2019 Annual Status Report
Boomsnub/Airco Superfund Site
Hazel Dell, Washington

Prepared for

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LIST OF ACRONYMS AND ABBREVIATIONS

AOC	Area of Concern
BDCM	bromodichloromethane
BOC	The BOC Group, Inc.
Boomsnub	Boomsnub Corporation
CD	Consent Decree
City	City of Vancouver
COC	Contaminant of concern
DCE	dichloroethene
DVT	Design verification testing
EA	EA Engineering, Science, and Technology, Inc., PBC
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
ft	feet
gpm	gallons per minute
IWS	in-well stripping
lb	pound
µg/L	micrograms per liter
MCL	Maximum Contaminant Level
MTCA	Model Toxics Control Act
Messer	Messer LLC
NFS	no further sampling
O&M	operation and maintenance
OU	operable unit
PDB	passive diffusion bag
QASP	Quality Assurance and Sampling Plan
ROD	Record of Decision
Site	Boomsnub/Airco Superfund Site
SVE	soil vapor extraction

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

TCE	trichloroethene
VOC	volatile organic compound

EXECUTIVE SUMMARY

Introduction

This Annual Status Report summarizes information on activities that took place during 2019 at the Boomsnub/Airco Superfund Site (Site) in Hazel Dell, Washington. EA Engineering, Science, and Technology, Inc., PBC (EA), under contract to Messer LLC (Messer), is operating and maintaining a Site-wide groundwater extraction and treatment system. Work at the Site is conducted under a Consent Decree (CD) between the U.S. Environmental Protection Agency (EPA) and Messer[a], Docket No. CO7-5163FDB, which was entered by the court on 29 June 2007 (EPA 2007).

Site Background and Operating Objectives

In 1987, the Washington State Department of Ecology (Ecology) determined that a plume of chromium-contaminated groundwater was emanating from the Boomsnub Corporation (Boomsnub) manufacturing facility. In 1991, during cleanup activities at the Boomsnub facility, a second plume containing volatile organic compounds (VOCs) was detected and determined to be coming from the Messer industrial gas production facility, located east of the Boomsnub facility. The two contaminant plumes overlap and become commingled downgradient of the source areas.

The Site is divided into three operable units (OUs) to manage cleanup activities: OU-1 (Boomsnub Soil); OU-2 (Messer Soil); and OU-3 (Site-wide Groundwater). The primary VOC of concern is trichloroethene (TCE), which serves as an indicator of VOC presence at the Site. The operating objectives are to remove sources of VOCs and chromium that may be acting as the source to groundwater, remove VOCs and chromium from the groundwater, halt the off-property migration of VOCs and chromium in groundwater, and reduce contaminant migration into the deeper Troutdale aquifer which serves as the drinking water source for the area. With the implementation and continued operation of remedial measures discussed below, these objectives have been, are, and continue to be, met.

In 1994 and 2001 EPA conducted removal actions at OU-1 to remove the majority of the hexavalent chromium contaminated soils which were serving as a source of hexavalent chromium in groundwater.

The OU-2 selected remedial action was a combination of in-well stripping (IWS) and soil vapor extraction (SVE) to remove VOCs from both the soil and groundwater. The IWS and SVE systems became operational in February 2004. The SVE system was operated to treat the vadose zone soil in OU-2 until 2008, when it was turned off with EPA approval. The IWS system was operated to treat groundwater in OU-2, until it was turned off with EPA approval in August

[a] As of 1 March 2019, Linde LLC changed its name to Messer LLC. Prior to that it was known as The BOC Group, Inc. (BOC)

2013. Following shutdown of the IWS system, groundwater samples were collected from monitoring wells within the TCE source area at an increased frequency to monitor for changes or possible rebound in VOC concentrations. Two years of post-shutdown sampling were completed in late 2015 and the results were evaluated and provided to EPA. It was agreed that the IWS system would remain off.

The OU-3 groundwater extraction and treatment system is designed to operate continuously with minimal operator supervision. The treatment system is composed of an ion-exchange system to remove chromium from extracted groundwater; and a granular activated carbon air stripper system to remove TCE and other volatile contaminants from groundwater. The treatment facility is located on the Boomsnub property. Treated groundwater is discharged to an infiltration gallery located on the Messer property. The groundwater treatment system has been in operation since 1990.

In 2008, an investigation identified another plume of VOC contamination in groundwater north of the Boomsnub/Airco Plume (OU-3 plume). This offsite plume is referred to as the Northern Plume. The Northern Plume continues to be monitored along with the OU-3 plume to evaluate potential impacts to the Site and treatment system. The source of this plume is unknown; however, EPA does not attribute this contamination to activities on the Boomsnub or Messer properties.

In-situ treatment in the remaining areas of residual contamination is being conducted in four steps: design verification testing (DVT), Phase I Treatment (pilot testing), Phase IIA Treatment, and Phase IIB Treatment. DVT was conducted in Summer 2018 and included vertical delineation of the plume using passive flux meters, passive diffusion bags, and collection of water samples from direct push boreholes; horizontal delineation of contamination using direct push boreholes; installation of two wells for performance monitoring; and injection testing. Phase IIA in-situ treatment injections were conducted 9 September through 17 October 2019, and Phase IIB in-situ treatment injections are proposed to start on 27 April 2020.

2019 OU-3 System Operations

During the reporting period, 48,205,285 gallons of groundwater were treated and discharged to the Messer infiltration gallery or used for in-situ treatment. Approximately 21,000 gallons of treated groundwater in September and October 2019 were used to mix with the treatment products for the in-situ treatment injections. All other treated groundwater was discharged to the Messer infiltration gallery during the reporting period. The groundwater extraction and treatment system operated within the performance standards established for the Site. The treatment system was operational for 8,741.8 hours, or over 99.7 percent of the reporting period. Routine monitoring of the treatment system influent and effluent was conducted throughout the year and included monthly sampling and analysis of TCE, chromium, and pH. In addition, semiannual site-wide groundwater monitoring was conducted in the Spring 2019 and Fall 2019.

The mass of contaminants removed during the reporting period continued to decline compared to the previous reporting period. This is primarily due to the continuing downward trend in

contaminant concentrations in Site groundwater, as reflected in the average influent concentrations of chromium and TCE at the Site over the years.

2019 Annual Screening of Groundwater Monitoring Data

Annual screening of groundwater monitoring data is conducted for each monitoring and extraction well currently sampled. As described in the Closure Plan, approved by EPA on 27 February 2018, site closure will occur when the concentrations of all Site COCs in groundwater monitoring and extraction wells included in the Closure Monitoring Program have reached the Site-specific cleanup levels, as defined in the ROD. The following EPA guidance documents were used to develop the procedures in the Closure Plan to determine when the groundwater cleanup levels have been achieved: *Recommended Approach for Evaluating Completion of Groundwater Restoration Remedial Actions at a Groundwater Monitoring Well* (EPA 2014), and *Guidance for Evaluating Completion of Groundwater Restoration Remedial Actions* (EPA 2013).

Based on the results of the annual screening of groundwater monitoring data through 2019, the following changes to monitoring frequencies were recommended this year:

Sampling at wells MW-3C, MW-4C, MW-6C, and MW-6D is "On Hold" for both VOC and chromium sampling in 2020, as remediation monitoring is complete. Concentrations for both VOC and chromium are below their respective cleanup levels, but the wells are "On Hold" since they are located in an area of active pumping or are impacted by infiltration from the infiltration gallery. Per the Closure Plan, attainment monitoring will commence when post remediation steady state conditions have existed for at least a month (EA 2018a).

Sampling frequency is recommended to be increased to semiannually in wells AMW-59 and MW-18E, to evaluate the effectiveness of the in-situ remediation activities.

Status of Previous Recommendations for 2019

To meet the operating objectives for OU-2 and OU-3, planned activities for 2019 were recommended in the 2018 Annual Status report (EA 2018b). The status of those planned activities is summarized below:

- **Well Sampling** – Wells were sampled in accordance with the updated sampling schedule.
- **Easement Agreements and Restrictive Covenants –** EA continues to request EPA assistance to obtain the required agreements with non-responsive property owners. EA will continue efforts to obtain agreements as opportunities arise. The lack of an easement agreement does not impact work at the Site.
- **Padden Parkway Business Park –** The Padden Parkway property was sold. The property owner was kept informed of activities on the property during in-situ treatments during 2019. The new owner does not yet have plans for property development, so

infrastructure modifications are on hold until plans are in place. The new owner is working with potential property developers and associated infrastructure plans, but a real estate transaction has not yet occurred.

- **In-situ Treatments** – Following completion of the Phase I pilot for in-situ treatment in 2018, a work plan was developed for full scale in-situ treatment in areas of residual contamination and approved by EPA. The first phase of treatments (Phase IIA) was completed in Fall 2019, with the second phase scheduled for 2020. Further discussion of the in-situ treatments is included in Section 5.2.
- **Northern Plume –** No strategy for closure of OU-3 wells being impacted by the Northern Plume was completed in 2019. A well closure strategy for OU-3 wells that have been impacted by the Northern Plume will be discussed in 2020.

Recommendations and Planned Activities for 2020

The following activities are planned during the 2020 reporting period:

- **Well Sampling** – Sample wells in accordance with the updated sampling schedule (Table 6).
- **Easement Agreements and Restrictive Covenants –** Continue to request EPA assistance to obtain the required agreements with non-responsive property owners. EA will continue efforts to obtain agreements as opportunities arise.
- **Padden Parkway Business Park –** EA will continue to coordinate monitoring and remedial actions planned on the Padden Parkway property and will stay in communication regarding future development plans.
- **In-Situ Treatments –** Complete Phase IIB in-situ treatment, and shut down groundwater extraction and treatment system as part of the in-situ after-injection monitoring strategy.
- **Northern Plume –** A well closure strategy for OU-3 wells that have been impacted by the Northern Plume will be discussed in 2020.

1. INTRODUCTION

This Annual Status Report summarizes information on activities that took place during 2019 at the Boomsnub/Airco Superfund Site (Site) in Hazel Dell, Washington. EA Engineering, Science, and Technology, Inc., PBC (EA), under contract to Messer LLC (Messer), is operating and maintaining a Site-wide groundwater extraction and treatment system. Work at the Site is conducted under a Consent Decree (CD) between the U.S. Environmental Protection Agency (EPA) and Messer[b], Docket No. CO7-5163FDB, which was entered by the court on 29 June 2007 (EPA 2007).

1.1 Background

The Site is located just north of the city limits of Vancouver, Washington, as depicted on Figure 1. It includes two adjacent facilities, the former Boomsnub Corporation (Boomsnub) chrome plating facility and the Messer industrial gas production facility. The Messer plant manufactures compressed and liquefied gas products including nitrogen, oxygen, and argon. The plant also stores and distributes other specialty gases such as hydrogen and helium. The facility was built by Air Liquide America Corporation in 1963 and has been in operation since 1964.

In 1987, the Washington State Department of Ecology (Ecology) determined that a plume of chromium-contaminated groundwater was emanating from the Boomsnub facility. While cleanup activities were being conducted at the Boomsnub facility, volatile organic compounds (VOCs) were detected in groundwater samples and were suspected to be coming from the Messer property. Messer began investigating the nature and extent of VOCs in 1991. In June 1994, EPA took over the role of lead regulatory agency from Ecology and in April 1995 the Site was placed on the National Priorities List. The primary constituents of concern at the Site are hexavalent chromium and selected VOCs. Previous studies indicated that almost all chromium in groundwater was hexavalent chromium (ICF Kaiser 1999). For this reason, most historical and recent groundwater samples have been analyzed only for total chromium to represent hexavalent chromium. The primary VOC of concern is trichloroethene (TCE), which serves as an indicator of VOC presence at the Site. The chromium and TCE groundwater contaminant plumes overlapped and were commingled downgradient of the source areas. In the 1990s, the plumes were found to extend approximately 4,400 feet (ft) in a west-northwest direction from the sources.

The Site is divided into three operable units (OUs) to manage cleanup activities: OU-1, Boomsnub Soil; OU-2, BOC (Messer) Soil; and OU-3, Site-wide Groundwater (Figure 2). EPA conducted soil removal actions at OU-1 in 1994 and 2001 to remove most of the hexavalent chromium-contaminated soils serving as a source for groundwater contamination. Messer has conducted numerous site investigations, conducted a removal action, and operated a VOC source removal system on their property at OU-2.

[b] As of 1 March 2019, Linde LLC changed its name to Messer LLC. Prior to that it was known as The BOC Group, Inc. (BOC). For ease of reporting, references to Messer in this report include the period of Linde responsibility prior to March 1, 2019

The highest concentrations of Site contaminants have occurred in a shallow groundwater-bearing zone referred to as the alluvial aquifer. The alluvial aquifer is not used as a municipal water supply, although a limited number of private wells pump from this aquifer. TCE and chromium have been detected, although at considerably lower concentrations (all within an order of magnitude of the remedial goals), in the deeper groundwater-bearing zone, the Troutdale aquifer. The Troutdale aquifer serves as a municipal water supply for the City of Vancouver (City) and Clark County. Municipal water supply wells are not located in areas impacted by the chromium or TCE groundwater contaminant plumes.

A groundwater extraction and treatment system is used to capture and treat Site groundwater. The groundwater extraction and treatment system has been operational since 1990 and was constructed along the axis of the chromium plume. Since the initial system was installed, it has been modified, upgraded, and expanded several times to increase pumping and treatment capacity, and to increase removal efficiency. The monitoring and extraction well network for the Site is presented on Figure 3. In recent years, selected portions of the extraction system have been shut down as the contaminant plumes have decreased in extent.

Chromium is removed from the extracted groundwater using an ion-exchange system. VOCs are removed from the extracted groundwater using air stripping with granular activated carbon treatment of the off-gases. The treatment facility is located on the Boomsnub property. Treated groundwater is discharged to an infiltration gallery located on the Messer property. The infiltration gallery was constructed during September and October 2005 and began receiving water in February 2006 (EA 2006). Prior to construction of the infiltration gallery, the treated groundwater was discharged to the City sanitary sewer system.

The ROD identified the remedy for OU-3 as continued groundwater extraction and treatment until groundwater cleanup levels are achieved throughout the groundwater plume (EPA 2000). The remediation goals include the reduction of total chromium in groundwater to 80 micrograms per liter (μg/L) and the reduction of TCE to 5 μg/L. The Record of Decision (ROD) for the Site, dated February 2000, identified the following groundwater cleanup levels:

Groundwater Cleanup Levels

Contaminant of Concern	CAS Number	Basis	Practical[(a)] Quantitation Limit (µg/L)	Cleanup[(b)] Level (µg/L)
Hexavalent chromium	18540-29-9	MTCA B	5	80
Chromium (total)	7440-47-3	MCL	5	100
Bromodichloromethane	75-27-4	MTCA B	1	1
Carbon tetrachloride	56-23-5	MTCA B	1	1
Dibromochloromethane	124-48-1	MTCA B	1	1
1,2-Dichloroethane	107-06-2	MCL	1	5
1,1-Dichloroethene	75-35-4	MTCA B	1	1
Tetrachloroethene	127-18-4	MCL	1	5
1,1,1-Trichloroethane	71-55-6	MCL	1	200
Trichloroethene	79-01-6	MCL	1	5

NOTES: CAS = Chemical Abstract Service
µg/L = Micrograms per liter
MTCA = Washington State Model Toxics Control Act
MCL = Maximum Contaminant Level
(a) Ecology Implementation Memo No. 3 dated 24 November 1993 (Ecology 1993).
(b) Cleanup level established as the higher of the regulatory level or the practical quantitation limit; see Washington Administrative Code 173-340-700(6) and Ecology Implementation Memo No. 3 dated 24 November 1993.

An Action Memorandum was issued by EPA in September 2001, identifying the requirements for remediation activities for OU-2 (EPA 2001). On 18 September 2002, Messer and EPA entered an Administrative Order on Consent (EPA Docket Number CERCLA 10-2002-0052; EPA 2002), addressing the specific design, construction, and operational requirements for a Non-Time-Critical Removal Action for OU-2 (source soils for VOC impacts) to implement the requirements of the Action Memorandum.

On 1 April 2002, Messer assumed interim responsibility for the operation and maintenance (O&M) of the groundwater extraction and treatment system. Messer continues with O&M of the system.

In October 2002, EPA conducted additional soil characterization activities on the Boomsnub property around the groundwater extraction and treatment system building. The purpose of the work was to identify areas in the shallow soils (15 ft or less deep) with concentrations of chromium above the cleanup levels specified in the ROD. The results of the soil characterization activities were presented in the *Soil Characterization: Groundwater Treatment System Compound* report, finalized in April 2003 (URS Group, Inc. 2003).

In September 2003, Messer began construction of the Non-Time Critical Removal Action at their facility to address the VOC source area (OU-2). The selected remedial action was a combination of in-well stripping (IWS) and soil vapor extraction (SVE) systems to remove VOCs from both the groundwater and soil. The systems became operational in February 2004. The SVE system was operated to treat the vadose zone soil in OU-2 until 2008, when it was turned off with EPA approval. The IWS system was operated to treat groundwater in OU-2, until it was turned off with EPA approval in August 2013.

The Toe-of-Plume Pilot Study, an in-situ treatment program, was performed in 2006 to treat an area of recalcitrant chromium and TCE contamination near the original toe of the groundwater contaminant plumes. Chromium and TCE concentrations in the pilot study monitoring wells have remained below the cleanup level since that time, indicating that the treatment was effective.

In 2008, an investigation identified another plume of VOC contamination in groundwater north of the Boomsnub/Airco Plume (OU-3 plume), in the area around well AMW-18 (EA 2008). This offsite plume is referred to as the Northern Plume. In May 2011, EPA and Messer performed a joint investigation of the Northern Plume area to get a better understanding of the source, extent, and concentrations of VOCs in the plume (EA 2011). A new monitoring well (AMW-64) was installed in February 2012, at the request of the EPA, to monitor the Northern Plume northwest of well AMW-18 (EA 2012). The Northern Plume continues to be monitored, along with the OU-3 plume, to evaluate potential impacts to the Site and treatment system, and in accordance with an agreement between Messer and EPA. The source of this plume is unknown; however, EPA does not attribute this contamination to activities on the Boomsnub or Messer properties.

In-situ treatment in the remaining areas of residual contamination is being conducted in four steps: design verification testing (DVT), Phase I Treatment (pilot testing), Phase IIA Treatment, and Phase IIB Treatment. DVT was conducted in Summer 2018, and included vertical delineation of the plume using passive flux meters, passive diffusion bags, and collection of water samples from direct push boreholes; horizontal delineation of contamination using direct push boreholes; installation of two wells for performance monitoring; and injection testing. Preliminary results from the DVT sampling were submitted to the EPA in a separate letter report dated 16 November 2018 (EA 2018b). The Phase I in-situ treatment pilot test was conducted in Fall 2018, to determine the effectiveness of proposed treatments on reducing TCE concentrations. The results of the pilot study showed both treatments were effective in reducing the TCE concentrations in nearby wells. Phase IIA treatment activities conducted in 2019 are summarized in Section 5.2. Phase IIB will be completed in 2020.

1.2 Purpose

The purpose of this report is to provide an overview of Site activities at OU-2 and OU-3 for the reporting period of 1 January through 31 December 2019.

1.3 Operating Objectives

The operating objectives for OU-1 are defined in the ROD (EPA 2000). Contaminated soil removal will take place in OU-1 following removal of the OU-3 groundwater treatment system and associated structures, as described in the Closure Plan (EA 2018a).

The operating objectives for OU-2, identified in the 2001 Action Memorandum (EPA 2001), include the following:

- Remove VOCs from the vadose zone that may be acting as the source to groundwater.

- Remove VOCs from groundwater on the western portion of the Messer property.
- Halt off-property migration of VOCs in groundwater.

The operating objectives for OU-3 are defined in the ROD (EPA 2000). Activities at the Site are designed to meet the following overall objectives:

- Reduce contaminant migration within the alluvial aquifer (expansion of the plumes).
- Continue mass removal activities designed to restore impacted groundwater to Site-specific cleanup levels.
- Reduce contaminant migration into the Troutdale aquifer by reducing contamination in the alluvial aquifer.

With the implementation and continued operation of remedial measures discussed in this document, these objectives are, and continue to be, met.

1.4 Organization of this Document

This report is divided into eight sections and three appendices:

- Section 1 provides the background, purpose, and operating objectives.
- Section 2 presents provides a discussion monitoring for OU-2.
- Section 3 presents summaries of the system operations and monitoring for OU-3.
- Section 4 provides a discussion of groundwater monitoring results and trends.
- Section 5 summarizes other Site activities conducted during the reporting period.
- Section 6 presents the results of the annual assessment of groundwater monitoring data and provides recommendations, as appropriate, for changes to the well sampling schedule.
- Section 7 summarizes the status of previously recommended activities for 2019 and presents recommendations and planned activities for 2020.
- Section 8 lists the references cited in this document.

Information on chromium and TCE concentrations in groundwater is presented in Appendices A and B, respectively. The information is presented both by well groupings and by individual wells. Appendices A and B are organized in sections, as follows:

- Tables reporting chromium and TCE groundwater concentrations for the last five sampling events are provided in Appendices A-1 and B-1, respectively. Only wells sampled during the 2019 reporting period are included in these tables.
- Graphs showing chromium and TCE concentration trends by well grouping are presented

in Appendices A-2 and B-2, respectively. Only wells sampled during the 2019 reporting period are included. These graphs allow a comparison of trends within geographical or hydrogeological groupings. They also allow immediate comparison of concentrations between wells in a grouping and the ability to identify potential outliers.

- Graphs showing chromium and TCE concentrations over time for individual wells are presented in Appendices A-3 and B-3, respectively. Only wells sampled during the 2019 reporting period are included.

Appendix C includes supporting information for the closure monitoring assessment, including a list of wells excluded from closure monitoring, and tables showing the results of the remediation monitoring analysis and attainment monitoring analysis for each contaminant of concern (COC).

Appendix D includes a discussion on the Northern Plume and associated tables and figures. The Northern Plume continues to be monitored, to evaluate potential impacts to the Site and treatment system.

2. OU-2 MONITORING

This section provides a summary of the OU-2 monitoring activities conducted between 1 January and 31 December 2019. Groundwater sampling and analyses were conducted in accordance with the recommendations in the 2018 Annual Status Report (EA 2019c). Locations of the OU-2 treatment and monitoring wells are shown on Figure 4.

Since the IWS system was turned off in August 2013, groundwater samples from OU-2 have been collected to monitor for changes/rebound in VOC concentrations. Groundwater monitoring was conducted in Spring and Fall 2019, following EPA approval of the associated Quality Assurance Sampling Plan (QASP) addenda (EA 2019a, 2019d). Groundwater samples were collected from seven OU-2 monitoring wells during the 2019 reporting period.

Section 4.3.2.1 provides a discussion and presents the TCE data from OU-2 wells sampled during the 2019 reporting period. Residual VOC contamination in OU-2 groundwater is being addressed by an in-situ injection program and will continue to be monitored to evaluate the potential need for further remedial actions in this area.

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3. OU-3 SYSTEM OPERATIONS AND MONITORING

This section provides a summary of OU-3 system operations, system performance, and plume monitoring conducted from 1 January to 31 December 2019. Groundwater sampling and analyses were conducted in accordance with the procedures in the EPA-approved Site QASP (EA 2019b), and subsequent EPA-approved QASP addenda (EA 2019a, 2019d).

3.1 System Operations

Routine system operation details are presented in the Progress and Groundwater Monitoring Reports (EA 2019e, 2020). During the reporting period the groundwater extraction and treatment system operated within the performance standards established for the Site.

3.1.1 Groundwater Extraction System

The extraction well pumping rates were recorded once a month during the reporting period. The recorded pumping rates are shown in Table 1. The following changes to extraction well pumping rates occurred during 2019. On 14 October 2019 well MW-19D was turned off and the pump removed, and on 16 October 2019 wells MW-14C and MW-14E were turned off and the pump removed, with EPA approval, due to the proximity of the in-situ treatment injection locations. After pumps in wells MW-14C, MW-14E, and MW-19D were removed the average pumping rate dropped from approximately 98 gallons per minute (gpm) to approximately 68 gpm.

3.1.2 Groundwater Treatment System

Routine monitoring of the treatment system influent and effluent was conducted throughout the year including monthly sampling and analysis of VOCs, chromium, and pH. Treatment system components are briefly described in the following sections.

3.1.2.1 Ion-Exchange and Air Stripper Systems

As reported in the Progress and Groundwater Monitoring Reports (EA 2019e, 2020), monthly influent and effluent sample concentrations were used to determine approximate chromium and TCE removal rates on a monthly basis. In 2019, the ion-exchange system had an annual average chromium removal rate of approximately 87 - 100 percent and the air stripper system an annual average VOC removal rate of approximately 98 - 100 percent. Removal rates are calculated based upon a percentage of the influent/effluent concentrations which continue to be either non-detect or an estimated concentration below the method reporting limit.

3.1.2.2 Messer Infiltration Gallery

Treated groundwater from the Site treatment system is discharged back into the alluvial aquifer through an infiltration gallery. The infiltration gallery is in the southeast corner of the Messer property and is designed to accept treated water at 160 gpm. No modifications or significant repairs were made to the infiltration gallery during the reporting period. TCE and chromium

concentrations in effluent discharged to the infiltration gallery during 2019 were consistently below the maximum allowable effluent concentrations of 1.9 µg/L for TCE and 19.2 µg/L for chromium. Effluent monitoring results are provided in the Progress and Groundwater Monitoring Reports (EA 2019e, 2020).

3.2 System Performance

OU-3 system performance for 2019 is summarized in the following table. Additional details are provided in the Progress and Groundwater Monitoring Reports (EA 2019e, 2020).

OU-3 System Performance Summary, 2019

Month	Hours/Month	Hours of Operation/Month	Availability (percent)	Flow (gallons)
January	744	739.53	99.40	4,413928
February	672	663.23	98.7	3,933,978
March	744	741.68	99.82	3,934,035
April	720	720	100	4,388,532
May	744	744	100	4,498,487
June	720	720	100	4,305,498
July	744	741.36	99.65	4,394,334
August	744	744	100	4,404,675
September	720	720	100	4,238,615
October	744	744	100	3,694,136
November	720	720	100	2,954,631
December	744	744	99.96	3,044,436
2019 Totals	**8,760**	**8,741.8**	**99.79**	**48,205,285**

Note: The percent availability includes actual minutes of operation.

3.2.1 Water Treated

During the reporting period, 48,205,285 gallons of groundwater were treated and discharged to the Messer infiltration gallery or used for in-situ treatment. Approximately 21,000 gallons of treated groundwater in September and October 2029 were used to mix with the treatment products for the in-situ treatment injections. All other treated groundwater was discharged to the Messer infiltration gallery during the reporting period. The groundwater extraction and treatment system operated within the performance standards established for the Site.

3.2.2 System Availability

The treatment system was operational for 8,741.8 hours, or over 99.7 percent of the reporting period, exceeding the 90 percent requirement of the CD. Details are provided in the Progress and Groundwater Monitoring Reports (EA 2019e, 2020).

3.2.3 Mass Removal

The following table presents cumulative chromium and TCE removed in 2019, along with monthly influent data and flow.

OU-3 Chromium and TCE Removal Summary, 2019

Date	Monthly Flow (gallons)	Influent/ Effluent Chromium (µg/L)	Influent/ Effluent TCE (µg/L)	Monthly Chromium Removal (lbs)	Monthly TCE Removal (lbs)	Cumulative Chromium Removal (lbs)	Cumulative TCE Removal (lbs)
January	4,413928	41.3 / 0.9 U	11 / 0.18 J	1.5	0.4	22,463.2	2,235.8
February	3,933,978	42.3 / 1.8 J	12 / 0.5 U	1.4	0.4	22,464.6	2,236.2
March	3,934,035	46.5 / 2.1 U	8.3 / 0.13 J	1.5	0.3	22,466.2	2,236.4
April	4,388,532	41.2 / 2.1 U	11 / 0.14 J	1.5	0.4	22,467.7	2,236.8
May	4,498,487	43.6 / 2.1 U	10 / 0.15 J	1.6	0.4	22,469.3	2,237.2
June	4,305,498	42.7 / 2.1 U	9.6 / 0.12 J	1.5	0.3	22,470.8	2,237.6
July	4,394,334	43.1 / 8.4 U	11 / 0.18 J	1.5	0.4	22,472.4	2,238.0
August	4,404,675	41.2 / 8.4 U	8.6 / 0.18 J	1.5	0.3	22,473.9	2,238.3
September	4,238,615	40.5 / 8.4 U	8.9 / 0.11 J	1.4	0.3	22,475.3	2,238.6
October	3,694,136	42.7 / 8.4 U	8.4 / 0.12 J	1.3	0.3	22,476.6	2,238.9
November	2,954,631	32.2 / 8.4 U	6.3 / 0.1 J	0.8	0.2	22,477.4	2,239.0
December	3,044,436	35.6 / 8.4 U	5.6 / 0.5 U	0.9	0.1	22,478.3	2,239.1

Note:
lbs = pounds
µg/L = micrograms per liter
TCE = trichloroethene
J Estimated concentration.
U Analyte not detected above the specified reporting limit.

Based on measured influent and effluent concentrations and the total monthly treatment system flow, 16.4 pounds (lbs) of chromium and 3.8 lbs of TCE were removed by the groundwater extraction and treatment system during 2019. This brings the cumulative total mass of chromium and TCE removed to approximately 22,478 lbs and 2,239 lbs, respectively, since initiating operations in 1990. There is a continuing downward trend in influent contaminant concentrations in Site groundwater which reflects in a lower removal rate year after year.

3.3 Deliverables

The following deliverables were submitted between January and December 2019.

- **17 January 2019 –** December 2018 Self-Monitoring Report was submitted to the City.
- **25 February 2019** – Spring 2019 QASP Addendum was submitted to EPA.
- **25 February 2019** – Progress and Groundwater Monitoring Report, July – December 2018 was submitted to the EPA.

- **13 February 2019** – 2018 Dangerous Waste Report was submitted to Ecology.
- **29 March 2019** – 2018 Annual Status Report was submitted to EPA.
- **1 April 2019** – Notification letters for the Spring 2019 sampling event were mailed to the property owners.
- **30 May 2019** – 2019 Revised Site QASP for the Boomsnub/Airco Superfund Site was submitted to EPA.
- **27 June 2019** – Final In-Situ Treatment of Areas of Residual Contamination Pilot Study for the Boomsnub/Airco Superfund Site Report submitted to EPA.
- **18 July 2019 –** June 2019 Self-Monitoring Report was submitted to the City.
- **7 August 2019 –** Fall 2019 QASP Addendum was submitted to EPA.
- **23 August 2019** – Progress and Groundwater Monitoring Report, January – June 2019 was submitted to EPA.
- **30 September 2019** – Notification letters for the Fall 2019 sampling event were mailed to the property owners.
- **24 October 2019 –** October 2019 Self-Monitoring Report was submitted to the City.

The following deliverables are anticipated for submittal during the next reporting period (January through December 2020):

- **TBD –**Report for the Phase IIA and IIB Treatment sampling to be submitted to EPA.
- **15 January 2020** – Notification letters for the Phase IIA In-Situ Treatment sampling event were mailed to the property owners.
- **15 January 2020** – QASP Addendum for Phase IIA In-Situ Treatment sampling submitted to the EPA.
- **31 January 2020 –** October – December 2019 Self-Monitoring Report was submitted to the City.
- **25 February 2020** – Spring 2020 QASP Addendum to be submitted to EPA.
- **28 February 2020** – Progress and Groundwater Monitoring Report, July – December 2019 to be submitted to the EPA.
- **1 March 2020 –** Dangerous Waste Report to be submitted to Ecology.
- **1 April 2020 –** 2019 Annual Status Report to be submitted to EPA. (Draft to be completed by 5 March prior to EPA meeting.)
- **2 April 2020** – Notification letters for the Spring 2020 sampling event to be mailed to the property owners.
- **30 April 2020 –** January – March 2020 Self-Monitoring Report to be submitted to the City.

- **30 July 2020 –** April – June 2020 Self-Monitoring Report to be submitted to the City.
- **18 August 2020 –** Fall 2020 QASP Addendum to be submitted to EPA.
- **22 August 2020** – Progress and Groundwater Monitoring Report, January – June 2020 to be submitted to EPA.
- **25 September 2020** – Notification letters for the Fall 2020 sampling event to be mailed to the property owners.
- **30 October 2020 –** July – September 2020 Self-Monitoring Report to be submitted to the City.

3.4 Field Events

The following field events were completed during the 2019 reporting period:

- **Monthly** – O&M influent and effluent sampling.
- **28 February 2019** – Conducted in-situ treatment test sampling in Area of Concern (AOC)-1 and AOC-2.
- **16 April through 18 April 2019 –** Spring 2019 semiannual groundwater sampling event.
- **9 September through 19 October 2019** – Phase IIA in-situ treatment injections in AOC-2.
- **14 through 17 October 2019 –** Fall 2019 semiannual groundwater sampling event.

The following field events are anticipated during the next reporting period (January through December 2020):

- **Monthly** – O&M influent and effluent sampling.
- **22 through 23 January 2020 –** Phase IIA In-Situ Treatment sampling event.
- **Spring/Summer 2020 –** In-Situ Treatment Phase IIB.
- **20 through 24 April 2020 –** Spring 2020 semiannual groundwater sampling event.
- **12 through 16 October 2020 –** Fall 2020 semiannual groundwater sampling event.

3.5 OU-3 Monitoring

Groundwater monitoring was conducted in Spring and Fall 2019, following EPA approval of the associated QASP addenda (EA 2019a, 2019d). Section 4 provides a discussion and presents the data from OU-3 wells sampled during the 2019 reporting period.

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4. GROUNDWATER MONITORING ACTIVITIES, RESULTS AND TRENDS

This section presents the concentration trends observed in groundwater since 1995 with a focus on data collected during 2019.

Groundwater sampling and analyses were conducted to monitor the groundwater quality in extraction and monitoring wells in accordance with the procedures in the Site QASP (EA 2019b). Task-specific QASP addenda are prepared for each sampling event to be compliant with the schedule established in the Long-Term Monitoring Plan (EA 2007) and subsequent updates. The sampling schedule is reviewed and updated annually; recommendations are presented in the Annual Status Reports. The recommended sampling schedule for 2019 was presented in the 2018 Annual Status Report (EA 2019c). The 2019 well sampling frequencies are presented in Table 2.

4.1 Field Methods

Groundwater samples were analyzed for chromium using EPA Method 200.7 and/or VOCs using EPA Method 8260C. The samples were submitted to ALS of Kelso, Washington for analysis and the groundwater monitoring results and concentration trends are discussed below.

4.1.1 Extraction Well Sampling

Five active Site extraction wells were sampled during the Spring 2019 sampling event and all nine extraction wells that were active as of October 2019 were sampled during Fall 2019. Extraction wells are equipped with 3-inch diameter submersible pumps with operating flow rates ranging from 0.5 to 17.4 gpm. Samples from the extraction wells were collected from sampling spigots located at the wellheads. At actively pumping extraction wells, the spigots were opened, and the flow rate was adjusted to less than 0.5 liter per minute prior to measuring field water quality parameters and collecting samples. The field parameters measured consisted of pH, specific conductivity, temperature, dissolved oxygen, turbidity, and oxidation-reduction potential. Groundwater purge and sampling forms are included in the Progress and Groundwater Monitoring Reports (EA 2019e, 2020). Samples collected from the extraction wells in Fall 2019 were analyzed for VOCs and total chromium. Samples collected from the extraction wells in Spring 2019 were analyzed for VOCs only, except for well MW-19D which was also analyzed for total chromium.

4.1.2 Monitoring Well Sampling

Groundwater samples from 10 monitoring wells sampled during Spring 2019 and 29 monitoring wells sampled during Fall 2019 were collected by using passive diffusion bag (PDB) samplers, deployed at least 14 days in advance of sample collection. Measurement of field parameters is not required when sampling from PDB samplers, as agreed on by EPA (EA 2019b). PDB samplers are only used to sample wells where VOCs are the only COC. The PDB samples were submitted for laboratory analysis of VOCs only. No biofilms were observed on any of the samplers. Nine monitoring wells in the spring and 27 in the fall were sampled via a dedicated

pump (stationed permanently in the well) or a non-dedicated pump. The field parameters measured consisted of pH, specific conductivity, temperature, dissolved oxygen, turbidity, and oxidation-reduction potential. PDB and sampling forms are included in Progress and Groundwater Sampling Reports (EA 2019e, 2020).

4.1.3 Water Level Gauging Program

Depth-to-groundwater measurements were collected from monitoring and extraction wells at the Site during the spring and fall sampling events. Groundwater level data are collected to determine the groundwater flow direction and gradient. During both spring and fall sampling events in 2019, the measurements were made while the groundwater treatment system was actively pumping to assess groundwater flow under drawdown conditions.

Generalized groundwater elevation contour maps for the alluvial and Troutdale aquifers for the Spring and Fall 2019 water level gauging events are provided in the Progress and Groundwater Sampling Reports (EA 2019e, 2020). The groundwater elevation contours maps for the Fall 2019 event are also presented as Figures 5 and 6, herein. The flow direction and horizontal gradient in both aquifers were similar to those observed previously. The alluvial aquifer groundwater elevations measured in Fall 2019 were approximately 2 to 4 ft lower than those measured in Spring 2019, reflecting the seasonal variation in rainfall. In the deeper, semi-confined Troutdale aquifer, the groundwater elevations measured in Fall 2019 were approximately 1 to 2 ft lower than those measured in Spring 2019. Water levels in the alluvial and Troutdale aquifers were approximately 2 to 3 ft lower during the Fall 2019 sampling event compared to the Fall 2018 sampling event. Typically, water levels tend to fluctuate 1 to 3 ft from year to year.

The vertical hydraulic gradient varies at the Site due to the groundwater pumping. Water levels in alluvial aquifer well clusters tend to be similar at the different depths, except near active extraction wells where groundwater withdrawals impact the flow patterns. However, there is a significant downward hydraulic gradient from the alluvial aquifer to the semi-confined Troutdale aquifer.

The horizontal gradients for the alluvial and Troutdale aquifers were determined using data from the Fall 2019 water level gauging event. In the alluvial aquifer, the hydraulic gradient across the Messer property was approximately 0.007; this area is impacted by the Infiltration Gallery. Downgradient, within the plume area (using an average from just west of the Messer property to the original toe-of-plume area), the gradient was approximately 0.004. The flow direction within the alluvial aquifer is generally to the west-northwest. In the Troutdale aquifer, the average hydraulic gradient across the Site area was approximately 0.005. The flow direction in this aquifer is generally to the west-southwest.

4.2 Well Groupings

To facilitate analysis of contaminant concentrations across the Site, the wells are grouped by aquifer and geographical location as follows:

- Alluvial aquifer wells
  - Upgradient wells
  - TCE Source wells (includes OU-2 monitoring wells)
  - Proximal wells
  - Intermediate wells
  - Church of God wells
  - Toe-of-Plume wells
- Troutdale aquifer wells.

The aquifer and geographic well groupings are presented on Figure 7, and wells within each grouping are summarized in Table 3. All wells except those identified as Troutdale aquifer wells are screened within or slightly below the alluvial aquifer.

4.3 Contaminant Concentrations and Trends

4.3.1 Overview

Groundwater monitoring results indicate that the current pumping scheme is maintaining control of the plume and that overall concentrations for both chromium and TCE continue on a decreasing trend. The extent of impacted groundwater in the alluvial aquifer, as determined from groundwater sampling data obtained in 1995 and Fall 2019, is presented on Figure 8 for chromium and on Figure 9 for TCE (OU-3 plume). These figures illustrate that groundwater remedial actions have been effective in mass removal and in reducing the footprints of both the chromium and TCE plumes.

Chromium and TCE concentrations detected in groundwater during sampling in 2019 are presented in Appendices A-1 and B-1, respectively. Wells with 2019 groundwater sampling results exceeding the Site cleanup levels of 80 µg/L for chromium and 5 µg/L TCE are highlighted on Figures 10 and 11, respectively.

For this report, tables, figures, and graphs were used to assist in evaluating groundwater trends across the Site. Chromium and TCE concentration trends are presented in Appendices A and B, respectively. The information is presented both by well groupings and by individual wells.

Specific information on trends observed within each well grouping is discussed in the following sections. Analytical results for a total of five sampling events for each grouping are provided, including results from 2019 and prior events. In data summary tables presented in this report, analytical results shown in blue bold are above the Site-specific cleanup level of 80 µg/L for chromium or 5 µg/L for TCE. For duplicate samples, the higher of the two results is reported.

4.3.2 Alluvial Aquifer Wells - TCE and Chromium

During the 2019 reporting period, groundwater samples were collected from the following alluvial aquifer well groups: TCE Upgradient, TCE Source Area, Proximal, Intermediate, and

Church of God (Figure 7). No samples were collected from Toe-of-Plume well MW-41, which is sampled every five years at the request of EPA to support the Toe-of-Plume Pilot Study.

4.3.2.1 TCE Upgradient Wells

The TCE Upgradient wells are located near the upgradient (eastern) site boundary and sampled for TCE every two years, including in 2019 (Figure 7). These wells are listed in Table 2 as either Upgradient Wells (sampled for VOCs only) or Infiltration Gallery Wells (sampled for chromium and VOCs). All four wells sampled for chromium in this well group had concentrations well below the cleanup level of 80 µg/L, and all five wells in this well group sampled for TCE had concentrations well below the cleanup level of 5 µg/L.

4.3.2.1 TCE Source Area Wells

The TCE Source Area wells are located on the western half of the Messer property (Figures 4 and 7), near the historic TCE-impacted soil. A source removal system was previously operated in this area. These wells are typically sampled for VOCs only, as part of the OU-2 monitoring program, as these wells are upgradient of the chromium source area.

TCE

During the 2019 reporting period, TCE concentrations were below the 5 µg/L cleanup level in groundwater samples collected from two of the seven wells sampled. The following table presents the results from the last five sampling events for comparison.

TCE Source Area Well TCE Concentrations, in µg/L

Well	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019
AMW-1A	**39**	**23**	**46**	**23**	**21**
AMW-2A	**86**	**27**	**28**	4.8	**12**
AMW-3A	0.71	--	0.72	--	0.63
AMW-4A	0.11 J	--	0.5 U	--	0.5 U
AMW-12A	**22**	**18**	**18**	**21**	**21**
AMW-53A	5.4	3.8	**7.8**	**13**	**15**
MW-1A	**110**	**77**	**65**	**6.1**	**15**

Note:
U Analyte not detected above the specified reporting limit.
Results shown in **blue bold** exceed the established cleanup level of 5 µg/L.

Since the IWS system was turned off in August 2013, groundwater samples from the TCE Source Area have been collected to monitor for changes/rebound in VOC concentrations.

Five wells were sampled for TCE during the Spring 2019 sampling event, and seven wells were sampled for TCE in Fall 2019. During the reporting period the TCE concentration exceeded the cleanup level in wells AMW-1A, AMW-2A, AMW-12A, AMW-53A, and MW-1A. TCE concentrations in well AMW-2A appear to be decreasing overall, and concentrations in well

MW-1A have decreased since Fall 2018. An in-situ treatment Phase I pilot test with reductive dechlorination/activated carbon was conducted in Fall 2018 just downgradient of TCE Source Group wells AMW-2A and MW-1A and appears to have been effective in reducing the TCE concentrations in those wells. TCE concentrations in well AMW-53A have slowly increased over the past four sampling events. Historical TCE concentrations in wells in this area tend to fluctuate (Appendix B).

4.3.2.2 Proximal Wells

The Proximal wells are located west of the maintenance building (former machine shop) on the Boomsnub property and east of NE St. Johns Road (Figure 7). These wells are proximal to the chromium source. All four extraction wells in this group (MW-6B, MW-10B, MW-10C, and PW-1B) were actively pumping when they were sampled during both the Spring and Fall sampling events.

Chromium

During the 2019 reporting period, chromium concentrations were below the 80 µg/L cleanup level in groundwater samples collected from 5 of the 10 wells sampled, as presented in the following table.

Proximal Well Chromium Concentrations, in µg/L

Well	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019
MW-2A	40.4	--	**153**	--	**292**
MW-3A	**149**	--	--	--	**105**
MW-4A	**490**	--	**226**	--	**371**
MW-4B	**438**	--	**561**	--	**366**
MW-4C	55.5	--	41.6	--	68.7
MW-6A	20.1	--	**143**	--	**128**
MW-6B	9.6	--	8.7	--	12.2
MW-10B	26.3	--	25.2	--	30.2
MW-10C	53.6	--	62.3	--	61.7
PW-1B	30.7	--	25.1	--	28.7

Notes:
Results shown in **blue bold** exceed the established cleanup level of 80 µg/L.
Wells shown in **bold** are extraction wells.

During the 2019 reporting period wells MW-2A, MW-3A, MW-4A, MW-4B and MW-6A had concentrations above the 80 µg/L cleanup level. Chromium concentrations were noted above the cleanup level in well MW-2A in 2018 and 2019; a cause has not yet been determined and the well will continue to be monitored. Groundwater samples from wells MW-4A and MW-4B continue to exhibit some of the highest concentrations of chromium in groundwater at the Site and consistently remain above the cleanup level. However, concentration fluctuations are typical

in these wells. Historically, groundwater from wells in the Proximal area have had large fluctuations in chromium concentrations and results from the sampling event were within the normal range of fluctuations (Appendix A).

TCE

During the 2019 reporting period, TCE concentrations were below the 5 µg/L cleanup level in groundwater samples collected from 13 of the 14 wells sampled, as presented in the following table.

Proximal Well TCE Concentrations, in µg/L

Well	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019
MW-2B	2	--	1.3	--	1.1
MW-3C	1.8	--	1.2	--	1
MW-4A	2.1	--	3	--	3.9
MW-4BSHED	2.1	--	--	--	1.5
MW-4C	2	--	2.3	--	1.7
MW-6A	0.5 U	--	0.5 U	--	0.5 U
MW-6B	2.5	--	2.1	--	2.8
MW-6C	0.5 UJ	--	0.2 J	--	0.35 J
MW-6D	0.5 UJ	--	1.9	--	1.8
MW-7B	**6.1**	--	3.1	--	4.2
MW-9C	**5.8**	--	4.5	--	2.9
MW-10B	**7**	--	**8.2**	**8.3**	**6.8**
MW-10C	1.2	--	1.3	--	1.3
MW-12C	0.71	--	--	--	0.63

Note:
J Estimated concentration.
U Analyte not detected above the specified reporting limit.
Active extraction wells are shown are in **bold**.
Results shown in **blue bold** exceed the established cleanup level of 5 µg/L.

The TCE concentration in well MW-10B remains above the cleanup level but has been on an overall decreasing trend. Historically, TCE concentrations in groundwater samples from this area have been on a decreasing trend (Appendix B).

4.3.2.3 Intermediate Wells

The Intermediate wells are located west of NE St. Johns Road, north and south of NE 78th Street (Figure 7). Four extraction wells in this area (MW-14C, MW-14E, MW-19D, and MW-20D) were actively pumping during the Spring and Fall 2019 sampling event. Due to the proximity to In-Situ treatment injections, wells MW-14C and MW-14E were shut off on 16 October 2019, and well MW-19D was shut off on 14 October 2019. All three wells were shut off indefinitely.

Chromium

During the 2019 reporting period, chromium concentrations were below the 80 µg/L cleanup level in all seven wells sampled, except for well MW-19D, as presented in the following table.

Intermediate Well Chromium Concentrations, in µg/L

Well	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019
MW-19D	72.3	78.2	71.6	**85.5**	**87.5**
MW-14C	44.2	--	38.7	--	48.1
MW-14E	27.1	--	24.5	--	27.5
MW-18D	72	72.2	**127**	65.6	74.2
MW-18E	--	--	--	11.2	69.2
MW-20D	43.5	--	40.7	--	48.8
MW-40	34	--	33.5	--	51.6

Note:
Active extraction wells are shown are in **bold**.
Results shown in **blue bold** exceed the established cleanup level of 80 µg/L.

MW-19D had been on a decreasing trend and dropped below the cleanup level for the first time in Fall 2016. Chromium concentration in the well have been fluctuating above and below the cleanup level since then. Well MW-18E was sampled in 2019, for the first time since Fall 2011, to evaluate the effectiveness of the Phase I in-situ treatment injections conducted just upgradient of this well. Fluctuations in chromium concentrations in both well MW-18D and MW-18E are likely related to the effects of treatment, as well as hydraulic changes that occurred after pumping from well MW-18D was shut off in 2018. Historically, chromium concentrations in groundwater samples from wells in this area continue on an overall decreasing trend (Appendix A).

TCE

TCE concentrations were below the 5 µg/L groundwater cleanup level in 6 of the 19 wells sampled in this area (Appendix B). Six of these wells (AMW-16, AMW-17, AMW-18, AMW-23, AMW-64, and MW-23D) were sampled to monitor the offsite Northern Plume. TCE concentrations in five of the six Northern Plume monitoring wells remain above the cleanup level, as shown in the following table.

Northern Plume Well TCE Concentrations, in µg/L

Well	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019
AMW-16	**41**	**45**	**13**	**39**	**36**
AMW-17	**79**	**65 D**	**23**	**66**	**48**
AMW-18	**28**	**28**	0.5 U	**20**	**18**
AMW-23	0.1 J	--	**8**	0.15 J	0.5 U
AMW-64	**15**	**13**	**71**	**11**	**9.9**
MW-23D	**140**	**120 D**	**160**	**150 E**	**120**

Note:
Results shown in **blue bold** exceed the established cleanup level of 5 µg/L.
J Estimated concentration
U Analyte not detected above the specified reporting limit.

