COMPREHENSIVE GROUNDWATER MONITORING REPORT FOR 2018
Former York Naval Ordnance Plant
1425 Eden Road, Springettsbury Township
York, Pennsylvania

Prepared for:

Former York Naval Ordnance Plant Remediation Team

April 29, 2019

Prepared by:

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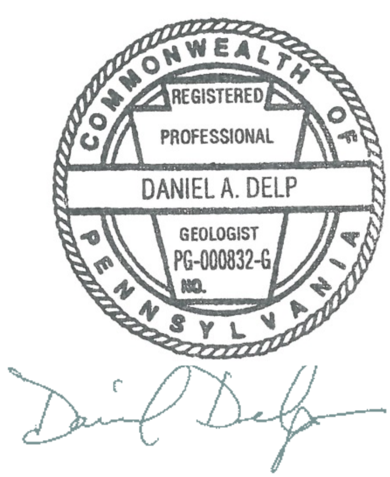

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** - in portable document format (PDF) on the USB Drive attached to this report.*

LIST OF ACRONYMS AND ABBREVIATIONS

%D	percent difference
%R	percent recovery
%RSD	percent relative standard deviation
µg/L	micrograms per liter
amsl	above mean sea level
bgs	below ground surface
BPA	Burn Pile Area
cfs	cubic feet per second
cis12DCE	cis-1,2-dichloroethene
COC	constituent of concern
CPA	Central Plant Area
CSM	Conceptual Site Model
DNAPL	dense non-aqueous phase liquid
DQO	data quality objective
EDD	electronic data deliverables
FSP	Field Sampling Plan
fYNOP	former York Naval Ordnance Plant
GSC	Groundwater Sciences Corporation
GWTS	groundwater extraction and treatment system
HHRA	human health risk assessment
HTG	Hydro-Terra Group
IS	internal standard
LCS/LCSD	laboratory control sample/laboratory control sample duplicate
MCL	maximum contaminant levels
MG	million gallons
MS/MSD	matrix spike/matrix spike duplicate
MSC	medium specific concentration
NBldg4	North Building 4
NETT	North End of Test Track
NPBA	Northern Property Boundary Area
NW-WPL	Northwest Corner of the WPL
PADEP	Pennsylvania Department of Environmental Protection
Part 2 SRI	Part 2 Supplemental Groundwater Remedial Investigation
PCE	tetrachloroethene
PP-FR	Proposed Plan - Final Remedy
ppm	part per million
PRCP	Post-remediation Care Plan
QA/QC	quality assurance/quality control
QAPP	Quality Assurance Project Plan
QC	quality control
RI	remedial investigation
RPD	relative percent difference
RRF	relative response factors
RSL	regional screening level
SAIC	Science Applications International Company

SDG	sample delivery group
SPA	South Plume Area
SPBA	Southern Property Boundary Area
SW-WPL	Southwest Corner of the West Parking Lot
TCA	1,1,1-trichloroethane
TCE	trichloroethene
USEPA	United States Environmental Protection Agency
USGS	United States Geologic Survey
VI	vapor intrusion
VOCs	volatile organic compounds
WPL	West Parking Lot

EXECUTIVE SUMMARY

This report presents the results of annual comprehensive groundwater and surface water monitoring activities completed in 2018 at the former York Naval Ordnance Plant (fYNOP). Completion of these activities meets the objectives of the Groundwater and Surface Water Monitoring Plan (GSC, 2016) and the recommendations from the Comprehensive Groundwater Monitoring Report for 2016 and 2017 (GSC, 2018b). The 2016 Monitoring Plan provided procedures for continued monitoring of constituent of concern (COC) concentrations in groundwater and surface water during completion of the Part 2 Supplemental Remedial Investigation (SRI) and Human Health Risk Assessment (HHRA) for groundwater. The stated objectives in the 2016 Monitoring Plan are as follows:

- Monitoring of plume perimeter and surface water.
- Determination of concentration and mass remaining in the aquifer that was not scheduled for completion in 2018.
- Monitoring of remedial action performance.

Analysis of Site-wide water level measurements in wells across the fYNOP indicates a westward gradient in shallow groundwater flowing towards Codorus Creek. In addition, pumping of groundwater from active collection wells CW-9, CW-13, CW-17, and CW-20 in the West Parking Lot (WPL) and CW-15A in the North Building 4 (NBldg4) area forms a closed groundwater depression that intercepts groundwater flowing to the west towards Codorus Creek that prevents COC migration off-Site. These data show that the WPL groundwater extraction system is operating as designed.

An evaluation of 2018 analytical data from groundwater in fYNOP plume perimeter wells located in the North Property Boundary Area (NPBA), WPL, and Levee Area shows that COC concentrations are generally stable or declining across the Site compared to historic groundwater sample results from 2014 through 2017. The highest COC concentrations in 2018 groundwater samples were collected from monitoring wells around CW-20 in the Southwest Corner of the WPL (SW-WPL) where concentrations exceed part per million (ppm) levels. Samples from these wells show either no trend or a declining trend in COC concentrations.

The 2018 analytical data from fourteen (14) off-Site groundwater samples in South Plume Area (SPA) wells shows no trend or a declining trend in COC concentrations. At one well located on the

K. G. Whiteford Ltd. property (i.e., the former Cole Steel and Pfaltzgraff Company manufacturing facilities), an increasing trend in trichloroethene (TCE) and cis-1,2-dichloroethene (cis12DCE) concentrations was observed in samples collected from 2013 through 2018.

The 2018 PCE concentration in the groundwater sample from Eastern Perimeter Road monitoring well MW-185 is lower than the Pennsylvania Department of Environmental Protection (PADEP) vapor intrusion (VI) residential screening value for PCE of 110 micrograms per liter (µg/L). The 2017 groundwater sample results from MW-185 were used in the HHRA for groundwater to evaluate the potential for residential VI exposure risk for an off-Site occupied building located to the east of MW-185. VI was determined not to be a health risk to occupants of the off-Site building based on the analytical results of the 2017 groundwater samples. Therefore, the 2018 tetrachloroethene (PCE) value does not affect the results of the HHRA.

Surface water samples collected from the monitoring stations along Codorus Creek in 2018 reported either undetected COC concentrations or detections that are within the range of historic concentrations recorded in samples collected under pumping conditions in March through September 2015.

Remedial action performance monitoring in WPL collection wells show 2018 COC concentrations in groundwater that are consistent with or have declined following the restart of the WPL groundwater extraction system in 2015. Analysis of 2018 data indicates that approximately 856 pounds of volatile organic compound (VOC) mass was removed from the aquifer by groundwater pumping and treatment in the WPL. Pumping from CW-20, the most effective WPL collection well in terms of VOC mass removal, accounted for 225 pounds or approximately 26% of the total mass removed by the WPL groundwater extraction system in 2018.

The 2018 groundwater and surface water monitoring results support the remedies in the Proposed Plan - Final Remedy (PP-FR) for the fYNOP (GSC, 2018a). The scope of future groundwater and surface water monitoring at the Site will be presented in the Post-remediation Care Plan (PRCP) for the fYNOP that replaces the 2016 Monitoring Plan. The complete PRCP will be outlined in the Cleanup Plan to be submitted to the PADEP and the United States Environmental Protection Agency (USEPA) during 2019. Following the submittal and approval of the PCRP, the next round of comprehensive Site-wide groundwater and surface water monitoring will be completed at the fYNOP in mid to late fall 2019. The monitoring is anticipated to consist of a Site-wide round of water level measurements and groundwater and surface water sample collection and analysis.

1 INTRODUCTION

This report documents the results of annual comprehensive Site-wide groundwater and surface water monitoring completed in 2018 at the former York Naval Ordnance Plant (fYNOP or Site). The site location is shown on **Figure 1.0-1**. Monitoring was performed in accordance with the Groundwater and Surface Water Monitoring Plan (GSC, 2016) and following the recommendations from the Comprehensive Groundwater Monitoring Report for 2016-2017 (GSC, 2018b).

1.1 Background and Purpose

In 2016, the Groundwater and Surface Water Monitoring Plan replaced the ongoing key well sampling program at the fYNOP. The 2016 Monitoring Plan facilitates continued monitoring of constituent of concern (COC) concentrations in groundwater and surface water during the completion of the Part 2 Supplemental Remedial Investigation (SRI) and Human Health Risk Assessment (HHRA). The stated objectives in the 2016 Monitoring Plan as follows:

- Monitoring of plume perimeter and surface water.
- Determination of concentration and mass remaining in the aquifer.
- Monitoring of remedial action performance.

Beginning in 2019, Site-wide monitoring at fYNOP will be completed following a Post-remediation Care Plan (PRCP) that replaces the 2016 Monitoring Plan. The PRCP will be submitted to satisfy the requirements of the Pennsylvania Land Recycling and Environmental Remediation Standards Act (Act 2).

1.2 Report Organization

This report is organized into five sections. The scope and results of the 2018 monitoring are presented in Section 2. Section 3 provides the laboratory data quality assessment performed on the groundwater and surface water sample results. Section 4 provides recommendations for future groundwater and surface water monitoring in the fall of 2019. Section 5 is a list of references.

2 GROUNDWATER AND SURFACE WATER MONITORING RESULTS

The results of the groundwater and surface water monitoring performed in 2018 are described in three subsections. Subsection 2.1 presents the Site-wide groundwater elevations and gradient. Subsection 2.2 describes the groundwater sampling results. Subsection 2.3 provides the surface water sampling results.

2.1 Groundwater Elevations

Site-wide water level measurements were collected on September 27, 2018 at wells, springs and surface water gauge locations. The water level measurement locations, measurement point elevations and calculated water level elevations for 2018 are provided on **Table 2.1-1**. The Site-wide water level data are contained in the fYNOP database.

Water level elevations from September 27, 2018, were used to develop the potentiometric contours illustrated on **Plate 2.1-1** that approximate the elevation of the water table with West Parking Lot (WPL) collection wells in operation. The contours indicate a generalized net flow direction perpendicular to the contour lines across the Site; however, actual flow paths may vary due to anisotropic groundwater flow (preferential permeability) along bedrock fractures, through solution cavities and interconnected conduits, and along bedding plane partings. At locations with multiple well screen depths, only the groundwater level elevation from the shallowest well was used to prepare the contours shown in blue font on **Plate 2.1-1.** Water level elevations collected from wells screened below the shallow portion of the aquifer (i.e., the deep wells), are shown on the plate in gray font. Groundwater elevations from the deep wells were not used to construct the contours because piezometric elevations deeper in the aquifer do not represent the water table surface elevation in the aquifer at the Site.

As shown on **Plate 2.1-1**, the shallow lateral groundwater gradient across most of the Site is generally westward from a groundwater elevation of approximately 540 feet above mean sea level (amsl) towards Codorus Creek with a groundwater surface elevation of approximately 341 feet amsl. In the southeast portion of the fYNOP, the groundwater gradient is southward toward the Southern Property Boundary Area (SPBA) and then to the southwest towards U.S. Route 30.

Consistent with previous monitoring, the gradient in the sandstone bedrock aquifer beneath the eastern portion of the Site is relatively steep and the gradient in the carbonate bedrock aquifer in the western portion of the Site is relatively flat (GSC, 2018c). Due to the historically high levels of precipitation during late summer of 2018, water levels measured in most wells were higher than those measured in 2016 and 2017 (see **Table 2.1-1**).

Groundwater flow in the western portion of the Site is controlled by the WPL groundwater extraction system consisting of wells CW-9, CW-13, CW-17, CW-20 (in the WPL), and CW-15A (near the northwest corner of former North Building 4 (NBldg4)). Pumping of these wells forms a closed groundwater depression depicted by the 340 feet amsl contour on **Plate 2.1-1** that intercepts groundwater flowing westward towards Codorus Creek.

A localized groundwater mound exists in the area of monitoring well MW-85 that is evident by the closed groundwater contours illustrated on **Plate 2.1-1**. This mound is a groundwater feature that likely exists due to groundwater recharge from the adjacent storm water management facility outfall (GSC, 2018c).

Vertical gradients consistent with those recorded in the past were measured in multi-level well pairs as shown on **Table 2.1-2** (GSC, 2018c). Upward gradients were measured in 21 well pairs in the former Central Plant Area (CPA), Levee Area, Eastern Landfill, former North End Test Track (NETT), Northern Property Boundary Area (NPBA), and WPL. Artesian flow occurs in well pairs MW-16S&D and MW-18S&D in the NPBA. Downward vertical gradients are evident from elevation data in 17 well pairs located in the former CPA, Eastern Landfill, former NETT, former North Plant Area, NPBA, South Plume Area (SPA), SPBA, and WPL.

2.2 Groundwater and Surface Water Sampling Scope

Groundwater and surface water sampling was performed in accordance with the procedures in the Field Sampling Plan (FSP) (GSC, 2012a) and the Quality Assurance Project Plan (QAPP) (GSC, 2012b and 2014a). FSP and QAPP are included in **Appendix A** and **B**, respectively. Purge logs for the groundwater and surface water samples are included in **Appendix C**. All samples were submitted to TestAmerica Pittsburgh for laboratory analyses.

The 2018 sampling was performed on the dates and locations listed on **Table 2.2-1** and highlighted on **Figure 2.2-1**. The sampling scope was performed in accordance with the 2016 Monitoring Plan (GSC, 2016) and following recommendations in the Comprehensive Groundwater Monitoring Report for 2016-2017 (GSC, 2018b) as follows:

- **Monitoring of Plume Perimeter and Surface Water –** Sampling was performed in wells at the following locations:
    - NPBA, WPL, Levee Area, SPA, and SPBA areas.
    - Eastern Site perimeter well MW-185.
    - Surface water stations along Codorus Creek.
- **Determination of Concentration and Mass in the Aquifer –** Sampling to determine concentration and mass in the aquifer was not scheduled for completion in 2018. However, VOC mass removed from groundwater by CW-20 pumping is discussed in Section 2.3.1.
- **Monitoring of Remedial Action Performance –** Sampling was performed as follows:
    - Five active groundwater collection wells, CW-9, CW-13, CW-15A, CW-17, and CW-20 in the WPL as part of the routine groundwater extraction and treatment system (GWTS) monitoring.
    - Monitoring wells around active collection well CW-20 in the Southwest Corner of the West Parking Lot (SW-WPL) to evaluate the long-term effectiveness of CW-20 pumping. Data was reviewed from CW-20 and eleven monitoring wells to assess the improvement of groundwater quality and mass removal at this suspected dense non-aqueous phase liquid (DNAPL) source area (GSC, 2018c).
    - Wells downgradient of the NPBA and four wells at the NETT to monitor the potential migration of COCs in accordance with the NPBA extraction system post shutdown monitoring plan (GSC, 2014b).
    - Well MW-93S in the SW-WPL – A confirmation sample was analyzed due to total lead exceedance of the Pennsylvania Department of Environmental Protection (PADEP) Medium-Specific Concentration (MSC) in 2017.

- o SPBA interim groundwater extraction system – This includes sampling of wells associated with extraction system startup (GSC, 2018d). Sample results and locations will be presented in a separate report.

2.3 Groundwater Sampling Results

The groundwater sample analytical results are summarized on **Table 2.2-1** (Volatile Organic Compounds (VOCs)) and **Table 2.3-1** (Lead). A tabulated summary of the VOC results for 2018 and all of the historic results is in **Appendix D**. For comparison to the results, the tables include the United States Environmental Protection Agency (USEPA) Maximum Contaminant Levels (MCLs), USEPA Regional Screening Levels (RSLs), and PADEP residential and non-residential MSCs.

Laboratory analysis reports for the 2018 samples are in **Appendix E**. **Appendix F** provides time versus concentration graphs for samples showing the primary COCs in groundwater such as tetrachloroethene (PCE), trichloroethene (TCE), and 1,1,1-trichloroethane (TCA) and degradation products. In addition, time versus concentration graphs showing the most recent PCE and TCE results of comprehensive groundwater sampling is provided on the figures; wells sampled in 2018 are highlighted in pink.

As part of the fYNOP chemistry data management process, electronic data deliverables (EDDs) from the laboratory are in the fYNOP database. GSC reviewed the laboratory-provided data packages for the groundwater samples in accordance with the QAPP (GSC, 2012b and 2014a) and then individual sample results were qualified (as necessary) in the fYNOP database.

The 2018 comprehensive groundwater sampling coincided with the timeframe that groundwater samples were collected in the NPBA and the SPBA. Therefore, the laboratory data quality assessment (DQA) of the comprehensive round samples was performed with the NPBA and SPBA samples. A summary of the results for the NPBA and SPBA monitoring is provided Section 2. A comprehensive discussion of these results is in separate submittals for the NPBA and the SPBA reports. Section 3 of this report provides a complete description of the DQA performed on the 2018 samples. **Appendix G** includes the data validation reports. **Appendix H** includes a data validation narrative. A summary of the validated analytical results from the DQA is included on **Table 2.2-1** and **Table 2.3-1**.

2.3.1 Southwest Corner of the West Parking Lot (CW-20 Area)

Eleven on-Site wells located in the SW-WPL, a suspected DNAPL source area, were sampled to monitor COC concentrations in groundwater at various depths in the carbonate bedrock aquifer during the pumping of CW-20. The groundwater samples were collected at well pairs MW-37S&D, MW-75S&D, MW-93S&D, and Waterloo™ multilevel well MW-136A (five sample ports at various depths). The locations of these wells are highlighted in purple on **Figure 2.1-1**.

2.3.1.1 VOC Results and CW-20 Performance Data

Figure 2.3-1 contains TCE and PCE concentrations in groundwater samples collected from 2008 through 2018 and time versus concentration graphs of the TCE and PCE results for that timeframe. Below is a description of the analytical results listed by well sampled:

- CW-20 (open from 205 to 215 feet below ground surface (bgs)) – The cis-1,2-cichloroethene (cis12DCE) and TCE concentrations of 45 micrograms per liter (µg/L) and 160 µg/L in the 2018 sample represent the lowest concentrations of these compounds detected to date at CW-20. The time versus concentration graphs in **Appendix F-1** for TCE, PCE and cis12DCE show overall declining concentration trends during pumping of CW-20 since 2015.

- MW-37S&D (open from 11 to 33 and 125 to 141 feet bgs, respectively) – As shown on **Figure 2.3-1,** concentrations of PCE and TCE in samples from MW-37S are lower than MW-37D, and PCE and TCE concentrations at both wells show an overall declining trend since 2015.

- MW-75S&D (open from 151 to 190 and 200 to 217 feet bgs, respectively) – The graphs in **Appendix F-1** for TCE, PCE and cis12DCE concentrations at MW-75S show an overall declining trend. At MW-75D containing an open interval similar in depth to CW-20 (205 to 215 feet bgs), the TCE, PCE and cis12DCE have fluctuated as shown on the graphs in **Appendix F-1**. COC concentrations in samples from MW-75S are typically higher than concentrations in MW-75D.

- MW-93S&D (open from 24 to 45 and 135 to 160 feet bgs) – As shown on **Figure 2.3-1**, this well pair is located to the west of CW-9 and to the north of CW-20. PCE concentrations have fluctuated in the samples from these wells; TCE concentrations show an overall declining trend since 2015. In the 2018 samples from MW-93S&D, the PCE and TCE concentrations were similar in samples collected from each depth-interval.

- MW-136A (multi-port deep well) – As shown on **Figure 2.3-1**, the detected TCE and PCE concentrations in the samples from the two middle sample ports (open from 351 to 365.5 and 368.5 to 378 feet bgs) were higher than in the shallow and deep ports (open from 270 to 348, 429 to 438.5 and, 441.5 to 467 feet bgs). TCE was detected at higher concentrations than PCE. As shown on **Table 2.2-1**, the cis12DCE concentration of 13,000 µg/L at deep port 429 to 438.5 feet bgs represents the highest VOC concentration detected in the 2018 samples. The graphs in **Appendix F-1**, for COC concentration trends in samples from all of the ports show no or a declining trend.

Figure 2.3-2 is a cross sectional view of the SW-WPL showing the screened intervals of the wells in the area discussed above. The cross-sectional view also shows TCE and PCE concentrations in annual comprehensive groundwater samples collected in 2013 through 2018. The pink-colored portions of the cross section are the interpreted TCE concentration distribution using 2013 through 2015 data as shown on **Figure 3.1-5** in the Part 2 SRI report (GSC, 2018c). A general comparison of TCE and PCE concentrations in 2018 samples to historic concentrations indicates no trend or a reduction in COC concentrations in samples.

Table 2.3-2 presents remedial action performance data for CW-20 from 2014 through 2018. The data consists of volume of groundwater extracted, VOC concentrations in pumped groundwater, mass removed from the aquifer, and calculated removal efficiency (pounds of VOC removed per million gallons (MG) pumped).

As shown on **Table 2.3-2**, approximately 1,765 pounds of VOCs were removed from groundwater by CW-20 pumping and treatment from 2014 through 2018. In January through December 2018, 225 pounds of VOCs were removed by the pumping of 33 MG of groundwater from CW-20. A further breakdown of mass removed in 2018 shows the majority of mass removal occurred from January through June (160 pounds).

The 2018 performance data for CW-20 was further evaluated based on a comparison to the volume of groundwater extracted and mass removed for the entire WPL groundwater extraction system. As indicated in GWTS Annual Operation Report for January through December 2018 (Hydro Terra Group (HTG), 2019), approximately 856 pounds of VOCs were removed by the pumping of 121 MG of groundwater from the five collection wells through the treatment system. CW-20 contributed more than one-quarter of the groundwater pumped and mass removed.

The bar graph on **Figure 2.3-3** illustrates the variability of VOC data from pumped groundwater sampled in CW-20 from 2014 through 2018. Pumping in CW-20 was sporadic until January 2016 when the well was consistently operated as part of the WPL groundwater extraction system. **Figure 2.3-4** illustrates that between 2016 through 2018, the volume of pumped groundwater was relatively consistent, ranging from 12 to 17 MG per six month increment. During this timeframe, VOC concentrations declined; a 5X reduction in the mass removal efficiency was observed from the first half of 2016 (21 pounds/MG) to the second half of 2018 (4 pounds/MG).

2.3.1.2 Lead Results for MW-93S

A confirmation sample was collected for analysis of total lead from MW-93S in the SW-WPL due to the PADEP MSC exceedance for lead of 5 µg/L in 2017's sample (7.7 µg/L). As shown on **Table 2.3-1**, total lead was undetected at 1 µg/L in the 2018 sample from MW-93S. With the exception of the 2017 sample, total and dissolved lead have been undetected at 3 µg/L or less in all of the historic MW-93 samples dating back to 2004, indicating that the lead result in the 2017 sample was an anomaly.

2.3.2 West Parking Lot and Codorus Creek Levee

Ten wells located in the WPL and Levee Areas were sampled for VOCs in 2018 to monitor COC concentrations in groundwater. The groundwater samples were collected from on-Site wells MW-74S and MW-96S&D located on the West Campus property, and off-Site wells MW-98S&I, MW-99S&D, MW-100I, and MW-101S&D located in the WPL and Levee Areas. The well locations are highlighted in cyan on **Figure 2.1-1**.

A description of the analytical results listed by well sampled and as shown on **Table 2.2-1 and Figure 2.3-1** is provided as follows:

- MW-74S – This on-Site well is located in the Northwest Corner of the WPL (NW-WPL). PCE, cis12DCE, and TCE were detected at concentrations below the PADEP MSCs in the sample from this well. The detected concentrations of cis12DCE and TCE (4.4 J µg/L and 2.8 µg/L, respectively) represent the lowest concentrations of these compounds detected to date in MW 74S. As discussed in Section 3, the "J" qualifier indicates the analyte was positively identified at an approximate concentration that is qualitatively acceptable.

- MW-96S&D – This on-Site nested well pair is located adjacent to the west side of the Burn Pile Area (BPA) at the fYNOP (GSC, 2011). PCE and TCE concentrations that exceed the PADEP MSCs were detected in each of the samples collected from these wells. As illustrated on the time versus concentration graphs in **Appendix F-2**, COC concentrations in these wells exhibited either no or a declining trend during the operation of the groundwater extraction system in the WPL.

- MW-98S&I – PCE, cis12DCE, and TCE in the samples from this off-Site well pair in the northwest portion of the fYNOP were either undetected at 1 µg/L or detected at a concentration of 1.8 µg/L or less.

- MW-99S&D – Concentrations of PCE and TCE in the samples from this off-Site nested well pair in the Levee Area between the NW-WPL and Codorus Creek exceed the PADEP MSC for these compounds of 5 µg/L. Concentrations of PCE and TCE in MW-99S were lower than the PCE and TCE concentrations in MW-99D.

- MW-100I – PCE, cis12DCE, and TCE were detected at similar concentrations in the sample from this off-Site well located in the Levee Area between the SW-WPL and Codorus Creek (21 µg/L, 9.3 µg/L, and 15 µg/L, respectively). Declining concentration trends over time for COCs in groundwater from MW-100I are shown on the graphs in **Appendix F-2**.

- MW-101S&D – PCE and TCE concentrations in the samples from this off-Site well pair in the southwest portion of the fYNOP were either undetected at 1 µg/L or detected at concentrations below the PADEP MSC of 5 µg/L. The graphs in **Appendix F-2** show COC concentrations in each of these wells are similar and indicate either no trend or an overall declining trend.

2.3.3 South Plume Area

In 2018 groundwater samples from 15 wells in the SPA were collected to monitor COC concentrations and plume migration. These well locations are highlighted in pink on **Figure 2.1-1**. Background information on the SPA is provided in the following paragraphs followed by a description of the 2018 groundwater sample results.

Additional characterization data and a refined Conceptual Site Model (CSM) for the SPA are provided in the Southern Property Boundary/South Plume Areas Supplemental Remedial Investigation and Interim Groundwater Remediation Report (GSC, 2019b). The report summarizes the nature, extent, and fate and transport of COCs in the SPA based on groundwater monitoring data collected through the completion of the 2017 comprehensive Site-wide monitoring. As shown on **Figures 3.2.-3** and **3.2-4** from that report, the COC plume beneath the SPA extends laterally southward in the carbonate bedrock aquifer from the SPBA to the southwest across U.S. Route 30 (Arsenal Road) and onto the K. G. Whiteford Ltd. property (i.e., the former Cole Steel and Pfaltzgraff Company manufacturing facilities). In addition, a localized area of COCs in groundwater exists along the southern property line of the East Campus in the area of on-Site monitoring well pair MW-43S&D.

On the south side of the East Campus property, samples were collected from on-Site wells MW-1 and MW-43S&D. As shown on **Figure 2.3-5**, TCE was undetected at 1 µg/L in the sample from MW-1 and PCE concentrations ranged from 1.3 µg/L to 2.8 µg/L in samples collected in 2016, 2017, and 2018. PCE and TCE in the sample from MW-43S were undetected at 1 µg/L. The time versus concentration graphs in **Appendix F-3** show the PCE concentration in the sample from MW-43D is similar to the concentrations in the 2013 through 2017 samples, and TCE concentrations show an overall declining concentration trend.

At off-Site well MW-110, located to the north of Arsenal Road and to the southwest (downgradient) of the SPBA, TCE was undetected at 1 µg/L in the 2018 sample. The PCE concentration of 33 J µg/L from this well represents the lowest concentration detected to date.

In the southwest portion of the fYNOP on the Giambolvo automotive dealership property along the south side of Arsenal Road, PCE and TCE were undetected at 1 µg/L in samples from off-Site wells RW-5 and MW-152S&D.

In the southern portion of the fYNOP, on the former Cole Steel property along the south side of Arsenal Road, samples were collected from nine off-Site wells that consist of eight shallow wells (MW-151, Cole D, Cole F, MW-4 (Cole), GM-1D, MW-12 (Cole Steel), Cole (Flush), and Cole B) and one deep well (MW-150). A summary of the analytical results for samples collected from these wells is provided below:

- TCE and PCE were undetected at 1 µg/L in groundwater samples from MW-4 (Cole) located along the property's eastern side and in samples from Cole (Flush) and Cole B located along the property's southern side.

- The sample from MW-12 (Cole Steel) was the only shallow well with a TCE concentration exceeding the PADEP MSC (8.8 µg/L versus 5 µg/L). The graphs in **Appendix F-3** show TCE concentrations at MW-12 (Cole Steel) increased from 0.43 J µg/L in the 2013 sample to 8.8 µg/L in the 2018 sample. TCE concentrations show no trend or are declining in samples from Cole D, Cole F, GM-1D, and MW-151. The highest TCE concentration was detected in the property's northeast corner at deep bedrock well MW-150 (31 µg/L). Based on dye tracer testing performed in 2014, MW-150 is located along the suspected groundwater flow path of Site-related COC migration from the northeast (upgradient) at the SPBA (GSC, 2019b).

- PCE concentrations in samples from wells Cole D, Cole F, GM-1D, and MW-151 show either no or a declining trend. Groundwater samples from wells Cole D and GM-1D had PCE concentrations exceeding the PADEP MSC of 5 µg/L (33 µg/L and 14 µg/L, respectively).

- As shown on **Table 2.2-1**, cis12DCE was detected in samples from two wells (MW-150 and MW-12 (Cole Steel)) at concentrations not exceeding the PADEP MSC of 70 µg/L.

2.3.4 West Parking Lot Groundwater Extraction System

Samples were collected in 2018 from each of the five active groundwater collection wells in the WPL (CW-9, CW-13, CW-15A, CW-17, and CW-20). The location of these collection wells is highlighted in black on **Figure 2.1-1**.

An evaluation of the CW-20 results is provided in Section 2.3.1 (above). As shown on the time versus concentration graphs in **Appendix F-4** and described in the GWTS Annual Operations Report for 2018 (HTG, 2019), COC concentrations in the 2018 collection well samples are consistent with or have declined following shutdown monitoring and the restart of the WPL groundwater extraction system in 2015.

2.3.5 Eastern Perimeter Road (Monitoring Well MW-185)

A groundwater sample was collected from on-Site well MW-185 in 2018 to monitor COC concentrations. This well is located along the Eastern Perimeter Road on the East Campus property and highlighted in yellow on **Figure 2.1-1**.

As described in the HHRA for groundwater (NewFields, 2018), MW-185 was installed to monitor COC plume conditions and evaluate the potential for residential vapor intrusion (VI) exposure risk for an off-Site occupied building located to the east of MW-185. Two groundwater samples collected from MW-185 following its installation in 2017 contained PCE and TCE concentrations that did not exceed the PADEP VI residential screening values (PADEP $SV_{GW\text{-}R}$) of 110 µg/L and 9 µg/L, respectively. Therefore, VI was determined not to be a health risk to occupants of the off-Site building to the east of MW-185.

As shown in **Table 2.2-1** and on the graphs in **Appendix F-5**, PCE was detected at a concentration of 61 µg/L in the sample from MW-185. This PCE concentration is higher than that detected in the 2017 samples from MW-185 (42 µg/L and 47 µg/L); however, both the 2017 and 2018 sample results are below the PADEP $SV_{GW\text{-}R}$ of 110 µg/L.

2.3.6 Northern Property Boundary Area

Water level monitoring and sampling of twenty-five wells and one spring in the NPBA was performed in 2018. This monitoring and sampling represented the fifth consecutive year of post-shutdown monitoring following the deactivation of the NPBA groundwater extraction system in June 2013. In addition, groundwater samples were collected from seven wells located to the southwest (downgradient) of the NPBA, including two well pairs in the NETT. Samples from the wells to the southwest of the NPBA were collected to evaluate groundwater chemistry changes and determine whether future monitoring of these wells is warranted to assess potential plume migration from the NPBA. **Figure 2.1-1** illustrates the locations of the NPBA wells and wells located to the southwest of the NPBA that are highlighted in green and dark blue, respectively.

The water level monitoring and sampling results are presented in the 2018 Annual Monitoring Progress Report for the NPBA Extraction System Shutdown (GSC, 2019a). A summary of the conclusions and recommendations from the report are as follows:

- No rebound occurred (increase in concentrations after shutdown of the pumping wells) and no observed consistent upward trend in COC concentrations in the majority of NPBA wells in the five years of annual sampling that was completed following cessation of groundwater pumping. NPBA groundwater extraction system reactivation is not warranted.

- The wells to the southwest of the NPBA do not appear to have been impacted by the shutdown of the NPBA groundwater extraction system, nor by migration of COCs from the NPBA. Therefore, continued sampling of these wells is not recommended to assess potential plume migration to the southwest of the NPBA.

- Annual water level measurements and sampling of groundwater for VOCs at selected NPBA well locations was recommended to monitor COC concentration trends, plume migration, and to confirm COCs are not migrating in groundwater off-Site to the north, northwest, and west from the NPBA. In addition, continued non-use or non-potable use of groundwater at off-Site residential wells RW-2, RW-3, and RW-4 will be confirmed concurrent with the water level measurement and groundwater sampling activities. A scope of work to perform these activities will be presented in the PRCP for the fYNOP that will be outlined in the Cleanup Plan.

2.3.7 Southern Property Boundary Area

The Southern Property Boundary/South Plume Areas Supplemental Remedial Investigation and Interim Groundwater Remediation Report (GSC, 2019b) provided a refined CSM that summarizes the nature, extent, fate and transport of COCs in the SPBA. The report included information on the testing, design, installation and operation of an interim groundwater extraction system to capture and control shallow groundwater containing PCE and TCE in the SPBA.

Groundwater samples were collected for analysis of VOCs from wells in the SPBA during the same timeframe as the comprehensive Site-wide monitoring in 2018. The samples were collected following the scope in the PADEP and USEPA approved monitored startup plan (GSC, 2018c) prior to and after the startup of the SPBA groundwater extraction system on October 31, 2018. Well sampling in the SPBA included monitoring well pair MW-64S&D identified in the 2016 Monitoring Plan as plume perimeter monitoring locations are highlighted in orange on **Figure 2.1-1**.

Below is a listing of the 2018 groundwater samples collected in the SPBA:

- **September and November 2018 Pre-System Startup (Baseline) Samples –** 14 on-Site monitoring wells, 3 on-Site collection wells, and 3 off-Site monitoring wells located immediately to the south of the SPBA along Canterbury Lane.

- **December 2018 Post-System Startup Samples (8 Weeks After Startup) –** 11 on-Site monitoring wells and 3 off-Site monitoring wells located immediately to the south of the SPBA along Canterbury Lane.

The 2018 groundwater sampling results will be presented in a groundwater extraction system effectiveness report in the first half of 2019.

2.4 Surface Water Sampling Results

Water samples were collected to monitor COC concentrations at 12 stations along Codorus Creek. The monitoring station locations are highlighted in blue on **Figure 2.1-1**. These stations were established to characterize Codorus Creek water quality during the Part 2 SRI activities and the results were used in the HHRA for groundwater.

The monitored stations are located upstream of the fYNOP (COD-SW-6&7), along the western margin of the fYNOP (COD-SW-16&27), and downstream of the fYNOP (COD-SW-13&28, COD-SW-8&9, and COD-SW-29). In addition, water samples were collected from three discrete groundwater discharges into the creek located upstream of the fYNOP (COD-SW-26) and along the western margin of the fYNOP (COD-SW-15 and COD-SW-17).

The WPL groundwater extraction system was operating when the water samples were collected from the monitoring stations on October 17, 2018. Flow in Codorus Creek on that date was 266 cubic feet per second (cfs) based on published creek flow data from the United States Geologic Survey (USGS). The flow when the samples were collected is more than 2X higher than normal creek flow of 113 cfs and 7X higher than low creek flow of 35 cfs established in the Part 2 SRI for groundwater (GSC, 2018c).

The 2018 sampling results were compared to eight rounds of samples collected under pumping conditions from March through September 2015 (GSC, 2018c). As shown on **Table 2.2-1**, cis12DCE, PCE, and TCE were undetected at 1 µg/L in the surface water samples from eight of the nine monitoring stations (COD-SW-6, 7, 8, 9, 13, 16, 28, and 29). At COD-SW-27, located along the western margin of the fYNOP on the west bank of the creek, cis12DCE and TCE were undetected at 1 µg/L. The detected PCE concentration of 0.73 J µg/L in the sample from COD-SW-27 is within the range of PCE concentrations in the March through September 2015 samples (0.39 µg/L to 2.3 µg/L) that were averaged and determined in the Part 2 SRI to be less than the current PADEP Chapter 93 ambient water quality criteria while the WPL groundwater extraction system was operating (GSC, 2018c).

Below is a discussion of the analytical results for the water samples collected from the three discrete discharges in the creek from upstream to downstream monitoring station relative to the fYNOP.

- COD-SW-26 is located upstream of the fYNOP and the Interstate 83 Bridge that crosses over Codorus Creek on the west side of the creek. TCE and cis12DCE were undetected at 1 µg/L in the sample from this station. The detected PCE concentration of 4.4 µg/L is within the range of PCE concentrations in the March through September 2015 samples (0.01 µg/L to 4.8 µg/L).

- COD-SW-17 is located along the western margin of the fYNOP on the east bank of the creek. COC concentrations in samples collected from this station are typically higher than the other creek monitoring stations. PCE, cis12DCE, and TCE were detected in the sample at concentrations of 7 J µg/L, 2.1 µg/L, and 3 µg/L, respectively. The time versus concentration graph in **Appendix F-6** shows the detected concentrations of PCE, cis12DCE, and TCE are lower than most concentrations reported in March through September 2015 samples.

- COD-SW-15 – This station is located along the western margin of the fYNOP on the west bank of the creek in a collapse feature (sinkhole) in front of the York City wastewater treatment plant. PCE, cis12DCE, and TCE were detected in the sample at concentrations of 4.1 µg/L, 1.4 µg/L, and 1.5 µg/L, respectively. The time versus concentration graph in **Appendix F-6** shows the detected concentrations of PCE, cis12DCE, and TCE are lower than most concentrations reported in March through September 2015 samples.

3 LABORATORY DATA QUALITY ASSESSMENT

A quality assurance/quality control (QA/QC) program was conducted on the samples collected during the 2018 comprehensive Site-wide monitoring event are described in Subsection 2.2. The samples were grouped together for this assessment into the following categories:

- Comprehensive Sampling Event in October through November 2018 at the monitoring locations illustrated on **Figure 2.2-1**.
- SPBA Pre-System Startup (Baseline) Sampling in September and November 2018.
- SPBA Post-System Startup Sampling in December 2018.

A total of 14 sample delivery groups (SDGs) were generated for samples collected from September 6, 2018 through December 21, 2018. Data packages from all 14 SDGs were screened for holding time exceedances, surrogate recoveries, and blank detections of VOCs as part of the general review of data packages. The laboratory case narratives for all SDGs were also reviewed.

Groundwater, surface water, and associated quality control (QC) blank samples were analyzed for VOCs using approved methods specified in the QAPP (GSC, 2012b and 2014a). The GSC data validator conducted a complete validation of the VOC analytical data in all SDGs for compliance with QC criteria in accordance with Section B.2.8 of the QAPP using Science Applications International Company (SAIC) Technical Procedure TP-DM-300-7 (Rev. 3, June 2009). TP-DM-300-7 uses the following categories to address the DQOs of precision, accuracy, bias, representativeness, comparability, completeness, and sensitivity listed on Table A-4 of the QAPP:

1. Review and verification of the laboratory case narrative.
2. Verification of sample reanalysis and secondary dilutions were used to assess the DQOs for comparability and sensitivity.
3. Holding time limits were used to assess the DQOs for representativeness and low bias.
4. Surrogate (System Monitoring Compound) percent recoveries (%R) for organic methods were used to assess the DQOs for accuracy and low/high bias.
5. Internal Standard (IS) area counts and retention times for organic methods were used to assess the DQO for accuracy.
6. Blank contamination (in method, field, equipment rinse, and trip blanks) was used to assess the DQOs for accuracy and high bias.
7. Relative Response Factors (RRFs) in initial calibration and continuing calibrations, Percent Relative Standard Deviation (%RSD) in initial calibrations, and Percent Difference (%D) in continuing calibrations were used to assess the DQOs for accuracy and low/high bias.
8. Matrix Spike and Matrix Spike Duplicate (MS/MSD), %R, and Relative Percent Difference (RPD) were used to assess the DQO for low/high bias.

9. Laboratory Control Sample and Laboratory Control Sample Duplicate (LCS/LCSD), %R, and RPD were used to assess the DQOs for precision, accuracy and low/high bias.
10. Field duplicate samples were used to assess the DQO for precision at the frequency of one field duplicate per 20 environmental samples being analyzed for VOCs.

Consistent with the data quality requirements as defined by the DQOs, groundwater and surface water chemistry data and associated QC data were evaluated on these categories and qualified according to the outcome of the review. During the review, laboratory-applied data qualifiers such as “E” (estimated concentration outside the calibration limits) and “B” (analyte detected in the associated method blank) were evaluated. During verification, individual sample results were qualified as necessary to designate usability of the data toward meeting project objectives. Data qualifiers were applied based on deviations from the measurement performance criteria identified in TP-DM-300-7 and Table A-4 of the QAPP. The qualifiers used are defined as follows:

U - The analyte was analyzed, but was not detected above the reported sample quantitation limit. These results are qualitatively acceptable.

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample. Although estimated, these results are qualitatively acceptable.

UJ - The analyte was not detected above the reported sample quantitation limit. The reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample. Although estimated, these results are qualitatively acceptable.

R - The analyte result was rejected due to serious deficiencies in the ability to analyze the sample and/or meet QC criteria. The presence or absence of the analyte cannot be verified.

In accordance with TP-DM-300-7, the contents of the data packages and QA/QC results were compared to the requirements of the analytical method. GSC evaluated QC data reported by the laboratory against required precision and accuracy limits established in Table A-4 of the QAPP. Validation reports generated for all SDGs are presented on the tables in **Appendix G**. These tables list only the analytical results qualified by the data validator that show the original laboratory qualifiers and reported values together with the final qualifiers (U, J, UJ, or R) and values applied by the validator. A detailed narrative on precision, accuracy, bias, representativeness, comparability, completeness, and sensitivity is provided in **Appendix H.**

In summary, the analytical results were acceptable as reported by the analytical laboratory with the following exceptions:

- 134 results for 1,4-dioxane and one result for bromomethane were rejected ("R"-qualified) due to very low RRFs in the initial calibrations for this parameter. The requirement for RRF of less than 0.01 was not met for any sample where 1,4-dioxane was analyzed by SW-846 Method 8260C, because that method is not appropriate for quantifying 1,4-dioxane concentrations in aqueous samples. The appropriate analytical method for 1,4-dioxane is SW-846 Method 8270D. Samples were not analyzed for 1,4-dioxane using Method 8270D.

- One acetone detection reported by the analytical laboratory was determined to be spurious due to blank contamination. Acetone is a common laboratory contaminant and the detection was "U"- qualified as "not detected." Acetone is not a Site-related COC.

- 46 detections reported by the analytical laboratory were "J"- qualified as estimated and qualitatively acceptable for various reasons including continuing calibration %D outside control limits or MS/MSD results outside control limits.

- 122 non-detect results reported by the analytical laboratory were "UJ"- qualified for various reasons including continuing calibration %D outside control limits, and LCS/LCSD or MS/MSD results outside control limits.

4 RECOMMENDATIONS FOR FUTURE GROUNDWATER AND SURFACE WATER MONITORING IN 2019

The 2018 groundwater and surface water monitoring results support the proposed remedies in the Proposed Plan - Final Remedy (PP-FR) for the fYNOP (GSC, 2018a). The scope and extent of future Site groundwater and surface water monitoring will be presented in the PRCP for the fYNOP. The complete PRCP will be outlined in the Cleanup Plan to be submitted to PADEP and USEPA during 2019. Following the submittal and approval of the PCRP, the next round of comprehensive Site-wide groundwater and surface water monitoring will be completed at the fYNOP in mid to late fall 2019. The monitoring is anticipated to consist of a Site-wide round of water level measurements and the collection and laboratory analysis of groundwater and surface water samples.

5 REFERENCES

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GSC, 2018d. fYNOP – Monitored Startup Plan for the Southern Property Boundary Area (SPBA) Groundwater Extraction System, March.

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HTG, 2019. Groundwater Extraction and Treatment System Annual Operations Report for the Period January 1 Through December 31, 2018, Former York Naval Ordnance Plant, March.

NewFields, 2018. Revised Groundwater Human Health Risk Assessment, Former York Naval Ordnance Plant, March.

Tables

TABLE 2.1-1
Site-Wide Water Level and Elevation Data (2016-2018)
Former York Naval Ordnance Plant - York, PA

		10/3/2016			12/9/2016			10/16/2017			9/27/2018		
		October 2016 Site Wide Water Levels			December 2016 Site Wide Water Levels			October 2017 Site Wide Water Levels			September 2018 Site Wide Water Levels		
Location	Site Type	MRP	DTW	GW Elev	MRP	DTW	GW Elev	MRP	DTW	GW Elev	MRP	DTW	GW Elev
CW-1	Collection Well	570.07	42.72	527.35	570.07	44.09	525.98	570.07	40.28	529.79	570.07	34.21	535.86
CW-1A	Collection Well	568.28	39.00	529.28	568.28	40.41	527.87	568.28	36.93	531.35	568.28	29.95	538.33
CW-2	Collection Well	556.95	29.30	527.65	556.95	32.32	524.63	556.95	27.49	529.46	556.95	19.02	537.93
CW-3	Collection Well	518.66	16.93	501.73	518.66	18.42	500.24	518.66	16.22	502.44	518.66	13.29	505.37
CW-4	Collection Well	541.55	25.20	516.35	541.55	29.45	512.10	541.55	23.97	517.58	541.55	20.19	521.36
CW-5	Collection Well	470.34	19.40	450.94	470.34	19.55	450.79	470.34	18.70	451.64	470.34	4.95	465.39
CW-6	Collection Well	484.67	8.15	476.52	484.67	8.55	476.12	484.67	7.63	477.04	484.67	5.92	478.75
CW-7	Collection Well	573.78	41.55	532.23	573.78	43.42	530.36	573.78	38.19	535.59	573.78	29.91	543.87
CW-7A	Collection Well	573.91	44.00	529.91	573.91	45.48	528.43	573.91	41.38	532.53	573.91	33.23	540.68
CW-8	Collection Well	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
CW-9	Collection Well	356.82	17.72	339.10	356.82	23.25	333.57	356.82	23.42	333.40	356.82	18.80	338.02
CW-13	Collection Well	358.85	34.55	324.30	358.85	31.00	327.85	358.85	35.75	323.10	358.85	34.85	324.00
CW-14	Monitoring Well	361.63	29.88	331.75	361.63	26.45	335.18	361.63	28.40	333.23	361.63	28.83	332.80
CW-15	Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
CW-15A	Collection Well	361.40	32.12	329.28	360.11	28.58	331.53	360.11	35.82	324.29	360.11	34.30	325.81
CW-16	Monitoring Well	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
CW-17	Collection Well	358.70	27.10	331.60	358.70	22.65	336.05	358.70	25.62	333.08	358.70	25.95	332.75
CW-18	Monitoring Well	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
CW-19	Collection Well	D	D	D	D	D	D	D	D	D	D	D	D
CW-20	Collection Well	361.49	29.88	331.61	361.49	74.93	286.56	NM	NM	NM	361.49	20.43	341.06
CW-21	Collection Well	NM	NM	NM	NM	NM	NM	415.69	61.40	354.29	415.72	55.24	360.48
CW-22	Collection Well	NM	NM	NM	NM	NM	NM	415.97	62.20	353.77	415.71	56.29	359.42
CW-23	Collection Well	NM	NM	NM	NM	NM	NM	417.98	35.80	382.18	418.11	29.48	388.63
MPE-1	Monitoring Well	NM	NM	NM	NM	NM	NM	415.88	47.29	368.59	415.88	37.49	378.39
MPE-2	Monitoring Well	NM	NM	NM	NM	NM	NM	415.15	61.44	353.71	415.15	55.20	359.95
MPE-3	Monitoring Well	NM	NM	NM	NM	NM	NM	417.65	35.16	382.49	417.65	29.80	387.85
MW-1	Monitoring Well	380.73	36.59	344.14	380.73	38.60	342.13	380.73	38.11	342.62	380.73	34.83	345.90
MW-2	Monitoring Well	508.88	69.50	439.38	508.88	72.06	436.82	508.88	66.60	442.28	508.88	61.85	447.03
MW-3	Monitoring Well	541.10	68.08	473.02	541.10	69.49	471.61	541.10	66.25	474.85	541.10	61.16	479.94
MW-5	Monitoring Well	369.71	24.90	344.81	369.71	26.56	343.15	369.71	25.36	344.35	369.71	20.79	348.92
MW-6	Monitoring Well	359.62	19.56	340.06	359.62	19.05	340.57	359.62	19.75	339.87	359.62	16.52	343.10
MW-7	Monitoring Well	359.48	27.60	331.88	359.48	24.27	335.21	359.48	26.55	332.93	359.48	25.56	333.92
MW-8	Monitoring Well	358.09	19.00	339.09	358.09	22.10	335.99	358.09	21.40	336.69	358.09	17.08	341.01
MW-9	Monitoring Well	558.78	32.57	526.21	558.78	34.14	524.64	558.78	30.74	528.04	558.78	25.24	533.54
MW-10	Monitoring Well	567.80	41.43	526.37	567.80	42.87	524.93	567.80	39.03	528.77	567.80	32.44	535.36
MW-11	Monitoring Well	563.08	26.10	536.98	563.08	27.41	535.67	563.08	24.57	538.51	563.08	20.92	542.16
MW-12	Monitoring Well	535.93	35.33	500.60	535.93	37.91	498.02	535.93	35.10	500.83	535.93	29.85	506.08
MW-14	Monitoring Well	519.54	33.93	485.61	519.54	35.23	484.31	519.54	32.81	486.73	519.54	28.87	490.67
MW-15	Monitoring Well	523.95	61.85	462.10	523.95	62.39	461.56	523.95	61.37	462.58	523.95	53.20	470.75
MW-16D	Monitoring Well	516.73	-3.70	520.43A	516.73	-2.55	519.28A	516.73	-6.52	523.25A	516.73	-9.94	526.67A
MW-16S	Monitoring Well	516.60	20.05	496.55	516.60	21.24	495.36	516.60	16.83	499.77	516.60	7.46	509.14
MW-17	Monitoring Well	456.86	7.95	448.91	456.86	16.37	440.49	456.86	14.64	442.22	456.86	11.79	445.07
MW-18D	Monitoring Well	464.52	-5.06	469.58A	464.52	-6.89	471.41A	464.52	-7.16	471.68A	464.52	-7.62	472.14A
MW-18S	Monitoring Well	464.52	-0.38	464.90A	464.52	-1.09	465.61A	464.52	-3.75	468.27A	464.52	-0.32	464.84A
MW-19	Monitoring Well	427.36	24.50	402.86	427.36	26.68	400.68	427.36	23.20	404.16	427.36	20.41	406.95
MW-20D	Monitoring Well	573.85	33.76	540.09	573.85	36.13	537.72	573.85	30.21	543.64	573.85	21.47	552.38
MW-20M	Monitoring Well	574.19	42.53	531.66	574.19	45.55	528.64	574.19	41.24	532.95	574.19	33.32	540.87
MW-20S	Monitoring Well	574.05	44.27	529.78	574.05	45.81	528.24	574.05	41.68	532.37	574.05	33.36	540.69
MW-22	Monitoring Well	447.57	66.15	381.42	447.57	69.39	378.18	447.57	61.22	386.35	447.57	55.89	391.68
MW-26	Monitoring Well	376.46	25.95	350.51	379.44	28.94	350.50	379.44	26.40	353.04	379.44	20.90	358.54
MW-27	Monitoring Well	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
MW-28	Monitoring Well	NM	NM	NM	366.78	24.79	341.99	366.78	24.38	342.40	366.78	20.90	345.88
MW-29	Monitoring Well	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
MW-30	Monitoring Well	362.26	15.34	346.92	362.26	16.83	345.43	362.26	16.58	345.68	362.26	12.08	350.18
MW-31D	Monitoring Well	369.30	19.04	350.26	369.30	21.22	348.08	369.30	18.65	350.65	369.30	13.60	355.70
MW-31S	Monitoring Well	369.28	18.65	350.63	369.28	20.43	348.85	369.28	18.09	351.19	369.28	13.11	356.17
MW-32D	Monitoring Well	NM	NM	NM	366.65	24.57	342.08	366.65	24.16	342.49	366.65	21.11	345.54
MW-32S	Monitoring Well	NM	NM	NM	366.62	24.61	342.01	366.62	24.21	342.41	366.62	21.02	345.60
MW-33	Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-34D	Monitoring Well	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
MW-34S	Monitoring Well	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
MW-35D	Monitoring Well	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
MW-35S	Monitoring Well	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
MW-36D	Monitoring Well	370.96	25.69	345.27	370.96	27.42	343.54	370.96	26.30	344.66	370.96	21.79	349.17
MW-36S	Monitoring Well	370.95	25.36	345.59	370.95	26.94	344.01	370.95	25.73	345.22	370.95	20.28	350.67
MW-37D	Monitoring Well	359.11	20.21	338.90	359.11	23.95	335.16	359.11	22.76	336.35	359.11	18.74	340.37
MW-37S	Monitoring Well	359.13	19.81	339.32	359.13	21.62	337.51	359.13	20.97	338.16	359.13	18.11	341.02
MW-38D	Monitoring Well	358.62	20.48	338.14	358.62	21.75	336.87	358.62	21.82	336.80	358.62	18.28	340.34
MW-39D	Monitoring Well	360.21	23.12	337.09	360.21	22.15	338.06	360.21	23.37	336.84	360.21	20.83	339.38
MW-39S	Monitoring Well	360.14	23.35	336.79	360.14	22.68	337.46	360.14	22.94	337.20	360.14	20.88	339.26
MW-40D	Monitoring Well	374.65	29.73	344.92	374.65	32.16	342.49	374.65	31.62	343.03	374.65	28.14	346.51
MW-40S	Monitoring Well	374.69	29.37	345.32	374.69	32.33	342.36	374.69	31.35	343.34	374.69	27.72	346.97
MW-43D	Monitoring Well	380.08	34.51	345.57	380.08	36.21	343.87	380.08	35.50	344.58	380.08	29.55	350.53
MW-43S	Monitoring Well	379.76	34.92	344.84	379.76	36.55	343.21	379.76	35.29	344.47	379.76	28.92	350.84
MW-45	Monitoring Well	359.91	15.90	344.01	360.57	18.53	342.04	360.57	18.45	342.12	360.57	16.59	343.98
MW-46	Monitoring Well	359.19	15.69	343.50	360.24	18.69	341.55	360.24	18.64	341.60	360.24	14.90	345.34
MW-47	Monitoring Well	360.57	15.80	344.77	360.45	19.32	341.13	360.45	20.47	339.98	360.45	17.91	342.54
MW-49D	Monitoring Well	361.44	17.37	344.07	360.45	17.94	342.51	360.45	17.97	342.48	360.45	14.43	346.02
MW-49S	Monitoring Well	361.45	17.41	344.04	360.44	17.88	342.56	360.44	17.95	342.49	360.44	14.34	346.10
MW-50D	Monitoring Well	363.36	23.78	339.58	363.36	23.93	339.43	363.36	24.21	339.15	363.36	22.20	341.16
MW-50S	Monitoring Well	363.42	22.28	341.14	363.42	22.84	340.58	363.42	24.42	339.00	363.42	21.53	341.89
MW-51D	Monitoring Well	363.11	28.75	334.36	363.11	26.98	336.13	363.11	27.85	335.26	363.11	26.33	336.78

TABLE 2.1-1
Site-Wide Water Level and Elevation Data (2016-2018)
Former York Naval Ordnance Plant - York, PA

		10/3/2016			12/9/2016			10/16/2017			9/27/2018		
		October 2016 Site Wide Water Levels			December 2016 Site Wide Water Levels			October 2017 Site Wide Water Levels			September 2018 Site Wide Water Levels		
Location	Site Type	MRP	DTW	GW Elev	MRP	DTW	GW Elev	MRP	DTW	GW Elev	MRP	DTW	GW Elev
MW-51S	Monitoring Well	363.20	27.13	336.07	363.20	25.63	337.57	363.20	27.74	335.46	363.20	27.80	335.40
MW-53	Abandoned Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-54	Monitoring Well	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
MW-55	Monitoring Well	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
MW-56	Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-57	Monitoring Well	362.30	16.84	345.46	362.30	19.14	343.16	362.30	19.14	343.16	362.30	15.41	346.89
MW-64D	Monitoring Well	416.43	62.65	353.78	416.43	64.43	352.00	416.43	62.09	354.34	416.43	55.70	360.73
MW-64S	Monitoring Well	416.34	41.05	375.29	D	D	D	416.34	38.45	377.89	416.34	32.49	383.85
MW-65D	Monitoring Well	546.80	51.00	495.80	546.80	51.12	495.68	546.80	48.73	498.07	546.80	46.02	500.78
MW-65S	Monitoring Well	546.82	49.70	497.12	546.82	52.09	494.73	546.82	49.80	497.02	546.82	47.39	499.43
MW-66D	Monitoring Well	506.92	42.37	464.55	506.92	43.56	463.36	506.92	40.78	466.14	506.92	35.83	471.09
MW-66S	Monitoring Well	506.73	40.55	466.18	506.73	41.70	465.03	506.73	39.50	467.23	506.73	34.64	472.09
MW-67D	Monitoring Well	446.26	1.59	444.67	446.26	-0.31	446.57	446.26	-0.76	447.02	446.26	-0.32	446.58
MW-67S	Monitoring Well	446.26	14.60	431.66	446.26	15.09	431.17	446.26	11.41	434.85	446.26	8.75	437.51
MW-68	Monitoring Well	458.06	8.05	450.01	458.06	8.47	449.59	458.06	7.23	450.83	458.06	4.25	453.81
MW-69	Monitoring Well	411.90	15.14	396.76	411.90	18.24	393.66	411.90	12.42	399.48	411.90	6.59	405.31
MW-70D	Monitoring Well	413.26	26.97	386.29	416.31	30.03	386.28	416.31	24.81	391.50	416.31	18.53	397.78
MW-70S	Monitoring Well	413.20	26.40	386.80	416.21	29.96	386.25	416.21	24.41	391.80	416.21	18.53	397.68
MW-74D	Monitoring Well	359.79	20.87	338.92	359.79	20.83	338.96	359.79	21.27	338.52	359.79	19.02	340.77
MW-74S	Monitoring Well	359.85	21.48	338.37	359.85	21.15	338.70	359.85	21.55	338.30	359.85	19.30	340.55
MW-75D	Monitoring Well	359.85	22.02	337.83	359.85	25.13	334.72	359.85	23.80	336.05	359.85	19.69	340.16
MW-75S	Monitoring Well	359.03	19.91	339.12	359.03	23.62	335.41	359.03	22.60	336.43	359.03	18.63	340.40
MW-77	Monitoring Well	379.48	24.94	354.54	379.48	27.82	351.66	379.48	24.41	355.07	379.48	21.08	358.40
MW-78	Monitoring Well	367.08	24.01	343.07	375.32	26.51	348.81	375.32	23.30	352.02	375.32	17.98	357.34
MW-79	Monitoring Well	375.84	23.71	352.13	375.84	22.61	353.23	375.84	24.15	351.69	375.84	19.07	356.77
MW-80	Monitoring Well	370.29	24.31	345.98	370.29	26.69	343.60	370.29	26.42	343.87	370.29	23.00	347.29
MW-81D	Monitoring Well	NM	NM	NM	366.92	24.33	342.59	366.92	24.38	342.54	366.92	21.09	345.83
MW-81S	Monitoring Well	NM	NM	NM	366.90	24.52	342.38	366.90	24.45	342.45	366.90	21.22	345.68
MW-82	Monitoring Well	384.27	37.63	346.64	382.18	39.13	343.05	382.18	37.84	344.34	382.18	33.33	348.85
MW-83	Monitoring Well	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
MW-84	Monitoring Well	366.97	25.67	341.30	376.53	28.04	348.49	376.53	25.33	351.20	376.53	20.23	356.30
MW-85	Monitoring Well	371.54	17.35	354.19	371.54	21.13	350.41	371.54	17.45	354.09	371.54	2.45	369.09
MW-86D	Monitoring Well	406.56	11.30	395.26	406.56	14.99	391.57	406.56	9.61	396.95	406.56	7.51	399.05
MW-86S	Monitoring Well	406.50	14.36	392.14	406.50	20.22	386.28	406.50	8.65	397.85	406.50	7.07	399.43
MW-87	Monitoring Well	370.64	24.69	345.95	370.64	27.07	343.57	370.64	26.81	343.83	370.64	23.21	347.43
MW-88	Monitoring Well	367.93	23.71	344.22	367.93	25.79	342.14	367.93	25.30	342.63	367.93	23.83	344.10
MW-91	Monitoring Well	501.18	60.64	440.54	501.18	62.91	438.27	501.18	57.75	443.43	501.18	53.22	447.96
MW-92	Monitoring Well	476.87	91.15	385.72	476.87	93.87	383.00	476.87	86.94	389.93	476.87	80.71	396.16
MW-93D	Monitoring Well	360.14	20.67	339.47	360.14	22.60	337.54	360.14	23.90	336.24	360.14	19.12	341.02
MW-93S	Monitoring Well	360.76	21.14	339.62	360.76	22.86	337.90	360.76	22.26	338.50	360.76	19.61	341.15
MW-94	Monitoring Well	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
MW-95	Monitoring Well	358.72	20.27	338.45	358.72	20.02	338.70	358.72	20.44	338.28	358.72	18.08	340.64
MW-96D	Monitoring Well	361.00	23.12	337.88	361.00	22.61	338.39	361.00	23.24	337.76	361.00	20.80	340.20
MW-96S	Monitoring Well	361.21	23.39	337.82	361.21	22.90	338.31	361.21	23.49	337.72	361.21	21.07	340.14
MW-97	Monitoring Well	357.39	21.97	335.42	357.39	21.20	336.19	357.39	21.05	336.34	357.39	18.96	338.43
MW-98D	Monitoring Well	361.41	21.32	340.09	361.41	21.80	339.61	361.41	22.00	339.41	361.41	19.62	341.79
MW-98I	Monitoring Well	360.78	21.56	339.22	360.78	22.11	338.67	360.78	22.02	338.76	360.78	19.71	341.07
MW-98S	Monitoring Well	360.77	21.62	339.15	360.77	22.00	338.77	360.77	21.92	338.85	360.77	19.89	340.88
MW-99D	Monitoring Well	359.91	20.08	339.83	359.91	20.54	339.37	359.91	20.45	339.46	359.91	18.51	341.40
MW-99S	Monitoring Well	360.37	20.48	339.89	360.37	21.06	339.31	360.37	20.91	339.46	360.37	19.01	341.36
MW-100D	Monitoring Well	362.14	22.00	340.14	362.14	22.60	339.54	362.14	22.45	339.69	362.14	20.46	341.68
MW-100I	Monitoring Well	361.81	21.64	340.17	361.81	22.32	339.49	361.81	22.19	339.62	361.81	20.14	341.67
MW-100S	Monitoring Well	362.28	22.18	340.10	362.28	22.79	339.49	362.28	22.60	339.68	362.28	20.65	341.63
MW-101D	Monitoring Well	356.22	16.41	339.81	356.22	16.90	339.32	356.22	16.75	339.47	356.22	14.92	341.30
MW-101S	Monitoring Well	356.54	16.89	339.65	356.54	17.29	339.25	356.54	17.15	339.39	356.54	15.41	341.13
MW-102D	Monitoring Well	401.71	16.31	385.40	405.23	19.32	385.91	405.23	14.09	391.14	405.23	7.80	397.43
MW-102S	Monitoring Well	401.95	43.18	358.77	405.41	46.81	358.60	405.41	41.58	363.83	405.41	34.41	371.00
MW-103D	Monitoring Well	397.62	21.50	376.12	401.61	25.00	376.61	401.61	20.22	381.39	401.61	15.32	386.29
MW-103S	Monitoring Well	397.96	19.67	378.29	402.00	23.22	378.78	402.00	18.21	383.79	402.00	13.57	388.43
MW-104	Monitoring Well	428.72	29.31	399.41	428.72	29.54	399.18	428.72	28.96	399.76	428.72	28.11	400.61
MW-105	Monitoring Well	362.05	23.78	338.27	362.05	23.65	338.40	362.05	23.77	338.28	362.05	21.85	340.20
MW-106	Monitoring Well	360.15	25.26	334.89	360.15	24.45	335.70	360.15	25.26	334.89	360.15	22.51	337.64
MW-107	Monitoring Well	363.56	22.98	340.58	363.56	24.06	339.50	363.56	23.82	339.74	363.56	22.21	341.35
MW-108D	Monitoring Well	426.35	27.10	399.25	426.35	28.52	397.83	426.35	23.13	403.22	426.35	14.58	411.77
MW-108S	Monitoring Well	425.46	39.03	386.43	425.46	42.70	382.76	425.46	23.34	402.12	425.46	18.79	406.67
MW-109D	Monitoring Well	389.12	35.94	353.18	389.12	37.57	351.55	389.12	35.81	353.31	389.12	30.99	358.13
MW-109S	Monitoring Well	388.39	36.20	352.19	388.39	37.88	350.51	388.39	36.12	352.27	388.39	31.25	357.14
MW-110	Monitoring Well	378.36	26.30	352.06	378.36	28.00	350.36	378.36	26.24	352.12	378.36	21.28	357.08
MW-111	Monitoring Well	433.63	28.83	404.80	433.63	31.61	402.02	433.63	25.67	407.96	433.63	19.51	414.12
MW-112	Monitoring Well	393.52	48.44	345.08	393.52	50.51	343.01	393.52	50.15	343.37	393.52	46.42	347.10
MW-113	Monitoring Well	371.02	25.06	345.96	371.02	27.38	343.64	371.02	27.19	343.83	371.02	23.49	347.53
MW-114	Monitoring Well	366.88	21.54	345.34	366.88	24.45	342.43	366.88	24.32	342.56	366.88	20.98	345.90
MW-115	Monitoring Well	373.30	22.45	350.85	373.30	23.71	349.59	373.30	23.92	349.38	373.30	20.54	352.76
MW-116	Monitoring Well	364.59	19.43	345.16	364.59	21.19	343.40	364.59	20.21	344.38	364.59	15.76	348.83
MW-117	Monitoring Well	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
MW-118	Monitoring Well	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
MW-119	Monitoring Well	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
MW-120	Monitoring Well	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
MW-121	Monitoring Well	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
MW-122	Monitoring Well	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
MW-123	Monitoring Well	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
MW-124	Monitoring Well	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB

TABLE 2.1-1
Site-Wide Water Level and Elevation Data (2016-2018)
Former York Naval Ordnance Plant - York, PA

		10/3/2016			12/9/2016			10/16/2017			9/27/2018		
		October 2016 Site Wide Water Levels			December 2016 Site Wide Water Levels			October 2017 Site Wide Water Levels			September 2018 Site Wide Water Levels		
Location	Site Type	MRP	DTW	GW Elev	MRP	DTW	GW Elev	MRP	DTW	GW Elev	MRP	DTW	GW Elev
MW-125	Monitoring Well	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
MW-126	Monitoring Well	371.42	25.08	346.34	371.42	27.40	344.02	371.42	27.00	344.42	371.42	23.15	348.27
MW-127	Monitoring Well	371.55	25.81	345.74	371.55	28.00	343.55	371.55	27.69	343.86	371.55	23.66	347.89
MW-128	Monitoring Well	370.58	24.70	345.88	370.58	27.03	343.55	370.58	26.71	343.87	370.58	22.78	347.80
MW-129	Monitoring Well	365.41	14.41	351.00	361.20	17.00	344.20	361.20	17.16	344.04	361.20	12.91	348.29
MW-130	Monitoring Well	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
MW-131	Monitoring Well	366.32	19.44	346.88	366.32	23.30	343.02	NM	NM	NM	NM	NM	NM
MW-132	Monitoring Well	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
MW-133	Monitoring Well	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
MW-134	Monitoring Well	361.21	16.52	344.69	362.18	19.53	342.65	362.18	19.47	342.71	362.18	16.10	346.08
MW-135	Monitoring Well	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
MW-136A	Waterloo Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-136A (270-348)	Waterloo Monitoring Well	NM	NM	NM	NM	NM	NM	359.78	23.78	336.00	NM	NM	NM
MW-136A (356-356.5)	Waterloo Monitoring Well	NM	NM	NM	NM	NM	NM	359.78	22.50	337.28	NM	NM	NM
MW-136A (372.5-373)	Waterloo Monitoring Well	NM	NM	NM	NM	NM	NM	359.78	22.06	337.72	NM	NM	NM
MW-136A (434-434.5)	Waterloo Monitoring Well	NM	NM	NM	NM	NM	NM	359.78	20.34	339.44	NM	NM	NM
MW-136A (459.5-460)	Waterloo Monitoring Well	NM	NM	NM	NM	NM	NM	359.78	18.78	341.00	359.78	15.45	344.33
MW-137A	Waterloo Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-137A (270-306)	Waterloo Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-137A (295.5-296)	Waterloo Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-137A (343-343.5)	Waterloo Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-137A (374.5-375)	Waterloo Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-137A (420-420.5)	Waterloo Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-137A (434.5-435)	Waterloo Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-138A	Monitoring Well	370.82	23.71	347.11	370.82	29.37	341.45	370.82	15.52	355.30	370.82	21.94	348.88
MW-139A	Waterloo Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-139A (270-285)	Waterloo Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-139A (305-305.5)	Waterloo Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-139A (333.5-334)	Waterloo Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-139A (365-365.5)	Waterloo Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-139A (421.5-422)	Waterloo Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-139A (454-454.5)	Waterloo Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-140A	Waterloo Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-140A (209.5-210)	Waterloo Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-140A (285-285.5)	Waterloo Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-140A (323.5-324)	Waterloo Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-140A (372-372.5)	Waterloo Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-140A (407.5-408)	Waterloo Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-141A	Monitoring Well	416.96	52.30	364.66	416.96	54.05	362.91	416.96	45.88	371.08	416.96	43.12	373.84
MW-142D	Monitoring Well	437.78	16.50	421.28	437.78	16.92	420.86	437.78	15.07	422.71	437.78	12.11	425.67
MW-142S	Monitoring Well	437.44	2.90	434.54	437.44	3.20	434.24	437.44	2.66	434.78	437.44	0.56	436.88
MW-143D	Monitoring Well	403.71	11.43	392.28	403.71	12.60	391.11	403.71	9.14	394.57	403.71	3.71	400.00
MW-143S	Monitoring Well	403.56	38.40	365.16	403.56	40.74	362.82	403.56	34.87	368.69	403.56	26.53	377.03
MW-144	Monitoring Well	361.52	21.92	339.60	361.52	22.31	339.21	361.52	22.31	339.21	361.52	20.27	341.25
MW-145A	Monitoring Well	362.44	22.20	340.24	362.44	22.75	339.69	362.44	22.66	339.78	362.44	20.62	341.82
MW-146	Monitoring Well	362.39	22.07	340.32	362.39	22.71	339.68	362.39	22.55	339.84	362.39	20.72	341.67
MW-147A	Monitoring Well	361.25	20.40	340.85	361.25	21.25	340.00	361.25	20.96	340.29	361.25	19.01	342.24
MW-148A (72.5-73)	Waterloo Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-148A (136-136.5)	Waterloo Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-148A (218-218.5)	Waterloo Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-150	Monitoring Well	366.80	14.82	351.98	NM	NM	NM	366.80	12.95	353.85	366.80	9.78	357.02
MW-151	Monitoring Well	374.11	24.70	349.41	374.11	26.45	347.66	374.11	25.92	348.19	374.11	20.59	353.52
MW-152 (0-10)	Waterloo Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-152 (23-23.5)	Waterloo Monitoring Well	358.92	14.48	344.44	NM	NM	NM	358.92	14.35	344.57	358.92	11.83	347.09
MW-152 (137.5-138)	Waterloo Monitoring Well	358.92	9.06	349.86	NM	NM	NM	358.92	15.67	343.25	358.92	12.63	346.29
MW-155	Monitoring Well	359.92	19.60	340.32	359.92	20.19	339.73	359.92	20.05	339.87	359.92	18.12	341.80
MW-156	Monitoring Well	353.53	13.12	340.41	353.53	14.21	339.32	353.53	13.85	339.68	353.53	11.78	341.75
MW-160	Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-161	Monitoring Well	415.92	62.33	353.59	415.92	64.17	351.75	415.92	61.74	354.18	415.92	55.31	360.61
MW-162	Monitoring Well	415.78	46.65	369.13	415.78	49.09	366.69	415.78	45.77	370.01	415.78	36.96	378.82
MW-163	Monitoring Well	419.41	39.75	379.66	419.41	42.86	376.55	419.41	34.66	384.75	419.41	32.91	386.50
MW-164	Monitoring Well	424.50	45.18	379.32	424.50	48.11	376.39	424.50	40.34	384.16	424.50	35.53	388.97
MW-165	Monitoring Well	419.41	47.79	371.62	419.41	49.28	370.13	419.41	44.50	374.91	419.41	36.96	382.45
MW-166	Monitoring Well	402.03	42.03	360.00	402.03	43.69	358.34	402.03	40.90	361.13	402.03	33.77	368.26
MW-167	Monitoring Well	399.07	35.85	363.22	399.07	38.88	360.19	399.07	33.34	365.73	399.07	18.48	380.59
MW-168	Monitoring Well	NM	NM	NM	395.19	28.76	366.43	395.19	18.81	376.38	395.19	12.00	383.19
MW-169	Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-170	Monitoring Well	385.60	29.88	355.72	385.60	30.48	355.12	385.60	25.31	360.29	385.60	20.15	365.45
MW-171	Monitoring Well	386.75	34.60	352.15	386.75	36.29	350.46	386.75	34.45	352.30	NM	NM	NM
MW-172	Monitoring Well	386.75	31.08	355.67	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-173	Monitoring Well	381.57	26.33	355.24	381.57	28.17	353.40	381.57	20.87	360.70	381.57	12.56	369.01
MW-174	Monitoring Well	NM	NM	NM	378.31	28.27	350.04	378.31	26.37	351.94	378.31	21.06	357.25
MW-175	Monitoring Well	376.18	24.55	351.63	376.18	26.62	349.56	376.18	24.91	351.27	376.18	19.56	356.62
MW-176	Monitoring Well	NM	NM	NM	NM	NM	NM	415.46	51.94	363.52	415.46	51.46	364.00
MW-177R	Monitoring Well	NM	NM	NM	NM	NM	NM	415.54	43.91	371.63	415.33	46.39	368.94
MW-178D	Monitoring Well	NM	NM	NM	NM	NM	NM	414.81	60.61	354.20	414.81	54.51	360.30
MW-178S	Monitoring Well	NM	NM	NM	NM	NM	NM	415.11	60.89	354.22	415.11	54.78	360.33
MW-179	Monitoring Well	NM	NM	NM	NM	NM	NM	414.74	57.47	357.27	414.74	48.23	366.51
MW-180	Monitoring Well	NM	NM	NM	NM	NM	NM	414.36	59.25	355.11	414.36	49.61	364.75
MW-181D	Monitoring Well	NM	NM	NM	NM	NM	NM	414.91	53.85	361.06	414.91	48.34	366.57
MW-181S	Monitoring Well	NM	NM	NM	NM	NM	NM	414.86	61.23	353.63	414.86	54.93	359.93
MW-182	Monitoring Well	NM	NM	NM	NM	NM	NM	416.41	34.51	381.90	416.41	27.37	389.04

TABLE 2.1-1
Site-Wide Water Level and Elevation Data (2016-2018)
Former York Naval Ordnance Plant - York, PA

		10/3/2016			12/9/2016			10/16/2017			9/27/2018		
		October 2016 Site Wide Water Levels			December 2016 Site Wide Water Levels			October 2017 Site Wide Water Levels			September 2018 Site Wide Water Levels		
Location	Site Type	MRP	DTW	GW Elev	MRP	DTW	GW Elev	MRP	DTW	GW Elev	MRP	DTW	GW Elev
MW-183	Monitoring Well	NM	NM	NM	NM	NM	NM	417.14	34.81	382.33	417.14	28.39	388.75
MW-184D	Monitoring Well	NM	NM	NM	NM	NM	NM	416.29	33.32	382.97	416.29	27.83	388.46
MW-184S	Monitoring Well	NM	NM	NM	NM	NM	NM	416.19	46.61	369.58	416.19	36.04	380.15
MW-185	Monitoring Well	NM	NM	NM	NM	NM	NM	514.13	69.23	444.90	514.13	65.16	448.97
Cole B	Monitoring Well	363.75	12.74	351.01	363.75	15.81	347.94	363.75	14.23	349.52	363.75	10.51	353.24
Cole D	Monitoring Well	370.15	14.16	355.99	370.15	19.61	350.54	370.15	16.11	354.04	370.15	9.93	360.22
Cole E deep	Monitoring Well	369.17	17.32	351.85	369.17	20.42	348.75	369.17	18.45	350.72	369.17	13.49	355.68
Cole E shallow	Monitoring Well	369.54	18.31	351.23	369.54	20.85	348.69	369.54	18.64	350.90	369.54	13.93	355.61
Cole F	Monitoring Well	370.39	18.80	351.59	370.39	21.73	348.66	370.39	19.63	350.76	370.39	15.11	355.28
Cole (Flush)	Monitoring Well	361.92	19.83	342.09	361.92	14.23	347.69	361.92	12.80	349.12	361.92	8.96	352.96
GM-1D	Monitoring Well	366.11	16.49	349.62	366.11	18.02	348.09	NM	NM	NM	366.11	12.58	353.53
MW-4 (Cole)	Monitoring Well	367.21	17.82	349.39	367.21	19.37	347.84	367.21	17.84	349.37	367.21	13.78	353.43
Cole Steel MW-12	Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Ru-MW-1	Monitoring Well	389.05	35.60	353.45	389.05	38.69	350.36	389.05	35.60	353.45	389.05	29.24	359.81
Ru-MW-2	Monitoring Well	NM	NM	NM	390.72	40.35	350.37	390.72	38.52	352.20	390.72	33.65	357.07
Ru-MW-3	Monitoring Well	NM	NM	NM	395.23	44.87	350.36	NM	NM	NM	395.23	38.16	357.07
Ru-MW-4	Abandoned Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Ru-MW-4R	Recovery Well	394.07	42.10	351.97	NM	NM	NM	NM	NM	NM	394.07	36.14	357.21
Ru-MW-5	Monitoring Well	378.11	25.98	352.13	378.11	27.72	350.39	378.11	25.76	352.35	378.11	20.90	356.88
Ru-MW-6	Monitoring Well	382.68	30.68	352.00	382.68	32.34	350.34	382.68	30.45	352.23	382.68	25.80	356.88
Ru-MW-7	Monitoring Well	386.34	34.10	352.24	386.34	35.94	350.40	386.34	34.15	352.19	386.34	29.15	357.19
Ru-MW-8	Monitoring Well	384.10	26.35	357.75	384.10	33.72	350.38	384.10	31.80	352.30	NM	NM	NM
Ru-MW-9	Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Ru-MW-10	Monitoring Well	390.15	36.55	353.60	390.15	40.00	350.15	390.15	38.15	352.00	390.15	32.87	357.28
Ru-MW-100	Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Ru-MW-101	Monitoring Well	NM	NM	NM	390.60	40.99	349.61	390.60	38.44	352.16	390.60	33.54	357.06
Ru-MW-102	Monitoring Well	393.87	41.80	352.07	393.87	76.37	317.50	393.87	41.60	352.27	393.87	36.96	356.91
Ru-MW-103	Monitoring Well	389.28	36.10	353.18	389.28	38.89	350.39	389.28	36.81	352.47	389.28	32.21	357.07
Herman (S-7)	Spring	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
TATE (S-6)	Spring	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
TATE (S-6) Staff Gauge	Staff Gauge	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
CODORUS 1	Bridge Surface Gauging Point	379.69	41.15	338.54	379.69	41.70	337.99	379.69	41.35	338.34	379.69	37.90	341.79
CODORUS 2	Staff Gauge	NM	NM	NM	NM	NM	NM	341.63	0.92	340.23	NM	NM	NM
JOHNSON 1	Surface Water	380.32	6.02	374.30	380.32	6.07	374.25	380.32	6.14	374.18	380.32	5.96	374.36
JOHNSON 2	Surface Water	376.79	5.77	371.02	376.79	5.45	371.34	376.79	5.41	371.38	376.79	5.42	371.37
SCP MP-1 (High)	Water Level Measuring Point	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
SCP MP-1 (Low)	Water Level Measuring Point	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
RW-2 (Flinchbaugh)	Residential Well	548.46	21.24	527.22	NM	NM	NA	548.46	21.24	527.22	548.27	16.78	531.49
RW-4 (Folk)	Residential Well	575.93	37.93	538.00	NM	NM	NM	575.93	37.93	538.00	575.93	30.02	545.91
RW-5 (Giambolvo)	Monitoring Well	375.54	31.32	344.22	375.54	31.62	343.92	375.54	31.32	344.22	375.54	28.71	346.83
RW-6 (Kinsley Well)	Monitoring Well	NM	NM	NM	NM	NM	NM	NM	NM	NM	465.83	68.20	397.63
SOFTAIL LIFT STATION	Lift Station	392.60	24.63	367.97	396.62	24.80	371.82	392.60	27.35	369.27	AB	AB	AB
WPL-SS-7	Monitoring Well	357.78	22.14	335.64	357.78	26.15	331.63	357.78	20.15	337.63	357.78	19.40	338.38
WPL-SS-8	Monitoring Well	364.40	26.18	338.22	364.40	25.07	339.33	364.40	25.76	338.64	364.40	23.66	340.74

Note: The staff gauge measurements are not depth to water measurements and is the water level on the gauge.

Data Flags:

A: Artesian
AB: Abandoned
D: Location was dry
DTW: Depth to water measurement
NM: Not Measured
MRP: Measurement reference point elevation in feet above mean sea level (AMSL)
WL Elev: Water level elevation in feet amsl

Table 2.1-2
Vertical Groundwater Gradient Data
Former York Naval Ordnance Plant - York, PA

Well Id	Elevation TOC (Ft. AMSL)	Open Interval (Ft.)	Mid-Point Screened Interval (Ft.)	Mid-Point Elevation (Ft. AMSL)	Difference Between Mid-Points	Depth to Water (Ft.)	Water Level Elevation (Ft. AMSL)	Difference Between Water Level Elevations.	Vertical Gradient (Ft./Ft.)
Former Central Plant Area (CPA)									
MW-32S	366.62	133-148	140.50	226.12	-67.47	21.02	345.60	0.06	-0.001
MW-32D	366.65	196-220	208.00	158.65		21.11	345.54		
MW-49S	360.44	134-158	146.00	214.44	-64.49	14.34	346.10	0.08	-0.001
MW-49D	360.45	201-220	210.50	149.95		14.43	346.02		
MW-81S	366.90	28-43	35.50	331.40	-23.48	21.22	345.68	-0.15	0.006
MW-81D	366.92	52-66	59.00	307.92		21.09	345.83		
Codorus Creek Levee									
MW-98S	360.77	58-68	63.00	297.77	-38.49	19.89	340.88	-0.19	0.005
MW-98I	360.78	98-105	101.50	259.28	-47.37	19.71	341.07	-0.72	0.015
MW-98D	361.41	128-171	149.50	211.91		19.62	341.79		
MW-99S	360.37	57.8-74.3	66.05	294.32	-68.16	19.01	341.36	-0.04	0.001
MW-99D	359.91	125.5-142	133.75	226.16		18.51	341.40		
MW-100S	362.28	45-51	48.00	314.28	-15.47	20.65	341.63	-0.04	0.003
MW-100I	361.81	60-66	63.00	298.81	-40.17	20.14	341.67	-0.01	0.000
MW-100D	362.14	93-114	103.50	258.64		20.46	341.68		
MW-101S	356.54	18-40	29.00	327.54	-66.82	15.41	341.13	-0.17	0.003
MW-101D	356.22	76-115	95.50	260.72		14.92	341.30		
Eastern Landfill Area									
MW-65S	546.82	71.3-86	78.65	468.17	-17.37	47.39	499.43	-1.35	0.078
MW-65D	546.80	89-103	96.00	450.80		46.02	500.78		
MW-66S	506.73	47.2-61.6	54.40	452.33	-36.11	34.64	472.09	1.00	-0.028
MW-66D	506.92	81.4-100	90.70	416.22		35.83	471.09		
MW-67S	446.26	12.8-31	21.90	424.36	-42.60	8.75	437.51	-9.07	0.213
MW-67D	446.26	58-71	64.50	381.76		-0.32	446.58		
Former North End of Test Track (NETT)									
MW-70S	416.21	15.8-35	25.40	390.81	-51.00	18.53	397.68	-0.10	0.002
MW-70D	416.31	68-85	76.50	339.81		18.53	397.78		
MW-86S	406.50	10-32.5	21.25	385.25	-61.44	7.07	399.43	0.38	-0.006
MW-86D	406.56	67-98.5	82.75	323.81		7.51	399.05		
MW-102S	405.41	41-65	53.00	352.41	-34.18	34.41	371.00	-26.43	0.773
MW-102D	405.23	75-99	87.00	318.23		7.80	397.43		
MW-103S	402.00	62.3-87.5	74.90	327.10	-26.19	13.57	388.43	2.14	-0.082
MW-103D	401.61	94.7-106.7	100.70	300.91		15.32	386.29		
Former North Plant Area									
MW-31S	369.28	12-36	24.00	345.28	-49.48	13.11	356.17	0.47	-0.009
MW-31D	369.30	66-81	73.50	295.80		13.60	355.70		
MW-36S	370.95	18-41	29.50	341.45	-45.49	20.28	350.67	1.50	-0.033
MW-36D	370.96	67-83	75.00	295.96		21.79	349.17		
Northern Property Boundary Area (NPBA)									
MW-16S	516.60	98-110	104.00	412.60	-91.37	7.46	509.14	-17.53	0.192
MW-16D	516.73	190-201	195.50	321.23		-9.94	526.67		
MW-18S	464.52	45-65	55.00	409.52	-80.00	-0.32	464.84	-7.30	0.091
MW-18D	464.52	130-140	135.00	329.52		-7.62	472.14		
MW-20S	574.05	28-61	44.50	529.55	-33.86	33.36	540.69	-0.18	0.005
MW-20M	574.19	72-85	78.50	495.69	-80.84	33.32	540.87	-11.51	0.142
MW-20D	573.85	153-165	159.00	414.85		21.47	552.38		
MW-142S	437.44	56-70	63.00	374.44	-70.36	0.56	436.88	11.21	-0.159
MW-142D	437.78	122-145.4	133.70	304.08		12.11	425.67		
MW-143S	403.56	24-54.5	39.25	364.31	-86.30	26.53	377.03	-22.97	0.266
MW-143D	403.71	117.4-134	125.70	278.01		3.71	400.00		
South Plume Area (SPA)									
MW-40S	374.69	26-47	36.50	338.19	-54.04	27.72	346.97	0.46	-0.009
MW-40D	374.65	78-103	90.50	284.15		28.14	346.51		
MW-43S	379.76	19-48	33.50	346.26	-51.68	28.92	350.84	0.31	-0.006
MW-43D	380.08	79-92	85.50	294.58		29.55	350.53		
MW-152S	358.92	10-30	20.00	338.92	-141.25	11.83	347.09	0.8	-0.006
MW-152D	358.92	122.5-200	161.25	197.67		12.63	346.29		

Table 2.1-2
Vertical Groundwater Gradient Data
Former York Naval Ordnance Plant - York, PA

Well Id	Elevation TOC (Ft. AMSL)	Open Interval (Ft.)	Mid-Point Screened Interval (Ft.)	Mid-Point Elevation (Ft. AMSL)	Difference Between Mid-Points	Depth to Water (Ft.)	Water Level Elevation (Ft. AMSL)	Difference Between Water Level Elevations.	Vertical Gradient (Ft./Ft.)
Southern Property Boundary Area (SPBA)									
MW-64S	416.34	33-42	37.50	378.84	-34.91	32.49	383.85	23.12	-0.662
MW-64D	416.43	68-77	72.50	343.93		55.70	360.73		
MW-108S	425.46	22.9-55.1	39.00	386.46	-70.61	18.79	406.67	-5.1	0.072
MW-108D	426.35	72-149	110.50	315.85		14.58	411.77		
MW-109S	388.39	42.9-65	53.95	334.44	-39.32	31.25	357.14	-0.99	0.025
MW-109D	389.12	88-100	94.00	295.12		30.99	358.13		
MW-178S	415.11	72-84	78.00	337.11	-17.30	54.78	360.33	0.03	-0.002
MW-178D	414.81	90-100	95.00	319.81		54.51	360.30		
MW-181S	414.86	61-71	66.00	348.86	-30.45	54.93	359.93	-6.64	0.218
MW-181D	414.91	93-100	96.50	318.41		48.34	366.57		
MW-184S	416.19	51-59	55.00	361.19	-14.90	36.04	380.15	-8.31	0.558
MW-184D	416.29	66-74	70.00	346.29		27.83	388.46		
Northern - West Parking Lot (WPL)									
MW-39S	360.14	3-30	16.50	343.64	-59.93	20.88	339.26	-0.12	0.002
MW-39D	360.21	53-100	76.50	283.71		20.83	339.38		
MW-50S	363.42	104-125	114.50	248.92	-49.06	21.53	341.89	0.73	-0.015
MW-50D	363.36	157-170	163.50	199.86		22.20	341.16		
MW-51S	363.20	34-51	42.50	320.70	-61.59	27.80	335.40	-1.38	0.022
MW-51D	363.11	88-120	104.00	259.11		26.33	336.78		
MW-74S	359.85	175-201	188.00	171.85	-47.06	19.30	340.55	-0.22	0.005
MW-74D	359.79	220-250	235.00	124.79		19.02	340.77		
MW-96S	361.21	27-39	33.00	328.21	-48.46	21.07	340.14	-0.06	0.001
MW-96D	361.00	75-87.5	81.25	279.75		20.80	340.20		
Southern - West Parking Lot (WPL)									
MW-37S	359.13	11-33	22.00	337.13	-111.02	18.11	341.02	0.65	-0.006
MW-37D	359.11	125-141	133.00	226.11		18.74	340.37		
MW-75S	359.03	151-190	170.50	188.53	-37.18	18.63	340.40	0.24	-0.006
MW-75D	359.85	200-217	208.50	151.35		19.69	340.16		
MW-93S	360.76	24-45	34.50	326.26	-113.47	19.61	341.15	0.13	-0.001
MW-93D	360.14	134.7-160	147.35	212.79		19.12	341.02		

Notes: A negative vertical gradient value indicates a downward vertical gradient.
A positive vertical gradient value indicates an upward vertical gradient.
Depth to water data collected on September 27, 2018.

Table 2.2-1
Groundwater and Surface Water Data Summary - Volatile Organic Compounds (VOCs)
Former York Naval Ordnance Plant - York, PA

Location/ID Depth (ft.) Sample Date Parameter	PA MSC UA R (µg/L)	PA MSC UA NR (µg/L)	Federal MCL (µg/L)	EPA RSL (µg/L)	MPE-1 9/7/18	MPE-2 9/10/18	MPE-3 9/11/18	MW-1 10/9/18	MW-3 10/1/18	MW-4 10/9/18	MW-9 10/3/18	MW-11 10/3/18	MW-12 10/3/18	MW-16D 10/2/18	MW-16D Dup 10/2/18	MW-16S 10/2/18	MW-18D 10/3/18	MW-18S 10/3/18	MW-20D 10/2/18	MW-20M 10/3/18
TOTAL VOC																				
Total VOC					303.5	517	0.92	1.3	21.02	0	61.7	3.5	127.1	26.4	27.8	28.5	34.6	32.8	0	22.85
Volatile Organic Compound																				
1,1,1,2-Tetrachloroethane	70	70		0.57	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,1-Trichloroethane	200	200	200	8000	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	0.84	4.3		0.076	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane	5	5	5	0.28	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	31	160		2.8	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	7	7	7	280	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromoethane	0.05	0.05	0.05	0.0075	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	5	5	5	0.17	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	5	5	5	0.85	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dioxane	6.4	32		0.46	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
2-Butanone	4000	4000		5600	5 U	13 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2-Hexanone	63	260		38	5 U	13 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
4-Methyl-2-Pentanone	3300	9300		6300	5 U	13 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Acetone	38000	110000		14000	5 U	13 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Acrylonitrile	0.72	3.7		0.052	20 U	50 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Benzene	5	5	5	0.46	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromochloromethane	90	90		83	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	80	80		0.13	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromoform	80	80		3.3	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromomethane	10	10		7.5	1 U	2.5 UJ	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon Disulfide	1500	6200		810	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon Tetrachloride	5	5	5	0.46	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chlorobenzene	100	100	100	78	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chlorodibromomethane	80	80		0.87	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroethane	250	1200		21000	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	80	80		0.22	1 U	2.5 U	1 U	1 U	2.2	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.3
Chloromethane	30	30		190	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	70	70	70	36	3.5	2.5 U	1 U	1 U	0.82 J	1 U	33	1 U	56	6.4	6.8	7.4	28	26	1 U	0.81 J
cis-1,3-Dichloropropene	7.3	34		0.47	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	700	700	700	1.5	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methyl tert-butyl ether	20	20		14	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methylene chloride	5	5		11	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Styrene	100	100	100	1200	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	5	5	5	11	180	420	0.92 J	1.3	1 U	1 U	1 U	1 U	4.1	1 U	1 U	1.1	1 U	1 U	1 U	0.74 J
Toluene	1000	1000	1000	1100	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	100	100	360	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	7.3	34		0.47	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	5	5	5	0.49	120	97	1 U	1 U	18	1 U	27	3.5	67	20 J	21	20	6.6	6.8	1 U	20
Vinyl Chloride	2	2	2	0.019	1 U	2.5 U	1 U	1 U	1 U	1 U	1.7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylenes (Total)	10000	10000	10000	190	2 U	5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U

Blank results = analyte not analyzed. U = Not detected. J = Organics; estimated. Inorganics; blank contamination.

Table 2.2-1
Groundwater and Surface Water Data Summary - Volatile Organic Compounds (VOCs)
Former York Naval Ordnance Plant - York, PA

Location/ID Depth (ft.) Sample Date Parameter	PA MSC UA R (µg/L)	PA MSC UA NR (µg/L)	Federal MCL (µg/L)	EPA RSL (µg/L)	MW-20S 10/2/18	MW-37D 10/4/18	MW-37S 10/4/18	MW-43D 10/9/18	MW-43S 10/9/18	MW-64D 10/4/18	MW-64D Dup 10/4/18	MW-64D 12/19/18	MW-64S 10/5/18	MW-64S 12/20/18	MW-74S 10/8/18	MW-74S Dup 10/8/18	MW-75D 10/5/18	MW-75S 10/4/18
TOTAL VOC																		
Total VOC					150.06	368.8	93.9	20.3	0	310.76	290.84	54	65	96	9.6	10.4	2930	11612
Volatile Organic Compound																		
1,1,1,2-Tetrachloroethane	70	70		0.57	1 U	2 U	2 U	1 U	1 U	1 U	1 U	2 U	1 U	2.5 U	1 U	1 U	5 U	50 U
1,1,1-Trichloroethane	200	200	200	8000	1 U	21	4.5	1 U	1 U	1 U	1 U	2 U	1 U	2.5 U	1 U	1 U	48	180
1,1,2,2-Tetrachloroethane	0.84	4.3		0.076	1 U	2 U	2 U	1 U	1 U	1 U	1 U	2 U	1 U	2.5 U	1 U	1 U	5 U	50 U
1,1,2-Trichloroethane	5	5	5	0.28	1 U	2 U	2 U	1 U	1 U	1 U	1 U	2 U	1 U	2.5 U	1 U	1 U	5 U	50 U
1,1-Dichloroethane	31	160		2.8	1 U	2.6	2 U	1 U	1 U	1 U	1 U	2 U	1 U	2.5 U	1 U	1 U	12	50 U
1,1-Dichloroethene	7	7	7	280	1 U	2.2	2 U	1 U	1 U	1 U	1 U	2 U	1 U	2.5 U	1 U	1 U	10	41 J
1,2-Dibromoethane	0.05	0.05	0.05	0.0075	1 U	2 U	2 U	1 U	1 U	1 U	1 U	2 U	1 U	2.5 U	1 U	1 U	5 U	50 U
1,2-Dichloroethane	5	5	5	0.17	1 U	2 U	2 U	1 U	1 U	1 U	1 U	2 U	1 U	2.5 U	1 U	1 U	5 U	50 U
1,2-Dichloropropane	5	5	5	0.85	1 U	2 U	2 U	1 U	1 U	1 U	1 U	2 U	1 U	2.5 U	1 U	1 U	5 U	50 U
1,4-Dioxane	6.4	32		0.46	R	R	R	R	R	R	R	R	R	R	R	R	R	R
2-Butanone	4000	4000		5600	5 U	10 U	10 U	5 U	5 U	5 U	5 U	10 U	5 U	13 U	5 U	5 U	25 U	250 U
2-Hexanone	63	260		38	5 U	10 U	10 U	5 U	5 U	5 U	5 U	10 U	5 U	13 U	5 U	5 U	25 U	250 U
4-Methyl-2-Pentanone	3300	9300		6300	5 U	10 U	10 U	5 U	5 U	5 U	5 U	10 U	5 U	13 U	5 U	5 U	25 U	250 U
Acetone	38000	110000		14000	5 U	10 U	10 U	5 U	5 U	5 U	5 U	10 U	5 U	13 U	5 U	5 U	25 U	250 U
Acrylonitrile	0.72	3.7		0.052	20 U	40 U	40 U	20 U	20 U	20 U	20 U	40 U	20 U	50 U	20 U	20 U	100 U	1000 U
Benzene	5	5	5	0.46	1 U	2 U	2 U	1 U	1 U	1 U	1 U	2 U	1 U	2.5 U	1 U	1 U	5 U	50 U
Bromochloromethane	90	90		83	1 U	2 U	2 U	1 U	1 U	1 U	1 U	2 U	1 U	2.5 U	1 U	1 U	5 U	50 U
Bromodichloromethane	80	80		0.13	1 U	2 U	2 U	1 U	1 U	1 U	1 U	2 U	1 U	2.5 U	1 U	1 U	5 U	50 U
Bromoform	80	80		3.3	1 U	2 U	2 U	1 U	1 U	1 U	1 U	2 U	1 U	2.5 U	1 U	1 U	5 U	50 U
Bromomethane	10	10		7.5	1 U	2 U	2 U	1 U	1 U	1 U	1 U	2 U	1 U	2.5 U	1 U	1 U	5 U	50 U
Carbon Disulfide	1500	6200		810	1 U	2 U	2 U	1 U	1 U	1 U	1 U	2 U	1 U	2.5 UJ	1 U	1 U	5 U	50 U
Carbon Tetrachloride	5	5	5	0.46	1 U	2 U	2 U	1 U	1 U	1 U	1 U	2 U	1 U	2.5 U	1 U	1 U	5 U	50 U
Chlorobenzene	100	100	100	78	1 U	2 U	2 U	1 U	1 U	1 U	1 U	2 U	1 U	2.5 U	1 U	1 U	5 U	50 U
Chlorodibromomethane	80	80		0.87	1 U	2 U	2 U	1 U	1 U	1 U	1 U	2 U	1 U	2.5 U	1 U	1 U	5 U	50 U
Chloroethane	250	1200		21000	1 U	2 U	2 U	1 U	1 U	1 U	1 U	2 U	1 U	2.5 U	1 U	1 U	5 U	50 U
Chloroform	80	80		0.22	0.86 J	2 U	2 U	1 U	1 U	1 U	1 U	2 U	1 U	2.5 U	1 U	1 U	5 U	50 U
Chloromethane	30	30		190	1 U	2 U	2 U	1 U	1 U	1 U	1 U	2 U	1 U	2.5 U	1 U	1 U	5 U	50 U
cis-1,2-Dichloroethene	70	70	70	36	2.2	22	4	5.4	1 U	1 U	1 U	2 U	1 U	2.5 U	4.4 J	4.7	180	91
cis-1,3-Dichloropropene	7.3	34		0.47	1 U	2 U	2 U	1 U	1 U	1 U	1 U	2 U	1 U	2.5 U	1 U	1 U	5 U	50 U
Ethylbenzene	700	700	700	1.5	1 U	2 U	2 U	1 U	1 U	1 U	1 U	2 U	1 U	2.5 U	1 U	1 U	5 U	50 U
Methyl tert-butyl ether	20	20		14	1 U	2 U	2 U	1 U	1 U	1 U	1 U	2 U	1 U	2.5 U	1 U	1 U	5 U	50 U
Methylene chloride	5	5		11	1 U	2 U	2 U	1 U	1 U	1 U	1 U	2 U	1 U	2.5 U	1 UJ	1 U	5 U	50 U
Styrene	100	100	100	1200	1 U	2 U	2 U	1 U	1 U	1 U	1 U	2 U	1 U	2.5 U	1 U	1 U	5 U	50 U
Tetrachloroethene	5	5	5	11	17	250	81	6.4	1 U	310	290	54	47	72	2.4	2.6	2300	9300
Toluene	1000	1000	1000	1100	1 U	2 U	2 U	1 U	1 U	1 U	1 U	2 U	1 U	2.5 U	1 U	1 U	5 U	50 U
trans-1,2-Dichloroethene	100	100	100	360	1 U	2 U	2 U	1 U	1 U	1 U	1 U	2 U	1 U	2.5 U	1 U	1 U	5 U	50 U
trans-1,3-Dichloropropene	7.3	34		0.47	1 U	2 U	2 U	1 U	1 U	1 U	1 U	2 U	1 U	2.5 U	1 U	1 U	5 U	50 U
Trichloroethene	5	5	5	0.49	130	71	4.4	8.5	1 U	0.76 J	0.84 J	2 U	18	24	2.8	3.1	370	2000
Vinyl Chloride	2	2	2	0.019	1 U	2 U	2 U	1 U	1 U	1 U	1 U	2 U	1 U	2.5 U	1 U	1 U	10	50 U
Xylenes (Total)	10000	10000	10000	190	2 U	4 U	4 U	2 U	2 U	2 U	2 U	4 U	2 U	5 U	2 U	2 U	10 U	100 U

Blank results = analyte not analyzed. U = Not detected. J = Organics; estimated. Inorganics; blank contamination.

Table 2.2-1
Groundwater and Surface Water Data Summary - Volatile Organic Compounds (VOCs)
Former York Naval Ordnance Plant - York, PA

Location/ID Depth (ft.) Sample Date Parameter	PA MSC UA R (µg/L)	PA MSC UA NR (µg/L)	Federal MCL (µg/L)	EPA RSL (µg/L)	MW-77 10/4/18	MW-82 10/4/18	MW-93D 10/5/18	MW-93S 10/8/18	MW-96D 10/5/18	MW-96S 10/5/18	MW-98I 10/8/18	MW-98S 10/8/18	MW-99D 10/9/18	MW-99S 10/9/18	MW-100I 10/8/18	MW-101D 10/8/18	MW-101S 10/8/18	MW-102D 10/3/18	MW-102S 10/3/18
TOTAL VOC																			
Total VOC					976	26.3	123.8	63.3	217.65	851	5.9	0.66	116.9	16	46.92	26.2	1.2	16.4	264
Volatile Organic Compound																			
1,1,1,2-Tetrachloroethane	70	70		0.57	5 U	1 UJ	1 U	1 U	1 U	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	10 U
1,1,1-Trichloroethane	200	200	200	8000	5 U	1 U	2.4	3.4	1 U	5 U	1 U	1 U	5.2	1 U	0.62 J	1 U	1 U	1 U	55
1,1,2,2-Tetrachloroethane	0.84	4.3		0.076	5 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	10 U
1,1,2-Trichloroethane	5	5	5	0.28	5 U	1 UJ	1 U	1 U	1 U	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	10 U
1,1-Dichloroethane	31	160		2.8	5 U	1 UJ	2.2	1 U	1 U	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	27
1,1-Dichloroethene	7	7	7	280	5 U	1 UJ	2.2	1 U	0.65 J	5 U	1 U	1 U	6.7	1 U	1	1 U	1 U	1 U	24
1,2-Dibromoethane	0.05	0.05	0.05	0.0075	5 U	1 UJ	1 U	1 U	1 U	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	10 U
1,2-Dichloroethane	5	5	5	0.17	5 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	10 U
1,2-Dichloropropane	5	5	5	0.85	5 U	1 UJ	1 U	1 U	1 U	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	10 U
1,4-Dioxane	6.4	32		0.46	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
2-Butanone	4000	4000		5600	25 U	5 U	5 U	5 U	5 U	25 U	5 U	5 U	25 U	5 U	5 U	5 U	5 U	5 U	50 U
2-Hexanone	63	260		38	25 U	5 U	5 U	5 U	5 U	25 U	5 U	5 U	25 U	5 U	5 U	5 U	5 U	5 U	50 U
4-Methyl-2-Pentanone	3300	9300		6300	25 U	5 U	5 U	5 U	5 U	25 U	5 U	5 U	25 U	5 U	5 U	5 U	5 U	5 U	50 U
Acetone	38000	110000		14000	25 U	5 U	5 U	5 U	5 U	25 U	5 U	5 U	25 U	5 U	5 U	5 U	5 U	5 U	50 U
Acrylonitrile	0.72	3.7		0.052	100 U	20 U	20 U	20 U	20 U	100 U	20 U	20 U	100 U	20 U	20 U	20 U	20 U	20 U	200 U
Benzene	5	5	5	0.46	680	1 UJ	1 U	1 U	1 U	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	10 U
Bromochloromethane	90	90		83	5 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	10 U
Bromodichloromethane	80	80		0.13	5 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	10 U
Bromoform	80	80		3.3	5 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	10 U
Bromomethane	10	10		7.5	5 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	10 U
Carbon Disulfide	1500	6200		810	5 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	10 U
Carbon Tetrachloride	5	5	5	0.46	5 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	10 U
Chlorobenzene	100	100	100	78	5 U	1 UJ	1 U	1 U	1 U	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	10 U
Chlorodibromomethane	80	80		0.87	5 U	1 UJ	1 U	1 U	1 U	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	10 U
Chloroethane	250	1200		21000	5 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	10 U
Chloroform	80	80		0.22	5 U	1 UJ	1 U	1 U	1 U	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	10 U
Chloromethane	30	30		190	5 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	10 U
cis-1,2-Dichloroethene	70	70	70	36	5 U	19 J	23	4.2	37	12	2.4	1 U	28	4	9.3	20	1 U	5.3	99
cis-1,3-Dichloropropene	7.3	34		0.47	5 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	10 U
Ethylbenzene	700	700	700	1.5	50	1 UJ	1 U	1 U	1 U	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	10 U
Methyl tert-butyl ether	20	20		14	210	1 UJ	1 U	1 U	1 U	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	10 U
Methylene chloride	5	5		11	5 U	1 UJ	1 U	1 U	1 U	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	10 U
Styrene	100	100	100	1200	5 U	1 UJ	1 U	1 U	1 U	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	10 U
Tetrachloroethene	5	5	5	11	5 U	1.5 J	49	50	30	790	1.8	0.66 J	12	6.7	21	1.8	1.2	8.9	24
Toluene	1000	1000	1000	1100	20	1 UJ	1 U	1 U	1 U	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	10 U
trans-1,2-Dichloroethene	100	100	100	360	5 U	1 UJ	1 U	1 U	1 U	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	10 U
trans-1,3-Dichloropropene	7.3	34		0.47	5 U	1 UJ	1 U	1 U	1 U	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	10 U
Trichloroethene	5	5	5	0.49	5 U	5.8	45	5.7	150	49	1.7	1 U	65	5.3	15	4.4	1 U	2.2	35
Vinyl Chloride	2	2	2	0.019	5 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	10 U
Xylenes (Total)	10000	10000	10000	190	16	2 UJ	2 U	2 U	2 U	10 U	2 U	2 U	10 U	2 U	2 U	2 U	2 U	2 U	20 U

Blank results = analyte not analyzed. U = Not detected. J = Organics; estimated. Inorganics; blank contamination.

Table 2.2-1
Groundwater and Surface Water Data Summary - Volatile Organic Compounds (VOCs)
Former York Naval Ordnance Plant - York, PA

Location/ID	PA MSC	PA MSC	Federal	EPA	MW-103D	MW-103S	MW-110	MW-136A	MW-136A	MW-136A	MW-136A	MW-136A	MW-142D	MW-142S	MW-143D	MW-143S	MW-150	MW-151
Depth (ft.)								270 - 348	356 - 356.5	372.5 - 373	434 - 434.5	459.5 - 460						
Sample Date	UA R	UA NR	MCL	RSL	10/3/18	10/3/18	10/9/18	11/7/18	11/2/18	11/1/18	11/1/18	11/7/18	10/3/18	10/3/18	10/3/18	10/3/18	10/10/18	10/9/18
Parameter	(µg/L)	(µg/L)	(µg/L)	(µg/L)														
TOTAL VOC																		
Total VOC					16.13	101.5	33	458	7950	16700	13000	356.7	0.75	8.7	1.5	1.65	63	1.7
Volatile Organic Compound																		
1,1,1,2-Tetrachloroethane	70	70		0.57	1 U	5 U	1 U	25 UJ	100 U	1000 U	1500 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
1,1,1-Trichloroethane	200	200	200	8000	1 U	5 U	1 U	25 UJ	100 U	1000 U	1500 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	0.84	4.3		0.076	1 U	5 U	1 U	25 UJ	100 U	1000 U	1500 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane	5	5	5	0.28	1 U	5 U	1 U	25 UJ	100 U	1000 U	1500 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	31	160		2.8	1 U	5 U	1 U	25 UJ	100 U	1000 U	1500 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	7	7	7	280	1 U	5 U	1 U	25 UJ	100 U	1000 U	1500 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromoethane	0.05	0.05	0.05	0.0075	1 U	5 U	1 U	25 UJ	100 U	1000 U	1500 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	5	5	5	0.17	1 U	5 U	1 U	25 UJ	100 U	1000 U	1500 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	5	5	5	0.85	1 U	5 U	1 U	25 UJ	100 U	1000 U	1500 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dioxane	6.4	32		0.46	R	R	R	R	R	R	R	R	R	R	R	R	R	R
2-Butanone	4000	4000		5600	5 U	25 U	5 U	130 UJ	500 U	5000 U	7500 U	50 UJ	5 U	5 U	5 U	5 U	5 U	5 U
2-Hexanone	63	260		38	5 U	25 U	5 U	130 UJ	500 U	5000 U	7500 U	50 UJ	5 U	5 U	5 U	5 U	5 U	5 U
4-Methyl-2-Pentanone	3300	9300		6300	5 U	25 U	5 U	130 UJ	500 U	5000 U	7500 U	50 UJ	5 U	5 U	5 U	5 U	5 U	5 U
Acetone	38000	110000		14000	5 U	25 U	5 U	130 UJ	500 U	5000 U	7500 U	50 UJ	5 U	5 U	5 U	5 U	5 U	5 U
Acrylonitrile	0.72	3.7		0.052	20 U	100 U	20 U	500 UJ	2000 U	20000 U	30000 U	200 UJ	20 U	20 U	20 U	20 U	20 U	20 U
Benzene	5	5	5	0.46	1 U	5 U	1 U	25 UJ	100 U	1000 U	1500 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
Bromochloromethane	90	90		83	1 U	5 U	1 U	25 UJ	100 U	1000 U	1500 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	80	80		0.13	1 U	5 U	1 U	25 UJ	100 U	1000 U	1500 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
Bromoform	80	80		3.3	1 U	5 U	1 U	25 UJ	100 U	1000 U	1500 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
Bromomethane	10	10		7.5	1 U	5 U	1 U	25 UJ	100 U	1000 U	1500 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
Carbon Disulfide	1500	6200		810	1 U	5 U	1 U	25 UJ	100 U	1000 U	1500 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
Carbon Tetrachloride	5	5	5	0.46	1 U	5 U	1 U	25 UJ	100 U	1000 U	1500 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
Chlorobenzene	100	100	100	78	1 U	5 U	1 U	25 UJ	100 U	1000 U	1500 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
Chlorodibromomethane	80	80		0.87	1 U	5 U	1 U	25 UJ	100 U	1000 U	1500 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
Chloroethane	250	1200		21000	1 U	5 U	1 U	25 UJ	100 U	1000 U	1500 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	80	80		0.22	0.63 J	5 U	1 U	25 UJ	100 U	1000 U	1500 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
Chloromethane	30	30		190	1 U	5 U	1 U	25 UJ	100 U	1000 U	1500 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	70	70	70	36	2.6	6.5	1 U	430 J	1700	4300	13000	260 J	0.75 J	8.7	1.5	1 U	32	1 U
cis-1,3-Dichloropropene	7.3	34		0.47	1 U	5 U	1 U	25 UJ	100 U	1000 U	1500 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	700	700	700	1.5	1 U	5 U	1 U	25 UJ	100 U	1000 U	1500 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
Methyl tert-butyl ether	20	20		14	1 U	5 U	1 U	25 UJ	100 U	1000 U	1500 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
Methylene chloride	5	5		11	1 U	5 U	1 UJ	25 UJ	100 U	1000 U	1500 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
Styrene	100	100	100	1200	1 U	5 U	1 U	25 UJ	100 U	1000 U	1500 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	5	5	5	11	8.2	19	33 J	25 UJ	950	2400	1500 U	7.7 J	1 U	1 U	1 U	0.55 J	1 U	1.7
Toluene	1000	1000	1000	1100	1 U	5 U	1 U	25 UJ	100 U	1000 U	1500 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	100	100	360	1 U	5 U	1 U	25 UJ	100 U	1000 U	1500 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	7.3	34		0.47	1 U	5 U	1 U	25 UJ	100 U	1000 U	1500 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	5	5	5	0.49	4.7	76	1 U	28 J	5300 J	10000	1500 U	89 J	1 U	1 U	1 U	1.1	31	1 U
Vinyl Chloride	2	2	2	0.019	1 U	5 U	1 U	25 UJ	100 U	1000 U	1500 U	10 UJ	1 U	1 U	1 U	1 U	1 U	1 U
Xylenes (Total)	10000	10000	10000	190	2 U	10 U	2 U	50 UJ	200 U	2000 U	3000 U	20 UJ	2 U	2 U	2 U	2 U	2 U	2 U

Blank results = analyte not analyzed. U = Not detected. J = Organics; estimated. Inorganics; blank contamination.

