory analysis or field screening are tabulated in Exhibit 3. Laboratory and field analytical data are summarized in Table 3.

Exhibit 1 Summary of Sampling Methods

Sample Method	Number of Locations Sampled
Modified Low-Flow	14
Submerged Container (surface water)	4
Passive Diffusion Bag	5
FLUTE® Purge	0
Bailer	0
Purge Water Tote Sample	1

Exhibit 2 Summary of QA/QC Samples for VOC analysis

Total Sample Locations	24
Duplicate Samples	2
Matrix Spikes	1
Matrix Spike Duplicates	1
Field Blanks	3
Equipment Blanks	1
Trip Blanks	2

Exhibit 3 Summary of Analytical Type

Sample Type – Off-Site Laboratory	Laboratory	Number of Samples
VOCs	Eurofins	34
Total Organic Carbon	Eurofins	21
Geochemical Analyses	Eurofins	14
Volatile Fatty Acids	Pace	21
Light Gases (Ethane, Ethene, and Methane)	Pace	21

Equipment Calibration

Exhibit 4 below summarizes the field instruments utilized during field sampling. The instruments were calibrated each morning and a calibration check was performed at the end of each day. Calibration records are kept on file and available upon request.

Exhibit 4 Summary of Field Instrumentation

INSTRUMENT	FIELD PARAMETER
YSI Water Quality Parameter Probe	Temperature, pH, Specific Conductance, Dissolved Oxygen, and Oxidation-reduction Potential
HACH 2100P Turbidimeter	Turbidity

SUMMARY OF RESULTS

Geochemical and VOC Results

A summary of the groundwater quality data and inferences is presented on Figure 2. Figure 3 is an interactive PDF presenting the geochemical data used to infer the geochemical conditions shown on Figure 2. Field sampling records and analytical laboratory reports are kept on file and available upon request.

Enhanced biochemical degradation of VOCs in groundwater is being monitored by: 1) tracking changes in concentration of the parent contaminant compound, trichloroethene (TCE), 2) tracking the presence of breakdown products of TCE, including the terminal breakdown products ethene and ethane, and 3) tracking the presence of geochemical conditions favorable to biochemical conditions by reductive dehalogenation.

The field and laboratory data for September 2019 reflect conditions approximately two years after the last injection of edible oil amendment (i.e., electron donor to facilitate reductive dichlorination) in August 2017. The results indicate remedy performance generally consistent with project performance goals established in the SMP, with some indications of potential changes noted below. Geochemical conditions generally remain within ranges that are favorable for reductive dehalogenation over most of the primary source area; however, as discussed in previous sampling reports, the most recent injection did not have as strong an affect as previous injections.

As shown on Figure 2, the overall area of sulfate-reducing conditions, which are marginally conducive to reductive dehalogenation, and the overall area of methanogenic conditions, which are more conducive to reductive dehalogenation, are generally comparable to previous areas in June 2019. There is evidence of slightly less favorable conditions downgradient to the north, but slightly more favorable conditions downgradient to the south and across the property boundary. Figure 3 (the interactive PDF) presents the geochemical data used to infer the limits of sulfate-reduction and methanogenesis shown on Figure 2.

Depicted below in Exhibit 5 are the September 2019 monitoring results for select key parameters in comparison to the previous monitoring results of June 2019. TCE and terminal breakdown product (ethene and ethane) concentrations are stable or have exhibited a favorable change in 73% and 58% of sampled wells, respectively, which is similar in magnitude for stable or improving concentrations observed in June 2019.

Exhibit 5: September 2019 Results Compared to June 2019

Analyte	TCE ug/L	Ethene+Ethane ug/L	TOC mg/L	ORP mV	DO mg/L
Injection Boreholes					
IB-7	0.40	31	65		
A-13	<100	2,300	49		
B-4	<50	6.1	360		
B-7	110	390	3,400		
B-9	62	700	3,700		
Injection Displacement Zone					
BP-2A	11	700	5.4	-80	0.59
BP-4A	290	76	4.6	50	0.39
BP-13A	25	0.0085	2.9	85	7.8
BP-36A	1,300	310	3.7	2.0	0.22
Downgradient - on site					
BP-1A	150	0.047	17	62	6.0
BP-5A	9.7	0.23	23		
BP-6A	4,200	360	310	30	0.36
BP-9A	440	38	2.2	19	1.0
BP-34A	26,000	290	6.5	-11	0.40
BP-35A	1,500	1.4	3.3	35	0.58
BP-37A	12	0.042	3.1	87	3.7
Downgradient - off site					
BP-31A	3.7	0.026	1.0	140	6.2
BP-38A	68	0.34	1.5	69	0.72
BP-39A	120	0.38	2.2	76	0.65

Favorable Change	≥ 10% decline	≥ 10% increase	≥ 10% increase	≥ 10% decline	≥ 10% decline
Number of Wells	10	6	5	5	5
Stable	0 to ± 10%	0 to ± 10%	0 to ± 10%	0 to ± 10%	0 to ± 10%
Number of Wells	4	5	6	3	0
Unfavorable Change	≥ 10% increase	≥ 10% decline	≥ 10% decline	≥ 10% increase	≥ 10% increase
Number of Wells	5	8	8	5	8

Concentrations shown from September 2019 sampling event, rounded to 2 sig. figures.
Blank cell indicates lack of data in one or both events.

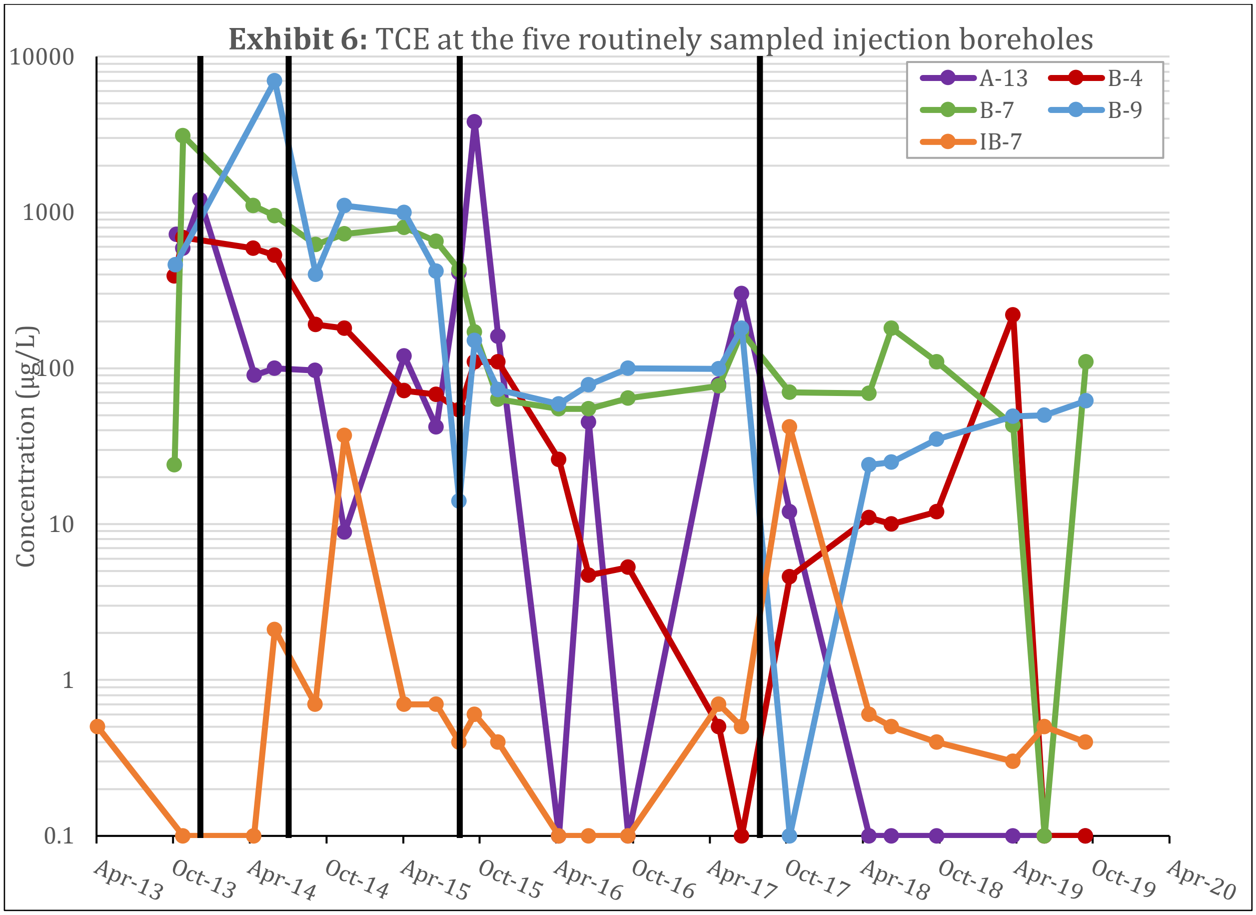
Exhibit 5 also summarizes results for total organic carbon (TOC) and geochemical data for oxidation-reduction potential (ORP) and dissolved oxygen (DO). The data indicate that 8 wells show a favorable or stable ORP change, compared to 6 wells in June. Five wells also show a favorable or stable DO change, which is the same as in June 2019.

TOC concentrations greater than the 100 milligrams per liter (mg/L) threshold to support biological degradation were measured at 3 of the 5 sampled injection boreholes. TOC levels declined by 10 percent or more at all the sampled injection boreholes and at 3 of the 14 sampled monitoring wells within the injection displacement zone and further downgradient. The decreasing trend in TOC concentrations suggests continued consumption and downgradient dispersal of amendment. Consistent with historical monitoring, the highest TOC concentration observed in downgradient monitoring wells was at BP-6A, where TOC was reported at 310 mg/L.

The average groundwater temperature increased from 10.8°C in June 2019 to 14.1°C in September 2019, consistent with past fall monitoring. Groundwater temperature above 10°C is thought to be most conducive to microbial activity.

Overall, the VOC and geochemical data continue to indicate a muted response to the injection of edible oil amendment in August 2017, which has been generally less impactful than previous injection events. As noted in previous reports, emplacement of the oil emulsion into the fractures has possibly reduced the effective water permeability and contact with VOC-containing groundwater. Redevelopment activities took place following the September 2019 monitoring round and are summarized under separate cover. After the effects of borehole redevelopment are assessed and spring 2020 monitoring is completed, we will assess the need for an amendment injection in summer 2020.

Exhibit 6 below shows the TCE concentrations for the five injection boreholes that are routinely sampled. Most of these injection boreholes continue to exhibit overall order of magnitude or greater decreases in TCE concentrations compared to historical high concentrations; however, since the August 2017 injection, the TCE concentrations trends have been variable.



Note: Non-detects are plotted as 0.1 µg/L. The vertical black lines indicate amendment injections conducted in December 2013, July 2014, August 2015, and August 2017.

Possible indication of increasing concentration trends and/or historical high concentrations of vinyl chloride have been observed in several monitoring wells starting in June 2018:

- **BP-39A:** Possible indication of increasing trend of vinyl chloride based on the detection of 7.2 µg/L in June 2018, which exceeded the New York State Department of Environmental Conservation Class GA Groundwater quality standard of 2 µg/L. In June 2019 and September 2019, vinyl chloride was detected at 5.9 and 3.1 µg/L, respectively. Since June 2018, vinyl chloride was detected at concentrations as low as 0.2 µg/L. However, during this time, terminal breakdown products ethene and ethane, which had not typically been detected above the reporting limit at this well, have been detected consistently, suggesting biodegradation has not stalled at vinyl chloride;

- **BP-35A:** Vinyl chloride was detected for the first time since September 2015 at 5.3 µg/L, which is lower than the historical high concentration. The increase in vinyl chloride was accompanied by increasing ethene and ethane concentrations and a reduction in TCE from 33% to 15% by mass of total VOCs;

- **BP-34A**: Historically high concentrations of vinyl chloride (2,000 µg/L) observed consistently since March 2019, compared to a previous high of 1,400 µg/L in April and

June 2017. Elevated vinyl chloride concentrations are accompanied by increasing ethene and ethane concentrations, suggesting biodegradation is not stalled; and

- **BP-6A:** Historically high concentration of 8,100 µg/L in September 2019 has increased from 1,400 ug/l in June 2019. Elevated vinyl chloride concentrations are accompanied by increasing ethene and ethane concentrations, suggesting biodegradation is not stalled.

The production of vinyl chloride does not appear to be driving greater mass flux across the property line based on further downgradient monitoring results.

The next performance monitoring event will be conducted in March/April 2020. Please contact us if you have any questions.

Very truly yours,
SANBORN, HEAD ENGINEERING, P.C.

David Shea, P.E.
Principal

Erica M. Bosse
Project Manager

PJP/EMB/DS: pjp

Encl.	Table 1	Summary of Water Level Data
	Table 2	Scope of Performance Monitoring
	Table 3	Summary of September 2019 Performance Monitoring
	Figure 1	Monitoring Location Plan
	Figure 2	Summary of September 2019 Groundwater Quality Conditions
	Figure 3	Summary of Geochemical Conditions

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Table 1
Summary of September 2019 Water Level Data
Summary Trip Report
IBM Gun Club - Former Burn Pit Area
Union, New York

Well Location	Reference Elevation (ft amsl)	Depth to Water (ft bgs)	Equivalent Potentiometric Elevation (ft amsl)
A-1	1391.11	6.32	1384.79
A-2	1390.68	6.25	1384.43
A-3	1392.74	10.15	1382.59
A-4	1397.56	9.91	1387.65
A-5	1397.40	6.90	1390.50
A-6	1397.86	5.96	1391.90
A-7	1397.28	9.89	1387.39
A-8	1396.81	4.69	1392.12
A-9	1396.47	5.86	1390.61
A-10	1396.06	2.42	1393.64
A-11	1395.73	9.68	1386.05
A-12	1395.59	11.74	1383.85
A-13	1394.25	17.18	1377.07
A-14	1394.61	8.46	1386.15
A-15	1393.47	11.73	1381.74
A-16	1398.14	8.72	1389.42
A-17	1395.48	10.56	1384.92
B-1	1385.26	8.94	1376.32
B-2	1384.71	8.49	1376.22
B-3	1385.48	6.57	1378.91
B-4	1385.03	6.71	1378.32
B-5	1383.99	7.35	1376.64
B-6	1384.48	7.58	1376.90
B-7	1385.33	6.85	1378.48
B-8	1384.90	4.95	1379.95
B-9	1385.21	10.90	1374.31
B-10	1384.69	6.19	1378.50
B-11	1384.40	6.98	1377.42
B-12	1383.87	7.71	1376.16
B-13	1384.50	8.22	1376.28
BP-1A	1395.67	15.37	1380.30
BP-2A	1396.89	12.25	1384.64
BP-4A	1391.96	14.33	1377.63
BP-5A	1391.09	18.16	1372.93
BP-6A	1393.95	15.43	1378.52
BP-7A	1388.89	12.79	1376.10
BP-8A	1384.53	15.77	1368.76
BP-9A	1379.17	12.94	1366.23
BP-10A	1381.74	17.18	1364.56
BP-11A	1384.80	12.90	1371.90
BP-12A	1386.64	18.58	1368.06
BP-13A	1398.89	15.80	1383.09
BP-14A	1379.46	29.80	1349.66
BP-15A	1388.32	Dry	

Table 1
Summary of September 2019 Water Level Data
Summary Trip Report
IBM Gun Club - Former Burn Pit Area
Union, New York

Well Location	**Reference Elevation (ft amsl)**	**Depth to Water (ft bgs)**	**Equivalent Potentiometric Elevation (ft amsl)**
BP-16A	1389.69	15.69	1374.00
BP-17A	1376.30	13.49	1362.81
BP-18A	1386.54	17.40	1369.14
BP-19A	1309.40	21.26	1288.14
BP-20A	1274.60	6.54	1268.06
BP-21A	1244.29	8.20	1236.09
BP-22A	1242.90	7.04	1235.86
BP-23A	1333.39	13.96	1319.43
BP-24A	1338.73	14.94	1323.79
BP-25A	1301.92	3.68	1298.24
BP-26A	1336.96	15.35	1321.61
BP-27A	1299.96	3.64	1296.32
BP-30A	1336.20	13.29	1322.91
BP-31A	1369.63	13.88	1355.75
BP-32A	1389.58	15.93	1373.65
BP-34A	1392.55	15.30	1377.25
BP-35A	1391.75	16.68	1375.07
BP-36A	1383.68	13.73	1369.95
BP-37A	1389.92	10.68	1379.24
BP-38A	1375.10	13.71	1361.39
BP-39A	1370.17	10.21	1359.96
GC-2A	1383.32	21.25	1362.07
IB-1	1392.20	7.63	1384.57
IB-2	1393.47	8.90	1384.57
IB-3	1393.07	10.82	1382.25
IB-4	1393.78	9.18	1384.60
IB-5	1393.88	11.56	1382.32
IB-6	1393.05	8.47	1384.58
IB-7	1393.23	8.64	1384.59
IB-8	1393.43	10.09	1383.34
IB-9	1393.62	9.03	1384.59

Notes:

1. This table summarizes depth to water measurements and calculated water table elevations recorded during the September 2019 performance monitoring round on September 16-18, 2019. Measurements were collected relative to the marked reference point at each location using a QED MP30 water level meter.

2. Abbreviations
ft amsl = feet above mean sea level
ft bgs = feet below ground surface

Table 2
Summary of Routine and Performance Monitoring Program
IBM Gun Club - Former Burn Pit Area
Union, New York

Monitoring Type	Monitoring Location	Monitoring Location Type	Sample Method				Analytical Laboratory									Field Screening
			Low Flow	PDBs	Nitrogen Purge	Surface Water	VOCs	Light Gasses	TOC	VFAs	Total Iron	Ferrous Iron	Nitrate	Sufate	Sulfide	Water Quality Parameters
Routine Monitoring (Annually in June)	BP-7A	Monitoring Well		x			x									x
	BP-8A	Monitoring Well		x			x									x
	BP-10A	Monitoring Well		x			x									x
	BP-11A	Monitoring Well		x			x									x
	BP-12A	Monitoring Well		x			x									x
	BP-14A	Monitoring Well		x			x									x
	BP-16A	Monitoring Well		x			x									x
	BP-17A	Monitoring Well		x			x									x
	BP-18A	Monitoring Well		x			x									x
	BP-19A	Monitoring Well		x			x									x
	BP-20A	Monitoring Well		x			x									x
	BP-21A	Monitoring Well		x			x									x
	BP-22A	Monitoring Well		x			x									x
	BP-23A	Monitoring Well		x			x									x
	BP-24A	Monitoring Well		x			x									x
	BP-25A	Monitoring Well		x			x									x
	BP-26A	Monitoring Well		x			x									x
	BP-27A	Monitoring Well		x			x									x
	BP-30A	Monitoring Well		x			x									x
	BP-32A	Monitoring Well		x			x									x
	GC-2A	Monitoring Well		x			x									x
	GC-1, P-1	Multi-Depth			x		x									x
	GC-1, P-8	Multi-Depth			x		x									x
	BP-12D, P1	Multi-Depth			x		x									x
	BP-12D, P7	Multi-Depth			x		x									x
	BP-13D, P1	Multi-Depth			x		x									x
	BP-13D, P5	Multi-Depth			x		x									x
	BP-15D, P1	Multi-Depth			x		x									x
	BP-15D, P5	Multi-Depth			x		x									x
Performance Monitoring (3x/year in April, June, and Sept/October)	IB-7	Injection Borehole		x			x	x	x	x						
	A-13	Injection Borehole		x			x	x	x	x						
	B-4	Injection Borehole		x			x	x	x	x						
	B-7	Injection Borehole		x			x	x	x	x						
	B-9	Injection Borehole		x			x	x	x	x						
	BP-1A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-2A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-4A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-5A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-6A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-9A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-13A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-31A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-34A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-35A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-36A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-37A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-38A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	BP-39A	Monitoring Well	x				x	x	x	x	x	x	x	x	x	x
	111	Seep/spring				x	x									x
	112	Seep/spring				x	x									x
	113	Seep/spring				x	x									x
	118	Seep/spring				x	x									x
	SW-Z	Seep/spring				x	x									x
		Total	**14**	**26**	**8**	**5**	**53**	**19**	**19**	**19**	**14**	**14**	**14**	**14**	**14**	**48**

Notes:

1. This table is intended to summarize the programs of routine and performance monitoring for remedy operations at the IBM Gun Club - Former Burn Pit Area starting in 2016. Additional monitoring points may be sampled based on field observations. "SW-Z" serves as a placeholder for sampling any on-site seep or spring that can be reasonably sampled. The table summarizes sample method, analytical laboratory analysis, and field screening.

2. Sample method:
"Low Flow" indicates samples will be collected by bladder pump using low flow techniques.
"PDBs" indicates that the well has sufficient water column to sample with passive diffusion bags - if conditions are observed to be different than anticipated, sampling will proceed using low flow techniques.
"Nitrogen purge" indicates that sample will be collected by purging the multi-level port with nitrogen (multi-level systems only).
"Surface water" samples will be collected using a clean glass vial.

3. Analytical laboratory samples:
"VOCs" indicates volatile organic compounds.
"Light gasses" includes methane, ethene and ethane.
"TOC" indicates total organic carbon.
"VFAs" indicates volatile fatty acids.

4. " Water quality parameters" indicates screening during well purging and water quality sampling by multi-parameter probes, e.g. by YSI® 556 multi-Probe meter or similar and HACH® turbidity meter or similar (low flow, multi-level system, bailer, and surface water sampling) or by water quality parameter sounding (PDB sampling). The water quality parameters may include temperature, specific conductance, oxidation-reduction potential, dissolved oxygen, pH, and turbidity. In addition surface water samples will include water clarity descriptors (transparency, translucence, or opaqueness, and color).

TABLE 3
SUMMARY OF SEPTEMBER 2019 PERFORMANCE MONITORING
Summary Trip Report
IBM Gun Club - Former Burn Pit Area
Union, New York

Analyte Name	Unit	BP-1A	BP-2A	BP-4A	BP-4A	BP-5A	BP-6A	BP-9A	BP-13A	BP-31A	BP-34A	BP-35A	BP-36A	BP-36A	BP-37A	BP-38A	BP-39A	A-13	B-4
		BP-1A	BP-2A	BP-4A	BP-4A_FD	BP-5A	BP-6A	BP-9A	BP-13A	BP-31A	BP-34A	BP-35A	BP-36A	BP-36A_FD	BP-37A	BP-38A	BP-39A	A-13	B-4
		Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	Low Flow	PDB	PDB
		S	S	S	FD	S	S	S	S	S	S	S	S	FD	S	S	S	S	S
	Unit	9/17/2019	9/17/2019	9/17/2019	9/17/2019	9/18/2019	9/18/2019	9/17/2019	9/18/2019	9/17/2019	9/17/2019	9/17/2019	9/17/2019	9/17/2019	9/17/2019	9/17/2019	9/17/2019	9/16/2019	9/16/2019
VOLATILE ORGANIC COMPOUNDS (VOCs)																			
Trichloroethene (TCE)	µg/l	**150**	**11 J**	**290**	**250**	**9.7**	**4,200**	**440**	**25**	**3.7**	**26,000**	**1,500**	**1,300**	**1,300**	**12**	**68**	**120**	<100	<50
Dichloroethene (cis-1,2-)	µg/l	**170**	**5,300**	**110**	**120**	**33**	**63,000**	**1,200**	**1.5**	**0.80**	**58,000**	**6,200**	**12,000**	**12,000**	**1.5**	**16**	**140**	**7,300**	**18 J**
Dichloroethene (trans-1,2-)	µg/l	**0.70**	**13 J**	**2.6**	**2.6**	**0.40 J**	**190 J**	**10**	<0.5	<0.5	**210 J**	**15 J**	**65**	**65**	<0.5	**0.10 J**	**0.40 J**	**21 J**	<50
Dichloroethene (1,1-)	µg/l	**0.50 J**	**6.9 J**	**1.3**	**1.2**	<2.5	**120 J**	**5.3 J**	<0.5	<0.5	**130 J**	**7.4 J**	**22 J**	**21 J**	<0.5	<1	**0.50**	<100	<50
Tetrachloroethene (PCE)	µg/l	<0.5	<25	<1	<1	<2.5	<250	<10	<0.5	**0.40 J**	<250	<25	<50	<50	<0.5	<1	**0.08 J**	<100	<50
Vinyl chloride	µg/l	**0.80**	**1,600**	**19**	**21**	<2.5	**8,100**	**86**	<0.5	<0.5	**2,000**	**5.3 J**	**820**	**790**	<0.5	<1	**3.1**	**1,600**	<50
LIGHT GASSES																			
Ethane	µg/l	**0.024 J**	**0.86**	**43**	**45**	**0.058 J**	**1.2**	**16**	<0.1	**0.015 J**	**13**	**0.17**	**13**	**13**	**0.026 J**	**0.070 J**	**0.24**	**110**	**1.3**
Ethene	µg/l	**0.023 J**	**700**	**29**	**31**	**0.17**	**360**	**22**	**0.0085 J**	**0.011 J**	**280**	**1.2**	**300**	**300**	**0.016 J**	**0.27**	**0.14**	**2,200**	**4.8**
Methane	µg/l	**0.20 J**	**950**	**5,300**	**5,400**	**0.67**	**100**	**9,100**	**0.10 J**	**0.20 J**	**3,500**	**50**	**5,300**	**5,400**	**46**	**6.7**	**37**	**5,100**	**26,000**
MOLAR CONCENTRATION																			
Trichloroethene (TCE)	µmol/l	1.1	0.084	2.2	1.9	0.074	32	3.3	0.19	0.028	200	11	9.9	9.9	0.091	0.52	0.91	ND	ND
Dichloroethene (cis-1,2-)	µmol/l	1.8	55	1.1	1.2	0.34	650	12	0.015	0.0083	600	64	120	120	0.015	0.17	1.4	75	0.19
Dichloroethene (trans-1,2-)	µmol/l	0.0072	0.13	0.027	0.027	0.0041	2.0	0.10	ND	ND	2.2	0.15	0.67	0.67	ND	0.0010	0.0041	0.22	ND
Dichloroethene (1,1-)	µmol/l	0.0052	0.071	0.013	0.012	ND	1.2	0.055	ND	ND	1.3	0.076	0.23	0.22	ND	ND	0.0052	ND	ND
Tetrachloroethene (PCE)	µmol/l	ND	ND	ND	ND	ND	ND	ND	ND	0.0024	ND	ND	ND	ND	ND	ND	0.00048	ND	ND
Vinyl chloride	µmol/l	0.013	26	0.30	0.34	ND	130	1.4	ND	ND	32	0.085	13	13	ND	ND	0.050	26	ND
Ethane	µmol/l	0.00080	0.029	1.4	1.5	0.0019	0.040	0.53	ND	0.00050	0.43	0.0057	0.43	0.43	0.00086	0.0023	0.0080	3.7	0.043
Ethene	µmol/l	0.00082	25	1.0	1.1	0.0061	13	0.78	0.00030	0.00039	10	0.043	11	11	0.00057	0.010	0.0050	78	0.17
Total	µmol/l	2.9	110	6.1	6.1	0.43	830	19	0.21	0.040	850	76	160	150	0.11	0.70	2.4	180	0.40
MOLAR PERCENTAGE																			
TCE	%	39	0.076	36	31	17	3.9	18	92	71	24	15	6.2	6.6	84	74	38	ND	ND
DCEs	%	60	50	19	21	81	79	67	7.5	21	71	85	76	81	14	24	60	42	46
VC	%	0.44	23	4.9	5.5	ND	16	7.4	ND	ND	3.8	0.11	8.2	8.4	ND	ND	2.0	14	ND
Ethane+Ethene	%	0.055	23	40	43	1.9	1.6	7.1	0.15	2.2	1.2	0.064	7.0	7.4	1.3	1.7	0.53	46	54
VOLATILE FATTY ACIDS																			
Acetic Acid	mg/l	**0.046 J**	**0.087 J**	**0.050 J**	**0.047 J**	**0.085 J**	**0.053 J**	**0.053 J**	**0.031 J**	**0.050 J**	**0.096 J**	**0.050 J**	**1.1**	**1.2**	**0.035 J**	**0.042 J**	**0.030 J**	**8.1**	**310**
Butyric Acid	mg/l	<0.1	**0.015 J**	**0.016 J**	**0.016 J**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.018 J**	**0.017 J**	<0.1	<0.1	<0.1	**0.19**	**9.9**
Hexanoic Acid	mg/l	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	**0.018 J**	**0.87**
i-Hexanoic Acid	mg/l	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	**0.27**
i-Pentanoic Acid	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.092 J**	**5.7**
Lactic Acid	mg/l	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	**0.054 J**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2
Pentanoic Acid	mg/l	<0.1	**0.031 J**	**0.021 J**	**0.020 J**	<0.1	**0.26**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.021 J**	**6.0**
Propionic Acid	mg/l	**0.040 J**	**0.0082 J**	**0.011 J**	**0.010 J**	**0.017 J**	**0.0048 J**	**0.015 J**	**0.0075 J**	**0.015 J**	**0.0072 J**	**0.016 J**	**0.011 J**	**0.012 J**	**0.011 J**	**0.016 J**	**0.014 J**	**0.33**	**110**
Pyruvic Acid	mg/l	<0.1	<0.1	<0.1	<0.1	**0.026 J**	**0.077 J**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
OTHER LABORATORY DATA																			
Carbon Tetrachloride	µg/l	<0.5	<25	<1	<1	<2.5	<250	<10	**0.90**	<0.5	<250	<25	<50	<50	**0.20 J**	**1.1**	**0.10 J**	<100	<50
Total Organic Carbon	mg/l	**17**	**5.4**	**4.6**	**4.4**	**23**	**311**	**2.2**	**2.9**	**0.95 J**	**6.5**	**3.3**	**3.7**	**3.7**	**3.1**	**1.5**	**2.2**	**49**	**357**
WATER QUALITY PROBE DATA																			
Temperature	°C	**16**	**16**	**18**	–	–	**12**	**13**	**11**	**11**	**15**	**15**	**14**	–	**17**	**12**	**12**	–	–
Specific Conductance	uS/cm	**2,300**	**870**	**720**	–	–	**6,300**	**460**	**140**	**310**	**1100**	**900**	**710**	–	**710**	**370**	**170**	–	–
pH	s.u.	**7.2**	**6.5**	**7.5**	–	–	**6.8**	**7.5**	**6.2**	**7.5**	**7.3**	**7.4**	**7.3**	–	**7.0**	**6.6**	**5.8**	–	–
Oxidation/Reduction Potential	mV	**62**	**-80**	**50**	–	–	**30**	**19**	**85**	**140**	**-11**	**35**	**2.0**	–	**87**	**69**	**76**	–	–
Dissolved Oxygen	mg/l	**6.0**	**0.59**	**0.39**	–	–	**0.36**	**0.96**	**7.8**	**6.2**	**0.40**	**0.58**	**0.22**	–	**3.7**	**0.72**	**0.65**	–	–
Turbidity	NTU	**0.99**	**2.0**	**1.4**	–	**1.5**	**4.2**	**1.3**	**39**	**7.2**	**3.4**	**3.7**	**4.0**	–	**0.98**	**0.80**	**3.0**	–	–
GEOCHEMISTRY																			
Iron	mg/l	**0.32**	**8.2**	<0.2	–	**0.13 J**	**12**	**0.13 J**	**0.077 J**	**0.12 J**	**0.22**	**0.095 J**	**1.1**	–	**0.053 J**	<0.2	**0.18 J**	–	–
Iron - Ferrous	mg/l	**0.023 J**	**8.5**	**0.024 J**	–	**0.070 J**	**15**	**0.19**	<0.1	<0.1	**0.16**	**0.018 J**	**1.2**	–	<0.1	<0.1	**0.020 J**	–	–
Nitrate	mg/l	**1.1**	<0.5	<0.5	–	**1.0**	<0.5	<0.5	**0.36 J**	<0.5	<0.5	**0.45 J**	<0.5	–	<0.5	<0.5	<0.5	–	–
Sulfate	mg/l	**220**	**34**	**35**	–	**510**	**3,000**	**25**	**7.8**	**27**	**40**	**33**	**13**	–	**8.8**	**25**	**11**	–	–
Sulfide	µg/l	<0.3	**0.30**	<0.3	–	<0.3	**0.14 J**	<0.3	<0.3	<0.3	<0.3	<0.3	**0.62**	–	<0.3	<0.3	<0.3	–	–