TCE concentrations in well AMW-23 dropped below the cleanup level in Spring 2019 after increasing to above the cleanup level for the first time in Fall 2018. Additional discussion of the Northern Plume, including previous monitoring results, is provided in Appendix D.

TCE concentrations were below the 5 µg/L groundwater cleanup level in 5 of the 13 OU-3 wells (not impacted by the Northern Plume) sampled in this area, as shown on the following table.

OU-3 Intermediate Well TCE Concentrations, in µg/L

Well	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019
AMW-59	**53**	--	--	--	**45**
AMW-60	0.22 J	--	0.35 J	--	0.4 J
CPU-14	3.92	--	4.9	--	**5.1**
MW-14C	**6.1**	**7.2**	**8.5**	**6.9**	**5.9**
MW-14E	**37**	**48**	**46**	**43**	**39**
MW-15E	2.5	--	--	--	1.4
MW-18D	**21**	**22**	**49**	2.2	2.9
MW-18E	**180**	--	**150**	1.8	0.7
MW-19D	**20**	**20**	**18**	**18**	**15**
MW-20D	**20**	**21**	**19**	**20**	**18**
MW-38	**9.5**	--	**20**	--	**28**
MW-40	0.44 J	--	0.34 J	--	0.3 J
PZ-39	**19**	--	**36**	--	**33**

Note:
J Estimated concentration.
Active extraction wells are shown are in **bold**.
Results shown in **blue bold** exceed the established cleanup level of 5 µg/L.

The TCE concentrations remain consistently above the cleanup level in wells AMW-59, MW-14C, MW-14E, MW-19D, MW-20D, MW-38, and PZ-39. The TCE concentration in well CPU-14 also increased to just above the cleanup level (5.1µg/L), after being below the cleanup level for several sampling events. Notably, TCE concentrations in wells MW-18D and MW-18E dropped below the cleanup level for the first time in Spring 2019. An in-situ treatment Phase I reductive dechlorination pilot test with activated carbon was conducted in Fall 2018 upgradient of these wells and was effective in reducing the TCE concentrations. Historically, TCE concentrations in groundwater samples from wells in this area (not impacted by the Northern Plume) have been on a decreasing trend (Appendix B).

4.3.2.4 Church of God Wells

The Church of God wells are located north of NE 78th Street between the west side of the Clark County sports field complex and the western Church of God property line (Figure 7). Extraction well MW-22D was actively pumping during both the Spring and Fall 2019 sampling events.

Chromium

During the reporting period chromium was not detected above the 80 µg/L cleanup level in groundwater from any of the three wells sampled, as shown in the following table.

Church of God Well Chromium Concentrations, in µg/L

Well	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019
CPU-12	3.3 J	--	4 J	--	8 J
MW-21D	8.3	--	6.1	--	12.3
MW-22D	15.1	--	13.5	--	17.9

Note:
J Estimated concentration.
Active extraction wells are shown are in **bold**.

TCE

During the reporting period, TCE concentrations in groundwater were below the 5 µg/L cleanup level in groundwater from two of the four wells sampled, as presented in the following table.

Church of God Well TCE Concentrations, in µg/L

Well	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019
AMW-61	**5.1**	--	**7.4**	--	**6.9**
CPU-12	2.6	--	--	--	2.9
MW-21D	2.4	5	**16**	**15**	**9.1**
MW-22D	1.7	--	1.7	--	1.5

Note:
Active extraction wells are shown are in **bold**.
Results shown in **blue bold** exceed the established cleanup level of 5 µg/L.

Historically, TCE concentrations in samples collected from wells in this area have been on an overall decreasing trend (Appendix B). However, well MW-21D appears to be impacted by the Northern Plume, as indicated by an increase in TCE concentrations to above cleanup levels beginning in 2018. The TCE concentration in well MW-21D was at the cleanup level of 5 µg/L in Spring 2018 and has remained above the cleanup level through Fall 2019. Prior to Spring 2018 the TCE concentrations in MW-21D had been below the cleanup level since Fall 2012. Pumping of extraction well MW-21D was stopped on 22 June 2018 to minimize drawing the Northern Plume into that well. TCE concentrations were also above the 5 µg/L cleanup level in the groundwater sample collected from well AMW-61. The TCE concentrations in this well, screened in the silty zone at the bottom of the alluvial aquifer, fluctuate but have remained above the cleanup level since Fall 2013.

4.3.3 Troutdale Aquifer Wells – TCE and Chromium

The Troutdale aquifer serves as a municipal water supply for the City and Clark County. Groundwater samples were collected for TCE from three Troutdale aquifer wells, including the

Bennett private well, during the 2019 reporting period. No Troutdale wells were sampled for chromium during the 2019 reporting period.

TCE

During the 2018 reporting period, TCE concentrations were above the 5 µg/L cleanup level in one of the three wells sampled in Spring and Fall 2019, as presented in the following table.

Troutdale Aquifer Well TCE Concentrations, in µg/L

Well	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019
AMW-24	**7.8**	--	**6.9**	--	**6.5**
BENNETT	1.7	--	1.5	--	0.9
MW-33	**5.1**	--	3.9	--	3.6

Notes:
Results shown in **blue bold** exceed the established cleanup level of 5 µg/L.

TCE concentrations in groundwater from well AMW-24 have been consistently decreasing but remain above the cleanup level. The TCE concentration in groundwater from the Bennett private well had historically fluctuated above and below the cleanup level but has remained below since Spring 2016 (Appendix B). The TCE concentration in Troutdale well MW-33 dropped below the cleanup level in Fall 2018 for the first time since monitoring began in Spring 1998 and remained below the cleanup level in Fall 2019.

4.3.4 Other Detected VOCs

In addition to TCE, several other VOCs were detected at the Site. Routinely detected other VOCs include: tetrachloroethene; trichlorofluoromethane; 1,1,1-trichloroethane; 1,1-dichloroethene (DCE); bromodichloromethane (BDCM); and cis-1,2-DCE (Table 2). Vinyl chloride and trans-1,2-DCE were also detected in a few wells in both spring and fall events. Analytical data can be found in the Groundwater and Progress Reports (EA 2019e, 2020).

Detected concentrations of 1,1-DCE exceeded the 1.0 µg/L site-specific cleanup level, as established in the ROD (EPA 2000), in 3 of 19 groundwater samples analyzed for VOCs during the Spring 2019 event, and 5 of the 54 groundwater samples analyzed for VOCs during the Fall 2019 event (EA 2019e, 2020). All wells with 1,1-DCE concentrations above the cleanup level were alluvial aquifer wells. All of these wells are in the Intermediate well group, where the highest TCE concentrations remain, with the exception of one (well MW-23D) which is a Northern Plume well. Other VOCs detected in samples from Site wells during the reporting period were at concentrations well below site-specific cleanup levels. Analytical results for all VOCs analyzed are provided in the Progress and Groundwater Monitoring Reports (EA 2019e, 2020).

5. OTHER ACTIVITIES

During the 2019 reporting period, the following other activities were performed.

5.1 Easement Agreements and Restrictive Covenants

EA, on behalf of Messer, has pursued easement agreements and restrictive covenants for non-Messer owned properties, as required by Sections 25 and 26 of the CD (EPA 2007). Properties which include Site infrastructure but for which Messer has been unable to negotiate easement agreements include the following:

Easement Agreements Needed

Property Owner	Parcel Number	Reason Agreement Needed
Clark County	144505-000 and various un-numbered	Wells, vaults, pipelines
Gaither Family II LLC	144492-000	Well CPU-12
Holtgrieve Estate	144718-000	Wells, vaults, pipelines
Xylem LLC	099630-000	Well MW-33

Further progress toward gaining easement agreements and restrictive covenants from non-responsive property owners is pending EPA assistance. Lack of an access agreement or restrictive covenant has not been impacting work at the Site.

5.2 In-Situ Testing/Treatment

Phase IIA of full scale in-situ treatment injections were conducted 9 September through 17 October 2019 using PeroxyChem EHC Plus® in a downgradient trough portion of the plume. Approximately 61,920 lbs of the slurry were injected into five permeable reactive zones. Performance monitoring of Phase IIA has been performed by sample collection in select wells and will be reported in a separate in-situ treatment report. Phase IIB of injections will be performed in 2020 and are proposed to start on 27 April 2020. They will include additional injections further downgradient of the Phase IIA injections using additional PeroxyChem EHC Plus® in three permeable reactive zones, as well as within the OU-2 area using Regenesis PlumeStop® in five permeable reactive zones.

5.3 Sustainability Practices

Messer and EA have a commitment to sustainable practices. In the office and in the field, attempts are made to reduce, reuse, and recycle whenever possible. In addition, the following monitoring and O&M activities are in place:

- Using PDBs or dedicated pumps for groundwater sampling wherever possible to eliminate the use of disposable tubing and decontamination solutions.

- Upgrading the groundwater treatment system to minimize energy usage by using variable frequency drives and smaller pumps, optimizing water flow to minimize head loss, removing redundant tanks (and pumps), and replacing air stripper packing.
- Using the infiltration gallery to discharge treated groundwater from the OU-3 treatment system back into the alluvial aquifer instead of to the sanitary sewer, eliminating the processing of millions of gallons per year of clean water through the city sewage treatment plant.

6. ANNUAL ASSESSMENT OF GROUNDWATER SAMPLING

This section summarizes the annual assessment of the groundwater sampling results and sampling frequency for the Site. The purpose of this assessment is to determine if any changes should be made to the current system operations and/or well monitoring schedule. To this end, the assessment includes two primary tasks: (1) evaluation of the status of wells included in the Closure Monitoring Program, specifically with regards to progress toward completion of remediation and attainment monitoring; and (2) evaluation of recommended changes to the well sampling frequencies.

6.1 Evaluation of Closure Monitoring Wells

The procedures used to evaluate groundwater monitoring data for wells included in the Closure Monitoring Program are based on the Site closure requirements described in the Closure Plan, Revision 3 for the Site (EA 2018a), which incorporates EPA suggestions and recent EPA guidance, as discussed below.

As described in the Closure Plan, approved by EPA on 27 February 2018, Site closure will occur when the concentrations of all Site COCs in groundwater monitoring and extraction wells included in the Closure Monitoring Program have reached the Site-specific cleanup levels, as defined in the ROD (EA 2000). The following EPA guidance documents were used to develop the procedures in the Closure Plan to determine when the groundwater cleanup levels have been achieved:

- *Recommended Approach for Evaluating Completion of Groundwater Restoration Remedial Actions at a Groundwater Monitoring Well* (EPA 2014)
- *Guidance for Evaluating Completion of Groundwater Restoration Remedial Actions* (EPA 2013).

Site closure will occur in two phases: (1) remediation monitoring will be performed to determine when remediation is complete (Section 6.1.1); and (2) attainment monitoring will be performed to confirm COC concentrations are expected to remain below the cleanup levels in the future (Section 6.1.2). The Site will be closed once all Closure Monitoring Program wells have reached attainment for all COCs.

Table 4 lists the wells included in the Closure Monitoring Program for the Site, as presented in the Closure Plan (EA 2018a). Wells excluded from closure monitoring are listed in Appendix C-1. Excluded wells include wells that have never had COC concentrations greater than the cleanup levels and wells impacted by the Northern Plume.

The sections below present the results of annual screening to evaluate whether VOCs and/or chromium concentrations in groundwater from Closure Monitoring Program wells at the Site have met the requirements for remediation monitoring complete and/or attainment monitoring complete.

6.1.1 Remediation Monitoring Phase

The remediation monitoring phase refers to the phase of the remedy where remedial activities are being implemented to reach groundwater cleanup levels. Once the cleanup levels have been met decisions can be made regarding shutting off pumps in nearby extraction wells, in preparation for attainment monitoring.

The most recent four data points from each Closure Monitoring Program well were evaluated to assess whether remediation monitoring is complete for each COC in each well, in accordance with the Closure Plan (EA 2018a) and EPA guidance (EPA 2014). Remediation monitoring is considered complete for wells where all COCs have been either non-detect or reported at levels below the cleanup levels for the most recent four consecutive sampling events. These wells may be considered for decreased sampling frequency.

If certain COCs meet their cleanup levels during four consecutive sampling events in a given well but other COCs are reported at concentrations above cleanup levels during one or more of the four sampling events, then remediation monitoring is considered complete for the COCs that have been below cleanup levels for four events. A decision may be made to remove the COCs that are below the cleanup levels from the monitoring program for wells fitting this scenario.

Factors used in evaluating the status of the closure monitoring wells are presented in Table 2. In the table, wells are presented by well groupings (as presented in Section 4.1) to demonstrate what is happening in specific areas of the plume. Columns titled “Remediation Monitoring Phase Complete?” in Table 2 show the results of the analysis based on the most recent four data points for TCE, all VOCs, and chromium. Columns titled “Never Exceeded Cleanup Level?” indicate wells where no exceedance has been reported for VOCs or for chromium. Generally, COCs that have never exceeded cleanup levels in a well are excluded from the Closure Monitoring Program.

Summary data are provided in Table 2 for TCE and chromium, the primary COCs at the Site. However, as indicated in the table, for a few wells, remediation monitoring is incomplete due to other VOCs reported at concentrations exceeding cleanup levels. Specifically, well AMW-4A in OU-2 has completed remediation monitoring for TCE but had exceedances of the cleanup levels for BDCM. Data for the other Site COCs are included in Appendix C-2.

Closure Monitoring Program wells that are currently undergoing remediation monitoring and wells for which remediation monitoring is complete are shown on Table 4 and Figures 12 and 13 for VOCs and chromium, respectively. Note that wells classified as “Remediation Phase Complete” (yellow-shaded) on the figures are not yet ready for attainment monitoring, due to continued groundwater extraction nearby, and therefore are not yet included as part of the attainment monitoring program.

Per the Closure Plan, more than four data points may be required to document the completion of remediation monitoring in some cases, if statistical analysis is required to evaluate a mixture of COC concentrations above and below the cleanup levels from recent sampling events. However,

statistical analysis was not performed as part of this annual assessment. Rather, wells with any exceedances of the cleanup level over the last four sampling events were considered, for the purposes of this assessment, to require additional remediation monitoring.

6.1.2 Attainment Monitoring Phase

The attainment monitoring phase is intended to confirm that COC concentrations will remain at or below the cleanup levels in the future. In accordance with EPA guidance, the attainment monitoring phase for each well will not begin until after the remediation monitoring phase is complete for the well and the groundwater in the vicinity is in steady state conditions.

Table 4 summarizes which of the closure monitoring wells/COCs currently meet the requirements for the initiation of attainment monitoring: (1) remediation monitoring is complete and (2) steady state conditions are present near the well (i.e., no pumping from extraction wells in the area has occurred for at least one month, or no impact from the Messer infiltration gallery[c]).

Cleanup attainment will be measured using eight data points, in accordance with EPA guidance (EPA 2014). As with the remediation monitoring, the attainment monitoring phase evaluation is conducted separately for each COC at each well. If the eight consecutive attainment monitoring results are either non-detect or below the cleanup level for one or more COCs in a given well, then attainment monitoring will be considered complete for that well/COC(s).

For wells that are ready for attainment monitoring, Table 5 provides a summary of their status, based on an evaluation of VOC and chromium concentrations reported from the last eight sampling events. This evaluation indicates that 11 wells meet the requirements for attainment monitoring complete for both VOCs and chromium (or are excluded from closure monitoring for one of the COCs). For the private well Bennett and AMW-27 attainment monitoring is almost complete for TCE and for AMW-3A attainment monitoring for VOCs has just begun.

Closure Monitoring Program wells that are currently undergoing attainment monitoring and wells for which attainment monitoring is complete are shown on Table 5 and Figures 12 and 13 for VOCs and chromium, respectively.

Similar to remediation monitoring, statistical analysis may be used to assess completion of attainment monitoring; however, no statistical analyses were conducted for this report.

6.2 Evaluation of Sampling Frequency

As part of the annual assessment, the current sampling frequency for each well is evaluated and, if appropriate, revised. When proposing a revised sampling frequency for a well, the following factors were considered: the current sampling frequency; the use of the well at the Site; and, for

[c] Impact from the infiltration gallery is defined by the alluvial aquifer contours, which currently indicates impacts from infiltration gallery cease at the western property boundary. With further reductions in the volume of water being sent to the infiltration gallery, these impacts will be reassessed in 2020.

closure monitoring wells, whether remediation monitoring and/or attainment monitoring is complete for VOCs and/or chromium. These factors are summarized in Table 2. Additionally, a review of graphs of historical TCE and chromium concentrations in each well sampled during 2019 (presented in Appendices A and B) was performed during the evaluation of recommended sampling frequencies for 2020.

Wells to be sampled in 2020 are included on Figure 14. Recommended sampling frequencies for 2020 are included in Table 2 and summarized in Table 6. Factors that may yield recommended changes in sampling frequency for Closure Monitoring Program wells include the following:

- In most cases, sampling from monitoring wells that meet the requirements for remediation but not attainment monitoring complete for VOCs and/or chromium will be temporarily discontinued, until attenuation monitoring begins for each well. The designation for these wells is "On Hold" to signify that sampling of these wells for attenuation monitoring will occur in future years. These wells will remain available for future sampling, if needed, and then for attainment monitoring.
- Some active extraction wells also meet the requirements for remediation monitoring complete for VOCs and/or chromium. In cases where COC concentrations in these extraction wells are stable below the cleanup levels and semiannual monitoring is not required for other purposes, the sampling frequency is recommended to be decreased from semiannual to annual for the COCs reported at concentrations below cleanup levels.
- Wells for which attainment monitoring is complete and for which sampling is not required for other purposes are designated for NFS, as no further sampling of these wells is recommended.

Generally, changes in sampling frequency are not recommended for Northern Plume wells or infiltration gallery wells. Four infiltration gallery wells are sampled biennially. Five Northern Plume wells are monitored semiannually for VOCs, and one additional well (AMW-23) is sampled annually for VOCs to monitor the approach of the Northern Plume (Tables 2 and 6).

Several changes to monitoring frequencies were recommended this year. Specifically, remediation monitoring for VOCs is complete at wells AMW-3A and MW-40, therefore sampling is on hold in 2020. Sampling at wells MW-3C, MW-4C, MW-6C, and MW-6D is "On Hold" for both VOC and chromium sampling in 2020, as remediation monitoring is complete. Concentrations for both VOC and chromium are below their respective cleanup levels, but the wells are "On Hold" since they are located in an area of active pumping or are impacted by infiltration from the infiltration gallery. Per the Closure Plan, attainment monitoring will commence when post remediation steady state conditions have exited for at least a month (EA 2018a).

Sampling frequency is recommended to be increased to semiannually in wells AMW-59 and MW-18E, to evaluate the effectiveness of the in-situ remediation activities. Changes to sampling frequencies are recommended based on the results of the annual assessment. Well sampling frequency recommendations for 2020 are provided in Table 2 and summarized in Table 6.

7. RECOMMENDATIONS AND PLANNED ACTIVITIES

The following sections summarize the status of activities recommended for 2019, as well as recommendations and planned activities for 2020.

7.1 Status of Previous Recommendations for 2019

To meet the operating objectives for OU-2 and OU-3, planned activities for 2019 were recommended in the 2018 Annual Status report (EA 2018b). The status of those planned activities is summarized below:

- **Well Sampling** – Wells were sampled in accordance with the updated sampling schedule.
- **Easement Agreements and Restrictive Covenants –** EA continues to request EPA assistance to obtain the required agreements with non-responsive property owners. EA will continue efforts to obtain agreements as opportunities arise.
- **Padden Parkway Business Park –** The Padden Parkway property was sold. The property owner was kept informed of activities on the property during in-situ treatments during 2019. The new owner does not yet have plans for property development, so infrastructure modifications are on hold until plans are in place. The new owner is working with potential property developers and associated infrastructure plans, but a real estate transaction has not yet occurred.
- **In-situ Treatments** – Following completion of the Phase I pilot for in-situ treatment in 2018, a work plan was developed for full scale in-situ treatment in areas of residual contamination and approved by EPA. The first phase of treatments (Phase IIA) was completed 9 September through 17 October 2019, with the second phase proposed to start on 27 April 2020. Further discussion of the in-situ treatments is included in Section 5.2.
- **Northern Plume –** No strategy for closure of OU-3 wells being impacted by the Northern Plume was completed in 2019. A well closure strategy for OU-3 wells that have been impacted by the Northern Plume will be discussed in 202o.

7.2 Recommendations and Planned Activities for 2020

The following activities are planned during the 2020 reporting period:

- **Well Sampling** – Sample wells in accordance with the updated sampling schedule (Table 6).
- **Easement Agreements and Restrictive Covenants –** Continue to request EPA assistance to obtain the required agreements with non-responsive property owners. EA will continue efforts to obtain agreements as opportunities arise.

- **Padden Parkway Business Park –** EA will continue to coordinate monitoring and remedial actions planned on the Padden Parkway property and will stay in communication regarding future development plans.
- **In-Situ Treatments** – Complete in-situ treatment and shut down groundwater extraction and treatment system.
- **Northern Plume –** Work with EPA to develop a strategy for closure of OU-3 wells being impacted by the Northern Plume.

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FIGURES

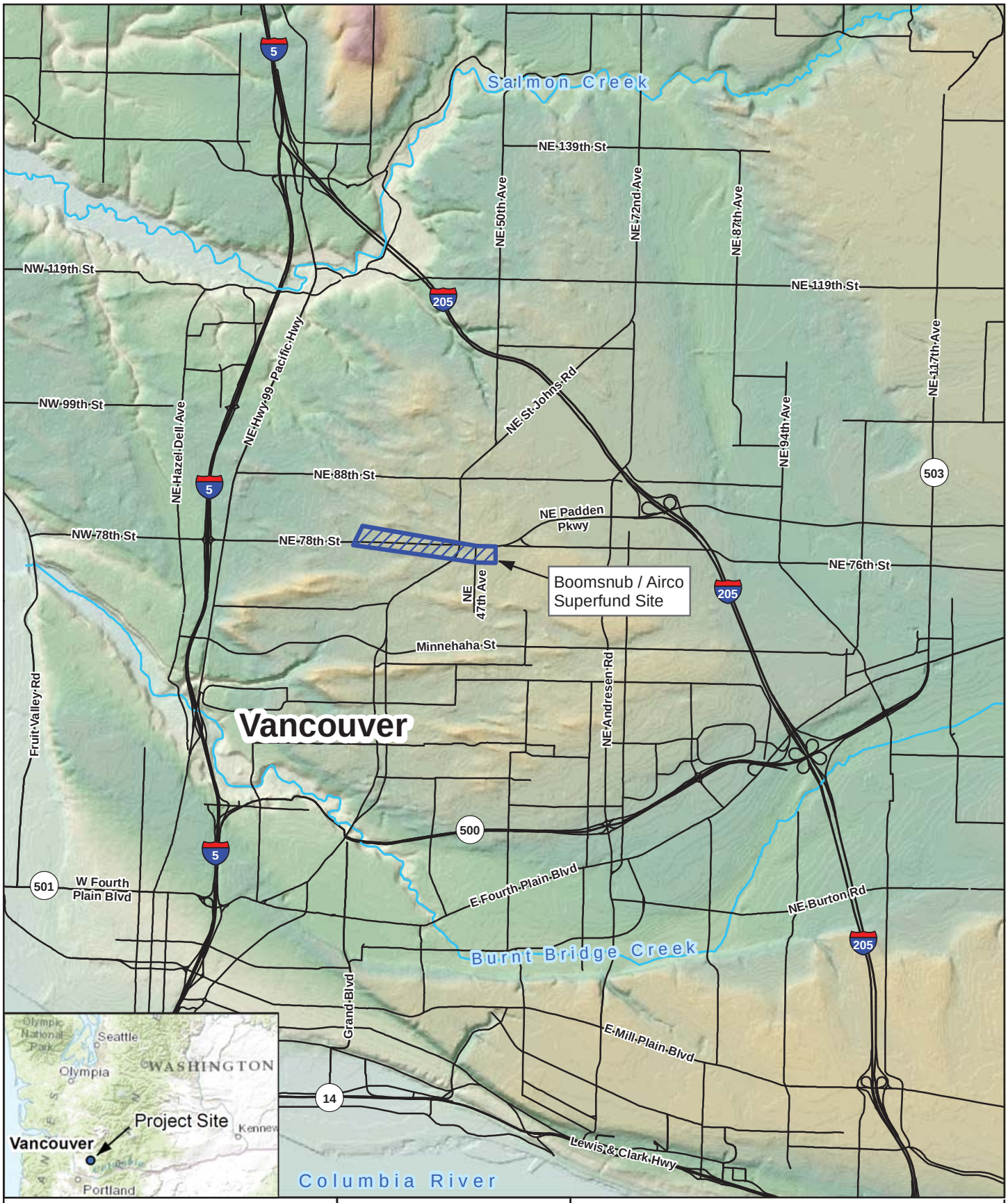

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FIGURE 1
SITE LOCATION MAP

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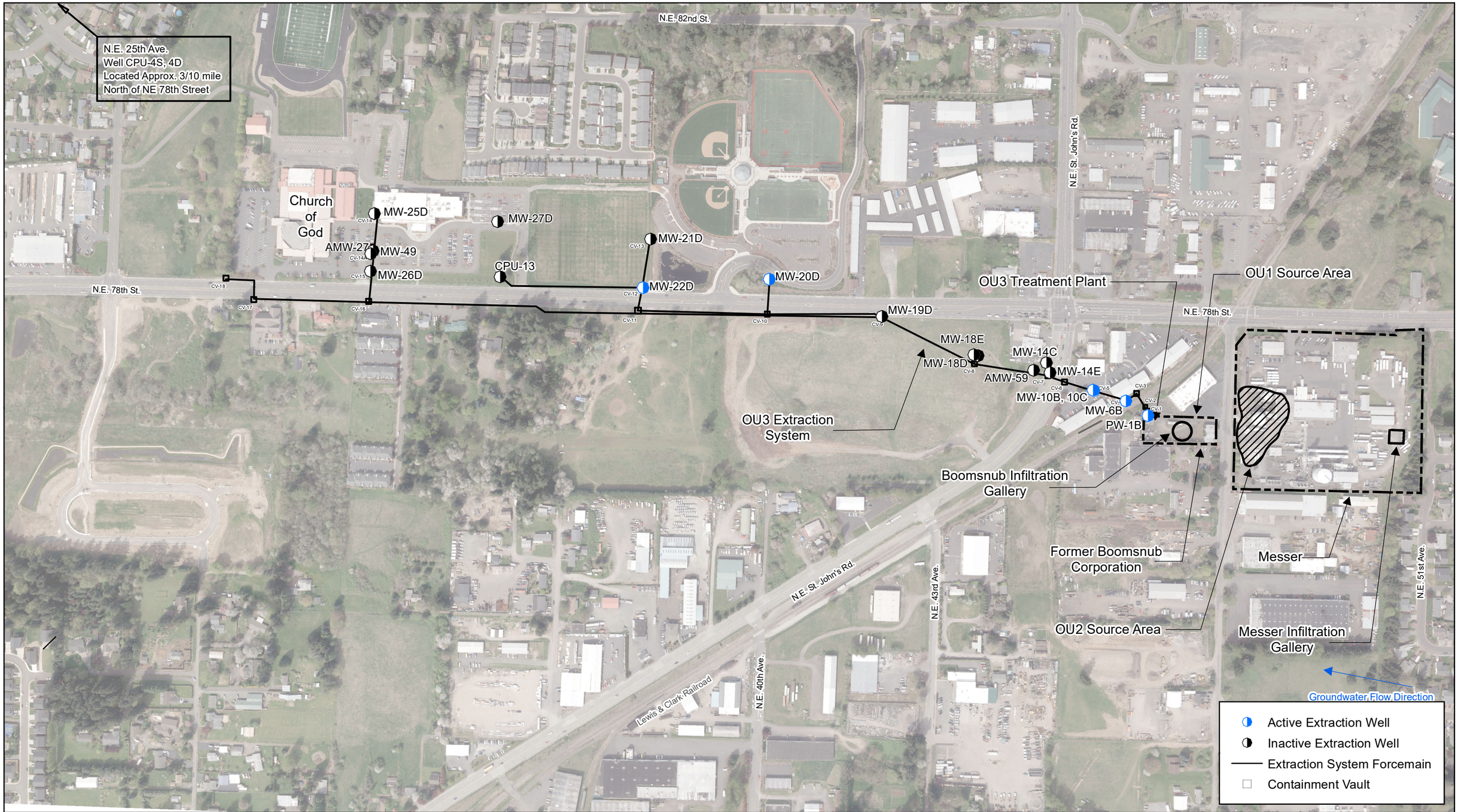

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FIGURE 2
OPERABLE UNITS AND TREATMENT SYSTEM
2019

N.E. 25th Ave.
Well CPU-4S, 4D
Located Approx. 3/10 mile
North of NE 78th Street

N.E. 82nd St.

AMW-23

AMW-43
MW-30
AMW-44
AMW-45
MW-46
MW-47
MW-41
MW-48
AMW-63
AMW-42
MW-36
MW-35
MW-32
MW-31
MW-29
MW-28
CPU-16
MW-37

Church of God

MW-24D
MW-25D
MW-27D
AMW-27
MW-49
AMW-61
MW-26D
CPU-13

AMW-15
AMW-14
MW-23D
MW-21D
MW-22D
AMW-22
AMW-16
AMW-64
AMW-17
MW-20D
AMW-60
MW-38
MW-40
PZ-40
PZ-39, MW-39
MW-19D
MW-15E
MW-17E
MW-18E
MW-18D
MW-16E

N.E. St. John's Rd.

CROCKFORD
AMW-18

PERMALUME
COLUMBIA VET

N.E. 78th St.

CPU-3D
CPU-3S
FERGUSON
HORN
CPU-15
GARRISON
CPU-12
CPU-10
CPU-14
CPU-1S, 1D
CPU-2

EC-1
See Inset 'A'
MW-14C
MW-12C
MW-9C
MW-9B
AMW-59
MW-14E
MW-10B, MW-10C
MW-34
MW-13C
MW-5A, 5B
LV
MW-6A
MW-6B
MW-6C
MW-6D
MW-33

AMW-62

GRIMM
ZENT
BENNETT
AMW-24

Former Boomsnub Corporation
Messer
Messer Infiltration Gallery

N.E. 43rd Ave.
N.E. 51st Ave.

COLF
FITZGERALD
Groundwater Flow Direction
Alluvial Aquifer

AMW-51

Lewis & Clark Railroad
N.E. 40th Ave.

Inset A

N.E. 47th Ave.
N.E. 51st Ave.

AMW-4A
AMW-25
AMW-9A
AMW-5A
AMW-8A
AMW-13A
MW-8B
AMW-52A
AMW-52C
MW-4A
MW-4B
MW-4BSHED
MW-4C
IWS-8S
IWS-8D
AMW-26
AMW-10A
AMW-53A
AMW-53B
AMW-53C
AMW-1A
AMW-1C
AMW-1B
PZ-2
PW-1B
GP-05
GP-01
MW-1A
MW-7B
MW-7C
AMW-58
MW-1B
MW-1C
GWSW-1
AMW-2B
AMW-2A
RAMW-2C
MW-11A, 11B
GWSW-2
AMW-50
AMW-54A
AMW-54C
MW-3A
MW-3B
MW-3C
AMW-56C
AMW-12A
AMW-19A
AMW-56A
AMW-11A
AMW-19B
MW-2A
MW-2B
MW-2C
AMW-55G
AMW-55A
IWS-2S
AMW-20
AMW-7A
PZ-1
AMW-57
AMW-3A
AMW-21
AMW-6A

Monitoring Well Sampled in 2019
Active Extraction Well Sampled in 2019
Inactive Extraction Well Sampled in 2019
Private Well Sampled in 2019
Temporary Monitoring Well Sampled in 2019
Abandoned Monitoring Well
Monitoring Well
Inactive Extraction Well
Private Well
Screened in Troutdale Aquifer
Containment Vaults
Extraction System Forcemain

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FIGURE 3
MONITORING AND EXTRACTION WELL NETWORK

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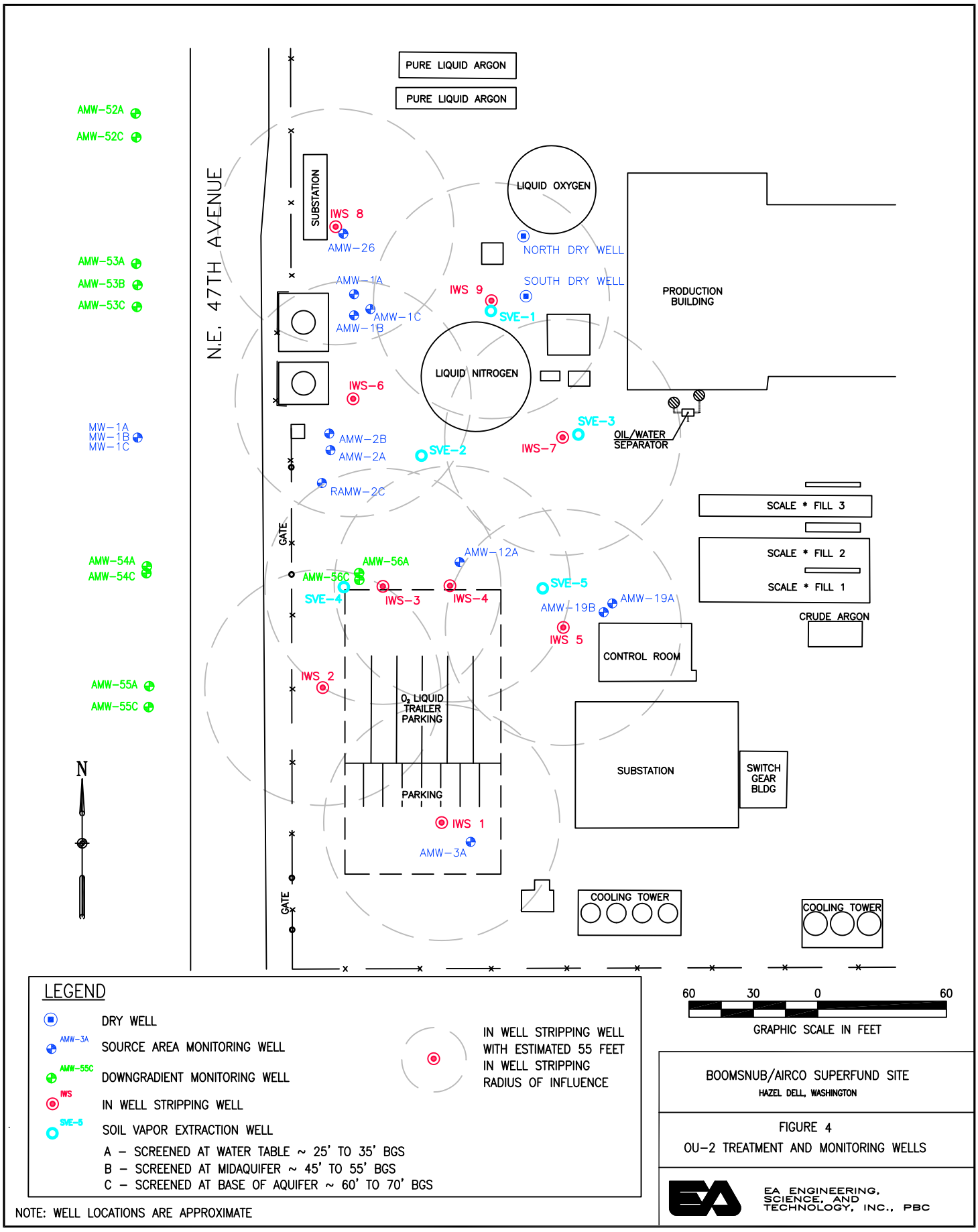

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FIGURE 4
OU-2 TREATMENT AND MONITORING WELLS

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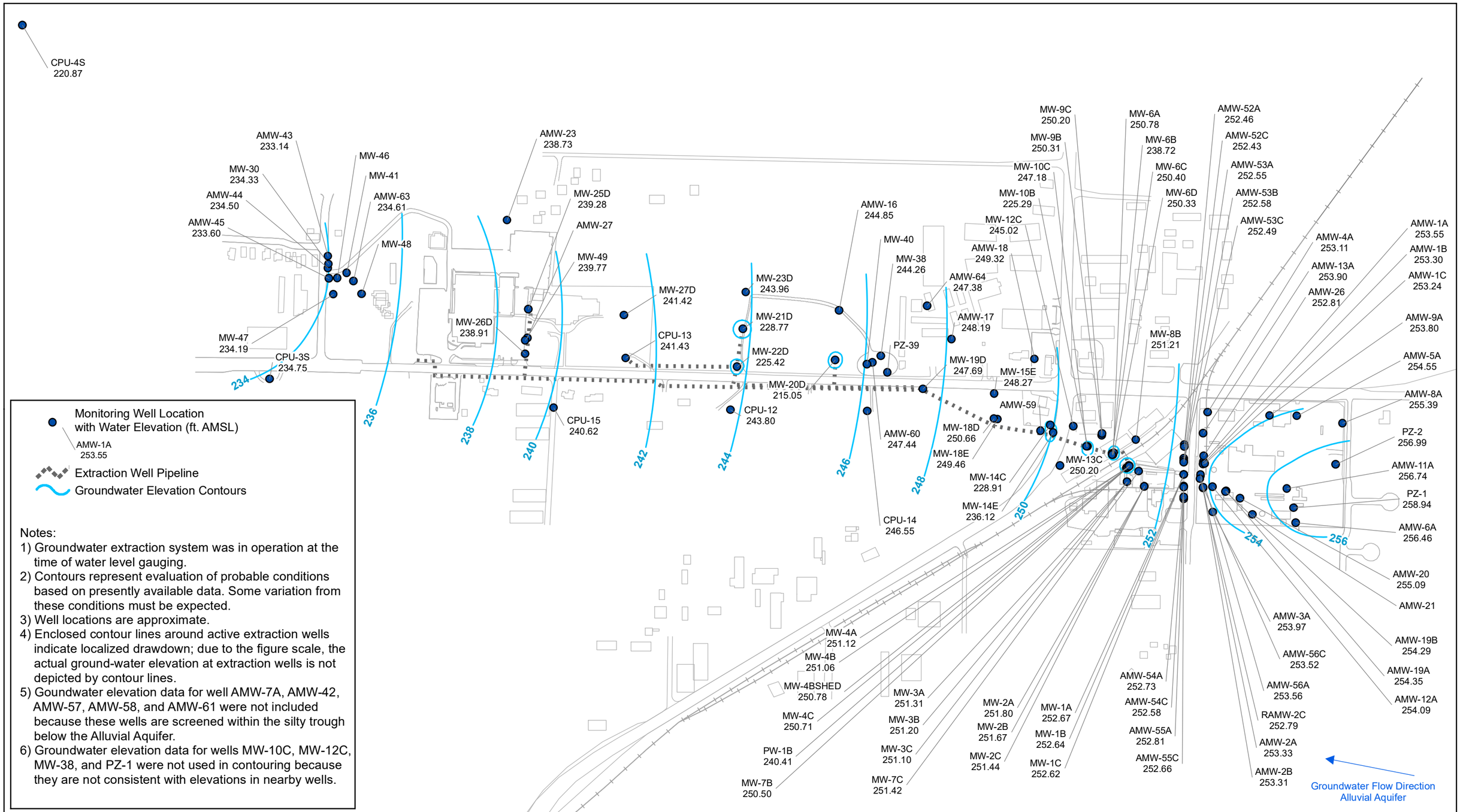

Monitoring Well Location with Water Elevation (ft. AMSL)

AMW-1A
253.55

Extraction Well Pipeline

Groundwater Elevation Contours

Notes:

1) Groundwater extraction system was in operation at the time of water level gauging.
2) Contours represent evaluation of probable conditions based on presently available data. Some variation from these conditions must be expected.
3) Well locations are approximate.
4) Enclosed contour lines around active extraction wells indicate localized drawdown; due to the figure scale, the actual ground-water elevation at extraction wells is not depicted by contour lines.
5) Goundwater elevation data for well AMW-7A, AMW-42, AMW-57, AMW-58, and AMW-61 were not included because these wells are screened within the silty trough below the Alluvial Aquifer.
6) Groundwater elevation data for wells MW-10C, MW-12C, MW-38, and PZ-1 were not used in contouring because they are not consistent with elevations in nearby wells.

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FIGURE 5
ALLUVIAL AQUIFER GROUNDWATER CONTOURS
FALL 2019

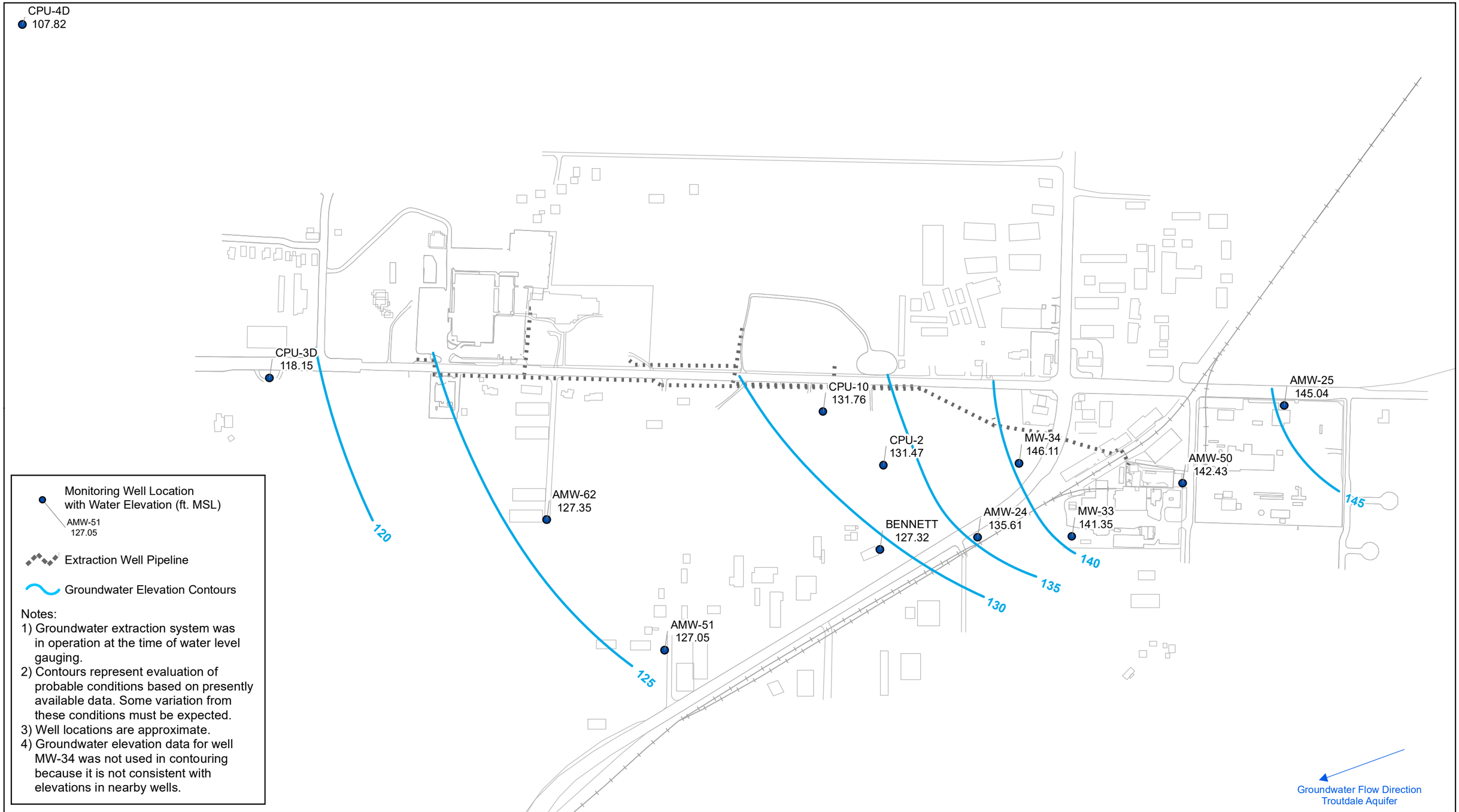

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FIGURE 6
TROUTDALE AQUIFER GROUNDWATER CONTOURS
FALL 2019

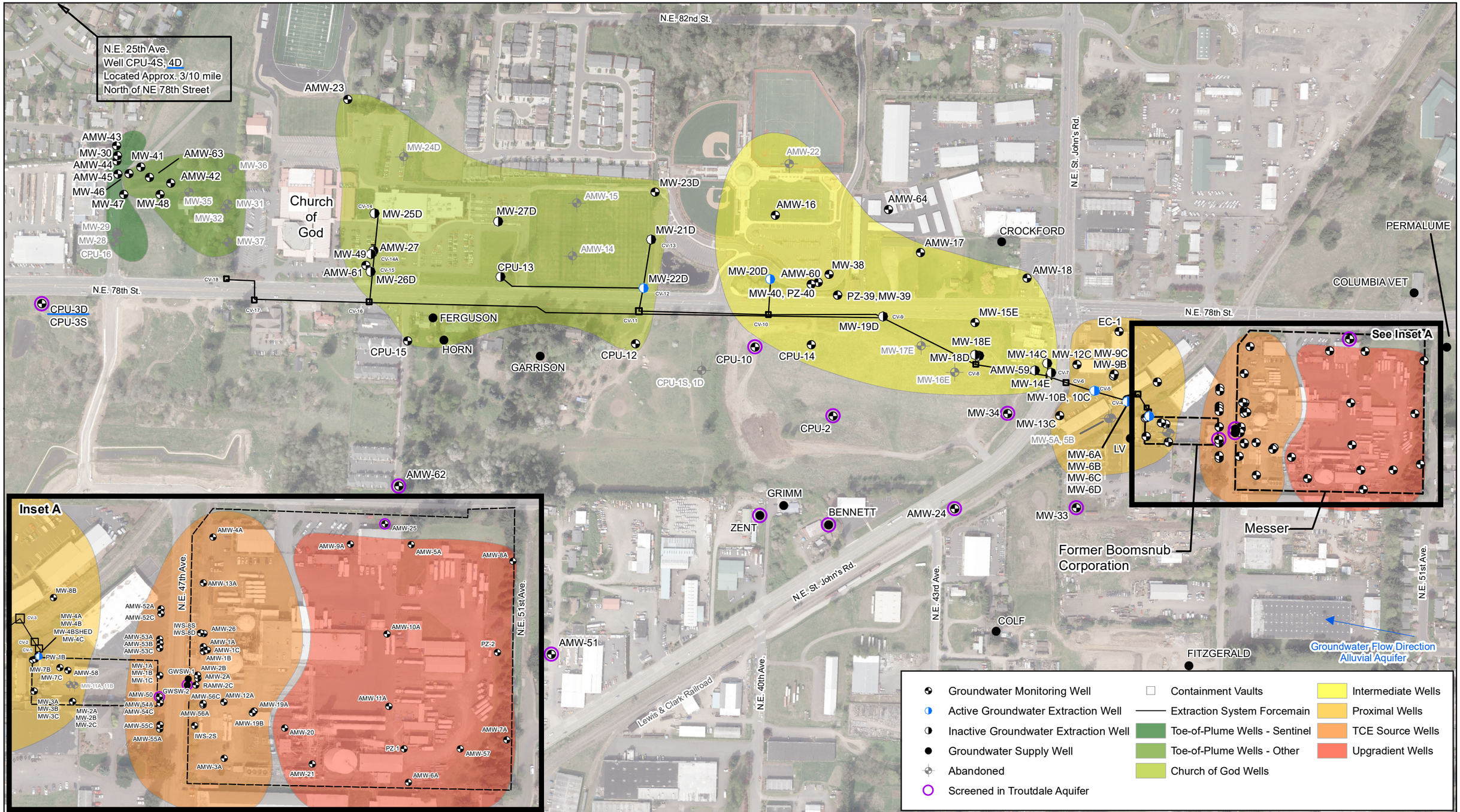

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FIGURE 7
EXTRACTION AND MONITORING
WELL GROUPINGS

1995

2019

Groundwater Flow Direction
Alluvial Aquifer

Extraction Well Pipeline

Chromium Concentration Contours

- 80 - 250 µg/L
- 250 - 500 µg/L
- 500 - 1,500 µg/L
- 1,500 - 5,000 µg/L
- 5,000 - 10,000 µg/L
- 10,000 - 20,000 µg/L
- >20,000 µg/L

Note:
Contours represent evaluation of probable conditions based on presently available data. Some variations from these conditions must be expected.