Table 2.2-1
Groundwater and Surface Water Data Summary - Volatile Organic Compounds (VOCs)
Former York Naval Ordnance Plant - York, PA

Location/ID	PA MSC	PA MSC	Federal	EPA	MW-152	MW-152	MW-161	MW-162	MW-163	MW-166	MW-166	MW-167	MW-167	MW-168	MW-168	MW-177R	MW-178D	MW-178D	MW-178S
Depth (ft.)					23 - 23.5	137.5 - 138													
Sample Date	UA R	UA NR	MCL	RSL	11/2/18	11/2/18	12/19/18	12/21/18	12/20/18	9/6/18	12/20/18	9/6/18	12/20/18	9/6/18	12/20/18	9/6/18	9/7/18	12/18/18	9/7/18
Parameter	(µg/L)	(µg/L)	(µg/L)	(µg/L)															
TOTAL VOC																			
Total VOC					0	4.6	64.5	650.61	42	2.75	3.9	26.4	9.5	1.3	3.3	460	812	622.4	166
Volatile Organic Compound																			
1,1,1,2-Tetrachloroethane	70	70		0.57	1 U	1 U	5 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3 U	2.5 U	1 U
1,1,1-Trichloroethane	200	200	200	8000	1 U	1 U	5 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3 U	2.5 U	1 U
1,1,2,2-Tetrachloroethane	0.84	4.3		0.076	1 U	1 U	5 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3 U	2.5 U	1 U
1,1,2-Trichloroethane	5	5	5	0.28	1 U	1 U	5 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3 U	2.5 U	1 U
1,1-Dichloroethane	31	160		2.8	1 U	1 U	5 U	1 U	2.5 UJ	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3 U	2.5 U	1 U
1,1-Dichloroethene	7	7	7	280	1 U	1 U	5 U	0.61 J	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3 U	2.5 U	1 U
1,2-Dibromoethane	0.05	0.05	0.05	0.0075	1 U	1 U	5 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3 U	2.5 U	1 U
1,2-Dichloroethane	5	5	5	0.17	1 U	1 U	5 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3 U	2.5 U	1 U
1,2-Dichloropropane	5	5	5	0.85	1 U	1 U	5 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3 U	2.5 U	1 U
1,4-Dioxane	6.4	32		0.46	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
2-Butanone	4000	4000		5600	5 U	3.8 J	25 U	5 U	13 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	15 U	13 U	5 U
2-Hexanone	63	260		38	5 U	5 U	25 U	5 U	13 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	15 U	13 U	5 U
4-Methyl-2-Pentanone	3300	9300		6300	5 U	5 U	25 U	5 U	13 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	15 U	13 U	5 U
Acetone	38000	110000		14000	5 U	5 U	25 U	5 U	13 U	5 U	1.0 U	5 U	5 U	5 U	5 U	5 U	15 U	13 U	5 U
Acrylonitrile	0.72	3.7		0.052	20 U	20 U	100 U	20 U	50 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	60 U	50 U	20 U
Benzene	5	5	5	0.46	1 U	1 U	5 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3 U	2.5 U	1 U
Bromochloromethane	90	90		83	1 U	1 U	5 U	1 U	2.5 UJ	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3 U	2.5 U	1 U
Bromodichloromethane	80	80		0.13	1 U	1 U	5 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3 U	2.5 U	1 U
Bromoform	80	80		3.3	1 U	1 U	5 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3 U	2.5 U	1 U
Bromomethane	10	10		7.5	1 U	1 U	5 U	1 U	2.5 U	1 UJ	1 U	1 UJ	1 U	1 UJ	1 U	1 U	3 U	2.5 U	1 U
Carbon Disulfide	1500	6200		810	1 U	1 U	5 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 J	1 U	3 U	2.5 UJ	1 U
Carbon Tetrachloride	5	5	5	0.46	1 U	1 U	5 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3 U	2.5 U	1 U
Chlorobenzene	100	100	100	78	1 U	1 U	5 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3 U	2.5 U	1 U
Chlorodibromomethane	80	80		0.87	1 U	1 U	5 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3 U	2.5 U	1 U
Chloroethane	250	1200		21000	1 U	1 U	5 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3 U	2.5 U	1 U
Chloroform	80	80		0.22	1 U	1 U	5 U	1 U	2.5 U	0.97 J	1.3	1 U	1 U	1 U	1 U	1 U	3 U	2.5 U	1 U
Chloromethane	30	30		190	1 U	1 U	5 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3 U	2.5 U	1 U
cis-1,2-Dichloroethene	70	70	70	36	1 U	1 U	5 U	1 U	2.5 UJ	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3 U	2.4 J	1 U
cis-1,3-Dichloropropene	7.3	34		0.47	1 U	1 U	5 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3 U	2.5 U	1 U
Ethylbenzene	700	700	700	1.5	1 U	1 U	5 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3 U	2.5 U	1 U
Methyl tert-butyl ether	20	20		14	1 U	1 U	5 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3 U	2.5 U	1 U
Methylene chloride	5	5		11	1 U	1 U	5 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1.2	1 U	3 U	2.5 U	1 U
Styrene	100	100	100	1200	1 U	1 U	5 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3 U	2.5 U	1 U
Tetrachloroethene	5	5	5	11	1 U	1 U	61	520 J	42	0.79 J	1.1	6.4	2.6	1.3	1.1	180	720	460	120
Toluene	1000	1000	1000	1100	1 U	0.8 J	5 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3 U	2.5 U	1 U
trans-1,2-Dichloroethene	100	100	100	360	1 U	1 U	5 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3 U	2.5 U	1 U
trans-1,3-Dichloropropene	7.3	34		0.47	1 U	1 U	5 U	1 U	2.5 UJ	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3 U	2.5 U	1 U
Trichloroethene	5	5	5	0.49	1 U	1 U	3.5 J	130	2.5 U	0.99 J	1.5	20	6.9	1 U	1 U	280	92	160	46
Vinyl Chloride	2	2	2	0.019	1 U	1 U	5 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3 U	2.5 U	1 U
Xylenes (Total)	10000	10000	10000	190	2 U	2 U	10 U	2 U	5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	6 U	5 U	2 U

Blank results = analyte not analyzed. U = Not detected. J = Organics; estimated. Inorganics; blank contamination.

Table 2.2-1
Groundwater and Surface Water Data Summary - Volatile Organic Compounds (VOCs)
Former York Naval Ordnance Plant - York, PA

Location/ID	PA MSC	PA MSC	Federal	EPA	MW-178S	MW-179	MW-180	MW-181D	MW-181D	MW-181S Dup	MW-181S	MW-181S	MW-182	MW-183	MW-184D	MW-184D	MW-184D Dup	MW-184S
Depth (ft.)																		
Sample Date	UA R	UA NR	MCL	RSL	12/18/18	9/7/18	9/7/18	9/11/18	12/19/18	9/10/18	9/10/18	12/18/18	9/6/18	9/7/18	9/11/18	12/20/18	12/20/18	9/12/18
Parameter	(µg/L)	(µg/L)	(µg/L)	(µg/L)														
TOTAL VOC																		
Total VOC					99	268	429	147	229	320	488	288	1.8	2.9	53	70	100	48.9
Volatile Organic Compound																		
1,1,1,2-Tetrachloroethane	70	70		0.57	5 U	2 U	4 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	4 U	5 U	5 U	1 U
1,1,1-Trichloroethane	200	200	200	8000	5 U	2 U	4 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	4 U	5 U	5 U	1 U
1,1,2,2-Tetrachloroethane	0.84	4.3		0.076	5 U	2 U	4 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	4 U	5 U	5 U	1 U
1,1,2-Trichloroethane	5	5	5	0.28	5 U	2 U	4 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	4 U	5 U	5 U	1 U
1,1-Dichloroethane	31	160		2.8	5 U	2 U	4 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	4 U	5 U	5 U	1 U
1,1-Dichloroethene	7	7	7	280	5 U	2 U	4 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	4 U	5 U	5 U	1 U
1,2-Dibromoethane	0.05	0.05	0.05	0.0075	5 U	2 U	4 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	4 U	5 U	5 U	1 U
1,2-Dichloroethane	5	5	5	0.17	5 U	2 U	4 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	4 U	5 U	5 U	1 U
1,2-Dichloropropane	5	5	5	0.85	5 U	2 U	4 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	4 U	5 U	5 U	1 U
1,4-Dioxane	6.4	32		0.46	R	R	R	R	R	R	R	R	R	R	R	R	R	R
2-Butanone	4000	4000		5600	25 U	10 U	20 U	5 U	5 U	5 U	5 U	13 U	5 U	5 U	20 U	25 U	25 U	5 U
2-Hexanone	63	260		38	25 U	10 U	20 U	5 U	5 U	5 U	5 U	13 U	5 U	5 U	20 U	25 U	25 U	5 U
4-Methyl-2-Pentanone	3300	9300		6300	25 U	10 U	20 U	5 U	5 U	5 U	5 U	13 U	5 U	5 U	20 U	25 U	25 U	5 U
Acetone	38000	110000		14000	25 U	10 U	20 U	5 U	5 U	5 U	5 U	13 U	5 U	5 U	20 U	25 U	25 U	5 U
Acrylonitrile	0.72	3.7		0.052	100 U	40 U	80 U	20 U	20 U	20 U	20 U	50 U	20 U	20 U	80 U	100 U	100 U	20 U
Benzene	5	5	5	0.46	5 U	2 U	4 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	4 U	5 U	5 U	1 U
Bromochloromethane	90	90		83	5 U	2 U	4 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	4 U	5 U	5 UJ	1 U
Bromodichloromethane	80	80		0.13	5 U	2 U	4 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	4 U	5 U	5 U	1 U
Bromoform	80	80		3.3	5 U	2 U	4 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	4 U	5 U	5 U	1 U
Bromomethane	10	10		7.5	5 U	2 U	4 U	1 UJ	1 U	1 U	1 U	2.5 U	1 UJ	1 U	4 UJ	5 U	5 U	1 U
Carbon Disulfide	1500	6200		810	5 U	2 U	4 U	1 U	1 UJ	1 U	1 U	2.5 U	1 U	1 U	4 U	5 U	5 UJ	1 U
Carbon Tetrachloride	5	5	5	0.46	5 U	2 U	4 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	4 U	5 U	5 U	1 U
Chlorobenzene	100	100	100	78	5 U	2 U	4 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	4 U	5 U	5 U	1 U
Chlorodibromomethane	80	80		0.87	5 U	2 U	4 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	4 U	5 U	5 U	1 U
Chloroethane	250	1200		21000	5 U	2 U	4 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	4 U	5 U	5 U	1 U
Chloroform	80	80		0.22	5 U	2 U	4 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	4 U	5 U	5 U	1 U
Chloromethane	30	30		190	5 U	2 U	4 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	4 U	5 U	5 U	1 U
cis-1,2-Dichloroethene	70	70	70	36	5 U	2 U	4 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	4 U	5 U	5 U	1 U
cis-1,3-Dichloropropene	7.3	34		0.47	5 U	2 U	4 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	4 U	5 U	5 U	1 U
Ethylbenzene	700	700	700	1.5	5 U	2 U	4 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	4 U	5 U	5 U	1 U
Methyl tert-butyl ether	20	20		14	5 U	2 U	4 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	4 U	5 U	5 U	1 U
Methylene chloride	5	5		11	5 U	2 U	4 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	4 U	5 U	5 U	1 U
Styrene	100	100	100	1200	5 U	2 U	4 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	4 U	5 U	5 U	1 U
Tetrachloroethene	5	5	5	11	73	240	350	100	160	300	470	270	1.8	2.9	53	70	100 J	41
Toluene	1000	1000	1000	1100	5 U	2 U	4 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	4 U	5 U	5 U	1 U
trans-1,2-Dichloroethene	100	100	100	360	5 U	2 U	4 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	4 U	5 U	5 U	1 U
trans-1,3-Dichloropropene	7.3	34		0.47	5 U	2 U	4 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	4 U	5 U	5 U	1 U
Trichloroethene	5	5	5	0.49	26	28	79	47	69	20	18	18	1 U	1 U	4 U	5 U	5 U	7.9
Vinyl Chloride	2	2	2	0.019	5 U	2 U	4 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	4 U	5 U	5 U	1 U
Xylenes (Total)	10000	10000	10000	190	10 U	4 U	8 U	2 U	2 U	2 U	2 U	5 U	2 U	2 U	8 U	10 U	10 U	2 U

Blank results = analyte not analyzed. U = Not detected. J = Organics; estimated. Inorganics; blank contamination.

Table 2.2-1
Groundwater and Surface Water Data Summary - Volatile Organic Compounds (VOCs)
Former York Naval Ordnance Plant - York, PA

Location/ID Depth (ft.) Sample Date Parameter	PA MSC UA R (µg/L)	PA MSC UA NR (µg/L)	Federal MCL (µg/L)	EPA RSL (µg/L)	MW-184S 12/20/18	MW-185 10/4/18	CW-1 10/2/18	CW-1A 10/1/18	CW-2 10/3/18	CW-3 10/3/18	CW-4 10/2/18	CW-5 10/2/18	CW-6 10/2/18	CW-7 10/3/18	CW-7A 10/2/18	CW-9 10/3/18	CW-13 10/3/18	CW-15A 10/3/18	CW-17 10/3/18	CW-20 10/3/18
TOTAL VOC																				
Total VOC					75.5	61	2.52	42.8	19	54.2	35.9	22.9	96	11.73	56.9	136.1	1016.2	16975	243.5	771.8
Volatile Organic Compound																				
1,1,1,2-Tetrachloroethane	70	70		0.57	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 UJ	1 U	1 U	50 U	5 U	5 U
1,1,1-Trichloroethane	200	200	200	8000	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U	8.5	4.3	6000	12	33
1,1,2,2-Tetrachloroethane	0.84	4.3		0.076	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	50 U	5 U	5 U
1,1,2-Trichloroethane	5	5	5	0.28	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 UJ	1 U	1 U	50 U	5 U	5 U
1,1-Dichloroethane	31	160		2.8	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U	2.2	1.6	95	6.5	7.1
1,1-Dichloroethene	7	7	7	280	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U	1.4	3.3	980	9	6.7
1,2-Dibromoethane	0.05	0.05	0.05	0.0075	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 UJ	1 U	1 U	50 U	5 U	5 U
1,2-Dichloroethane	5	5	5	0.17	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	50 U	5 U	5 U
1,2-Dichloropropane	5	5	5	0.85	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	50 U	5 U	5 U
1,4-Dioxane	6.4	32		0.46	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
2-Butanone	4000	4000		5600	25 U	25 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	25 U	5 U	5 U	250 U	25 U	25 U
2-Hexanone	63	260		38	25 U	25 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	25 U	5 U	5 U	250 U	25 U	25 U
4-Methyl-2-Pentanone	3300	9300		6300	25 U	25 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	25 U	5 U	5 U	250 U	25 U	25 U
Acetone	38000	110000		14000	25 U	25 U	5 U	5 U	5 U	19	5 U	5 U	5 U	5 U	25 U	5 U	5 U	250 U	25 U	25 U
Acrylonitrile	0.72	3.7		0.052	100 U	100 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	100 U	20 U	20 U	1000 U	100 U	100 U
Benzene	5	5	5	0.46	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	50 U	5 U	5 U
Bromochloromethane	90	90		83	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	50 U	5 U	5 U
Bromodichloromethane	80	80		0.13	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	50 U	5 U	5 U
Bromoform	80	80		3.3	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	50 U	5 U	5 U
Bromomethane	10	10		7.5	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	50 U	5 U	5 U
Carbon Disulfide	1500	6200		810	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	50 U	5 U	5 U
Carbon Tetrachloride	5	5	5	0.46	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	50 U	5 U	5 U
Chlorobenzene	100	100	100	78	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 UJ	1 U	1 U	50 U	5 U	5 U
Chlorodibromomethane	80	80		0.87	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 UJ	1 U	1 U	50 U	5 U	5 U
Chloroethane	250	1200		21000	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	50 U	5 U	5 U
Chloroform	80	80		0.22	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.93 J	5 U	1 U	1 U	50 U	5 U	5 U
Chloromethane	30	30		190	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	50 U	5 U	5 U
cis-1,2-Dichloroethene	70	70	70	36	5 U	5 U	0.92 J	1 U	5.7	32	34	6.3	41	1 U	5 U	13	660	5300 J	67	45
cis-1,3-Dichloropropene	7.3	34		0.47	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	50 U	5 U	5 U
Ethylbenzene	700	700	700	1.5	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 UJ	1 U	1 U	50 U	5 U	5 U
Methyl tert-butyl ether	20	20		14	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	50 U	5 U	5 U
Methylene chloride	5	5		11	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	50 U	5 U	5 U
Styrene	100	100	100	1200	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 UJ	1 U	1 U	50 U	5 U	5 U
Tetrachloroethene	5	5	5	11	66	61	1 U	1.8	1.3	1.8	1 U	11	42	1	4.9 J	97	160	1100	63	520
Toluene	1000	1000	1000	1100	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 UJ	1 U	1 U	50 U	5 U	5 U
trans-1,2-Dichloroethene	100	100	100	360	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U	1 U	3.1	50 U	5 U	5 U
trans-1,3-Dichloropropene	7.3	34		0.47	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	50 U	5 U	5 U
Trichloroethene	5	5	5	0.49	9.5	5 U	1.6	41	12	1.4	1.9	5.6	13	9.8	52	14	180	3500	86	160
Vinyl Chloride	2	2	2	0.019	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U	1 U	3.9	50 U	5 U	5 U
Xylenes (Total)	10000	10000	10000	190	10 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	10 UJ	2 U	2 U	100 U	10 U	10 U

Blank results = analyte not analyzed. U = Not detected. J = Organics; estimated. Inorganics; blank contamination.

Table 2.2-1
Groundwater and Surface Water Data Summary - Volatile Organic Compounds (VOCs)
Former York Naval Ordnance Plant - York, PA

Location/ID	PA MSC	PA MSC	Federal	EPA	CW-21	CW-21	CW-22	CW-22	CW-23	CW-23	Cole (Flush)	Cole B	Cole D	Cole D Dup	Cole F	Cole Steel	RW-2	RW-4 Folk	RW-5
Depth (ft.)																			
Sample Date	UA R	UA NR	MCL	RSL	11/1/18	12/20/18	11/1/18	12/20/18	11/1/18	12/20/18	10/9/18	10/9/18	10/10/18	10/10/18	10/10/18	10/10/18	10/2/18	10/2/18	10/10/18
Parameter	(µg/L)	(µg/L)	(µg/L)	(µg/L)															
TOTAL VOC																			
Total VOC					740	680	200	123.6	29.4	32	0	0	33.84	31.84	5.9	16.2	2.2	0	0
Volatile Organic Compound																			
1,1,1,2-Tetrachloroethane	70	70		0.57	50 U	2.5 U	25 U	2.5 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,1-Trichloroethane	200	200	200	8000	50 U	2.5 U	25 U	2.5 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	0.84	4.3		0.076	50 U	2.5 U	25 U	2.5 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane	5	5	5	0.28	50 U	2.5 U	25 U	2.5 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	31	160		2.8	50 U	2.5 U	25 U	2.5 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	7	7	7	280	50 U	2.5 U	25 U	2.5 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromoethane	0.05	0.05	0.05	0.0075	50 U	2.5 U	25 U	2.5 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	5	5	5	0.17	50 U	2.5 U	25 U	2.5 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	5	5	5	0.85	50 U	2.5 U	25 U	2.5 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dioxane	6.4	32		0.46	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
2-Butanone	4000	4000		5600	250 U	13 U	130 U	13 U	5 U	10 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2-Hexanone	63	260		38	250 U	13 U	130 U	13 U	5 U	10 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
4-Methyl-2-Pentanone	3300	9300		6300	250 U	13 U	130 U	13 U	5 U	10 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Acetone	38000	110000		14000	250 U	13 U	130 U	13 U	5 U	10 U	5 U	5 U	5 U	5 U	3.6 J	5 U	5 U	5 U	5 U
Acrylonitrile	0.72	3.7		0.052	1000 U	50 U	500 U	50 U	20 U	40 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Benzene	5	5	5	0.46	50 U	2.5 U	25 U	2.5 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromochloromethane	90	90		83	50 U	2.5 U	25 U	2.5 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	80	80		0.13	50 U	2.5 U	25 U	2.5 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromoform	80	80		3.3	50 U	2.5 U	25 U	2.5 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromomethane	10	10		7.5	50 U	2.5 U	25 U	2.5 U	1 U	2 U	1 U	1 U	1 U	R	1 U	1 U	1 U	1 U	1 U
Carbon Disulfide	1500	6200		810	50 U	2.5 UJ	25 U	2.5 UJ	1 U	2 UJ	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon Tetrachloride	5	5	5	0.46	50 U	2.5 U	25 U	2.5 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chlorobenzene	100	100	100	78	50 U	2.5 U	25 U	2.5 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chlorodibromomethane	80	80		0.87	50 U	2.5 U	25 U	2.5 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroethane	250	1200		21000	50 U	2.5 U	25 U	2.5 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	80	80		0.22	50 U	2.5 U	25 U	2.5 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloromethane	30	30		190	50 U	2.5 U	25 U	2.5 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	70	70	70	36	50 U	2.5 U	25 U	2.5 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	7.4	1 U	1 U	1 U
cis-1,3-Dichloropropene	7.3	34		0.47	50 U	2.5 U	25 U	2.5 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	700	700	700	1.5	50 U	2.5 U	25 U	2.5 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methyl tert-butyl ether	20	20		14	50 U	2.5 U	25 U	2.5 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methylene chloride	5	5		11	50 U	2.5 U	25 U	2.5 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Styrene	100	100	100	1200	50 U	2.5 U	25 U	2.5 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	5	5	5	11	550	570	200	120	28	32	1 U	1 U	33	31	2.3	1 U	1 U	1 U	1 U
Toluene	1000	1000	1000	1100	50 U	2.5 U	25 U	2.5 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	100	100	360	50 U	2.5 U	25 U	2.5 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	7.3	34		0.47	50 U	2.5 U	25 U	2.5 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	5	5	5	0.49	190	110	25 U	3.6	1.4	2 U	1 U	1 U	0.84 J	0.84 J	1 U	8.8	2.2	1 U	1 U
Vinyl Chloride	2	2	2	0.019	50 U	2.5 U	25 U	2.5 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylenes (Total)	10000	10000	10000	190	100 U	5 U	50 U	5 U	2 U	4 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U

Blank results = analyte not analyzed. U = Not detected. J = Organics; estimated. Inorganics; blank contamination.

Table 2.2-1
Groundwater and Surface Water Data Summary - Volatile Organic Compounds (VOCs)
Former York Naval Ordnance Plant - York, PA

Location/ID Depth (ft.) Sample Date Parameter	PA MSC UA R (µg/L)	PA MSC UA NR (µg/L)	Federal MCL (µg/L)	EPA RSL (µg/L)	TATE (S-6) 10/4/18	COD-SW-13 10/17/18	COD-SW-15 10/17/18	COD-SW-16 10/17/18	COD-SW-17 10/17/18	COD-SW-17 Dup 10/17/18	COD-SW-26 10/17/18	COD-SW-27 10/17/18	COD-SW-28 10/17/18	COD-SW-29 10/17/18	COD-SW-6 10/17/18	COD-SW-7 10/17/18	COD-SW-8 10/17/18
TOTAL VOC																	
Total VOC					0.92	0	7	0	12.1	11.7	5.4	0.73	0	0	0	0	0
Volatile Organic Compound																	
1,1,1,2-Tetrachloroethane	70	70		0.57	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,1-Trichloroethane	200	200	200	8000	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	0.84	4.3		0.076	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane	5	5	5	0.28	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	31	160		2.8	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	7	7	7	280	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromoethane	0.05	0.05	0.05	0.0075	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	5	5	5	0.17	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	5	5	5	0.85	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dioxane	6.4	32		0.46	R	R	R	R	R	R	R	R	R	R	R	R	R
2-Butanone	4000	4000		5600	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2-Hexanone	63	260		38	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
4-Methyl-2-Pentanone	3300	9300		6300	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Acetone	38000	110000		14000	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Acrylonitrile	0.72	3.7		0.052	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Benzene	5	5	5	0.46	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromochloromethane	90	90		83	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	80	80		0.13	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromoform	80	80		3.3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromomethane	10	10		7.5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon Disulfide	1500	6200		810	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon Tetrachloride	5	5	5	0.46	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chlorobenzene	100	100	100	78	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chlorodibromomethane	80	80		0.87	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroethane	250	1200		21000	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	80	80		0.22	0.92 J	1 U	1 U	1 U	1 U	1 U	1	1 U	1 U	1 U	1 U	1 U	1 U
Chloromethane	30	30		190	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	70	70	70	36	1 U	1 U	1.4	1 U	2.1	2	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	7.3	34		0.47	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	700	700	700	1.5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methyl tert-butyl ether	20	20		14	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methylene chloride	5	5		11	1 U	1 U	1 U	1 U	1 UJ	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Styrene	100	100	100	1200	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	5	5	5	11	1 U	1 U	4.1	1 U	7 J	6.9	4.4	0.73 J	1 U	1 U	1 U	1 U	1 U
Toluene	1000	1000	1000	1100	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	100	100	360	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	7.3	34		0.47	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	5	5	5	0.49	1 U	1 U	1.5	1 U	3	2.8	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Vinyl Chloride	2	2	2	0.019	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylenes (Total)	10000	10000	10000	190	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U

Blank results = analyte not analyzed. U = Not detected. J = Organics; estimated. Inorganics; blank contamination.

Table 2.2-1
Groundwater and Surface Water Data Summary - Volatile Organic Compounds (VOCs)
Former York Naval Ordnance Plant - York, PA

Location/ID Depth (ft.) Sample Date Parameter	PA MSC UA R (µg/L)	PA MSC UA NR (µg/L)	Federal MCL (µg/L)	EPA RSL (µg/L)	COD-SW-9 10/17/18	GM-1D 10/10/18
TOTAL VOC						
Total VOC					0	15.1
Volatile Organic Compound						
1,1,1,2-Tetrachloroethane	70	70		0.57	1 U	1 U
1,1,1-Trichloroethane	200	200	200	8000	1 U	1 U
1,1,2,2-Tetrachloroethane	0.84	4.3		0.076	1 U	1 U
1,1,2-Trichloroethane	5	5	5	0.28	1 U	1 U
1,1-Dichloroethane	31	160		2.8	1 U	1 U
1,1-Dichloroethene	7	7	7	280	1 U	1 U
1,2-Dibromoethane	0.05	0.05	0.05	0.0075	1 U	1 U
1,2-Dichloroethane	5	5	5	0.17	1 U	1 U
1,2-Dichloropropane	5	5	5	0.85	1 U	1 U
1,4-Dioxane	6.4	32		0.46	R	R
2-Butanone	4000	4000		5600	5 U	5 U
2-Hexanone	63	260		38	5 U	5 U
4-Methyl-2-Pentanone	3300	9300		6300	5 U	5 U
Acetone	38000	110000		14000	5 U	5 U
Acrylonitrile	0.72	3.7		0.052	20 U	20 U
Benzene	5	5	5	0.46	1 U	1 U
Bromochloromethane	90	90		83	1 U	1 U
Bromodichloromethane	80	80		0.13	1 U	1 U
Bromoform	80	80		3.3	1 U	1 U
Bromomethane	10	10		7.5	1 U	1 U
Carbon Disulfide	1500	6200		810	1 U	1 U
Carbon Tetrachloride	5	5	5	0.46	1 U	1 U
Chlorobenzene	100	100	100	78	1 U	1 U
Chlorodibromomethane	80	80		0.87	1 U	1 U
Chloroethane	250	1200		21000	1 U	1 U
Chloroform	80	80		0.22	1 U	1 U
Chloromethane	30	30		190	1 U	1 U
cis-1,2-Dichloroethene	70	70	70	36	1 U	1 U
cis-1,3-Dichloropropene	7.3	34		0.47	1 U	1 U
Ethylbenzene	700	700	700	1.5	1 U	1 U
Methyl tert-butyl ether	20	20		14	1 U	1 U
Methylene chloride	5	5		11	1 U	1 U
Styrene	100	100	100	1200	1 U	1 U
Tetrachloroethene	5	5	5	11	1 U	14
Toluene	1000	1000	1000	1100	1 U	1 U
trans-1,2-Dichloroethene	100	100	100	360	1 U	1 U
trans-1,3-Dichloropropene	7.3	34		0.47	1 U	1 U
Trichloroethene	5	5	5	0.49	1 U	1.1
Vinyl Chloride	2	2	2	0.019	1 U	1 U
Xylenes (Total)	10000	10000	10000	190	2 U	2 U

Blank results = analyte not analyzed. U = Not detected. J = Organics; estimated. Inorganics; blank contamination.

Table 2.3-1
Groundwater Data Summary - MW-93S (Lead)
Former York Naval Ordnance Plant - York, PA

Location/ID Depth (ft.) Sample Date Parameter	PA MSC UA R (µg/L)	PA MSC UA NR (µg/L)	Federal MCL (µg/L)	EPA RSL (µg/L)	MW-93S 4/15/04	MW-93S Dup 4/15/04	MW-93S 4/26/04	MW-93S 6/20/05	MW-93S 6/22/06	MW-93S 341.79 6/27/07	MW-93S 4/25/08	MW-93S 9/15/08	MW-93S 10/24/17	MW-93S 10/8/18
METAL														
Lead	5	5	15	15	2.2 U	2.2 U	2.2 U	2.7 U	3 U	NA	3 U	1 U	7.7	1 U
METAL (Dissolved)														
Lead	5	5	15	15	2.2 U	2.2 U	2.2 U	NA	NA	3 U	3 U	1 U	1 U	NA

NA = sample not analyzed for this compound. U = Not detected. J = Organics; estimated. Inorganics; blank contamination.

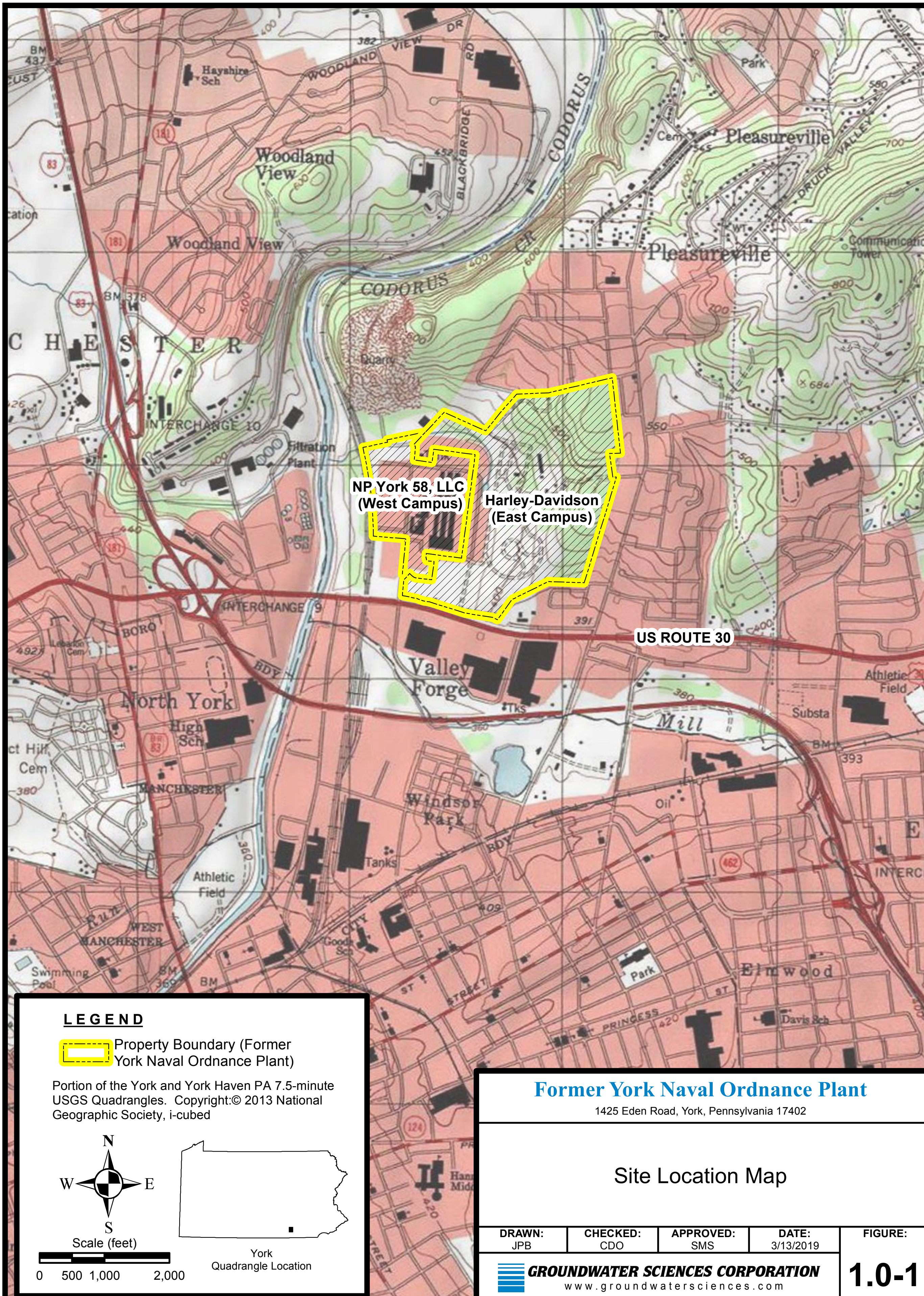
Table 2.3-2

CW-20 Pumping Volumes, Total VOC Mass Removed and Total VOC Mass Removal Efficiency
Former York Naval Ordnance Plant - York, PA

Period	Sample Date	Total VOC Concentration (µg/l)	Volume of Groundwater Pumped per Period (gallons)	Volume of Groundwater Pumped per Period (MG)	Total VOC Mass Removed per Period (pounds)	Removal Efficiency per Period (pounds/MG)
Mar 14 - Apr 14	3/28/2014	1,542	2,771,243	3	36	13
May 14	5/7/2014	931	4,194,240	4	33	8
Jun 14	6/5/2014	1,130	4,023,097	4	38	9
Jul 14	7/2/2014	1,495	3,385,920	3	42	12
Aug 14	8/5/2014	2,760	1,278,216	1	29	23
Sep 14	9/10/2014	1,590	2,083	0	0	13
Oct 14	10/8/14 and 10/31/14 (1)	1,766	4,486	0	0	15
Nov 14	N/A	0	0	0	0	0
Dec 14	N/A	0	0	0	0	0
Jan 15	1/20/2015	1,793	570,010	1	9	15
Feb 15	2/25/2015	2,696	3,369,262	3	76	23
Mar 15	3/25/2015	1,606	3,289,408	3	44	13
Apr 15	4/22/2015	2,696	2,938,139	3	66	23
May 15	5/20/2015	2,002	2,805,871	3	47	17
Jul 15 - Oct 15	10/5/2015	2,104	6,027,759	6	106	18
Nov 15 - Dec 15	12/21/2015	2,426	2,028,599	2	41	20
Jan 16 - Jun 16	6/27/2016	2,574	12,005,114	12	258	21
Jul 16 - Dec 16	10/26/2016	2,238	16,685,115	17	312	19
Jan 17 - Jun 17	7/6/2017	1,445	16,679,443	17	201	12
Jul 17 - Dec 17	10/24/2017	1,508	16,052,062	16	202	13
Jan 18 - June 18	(2)	1,140	16,846,527	17	160	10
Jul 18 - Dec 18	10/10/18 and 12/20/18 (1)	500	15,536,470	16	65	4
TOTALS			130,493,064		1,765	

Notes:
(1) Two samples were collected during this period and an average total VOC concentration was calculated based on the results of the two samples.
(2) - No samples were collected during this period. An average total VOC concentration was calculated based on the results from the 10/24/2017 & 10/10/18 samples.
µg/L - Micrograms per liter
MG - Million Gallons
N/A - Not Applicable (CW-20 not pumping during this period)

Figures



Former York Naval Ordnance Plant

1425 Eden Road, York, Pennsylvania 17402

Site Location Map

DRAWN:	CHECKED:	APPROVED:	DATE:	FIGURE:
JPB	CDO	SMS	3/13/2019	1.0-1

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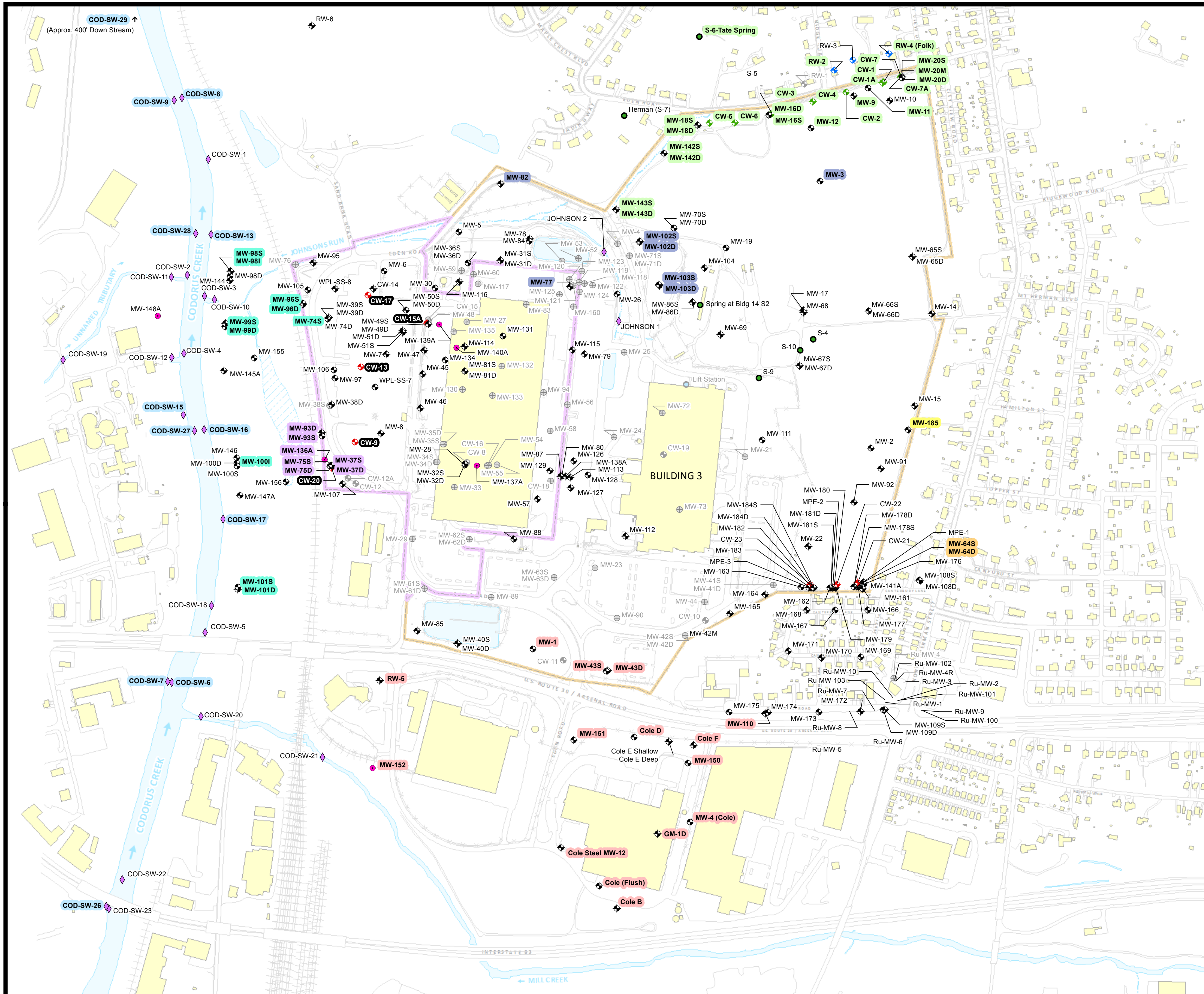

N
W E
S

LEGEND

- Active Collection Well
- Inactive Collection Well
- Monitoring Well
- Residential Well
- Waterloo Monitoring Well
- Spring
- Surface Water
- Lift Station (Abandoned February 2013)
- Abandoned Collection Well
- Abandoned Monitoring Well
- Abandoned Residential Well
- NP York 58, LLC Property Boundary (West Campus)
- Harley-Davidson Property Boundary (East Campus)
- Existing Building
- Existing Stream
- Existing Water Feature
- Wetland Boundary (2006)
- Railroad
- Road, Curb or Walkway
- Fenceline

2018 Comprehensive Sampling Locations:

- MW-XX Northern Property Boundary Area (NPBA) - 25 Wells and 1 Spring
- MW-XX Southwest (Downgradient) of the NPBA - 7 Wells
- MW-XX Eastern Perimeter Road - 1 Well
- MW-XX Southern Property Boundary Area (SPBA) - 2 Wells
- MW-XX South Plume Area (SPA) - 15 Wells
- COD-SW-XX Surface Water in Codorus Creek - 12 Stations
- MW-XX Southwest Corner of the West Parking Lot (SW-WPL) - 11 Wells
- MW-XX WPL and Levee Area - 10 Wells
- CW-XX Active Groundwater Collection Wells - 5 Wells

Scale (feet)
0 150 300 600

Former York Naval Ordnance Plant
1425 Eden Road, York, Pennsylvania 17402

Comprehensive
Site-Wide Sampling Locations
for 2018

DRAWN:	CHECKED:	APPROVED:	DATE:	FIGURE:
JPB	CDO	SMS	4/17/2019	2.2-1

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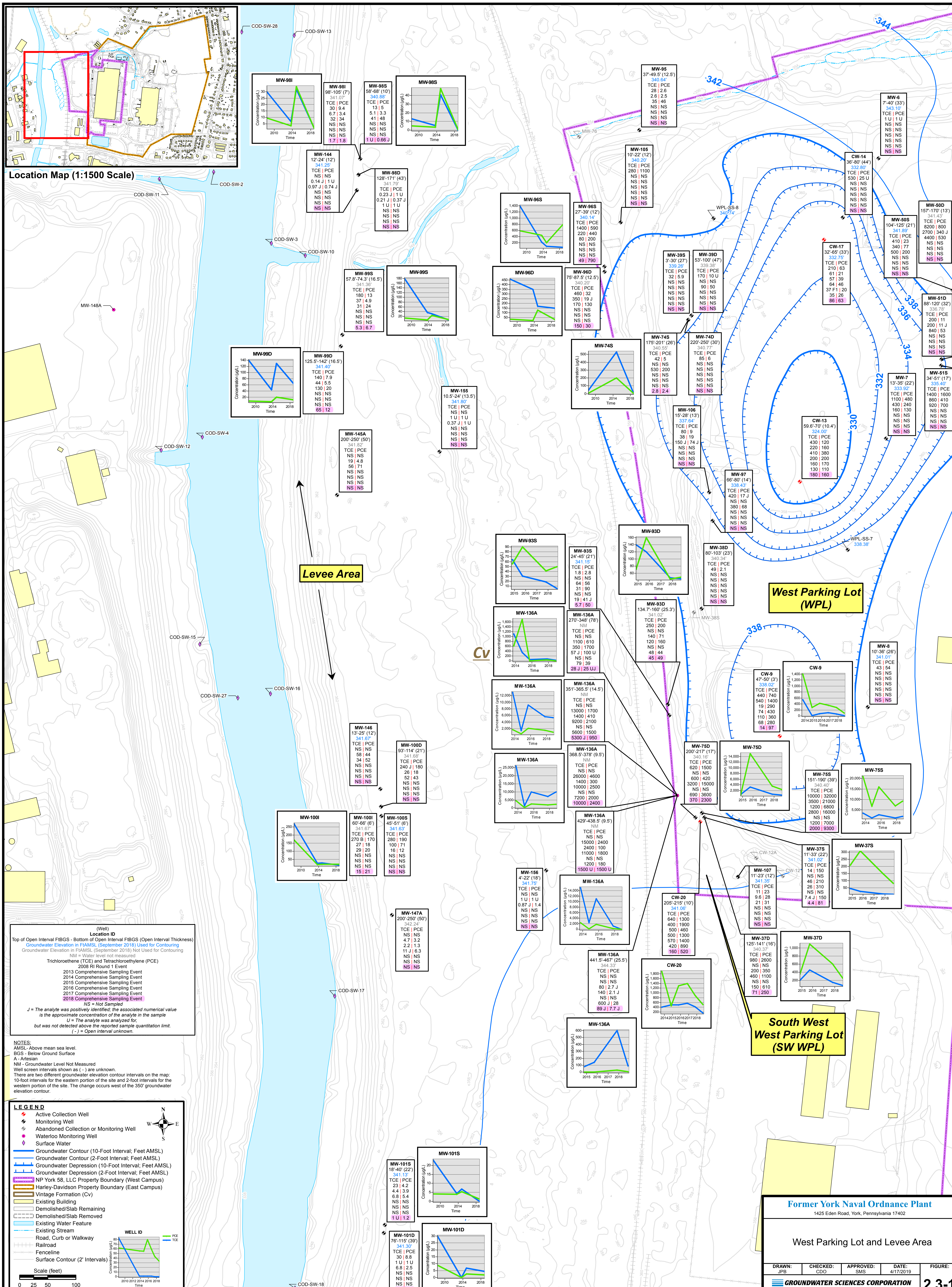

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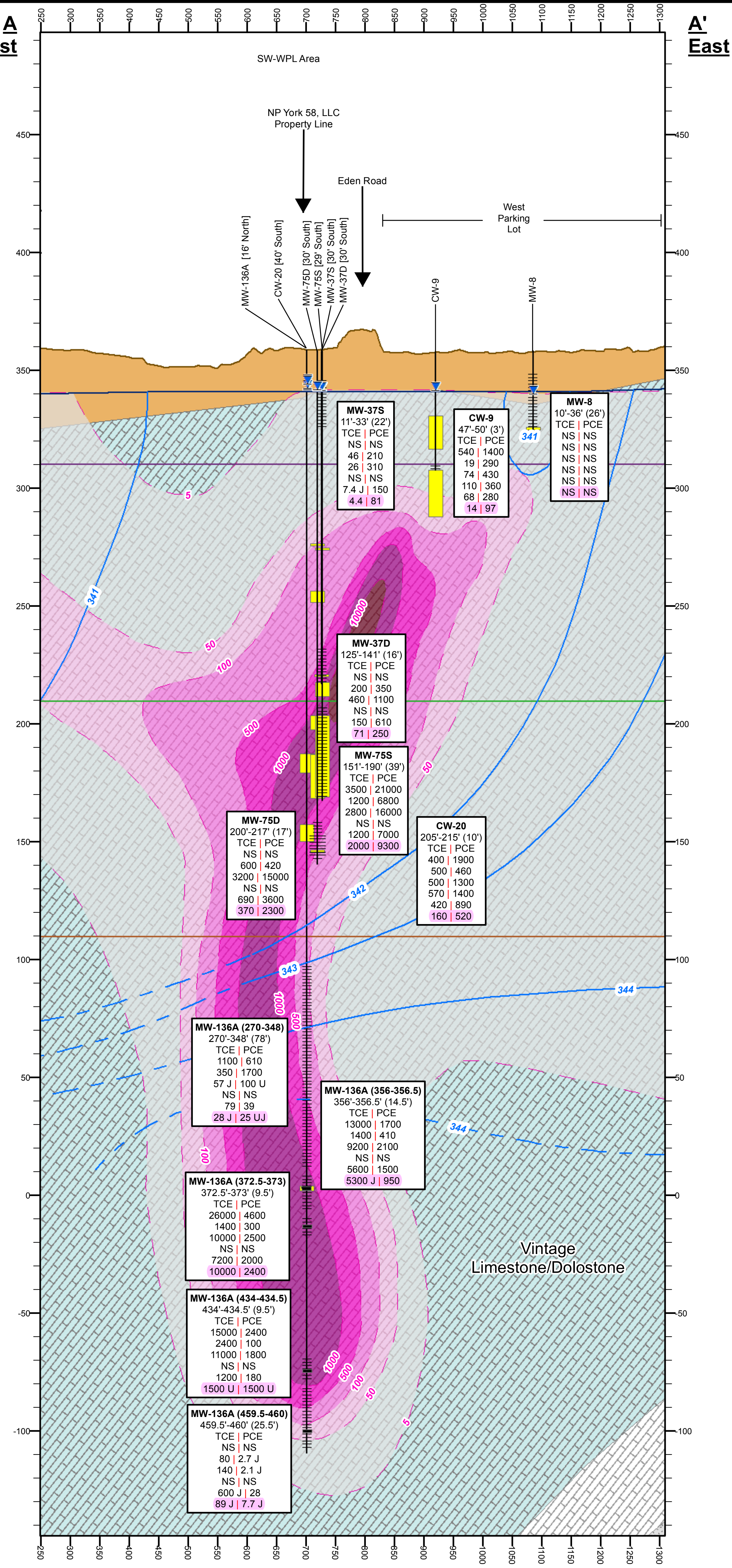


Scale: 1" = 50' (Vertical) and 1" = 200' (Horizontal)
Vertical Exaggeration 4X

LEGEND

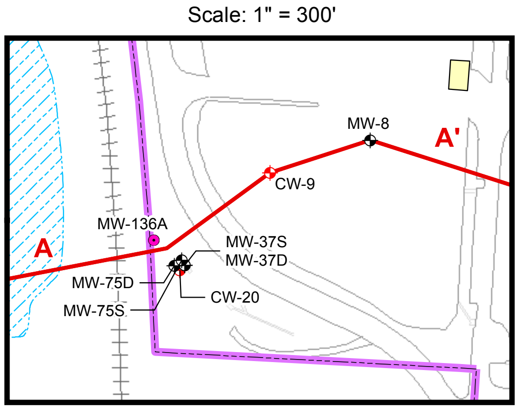
- Water Level
- Flow Direction
- Piezometric Contour
- Piezometric Contour (Inferred)
- Water Table
- Well
- Open Interval
- 110' AMSL
- 210' AMSL
- 310' AMSL
- Void
- Phyllitic Dolostone
- Limestone/Dolostone
- Sandstone/Quartzite
- Quartzite
- Marble
- Overburden
- TCE Concentration >5 <50 ppb
- TCE Concentration >50 <100 ppb
- TCE Concentration >100 <500 ppb
- TCE Concentration >500 <1,000 ppb
- TCE Concentration >1,000 <10,000 ppb
- TCE Concentration >10,000 ppb

Location ID
Top of Open Interval FtBGS - Bottom of Open Interval FtBGS (Open Interval Thickness)
Trichloroethene and Tetrachloroethylene
2013 Comprehensive Sampling Event
2014 Comprehensive Sampling Event
2015 Comprehensive Sampling Event
2016 Comprehensive Sampling Event
2017 Comprehensive Sampling Event
2018 Comprehensive Sampling Event
(NS = Not Sampled)
(J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample)
(U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit)

NOTE:
TCE concentration shading is based on the 2013 through 2015 results.

Cross Section Location Map

Scale: 1" = 300'



LEGEND

- Collection Well
- Monitoring Well
- Waterloo Monitoring Well
- Cross Section Transect
- NP York 58, LLC Property Boundary (West Campus)
- Existing Building
- Wetland Boundary (2006)
- Railroad
- Road, Curb or Walkway

Former York Naval Ordnance Plant

1425 Eden Road, York, Pennsylvania 17402

Cross Section A-A'
(CW-20 Area)

DRAWN:	CHECKED:	APPROVED:	DATE:	FIGURE:
JPB	CDO	SMS	03/14/2019	2.3-2

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Figure 2.3-3
CW-20 Pumping Volumes, Total VOC Mass Removed and Total VOC Mass Removal Efficiency
(2014 through 2018)
Former York Naval Ordnance Plant - York, PA

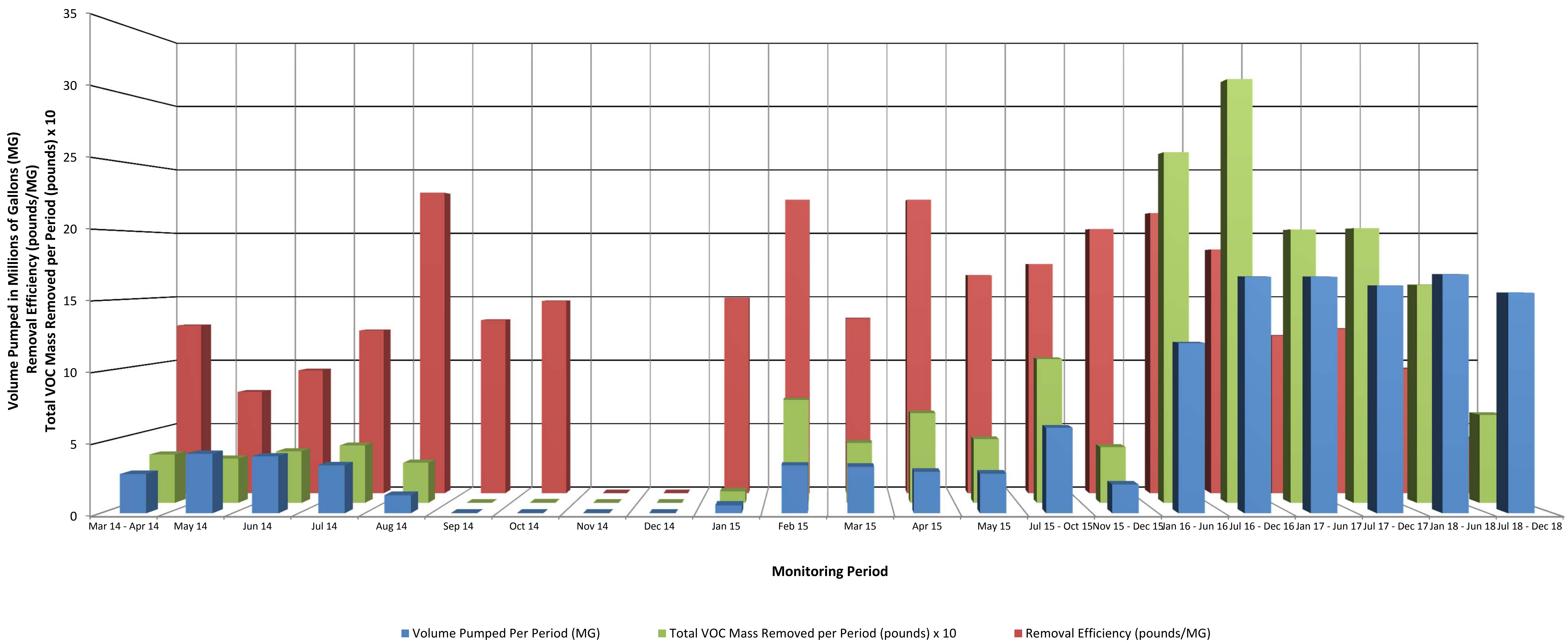
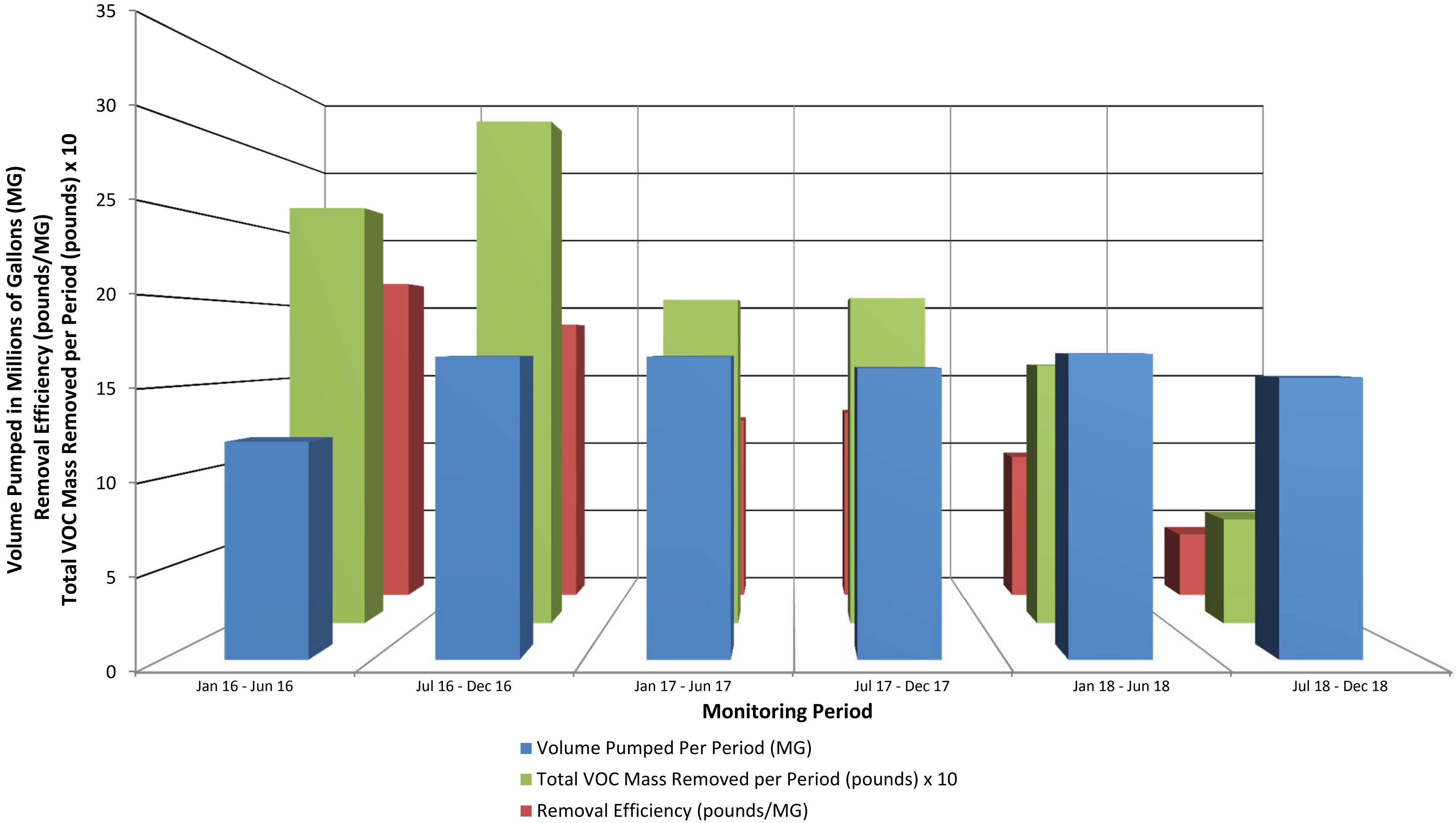


Figure 2.3-4
CW-20 Pumping Volumes, Total VOC Mass Removed and Total VOC Mass Removal Efficiency (2016 through 2018)
Former York Naval Ordnance Plant - York, PA



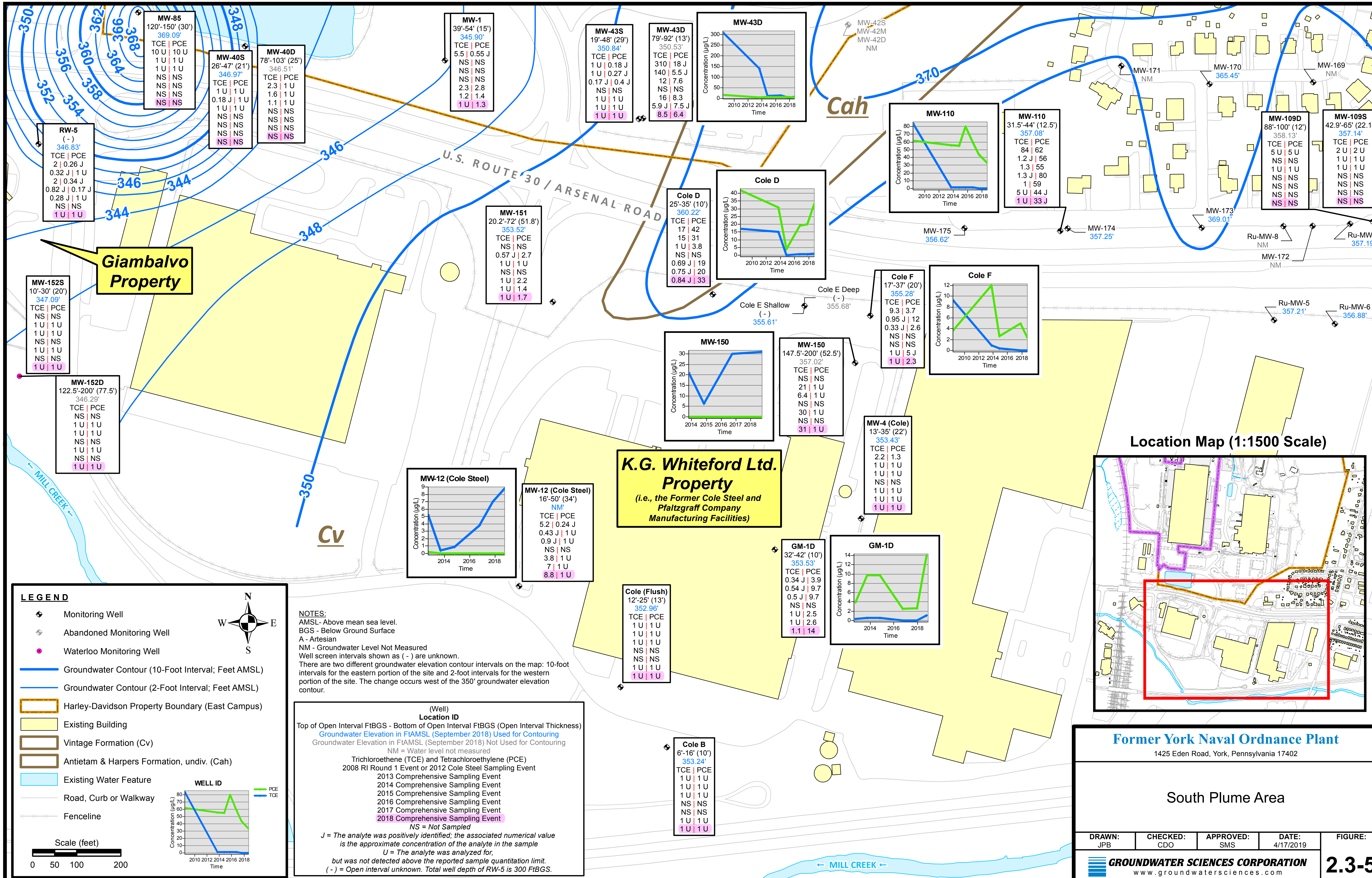


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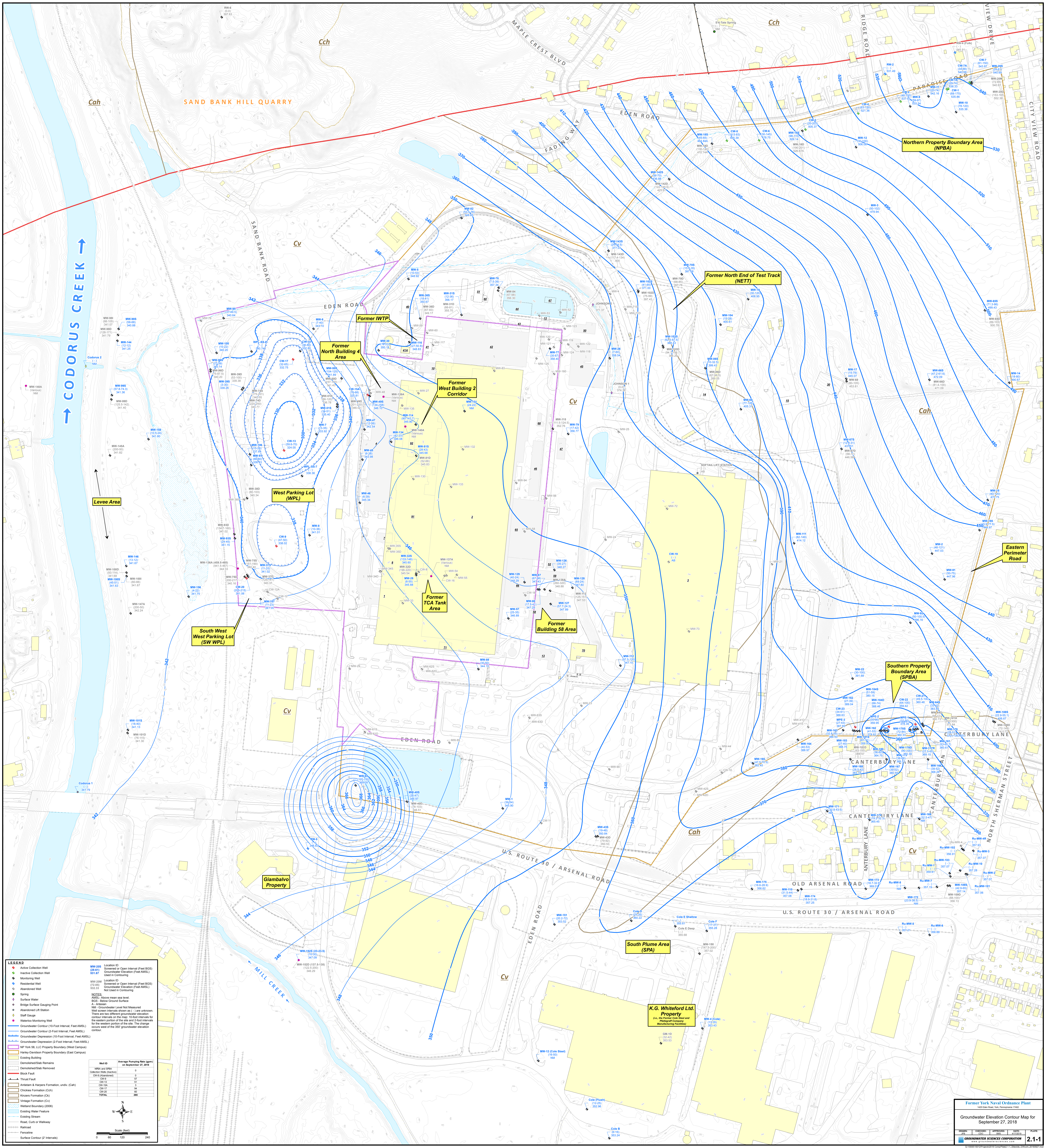
Plate



Well ID	Average Pumping Rate (gpm) on September 27, 2018
NPBA and SPBA Collection Wells (Inactive)	0
CW-8 (Abandoned)	0
CW-9	57
CW-13	51
CW-15A	3
CW-17	94
CW-20	60
TOTAL	**265**

Appendix A

Field Sampling Plan for Part 2 of the Supplemental Groundwater Remedial Investigation*

** - in portable document format (PDF) on the USB Drive attached to this report.*

Appendix B

Quality Assurance Project Plan*

** - in portable document format (PDF) on the USB Drive attached to this report.*

Appendix C

Groundwater and Surface Water Sample Purge Logs*

** - in portable document format (PDF) on the USB Drive attached to this report.*

Appendix D

Comprehensive Groundwater and Surface Water Data Summary – VOC Analysis*

** - in portable document format (PDF) on the USB Drive attached to this report.*

Appendix E

Laboratory Analysis Reports for 2018 Samples*

** - in portable document format (PDF) on the USB Drive attached to this report.*

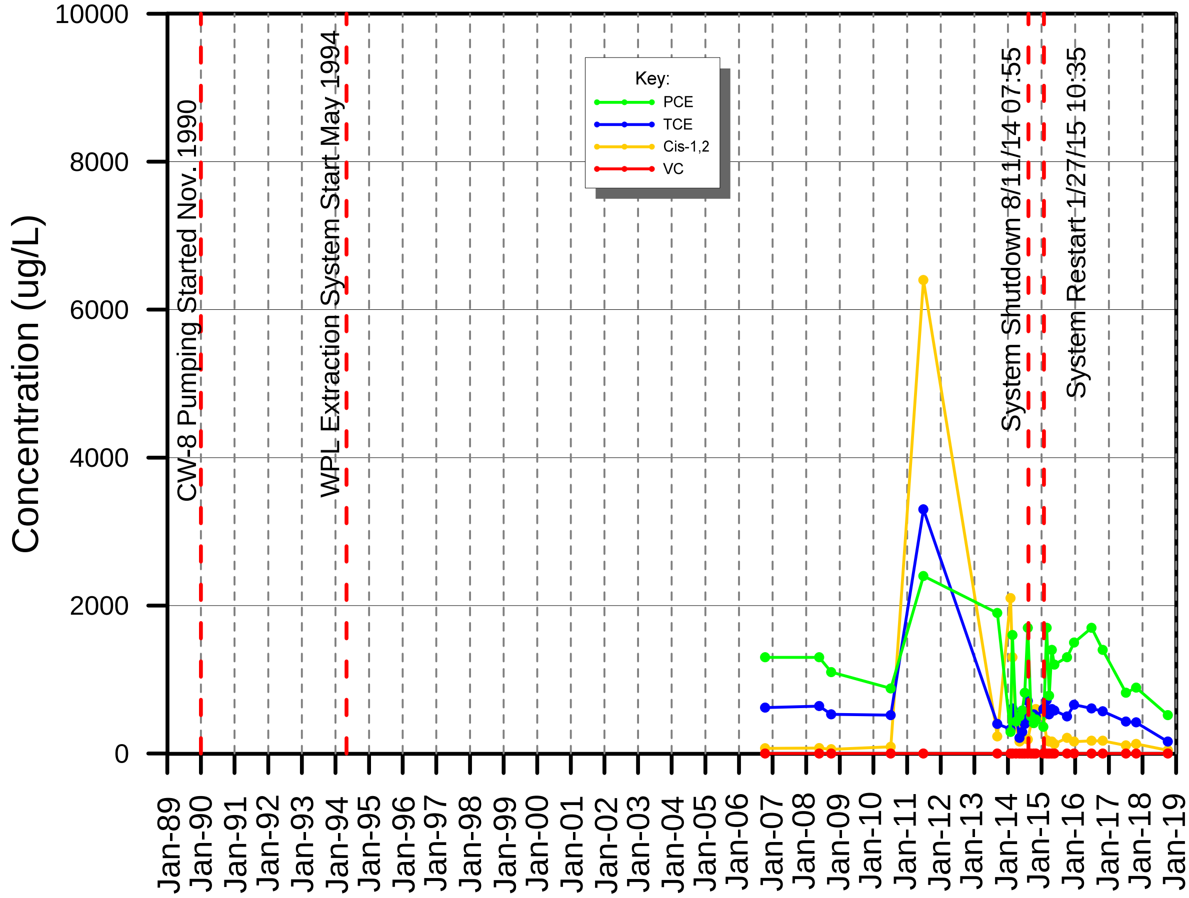
Appendix F

Groundwater Chemistry Graphs

Appendix F-1

Southwest Corner of the West Parking Lot (CW-20 Area)

CW-20



Concentration (ug/L)
10000
8000
6000
4000
2000
0
Key:
PCE
TCE
Cis-1,2
VC
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
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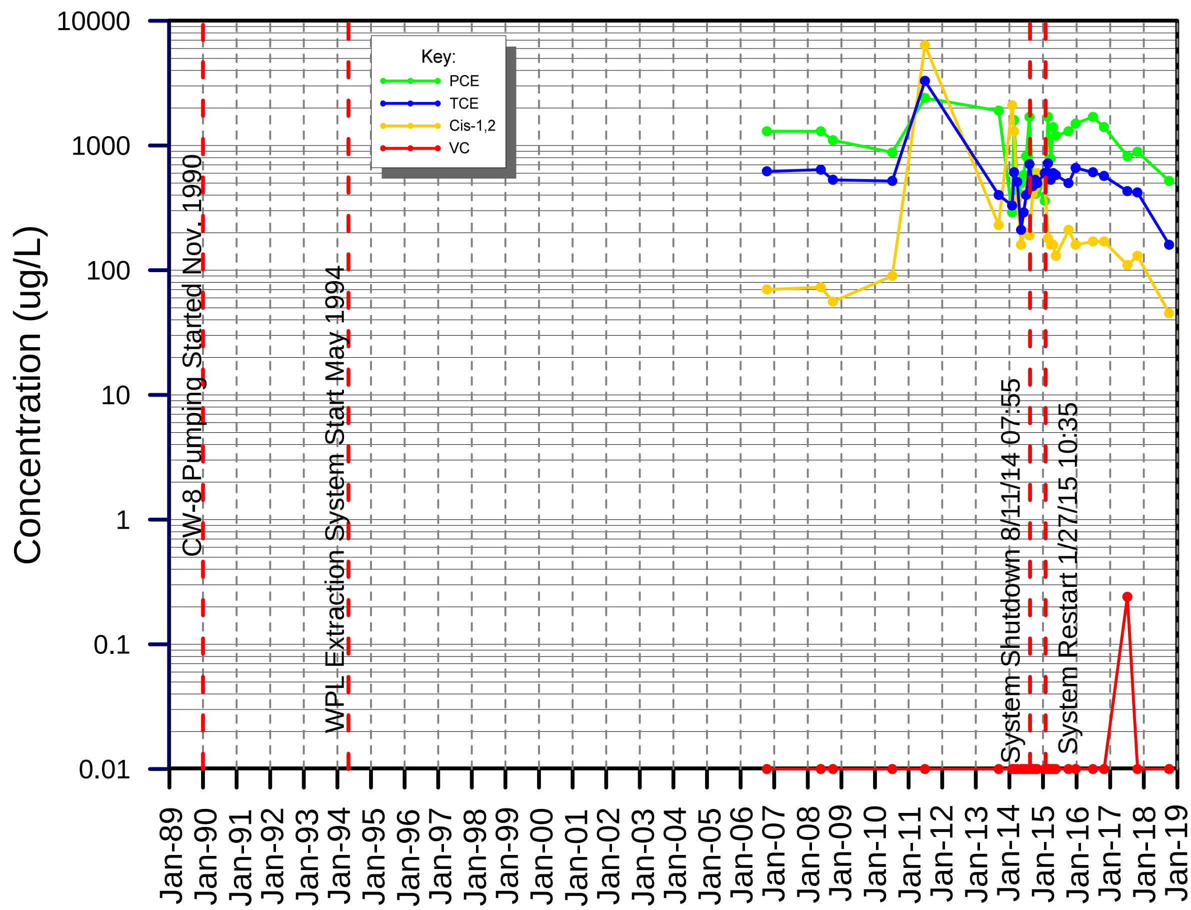
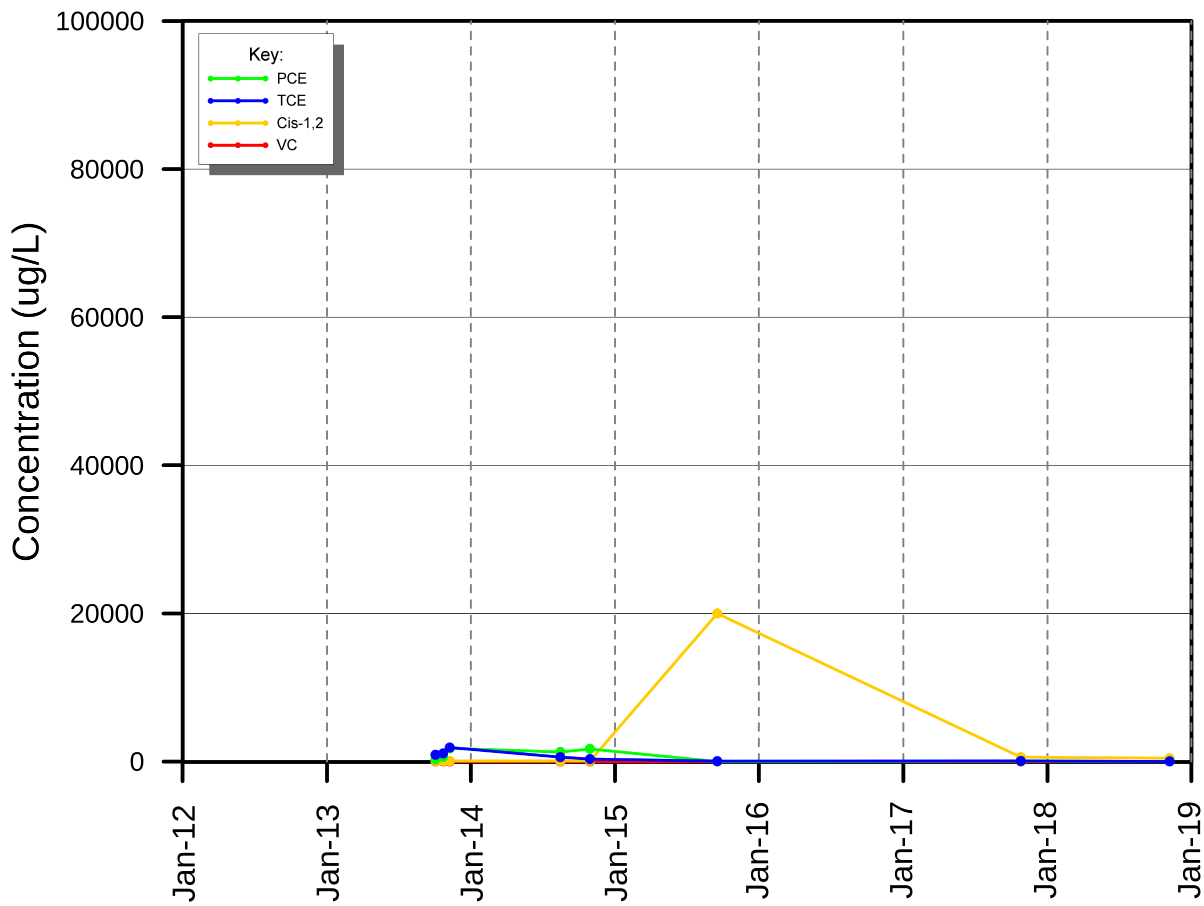
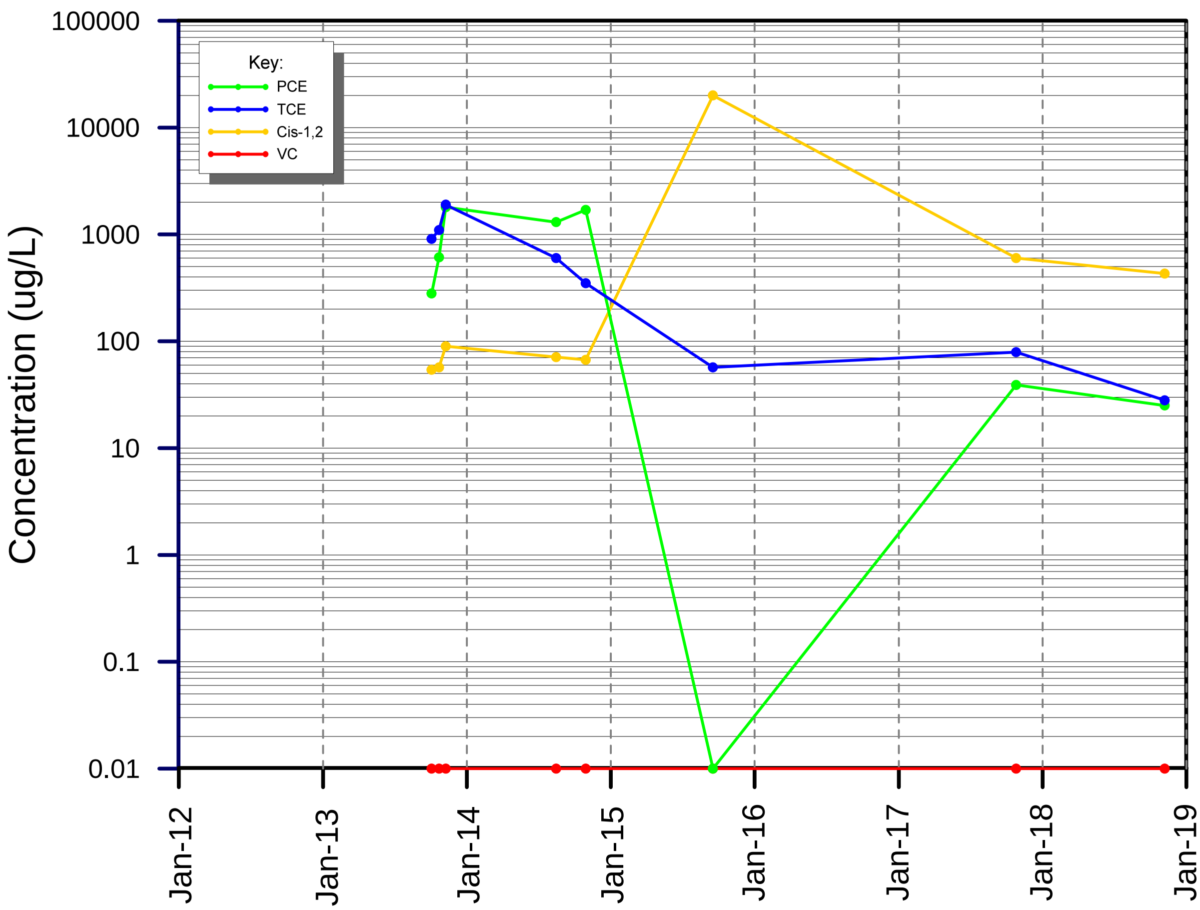
Jan-17
Jan-18
Jan-19



Concentration (ug/L)
10000
1000
100
10
1
0.1
0.01
Key:
PCE
TCE
Cis-1,2
VC
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

MW-136A(270-348)





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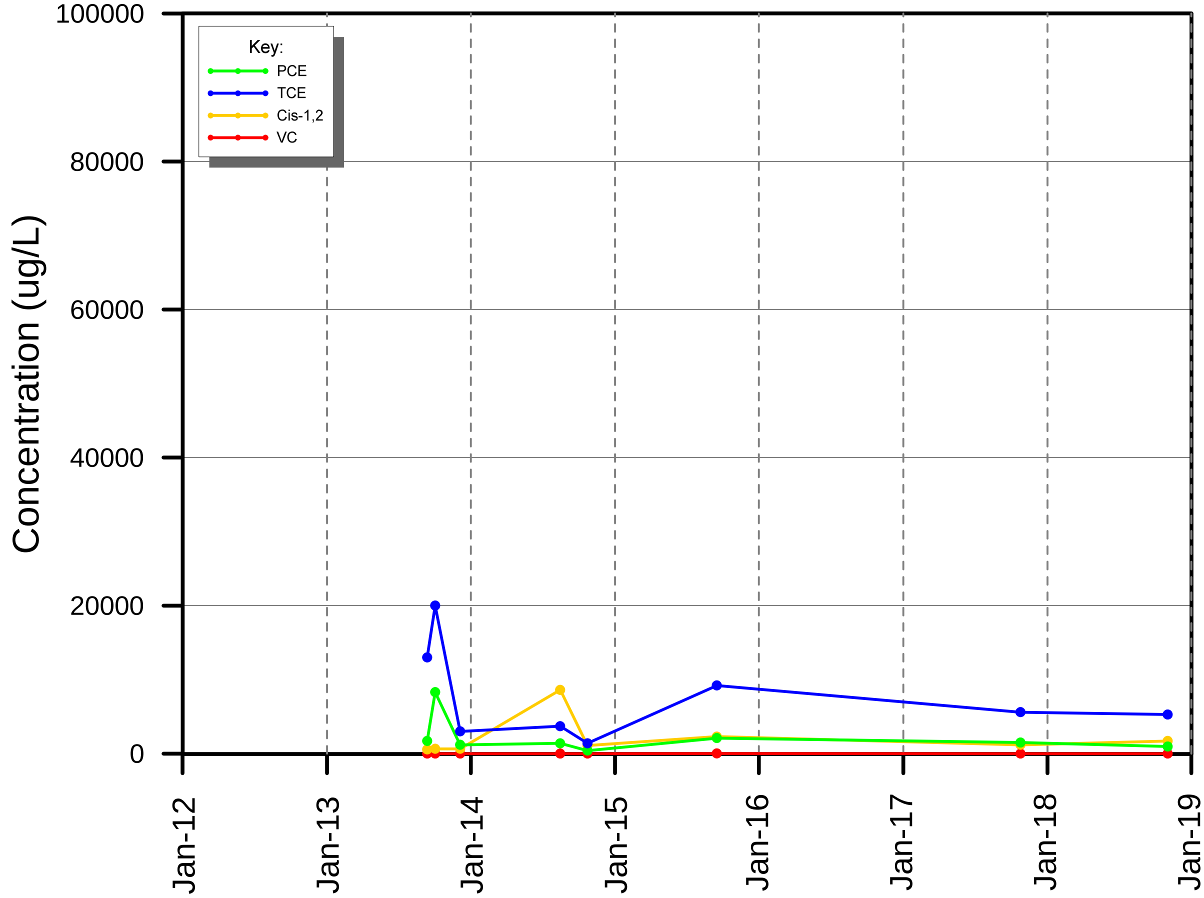
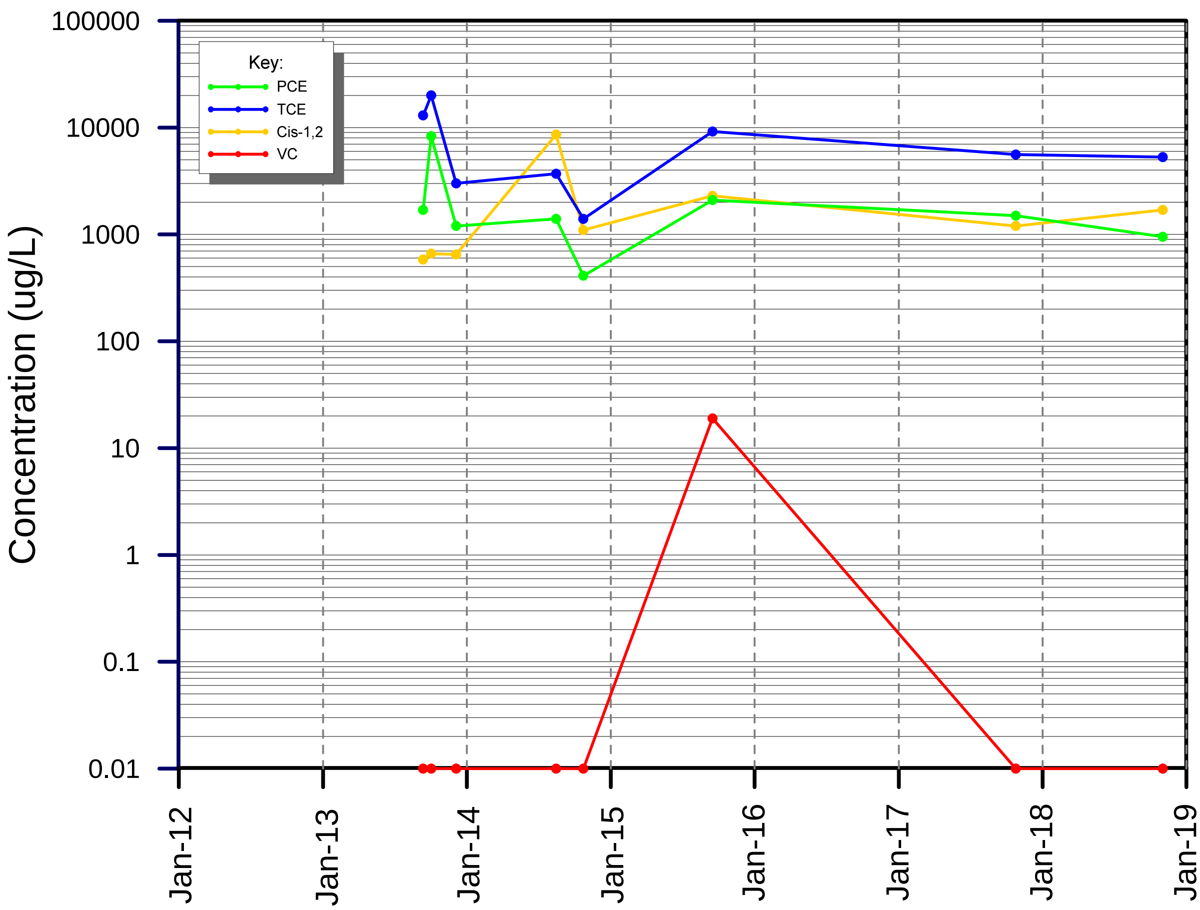
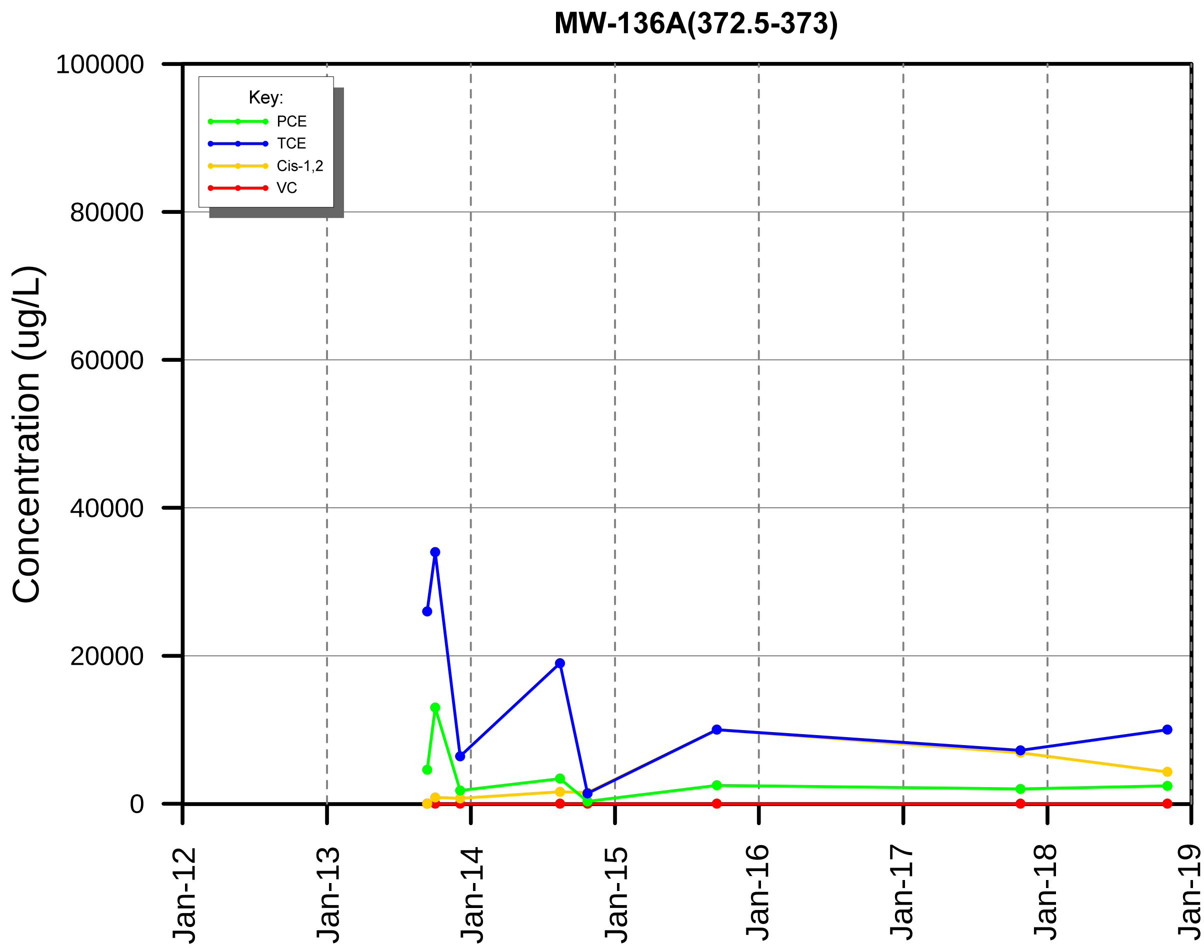
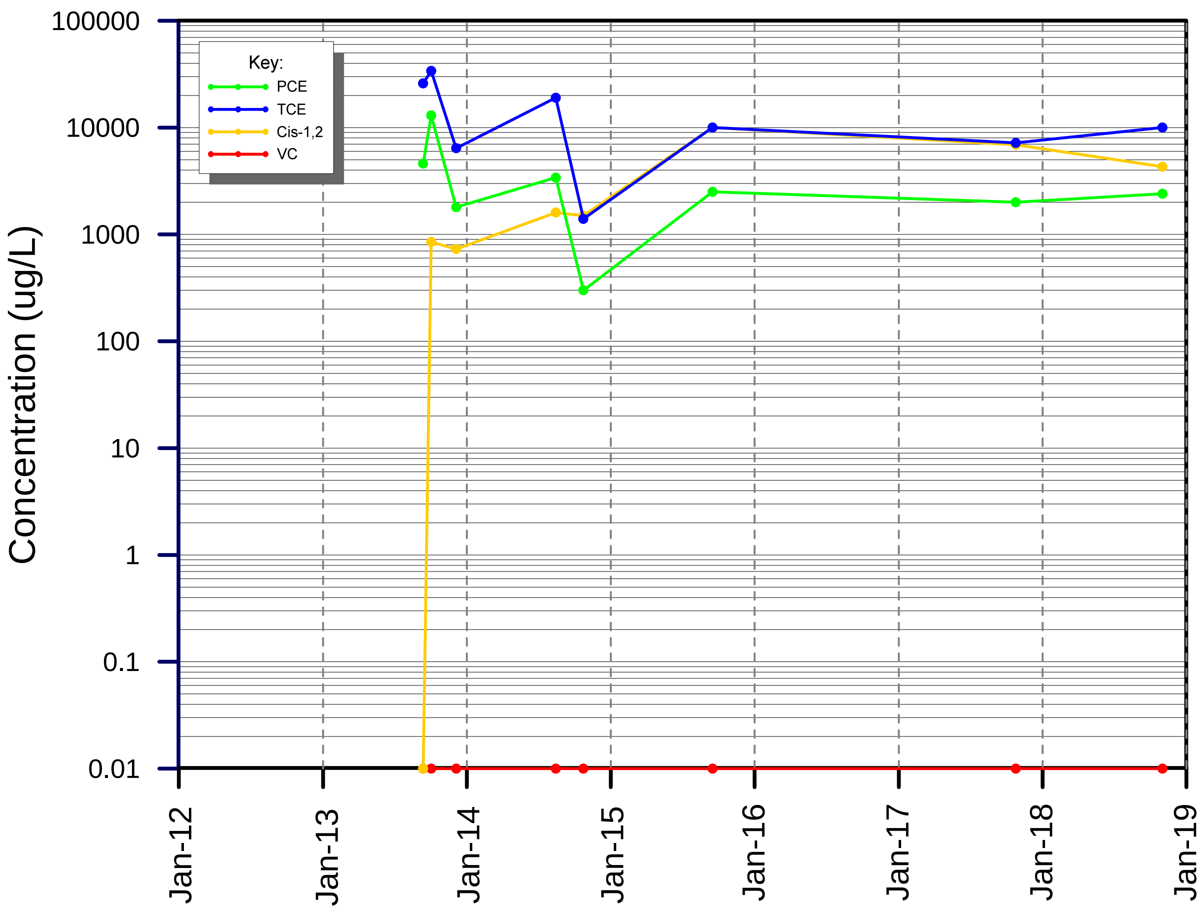
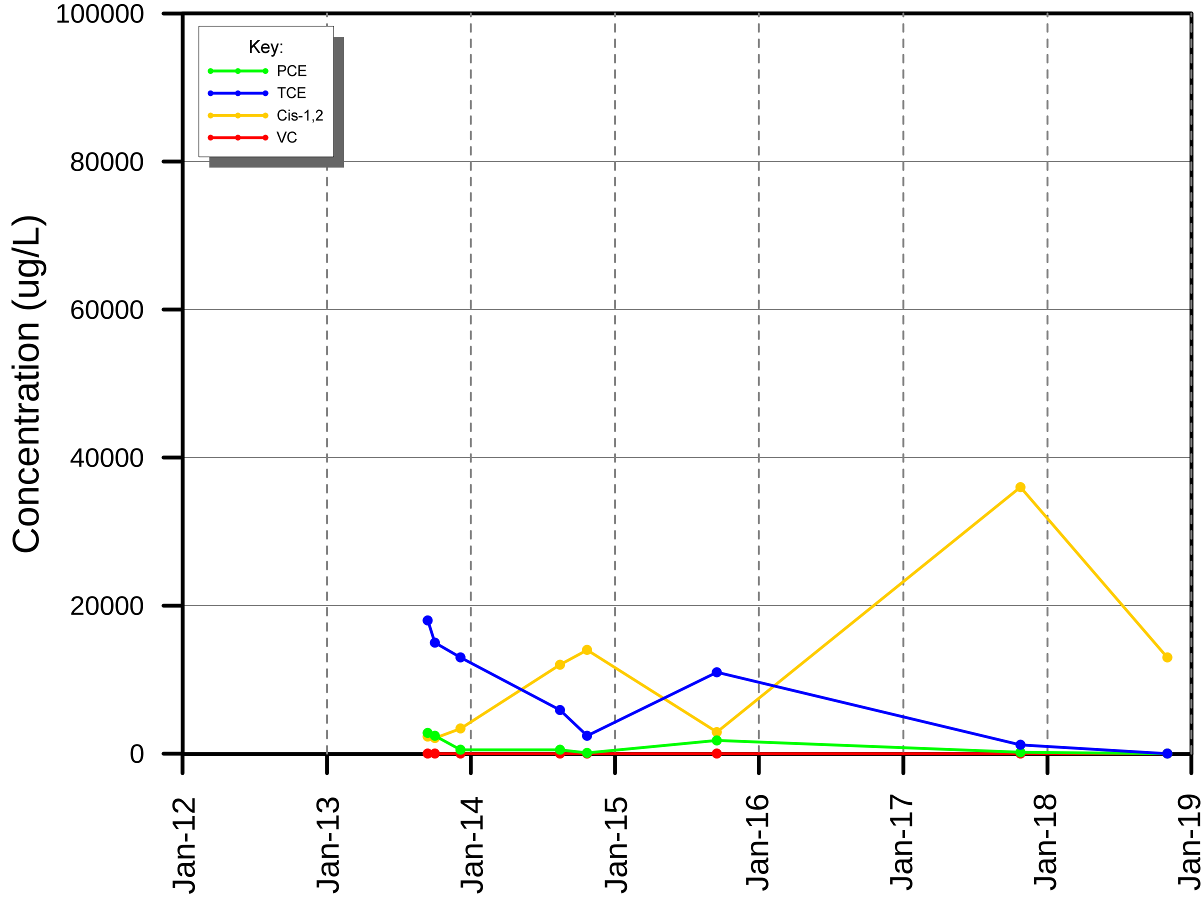


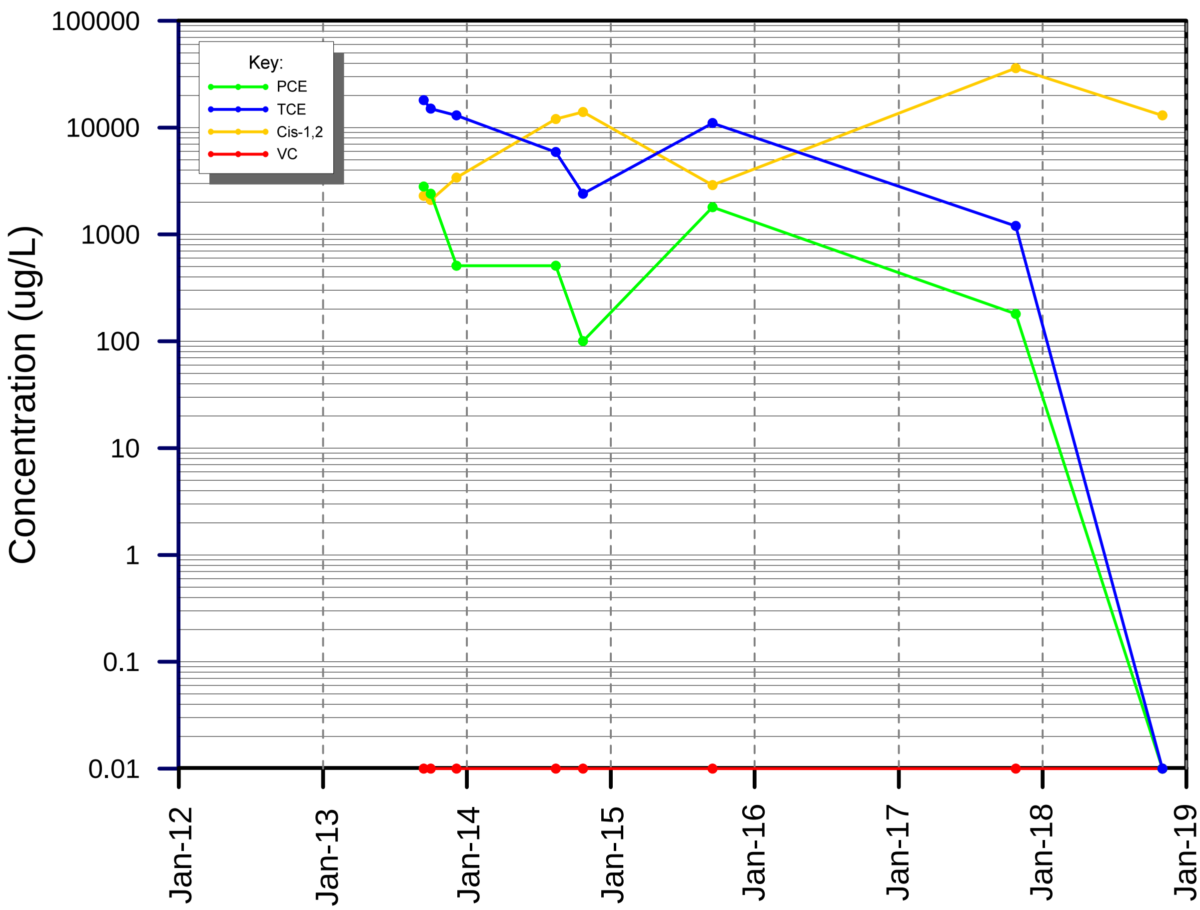



MW-136A(372.5-373)
Concentration (ug/L)
100000
80000
60000
40000
20000
0
Key:
PCE
TCE
Cis-1,2
VC
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

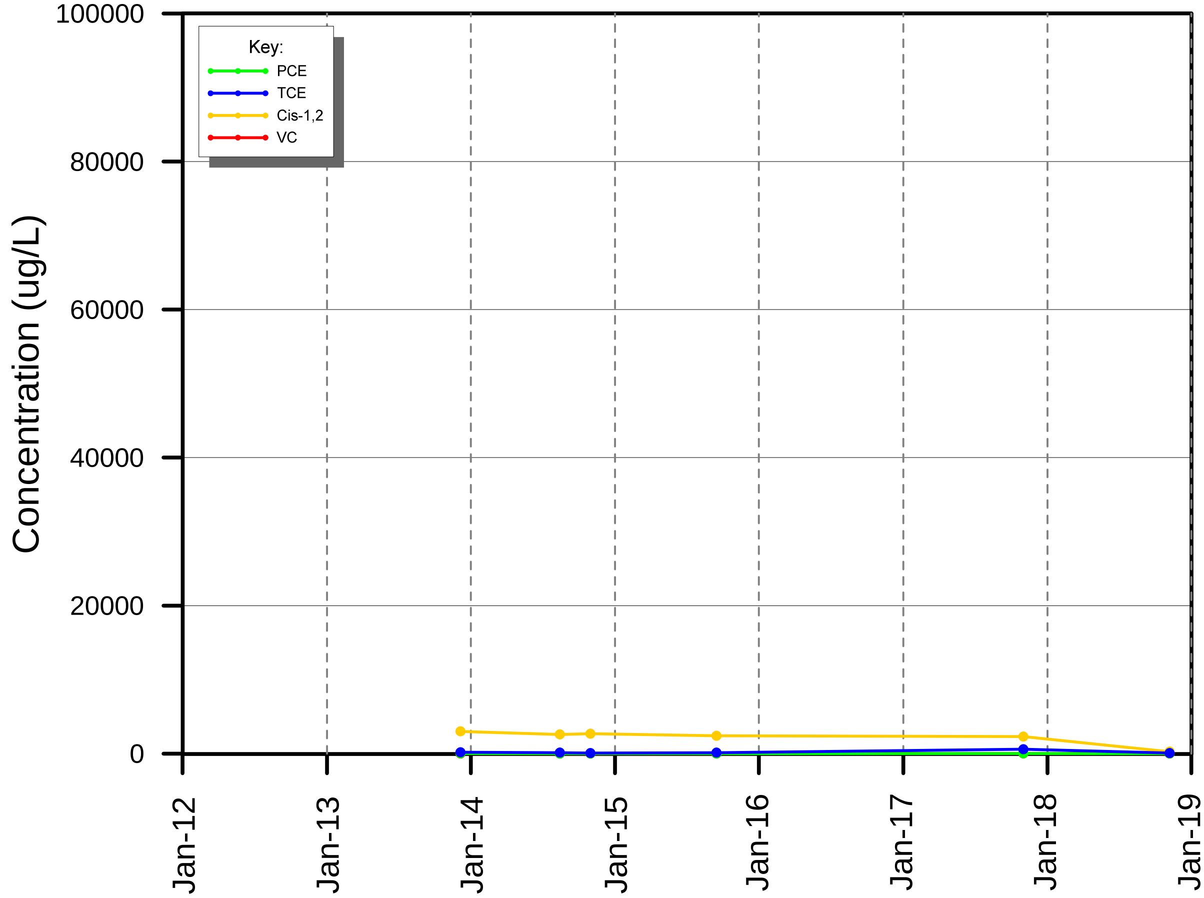

Concentration (ug/L)
100000
10000
1000
100
10
1
0.1
0.01
Key:
PCE
TCE
Cis-1,2
VC
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

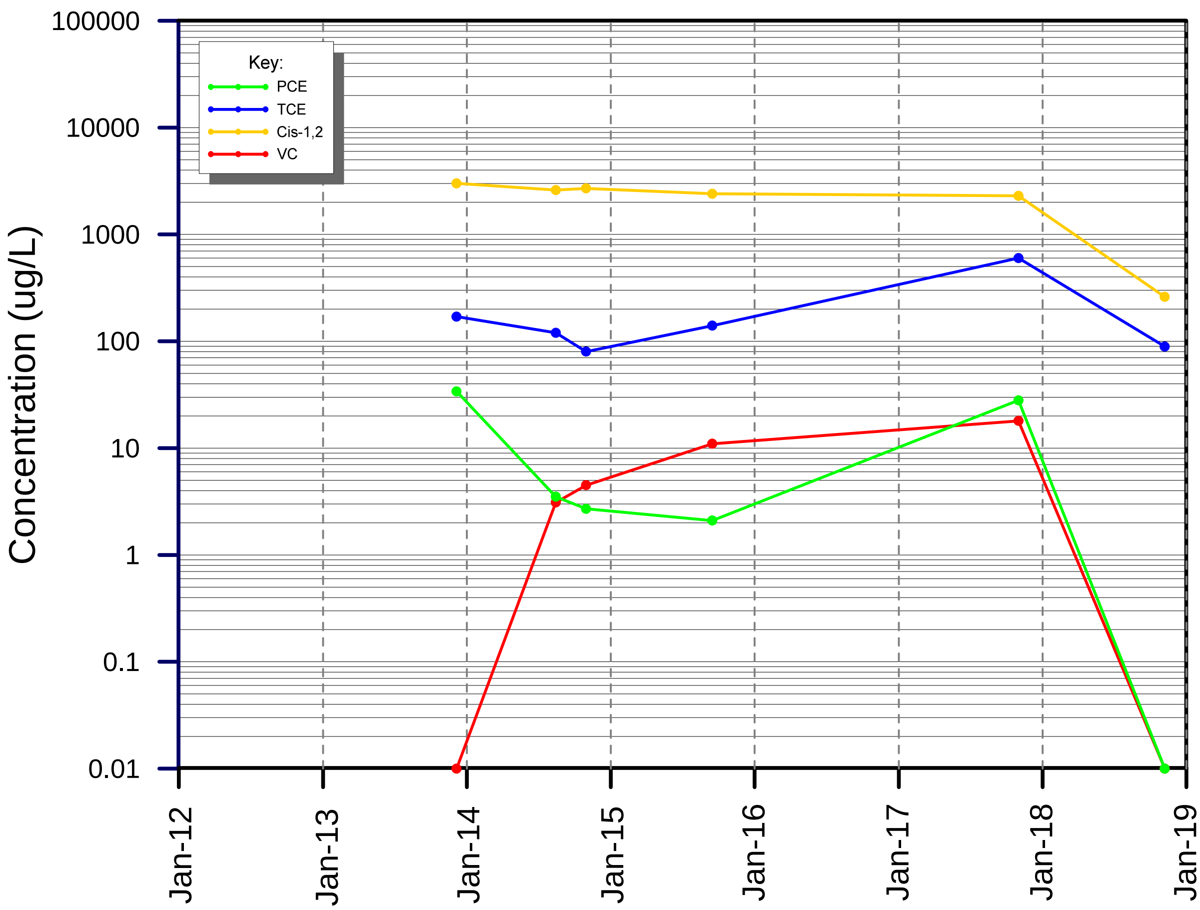
MW-136A(434-434.5)