TABLE 3
SUMMARY OF SEPTEMBER 2019 PERFORMANCE MONITORING
Summary Trip Report
IBM Gun Club - Former Burn Pit Area
Union, New York

Analyte Name		B-7	B-9	IB-7	111	112	113	118	TOTE
		B-7	B-9	IB-7	111	112	113	118	TOTE
		PDB	PDB	PDB	Surface Water	Surface Water	Surface Water	Surface Water	Purge Water
		S	S	S	S	S	S	S	S
	Unit	9/16/2019	9/16/2019	9/16/2019	9/18/2019	9/18/2019	9/18/2019	9/18/2019	9/18/2019
VOLATILE ORGANIC COMPOUNDS (VOCs)									
Trichloroethene (TCE)	µg/l	**110 J**	**62 J**	**0.40 J**	**0.30 J**	**0.60**	**0.30 J**	**0.070 J**	<5
Dichloroethene (cis-1,2-)	µg/l	**470**	**1,400**	**3.3**	<0.5	<0.5	<0.5	**0.060 J**	<5
Dichloroethene (trans-1,2-)	µg/l	<250	<100	**0.70**	<0.5	<0.5	<0.5	<0.5	<5
Dichloroethene (1,1-)	µg/l	<250	<100	<0.5	<0.5	<0.5	<0.5	<0.5	<5
Tetrachloroethene (PCE)	µg/l	<250	<100	<0.5	<0.5	<0.5	<0.5	<0.5	<5
Vinyl chloride	µg/l	**53 J**	**170**	<0.5	<0.5	<0.5	<0.5	<0.5	<5
LIGHT GASSES									
Ethane	µg/l	**50**	**23**	**31**	–	–	–	–	–
Ethene	µg/l	**340**	**680**	<0.1	–	–	–	–	–
Methane	µg/l	**16,000**	**15,000**	**28,000**	–	–	–	–	–
MOLAR CONCENTRATION									
Trichloroethene (TCE)	µmol/l	0.84	0.47	0.0030	0.0023	0.0046	0.0023	0.00053	ND
Dichloroethene (cis-1,2-)	µmol/l	4.8	14	0.034	ND	ND	ND	0.00062	ND
Dichloroethene (trans-1,2-)	µmol/l	ND	ND	0.0072	ND	ND	ND	ND	ND
Dichloroethene (1,1-)	µmol/l	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene (PCE)	µmol/l	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl chloride	µmol/l	0.85	2.7	ND	ND	ND	ND	ND	ND
Ethane	µmol/l	1.7	0.76	1.0	–	–	–	–	–
Ethene	µmol/l	12	24	ND	–	–	–	–	–
Total	µmol/l	20	43	1.1	0.0023	0.0046	0.0023	0.0012	ND
MOLAR PERCENTAGE									
TCE	%	4.1	1.1	0.28	100	100	100	46	ND
DCEs	%	24	34	3.8	ND	ND	ND	54	ND
VC	%	4.2	6.4	ND	ND	ND	ND	ND	ND
Ethane+Ethene	%	68	59	96	–	–	–	–	–
VOLATILE FATTY ACIDS									
Acetic Acid	mg/l	**74**	**160**	**0.14**	–	–	–	–	–
Butyric Acid	mg/l	**44**	**30**	**0.030 J**	–	–	–	–	–
Hexanoic Acid	mg/l	**17**	**5.8**	**0.015 J**	–	–	–	–	–
i-Hexanoic Acid	mg/l	**0.15 J**	**0.044 J**	<0.2	–	–	–	–	–
i-Pentanoic Acid	mg/l	**1.0**	**1.6**	<0.1	–	–	–	–	–
Lactic Acid	mg/l	<2	**0.12 J**	<0.2	–	–	–	–	–
Pentanoic Acid	mg/l	**34**	**68**	<0.1	–	–	–	–	–
Propionic Acid	mg/l	**44**	**270**	<0.1	–	–	–	–	–
Pyruvic Acid	mg/l	**0.46**	<0.1	**0.011 J**	–	–	–	–	–
OTHER LABORATORY DATA									
Carbon Tetrachloride	µg/l	<250	<100	<0.5	<0.5	<0.5	<0.5	<0.5	<5
Total Organic Carbon	mg/l	**3,350**	**3,660**	**65**	–	–	–	–	–
WATER QUALITY PROBE DATA									
Temperature	°C	–	–	–	**14**	**14**	**14**	**16**	–
Specific Conductance	uS/cm	–	–	–	**120**	**140**	**210**	**300**	–
pH	s.u.	–	–	–	**6.8**	**6.8**	**7.3**	**7.5**	–
Oxidation/Reduction Potential	mV	–	–	–	**89**	**91**	**100**	**100**	–
Dissolved Oxygen	mg/l	–	–	–	**8.2**	**7.6**	**8.1**	**7.5**	–
Turbidity	NTU	–	–	–	**12**	**17**	**17**	**85**	–
GEOCHEMISTRY									
Iron	mg/l	–	–	–	–	–	–	–	–
Iron - Ferrous	mg/l	–	–	–	–	–	–	–	–
Nitrate	mg/l	–	–	–	–	–	–	–	–
Sulfate	mg/l	–	–	–	–	–	–	–	–
Sulfide	µg/l	–	–	–	–	–	–	–	–

Notes:

1. The table summarizes samples collected during the week of Septmeber 16, 2019 as part of performance monitoring at the IBM Gun Club former Burn Pit Area. Samples were analyzed both in the field and at fixed analytical laboratories as indicated on the table.

2. Analytical laboratory analysis was performed by Eurofins Lancaster Laboratories of Lancaster, Pennsylvania (Lancaster) and/or Pace Analytical (formerly Microseeps, Inc.) of Pittsburgh, Pennsylvania (Pace). Results are recorded in units indicated on the table. Detections of compounds are emboldened.

3. Definitions:
"S" indicates primary sample
"FD" indicates field duplicate
"PDB" indicates the sample was collected via a passive diffusion bag
"–" indicates the compounds were not analyzed for that particular sample.
"<" indicates the result was below the analytical detection limit.
"J" indicates that the laboratory data was below the lowest quantifiable limit and therefore estimated.
"ND" indicates that results were not detected above the analytical reporting limit or the calibration range of the field screening device.

4. Refer to the report text for further discussion. The sample plan can be referenced in Table 2 and the Site Management Plan.

Figure 1

Monitoring Location Plan

IBM Gun Club - Former Burn Pit Area

Union, New York

Drawn By:	H. Pothier
Designed By:	E. Bosse
Reviewed By:	D. Shea
Project No:	3526.05
Date:	October 2019

Figure Narrative

This figure summarizes the locations of monitoring wells, multi-level monitoring systems, and surface water sampling points where depth to water is measured and water quality samples may be collected for field and analytical laboratory testing as part of routine and performance monitoring programs. The figure also depicts monitoring wells where dedicated water quality probes have been deployed to continuously monitor for temperature, specific conductance, oxidation-reduction potential, dissolved oxygen and pH.

The locations of site features, including monitoring wells, seeps and springs, and culverts are based on field survey by Butler Land Surveying, LLC. of Little Meadows Pennsylvania in the period 2006 through 2012.

Refer to report text for further discussion.

Legend

- Parcel B Site Boundary
- Injection Borehole
- Observed Drainage Features (arrows indicate flow direction)
- Monitoring Well
- Multi-Level Monitoring Installation
- Surface Water Sampling Point
- Culvert

Feet
100 50 0 100 200

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Figure 2

Summary of September 2019 Groundwater Quality Conditions

IBM Gun Club - Former Burn Pit Area

Union, New York

Drawn By:	H. Pothier
Designed By:	E. Bosse
Reviewed By:	D. Shea
Project No:	3526.05
Date:	October 2019

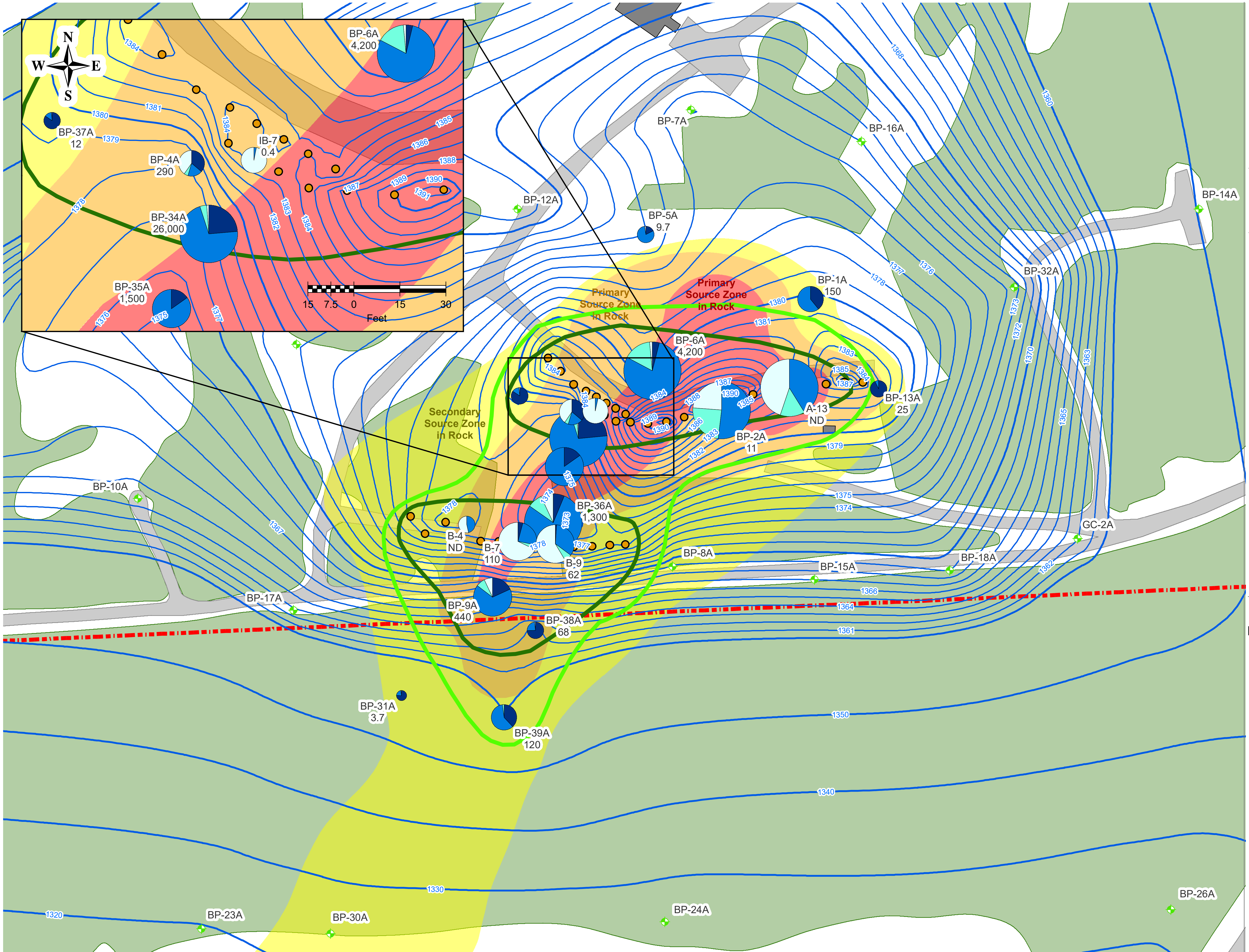

Figure Narrative

This figure shows groundwater quality data and inference based on monitoring conducted September 16-18, 2019.

The groundwater data for site key VOCs including TCE, cDCE, vinyl chloride, and ethane/ethene from water table monitoring wells are presented as pie diagrams. The wedges of each pie diagram represent concentrations of the four compounds expressed in micromoles per liter (umol/L). The relative diameter of each pie diagram varies based on the sum of the five VOCs and tDCE at each location.

The inferred sulfate-reducing and methanogenic conditions are based on observations of oxidation-reduction potential (ORP), methane, sulfide, ferrous and total iron, and nitrate. Methanogenic conditions are characterized by methane concentrations ≥ 20 µg/L, sulfate reducing by sulfide ≥ 50 µg/L, iron reducing by Fe(II)/Fe(tot) ≥ 0.7 mg/L, and nitrate reduction by nitrate <1 mg/L. ORP is generally expected to be <200 for iron reduction, <100 for sulfate reduction, and <0 for methanogenic conditions. See Figure 3 for geochemical data.

Not all geochemical conditions are satisfied within the areas shown for sulfate-reducing and methanogenic conditions. The inferred areas assume the presence of a transition zone between sulfate-reducing and methanogenic, and the position and size of these zones are based on judgement of the combined data. Other interpretations are possible.

Primary and secondary source rock was defined during the Remedial Investigation and is based on rock core samples collected from borings drilled from 2006 to 2008.

Refer to the report text for further discussion.

Legend

BP-34A 26,000 — Well Name and September 2019 TCE Concentrations in Groundwater (µg/L).

Inferred Groundwater Contour September 2019

Inferred Methanogenic Conditions

Inferred Sulfate-Reducing Conditions

Parent VOC (Trichloroethene)

Primary Daughter Product (*cis*-1,2DCE)

Secondary Daughter Product (Vinyl Chloride)

Terminal Breakdown Products (Ethane, Ethene)

Total Chlorinated Ethanes & Ethenes in Groundwater (µmol/L)

< 0.1

>0.1 to 1

>1 to 10

>10 to 100

>100

40 20 0 40 80

Feet

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Figure 3

September 2019 Assessment of Reducing Conditions

IBM Gun Club - Former Burn Pit Area

Union, New York

Drawn By: H. Pothier
Designed By: E. Bosse
Reviewed By: D. Shea
Project No: 3526.05
Date: October 2019

Figure Narrative

This figure is intended to assess multiple lines of evidence to assess what proportion of the primary and secondary source rock are under sulfate reducing and methanogenic conditions. Green labels indicate conditions conducive to reductive dehalogenation. Orange labels indicate reductive dehalogenation may be possible, but conditions are less conducive. Red labels indicate conditions where reductive dehalogenation is less likely.

Posted data is from the September 2019 sampling round.

Legend

DO mg/L	>5	2-5	<=2
ORP mV	>100	0-100	<=0
Sulfide µg/L	<10	10-50	>=50
Methane µg/L	<0.5	0.5-20	>=20
FeII mg/L	<1		>=1
pH SU	<6.3 or >7.5		6.3-7.5
Total VFA mg/L	<1		>=1
TOC mg/L	<4		>=4
Ethane + Ethene µg/L	<10	10-50	>=50

30 15 0 30 60

Feet

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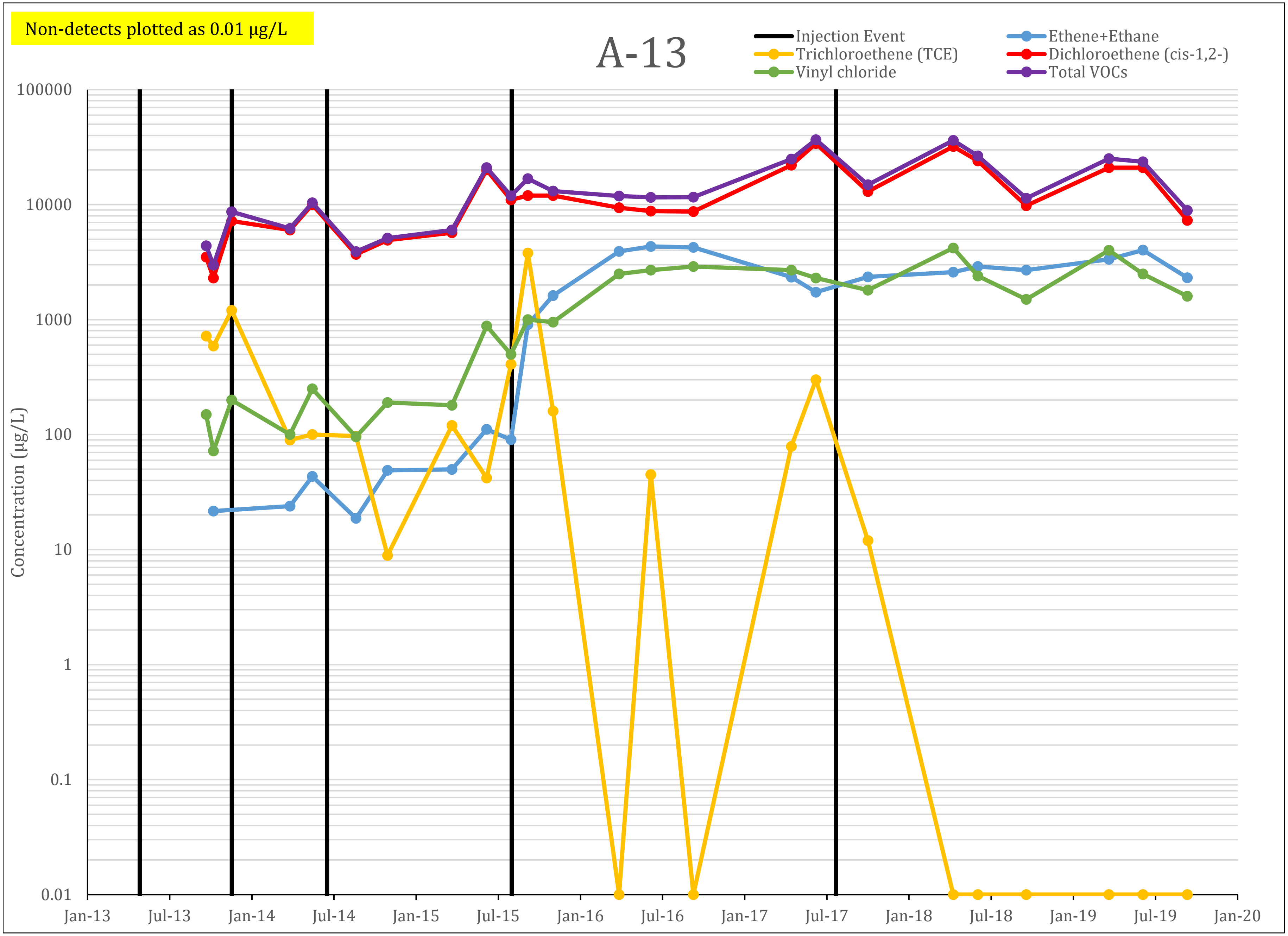
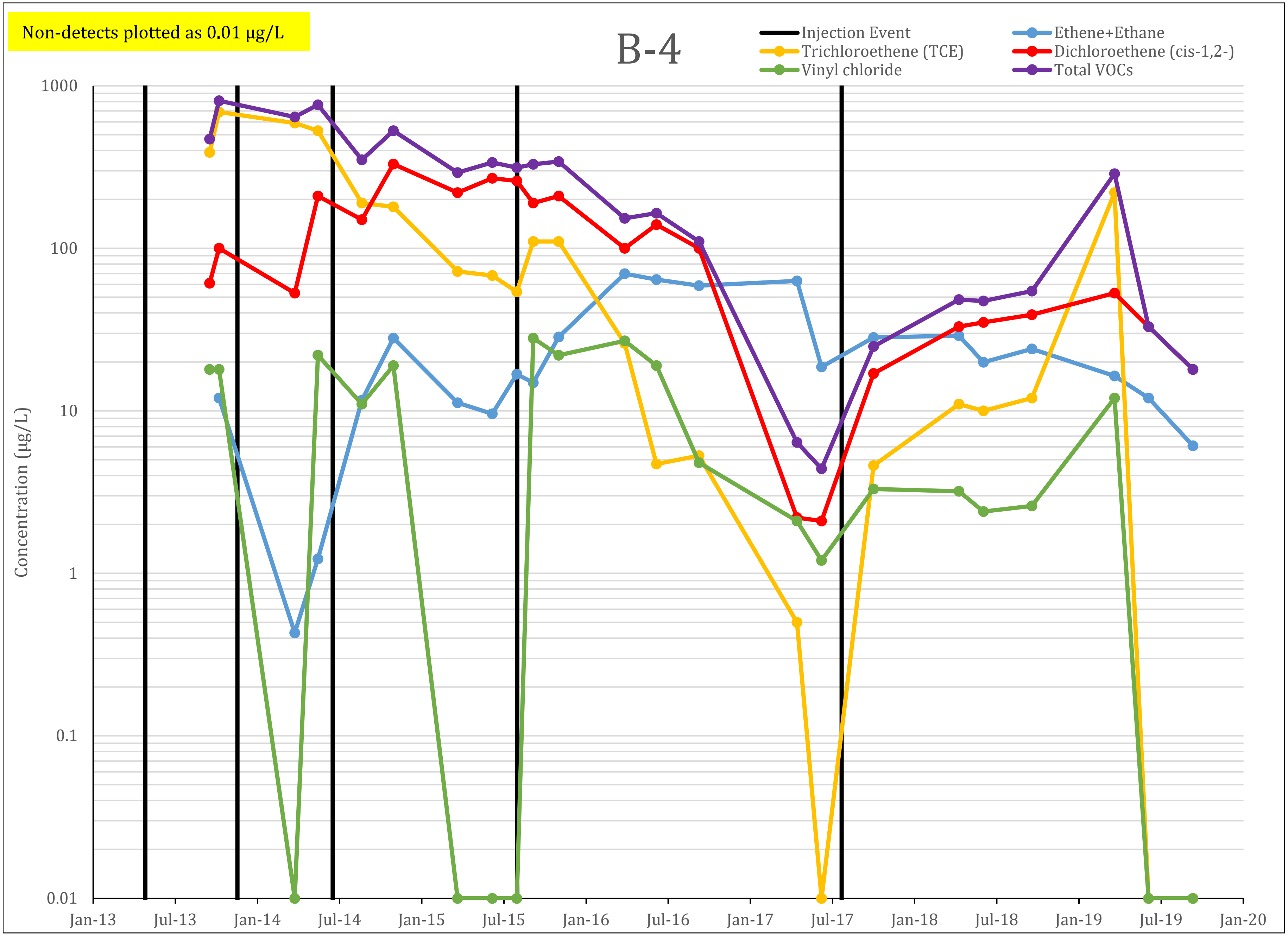
APPENDIX D

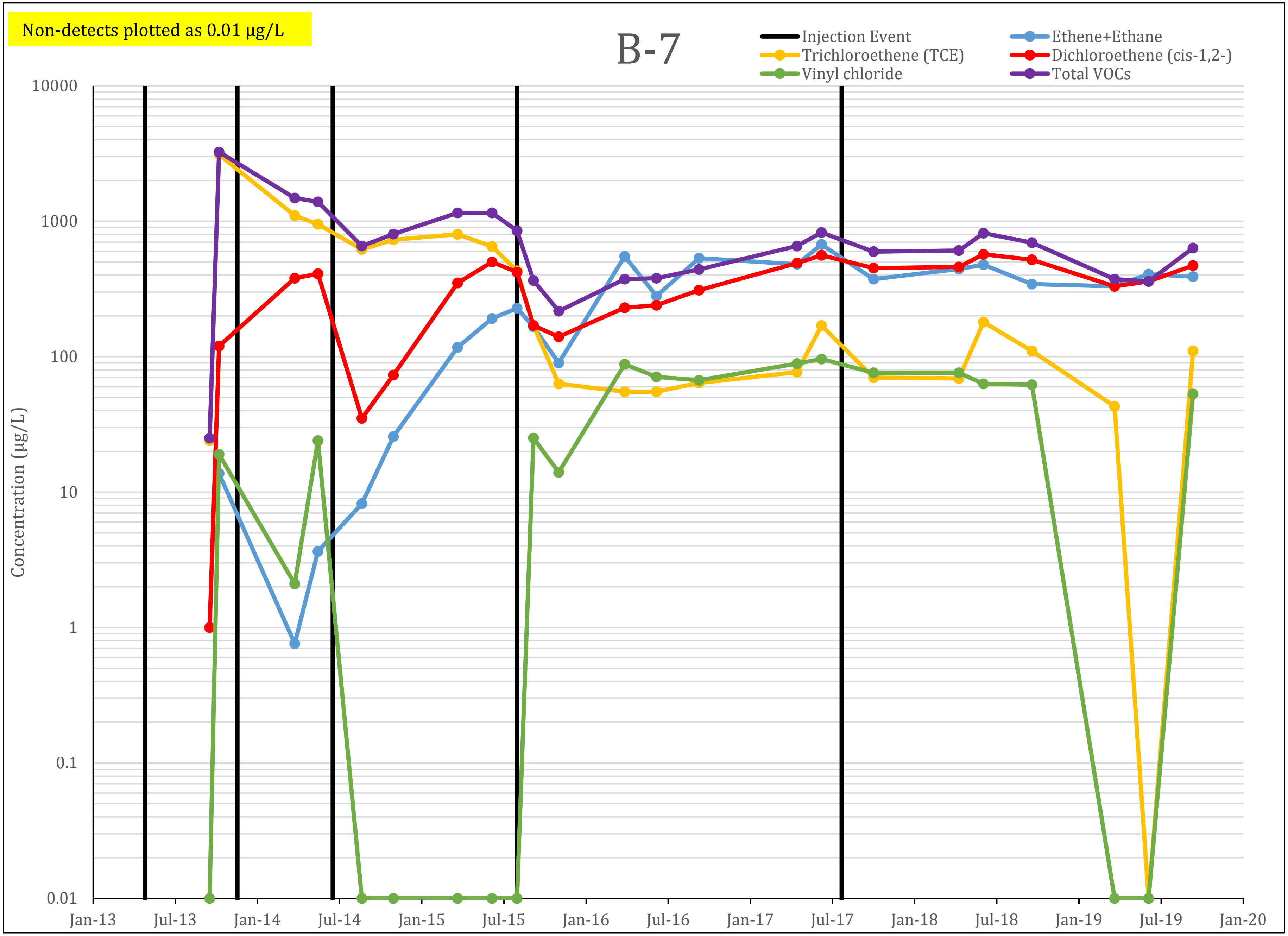
TIME SERIES PLOTS FOR CURRENT MONITORING LOCATIONS

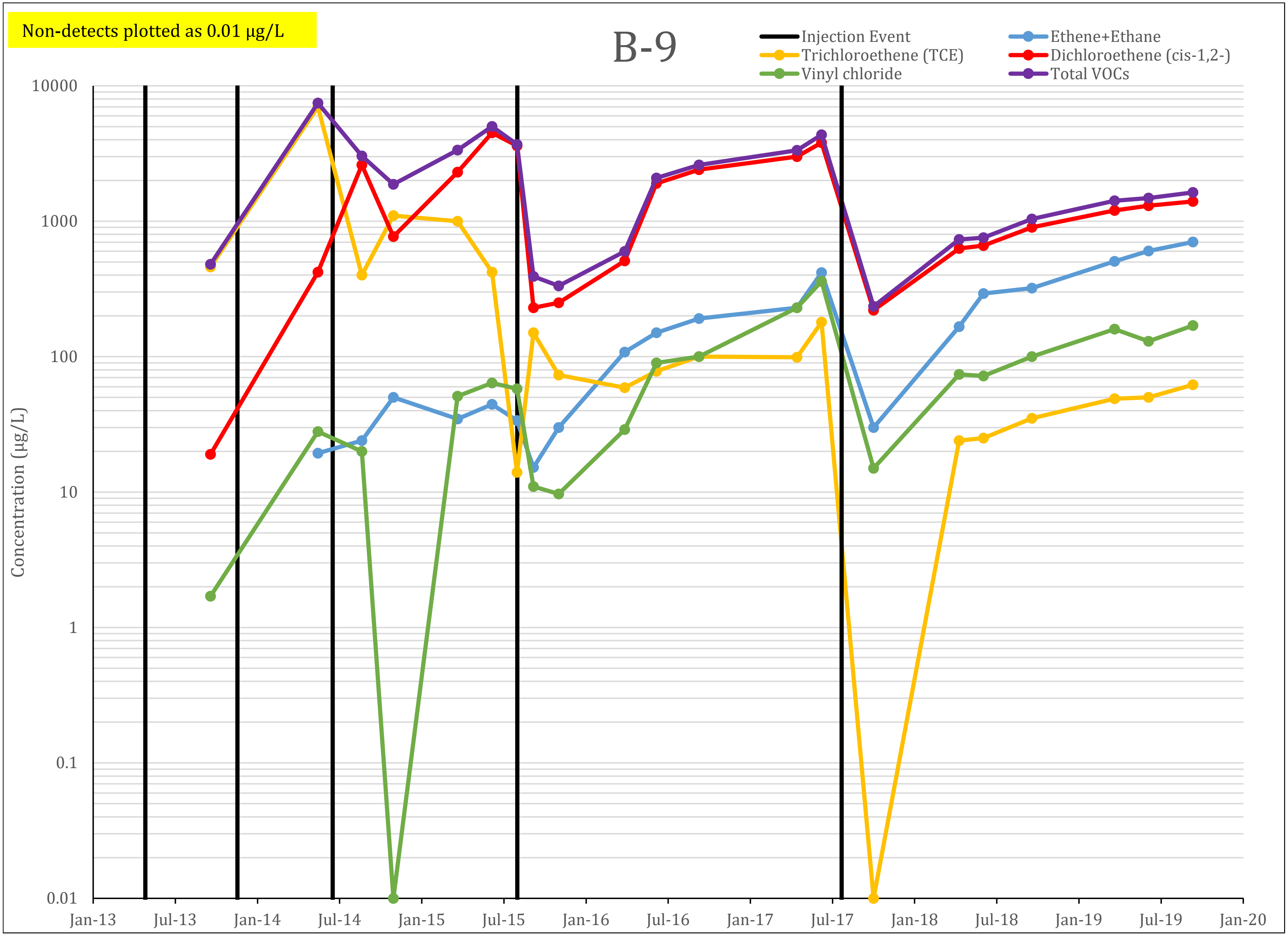


Non-detects plotted as 0.01 µg/L
A-13
Injection Event
Trichloroethene (TCE)
Vinyl chloride
Ethene+Ethane
Dichloroethene (cis-1,2-)
Total VOCs
Concentration (µg/L)
100000
10000
1000
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20