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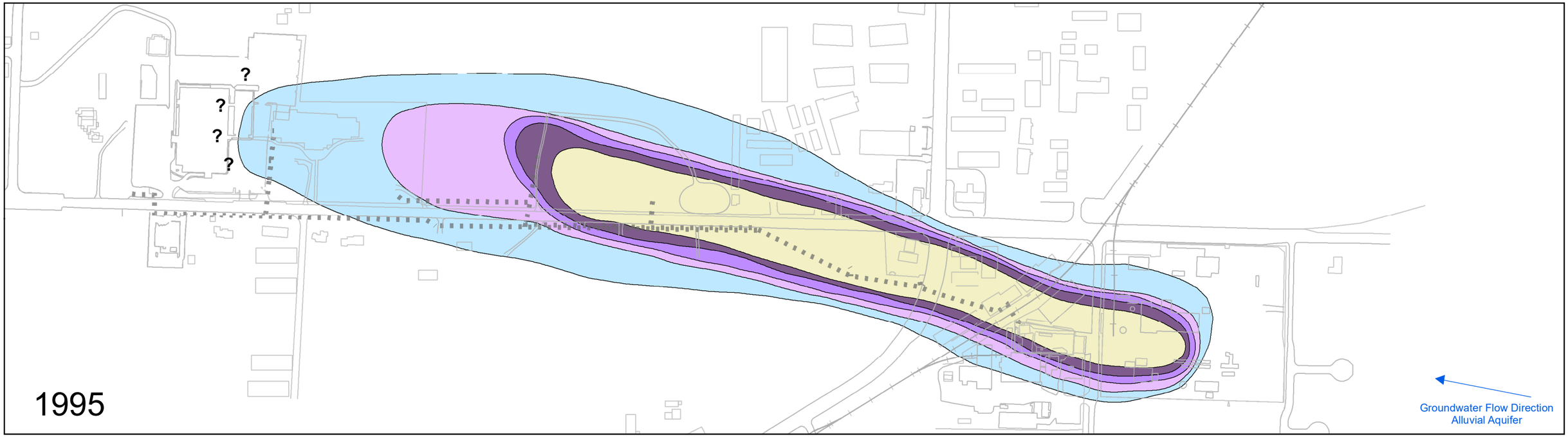
FIGURE 8
CHROMIUM PLUME COMPARISON
1995 VS. 2019



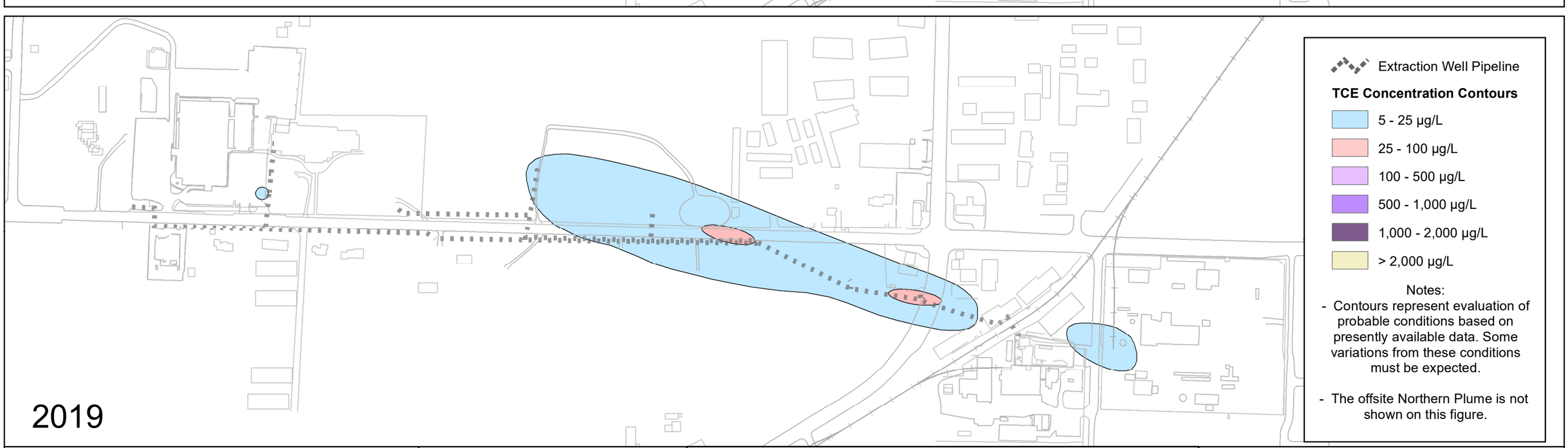


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FIGURE 9
TRICHLOROETHENE PLUME COMPARISON
1995 VS. 2019

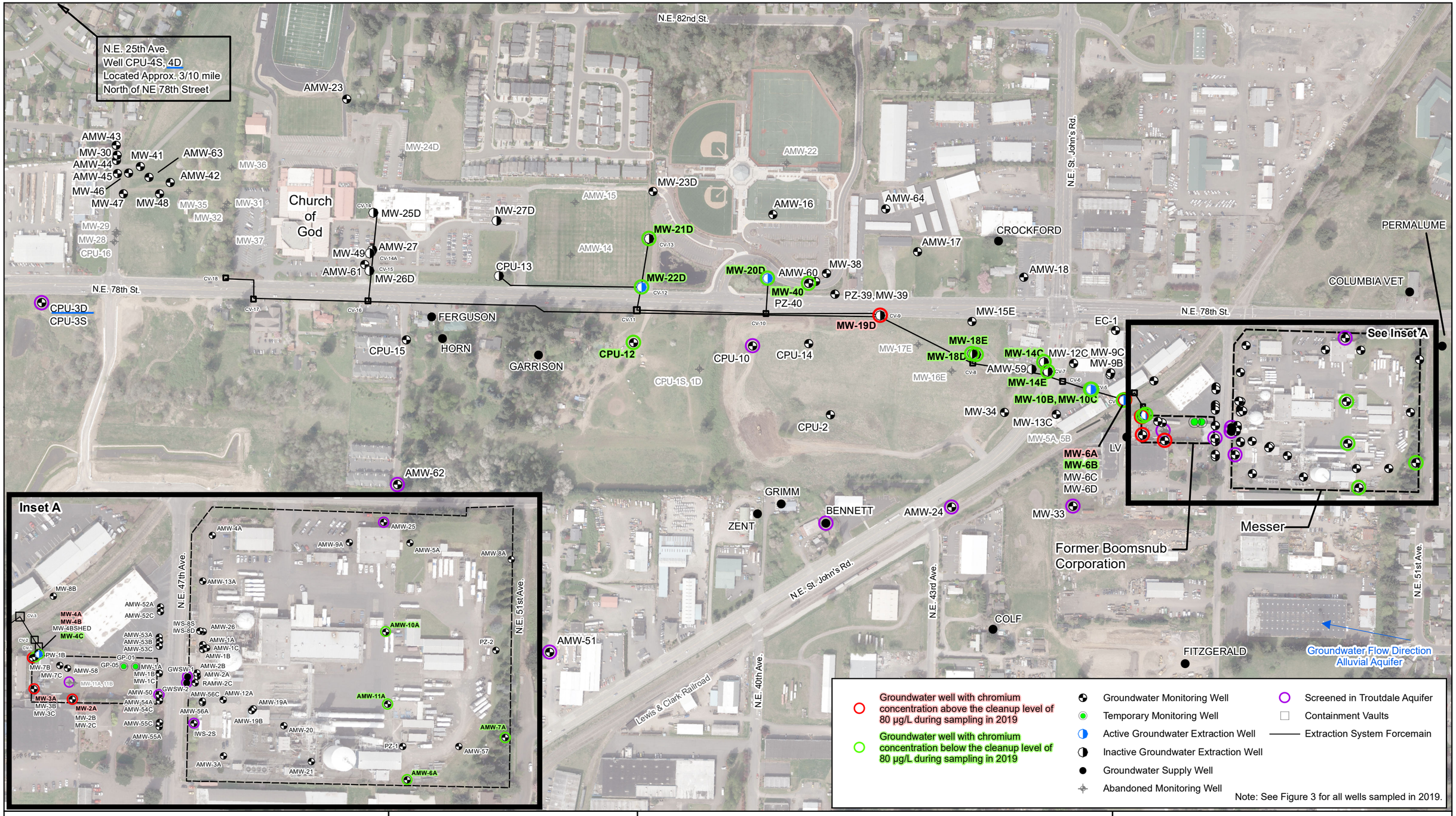

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FIGURE 10
WELLS WITH CHROMIUM CONCENTRATIONS ABOVE THE CLEANUP LEVEL IN 2019

N.E. 25th Ave.
Well CPU-4S, 4D
Located Approx. 3/10 mile
North of NE 78th Street

N.E. 82nd St.
N.E. St. John's Rd.
N.E. 78th St.
N.E. 47th Ave.
N.E. 51st Ave.
N.E. 43rd Ave.
N.E. 40th Ave.
Lewis & Clark Railroad
N.E. 51st Ave.

AMW-23
AMW-43
MW-30
MW-41
AMW-63
AMW-44
AMW-45
AMW-42
MW-46
MW-47
MW-48
MW-24D
MW-36
MW-35
MW-31
MW-32
MW-29
MW-28
CPU-16
MW-37
Church of God
MW-25D
MW-27D
AMW-27
MW-49
AMW-61
MW-26D
CPU-13
AMW-15
AMW-14
MW-23D
MW-21D
MW-22D
AMW-22
AMW-16
AMW-64
AMW-17
CROCKFORD
AMW-18
MW-20D
AMW-60
MW-38
MW-40
PZ-40
PZ-39, MW-39
MW-19D
MW-15E
MW-18E
MW-18D
MW-17E
MW-16E
MW-14C
MW-12C
MW-9C
MW-9B
AMW-59
MW-14E
MW-10B, MW-10C
MW-34
MW-13C
MW-5A, 5B
EC-1
LV
MW-6A
MW-6B
MW-6C
MW-6D
MW-33
PERMALUME
COLUMBIA VET
See Inset 'A'
Messer
Former Boomsnub Corporation
CPU-3D
CPU-3S
FERGUSON
HORN
CPU-15
GARRISON
CPU-12
CPU-10
CPU-14
CPU-1S, 1D
CPU-2
AMW-62
GRIMM
ZENT
BENNETT
AMW-24
COLF
FITZGERALD
AMW-51
Groundwater Flow Direction
Alluvial Aquifer

Inset A
AMW-4A
AMW-25
AMW-9A
AMW-5A
AMW-8A
AMW-13A
MW-8B
AMW-52A
AMW-52C
IWS-8S
IWS-8D
AMW-26
AMW-10A
MW-4A
MW-4B
MW-4BSHED
NW-4C
AMW-53A
AMW-53B
AMW-53C
AMW-1A
AMW-1C
AMW-1B
PZ-2
PW-1B
GP-01
GP-05
MW-1A
MW-1B
MW-1C
GWSW-1
AMW-2B
AMW-2A
RAMW-2C
MW-7B
MW-7C
AMW-58
MW-11A, 11B
GWSW-2
AMW-50
AMW-56C
AMW-12A
AMW-19A
MW-3A
MW-3B
MW-3C
AMW-54A
AMW-54C
MW-2A
MW-2B
MW-2C
AMW-56A
AMW-19B
AMW-11A
AMW-55G
AMW-55A
IWS-2S
AMW-20
AMW-7A
PZ-1
AMW-57
AMW-3A
AMW-21
AMW-6A

Groundwater Well with TCE concentration above the cleanup level of 5 µg/L during sampling in 2019
Groundwater Well with TCE concentration below the cleanup level of 5 µg/L during sampling in 2019

Groundwater Monitoring Well
Temporary Monitoring Well
Active Groundwater Extraction Well
Inactive Groundwater Extraction Well
Groundwater Supply Well
Abandoned Monitoring Well
Screened in Troutdale Aquifer
Containment Vaults
Extraction System Forcemain

Note: See Figure 3 for all wells sampled in 2019.

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FIGURE 11
WELLS WITH TCE CONCENTRATIONS
ABOVE THE CLEANUP LEVEL IN 2019

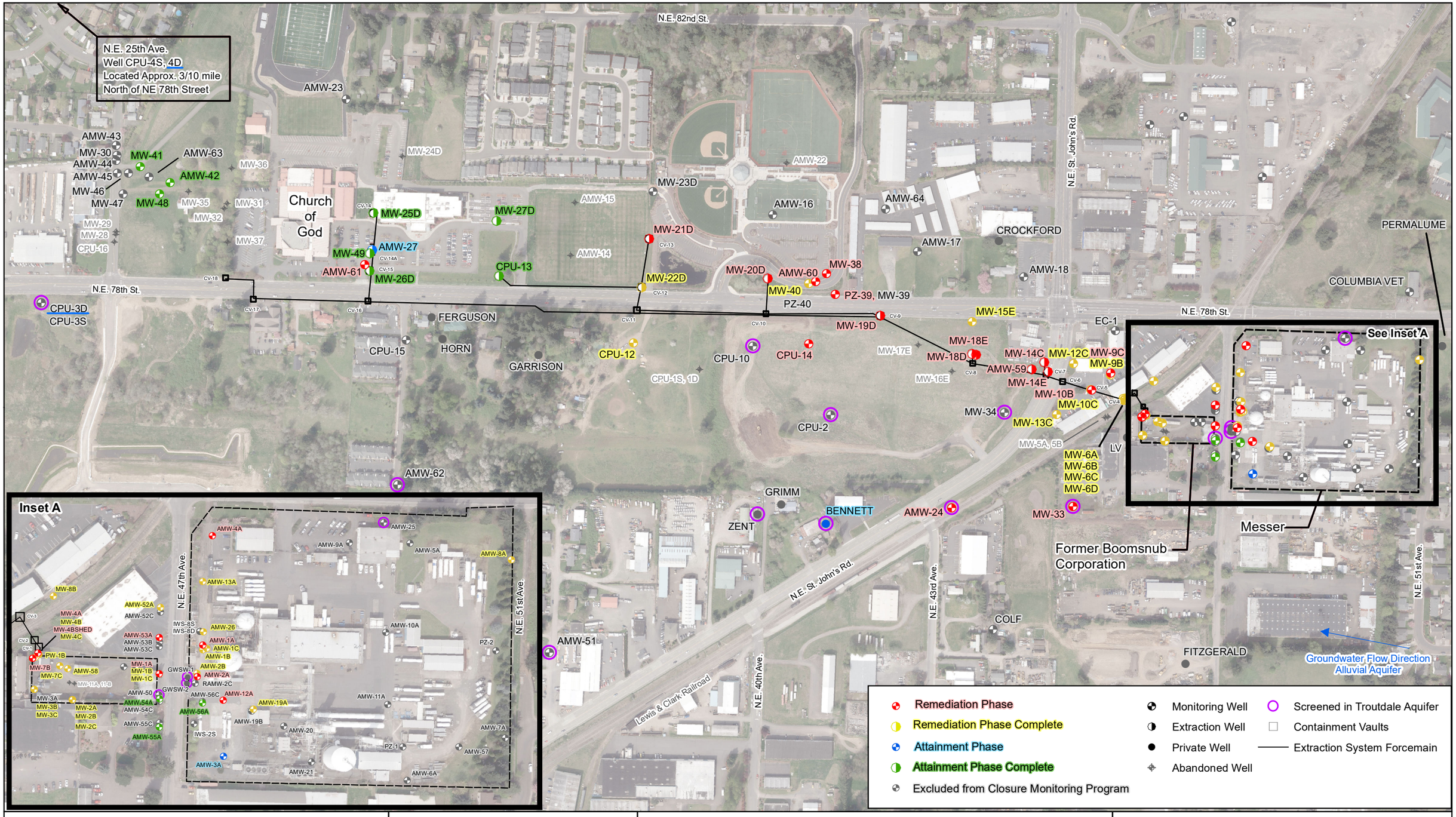

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FIGURE 12
STATUS OF CLOSURE MONITORING PROGRAM
VOLATILE ORGANIC COMPOUNDS

N.E. 25th Ave.
Well CPU-4S, 4D
Located Approx. 3/10 mile
North of NE 78th Street

N.E. 82nd St.

AMW-23
AMW-43
MW-30
AMW-44
AMW-45
MW-46
MW-47
MW-41
AMW-63
AMW-42
MW-48
MW-36
MW-35
MW-31
MW-32
MW-24D
MW-29
MW-28
CPU-16
MW-37
Church of God
CV-14
MW-25D
MW-27D
MW-49
AMW-27
CV-14A
AMW-61
CV-15
MW-26D
CPU-13
AMW-15
AMW-14
MW-23D
AMW-22
MW-21D
CV-13
MW-22D
CV-12
MW-20D
AMW-60
MW-40
MW-38
PZ-39, MW-39
PZ-40
AMW-16
AMW-64
AMW-17
CROCKFORD
AMW-18
N.E. St. John's Rd.
PERMALUME
COLUMBIA VET
N.E. 78th St.
CV-18
CV-17
CV-16
CV-11
CV-10
CV-9
CPU-3D
CPU-3S
FERGUSON
HORN
CPU-15
GARRISON
CPU-12
CPU-10
CPU-14
CPU-1S, 1D
MW-19D
MW-15E
MW-18E
MW-18D
MW-17E
MW-16E
CV-8
AMW-59
MW-14C
MW-12C
MW-9C
MW-9B
CV-7
CV-6
CV-5
CV-4
MW-14E
MW-10B
MW-10C
MW-34
MW-13C
CPU-2
MW-5A, 5B
MW-6A
MW-6B
MW-6C
MW-6D
LV
MW-33
EC-1
See Inset 'A'
Messer
Former Boomsnub Corporation
N.E. 51st Ave.
N.E. 43rd Ave.
N.E. 40th Ave.
COLF
FITZGERALD
Groundwater Flow Direction
Alluvial Aquifer
AMW-62
GRIMM
ZENT
BENNETT
AMW-24
AMW-51
Lewis & Clark Railroad
N.E. St. John's Rd.

Inset A
N.E. 47th Ave.
N.E. 51st Ave.
MW-8B
MW-4A
MW-4B
MW-4BSHED
MW-4C
PW-1B
MW-7B
MW-7C
MW-3A
MW-3B
MW-3C
MW-2A
MW-2B
MW-2C
MW-11A, 11B
AMW-52A
AMW-52C
AMW-53A
AMW-53B
AMW-53C
AMW-58
MW-1A
MW-1B
MW-1C
AMW-50
AMW-54A
AMW-54C
AMW-55C
AMW-55A
GWSW-1
GWSW-2
AMW-4A
AMW-25
AMW-9A
AMW-5A
AMW-8A
AMW-13A
AMW-26
AMW-1A
AMW-1C
AMW-1B
AMW-2B
AMW-2A
RAMW-2C
AMW-56C
AMW-12A
AMW-56A
AMW-19A
AMW-19B
AMW-20
AMW-10A
PZ-2
AMW-11A
PZ-1
AMW-57
AMW-7A
AMW-3A
AMW-21
AMW-6A

Remediation Phase
Remediation Phase Complete
Attainment Phase
Attainment Phase Complete
Excluded from Closure Monitoring Program
Monitoring Well
Extraction Well
Private Well
Abandoned Well
Screened in Troutdale Aquifer
Containment Vaults
Extraction System Forcemain

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FIGURE 13
STATUS OF CLOSURE MONITORING PROGRAM
CHROMIUM

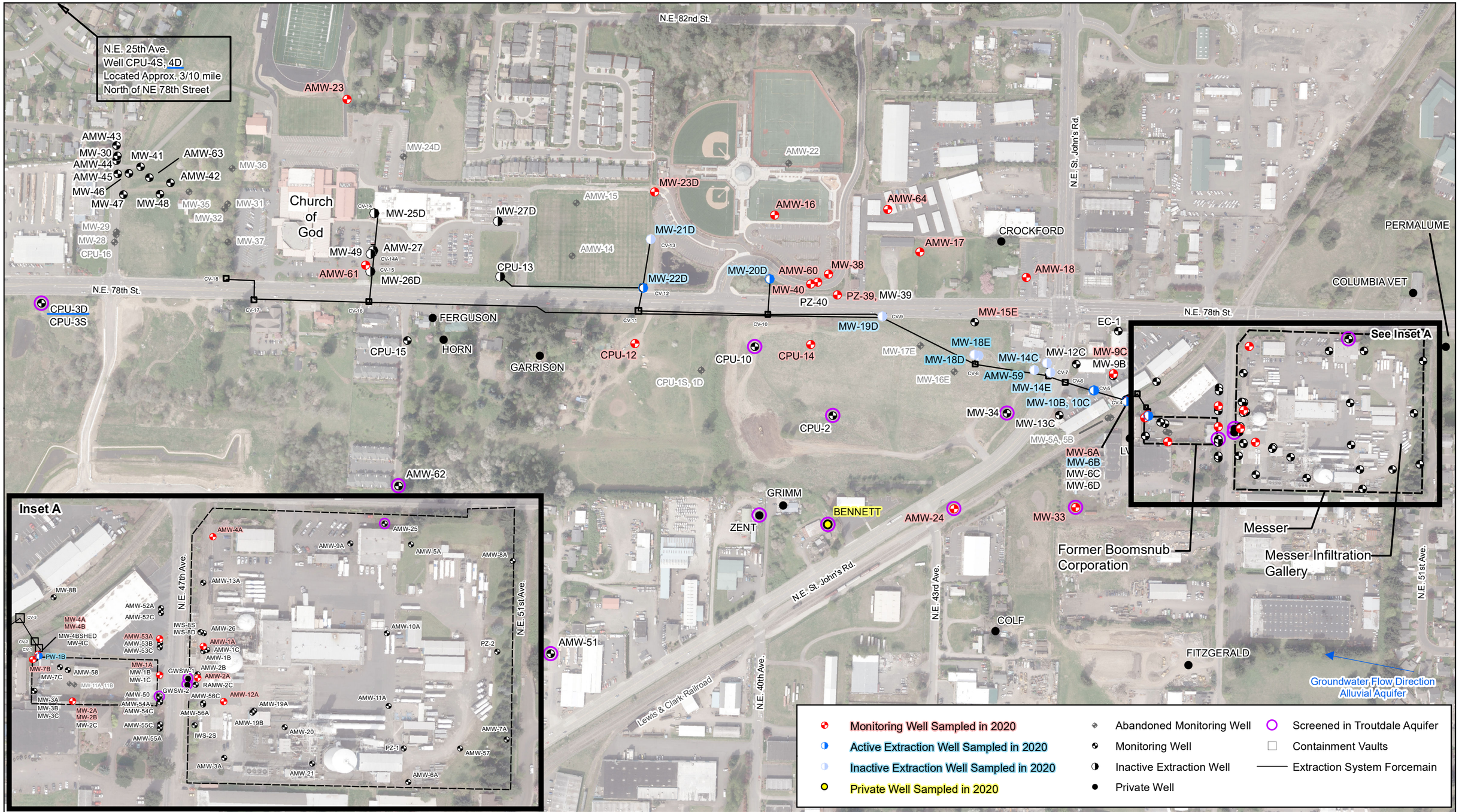

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FIGURE 14
WELLS TO BE SAMPLED IN 2020

Tables

TABLE 1. 2019 EXTRACTION WELL PUMPING RATES

Flow Rates (gpm)												
Well ID	**January**	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**
MW-6B	5.8	6.4	6.4	6.4	6.4	6.2	6.2	6.2	6.2	6.2	6.2	6.2
MW-10B	10	10.2	10.2	10.2	10	10	10	10	10	10	10	10
MW-10C	11.8	11.5	11.5	12	12	12	12	12	12	12	12	12
MW-14C	12.8	13.4	13	13	13	12.8	12.8	12.8	12.8	off	off	off
MW-14E	8	7.8	7.8	7.8	7.8	7.6	7.6	7.6	7.6	off	off	off
MW-19D	8	10	8	8	8	7.6	7.6	7.6	7.6	off	off	off
MW-20D	15	15.1	15.4	15.3	15.3	15	15	15	15	15.4	15.4	15.5
MW-21D	off	off	off	off	off	off	off	off	off	off	off	off
MW-22D	15	16.3	17.4	17.2	17.2	16.5	16.5	16.5	16.5	17.1	17.1	17.2
PW-1B	11.8	11.3	11.2	11.2	11.1	11.1	11.1	11.2	11.5	11.2	11.2	11.2
Total	**98.2**	**102**	**100.9**	**101.1**	**100.8**	**98.8**	**98.8**	**98.9**	**99.2**	**71.9**	**71.9**	**72.1**

Notes:
Due to the proximity to In-Situ treatment injections, wells MW-14C and MW-14Ewere shut off indefinitely on 16 October 2019, and MW-19D was shut off indefinitely on 14 October2019.
Pumping of extraction well MW-21D was stopped on 22 June 2018, with EPA approval, to minimize drawing the Northern Plume into the well.
gpm = gallons per minute

TABLE 2. WELLS AND RECOMMENDED SAMPLING FREQUENCIES

Well Name	Well Type	Total Number VOC Datapoints	TCE Annual Evaluation (Last 4 Samples)								Never Exceeded Cleanup Level for VOCs?	Chromium Annual Evaluation (Last 4 Samples)							Never Exceeded Cleanup Level for Cr?	2019 Sampling Frequency [1]		2020 Sampling Frequency Recommendations and When Sampled Next[2]		Well Use / Rationale for Recommendation
			Date of First of the Most Recent Four Samples	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Consecutive Samples < Cleanup Goal	Remediation Monitoring Phase Complete for TCE? [3]	Remediation Phase Complete for all VOCs? [3]		Date of First of the Most Recent Four Samples	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Consecutive Samples < Cleanup Goal	Remediation Monitoring Phase Complete for Chromium? [3]		VOCs	Cr	VOCs	Cr	
Closure Monitoring Program Wells																								
Upgradient Wells																								
AMW-8A	M	38	10/2014	10/2019	0.22	0.46	0.32	4	YES	YES		04/1995	10/1995	U	U	U	2	NA		Biennial 2019	NA	Biennial 2021	NA	TCE background well
TCE Source Wells																								
AMW-1A	M	61	04/2018	10/2019	21.00	46.00	21.00	None	NO	NO										Semiannual	NA	Semiannual	NA	OU-2 well; well cluster, remediation monitoring for VOCs
AMW-1B	M	31	01/2009	10/2010	0.45	0.51	0.45	4	YES	YES										On Hold	NA	On Hold	NA	OU-2 well; remediation monitoring complete
AMW-1C	M	24	10/2007	10/2009	U	U	U	4	YES	YES										On Hold	NA	On Hold	NA	OU-2 well; remediation monitoring complete
AMW-2A	M	64	04/2018	10/2019	4.80	28.00	12.00	None	NO	NO										Semiannual	NA	Semiannual	NA	OU-2 well; well cluster - most impacted, remediation monitoring for VOCs
AMW-2B	M	36	10/2012	10/2015	0.34	0.41	0.41	4	YES	YES										On Hold	NA	On Hold	NA	OU-2 well; well cluster - remediation monitoring complete
AMW-3A	M	48	10/2015	10/2019	0.53	0.72	0.63	4	YES	YES										Annual	NA	On Hold	NA	OU-2 well; remediation monitoring complete for VOCs
AMW-4A	M	15	10/2009	10/2019	U	0.23	U	4	YES	NO										Annual	NA	Annual	NA	OU-2 well; remediation monitoring for VOCs
AMW-12A	M	62	04/2018	10/2019	18.00	21.00	21.00	None	NO	NO										Semiannual	NA	Semiannual	NA	OU-2 well; remediation monitoring for VOCs
AMW-13A	M	45	10/2012	10/2015	0.17	0.26	0.26	4	YES	YES										On Hold	NA	On Hold	NA	OU-2 well; remediation monitoring complete
AMW-19A	M	43	10/2013	10/2017	1.10	1.40	1.30	4	YES	YES										Every 5 years 2022	NA	Every 5 years 2022	NA	OU-2 boundary well
AMW-26	M	29	10/2010	10/2017	0.24	4.30	4.30	4	YES	YES										Every 5 years 2022	NA	Every 5 years 2022	NA	OU-2 boundary well
AMW-52A	M	28	10/2012	10/2015	U	0.32	0.32	4	YES	YES										On Hold	NA	On Hold	NA	OU-2 well; remediation monitoring complete
AMW-53A	M	47	04/2018	10/2019	3.80	15.00	15.00	None	NO	NO										Semiannual	NA	Semiannual	NA	OU-2 well - remediation monitoring for VOCs
AMW-54A	M	30	10/2013	10/2017	1.80	3.00	2.10	4	YES	YES										Every 5 years 2022	Every 5 years 2022	Every 5 years 2022	Every 5 years 2022	OU-2 boundary well; remediation and attainment monitoring complete
AMW-55A	M	23	10/2012	10/2015	1.00	1.30	1.00	4	YES	YES										NFS	NA	NFS	NA	OU-2 well; remediation and attainment monitoring complete
AMW-56A	M	29	10/2013	10/2017	1.70	3.70	3.70	4	YES	YES										Every 5 years 2022	NA	Every 5 years 2022	NA	OU-2 boundary well; remediation and attainment monitoring complete
MW-1A	M	62	04/2018	10/2019	6.10	77.00	15.00	None	NO	NO										Semiannual	NA	Semiannual	NA	OU-2 well - well cluster; remediation monitoring for VOCs
MW-1B	M	26	10/2006	10/2009	U	0.29	0.28	4	YES	YES										On Hold	NA	On Hold	NA	OU-2 well; remediation monitoring complete; well cluster
MW-1C	M	20	10/2006	10/2009	U	U	U	4	YES	YES										On Hold	NA	On Hold	NA	OU-2 well; remediation monitoring complete; well cluster
Proximal Wells																								
AMW-58	M	9	10/2006	10/2012	U	1.90	0.10	4	YES	YES		04/2006	10/2010	2.60	34.70	3.60	4	NA	X	On Hold	NA	On Hold	NA	Remediation monitoring complete for VOCs; Cr never exceeded cleanup level
MW-2A	M	27	10/2011	10/2016	1.70	1.90	1.70	4	YES	YES		10/2016	10/2019	40.40	292.00	292.00	None	NO		On Hold	Annual	On Hold	Annual	Well cluster - remediation monitoring for Cr; remediation monitoring complete for VOCs.
MW-2B	M	17	10/2009	10/2019	1.10	2.40	1.10	4	YES	YES		10/2002	10/2009	U	9.60	9.60	4	YES		Annual	On Hold	Annual	On Hold	Well cluster - remediation monitoring for VOCs; remediation monitoring complete for Cr
MW-2C	M	8	10/2002	10/2009	0.36	3.30	0.36	4	YES	YES		10/2002	10/2009	U	11.60	U	4	NA	X	On Hold	NA	On Hold	NA	Well cluster - remediation monitoring complete for TCE; Cr never exceeded cleanup level
MW-3A	M	19	05/2004	10/2008	0.23	0.91	0.23	4	NA	NA	X	10/2014	10/2019	63.60	149.00	105.00	None	NO		NA	Biennial 2019	NA	Biennial 2021	Well cluster - remediation monitoring for Cr; VOCs never exceeded cleanup level
MW-3B	M	15	10/2010	10/2016	1.40	2.00	1.40	4	YES	YES		10/2002	10/2009	U	10.40	U	4	YES		On Hold	On Hold	On Hold	On Hold	Well cluster - remediation monitoring complete
MW-3C	M	10	10/2004	10/2019	1.00	3.80	1.00	4	YES	YES		05/1995	10/2004	4.40	7.65	6.10	4	YES		Annual	On Hold	On Hold	On Hold	Well cluster - not optimal depth; remediation monitoring complete for VOCs and Cr
MW-4A	M	22	10/2009	10/2019	2.10	5.50	3.90	3	NO	NO		10/2014	10/2019	226.00	495.00	371.00	None	NO		Annual	Annual	Annual	Annual	Well cluster - not optimal depth; remediation monitoring for VOCs and Cr
MW-4B	M	16	10/2011	10/2016	3.10	4.60	3.10	4	YES	YES		10/2016	10/2019	366.00	795.00	366.00	None	NO		On Hold	Annual	On Hold	Annual	Well cluster - remediation monitoring complete for VOCs; remediation monitoring for Cr
MW-4BShed	M	16	10/2004	10/2019	1.50	5.20	1.50	3	NO	NO		04/2013	10/2018	46.00	68.30	46.00	4	YES		Biennial 2019	On Hold	Biennial 2021	On Hold	Well cluster - remediation monitoring complete for Cr; remediation monitoring for VOCs
MW-4C	M	11	10/2009	10/2019	1.70	3.80	1.70	4	YES	YES		10/2009	10/2019	41.60	68.70	68.70	4	YES		Annual	Annual	On Hold	On Hold	Well cluster - not optimal depth; remediation monitoring complete for VOCs and Cr
MW-6A	M	7	10/1997	10/2019	U	U	U	4	YES	YES		10/2013	10/2019	20.10	143.00	128.00	None	NO		Annual	Annual	Annual	Annual	Well cluster - not optimal depth; remediation monitoring complete for VOCs, remediation monitoring for Cr
MW-6B	E	58	04/2017	10/2019	2.10	3.30	2.80	4	YES	YES		04/2017	10/2019	8.70	30.70	12.20	4	YES		Annual	Annual	Annual	Annual	Extraction well - active; remediation monitoring complete (also well cluster, previously most impacted)

TABLE 2. WELLS AND RECOMMENDED SAMPLING FREQUENCIES

Well Name	Well Type	Total Number VOC Datapoints	TCE Annual Evaluation (Last 4 Samples)								Never Exceeded Cleanup Level for VOCs?	Chromium Annual Evaluation (Last 4 Samples)							Never Exceeded Cleanup Level for Cr?	2019 Sampling Frequency [1]		2020 Sampling Frequency Recommendations and When Sampled Next[2]		Well Use / Rationale for Recommendation
			Date of First of the Most Recent Four Samples	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Consecutive Samples < Cleanup Goal	Remediation Monitoring Phase Complete for TCE? [3]	Remediation Phase Complete for all VOCs? [3]		Date of First of the Most Recent Four Samples	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Consecutive Samples < Cleanup Goal	Remediation Monitoring Phase Complete for Chromium? [3]			VOCs	Cr	VOCs	Cr	
MW-6C	M	13	10/2009	10/2019	U	0.54	0.35	4	YES	YES		10/2002	10/2009	U	22.90	U	4	YES		Annual	On Hold	On Hold	On Hold	Well cluster - not optimal depth; remediation monitoring complete for Cr and VOCs
MW-6D	M	11	10/2009	10/2019	U	4.30	1.80	4	YES	YES		05/1999	10/2009	6.10	29.80	29.80	4	YES		Annual	On Hold	On Hold	On Hold	Well cluster - not optimal depth; remediation monitoring complete for Cr and VOCs
MW-7B	M	10	10/2014	10/2019	3.10	6.10	4.20	2	NO	NO		04/1995	10/2009	U	72.60	U	4	YES		Annual	On Hold	Annual	On Hold	Well cluster - adjacent to MW-4 cluster; remediation monitoring complete for Cr
MW-7C	M	6	05/1995	10/2009	0.18	3.00	0.18	4	YES	YES		05/1995	10/2009	6.50	13.50	12.30	4	YES		On Hold	On Hold	On Hold	On Hold	Well cluster - remediation monitoring complete
MW-8B	M	15	10/2010	10/2017	1.80	3.30	1.80	4	YES	YES		05/1999	10/2008	U	13.00	7.30	4	YES		On Hold	On Hold	On Hold	On Hold	Remediation monitoring complete
MW-9B	M	18	10/2012	10/2017	2.00	3.70	2.00	4	YES	YES		10/1999	10/2008	U	25.30	3.60	4	YES		On Hold	On Hold	On Hold	On Hold	Well cluster - previously most TCE impacted; Remediation monitoring complete
MW-9C	M	12	10/2009	10/2019	2.90	5.80	2.90	2	NO	NO		10/1997	10/2009	4.10	65.40	65.40	4	NA	X	Annual	NA	Annual	NA	Well cluster - not optimum depth; remediation monitoring for VOCs; Cr never exceeded cleanup level
MW-10B	E	59	10/2017	10/2019	6.80	8.30	6.80	None	NO	NO		04/2017	10/2019	25.20	31.70	30.20	4	YES		Semiannual	Annual	Semiannual	Annual	Extraction well - active (also well cluster); remediation monitoring complete for Cr
MW-10C	E	60	04/2017	10/2019	1.20	1.60	1.30	4	YES	YES		04/2017	10/2019	53.60	78.50	61.70	4	YES		Annual	Annual	Annual	Annual	Extraction well - active (also well cluster); remediation monitoring complete
MW-12C	M	29	10/2014	10/2019	0.63	0.89	0.63	4	YES	YES		10/2007	10/2010	U	4.50	U	4	YES		Biennial 2019	On Hold	Biennial 2021	On Hold	TCE Plume boundary; remediation monitoring complete for VOCs and Cr
MW-13C	M	32	10/2016	10/2019	2.20	3.70	2.50	4	YES	YES		10/2007	10/2010	27.50	35.40	27.50	4	YES		Biennial 2019	On Hold	Biennial 2021	On Hold	TCE Plume boundary; remediation monitoring complete for VOCs and Cr
PW-1B	E	86	04/2017	10/2019	2.40	4.10	2.40	4	YES	YES		04/2017	10/2019	25.10	41.80	28.70	4	YES		Annual	Annual	Annual	Annual	Extraction well - active; remediation monitoring complete
Intermediate Wells																								
AMW-59	E/O	15	10/2014	10/2019	45.00	58.00	45.00	None	NO	NO		10/2006	10/2009	U	4.80	U	4	NA	X	Biennial 2019	NA	Semiannual	NA	Plume area - silt well; remediation monitoring for VOCs; Cr never exceeded cleanup level
AMW-60	M	7	11/2004	10/2019	U	0.35	U	4	YES	NO		11/2004	10/2009	U	8.90	2.10	3	NA	X	Annual	NA	Annual	NA	Silt well, remediation monitoring for VOCs, Cr never exceeded cleanup level
CPU-14	M	38	10/2016	10/2019	3.90	5.10	5.10	None	NO	NO		10/2012	04/2015	U	53.60	U	4	YES		Annual	On Hold	Annual	On Hold	Plume boundary; remediation monitoring for VOCs, remediation monitoring complete for Cr
MW-14C	E/M[4]	72	04/2018	10/2019	5.90	8.50	5.90	None	NO	NO		04/2017	10/2019	38.70	52.30	48.10	4	YES		Semiannual	Annual	Semiannual	Annual	Extraction well - not pumping as of October 2019, (also well cluster); remediation monitoring for VOCs, remediation monitoring complete for Cr
MW-14E	E/M[4]	70	04/2018	10/2019	39.00	48.00	39.00	None	NO	NO		05/2017	10/2019	24.50	31.40	27.50	4	YES		Semiannual	Annual	Semiannual	Annual	Extraction well - not pumping as of October 2019, (also well cluster); remediation monitoring for VOCs, remediation monitoring complete for Cr
MW-15E	M	30	10/2015	10/2019	1.40	2.50	1.40	4	YES	YES		10/2002	10/2008	3.30	17.30	3.30	4	YES		Biennial 2019	On Hold	Biennial 2021	On Hold	Remediation monitoring complete; monitoring potential Northern Plume impacts, but none noted to date
MW-18D	E/M	81	04/2018	10/2019	2.20	49.00	2.90	2	NO	NO		04/2018	10/2019	65.60	127.00	74.20	2	NO		Semiannual	Semiannual	Semiannual	Semiannual	Extraction well - not pumping as of August 2018; remediation monitoring for VOCs and Cr
MW-18E	E/O	38	10/2017	10/2019	0.70	180.00	0.70	2	NO	NO		10/2011	10/2019	4.70	69.20	69.20	4	YES		Annual	On Hold	Semiannual	On Hold	Plume area - remediation monitoring for VOCs, remediation monitoring complete for Cr
MW-19D	E/M[4]	80	04/2018	10/2019	15.00	20.00	15.00	None	NO	NO		04/2018	10/2019	71.60	87.50	87.50	None	NO		Semiannual	Semiannual	Semiannual	Semiannual	Extraction well - not pumping as of October 2019, remediation monitoring for VOCs, Cr
MW-20D	E	84	04/2018	10/2019	18.00	21.00	18.00	None	NO	NO		04/2017	10/2019	40.70	56.20	48.80	4	YES		Semiannual	Annual	Semiannual	Annual	Extraction well - active; remediation monitoring for VOCs, remediation monitoring complete for Cr
MW-38	M	15	04/2017	10/2019	9.50	28.00	28.00	None	NO	NO		-	-	-	-	-	-	NA		Annual	NA	Annual	NA	Plume area - silt well; remediation monitoring for VOCs
MW-40	M	9	10/2008	10/2019	0.30	1.20	0.30	4	YES	YES		10/2008	10/2019	33.50	126.00	51.60	3	NO		Annual	Annual	On Hold	Annual	Remediation monitoring for Cr, remediation monitoring complete for VOCs
PZ-39	M	19	04/2017	10/2019	19.00	36.00	33.00	None	NO	NO		10/1999	10/2010	U	11.00	4.80	3	NA	X	Annual	NA	Annual	NA	Monitoring for Northern Plume impacts; VOC concentrations decreasing; Cr never exceeded cleanup level
Church of God Wells																								
AMW-27	E/M	52	04/2015	10/2016	3.00	4.20	3.00	4	YES	YES		01/2013	10/2014	U	15.80	U	4	YES		On Hold	NFS	On Hold	NFS	Extraction well - inactive; remediation monitoring complete for VOCs & Cr
AMW-61	M	16	04/2017	10/2019	5.10	7.40	6.90	None	NO	NO		11/2004	10/2017	17.30	1410.00	39.70	3	NO		Annual	Every 5 years 2022	Annual	Every 5 years 2022	Plume area - silt well; remediation monitoring
CPU-12	M	36	10/2015	10/2019	2.20	2.90	2.90	4	YES	YES		10/2010	10/2019	U	8.00	8.00	4	YES		Biennial 2019	Annual	Biennial 2021	Annual	VOC Plume boundary; remediation monitoring complete for VOCs and Cr
CPU-13	E/O	59	04/2013	10/2014	0.92	1.20	0.94	4	YES	YES		04/2013	10/2014	25.30	54.80	45.70	4	YES		NFS	NFS	NFS	NFS	Former sentinel well; remediation and attainment monitoring complete
MW-21D	E/O	87	04/2018	10/2019	5.00	16.00	9.10	None	NO	NO		04/2017	10/2019	6.10	12.30	12.30	4	YES		Semiannual	Annual	Semiannual	Annual	Extraction well - not pumping as of June 2018; remediation monitoring complete for Cr; remediation monitoring for VOCs; monitor TCE for **Northern Plume** impacts
MW-22D	E	80	04/2017	10/2019	1.50	2.30	1.50	4	YES	YES		04/2017	10/2019	13.50	17.90	17.90	4	YES		Annual	Annual	Annual	Annual	Extraction well - active; remediation monitoring complete

TABLE 2. WELLS AND RECOMMENDED SAMPLING FREQUENCIES

Well Name	Well Type	Total Number VOC Datapoints	TCE Annual Evaluation (Last 4 Samples)								Never Exceeded Cleanup Level for VOCs?	Chromium Annual Evaluation (Last 4 Samples)							Never Exceeded Cleanup Level for Cr?	2019 Sampling Frequency [1]		2020 Sampling Frequency Recommendations and When Sampled Next[2]		Well Use / Rationale for Recommendation
			Date of First of the Most Recent Four Samples	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Consecutive Samples < Cleanup Goal	Remediation Monitoring Phase Complete for TCE? [3]	Remediation Phase Complete for all VOCs? [3]		Date of First of the Most Recent Four Samples	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Consecutive Samples < Cleanup Goal	Remediation Monitoring Phase Complete for Chromium? [3]		VOCs	Cr	VOCs	Cr	
MW-25D	E/O	77	10/2012	10/2014	1.30	3.00	1.70	4	YES	YES		10/2012	10/2014	2.70	6.30	6.30	4	YES		NFS	NFS	NFS	NFS	Former extraction well; remediation and attainment monitoring complete
MW-26D	E/O	76	10/2012	10/2014	0.35	2.10	0.35	4	YES	YES		10/2012	10/2014	7.00	38.60	11.40	4	YES		NFS	NFS	NFS	NFS	Former extraction well; remediation and attainment monitoring complete
MW-27D	E/M	50	10/2011	10/2014	0.63	1.50	1.50	4	YES	YES		10/2011	10/2014	U	12.20	U	4	YES		NFS	NFS	NFS	NFS	Former sentinel well; remediation and attainment monitoring complete
MW-49	E/O	35	10/2012	10/2014	1.10	1.70	1.60	4	YES	YES		10/2012	10/2014	9.30	12.20	12.20	4	YES		NFS	NFS	NFS	NFS	Former extraction well; remediation and attainment monitoring complete
Toe Wells																								
AMW-42	M	52	10/2009	10/2014	0.65	1.30	0.65	4	YES	YES		10/2009	10/2014	U	21.30	U	4	YES		NFS	NFS	NFS	NFS	Remediation and attainment monitoring complete
MW-31	E	40	10/2008	10/2012	0.20	0.36	0.26	4	YES	YES		10/2008	10/2012	8.10	12.90	11.40	4	YES		NFS	NFS	NFS	NFS	Decommissioned 2017
MW-35	E/M	70	10/2015	04/2017	3.00	3.70	3.60	4	YES	YES		10/2012	04/2015	U	29.30	U	4	YES		NFS	NFS	NFS	NFS	Decommissioned 2017
MW-41	E/M	58	10/2010	10/2017	U	U	U	4	YES	YES		10/2010	10/2017	U	U	U	4	YES		Every 5 years 2022	Every 5 years 2022	Every 5 years 2022	Every 5 years 2022	Attainment monitoring complete for TCE and Cr. EPA request for sampling every 5 years to support Toe-of-Plume Pilot Study.
MW-48	M	38	10/2006	10/2009	U	U	U	4	YES	YES		10/2006	10/2009	4.00	35.00	35.00	4	NA	X	NFS	NA	NFS	NA	Remediation and attainment monitoring complete; Cr never exceeded cleanup level
Troutdale Wells																								
AMW-24	M/D	31	10/2016	10/2019	6.50	8.30	6.50	None	NO	NO		10/2011	10/2014	3.50	13.60	13.60	4	NA	X	Annual	NA	Annual	NA	Troutdale well - TCE impacted; Cr never exceeded cleanup level
MW-33	M/D	31	10/2016	10/2019	3.60	6.30	3.60	2	NO	NO		10/2011	10/2014	1.90	3.20	2.20	4	NA	X	Annual	NA	Annual	NA	Troutdale well - TCE impacted; Cr never exceeded cleanup level
BENNETT	Other	26	04/2017	10/2019	0.90	1.70	0.90	4	YES	YES		10/2014	04/2017	U	U	U	4	NA	X	Annual	NA	Annual	NA	Troutdale well - remediation monitoring complete for TCE; Cr never exceeded cleanup level
Wells Excluded from Closure Monitoring Program																								
Northern Plume Wells																								
AMW-16	M	37	04/2018	10/2019	13.00	45.00	36.00	0	NA	NA									X	Semiannual	NA	Semiannual	NA	Northern Plume monitoring well
AMW-17	M/D	49	04/2018	10/2019	23.00	66.00	48.00	0	NA	NA									X	Semiannual	NA	Semiannual	NA	Northern Plume monitoring well
AMW-18	M	49	04/2018	10/2019	U	28.00	18.00	0	NA	NA									X	Semiannual	NA	Semiannual	NA	Northern Plume monitoring well
AMW-23	M	15	10/2017	10/2019	0.10	8.00	0.50	2	NA	NA									X	Annual	NA	Annual	NA	Northern Plume monitoring well
AMW-64	M	21	04/2018	10/2019	9.90	71.00	9.90	0	NA	NA									X	Semiannual	NA	Semiannual	NA	Northern Plume monitoring well
MW-23D	M	41	04/2018	10/2019	120.00	160.00	120.00	0	NA	NA										Semiannual	NA	Semiannual	NA	Northern Plume monitoring well
Toe Wells																								
AMW-63	M	11	10/2009	10/2017	U	U	U	4	NA	NA	X	10/2009	10/2017	-	-	-	-	NA	X	Every 5 years 2022	Every 5 years 2022	Every 5 years 2022	Every 5 years 2022	TCE and Cr below cleanup levels. EPA request for sampling every 5 years to support Toe-of-Plume Pilot Study.
Infiltration Gallery Wells																								
AMW-6A	M/D	22	10/2014	10/2019	0.10	0.26	0.10	4	YES	YES	X	10/2014	10/2019	3.60	10.50	10.50	4	YES	X	Biennial 2019	Biennial 2019	Biennial 2021	Biennial 2021	Infiltration gallery monitoring well
AMW-7A	M/D	31	10/2014	10/2019	U	0.21	U	4	YES	YES	X	10/2014	10/2019	0.70	2.10	2.10	4	YES	X	Biennial 2019	Biennial 2019	Biennial 2021	Biennial 2021	Infiltration gallery monitoring well
AMW-10A	M/D	21	10/2014	10/2019	U	0.14	U	4	YES	YES	X	10/2014	10/2019	3.70	8.30	5.70	4	YES	X	Biennial 2019	Biennial 2019	Biennial 2021	Biennial 2021	Infiltration gallery monitoring well
AMW-11A	M/D	22	10/2014	10/2019	U	0.27	U	4	YES	YES	X	10/2014	10/2019	1.20	3.80	3.80	4	YES	X	Biennial 2019	Biennial 2019	Biennial 2021	Biennial 2021	Infiltration gallery monitoring well

NOTES:

The rationale for changing wells from NFS (2016 recommendation) to "On Hold" or "Every 5 Years" is presented in Section 6.2.

Bold text indicates changes in 2020 for recommendations for sampling frequency.

[1] The 2019 sampling frequencies shown are those recommended in the 2018 Annual Status Report for the Boomsnub/Airco Superfund Site.

[2] A summary of all 2020 recommended sampling frequencies is provided in Table 5.

[3] The "Remediation Monitoring Phase is Completed" determinations are per EPA Guidance (EPA 2013) based on the most recent four sample data points for each COC. The remediation monitoring phase is completed when the last four sample concentrations are lower than the cleanup level.

[4] The pumps in wells MW-14C and MW14E were turned off and removed on 10/16/2019; and the pump in well MW-19D was turned off and removed 10/14/2019.

COC = Contaminant of Concern.
Cr = Chromium.
E = Extraction well.
E/M = Extraction well with pump pulled; now sampled as a monitoring well.
E/O = Extraction well with pump turned off; pump is turned on for sampling.
EPA = U.S. Environmental Protection Agency.
M = Monitoring well.
M/D = Monitoring well with dedicated pump installed.
NA = Not applicable.
NFS = No further sampling (closure monitoring complete, or for a well excluded from closure monitoring, further sampling determined to be unnecessary)
TCE = Trichloroethene.
U = Analyte not detected above the reporting limit.
= Indicates a change in sampling frequency.
µg/L = Micrograms per liter.
VOC = Volatile organic compound.
X = Never exceeded cleanup level

Biennial sampling (every 2 years) - these wells will be sampled next in Fall 2021.
Every 5 years - these wells will be sampled next in Fall 2022.
On Hold - sampling on hold pending attainment monitoring; no sampling planned for 2020.
Wells not included in the Closure Monitoring Program and not determined to require sampling for another purpose have been deleted from this table.
Where no entries are present for one of the two constituents (TCE or Cr) for a given well, that constituent is not a COC for and has not been sampled in the well.
TCE summary data are presented as a representation of all VOCs.