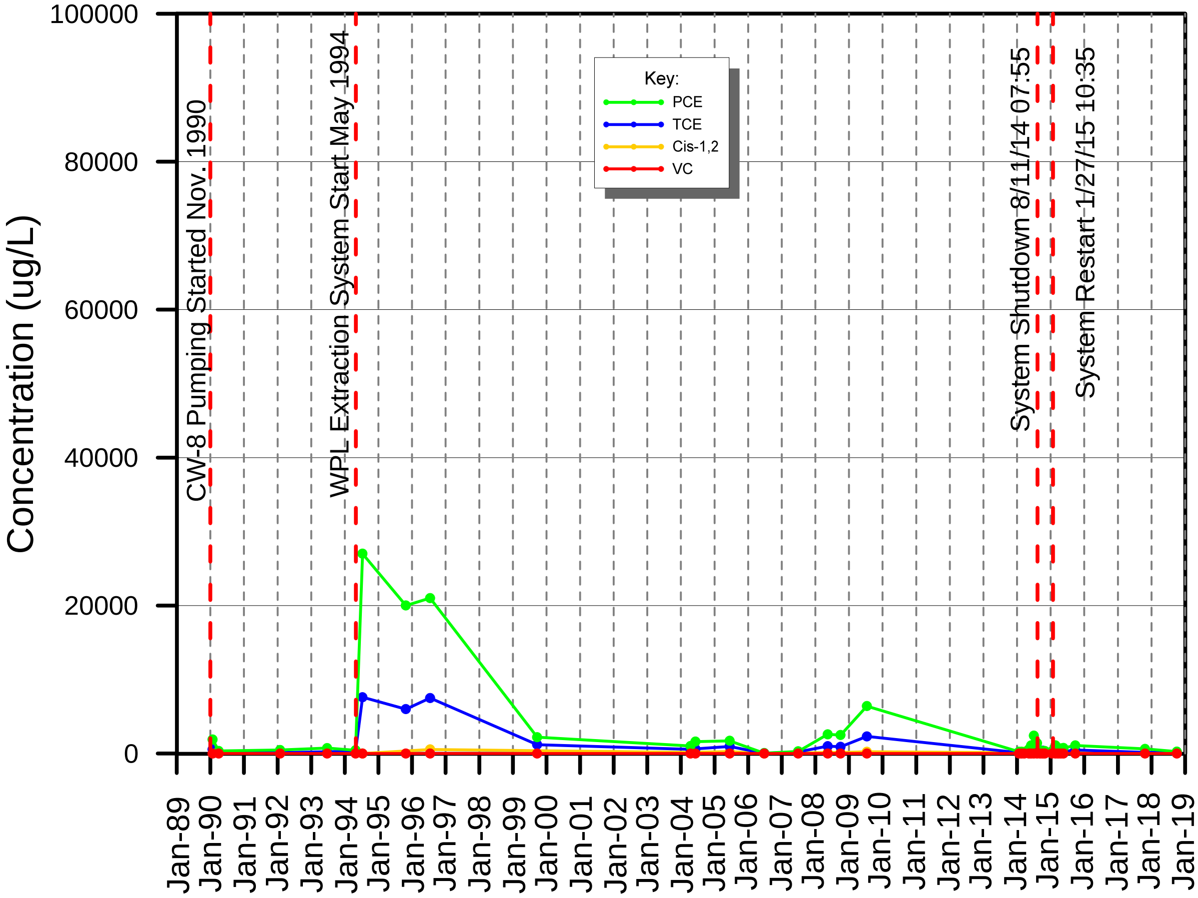


MW-136A (459.5-460)





MW-37D


Concentration (ug/L)
100000
80000
60000
40000
20000
0
Key:
PCE
TCE
Cis-1,2
VC
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
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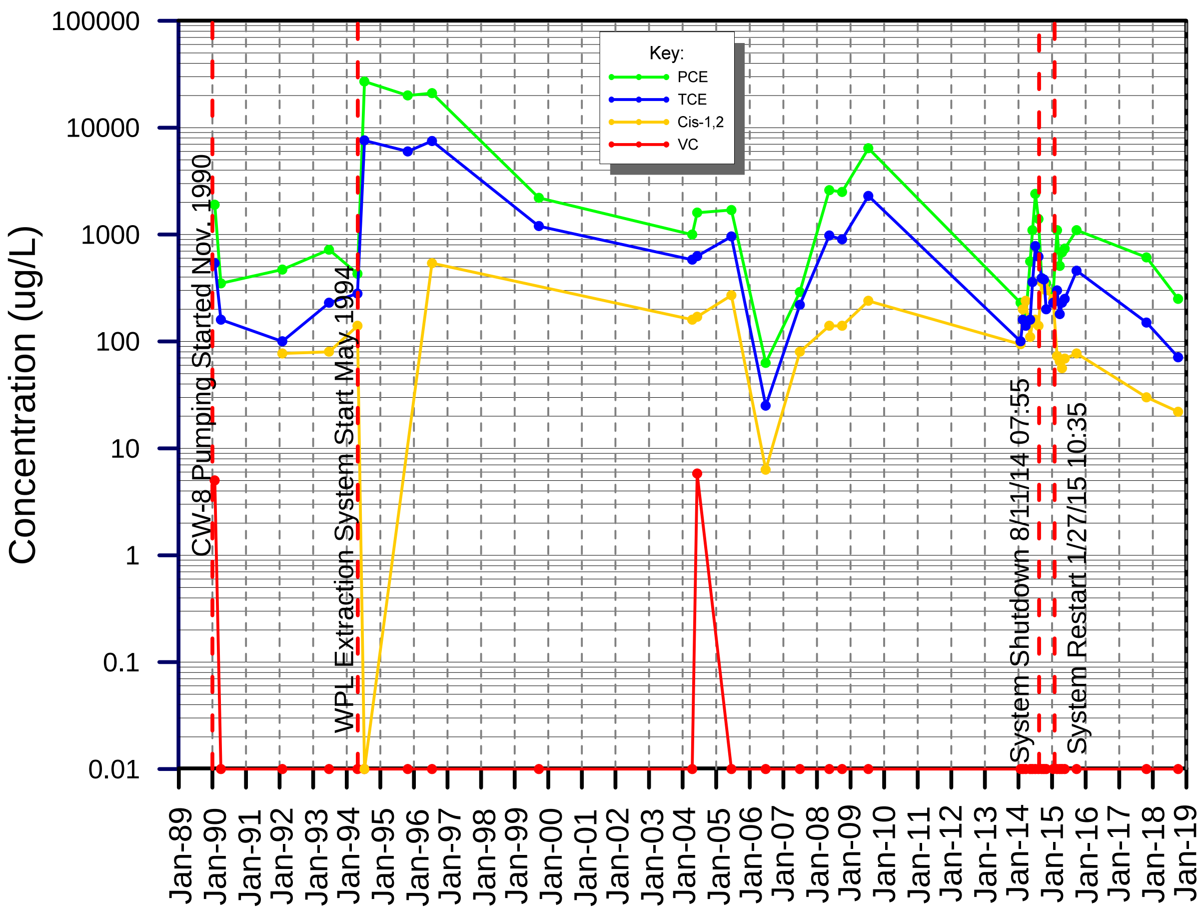
Jan-18
Jan-19


Concentration (ug/L)
100000
10000
1000
100
10
1
0.1
0.01
Key:
PCE
TCE
Cis-1,2
VC
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89
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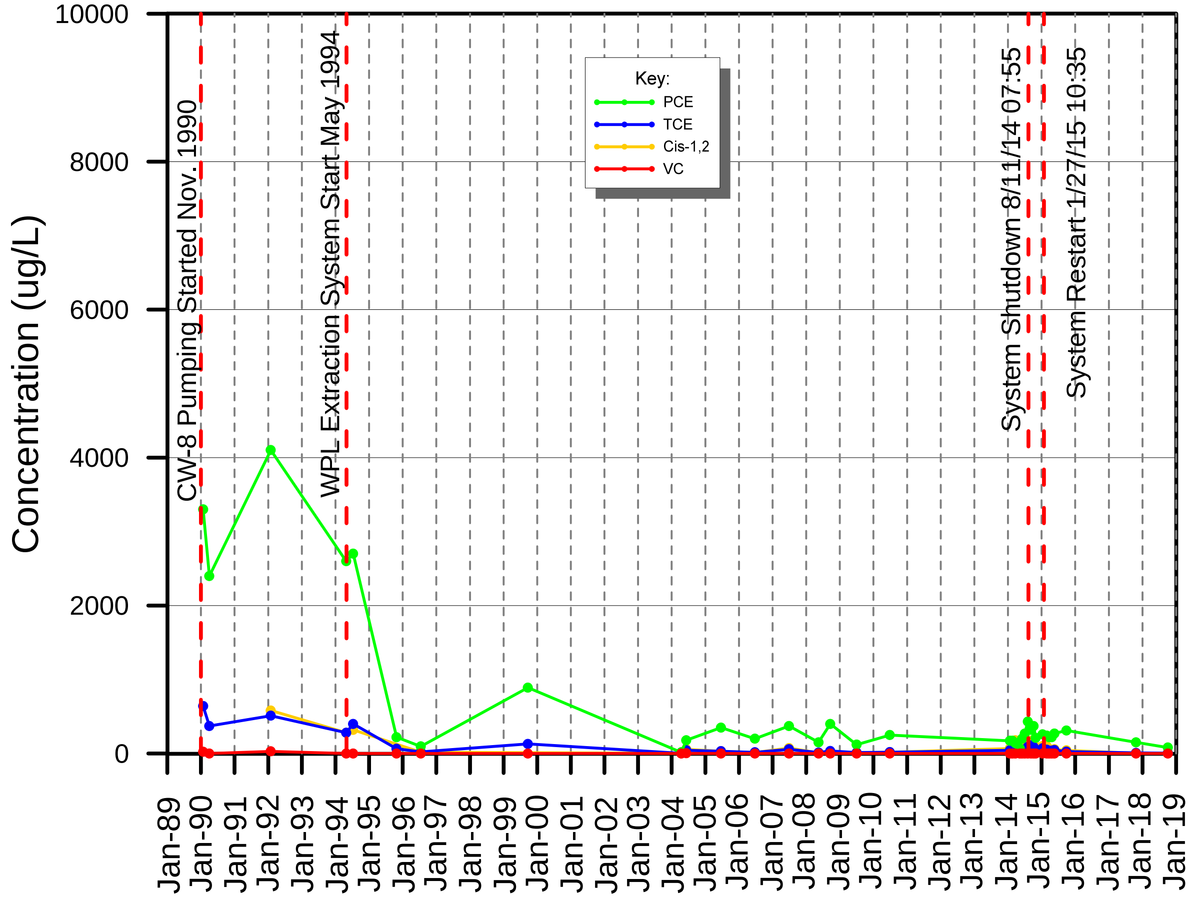
MW-37S



Concentration (ug/L)
10000
8000
6000
4000
2000
0
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Key:
PCE
TCE
Cis-1,2
VC
Jan-89
Jan-90
Jan-91
Jan-92
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Jan-94
Jan-95
Jan-96
Jan-97
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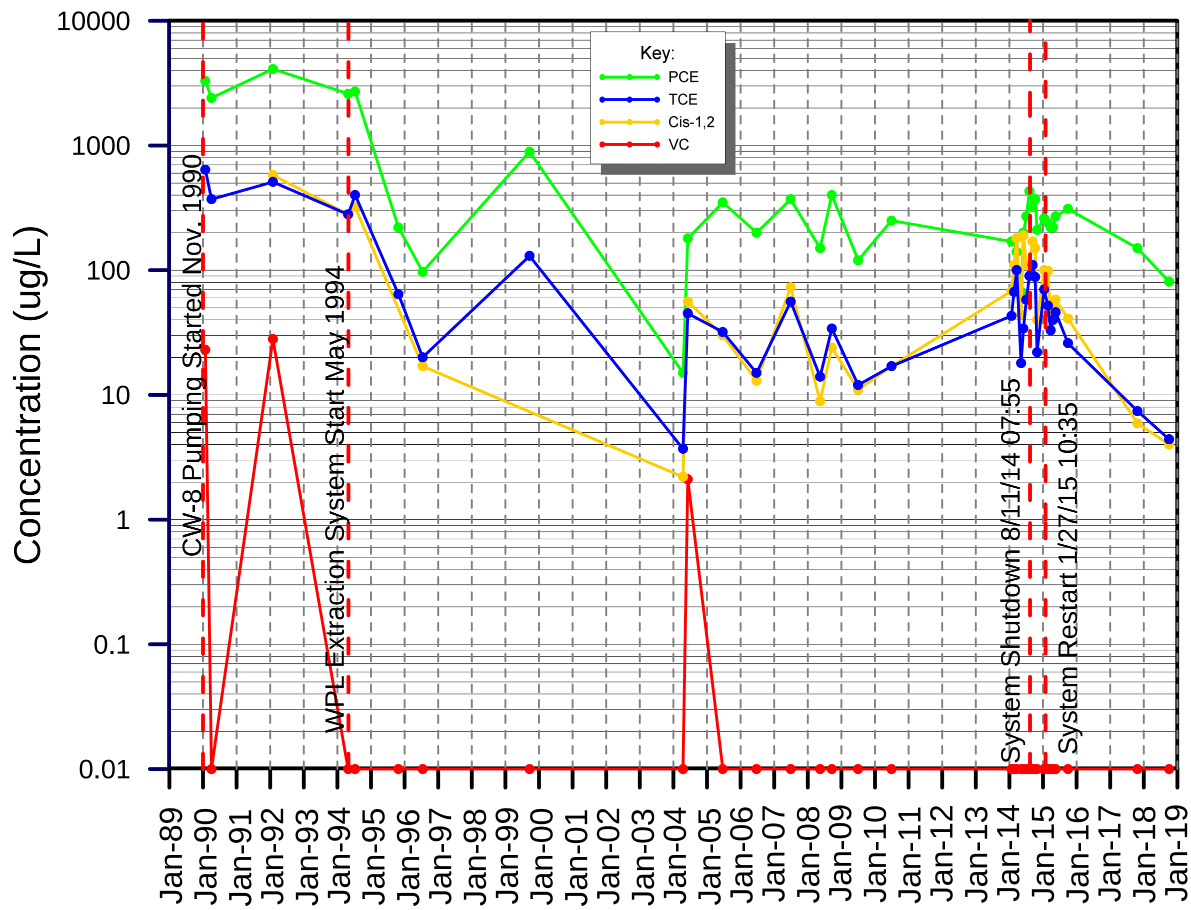

Concentration (ug/L)
10000
1000
100
10
1
0.1
0.01
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Key:
PCE
TCE
Cis-1,2
VC
Jan-89
Jan-90
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Jan-95
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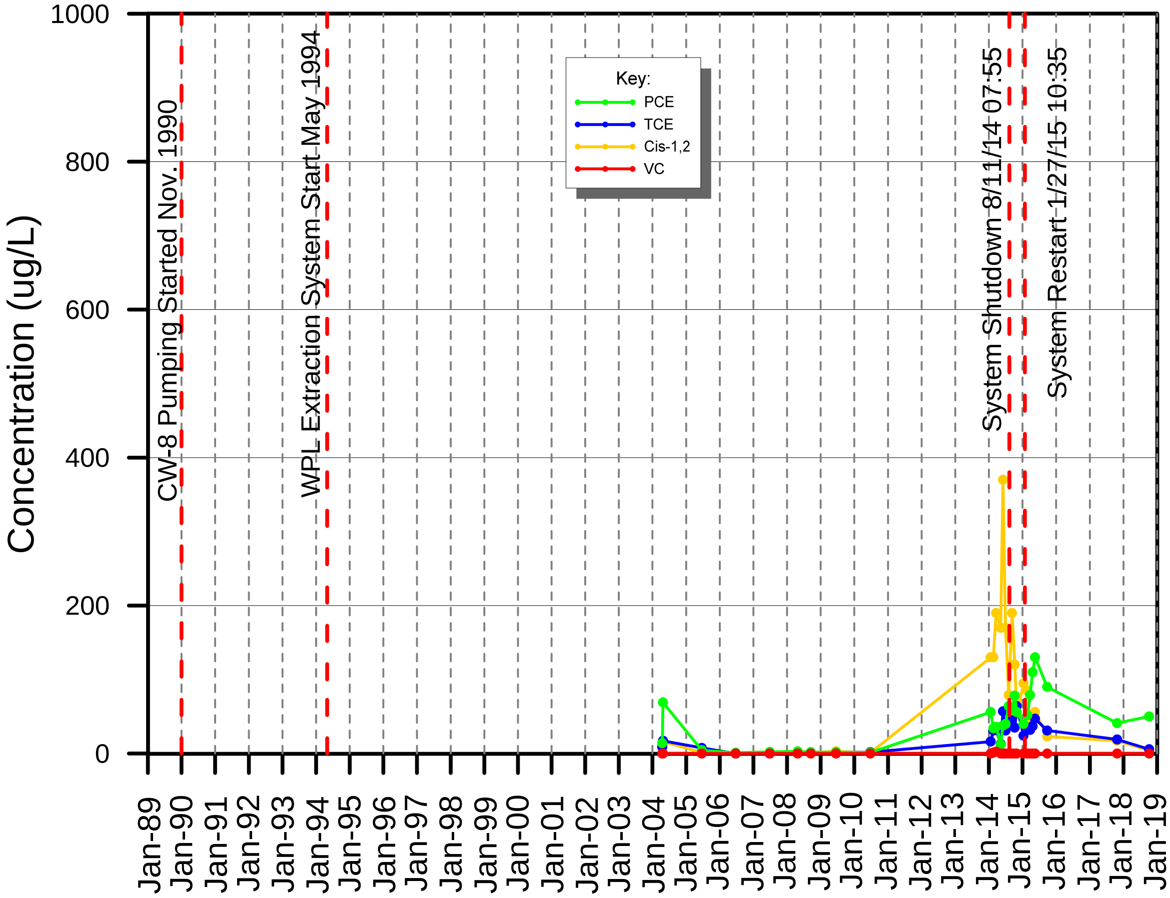
MW-93S



Concentration (ug/L)
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200
400
600
800
1000
Key:
PCE
TCE
Cis-1,2
VC
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89
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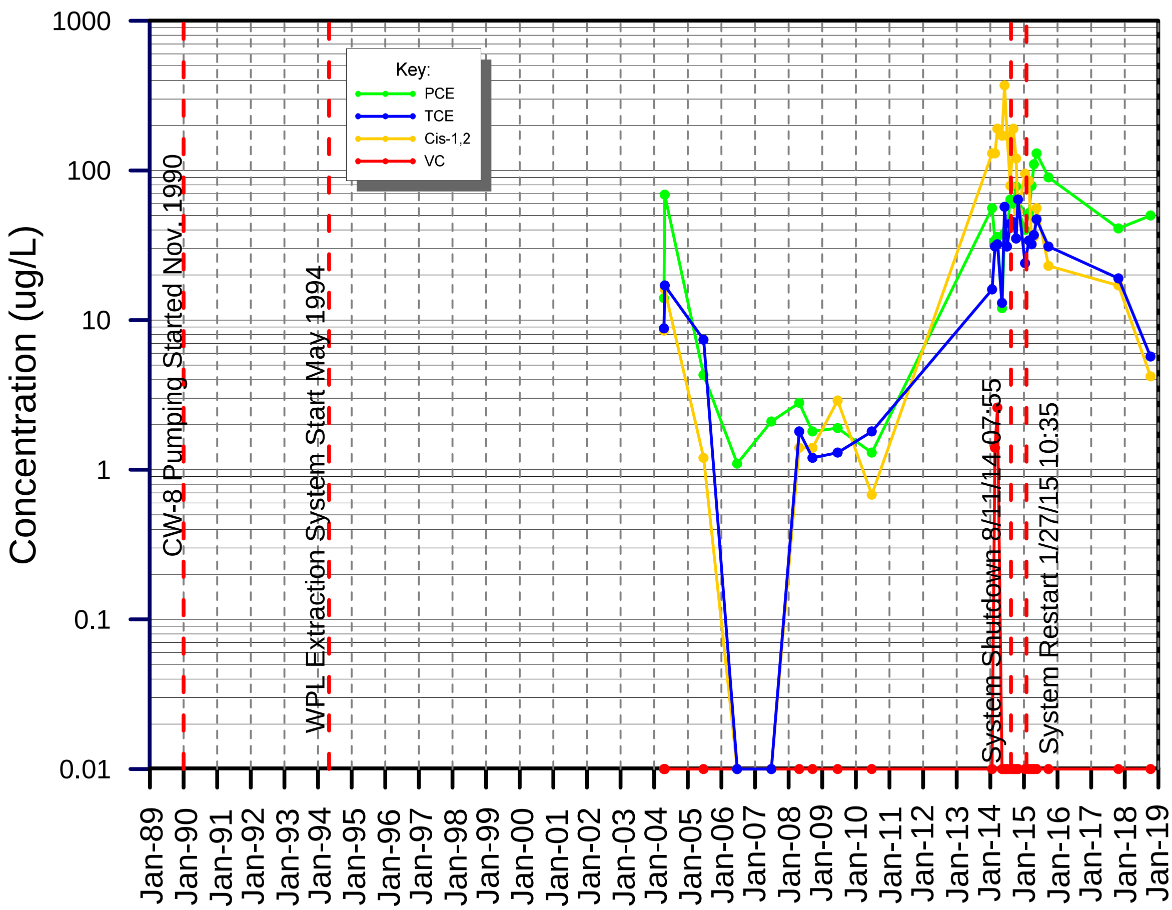

Concentration (ug/L)
0.01
0.1
1
10
100
1000
Key:
PCE
TCE
Cis-1,2
VC
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89
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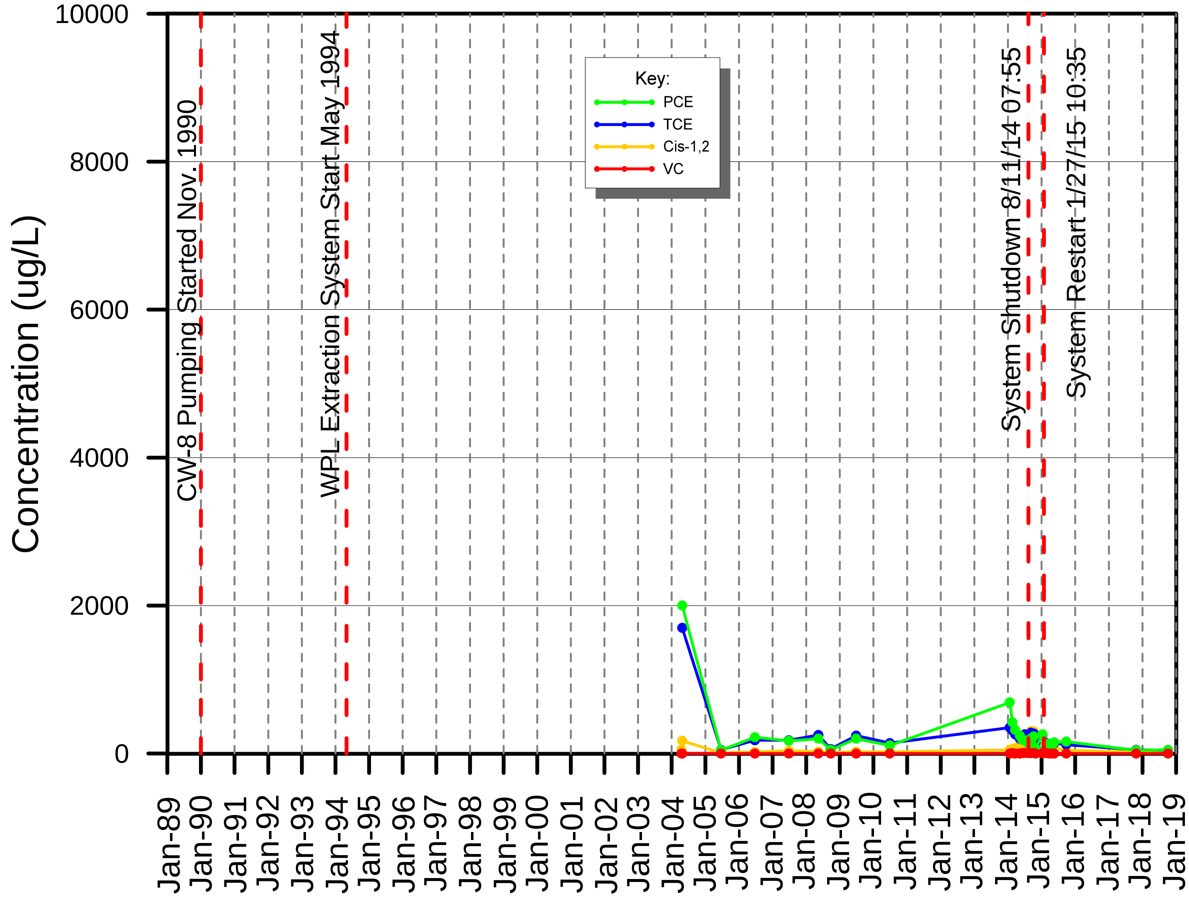
Jan-19

MW-93D


Concentration (ug/L)
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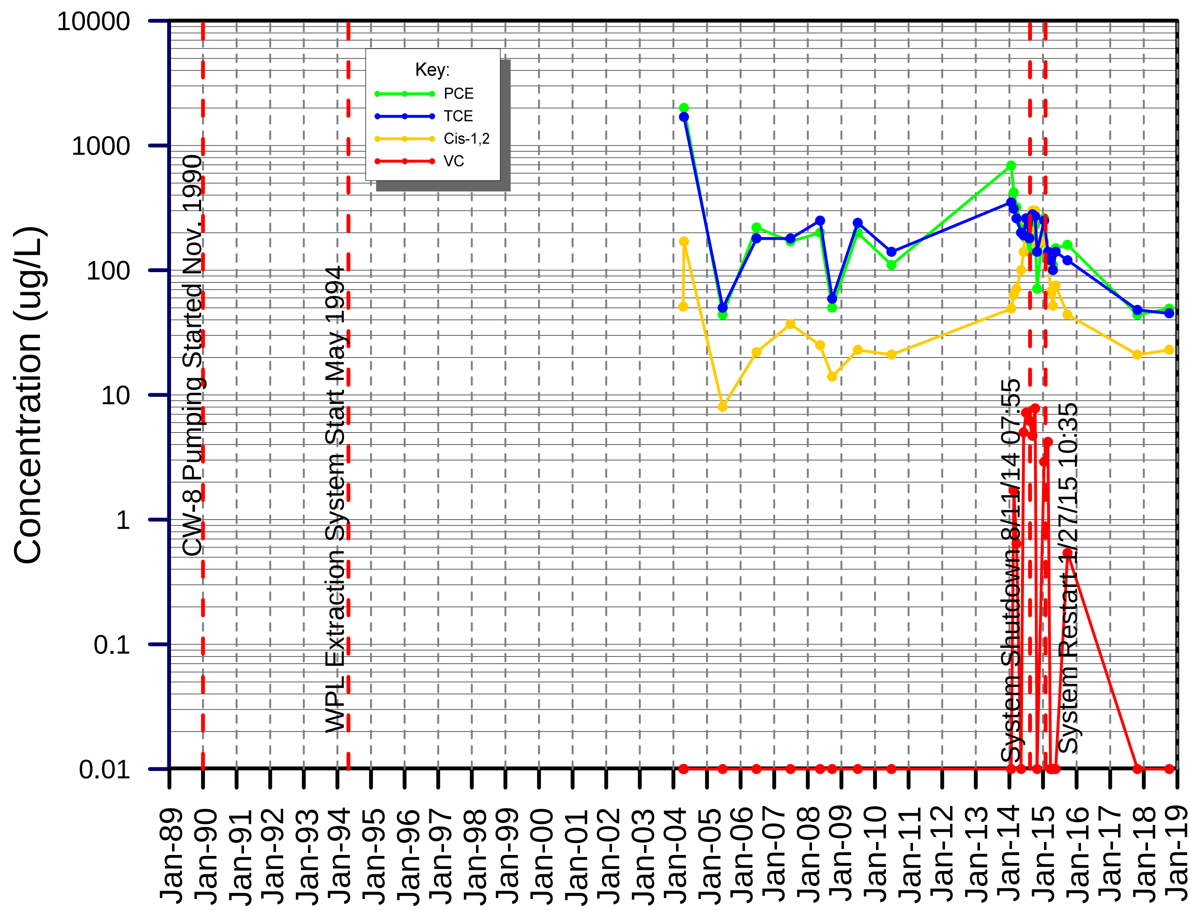
2000
4000
6000
8000
10000
Key:
PCE
TCE
Cis-1,2
VC
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19


Concentration (ug/L)
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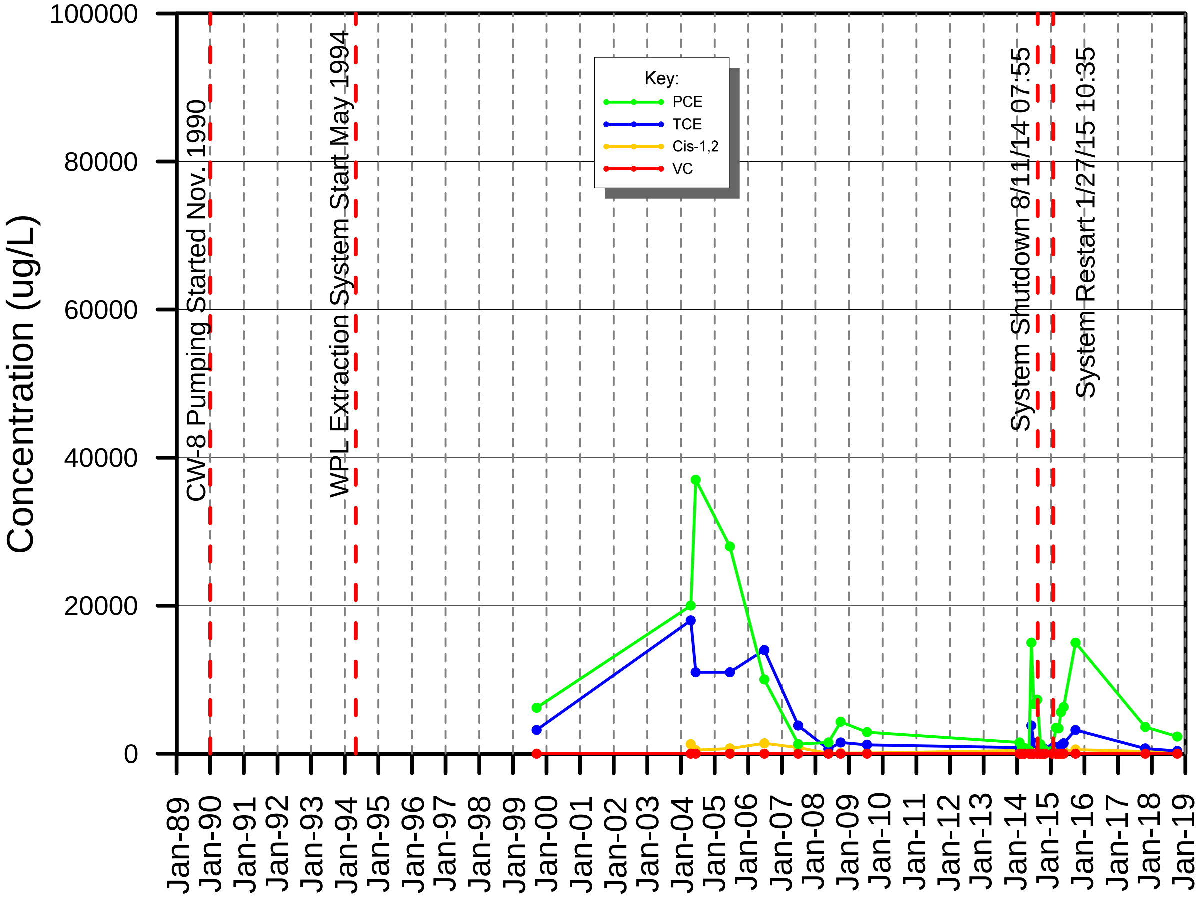
0.1
1
10
100
1000
10000
Key:
PCE
TCE
Cis-1,2
VC
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19

MW-75D



Concentration (ug/L)
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80000
60000
40000
20000
0
Key:
PCE
TCE
Cis-1,2
VC
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89
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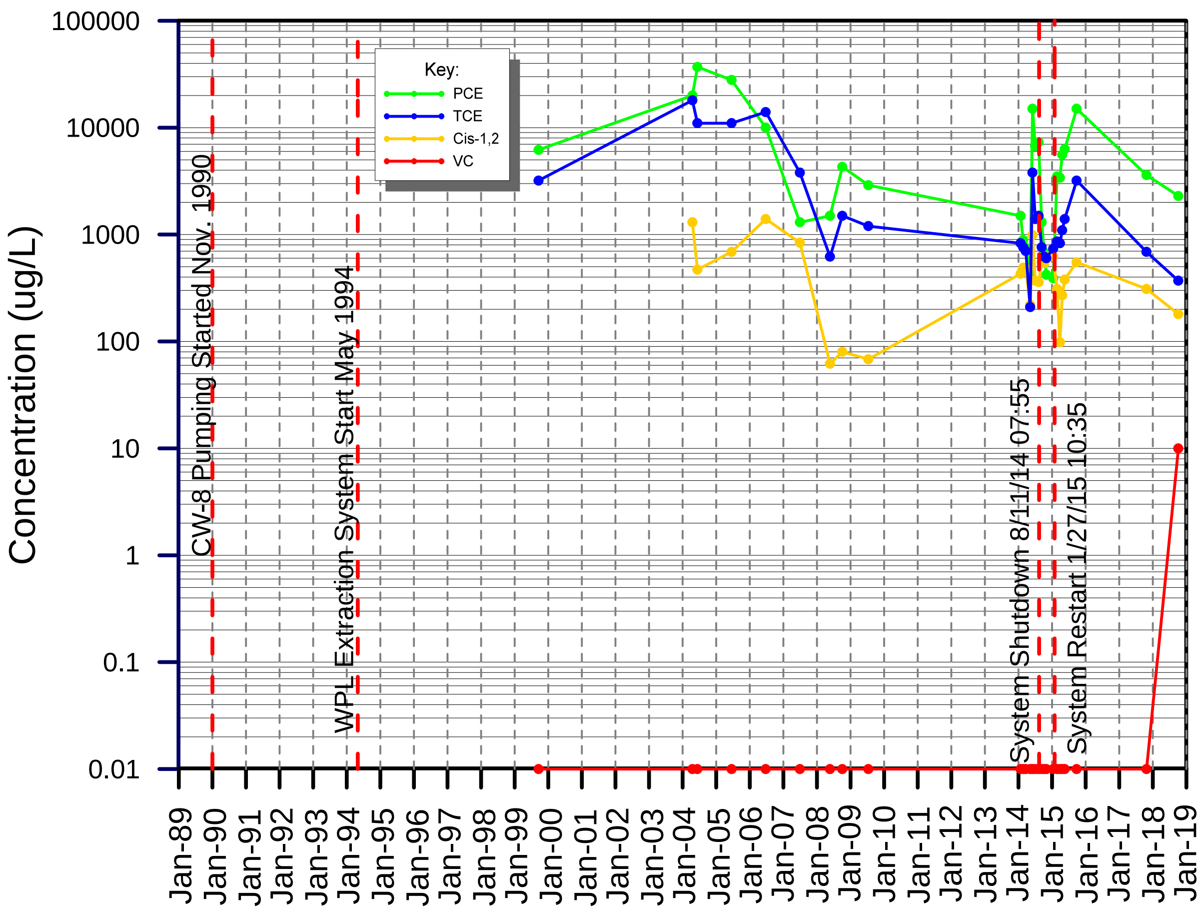

Concentration (ug/L)
100000
10000
1000
100
10
1
0.1
0.01
Key:
PCE
TCE
Cis-1,2
VC
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89
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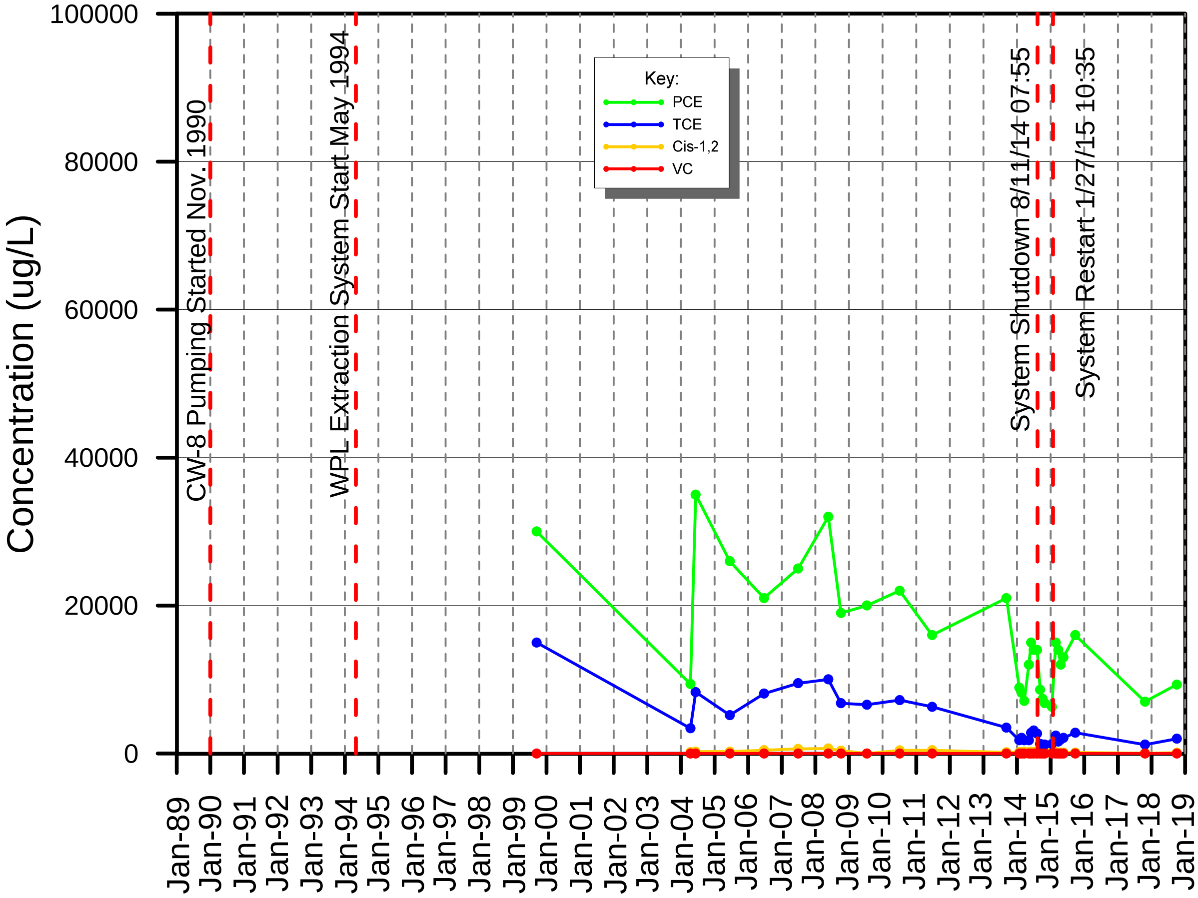
MW-75S



Concentration (ug/L)
100000
80000
60000
40000
20000
0
Key:
PCE
TCE
Cis-1,2
VC
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89
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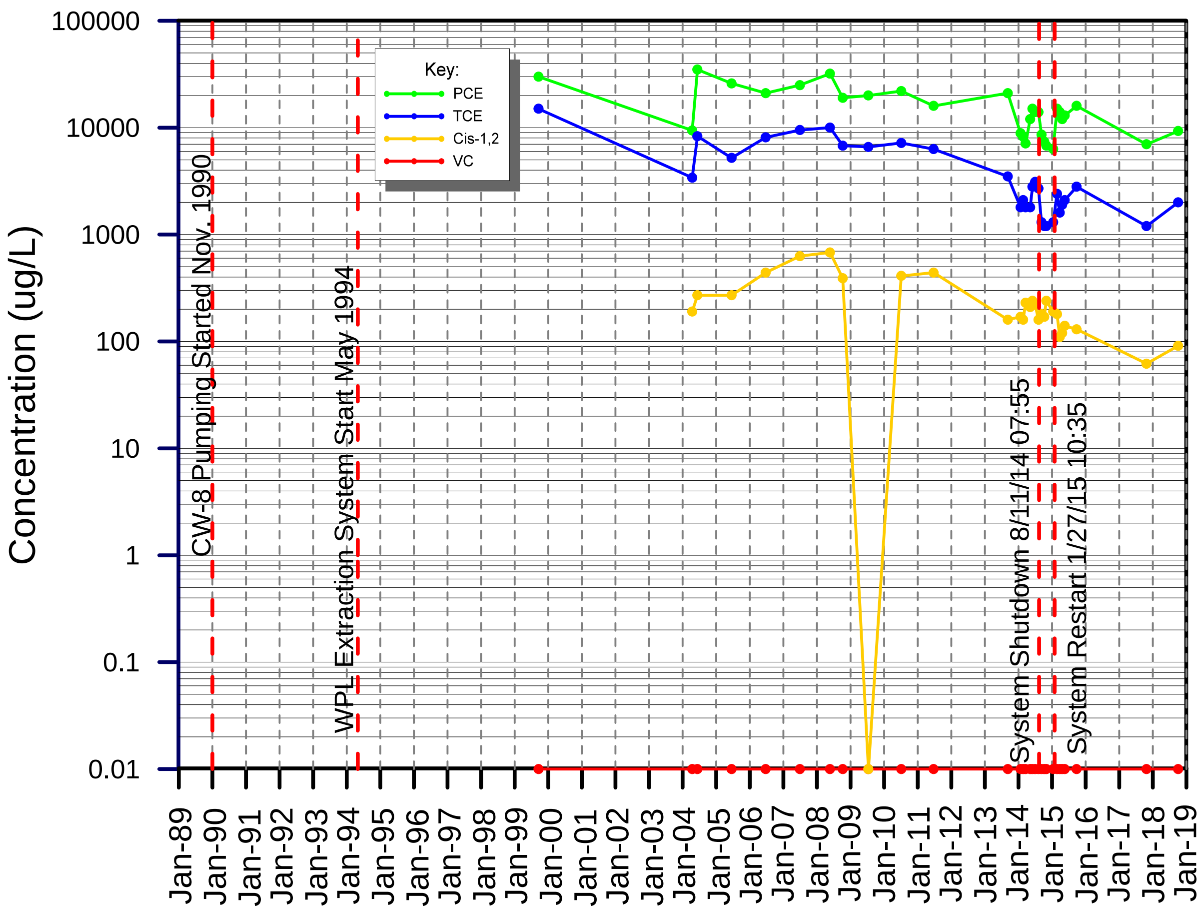

Concentration (ug/L)
100000
10000
1000
100
10
1
0.1
0.01
Key:
PCE
TCE
Cis-1,2
VC
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89
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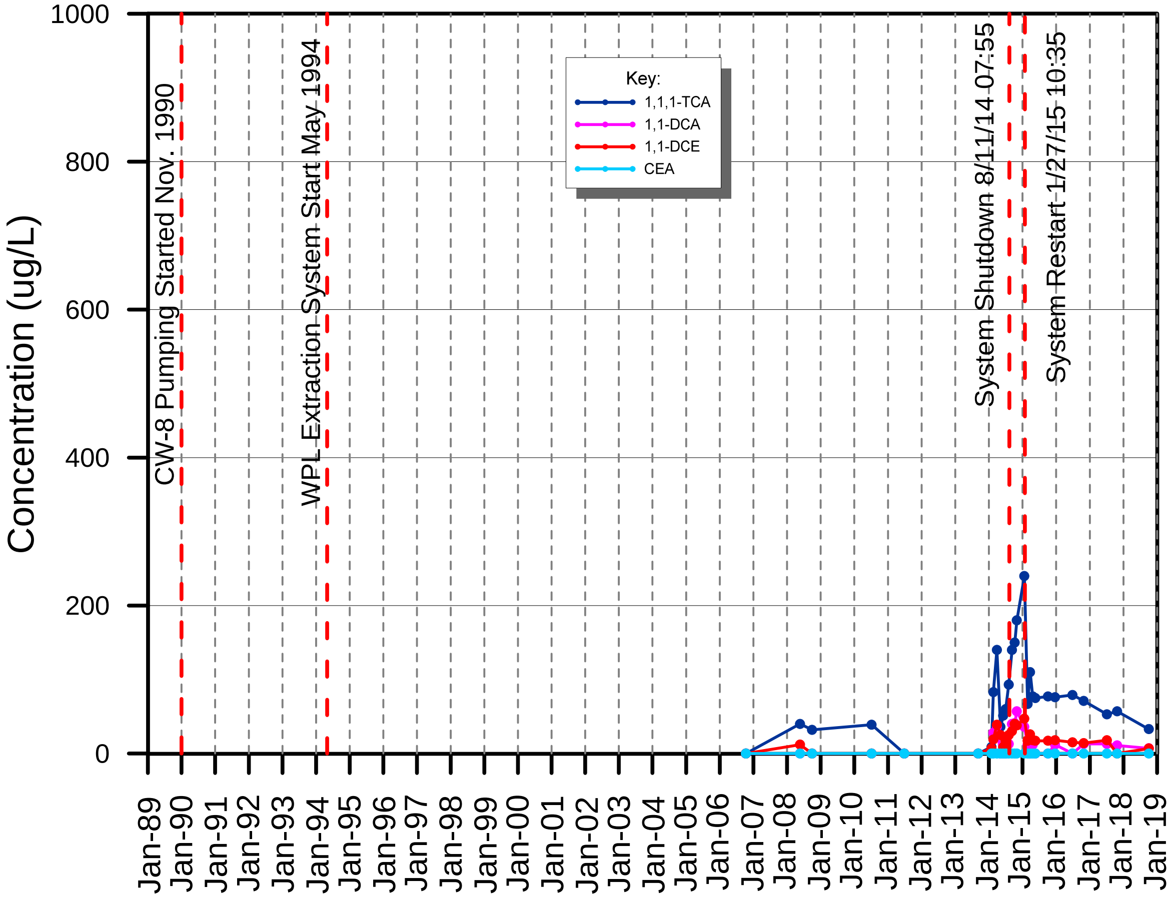
CW-20



Concentration (ug/L)
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800
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400
200
0
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Jan-89
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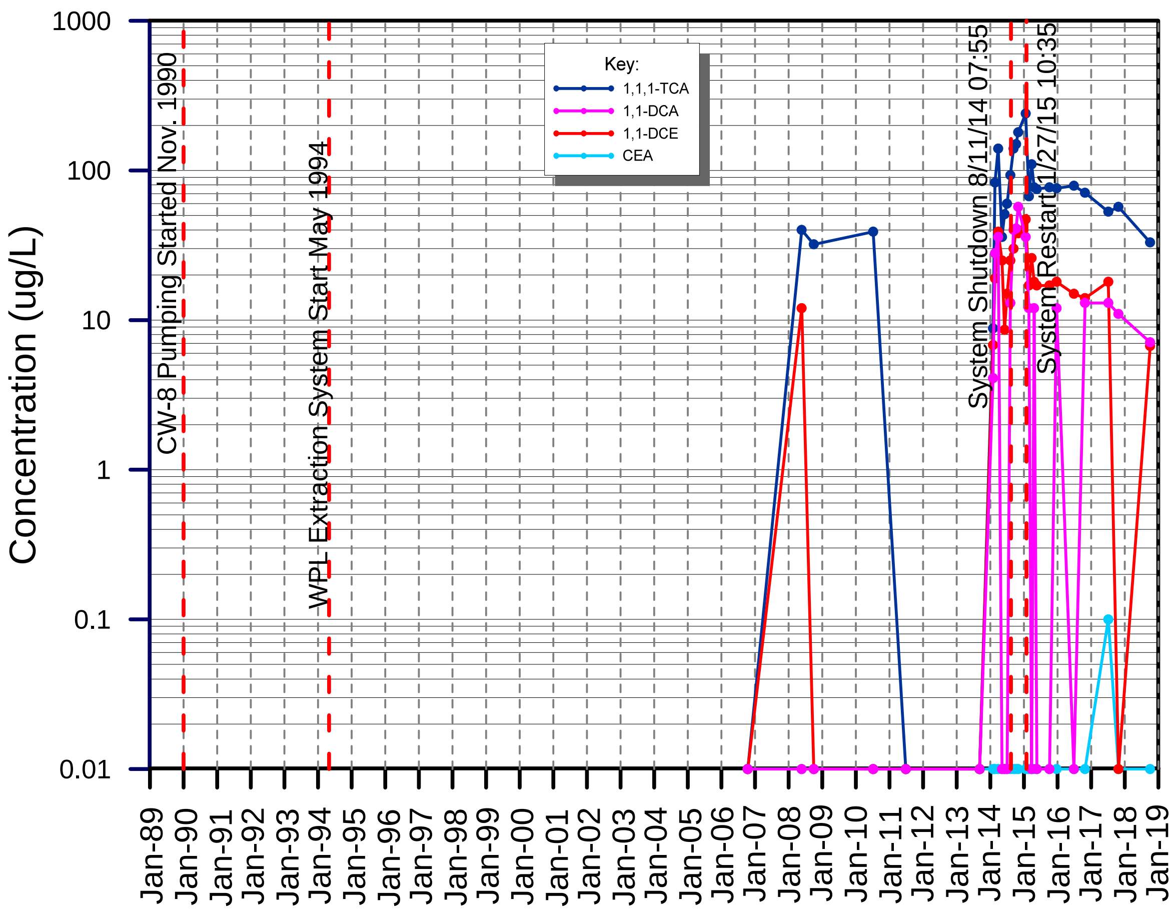

Concentration (ug/L)
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10
1
0.1
0.01
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
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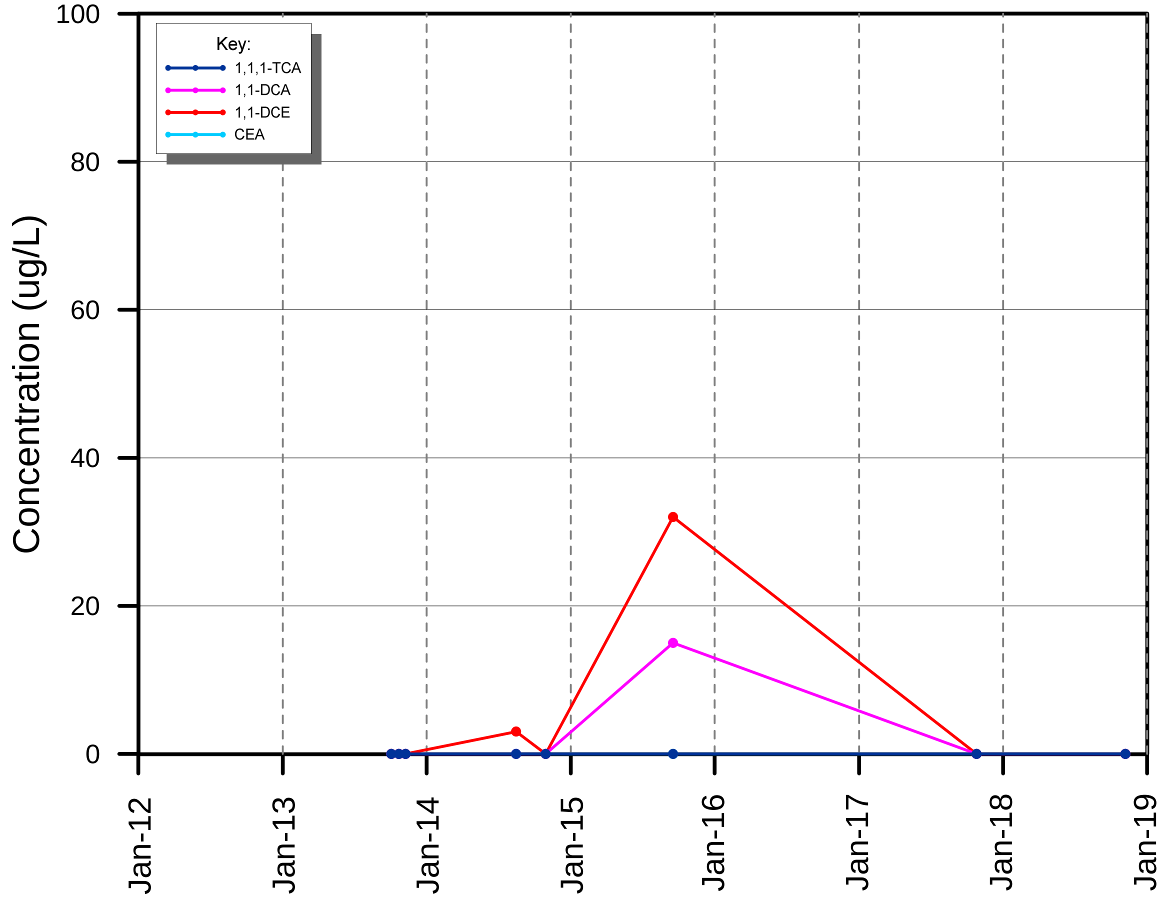
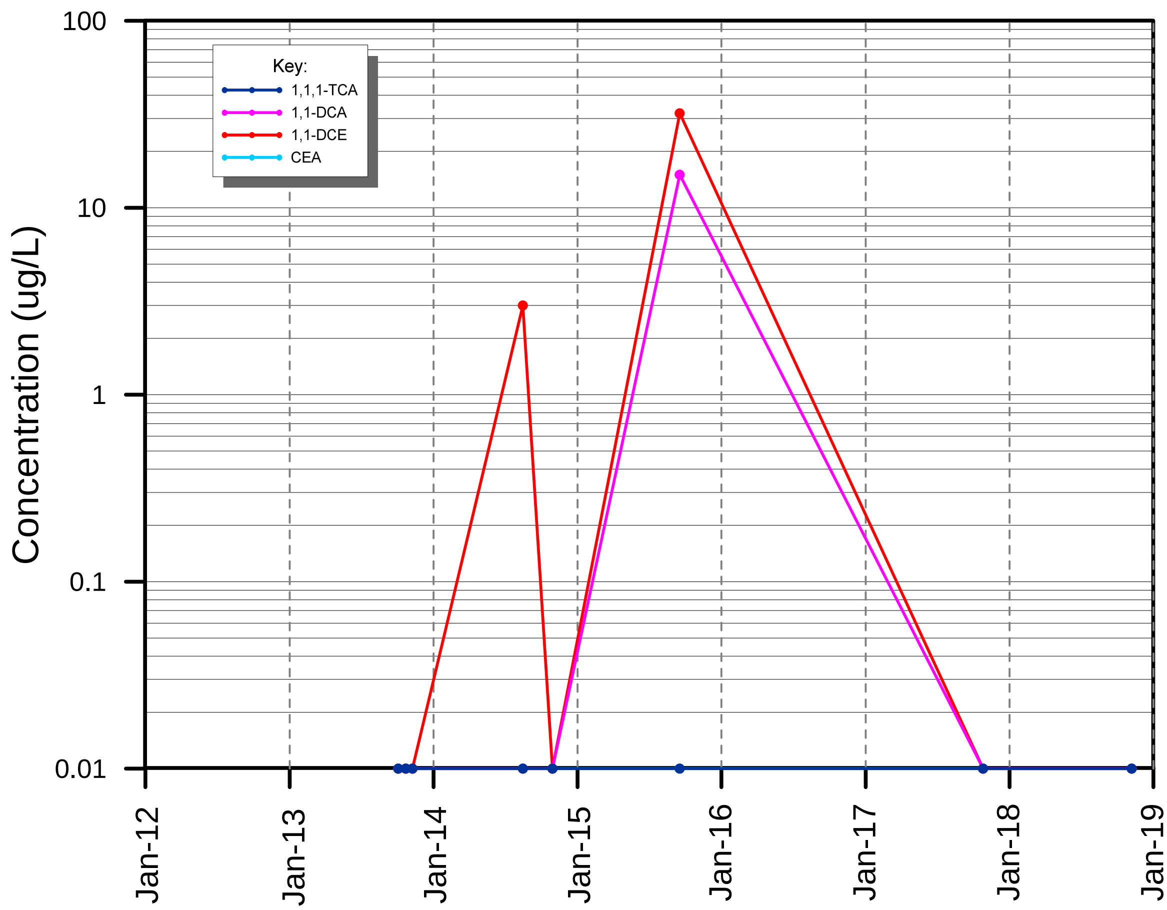
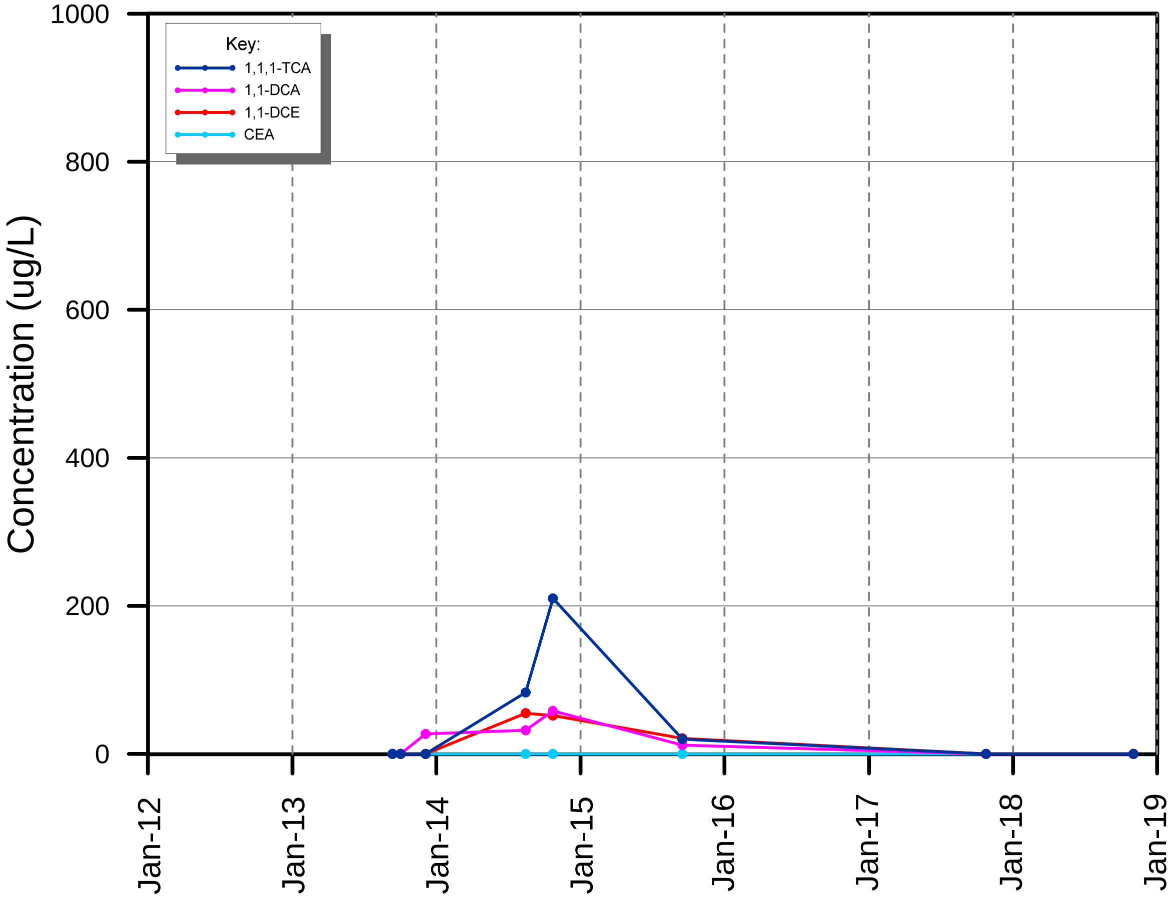
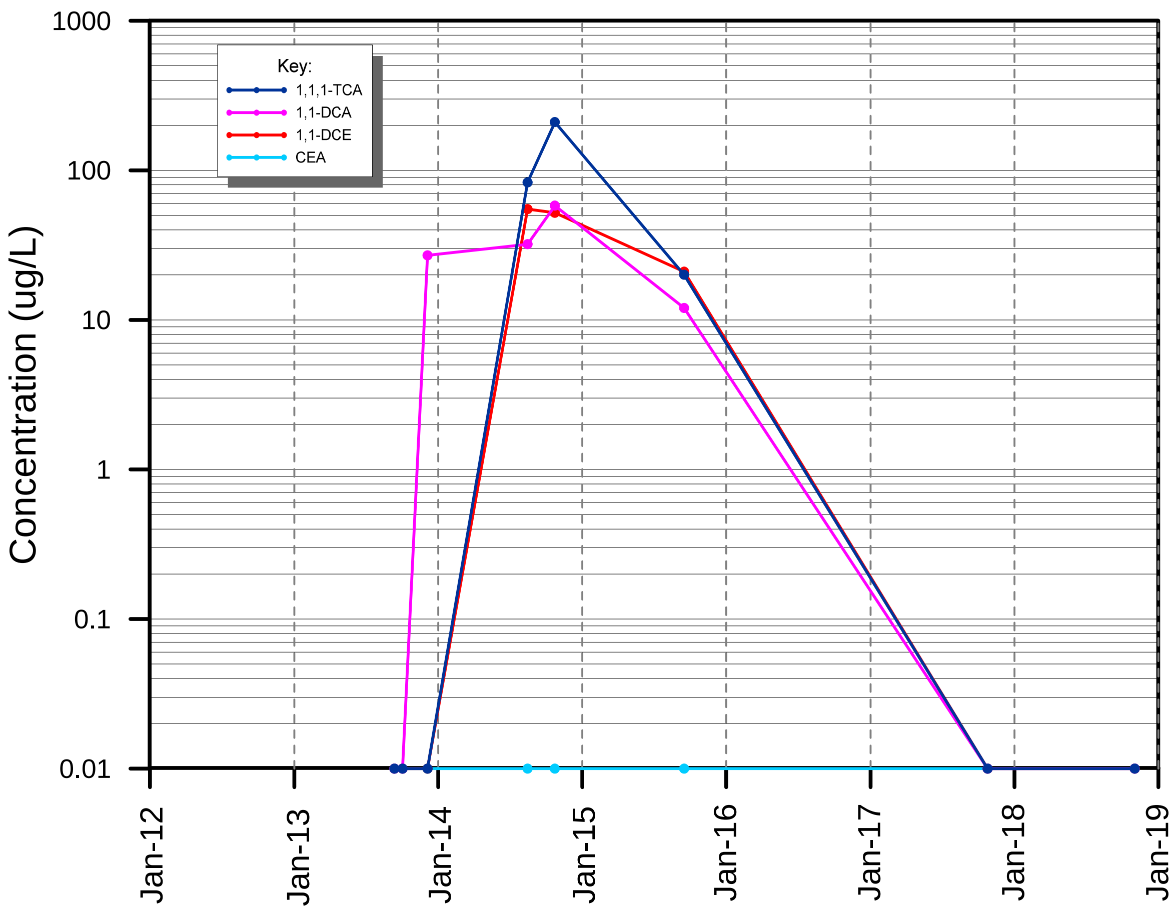
MW-136A(270-348)



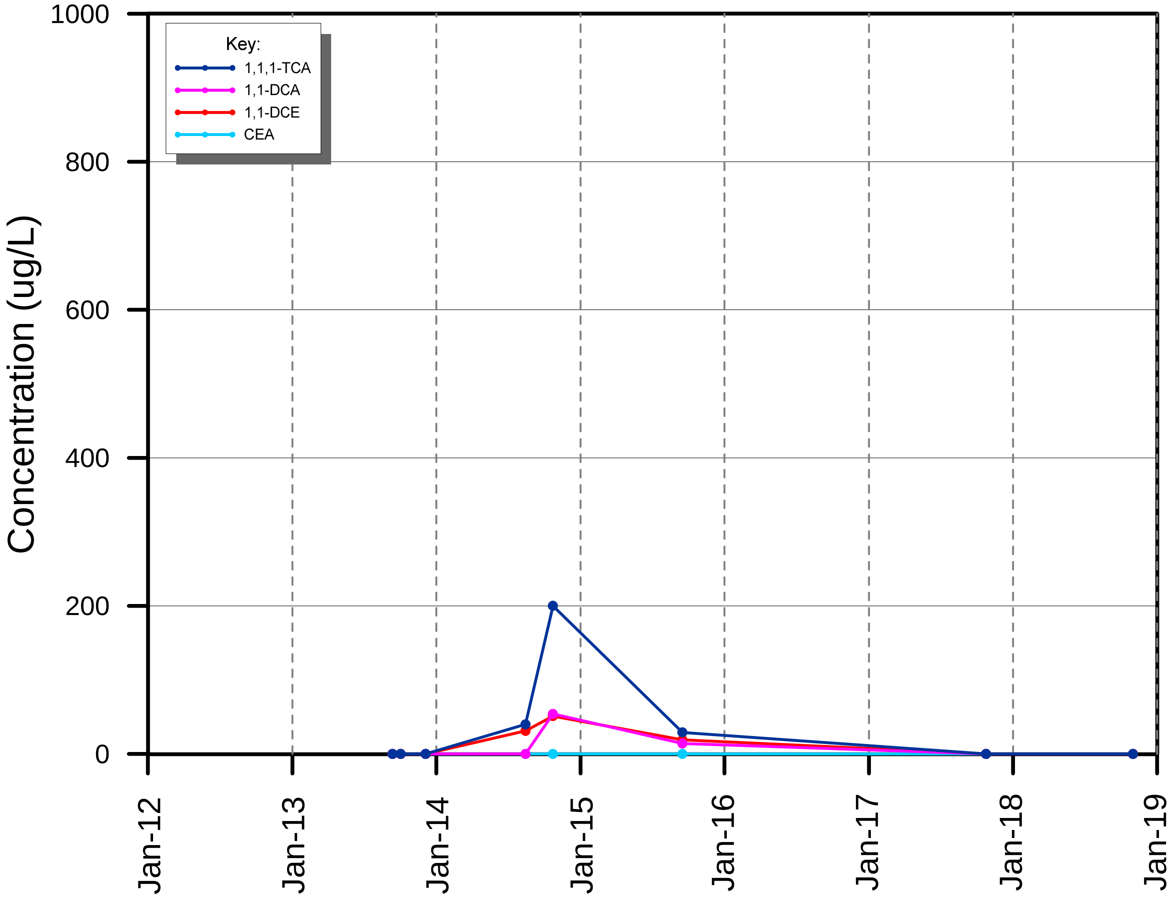


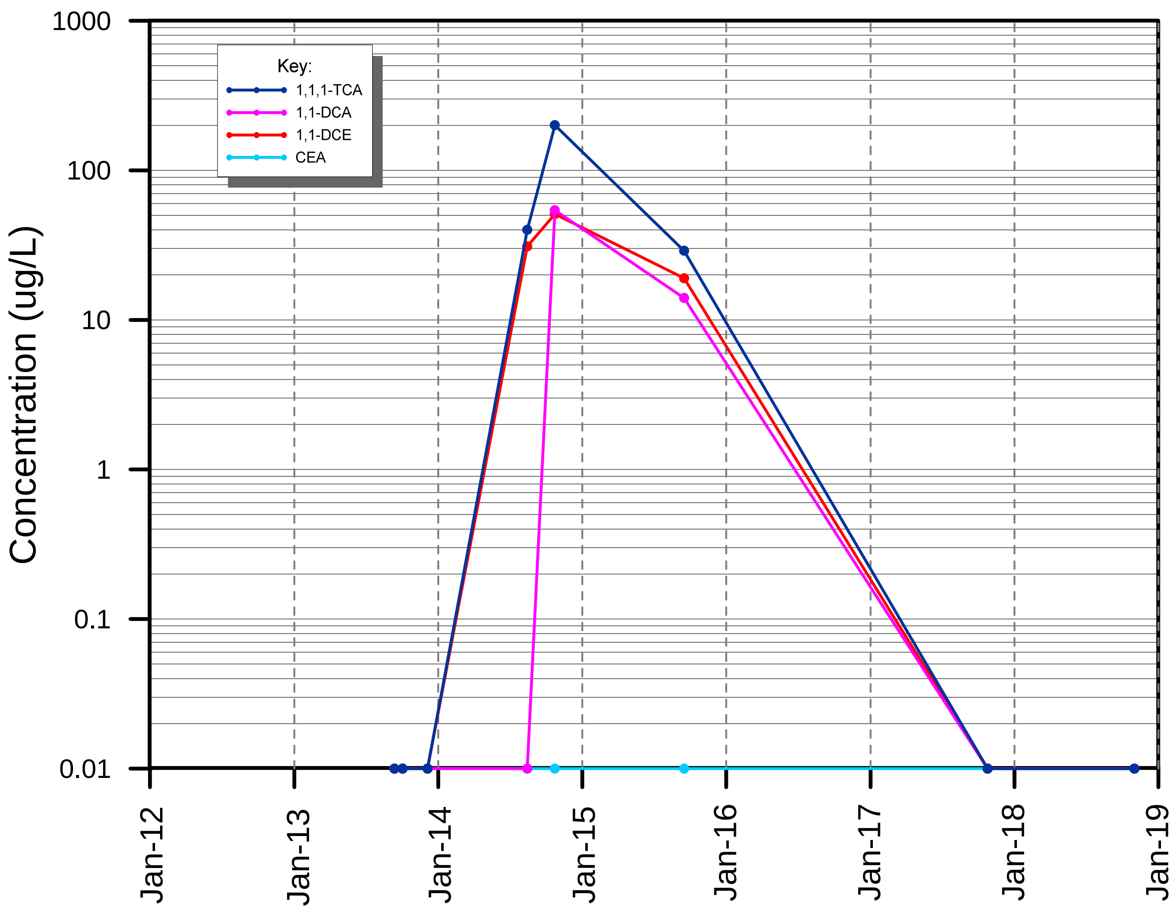
MW-136A(356-356.5)



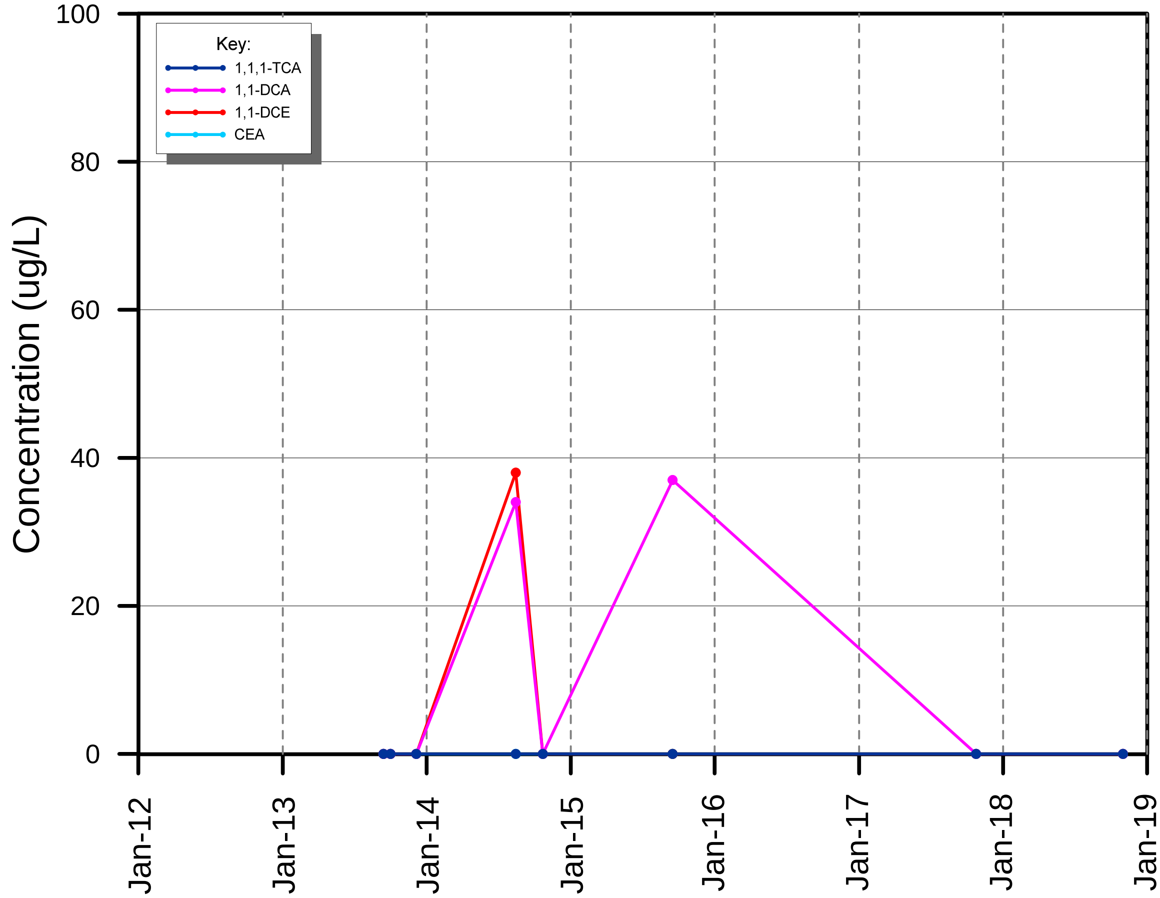


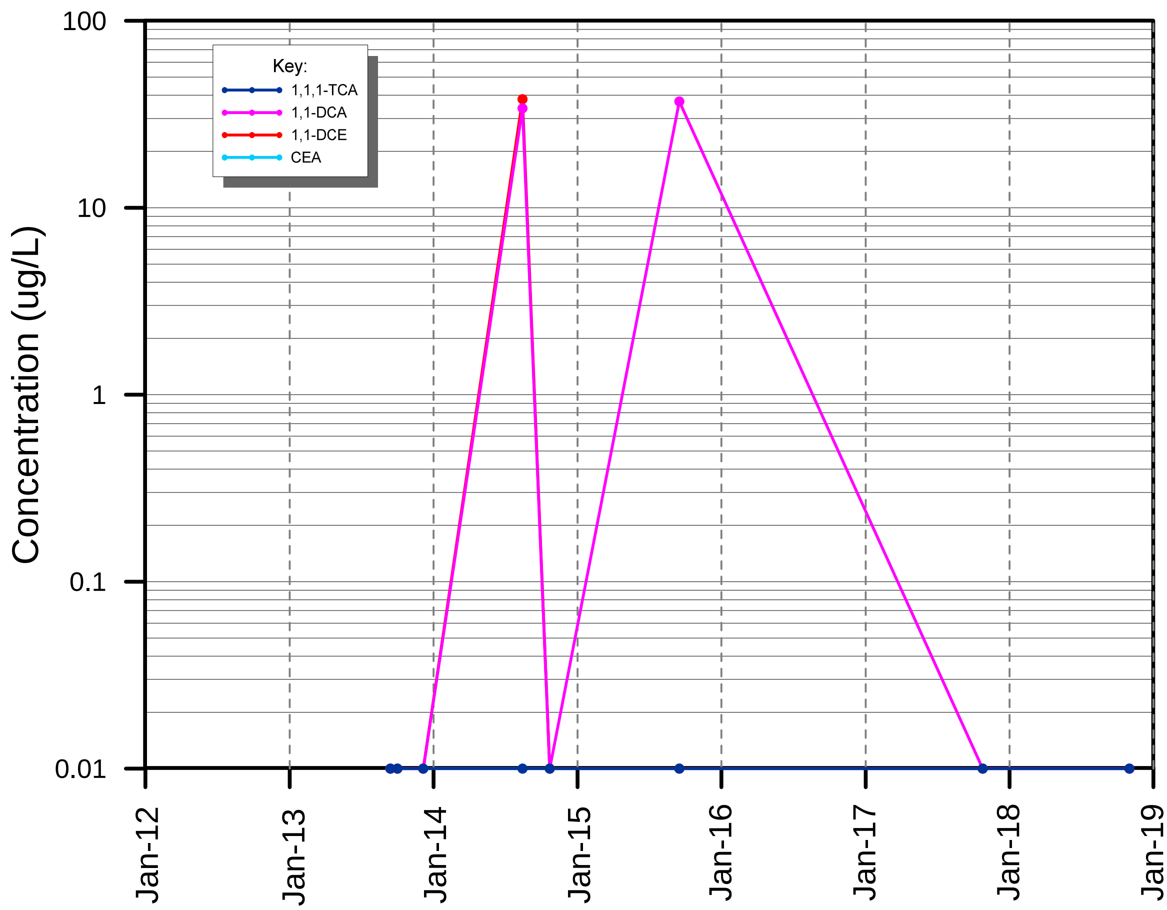
MW-136A(372.5-373)



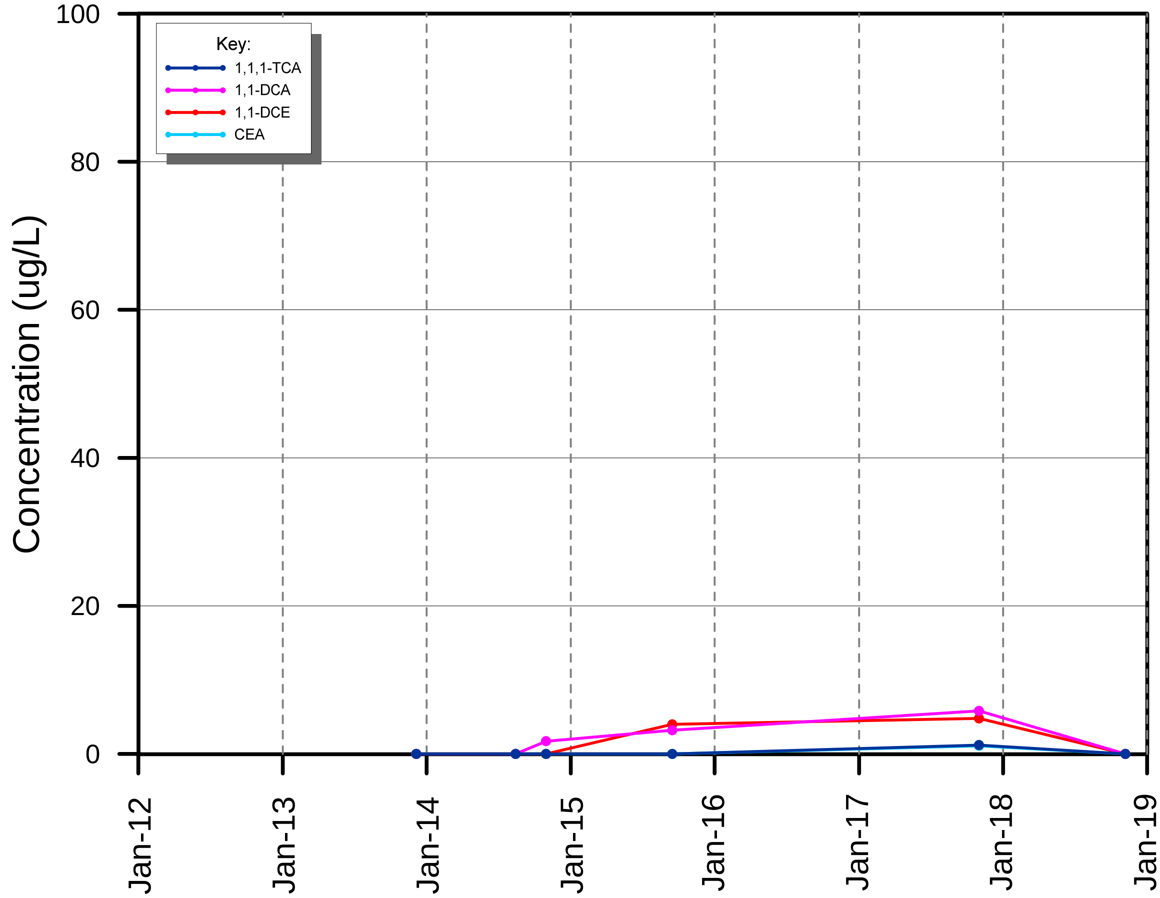


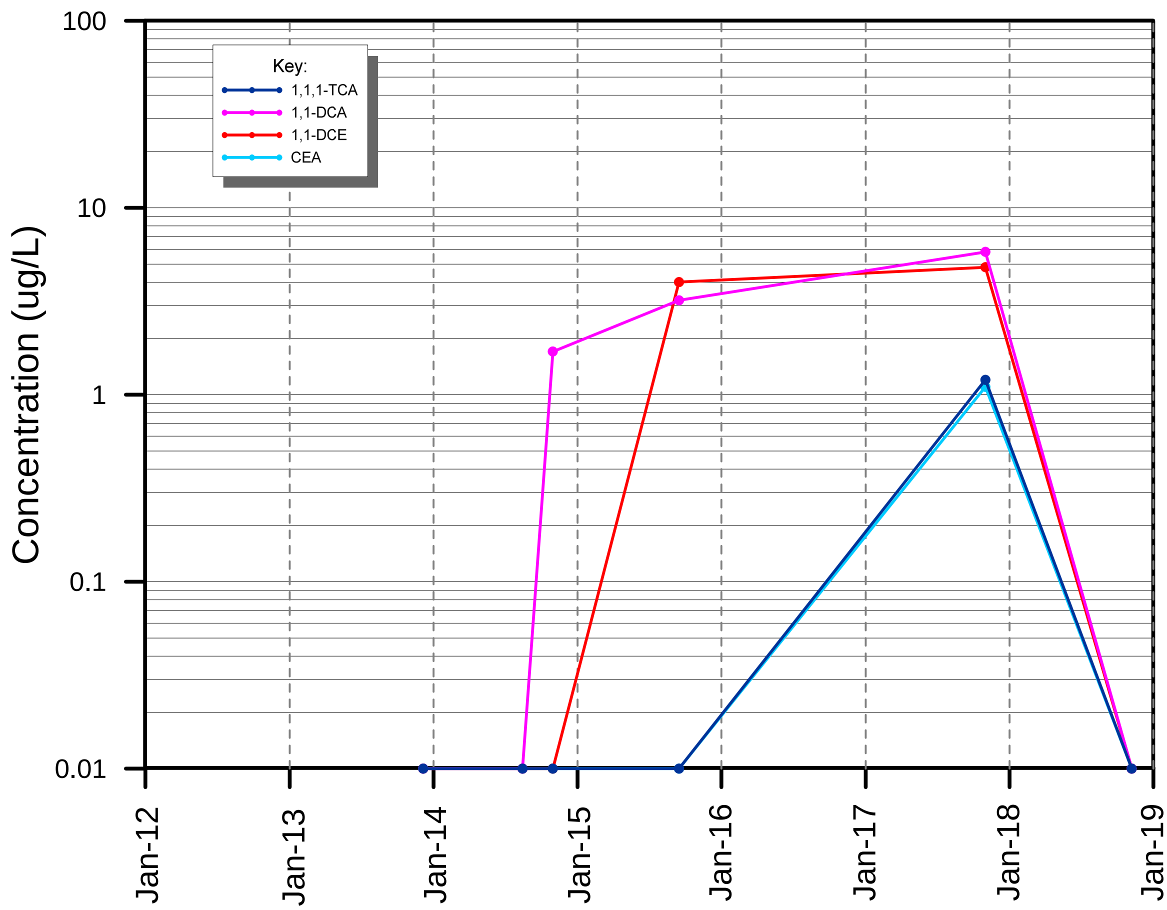
MW-136A(434-434.5)



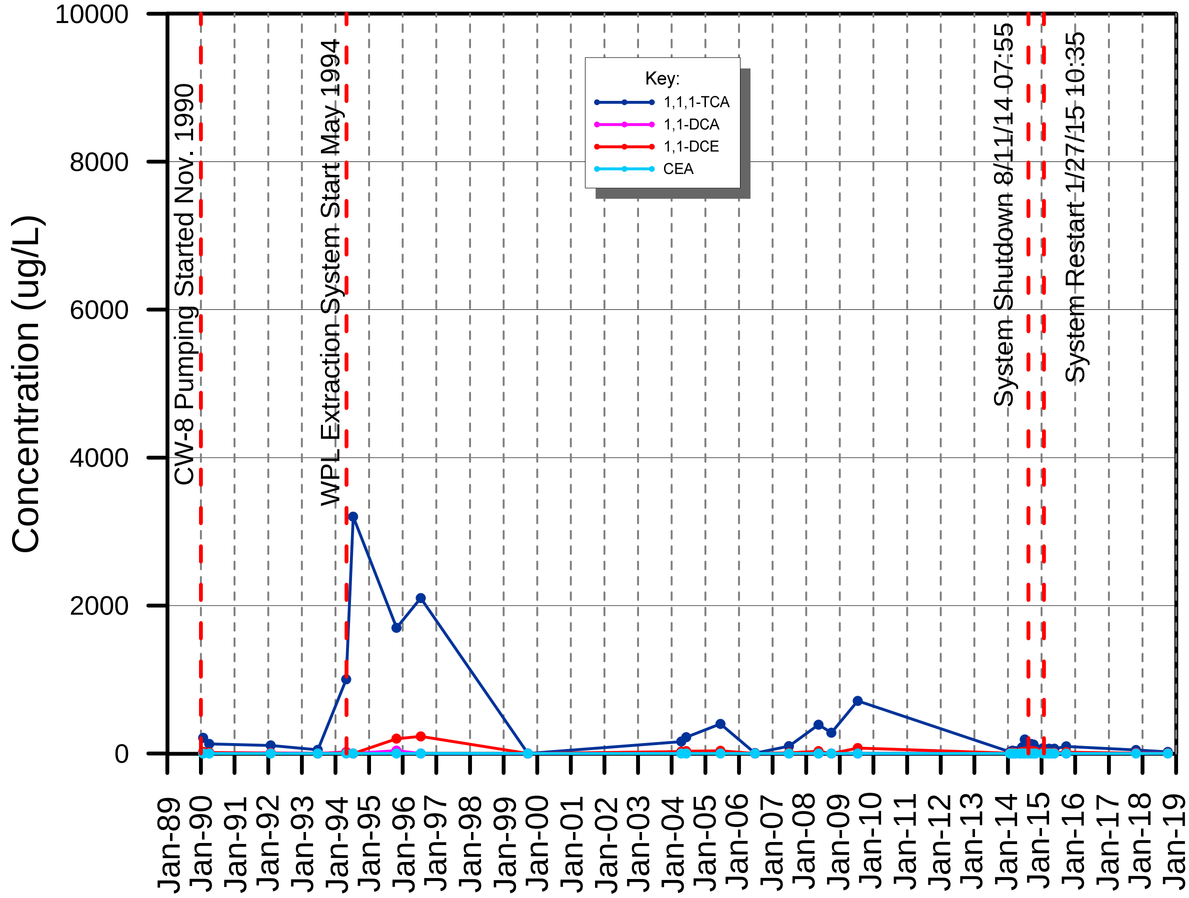


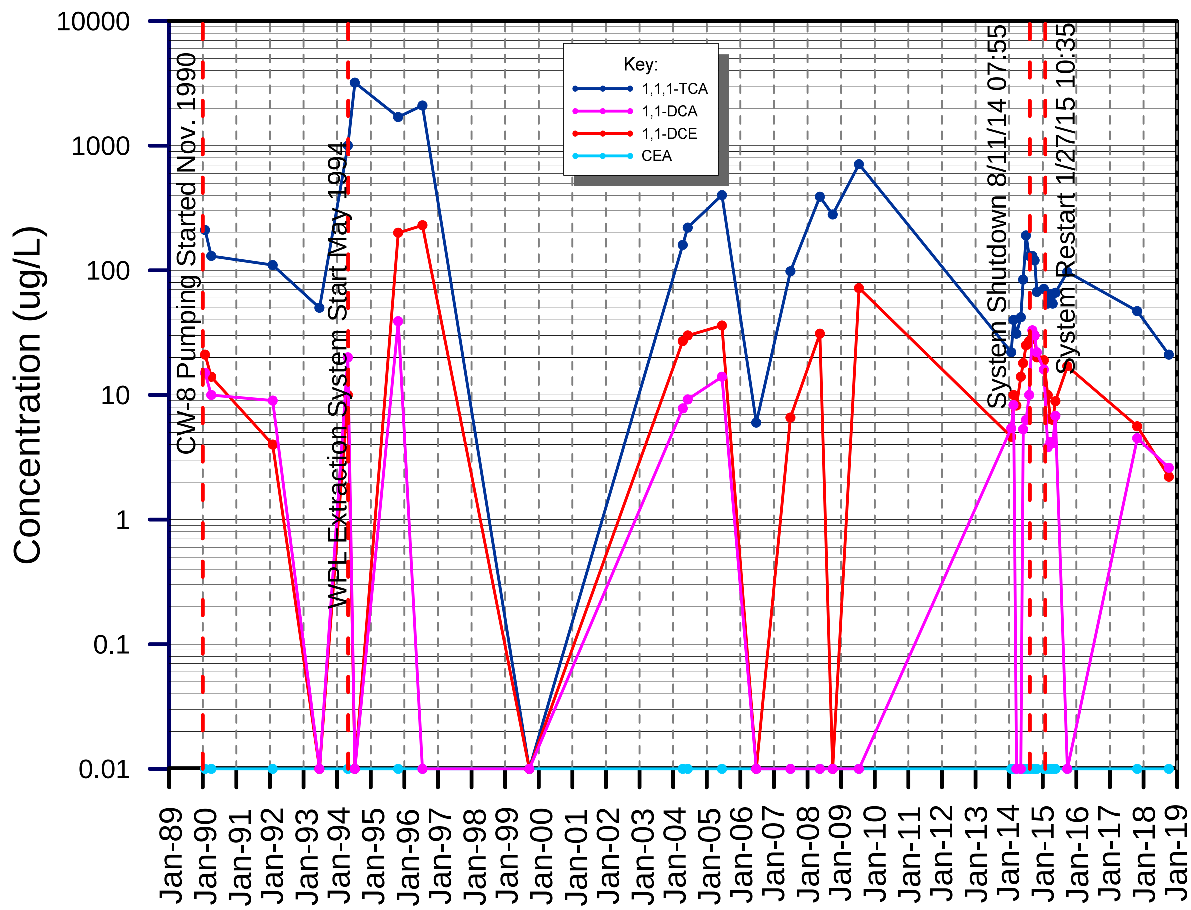
MW-136A (459.5-460)



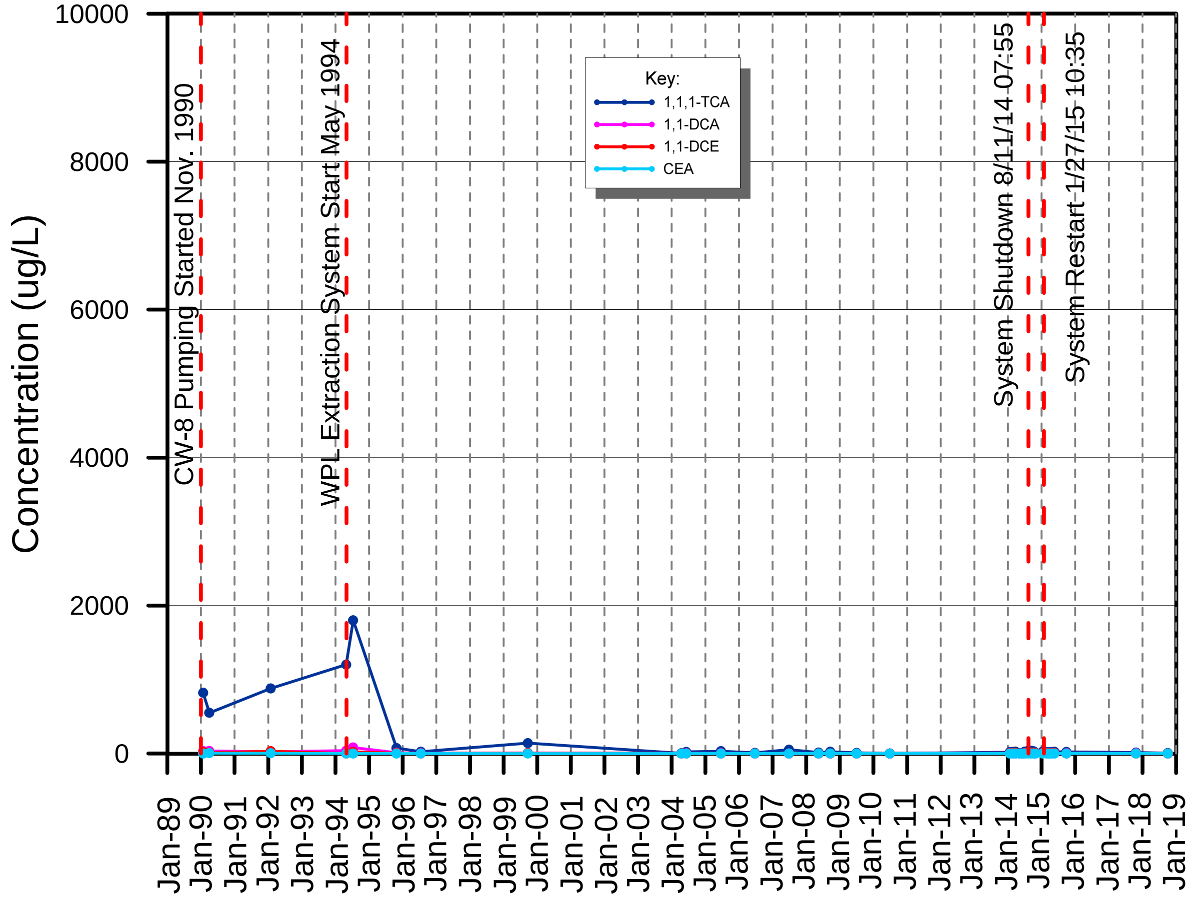


MW-37D


Concentration (ug/L)
10000
8000
6000
4000
2000
0
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19


Concentration (ug/L)
10000
1000
100
10
1
0.1
0.01
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19

MW-37S


Concentration (ug/L)
10000
8000
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4000
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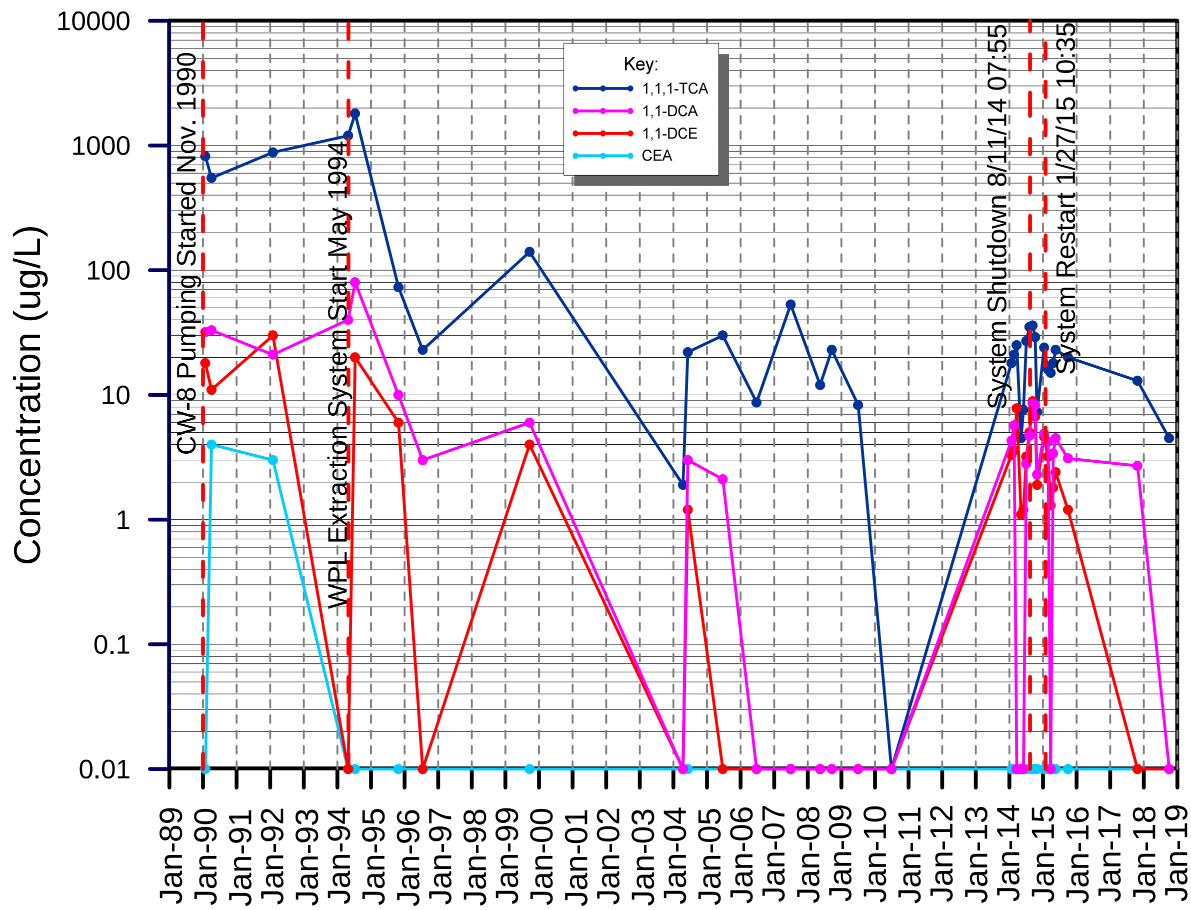
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19


Concentration (ug/L)
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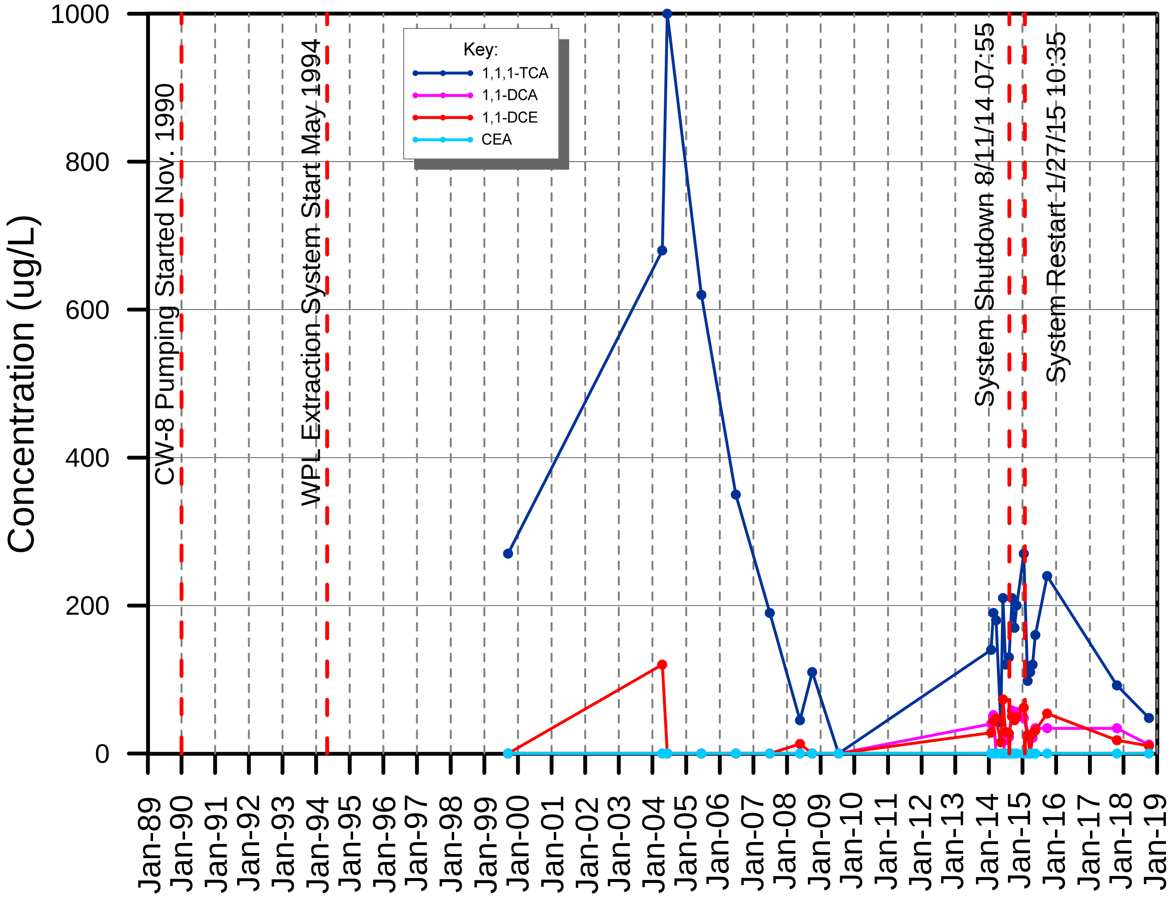
1000
100
10
1
0.1
0.01
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19

MW-75D



Concentration (ug/L)
1000
800
600
400
200
0
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89
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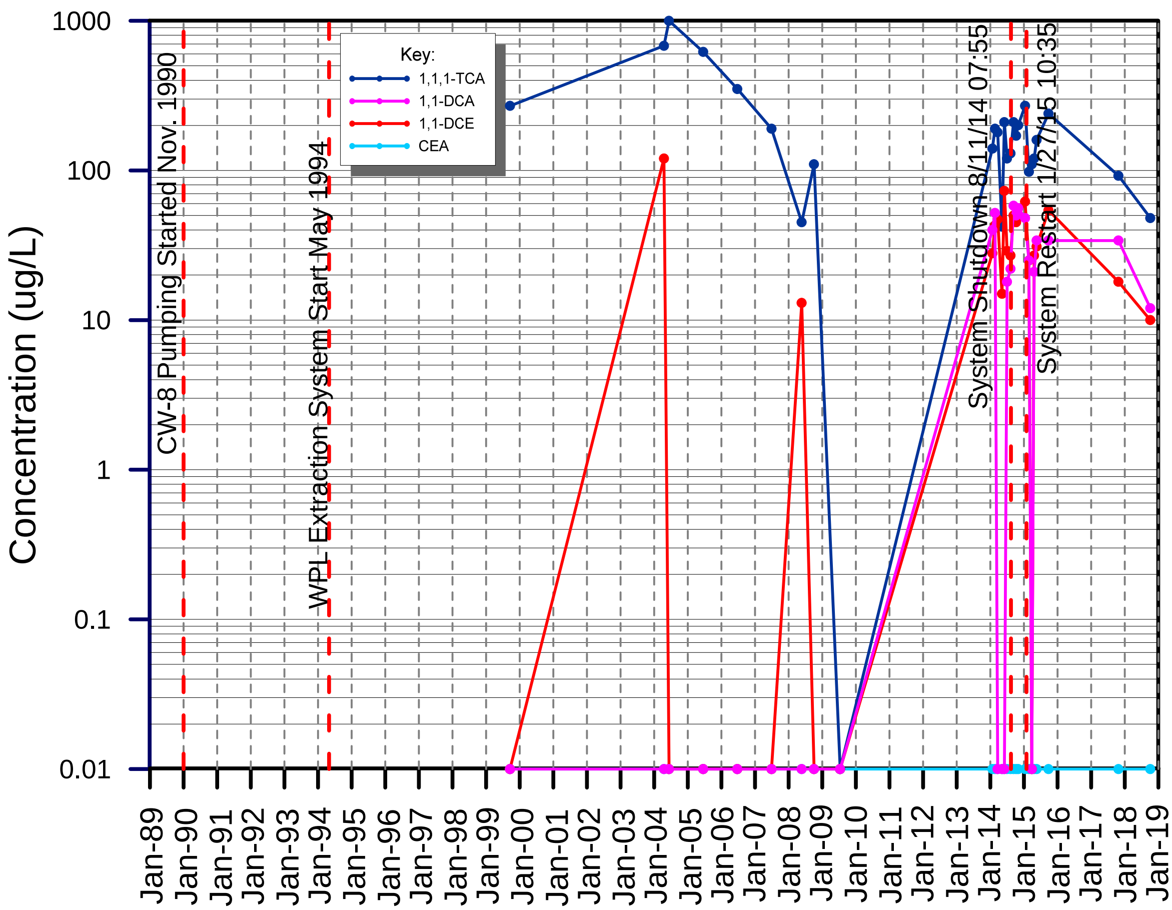

Concentration (ug/L)
1000
100
10
1
0.1
0.01
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89
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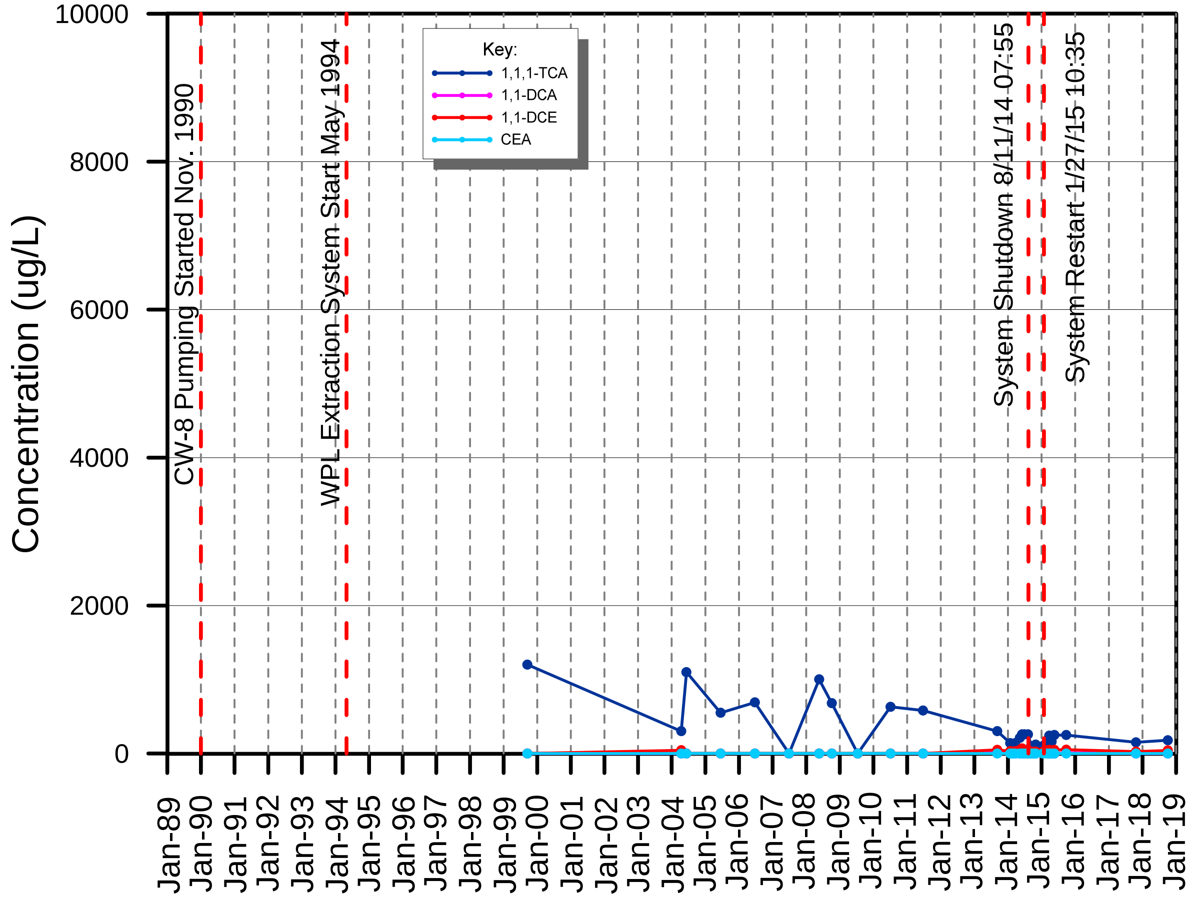
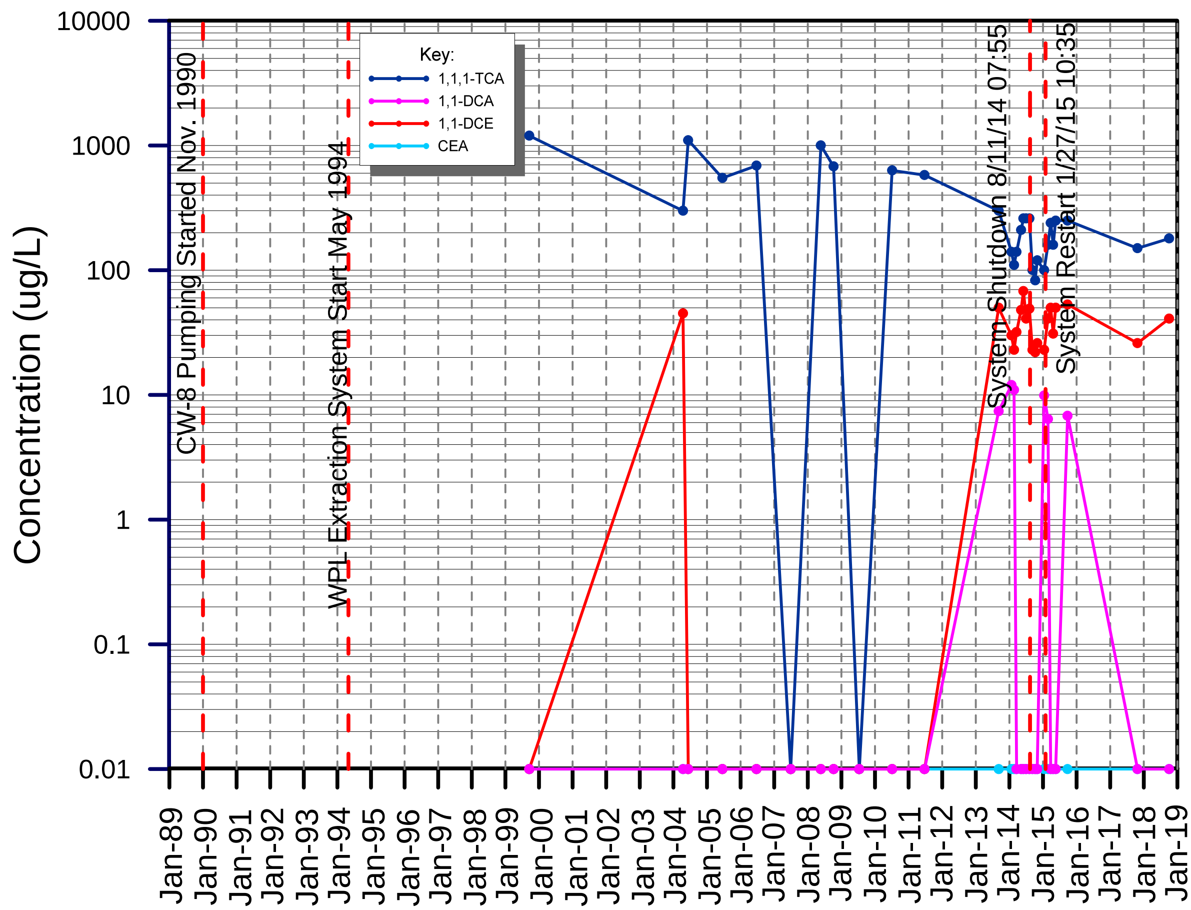
MW-75S