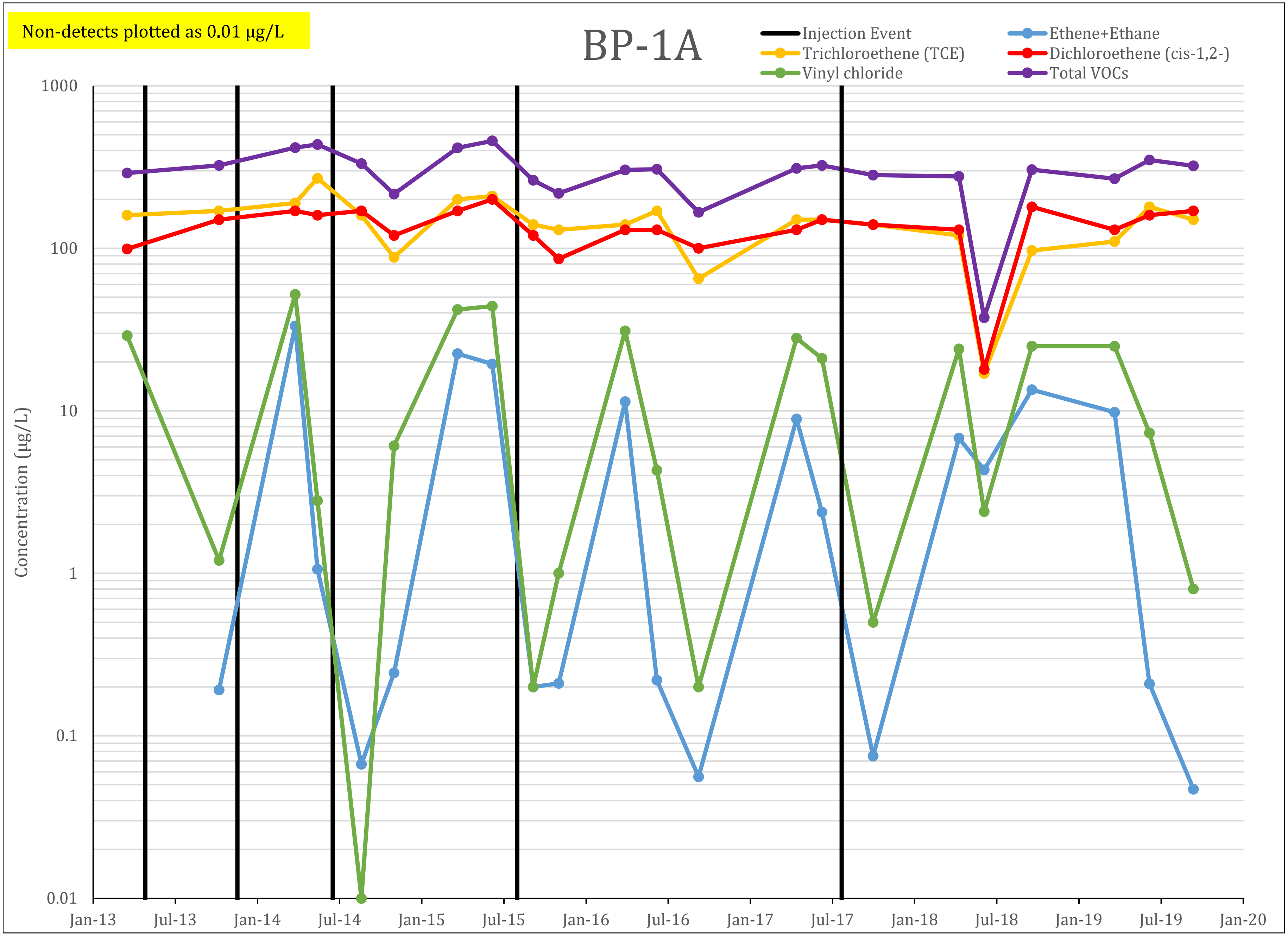


Non-detects plotted as 0.01 µg/L
B-4
Injection Event
Trichloroethene (TCE)
Vinyl chloride
Ethene+Ethane
Dichloroethene (cis-1,2-)
Total VOCs
Concentration (µg/L)
1000
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20

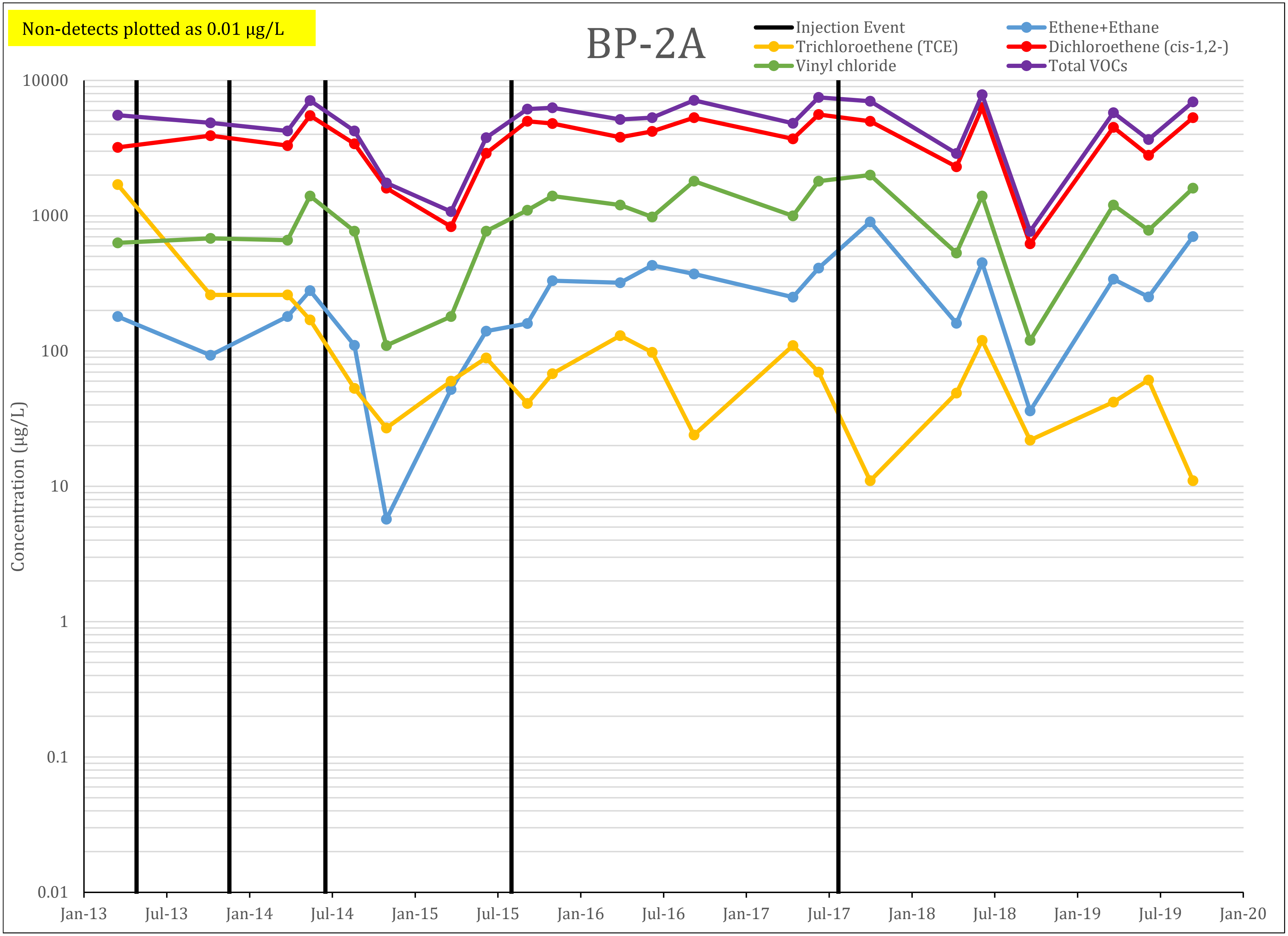

Non-detects plotted as 0.01 µg/L
B-7
Injection Event
Trichloroethene (TCE)
Vinyl chloride
Ethene+Ethane
Dichloroethene (cis-1,2-)
Total VOCs
Concentration (µg/L)
10000
1000
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20



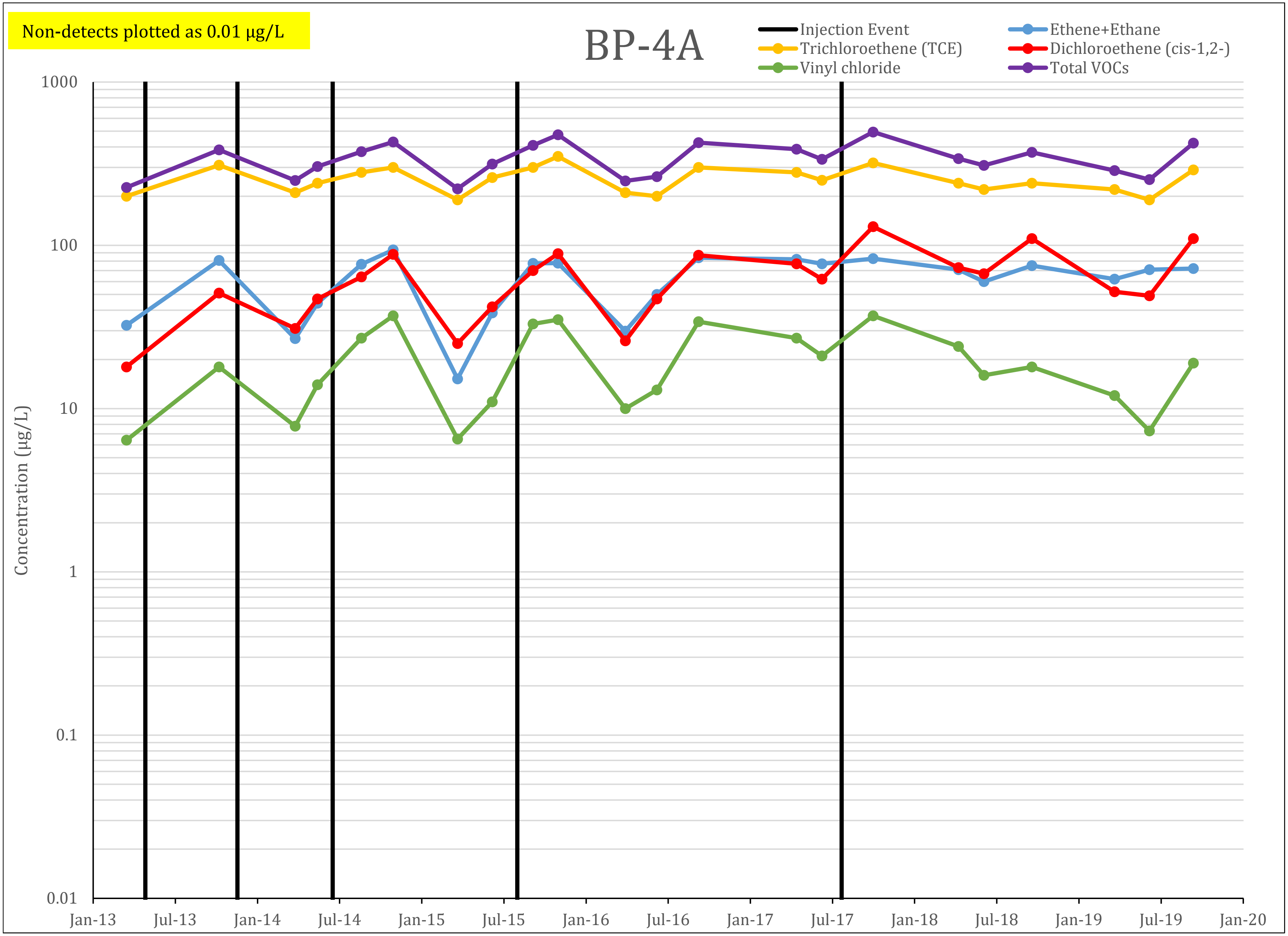
Non-detects plotted as 0.01 µg/L
B-9
Injection Event
Trichloroethene (TCE)
Vinyl chloride
Ethene+Ethane
Dichloroethene (cis-1,2-)
Total VOCs
Concentration (µg/L)
10000
1000
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20

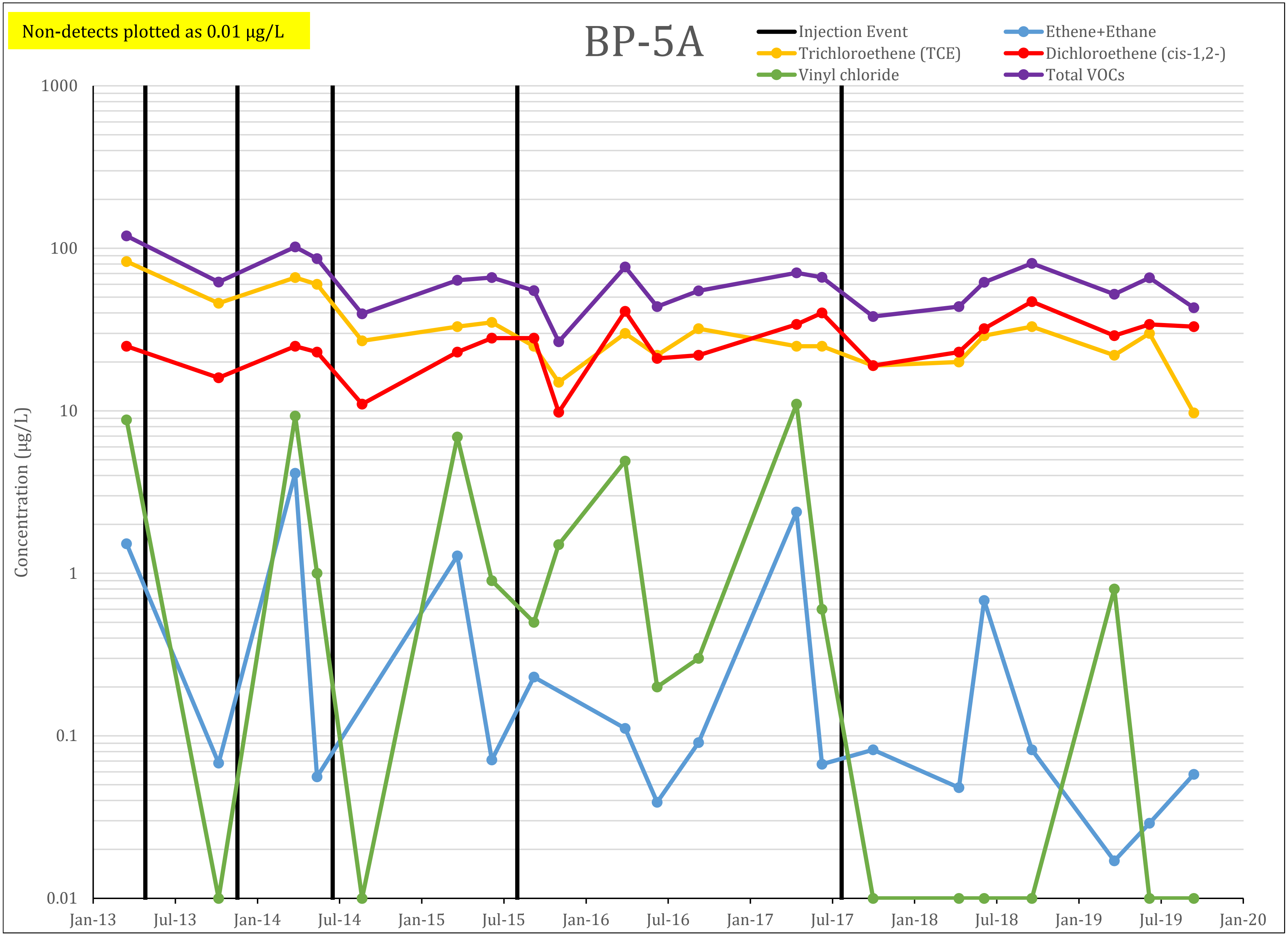


Non-detects plotted as 0.01 µg/L
BP-1A
Injection Event
Trichloroethene (TCE)
Vinyl chloride
Ethene+Ethane
Dichloroethene (cis-1,2-)
Total VOCs
Concentration (µg/L)
1000
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20

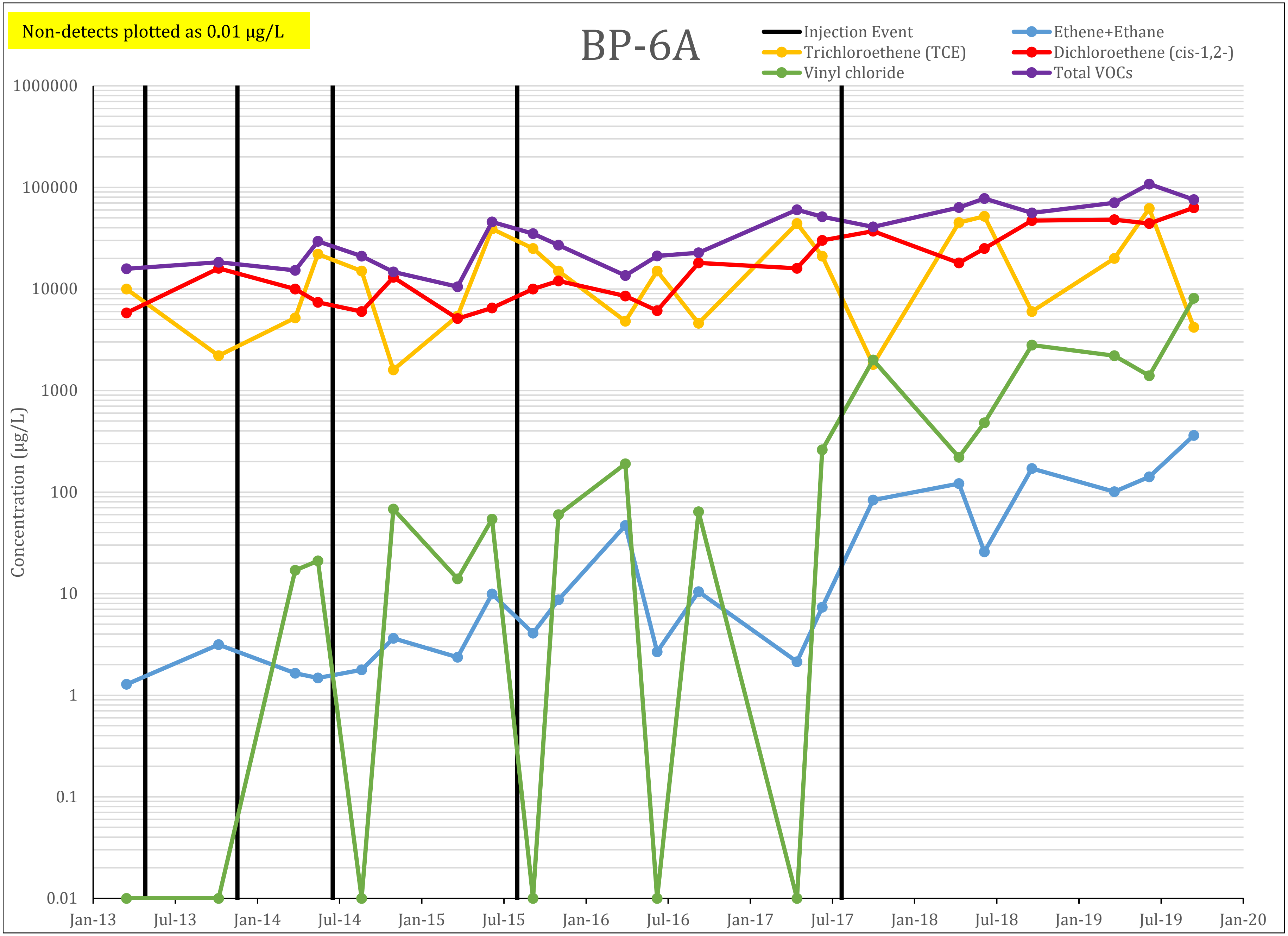


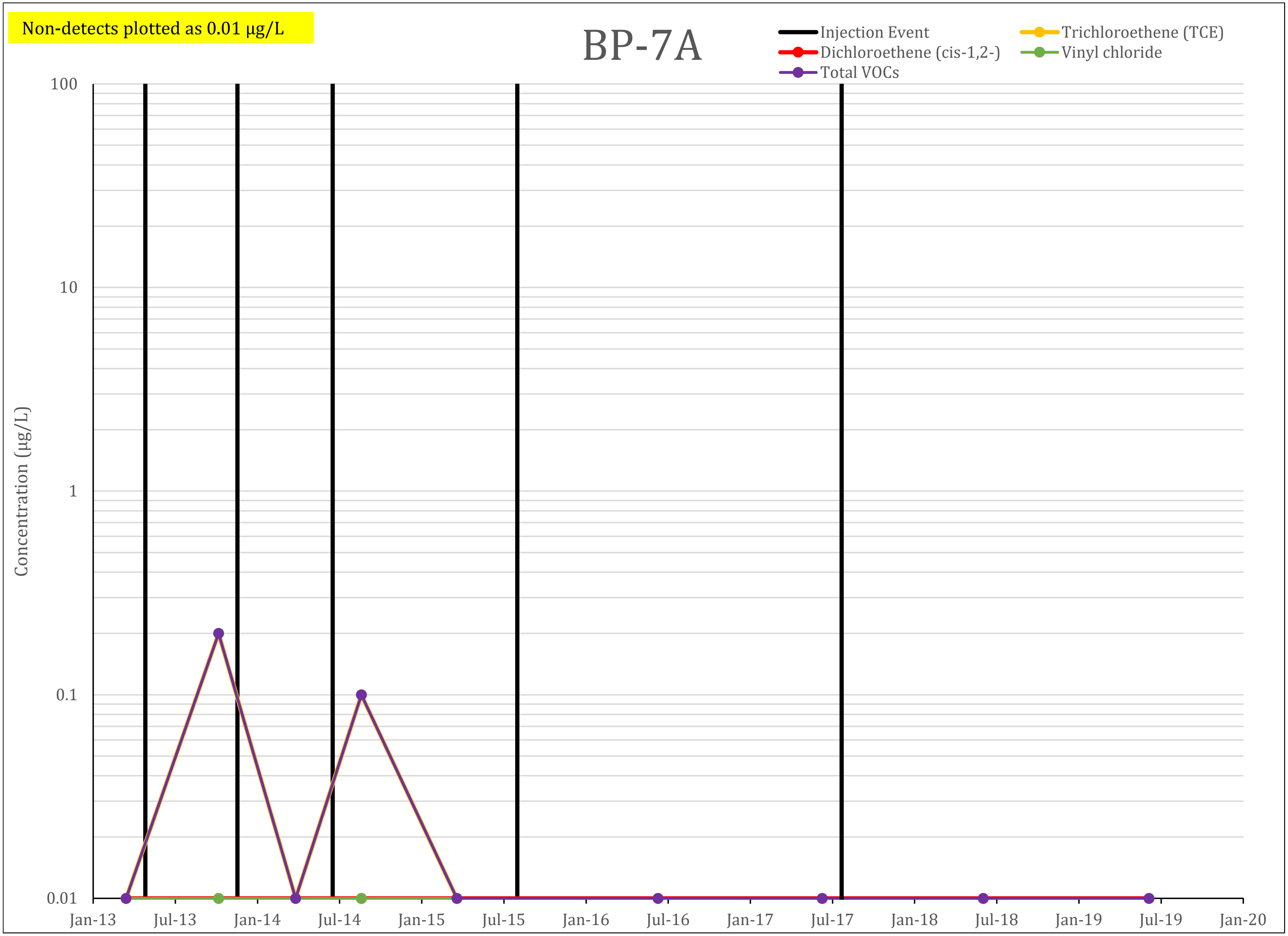
Non-detects plotted as 0.01 µg/L
BP-2A
Injection Event
Trichloroethene (TCE)
Vinyl chloride
Ethene+Ethane
Dichloroethene (cis-1,2-)
Total VOCs
Concentration (µg/L)
10000
1000
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20


Non-detects plotted as 0.01 µg/L
BP-4A
Injection Event
Trichloroethene (TCE)
Vinyl chloride
Ethene+Ethane
Dichloroethene (cis-1,2-)
Total VOCs
Concentration (µg/L)
1000
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20