Table 3. Extraction and Monitoring Well Groupings

Well Group	AMW Wells	MW Wells	Other Wells
Upgradient	**AMW-6A** **AMW-7A** **AMW-8A** **AMW-10A** **AMW-11A**		
TCE Source (OU-2)	**AMW-1A** AM-19A **AMW-2A** AMW-26 **AMW-3A** **AMW-53A** **AMW-4A** AMW-54A **AMW-12A** AMW-56A	**MW-1A**	
Proximal		**MW-2A** **MW-6C** **MW-2B** **MW-6D** **MW-3A** **MW-7B** **MW-3C** **MW-9C** **MW-4A** **MW-10B** **MW-4B** **MW-10C** **MW-4BSHED** **MW-12C** **MW-4C** **MW-13C** **MW-6A** **MW-6B**	**PW-1B**
Intermediate	**AMW-59** **AMW-60**	**MW-14C** **MW-19D** **MW-14E** **MW-20D** **MW-15E** **MW-38** **MW-18D** **MW-40** **MW-18E**	**CPU-14** **PZ-39**
Northern Plume	**AMW-16** **AMW-23** **AMW-17** **AMW-64** **AMW-18**	**MW-23D**	
Church of God	**AMW-61**	**MW-21D** **MW-22D**	**CPU-12**
Toe of Plume	AMW-63	MW-41	
Troutdale Aquifer	**AMW-24**	**MW-33**	**Bennett**

NOTES:
- Wells shown in **bold** and shaded were sampled during the Spring and Fall 2019 semiannual monitoring events.
- Only wells being sampled as part of the current monitoring plan (EA 2018a) are listed on this table (and does not include wells where sampling is on hold).
- Northern Plume wells include those currently impacted by the off-site Northern Plume.
- AMW wells were installed by Messer LLC.
- MW wells were installed by the U.S. Environmental Protection Agency or Washington Department of Ecology.
- CPU wells were installed by Clark Public Utilities.

TABLE 4. CLOSURE MONITORING PROGRAM WELLS

Well Name	No longer Impacted by Treatment System/Under Steady State Conditions ? [1]	Remediation Phase Complete for VOCs?	VOCs Not Completing Remediation Phase	Currently Ready for Attainment Monitoring of VOCs?	Remediation Phase Complete for Chromium?	Currently Ready for Attainment Monitoring of Chromium?
Upgradient						
AMW-8A	No	NA		No	No	NA
TCE Source Area [2]						
AMW-1A	No	No	1,1-Dichloroethylene, Trichloroethylene	No	NA	NA
AMW-1B	No	Yes		No	NA	NA
AMW-1C	No	Yes		No	NA	NA
AMW-2A	No	No	Trichloroethylene	No	NA	NA
AMW-2B	No	Yes		No	NA	NA
AMW-3A	Yes	Yes		Yes	NA	NA
AMW-4A	Yes	No	Bromodichloromethane	No	NA	NA
AMW-12A	No	No	Trichloroethylene	No	NA	NA
AMW-13A	No	Yes		No	NA	NA
AMW-19A	No	Yes		No	NA	NA
AMW-26	No	Yes		No	NA	NA
AMW-52A	No	Yes		No	NA	NA
AMW-53A	No	No	Trichloroethylene	No	NA	NA
AMW-54A	Yes	Yes		Yes	NA	NA
AMW-55A	Yes	Yes		Yes	NA	NA
AMW-56A	Yes	Yes		Yes	NA	NA
MW-1A	No	No	Trichloroethylene	No	NA	NA
MW-1B	No	Yes		No	NA	NA
MW-1C	No	Yes		No	NA	NA
Proximal						
AMW-58	No	Yes		No	NA	NA [3]
MW-2A	No	Yes		No	No	No
MW-2B	No	Yes		No	Yes	No
MW-2C	No	Yes		No	NA	NA [3]
MW-3A	No	NA		NA [3]	No	No
MW-3B	No	Yes		No	Yes	No
MW-3C	No	Yes		No	Yes	No
MW-4A	No	No	Trichloroethylene	No	No	No
MW-4B	No	Yes		No	No	No
MW-4BSHED	No	No	Trichloroethylene	No	Yes	No
MW-4C	No	Yes		No	Yes	No
MW-6A	No	Yes		No	No	No
MW-6B	No	Yes		No	Yes	No
MW-6C	No	Yes		No	Yes	No
MW-6D	No	Yes		No	Yes	No

TABLE 4. CLOSURE MONITORING PROGRAM WELLS

Well Name	No longer Impacted by Treatment System/Under Steady State Conditions ? [1]	Remediation Phase Complete for VOCs?	VOCs Not Completing Remediation Phase	Currently Ready for Attainment Monitoring of VOCs?	Remediation Phase Complete for Chromium?	Currently Ready for Attainment Monitoring of Chromium?
MW-7B	No	No	Trichloroethylene	No	Yes	No
MW-7C	No	Yes		No	Yes	No
MW-8B	No	Yes		No	Yes	No
MW-9B	No	Yes		No	Yes	No
MW-9C	No	No	Trichloroethylene	No	NA	NA [3]
MW-10B	No	No	Trichloroethylene	No	Yes	No
MW-10C	No	Yes		No	Yes	No
MW-12C	No	Yes		No	Yes	No
MW-13C	No	Yes		No	Yes	No
PW-1B	No	Yes		No	Yes	No
Intermediate						
AMW-59	No	No	1,1-Dichloroethylene, Trichloroethylene	No	NA	NA [3]
AMW-60	No	No	1,1-Dichloroethylene	No	NA	NA [3]
CPU-14	No	No	Trichloroethylene	No	Yes	No
MW-14C	No	No	Trichloroethylene	No	Yes	No
MW-14E	No	No	1,1-Dichloroethylene, Trichloroethylene	No	Yes	No
MW-15E	No	Yes		No	Yes	No
MW-18D	No	No	Trichloroethylene	No	No	No
MW-18E	No	No	1,1-Dichloroethylene, Trichloroethylene	No	Yes	No
MW-19D	No	No	Trichloroethylene	No	No	No
MW-20D	No	No	1,1-Dichloroethylene, Trichloroethylene	No	Yes	No
MW-38	No	No	Trichloroethylene	No	NA	NA
MW-40	No	Yes		No	No	No
PZ-39	No	No	1,1-Dichloroethylene, Trichloroethylene	No	NA	NA [3]
Church of God						
AMW-27	Yes	Yes		Yes	Yes	Yes
AMW-61	Yes	No	Trichloroethylene	No	No	No
CPU-12	No	Yes		No	Yes	No
CPU-13	Yes	Yes		Yes	Yes	Yes
MW-21D	No	No	Trichloroethylene	No	Yes	No
MW-22D	No	Yes		No	Yes	No
MW-25D	Yes	Yes		Yes	Yes	Yes
MW-26D	Yes	Yes		Yes	Yes	Yes
MW-27D	Yes	Yes		Yes	Yes	Yes
MW-49	Yes	Yes		Yes	Yes	Yes

TABLE 4. CLOSURE MONITORING PROGRAM WELLS

Well Name	No longer Impacted by Treatment System/Under Steady State Conditions ? (1)	Remediation Phase Complete for VOCs?	VOCs Not Completing Remediation Phase	Currently Ready for Attainment Monitoring of VOCs?	Remediation Phase Complete for Chromium?	Currently Ready for Attainment Monitoring of Chromium?
Toe of Plume						
AMW-42	Yes	Yes		Yes	Yes	Yes
MW-41	Yes	Yes		Yes	Yes	Yes
MW-48	Yes	Yes		Yes	NA	NA [3]
Troutdale						
AMW-24	Yes	No	1,1-Dichloroethylene, Trichloroethylene	No	NA	NA [3]
BENNETT	Yes	Yes		Yes	NA	NA [3]
MW-33	Yes	No	Trichloroethylene	No	NA	NA [3]

Notes:

Table 4 presents attainment status for wells currently in attainment monitoring.

COC = Contaminant of Concern identified for the Site

NA = Not Applicable

VOC = Volatile organic compound

(1) Implies the well is no longer influenced by nearby extraction wells or by discharge to the infiltration gallery, and that groundwater at the well has achieved post-remediation steady-state conditions.

(2) Chromium is not a contaminant of concern (COC) for TCE Source Area wells

(3) Designated as NA since contaminant(s) never exceeded cleanup level.

Per the Closure Monitoring Plan, the determination of whether Remediation Phase is Complete is based on analysis of the most recent four samples for each COC.

Shaded cells indicate wells ready for attainment monitoring

TABLE 5. ATTAINMENT MONITORING STATUS

Well Name	Date No Longer Impacted	Attainment Phase Complete for VOCs?	VOCs Not Completing Attainment Phase (# Results needed)	Attainment Phase Complete for Chromium? (# Results Needed)
TCE Source Area [a]				
AMW-3A	NA	No	Bromodichloromethane Dibromochloromethane	NA
AMW-54A	NA	Yes		NA
AMW-55A	NA	Yes		NA
AMW-56A	NA	Yes		NA
Church of God				
AMW-27	Jan-13	No	Trichloroethene	Yes
CPU-13	May-13	Yes		Yes
MW-25D	Jan-13	Yes		Yes
MW-26D	Jan-13	Yes		Yes
MW-27D	Nov-09	Yes		Yes
MW-49	Jan-13	Yes		Yes
Toe of Plume				
AMW-42	Feb-05	Yes		Yes
MW-41		Yes		Yes
MW-48	Jun-04	Yes		NA
Troutdale				
BENNETT	NA	No	Trichloroethene	NA

Notes:

[a] Chromium is not a COC for TCE Source Area wells.

This table includes wells from Table 4 that are ready for attainment monitoring for either VOCs and/or Chromium.

Per the Closure Monitoring Plan, the determination of whether Attainment Phase is complete is based on analysis of the most recent eight samples for each contaminant of concern.

NA = Not applicable

VOC = Volatile organic compound

TABLE 6. SUMMARY OF 2020 WELL SAMPLING FREQUENCIES

Well Name	Recommendation						Rationale for Recommendation
	Well Type	Semi-annual	Annual	Biennial[a]	Every 5 Years[b]	On Hold[c]	
Closure Monitoring Program Wells							
Upgradient Wells							
AMW-8A	M			VOCs			TCE background well
TCE Source Wells							
AMW-1A	M	VOCs					OU-2 well; well cluster, remediation monitoring for VOCs
AMW-1B	M					VOCs	OU-2 well; remediation monitoring complete
AMW-1C	M					VOCs	OU-2 well; remediation monitoring complete
AMW-2A	M	VOCs					OU-2 well; well cluster - most impacted, remediation monitoring for VOCs
AMW-2B	M					VOCs	OU-2 well; well cluster - remediation monitoring complete
AMW-3A	M					VOCs	OU-2 well; remediation monitoring complete
AMW-4A	M		VOCs				OU-2 well; remediation monitoring complete Cr but not for VOCs
AMW-12A	M	VOCs					OU-2 well; remediation monitoring for VOCs
AMW-13A	M					VOCs	OU-2 well; remediation monitoring complete
AMW-19A	M				VOCs		OU-2 boundary well
AMW-26	M				VOCs		OU-2 boundary well
AMW-52A	M					VOCs	OU-2 well; remediation monitoring complete
AMW-53A	M	VOCs					OU-2 well - remediation monitoring for VOCs
AMW-54A	M				X		OU-2 boundary well; remediation and attainment monitoring complete
AMW-55A	M						OU-2 well; remediation and attainment monitoring complete
AMW-56A	M				VOCs		OU-2 well - well cluster; remediation and attainment monitoring completefor VOCs
MW-1A	M	VOCs					OU-2 well - well cluster; remediation monitoring for VOCs
MW-1B	M					VOCs	OU-2 well; remediation monitoring complete; well cluster
MW-1C	M					VOCs	OU-2 well; remediation monitoring complete; well cluster
Proximal Wells							
AMW-58	M					VOCs	Remediation monitoring complete for TCE; Cr never exceeded cleanup level
MW-2A	M		Cr			VOCs	Well cluster - remediation monitoring for Cr; remediation monitoring complete for VOCs.
MW-2B	M		VOCs			Cr	Well cluster - remediation monitoring for VOCs; remediation monitoring complete for Cr

TABLE 6. SUMMARY OF 2020 WELL SAMPLING FREQUENCIES

Well Name	Recommendation						Rationale for Recommendation
	Well Type	Semi-annual	Annual	Biennial[a]	Every 5 Years[b]	On Hold[c]	
MW-2C	M					VOCs	Well cluster - remediation monitoring complete for TCE; Cr never exceeded cleanup level
MW-3A	M			Cr			Well cluster - remediation monitoring for Cr; TCE never exceeded cleanup level
MW-3B	M					X	Well cluster - remediation monitoring complete
MW-3C	M					X	Well cluster - not optimal depth; remediation monitoring complete for VOCs and Cr
MW-4A	M		X				Well cluster - not optimal depth; remediation monitoring for VOCs and Cr
MW-4B	M		Cr			VOCs	Well cluster - remediation monitoring complete for VOCs and Cr
MW-4BSHED	M			VOCs		Cr	Well cluster - remediation monitoring complete for Cr; remediation monitoring for VOCs
MW-4C	M					X	Well cluster - not optimal depth; remediation monitoring complete for VOCs and Cr
MW-6A	M		X				Well cluster - not optimal depth; remediation monitoring complete for VOCs, remediation monitoring for Cr
MW-6B	E		X				Extraction well - active; remediation monitoring complete (also well cluster, previously most impacted)
MW-6C	M					X	Well cluster - not optimal depth; remediation monitoring complete for Cr and VOCs
MW-6D	M					X	Well cluster - not optimal depth; remediation monitoring complete for Cr and VOCs
MW-7B	M		VOCs			Cr	Well cluster - adjacent to MW-4 cluster; remediation monitoring complete for Cr
MW-7C	M					X	Well cluster - remediation monitoring complete
MW-8B	M					X	Remediation monitoring complete for Cr and TCE

TABLE 6. SUMMARY OF 2020 WELL SAMPLING FREQUENCIES

Well Name	Recommendation						Rationale for Recommendation
	Well Type	Semi-annual	Annual	Biennial[a]	Every 5 Years[b]	On Hold[c]	
MW-9B	M					X	Well cluster - previously most TCE impacted; Remediation monitoring complete for Cr and TCE
MW-9C	M		VOCs				Well cluster - not optimum depth; remediation monitoring for VOCs; Cr never exceeded cleanup level
MW-10B	E	VOCs	Cr				Extraction well - active (also well cluster); remediation monitoring complete for Cr
MW-10C	E		X				Extraction well - active (also well cluster); remediation monitoring complete
MW-12C	M			VOCs		Cr	TCE Plume boundary; remediation monitoring complete for VOCs, Cr
MW-13C	M			VOCs		Cr	TCE Plume boundary; remediation monitoring complete
PW-1B	E		X				Extraction well - active; remediation monitoring complete
Intermediate Wells							
AMW-59	E/O	VOCs					Plume area - silt well; remediation monitoring for VOCs; Cr never exceeded cleanup level
AMW-60	M		VOCs				Silt well, remediation monitoring for VOCs, Cr never exceeded cleanup level
CPU-14	M		VOCs			Cr	Plume boundary; remediation monitoring for VOCs, remediation monitoring complete for Cr
MW-14C	E/M[d]	VOCs	Cr				Extraction well - not pumping as of October 2019, (also well cluster); remediation monitoring for VOCs, remediation monitoring complete for Cr
MW-14E	E/M[d]	VOCs	Cr				Extraction well - not pumping as of October 2019, (also well cluster); remediation monitoring for VOCs, remediation monitoring complete for Cr
MW-15E	M			VOCs		Cr	Remediation monitoring complete; monitoring potential **Northern Plume** impacts, but none noted to date
MW-18D	E/M	X					Extraction well - not pumping as of August 2018; remediation monitoring for VOCs and Cr
MW-18E	E/O	VOCs				Cr	Plume area - remediation monitoring for VOCs, remediation monitoring complete for Cr
MW-19D	E/M[d]	X					Extraction well - not pumping as of October 2019, remediation monitoring for VOCs, Cr
MW-20D	E	VOCs	Cr				Extraction well - active; remediation monitoring for VOCs, remediation monitoring complete for Cr

TABLE 6. SUMMARY OF 2020 WELL SAMPLING FREQUENCIES

Well Name	Recommendation						Rationale for Recommendation
	Well Type	Semi-annual	Annual	Biennial[a]	Every 5 Years[b]	On Hold[c]	
MW-38	M		VOCs				Plume area - silt well; remediation monitoring for VOCs
MW-40	M		Cr			VOCs	Remediation monitoring for Cr, remediation monitoring complete for VOCs
PZ-39	M		VOCs				Monitoring for **Northern Plume** impacts; VOC concentrations decreasing; Cr never exceeded cleanup level
Church of God Wells							
AMW-27	E/M					VOCs	Extraction well - inactive; remediation monitoring complete for VOCs & Cr
AMW-61	M		VOCs		Cr		Plume area - silt well; remediation monitoring
CPU-12	M		Cr	VOCs			VOC Plume boundary; remediation monitoring complete for Cr and VOCs
CPU-13	E/O						Former sentinel well; remediation and attainment monitoring complete. No further sampling.
MW-21D	E/O	VOCs	Cr				Extraction well - not pumping as of June 2018; remediation monitoring complete for Cr; remediation monitoring for VOCs; monitor TCE for **Northern Plume** impacts
MW-22D	E		X				Extraction well - active; remediation monitoring complete
MW-25D	E/O						Former extraction well; remediation and attainment monitoring complete. No further sampling.
MW-26D	E/O						Former extraction well; remediation and attainment monitoring complete. No further sampling.
MW-27D	E/M						Former sentinel well; remediation and attainment monitoring complete. No further sampling.
MW-49	E/O						Former extraction well; remediation and attainment monitoring complete. No further sampling.
Toe Wells							
AMW-42	M						Troutdale well - remediation monitoring complete for TCE; Cr never exceeded cleanup level; No further sampling.
MW-41	E/M				X		Attainment monitoring complete for TCE and Cr. EPA request for sampling every 5 years to support Toe-of-Plume Pilot Study.
MW-48	M						Remediation and attainment monitoring complete; Cr never exceeded cleanup level. No further sampling.

TABLE 6. SUMMARY OF 2020 WELL SAMPLING FREQUENCIES

Well Name	Recommendation						Rationale for Recommendation
	Well Type	Semi-annual	Annual	Biennial[a]	Every 5 Years[b]	On Hold[c]	
Troutdale Wells							
AMW-24	M/D		VOCs				Troutdale well - TCE impacted; Cr never exceeded cleanup level
MW-33	M/D		VOCs				Troutdale well - TCE impacted; Cr never exceeded cleanup level
BENNETT	Other		VOCs				Troutdale well - remediation monitoring complete for TCE; Cr never exceeded cleanup level
Wells Excluded from Closure Monitoring Prog							
Northern Plume Wells							
AMW-16	M	VOCs					Northern Plume monitoring well
AMW-17	M/D	VOCs					Northern Plume monitoring well
AMW-18	M	VOCs					Northern Plume monitoring well
AMW-23	M		VOCs				New Northern Plume monitoring well
AMW-64	M	VOCs					Northern Plume monitoring well
MW-23D	M	VOCs					Northern Plume monitoring well
Toe Wells							
AMW-63	M				X		TCE and Cr never exceeded cleanup levels. EPA request for sampling every 5 years to support Toe-of-Plume Pilot Study.
Infiltration Gallery Wells							
AMW-6A	M/D			X			Infiltration gallery monitoring well
AMW-7A	M/D			X			Infiltration gallery monitoring well
AMW-10A	M/D			X			Infiltration gallery monitoring well
AMW-11A	M/D			X			Infiltration gallery monitoring well
Total Wells:		19	29	11	7	29	

(Note that TCE and Cr are on different sampling schedules in a number of wells.)

Notes:

Wells to be sampled once in 2020.

Wells to be sampled twice in 2020.

Wells excluded from the Closure Monitoring Program have been deleted from this table.

[a] Biennial sampling (every 2 years) - these wells will be sampled next in Fall 2021.

[b] Every 5 years - these wells will be sampled next in Fall 2022.

[c] On Hold - sampling on hold pending attainment monitoring; no sampling planned for 2020.

[d] The pumps in wells MW-14C and MW14E were turned off and removed on 10/16/2019; and the pump in well MW-19D was turned off and removed 10/14/2019.

Cr	= Chromium	E	= Extraction well
EPA	= U.S. Environmental Protection Agency	E/M	= Extraction well with pump pulled; now sampled as a monitoring well
TCE	= Trichlorethene		
VOC	= Volatile organic compound	M	= Monitoring well
X	= Cr and VOCs	M/D	= Monitoring well with dedicated pump installed
E/O	= Extraction well with pump turned off; pump is turned on for sampling.		

APPENDIX A

CHROMIUM CONCENTRATIONS IN GROUNDWATER

APPENDIX A-1

CHROMIUM CONCENTRATIONS – SUMMARY TABLE

A-1. Chromium Concentrations Summary

Well Group	Well	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019
TCE Upgradient Wells	AMW-6A	3.6 J	--	--	--	10.5
	AMW-7A	1.9 J	--	--	--	2.1 J
	AMW-10A	4.8	--	--	--	5.7 J
	AMW-11A	1.2 J	--	--	--	3.8 J
Proximal Wells	MW-2A	40.4	--	**153**	--	**292**
	MW-3A	**149**	--	--	--	**105**
	MW-4A	**490**	--	**226**	--	**371**
	MW-4B	**438**	--	**561**	--	**366**
	MW-4C	55.5	--	41.6	--	68.7
	MW-6A	20.1	--	**143**	--	**128**
	MW-6B	9.6	--	8.7	--	12.2
	MW-10B	26.3	--	25.2	--	30.2
	MW-10C	53.6	--	62.3	--	61.7
	PW-1B	30.7	--	25.1	--	28.7
Intermediate Plume Wells	**MW-14C**	44.2	--	38.7	--	48.1
	MW-14E	27.1	--	24.5	--	27.5
	MW-18D	72	72.2	**127**	65.6	74.2
	MW-18E	--	--	--	11.2	69.2
	MW-19D	72.3	78.2	71.6	**85.5**	**87.5**
	MW-20D	43.5	--	40.7	--	48.8
	MW-40	34	--	33.5	--	51.6
Church of God Wells	CPU-12	3.3 J	--	4 J	--	8 J
	MW-21D	8.3	--	6.1	--	12.3
	MW-22D	15.1	--	13.5	--	17.9

NOTES:
Only wells sampled for chromium during Fall 2019 are included in this table.
Results are in micrograms per liter (µg/L).
Results are for total chromium, unless otherwise noted.
Active extractions wells are shown in **bold.**
Results shown in **blue bold** exceed the cleanup level of 80 µg/L.
-- = Not Sampled

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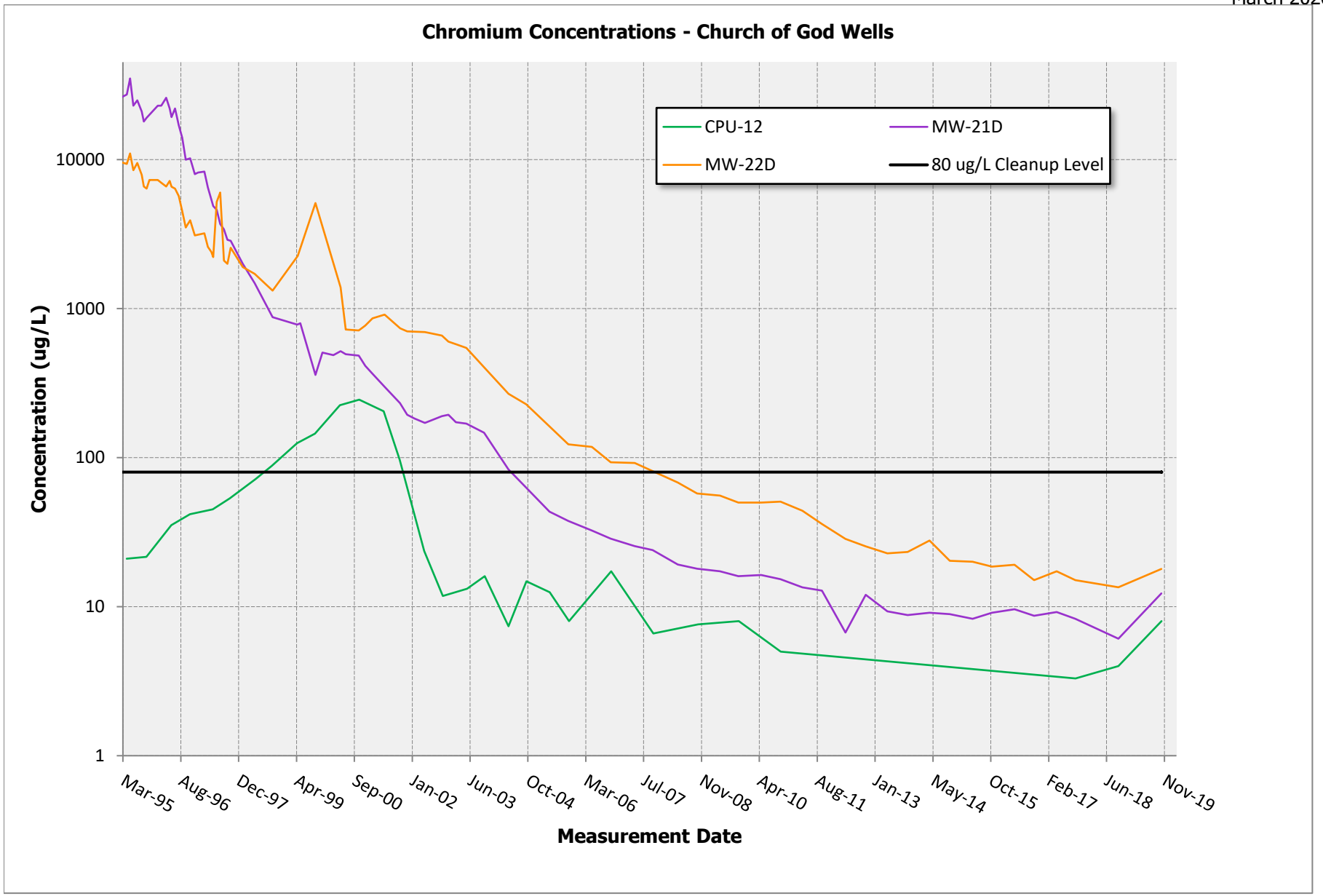
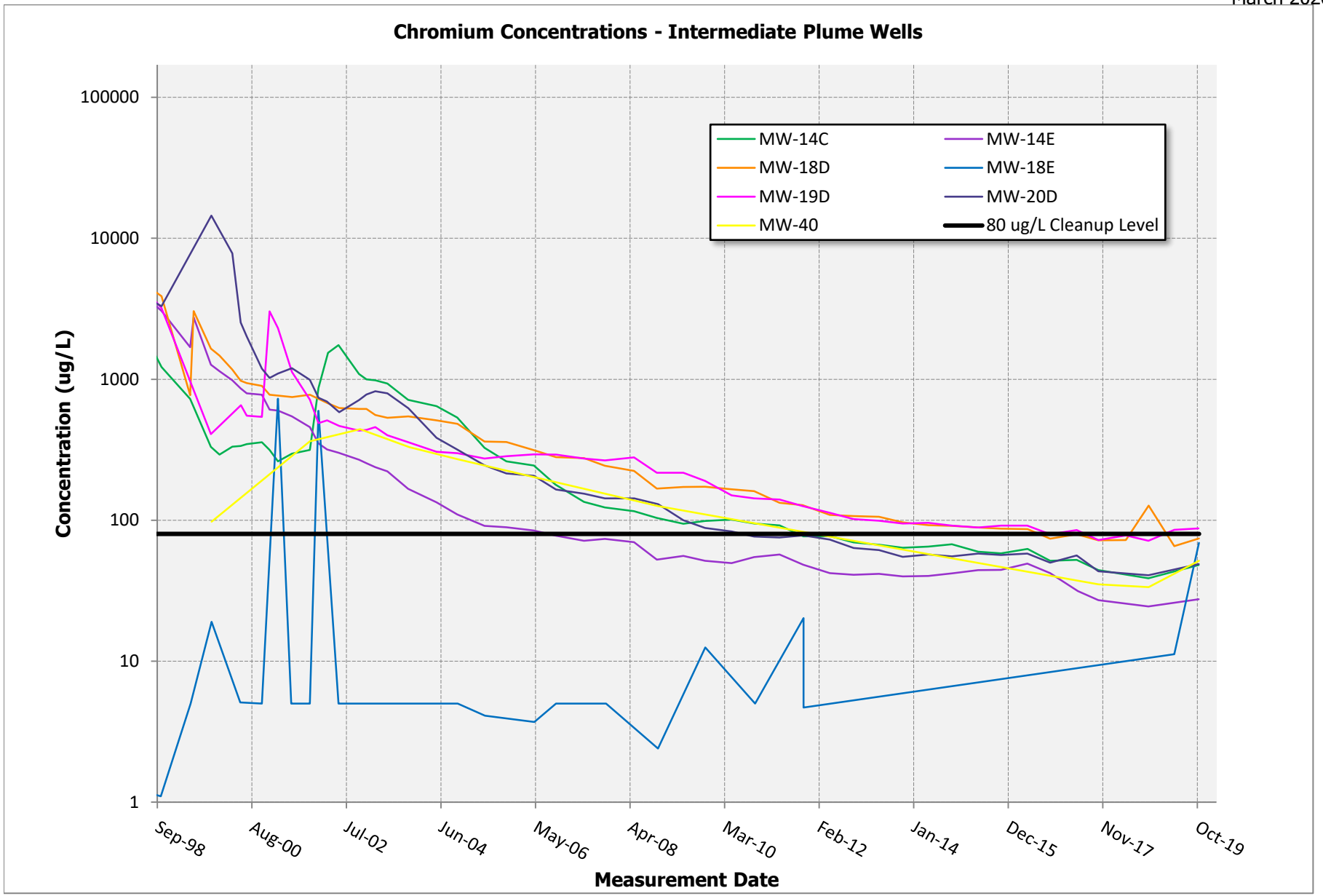
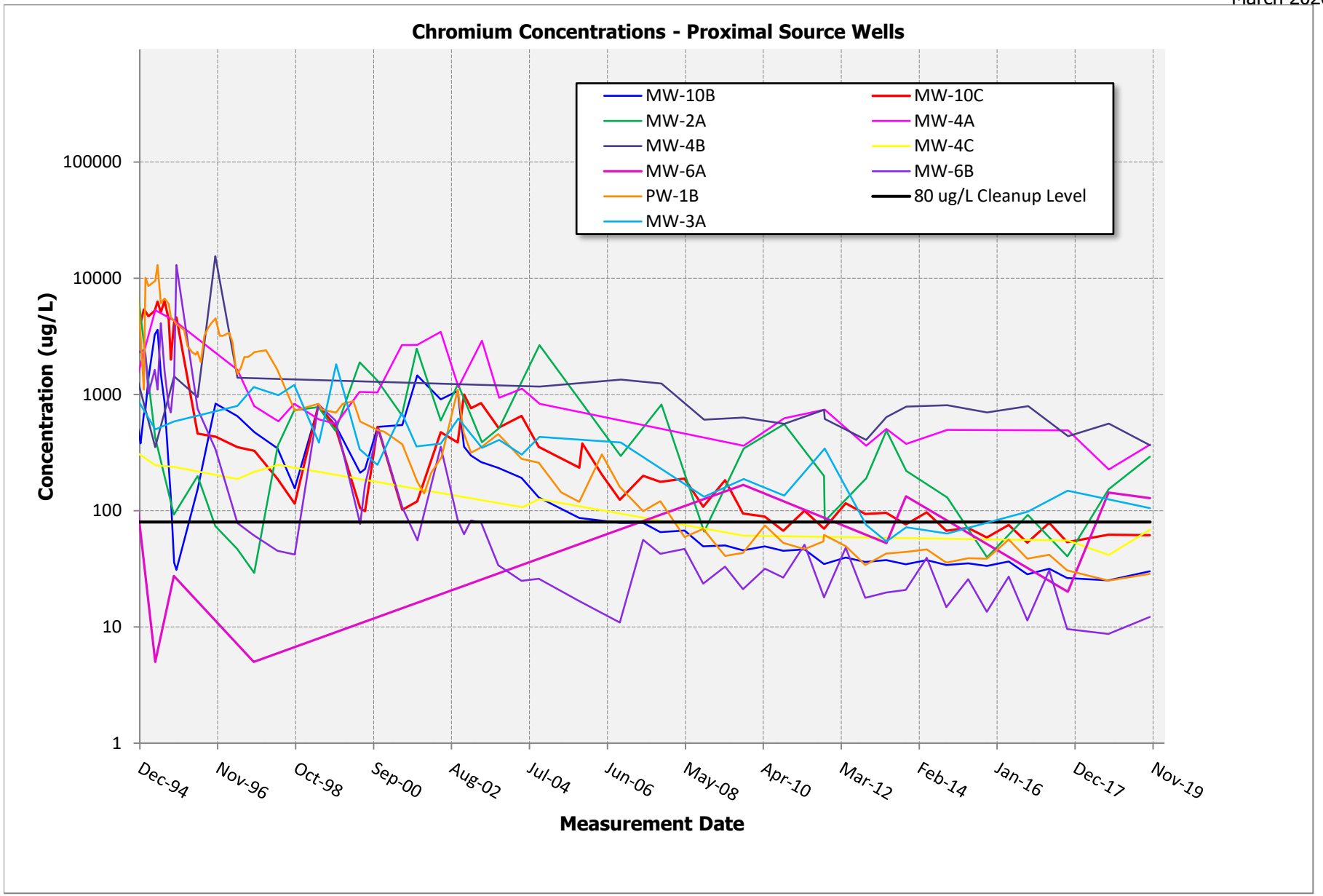
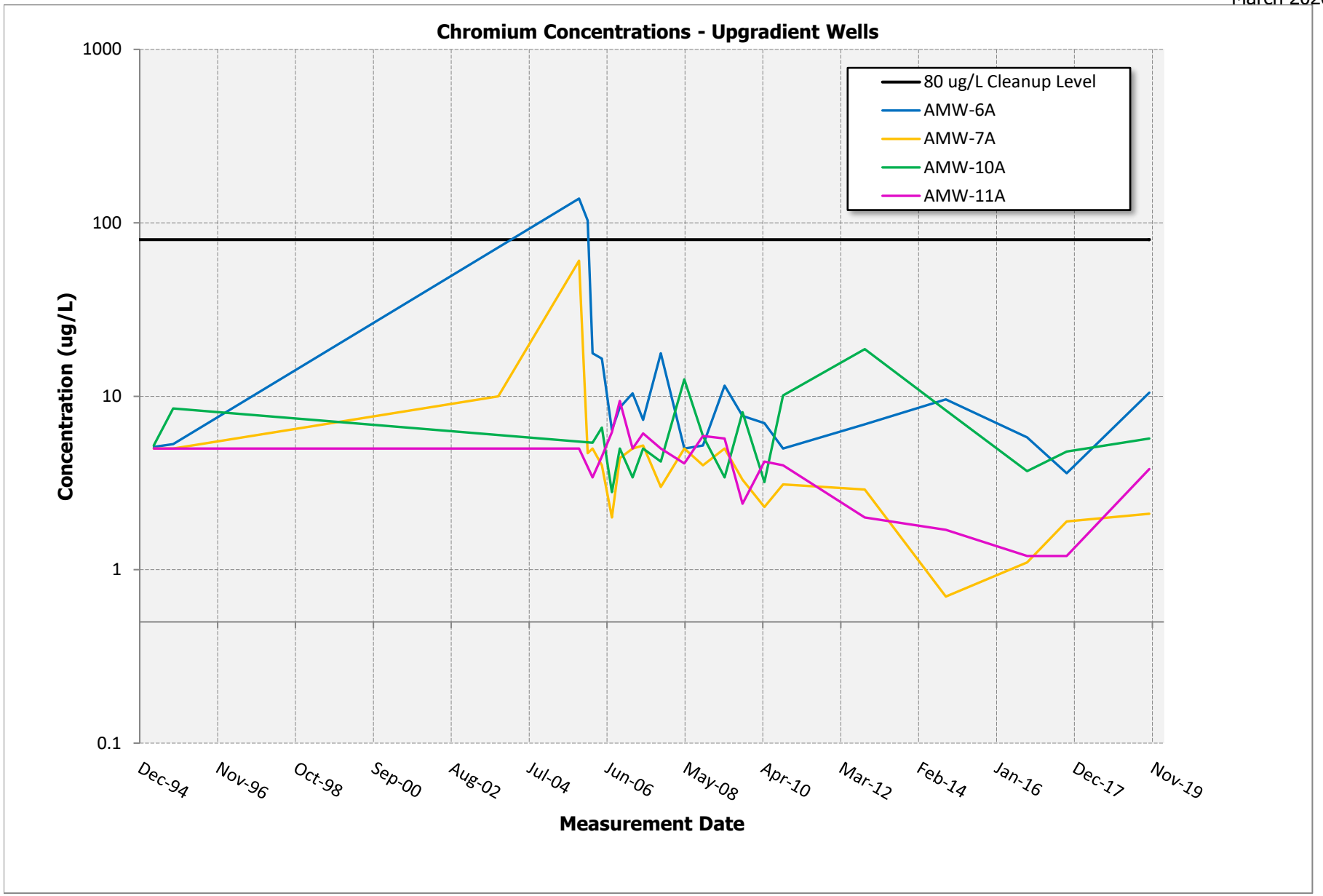
APPENDIX A-2

CHROMIUM CONCENTRATIONS – BY WELL GROUPING


Chromium Concentrations - Church of God Wells
CPU-12
MW-21D
MW-22D
80 ug/L Cleanup Level
Concentration (ug/L)
10000
1000
100
10
1
Mar-95
Aug-96
Dec-97
Apr-99
Sep-00
Jan-02
Jun-03
Oct-04
Mar-06
Jul-07
Nov-08
Apr-10
Aug-11
Jan-13
May-14
Oct-15
Feb-17
Jun-18
Nov-19
Measurement Date

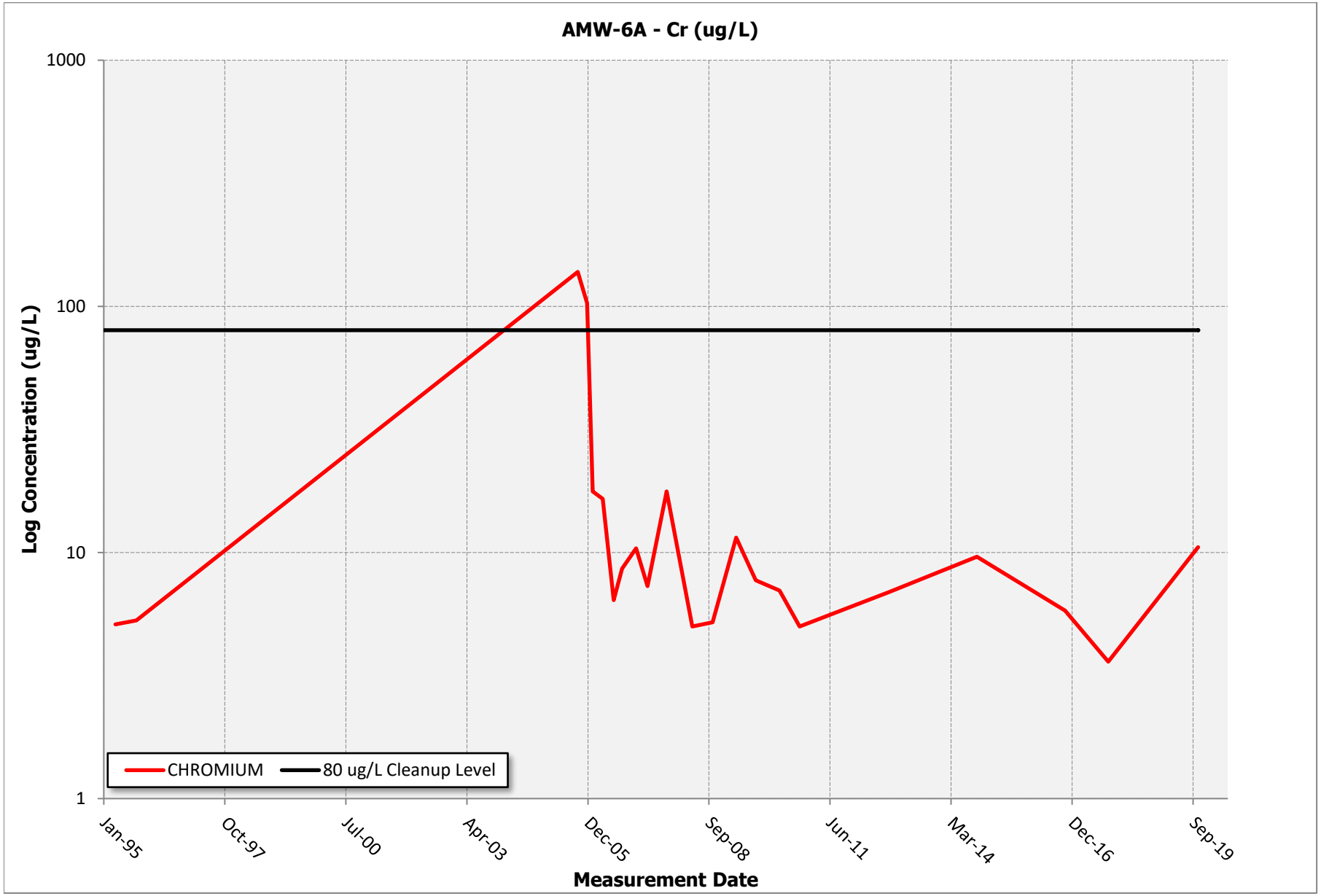

Chromium Concentrations - Intermediate Plume Wells
Concentration (ug/L)
100000
10000
1000
100
10
1
MW-14C
MW-14E
MW-18D
MW-18E
MW-19D
MW-20D
MW-40
80 ug/L Cleanup Level
Sep-98
Aug-00
Jul-02
Jun-04
May-06
Apr-08
Mar-10
Feb-12
Jan-14
Dec-15
Nov-17
Oct-19
Measurement Date

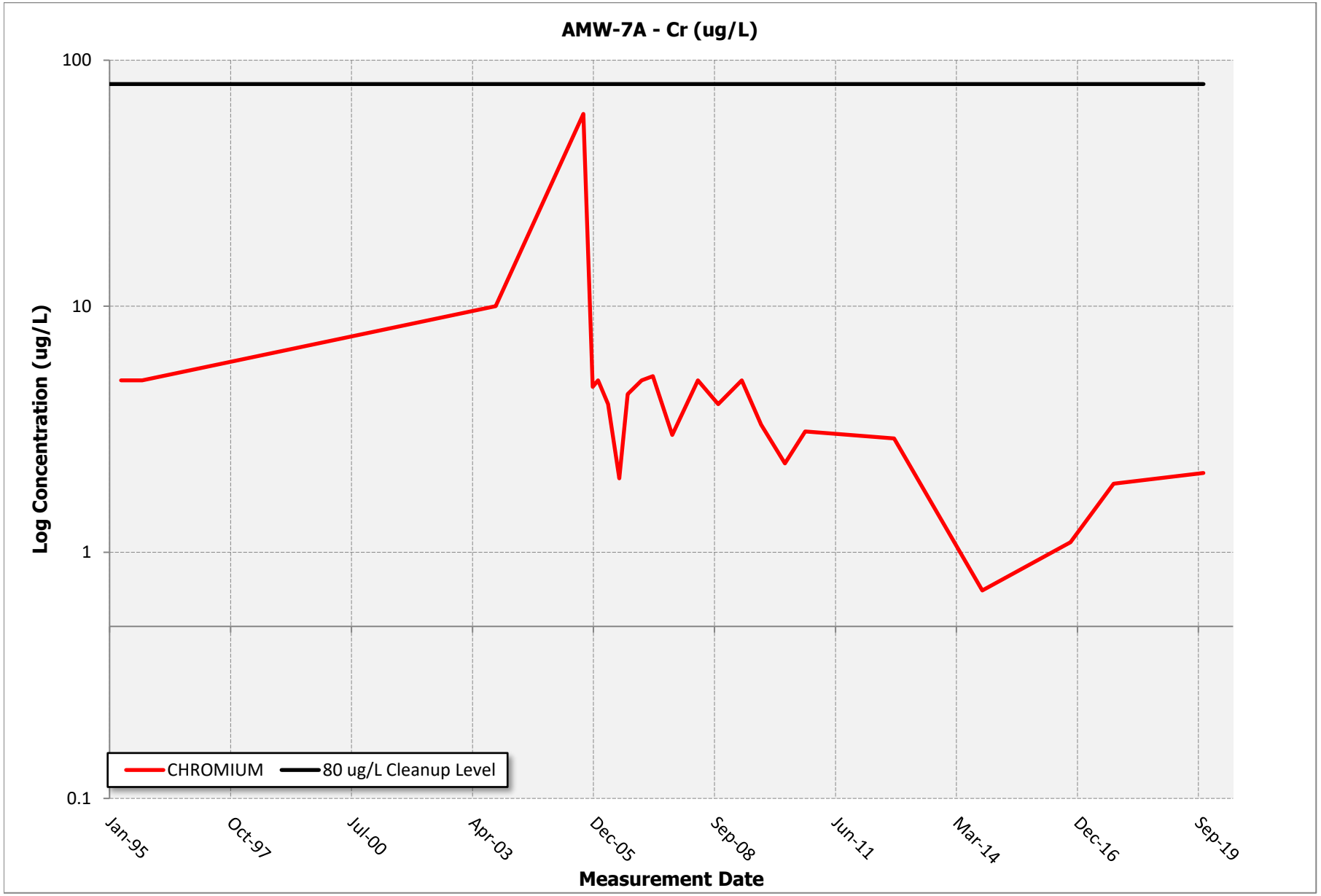

Chromium Concentrations - Proximal Source Wells
MW-10B
MW-10C
MW-2A
MW-4A
MW-4B
MW-4C
MW-6A
MW-6B
PW-1B
80 ug/L Cleanup Level
MW-3A
Concentration (ug/L)
100000
10000
1000
100
10
1
Dec-94
Nov-96
Oct-98
Sep-00
Aug-02
Jul-04
Jun-06
May-08
Apr-10
Mar-12
Feb-14
Jan-16
Dec-17
Nov-19
Measurement Date

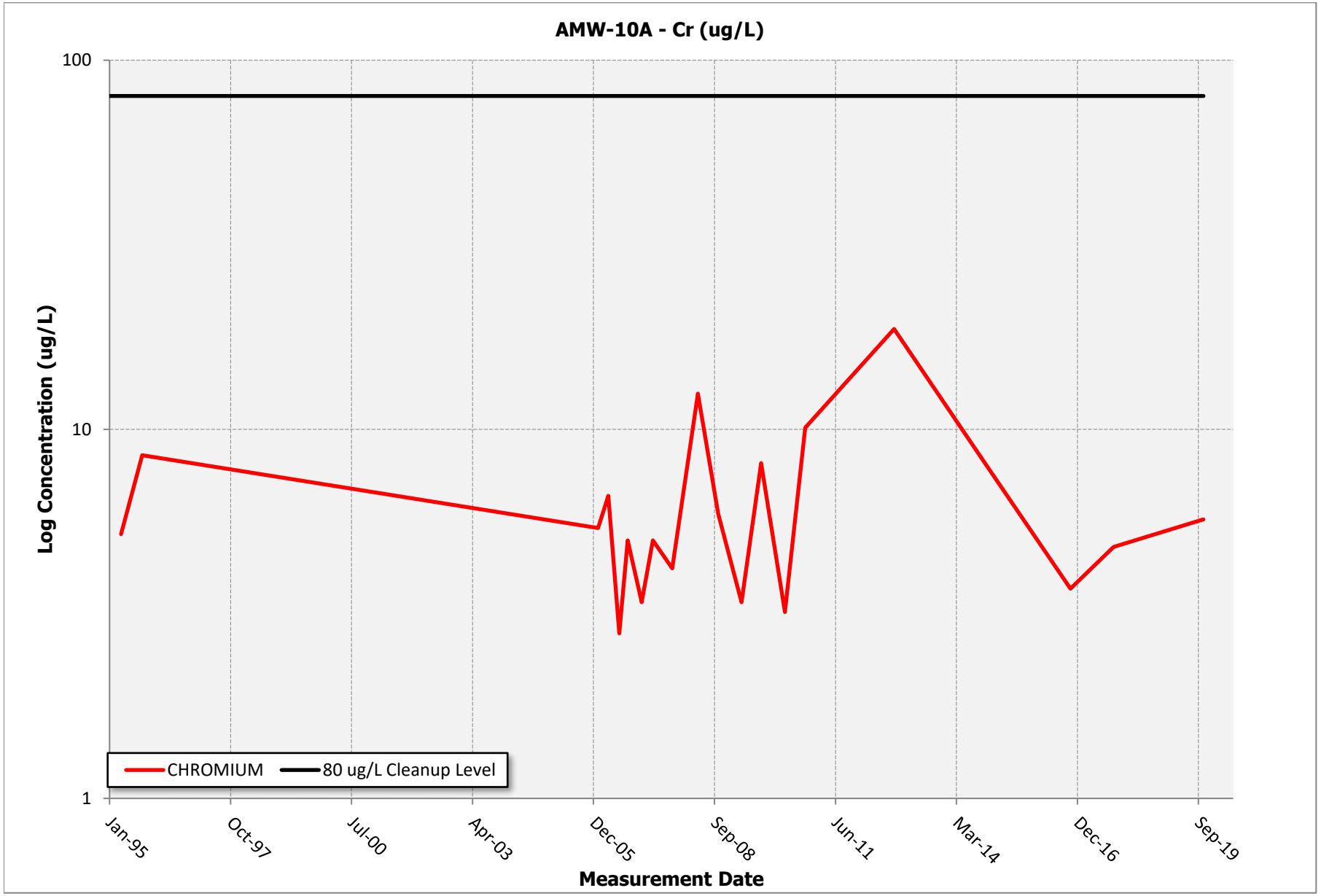

Chromium Concentrations - Upgradient Wells
1000
100
10
1
0.1
Concentration (ug/L)
80 ug/L Cleanup Level
AMW-6A
AMW-7A
AMW-10A
AMW-11A
Dec-94
Nov-96
Oct-98
Sep-00
Aug-02
Jul-04
Jun-06
May-08
Apr-10
Mar-12
Feb-14
Jan-16
Dec-17
Nov-19
Measurement Date