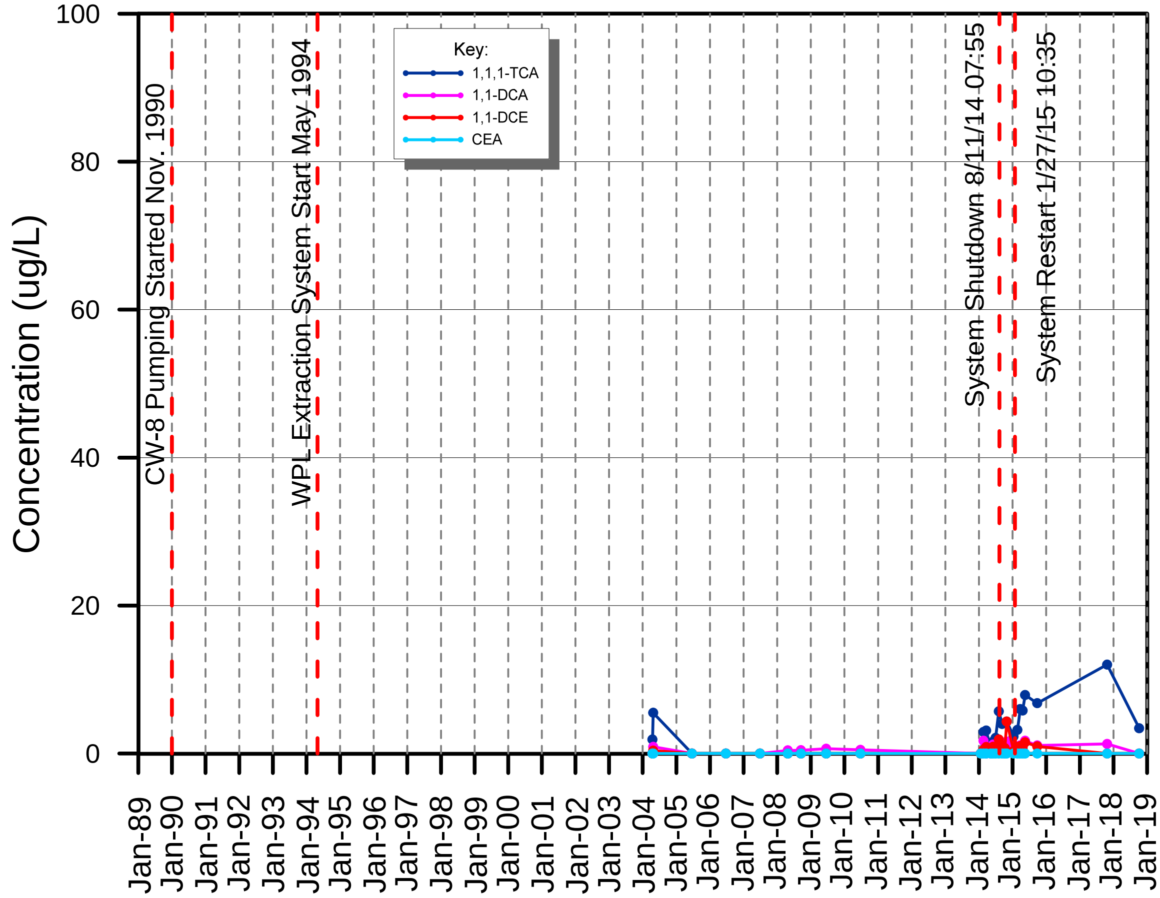


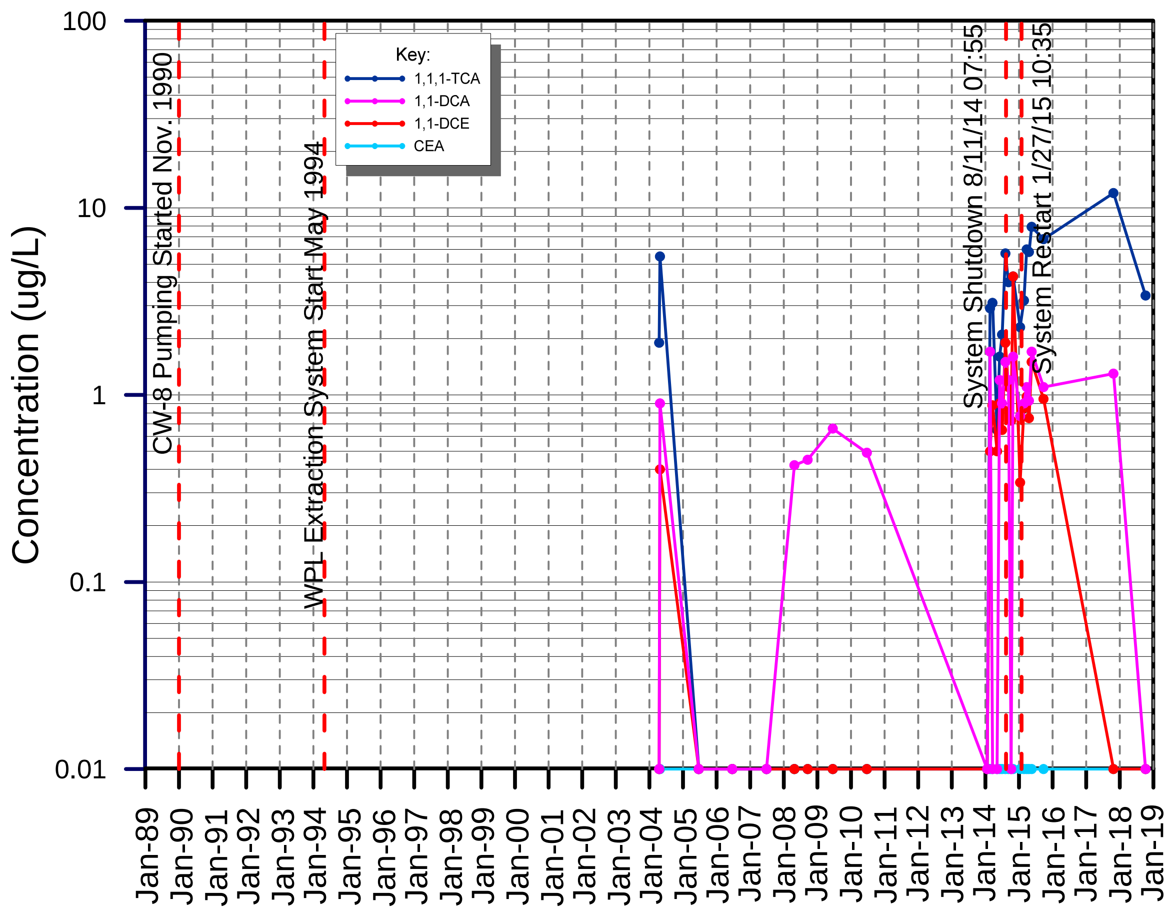
Concentration (ug/L)
10000
8000
6000
4000
2000
0
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19



Concentration (ug/L)
10000
1000
100
10
1
0.1
0.01
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19

MW-93S


Concentration (ug/L)
100
80
60
40
20
0
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19


Concentration (ug/L)
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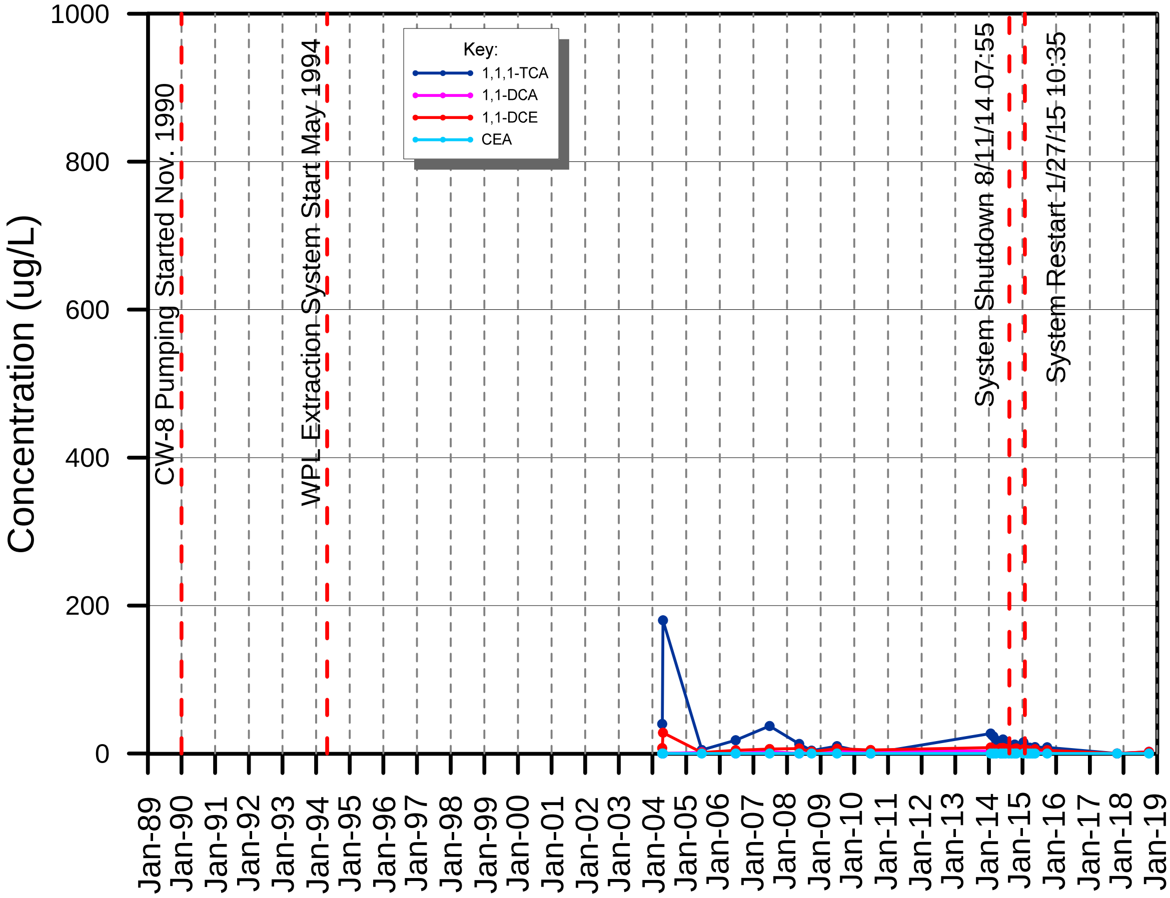
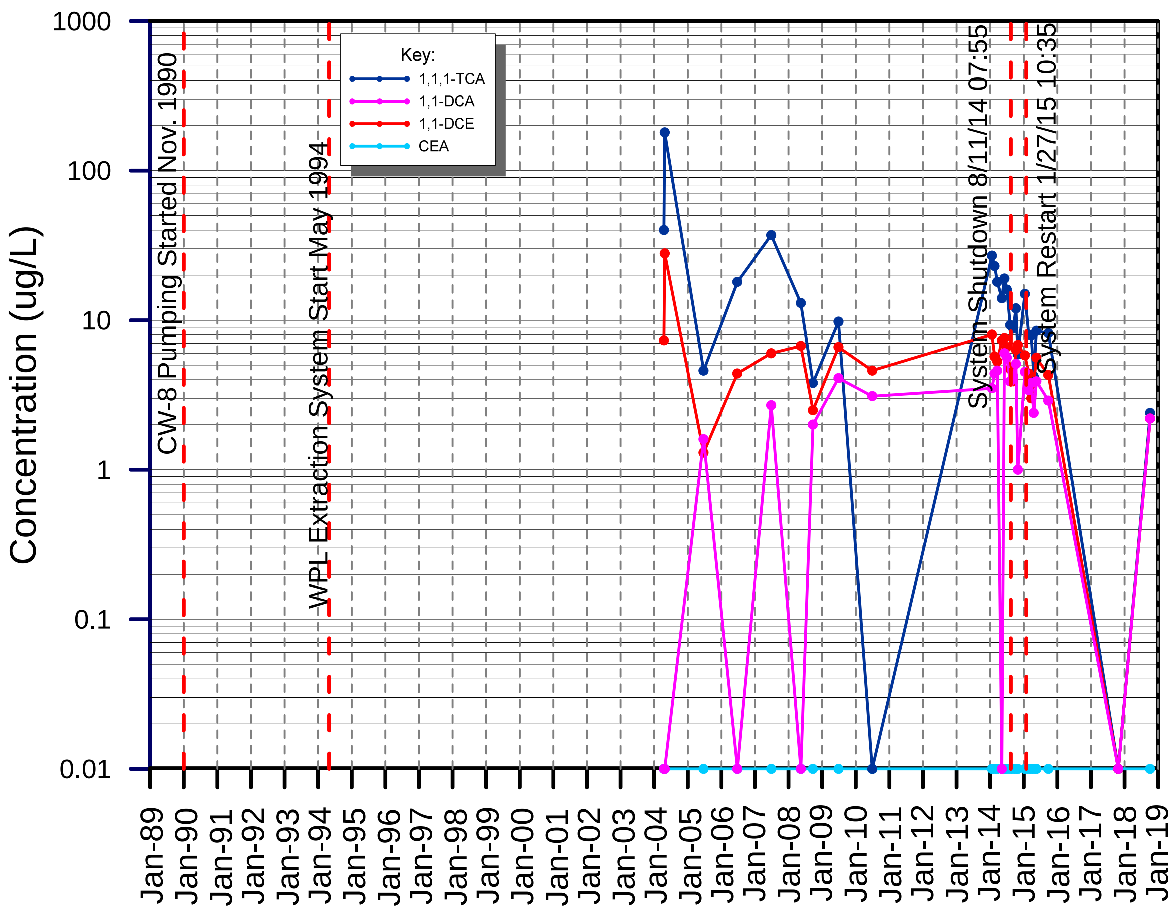
0.1
0.01
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19

MW-93D

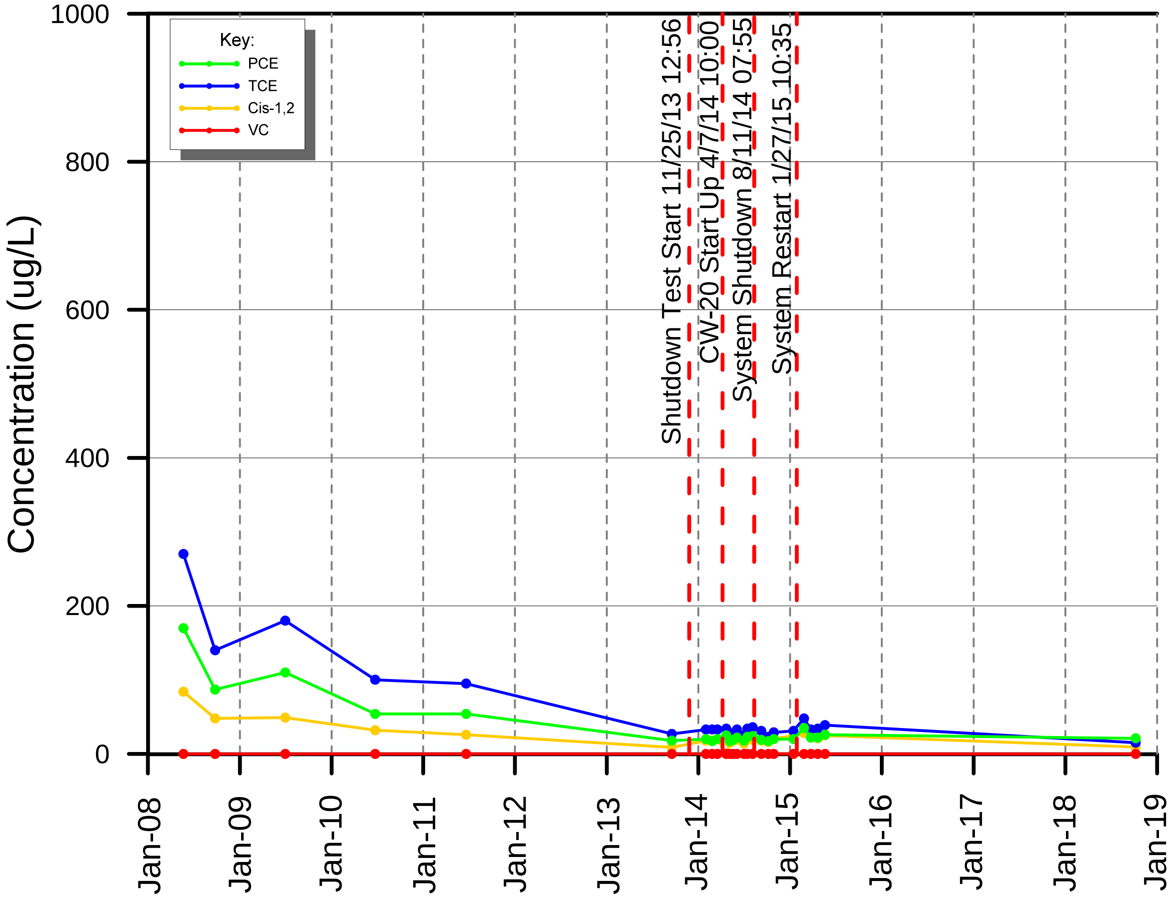

Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Concentration (ug/L)
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
0
200
400
600
800
1000
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19


Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Concentration (ug/L)
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
0.01
0.1
1
10
100
1000
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19

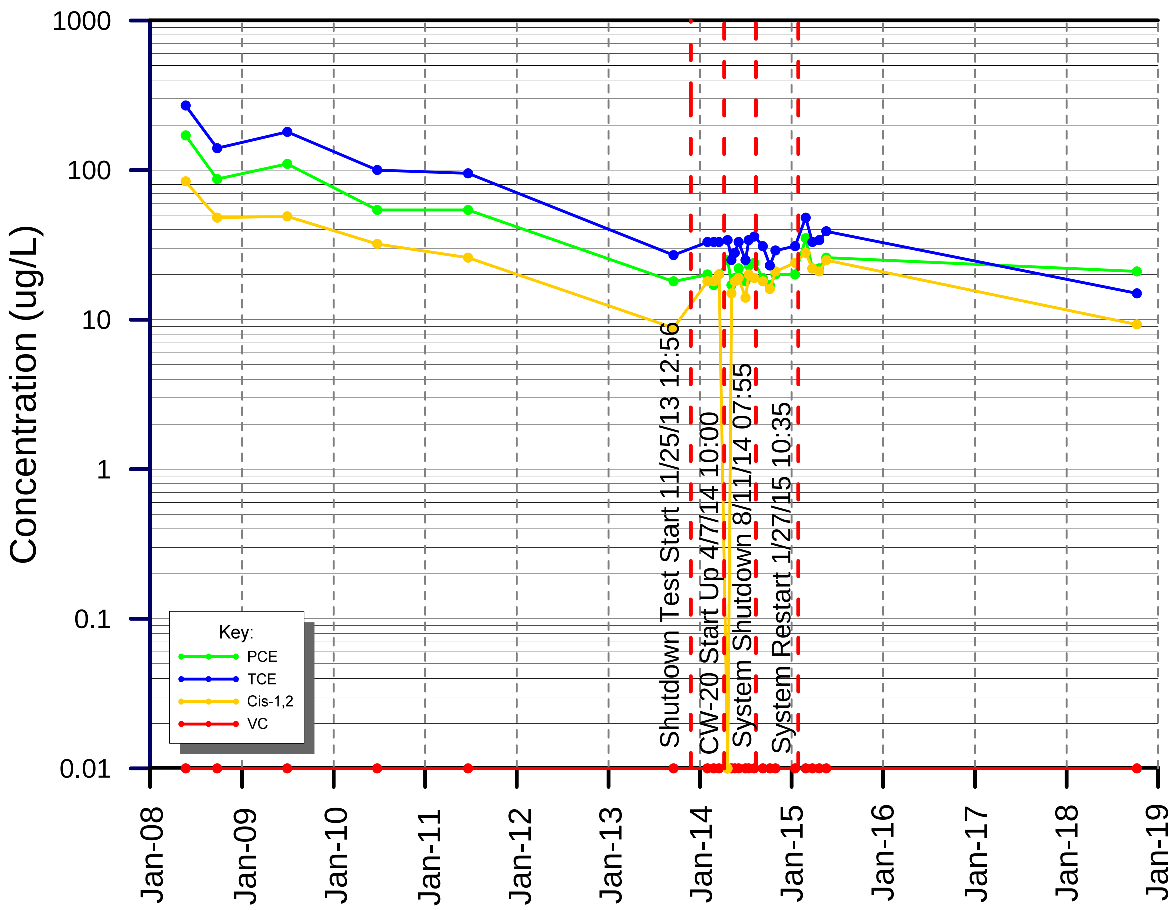
Appendix F-2

West Parking Lot and Codorus Creek Levee

MW-100I



Concentration (ug/L)
1000
800
600
400
200
0
Key:
PCE
TCE
Cis-1,2
VC
Shutdown Test Start 11/25/13 12:56
CW-20 Start Up 4/7/14 10:00
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19



Concentration (ug/L)
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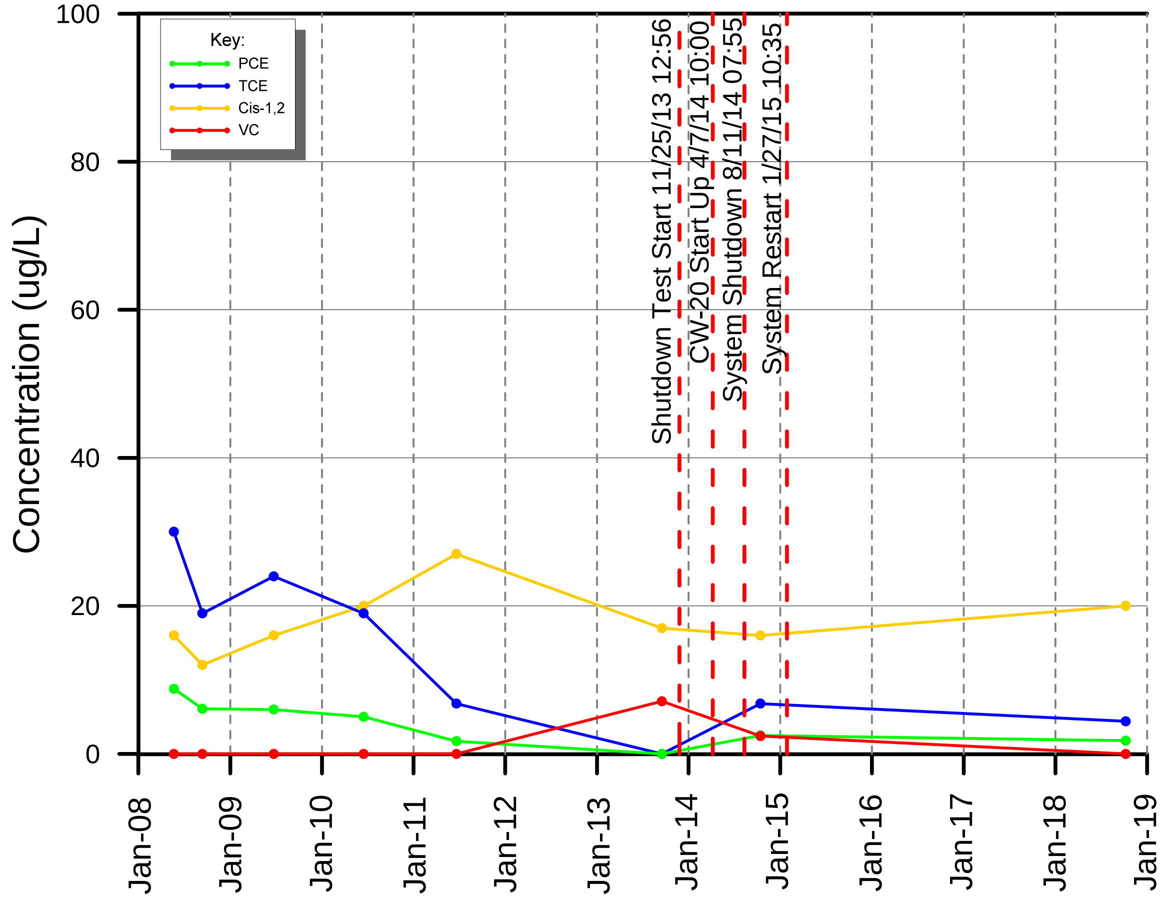
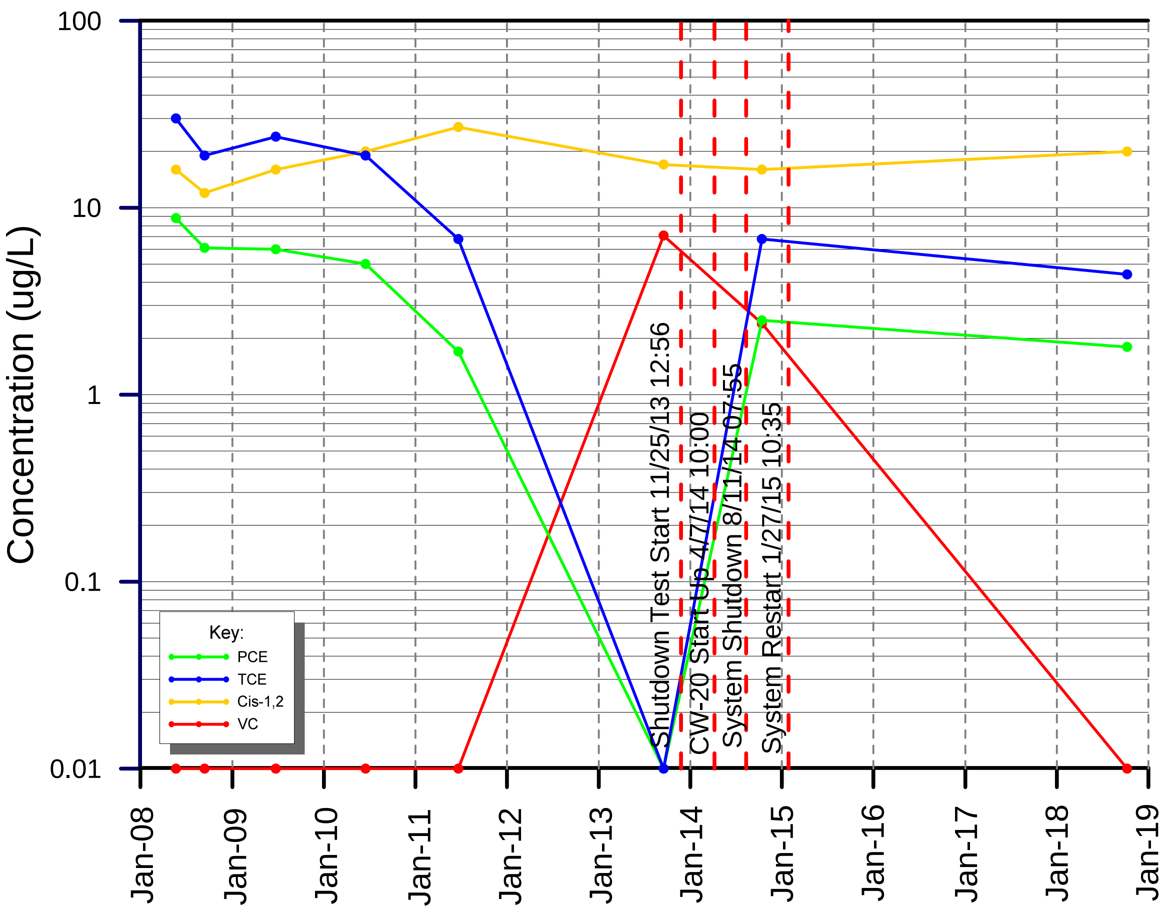
100
10
1
0.1
0.01
Key:
PCE
TCE
Cis-1,2
VC
Shutdown Test Start 11/25/13 12:56
CW-20 Start Up 4/7/14 10:00
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

MW-101D



Concentration (ug/L)
100
80
60
40
20
0
Key:
PCE
TCE
Cis-1,2
VC
Shutdown Test Start 11/25/13 12:56
CW-20 Start Up 4/7/14 10:00
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19



Concentration (ug/L)
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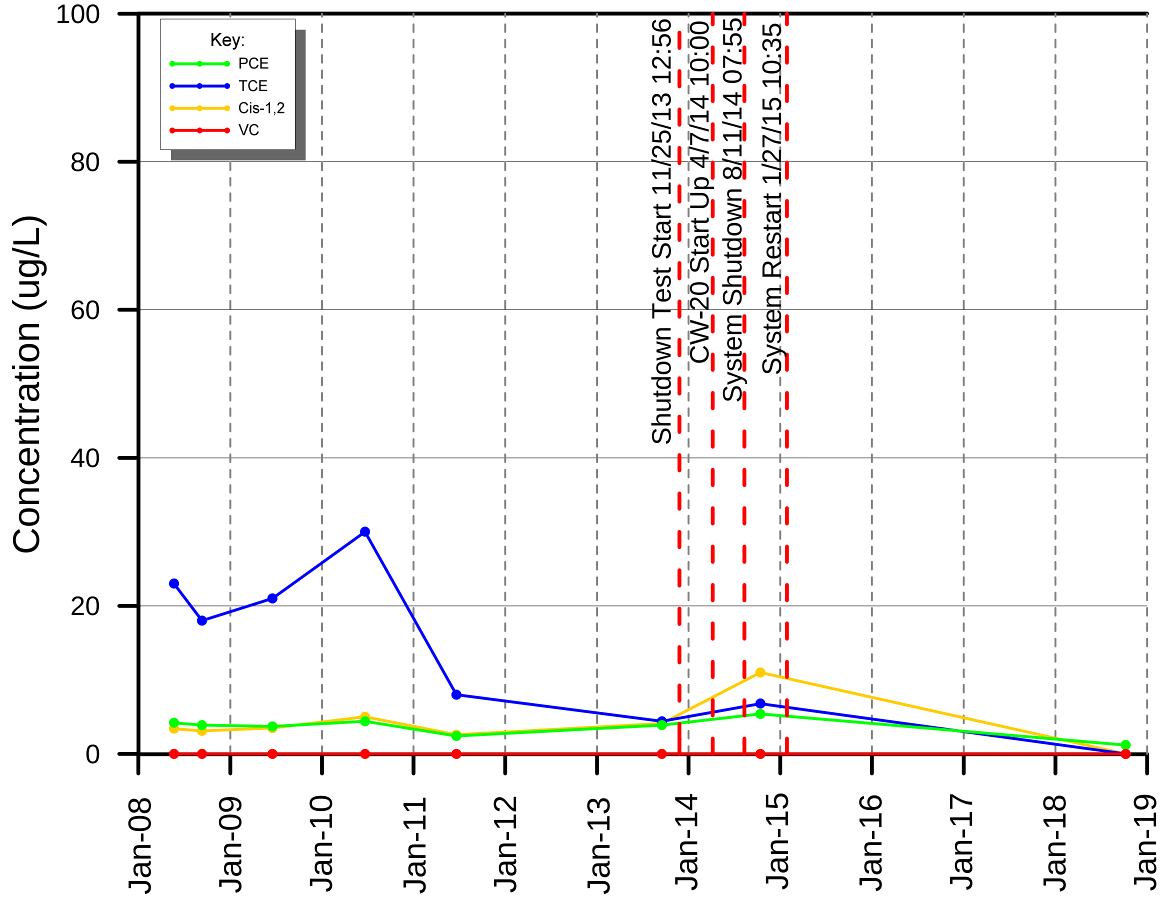
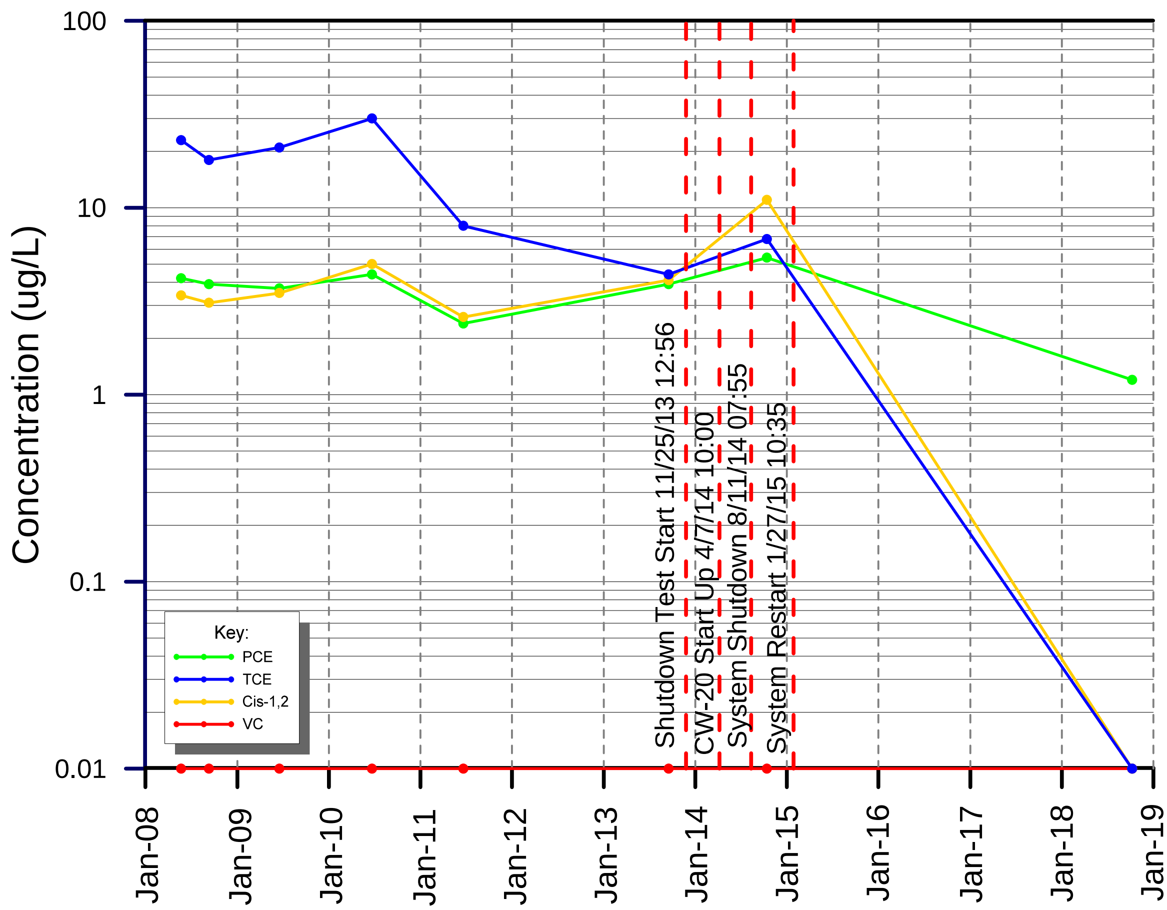
0.1
0.01
Shutdown Test Start 11/25/13 12:56
CW-20 Start Up 4/7/14 10:00
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Key:
PCE
TCE
Cis-1,2
VC
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

MW-101S



Key:
PCE
TCE
Cis-1,2
VC
Concentration (ug/L)
100
80
60
40
20
0
Shutdown Test Start 11/25/13 12:56
CW-20 Start Up 4/7/14 10:00
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19



Concentration (ug/L)
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10
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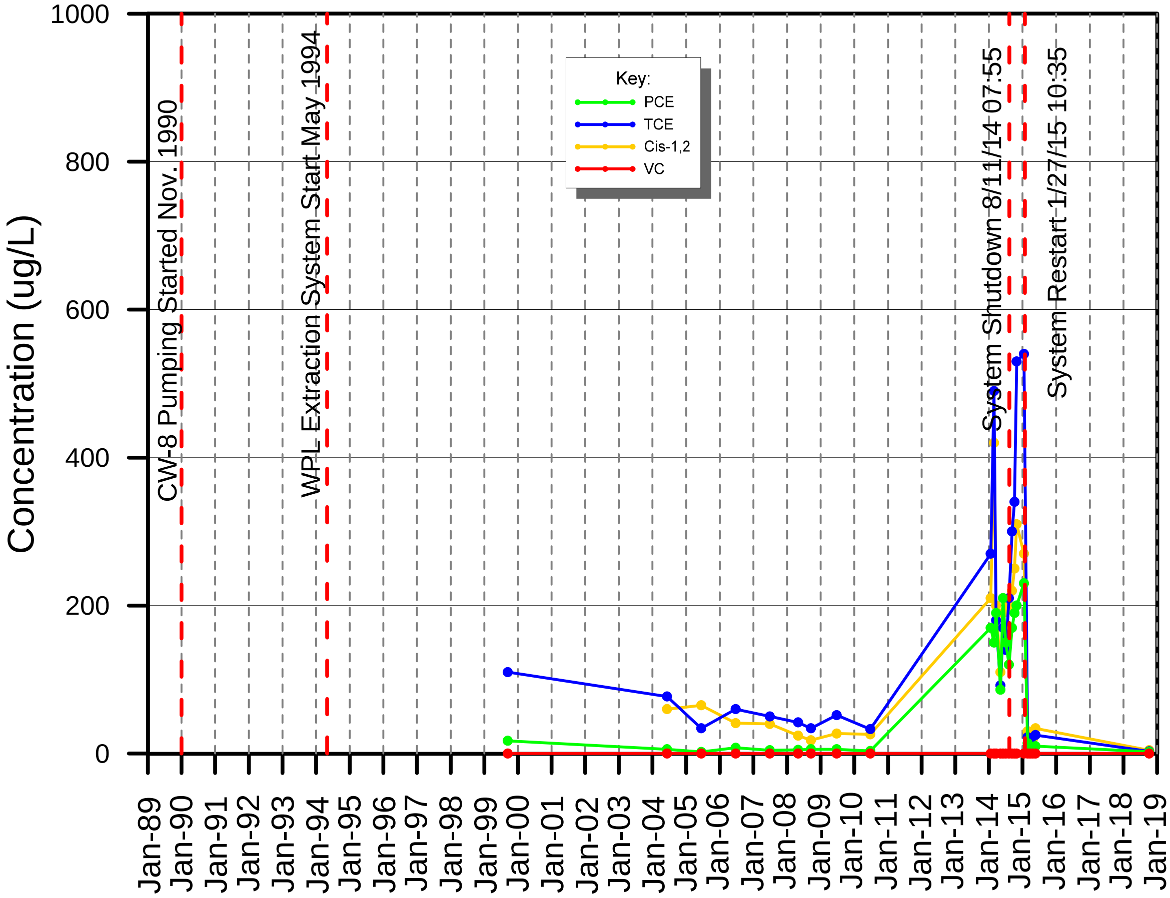
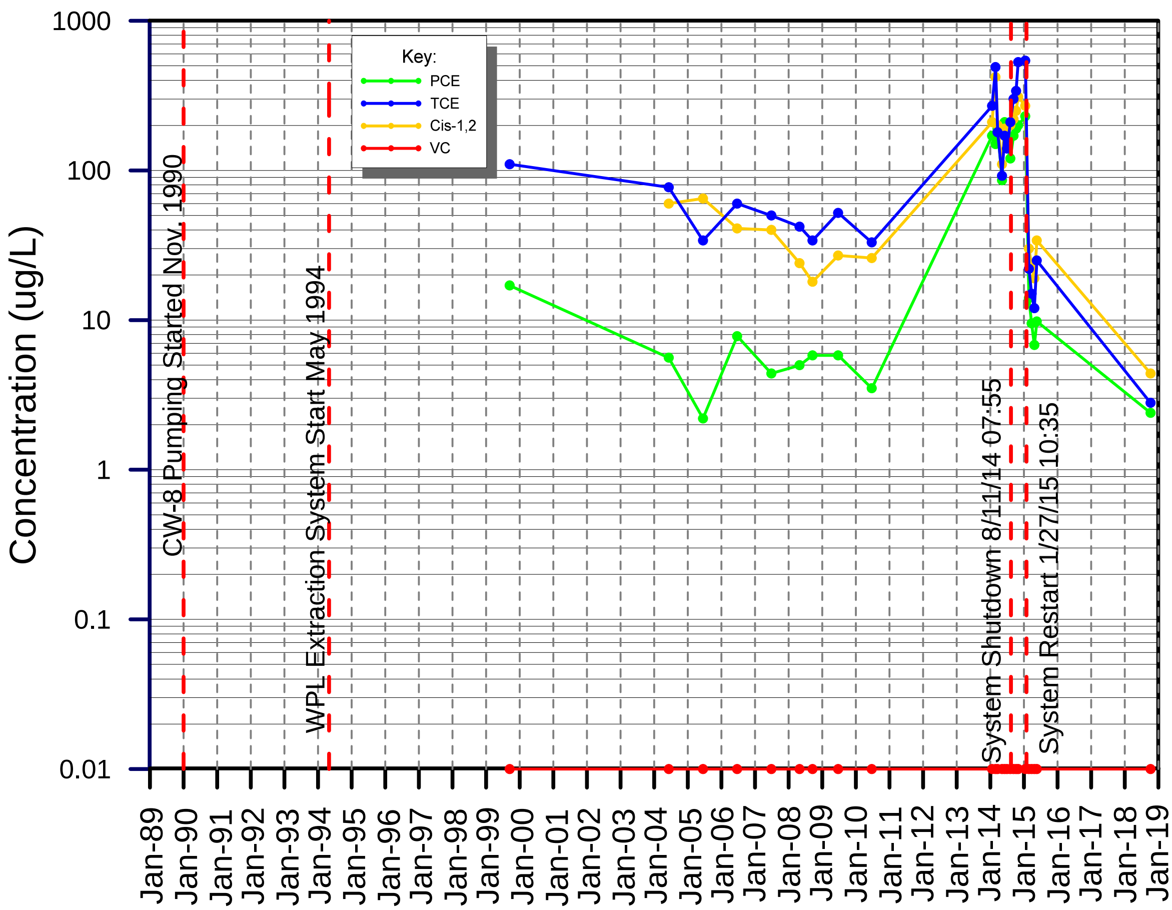
0.1
0.01
Shutdown Test Start 11/25/13 12:56
CW-20 Start Up 4/7/14 10:00
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Key:
PCE
TCE
Cis-1,2
VC
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

MW-74S



Concentration (ug/L)
1000
800
600
400
200
0
Key:
PCE
TCE
Cis-1,2
VC
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19



Concentration (ug/L)
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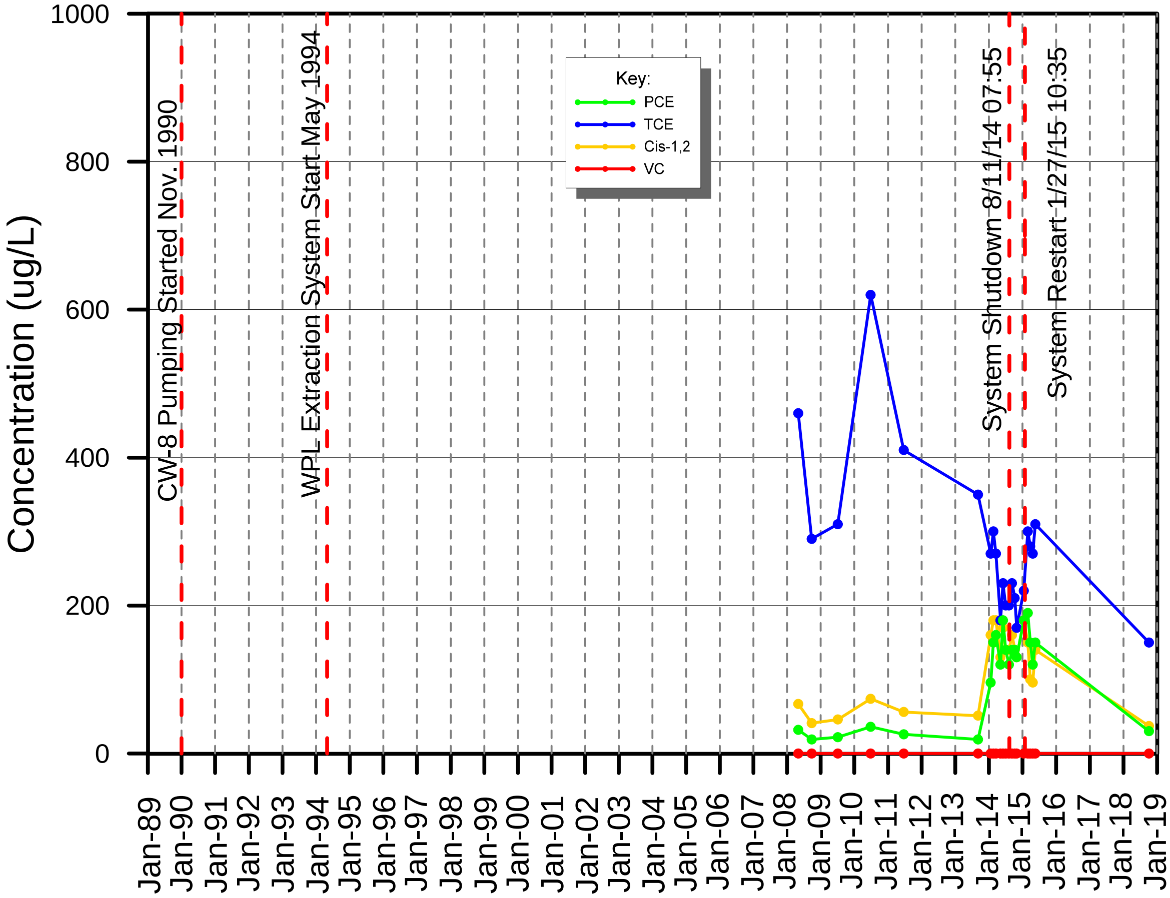
100
10
1
0.1
0.01
Key:
PCE
TCE
Cis-1,2
VC
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19

MW-96D



Concentration (ug/L)
1000
800
600
400
200
0
Key:
PCE
TCE
Cis-1,2
VC
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
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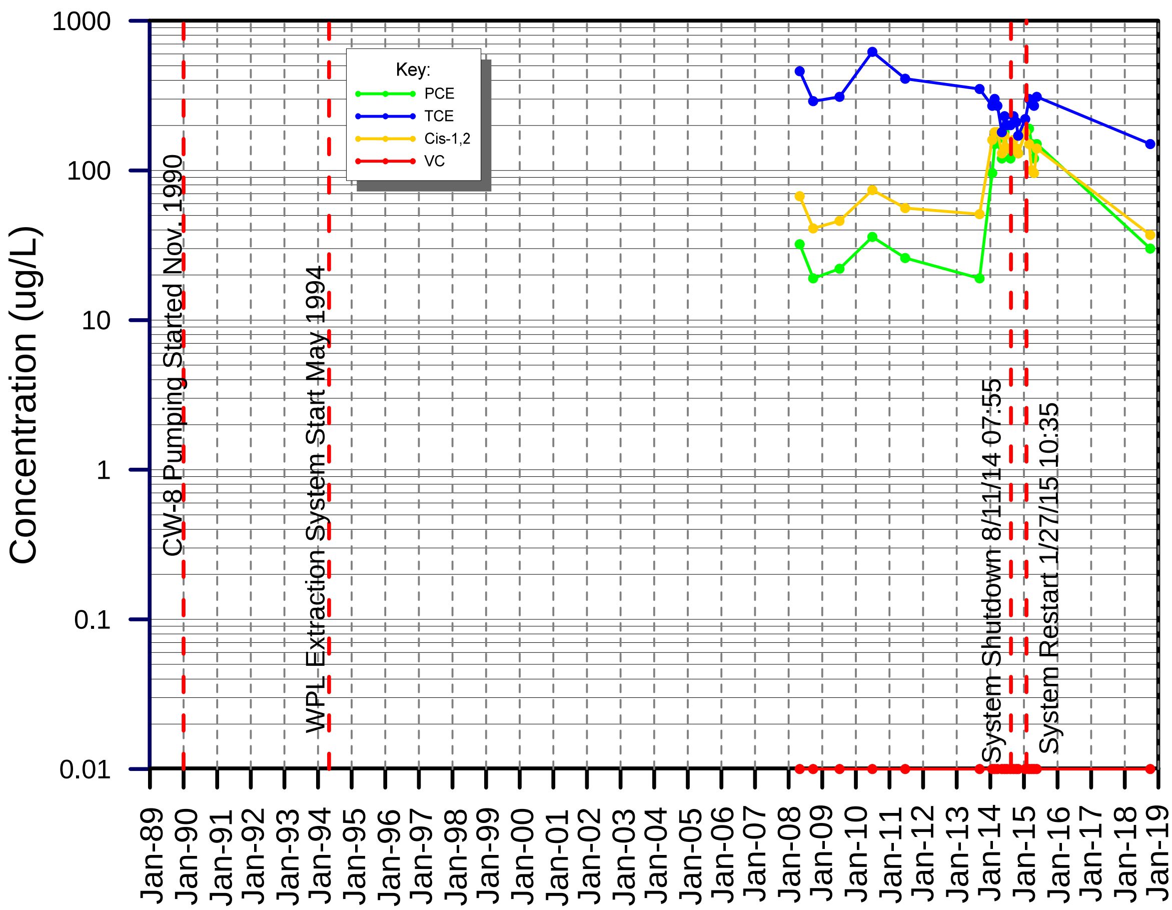
Jan-16
Jan-17
Jan-18
Jan-19



Concentration (ug/L)
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1
0.1
0.01
Key:
PCE
TCE
Cis-1,2
VC
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
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Jan-99
Jan-00
Jan-01
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Jan-06
Jan-07
Jan-08
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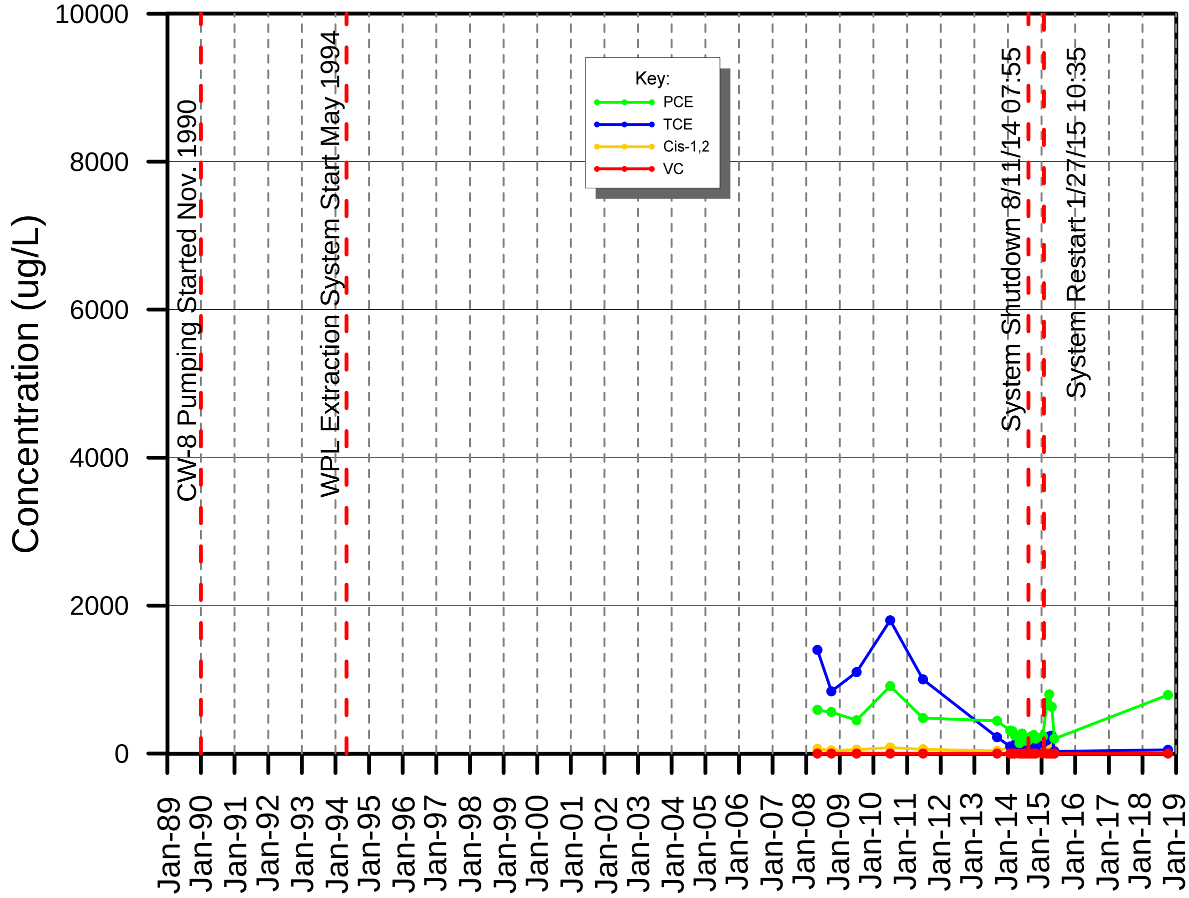
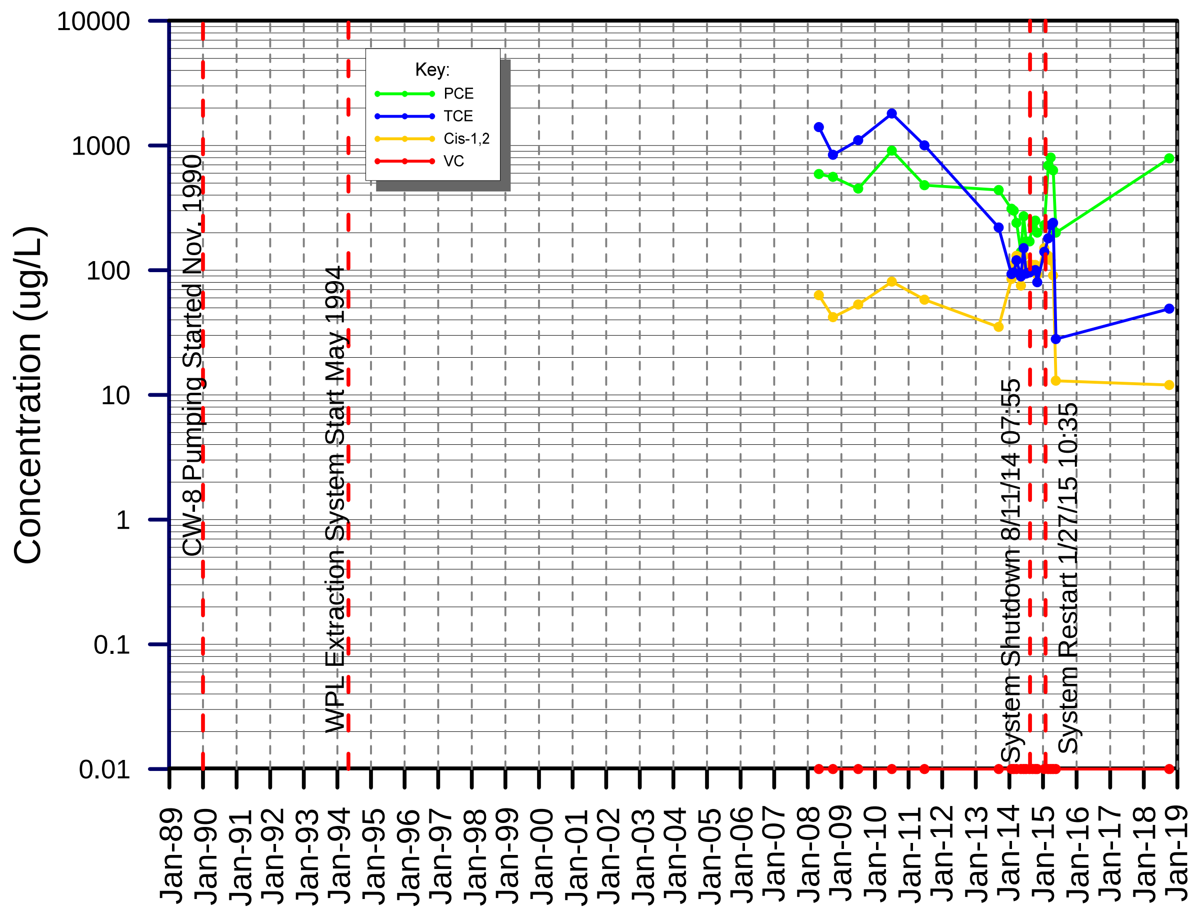
Jan-16
Jan-17
Jan-18
Jan-19

MW-96S



Concentration (ug/L)
10000
8000
6000
4000
2000
0
Key:
PCE
TCE
Cis-1,2
VC
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19



Concentration (ug/L)
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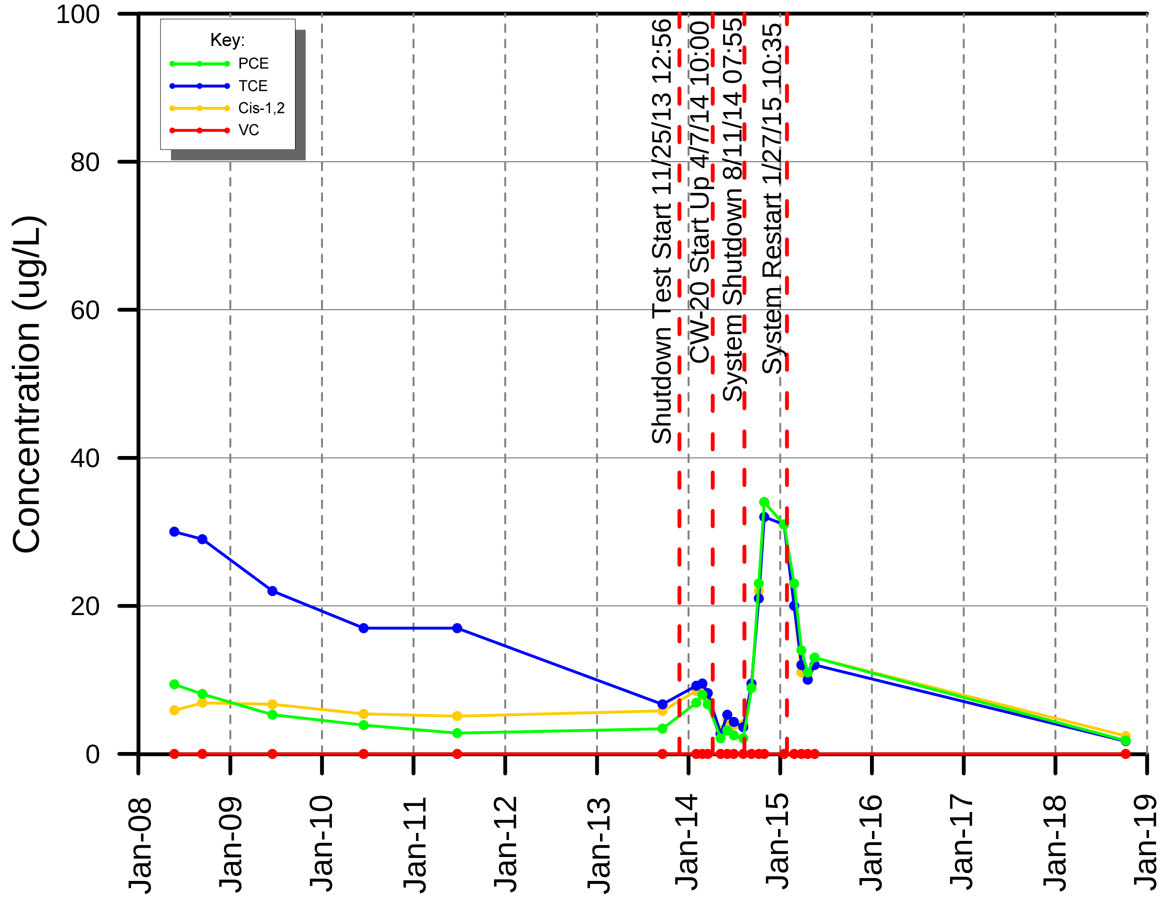
1000
100
10
1
0.1
0.01
Key:
PCE
TCE
Cis-1,2
VC
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19

MW-98I



Concentration (ug/L)
100
80
60
40
20
0
Key:
PCE
TCE
Cis-1,2
VC
Shutdown Test Start 11/25/13 12:56
CW-20 Start Up 4/7/14 10:00
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-08
Jan-09
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Jan-11
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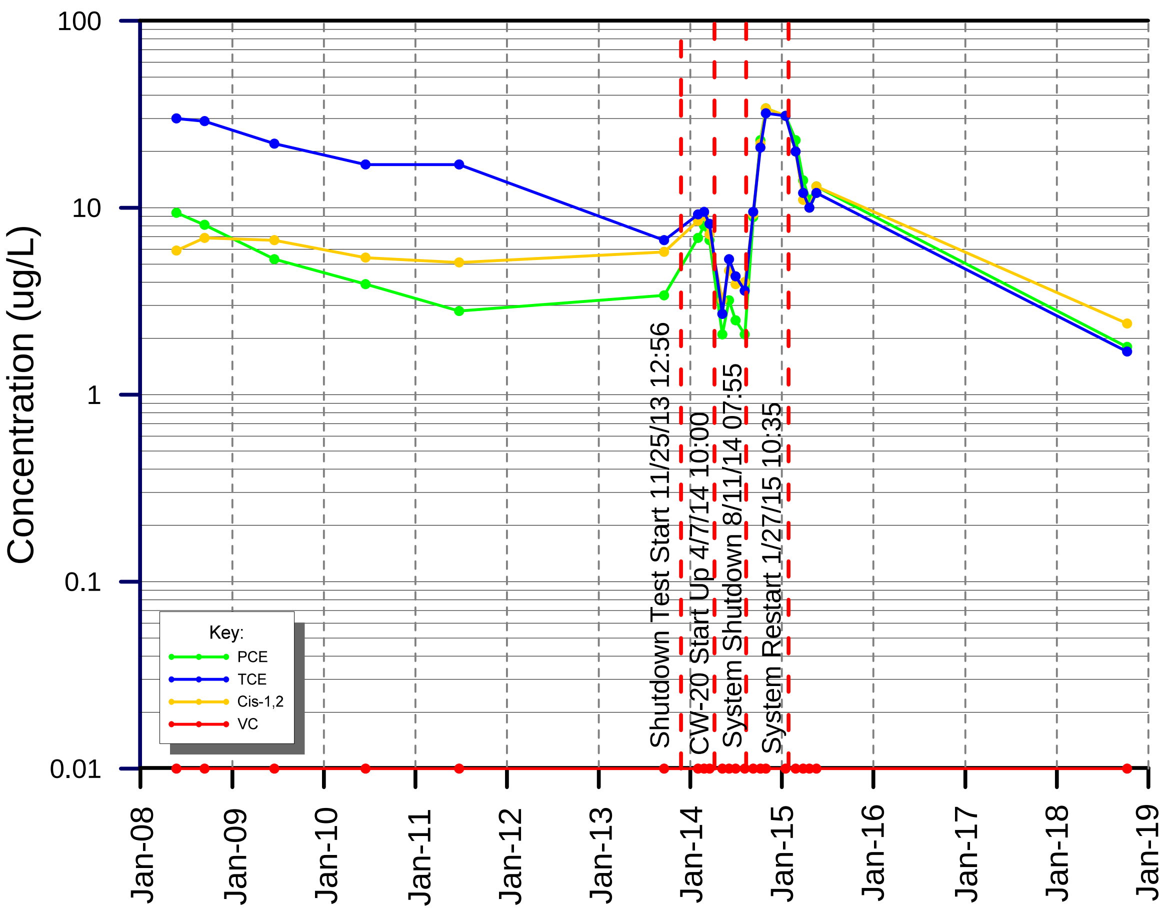
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19



Concentration (ug/L)
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0.1
0.01
Key:
PCE
TCE
Cis-1,2
VC
Shutdown Test Start 11/25/13 12:56
CW-20 Start Up 4/7/14 10:00
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-08
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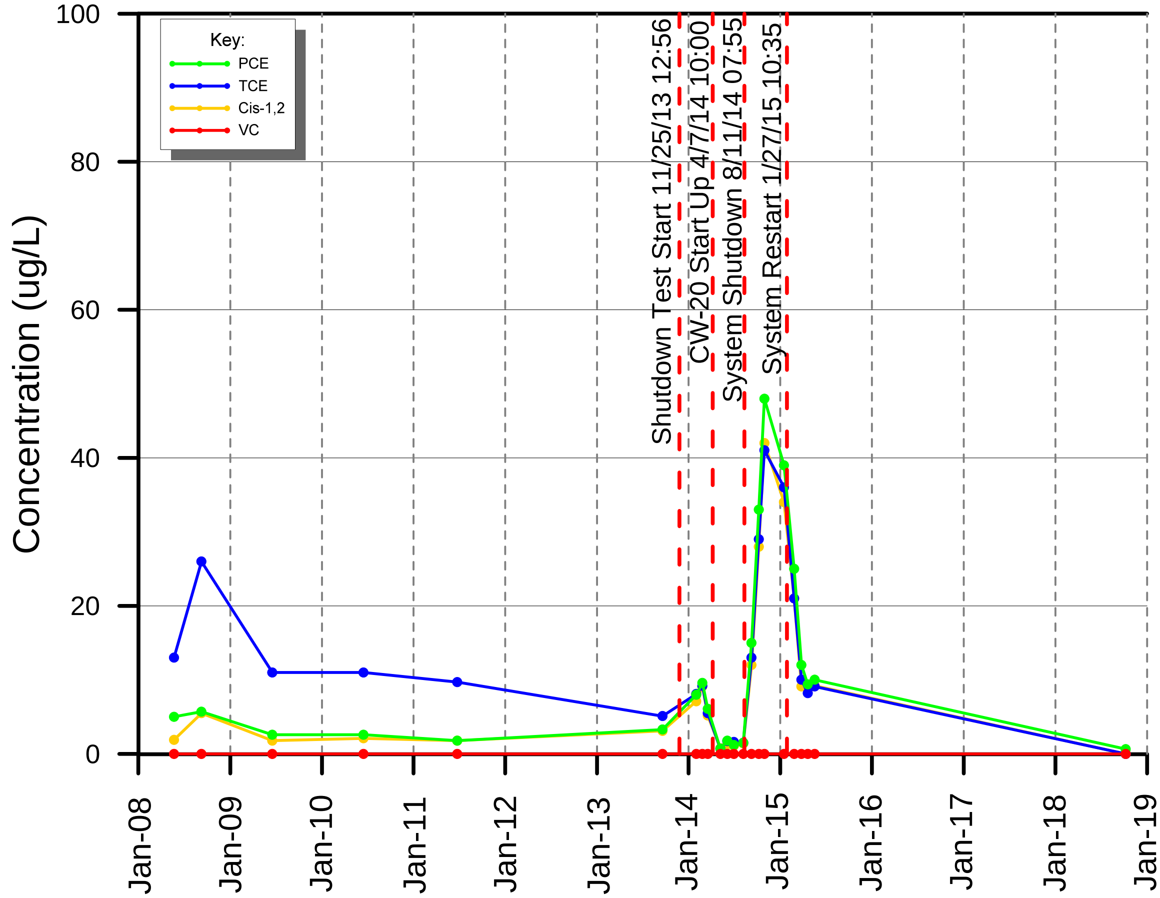
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

MW-98S


Concentration (ug/L)
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80
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40
20
0
Key:
PCE
TCE
Cis-1,2
VC
Shutdown Test Start 11/25/13 12:56
CW-20 Start Up 4/7/14 10:00
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
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Jan-12
Jan-13
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Jan-15
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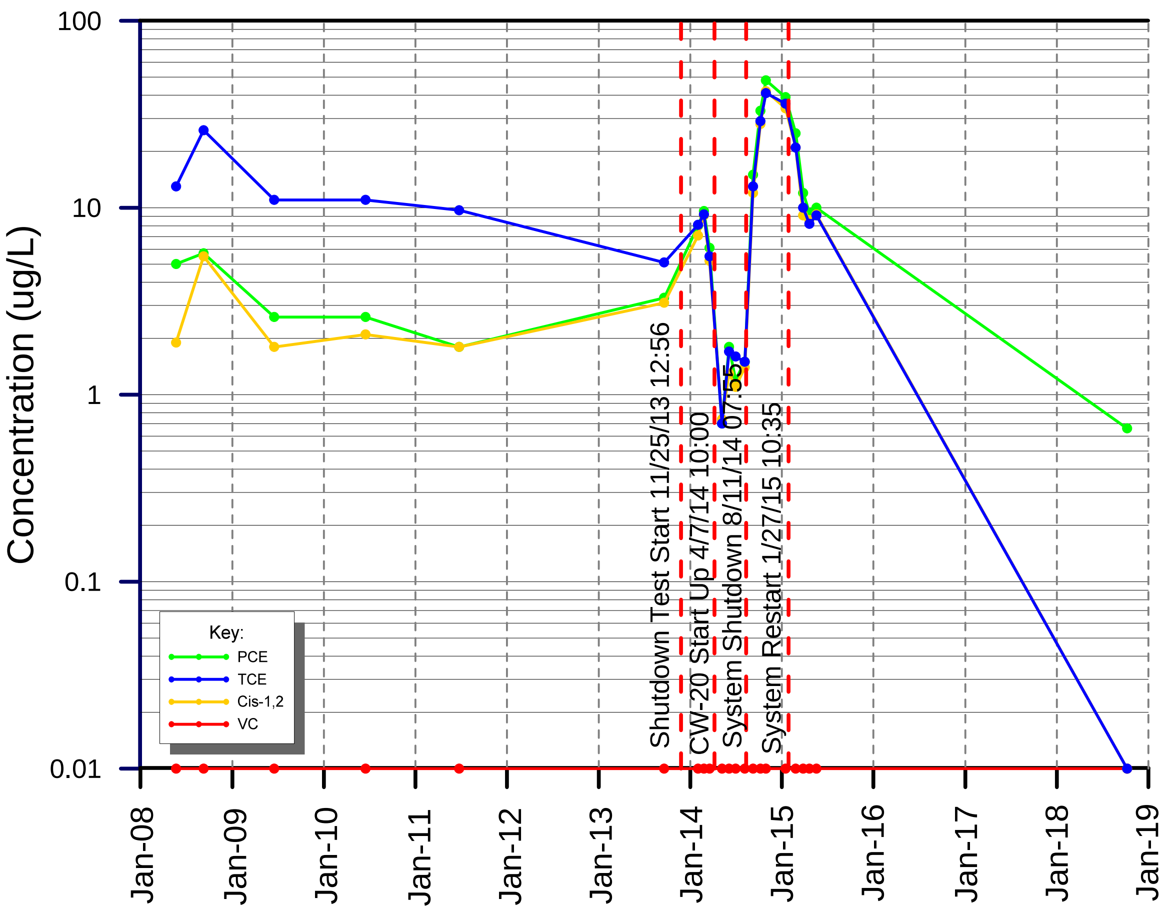
Jan-19


Concentration (ug/L)
100
10
1
0.1
0.01
Key:
PCE
TCE
Cis-1,2
VC
Shutdown Test Start 11/25/13 12:56
CW-20 Start Up 4/7/14 10:00
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-08
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Jan-16
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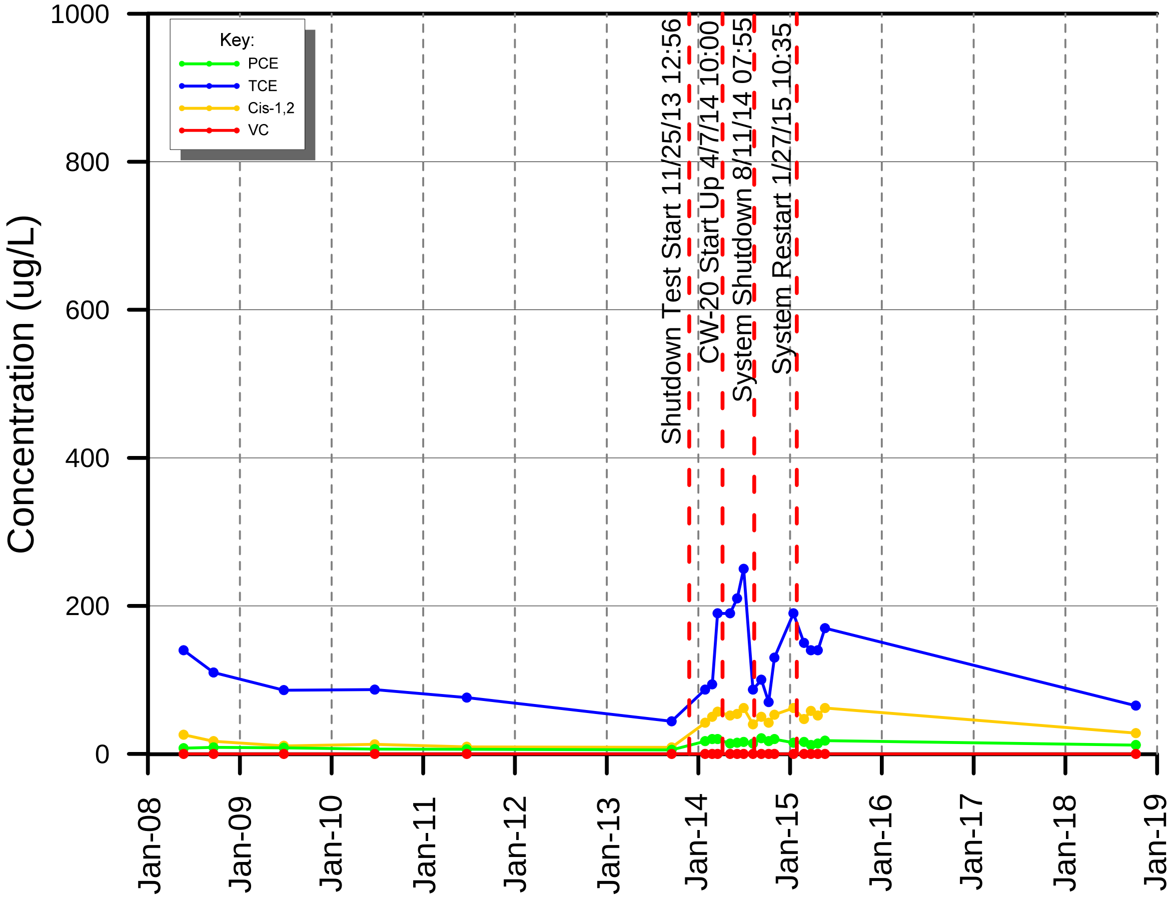
Jan-18
Jan-19

MW-99D



Key:
PCE
TCE
Cis-1,2
VC
Concentration (ug/L)
1000
800
600
400
200
0
Shutdown Test Start 11/25/13 12:56
CW-20 Start Up 4/7/14 10:00
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-08
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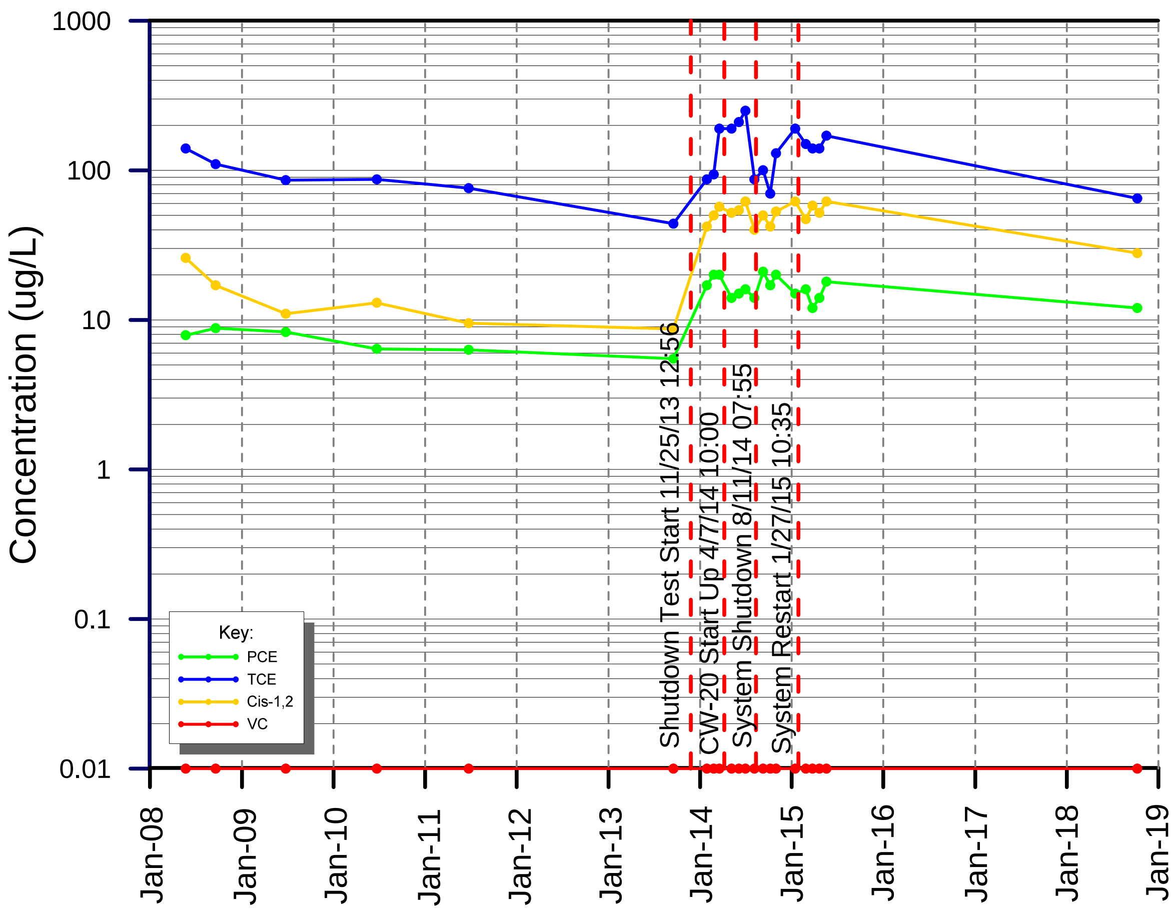
Jan-17
Jan-18
Jan-19



Concentration (ug/L)
1000
100
10
1
0.1
0.01
Shutdown Test Start 11/25/13 12:56
CW-20 Start Up 4/7/14 10:00
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Key:
PCE
TCE
Cis-1,2
VC
Jan-08
Jan-09
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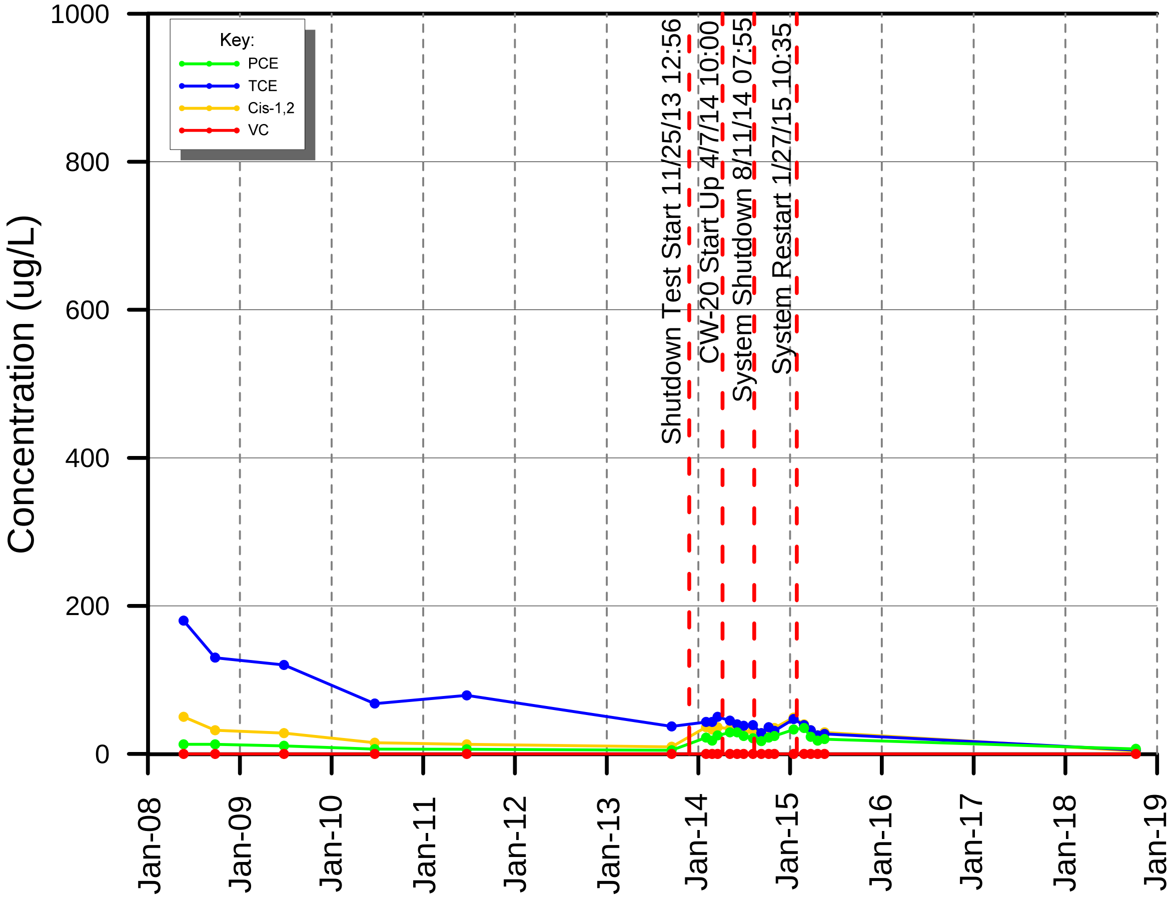
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

MW-99S



Key:
PCE
TCE
Cis-1,2
VC
Concentration (ug/L)
1000
800
600
400
200
0
Shutdown Test Start 11/25/13 12:56
CW-20 Start Up 4/7/14 10:00
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-08
Jan-09
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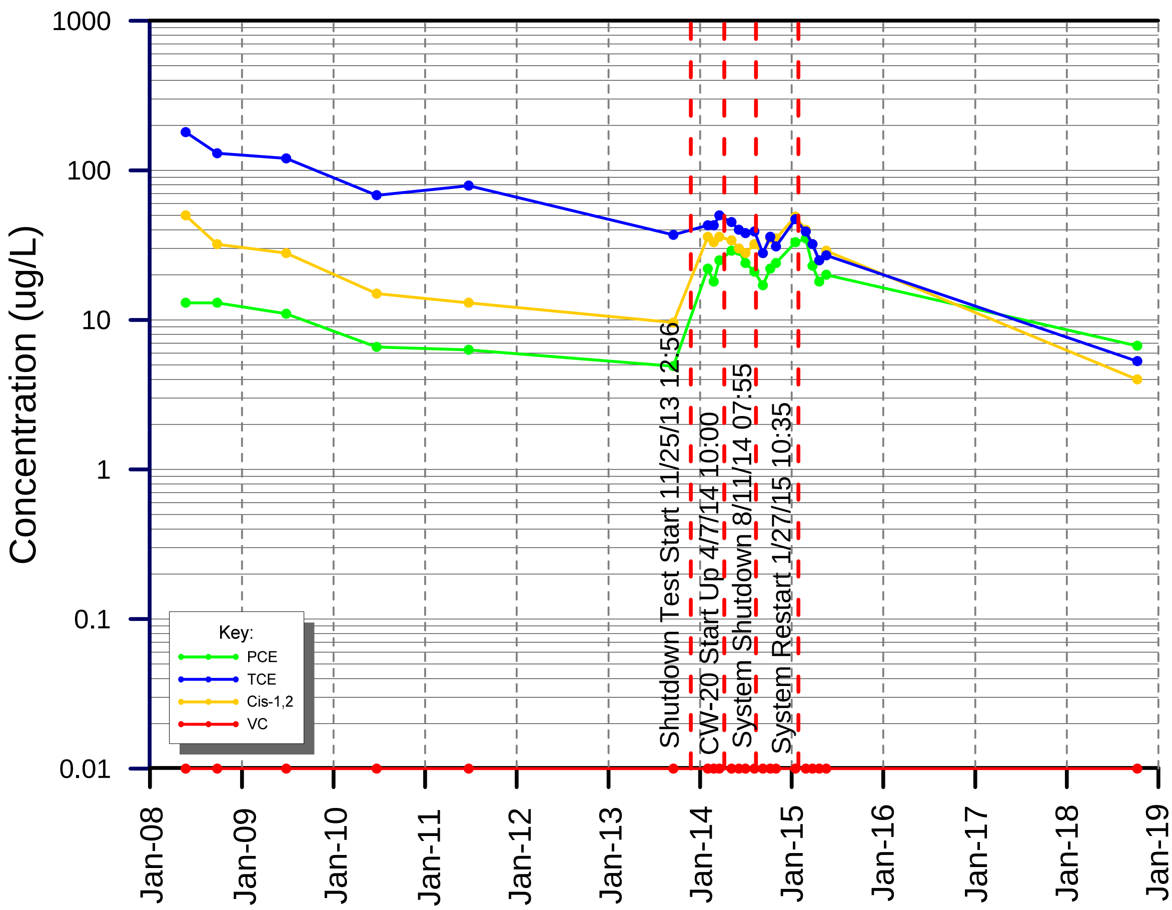
Jan-18
Jan-19



Concentration (ug/L)
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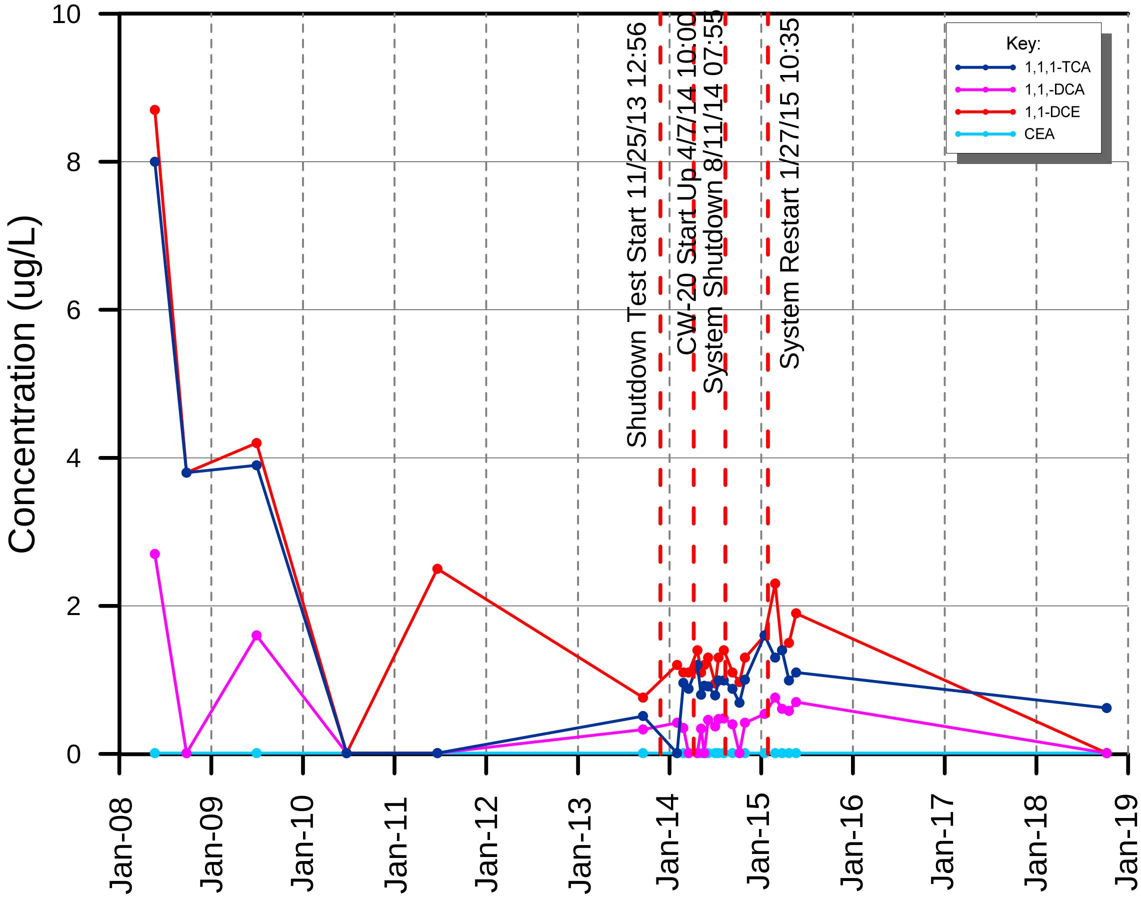
100
10
1
0.1
0.01
Shutdown Test Start 11/25/13 12:56
CW-20 Start Up 4/7/14 10:00
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Key:
PCE
TCE
Cis-1,2
VC
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

MW-100I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8
6
4
2
0
Jan-08
Jan-09
Jan-10
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Jan-12
Jan-13
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Jan-17
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Jan-19
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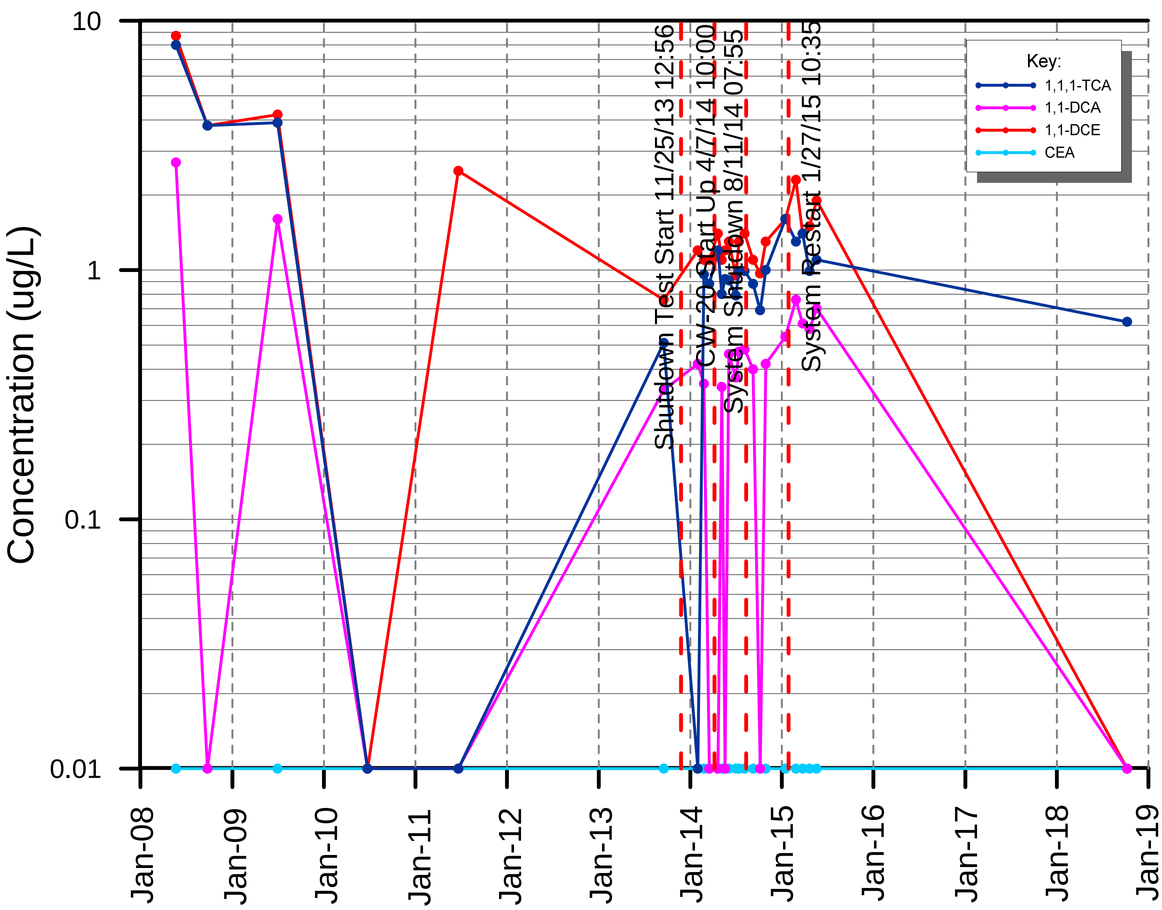
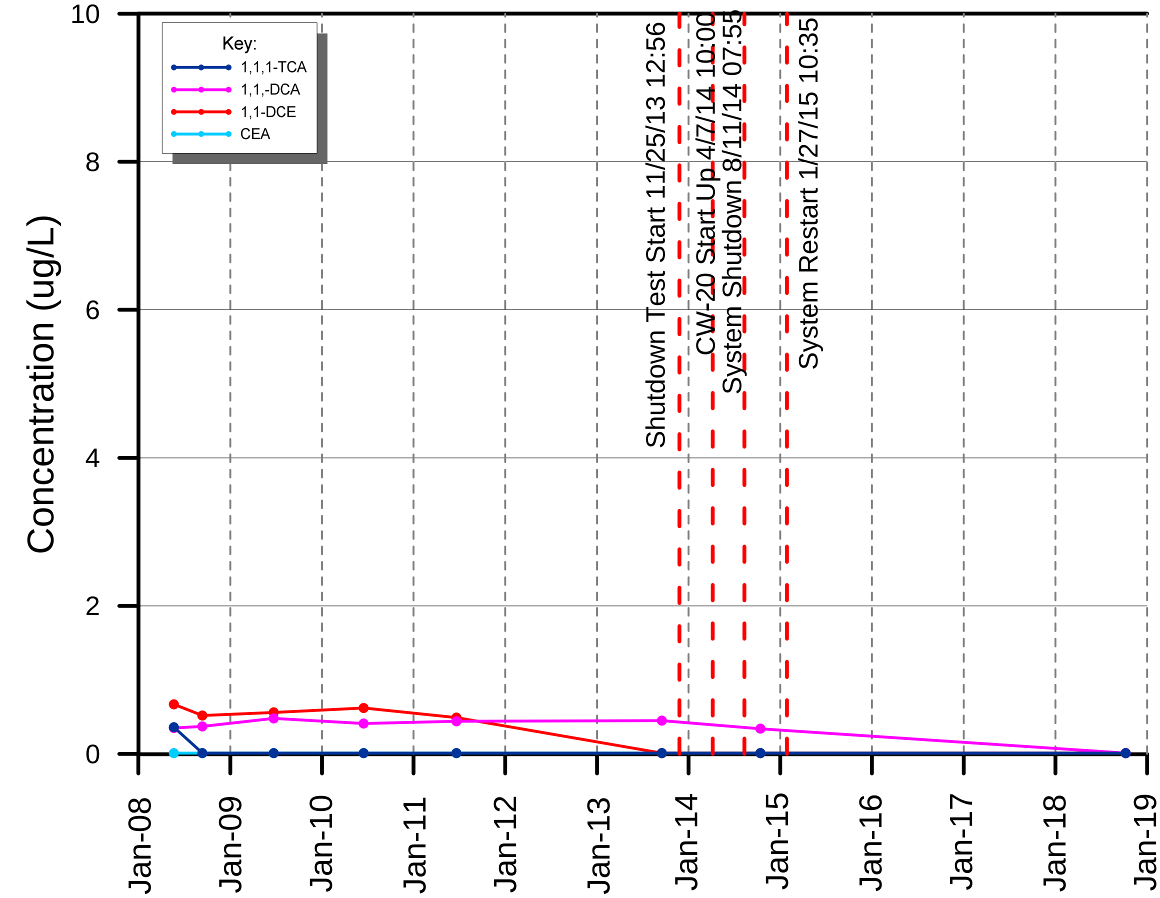
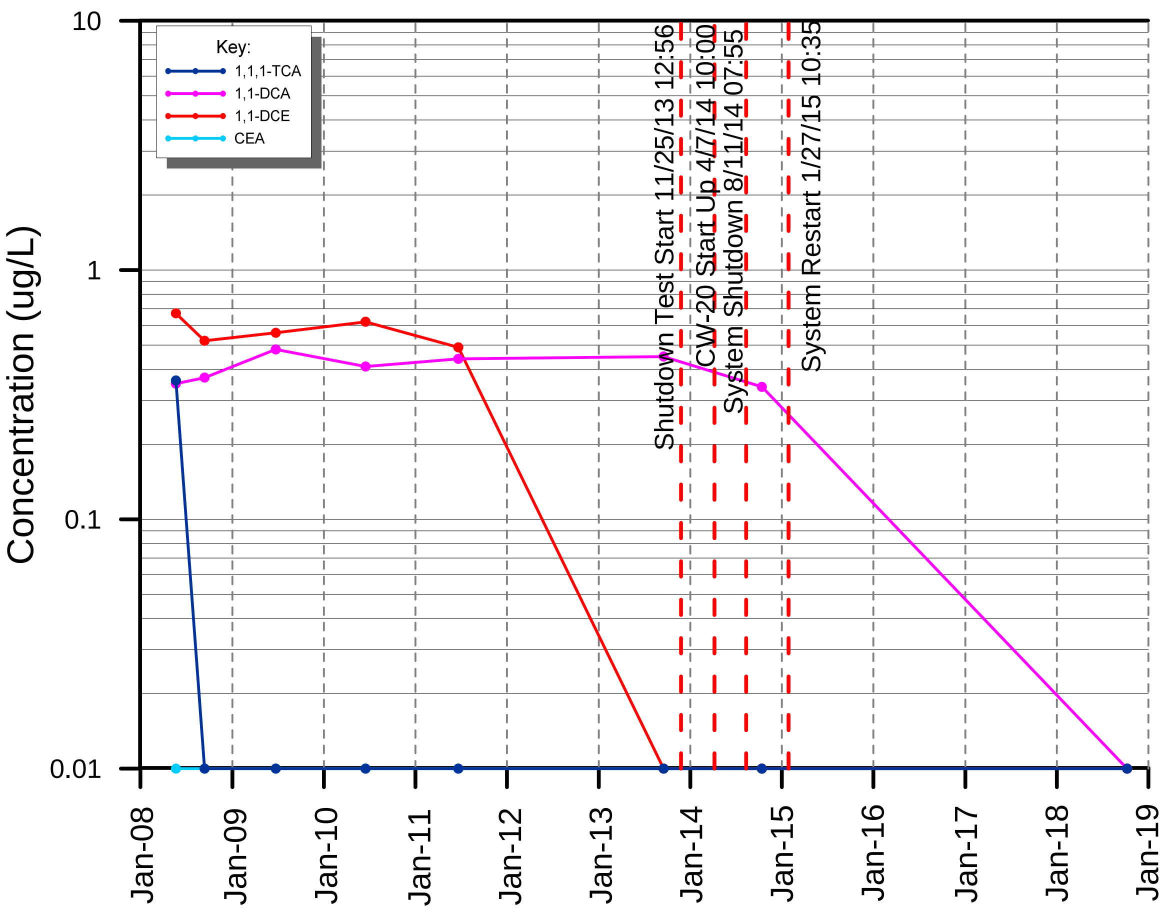
CW-20 Start Up 4/7/14 10:00
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Key:
1,1,1-TCA
1,1,-DCA
1,1-DCE
CEA

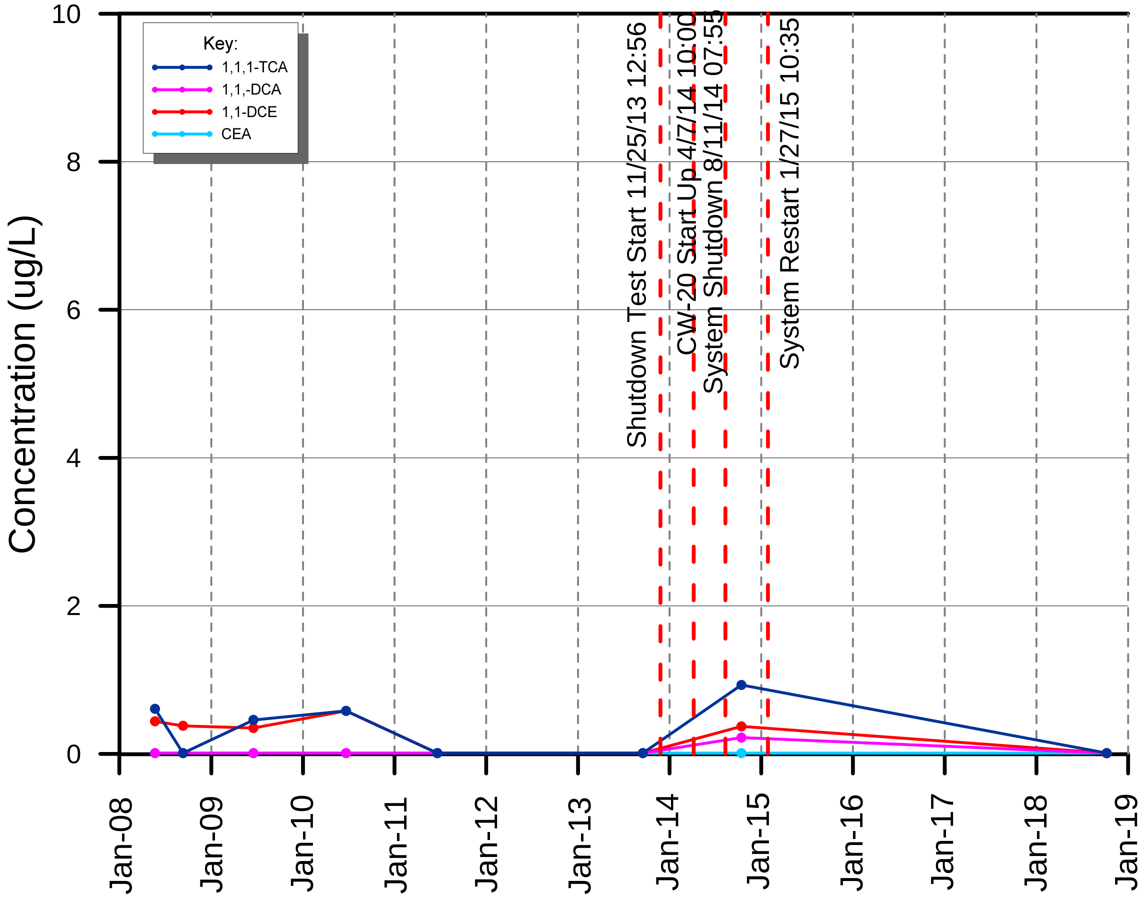

Concentration (ug/L)
10
1
0.1
0.01
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Shutdown Test Start 11/25/13 12:56
CW-20 Start Up 4/7/14 10:00
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA

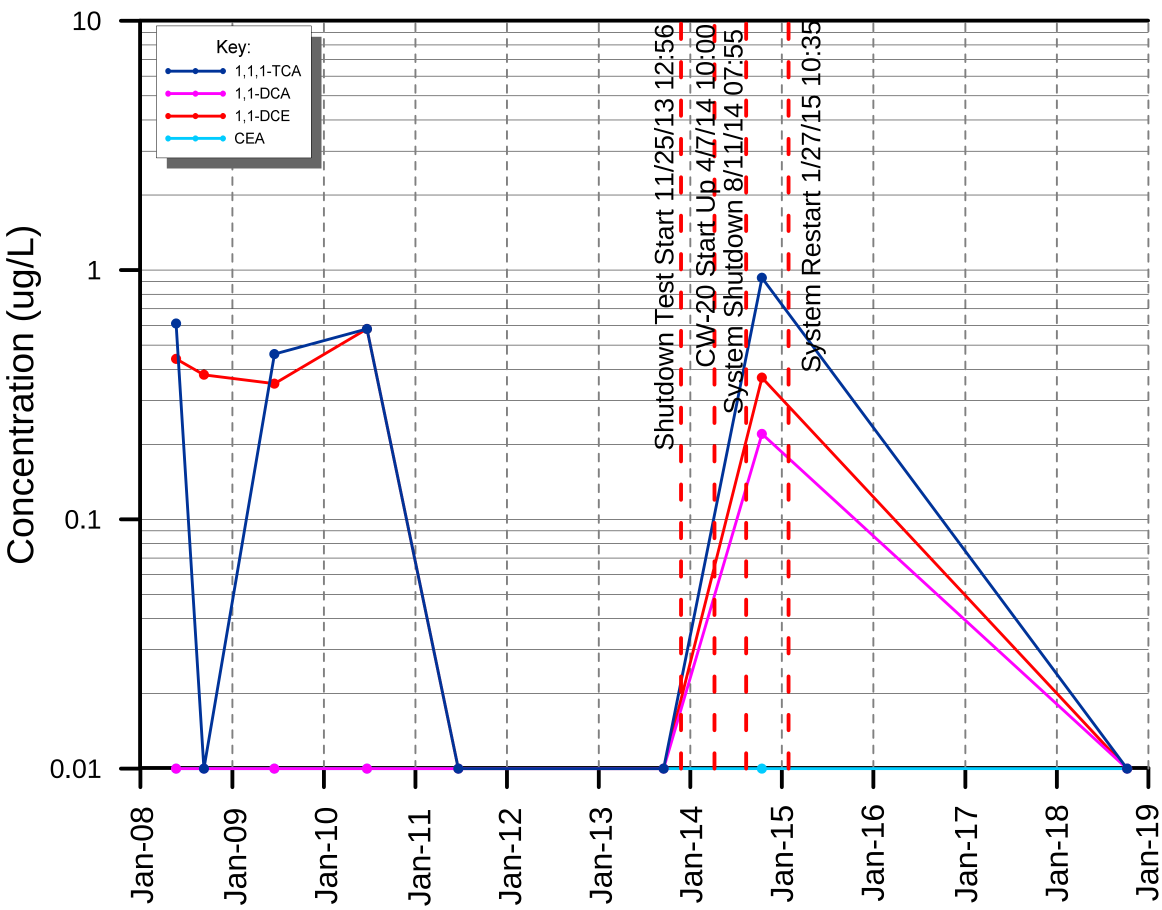
MW-101D


Key:
1,1,1-TCA
1,1,-DCA
1,1-DCE
CEA
Concentration (ug/L)
10
8
6
4
2
0
Shutdown Test Start 11/25/13 12:56
CW-20 Start Up 4/7/14 10:00
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

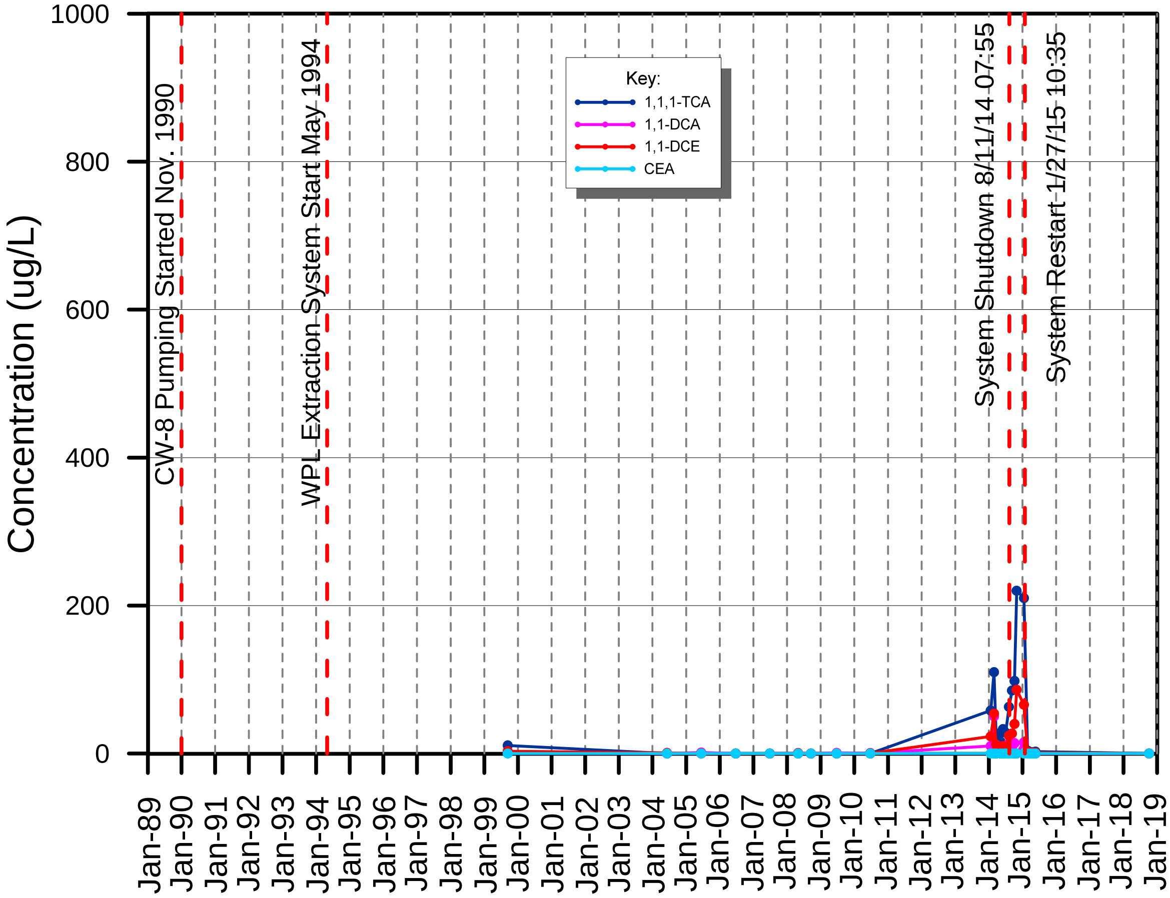

Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Concentration (ug/L)
10
1
0.1
0.01
Shutdown Test Start 11/25/13 12:56
CW-20 Start Up 4/7/14 10:00
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

MW-101S

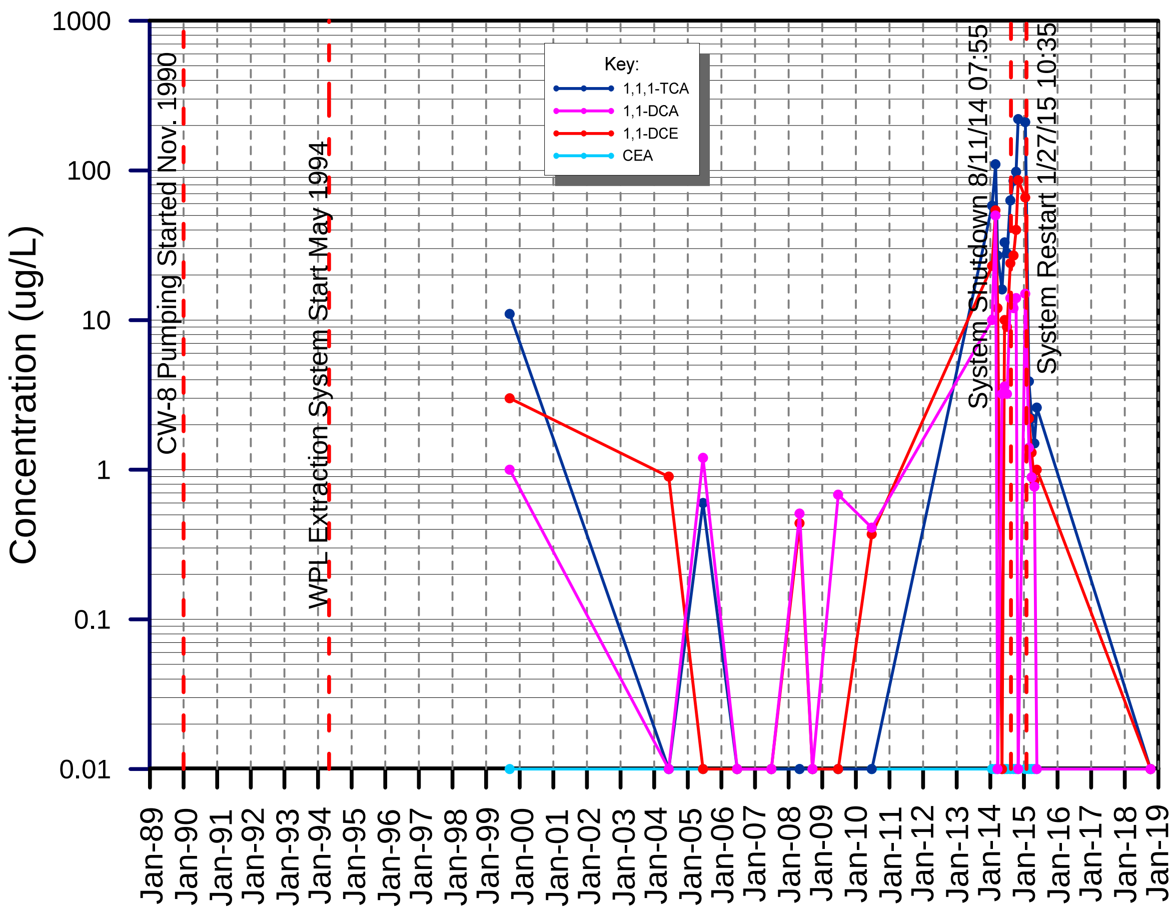

Key:
1,1,1-TCA
1,1,-DCA
1,1-DCE
CEA
Shutdown Test Start 11/25/13 12:56
CW-20 Start Up 4/7/14 10:00
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Concentration (ug/L)
10
8
6
4
2
0
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19


Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Shutdown Test Start 11/25/13 12:56
CW-20 Start Up 4/7/14 10:00
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Concentration (ug/L)
10
1
0.1
0.01
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

MW-74S

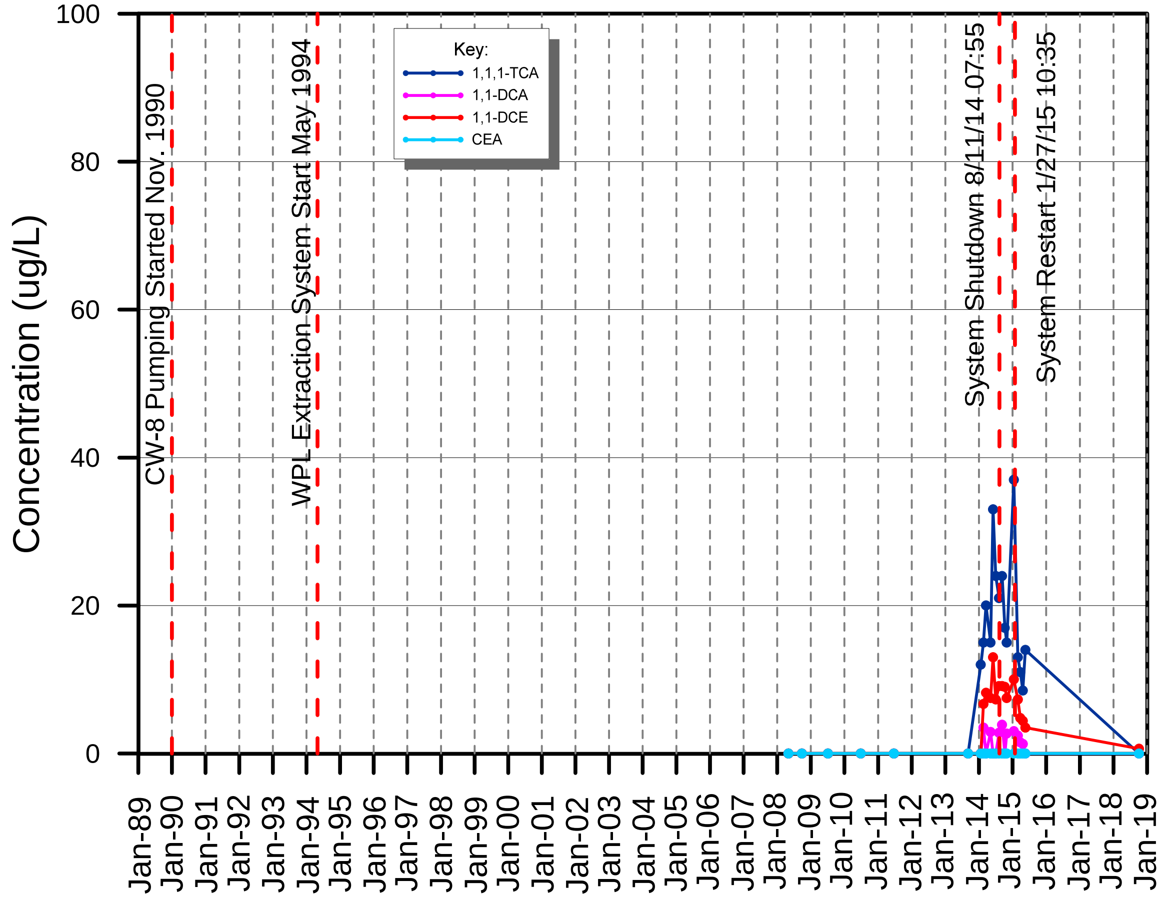


Concentration (ug/L)
1000
800
600
400
200
0
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19

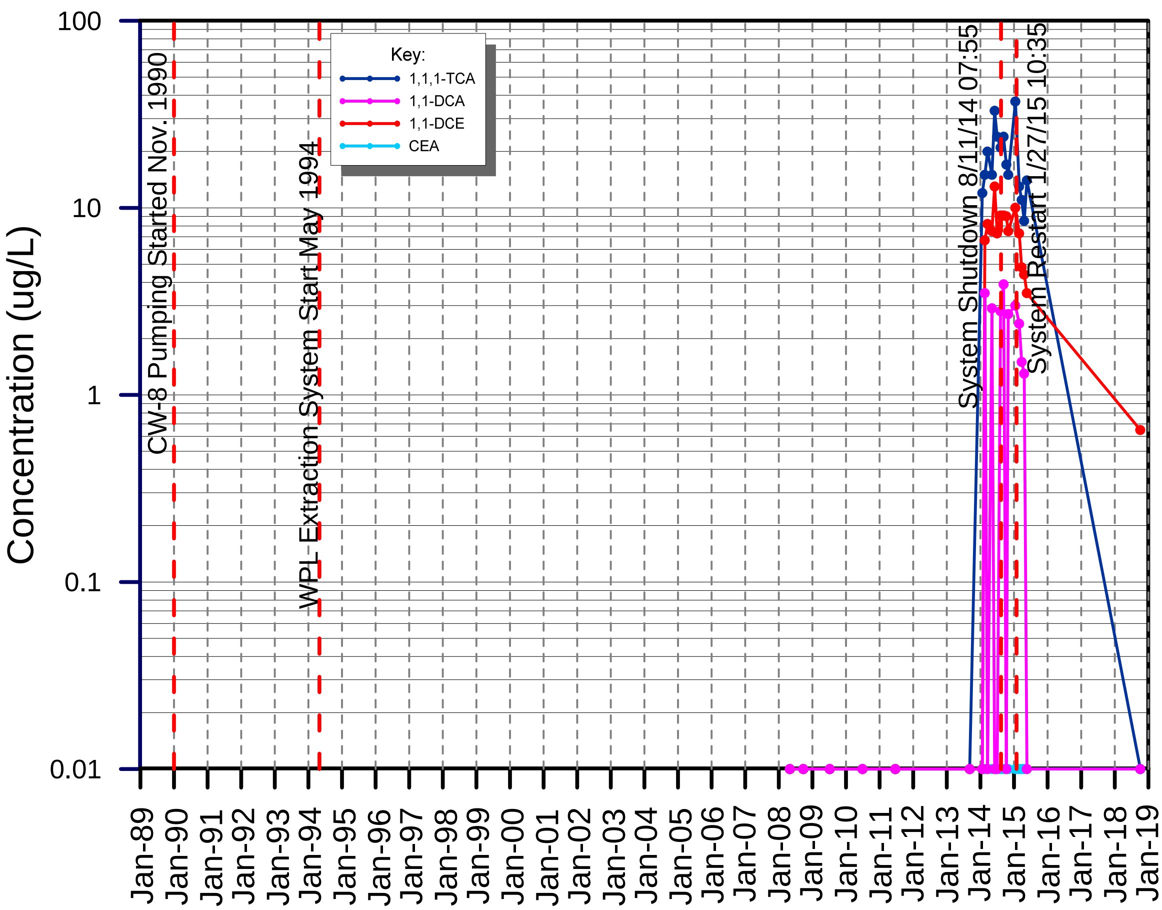


Concentration (ug/L)
1000
100
10
1
0.1
0.01
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19

MW-96D

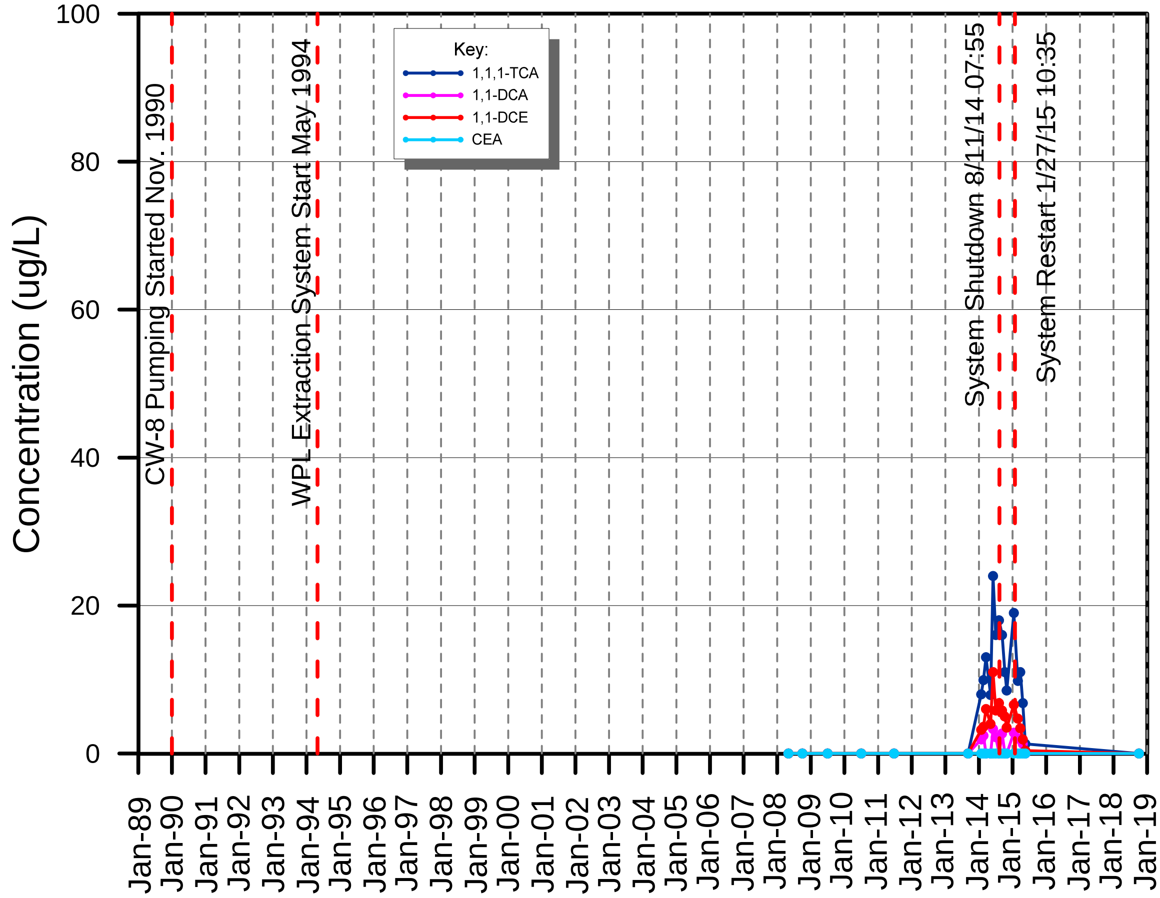


Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Concentration (ug/L)
100
80
60
40
20
0
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19



Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Concentration (ug/L)
100
10
1
0.1
0.01
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19

MW-96S



Concentration (ug/L)
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
0
20
40
60
80
100
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
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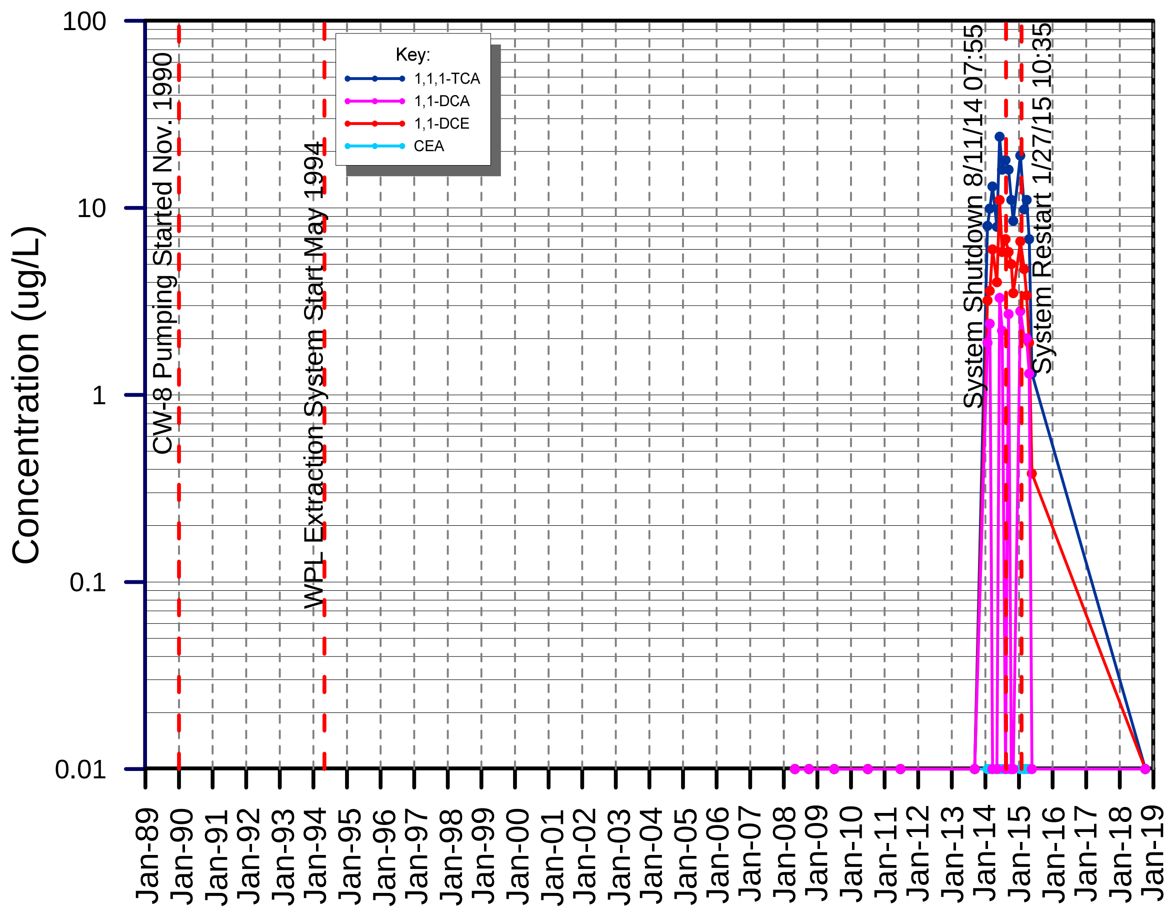
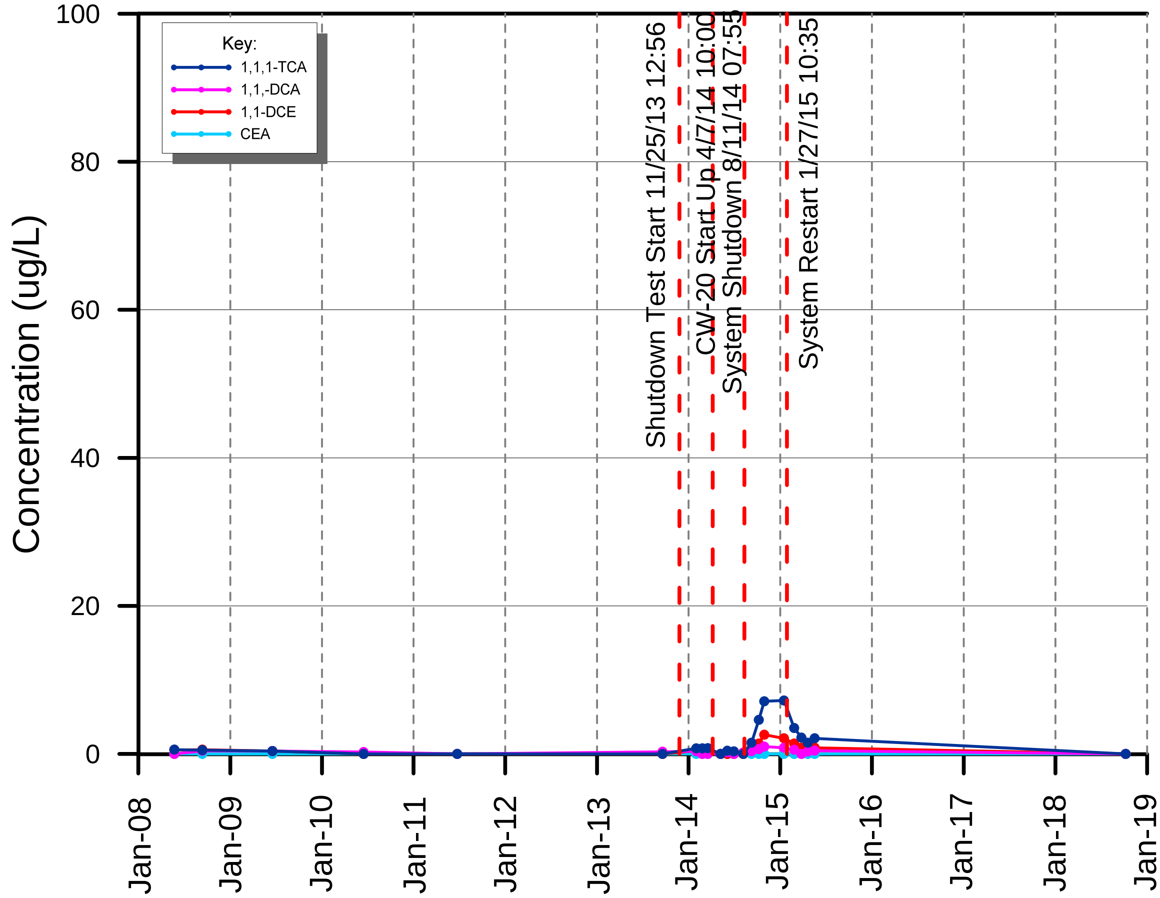
Jan-17
Jan-18
Jan-19

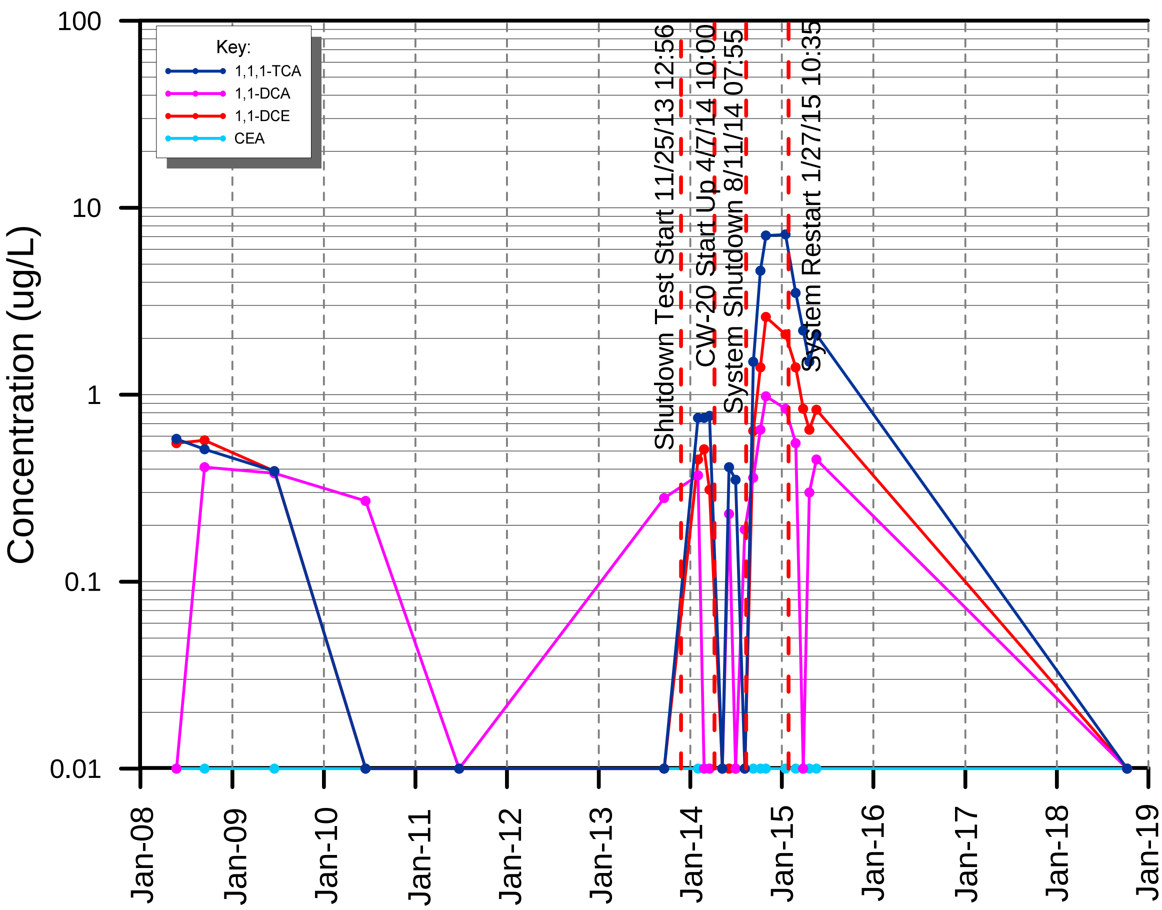


Concentration (ug/L)
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
0.01
0.1
1
10
100
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

MW-98I

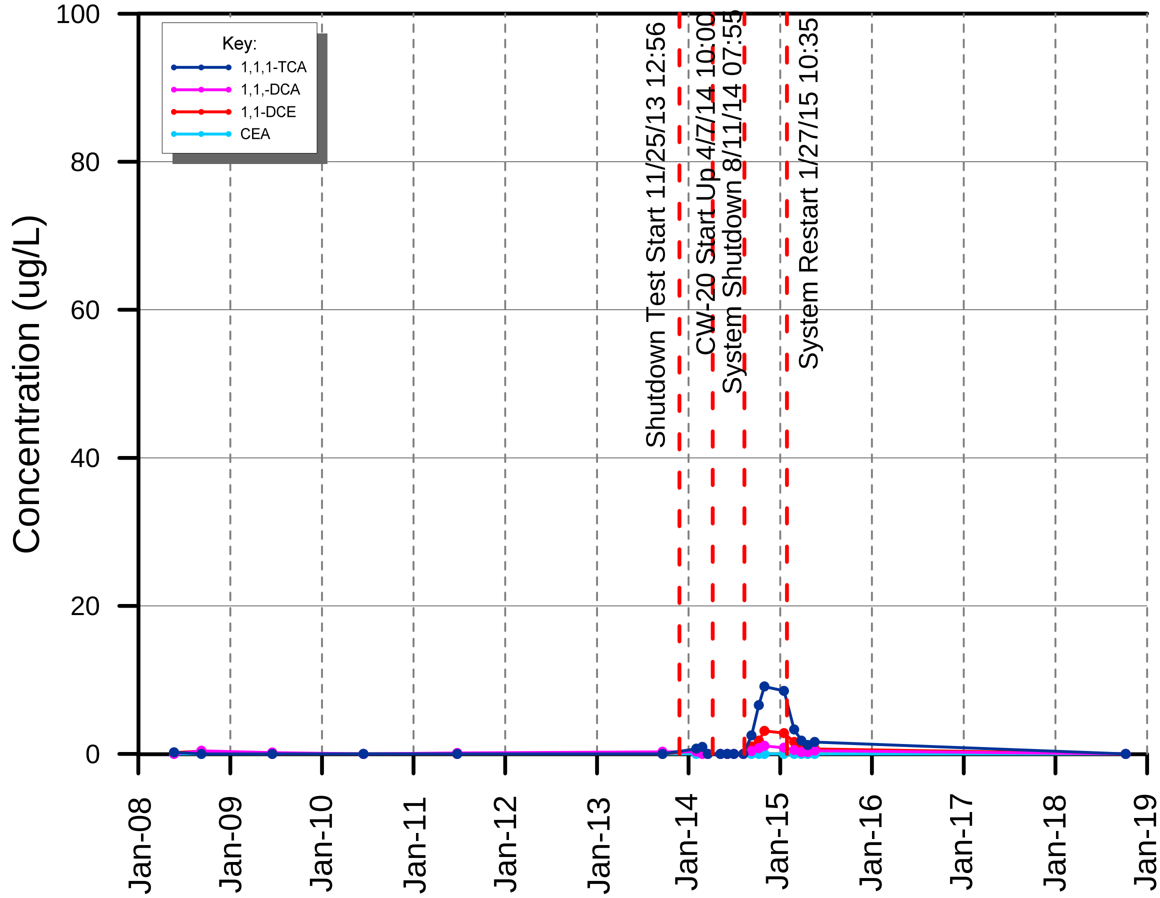


Key:
1,1,1-TCA
1,1,-DCA
1,1-DCE
CEA
Concentration (ug/L)
100
80
60
40
20
0
Shutdown Test Start 11/25/13 12:56
CW-20 Start Up 4/7/14 10:00
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19



Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Concentration (ug/L)
100
10
1
0.1
0.01
Shutdown Test Start 11/25/13 12:56
CW-20 Start Up 4/7/14 10:00
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

MW-98S



Concentration (ug/L)
100
80
60
40
20
0
Key:
1,1,1-TCA
1,1,-DCA
1,1-DCE
CEA
Shutdown Test Start 11/25/13 12:56
CW-20 Start Up 4/7/14 10:00
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-08
Jan-09
Jan-10
Jan-11
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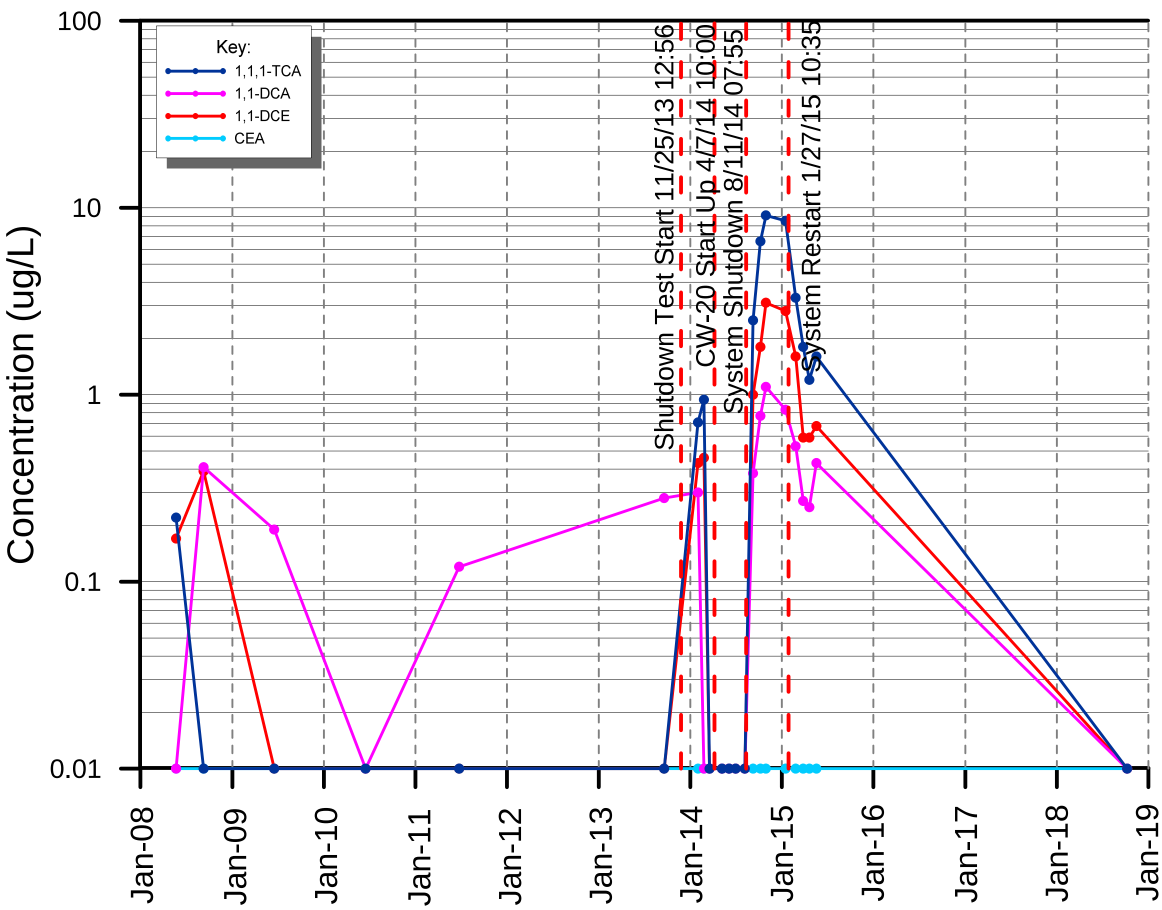
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19



Concentration (ug/L)
100
10
1
0.1
0.01
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Shutdown Test Start 11/25/13 12:56
CW-20 Start Up 4/7/14 10:00
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-08
Jan-09
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Jan-12
Jan-13
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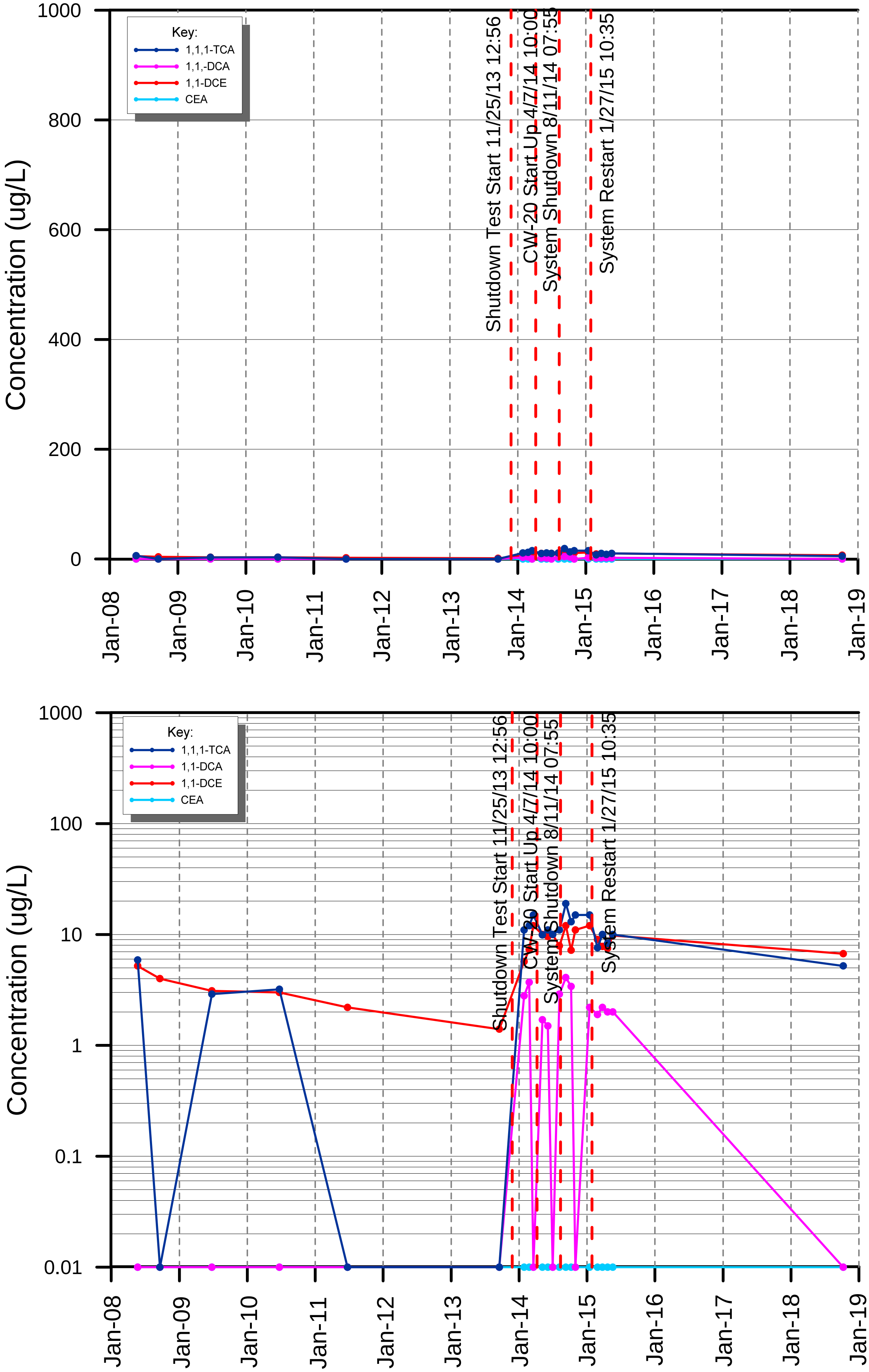
Jan-16
Jan-17
Jan-18
Jan-19

MW-99D



Key:
1,1,1-TCA
1,1,-DCA
1,1-DCE
CEA
Concentration (ug/L)
1000
800
600
400
200
0
Shutdown Test Start 11/25/13 12:56
CW-20 Start Up 4/7/14 10:00
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Concentration (ug/L)
1000
100
10
1
0.1
0.01
Shutdown Test Start 11/25/13 12:56
CW-20 Start Up 4/7/14 10:00
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-08
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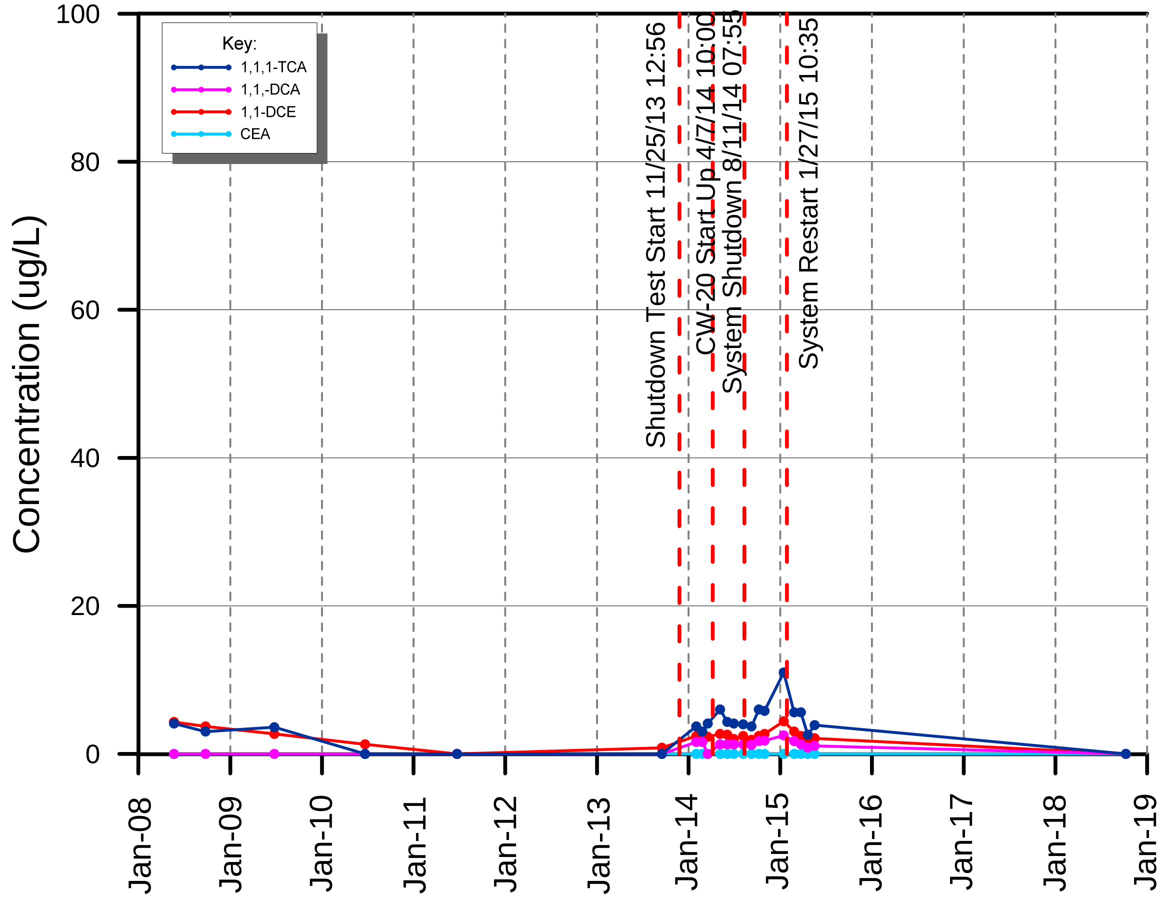
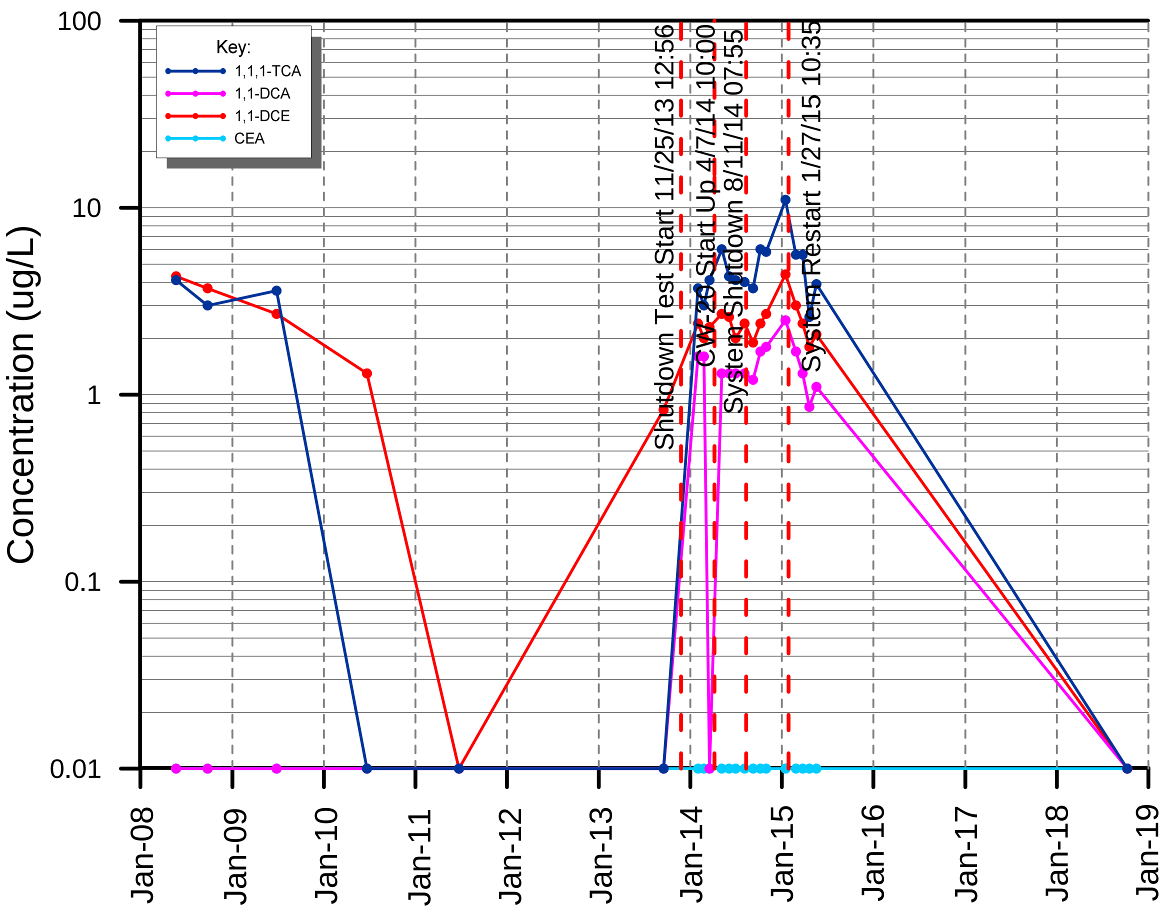
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

MW-99S

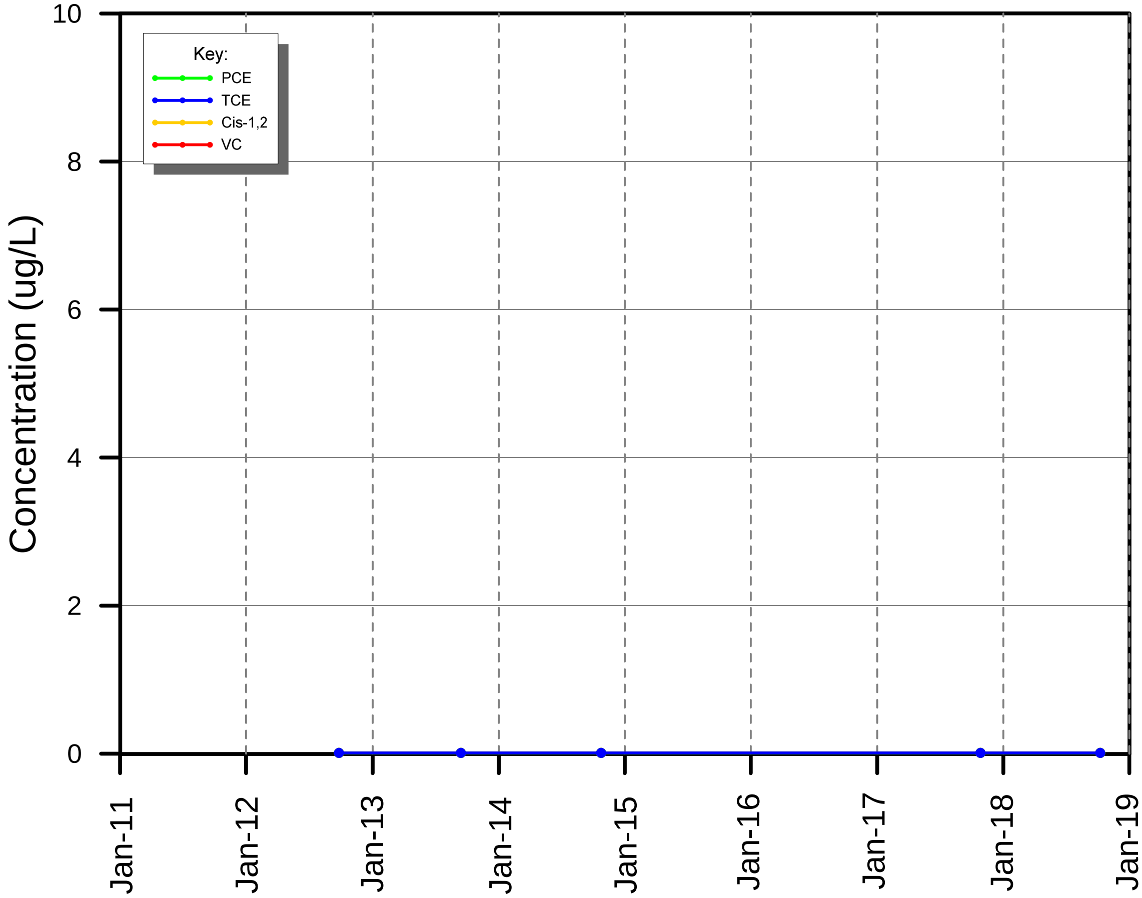

Key:
1,1,1-TCA
1,1,-DCA
1,1-DCE
CEA
Concentration (ug/L)
100
80
60
40
20
0
Shutdown Test Start 11/25/13 12:56
CW-20 Start Up 4/7/14 10:00
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19


Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Concentration (ug/L)
100
10
1
0.1
0.01
Shutdown Test Start 11/25/13 12:56
CW-20 Start Up 4/7/14 10:00
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

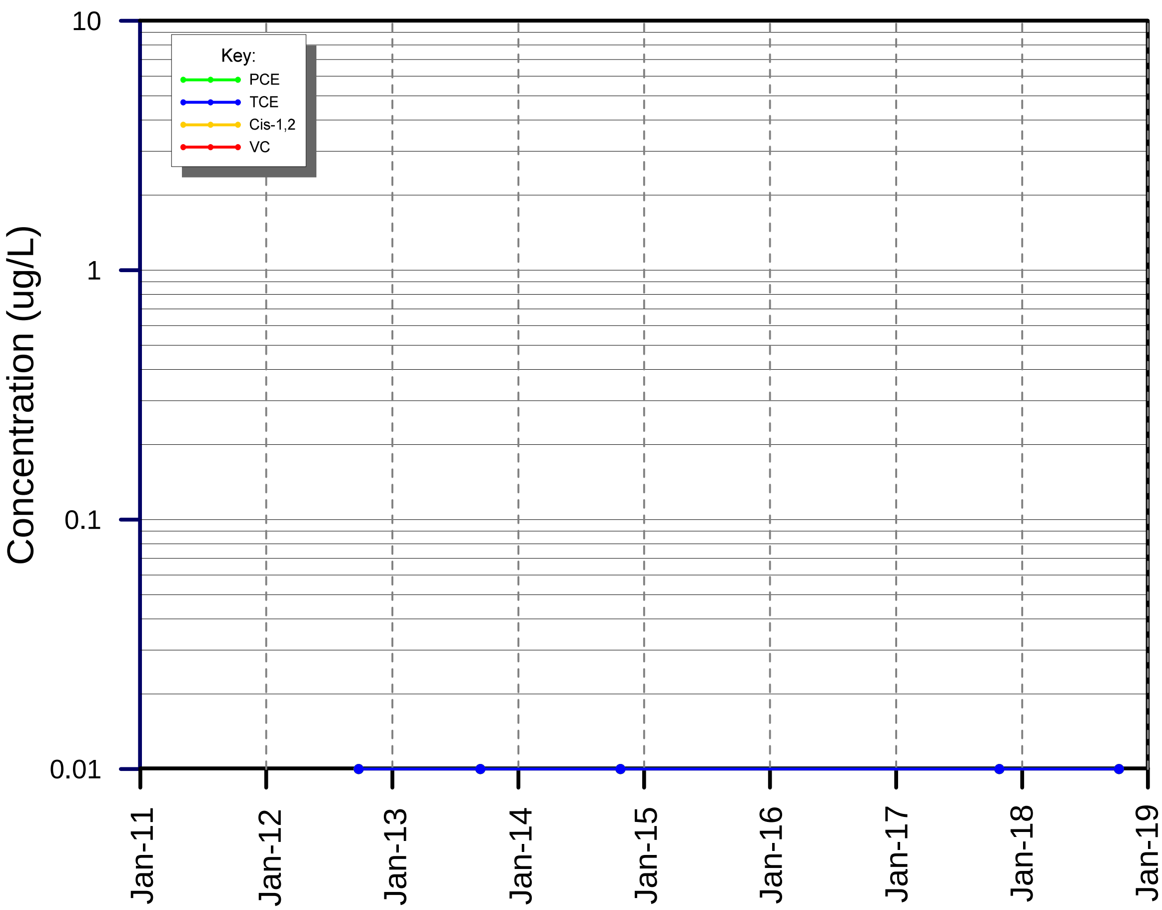
Appendix F-3

South Plume Area

ColeB

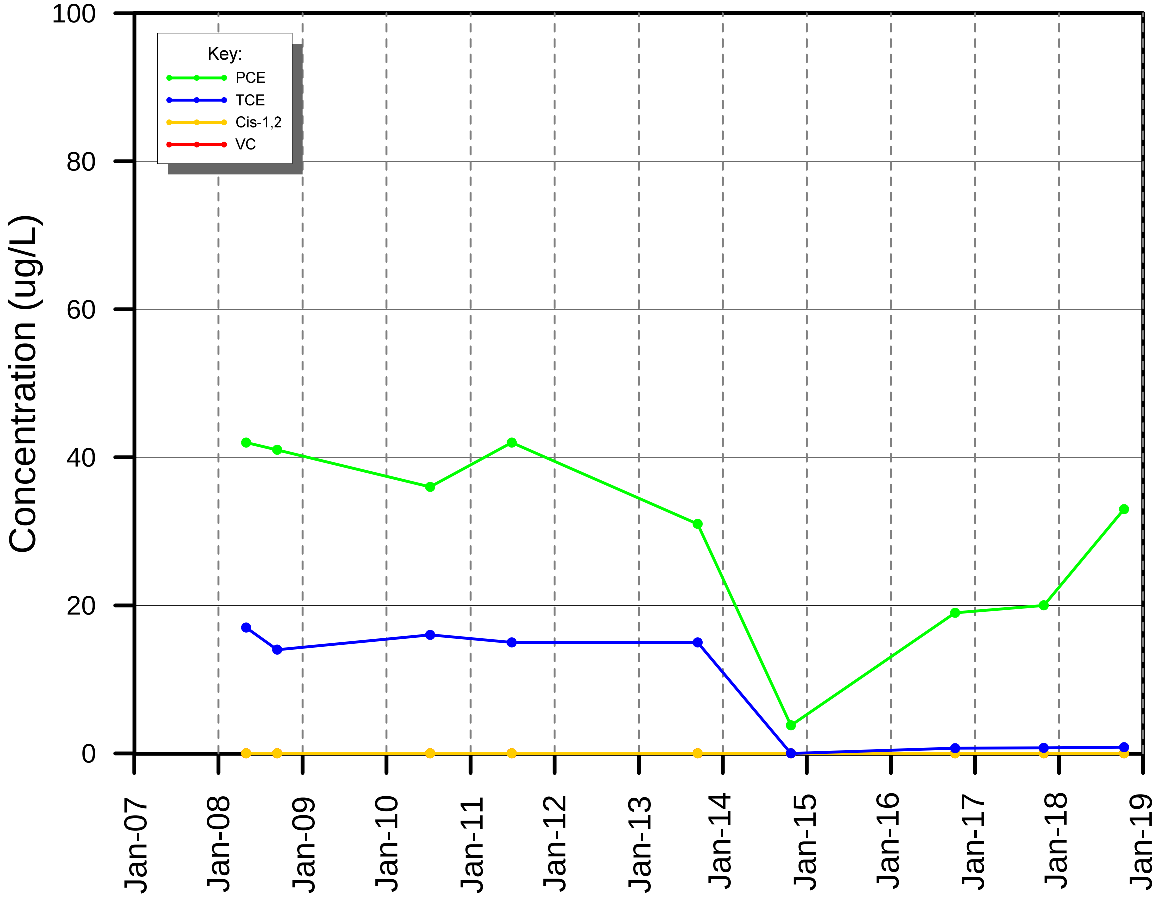


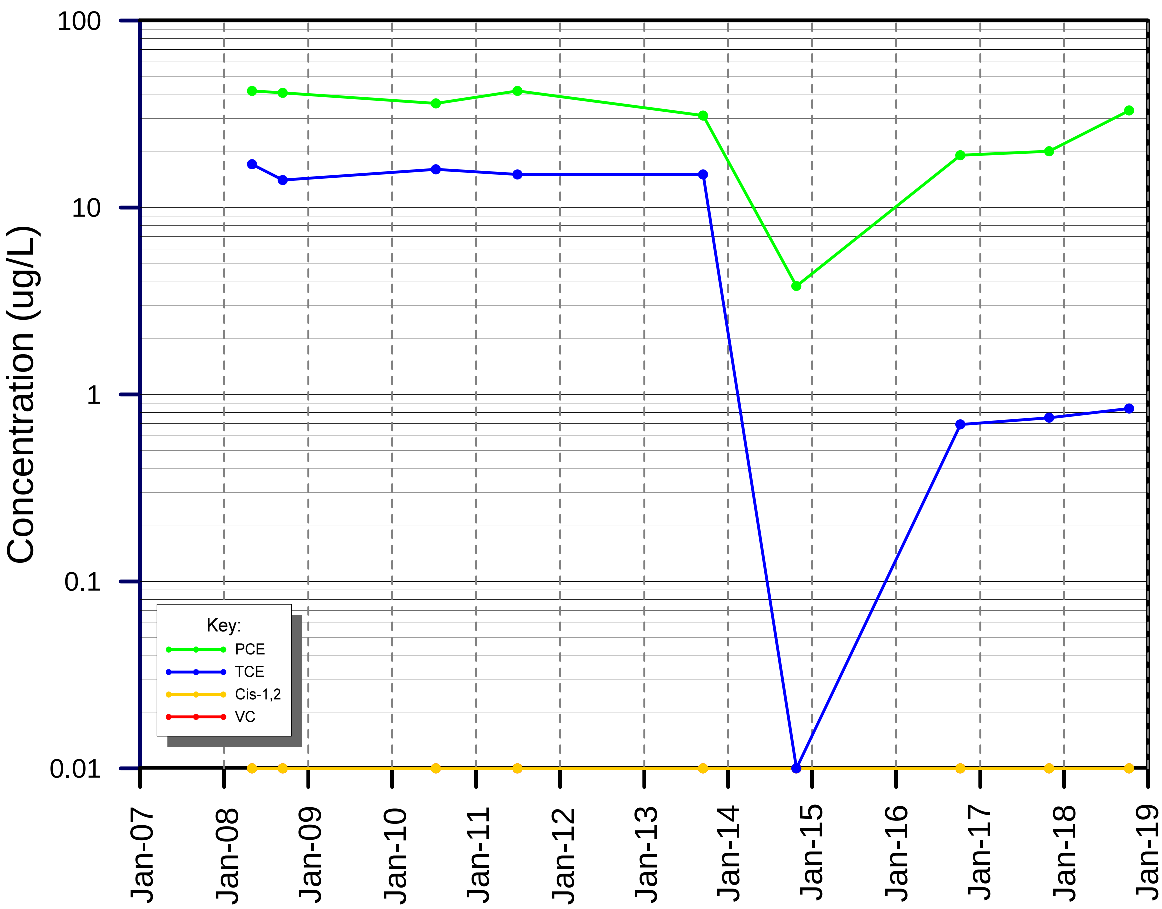
10
8
6
4
2
0
Concentration (ug/L)
Key:
PCE
TCE
Cis-1,2
VC
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19



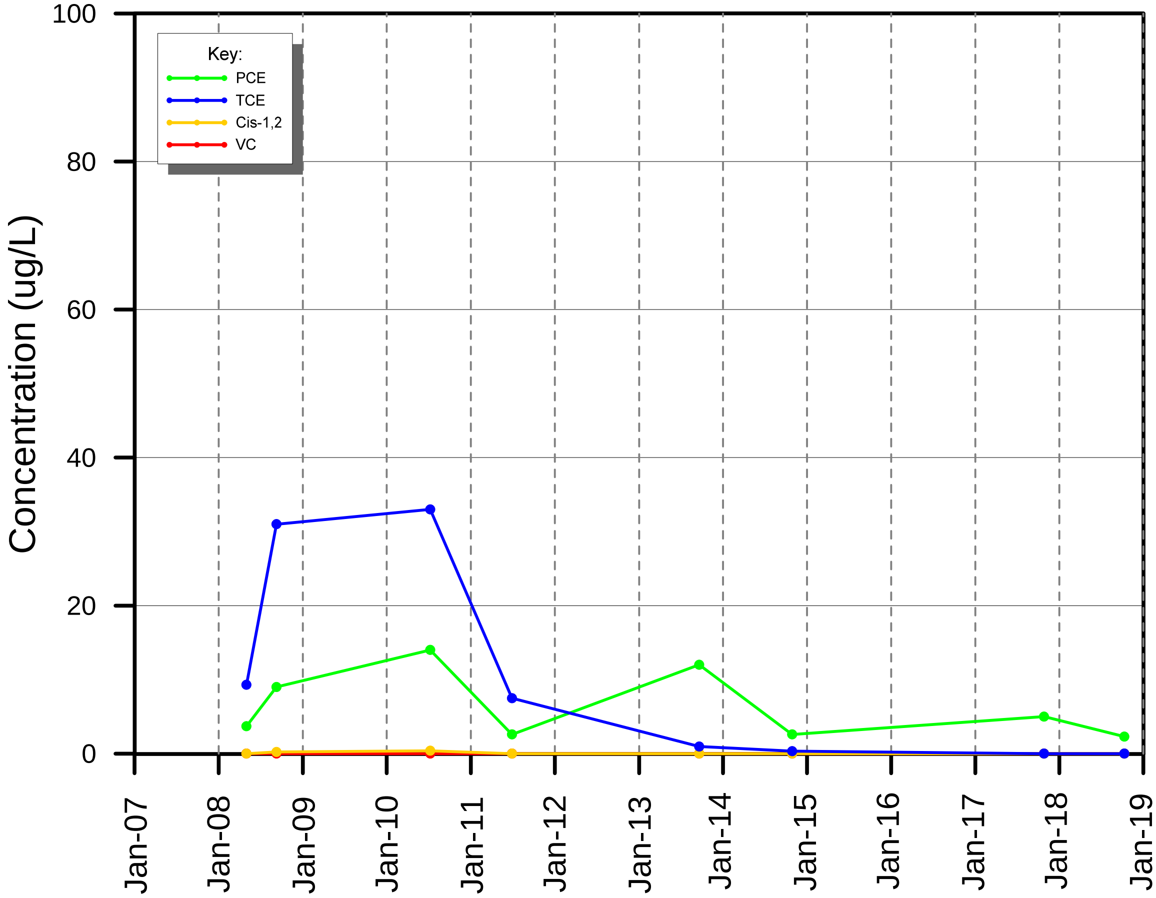
10
1
0.1
0.01
Concentration (ug/L)
Key:
PCE
TCE
Cis-1,2
VC
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

Cole D

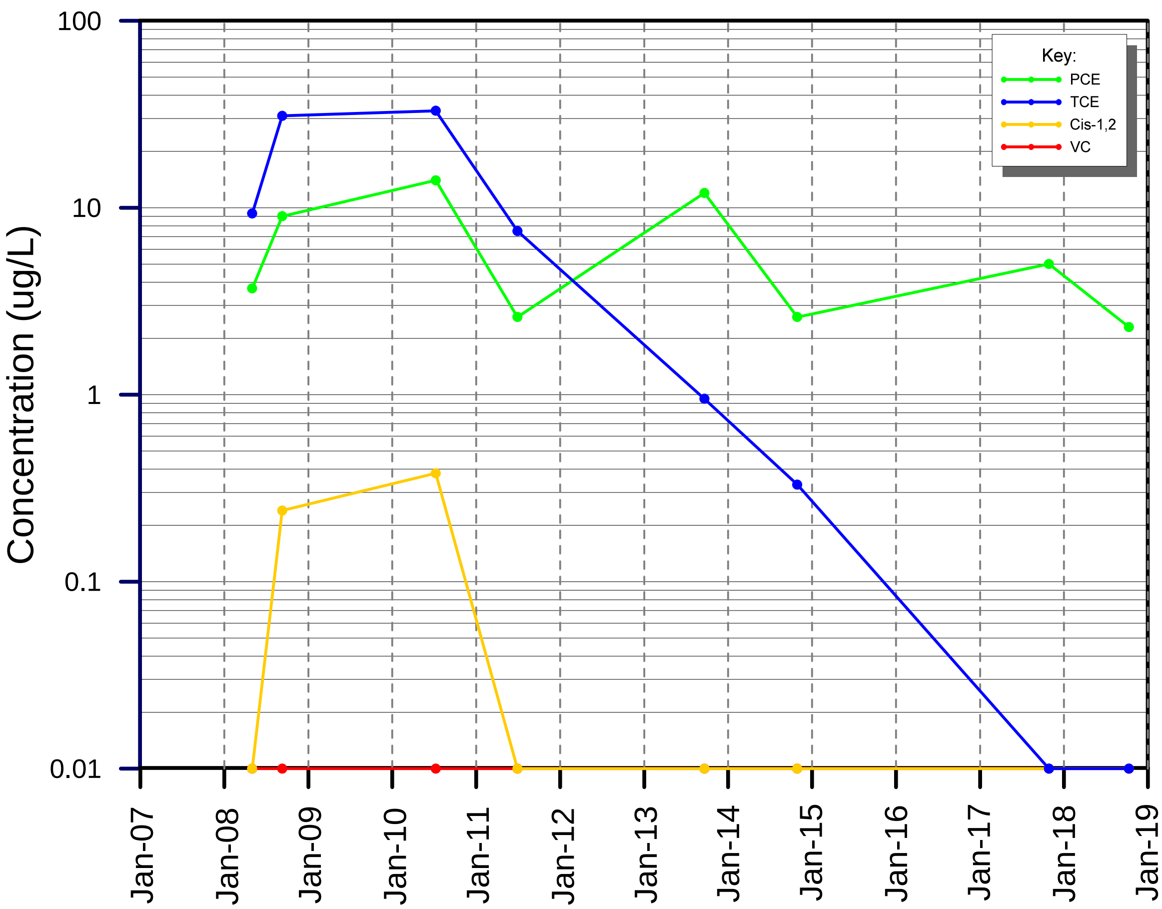

Key:
PCE
TCE
Cis-1,2
VC
Concentration (ug/L)
100
80
60
40
20
0
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19


Key:
PCE
TCE
Cis-1,2
VC
Concentration (ug/L)
100
10
1
0.1
0.01
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

Cole F

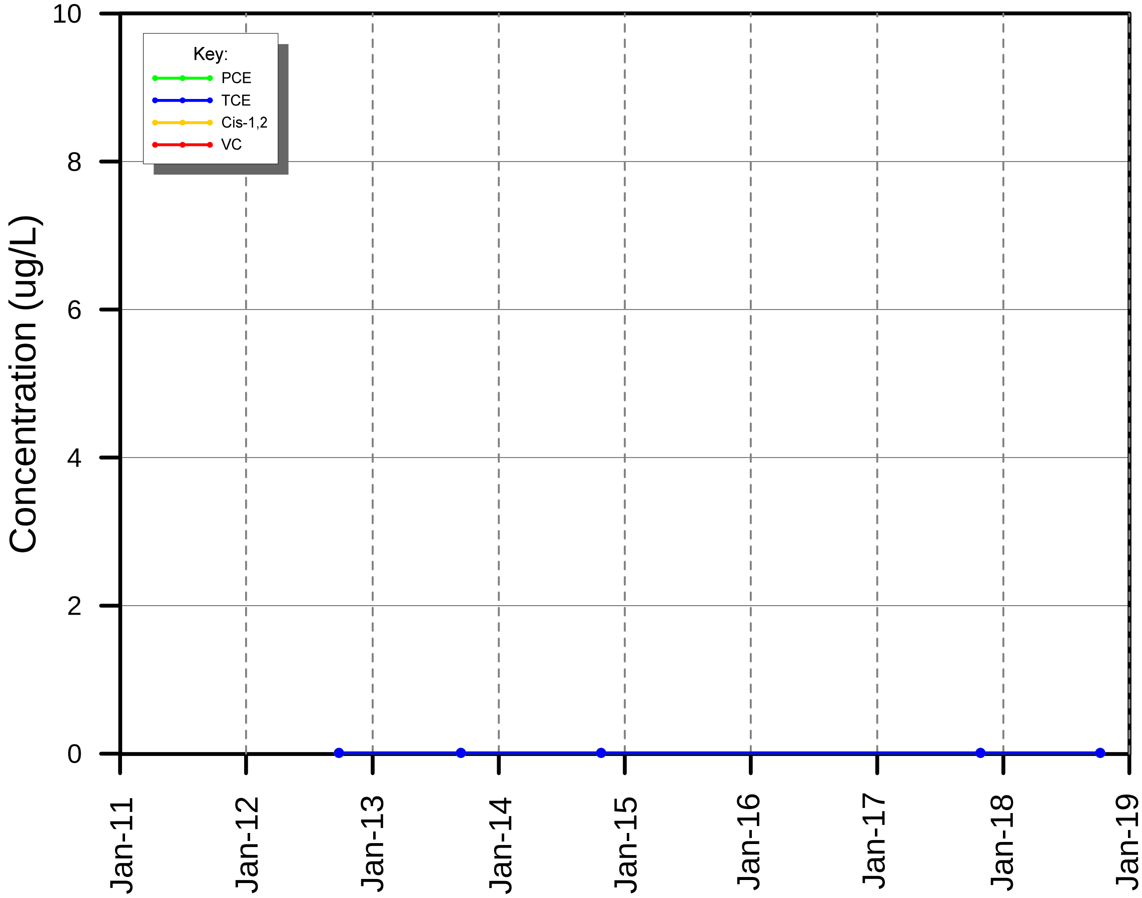


Key:
PCE
TCE
Cis-1,2
VC
Concentration (ug/L)
100
80
60
40
20
0
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

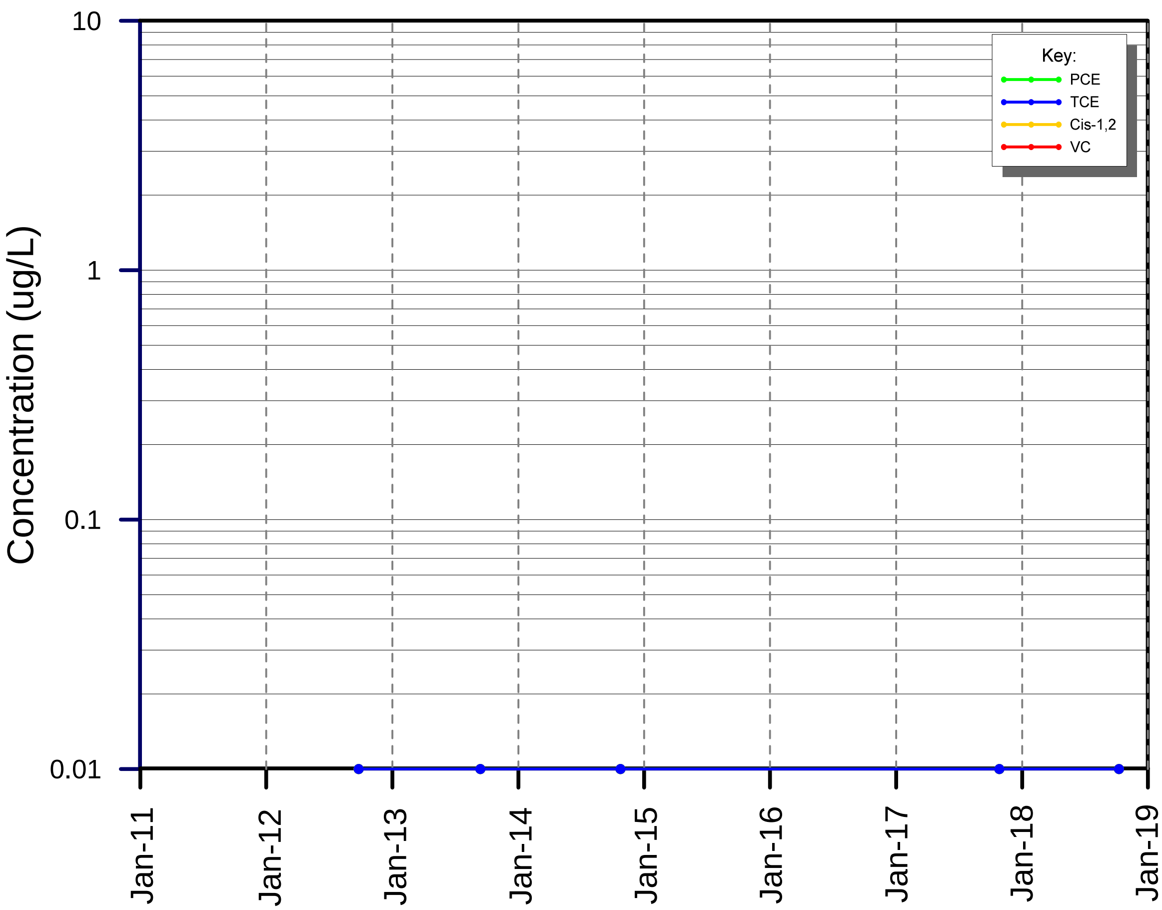


Key:
PCE
TCE
Cis-1,2
VC
Concentration (ug/L)
100
10
1
0.1
0.01
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

Cole Flush

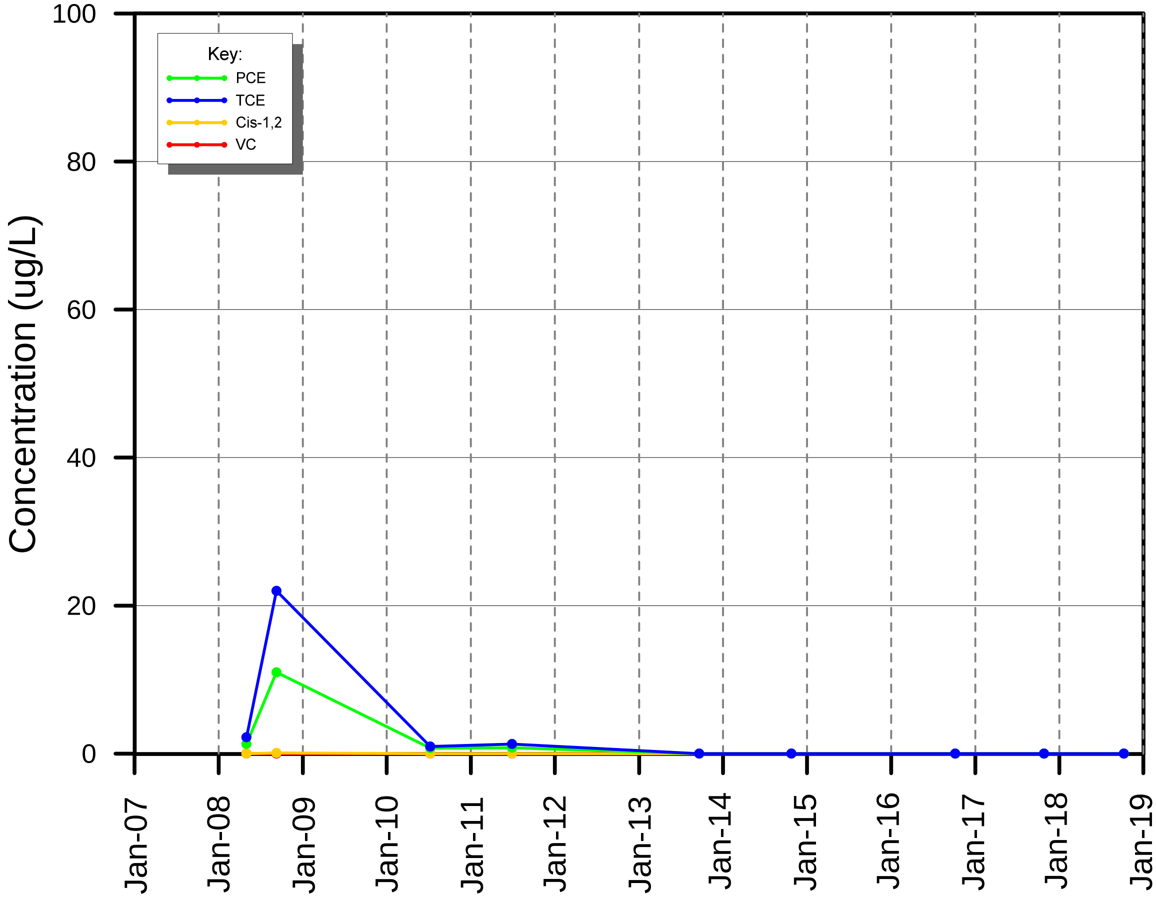


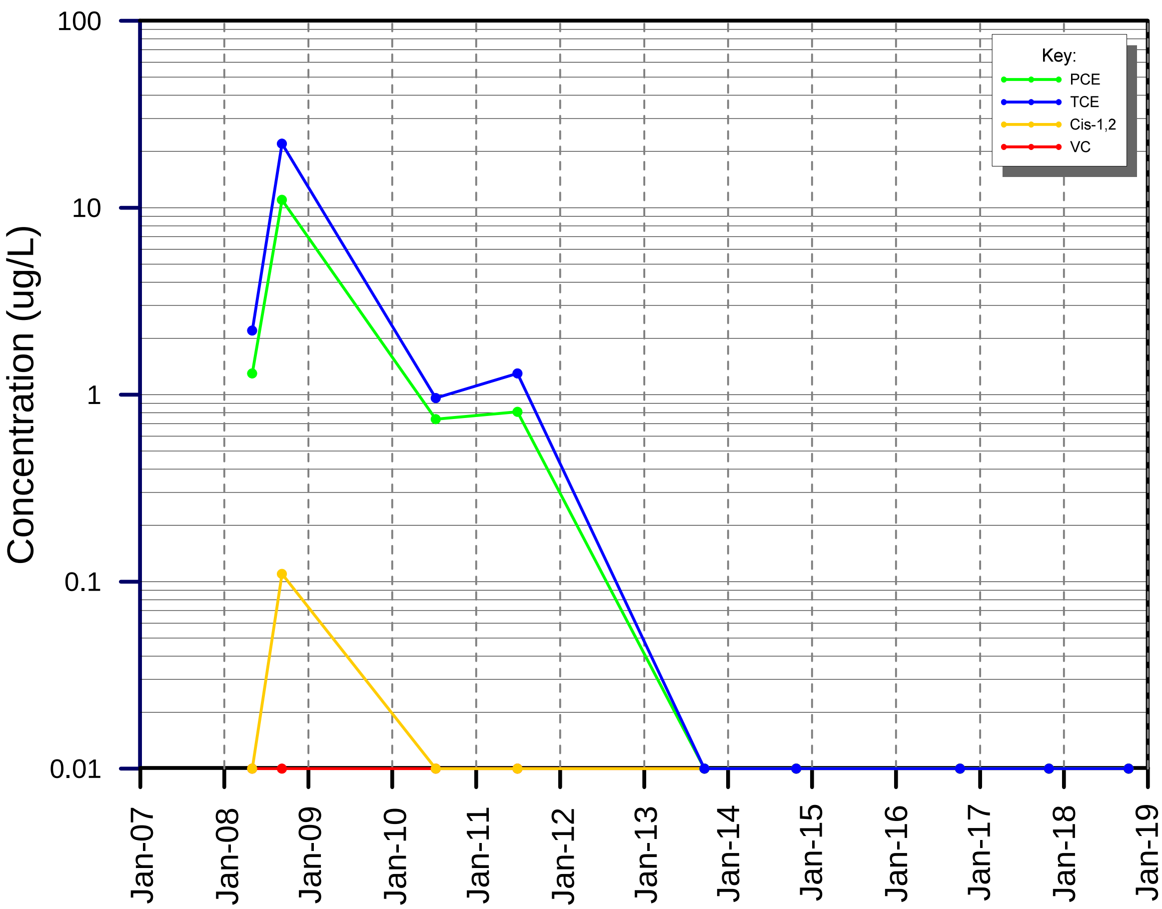
Concentration (ug/L)
10
8
6
4
2
0
Key:
PCE
TCE
Cis-1,2
VC
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19



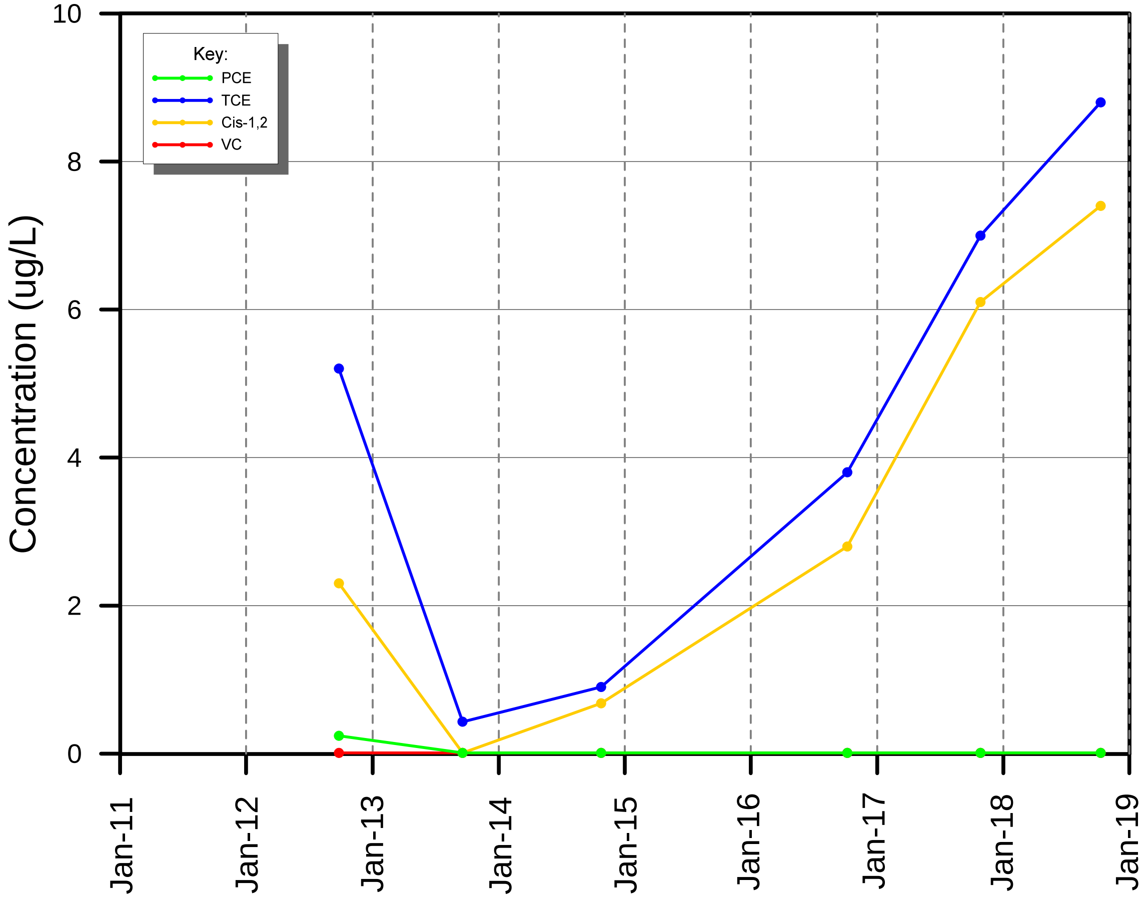
Concentration (ug/L)
10
1
0.1
0.01
Key:
PCE
TCE
Cis-1,2
VC
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

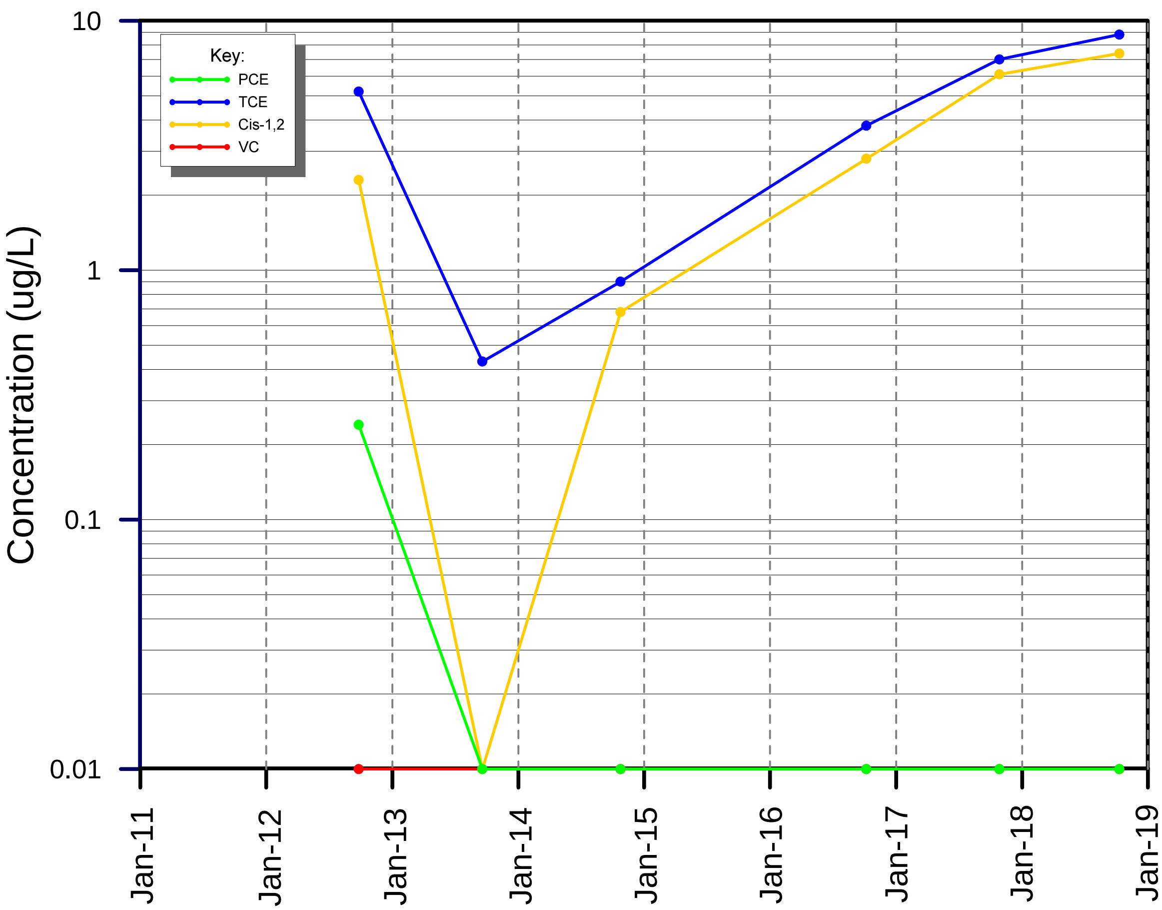
Cole MW-4


Key:
PCE
TCE
Cis-1,2
VC
Concentration (ug/L)
100
80
60
40
20
0
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

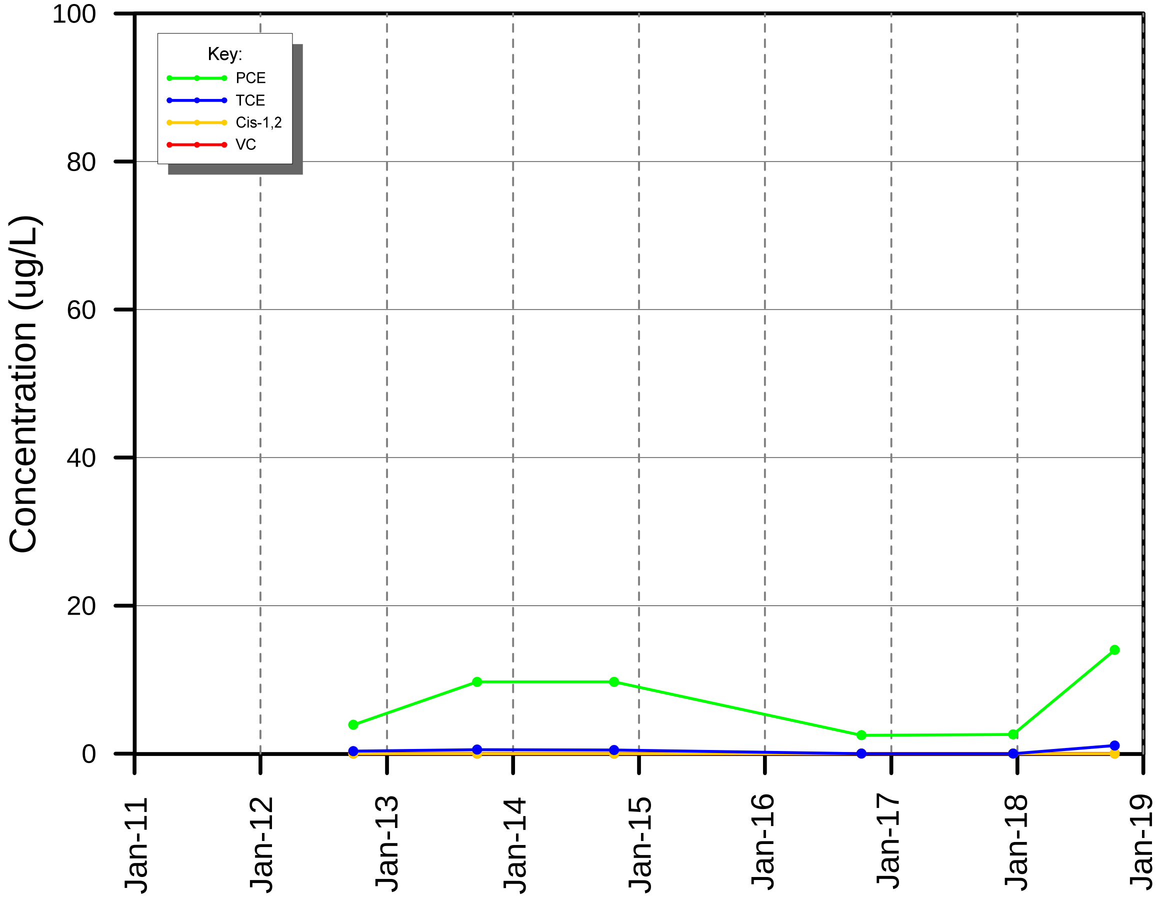

Key:
PCE
TCE
Cis-1,2
VC
Concentration (ug/L)
100
10
1
0.1
0.01
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

Cole Steel (MW-12)

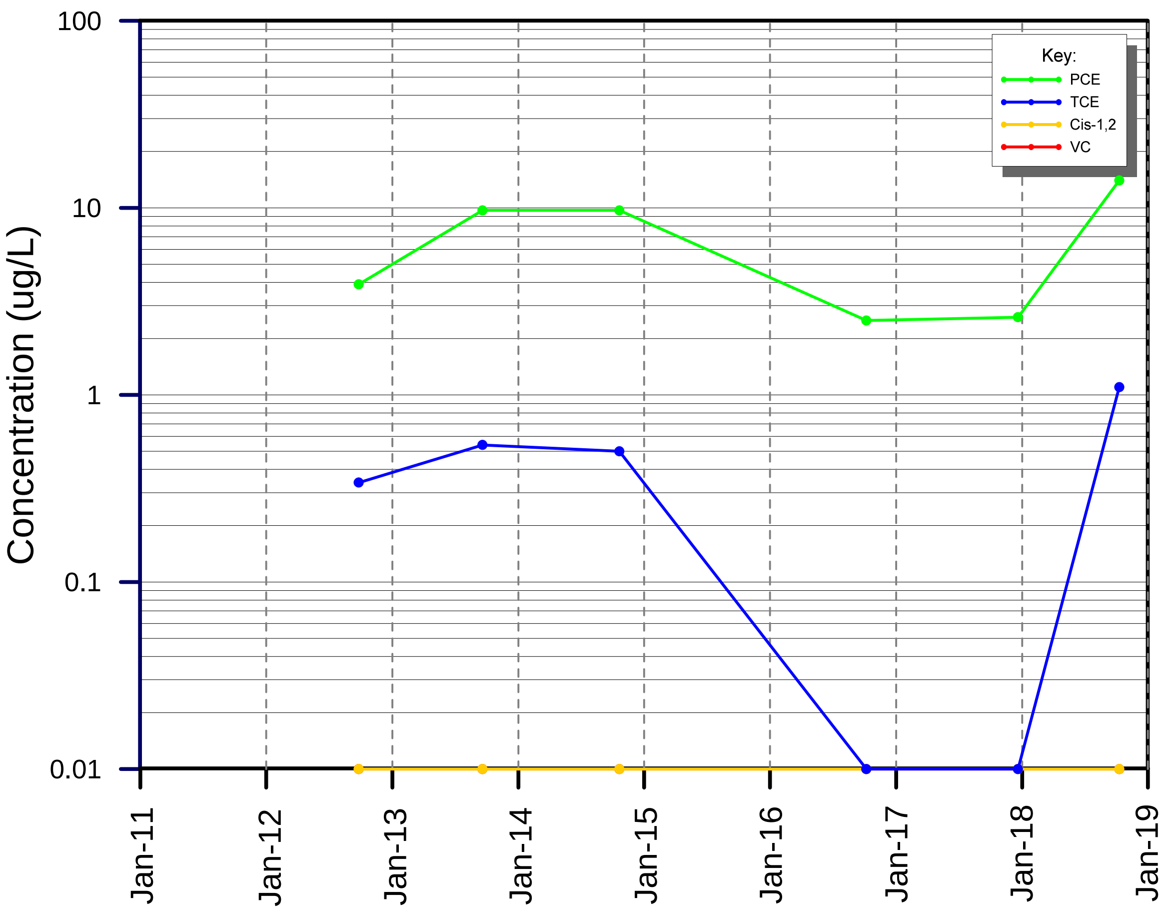




GM-1D

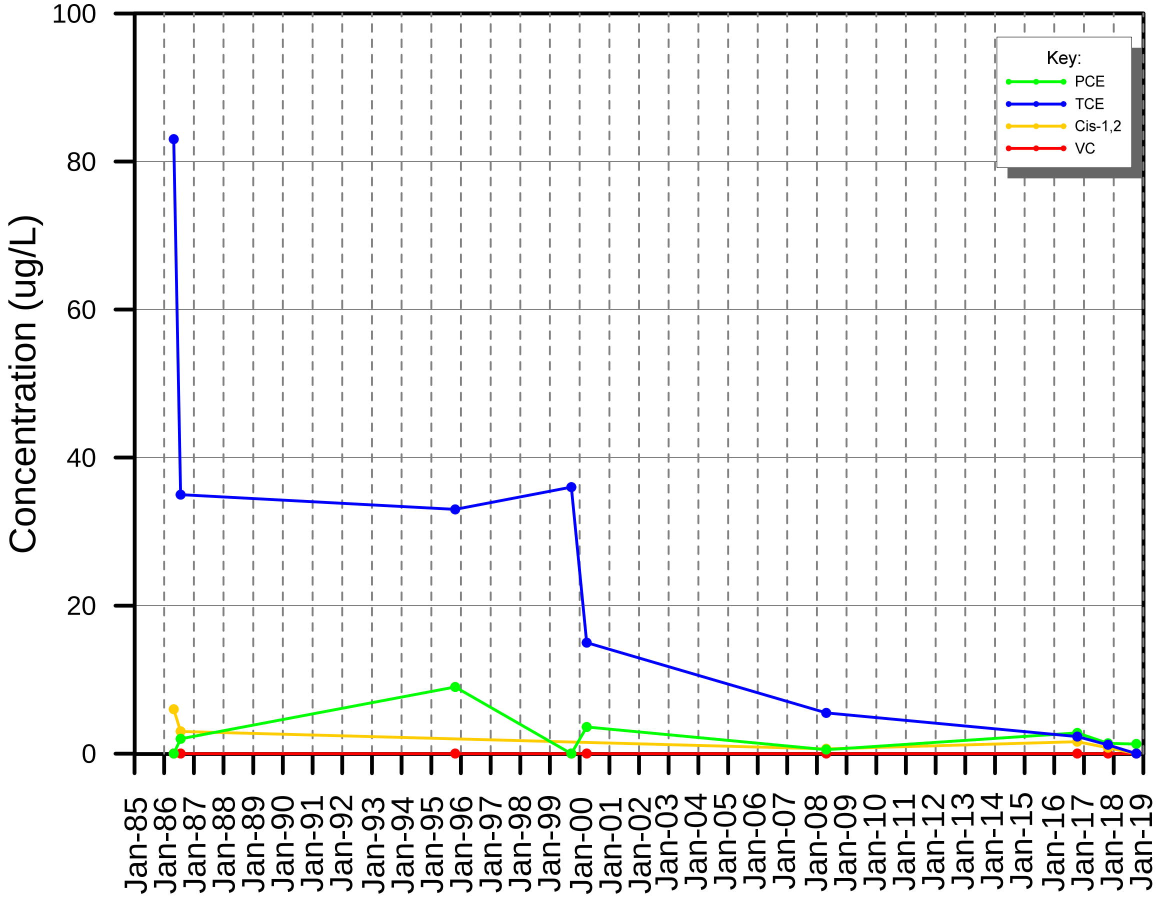


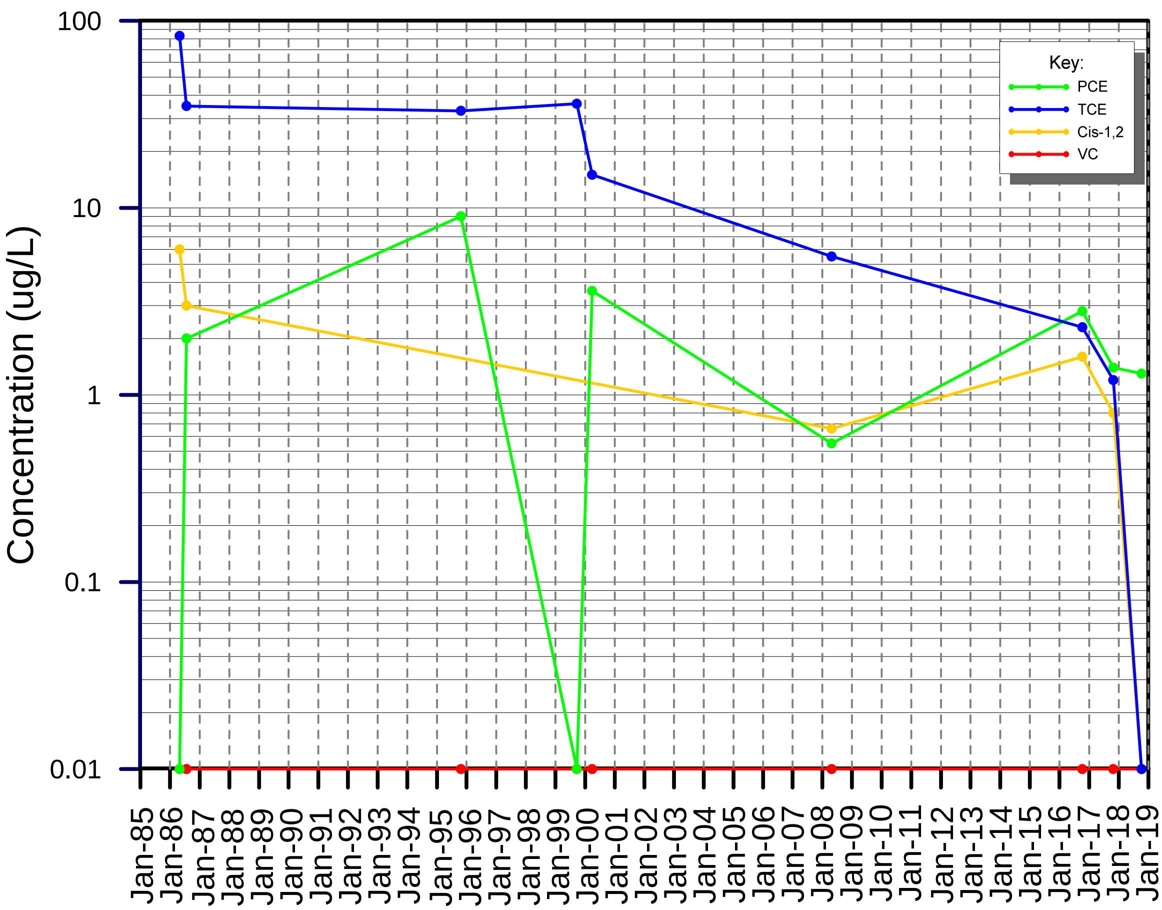
Concentration (ug/L)
100
80
60
40
20
0
Key:
PCE
TCE
Cis-1,2
VC
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19



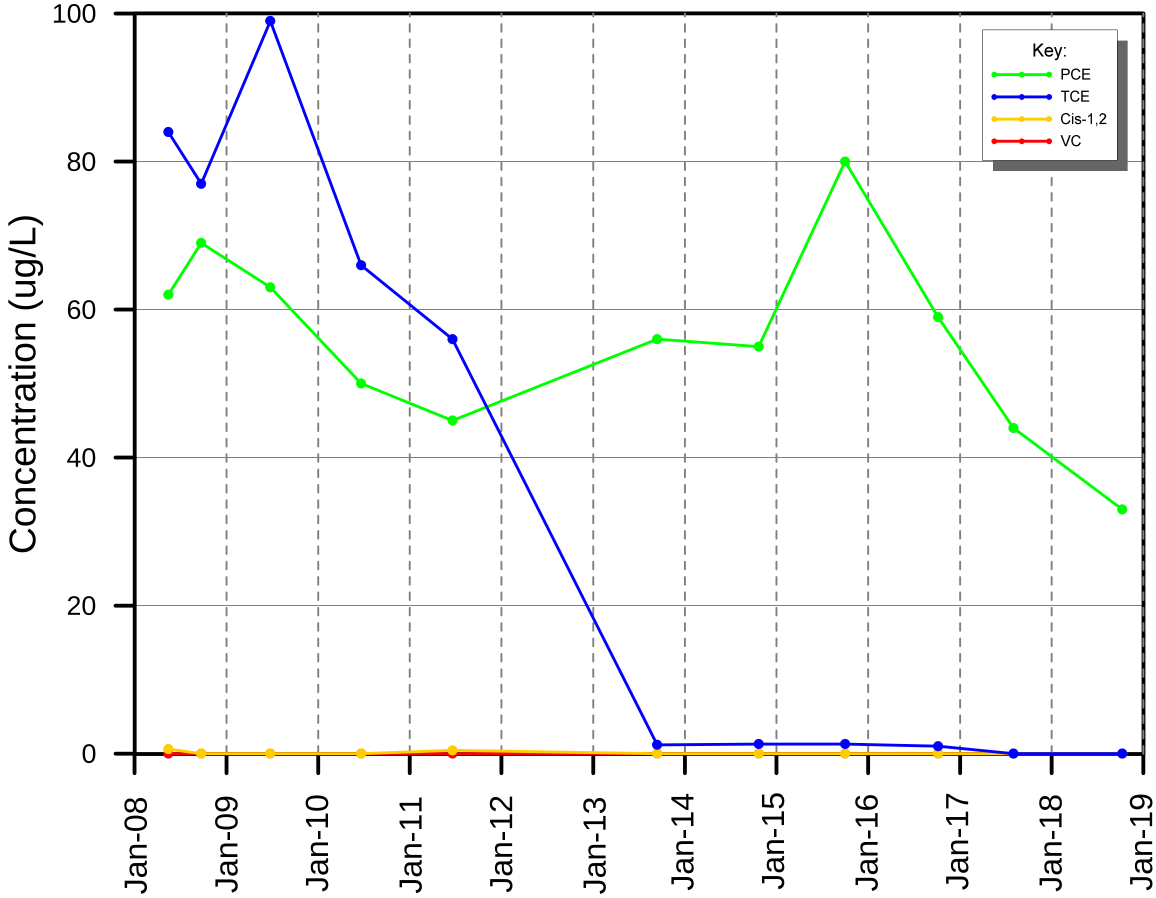
Concentration (ug/L)
100
10
1
0.1
0.01
Key:
PCE
TCE
Cis-1,2
VC
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

MW-1

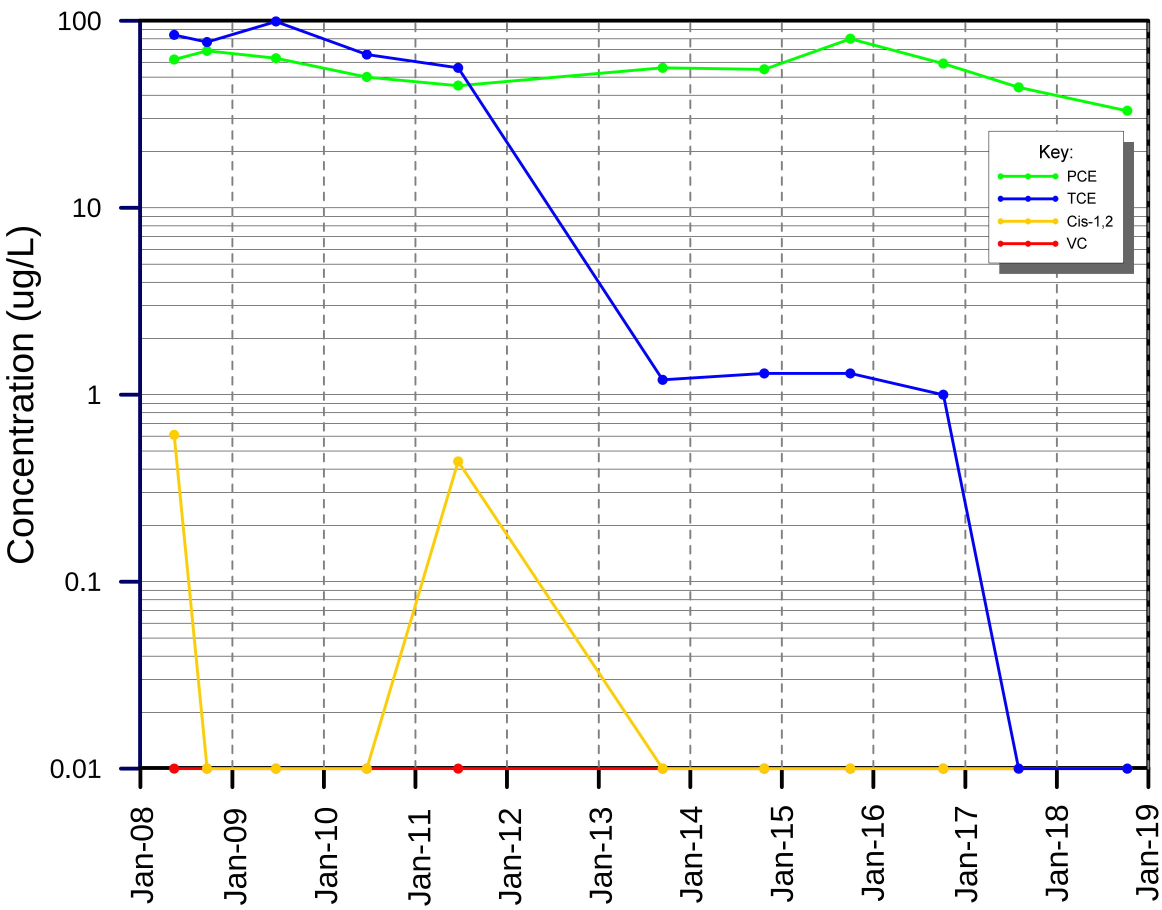

Concentration (ug/L)
100
80
60
40
20
0
Key:
PCE
TCE
Cis-1,2
VC
Jan-85 Jan-86 Jan-87 Jan-88 Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19


Concentration (ug/L)
100
10
1
0.1
0.01
Key:
PCE
TCE
Cis-1,2
VC
Jan-85 Jan-86 Jan-87 Jan-88 Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19

MW-110

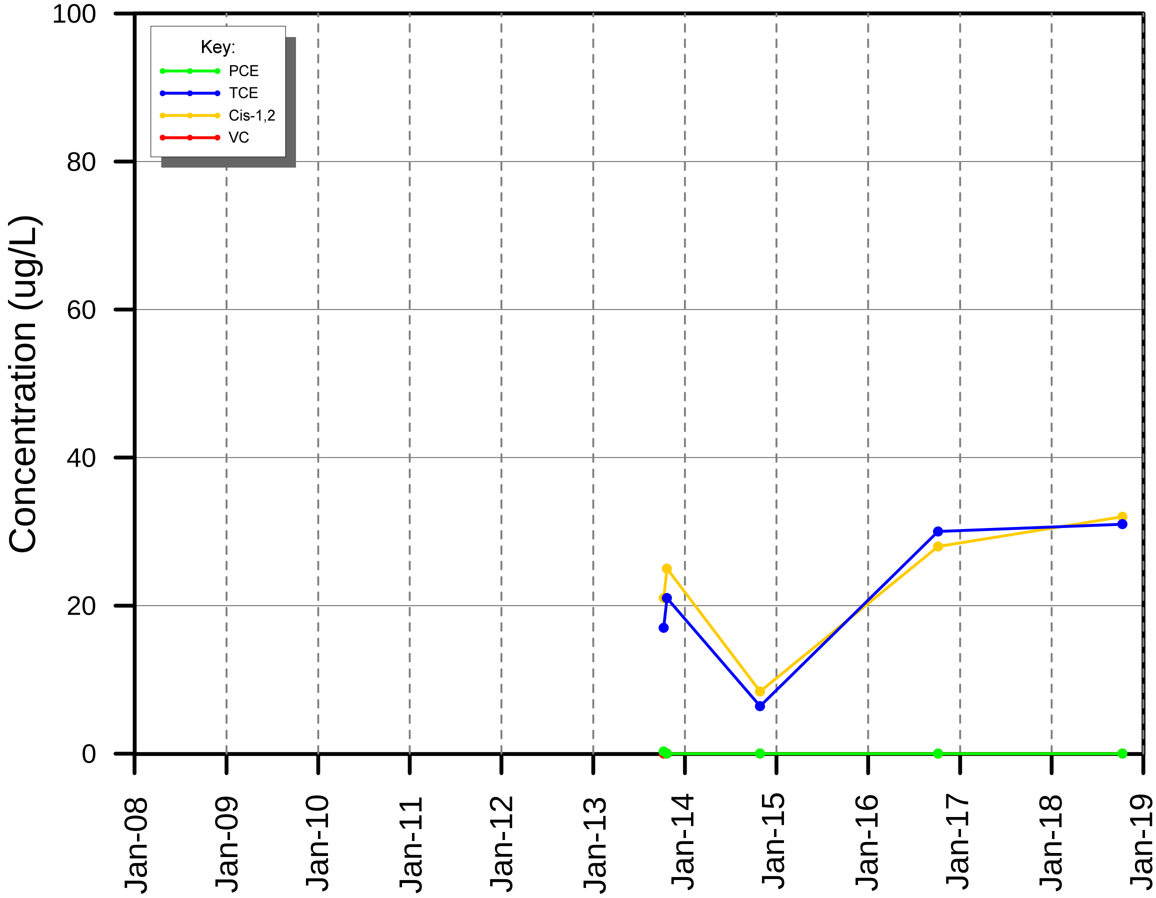


100
80
60
40
20
0
Concentration (ug/L)
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Key:
PCE
TCE
Cis-1,2
VC

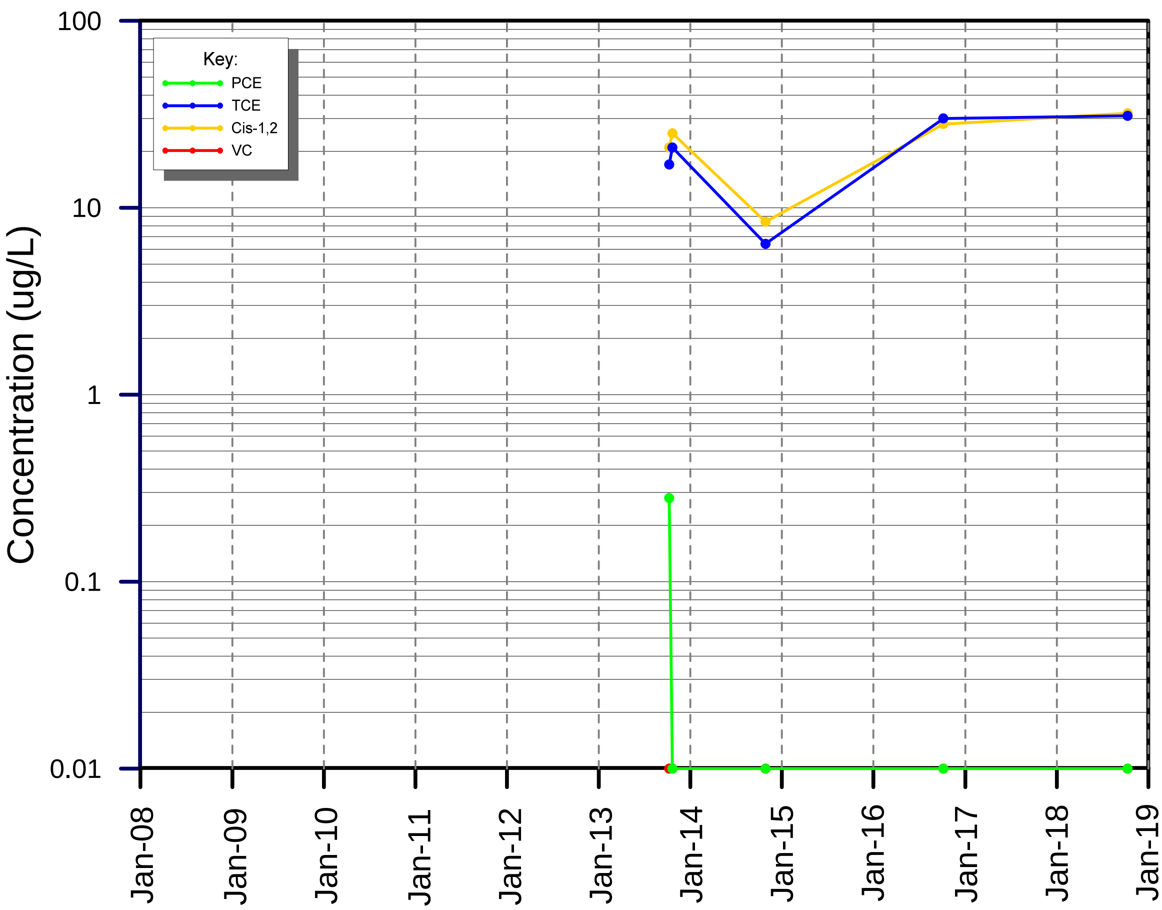


100
10
1
0.1
0.01
Concentration (ug/L)
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Key:
PCE
TCE
Cis-1,2
VC