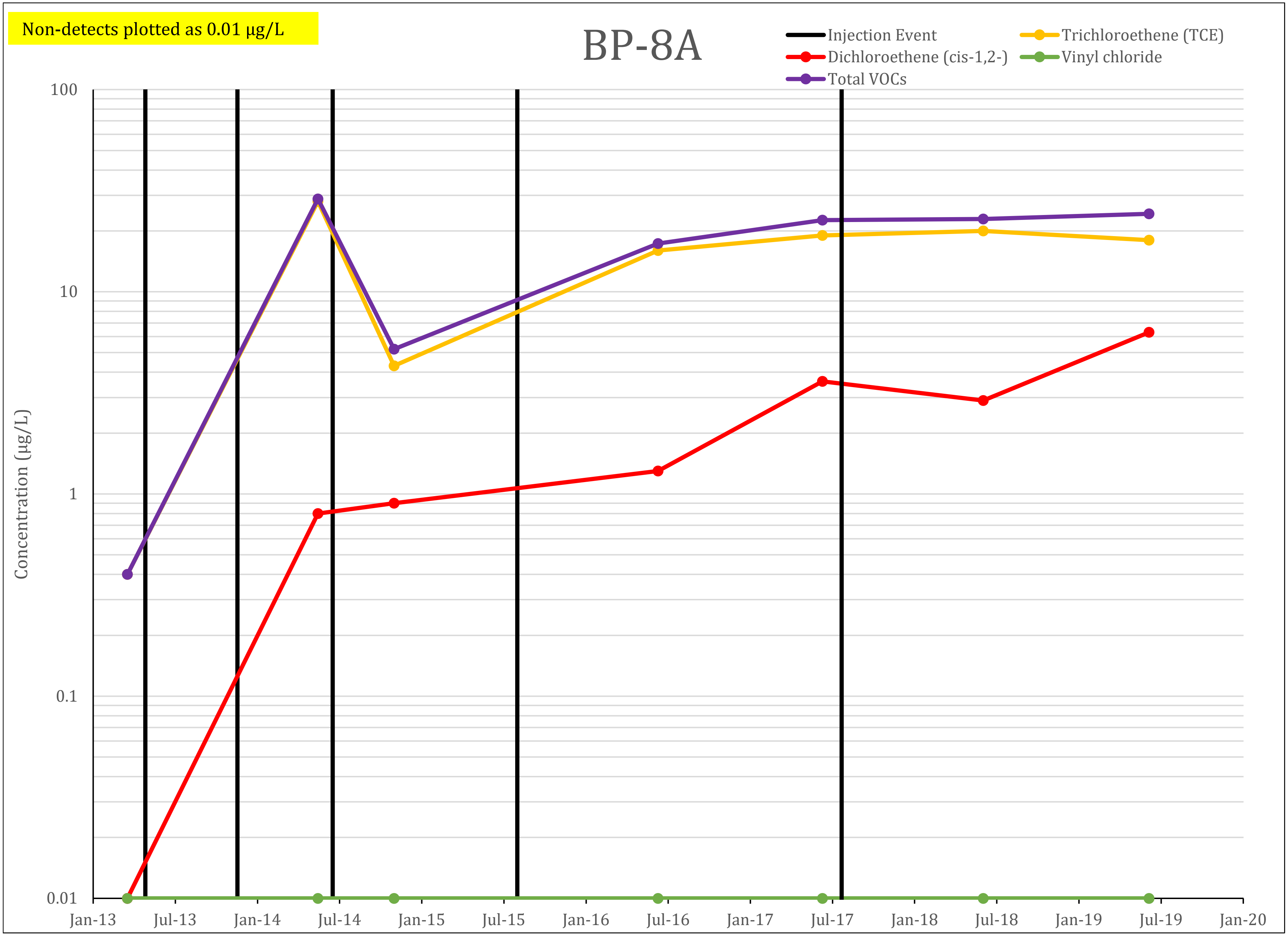


Non-detects plotted as 0.01 µg/L
BP-5A
Injection Event
Trichloroethene (TCE)
Vinyl chloride
Ethene+Ethane
Dichloroethene (cis-1,2-)
Total VOCs
Concentration (µg/L)
1000
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20

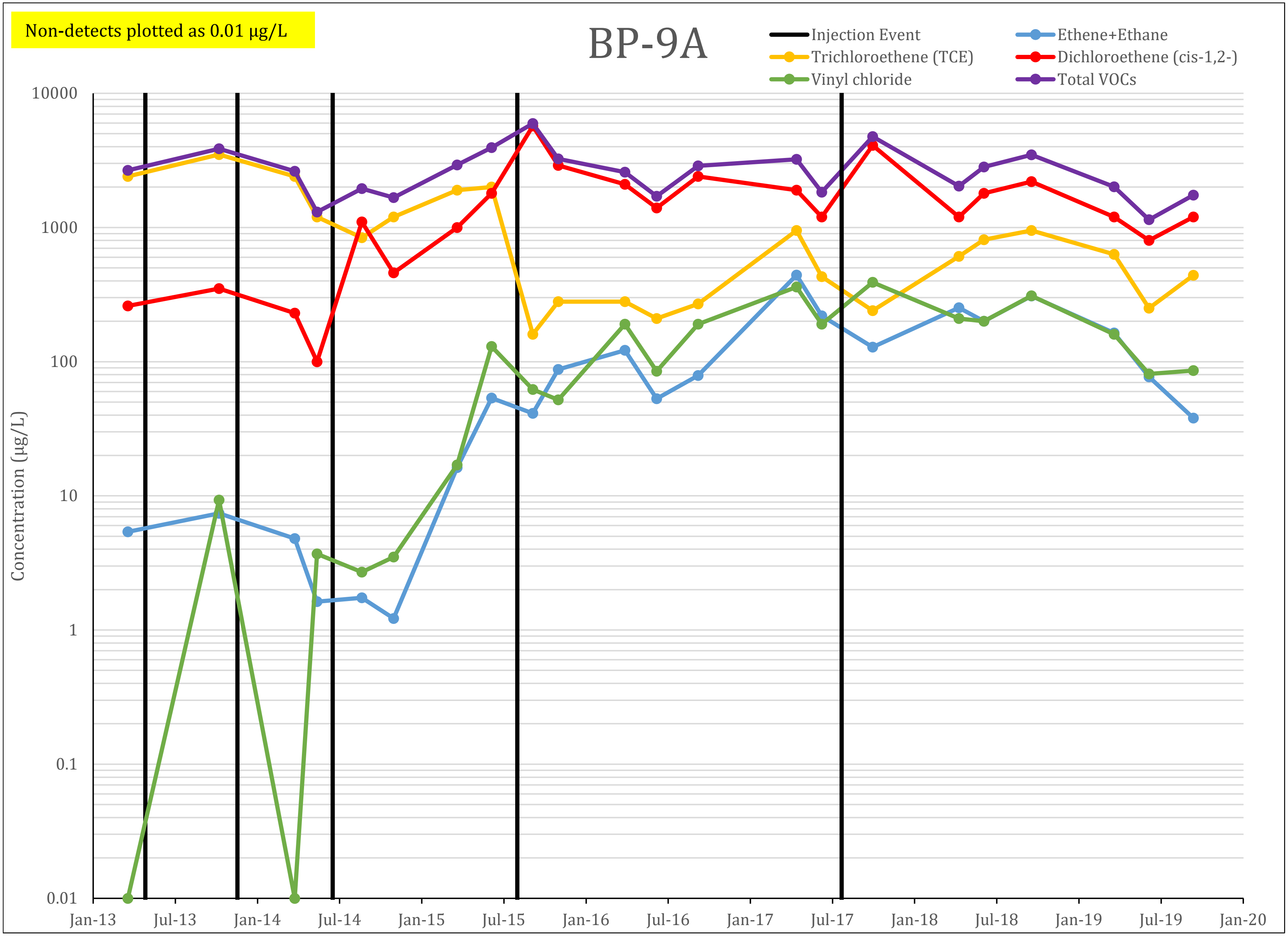

Non-detects plotted as 0.01 µg/L
BP-6A
Injection Event
Trichloroethene (TCE)
Vinyl chloride
Ethene+Ethane
Dichloroethene (cis-1,2-)
Total VOCs
Concentration (µg/L)
1000000
100000
10000
1000
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20



Non-detects plotted as 0.01 µg/L
BP-7A
Injection Event
Dichloroethene (cis-1,2-)
Total VOCs
Trichloroethene (TCE)
Vinyl chloride
Concentration (µg/L)
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20



Non-detects plotted as 0.01 µg/L
BP-8A
Injection Event
Trichloroethene (TCE)
Dichloroethene (cis-1,2-)
Vinyl chloride
Total VOCs
Concentration (µg/L)
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20



Non-detects plotted as 0.01 µg/L
BP-9A
Injection Event
Trichloroethene (TCE)
Vinyl chloride
Ethene+Ethane
Dichloroethene (cis-1,2-)
Total VOCs
Concentration (µg/L)
10000
1000
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
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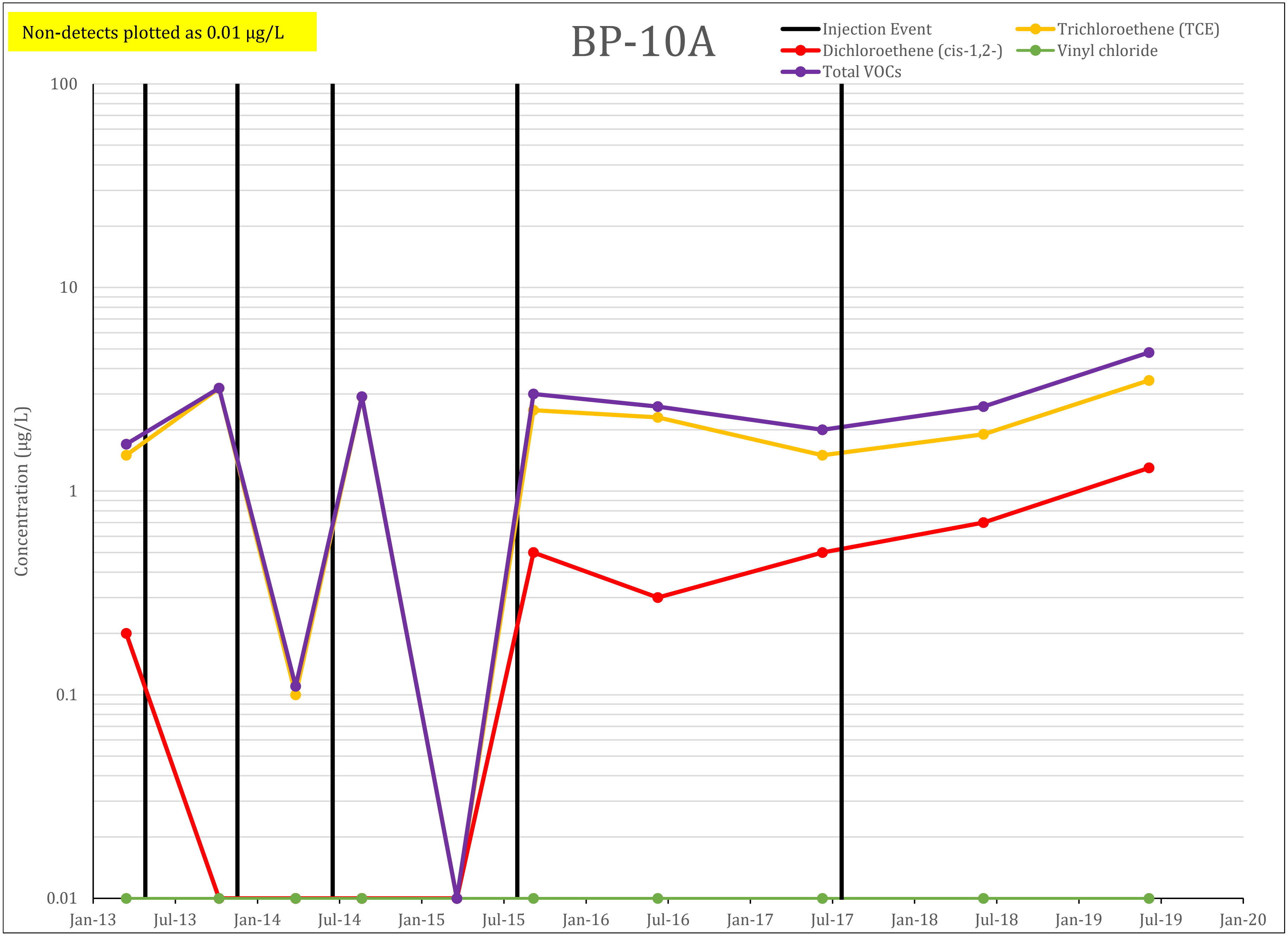
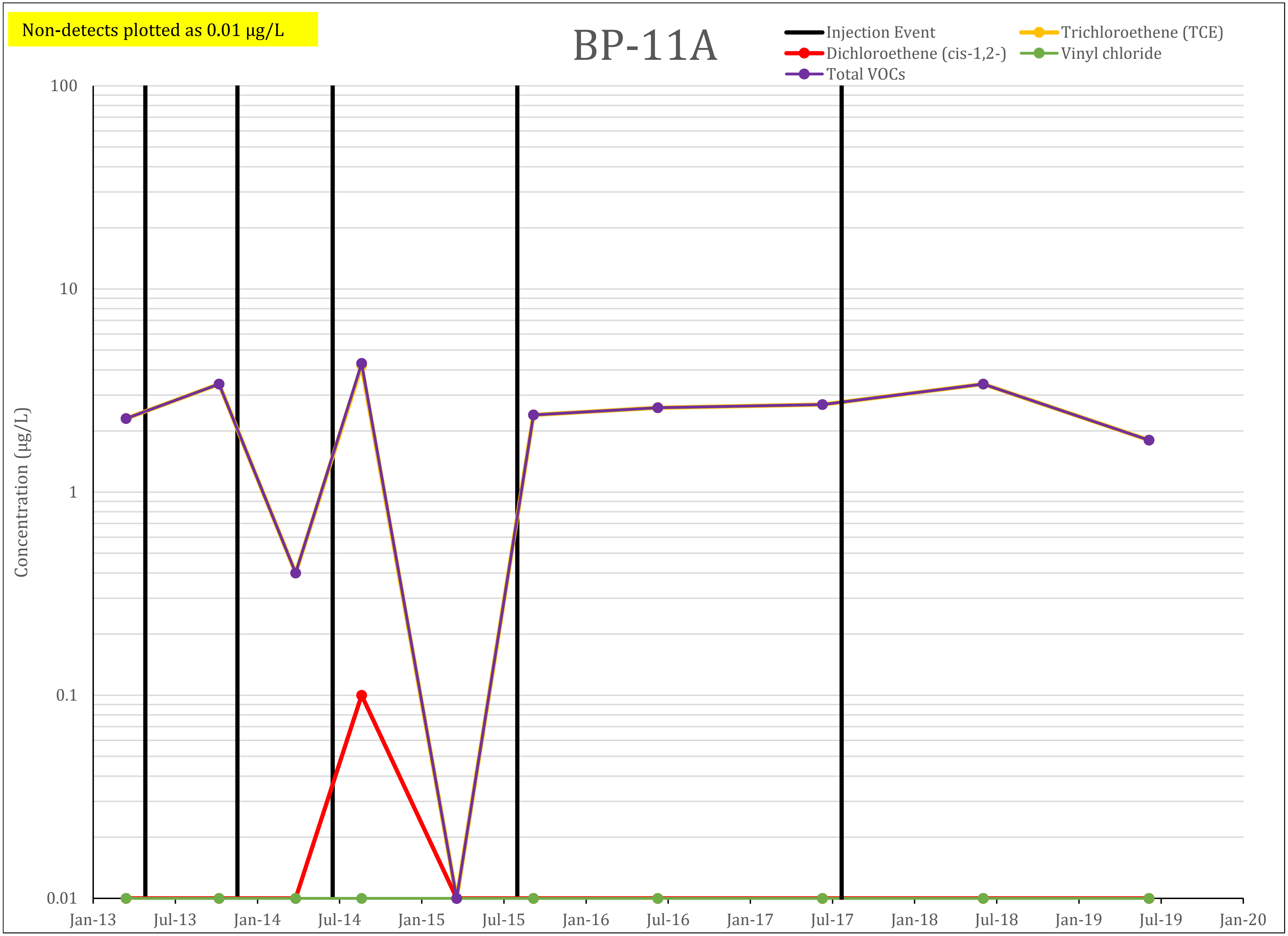
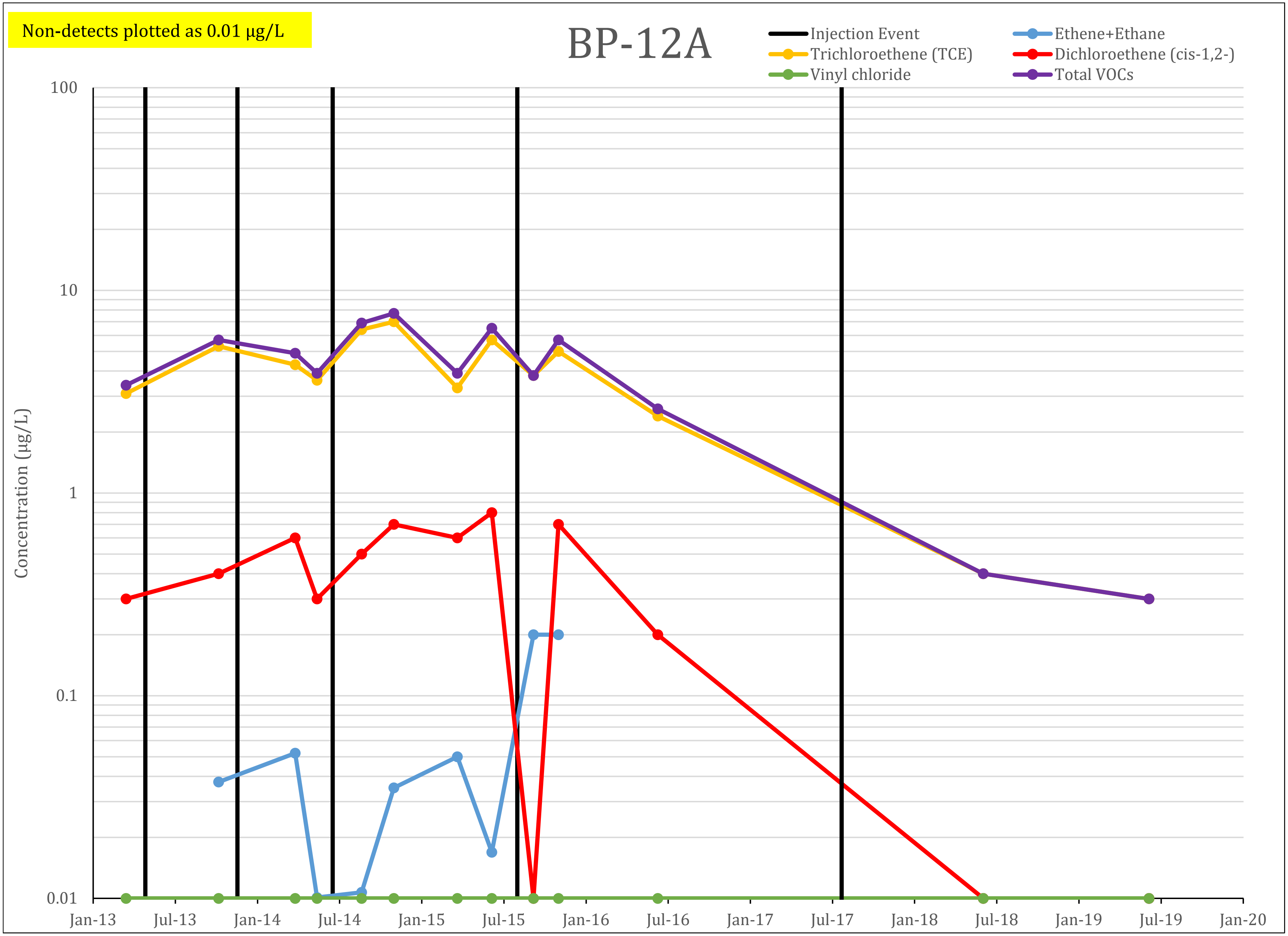
Jan-19
Jul-19
Jan-20



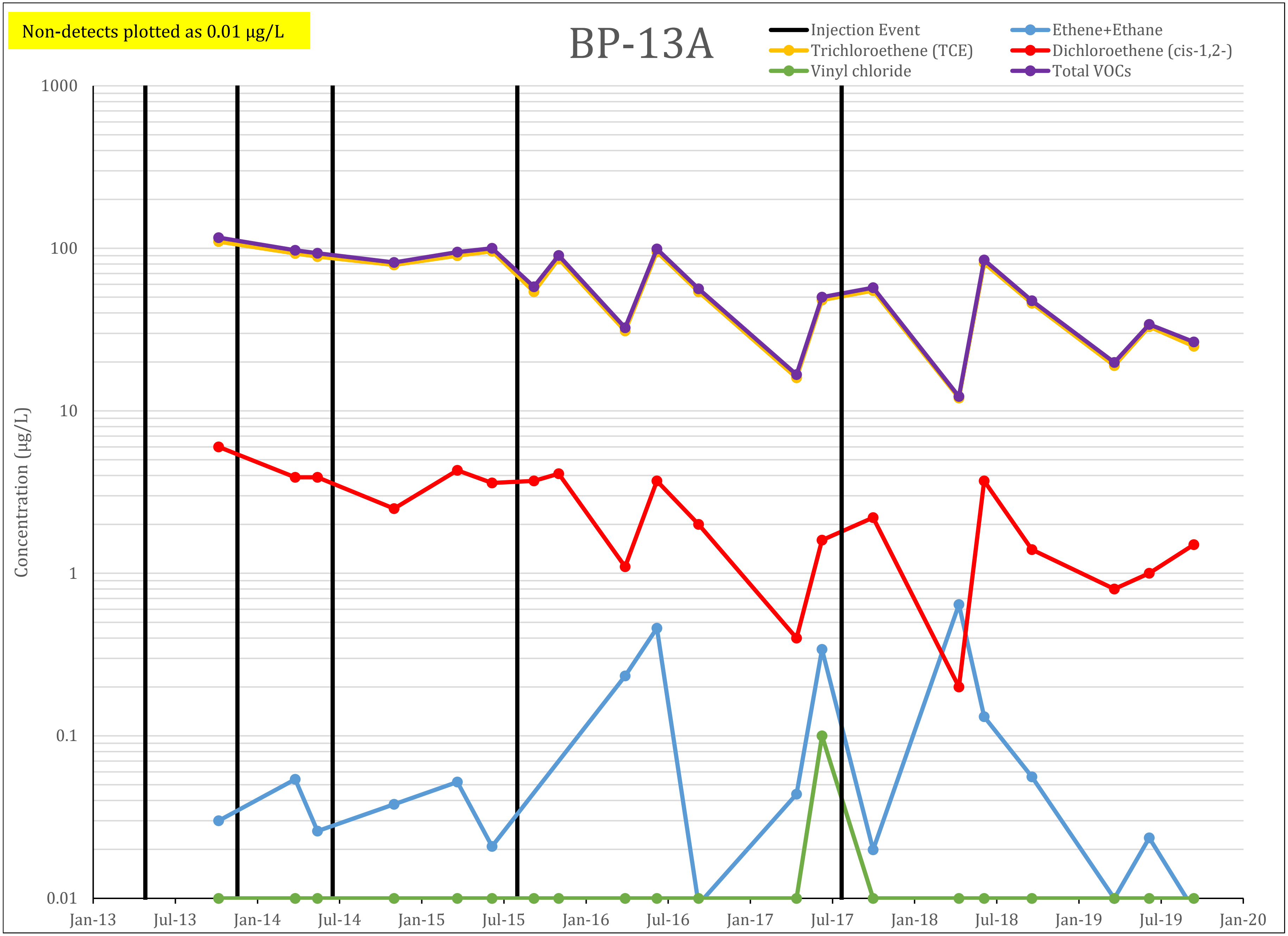
Non-detects plotted as 0.01 µg/L
BP-10A
Injection Event
Dichloroethene (cis-1,2-)
Total VOCs
Trichloroethene (TCE)
Vinyl chloride
Concentration (µg/L)
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20



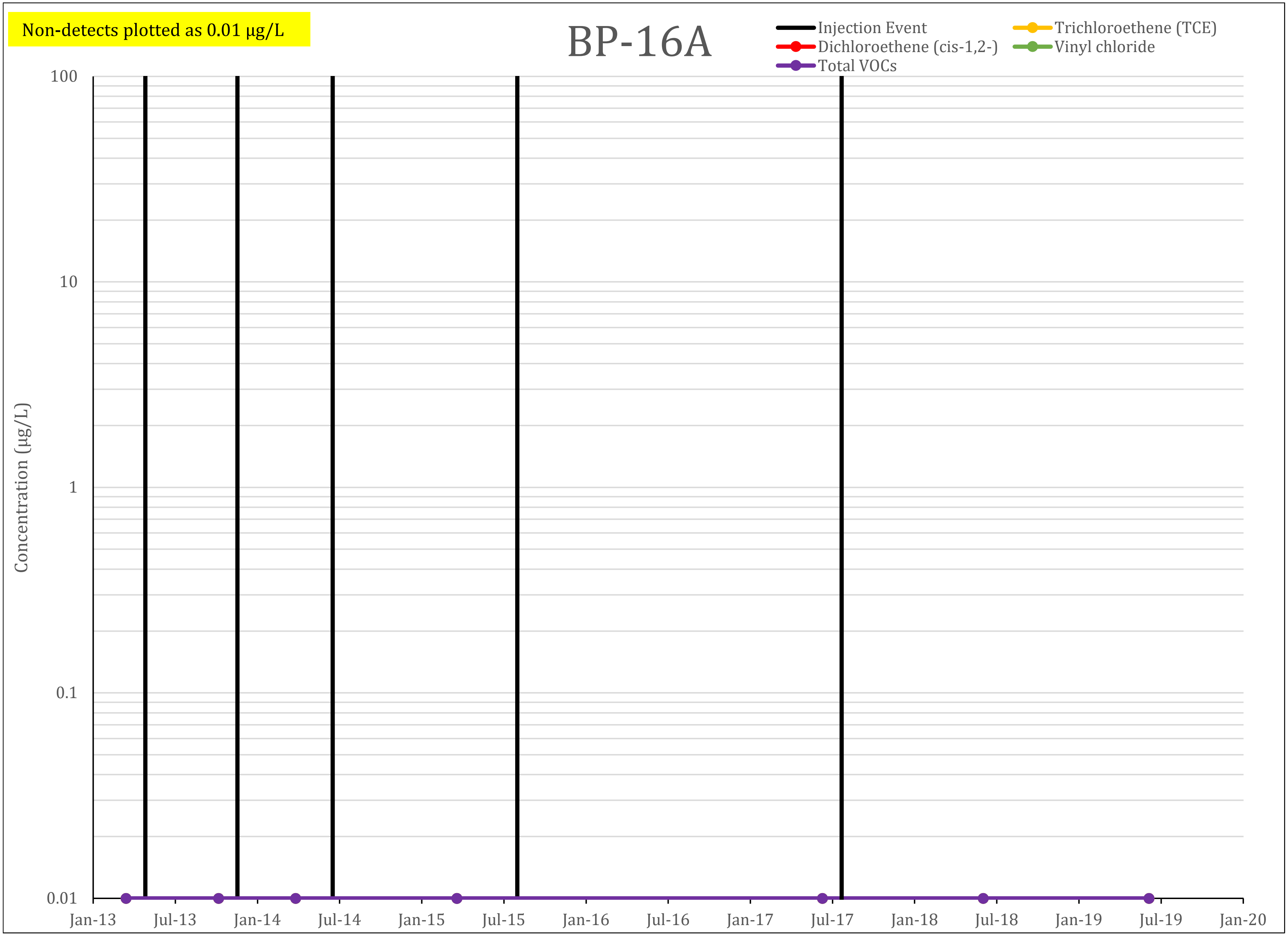
Non-detects plotted as 0.01 µg/L
BP-11A
Injection Event
Dichloroethene (cis-1,2-)
Total VOCs
Trichloroethene (TCE)
Vinyl chloride
Concentration (µg/L)
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20



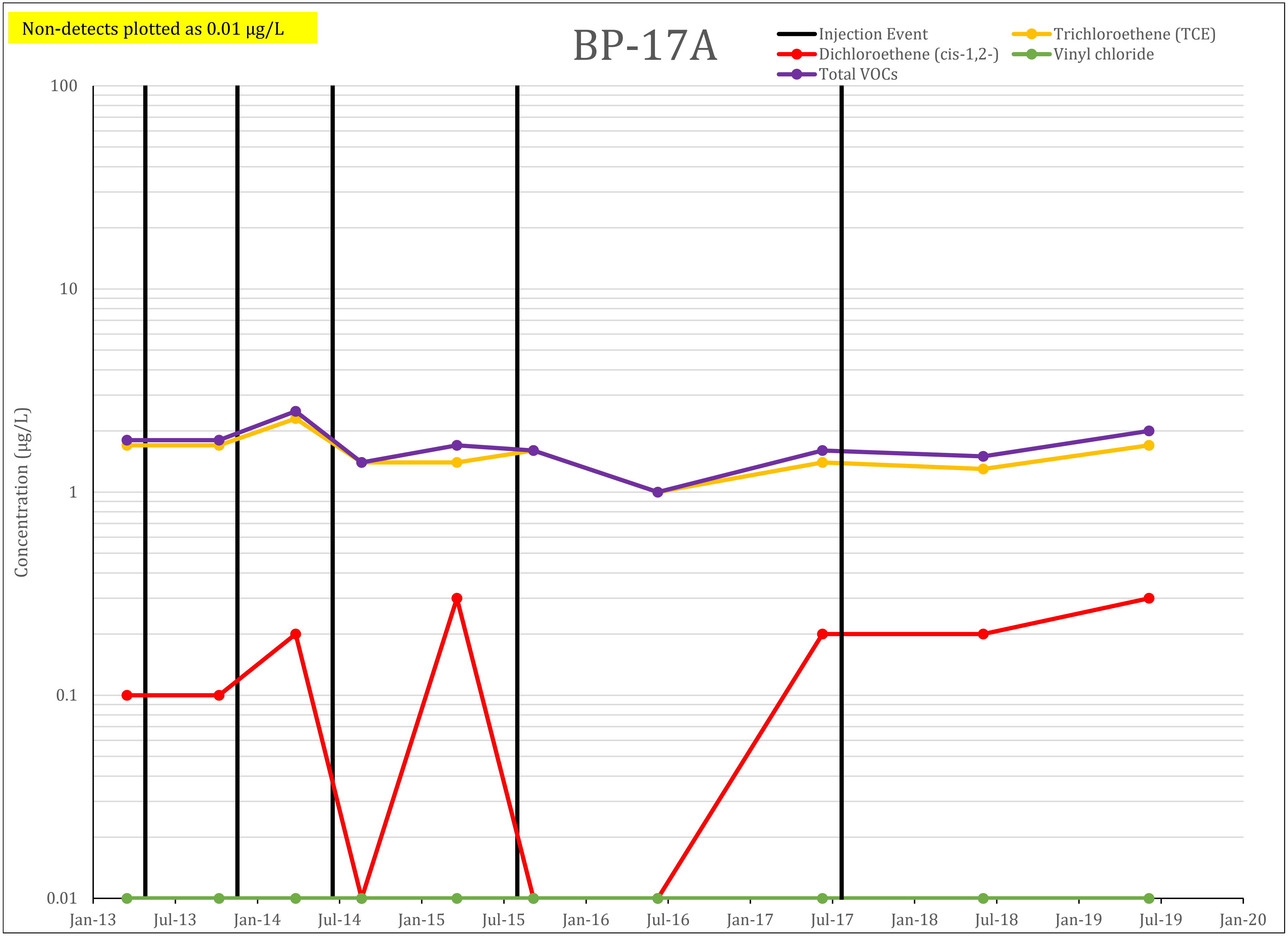
Non-detects plotted as 0.01 µg/L
BP-12A
Injection Event
Trichloroethene (TCE)
Vinyl chloride
Ethene+Ethane
Dichloroethene (cis-1,2-)
Total VOCs
Concentration (µg/L)
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20