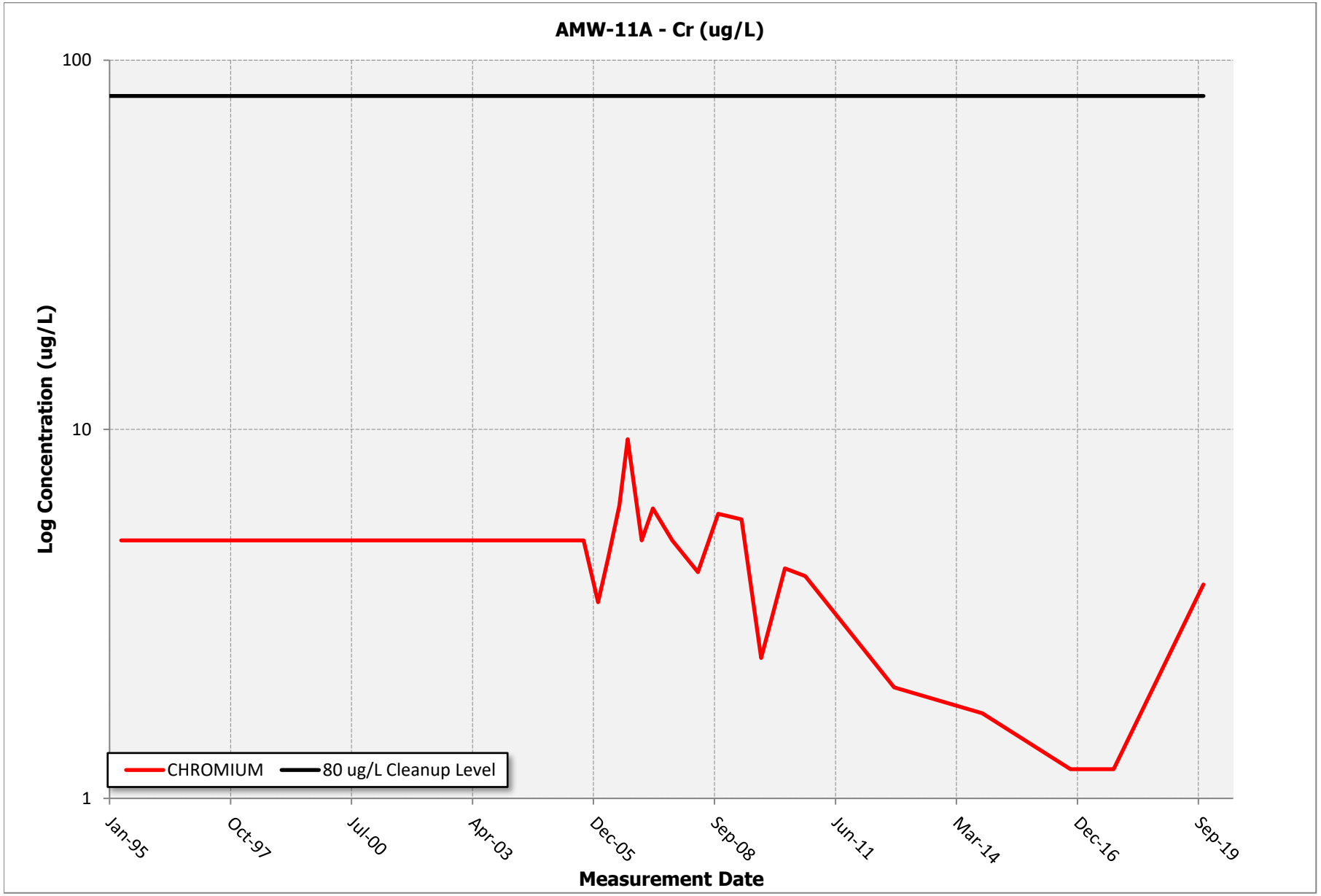
APPENDIX A-3

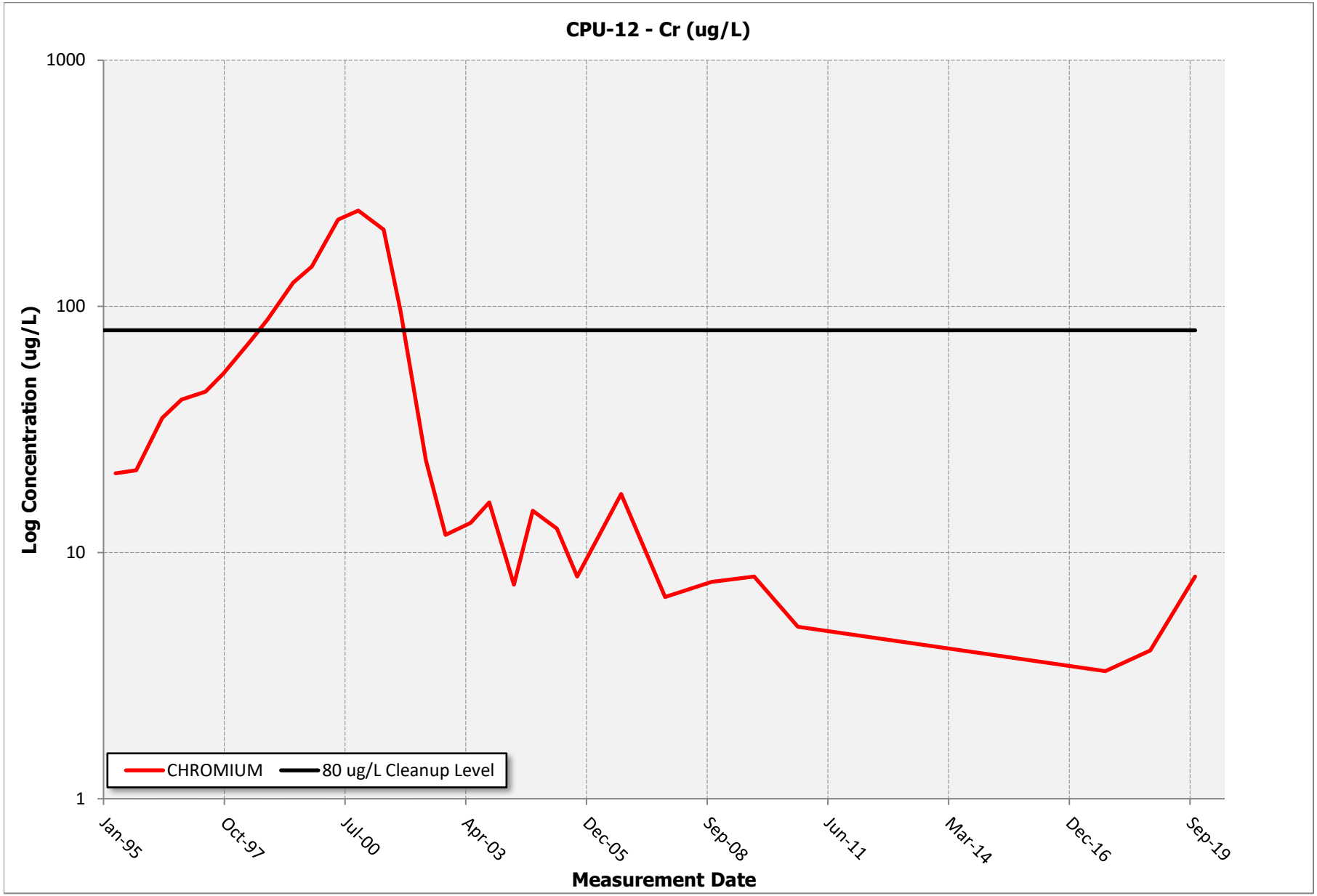
CHROMIUM CONCENTRATIONS – INDIVIDUAL WELLS

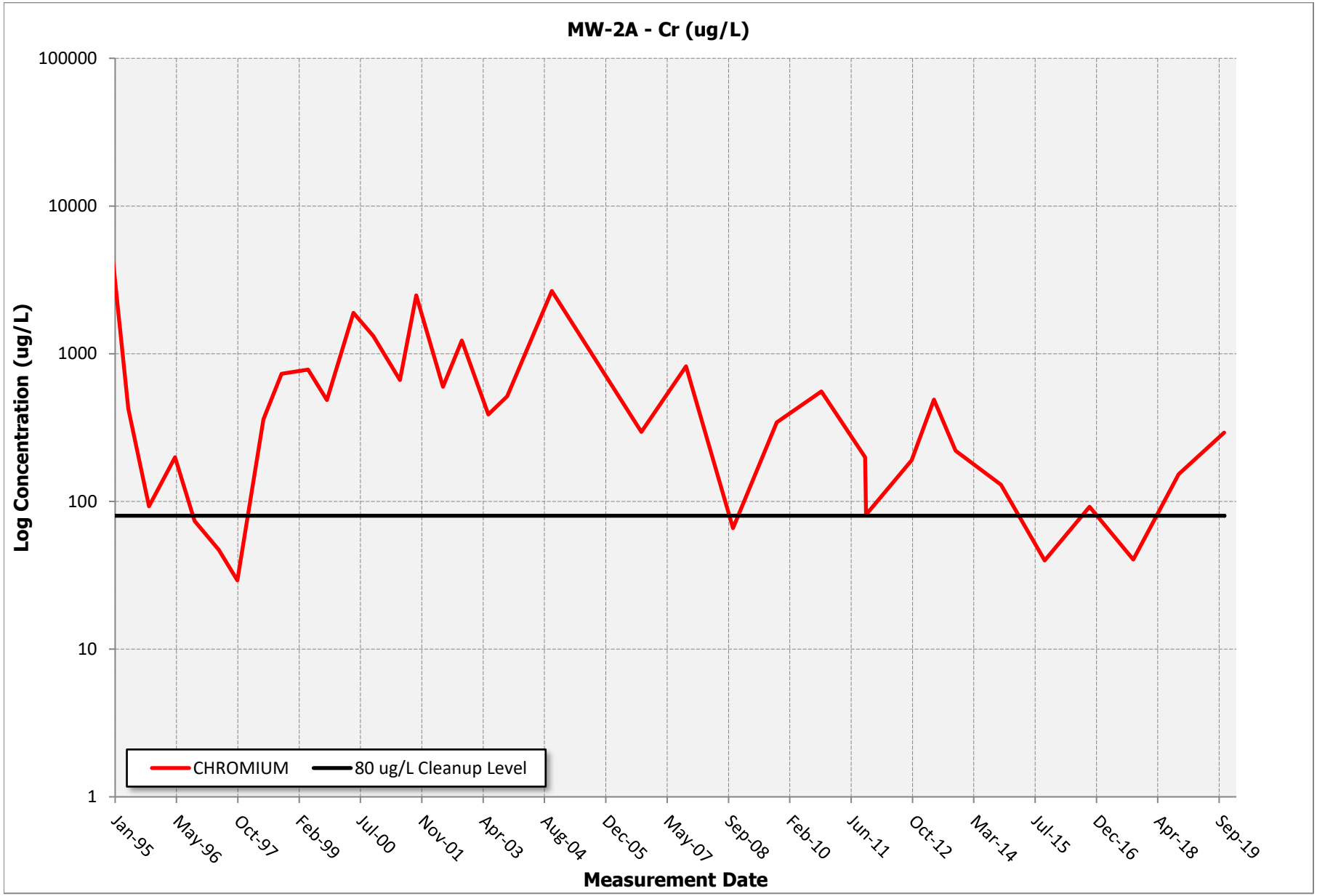

AMW-6A - Cr (ug/L)
1000
100
10
1
Log Concentration (ug/L)
CHROMIUM
80 ug/L Cleanup Level
Jan-95
Oct-97
Jul-00
Apr-03
Dec-05
Sep-08
Jun-11
Mar-14
Dec-16
Sep-19
Measurement Date

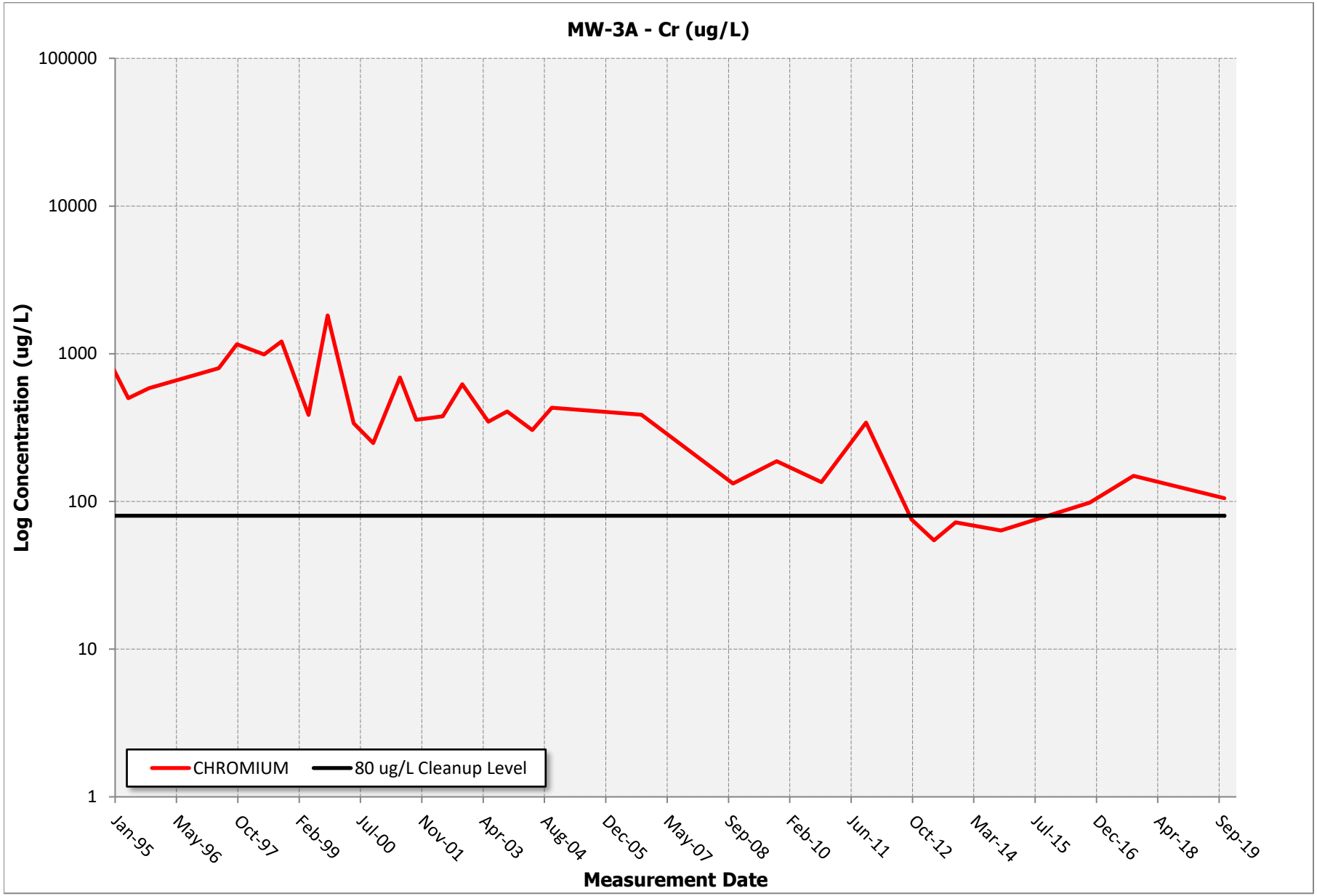

AMW-7A - Cr (ug/L)
100
10
1
0.1
Log Concentration (ug/L)
CHROMIUM
80 ug/L Cleanup Level
Jan-95
Oct-97
Jul-00
Apr-03
Dec-05
Sep-08
Jun-11
Mar-14
Dec-16
Sep-19
Measurement Date

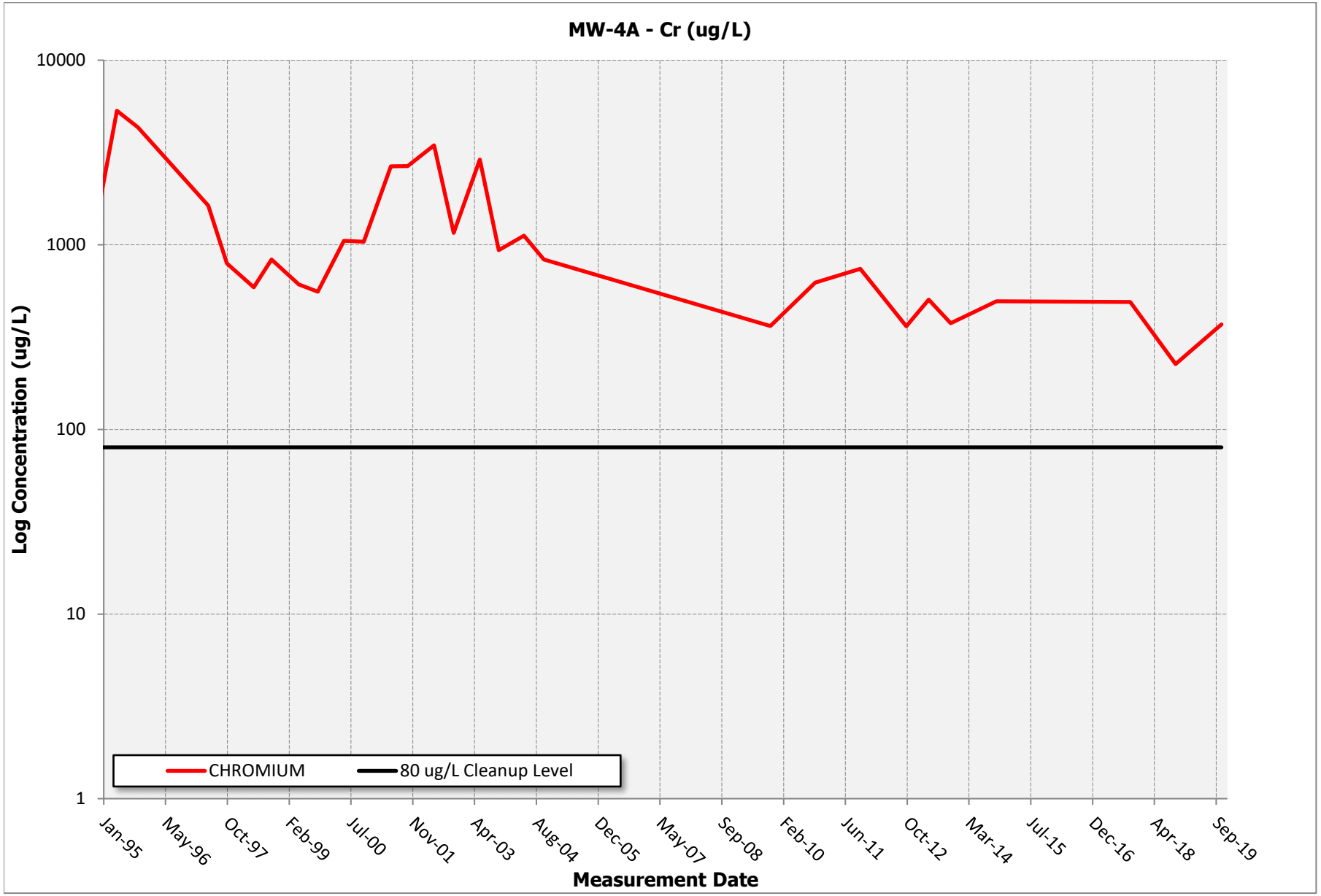

AMW-10A - Cr (ug/L)
100
10
1
Log Concentration (ug/L)
CHROMIUM
80 ug/L Cleanup Level
Jan-95
Oct-97
Jul-00
Apr-03
Dec-05
Sep-08
Jun-11
Mar-14
Dec-16
Sep-19
Measurement Date

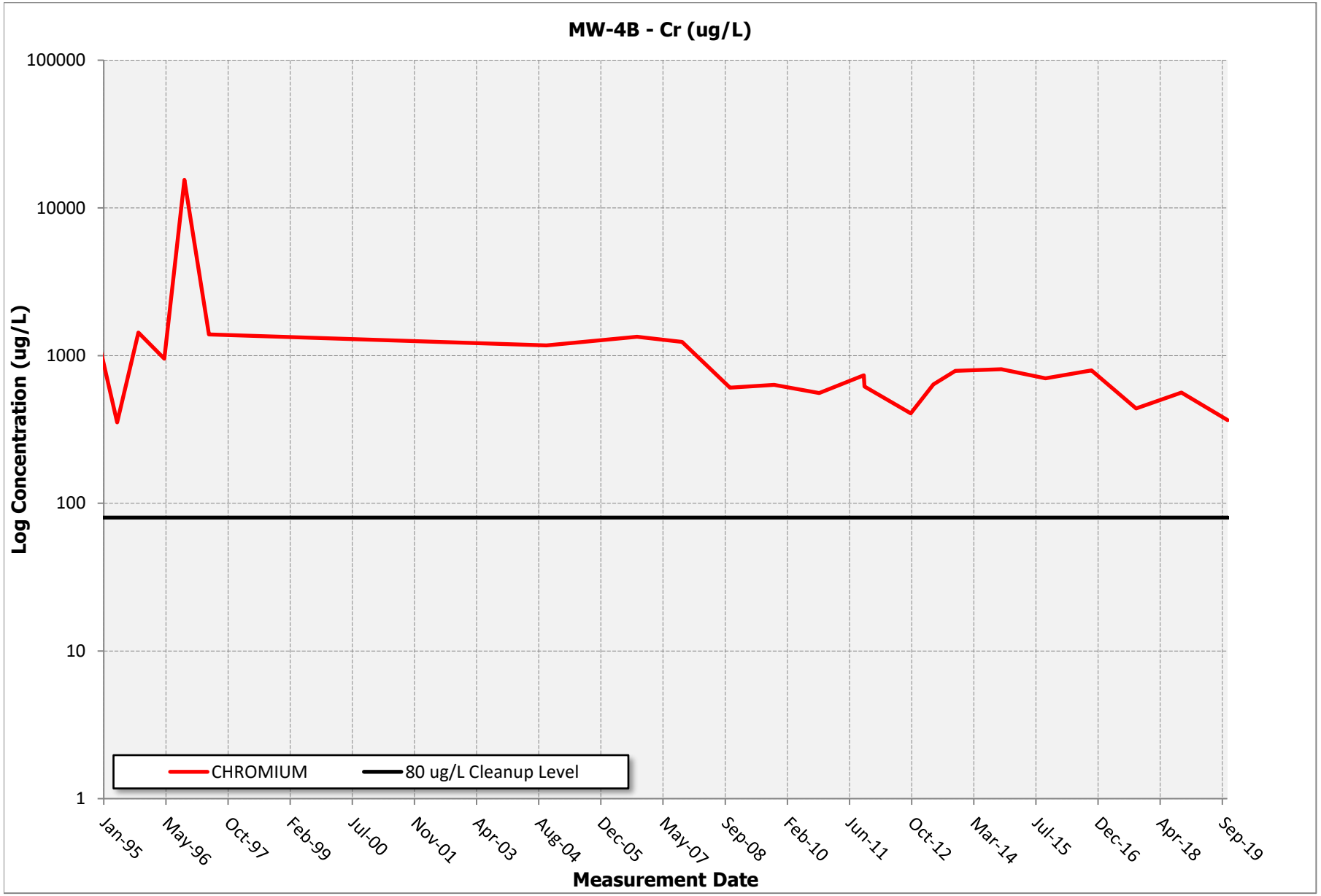

AMW-11A - Cr (ug/L)
100
10
1
Log Concentration (ug/L)
CHROMIUM
80 ug/L Cleanup Level
Jan-95
Oct-97
Jul-00
Apr-03
Dec-05
Sep-08
Jun-11
Mar-14
Dec-16
Sep-19
Measurement Date

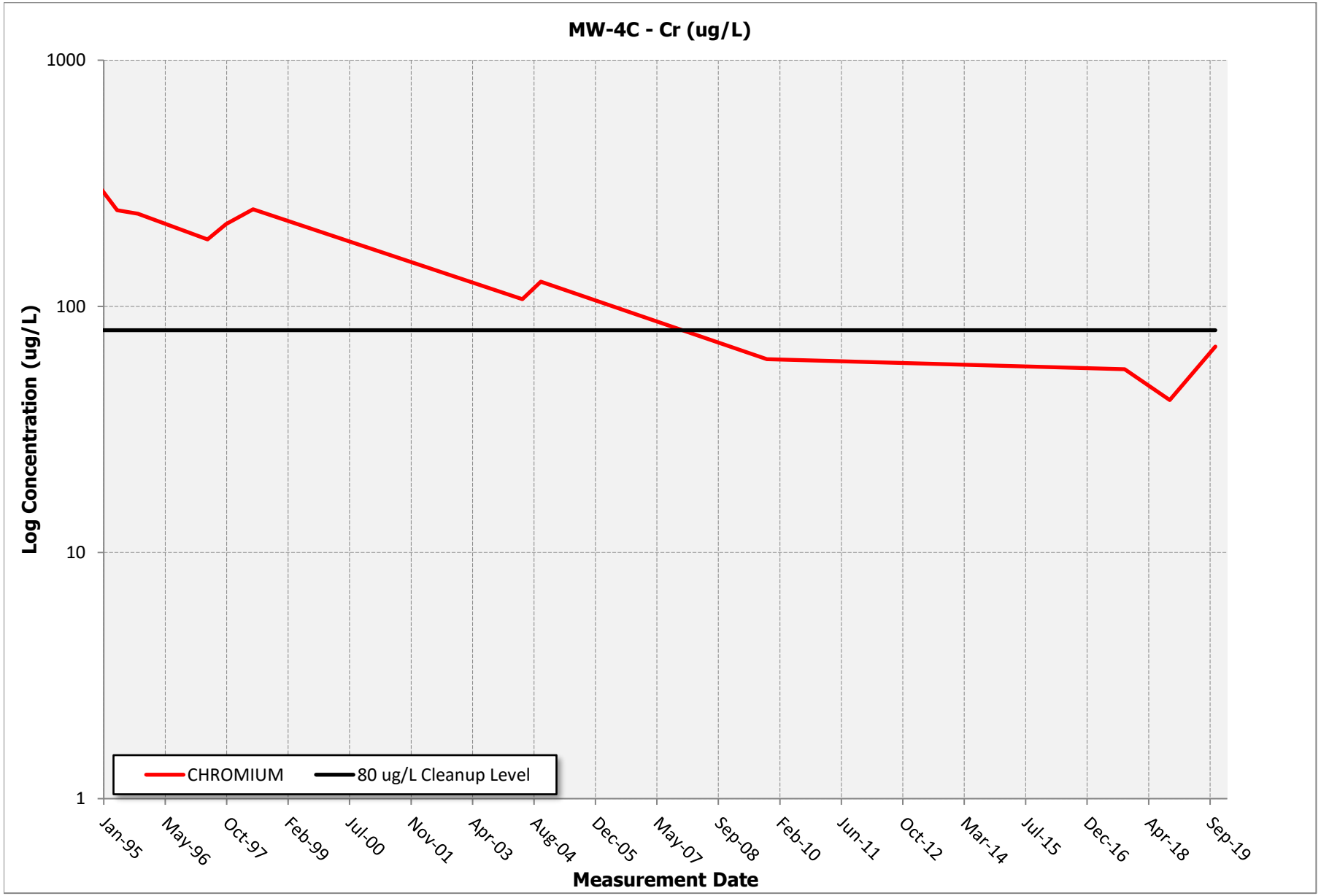

CPU-12 - Cr (ug/L)
1000
100
10
1
Log Concentration (ug/L)
CHROMIUM
80 ug/L Cleanup Level
Jan-95
Oct-97
Jul-00
Apr-03
Dec-05
Sep-08
Jun-11
Mar-14
Dec-16
Sep-19
Measurement Date

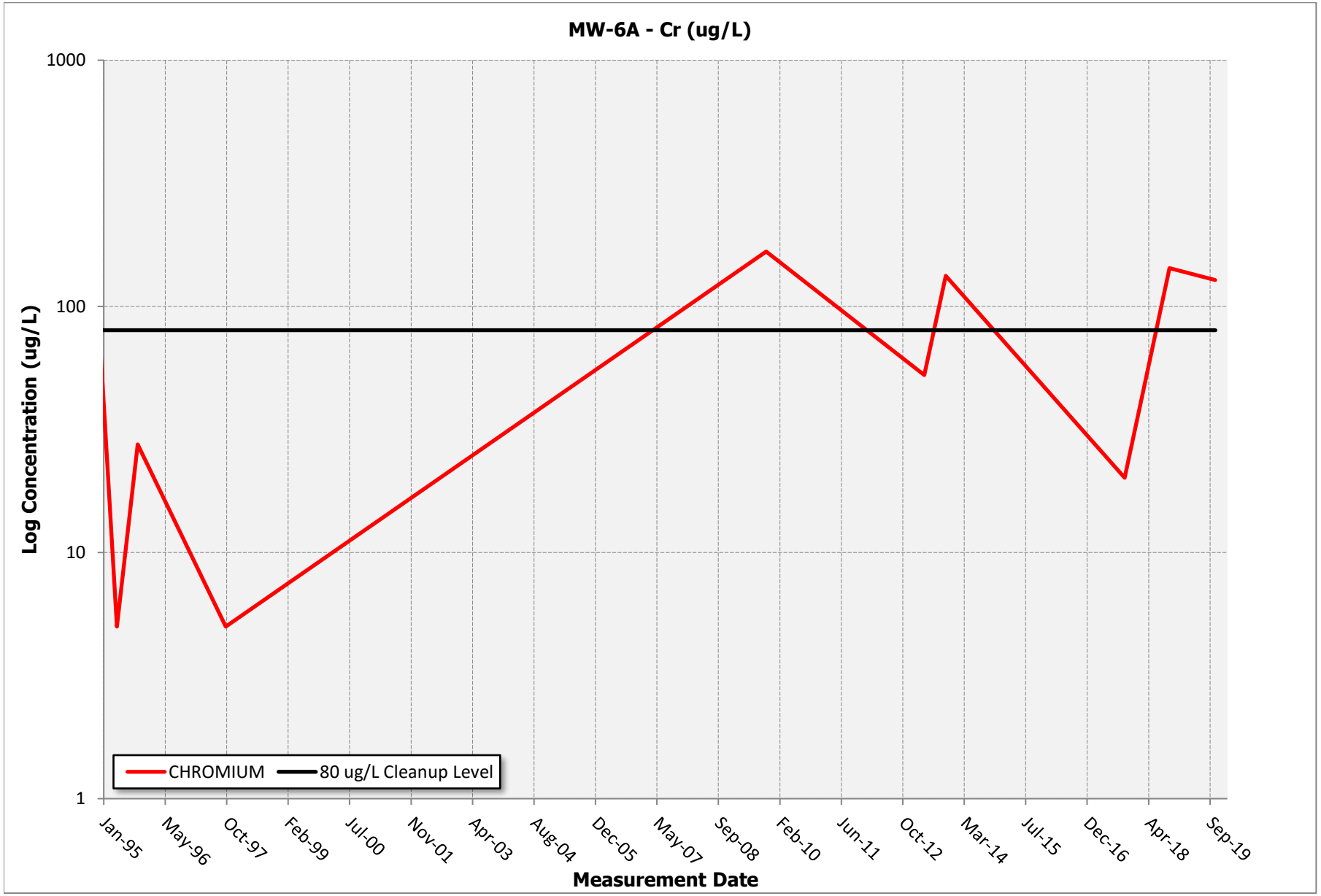

MW-2A - Cr (ug/L)
Log Concentration (ug/L)
100000
10000
1000
100
10
1
CHROMIUM
80 ug/L Cleanup Level
Jan-95
May-96
Oct-97
Feb-99
Jul-00
Nov-01
Apr-03
Aug-04
Dec-05
May-07
Sep-08
Feb-10
Jun-11
Oct-12
Mar-14
Jul-15
Dec-16
Apr-18
Sep-19
Measurement Date

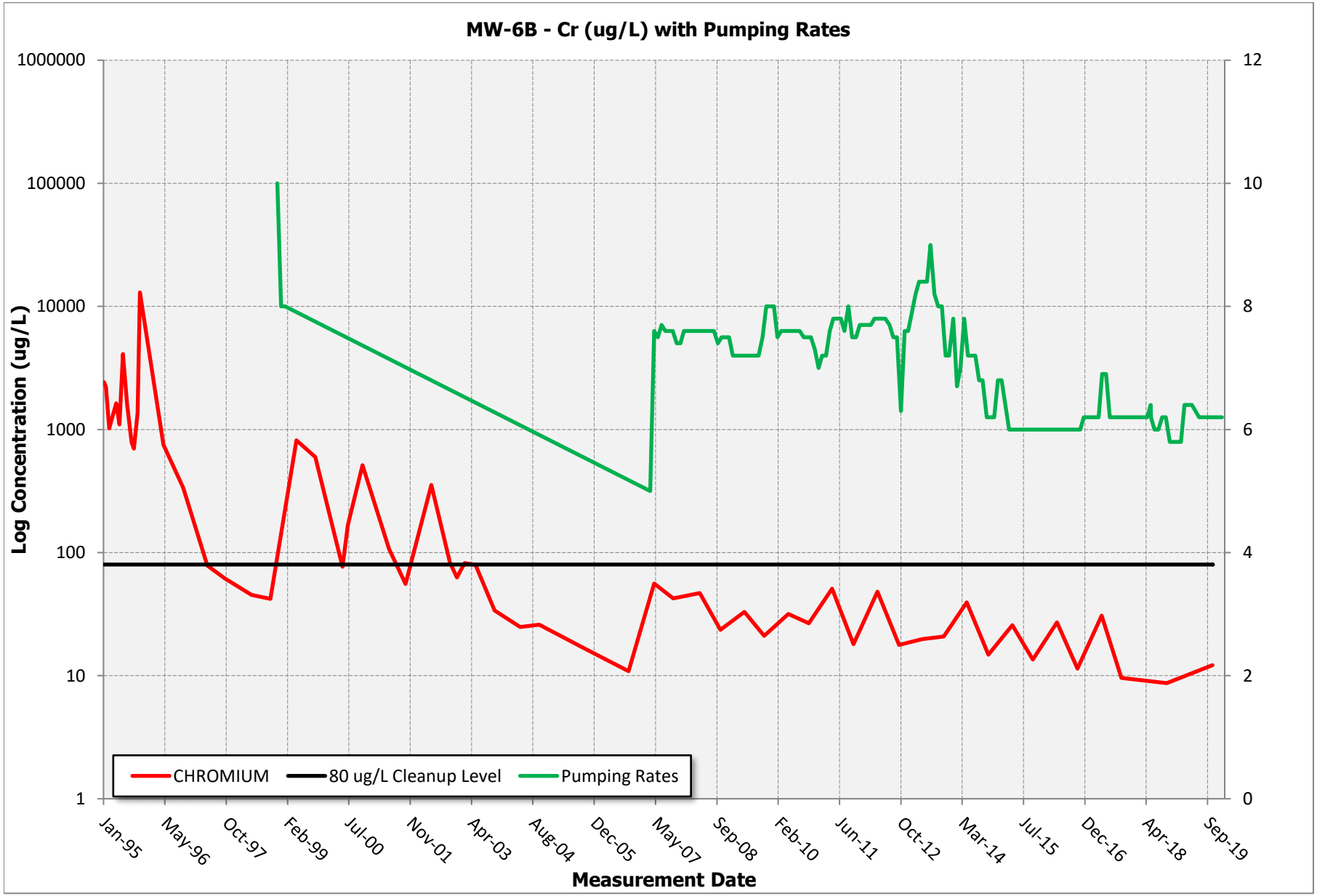

MW-3A - Cr (ug/L)
Log Concentration (ug/L)
100000
10000
1000
100
10
1
CHROMIUM
80 ug/L Cleanup Level
Jan-95
May-96
Oct-97
Feb-99
Jul-00
Nov-01
Apr-03
Aug-04
Dec-05
May-07
Sep-08
Feb-10
Jun-11
Oct-12
Mar-14
Jul-15
Dec-16
Apr-18
Sep-19
Measurement Date

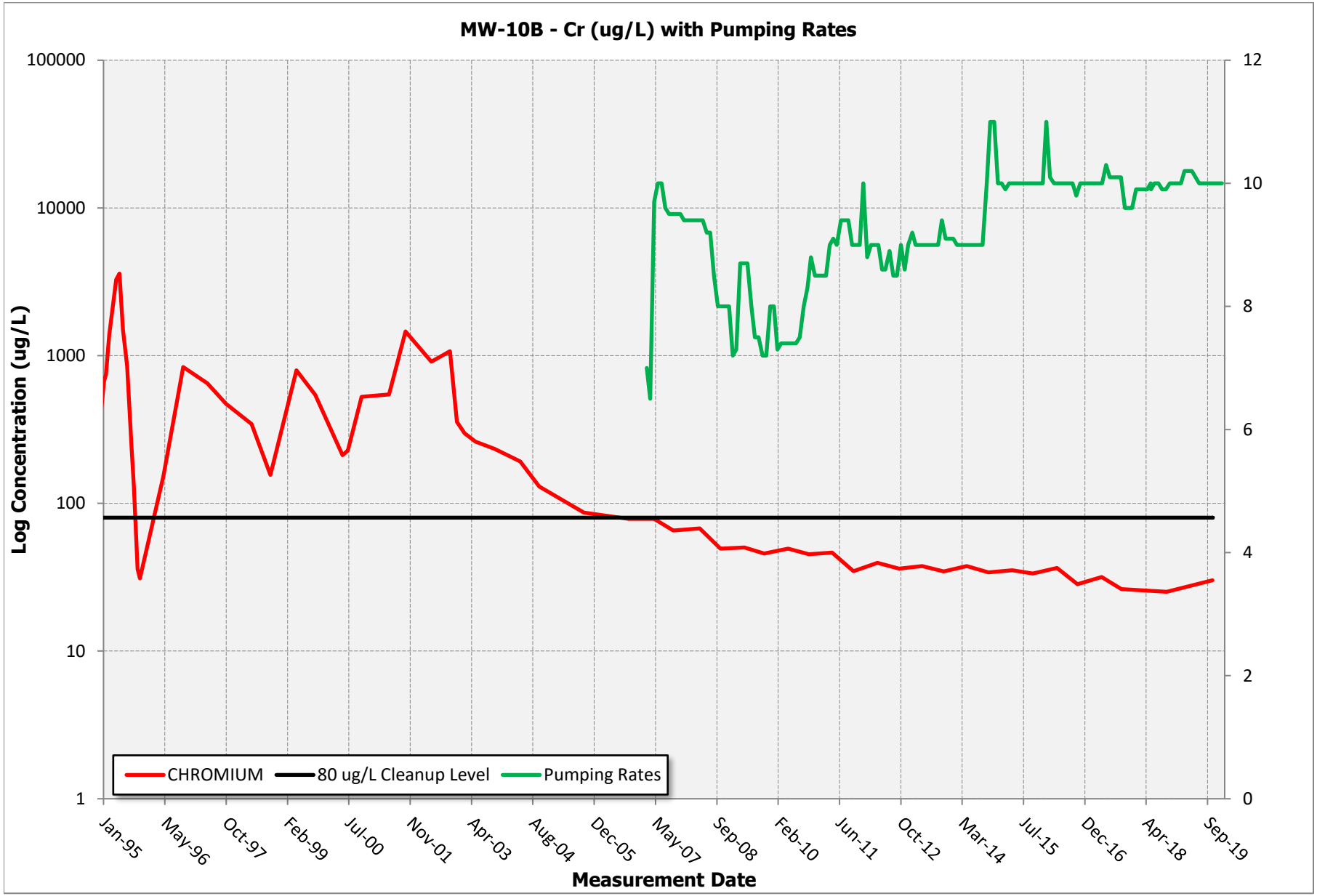

MW-4A - Cr (ug/L)
10000
1000
100
10
1
Log Concentration (ug/L)
CHROMIUM
80 ug/L Cleanup Level
Jan-95
May-96
Oct-97
Feb-99
Jul-00
Nov-01
Apr-03
Aug-04
Dec-05
May-07
Sep-08
Feb-10
Jun-11
Oct-12
Mar-14
Jul-15
Dec-16
Apr-18
Sep-19
Measurement Date

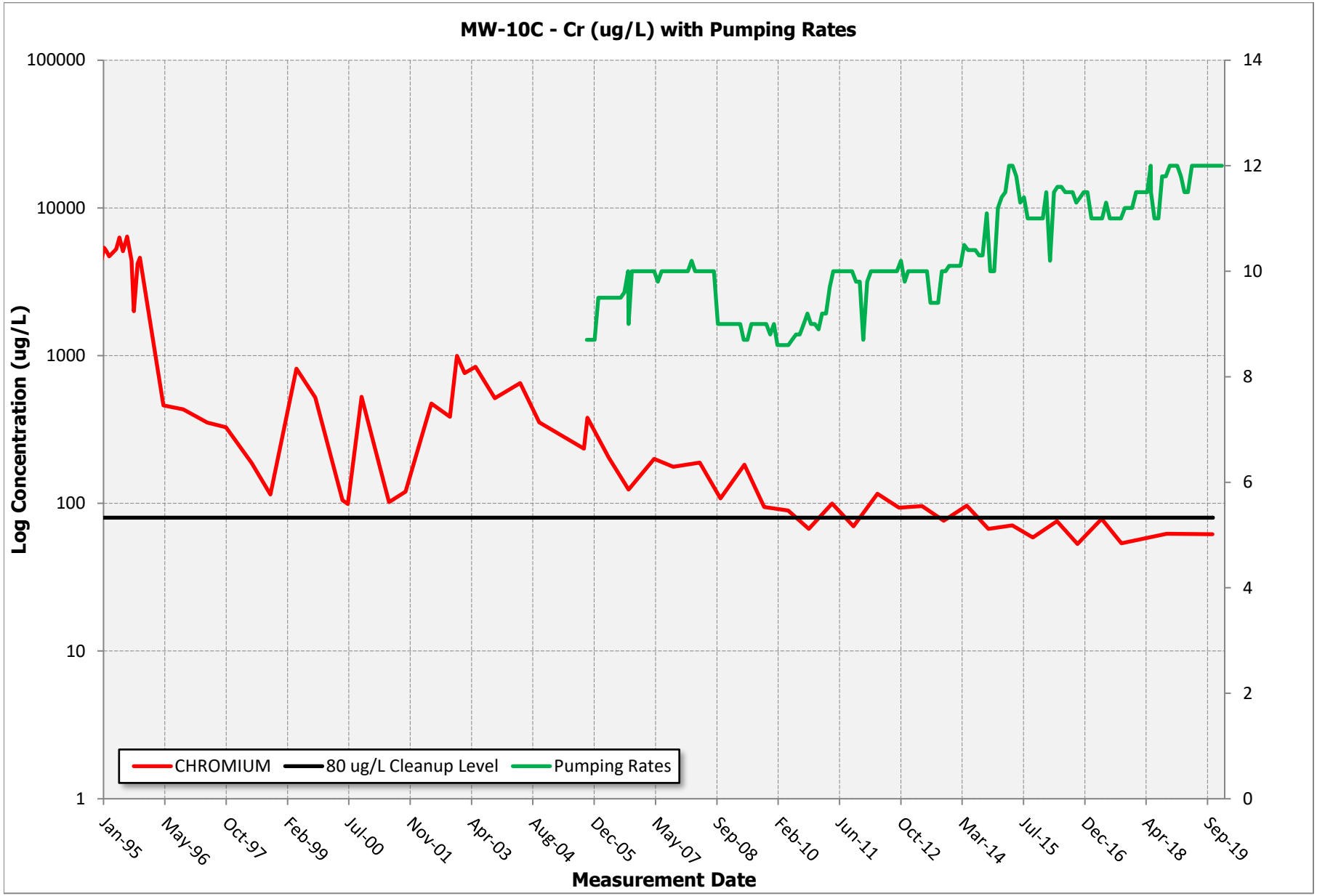

MW-4B - Cr (ug/L)
Log Concentration (ug/L)
100000
10000
1000
100
10
1
CHROMIUM
80 ug/L Cleanup Level
Jan-95
May-96
Oct-97
Feb-99
Jul-00
Nov-01
Apr-03
Aug-04
Dec-05
May-07
Sep-08
Feb-10
Jun-11
Oct-12
Mar-14
Jul-15
Dec-16
Apr-18
Sep-19
Measurement Date

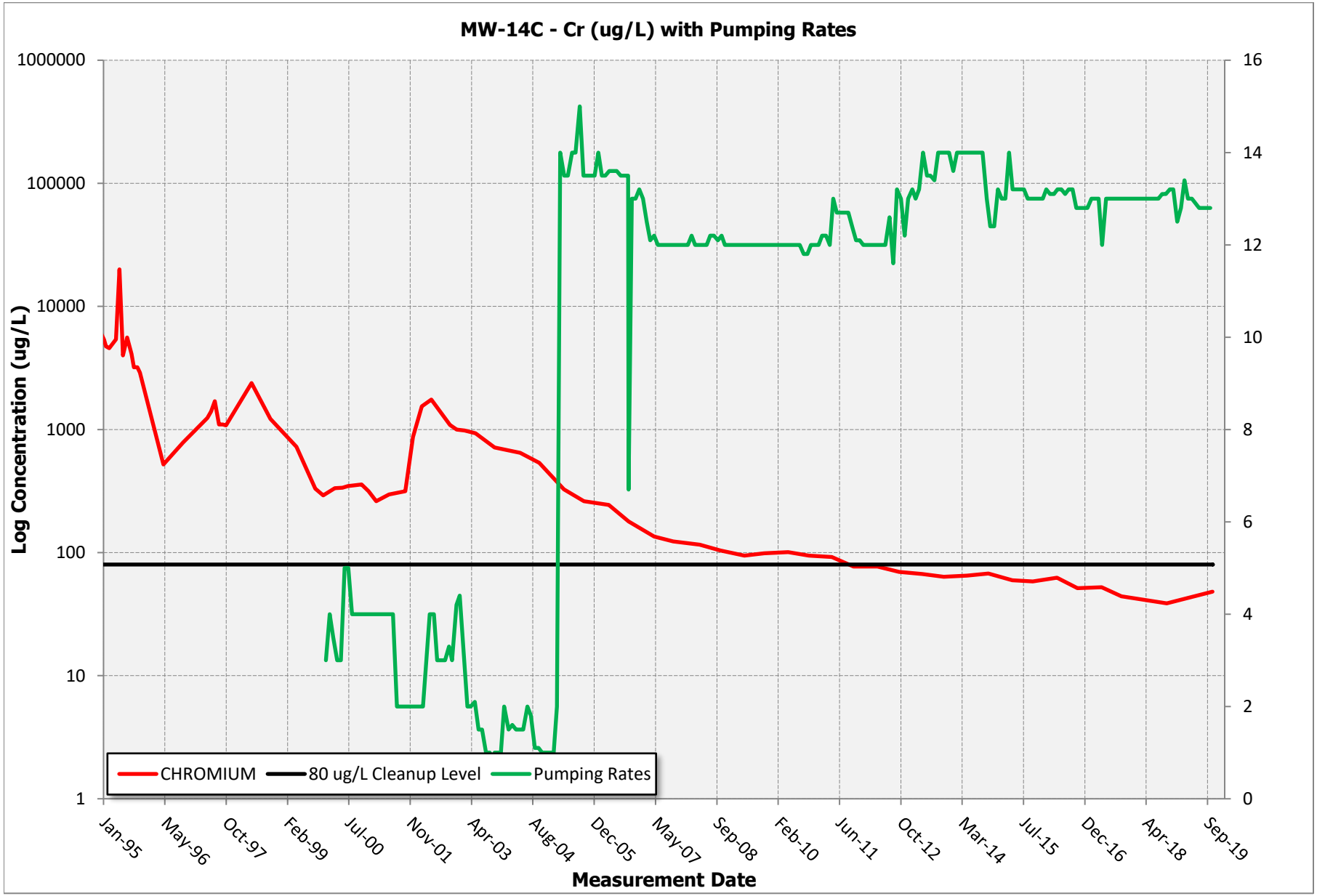

MW-4C - Cr (ug/L)
Log Concentration (ug/L)
1000
100
10
1
CHROMIUM
80 ug/L Cleanup Level
Jan-95
May-96
Oct-97
Feb-99
Jul-00
Nov-01
Apr-03
Aug-04
Dec-05
May-07
Sep-08
Feb-10
Jun-11
Oct-12
Mar-14
Jul-15
Dec-16
Apr-18
Sep-19
Measurement Date