MW-150

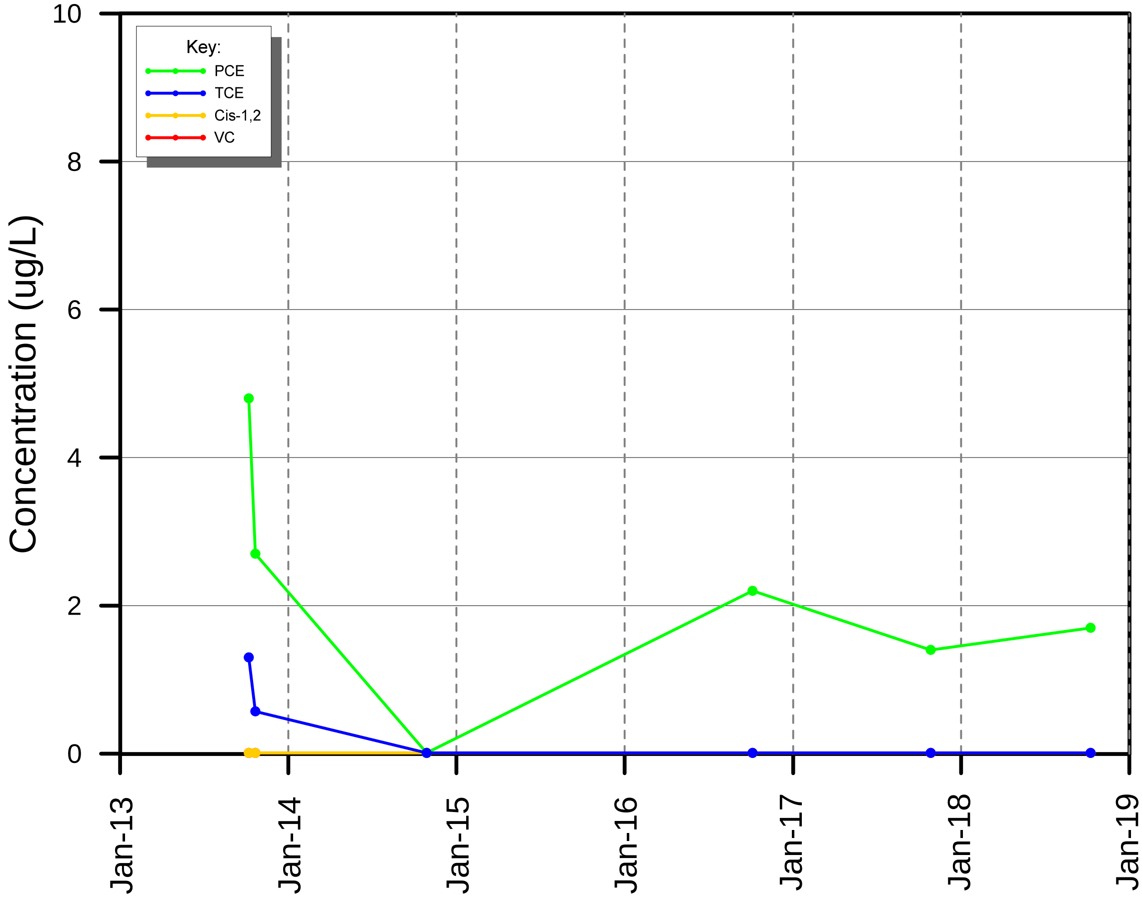


Key:
PCE
TCE
Cis-1,2
VC
Concentration (ug/L)
100
80
60
40
20
0
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

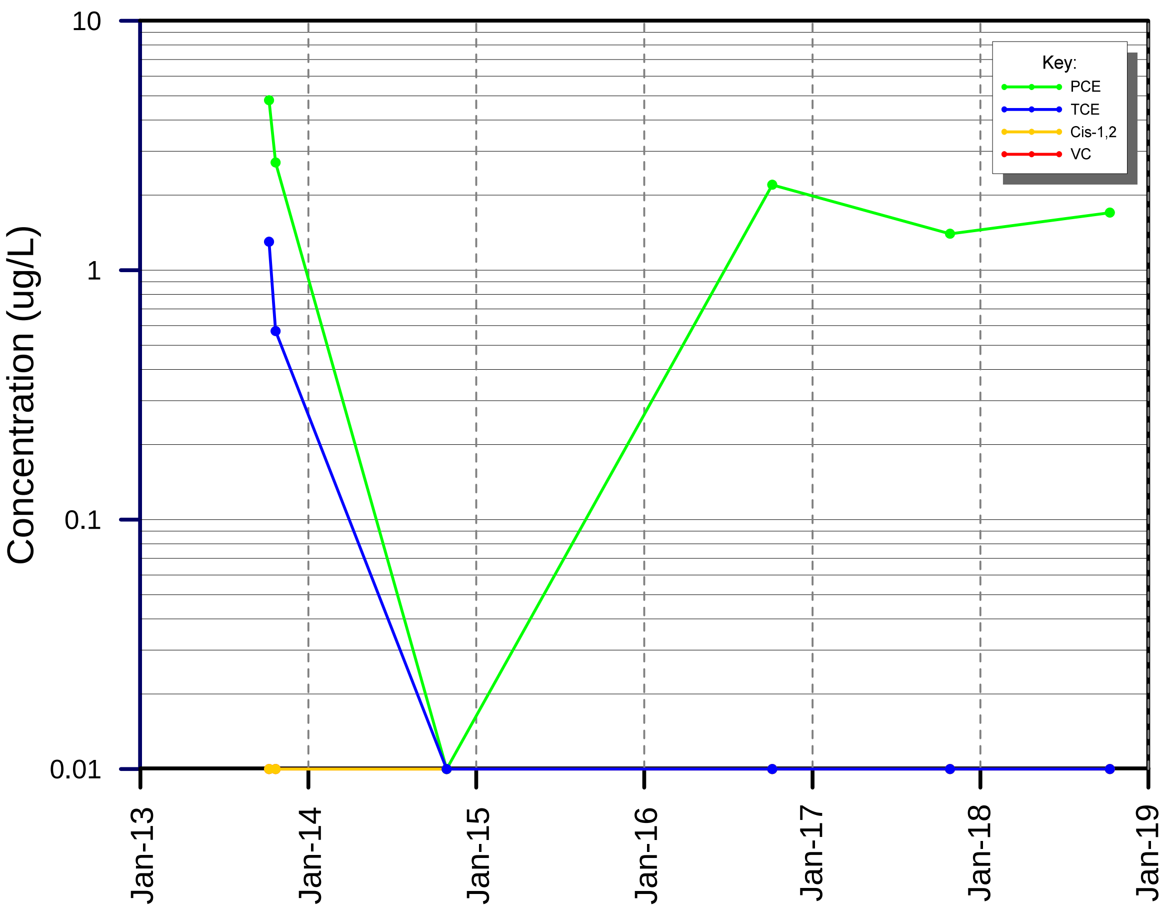


Key:
PCE
TCE
Cis-1,2
VC
Concentration (ug/L)
100
10
1
0.1
0.01
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

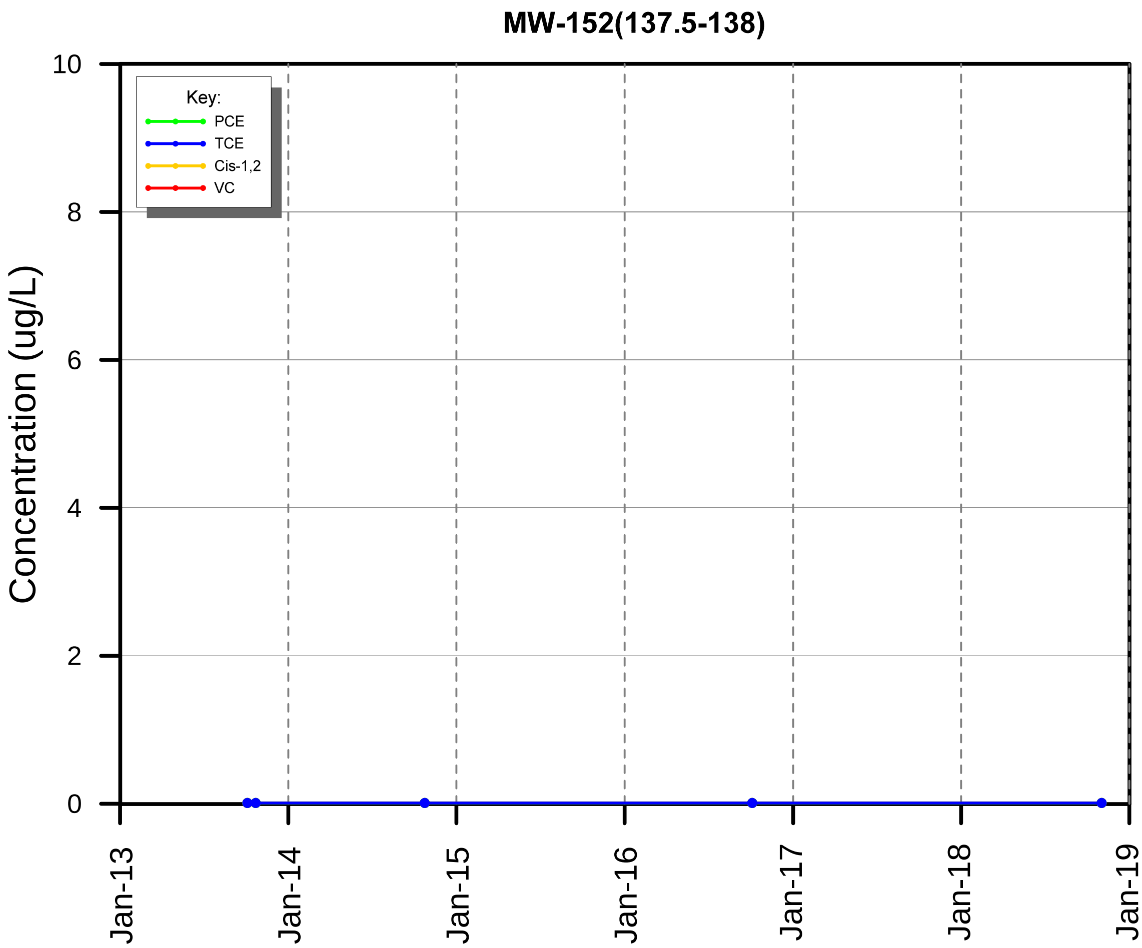
MW-151



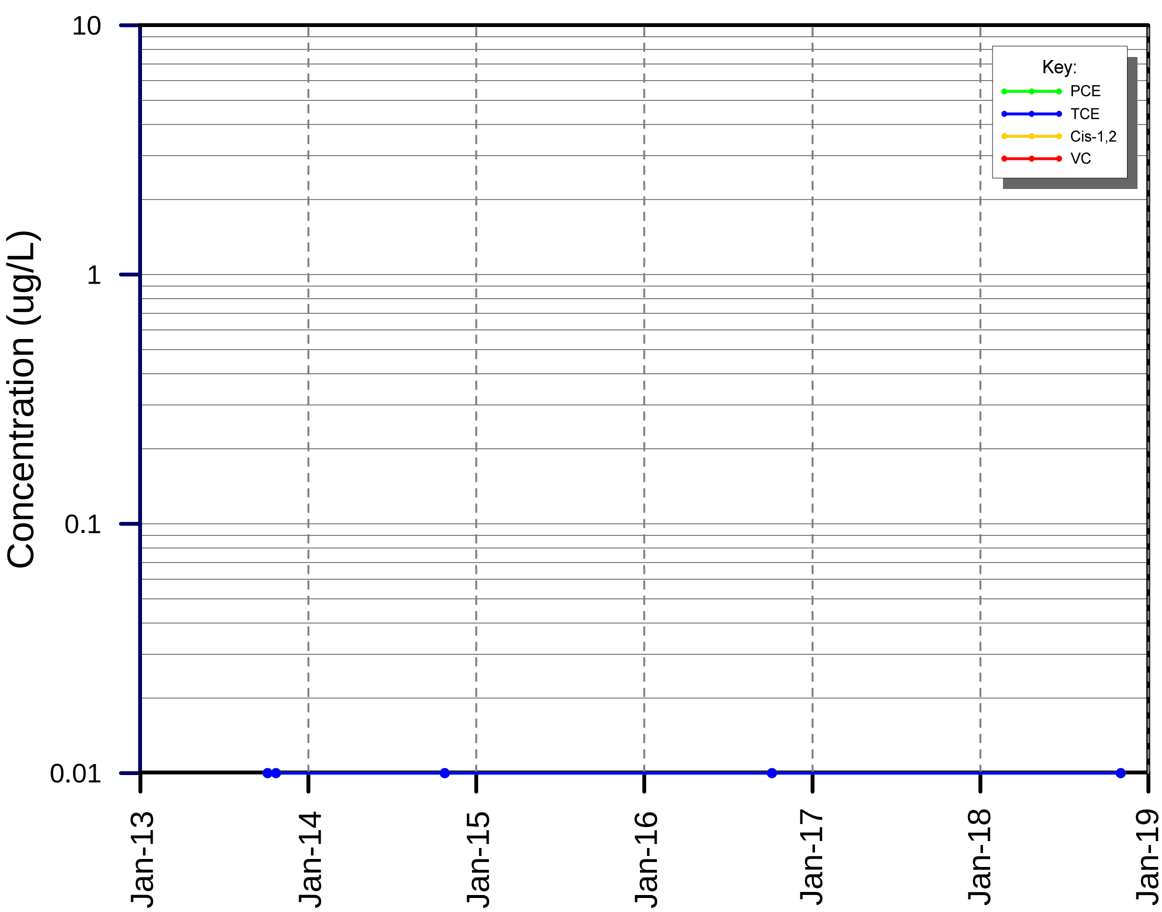
Key:
PCE
TCE
Cis-1,2
VC
Concentration (ug/L)
10
8
6
4
2
0
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19



Key:
PCE
TCE
Cis-1,2
VC
Concentration (ug/L)
10
1
0.1
0.01
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

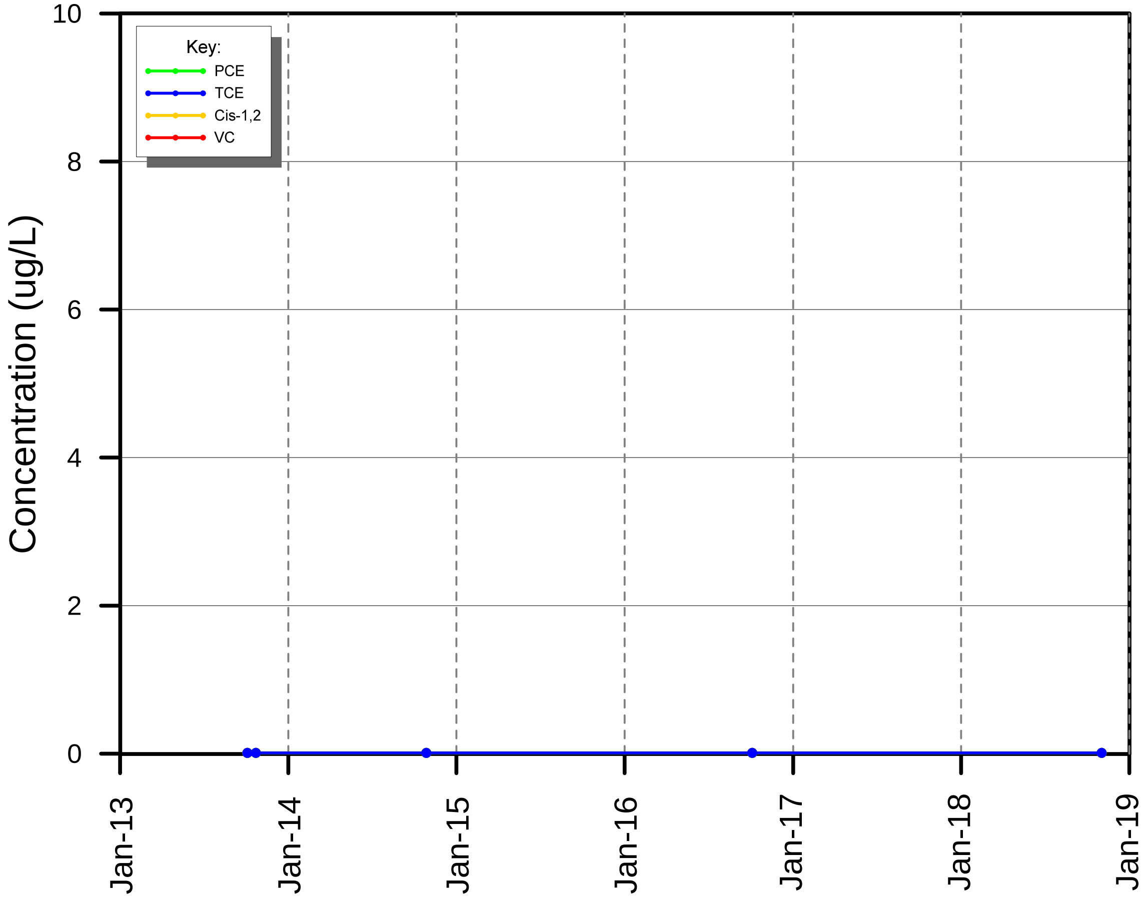


MW-152(137.5-138)
Key:
PCE
TCE
Cis-1,2
VC
Concentration (ug/L)
10
8
6
4
2
0
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

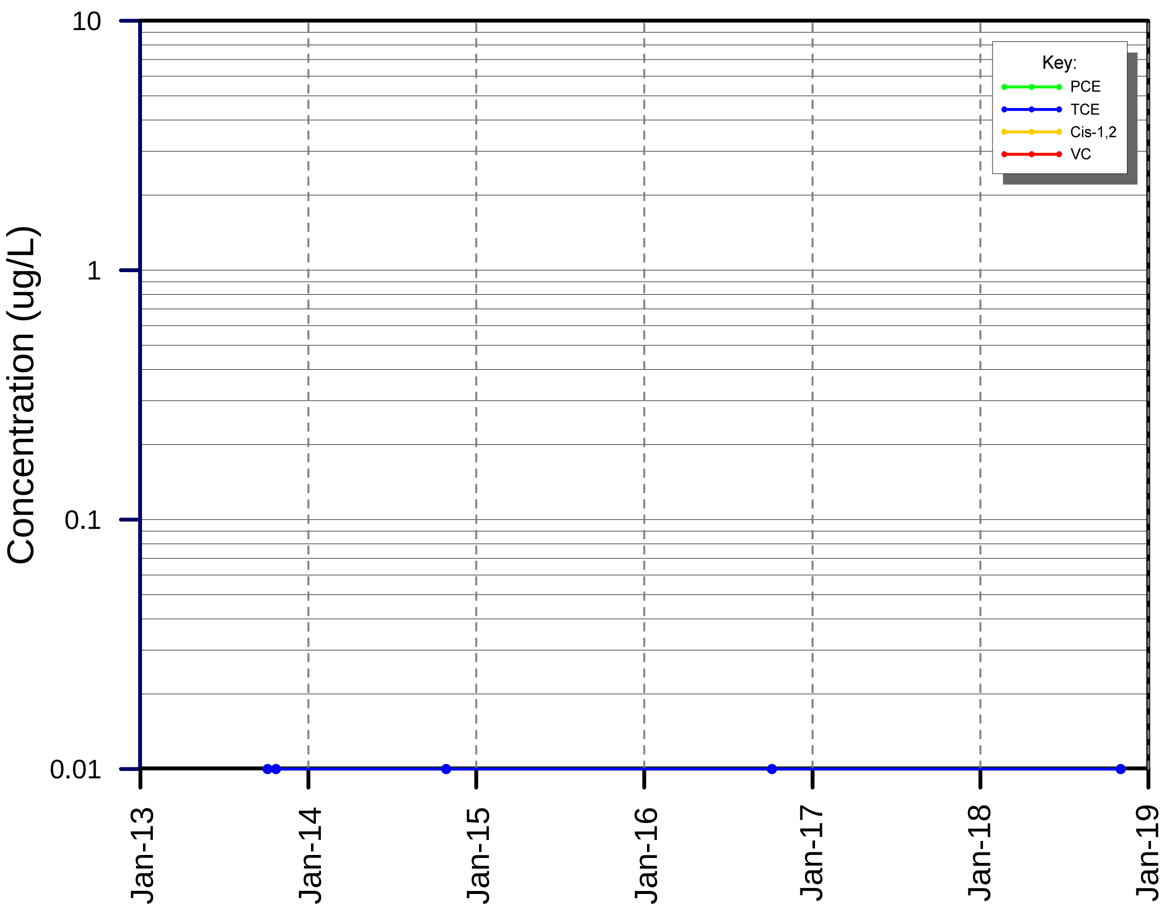


Key:
PCE
TCE
Cis-1,2
VC
Concentration (ug/L)
10
1
0.1
0.01
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

MW-152(23-23.5)

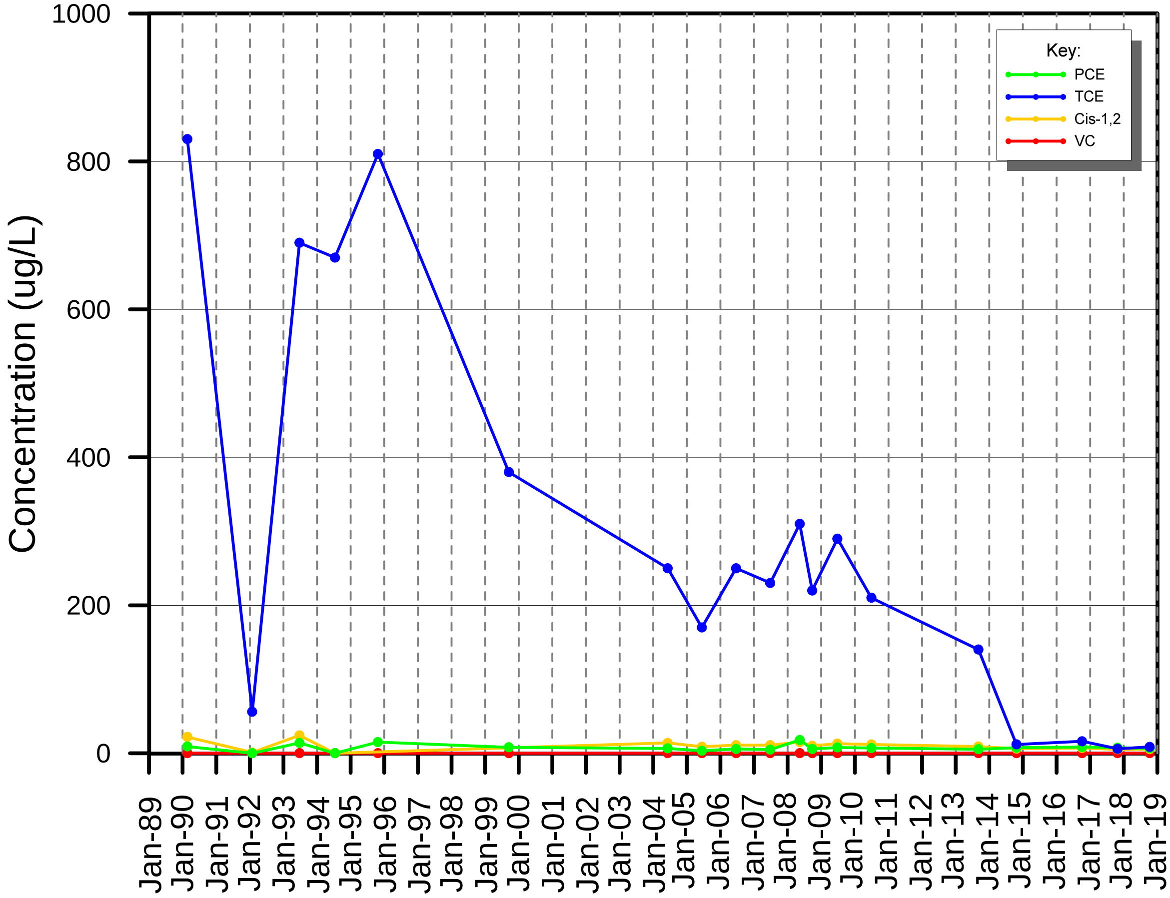


Key:
PCE
TCE
Cis-1,2
VC
Concentration (ug/L)
10
8
6
4
2
0
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

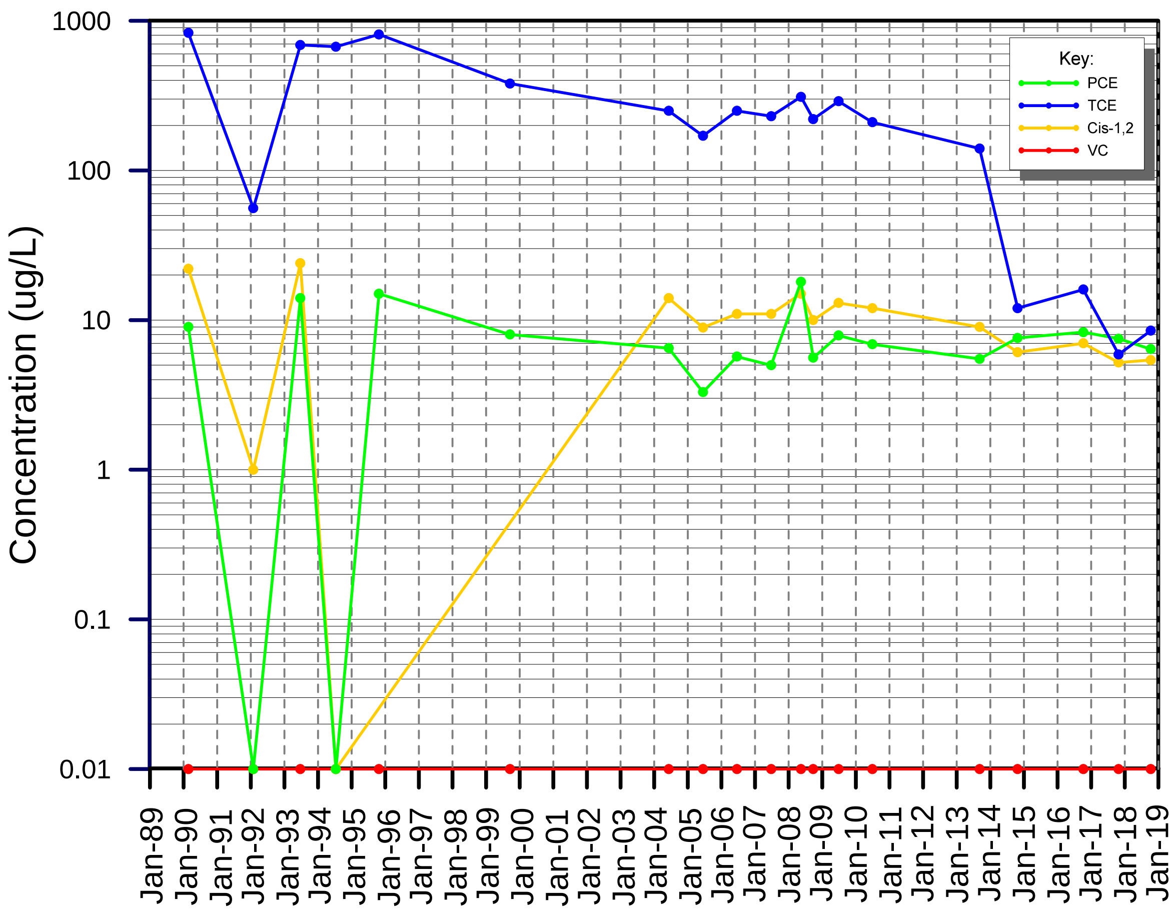


Key:
PCE
TCE
Cis-1,2
VC
Concentration (ug/L)
10
1
0.1
0.01
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

MW-43D

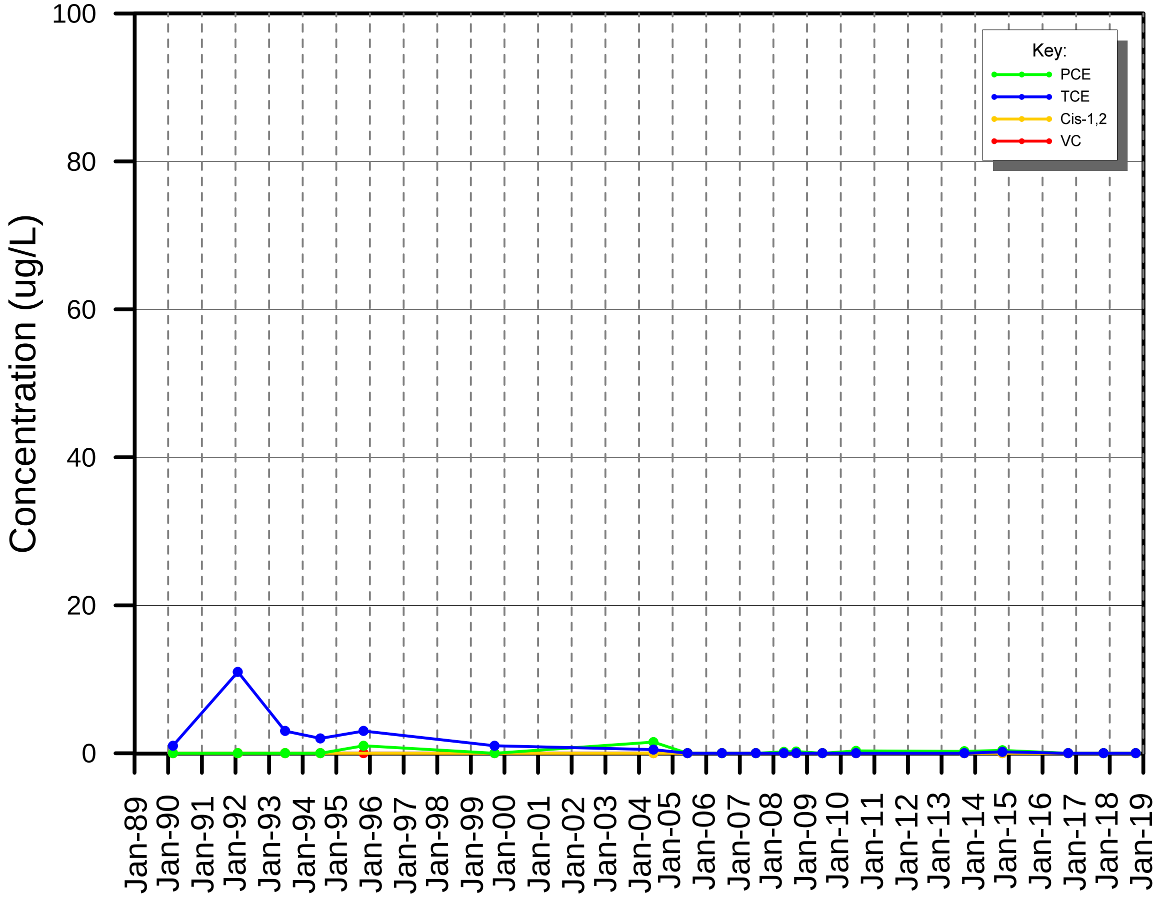


Concentration (ug/L)
0
200
400
600
800
1000
Key:
PCE
TCE
Cis-1,2
VC
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

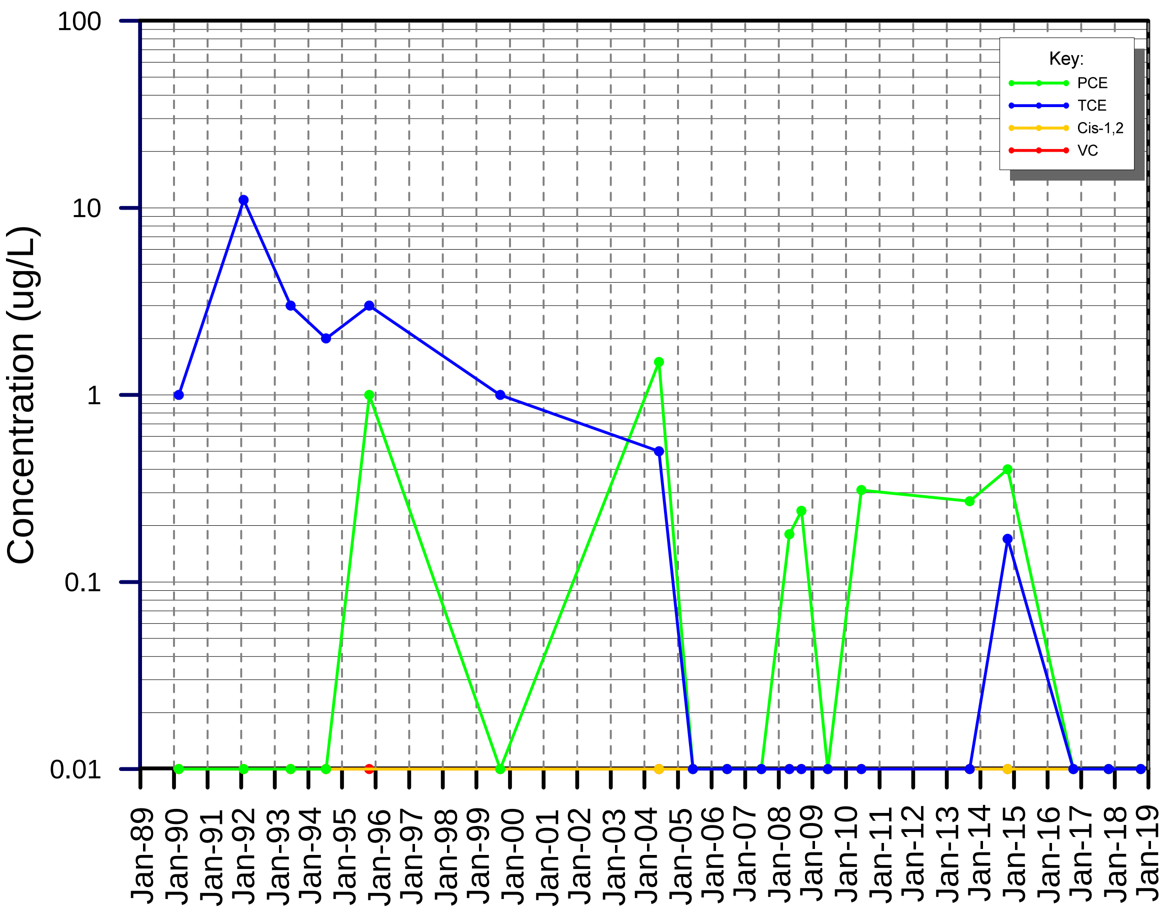


Concentration (ug/L)
0.01
0.1
1
10
100
1000
Key:
PCE
TCE
Cis-1,2
VC
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

MW-43S

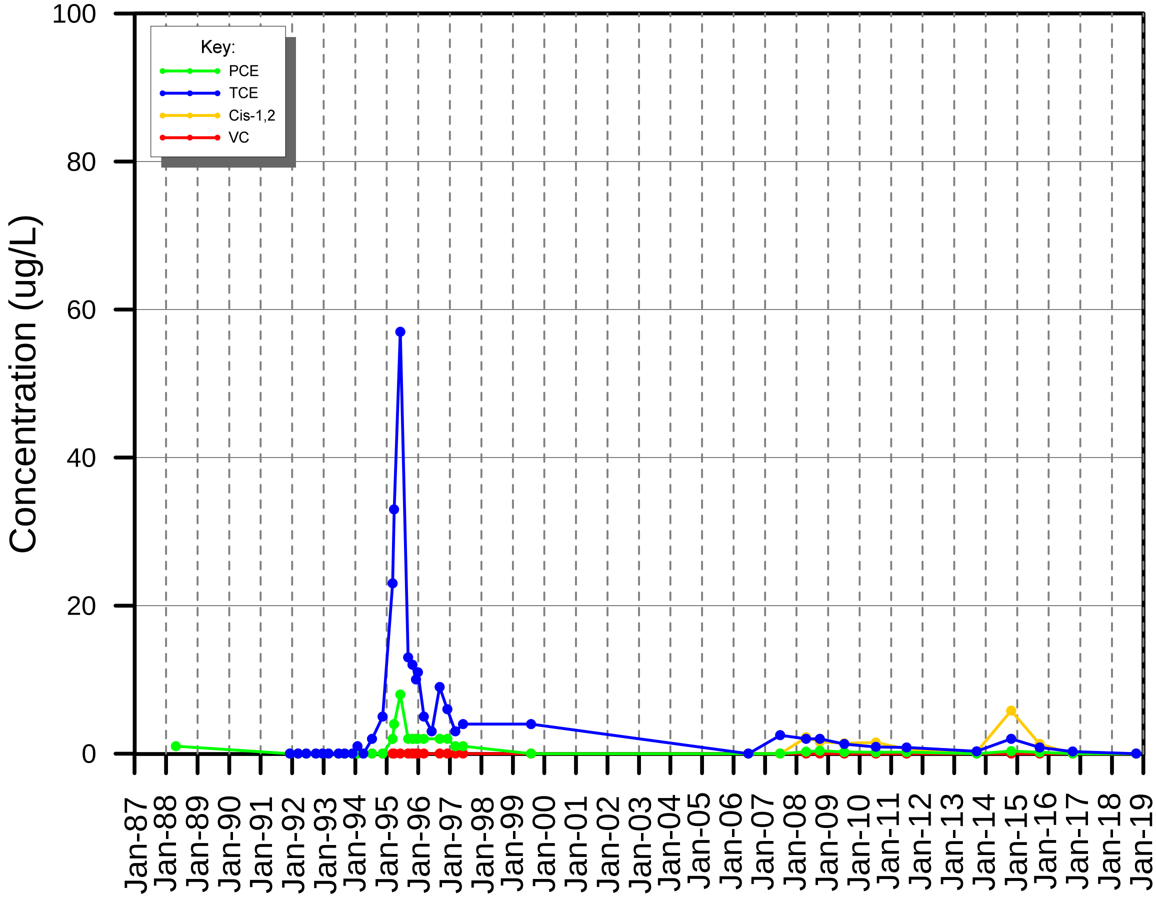


Key:
PCE
TCE
Cis-1,2
VC
Concentration (ug/L)
100
80
60
40
20
0
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19

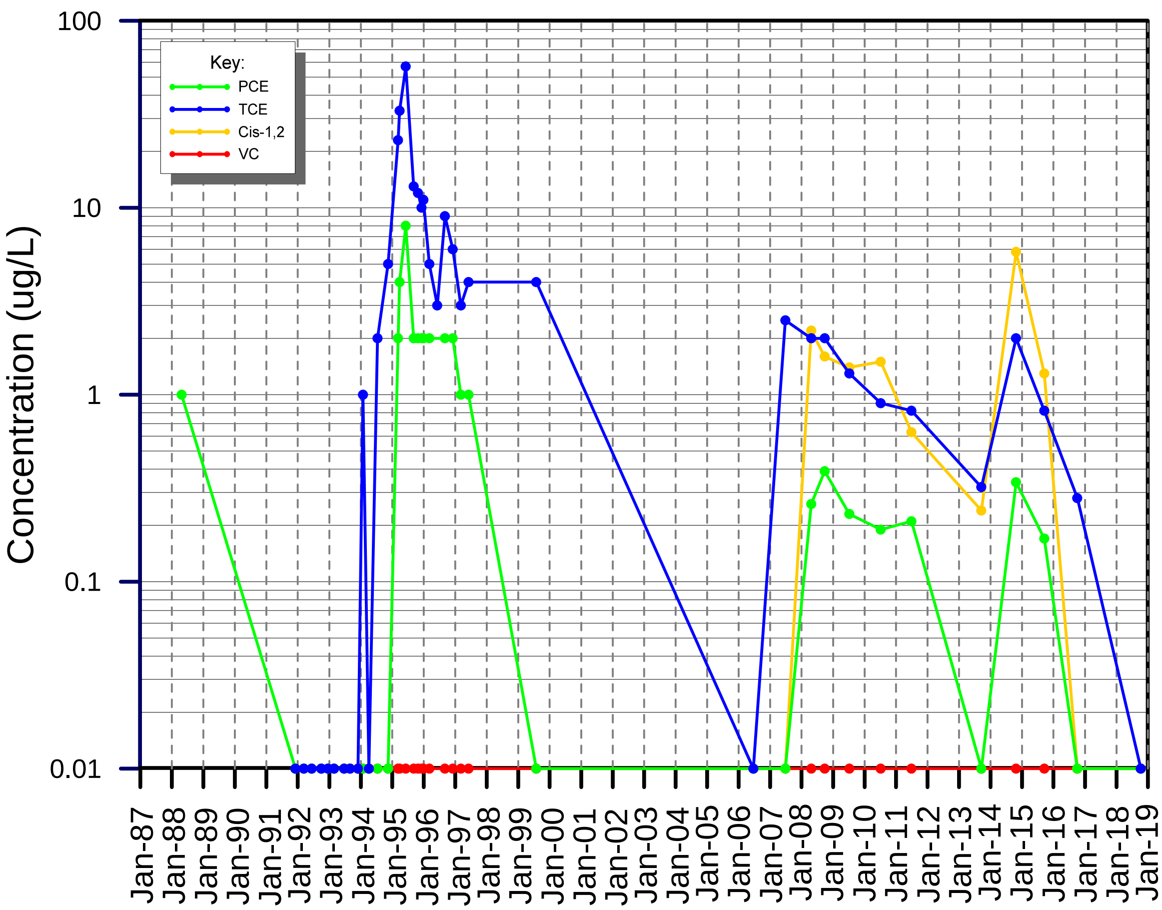


Key:
PCE
TCE
Cis-1,2
VC
Concentration (ug/L)
100
10
1
0.1
0.01
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19

RW-5

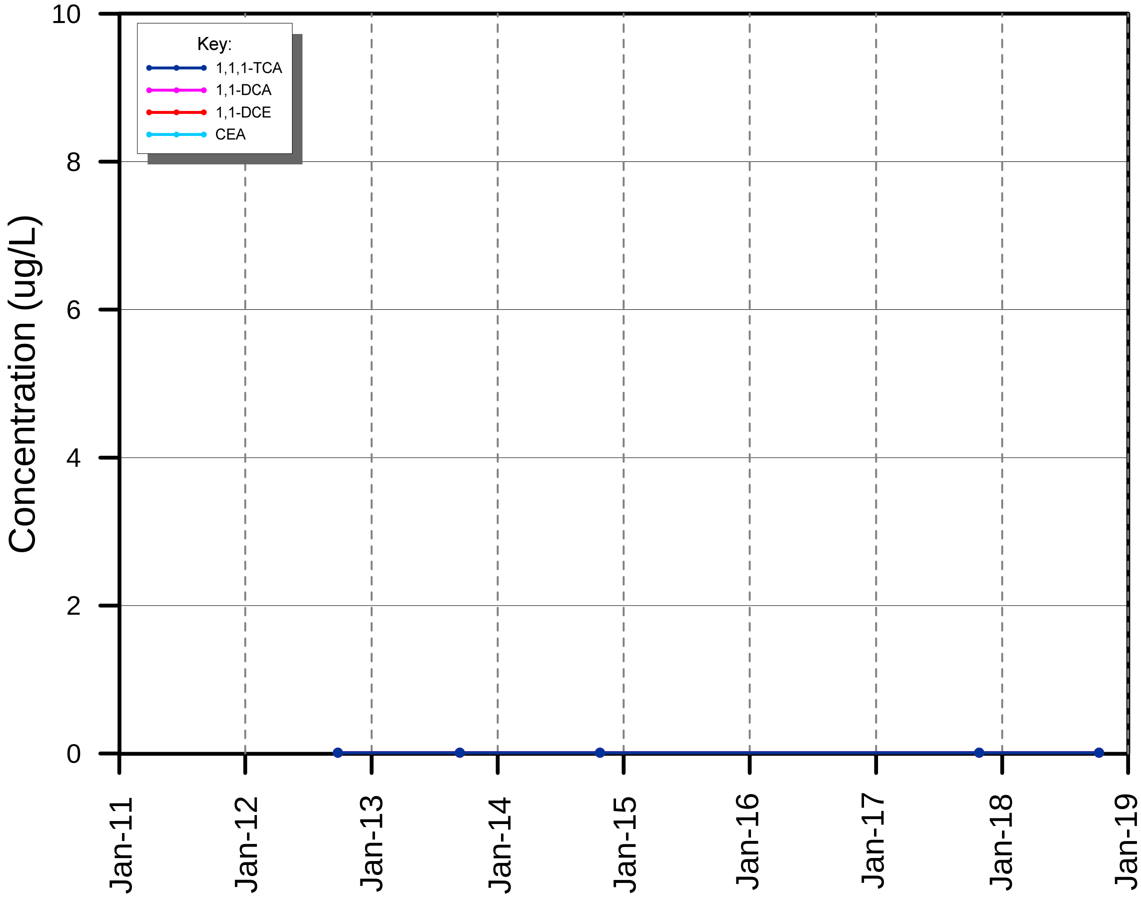


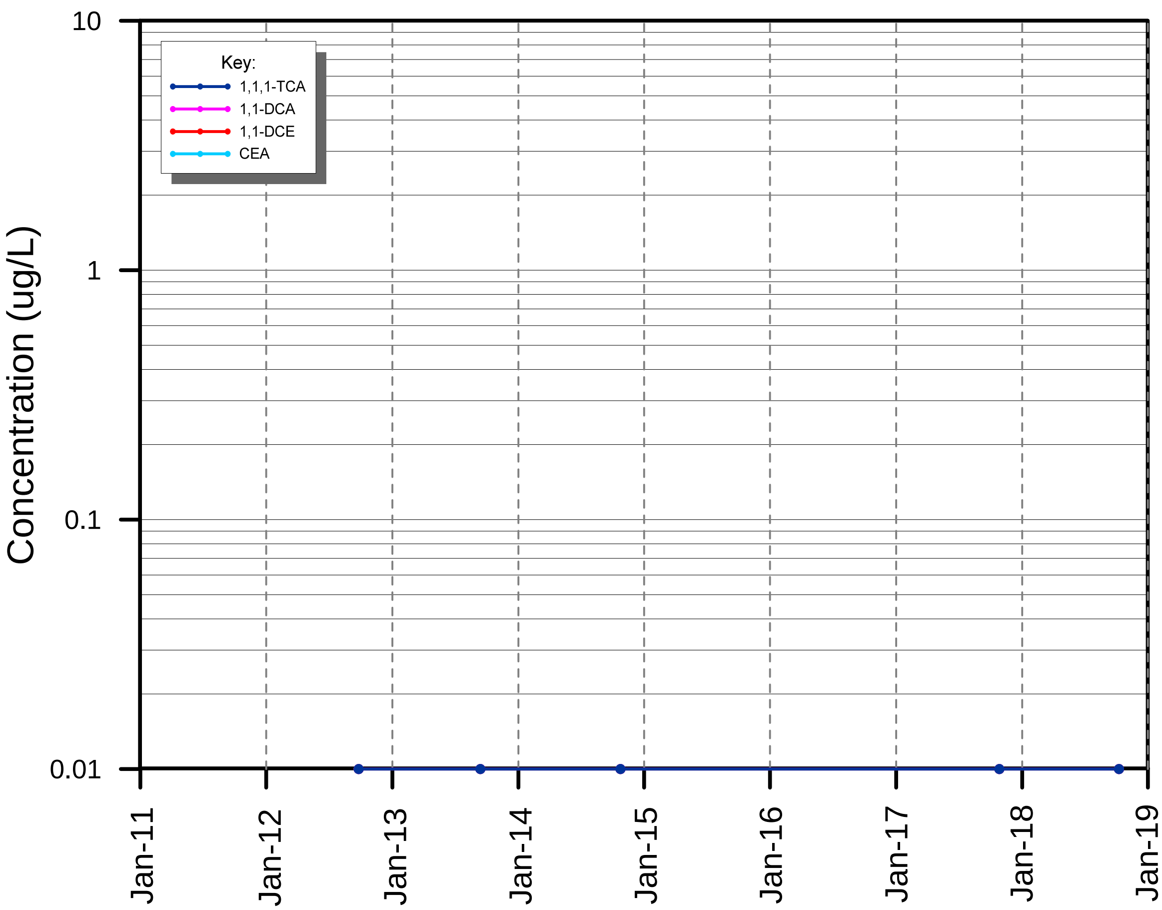
Key:
PCE
TCE
Cis-1,2
VC
Concentration (ug/L)
100
80
60
40
20
0
Jan-87
Jan-88
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19



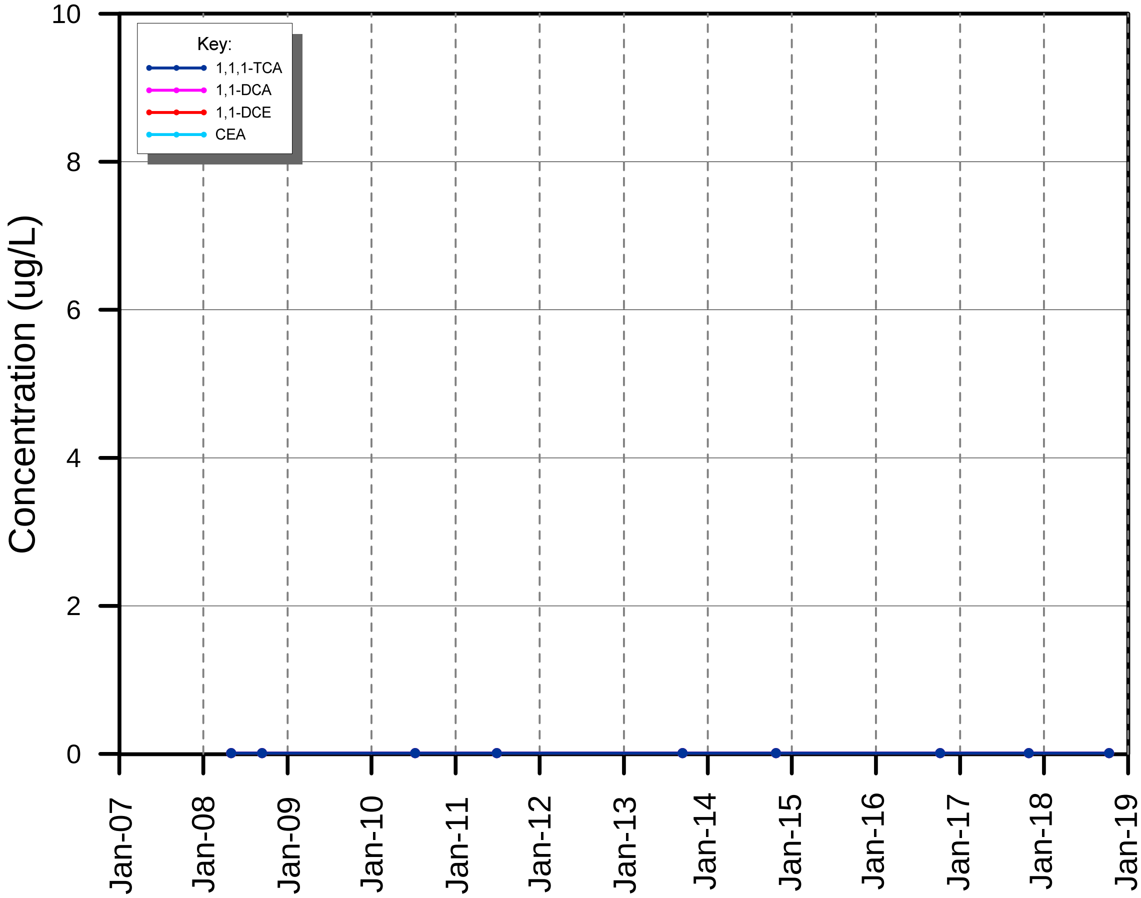
Key:
PCE
TCE
Cis-1,2
VC
Concentration (ug/L)
100
10
1
0.1
0.01
Jan-87
Jan-88
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

ColeB

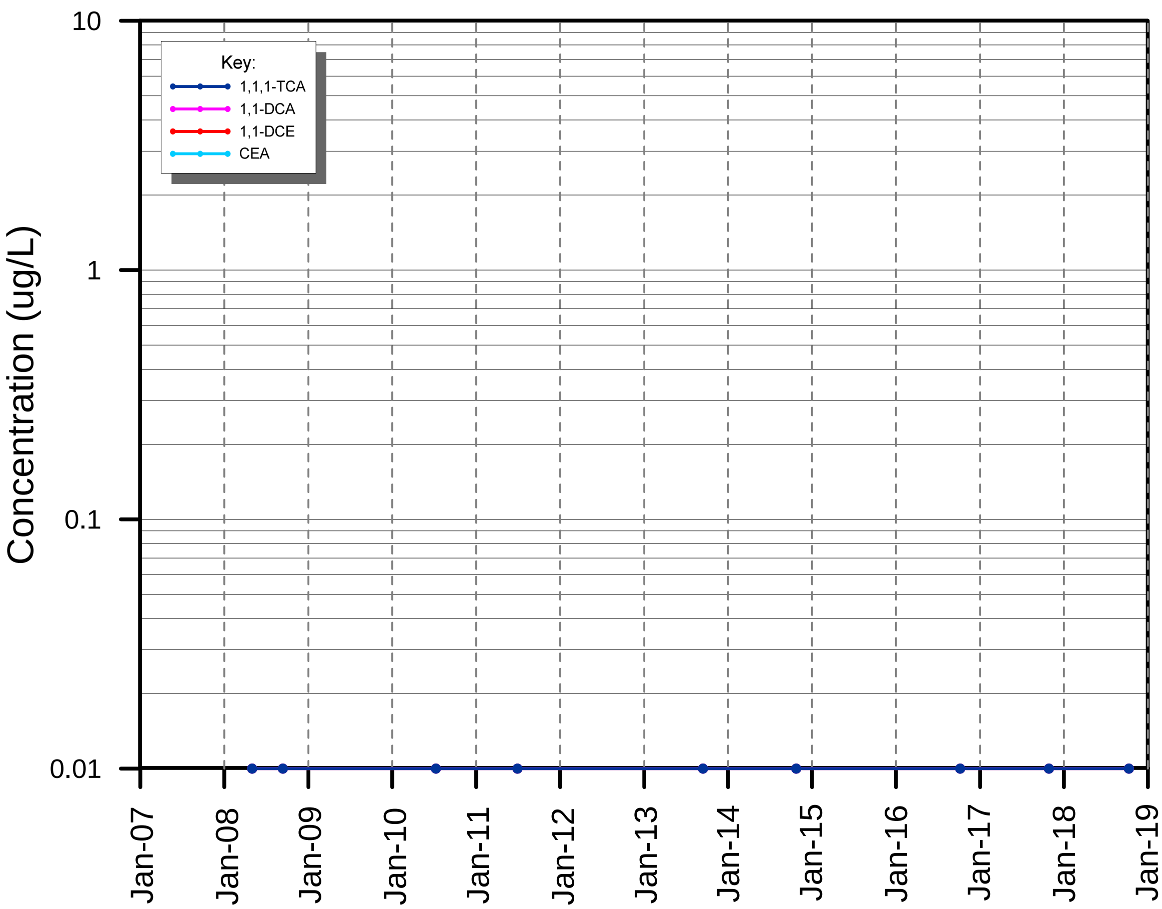

Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Concentration (ug/L)
10
8
6
4
2
0
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19


Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Concentration (ug/L)
10
1
0.1
0.01
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

Cole D

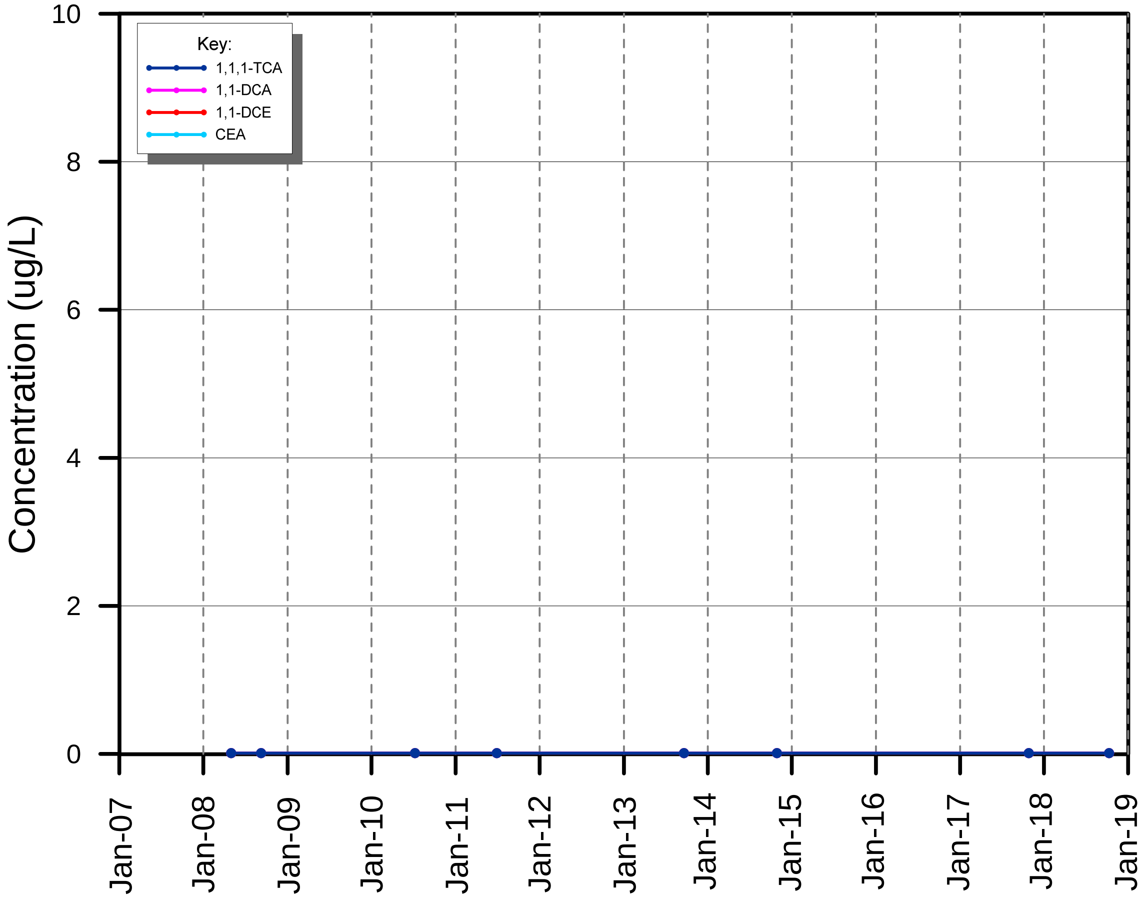


Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Concentration (ug/L)
10
8
6
4
2
0
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

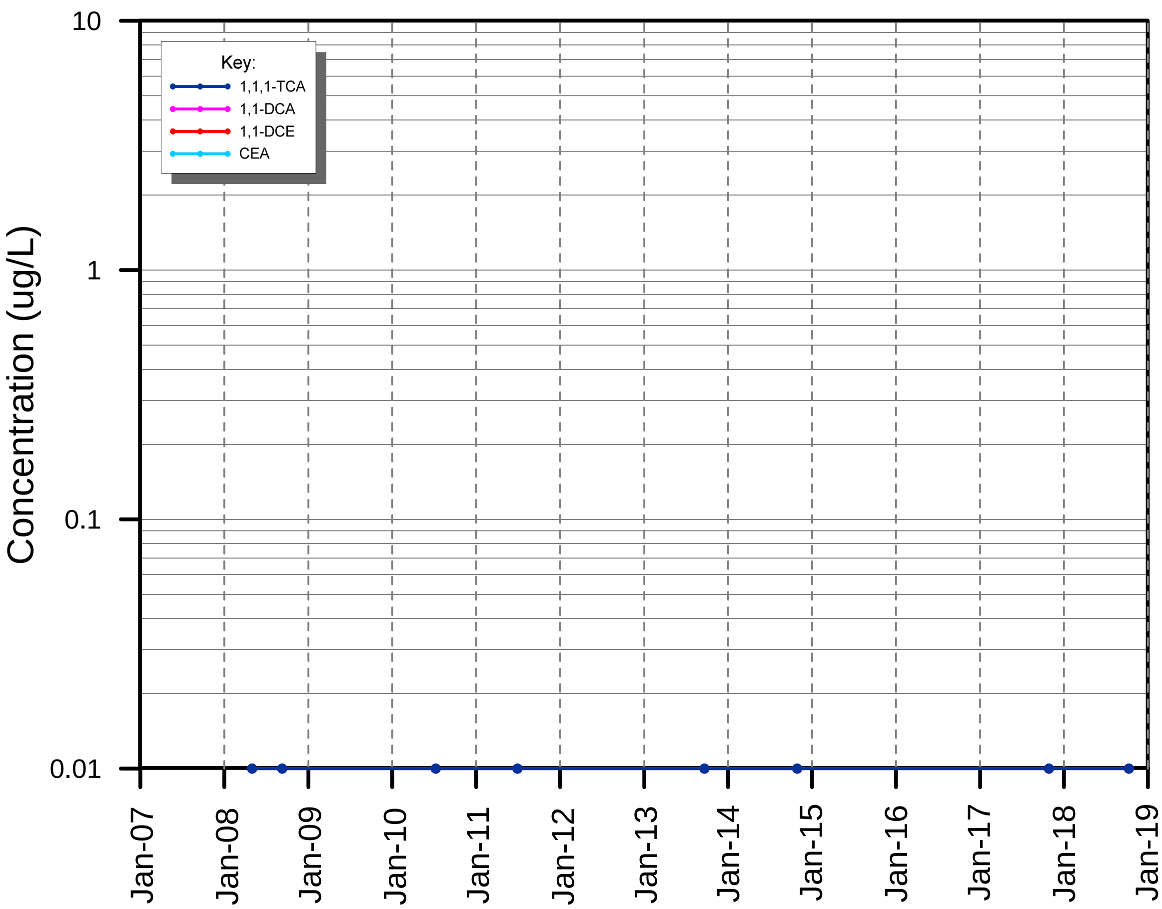


Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Concentration (ug/L)
10
1
0.1
0.01
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

Cole F

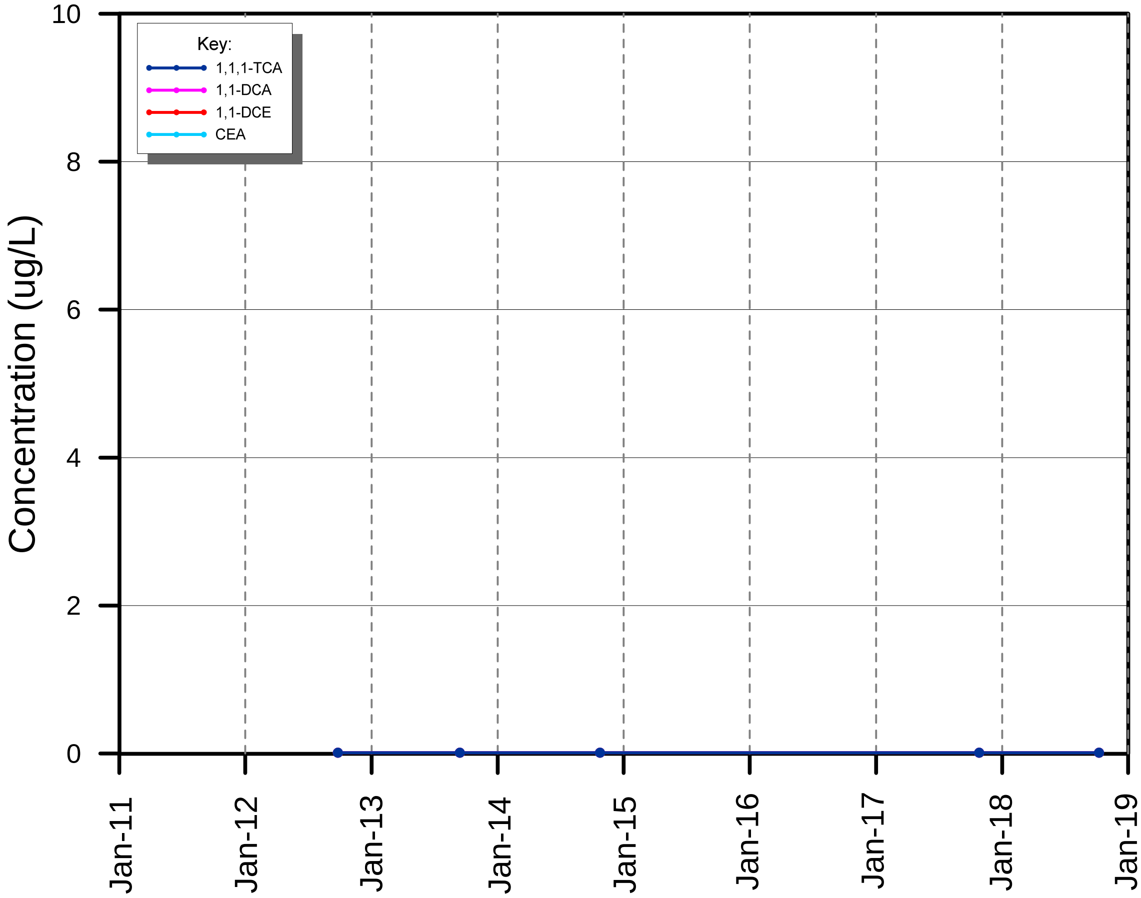


10
8
6
4
2
0
Concentration (ug/L)
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

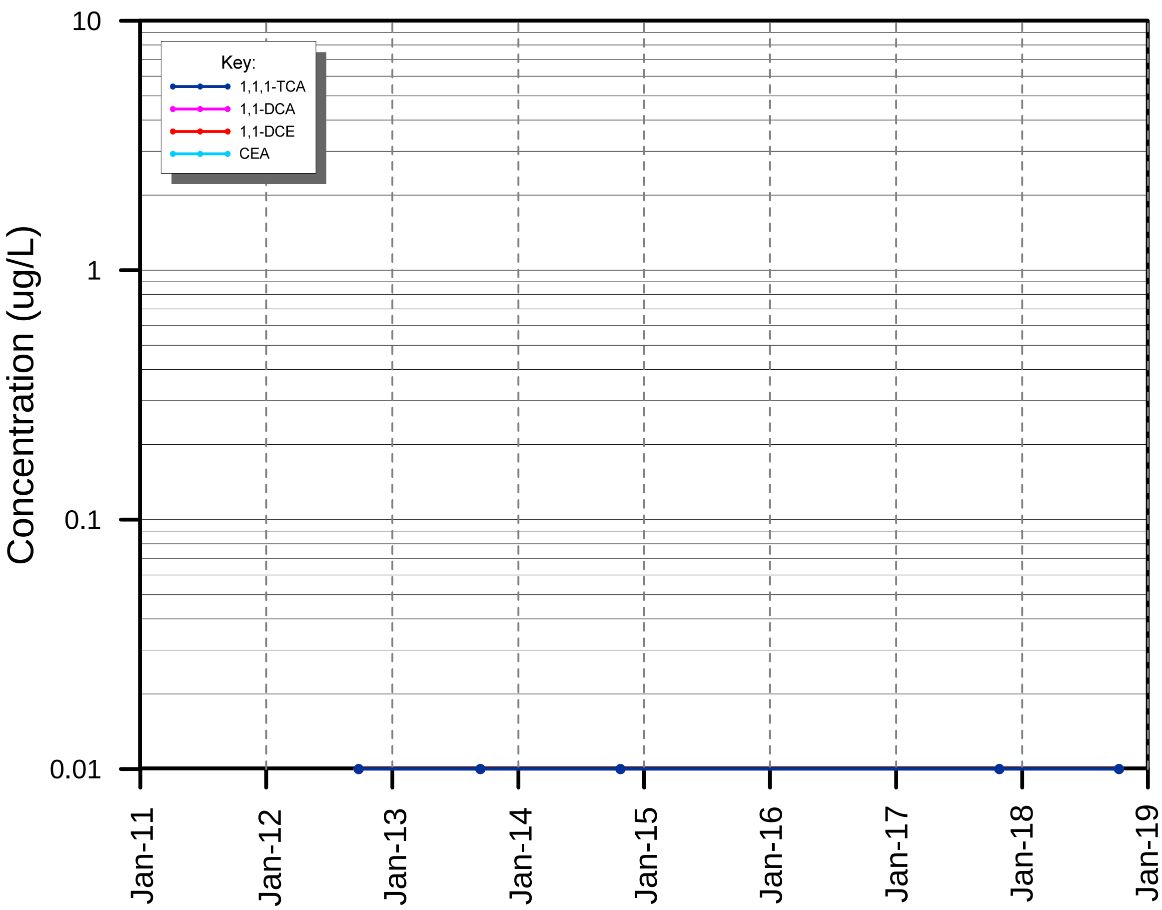


10
1
0.1
0.01
Concentration (ug/L)
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

Cole Flush

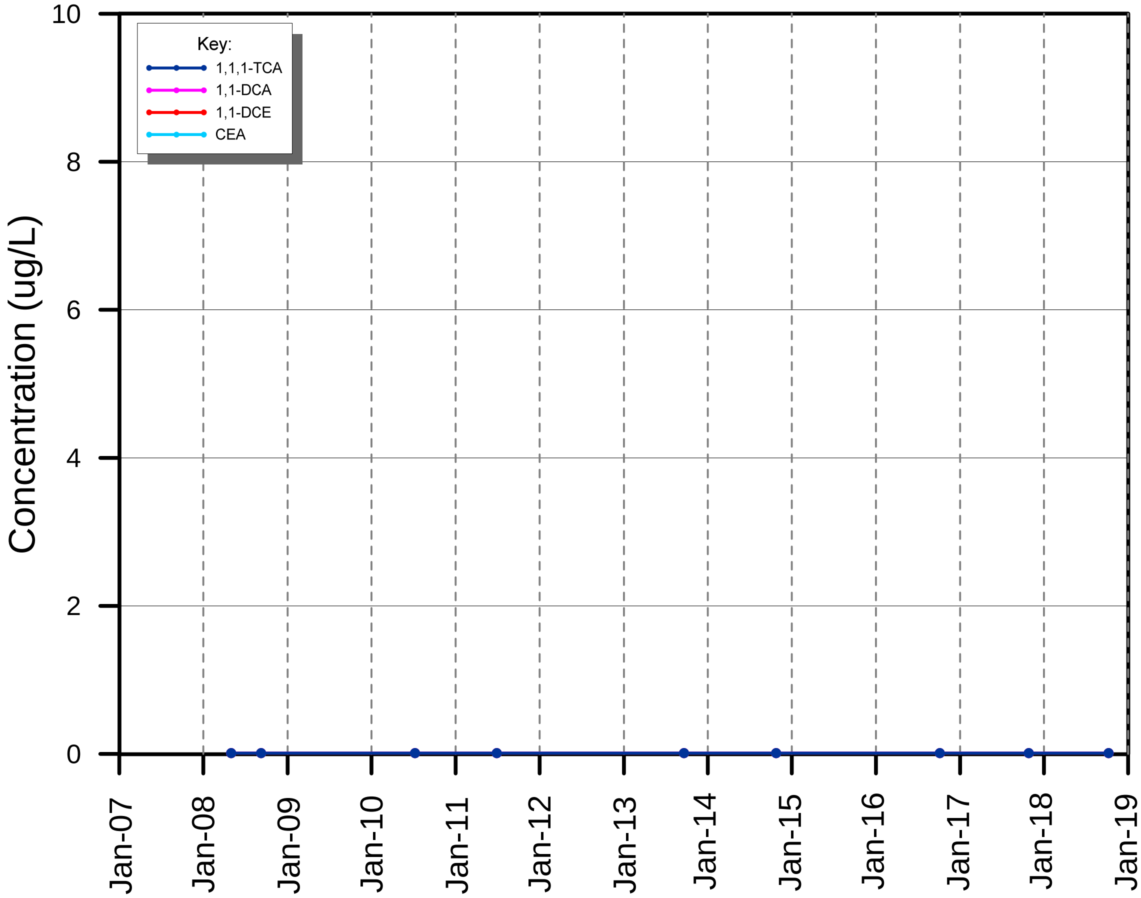


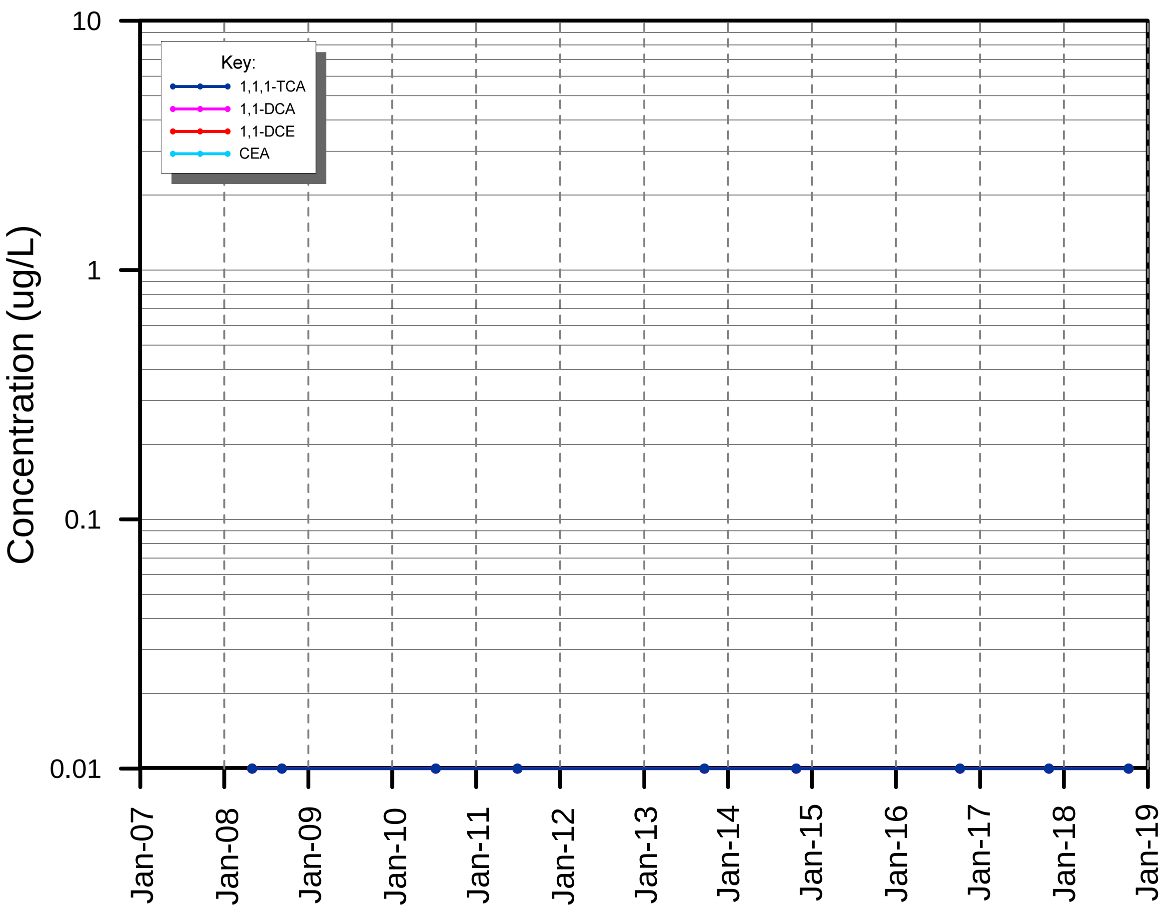
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Concentration (ug/L)
10
8
6
4
2
0
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19



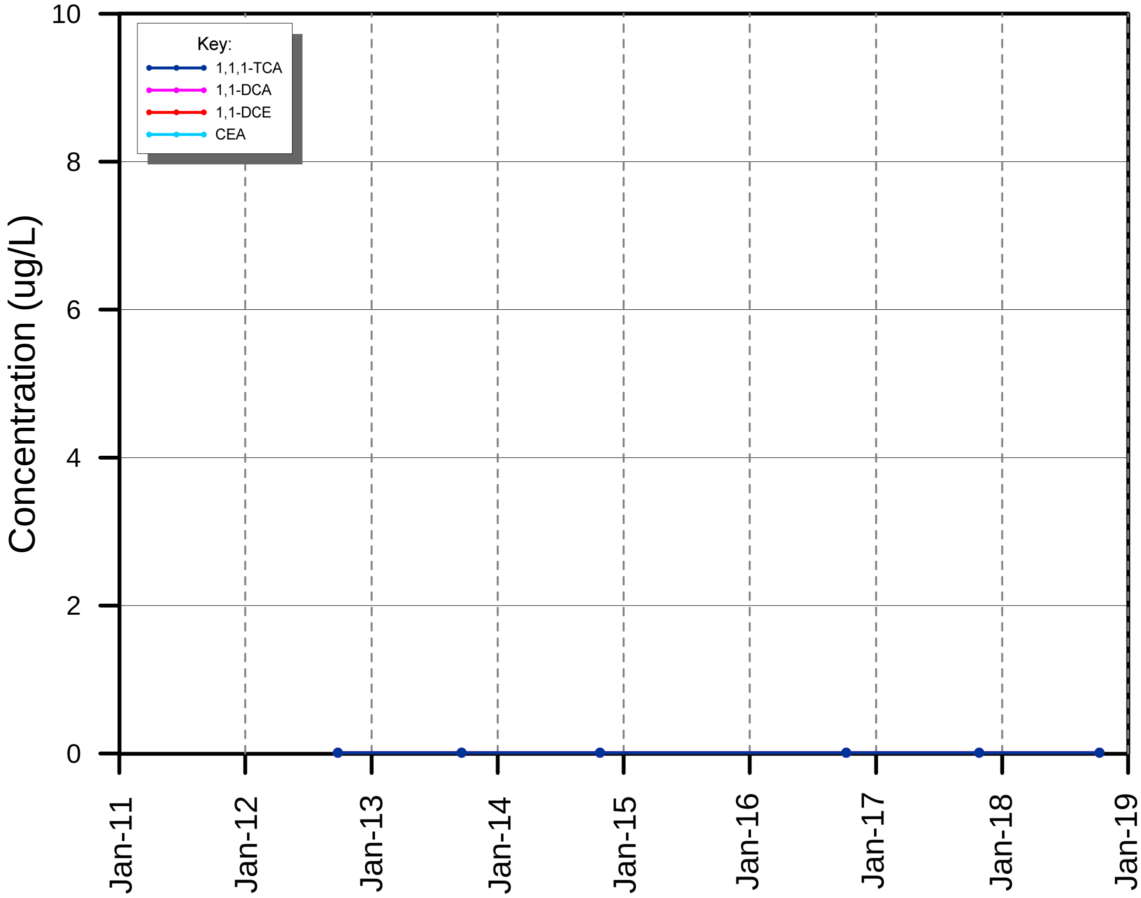
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Concentration (ug/L)
10
1
0.1
0.01
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

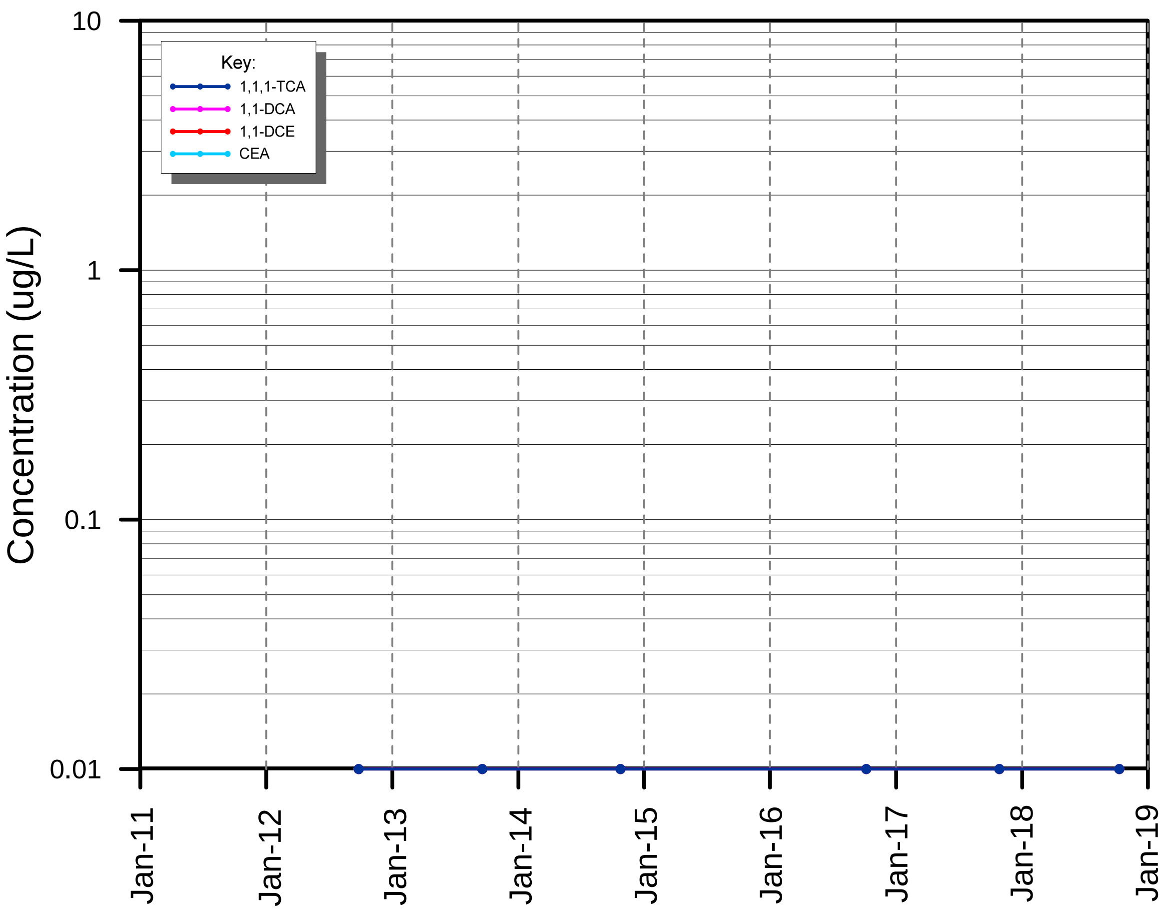
Cole MW-4


Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Concentration (ug/L)
10
8
6
4
2
0
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

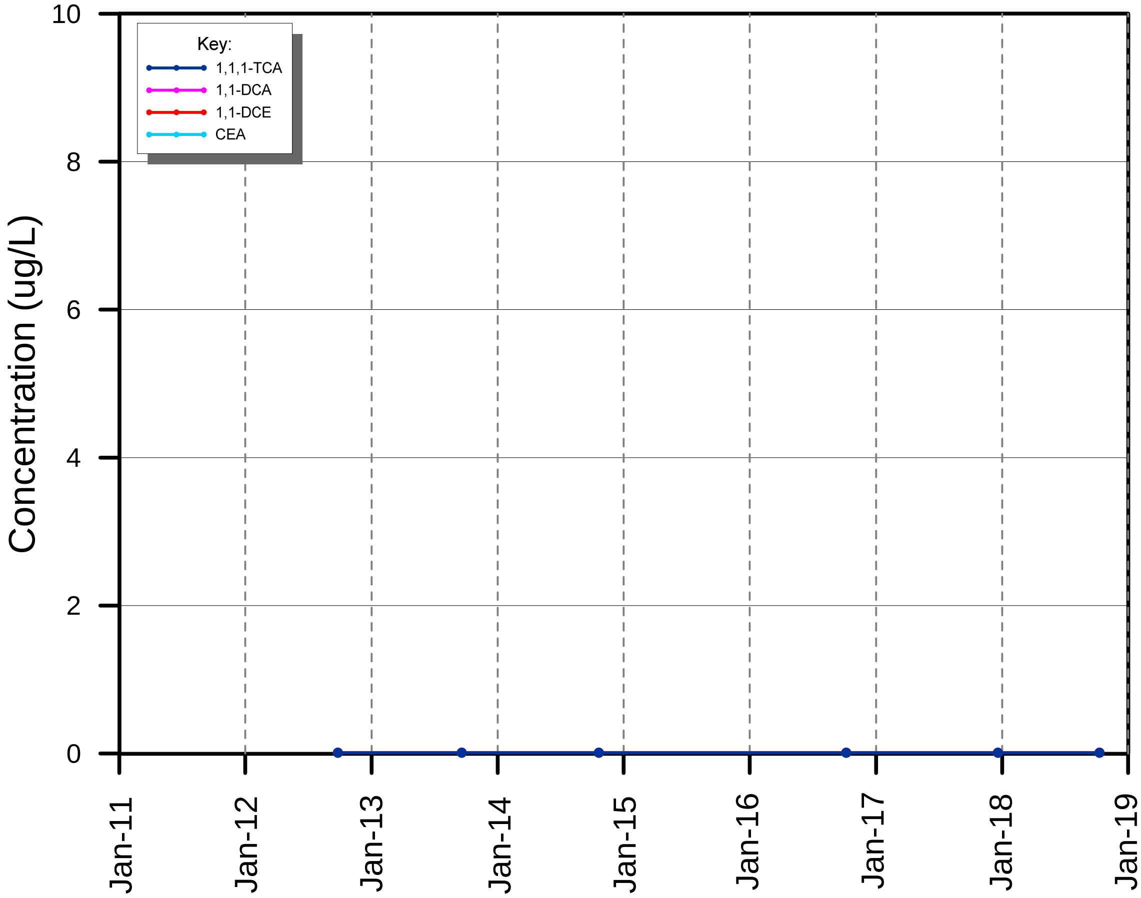

Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Concentration (ug/L)
10
1
0.1
0.01
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

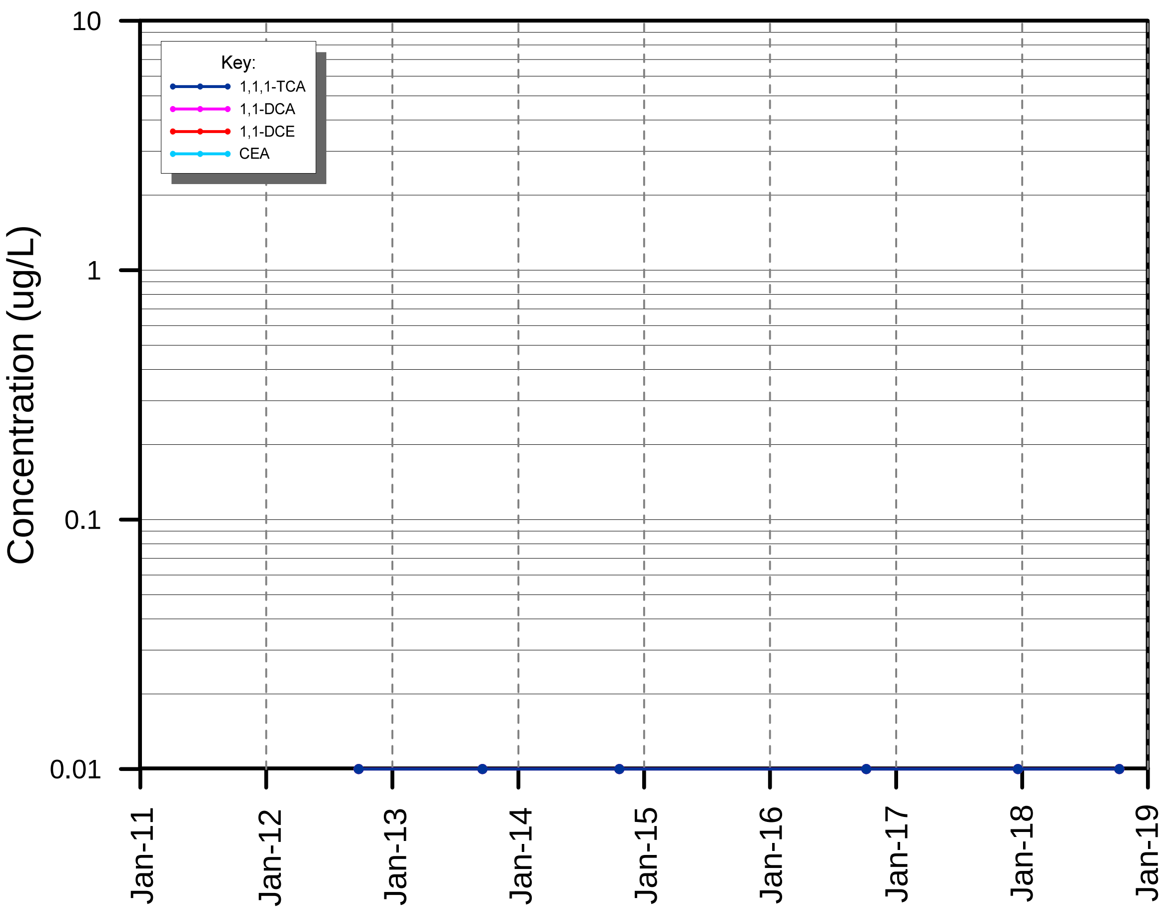
Cole Steel (MW-12)



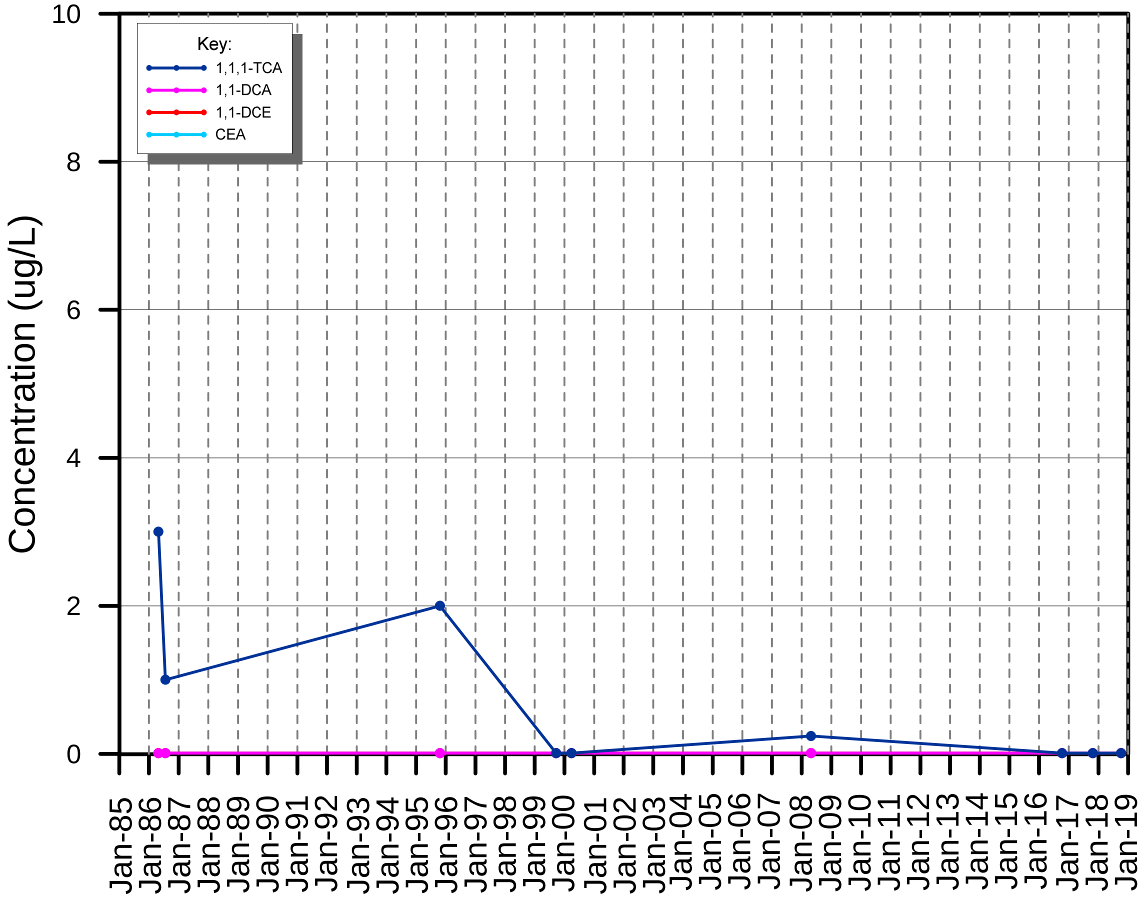


GM-1D

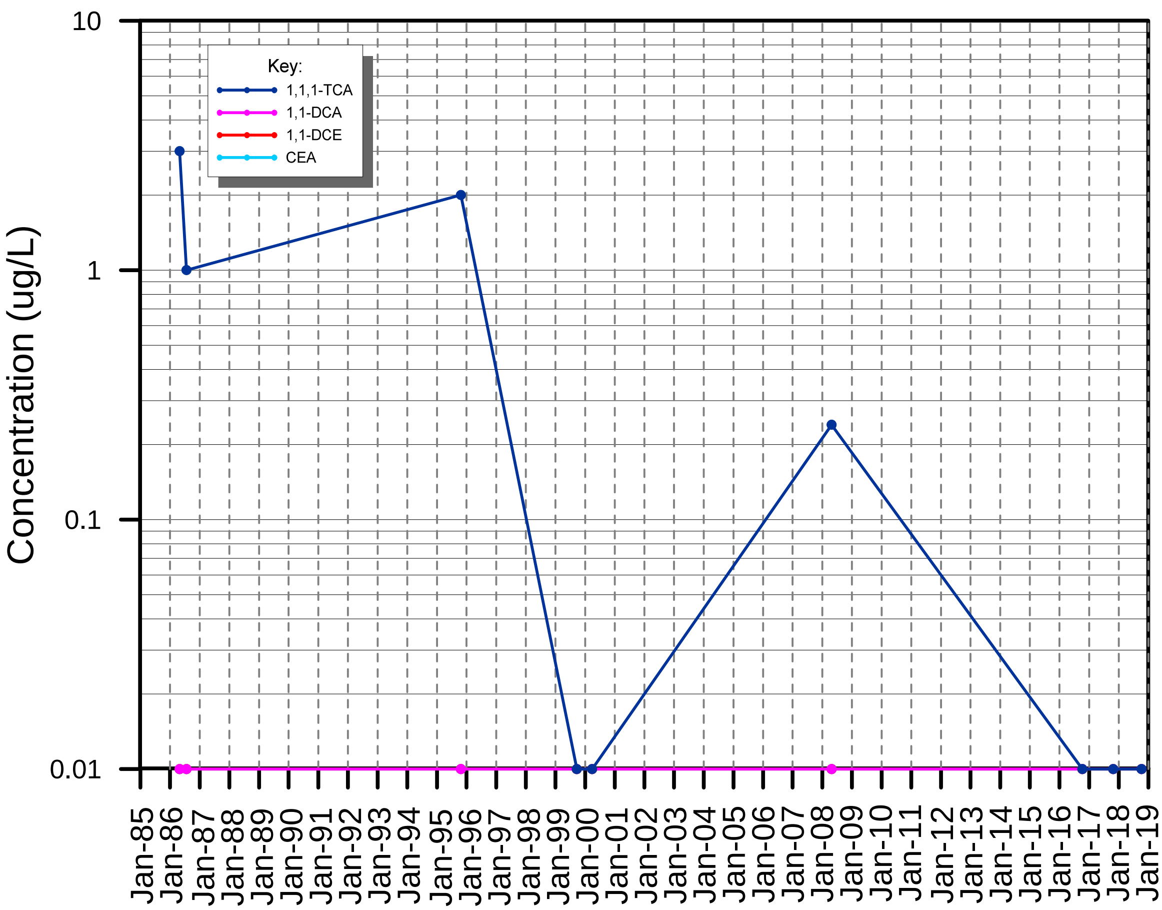

Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Concentration (ug/L)
10
8
6
4
2
0
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19


Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Concentration (ug/L)
10
1
0.1
0.01
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

MW-1

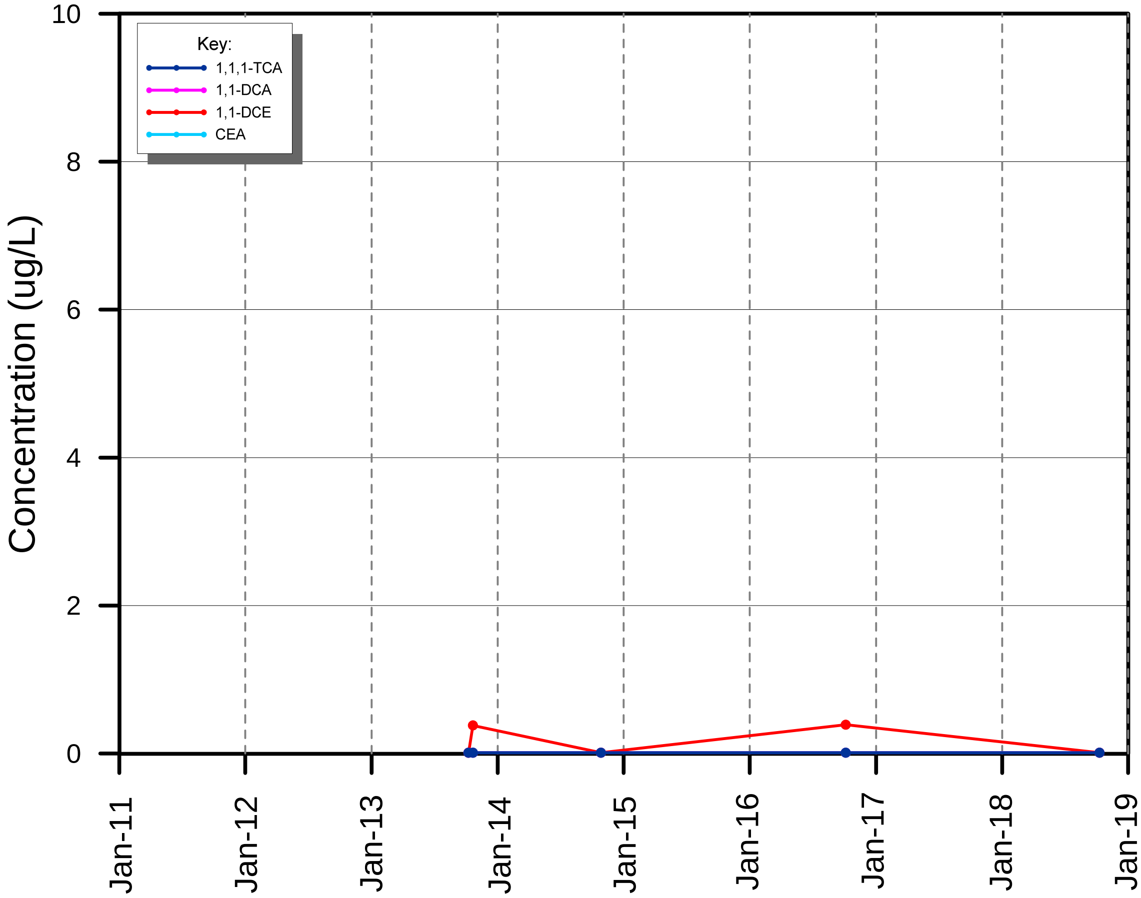


Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Concentration (ug/L)
10
8
6
4
2
0
Jan-85 Jan-86 Jan-87 Jan-88 Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19

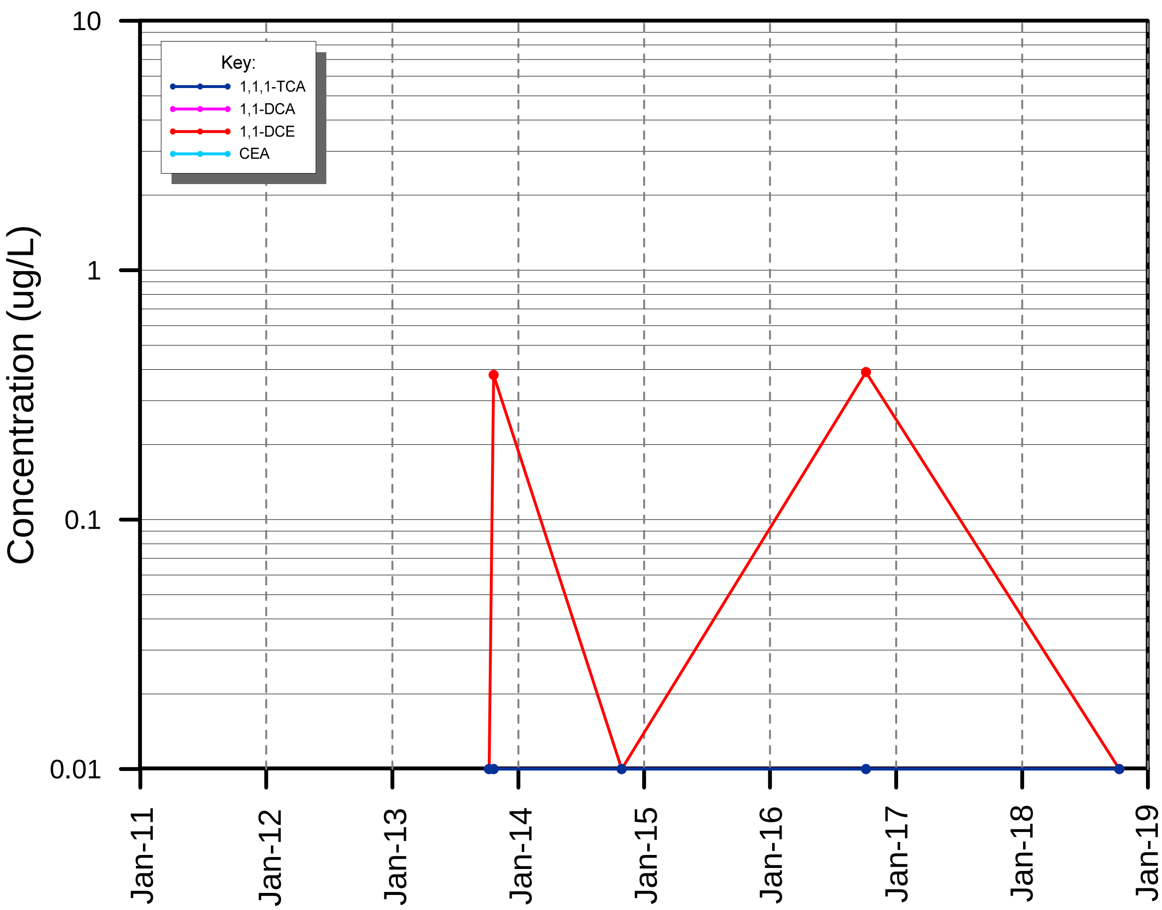


Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Concentration (ug/L)
10
1
0.1
0.01
Jan-85 Jan-86 Jan-87 Jan-88 Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19

MW-150

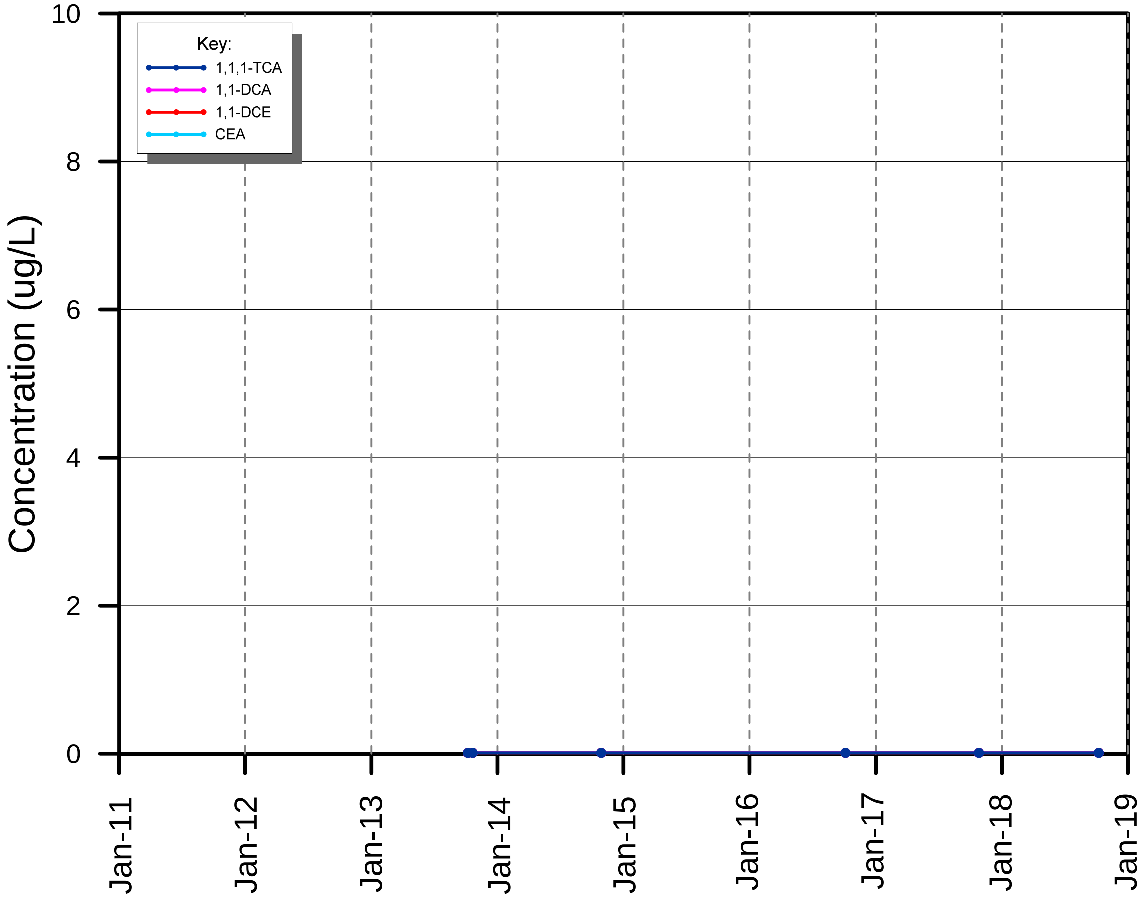


Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Concentration (ug/L)
10
8
6
4
2
0
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

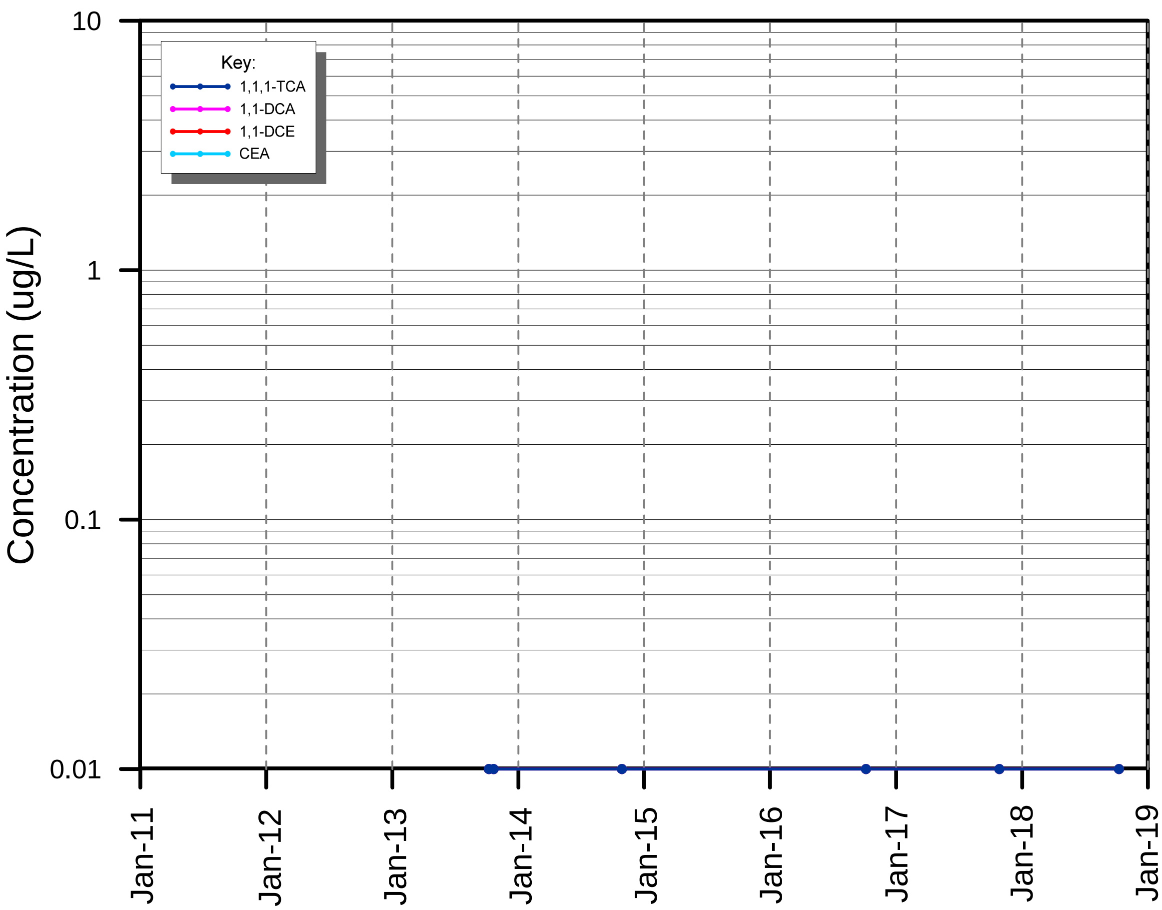


Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Concentration (ug/L)
10
1
0.1
0.01
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

MW-151

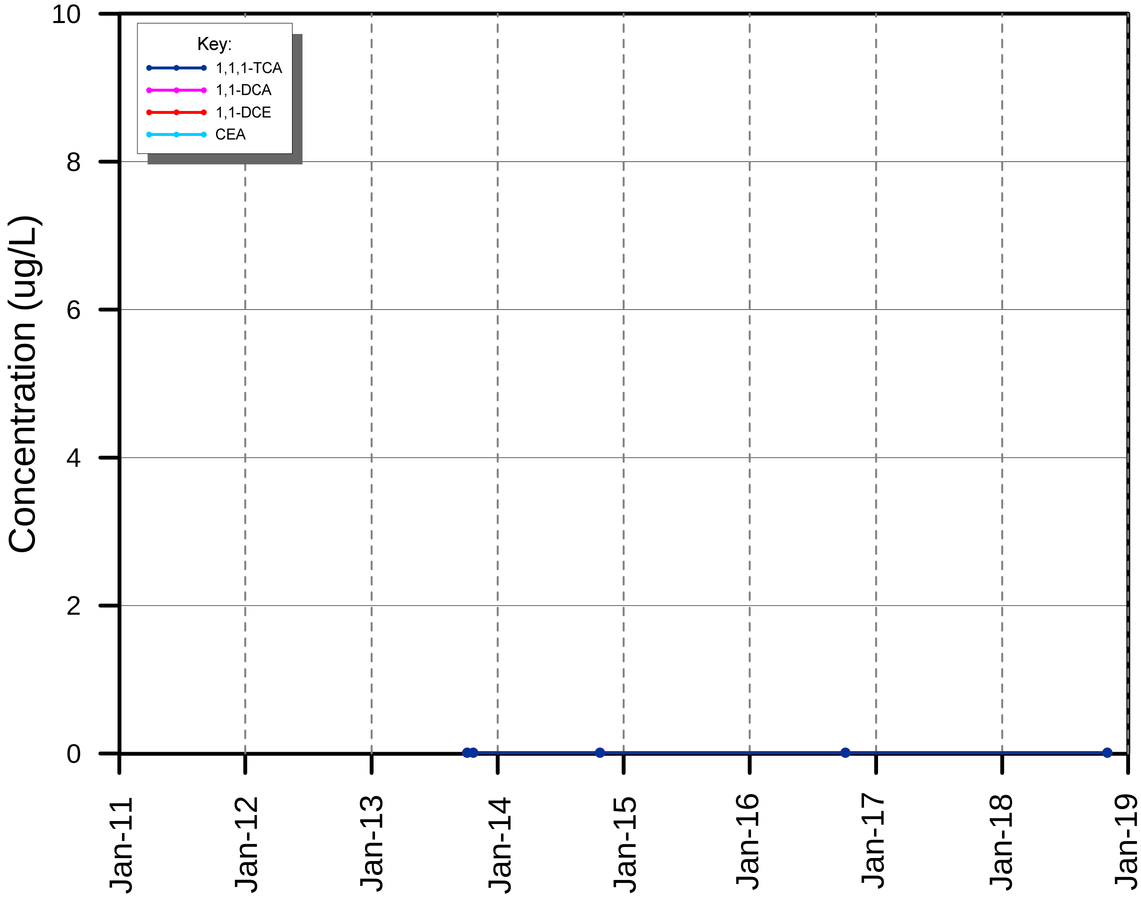


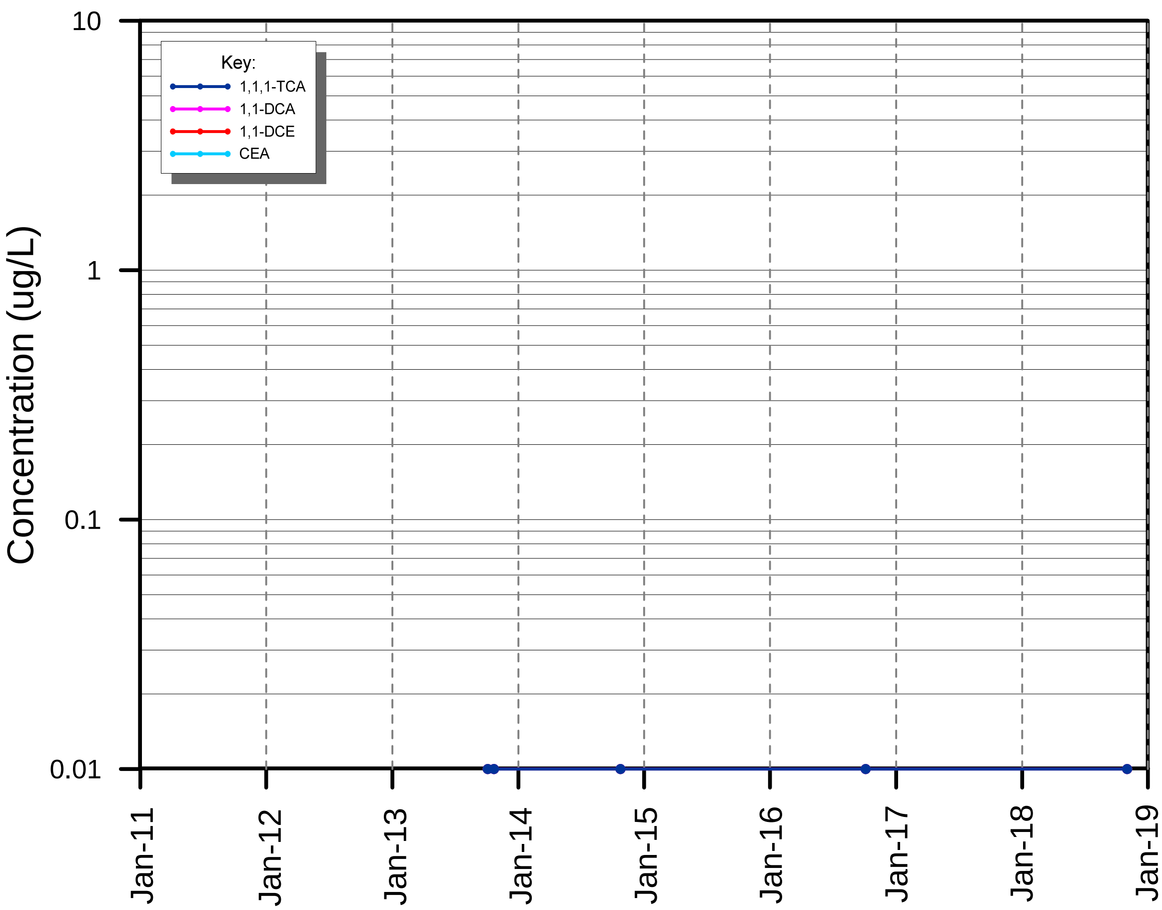
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Concentration (ug/L)
10
8
6
4
2
0
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19