Non-detects plotted as 0.01 µg/L
BP-13A
Injection Event
Trichloroethene (TCE)
Vinyl chloride
Ethene+Ethane
Dichloroethene (cis-1,2-)
Total VOCs
Concentration (µg/L)
1000
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20



Non-detects plotted as 0.01 µg/L
BP-16A
Injection Event
Dichloroethene (cis-1,2-)
Total VOCs
Trichloroethene (TCE)
Vinyl chloride
Concentration (µg/L)
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20


Non-detects plotted as 0.01 µg/L
BP-17A
Injection Event
Dichloroethene (cis-1,2-)
Total VOCs
Trichloroethene (TCE)
Vinyl chloride
Concentration (µg/L)
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
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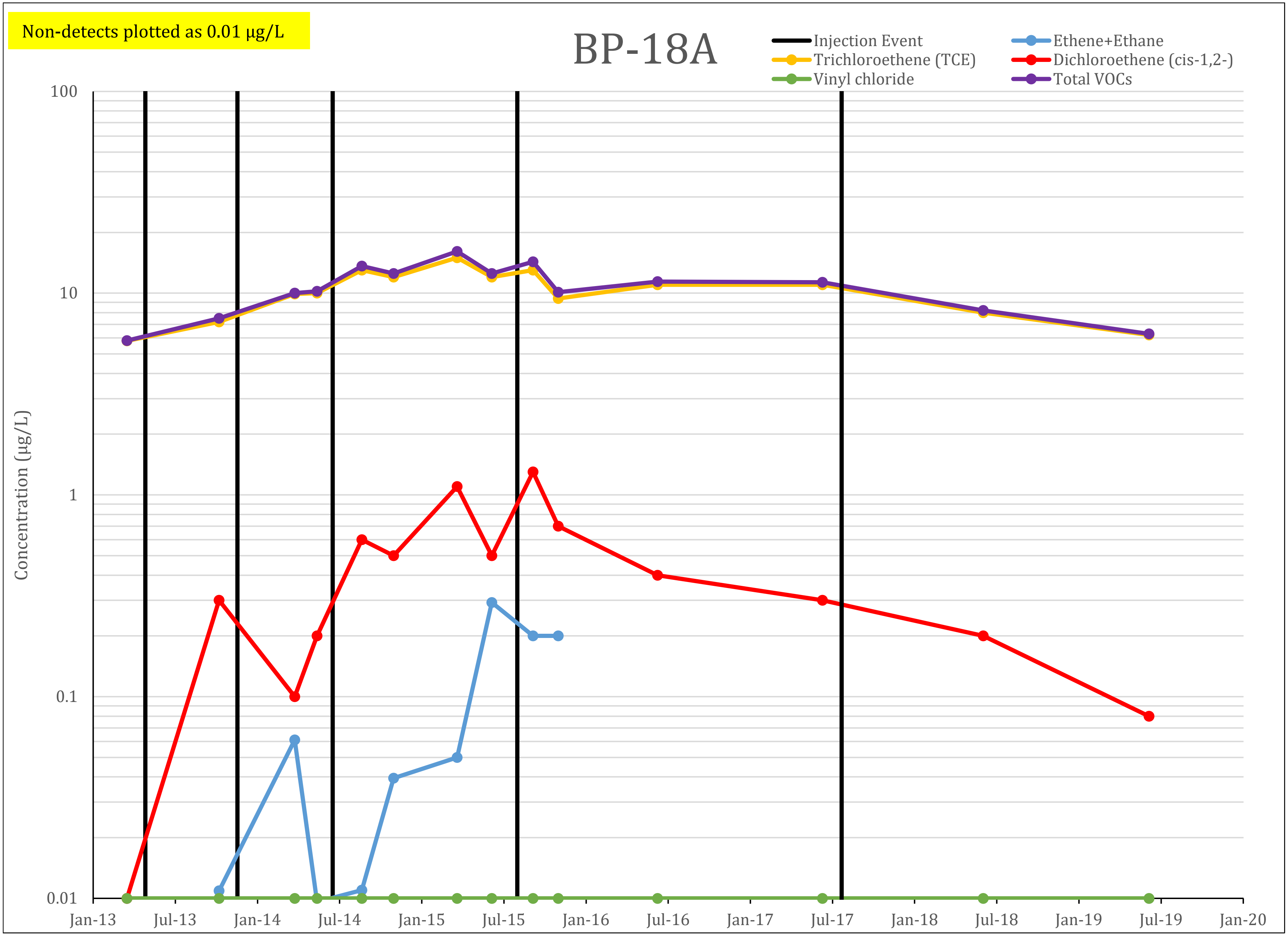
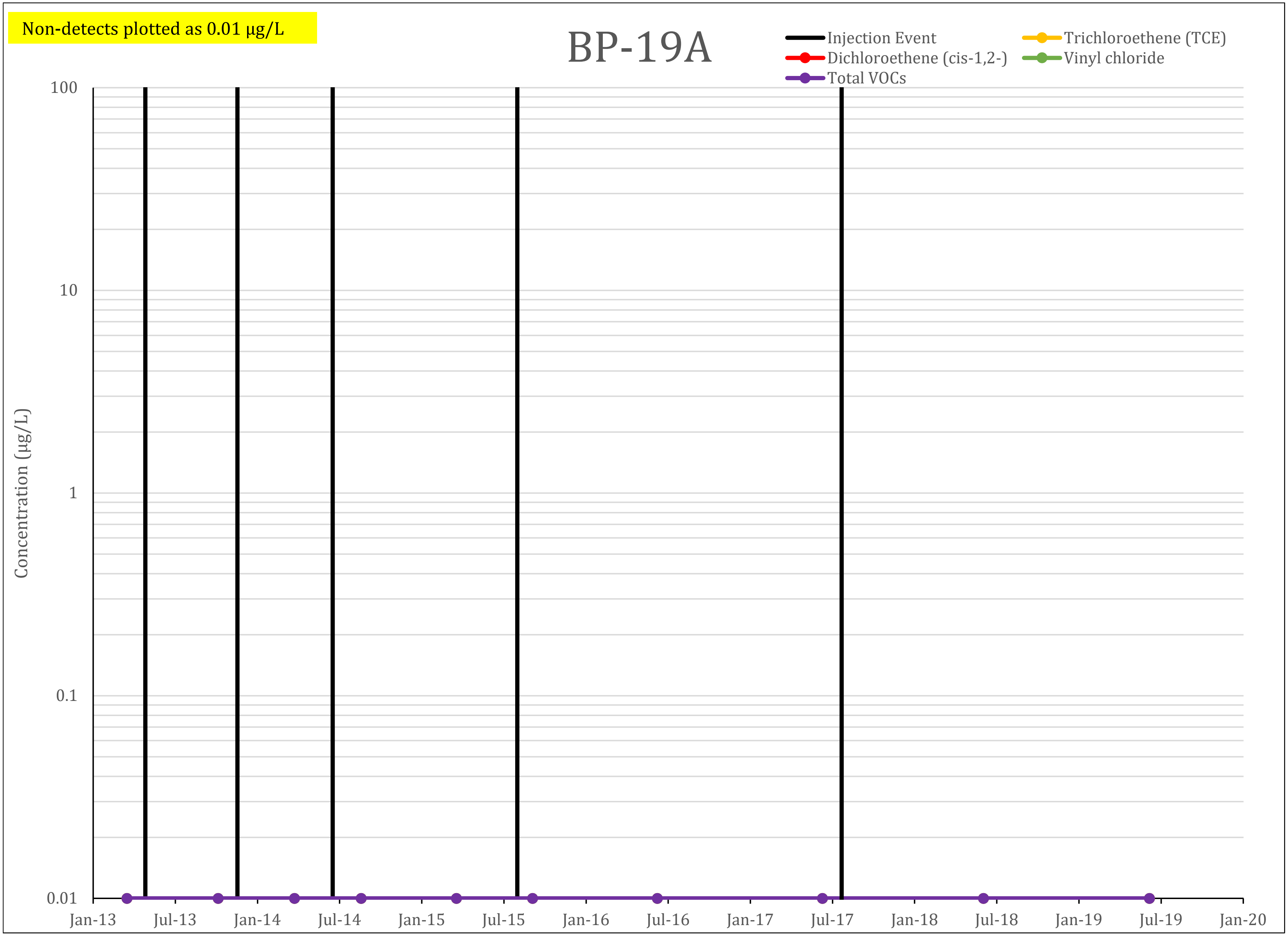
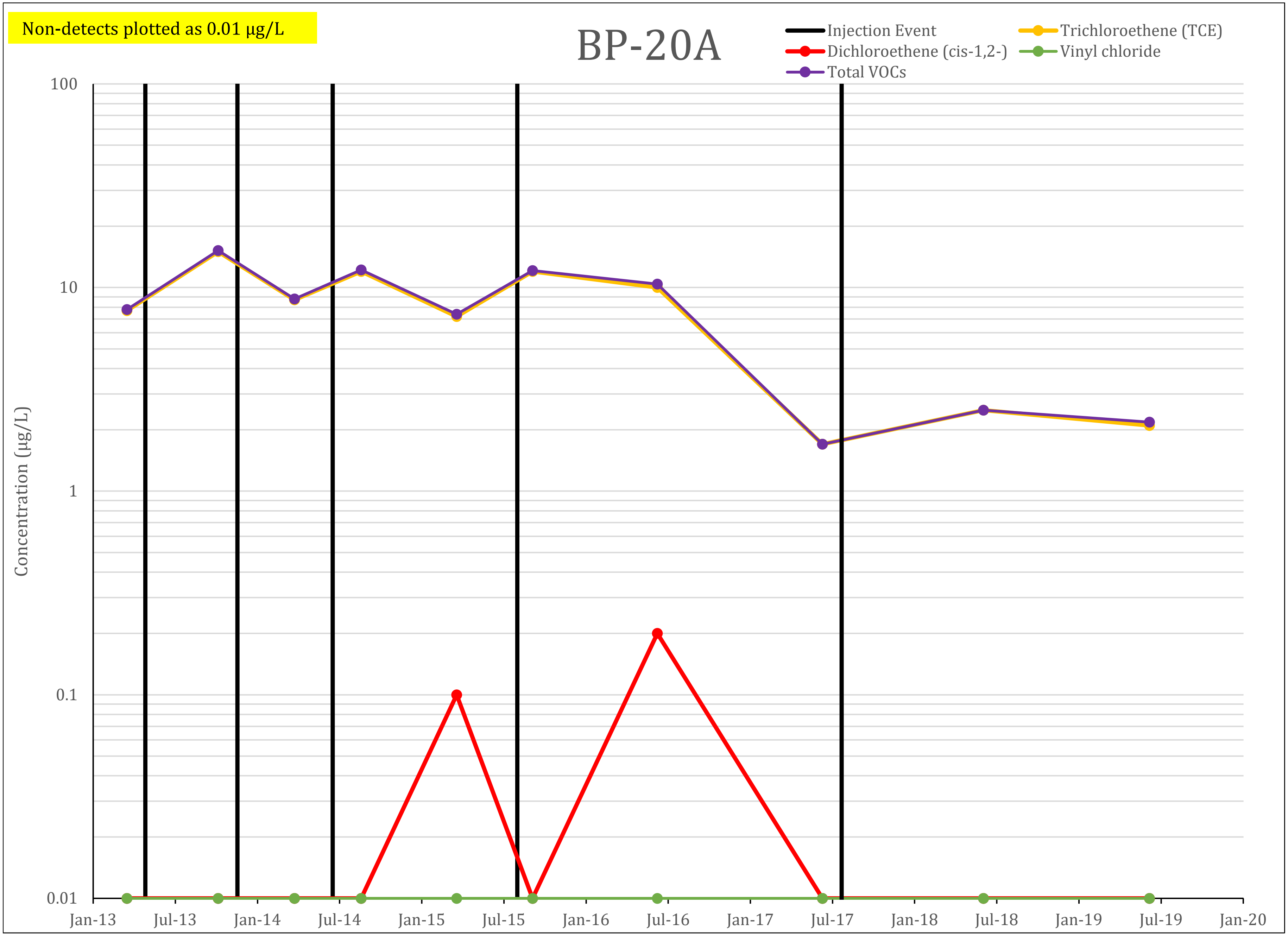
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20

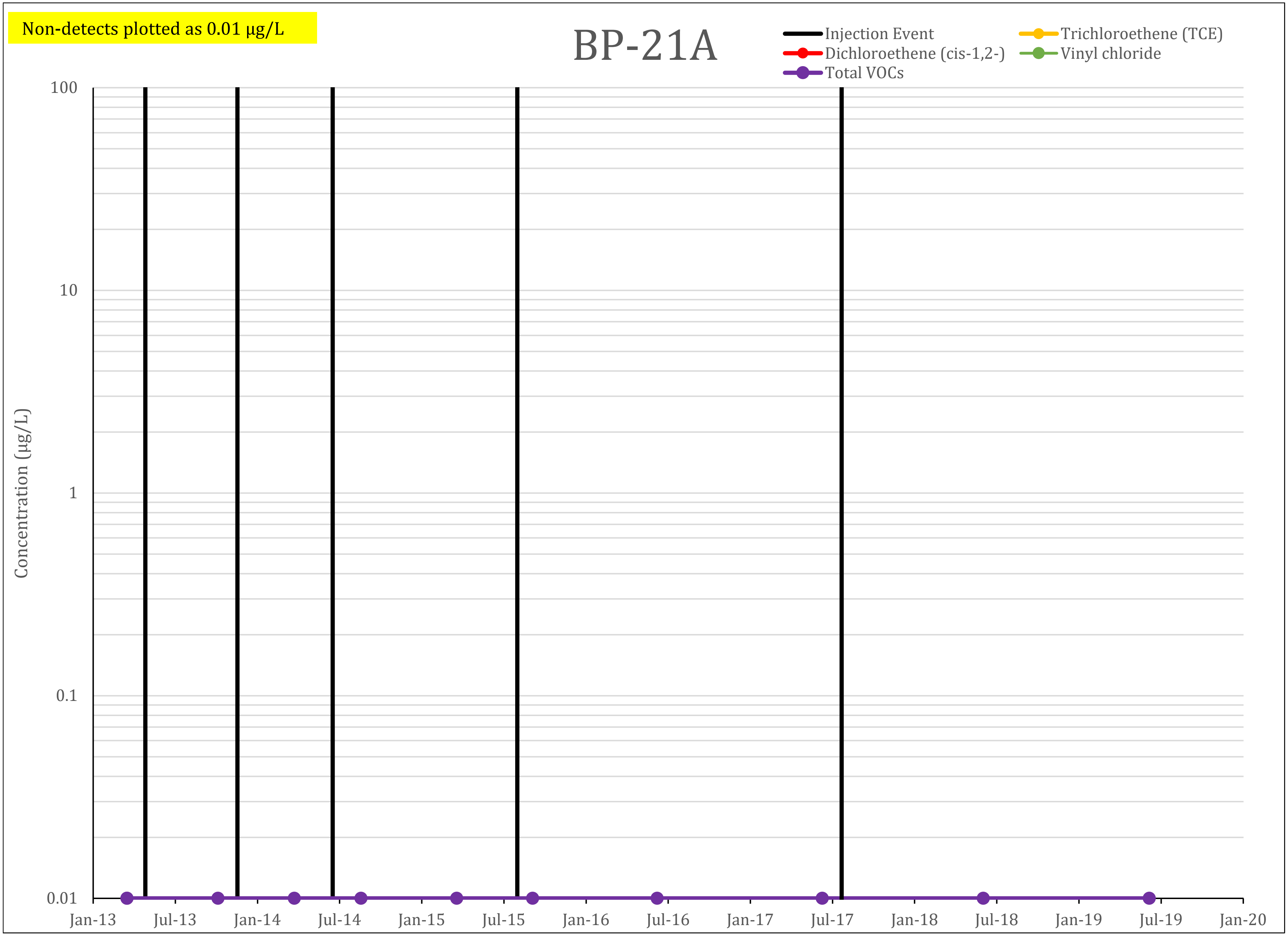


Non-detects plotted as 0.01 µg/L
BP-18A
Injection Event
Trichloroethene (TCE)
Vinyl chloride
Ethene+Ethane
Dichloroethene (cis-1,2-)
Total VOCs
Concentration (µg/L)
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20

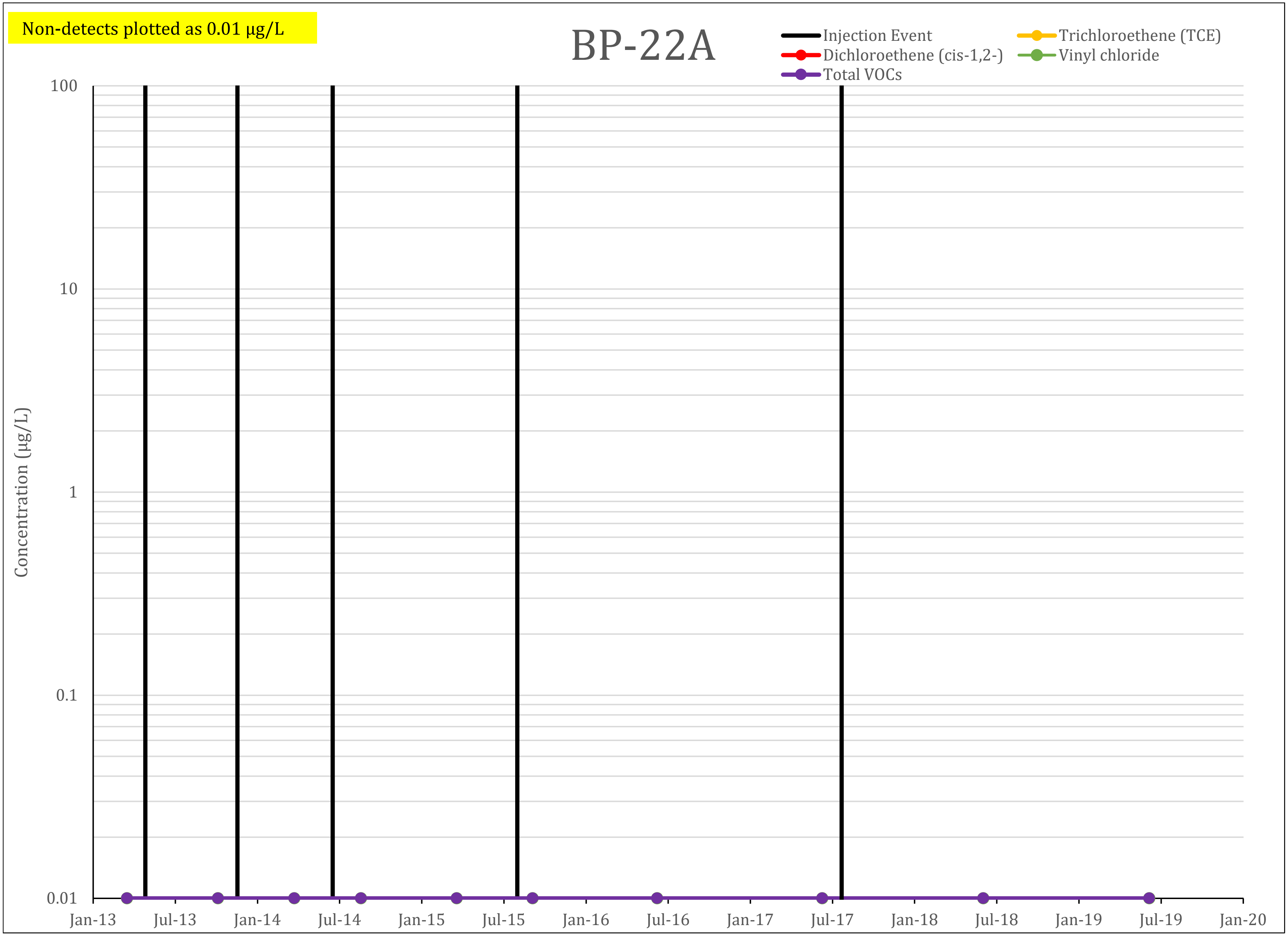

Non-detects plotted as 0.01 µg/L
BP-19A
Injection Event
Dichloroethene (cis-1,2-)
Total VOCs
Trichloroethene (TCE)
Vinyl chloride
Concentration (µg/L)
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20



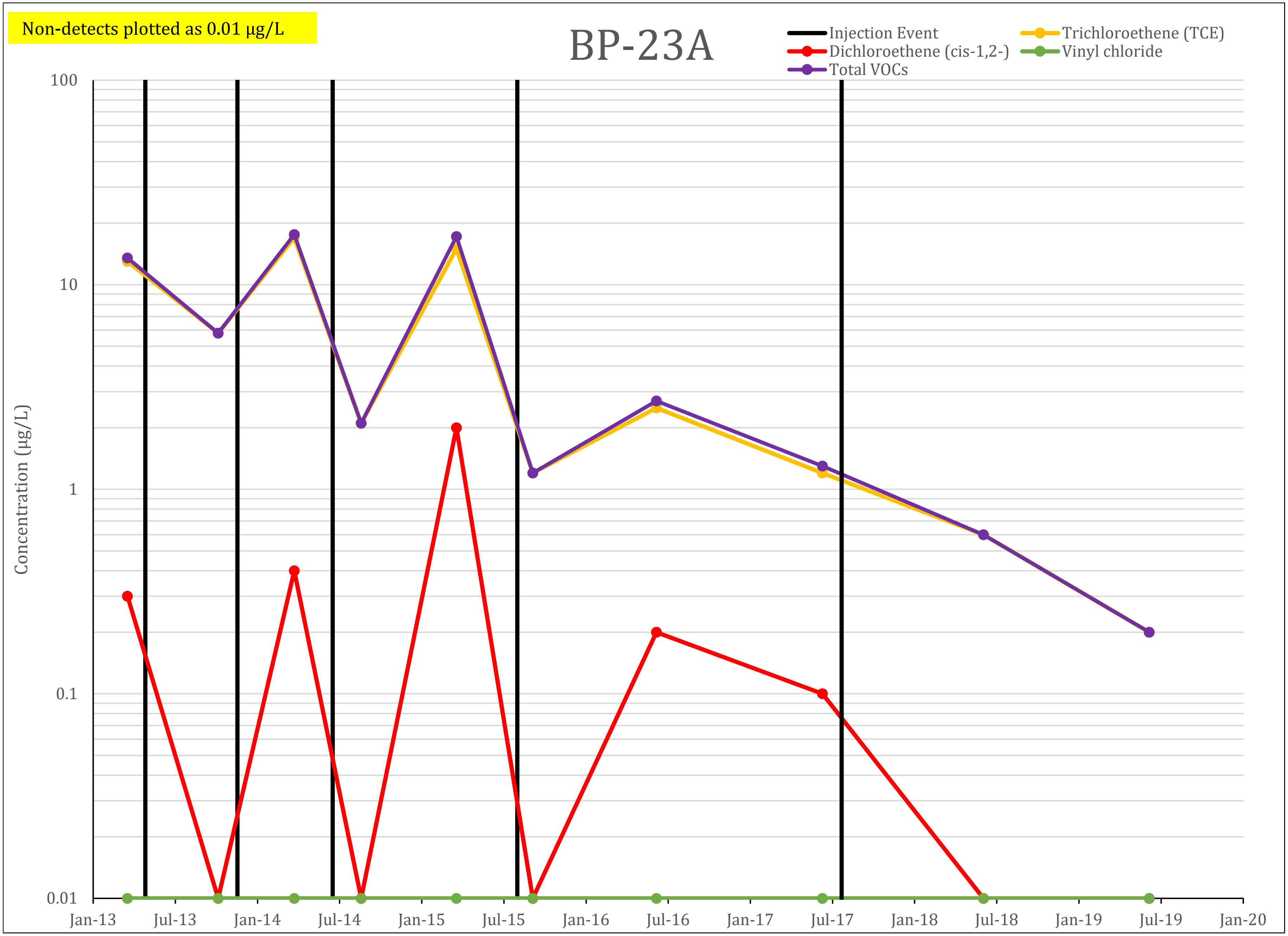
Non-detects plotted as 0.01 µg/L
BP-20A
Injection Event
Dichloroethene (cis-1,2-)
Total VOCs
Trichloroethene (TCE)
Vinyl chloride
Concentration (µg/L)
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20



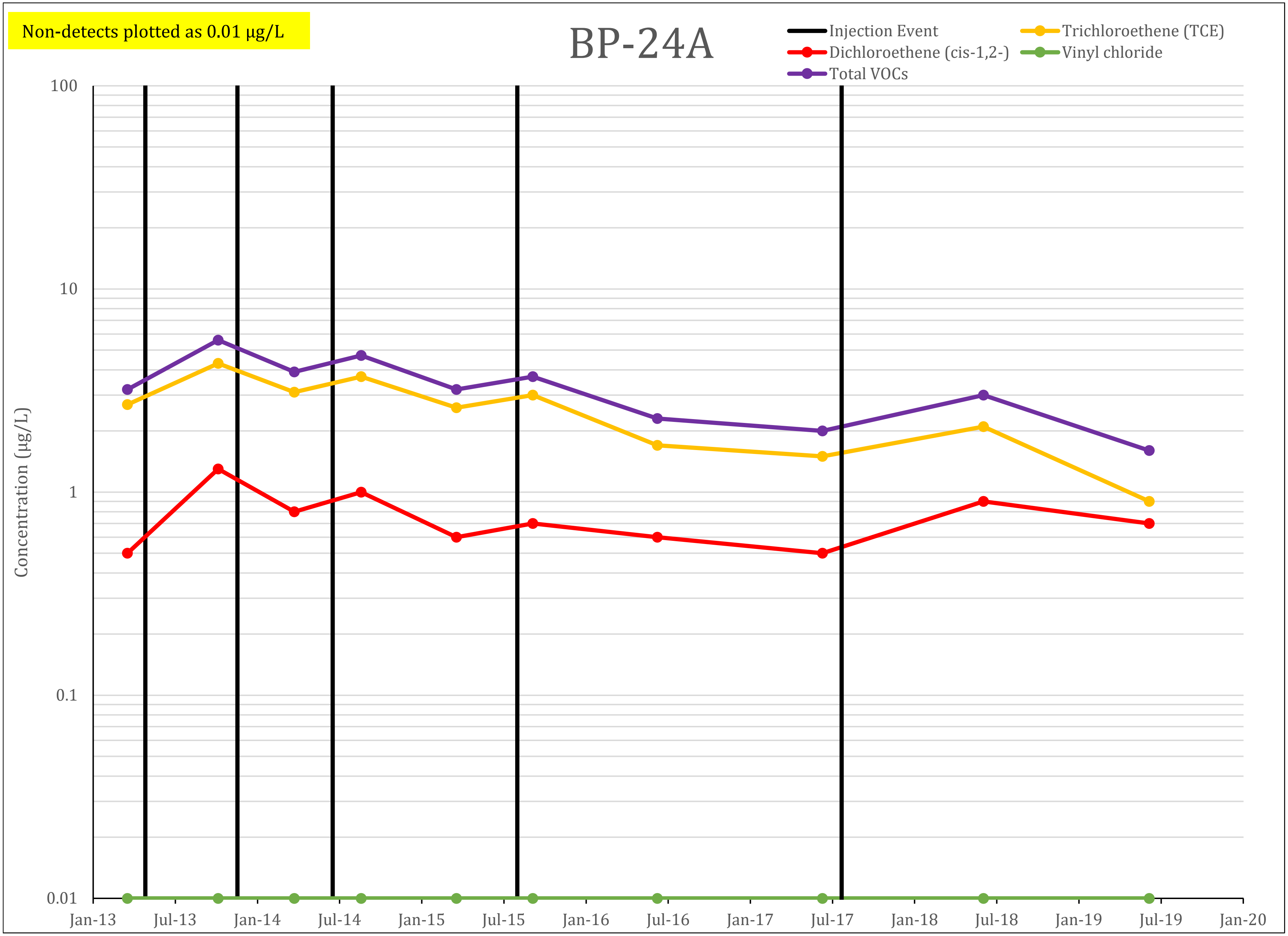
Non-detects plotted as 0.01 µg/L
BP-21A
Injection Event
Dichloroethene (cis-1,2-)
Total VOCs
Trichloroethene (TCE)
Vinyl chloride
Concentration (µg/L)
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20