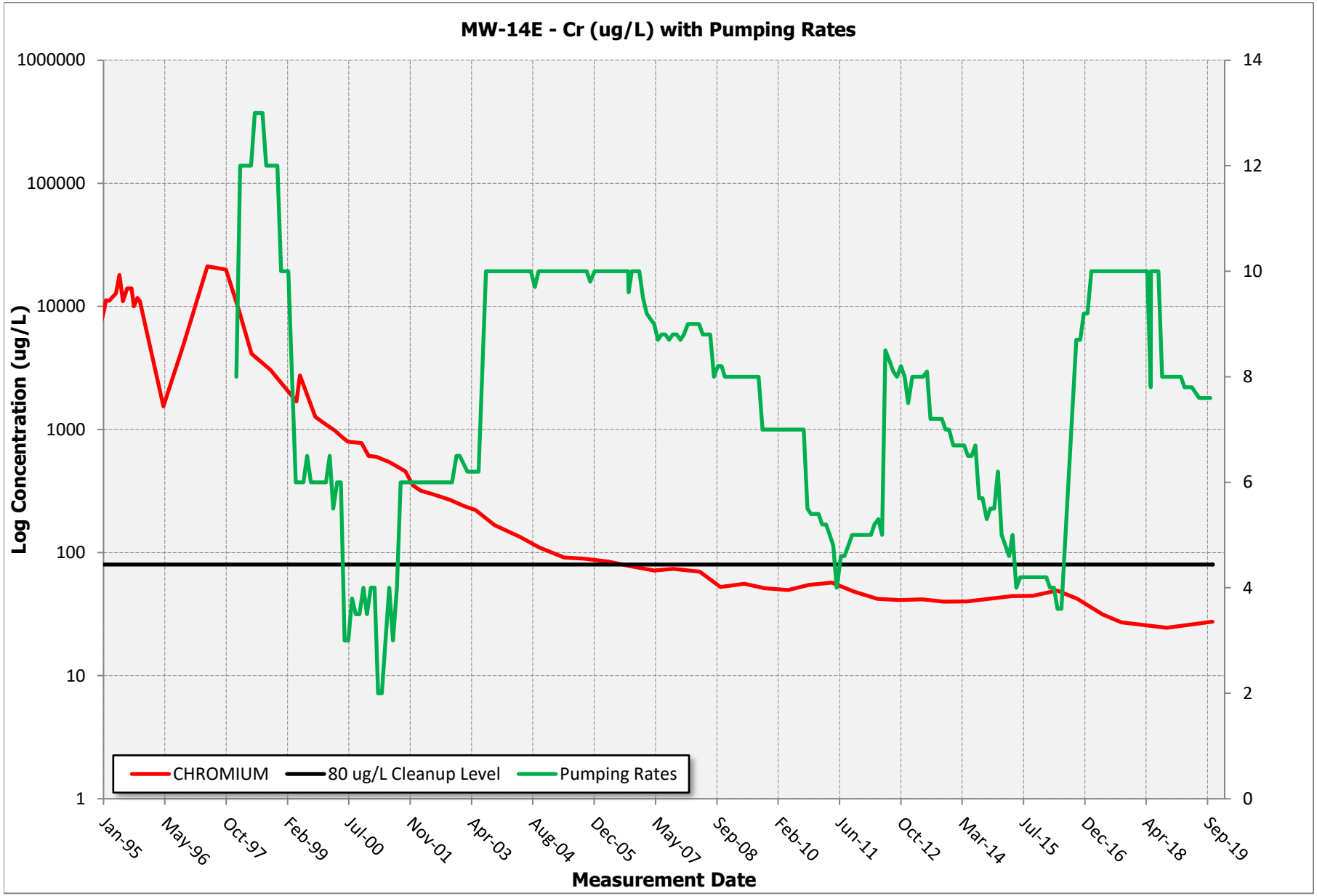

MW-6A - Cr (ug/L)
Log Concentration (ug/L)
1000
100
10
1
CHROMIUM
80 ug/L Cleanup Level
Jan-95
May-96
Oct-97
Feb-99
Jul-00
Nov-01
Apr-03
Aug-04
Dec-05
May-07
Sep-08
Feb-10
Jun-11
Oct-12
Mar-14
Jul-15
Dec-16
Apr-18
Sep-19
Measurement Date

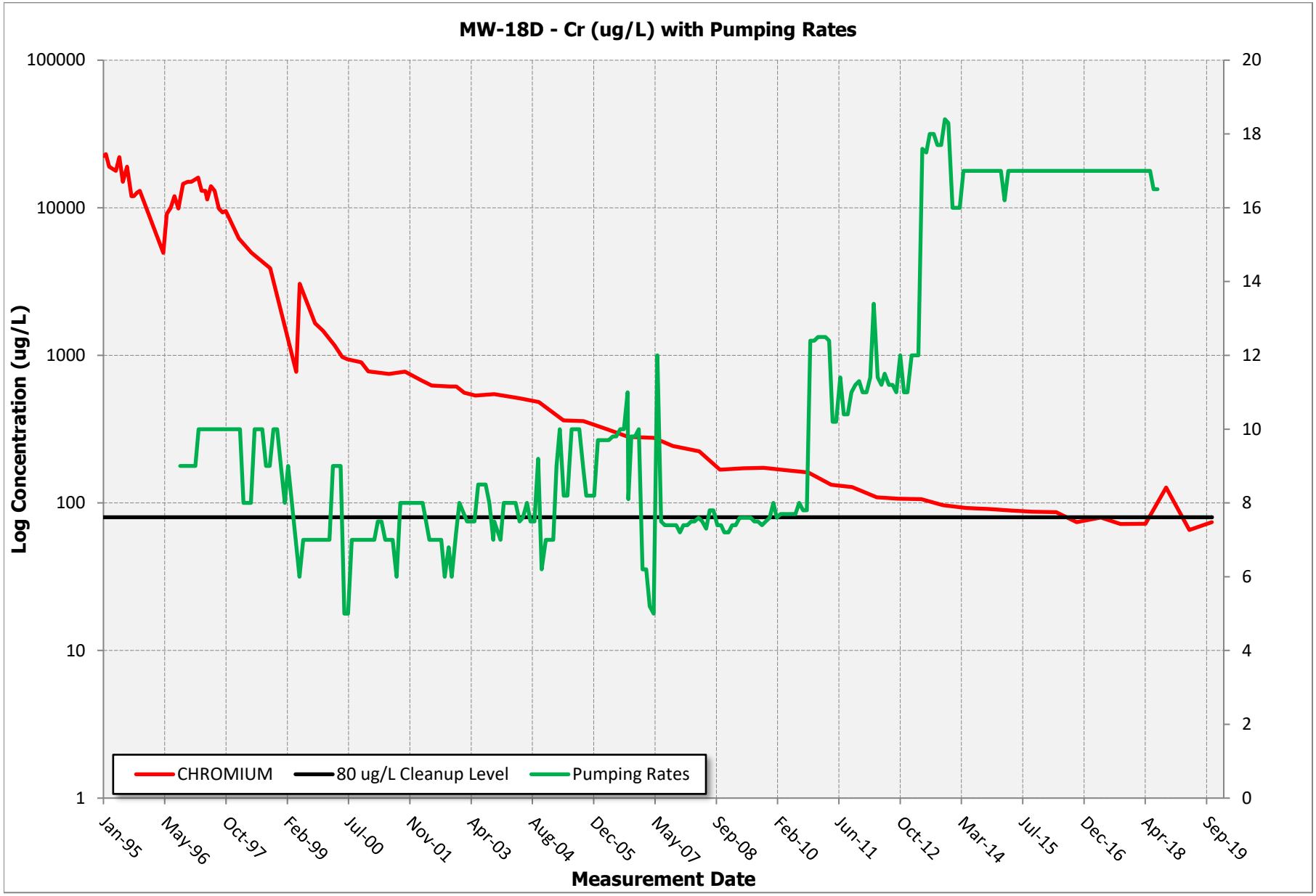

MW-6B - Cr (ug/L) with Pumping Rates
Log Concentration (ug/L)
1000000
100000
10000
1000
100
10
1
12
10
8
6
4
2
0
CHROMIUM
80 ug/L Cleanup Level
Pumping Rates
Jan-95
May-96
Oct-97
Feb-99
Jul-00
Nov-01
Apr-03
Aug-04
Dec-05
May-07
Sep-08
Feb-10
Jun-11
Oct-12
Mar-14
Jul-15
Dec-16
Apr-18
Sep-19
Measurement Date

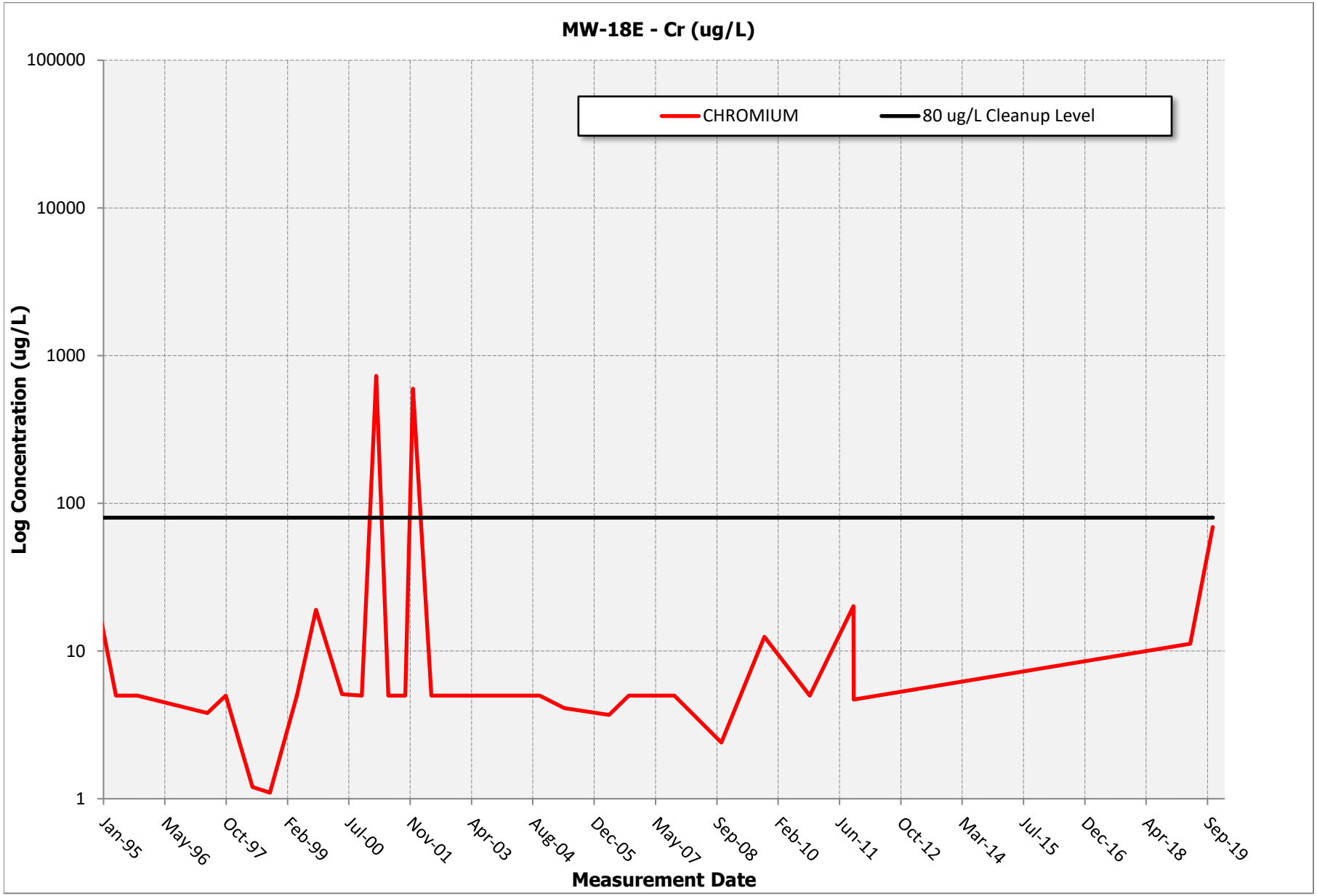

MW-10B - Cr (ug/L) with Pumping Rates
Log Concentration (ug/L)
100000
10000
1000
100
10
1
12
10
8
6
4
2
0
Jan-95
May-96
Oct-97
Feb-99
Jul-00
Nov-01
Apr-03
Aug-04
Dec-05
May-07
Sep-08
Feb-10
Jun-11
Oct-12
Mar-14
Jul-15
Dec-16
Apr-18
Sep-19
Measurement Date
CHROMIUM
80 ug/L Cleanup Level
Pumping Rates

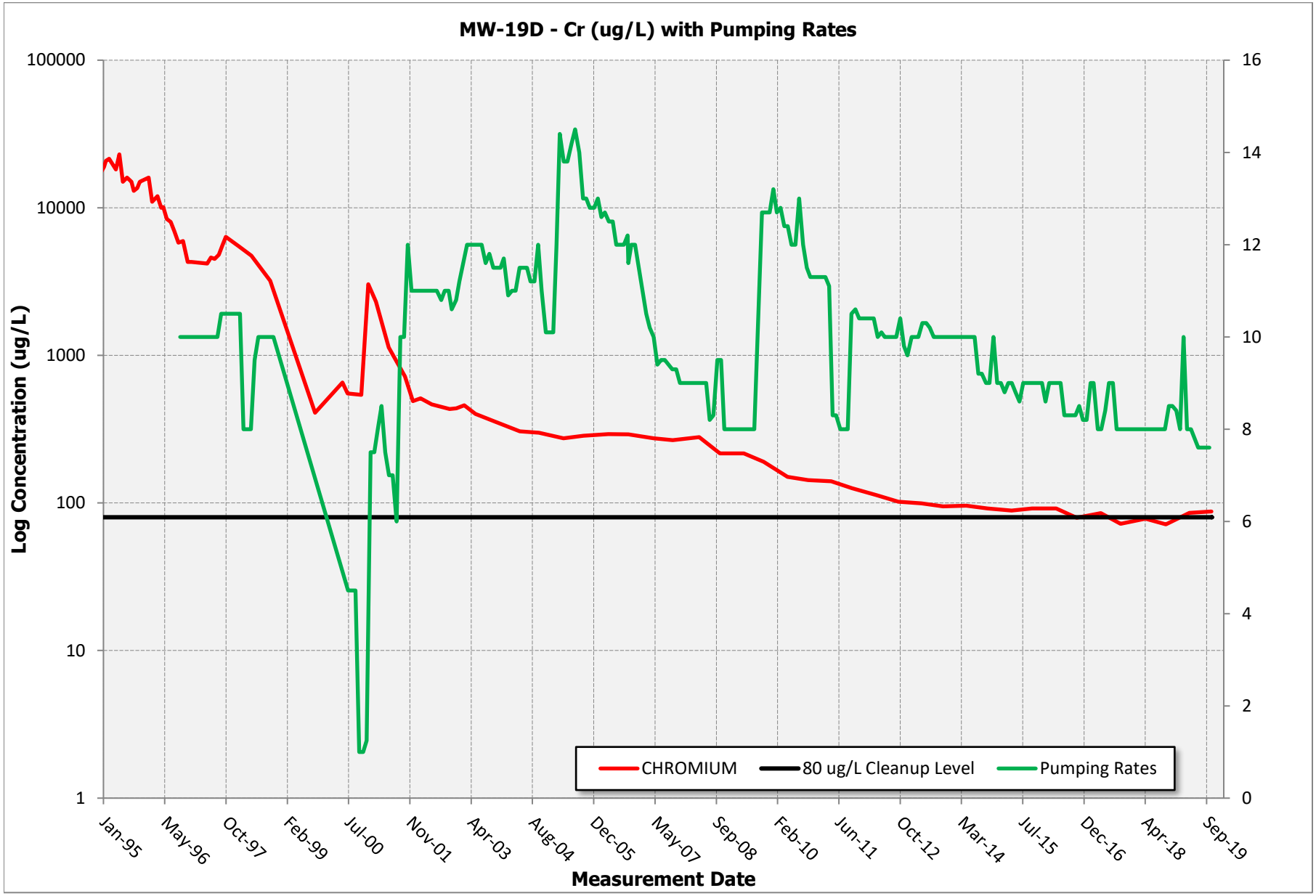

MW-10C - Cr (ug/L) with Pumping Rates
Log Concentration (ug/L)
100000
10000
1000
100
10
1
14
12
10
8
6
4
2
0
CHROMIUM
80 ug/L Cleanup Level
Pumping Rates
Jan-95
May-96
Oct-97
Feb-99
Jul-00
Nov-01
Apr-03
Aug-04
Dec-05
May-07
Sep-08
Feb-10
Jun-11
Oct-12
Mar-14
Jul-15
Dec-16
Apr-18
Sep-19
Measurement Date

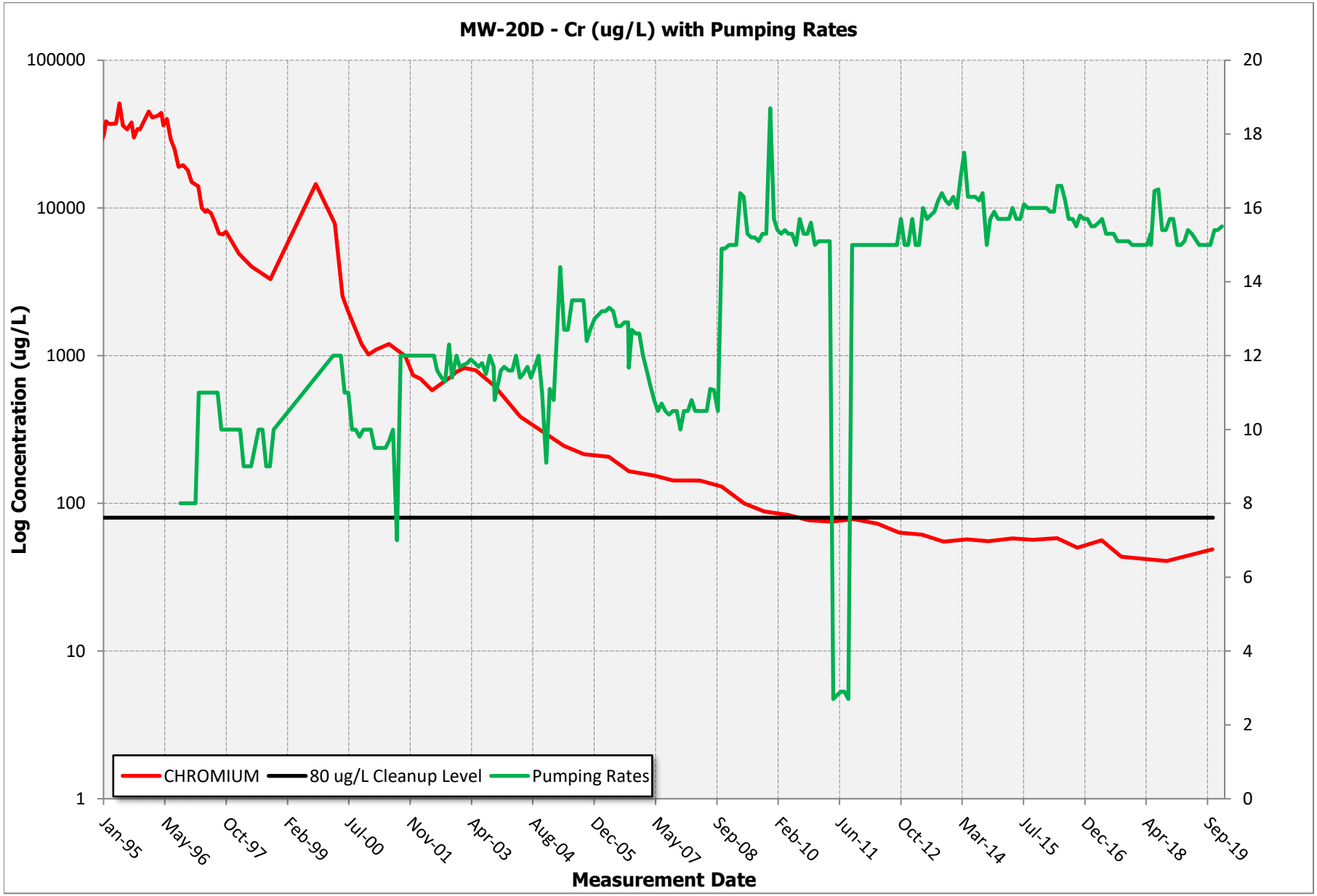

MW-14C - Cr (ug/L) with Pumping Rates
Log Concentration (ug/L)
1000000
100000
10000
1000
100
10
1
16
14
12
10
8
6
4
2
0
CHROMIUM
80 ug/L Cleanup Level
Pumping Rates
Jan-95
May-96
Oct-97
Feb-99
Jul-00
Nov-01
Apr-03
Aug-04
Dec-05
May-07
Sep-08
Feb-10
Jun-11
Oct-12
Mar-14
Jul-15
Dec-16
Apr-18
Sep-19
Measurement Date

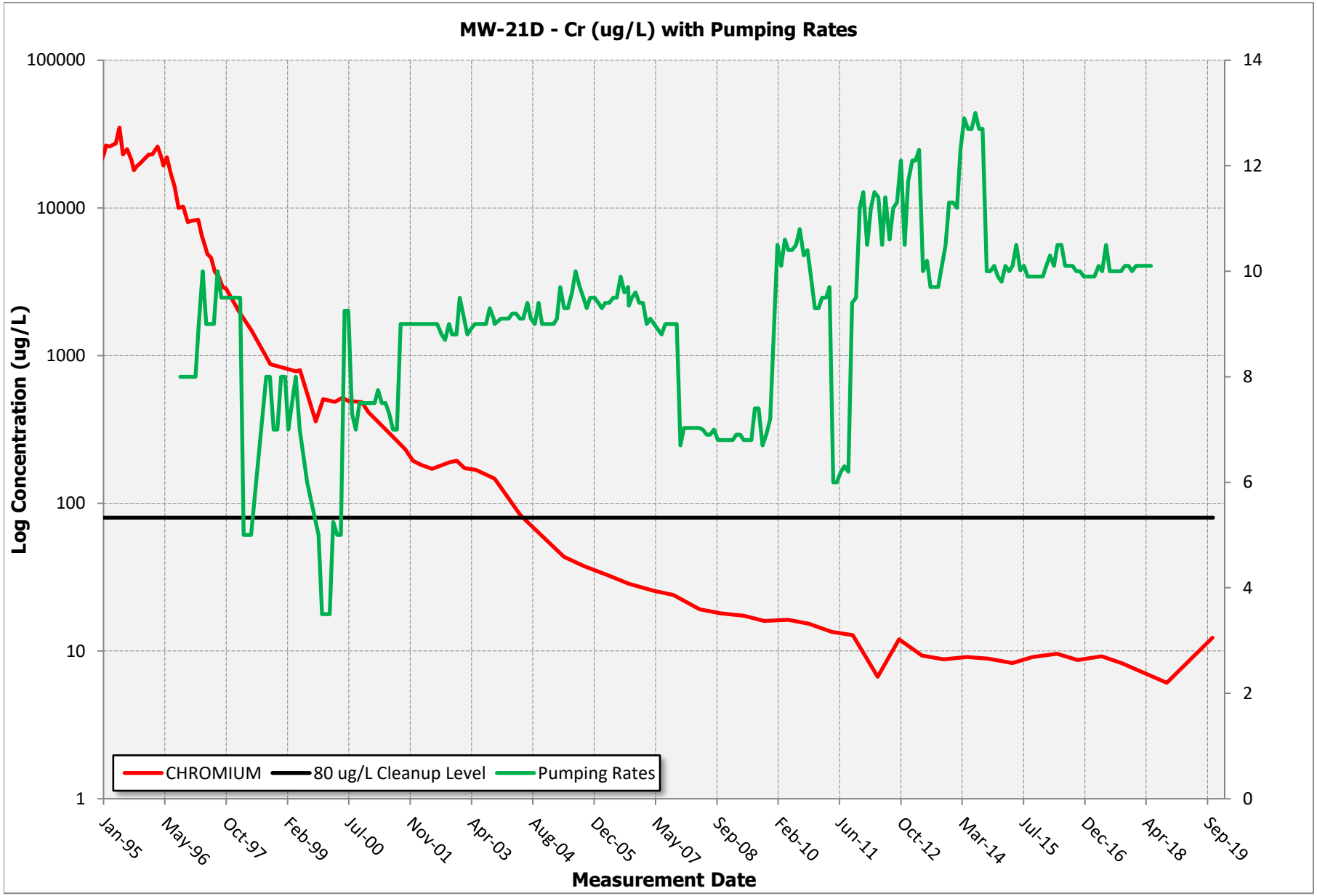

MW-14E - Cr (ug/L) with Pumping Rates
Log Concentration (ug/L)
1000000
100000
10000
1000
100
10
1
14
12
10
8
6
4
2
0
CHROMIUM
80 ug/L Cleanup Level
Pumping Rates
Jan-95
May-96
Oct-97
Feb-99
Jul-00
Nov-01
Apr-03
Aug-04
Dec-05
May-07
Sep-08
Feb-10
Jun-11
Oct-12
Mar-14
Jul-15
Dec-16
Apr-18
Sep-19
Measurement Date

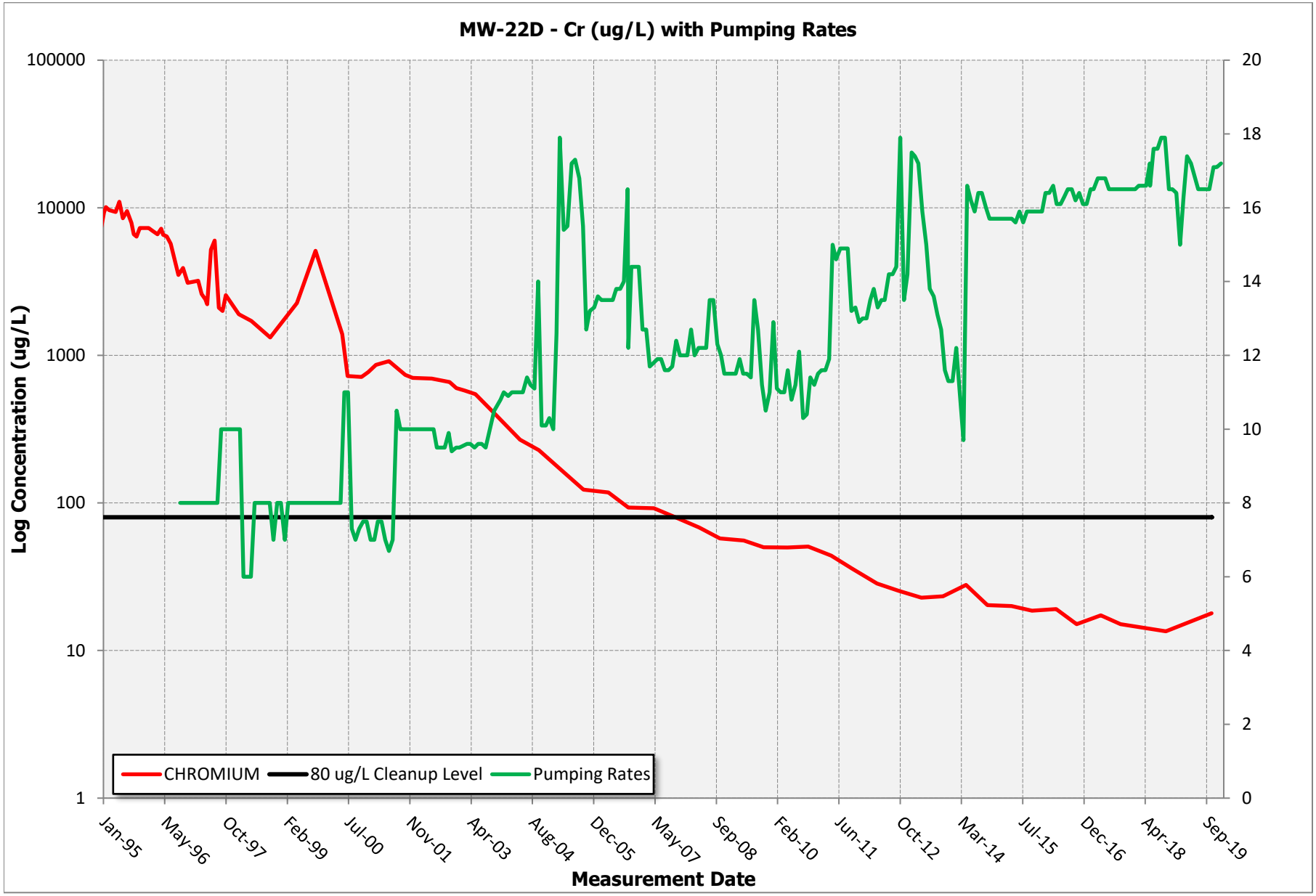

MW-18D - Cr (ug/L) with Pumping Rates
Log Concentration (ug/L)
100000
10000
1000
100
10
1
20
18
16
14
12
10
8
6
4
2
0
CHROMIUM
80 ug/L Cleanup Level
Pumping Rates
Jan-95
May-96
Oct-97
Feb-99
Jul-00
Nov-01
Apr-03
Aug-04
Dec-05
May-07
Sep-08
Feb-10
Jun-11
Oct-12
Mar-14
Jul-15
Dec-16
Apr-18
Sep-19
Measurement Date

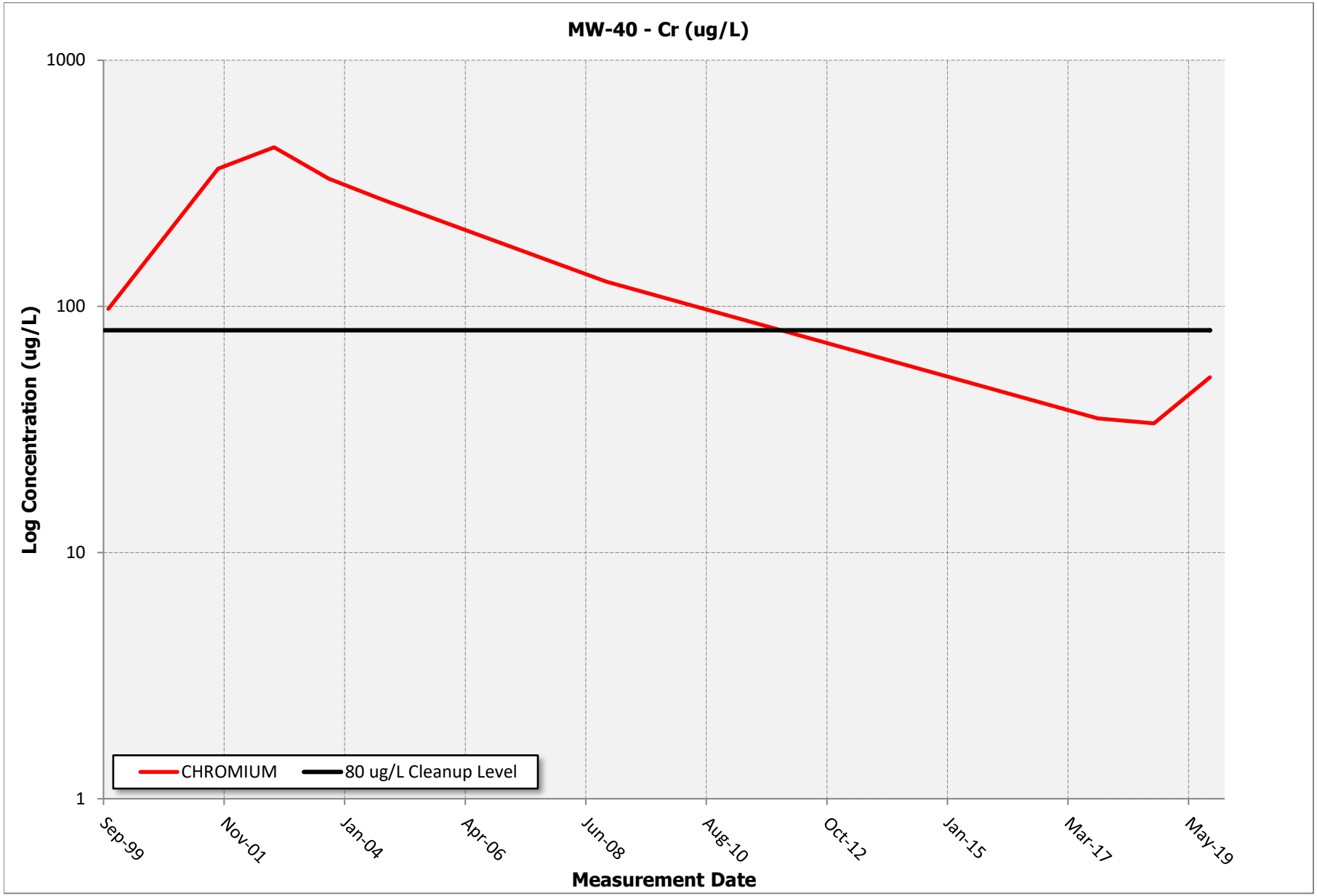

MW-18E - Cr (ug/L)
CHROMIUM
80 ug/L Cleanup Level
Log Concentration (ug/L)
100000
10000
1000
100
10
1
Jan-95
May-96
Oct-97
Feb-99
Jul-00
Nov-01
Apr-03
Aug-04
Dec-05
May-07
Sep-08
Feb-10
Jun-11
Oct-12
Mar-14
Jul-15
Dec-16
Apr-18
Sep-19
Measurement Date

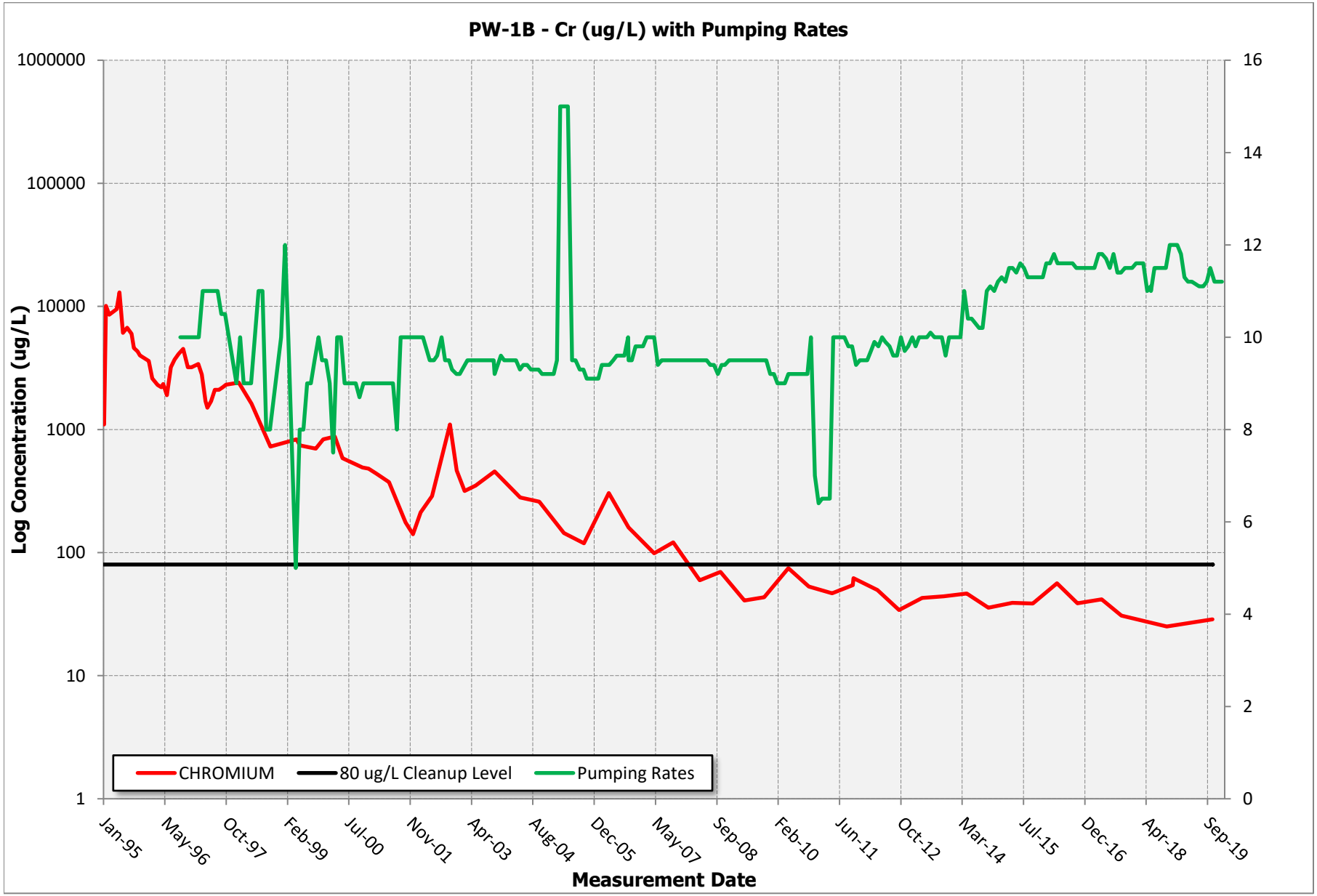

MW-19D - Cr (ug/L) with Pumping Rates
Log Concentration (ug/L)
100000
10000
1000
100
10
1
16
14
12
10
8
6
4
2
0
Jan-95
May-96
Oct-97
Feb-99
Jul-00
Nov-01
Apr-03
Aug-04
Dec-05
May-07
Sep-08
Feb-10
Jun-11
Oct-12
Mar-14
Jul-15
Dec-16
Apr-18
Sep-19
Measurement Date
CHROMIUM
80 ug/L Cleanup Level
Pumping Rates


MW-20D - Cr (ug/L) with Pumping Rates
Log Concentration (ug/L)
100000
10000
1000
100
10
1
20
18
16
14
12
10
8
6
4
2
0
CHROMIUM
80 ug/L Cleanup Level
Pumping Rates
Jan-95
May-96
Oct-97
Feb-99
Jul-00
Nov-01
Apr-03
Aug-04
Dec-05
May-07
Sep-08
Feb-10
Jun-11
Oct-12
Mar-14
Jul-15
Dec-16
Apr-18
Sep-19
Measurement Date


MW-21D - Cr (ug/L) with Pumping Rates
Log Concentration (ug/L)
100000
10000
1000
100
10
1
14
12
10
8
6
4
2
0
Jan-95
May-96
Oct-97
Feb-99
Jul-00
Nov-01
Apr-03
Aug-04
Dec-05
May-07
Sep-08
Feb-10
Jun-11
Oct-12
Mar-14
Jul-15
Dec-16
Apr-18
Sep-19
Measurement Date
CHROMIUM
80 ug/L Cleanup Level
Pumping Rates


MW-22D - Cr (ug/L) with Pumping Rates
Log Concentration (ug/L)
100000
10000
1000
100
10
1
20
18
16
14
12
10
8
6
4
2
0
CHROMIUM
80 ug/L Cleanup Level
Pumping Rates
Jan-95
May-96
Oct-97
Feb-99
Jul-00
Nov-01
Apr-03
Aug-04
Dec-05
May-07
Sep-08
Feb-10
Jun-11
Oct-12
Mar-14
Jul-15
Dec-16
Apr-18
Sep-19
Measurement Date


MW-40 - Cr (ug/L)
1000
100
10
1
Log Concentration (ug/L)
CHROMIUM
80 ug/L Cleanup Level
Sep-99
Nov-01
Jan-04
Apr-06
Jun-08
Aug-10
Oct-12
Jan-15
Mar-17
May-19
Measurement Date


PW-1B - Cr (ug/L) with Pumping Rates
Log Concentration (ug/L)
1000000
100000
10000
1000
100
10
1
16
14
12
10
8
6
4
2
0
CHROMIUM
80 ug/L Cleanup Level
Pumping Rates
Jan-95
May-96
Oct-97
Feb-99
Jul-00
Nov-01
Apr-03
Aug-04
Dec-05
May-07
Sep-08
Feb-10
Jun-11
Oct-12
Mar-14
Jul-15
Dec-16
Apr-18
Sep-19
Measurement Date

APPENDIX B

TCE CONCENTRATIONS IN GROUNDWATER

APPENDIX B-1

TCE CONCENTRATIONS – SUMMARY TABLE

B-1. Trichloroethene Concentrations Summary

Well Group	Well	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019
TCE Upgradient	AMW-6A	0.26 J	--	--	--	0.1 J
	AMW-7A	0.1 J	--	--	--	0.5 U
	AMW-8A	0.22 J	--	--	--	0.32 J
	AMW-10A	0.12 J	--	--	--	0.5 U
	AMW-11A	0.17 J	--	--	--	0.5 U
TCE Source	AMW-1A	**39**	**23**	**46**	**23**	**21**
	AMW-2A	**86**	**27**	**28**	4.8	**12**
	AMW-3A	0.71	--	0.72	--	0.63
	AMW-4A	0.11 J	--	0.5 U	--	0.5 U
	AMW-12A	**22**	**18**	**18**	**21**	**21**
	AMW-53A	5.4	3.8	**7.8**	**13**	**15**
	MW-1A	**110**	**77**	**65**	**6.1**	**15**
Proximal	MW-2B	2	--	1.3	--	1.1
	MW-3C	1.8	--	1.2	--	1
	MW-4A	2.1	--	3	--	3.9
	MW-4BSHED	2.1	--	--	--	1.5
	MW-4C	2	--	2.3	--	1.7
	MW-6A	0.5 U	--	0.5 U	--	0.5 U
	MW-6B	2.5	--	2.1	--	2.8
	MW-6C	0.5 UJ	--	0.2 J	--	0.35 J
	MW-6D	0.5 UJ	--	1.9	--	1.8
	MW-7B	**6.1**	--	3.1	--	4.2
	MW-9C	**5.8**	--	4.5	--	2.9
	MW-10B	**7**	--	**8.2**	**8.3**	**6.8**
	MW-10C	1.2	--	1.3	--	1.3
	MW-12C	0.71	--	--	--	0.63
	MW-13C	2.2	--	3.7	--	2.5
	PW-1B	3.1 J	--	3.7	--	2.4
Intermediate	AMW-59	**53**	--	--	--	**45**
	AMW-60	0.22 J	--	0.35 J	--	0.4 J
	CPU-14	3.92	--	4.9	--	**5.1**
	MW-14C	**6.1**	**7.2**	**8.5**	**6.9**	**5.9**

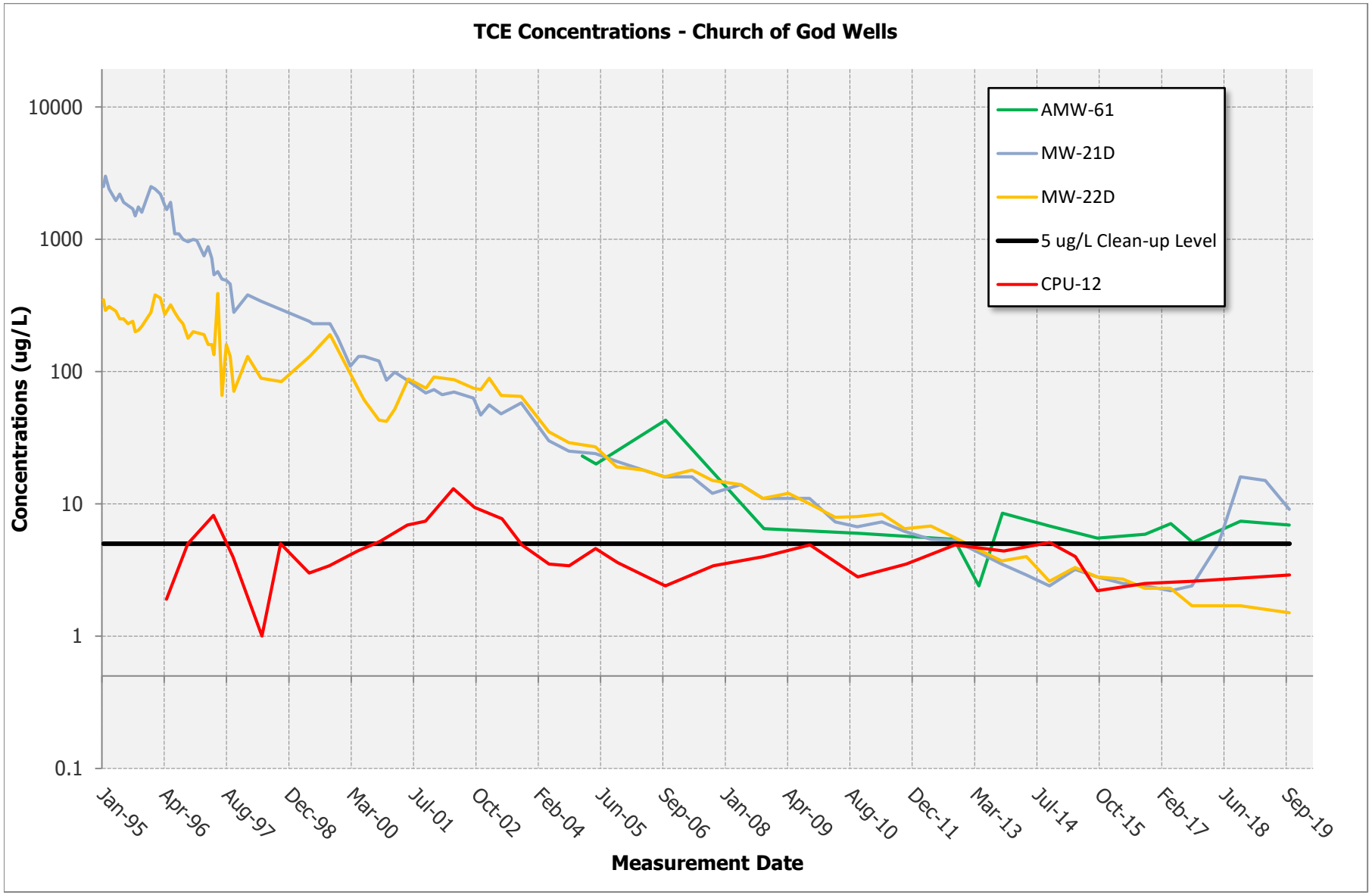
B-1. Trichloroethene Concentrations Summary

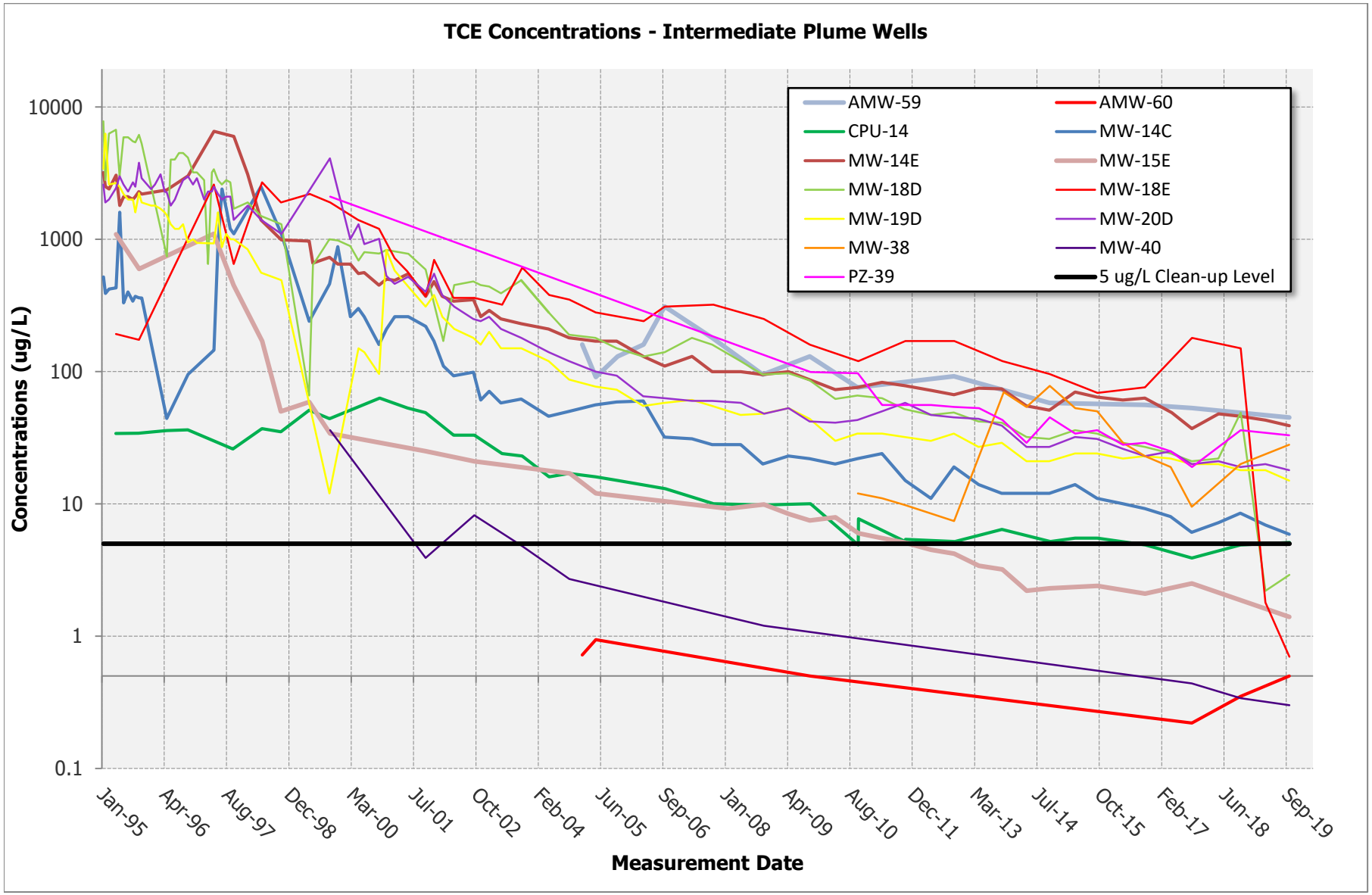
Well Group	Well	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019
Intermediate Cont.	**MW-14E**	**37**	**48**	**46**	**43**	**39**
	MW-15E	2.5	--	--	--	1.4
	MW-18D	**21**	**22**	**49**	2.2	2.9
	MW-18E	**180**	--	**150**	1.8	0.7
	MW-19D	**20**	**20**	**18**	**18**	**15**
	MW-20D	**20**	**21**	**19**	**20**	**18**
	MW-38	**9.5**	--	**20**	--	**28**
	MW-40	0.44 J	--	0.34 J	--	0.3 J
	PZ-39	**19**	--	**36**	--	**33**
Northern Plume	AMW-16	**41**	**45**	**13**	**39**	**36**
	AMW-17	**79**	**65 D**	**23**	**66**	**48**
	AMW-18	**28**	**28**	0.5 U	**20**	**18**
	AMW-23	0.1 J	--	**8**	0.15 J	0.5 U
	AMW-64	**15**	**13**	**71**	**11**	**9.9**
	MW-23D	**140**	**120 D**	**160**	**150 E**	**120**
Church of God	AMW-61	**5.1**	--	**7.4**	--	**6.9**
	CPU-12	2.6	--	--	--	2.9
	MW-21D	2.4	5	**16**	**15**	**9.1**
	MW-22D	1.7	--	1.7	--	1.5
Troutdale	AMW-24	**7.8**	--	**6.9**	--	**6.5**
	BENNETT	1.7	--	1.5	--	0.9
	MW-33	**5.1**	--	3.9	--	3.6

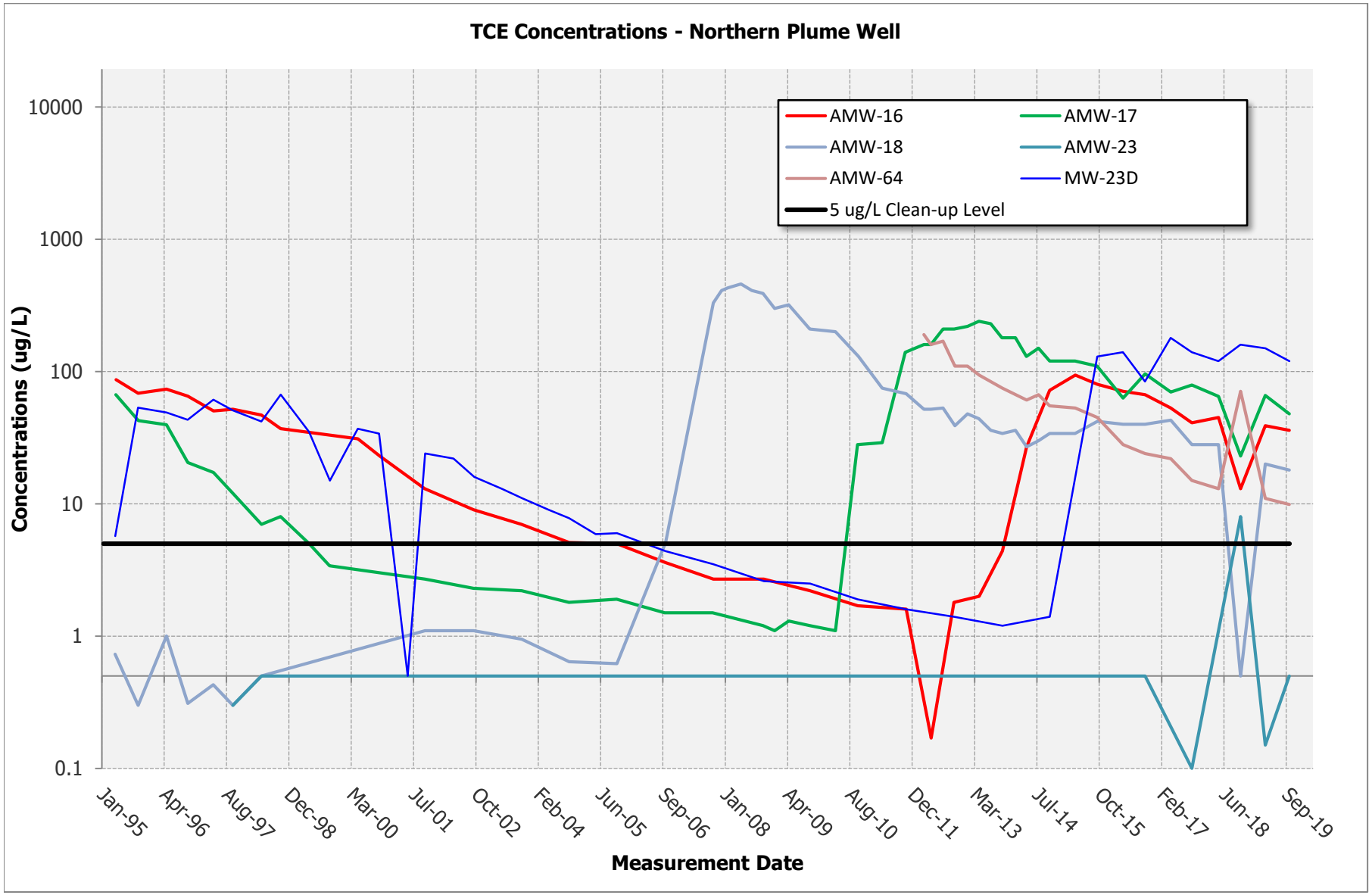
NOTES:
Only wells sampled for TCE during 2019 are included in this table.
Active extraction wells shown are in **bold**.
Results are in micrograms per liter (µg/L).
Results shown in **blue bold** exceed the cleanup level of 5 µg/L.
* = Unless otherwise noted.
E = The result is an estimated concentration because the value exceeded the instrument calibration range.
J = The result is an estimated concentration that is less than the method reporting limit but greater than or equal to the method detection limit.
-- = Not Sampled.
TCE = Trichloroethene.
U = Analyte not detected above the specified reporting limit.