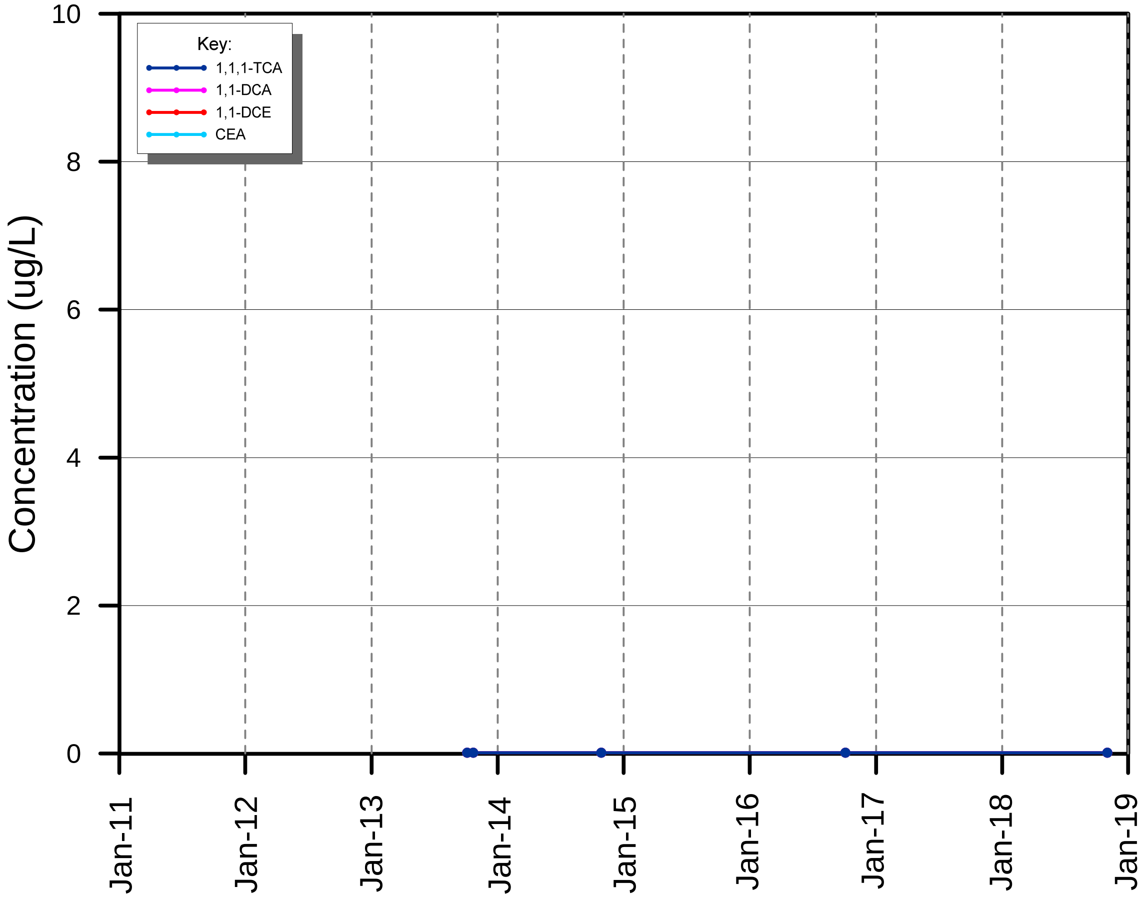
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Concentration (ug/L)
10
1
0.1
0.01
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

MW-152(137.5-138)

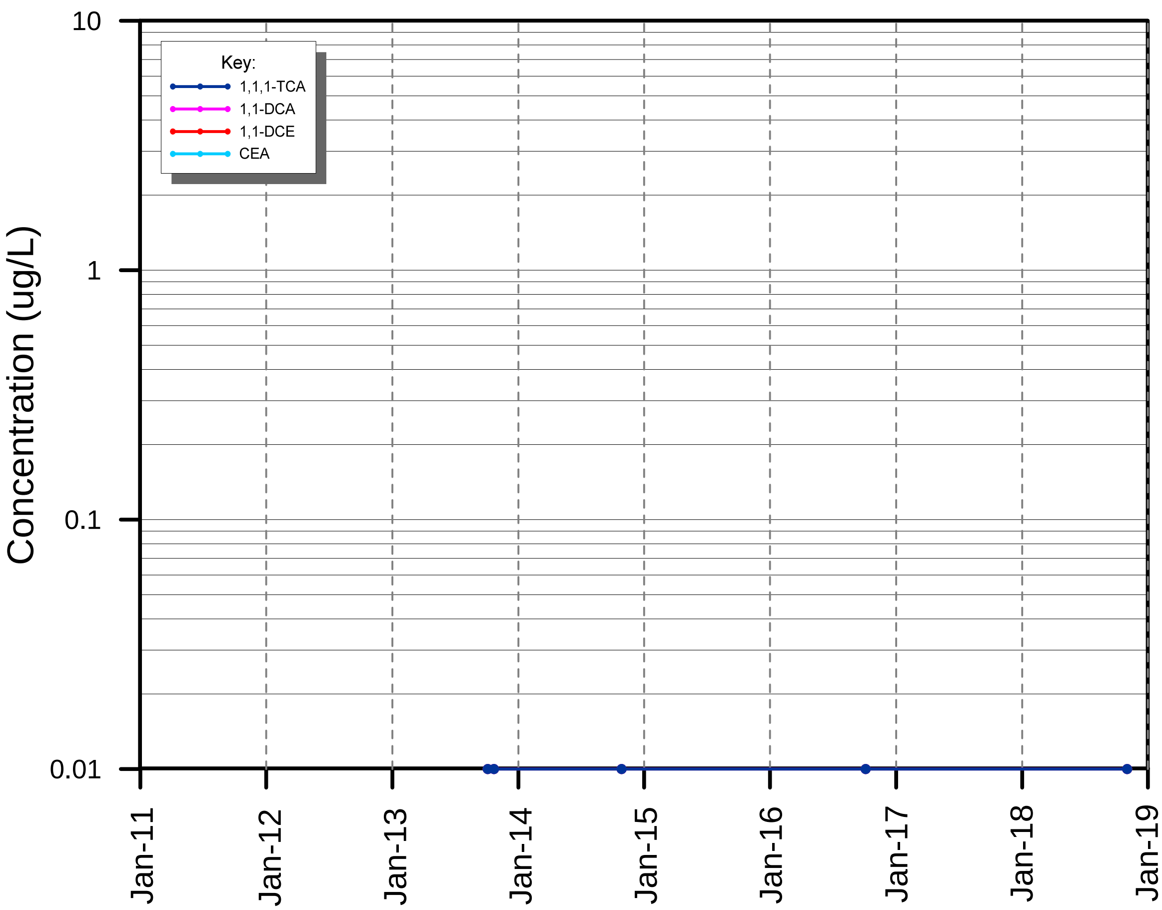




MW-152(23-23.5)

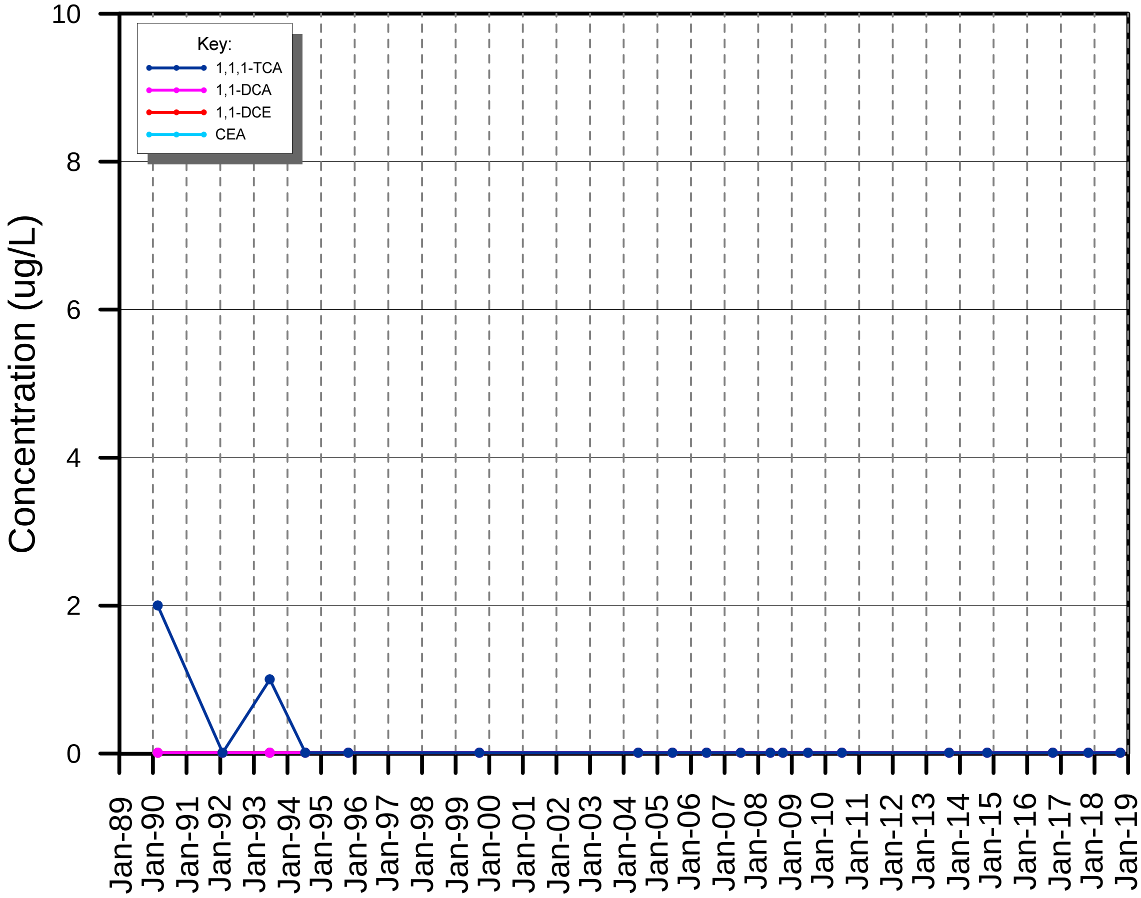


Concentration (ug/L)
10
8
6
4
2
0
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

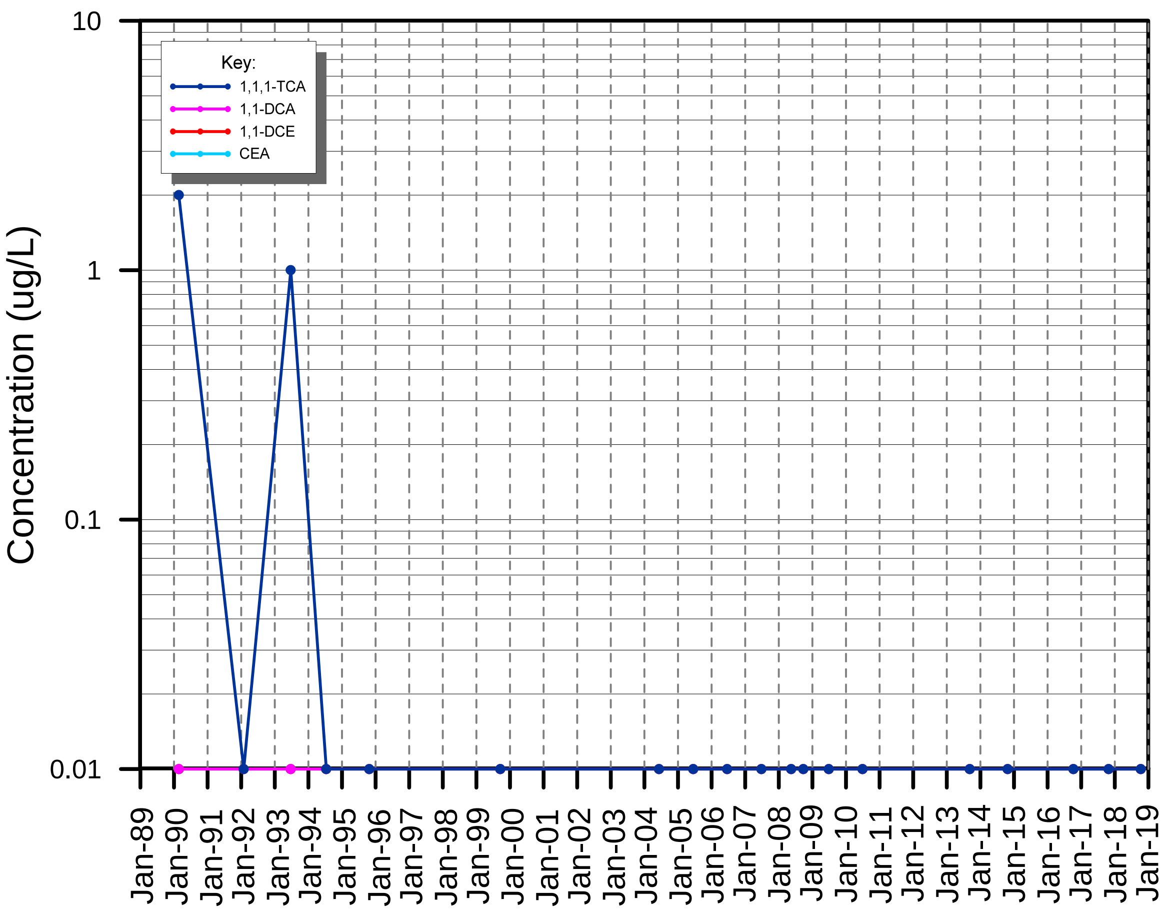


Concentration (ug/L)
10
1
0.1
0.01
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

MW-43D

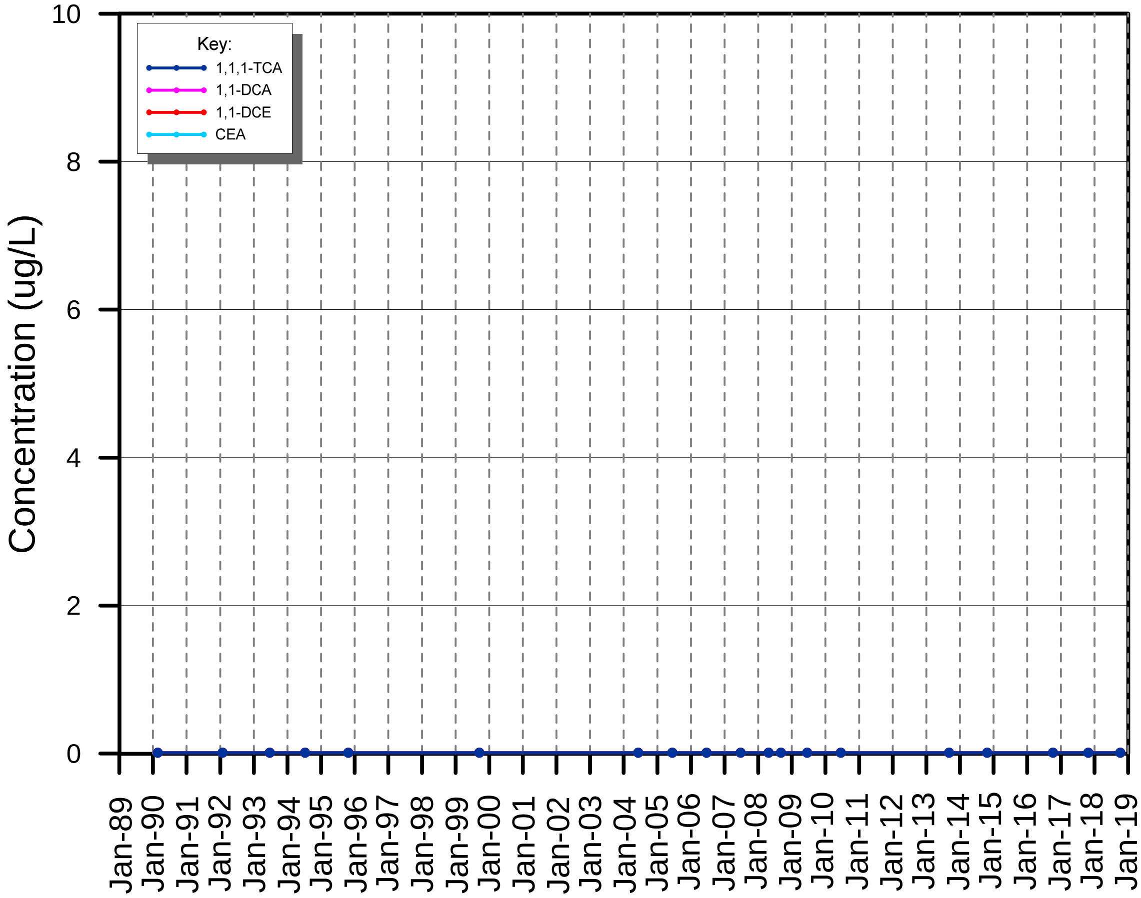


Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Concentration (ug/L)
0
2
4
6
8
10
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

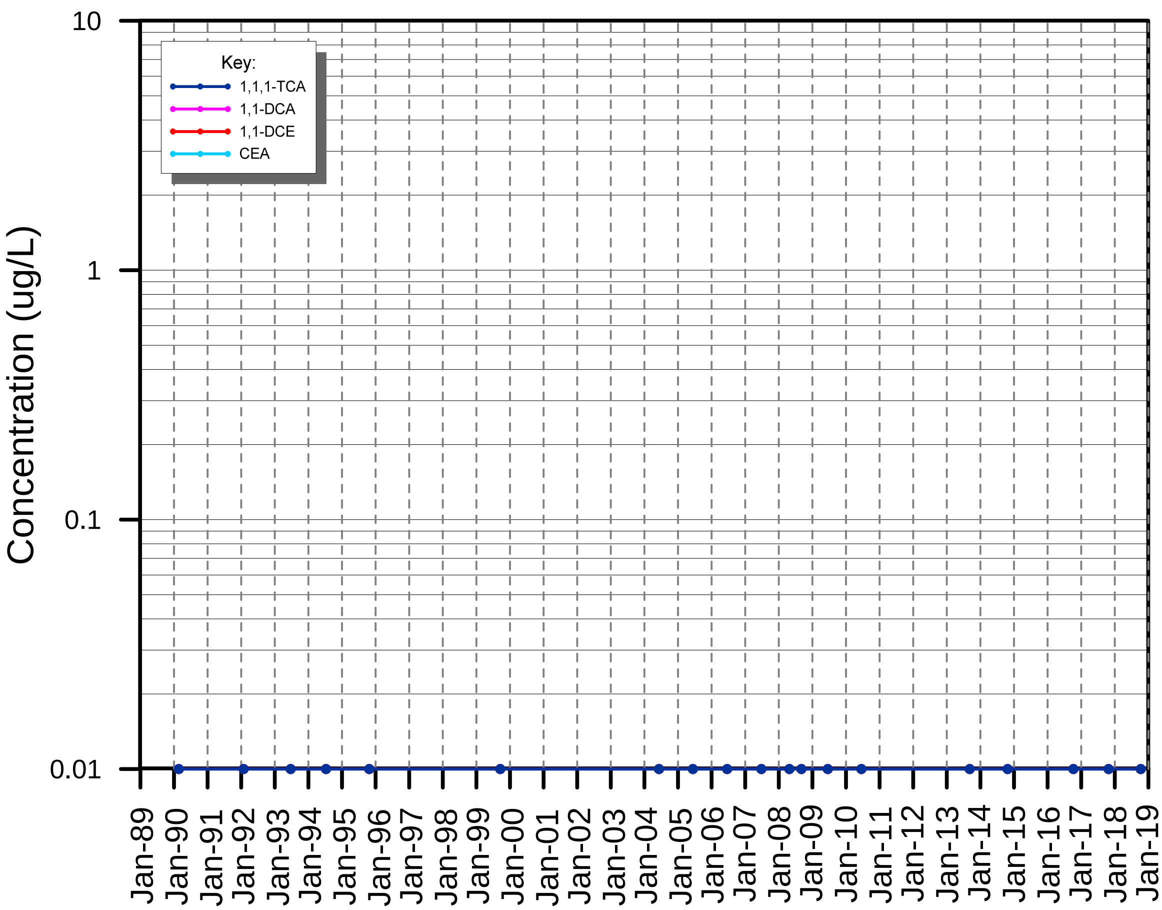


Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Concentration (ug/L)
0.01
0.1
1
10
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

MW-43S

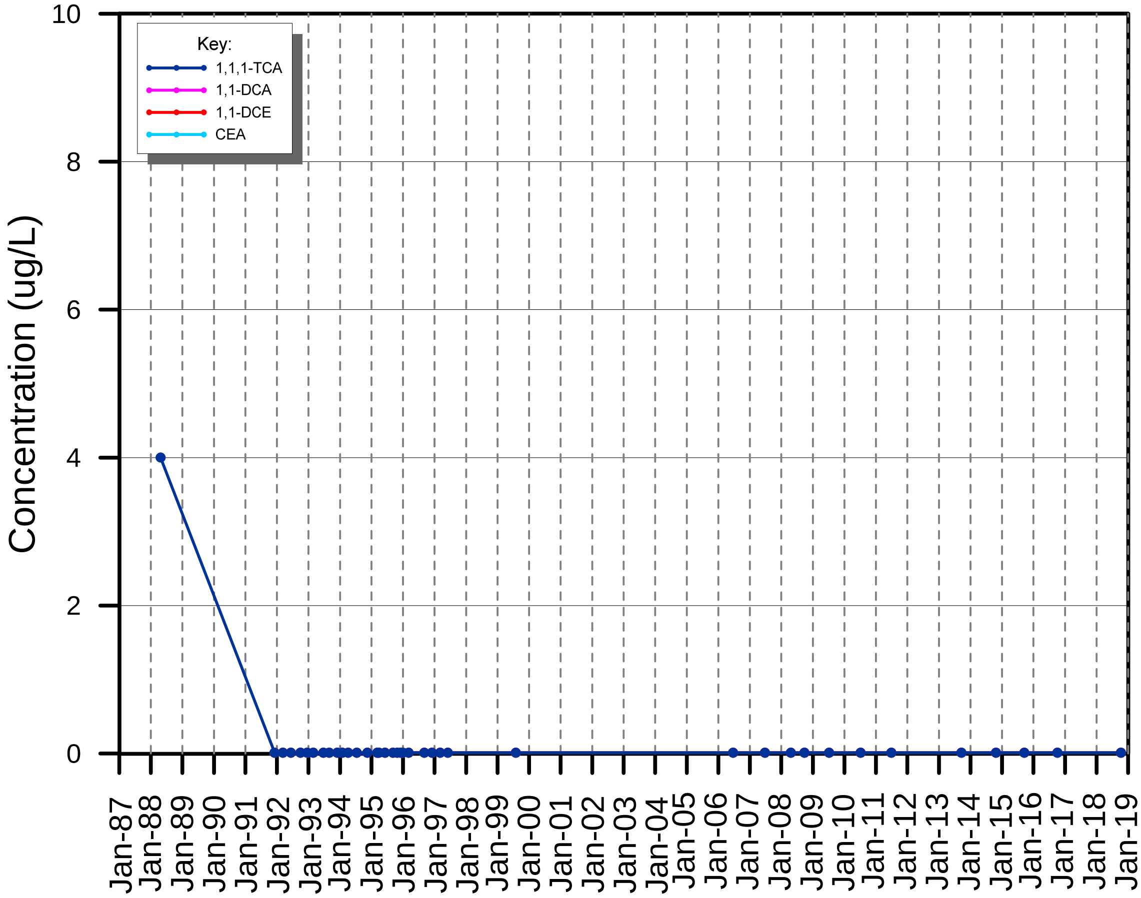


Concentration (ug/L)
10
8
6
4
2
0
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19



Concentration (ug/L)
10
1
0.1
0.01
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19

RW-5



Concentration (ug/L)
10
8
6
4
2
0
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Jan-87
Jan-88
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
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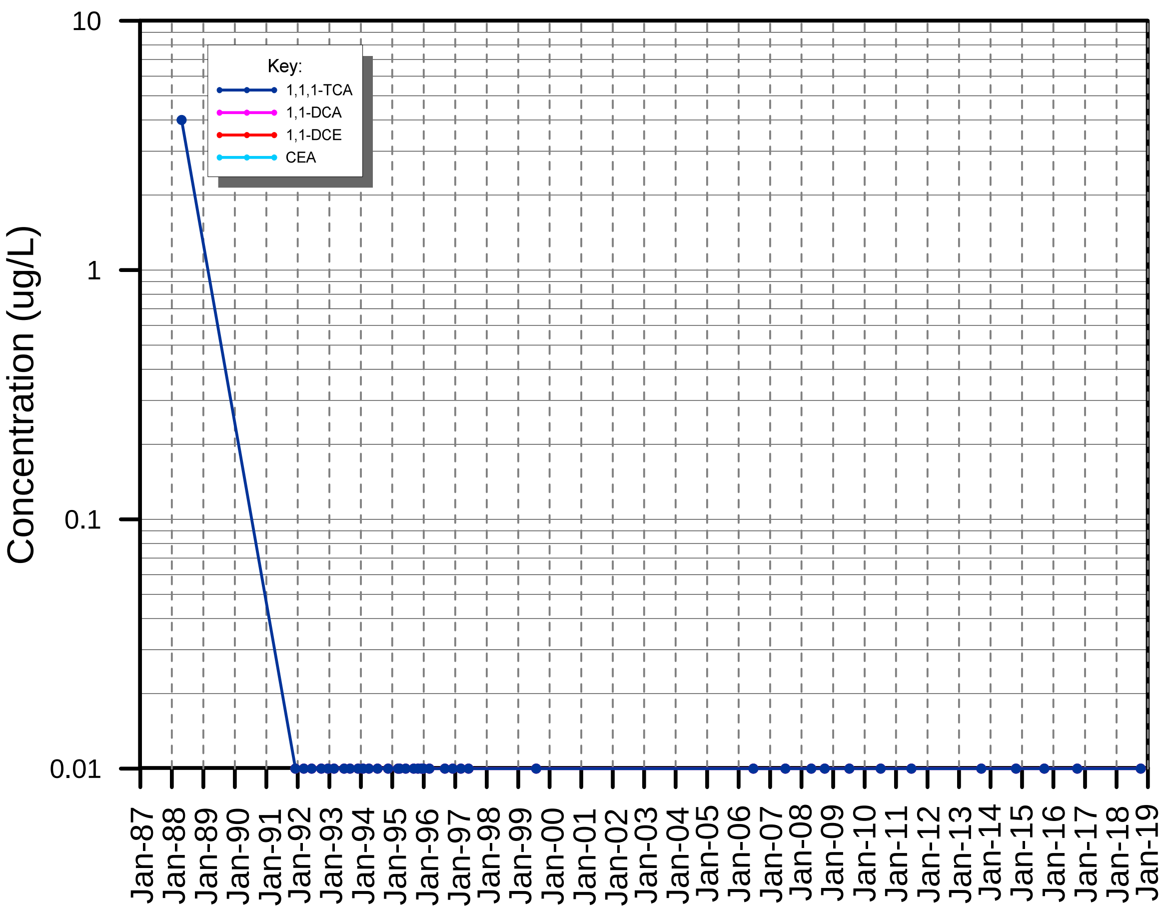
Jan-17
Jan-18
Jan-19

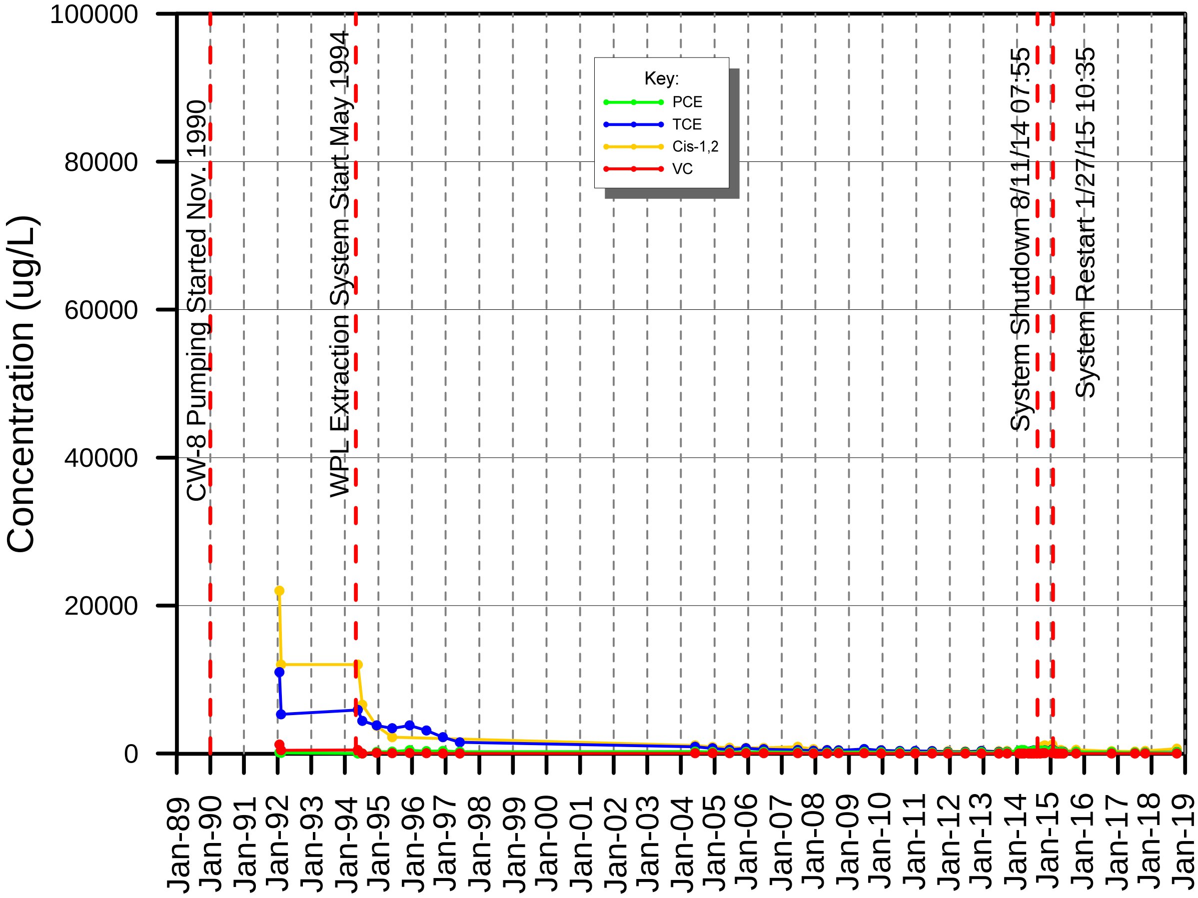


Concentration (ug/L)
10
1
0.1
0.01
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Jan-87
Jan-88
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

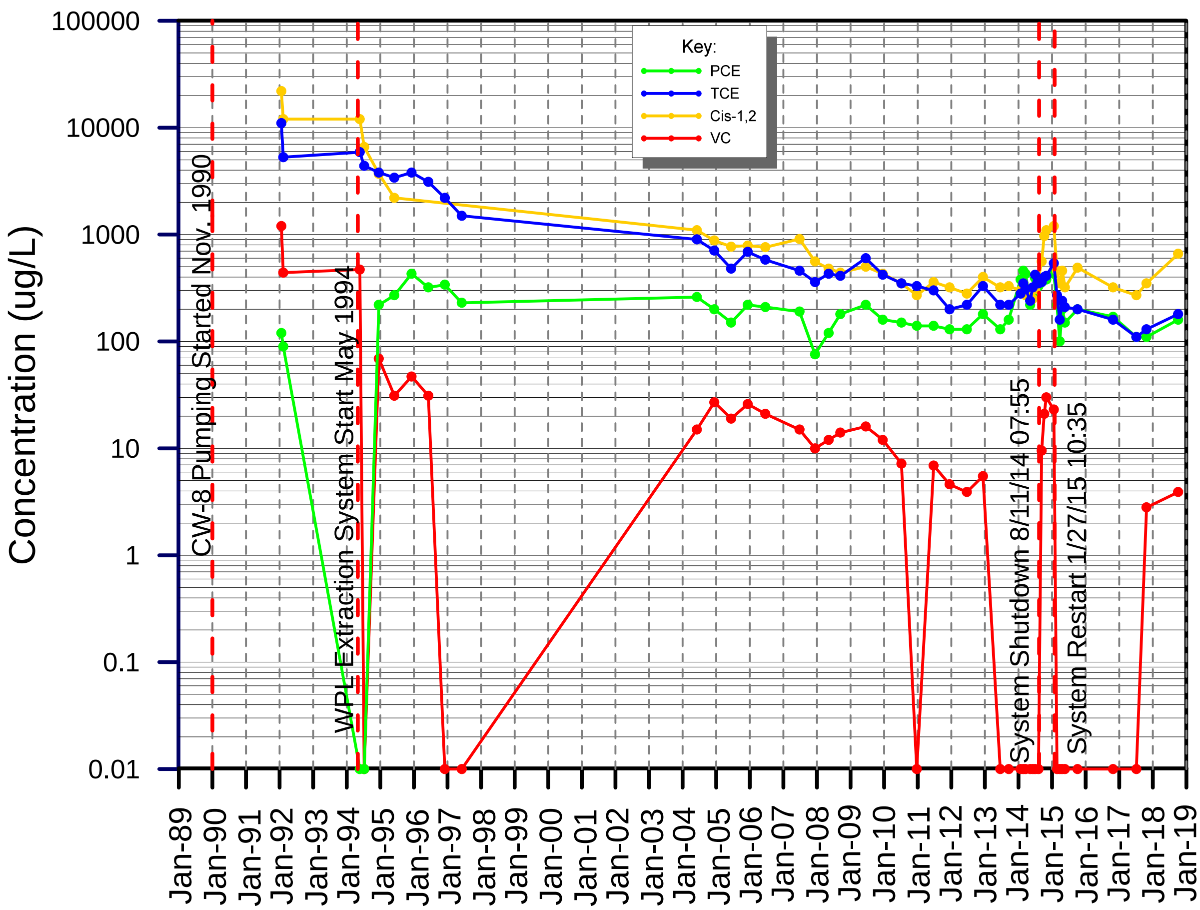
Appendix F-4

West Parking Lot Collection Wells

CW-13

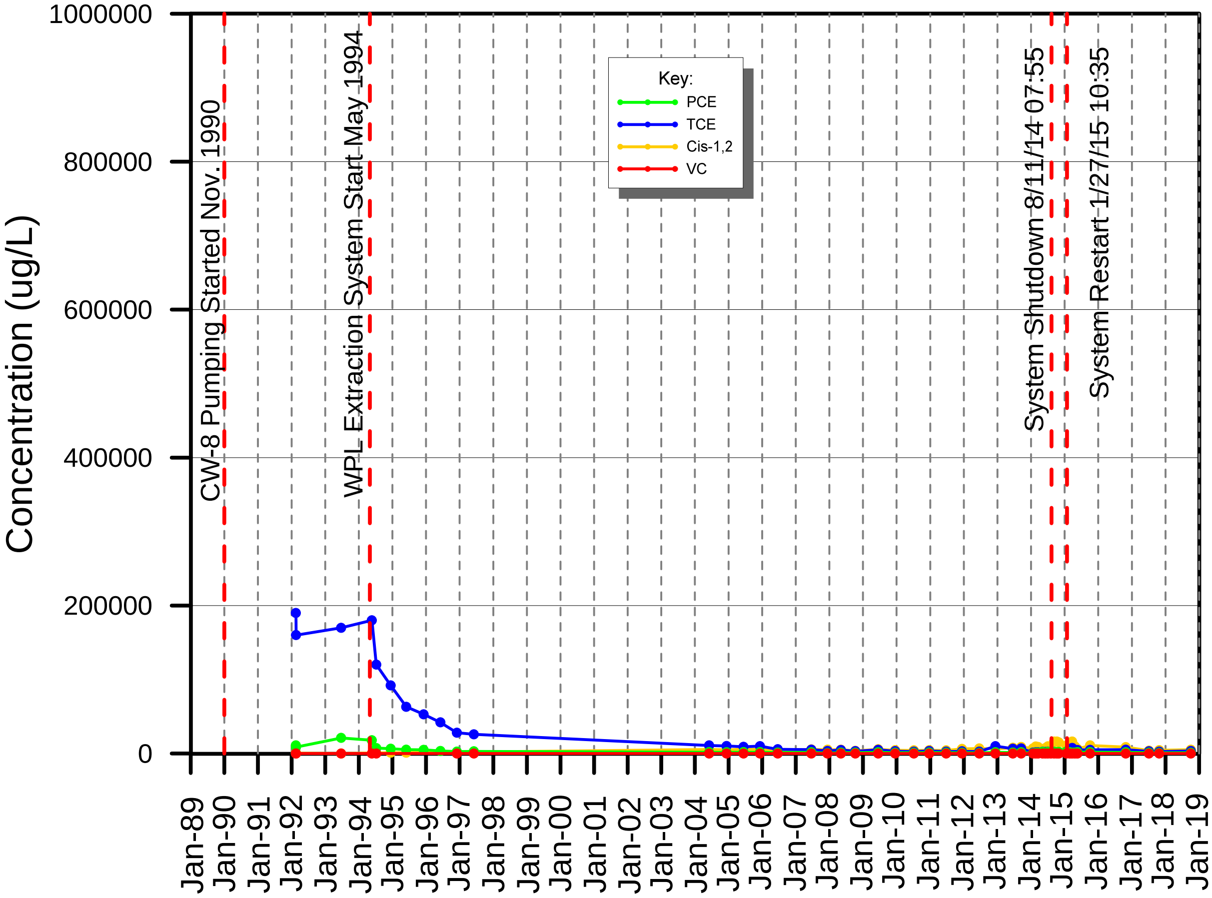


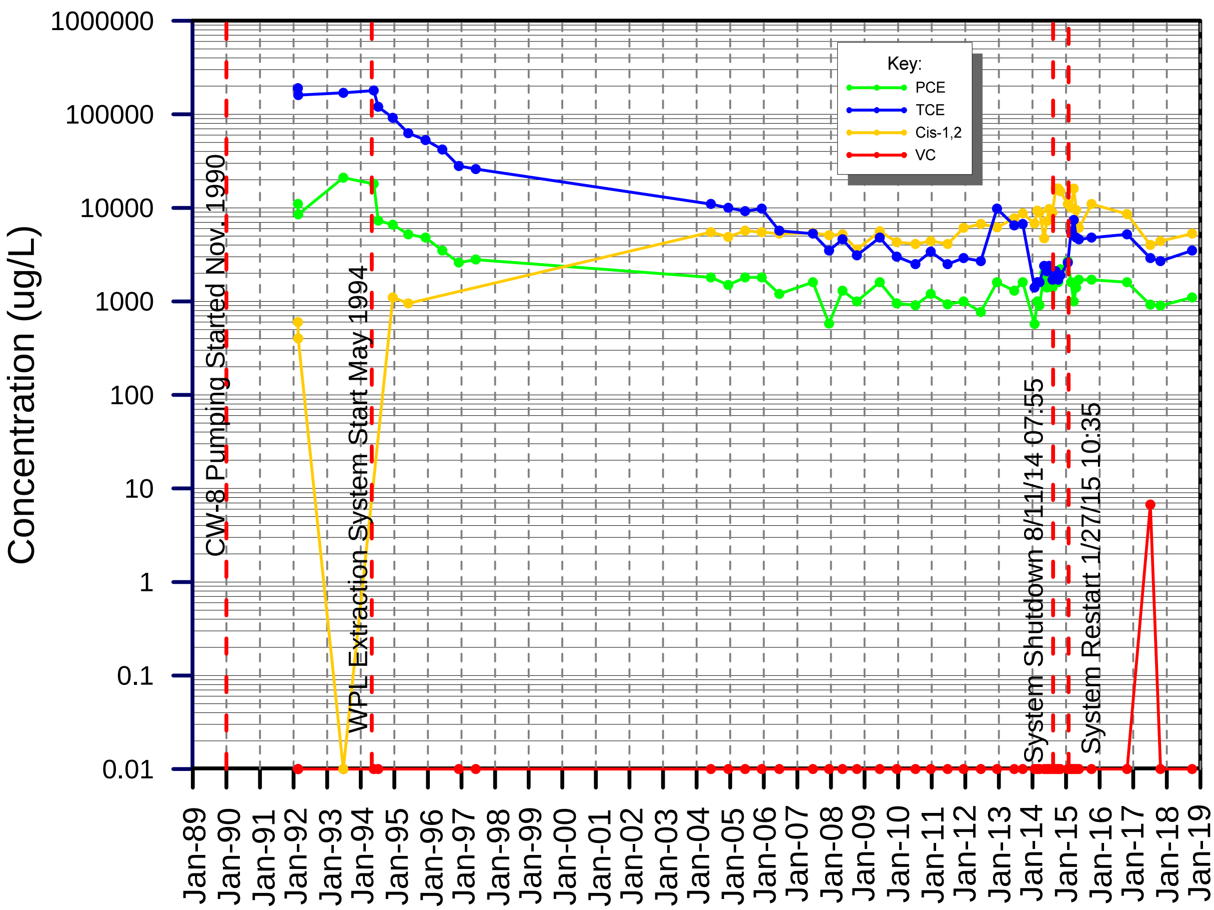
Concentration (ug/L)
100000
80000
60000
40000
20000
0
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Key:
PCE
TCE
Cis-1,2
VC
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19



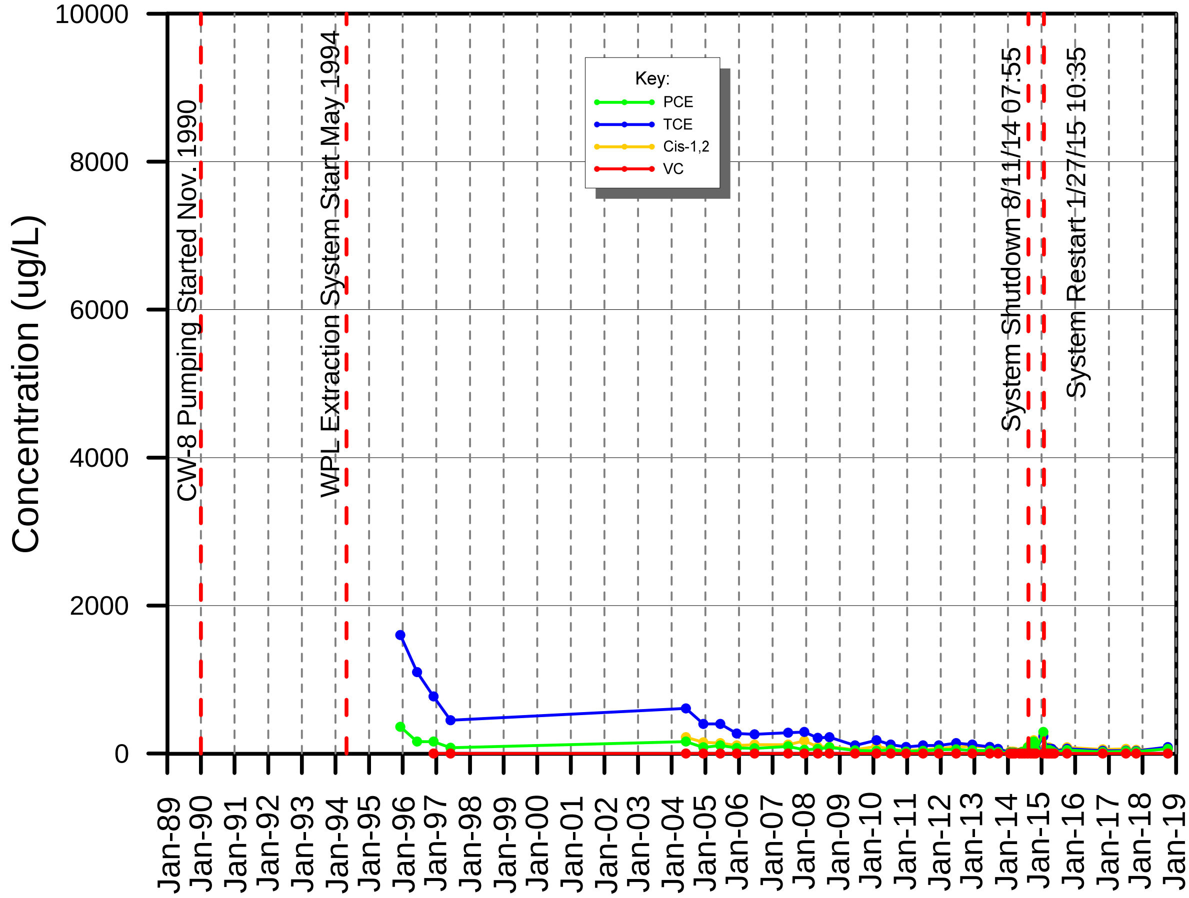
Concentration (ug/L)
100000
10000
1000
100
10
1
0.1
0.01
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Key:
PCE
TCE
Cis-1,2
VC
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

CW-15A


Concentration (ug/L)
1000000
800000
600000
400000
200000
0
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Key:
PCE
TCE
Cis-1,2
VC
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19


Concentration (ug/L)
1000000
100000
10000
1000
100
10
1
0.1
0.01
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Key:
PCE
TCE
Cis-1,2
VC
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19

CW-17



Concentration (ug/L)
10000
8000
6000
4000
2000
0
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Key:
PCE
TCE
Cis-1,2
VC
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
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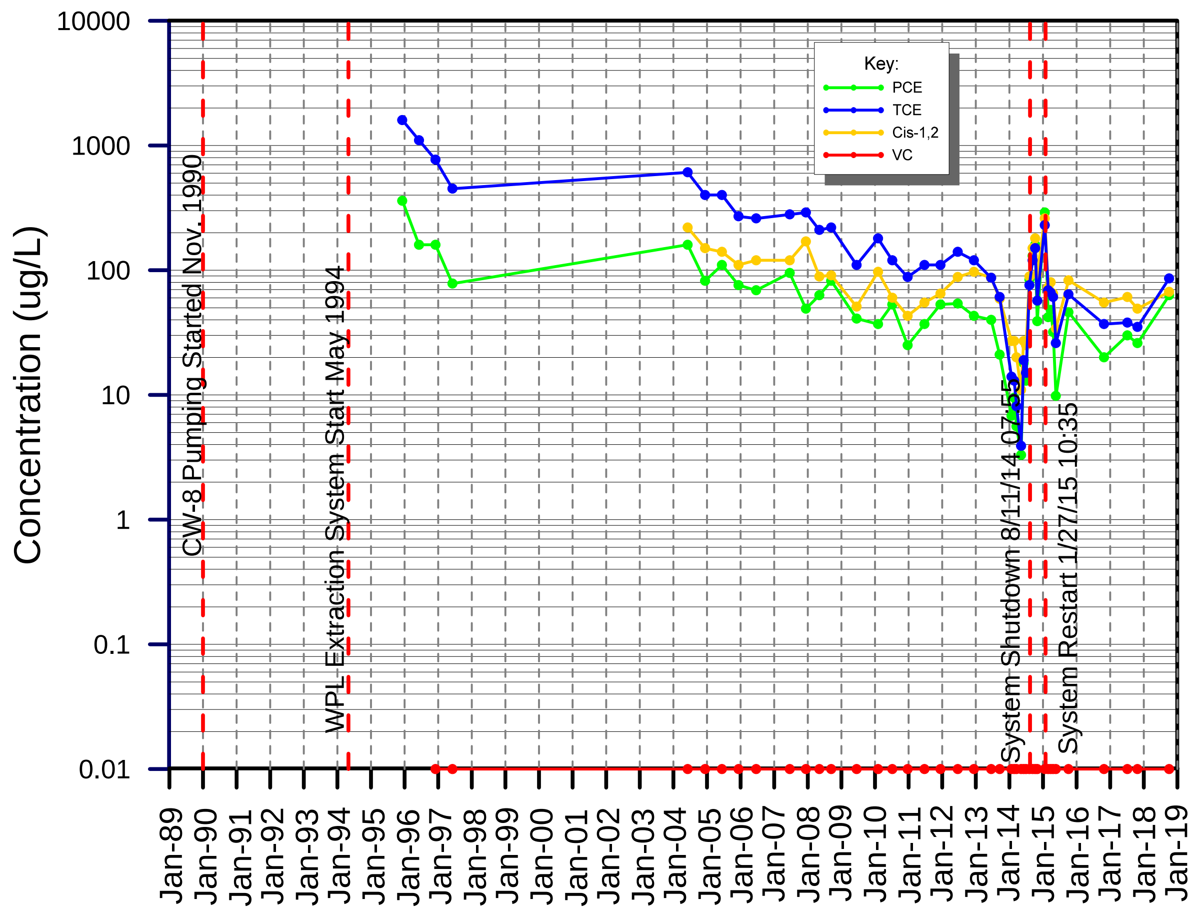
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19



Concentration (ug/L)
10000
1000
100
10
1
0.1
0.01
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Key:
PCE
TCE
Cis-1,2
VC
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
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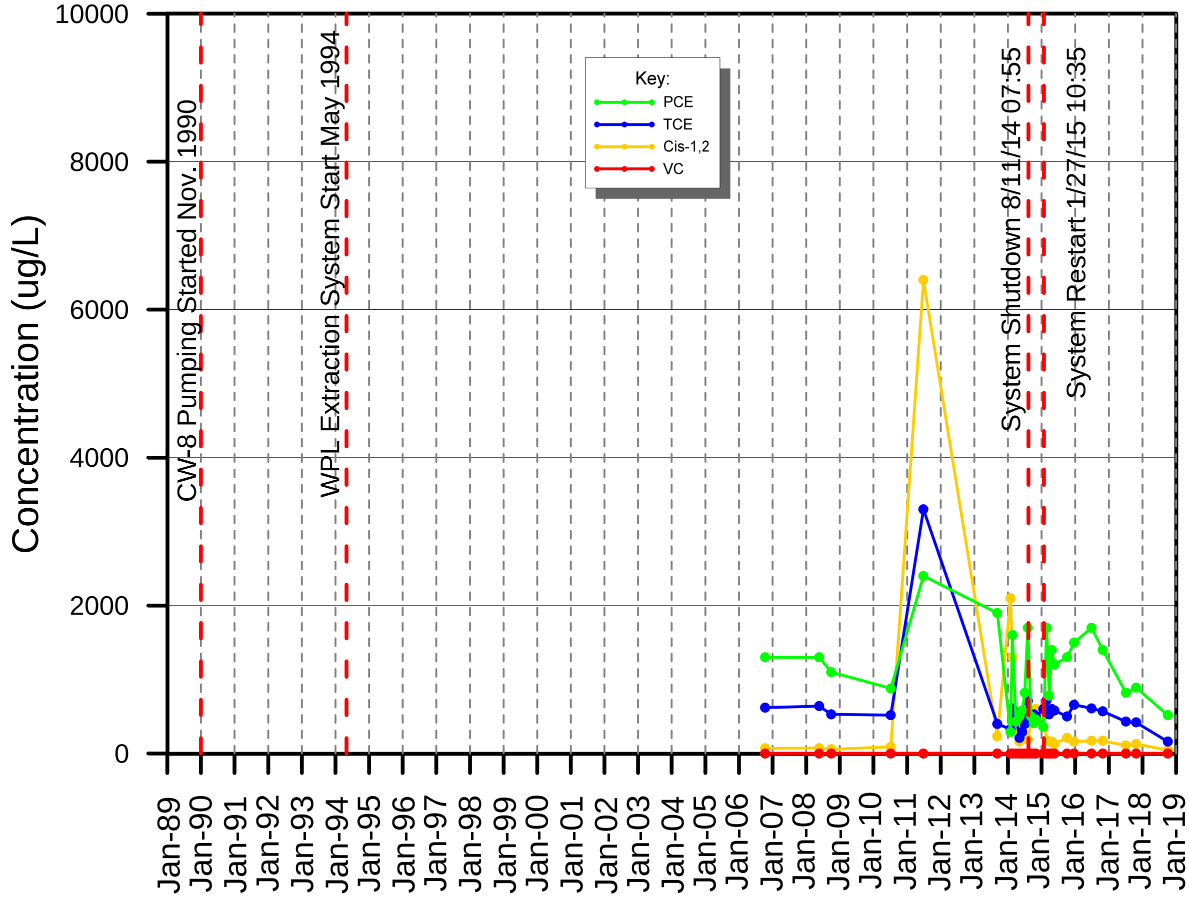
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

CW-20



Concentration (ug/L)
10000
8000
6000
4000
2000
0
Key:
PCE
TCE
Cis-1,2
VC
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
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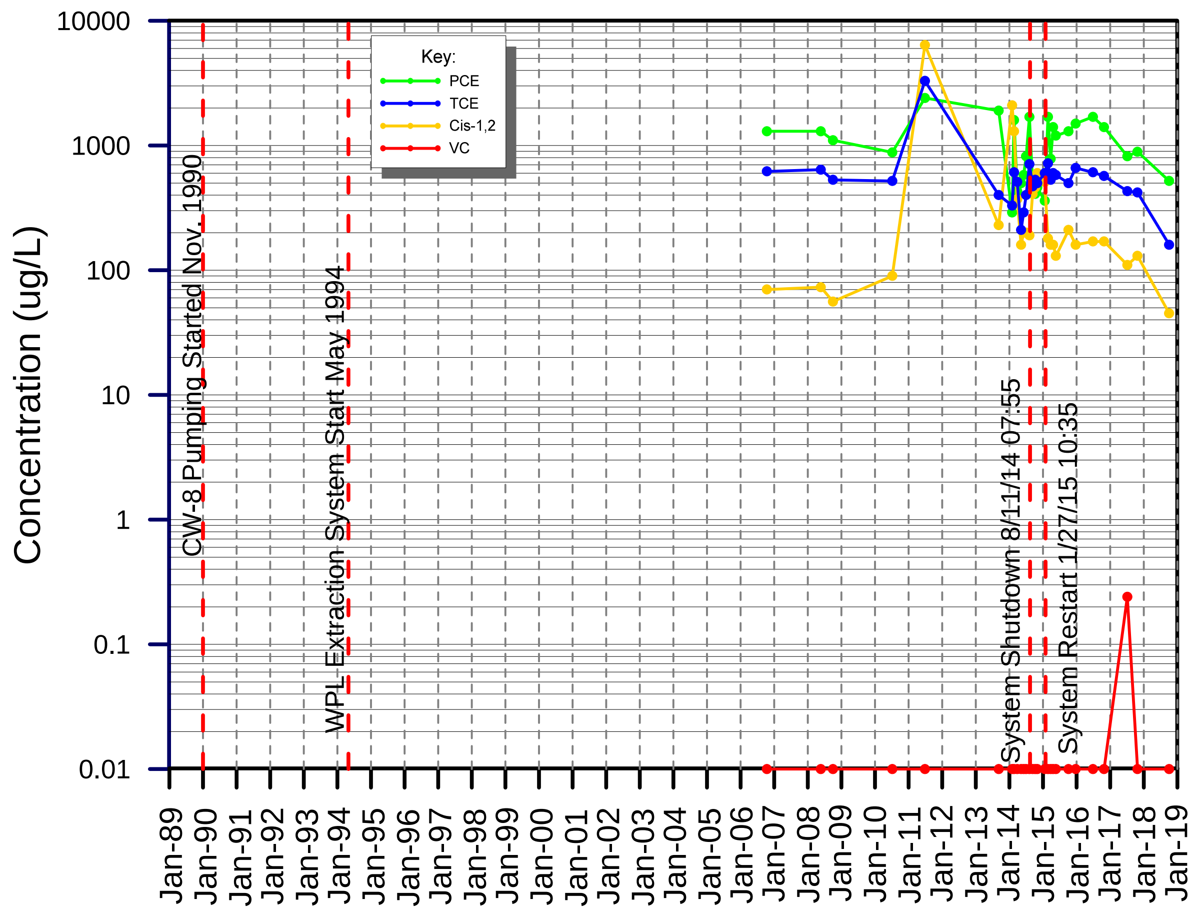
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19



Concentration (ug/L)
10000
1000
100
10
1
0.1
0.01
Key:
PCE
TCE
Cis-1,2
VC
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
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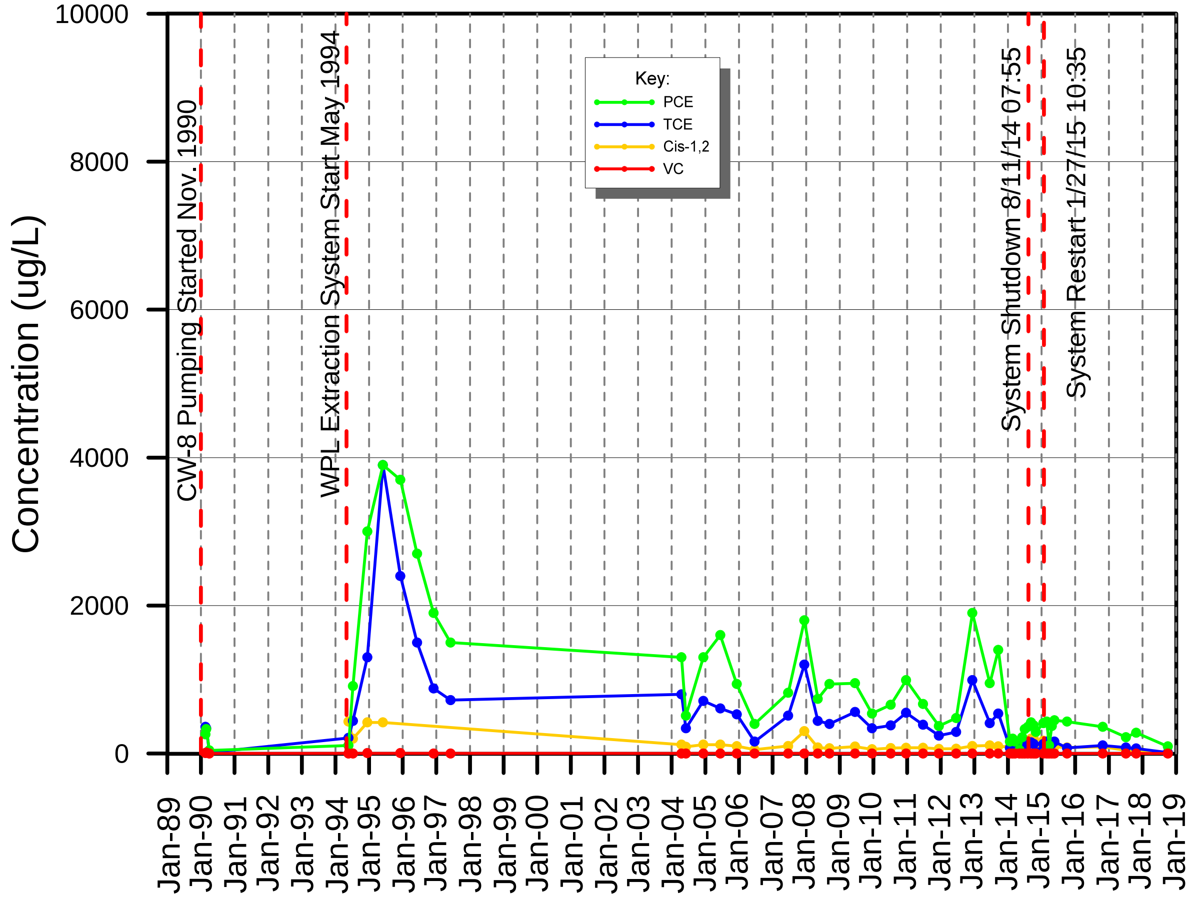
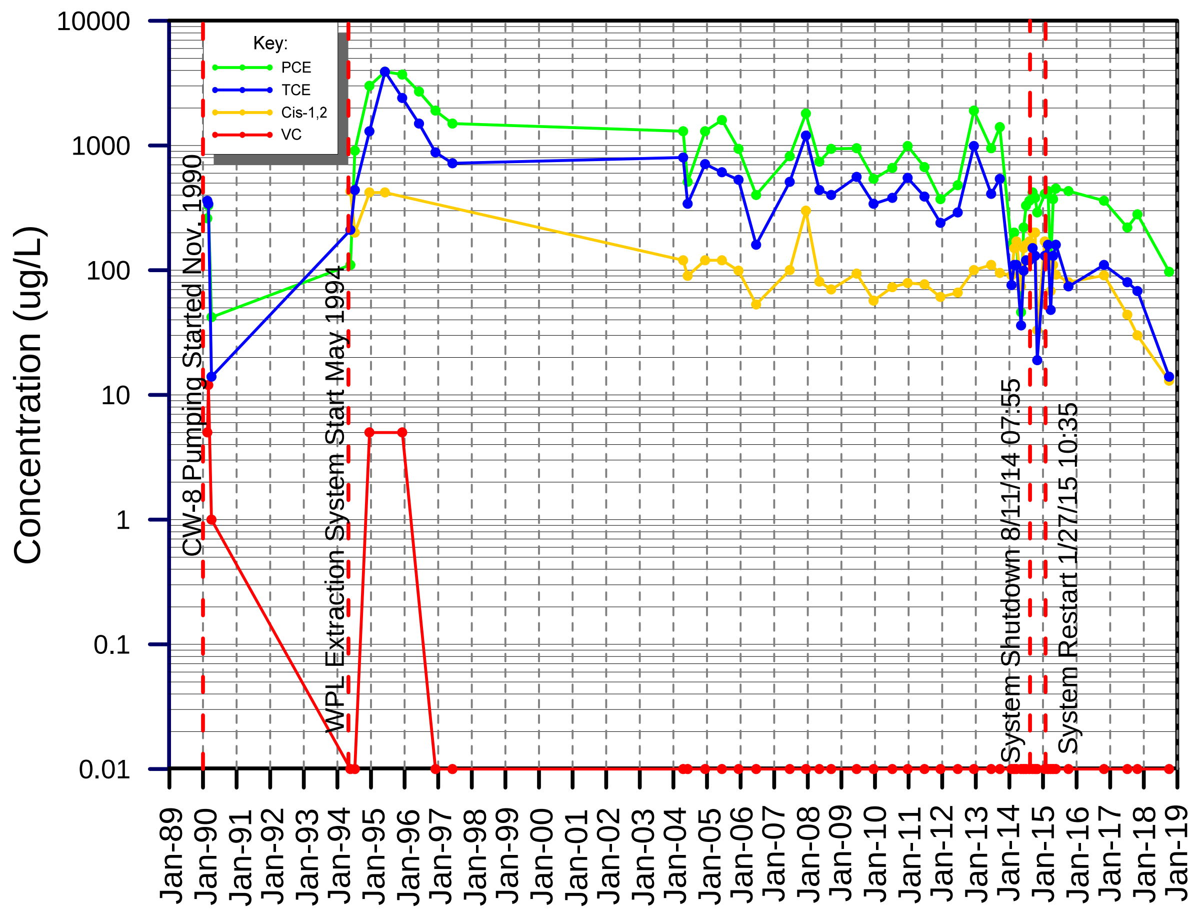
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

CW-9

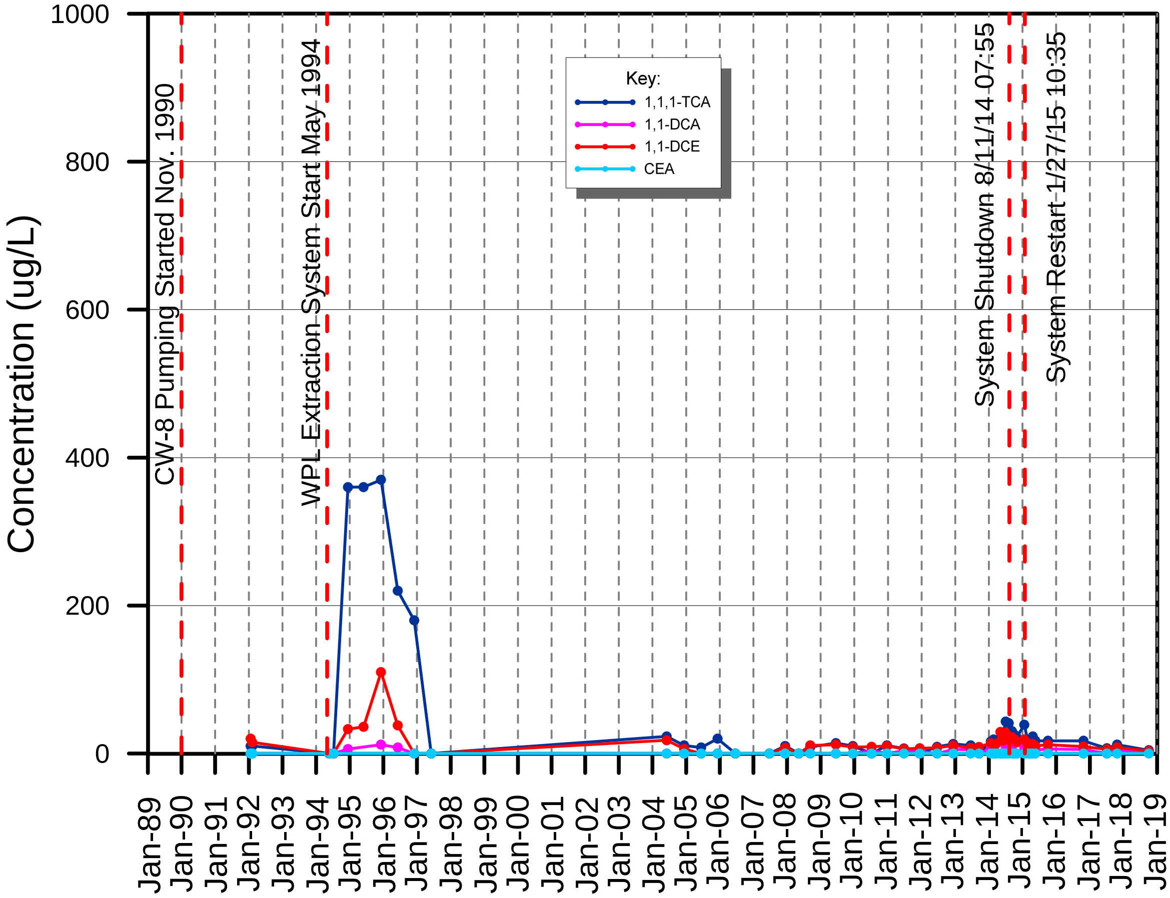


Concentration (ug/L)
10000
8000
6000
4000
2000
0
Key:
PCE
TCE
Cis-1,2
VC
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19

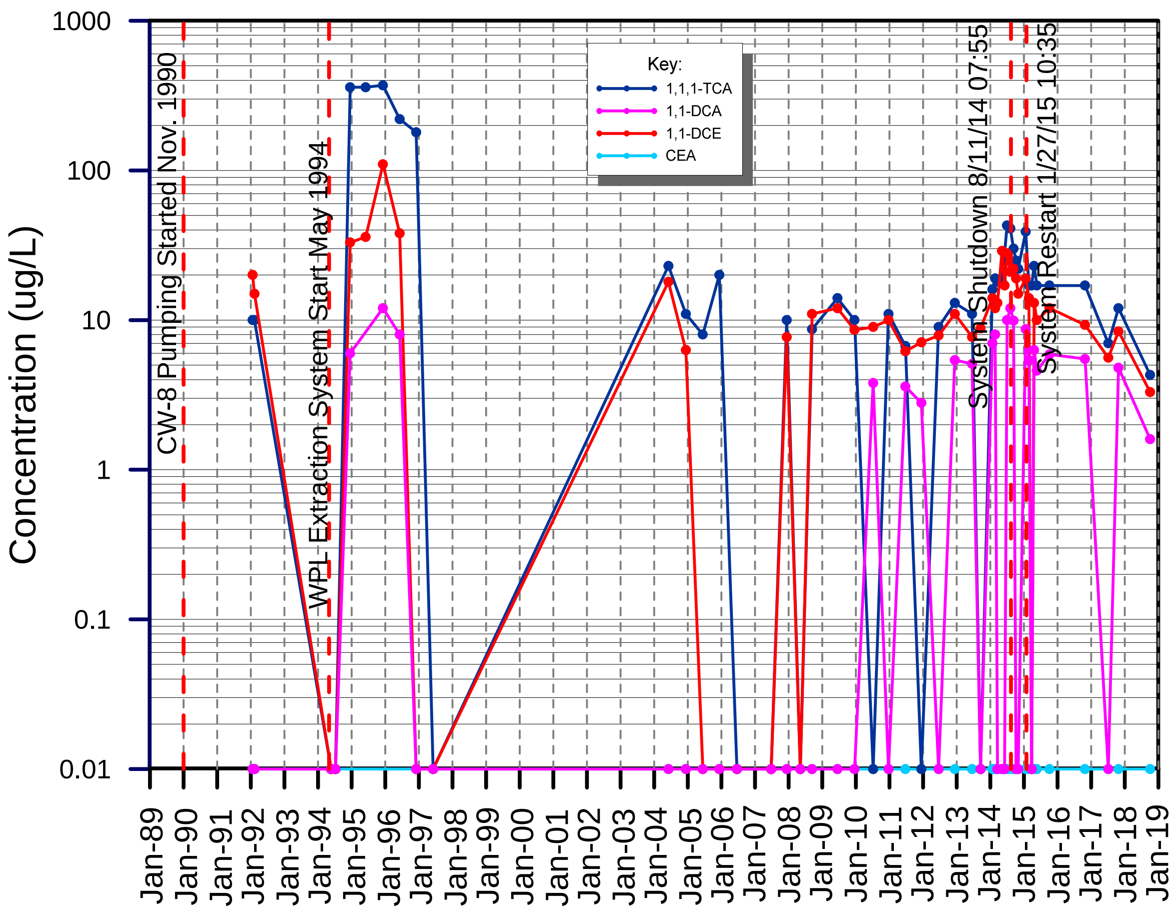


Concentration (ug/L)
10000
1000
100
10
1
0.1
0.01
Key:
PCE
TCE
Cis-1,2
VC
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19

CW-13

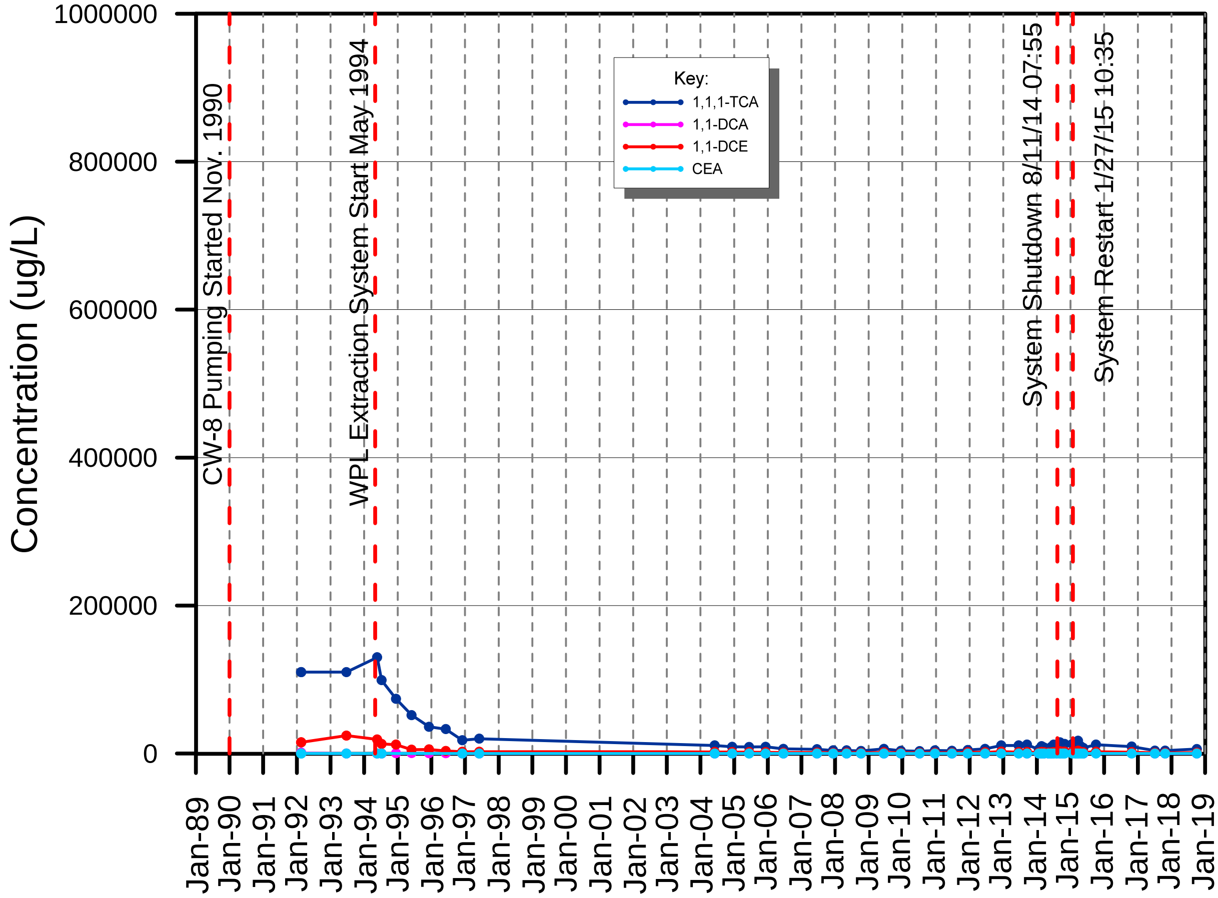


Concentration (ug/L)
1000
800
600
400
200
0
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19



Concentration (ug/L)
1000
100
10
1
0.1
0.01
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19

CW-15A



Concentration (ug/L)
1000000
800000
600000
400000
200000
0
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
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Jan-06
Jan-07
Jan-08
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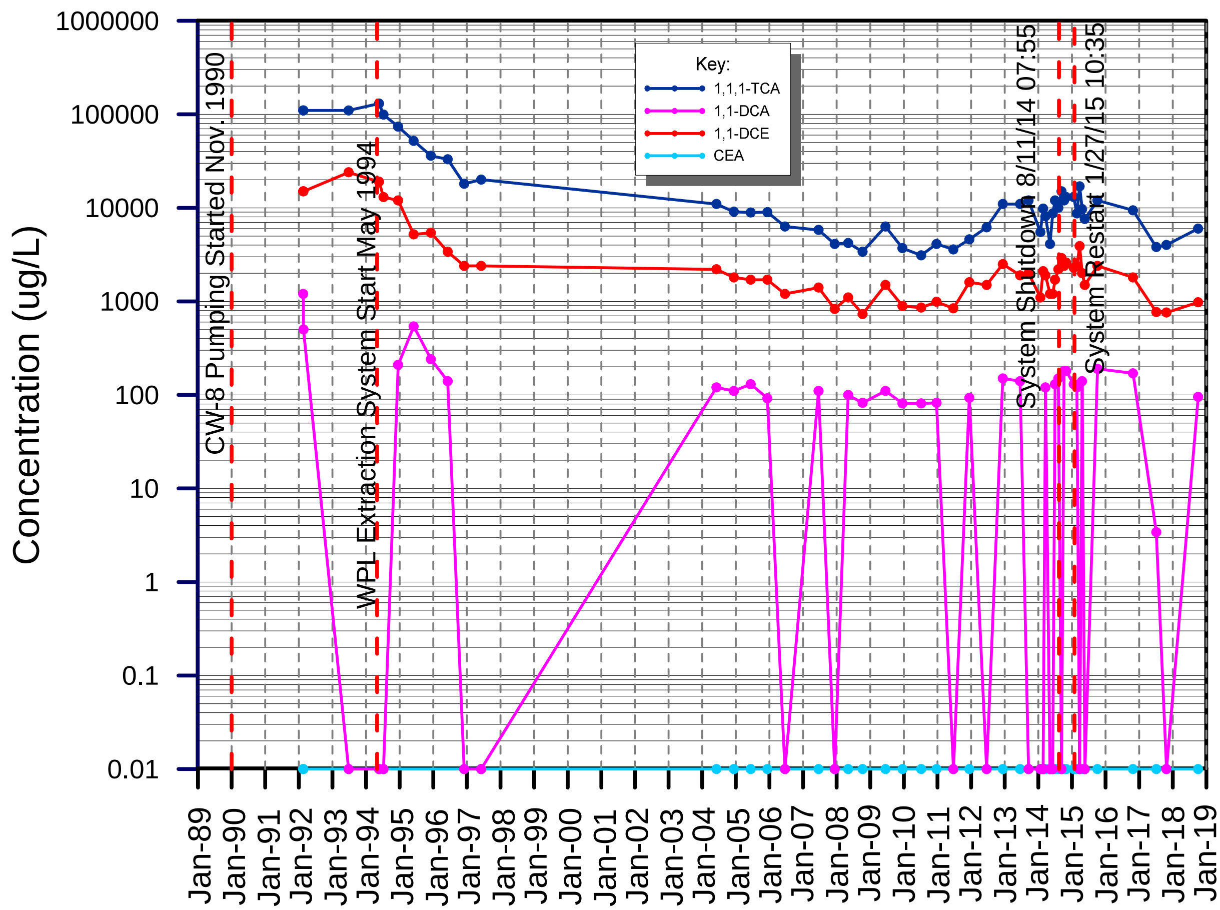
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19



Concentration (ug/L)
1000000
100000
10000
1000
100
10
1
0.1
0.01
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
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Jan-06
Jan-07
Jan-08
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Jan-12
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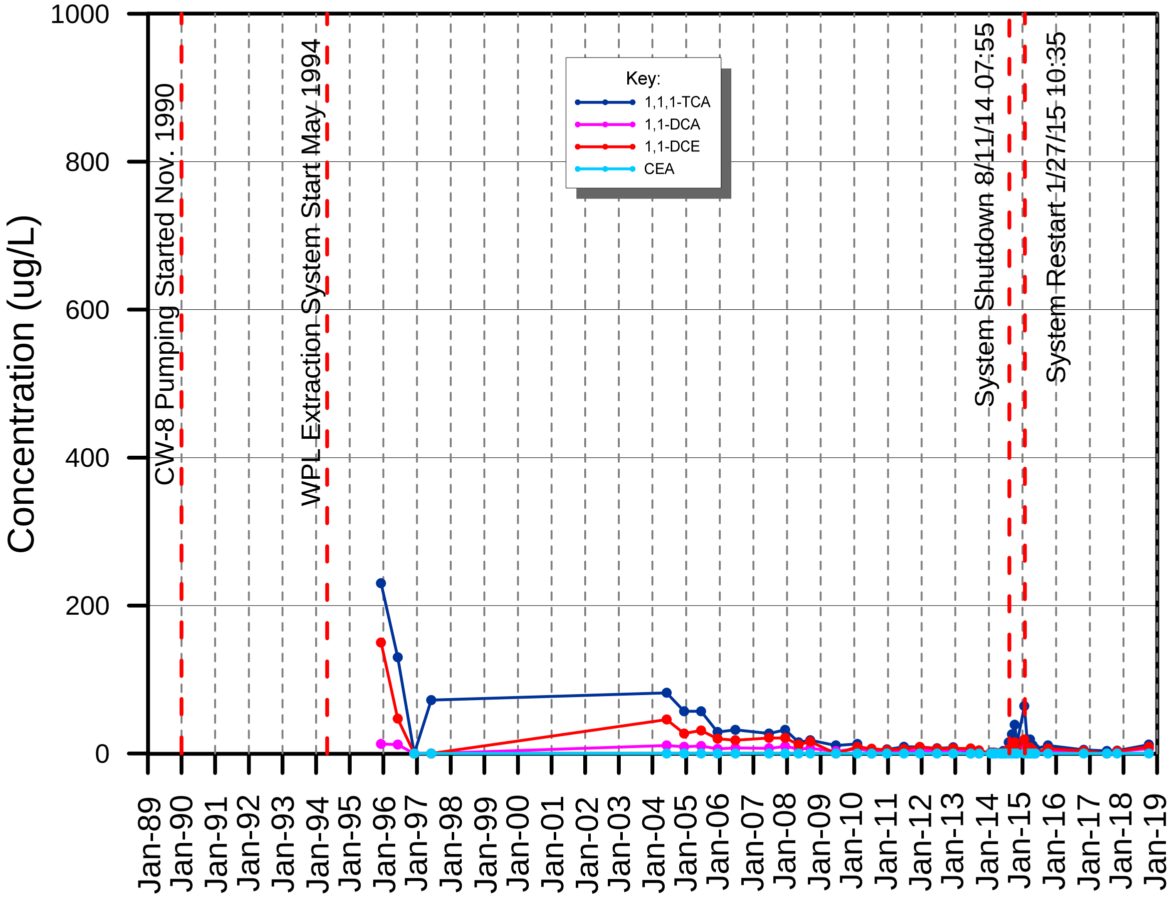
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

CW-17



Concentration (ug/L)
1000
800
600
400
200
0
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
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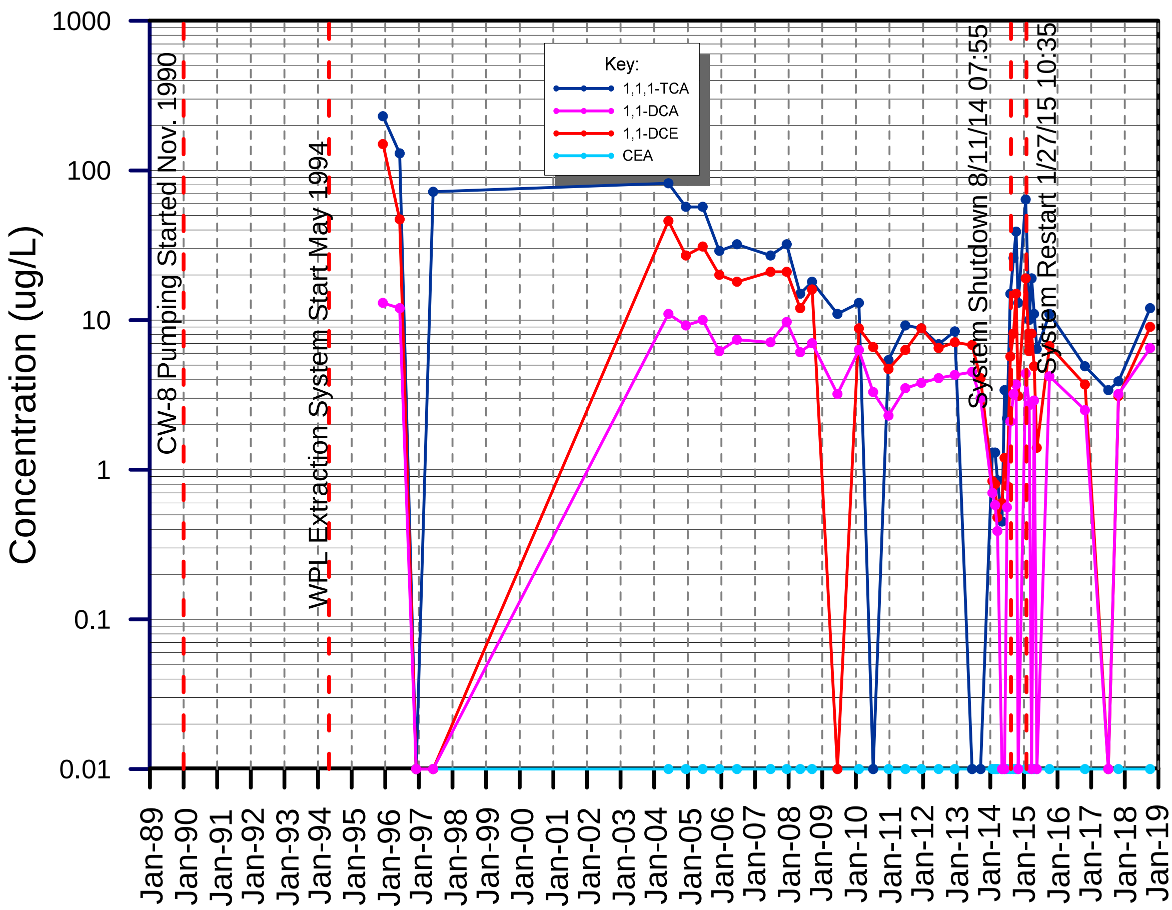
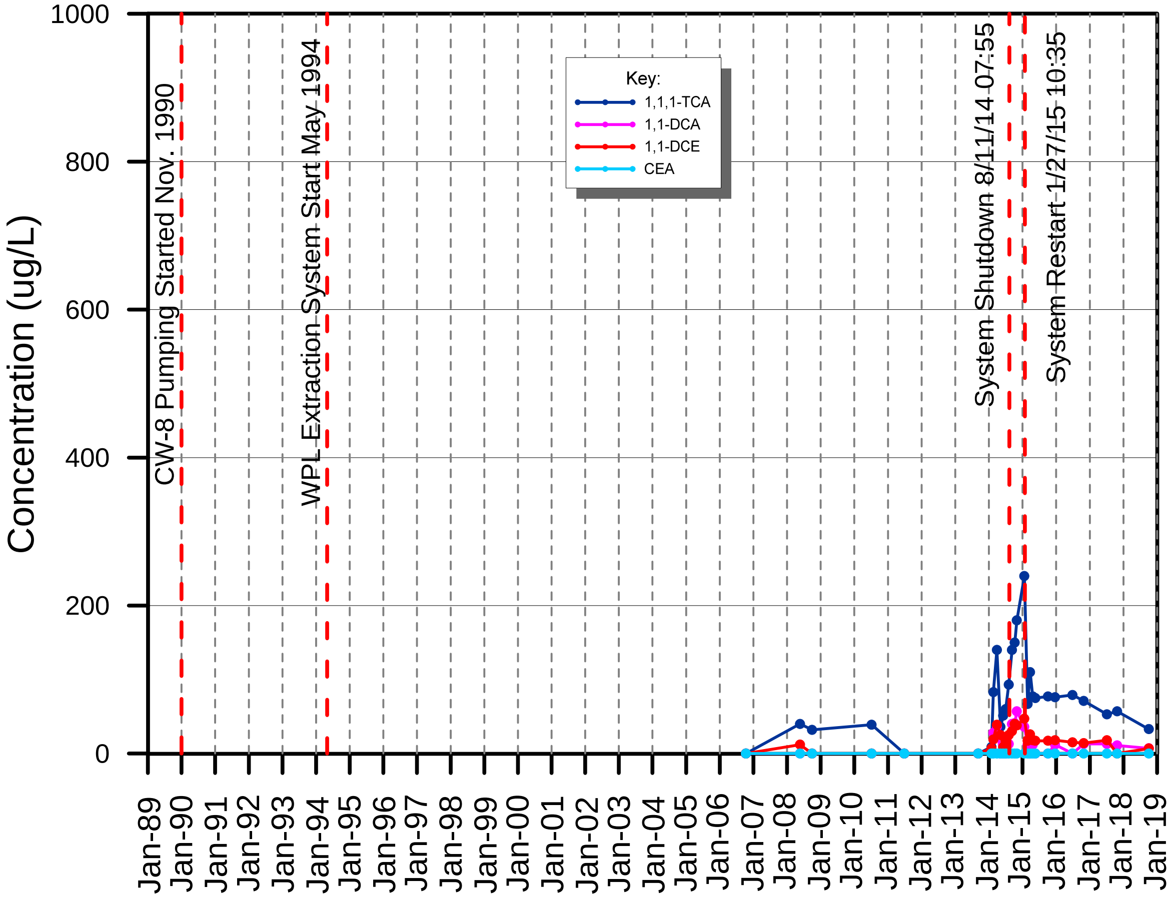
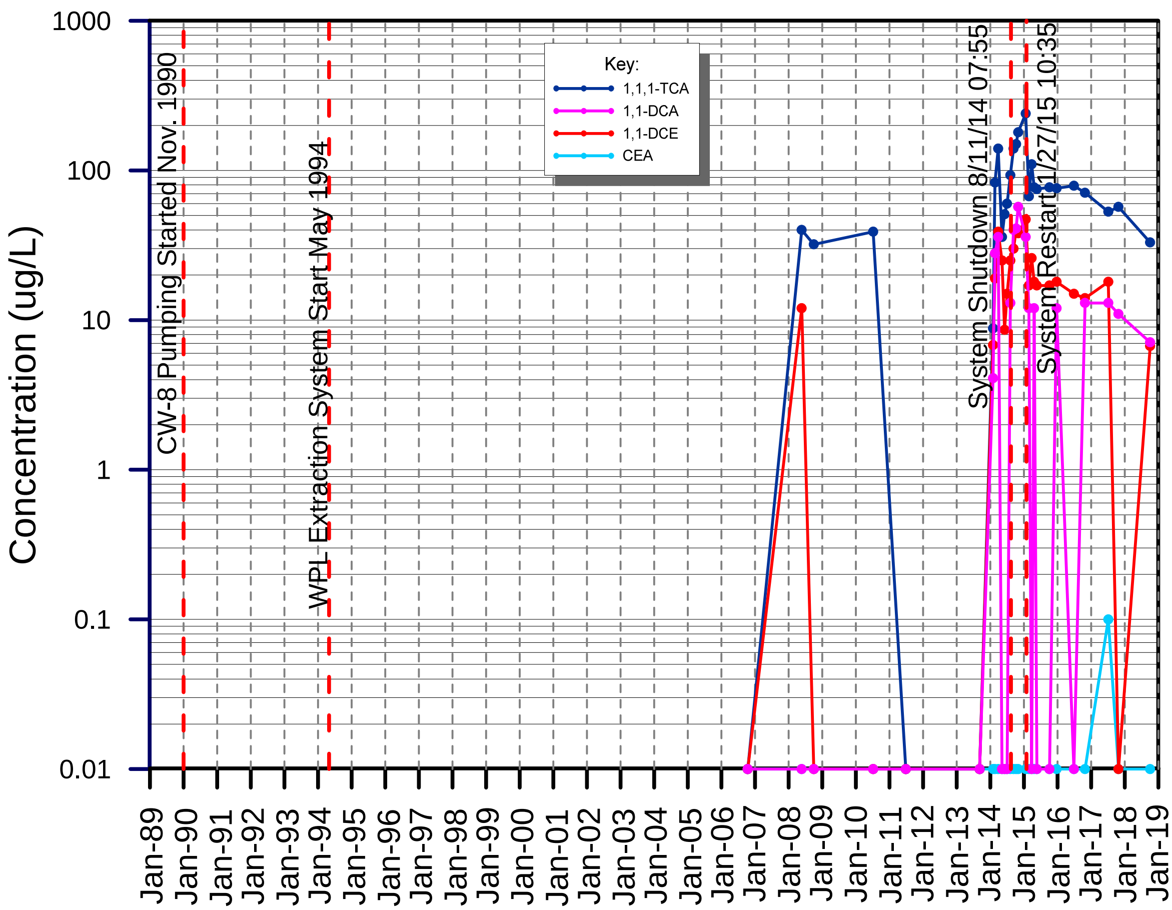
Jan-17
Jan-18
Jan-19



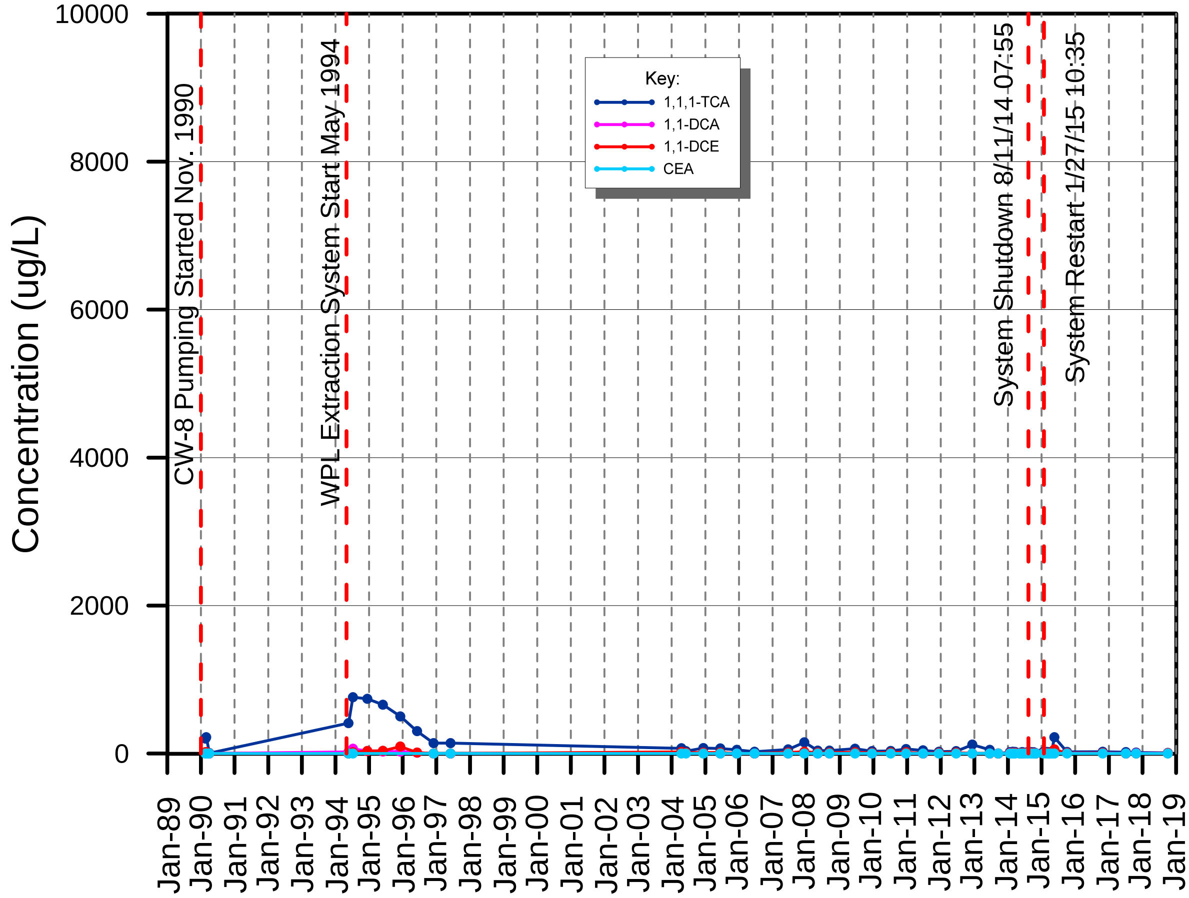
Concentration (ug/L)
1000
100
10
1
0.1
0.01
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19

CW-20


Concentration (ug/L)
1000
800
600
400
200
0
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19


Concentration (ug/L)
1000
100
10
1
0.1
0.01
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19

CW-9



Concentration (ug/L)
10000
8000
6000
4000
2000
0
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
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Jan-05
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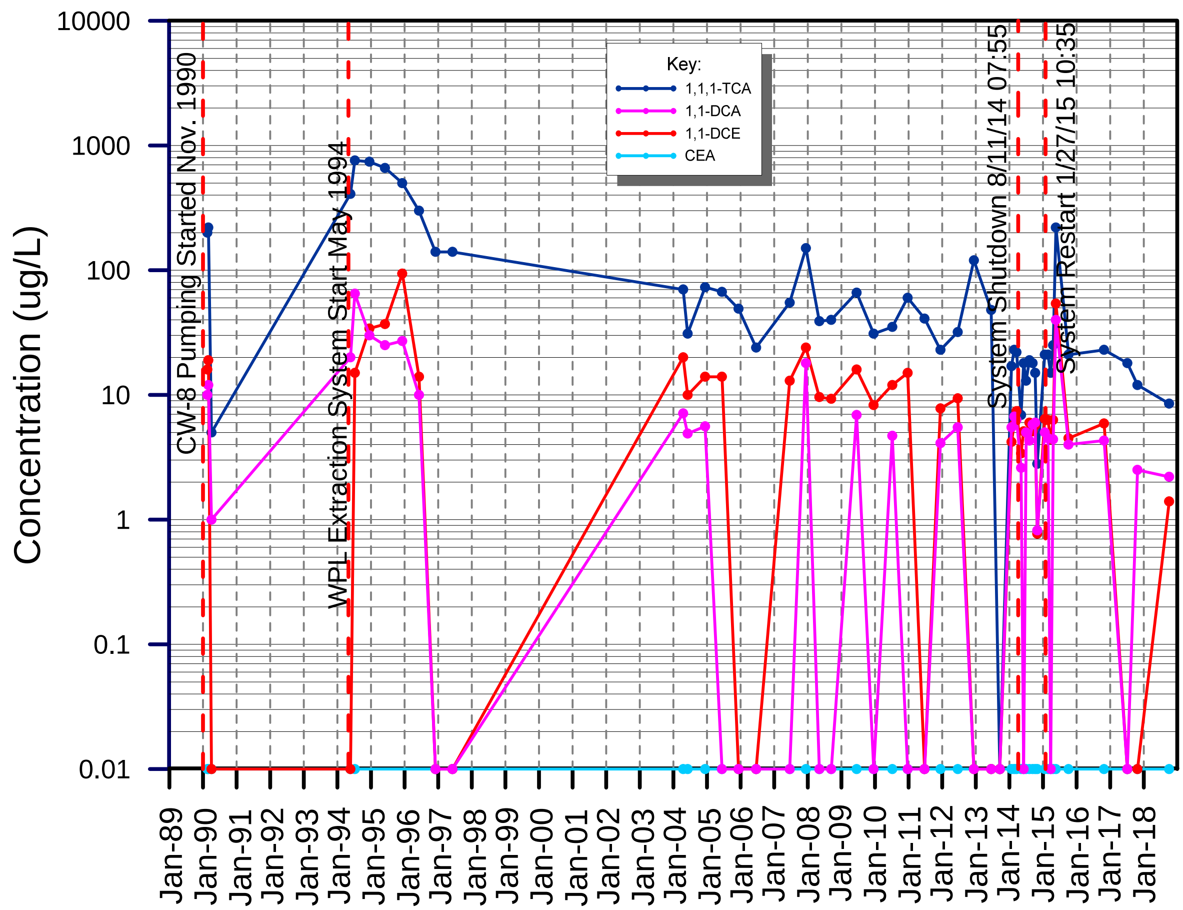
Jan-17
Jan-18
Jan-19



Concentration (ug/L)
10000
1000
100
10
1
0.1
0.01
CW-8 Pumping Started Nov. 1990
WPL Extraction System Start May 1994
System Shutdown 8/11/14 07:55
System Restart 1/27/15 10:35
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
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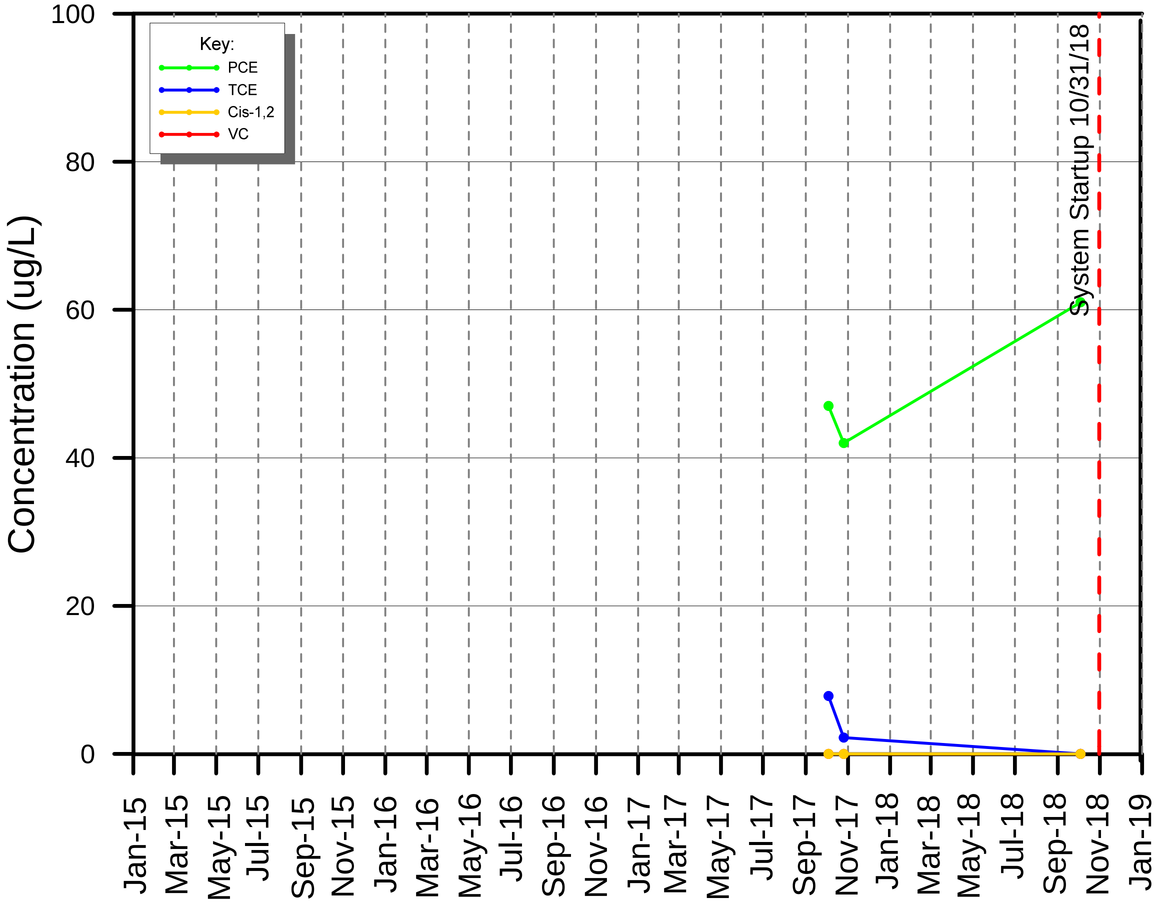
Jan-15
Jan-16
Jan-17
Jan-18

Appendix F-5

Eastern Perimeter Road (Monitoring Well MW-185)

MW-185



Concentration (ug/L)
100
80
60
40
20
0
Key:
PCE
TCE
Cis-1,2
VC
System Startup 10/31/18
Jan-15
Mar-15
May-15
Jul-15
Sep-15
Nov-15
Jan-16
Mar-16
May-16
Jul-16
Sep-16
Nov-16
Jan-17
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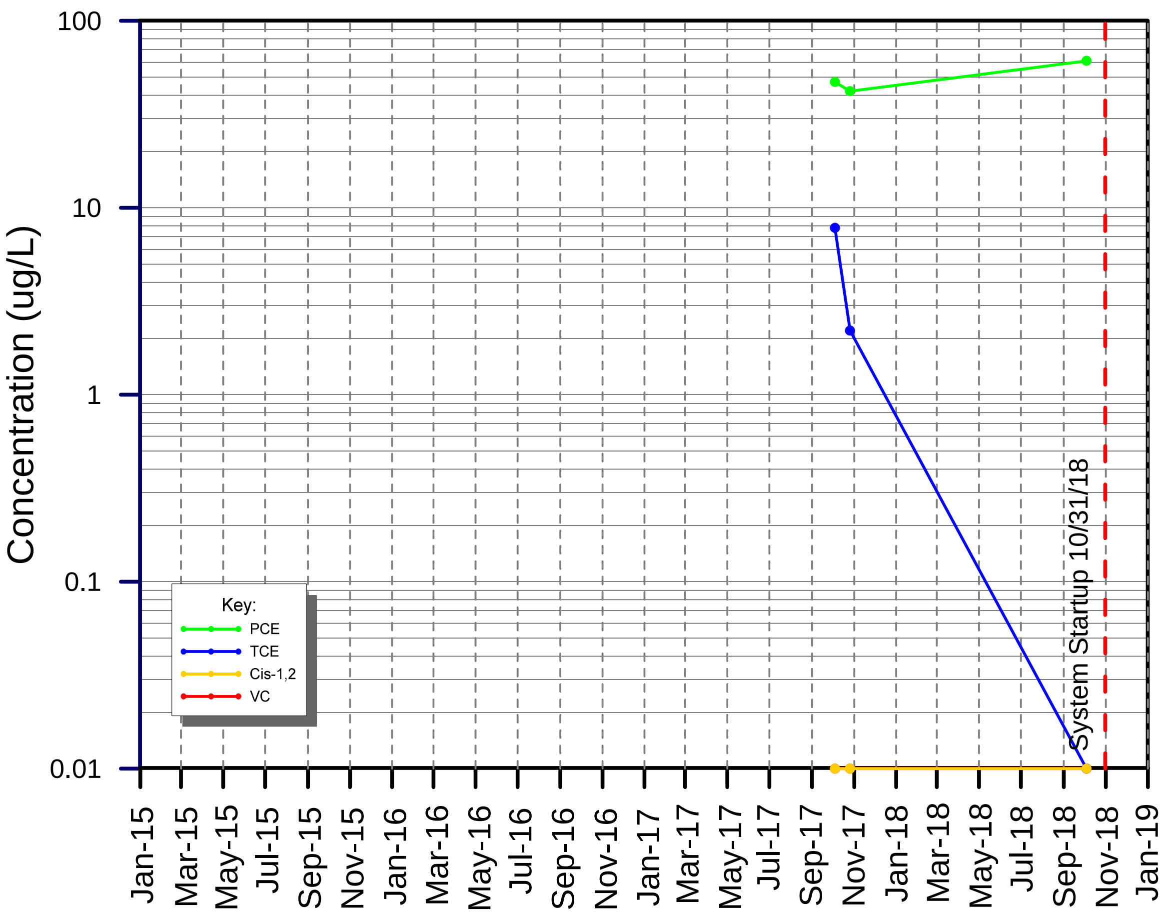
Sep-18
Nov-18
Jan-19



Concentration (ug/L)
100
10
1
0.1
0.01
Key:
PCE
TCE
Cis-1,2
VC
System Startup 10/31/18
Jan-15
Mar-15
May-15
Jul-15
Sep-15
Nov-15
Jan-16
Mar-16
May-16
Jul-16
Sep-16
Nov-16
Jan-17
Mar-17
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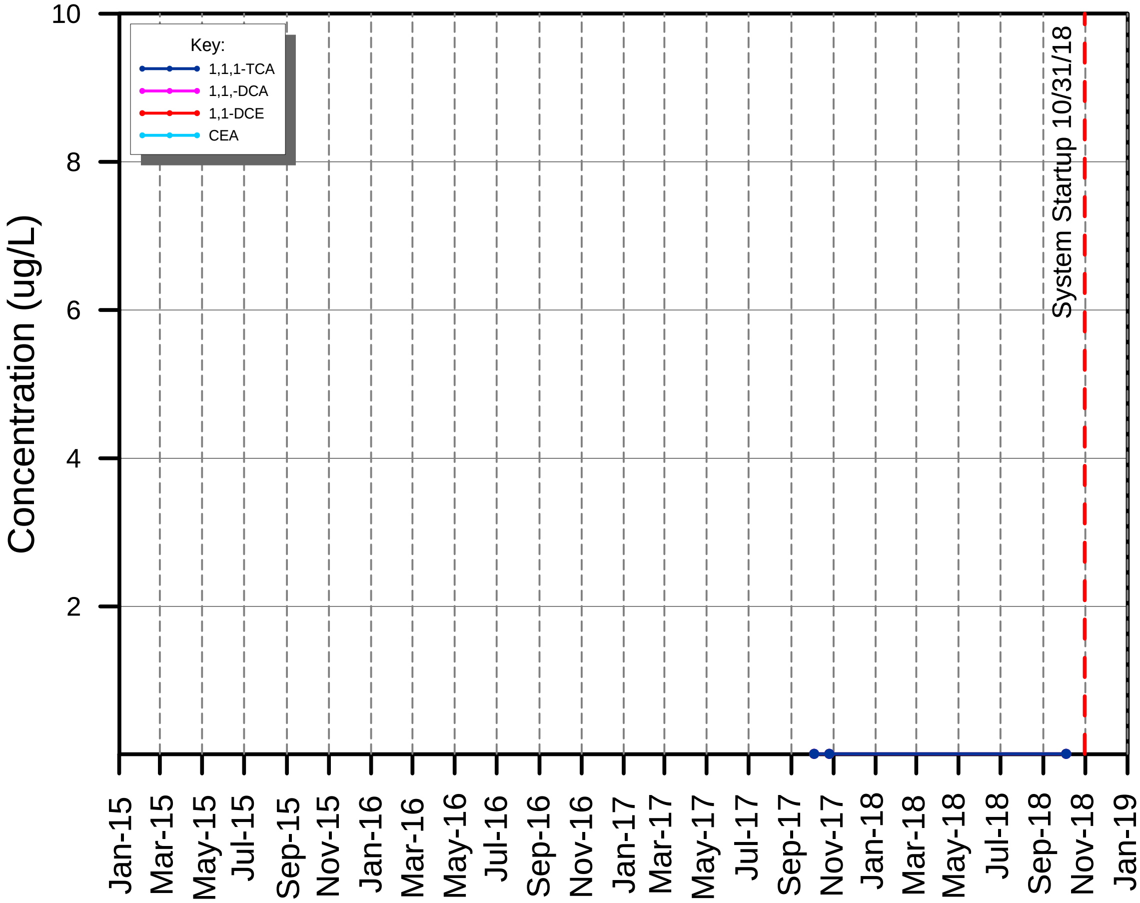
Nov-18
Jan-19