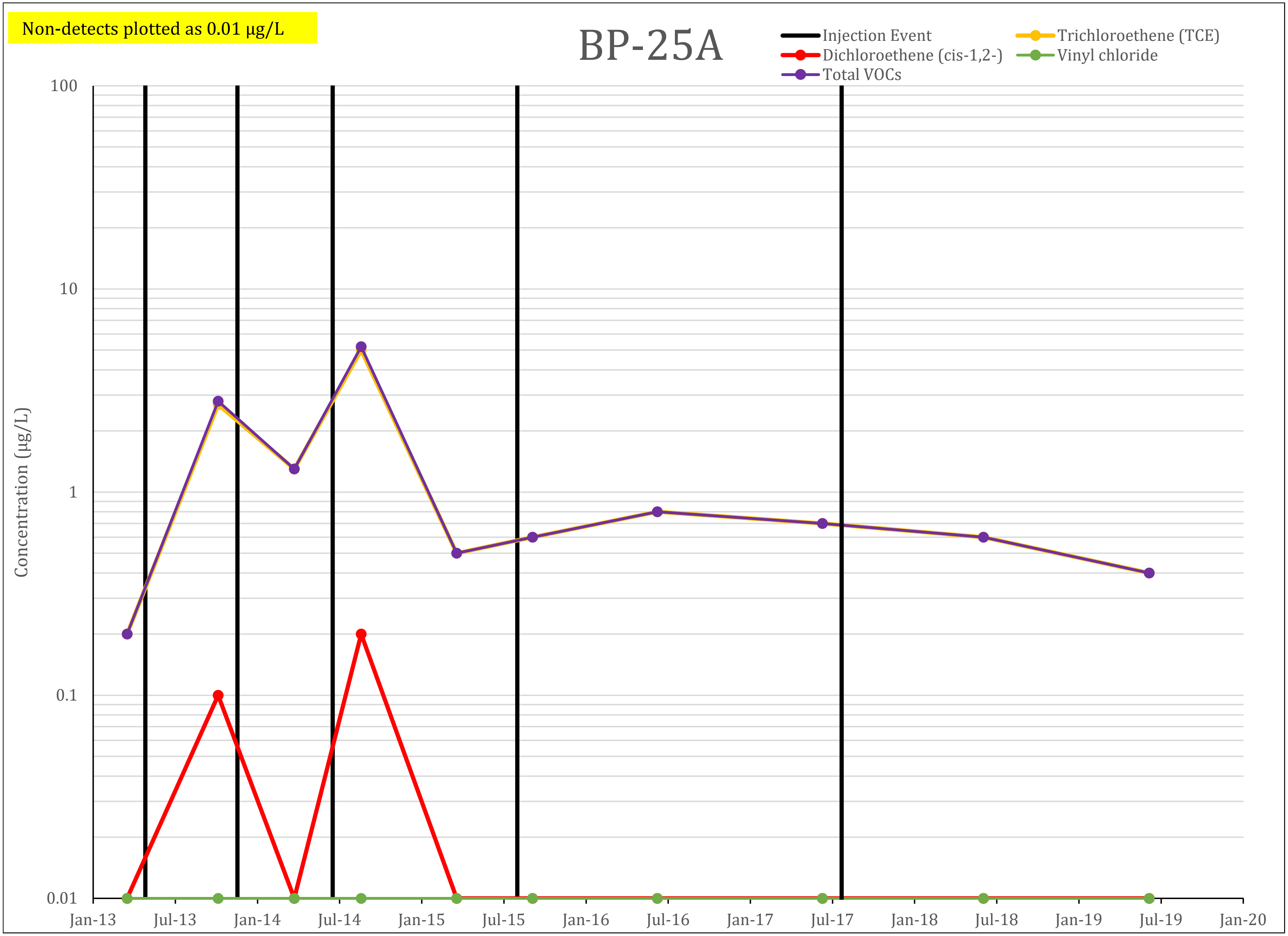


Non-detects plotted as 0.01 µg/L
BP-22A
Injection Event
Dichloroethene (cis-1,2-)
Total VOCs
Trichloroethene (TCE)
Vinyl chloride
Concentration (µg/L)
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20

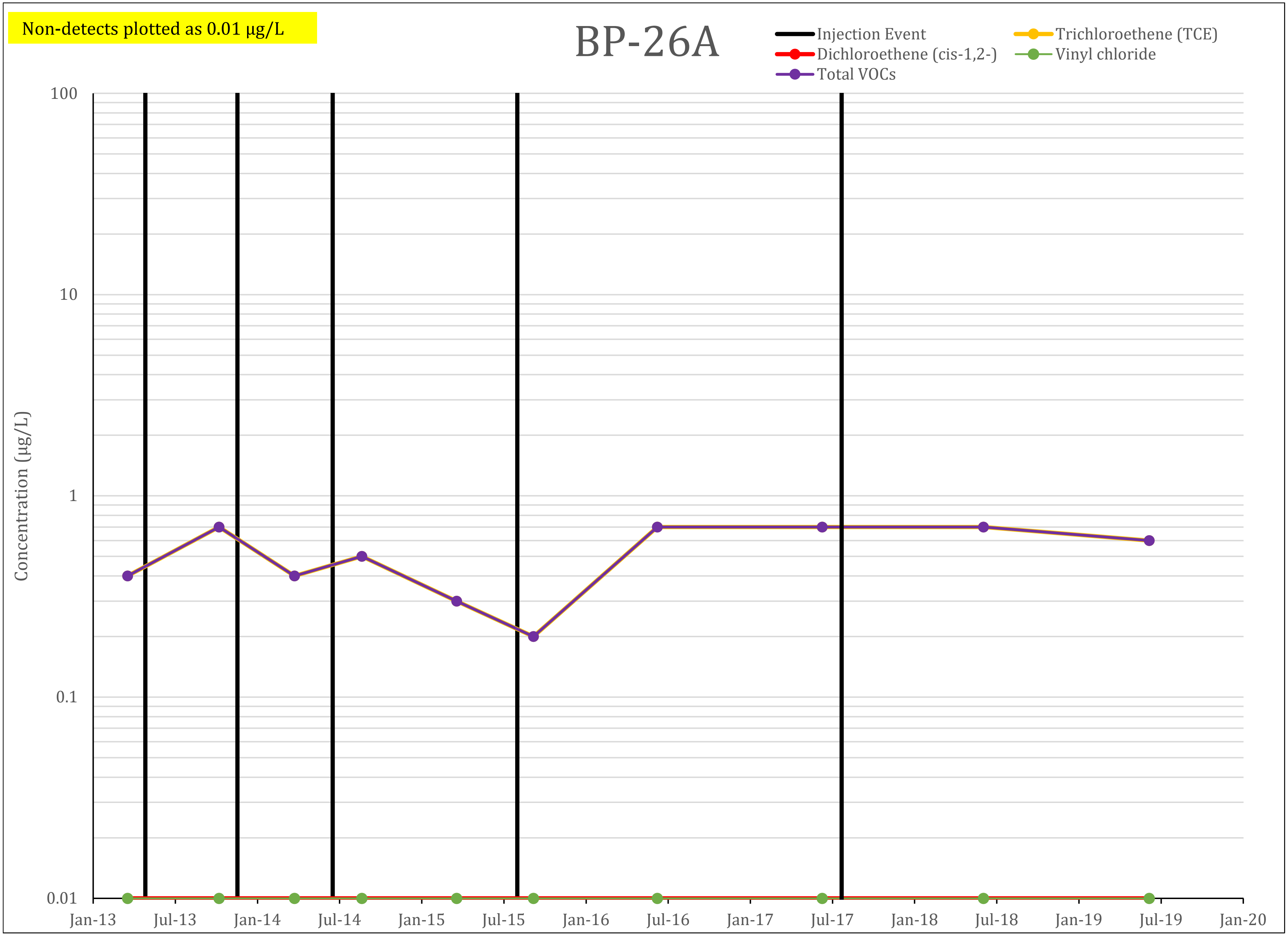


Non-detects plotted as 0.01 µg/L
BP-23A
Injection Event
Dichloroethene (cis-1,2-)
Total VOCs
Trichloroethene (TCE)
Vinyl chloride
Concentration (µg/L)
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20

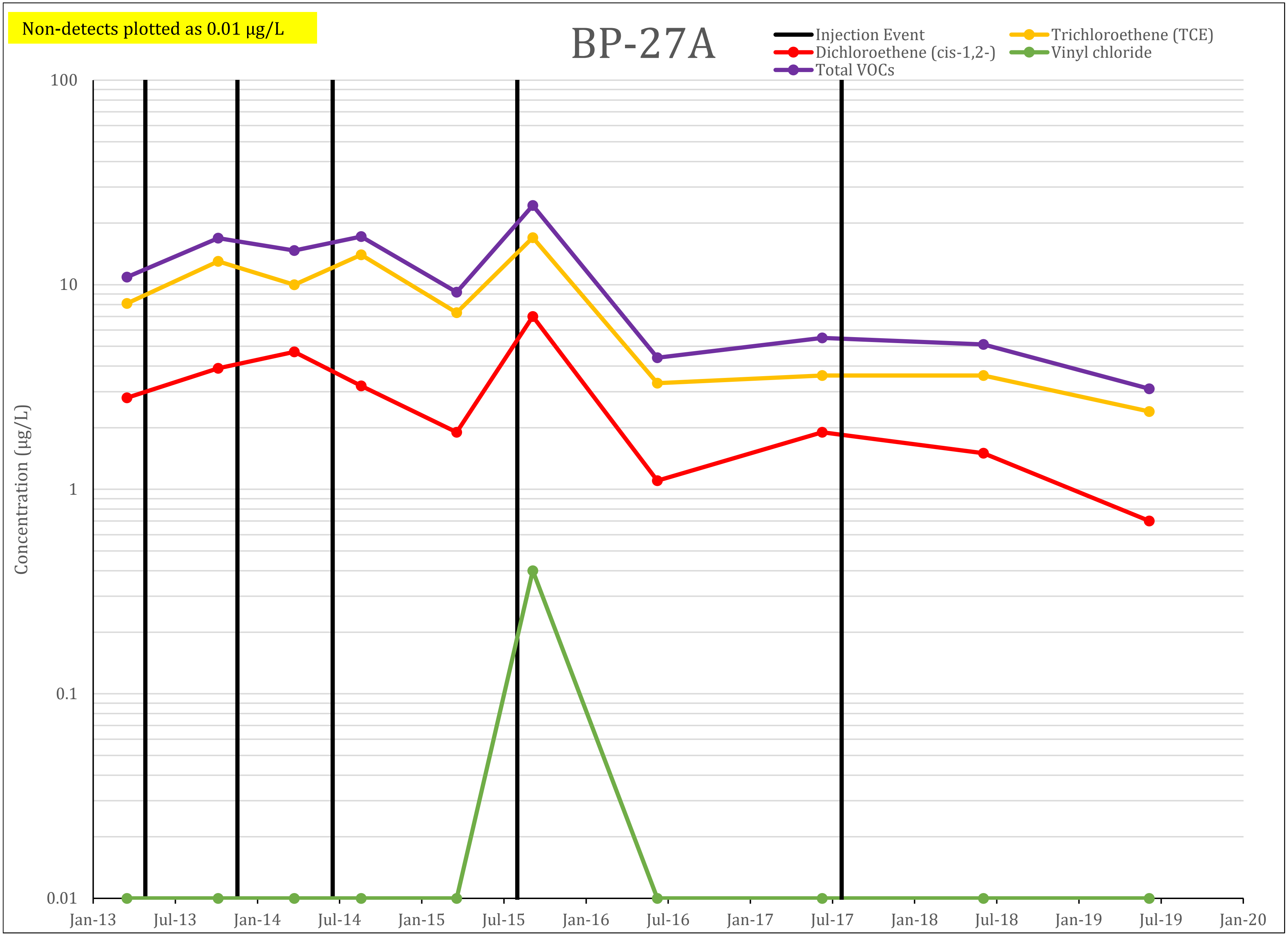

Non-detects plotted as 0.01 µg/L
BP-24A
Injection Event
Dichloroethene (cis-1,2-)
Total VOCs
Trichloroethene (TCE)
Vinyl chloride
Concentration (µg/L)
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20



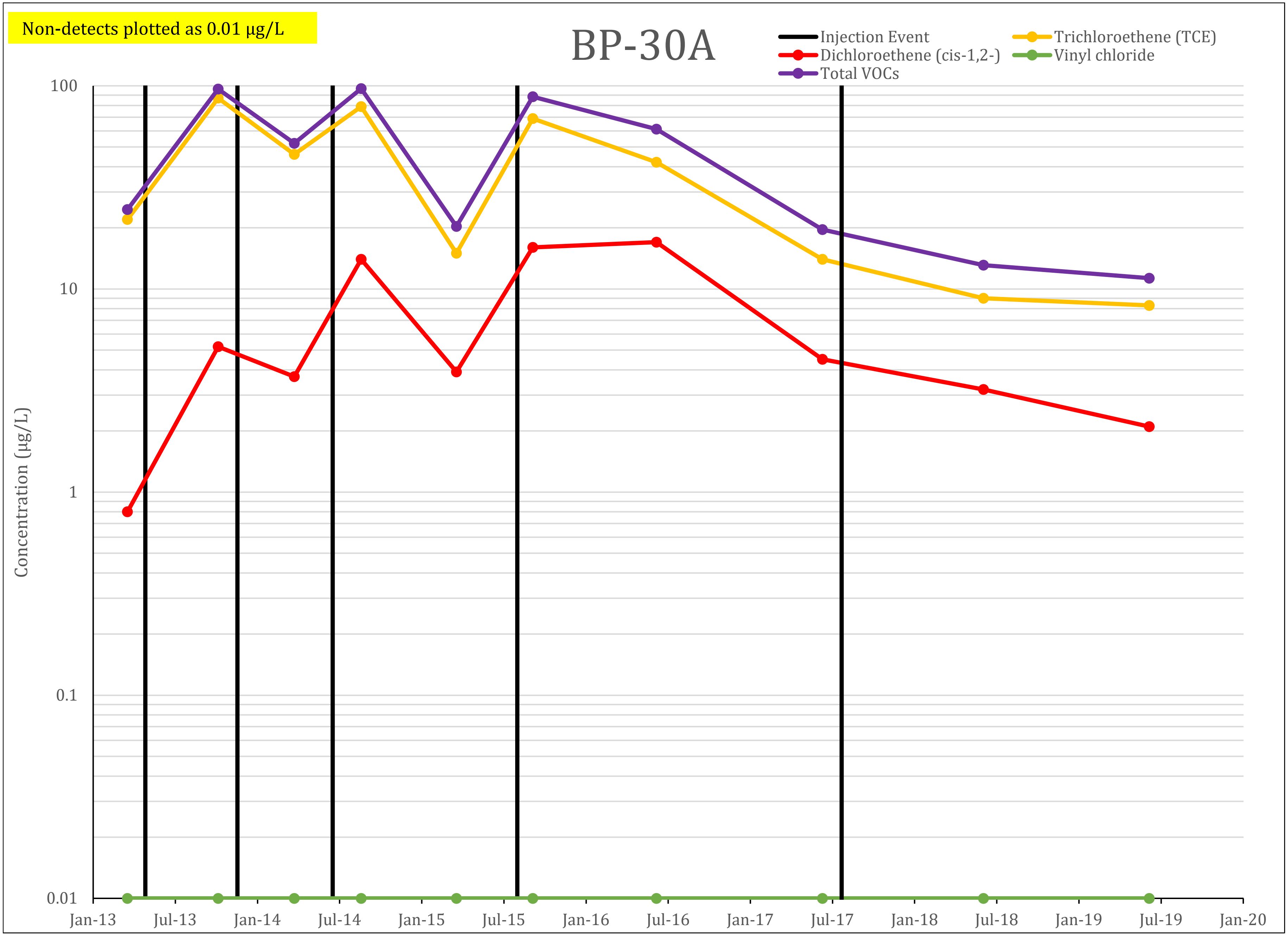
Non-detects plotted as 0.01 µg/L
BP-25A
Injection Event
Dichloroethene (cis-1,2-)
Total VOCs
Trichloroethene (TCE)
Vinyl chloride
Concentration (µg/L)
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20



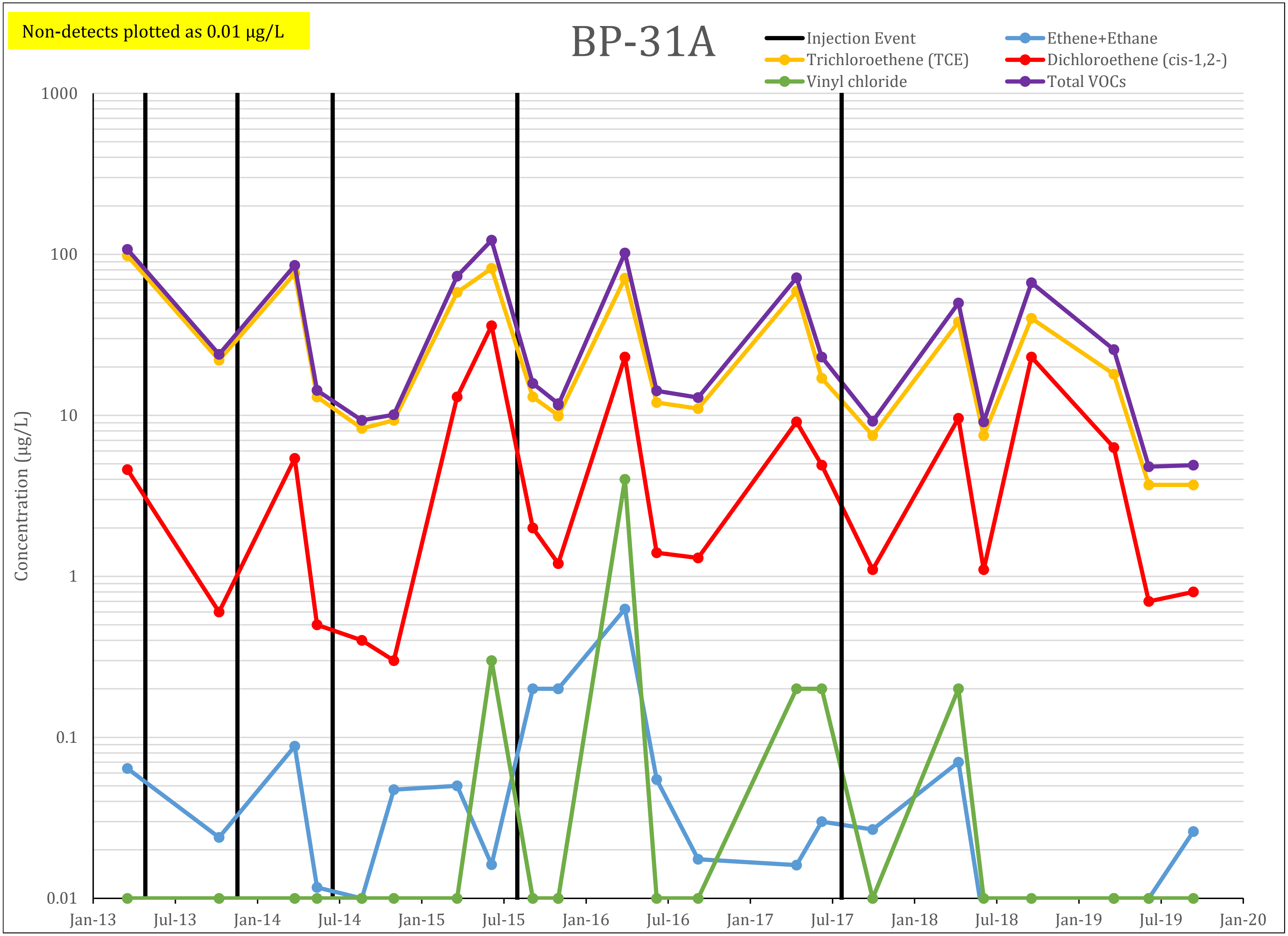
Non-detects plotted as 0.01 µg/L
BP-26A
Injection Event
Dichloroethene (cis-1,2-)
Total VOCs
Trichloroethene (TCE)
Vinyl chloride
Concentration (µg/L)
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20



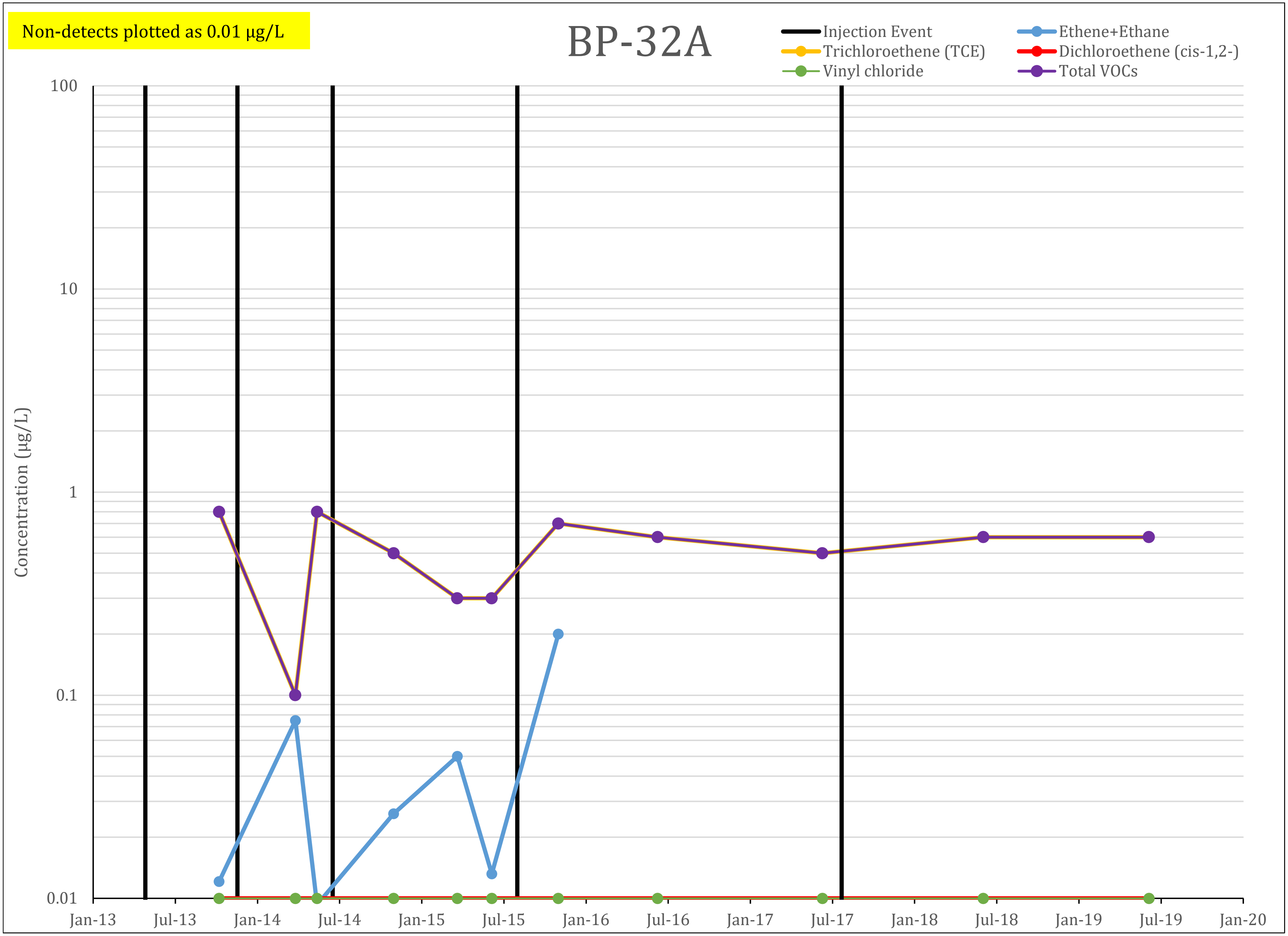
Non-detects plotted as 0.01 µg/L
BP-27A
Injection Event
Dichloroethene (cis-1,2-)
Total VOCs
Trichloroethene (TCE)
Vinyl chloride
Concentration (µg/L)
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20



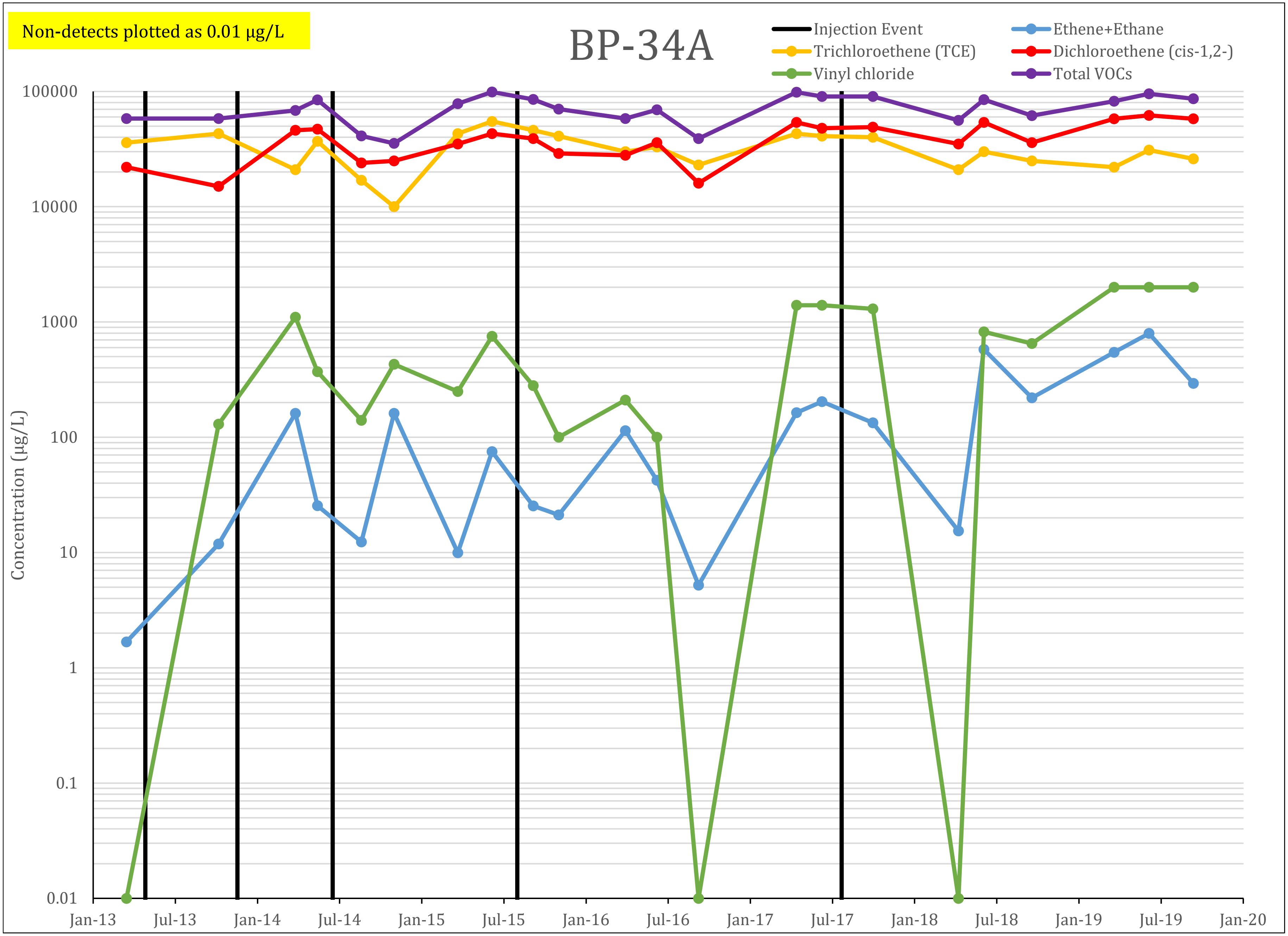
Non-detects plotted as 0.01 µg/L
BP-30A
Injection Event
Dichloroethene (cis-1,2-)
Total VOCs
Trichloroethene (TCE)
Vinyl chloride
Concentration (µg/L)
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20

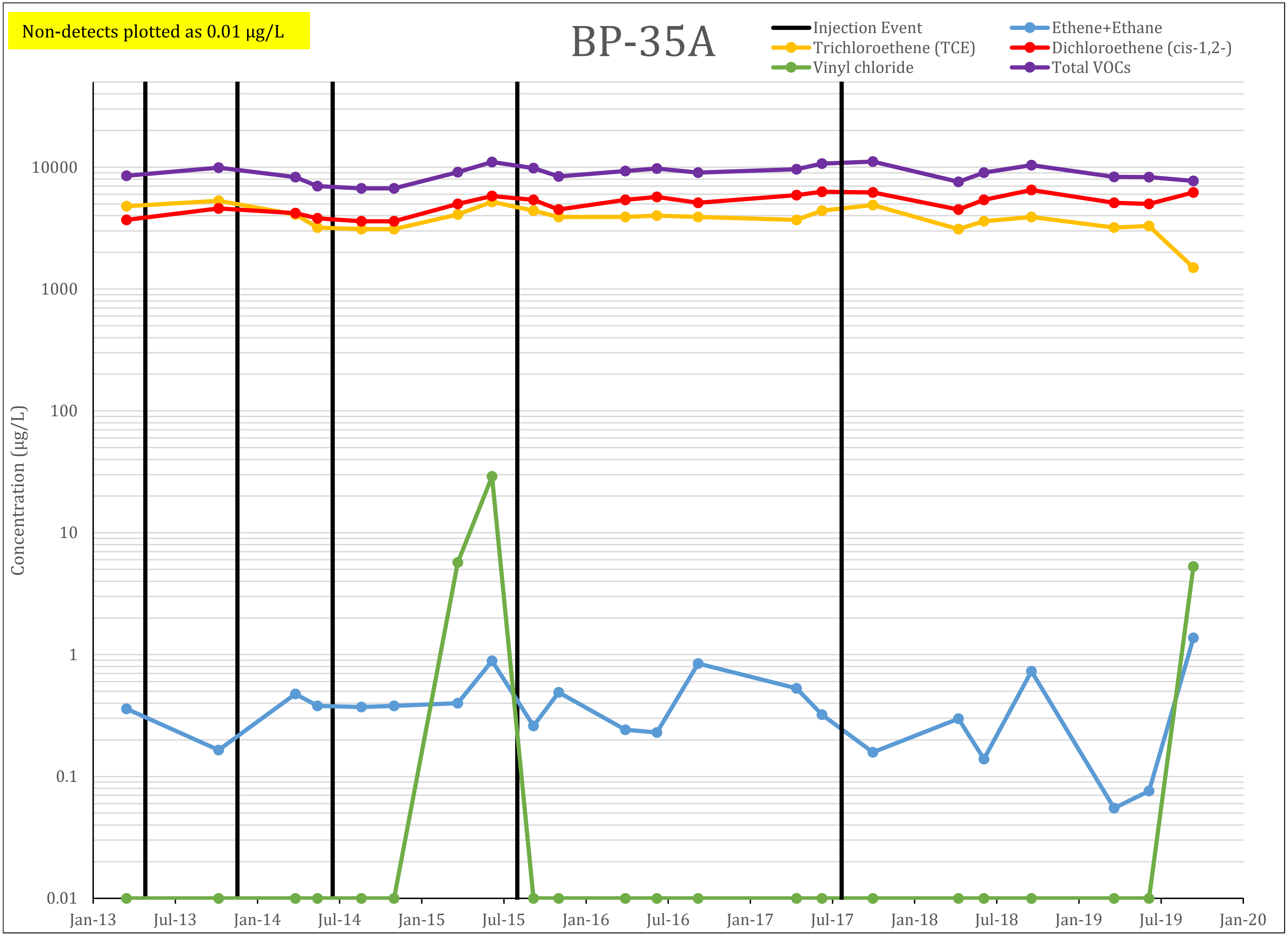


Non-detects plotted as 0.01 µg/L
BP-31A
Injection Event
Trichloroethene (TCE)
Vinyl chloride
Ethene+Ethane
Dichloroethene (cis-1,2-)
Total VOCs
Concentration (µg/L)
1000
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20