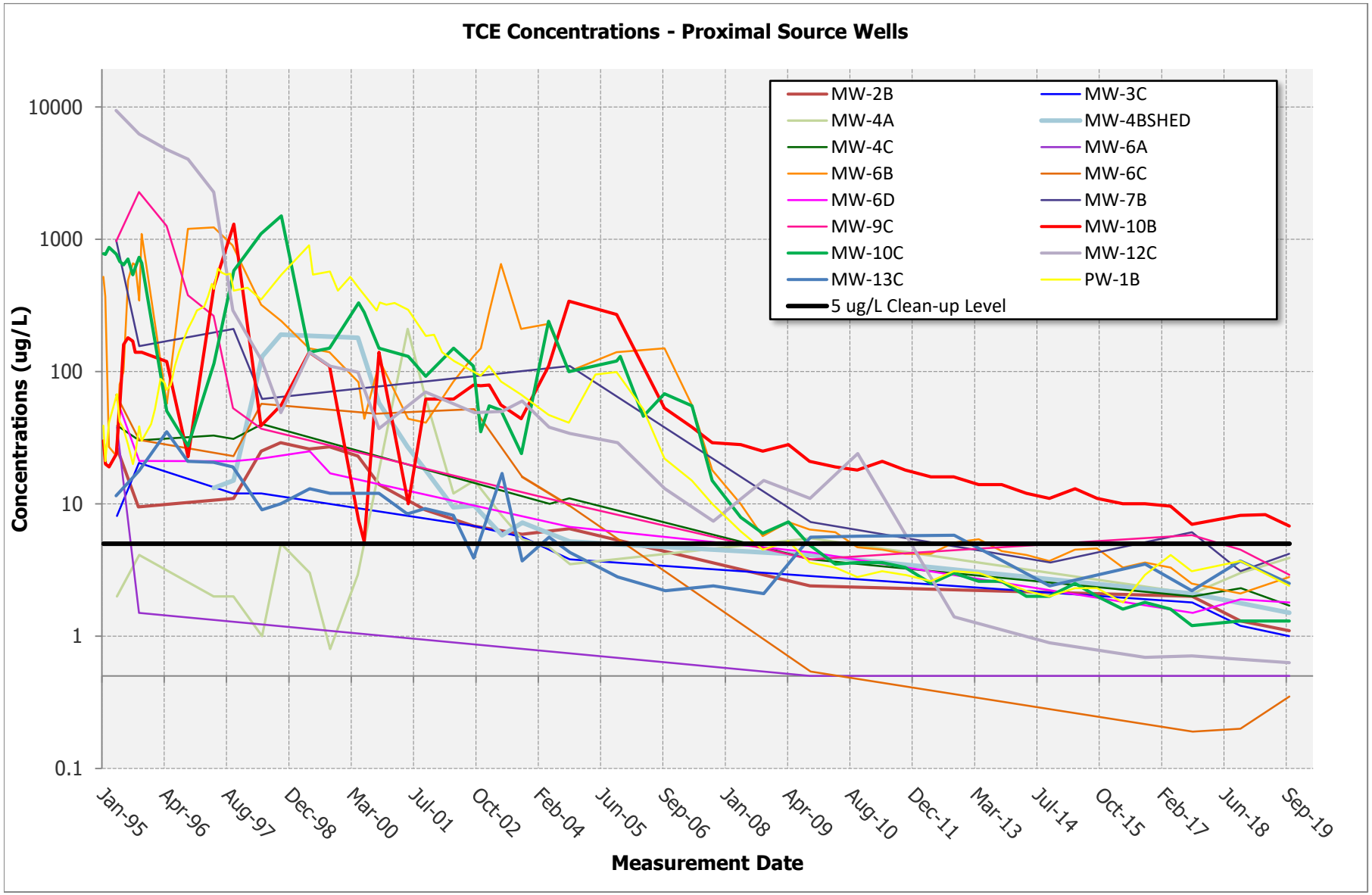
APPENDIX B-2

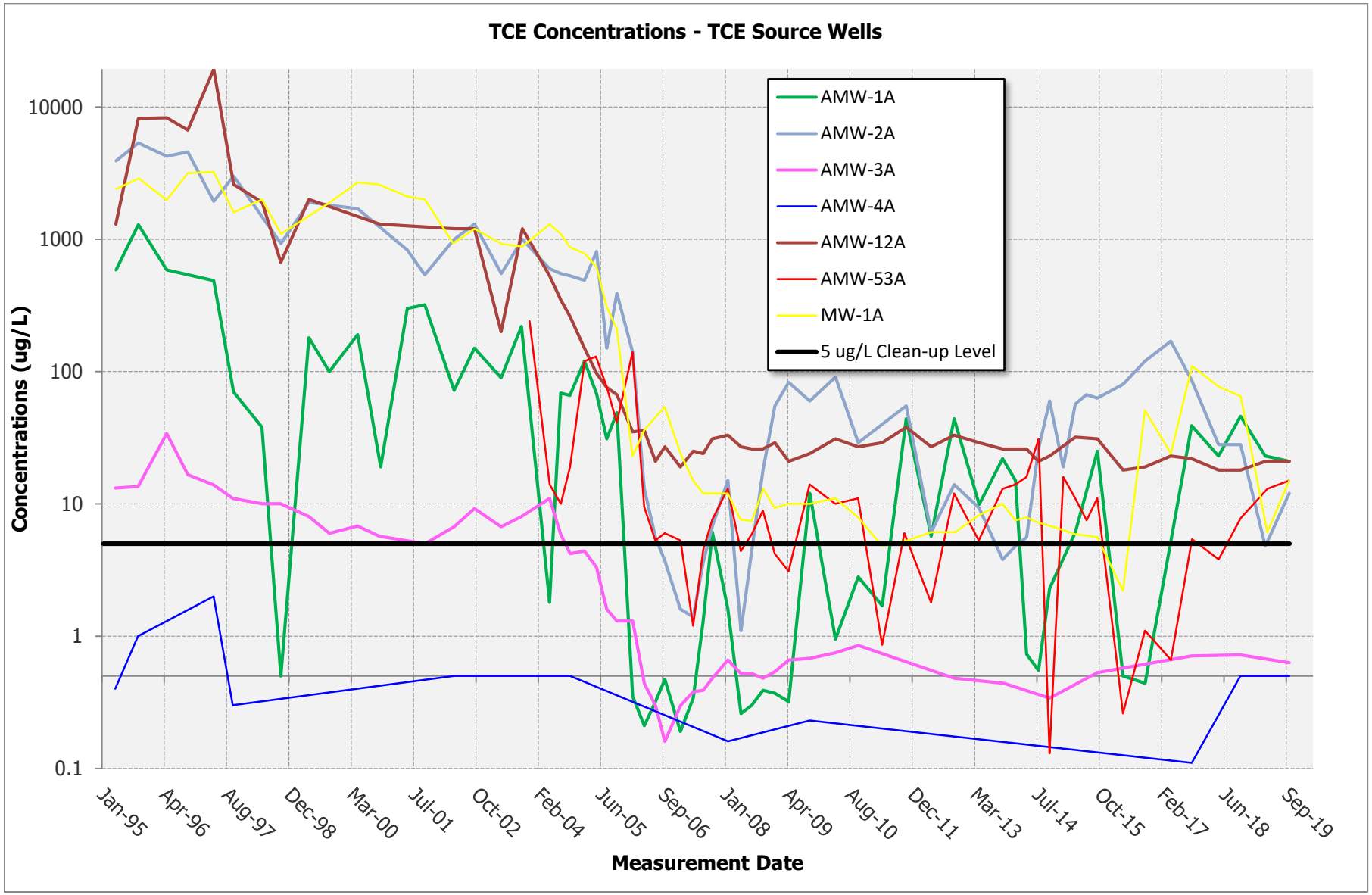
TCE CONCENTRATIONS –
BY WELL GROUPING

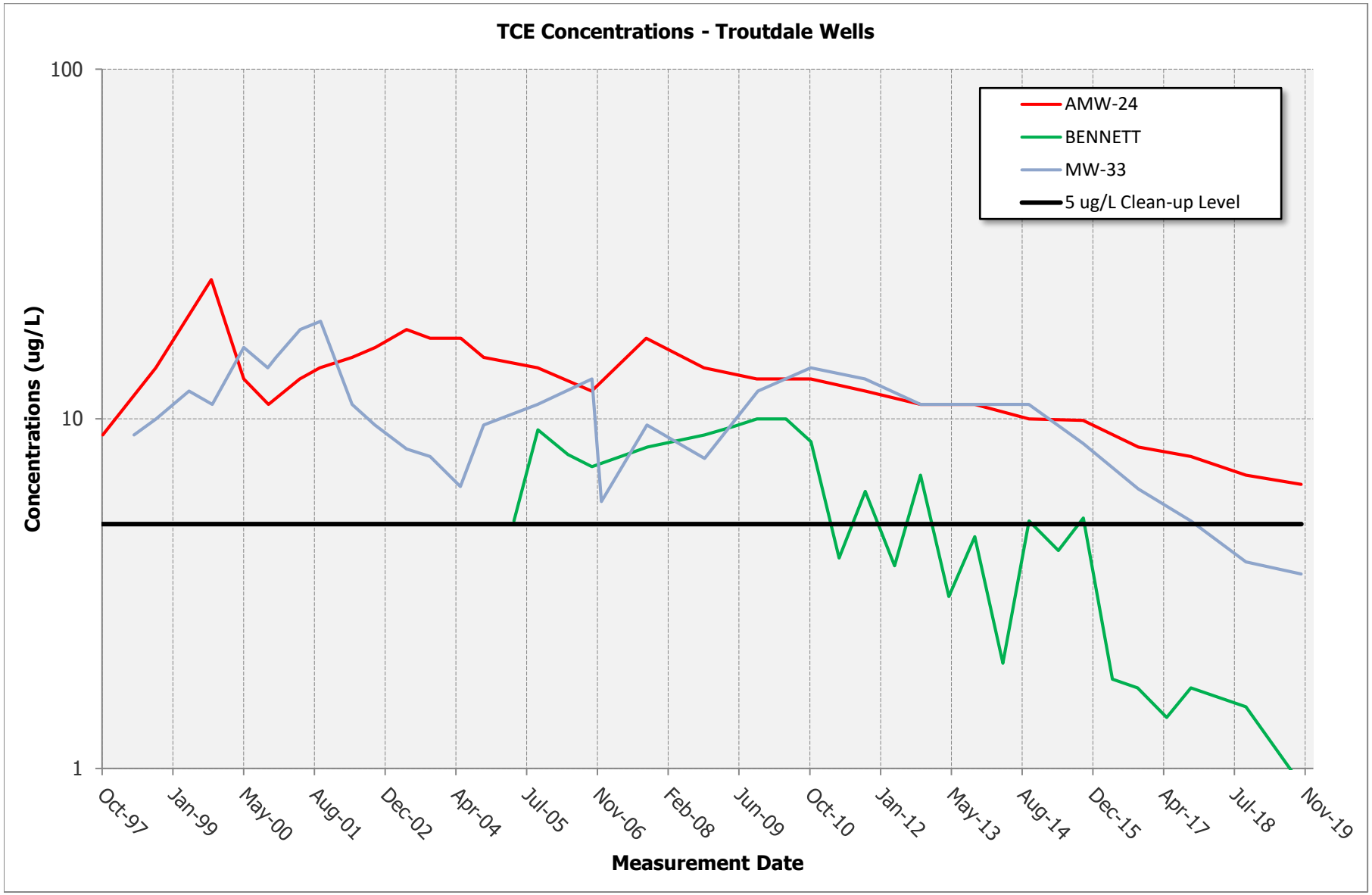

TCE Concentrations - Church of God Wells
Concentrations (ug/L)
10000
1000
100
10
1
0.1
Jan-95
Apr-96
Aug-97
Dec-98
Mar-00
Jul-01
Oct-02
Feb-04
Jun-05
Sep-06
Jan-08
Apr-09
Aug-10
Dec-11
Mar-13
Jul-14
Oct-15
Feb-17
Jun-18
Sep-19
Measurement Date
AMW-61
MW-21D
MW-22D
5 ug/L Clean-up Level
CPU-12

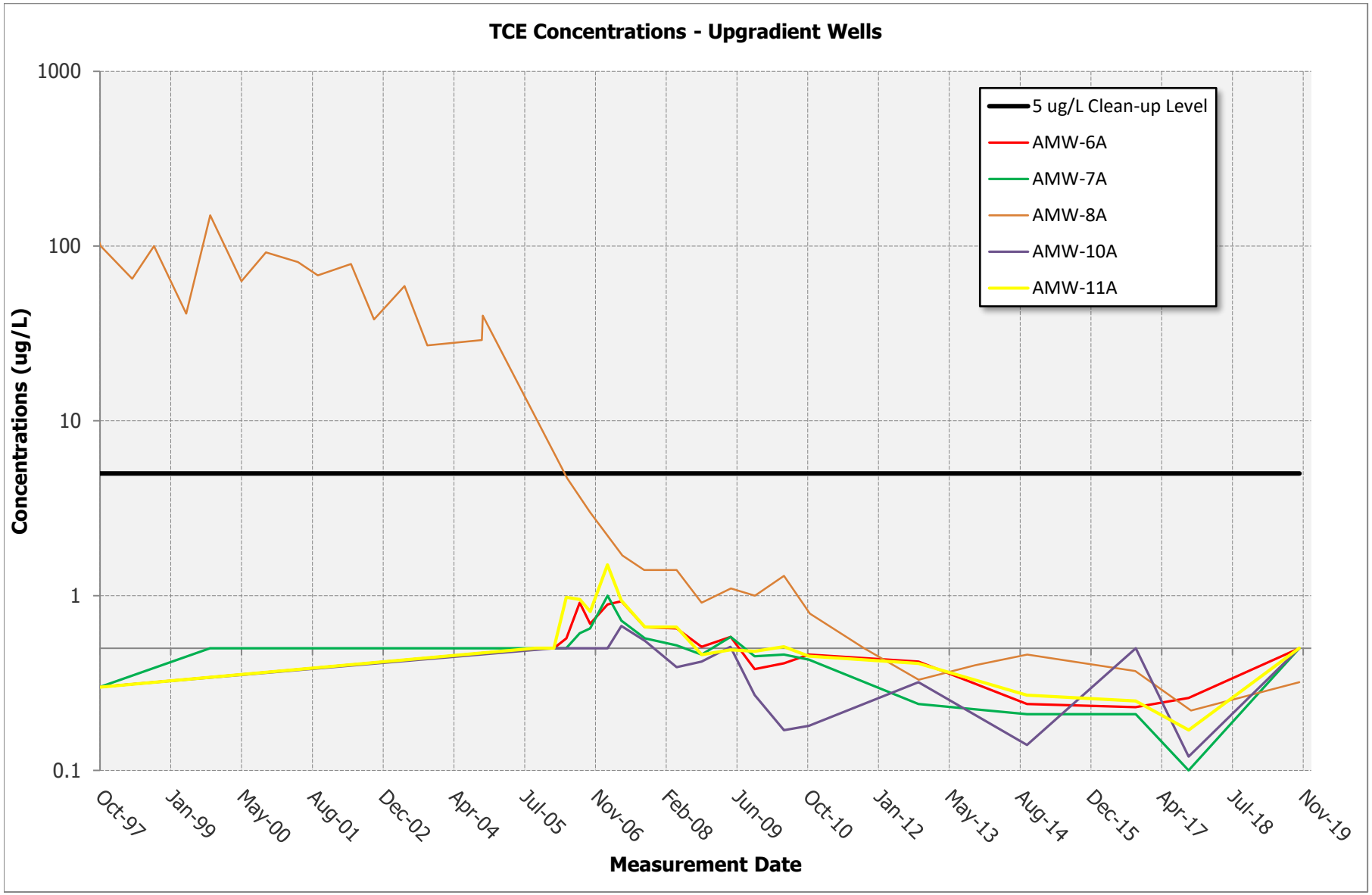

TCE Concentrations - Intermediate Plume Wells
Concentrations (ug/L)
10000
1000
100
10
1
0.1
Jan-95
Apr-96
Aug-97
Dec-98
Mar-00
Jul-01
Oct-02
Feb-04
Jun-05
Sep-06
Jan-08
Apr-09
Aug-10
Dec-11
Mar-13
Jul-14
Oct-15
Feb-17
Jun-18
Sep-19
Measurement Date
AMW-59
AMW-60
CPU-14
MW-14C
MW-14E
MW-15E
MW-18D
MW-18E
MW-19D
MW-20D
MW-38
MW-40
PZ-39
5 ug/L Clean-up Level


TCE Concentrations - Northern Plume Well
AMW-16
AMW-17
AMW-18
AMW-23
AMW-64
MW-23D
5 ug/L Clean-up Level
Concentrations (ug/L)
10000
1000
100
10
1
0.1
Jan-95
Apr-96
Aug-97
Dec-98
Mar-00
Jul-01
Oct-02
Feb-04
Jun-05
Sep-06
Jan-08
Apr-09
Aug-10
Dec-11
Mar-13
Jul-14
Oct-15
Feb-17
Jun-18
Sep-19
Measurement Date


TCE Concentrations - Proximal Source Wells
Concentrations (ug/L)
10000
1000
100
10
1
0.1
Jan-95
Apr-96
Aug-97
Dec-98
Mar-00
Jul-01
Oct-02
Feb-04
Jun-05
Sep-06
Jan-08
Apr-09
Aug-10
Dec-11
Mar-13
Jul-14
Oct-15
Feb-17
Jun-18
Sep-19
Measurement Date
MW-2B
MW-3C
MW-4A
MW-4BSHED
MW-4C
MW-6A
MW-6B
MW-6C
MW-6D
MW-7B
MW-9C
MW-10B
MW-10C
MW-12C
MW-13C
PW-1B
5 ug/L Clean-up Level

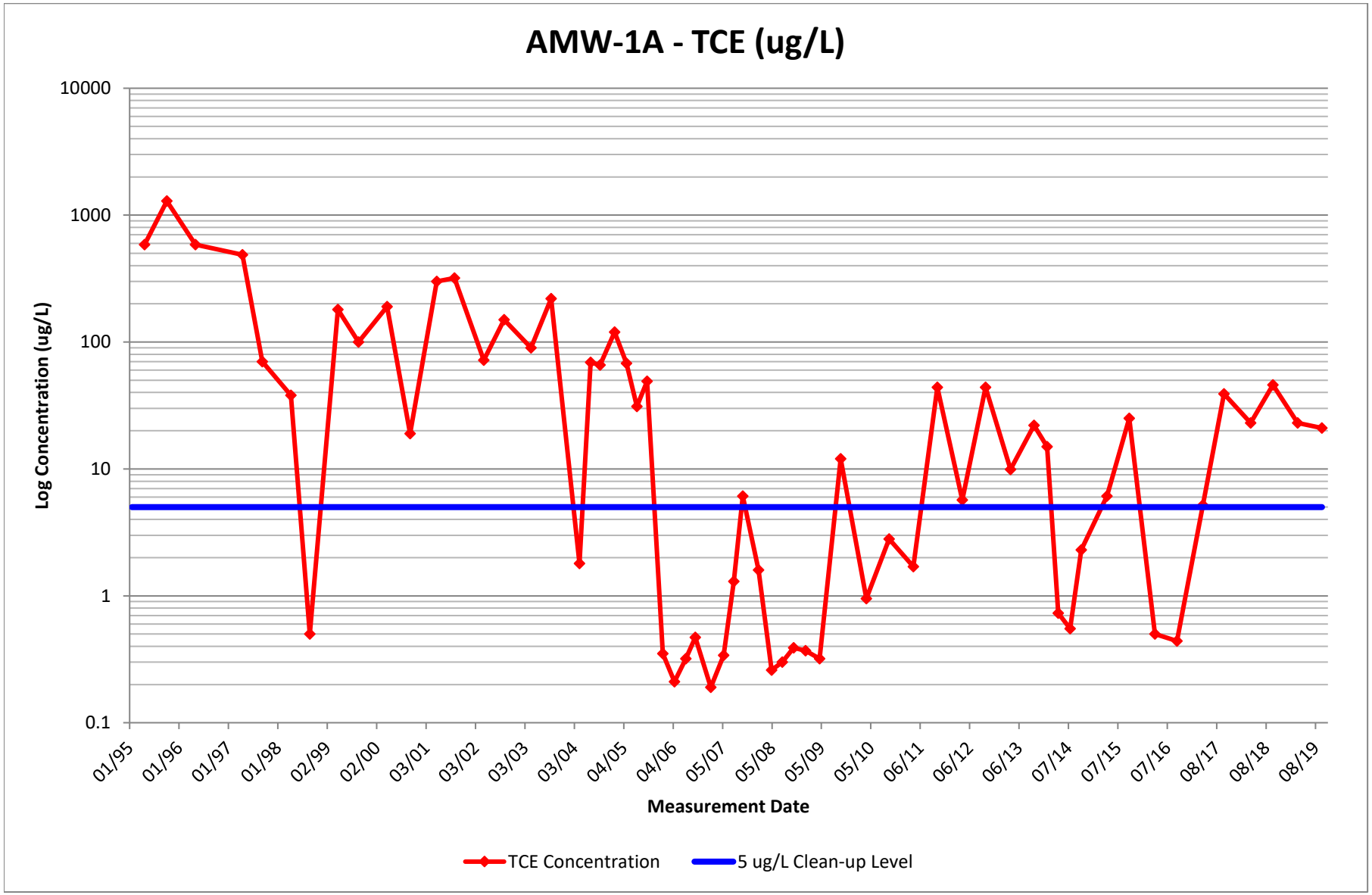

TCE Concentrations - TCE Source Wells
Concentrations (ug/L)
10000
1000
100
10
1
0.1
AMW-1A
AMW-2A
AMW-3A
AMW-4A
AMW-12A
AMW-53A
MW-1A
5 ug/L Clean-up Level
Jan-95
Apr-96
Aug-97
Dec-98
Mar-00
Jul-01
Oct-02
Feb-04
Jun-05
Sep-06
Jan-08
Apr-09
Aug-10
Dec-11
Mar-13
Jul-14
Oct-15
Feb-17
Jun-18
Sep-19
Measurement Date

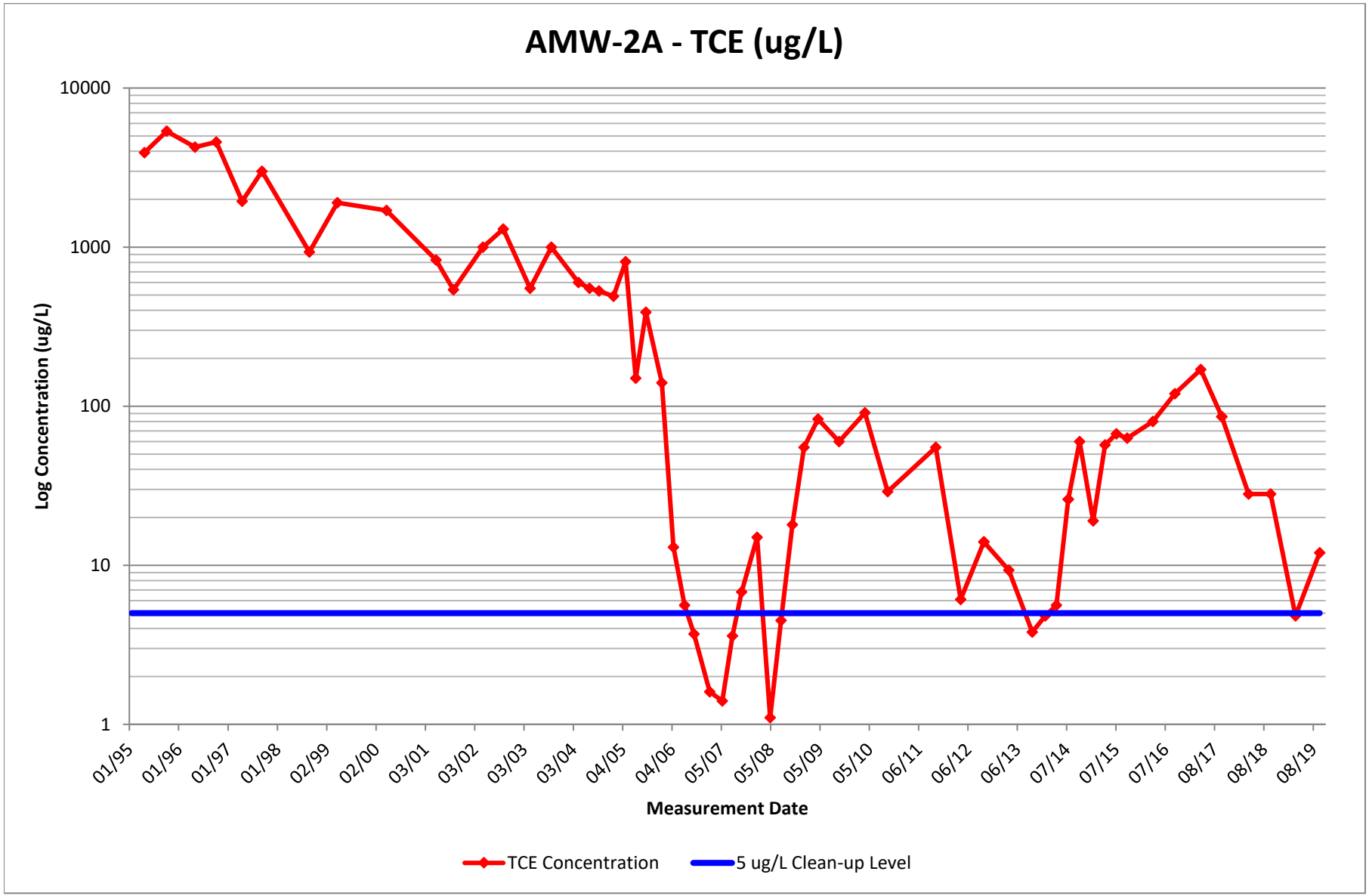

TCE Concentrations - Troutdale Wells
100
10
1
Concentrations (ug/L)
AMW-24
BENNETT
MW-33
5 ug/L Clean-up Level
Oct-97
Jan-99
May-00
Aug-01
Dec-02
Apr-04
Jul-05
Nov-06
Feb-08
Jun-09
Oct-10
Jan-12
May-13
Aug-14
Dec-15
Apr-17
Jul-18
Nov-19
Measurement Date

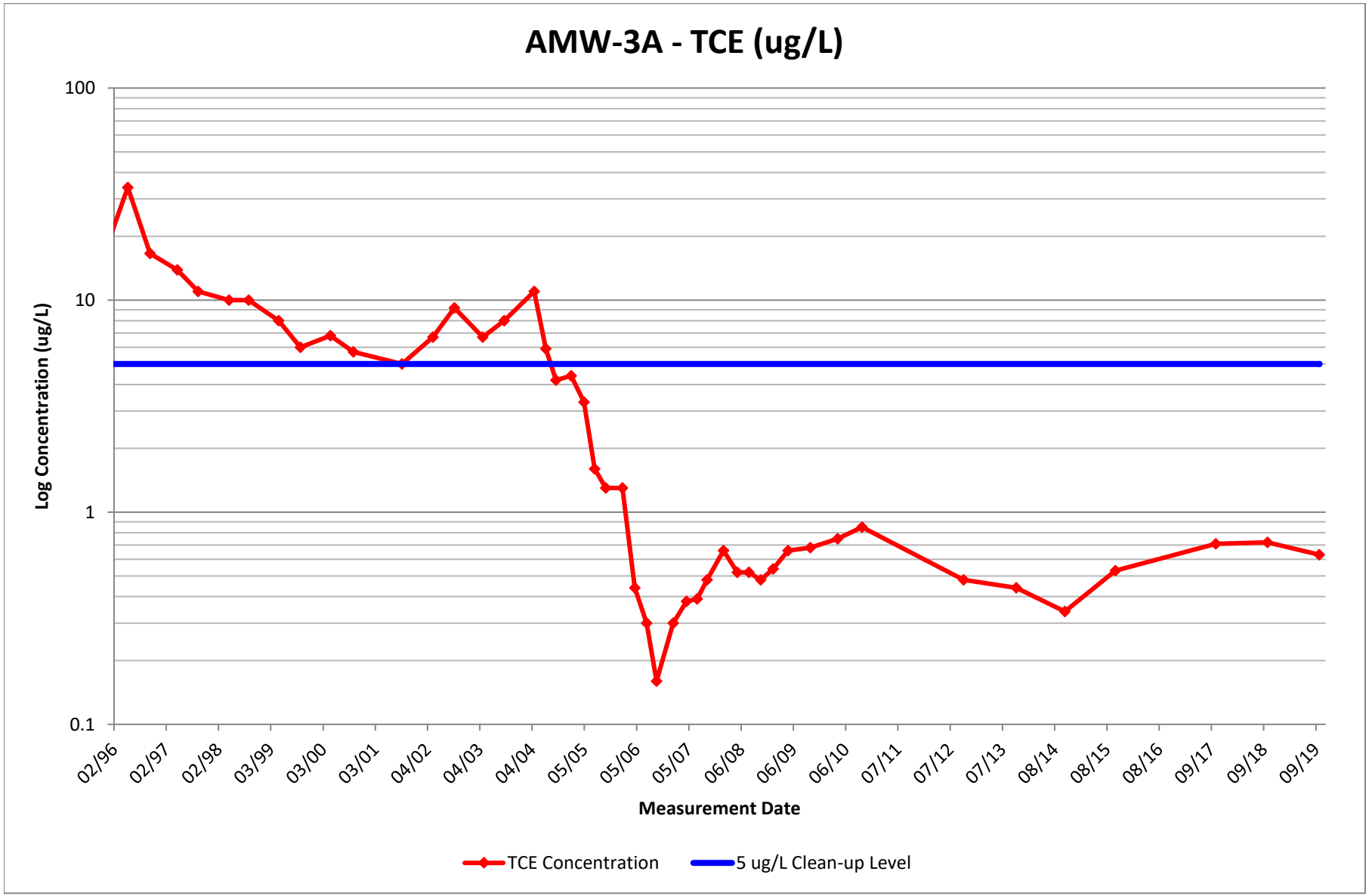

TCE Concentrations - Upgradient Wells
Concentrations (ug/L)
1000
100
10
1
0.1
5 ug/L Clean-up Level
AMW-6A
AMW-7A
AMW-8A
AMW-10A
AMW-11A
Oct-97
Jan-99
May-00
Aug-01
Dec-02
Apr-04
Jul-05
Nov-06
Feb-08
Jun-09
Oct-10
Jan-12
May-13
Aug-14
Dec-15
Apr-17
Jul-18
Nov-19
Measurement Date

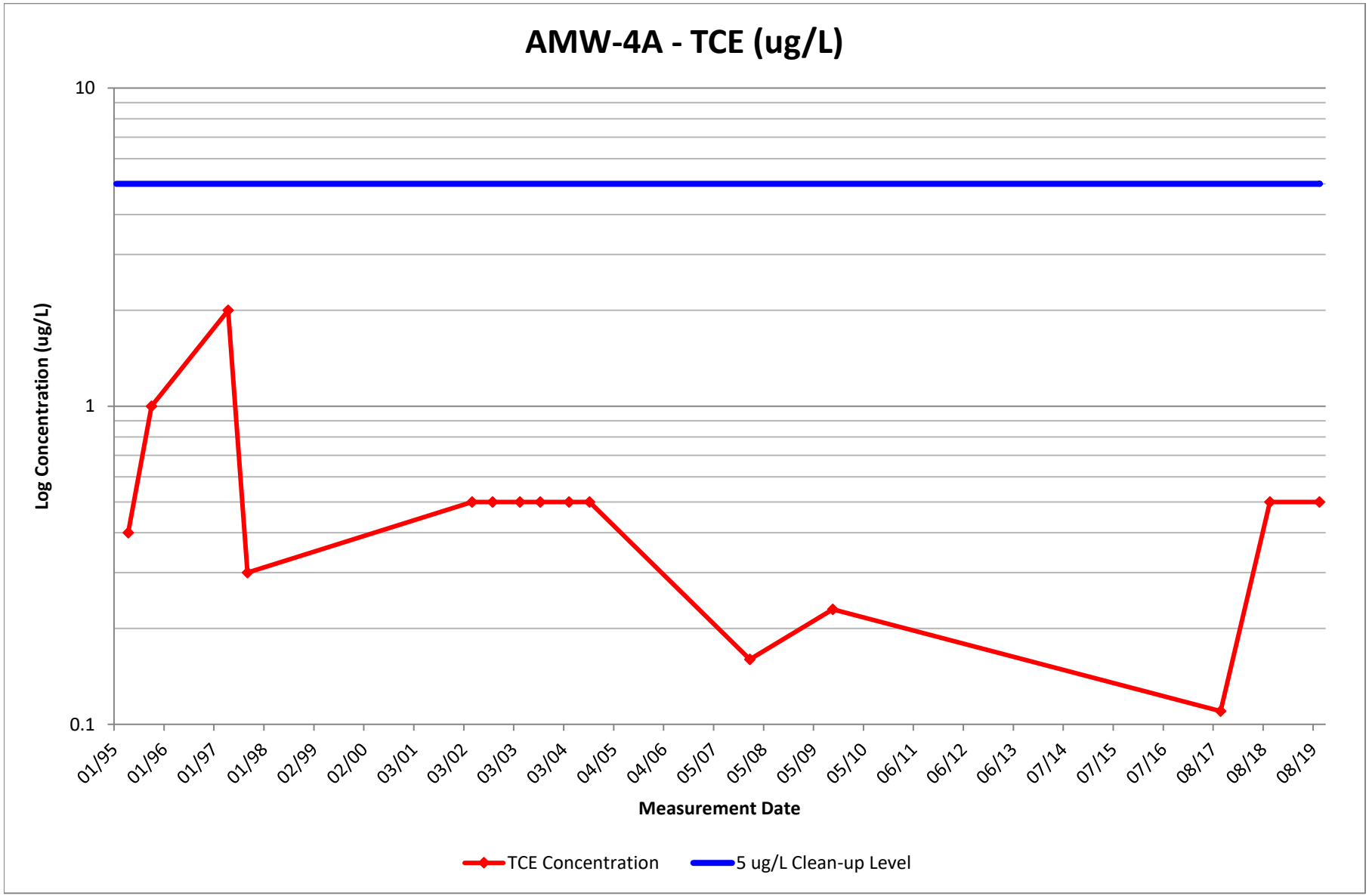
APPENDIX B-3

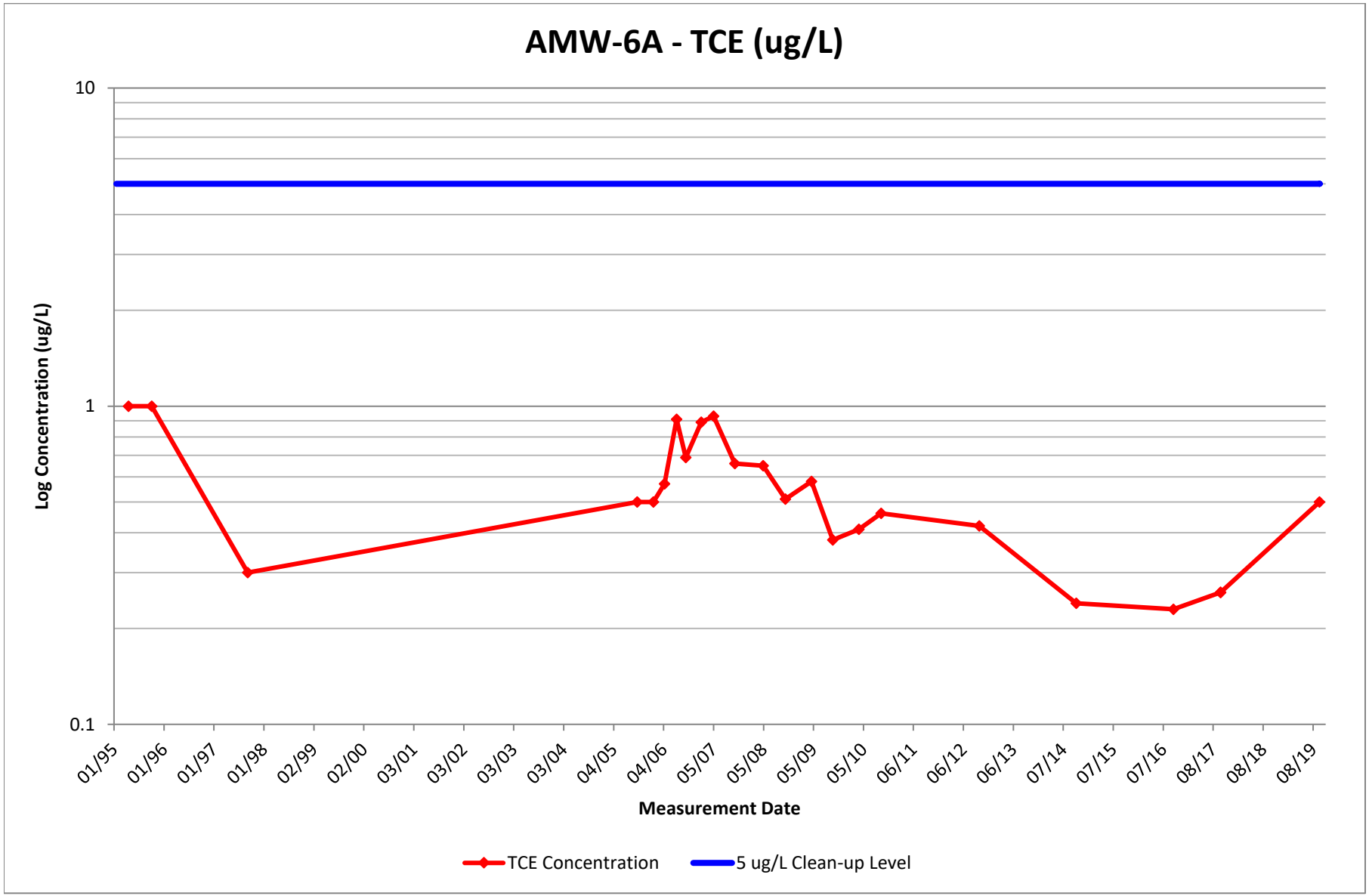
TCE CONCENTRATIONS – INDIVIDUAL WELLS

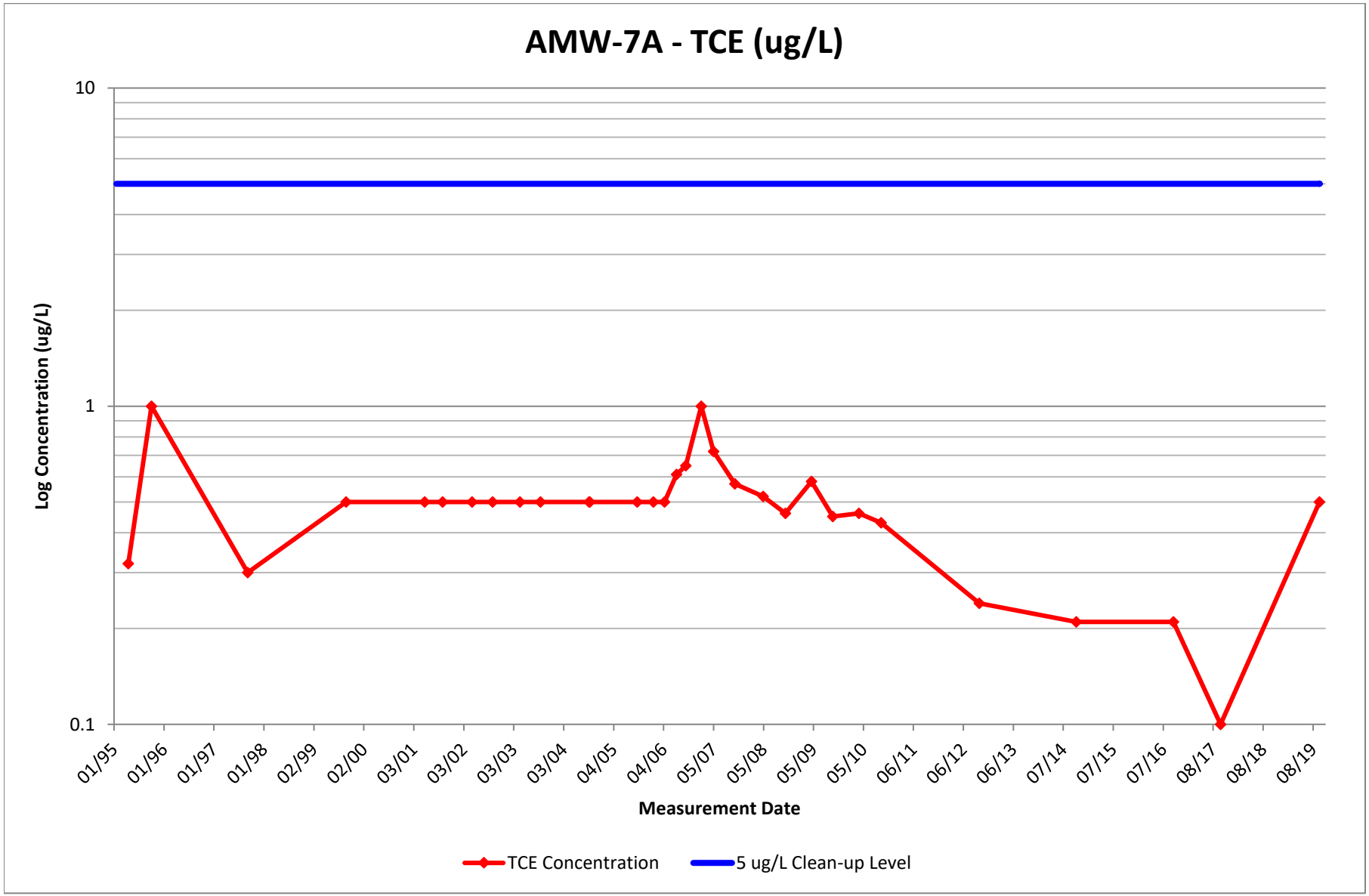

AMW-1A - TCE (ug/L)
Log Concentration (ug/L)
10000
1000
100
10
1
0.1
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