MW-185



Concentration (ug/L)
10
8
6
4
2
Key:
1,1,1-TCA
1,1,-DCA
1,1-DCE
CEA
System Startup 10/31/18
Jan-15
Mar-15
May-15
Jul-15
Sep-15
Nov-15
Jan-16
Mar-16
May-16
Jul-16
Sep-16
Nov-16
Jan-17
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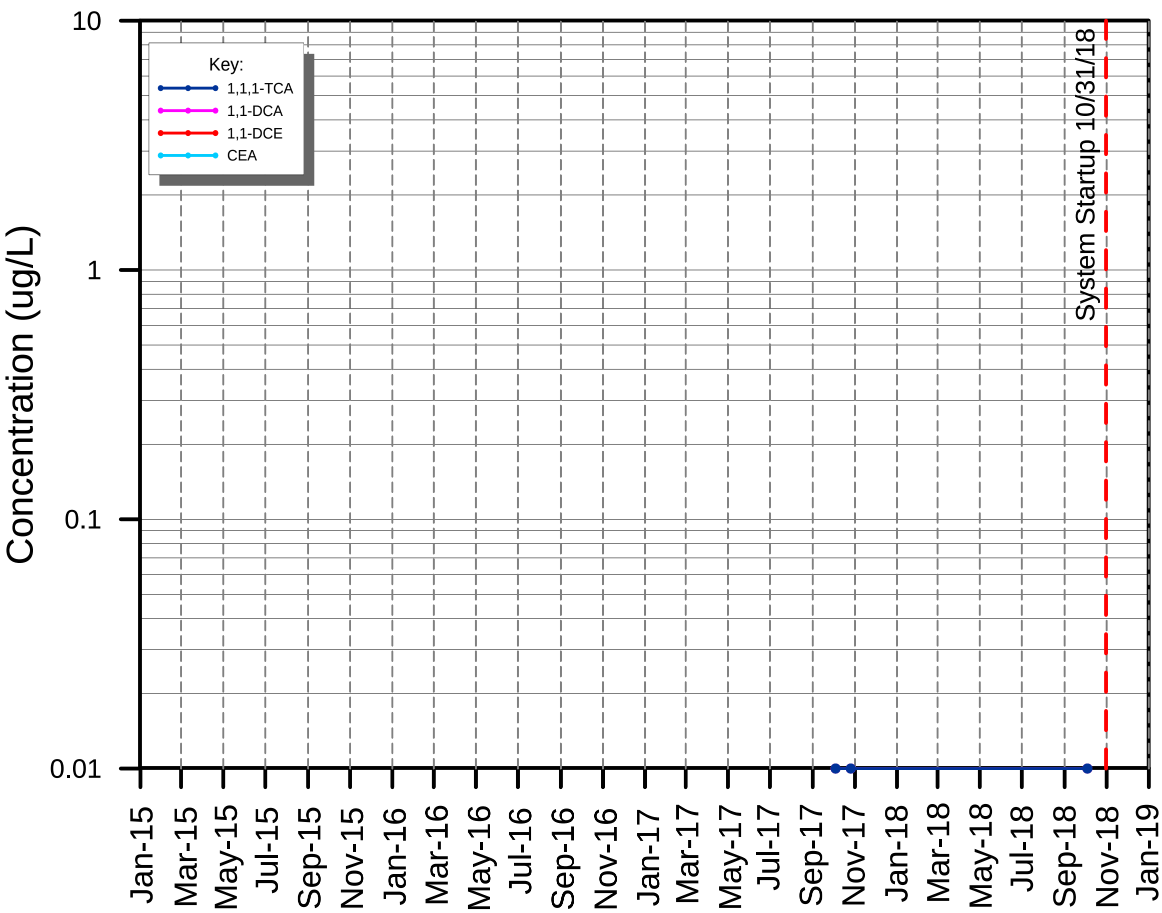
Sep-18
Nov-18
Jan-19

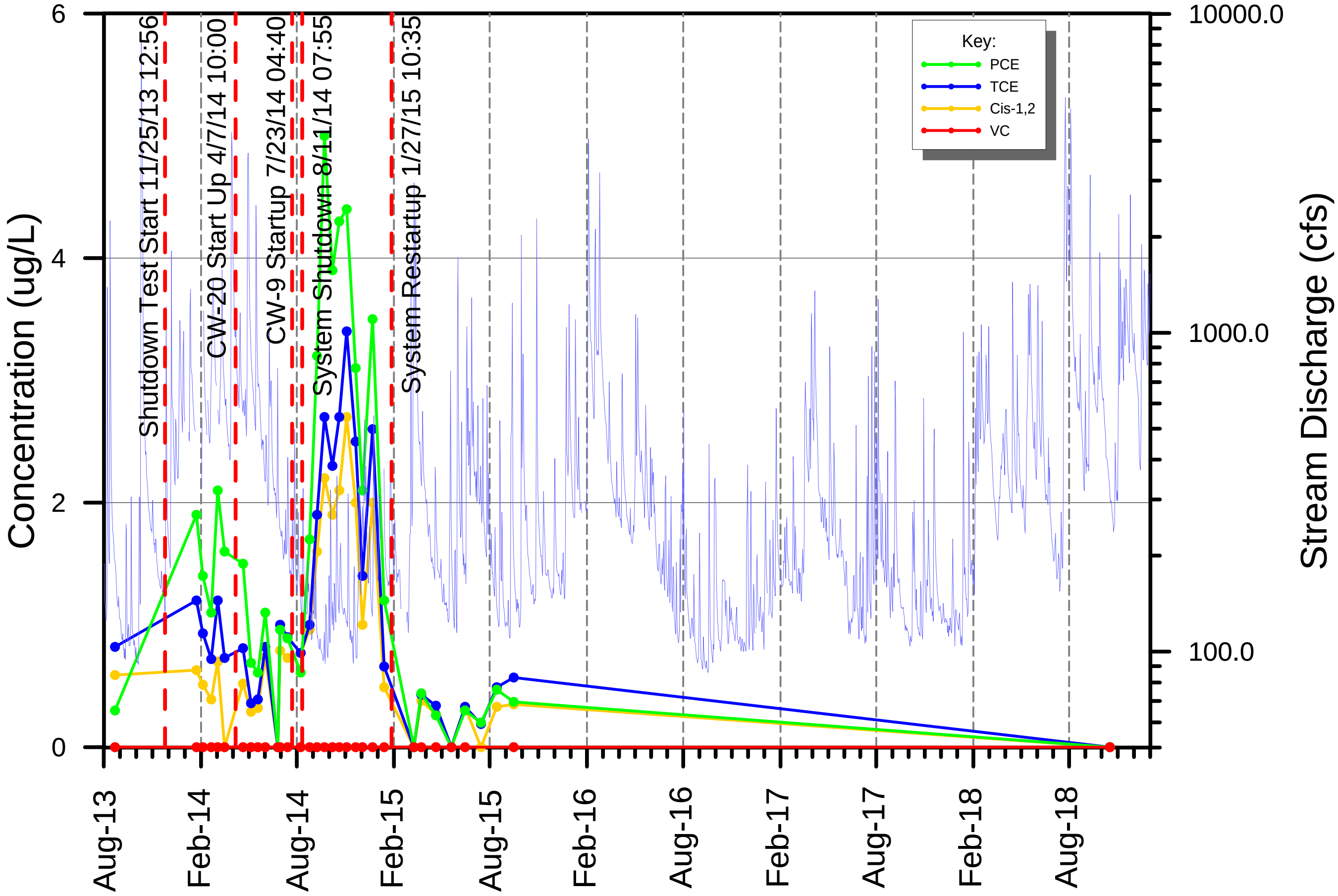


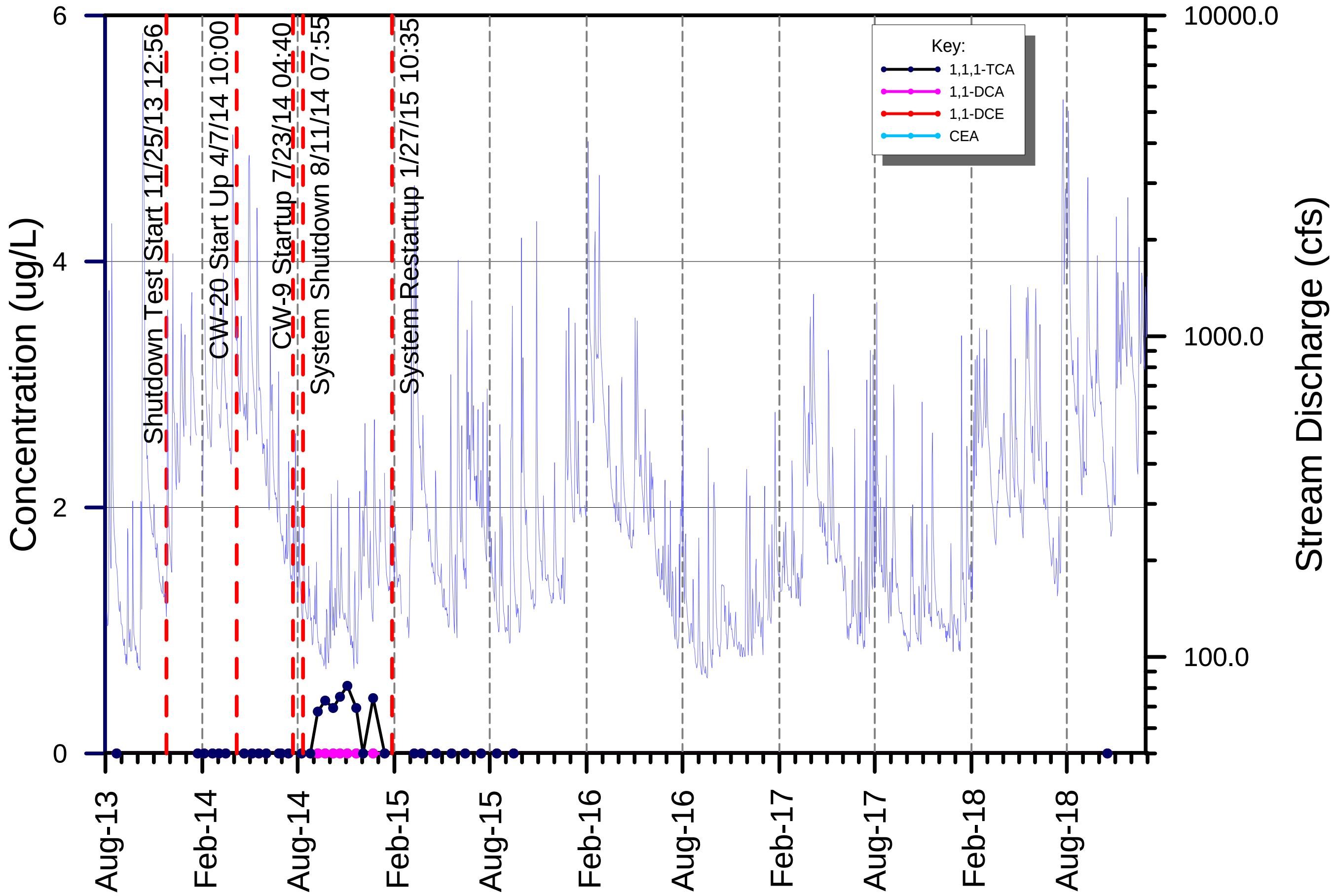
Concentration (ug/L)
10
1
0.1
0.01
Key:
1,1,1-TCA
1,1-DCA
1,1-DCE
CEA
System Startup 10/31/18
Jan-15
Mar-15
May-15
Jul-15
Sep-15
Nov-15
Jan-16
Mar-16
May-16
Jul-16
Sep-16
Nov-16
Jan-17
Mar-17
May-17
Jul-17
Sep-17
Nov-17
Jan-18
Mar-18
May-18
Jul-18
Sep-18
Nov-18
Jan-19

Appendix F-6

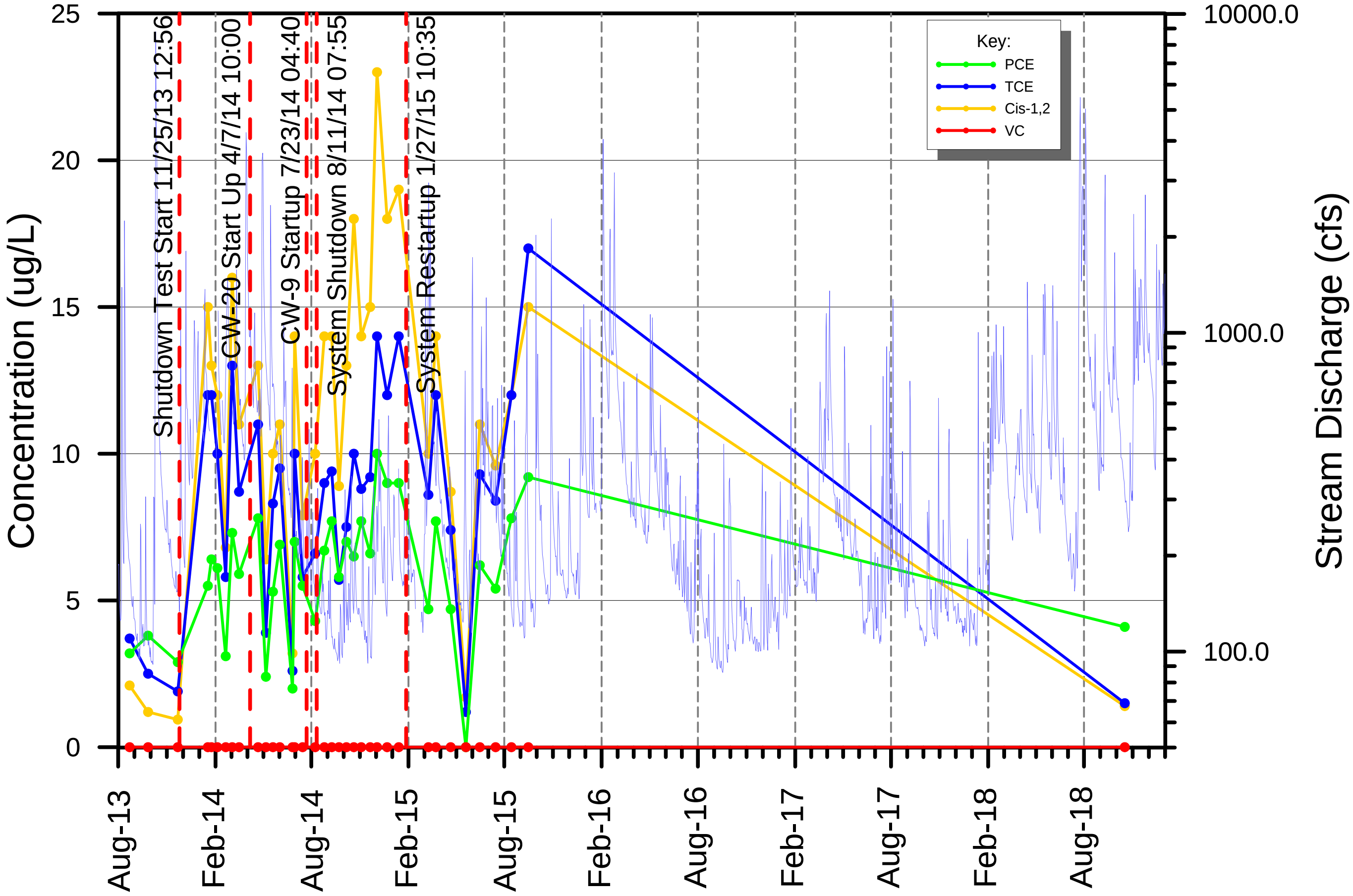
Surface Water

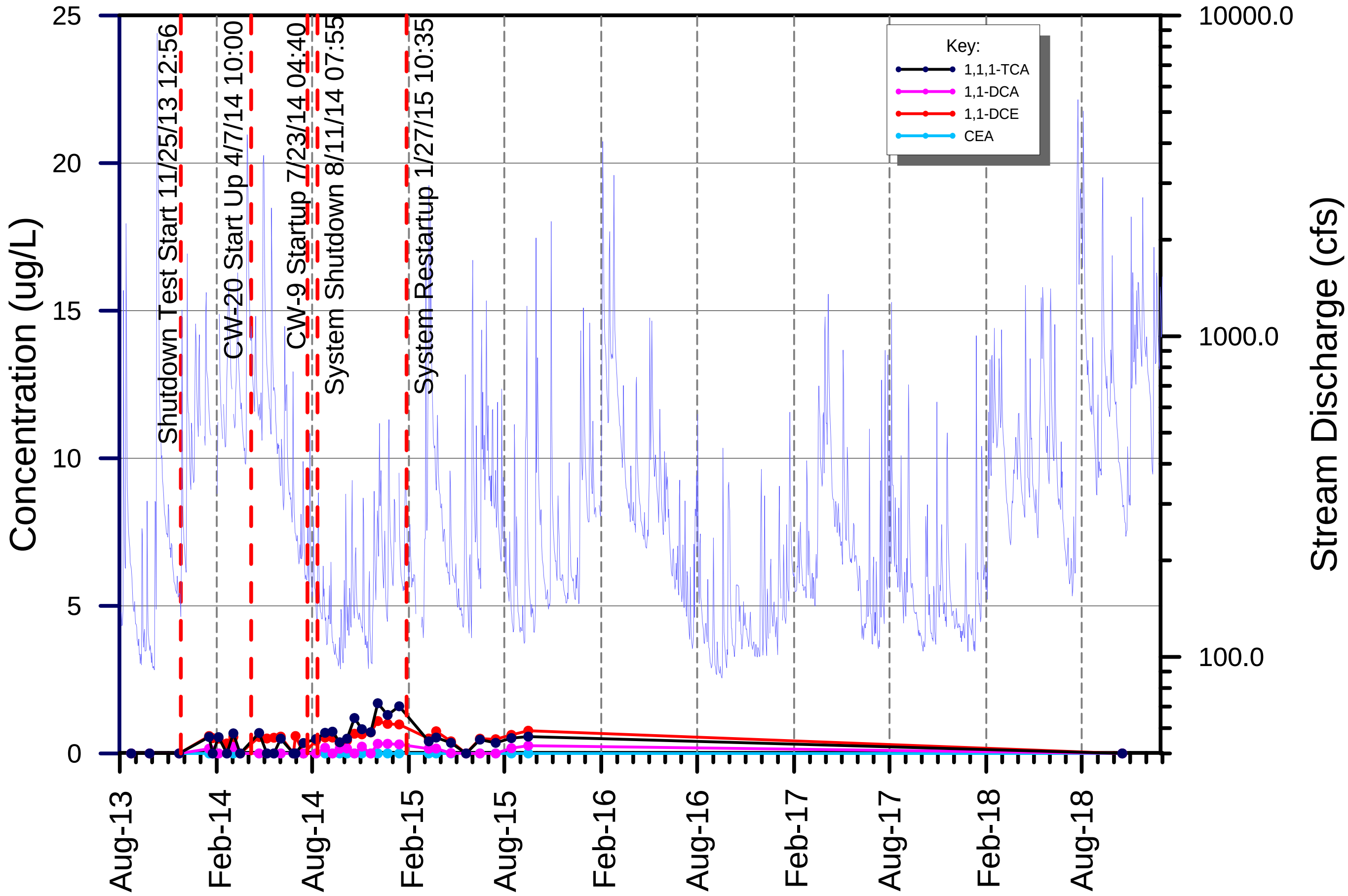
SW-13 Chemistry



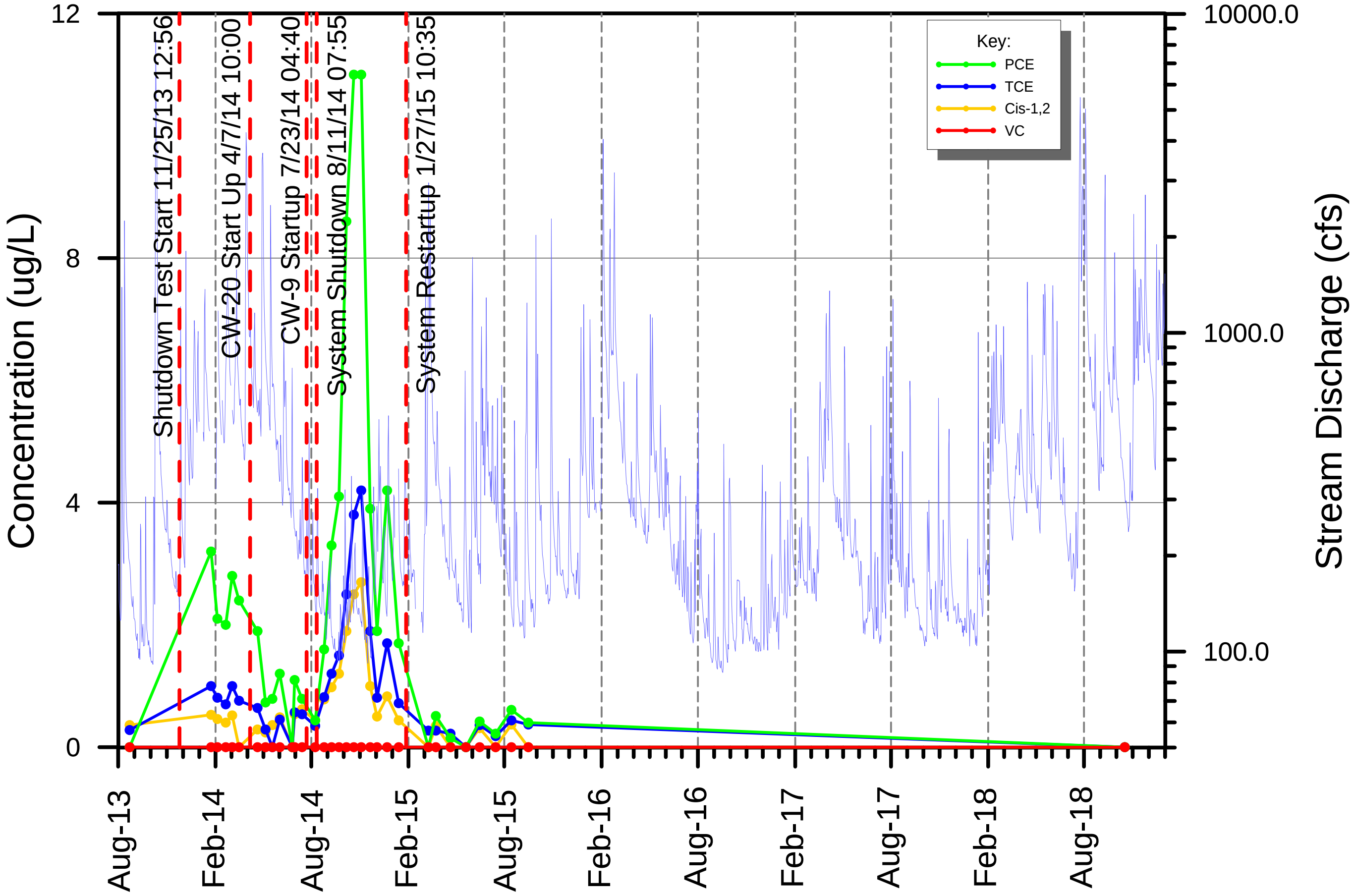


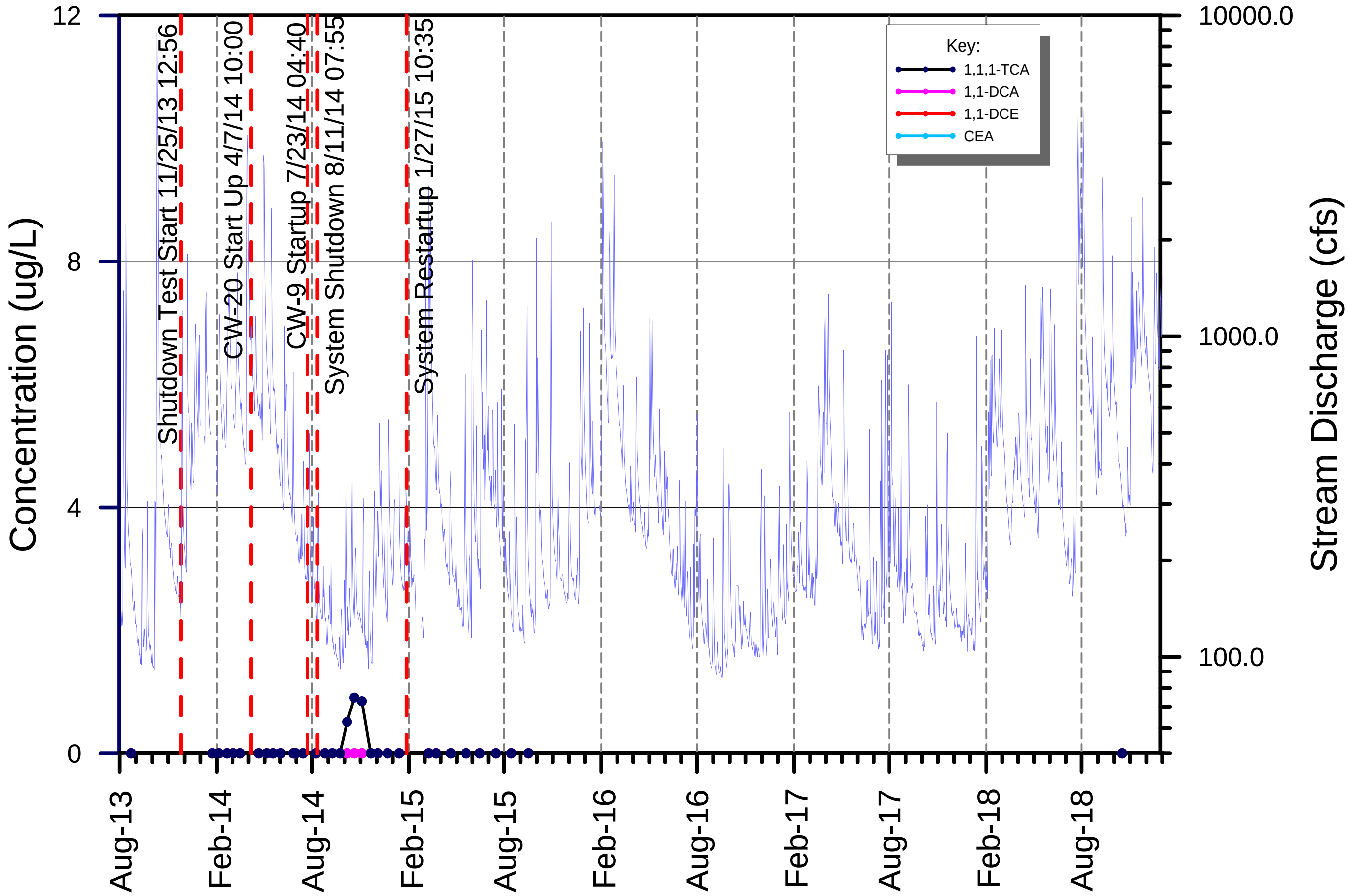
SW-15 Chemistry



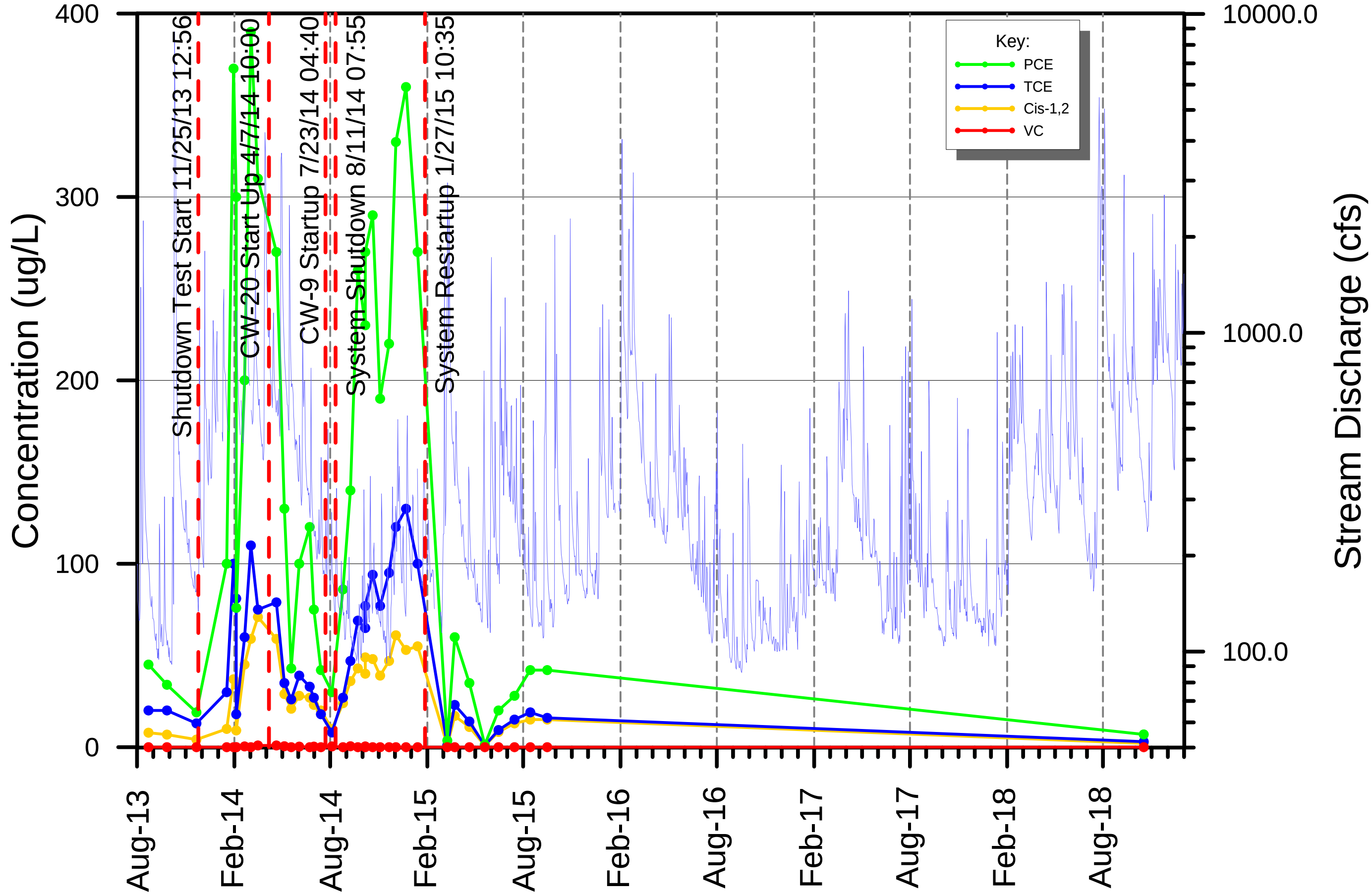


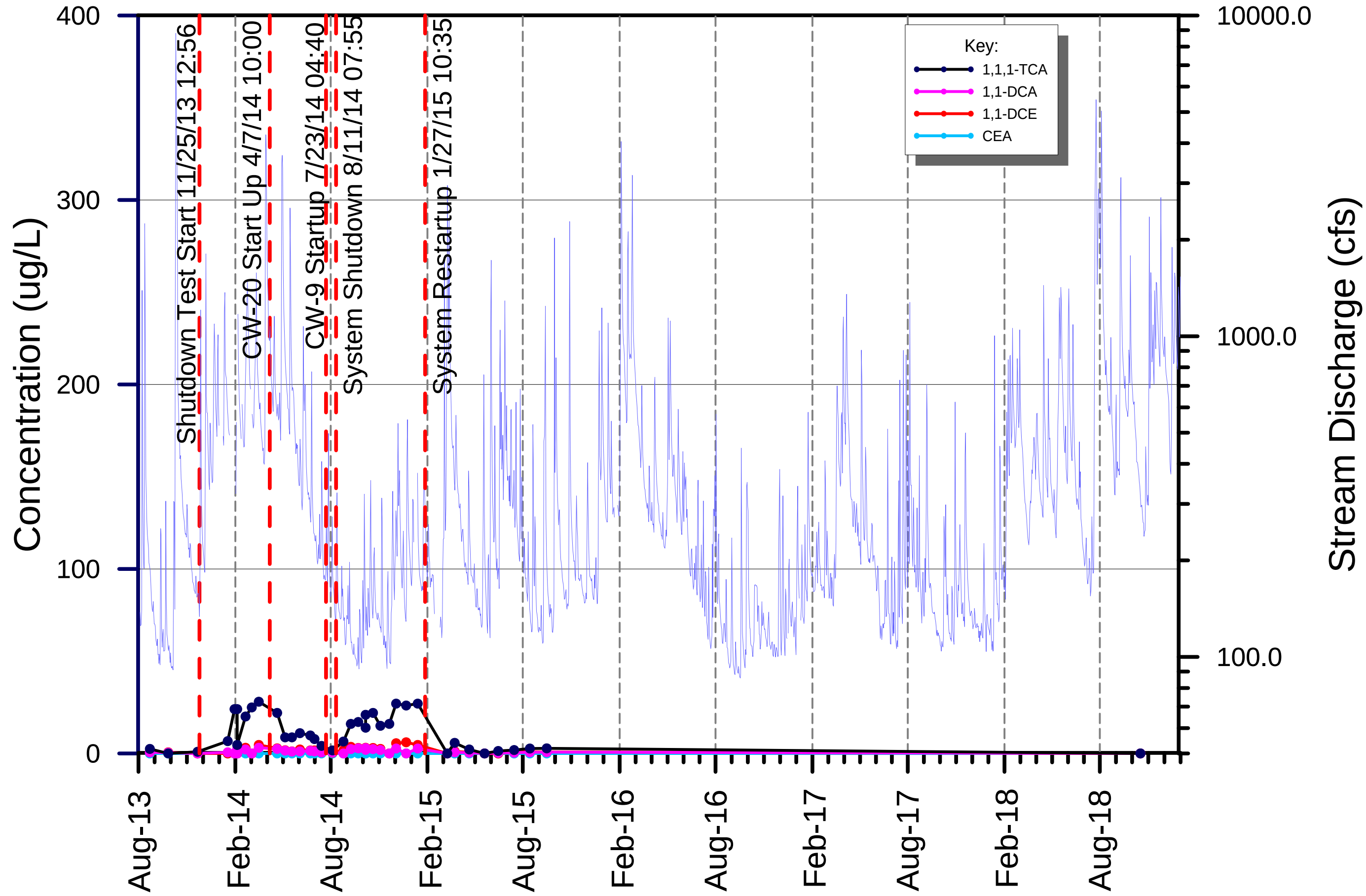
SW-16 Chemistry



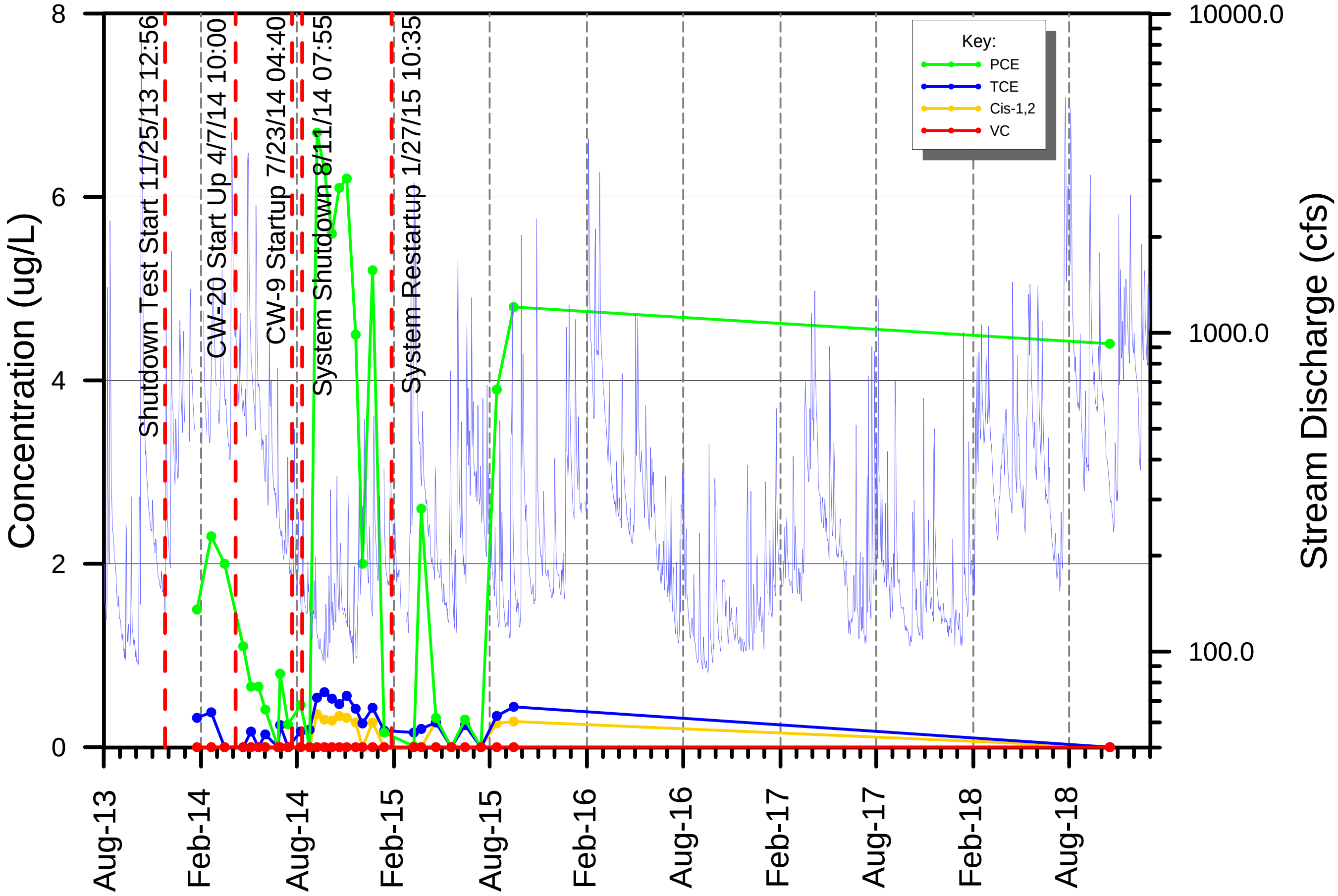


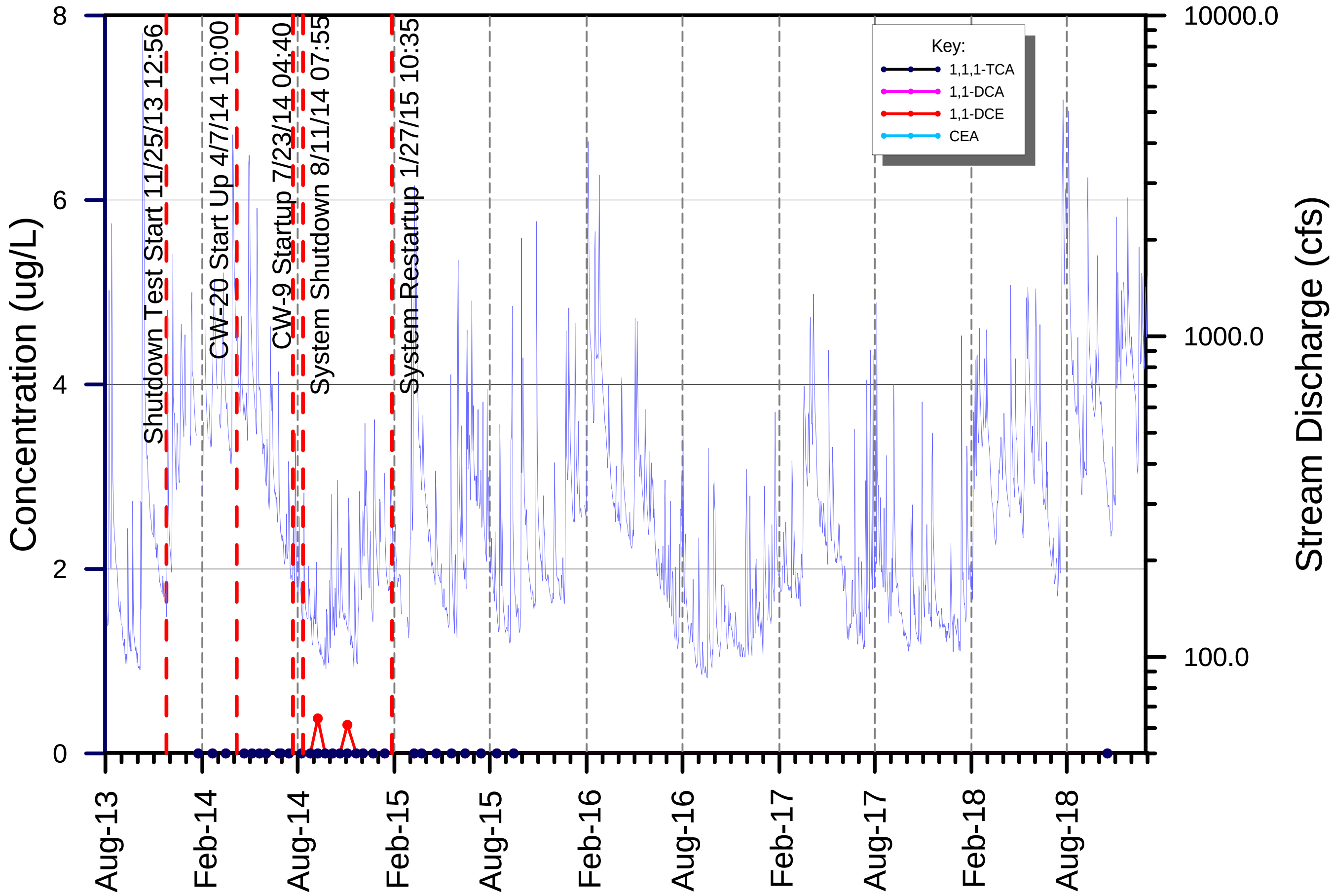
SW-17 Chemistry



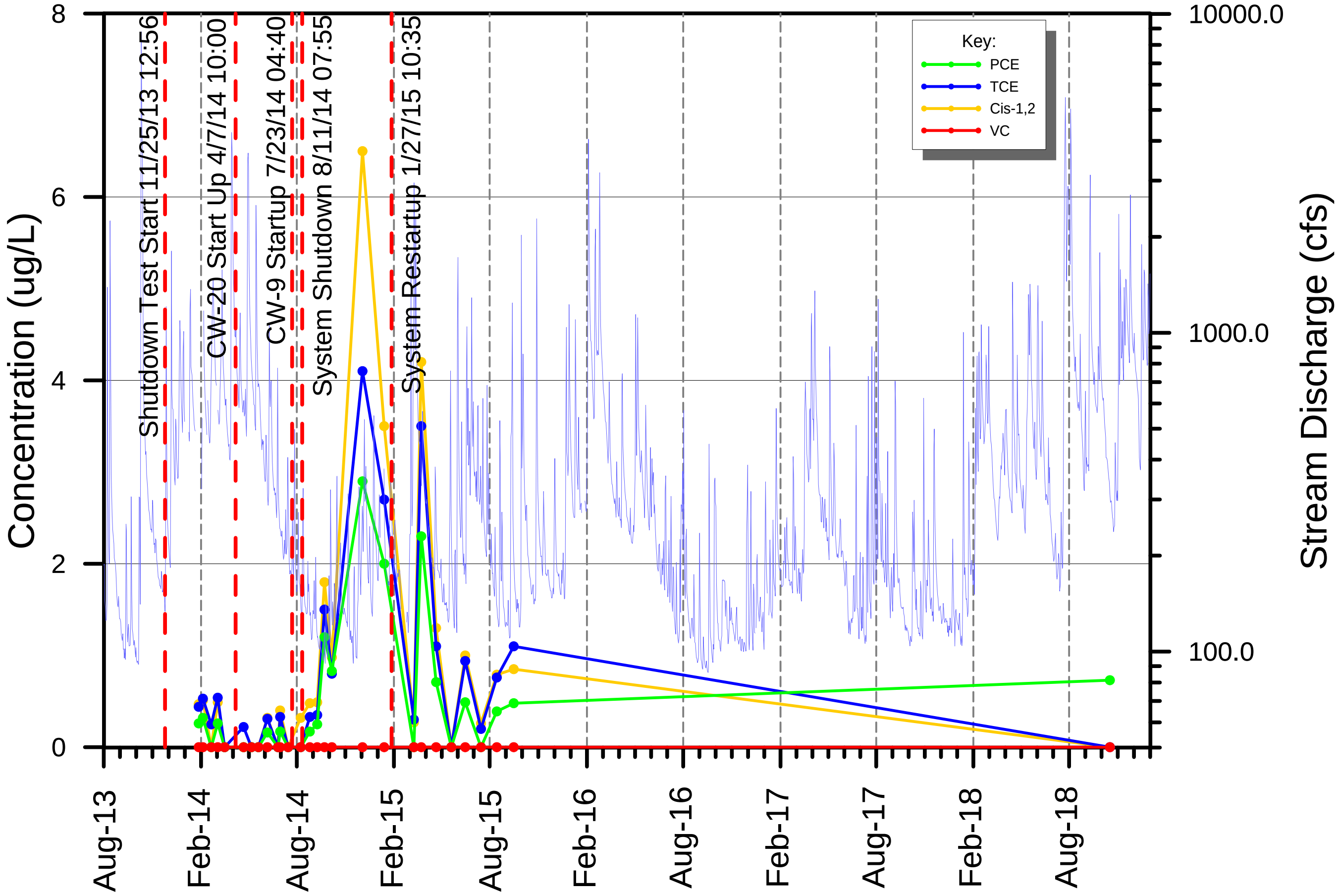


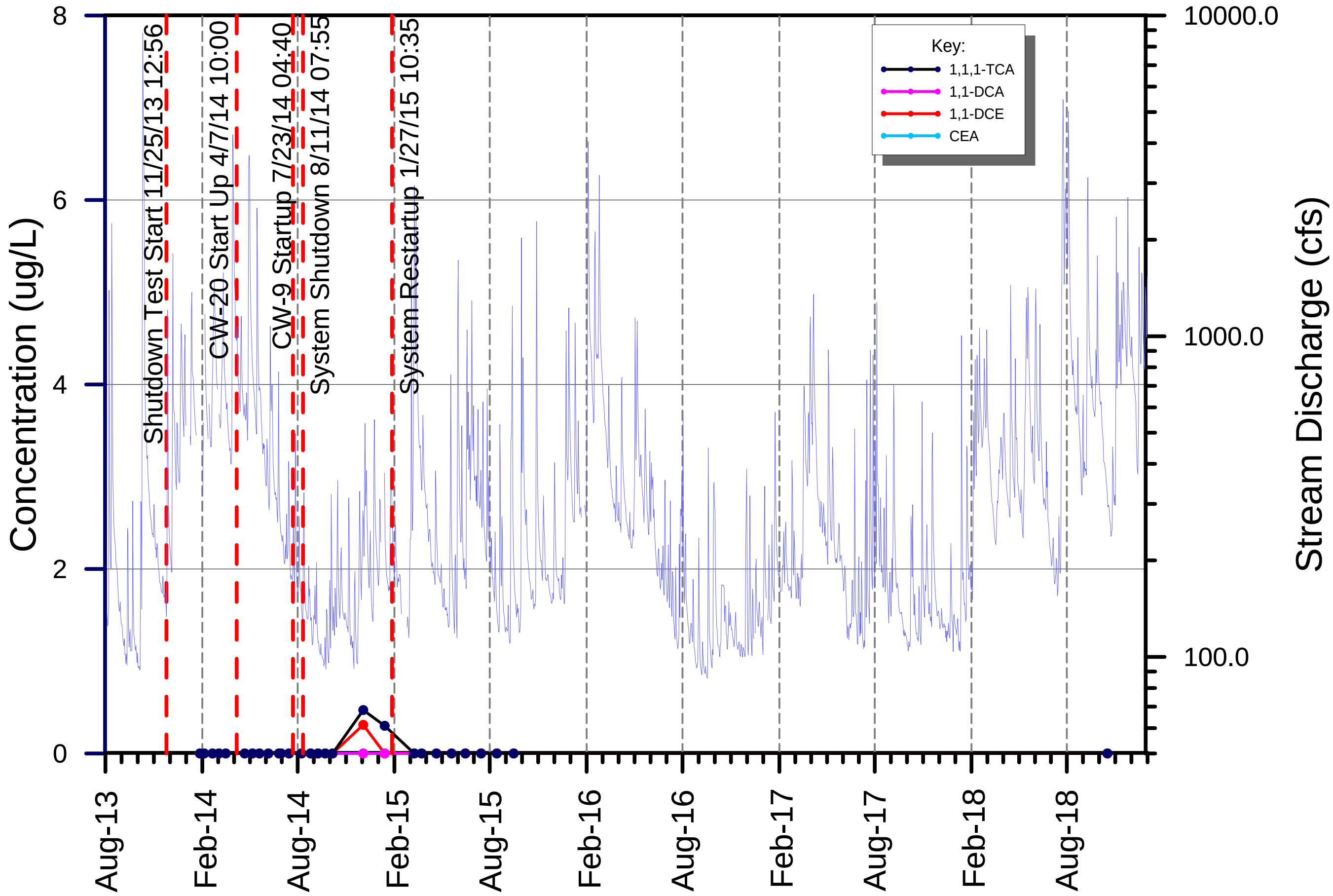
SW-26 Chemistry



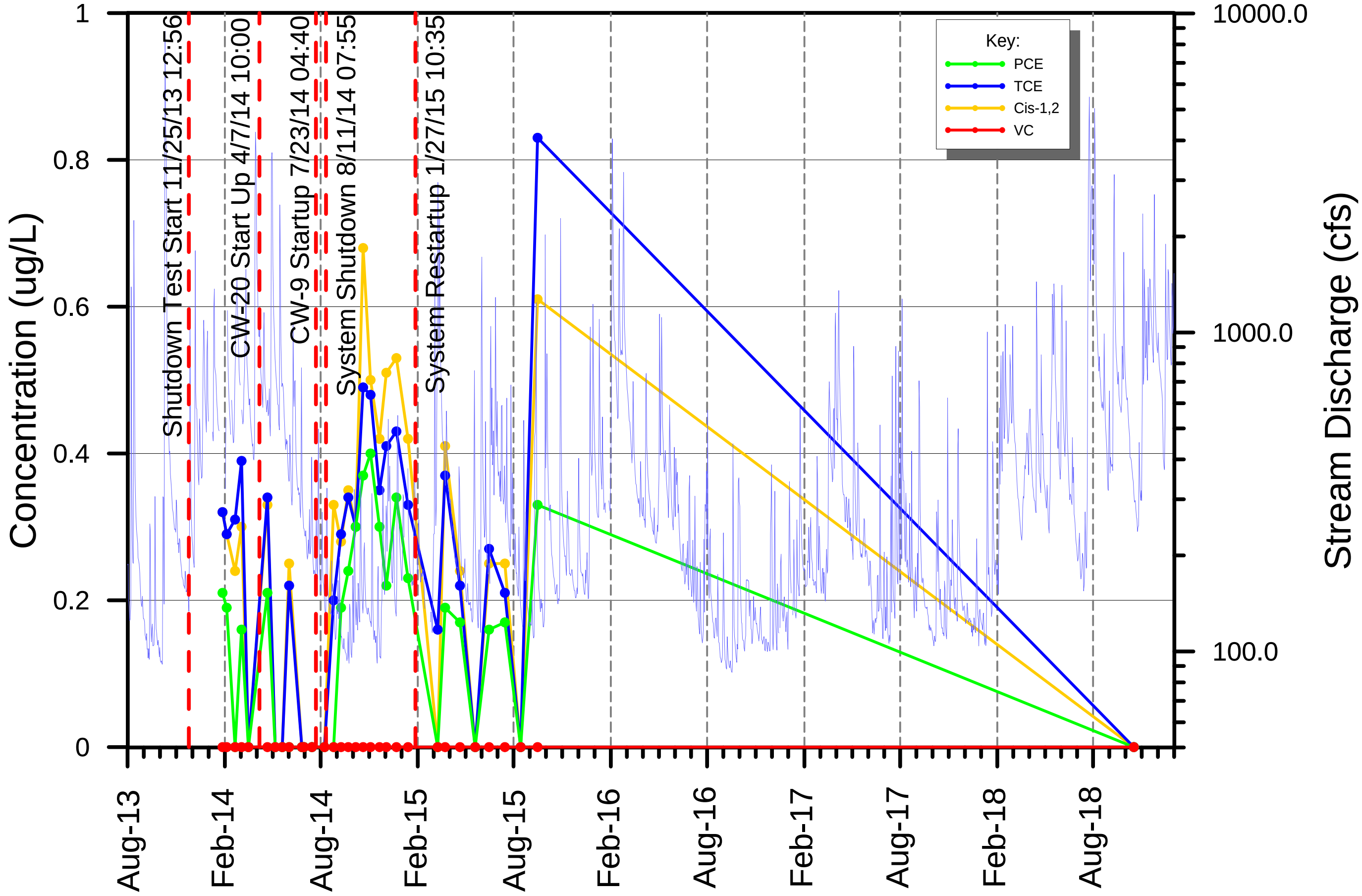


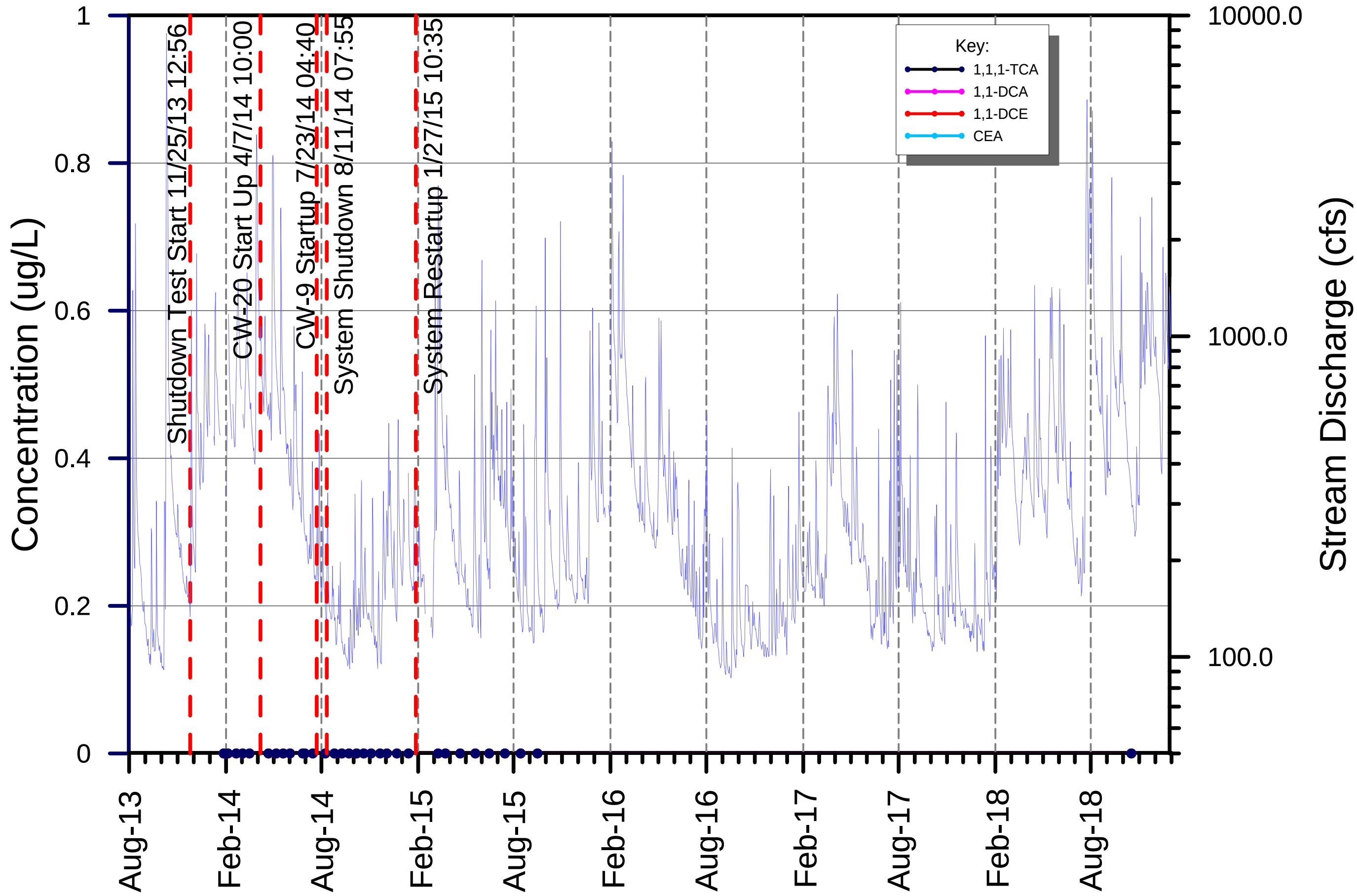
SW-27 Chemistry



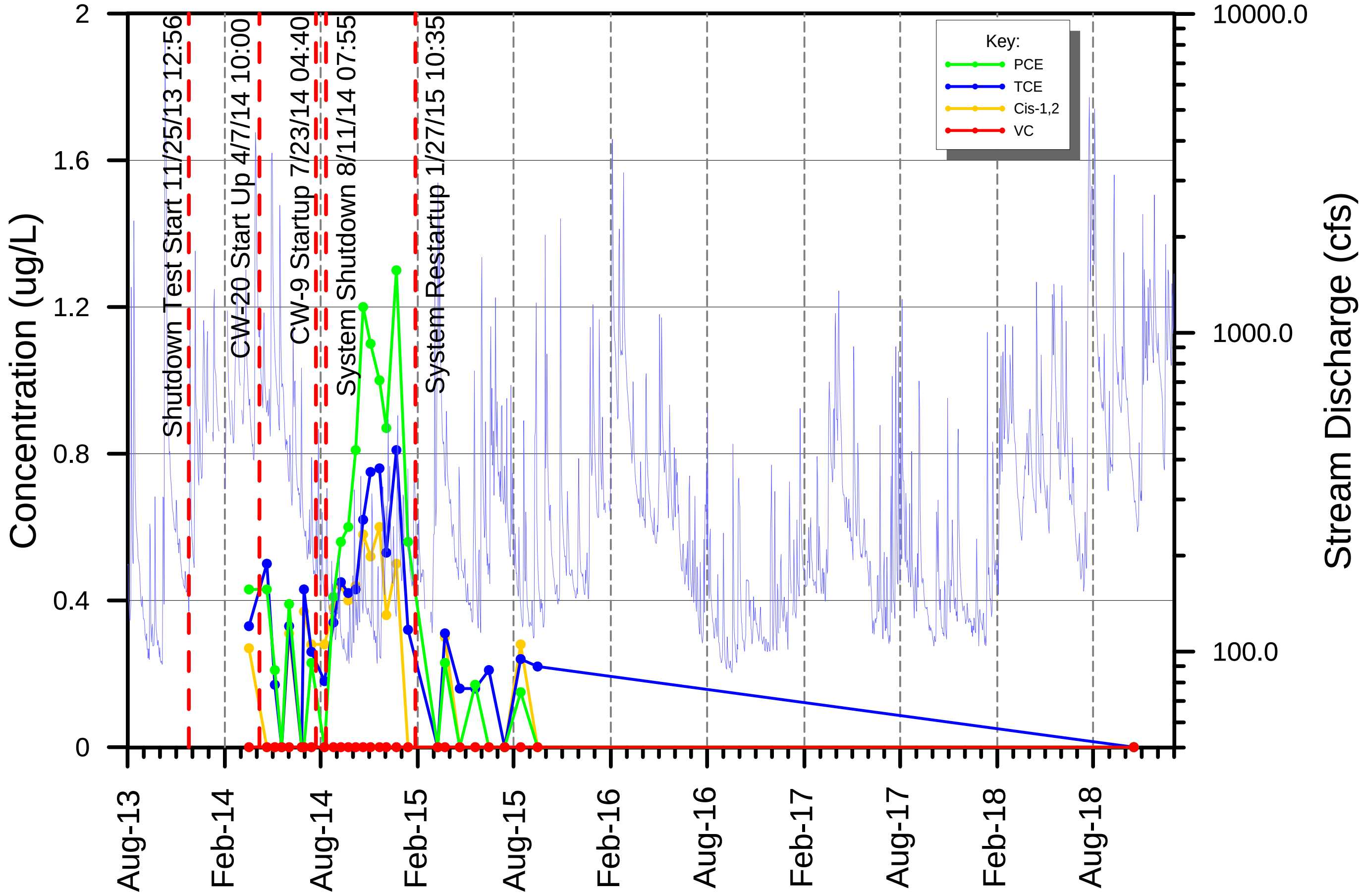


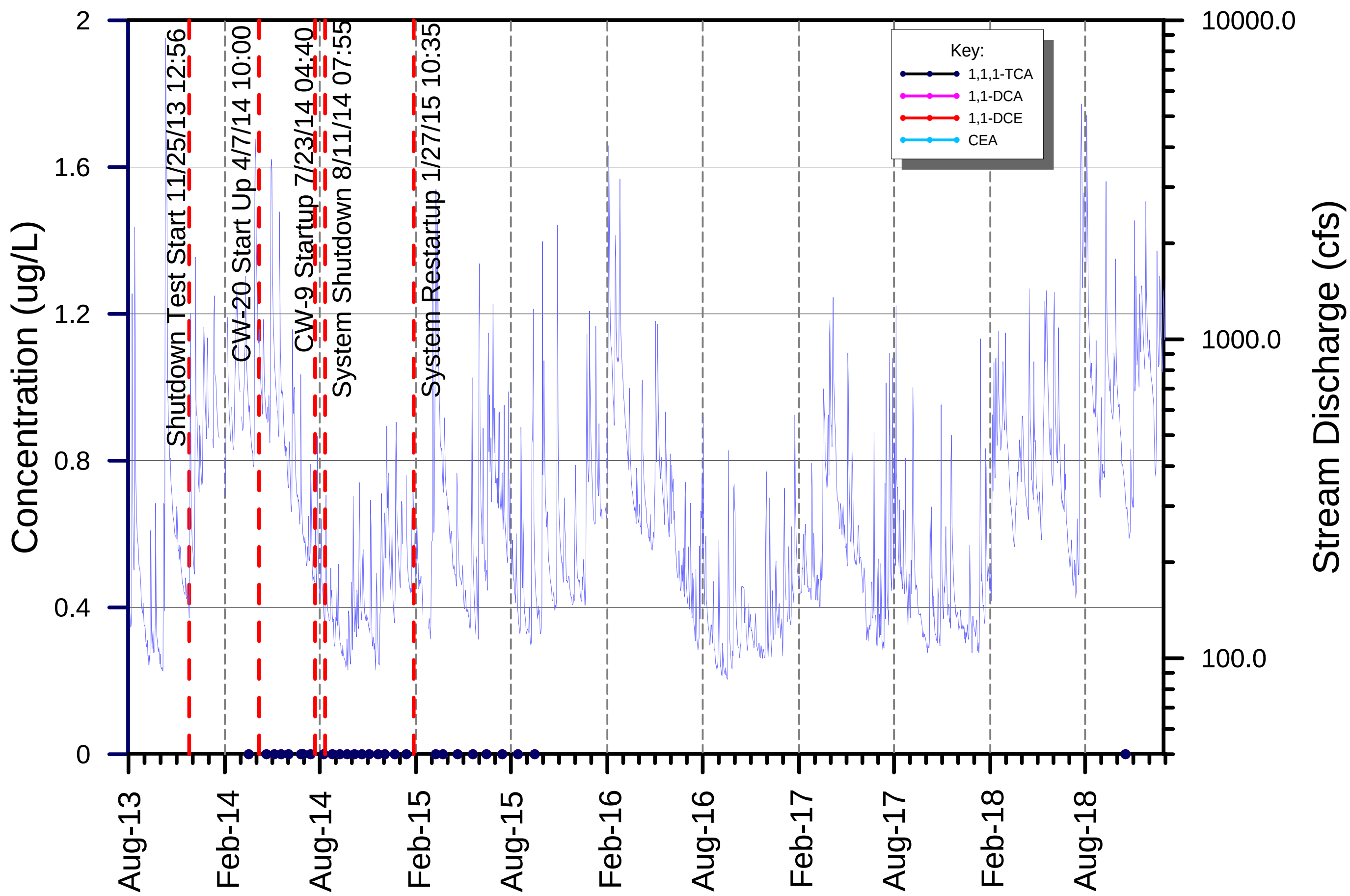
SW-28 Chemistry



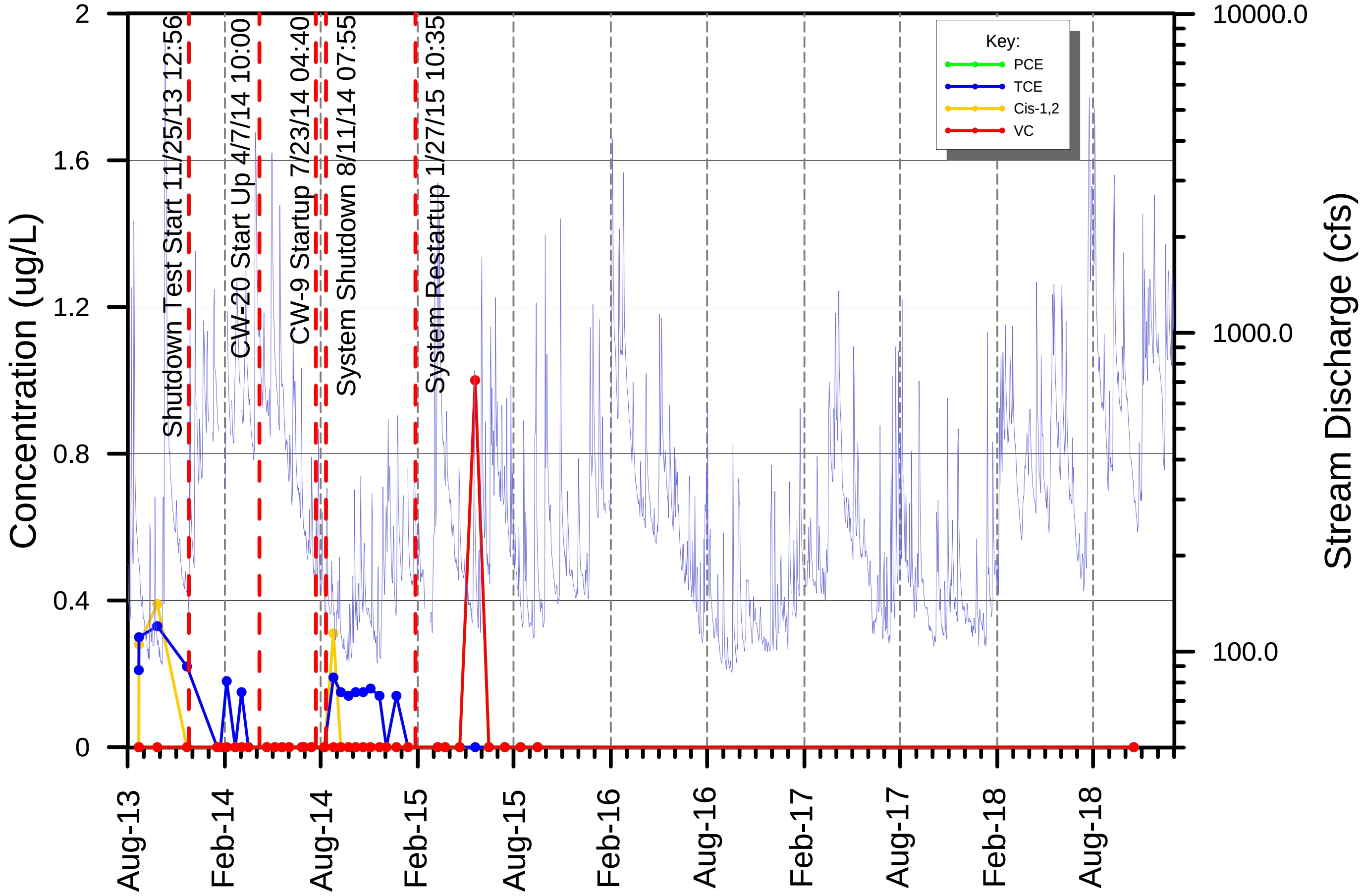


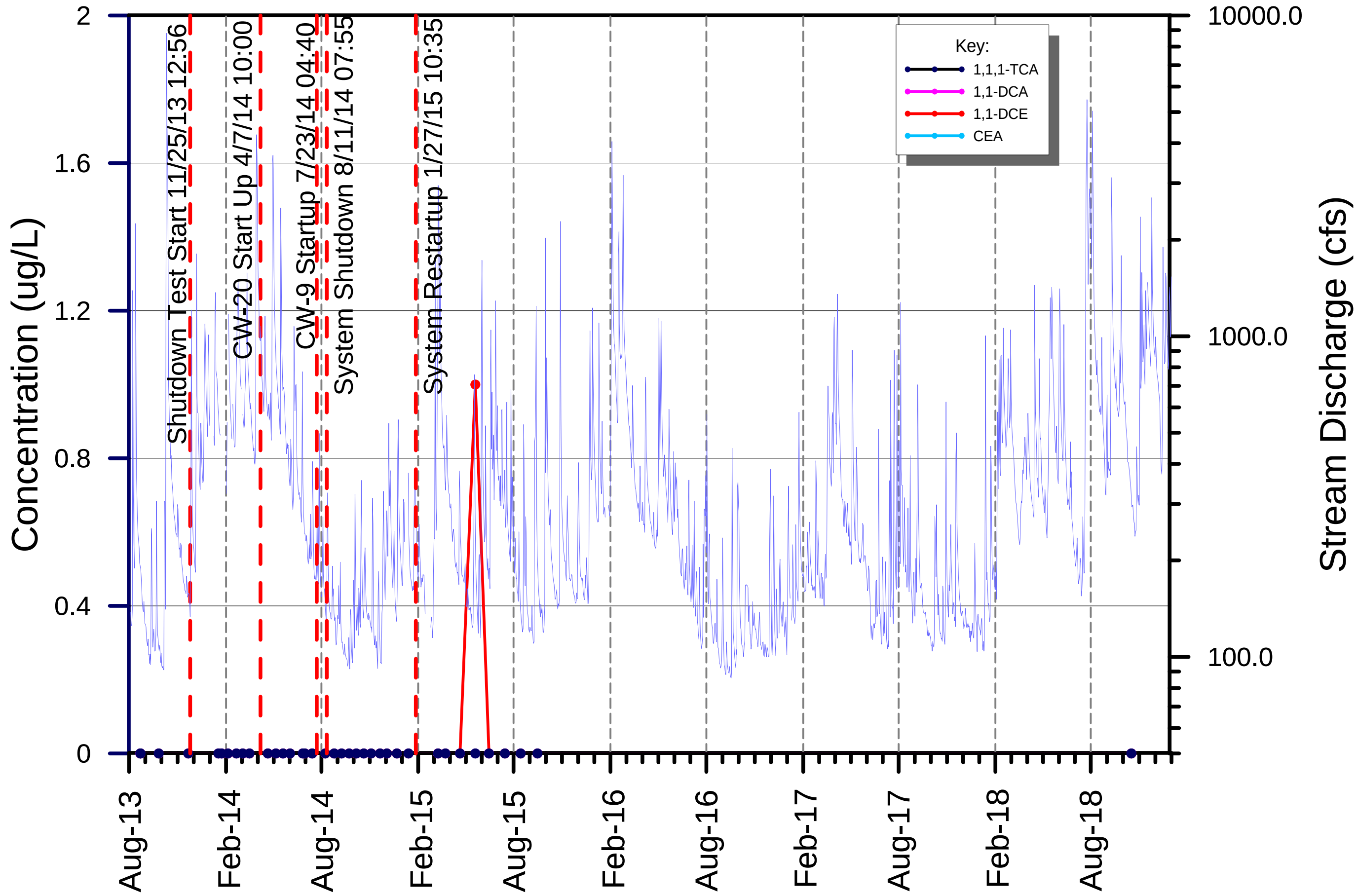
SW-29 Chemistry



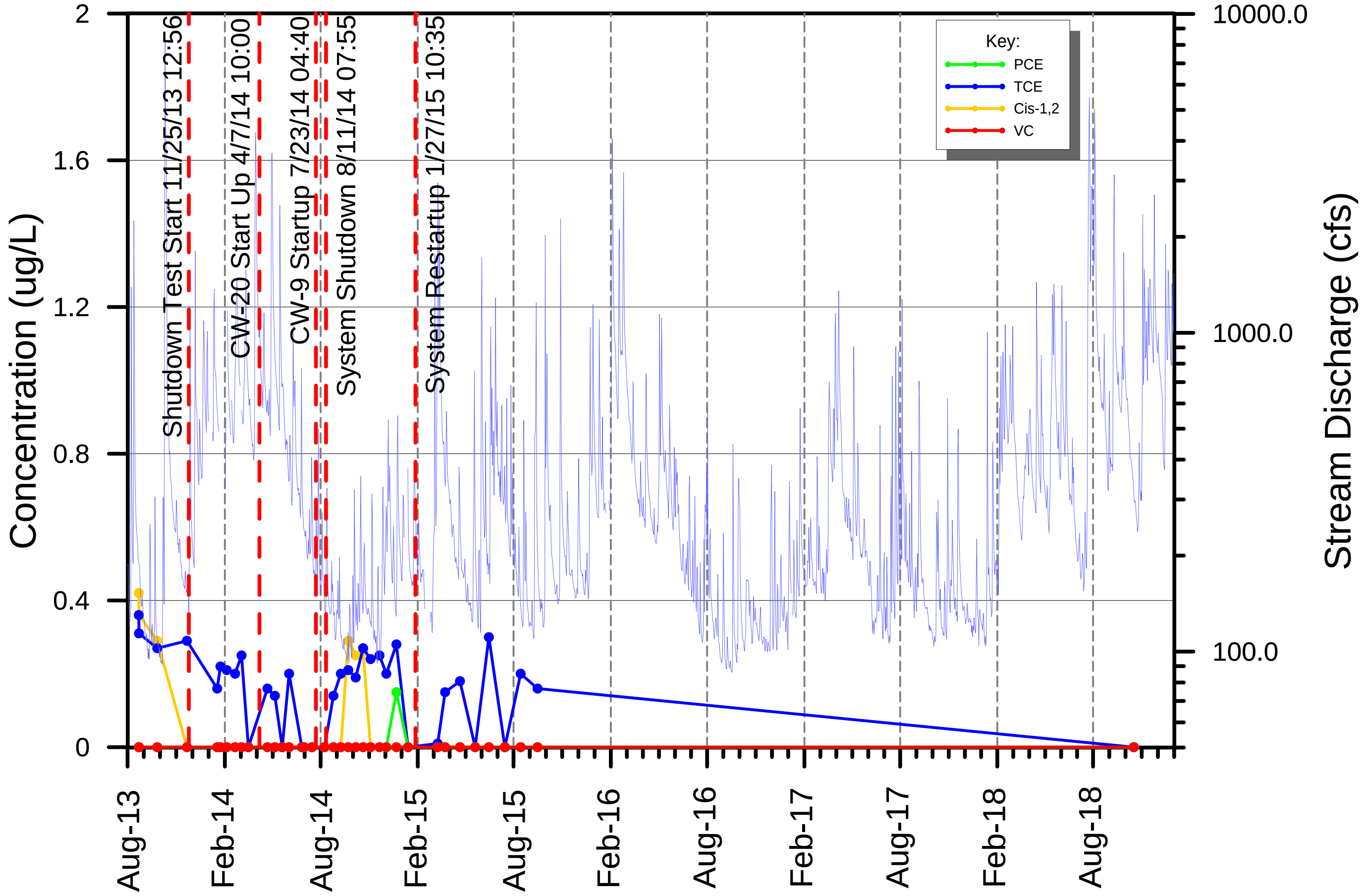


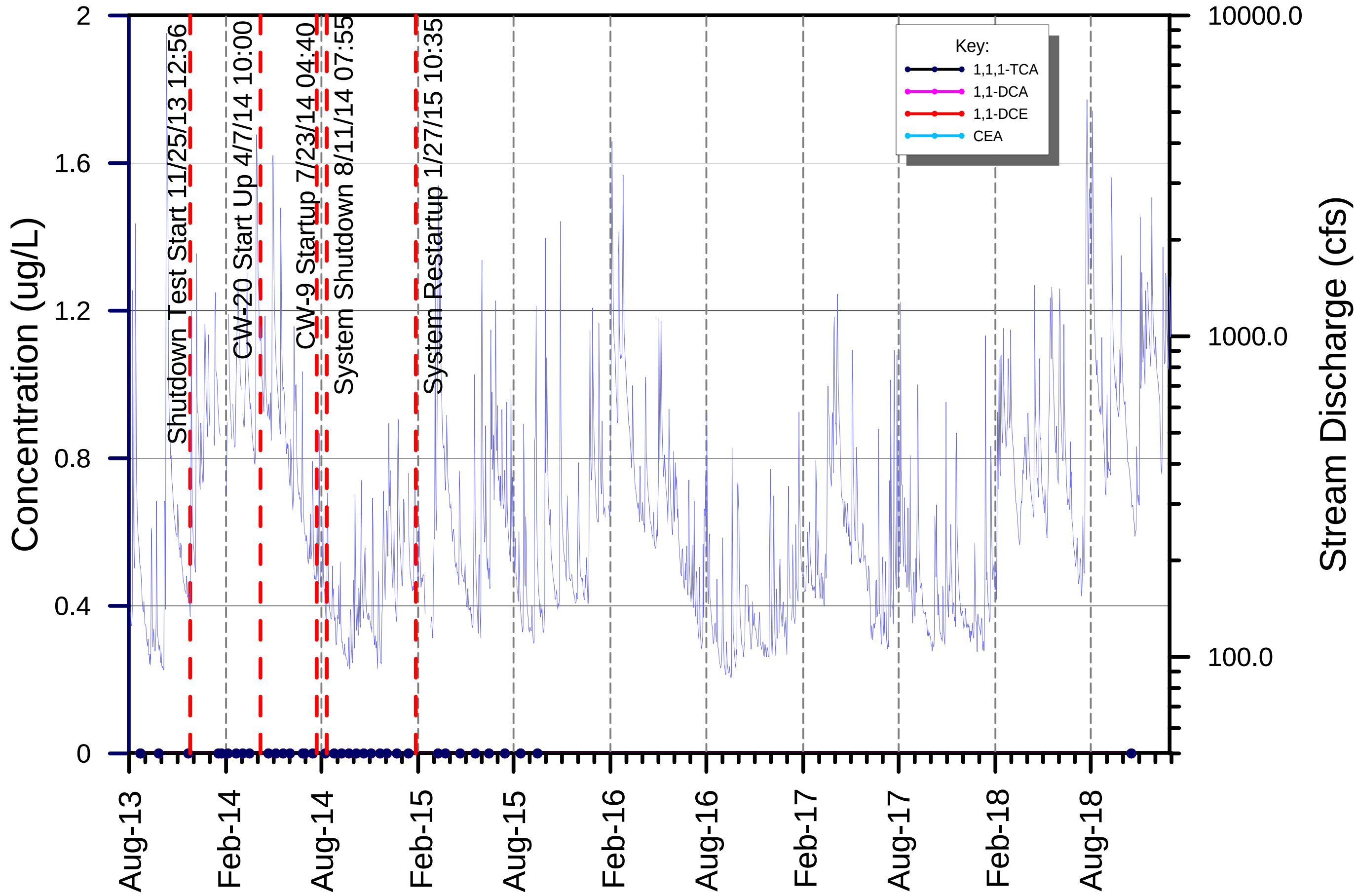
SW-6 Chemistry



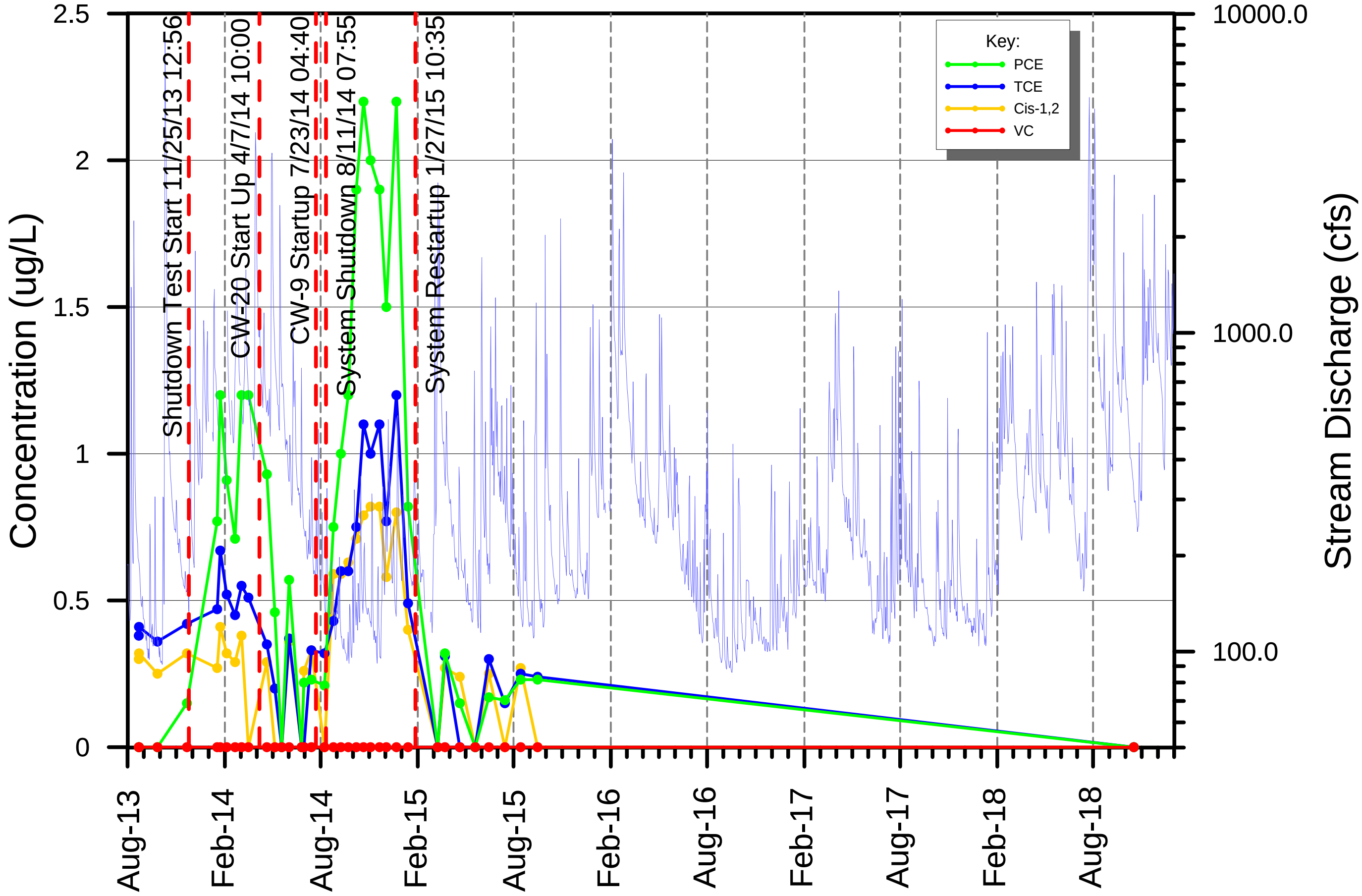


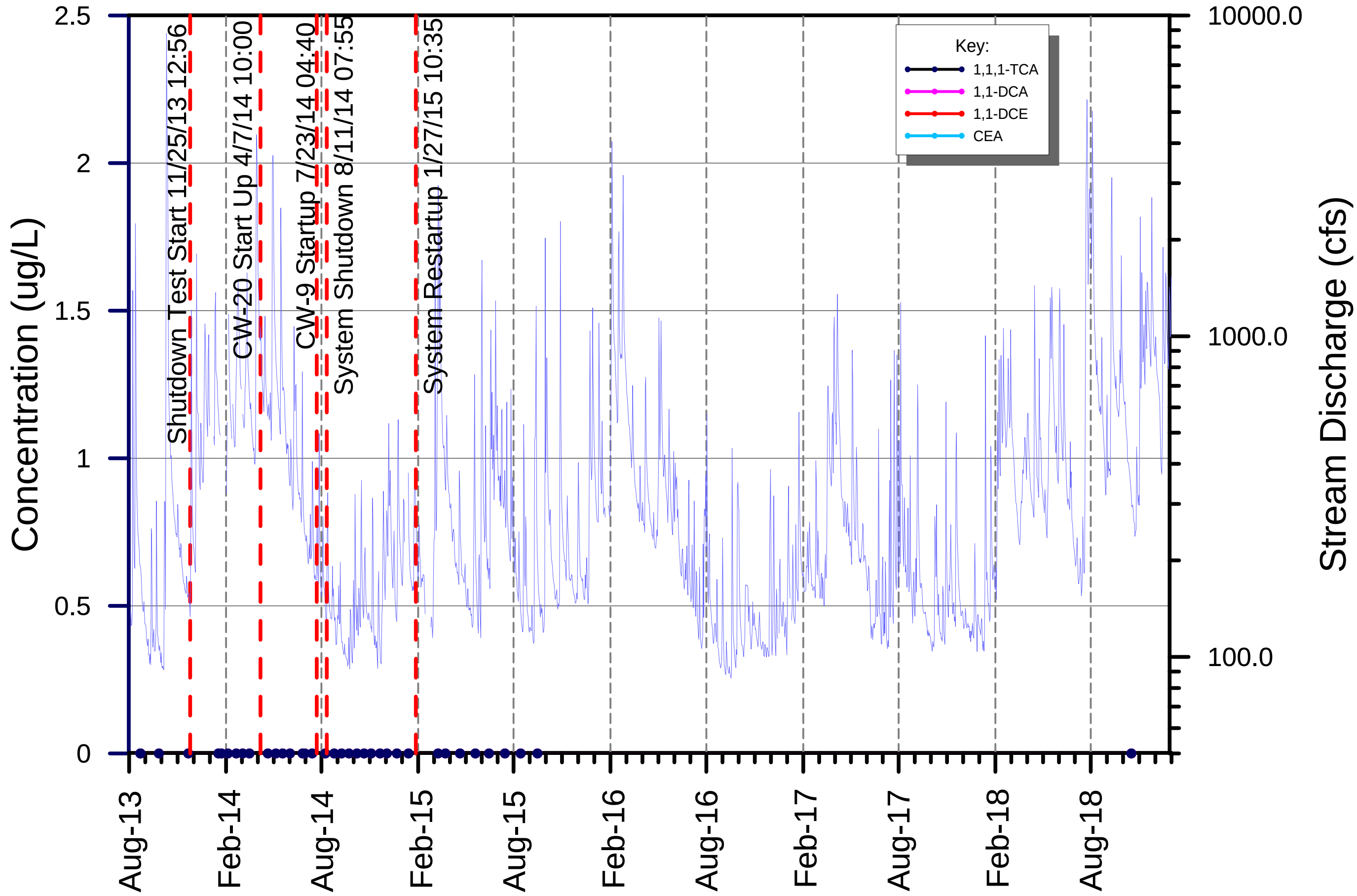
SW-7 Chemistry



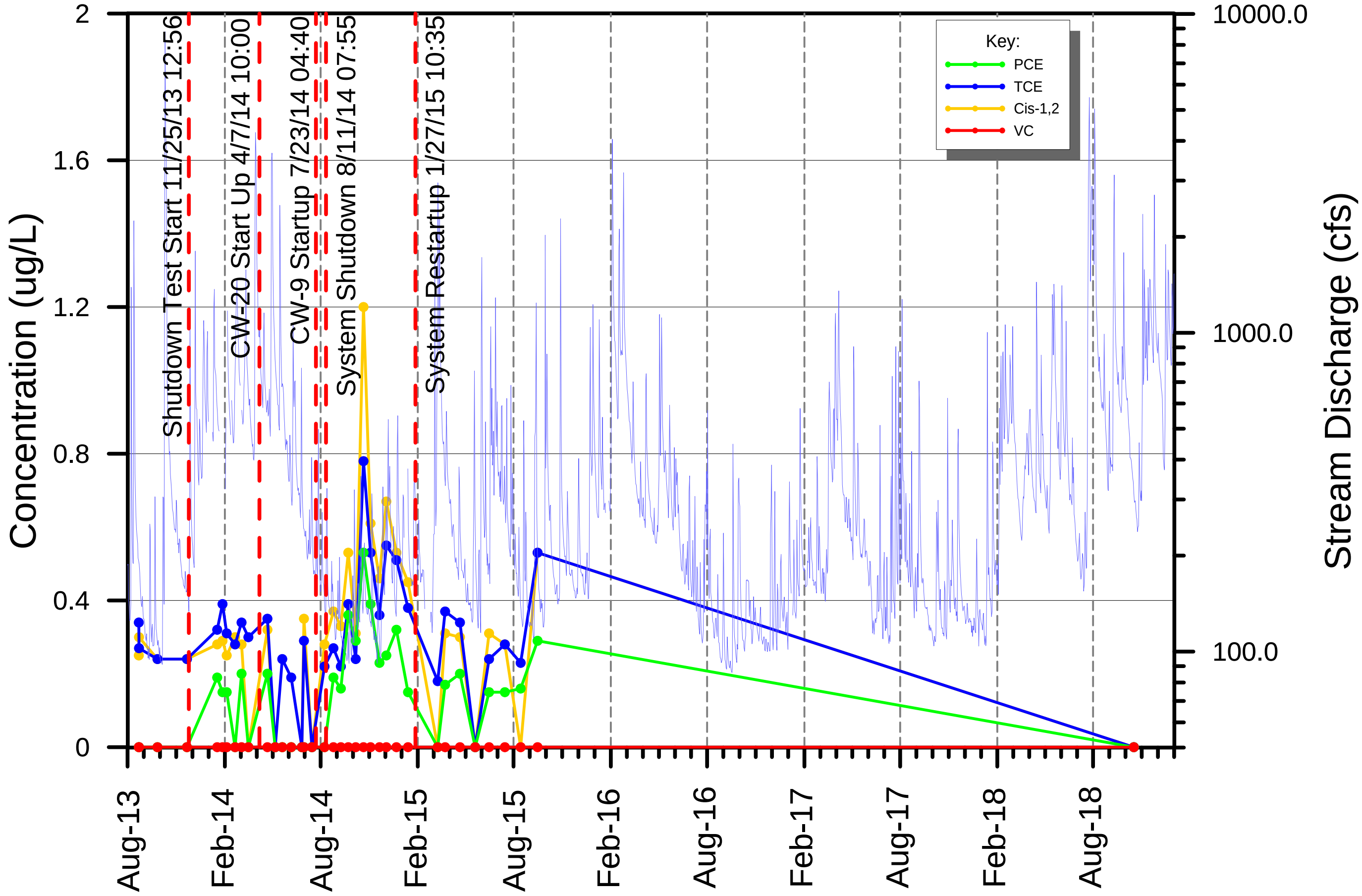


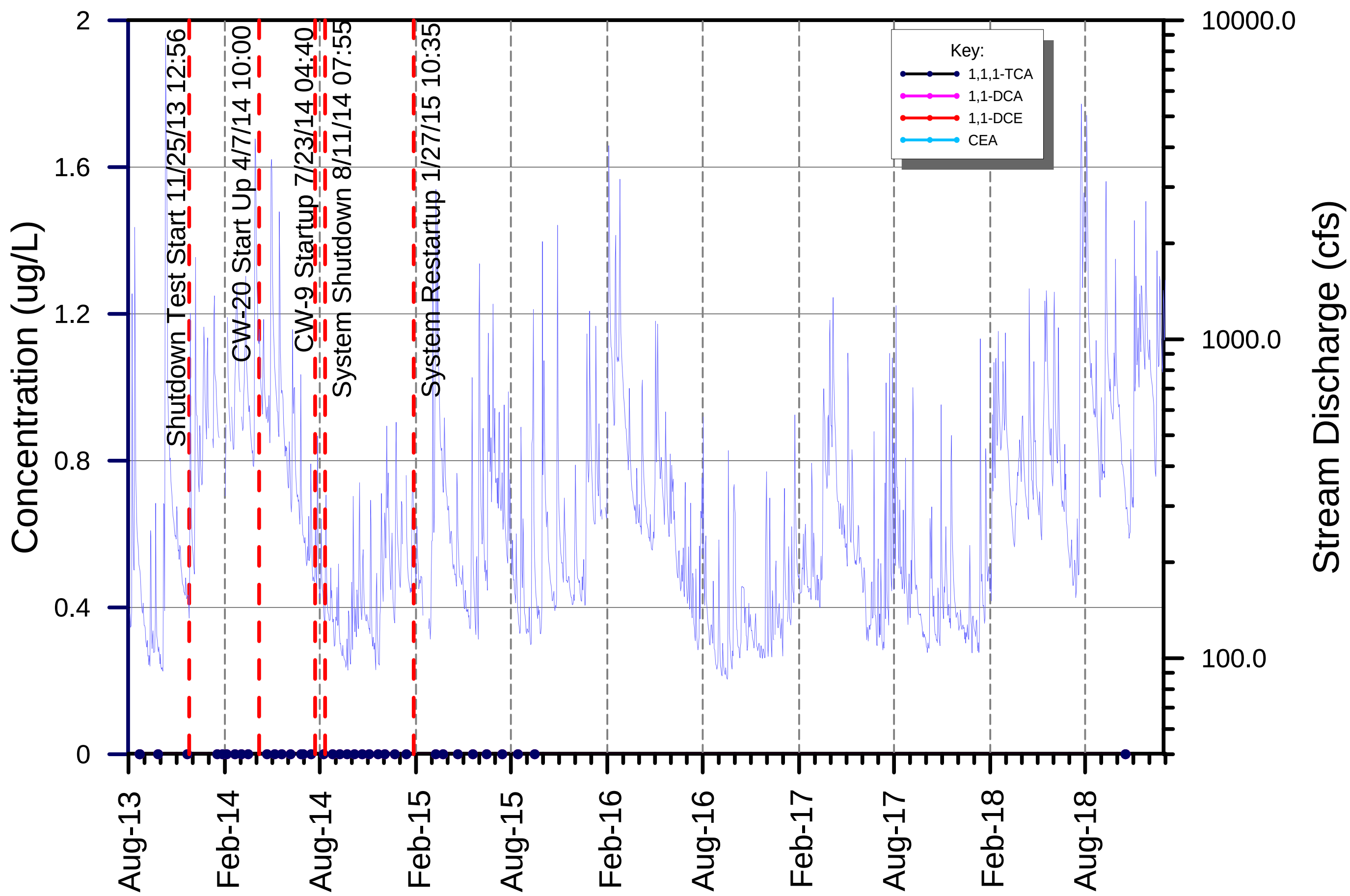
SW-8 Chemistry





SW-9 Chemistry





Appendix G

Data Validation Reports*

** - in portable document format (PDF) on the USB Drive attached to this report.*

Appendix H

Data Validation Narrative

Laboratory Data Validation Narrative

A comprehensive quality assurance/quality control (QA/QC) program was followed during the 2018 groundwater and surface water sampling events. A total of 14 sample delivery groups (SDGs) were generated for 159 samples that were collected from September 6, 2018 throμμh December 21, 2018. The total includes 27 QC blank samples consisting of equipment rinse blanks, field blanks, and trip blanks. Duplicate samples were also collected and are included in the total.

All of the samples were analyzed for VOCs by SW-846 Method 8260C as specified in the QAPP (GSC, 2012b and 2014a).

GSC systematically reviewed all 14 SDGs for compliance with QC criteria in accordance with Section B.2.8 of the QAPP. The GSC Data Validator conducted a complete data validation on these SDGs using SAIC Technical Procedure TP-DM-300-7 (Rev. 3, June 2009) and based on the following categories:

1. Review and verification of the laboratory case narrative;
2. Verification of sample reanalysis and secondary dilutions;
3. Holding time limits;
4. Surrogate (System Monitoring Compound) percent recoveries (%R) for organic methods;
5. Internal Standard (IS) area counts and retention times for organic methods;
6. Blank contamination (in method, field, equipment rinse and trip blanks);
7. Relative Response Factors (RRFs) in initial calibration and continuing calibrations, Percent Relative Standard Deviation (%RSD) in initial calibrations, and Percent Difference (%D) in continuing calibrations;
8. Matrix Spike and Matrix Spike Duplicate (MS/MSD) Percent Recovery (%R) and Relative Percent Difference (RPD);
9. Laboratory Control Sample and Laboratory Control Sample Duplicate (LCS/LCSD) %R and RPD.

The laboratory case narratives were also reviewed for all SDGs. The contents of the data packages and QA/QC results were compared to the requirements of the requested analytical method, SW-846 Method 8260C. GSC evaluated QC data reported by the laboratory against required precision and accuracy limits established in Table A-4 of the QAPP. The validation reports that were generated are presented in **Appendix G**. All groundwater VOC chemistry data in the report include qualifiers added by the data validator.

Consistent with the data quality requirements as defined in the data quality objectives (DQOs) on Table A-4 of the QAPP, project data and associated QC data were evaluated on these categories and qualified according to the outcome of the review. During the review, laboratory-applied data qualifiers such as “E” (estimated concentration outside the calibration limits) and “B” (analyte detected in the associated method blank) were evaluated, defined and explained. During verification, individual sample results were qualified as necessary to designate usability of the data toward meeting project objectives. The qualifiers that were used are defined as follows:

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit. These results are qualitatively acceptable.

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample. Although estimated, these results are qualitatively acceptable.

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample. Although estimated, these results are qualitatively acceptable.

R - The analyte result was rejected due to serious deficiencies in the ability to analyze the sample and/or meet QC criteria. The presence or absence of the analyte cannot be verified.

Data qualifiers were applied based on deviations from the measurement performance criteria identified in TP-DM-300-7 and Table A-4 of the QAPP.

A secondary stage of validation occurred following completion of the initial validation for a discrete sampling event. Individual equipment rinse blanks, trip blanks, and field blanks were associated with the corresponding environmental samples. These field QC blanks were evaluated using the same criteria as method blanks, and the associated environmental samples were qualified accordingly.

The following sections address the laboratory chemical analysis program implemented for the 2018 sampling events. The project DQOs are summarized in the following sections and include a review of precision, accuracy, bias, representativeness, comparability, completeness, and sensitivity.

Precision

Precision was assessed using the analysis of LCS/LCSDs and duplicate samples. MS/MSDs were also evaluated but data was not qualified based solely on MS/MSD results, except for the specific environmental sample that was spiked for the MS/MSD analysis.

LCS/LCSDs were evaluated based on %R results. The %R for six reported analytes was outside LCS/LCSD control limits and the results for six samples were ultimately qualified based on LCS/LCSD %R acceptance criteria.

MS/MSD results greater than the UCL or less than the LCL affected 45 analytes in ten samples. However, as noted above, data for this project was not qualified based solely on MS/MSD results.

Field duplicate samples were used to assess intralaboratory precision and were collected by filling multiple sample containers from the same sampling device during sampling events at a frequency of at least one duplicate sample per 20 samples collected from groundwater monitoring wells. Seven duplicate samples were collected, which is at least five percent of the 139 unique groundwater and surface water samples that were collected. The duplicate samples were assigned blind field identification numbers by the samplers and were analyzed by SW-846 Method 8260C.

Comparative results for a portion of the data from duplicate samples collected in 2018 are shown on the table below. In accordance with Section A.7.2.1 of the QAPP, the relative percent difference (RPD) between the results for each primary sample and duplicate sample was calculated for the two VOCs with the highest detections in each well. Only two of the 14 RPD results shown below exceed the data quality objective (DQO) for precision (<30 RPD) in the volatile organics analysis of a field duplicate sample. This DQO is specified on Table A-4 of the QAPP. The two sample results with an RPD greater than 30 were for detections of PCE; however, the comparative results for TCE in the same samples were 11 RPD and non-detect, suggesting that PCE was the only VOC where precision may have been affected. The technical procedure for data validation does not specify an action for field duplicate RPD of 30 or greater.

Comparison of Intralaboratory Duplicate Sample Results (Two Highest Detections per Location)					
Location	**Date**	**Parameter**	**Primary Result (µg/L)**	**Duplicate Result (µg/L)**	**Relative Difference (%)**
COD-SW-17	10/17/18	Tetrachloroethene	7.0	6.9	1%
		Trichloroethene	3.0	2.8	7%
MW-16D	10/02/18	Trichloroethene	20	21	5%
		cis-1,2-Dichloroethene	6.4	6.8	6%
MW-181S	09/10/18	Tetrachloroethene	470	300	44%
		Trichloroethene	18	20	11%
MW-184D	12/20/18	Tetrachloroethene	70	100	35%
		Trichloroethene	ND@5	ND@5	NA
MW-64D	10/04/18	Tetrachloroethene	310	290	7%
		Trichloroethene	0.76	0.84	10%
MW-74S	10/08/18	Trichloroethene	2.8	3.1	10%
		cis-1,2-Dichloroethene	4.4	4.7	7%
Cole D	10/10/18	Tetrachloroethene	33	31	6%
		Trichloroethene	0.84	0.84	0%

Based on criteria including the results of the calculations, the parameters analyzed and reported, the absolute differences given sample dilutions, concentration levels, and professional judgment, the duplicate results do not show variations that indicate a lack of precision in the analytical results.

Based on an evaluation of %R for LCS/LCSDs and RPDs for duplicate samples, the overall precision of samples collected for the project appears to be acceptable. As a result, the laboratory DQO for precision was met.

Accuracy

Analytical accuracy was measured through the use of LCSs, surrogates, internal standards, initial and continuing instrument calibrations, serial dilutions, method blanks, and field QC blanks (trip blanks, field blanks, and equipment rinse blanks).

The first type of QC sample used to assess data accuracy is the LCS and/or LCSD sample. As noted in the discussion of Precision, the LCS and/or LCSD percent recoveries are acceptable with the exception of six analytes in six samples that were qualified as estimated (“J”), or as not detected and estimated (“UJ”).

The second QC measure used to assess the accuracy of the data is the surrogate %R for VOCs. Sample results were qualified as estimated (“J/UJ”) if the associated surrogate %R was less than the LCL. Detected organic sample results were qualified as estimated (“J”) if the associated surrogate %R was greater than the UCL. Non-detected organic sample results were qualified as rejected (“R”) if the associated surrogate %R was less than 10 percent. No data was qualified based on surrogate %R criteria.

Internal standards were added to calibration standards, environmental samples, and QC blanks in accordance with SW-846 method requirements. Data was qualified based on area counts and retention times being outside the control limits. No data was qualified based on internal standard criteria.

Initial calibration of each analytical instrument was completed in accordance with SW-846 method requirements for all analyses. Data was qualified based on RRFs and %RSDs being outside the control limits. No data was qualified based on initial calibration criteria.

Continuing calibration verification (CCV) of each instrument was completed in accordance with SW-846 method requirements for all analyses. Organic sample results were qualified as estimated (“J/UJ”) if the associated CCV was less than the LCL. Detected organic sample results were qualified as estimated (“J”) and non-detected sample results were qualified “UJ” if the associated CCV was greater than the UCL. Seventeen (17) analytes in 17 samples were qualified as estimated (“J”) or as not detected and estimated (“UJ”) based on CCV criteria.

Method blanks were analyzed with each batch (SDG) of samples in accordance with SW-846 Method 8260C. No data was qualified based on method blank contamination.

During activities conducted as part of the groundwater monitoring program at fYNOP, field QC blanks were collected to assess the potential effects of various components of field activities on the analytical results. Field QC samples were obtained to determine the degree of cross-contamination, verify successful decontamination procedures, or determine the effects of media heterogeneity on results. Equipment rinse blanks and field blanks provide a way of measuring the degree of cross-contamination, decontamination efficiency, and other potential error that can be introduced from sources other than the sample. Field sample results associated with contaminants found in field QC blanks are considered non-detect ("U") if the concentrations are less than ten times the level found in the associated blank for common laboratory contaminants such as acetone and MC, and less than five times the level found in the associated blank for other contaminants.

A total of six equipment rinse blanks and six field blanks were collected in 2018. The QAPP specifies the collection of one equipment rinse blank and one field blank per 20 environmental samples being analyzed for VOCs. This 5% specification was based on the total number of groundwater samples that were collected and does not include field QC samples or surface water samples. Of the 159 samples that were collected in 2018, 119 of these were groundwater samples subject to the 5% rinse blank specification, where the six blanks of each type that were collected represent 5% of the 119 groundwater samples.

No VOCs were detected in equipment rinse blanks and no groundwater analytical results were qualified as non-detect ("U") due to rinse blank contamination.

VOCs were detected in field blanks sourced from deionized and ideally organic-free water; however, with the exception of acetone in one sample, the concentrations were not high enough to bias the analytical results. The associated groundwater sample detection of acetone greater than five times the field blank result was qualified as non-detect ("U") due to field blank contamination.

Supporting QC information cited above was qualitatively evaluated with respect to the analytical accuracy DQO. Based on the evaluation of the LCSs, surrogate recoveries, internal standards, initial and continuing instrument calibrations, serial dilutions, method blank, and field QC blank results, the laboratory accuracy has been determined to be acceptable for all other analyses. The analytical DQO for accuracy has been met except as noted.

Based on an evaluation of the compounds and elements detected in the field QC blanks, overall field accuracy is acceptable, except where noted. As a result, the field DQO for accuracy has been fulfilled.

Bias

Bias is the systematic or persistent distortion of a measurement process causing errors in one direction. Data conditions that imply a potential for high bias in the sample result include:

1. Detection of a target compound in an associated method blank, trip blank, field blank, or equipment rinse blank,
2. A surrogate recovery greater than the acceptable range for a specific compound's analytical analogue,
3. A CCV sample recovery greater than the acceptable range for a specific compound, and
4. A LCS/LCSD or MS/MSD recovery greater than the acceptable range for a specific compound.

Similarly, data conditions that imply a potential for low bias in the sample result include:

1. Analysis of the sample outside the holding time (i.e., 14 days for preserved VOCs),
2. A CCV sample recovery less than the acceptable range for a specific compound, and
3. A LCS/LCSD or MS/MSD recovery less than the acceptable range for a specific compound.

High analytical bias was evaluated by reviewing blank detections, low analytical bias was evaluated by reviewing holding times, and both high and low analytical biases were evaluated by analysis of LCS/LCSD and MS/MSD samples, and CCV sample recoveries. The laboratory performed a LCS/LCSD or MS/MSD for each SDG, as appropriate. Acceptance criteria for LCS/LCSD and MS/MSD measurements are expressed as a percent recovery and are specified in Table A-4 of the QAPP.

No VOC results were qualified "U" (not detected) due to method blank detections with the potential for high bias. No VOC detections were qualified "U" due to trip blank contamination with the potential for high bias.

Minor holding time exceedances with the potential for low bias resulted in the qualification of 78 VOC analytes in two samples. The qualified samples were flagged as estimated ("J") or estimated undetected ("UJ"), but none of the VOC data was rejected because samples were analyzed within two times the holding-time limit. In both cases, the holding time was exceeded by only a few hours.

LCS/LCSD and MS/MSD results outside the QC limits for VOCs resulted in the qualification of six analytes in six samples and MS/MSD results outside the QC limits for VOCs resulted in the qualification of 45 analytes in 10 samples. These qualifications for laboratory control sample and matrix spike results were due to the potential for either high or low bias, depending on whether the results were greater than (high bias) or less than (low bias) the QC limits.

Based on a review of the results in **Appendix G**, the data conditions implying a potential for low or high bias in a sample have been addressed by validation and resulting qualification of the analytical data using the following flags: "U", "J", "UJ" and "R" (Rejected). Note: Both "UJ" and "R" are unique validation qualifiers whereas "U" and "J" can be either laboratory qualifiers or validation qualifiers. Except for the results for 1,4-dioxane that were rejected due to the use of an unsuitable analytical method, all data is acceptable as qualified.

Representativeness

Representativeness was satisfied by verifying that the QAPP was properly followed, that proper sampling techniques were used, that proper analytical procedures were followed, and that analytical holding times of the samples were not exceeded. When holding times were greater than two times the method-required holding time, the sample results were rejected ("R") for non-detects and were qualified as estimated ("J") for detects. No sample results were rejected due to missed holding times. Based on an evaluation of sample precision and accuracy, the samples collected in 2018 are considered to be representative of the environmental conditions at the time of sampling.

Comparability

Comparability expresses the confidence with which one data set can be compared to another data set measuring the same property. Comparability is achieved through the use of established and approved sample collection techniques and analytical methods, consistency in the basis of analysis (wet weight vs. dry weight, volume vs. mass, etc.), consistency in reporting units, and analysis of standard reference materials.

Data comparability is achieved by using standard units of measure. The use of EPA-approved methods to collect and analyze samples, along with instruments calibrated against Standard

Analytical Reference Materials (SARM), which are National Institute for Standards and Technology (NIST)-traceable standards, also aids comparability.

Based on the precision and accuracy assessment presented above and the use of EPA-approved methods, the data collected during the 2018 sampling events are considered to be comparable to data collected using similar EPA-approved methods.

Completeness

Completeness measures the quantity of valid data generated from the laboratory analysis and sampling processes. For data to be valid, all acceptance criteria must be fulfilled, including accuracy and precision, analytical methods must be followed, and each data point must be validated satisfactorily. Results from the 2018 sampling events that have been qualified for reasons of completeness have limited impact on the data quality. The DQOs (Table A-4 of the QAPP) were set at 90 percent for analytical laboratory completeness. Based on the evaluation of the laboratory QC results, the data exceeded 90 percent completeness and are deemed useful for assessing results and developing recommendations.

Results that have been flagged or qualified “U”, “UJ”, or “J” for various reasons encountered minor analytical problems, and have a limited impact on the data quality.

Sensitivity

Sensitivity requirements were specified as the minimum required reporting levels for VOCs listed in Table A-6 of the QAPP. For example, a review of non-detect reporting limit data exceedances due to serial dilution by the analytical laboratory shows that for TCE, only two of the non-detects were such that the laboratory reporting limit exceeded 5 micrograms per liter (µg/L), the applicable regulatory standard for TCE. In contrast, vinyl chloride, where the reporting limits were most affected by serial dilution, showed 33 non-detect results with laboratory reporting limits greater than 2 µg/L, the applicable regulatory standard for vinyl chloride. Otherwise, the reporting limit criteria were met, with the exception of those samples that required serial dilution due to matrix interferences or elevated concentrations of target compounds. Therefore, the analytical DQO for sensitivity was met.