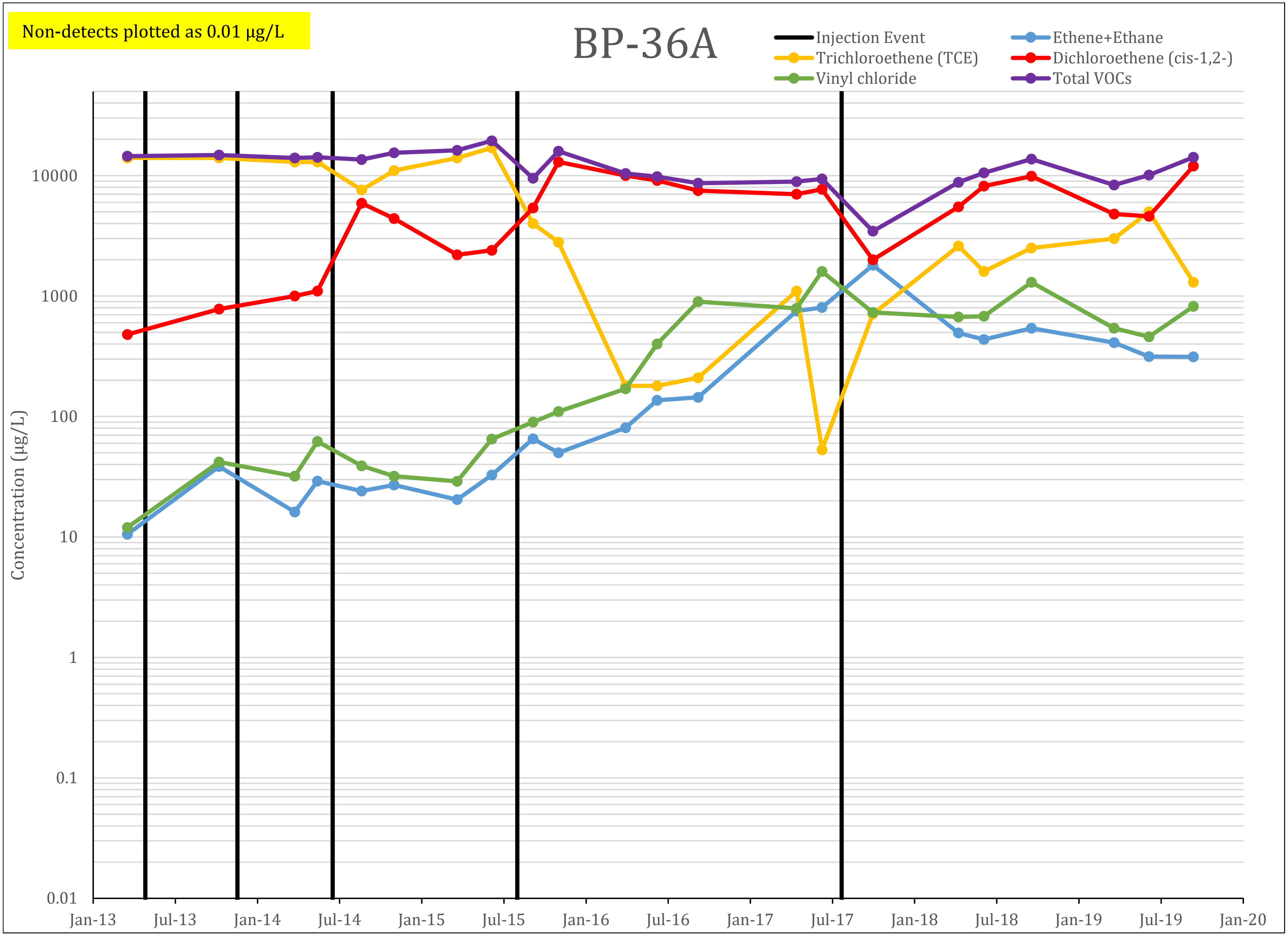


Non-detects plotted as 0.01 µg/L
BP-32A
Injection Event
Ethene+Ethane
Trichloroethene (TCE)
Dichloroethene (cis-1,2-)
Vinyl chloride
Total VOCs
Concentration (µg/L)
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20

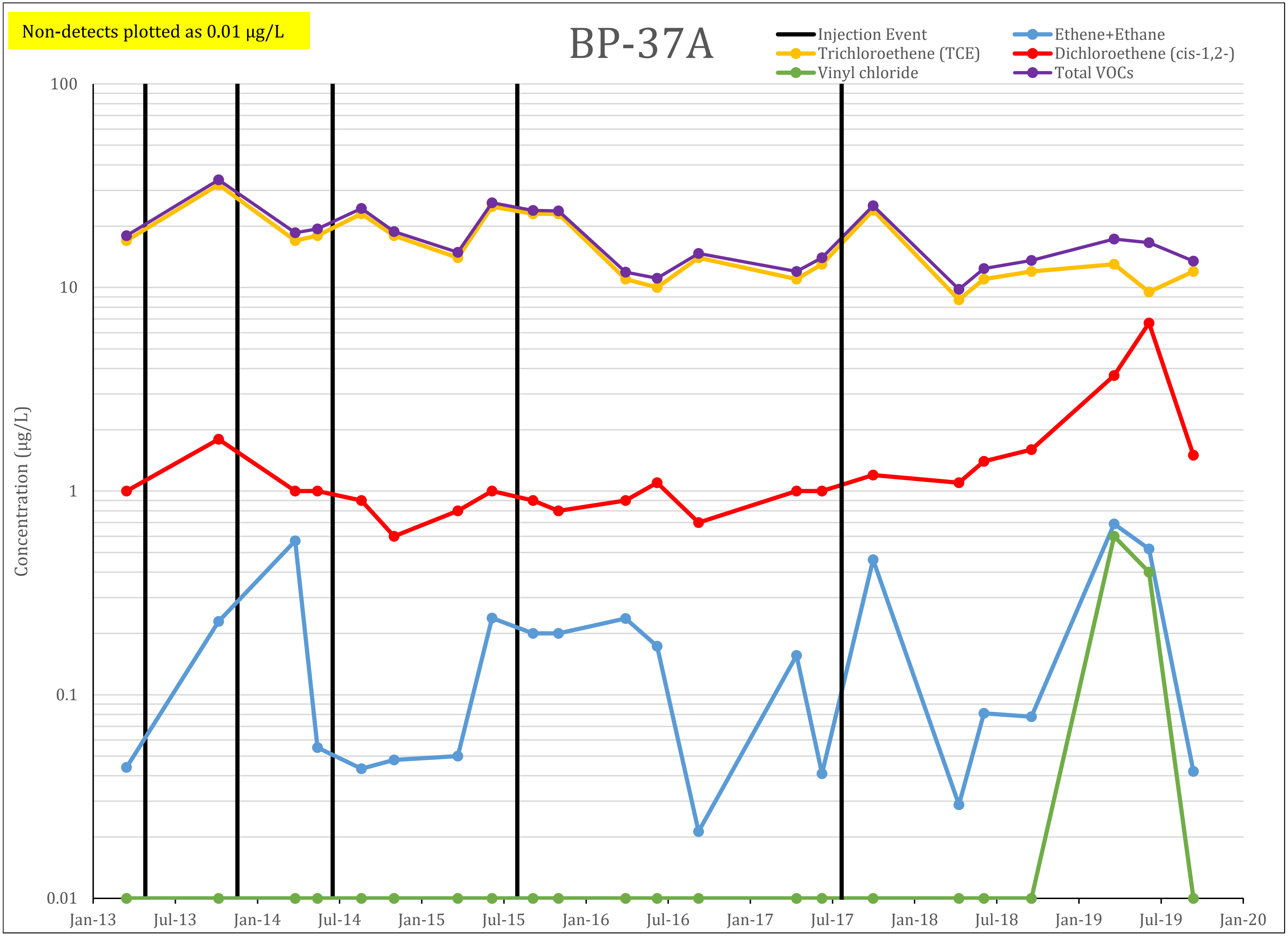

Non-detects plotted as 0.01 µg/L
BP-34A
Injection Event
Trichloroethene (TCE)
Vinyl chloride
Ethene+Ethane
Dichloroethene (cis-1,2-)
Total VOCs
Concentration (µg/L)
100000
10000
1000
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20



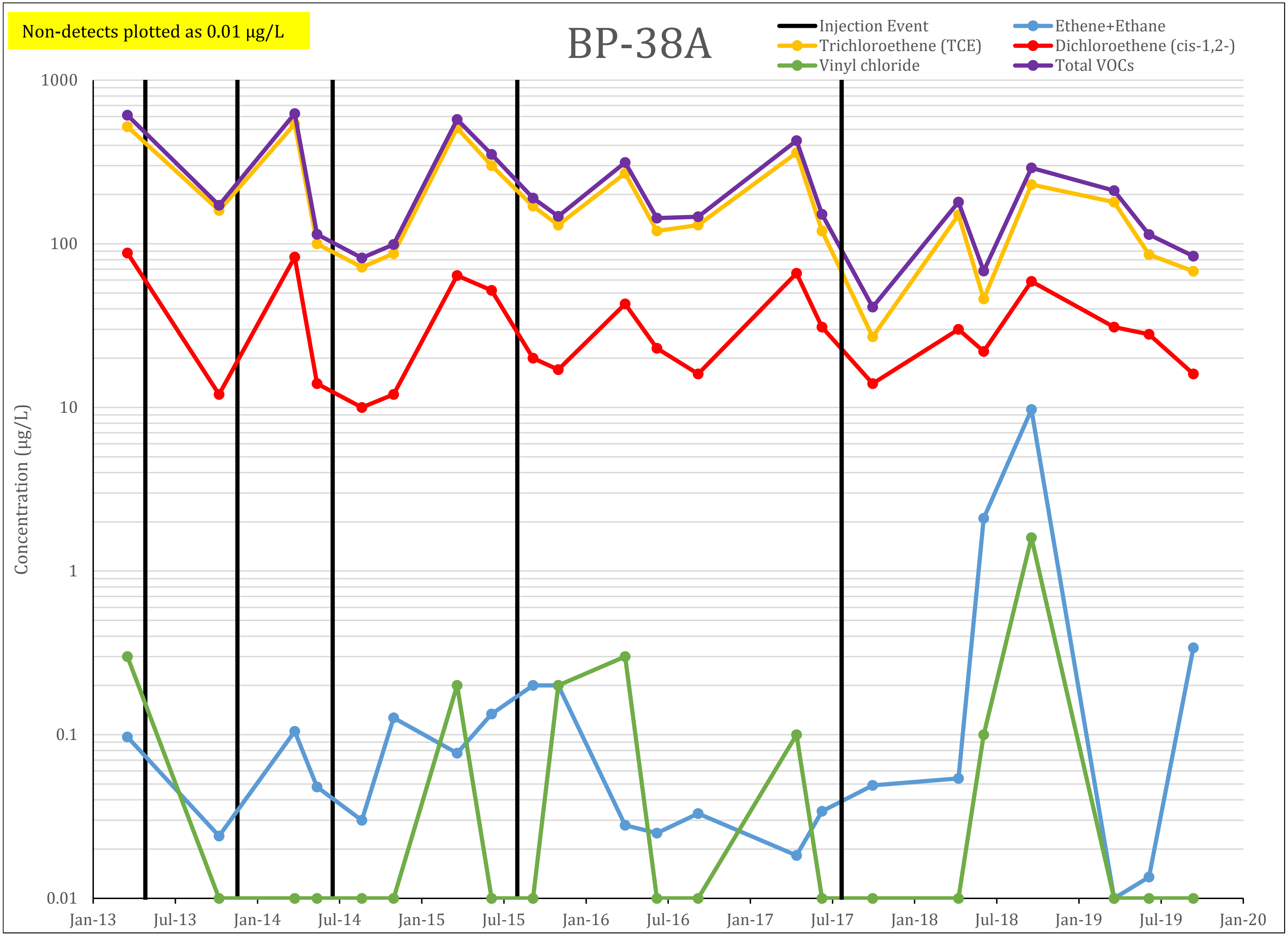
Non-detects plotted as 0.01 µg/L
BP-35A
Injection Event
Trichloroethene (TCE)
Vinyl chloride
Ethene+Ethane
Dichloroethene (cis-1,2-)
Total VOCs
Concentration (µg/L)
10000
1000
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20

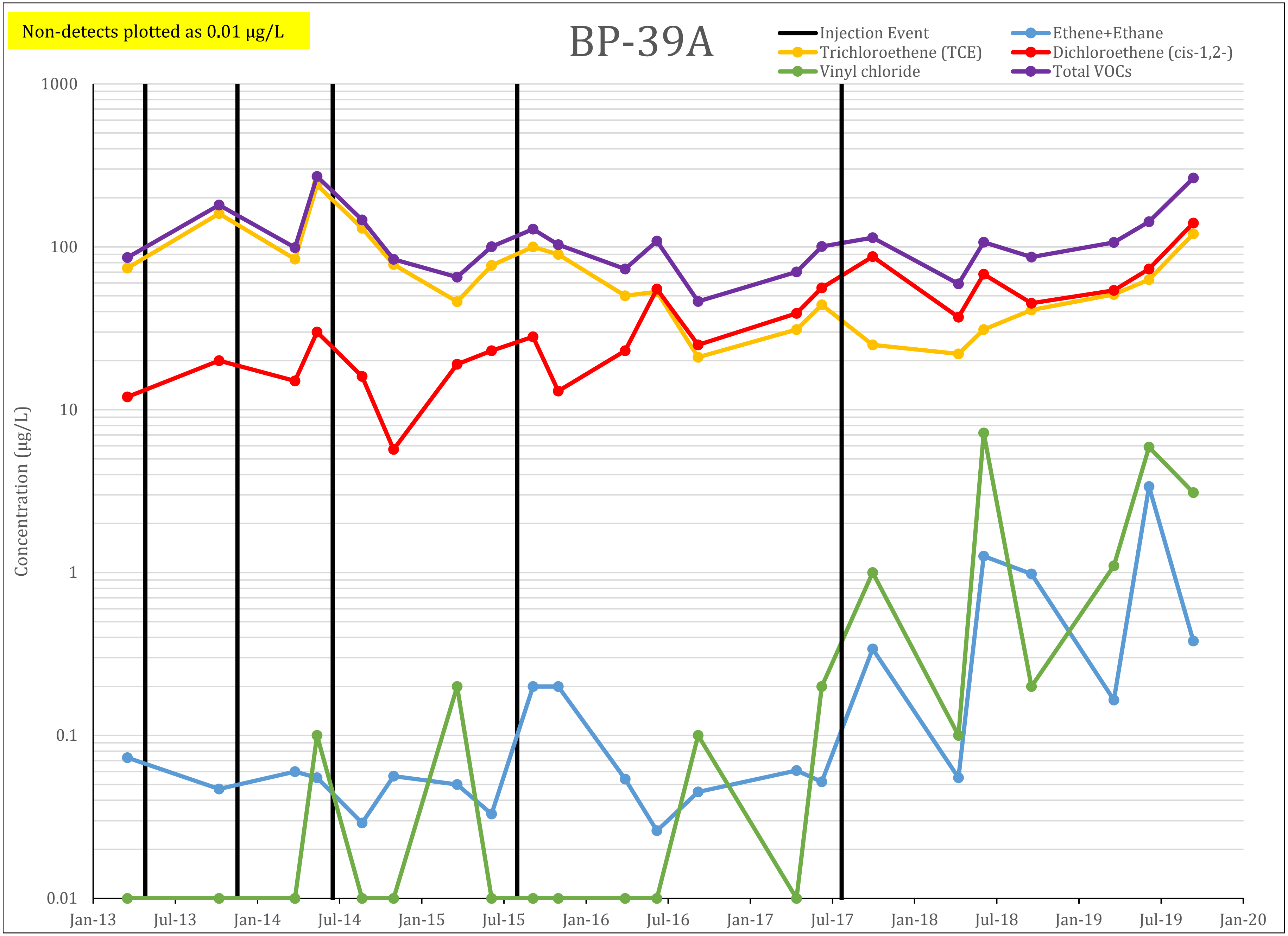


Non-detects plotted as 0.01 µg/L
BP-36A
Injection Event
Trichloroethene (TCE)
Vinyl chloride
Ethene+Ethane
Dichloroethene (cis-1,2-)
Total VOCs
Concentration (µg/L)
10000
1000
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20

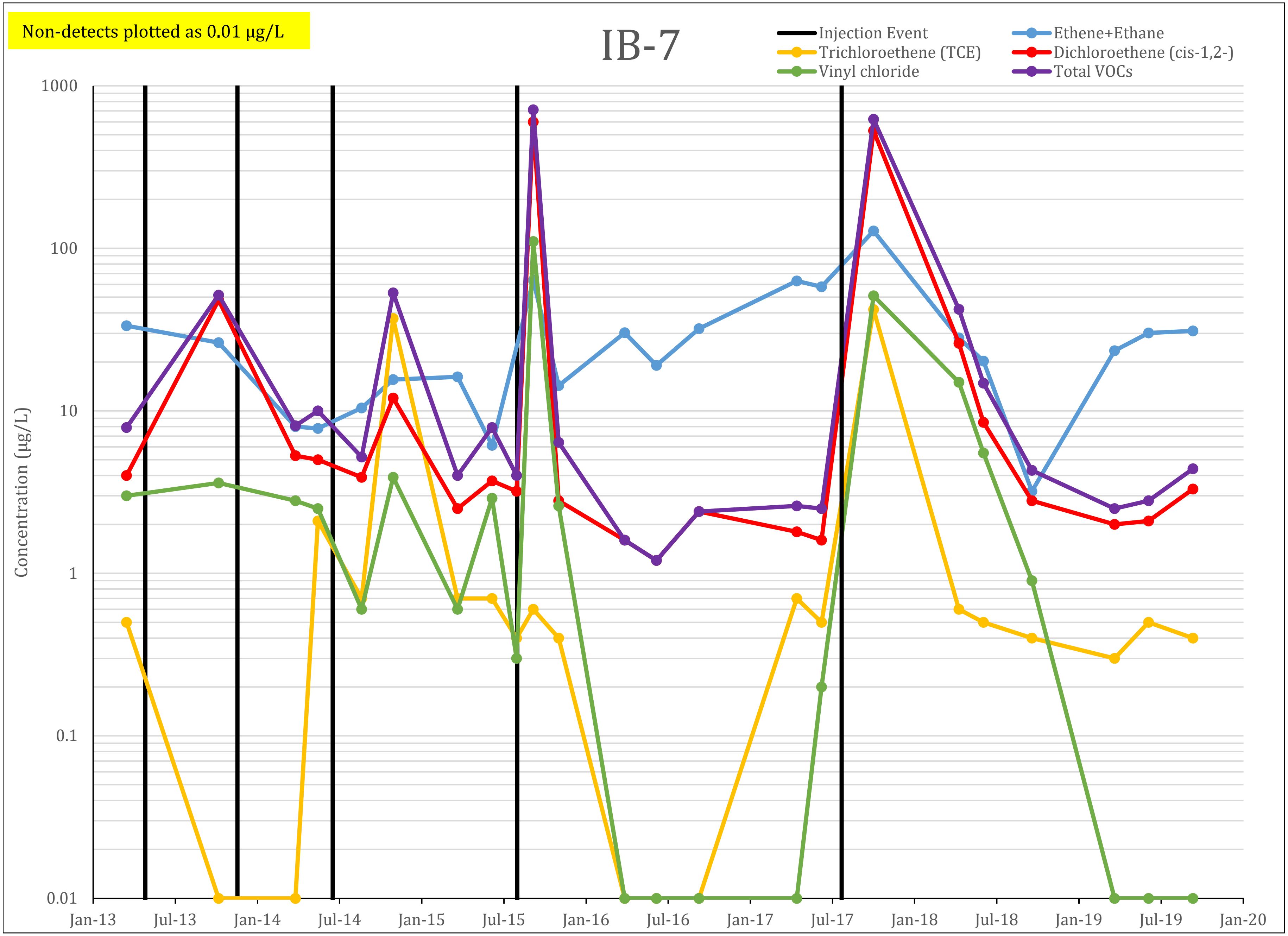


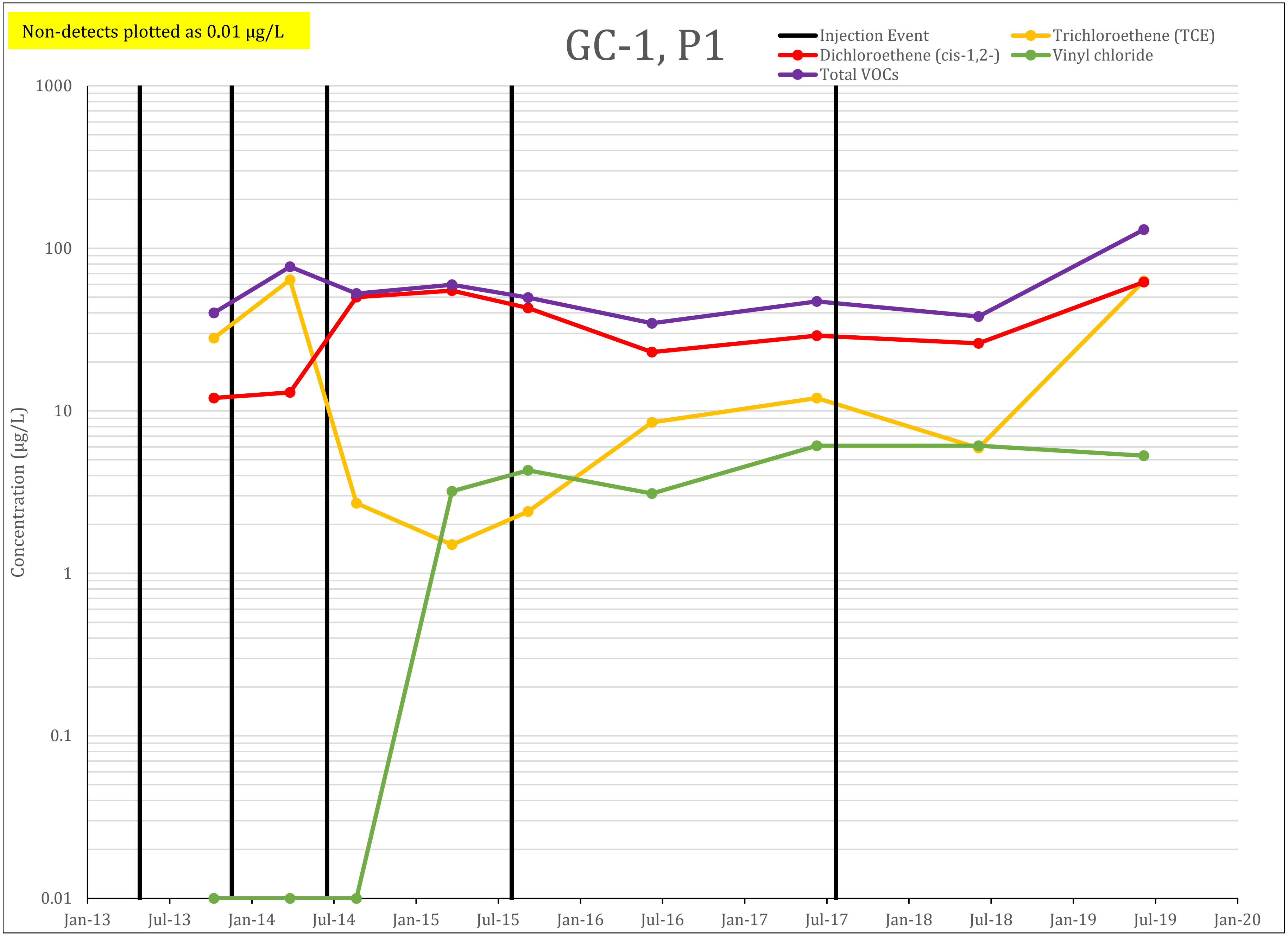
Non-detects plotted as 0.01 µg/L
BP-37A
Injection Event
Trichloroethene (TCE)
Vinyl chloride
Ethene+Ethane
Dichloroethene (cis-1,2-)
Total VOCs
Concentration (µg/L)
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20


Non-detects plotted as 0.01 µg/L
BP-38A
Injection Event
Trichloroethene (TCE)
Vinyl chloride
Ethene+Ethane
Dichloroethene (cis-1,2-)
Total VOCs
Concentration (µg/L)
1000
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20

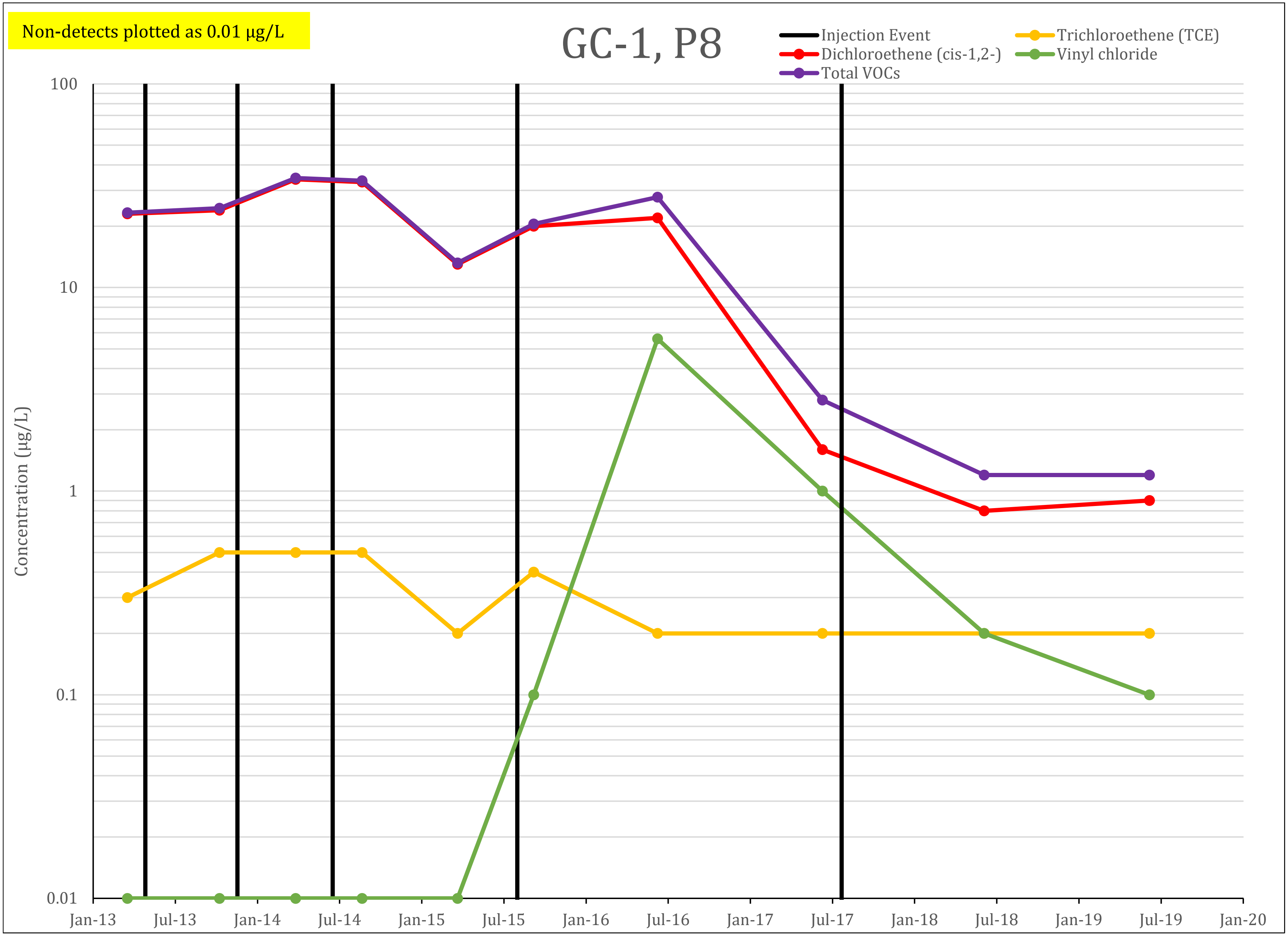


Non-detects plotted as 0.01 µg/L
BP-39A
Injection Event
Trichloroethene (TCE)
Vinyl chloride
Ethene+Ethane
Dichloroethene (cis-1,2-)
Total VOCs
Concentration (µg/L)
1000
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20

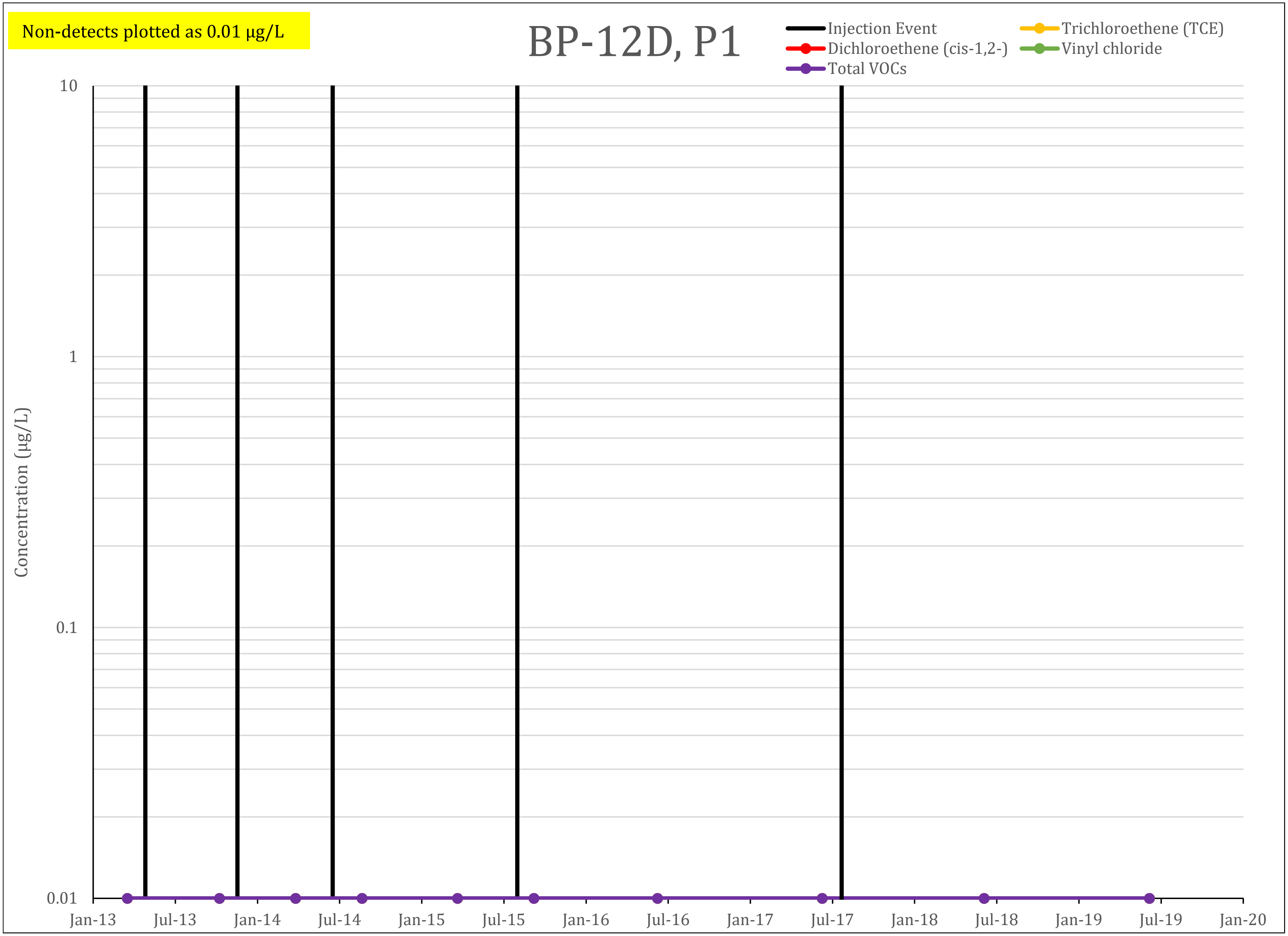

Non-detects plotted as 0.01 µg/L
IB-7
Injection Event
Trichloroethene (TCE)
Vinyl chloride
Ethene+Ethane
Dichloroethene (cis-1,2-)
Total VOCs
Concentration (µg/L)
1000
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20



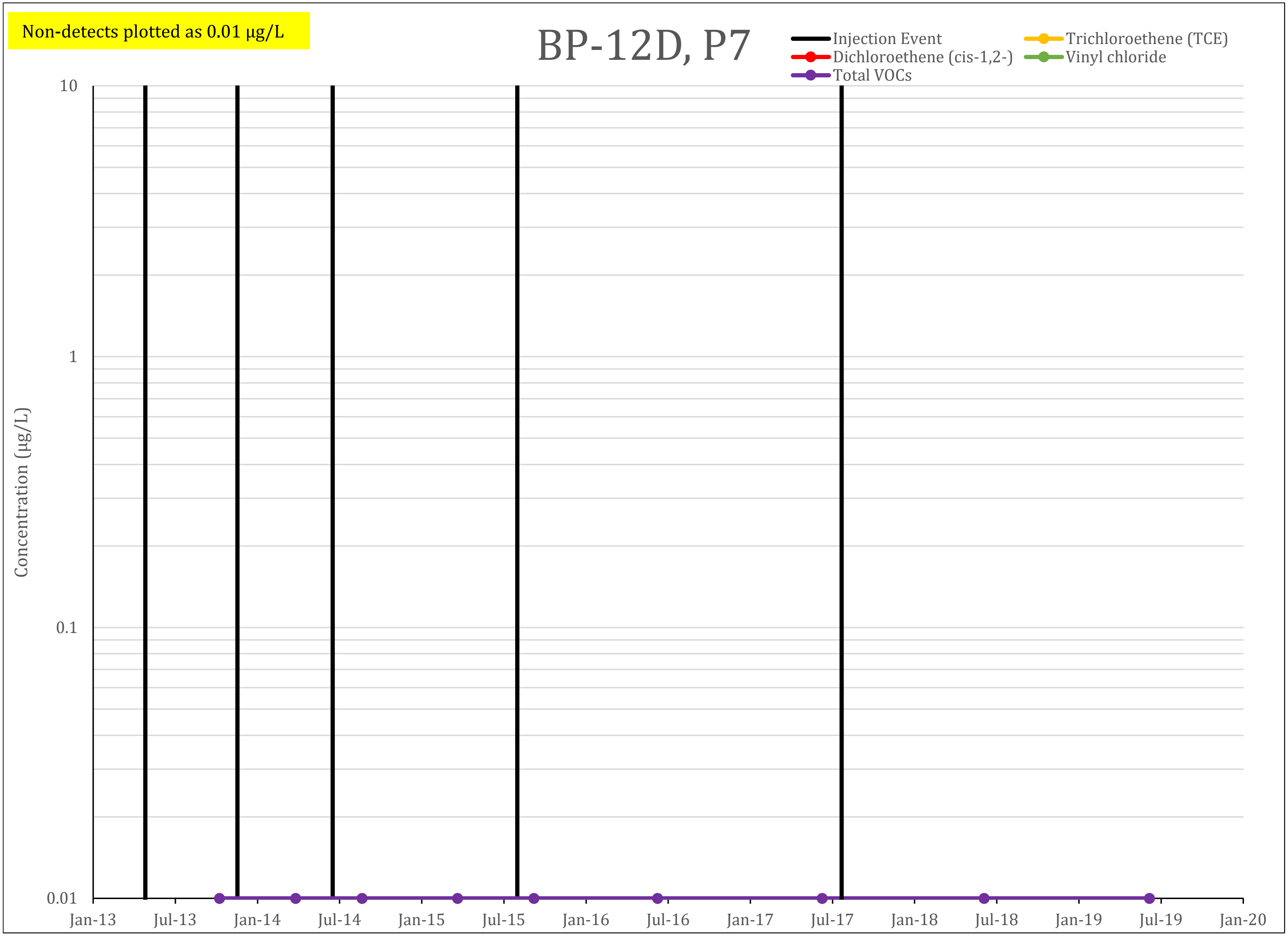
Non-detects plotted as 0.01 µg/L
GC-1, P1
Injection Event
Trichloroethene (TCE)
Dichloroethene (cis-1,2-)
Vinyl chloride
Total VOCs
Concentration (µg/L)
1000
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20



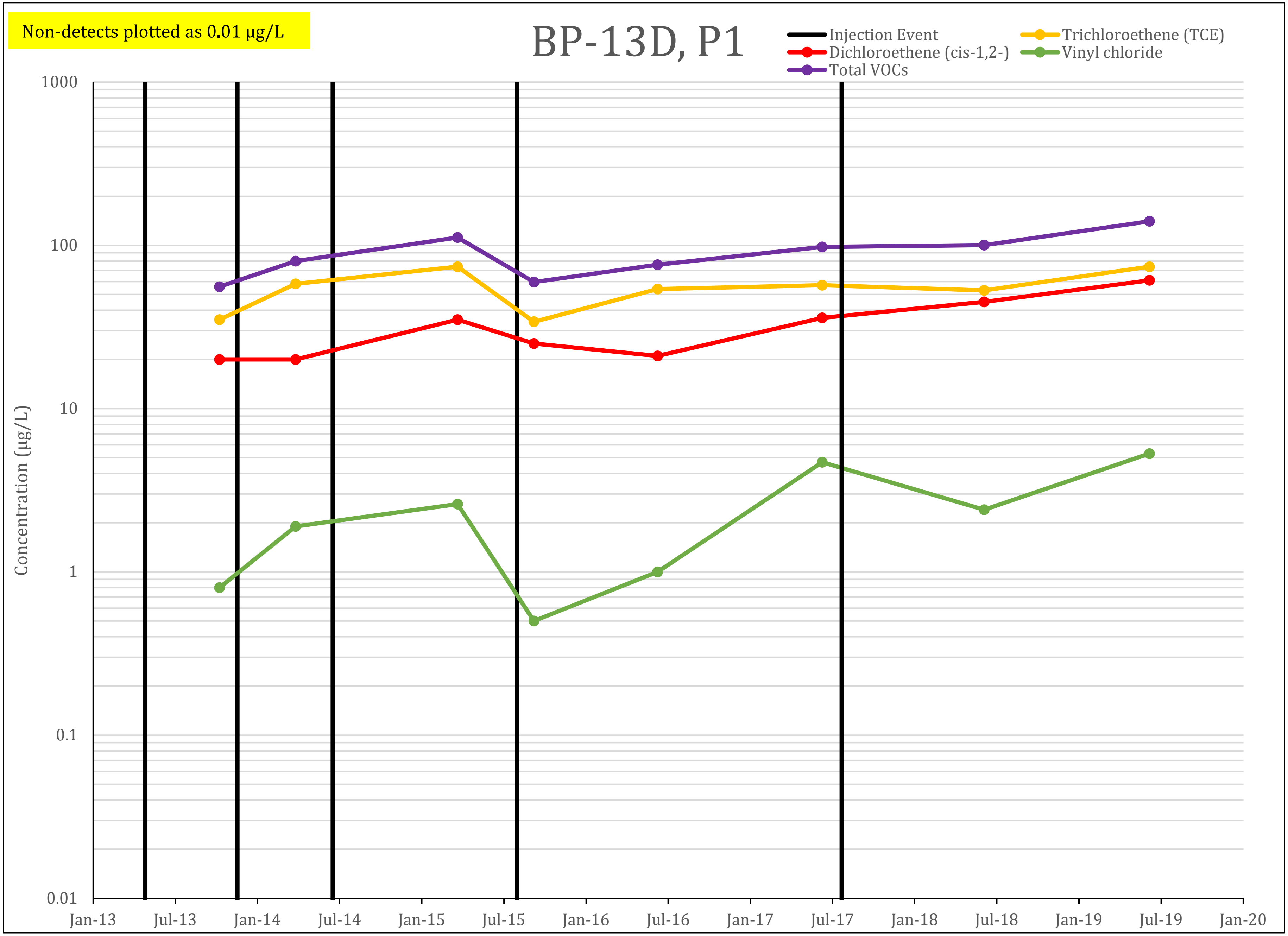
Non-detects plotted as 0.01 µg/L
GC-1, P8
Injection Event
Dichloroethene (cis-1,2-)
Total VOCs
Trichloroethene (TCE)
Vinyl chloride
Concentration (µg/L)
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20



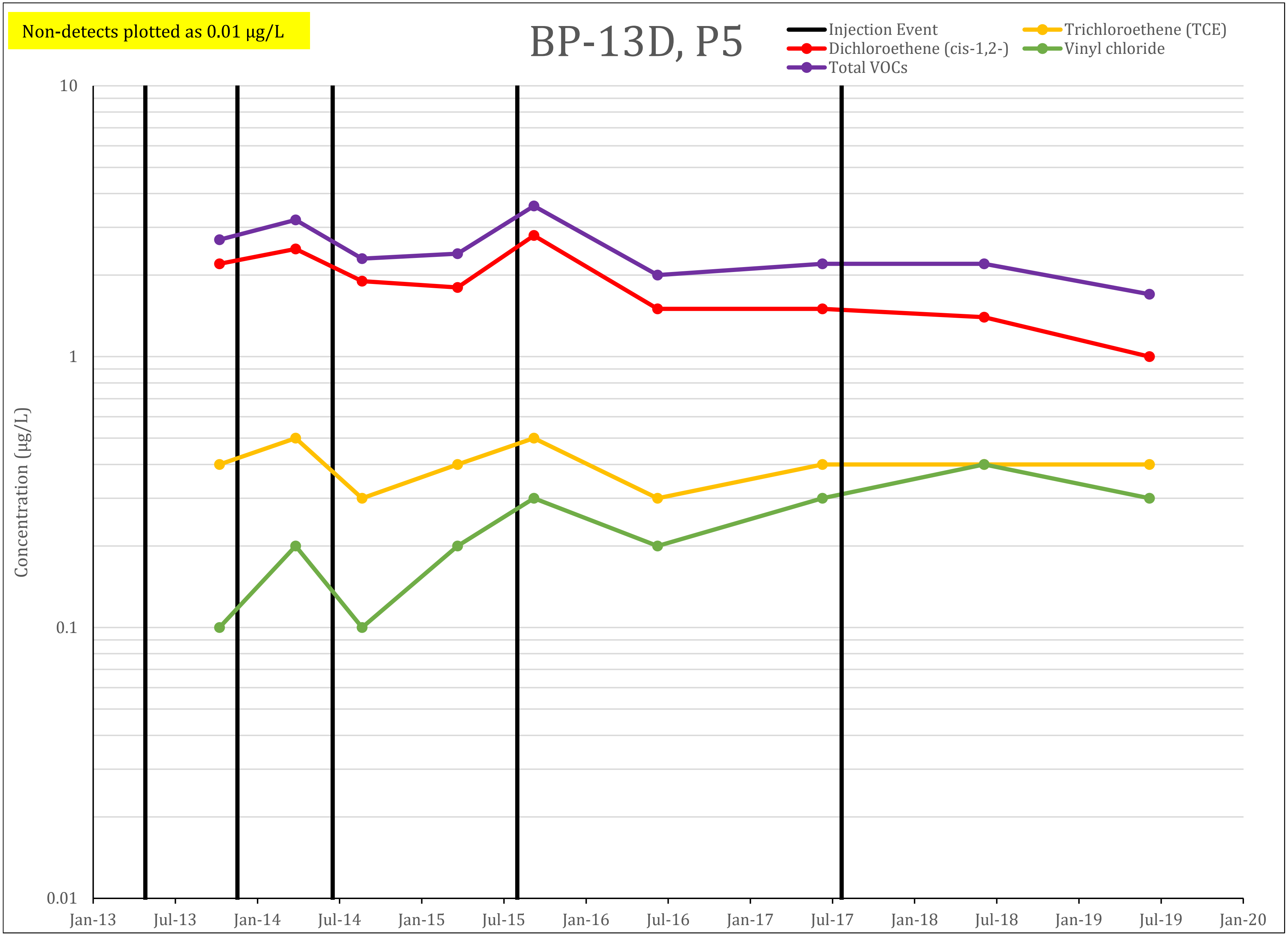
Non-detects plotted as 0.01 µg/L
BP-12D, P1
Injection Event
Dichloroethene (cis-1,2-)
Total VOCs
Trichloroethene (TCE)
Vinyl chloride
Concentration (µg/L)
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20



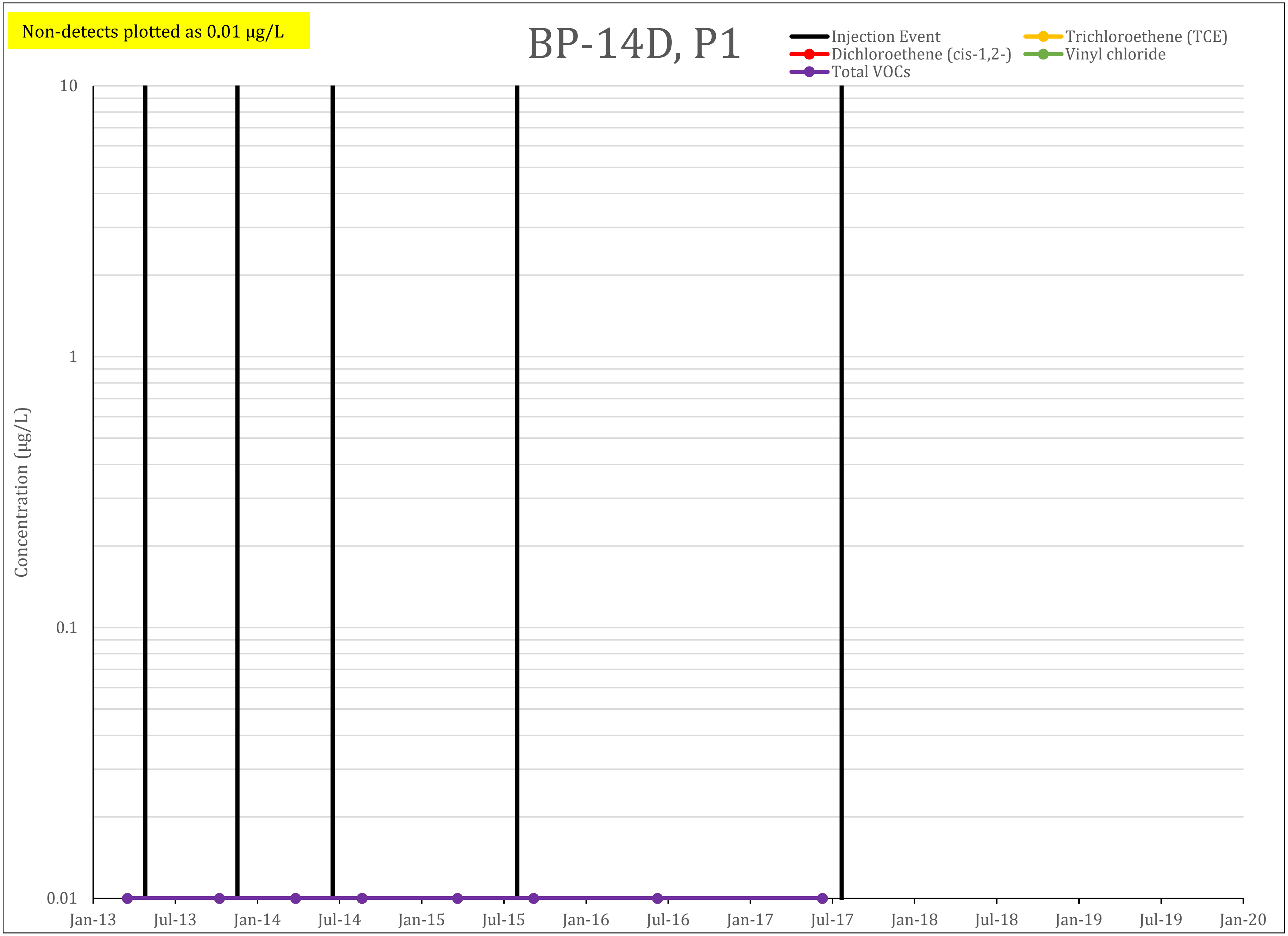
Non-detects plotted as 0.01 µg/L
BP-12D, P7
Injection Event
Trichloroethene (TCE)
Dichloroethene (cis-1,2-)
Vinyl chloride
Total VOCs
Concentration (µg/L)
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20



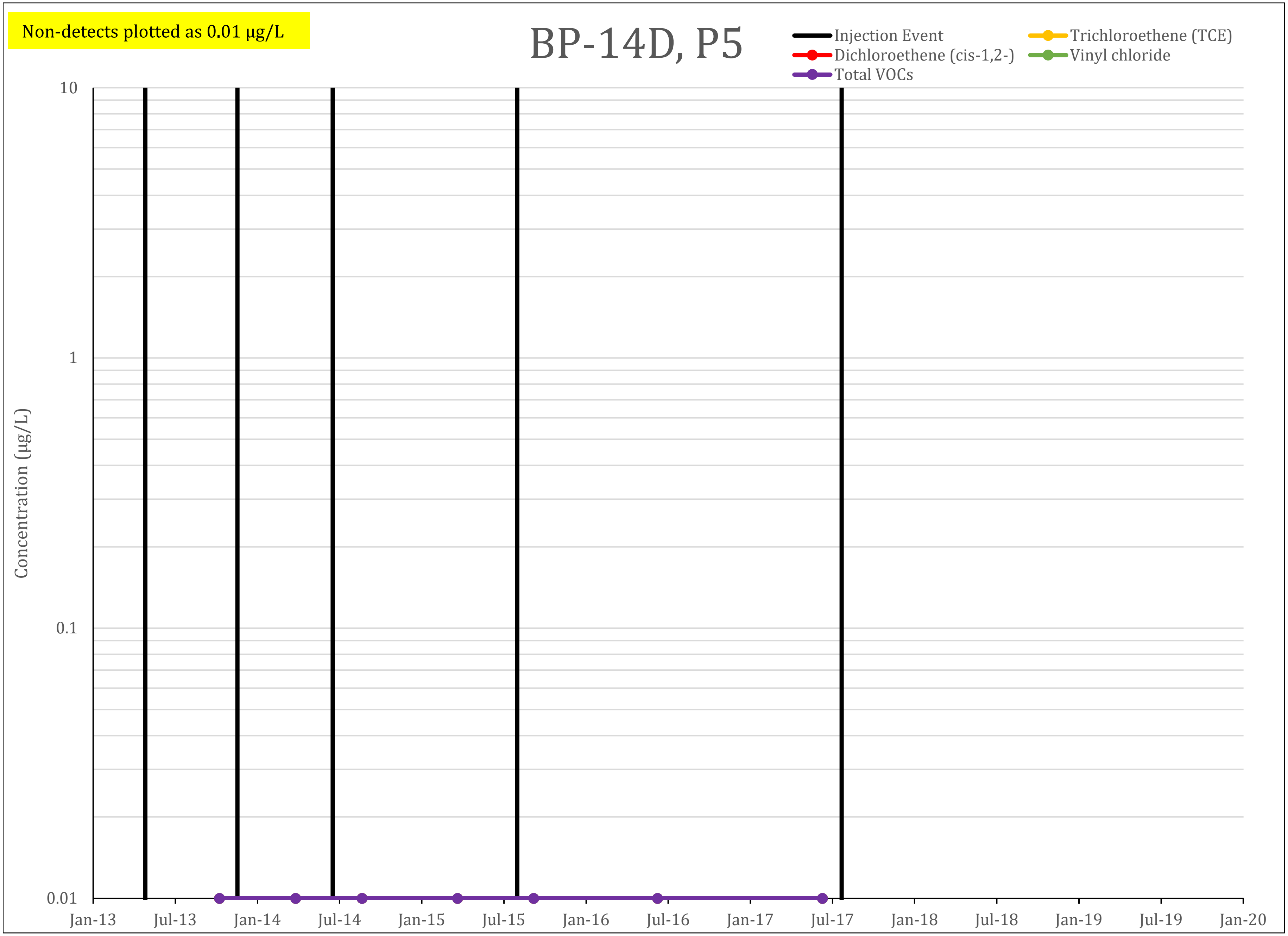
Non-detects plotted as 0.01 µg/L
BP-13D, P1
Injection Event
Dichloroethene (cis-1,2-)
Total VOCs
Trichloroethene (TCE)
Vinyl chloride
Concentration (µg/L)
1000
100
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20



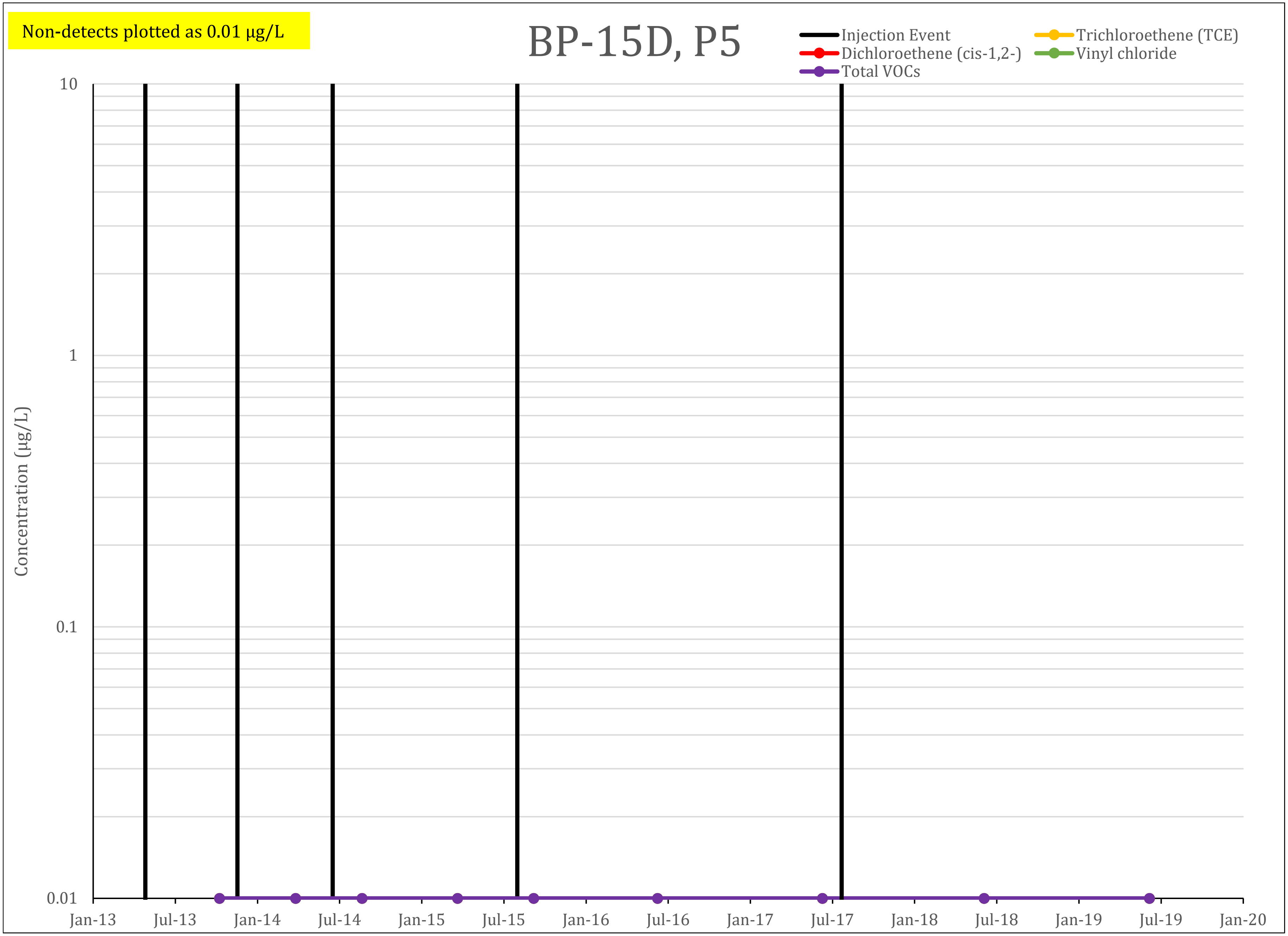
Non-detects plotted as 0.01 µg/L
BP-13D, P5
Injection Event
Dichloroethene (cis-1,2-)
Total VOCs
Trichloroethene (TCE)
Vinyl chloride
Concentration (µg/L)
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20



Non-detects plotted as 0.01 µg/L
BP-14D, P1
Injection Event
Trichloroethene (TCE)
Dichloroethene (cis-1,2-)
Vinyl chloride
Total VOCs
Concentration (µg/L)
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20



Non-detects plotted as 0.01 µg/L
BP-14D, P5
Injection Event
Dichloroethene (cis-1,2-)
Total VOCs
Trichloroethene (TCE)
Vinyl chloride
Concentration (µg/L)
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20


Non-detects plotted as 0.01 µg/L
BP-15D, P5
Injection Event
Dichloroethene (cis-1,2-)
Total VOCs
Trichloroethene (TCE)
Vinyl chloride
Concentration (µg/L)
10
1
0.1
0.01
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20