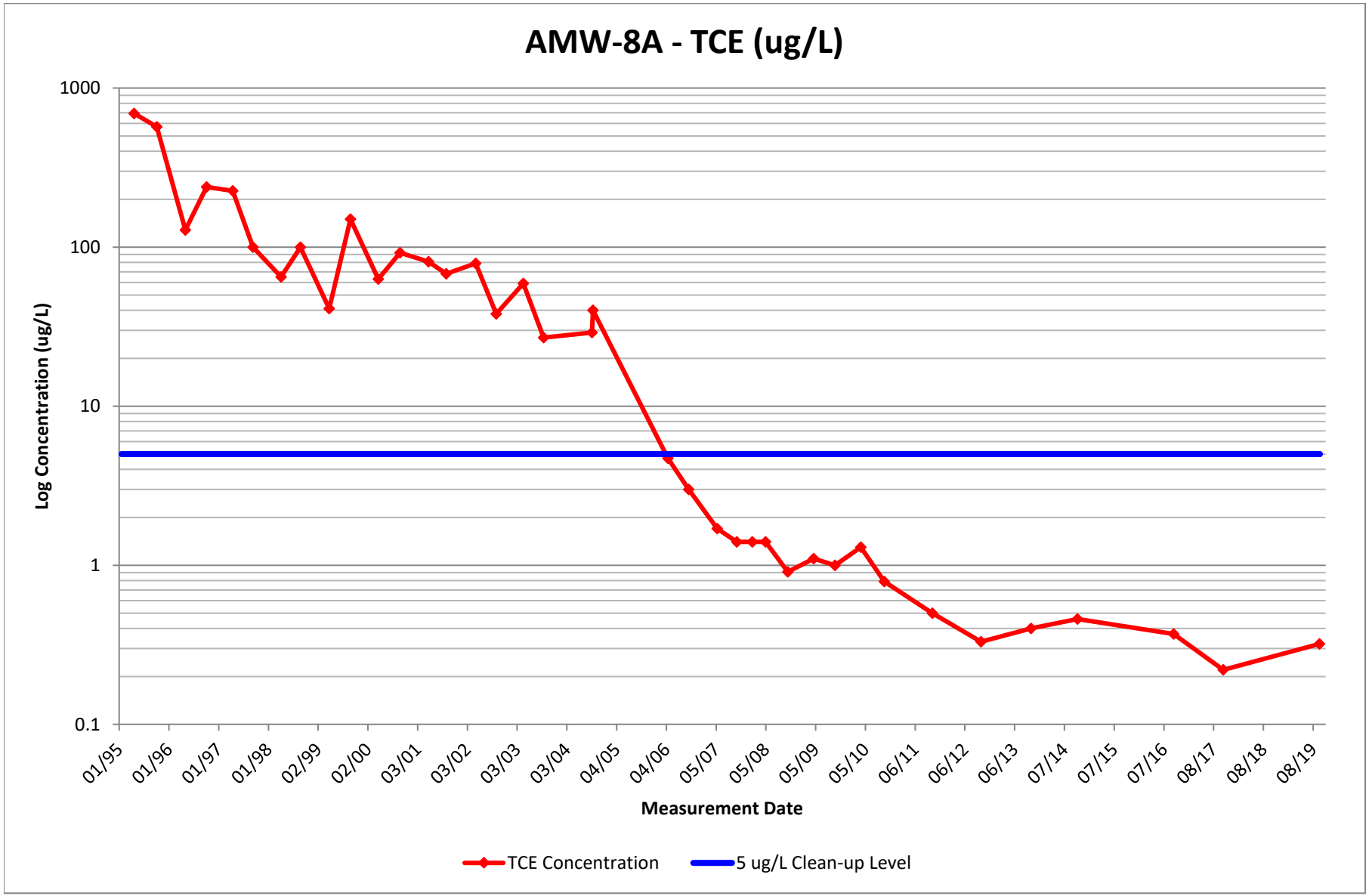

AMW-2A - TCE (ug/L)
Log Concentration (ug/L)
10000
1000
100
10
1
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

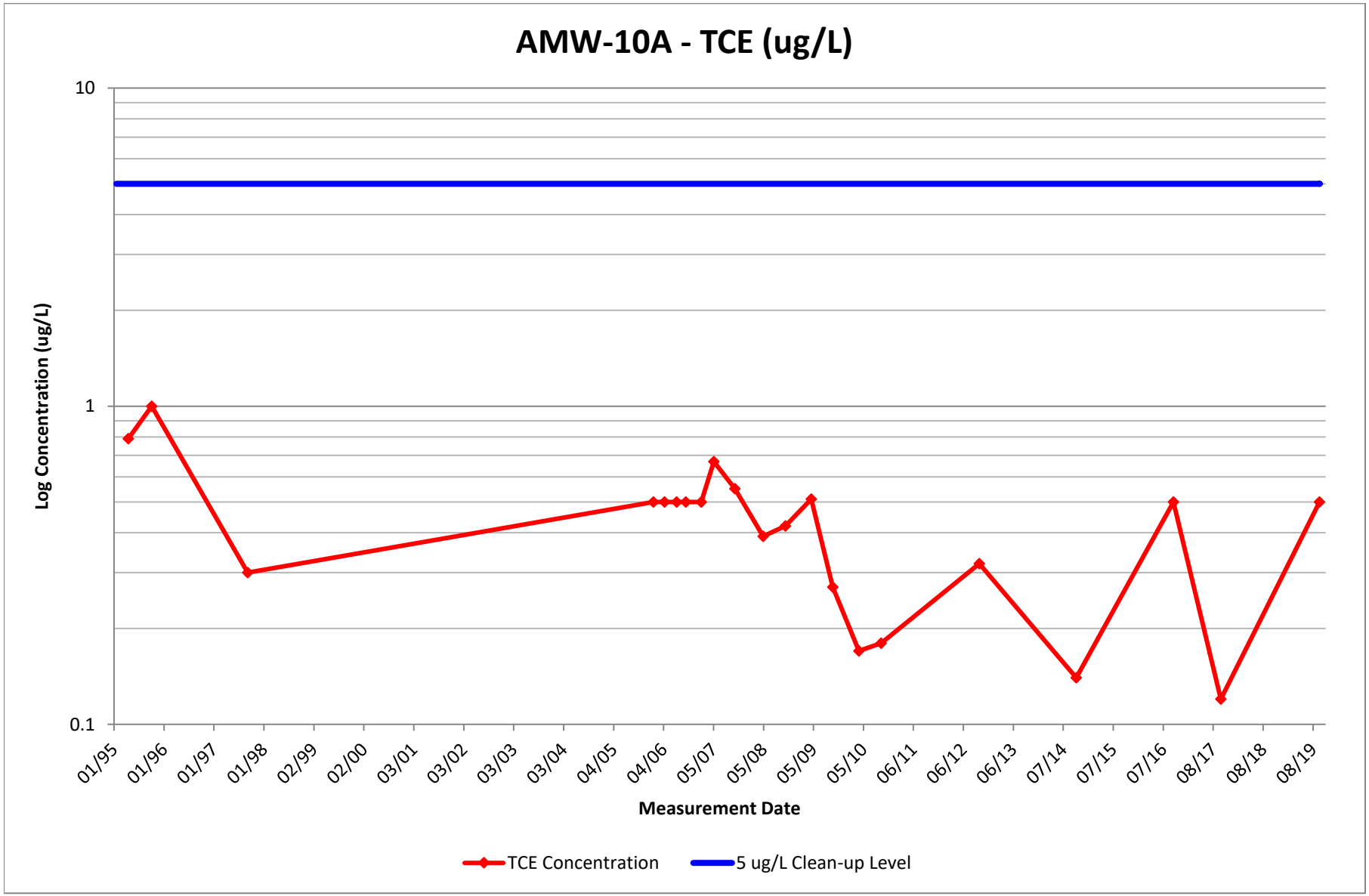

AMW-3A - TCE (ug/L)
Log Concentration (ug/L)
100
10
1
0.1
02/96
02/97
02/98
03/99
03/00
03/01
04/02
04/03
04/04
05/05
05/06
05/07
06/08
06/09
06/10
07/11
07/12
07/13
08/14
08/15
08/16
09/17
09/18
09/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

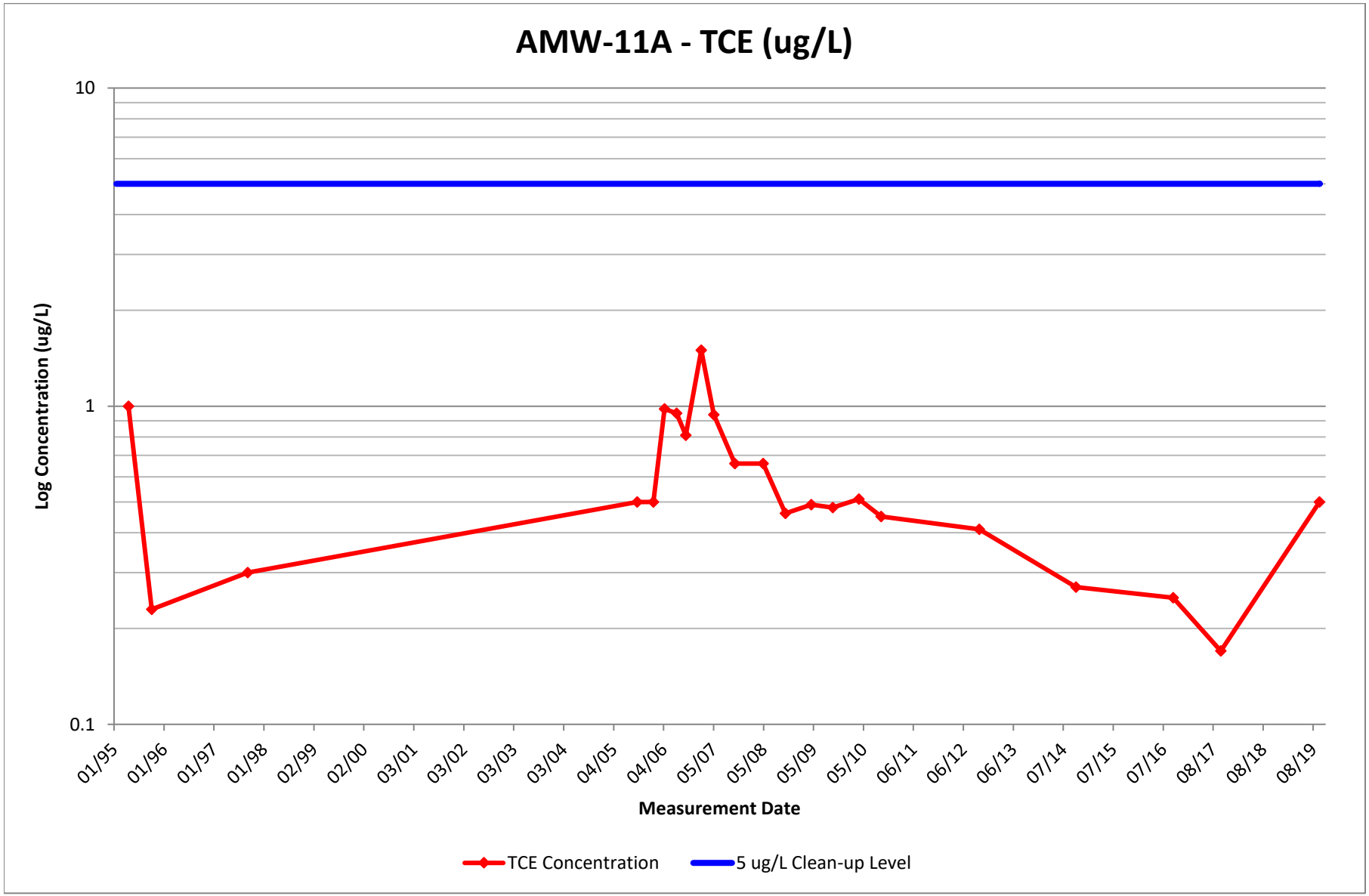

AMW-4A - TCE (ug/L)
10
1
0.1
Log Concentration (ug/L)
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

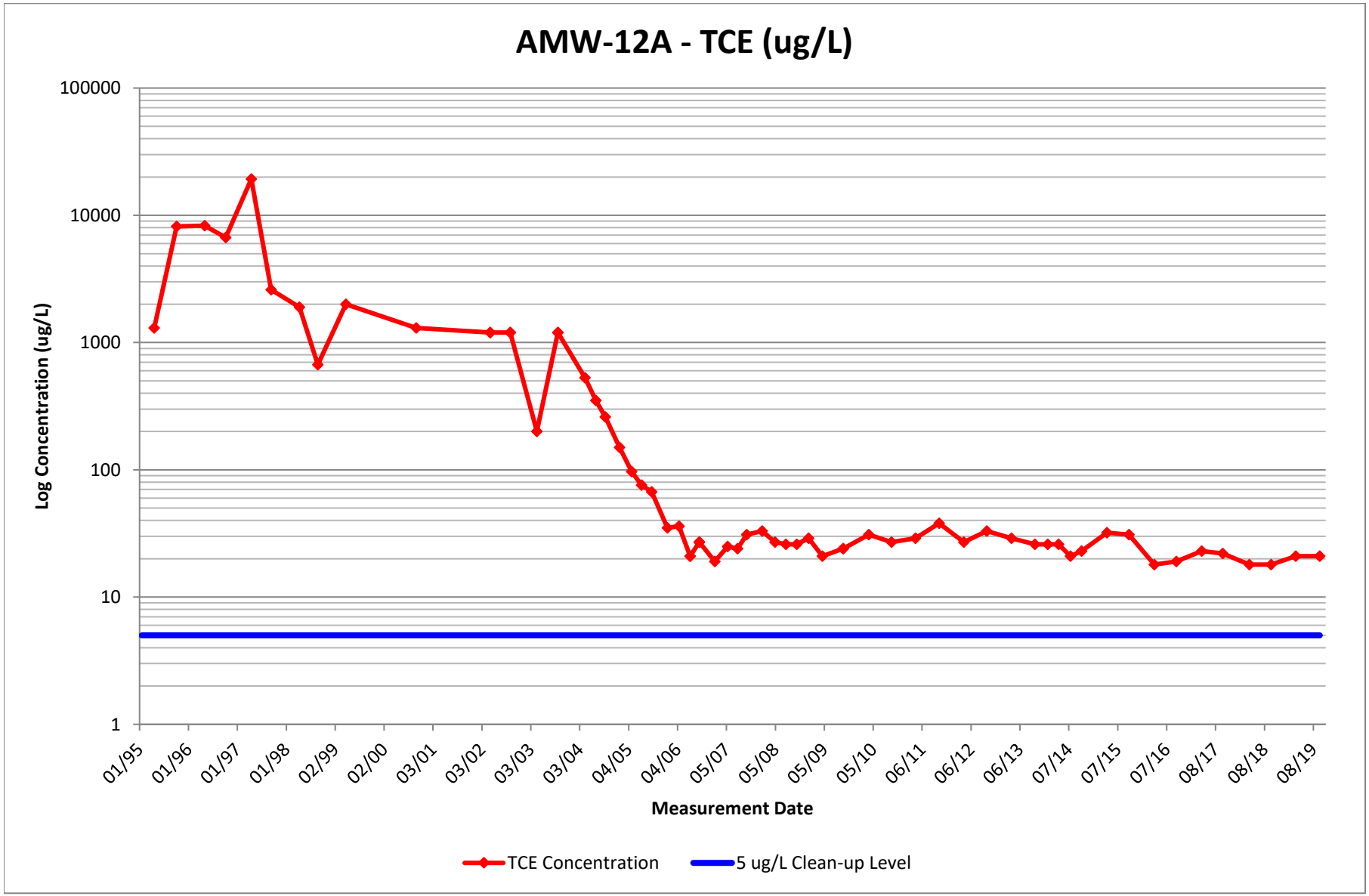

AMW-6A - TCE (ug/L)
10
1
0.1
Log Concentration (ug/L)
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

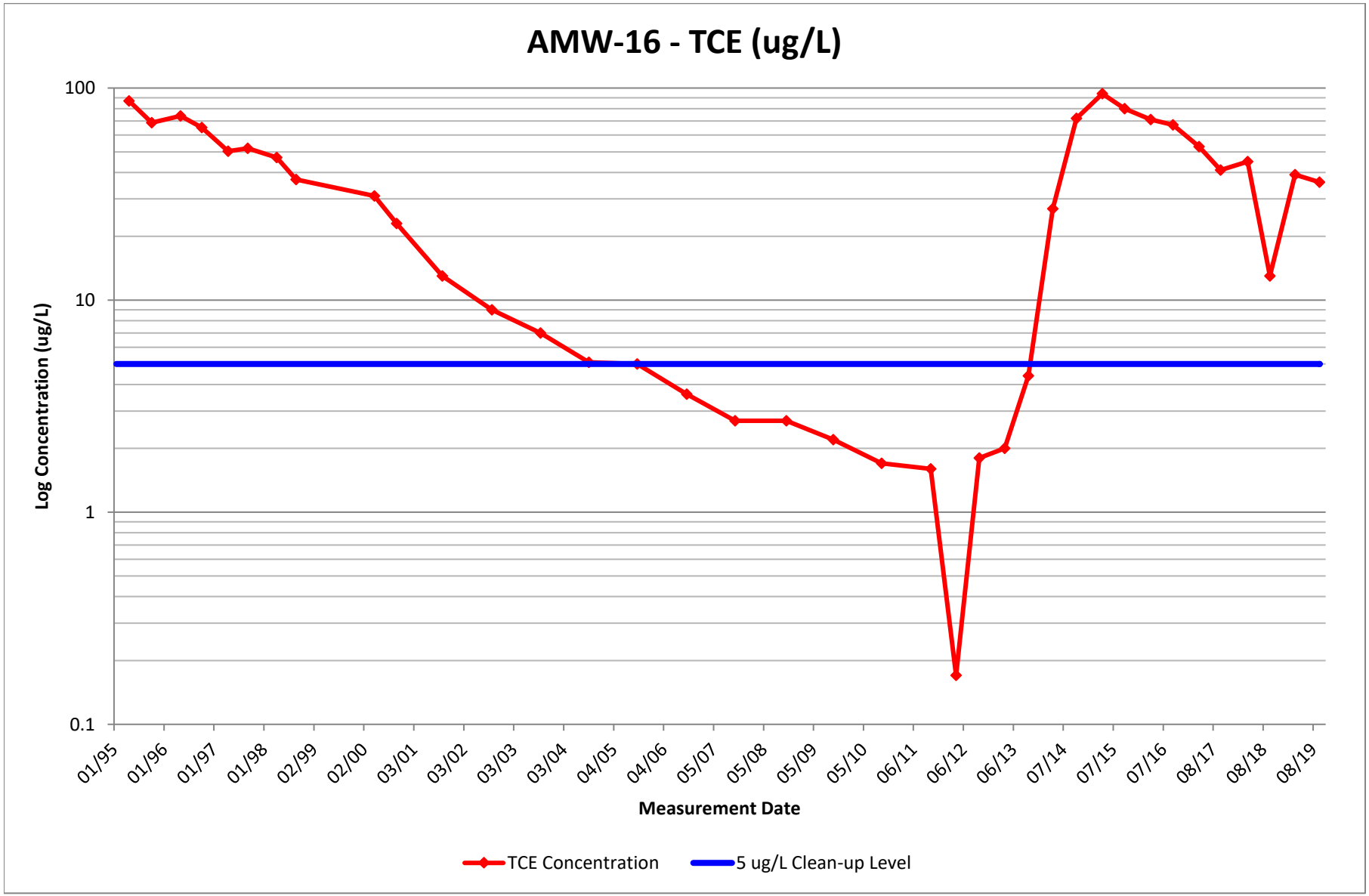

AMW-7A - TCE (ug/L)
10
1
0.1
Log Concentration (ug/L)
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

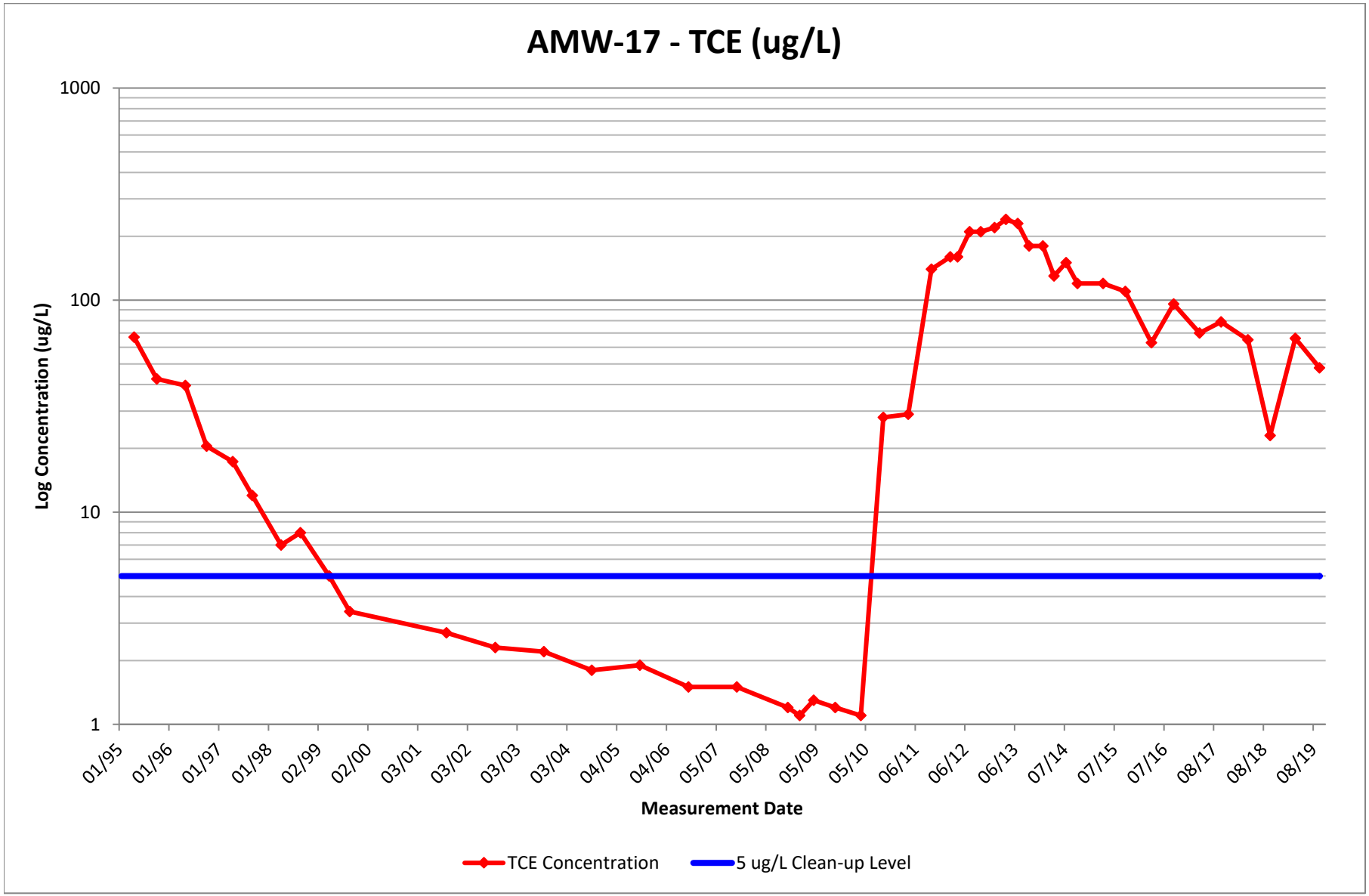

AMW-8A - TCE (ug/L)
Log Concentration (ug/L)
1000
100
10
1
0.1
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

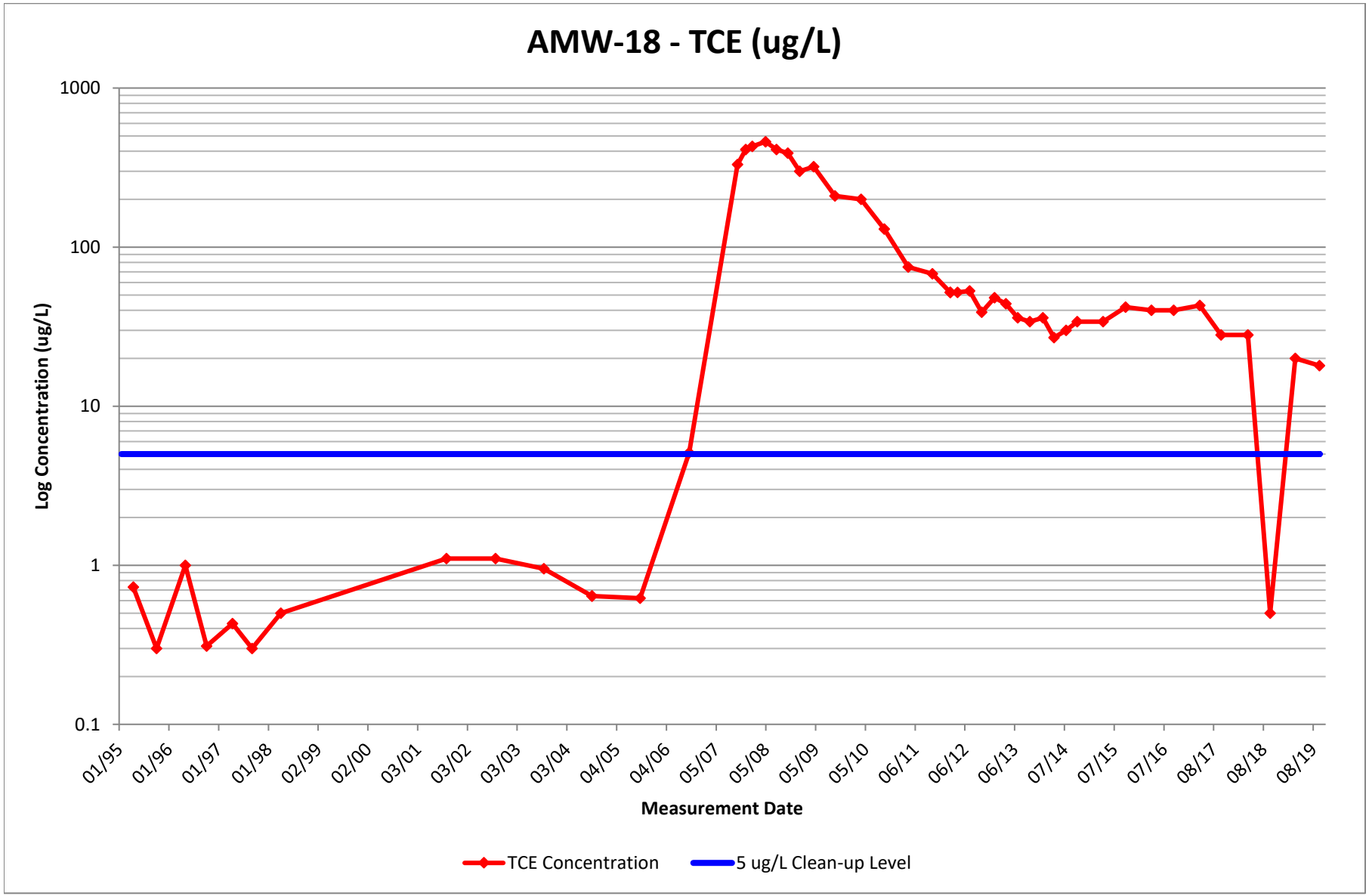

AMW-10A - TCE (ug/L)
10
1
0.1
Log Concentration (ug/L)
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

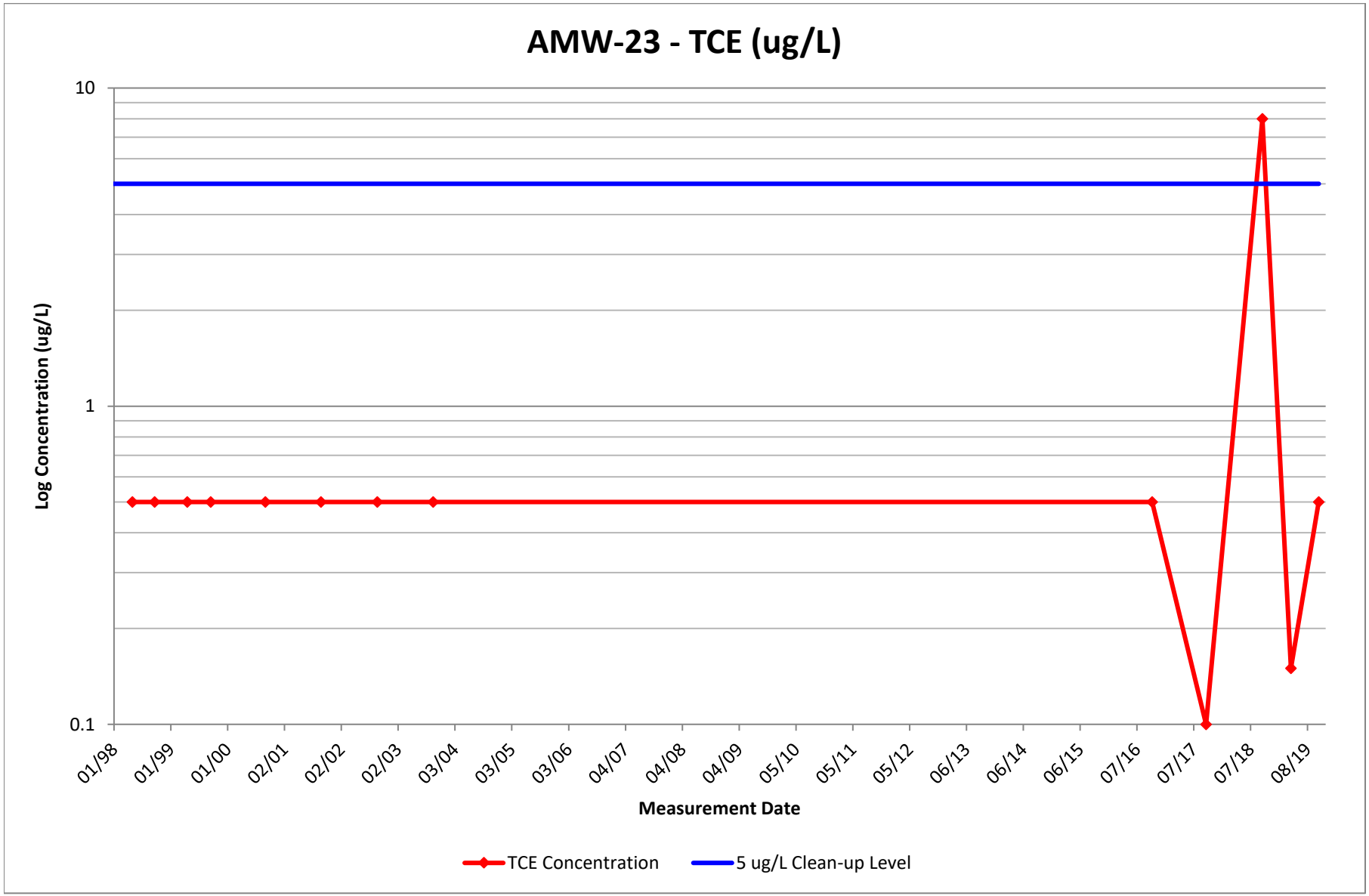

AMW-11A - TCE (ug/L)
10
1
0.1
Log Concentration (ug/L)
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

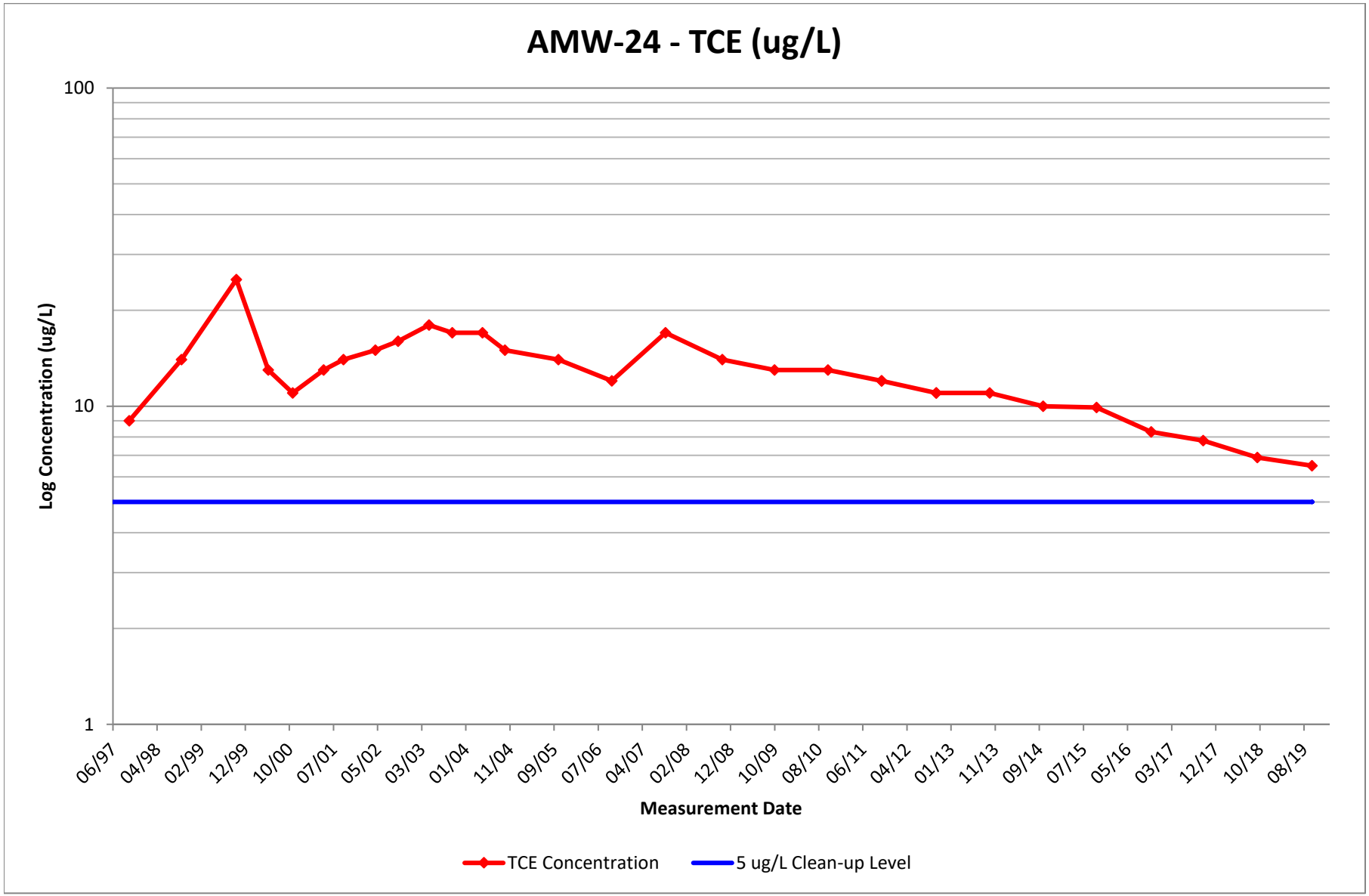

AMW-12A - TCE (ug/L)
Log Concentration (ug/L)
100000
10000
1000
100
10
1
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

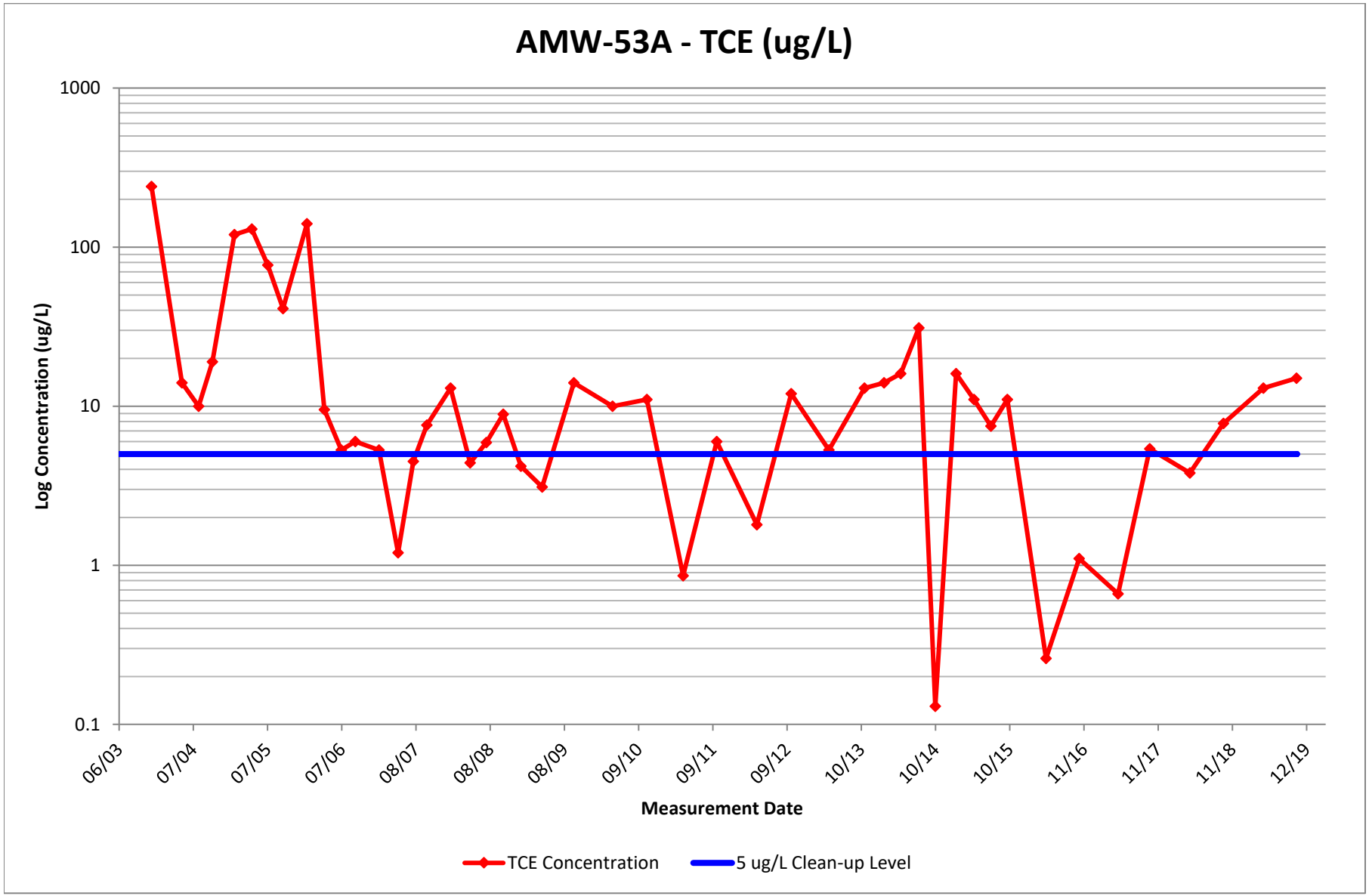

AMW-16 - TCE (ug/L)
Log Concentration (ug/L)
100
10
1
0.1
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

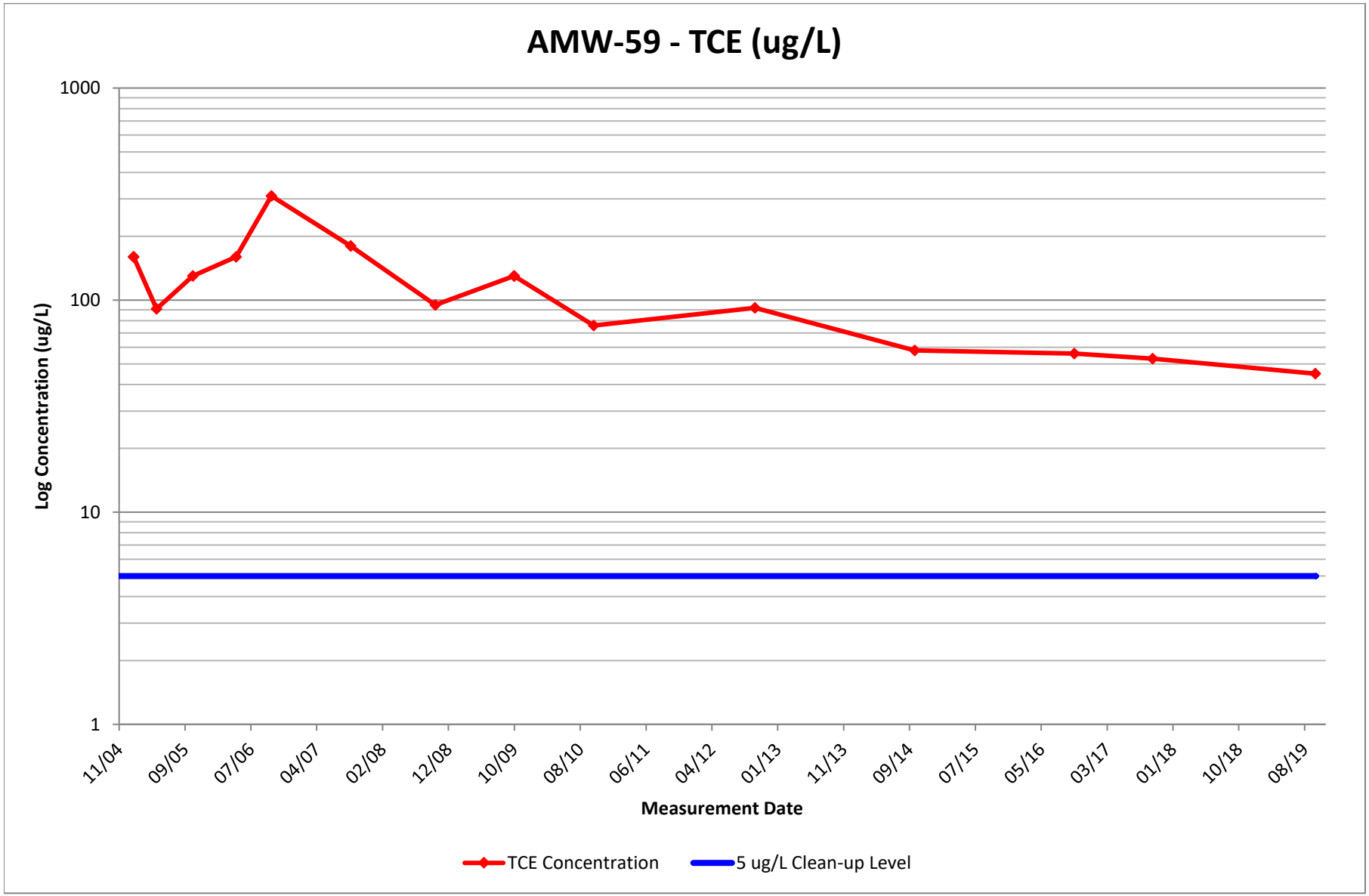

AMW-17 - TCE (ug/L)
Log Concentration (ug/L)
1000
100
10
1
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

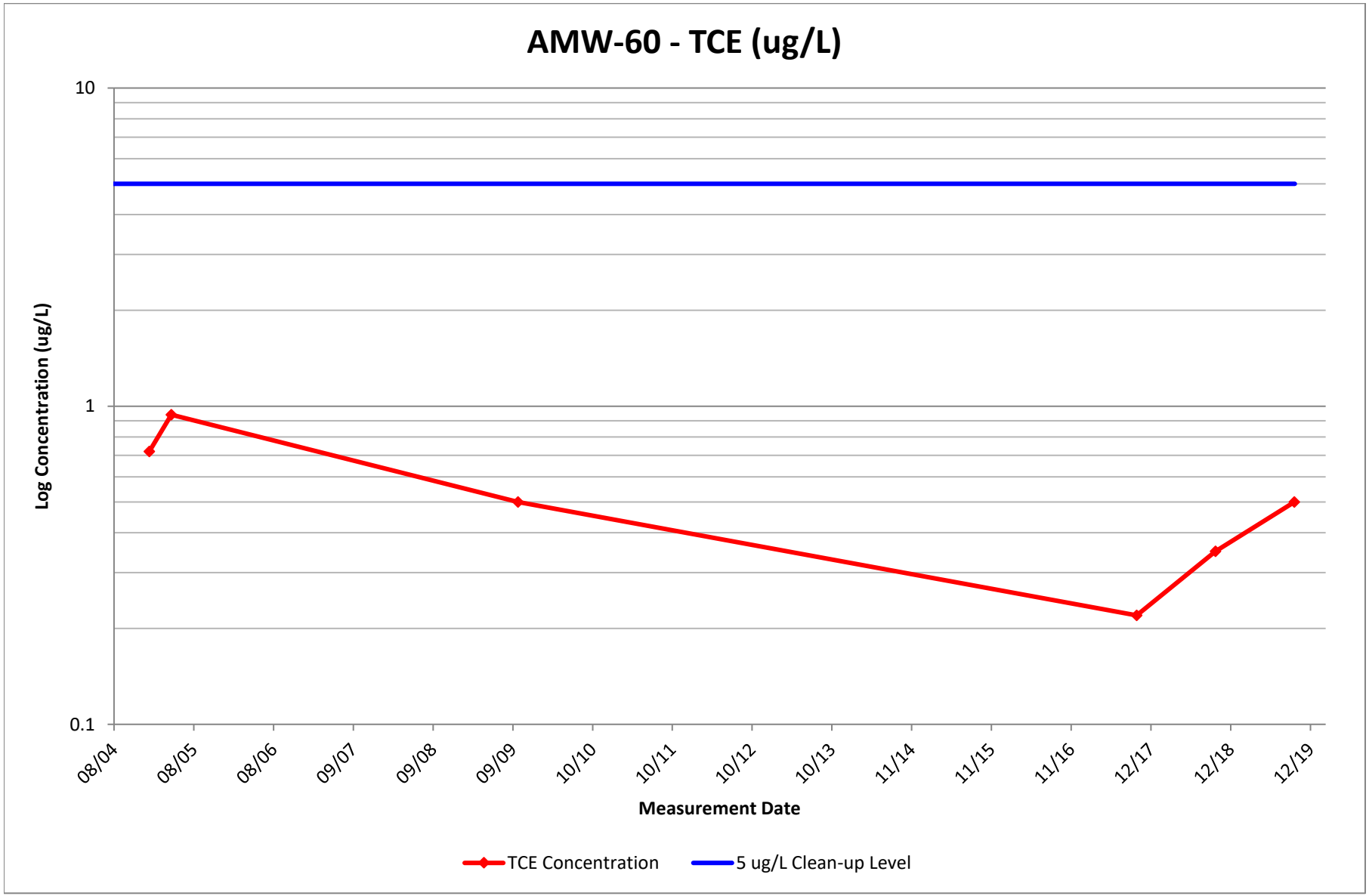

AMW-18 - TCE (ug/L)
Log Concentration (ug/L)
1000
100
10
1
0.1
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

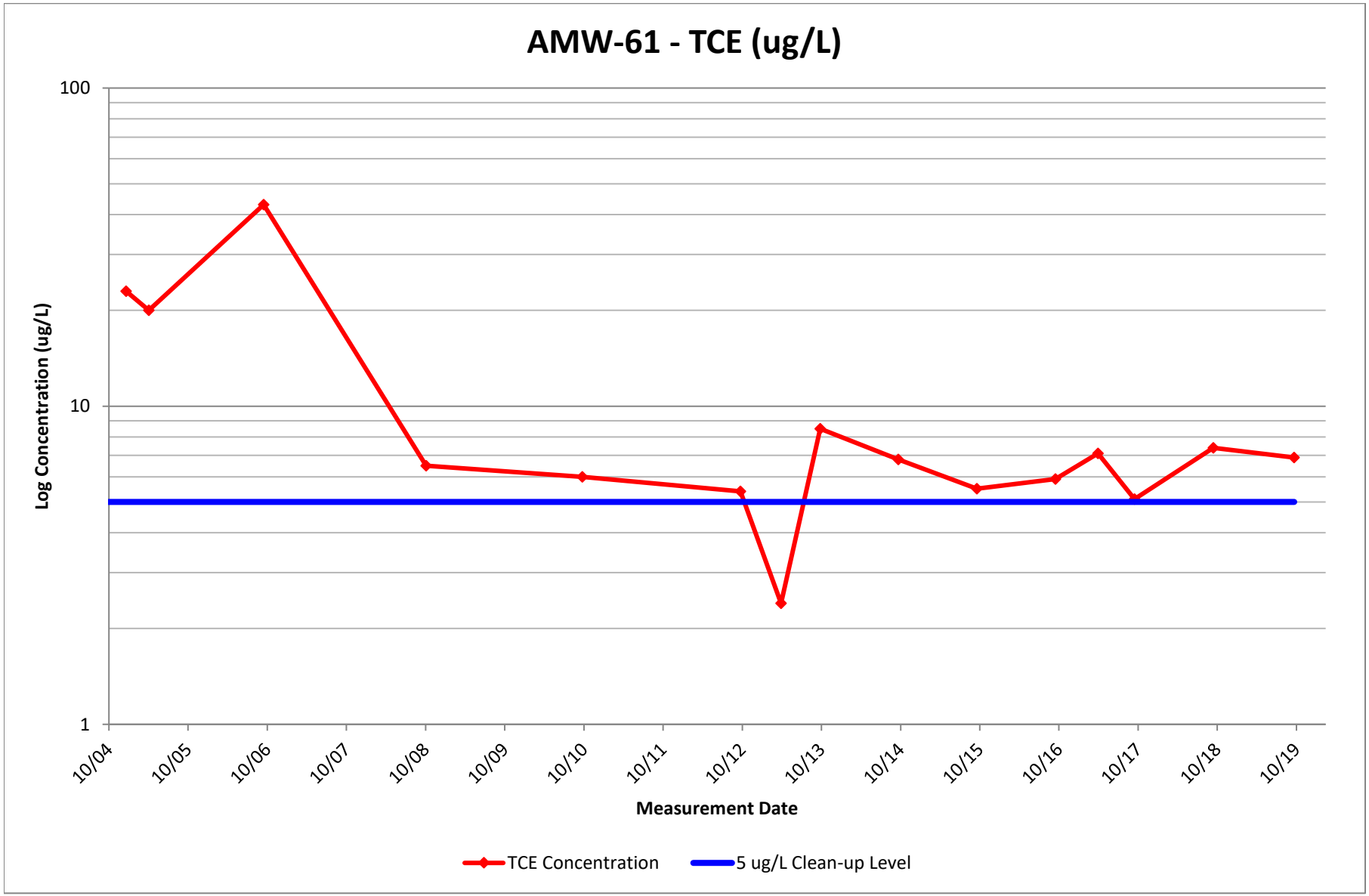

AMW-23 - TCE (ug/L)
10
1
0.1
Log Concentration (ug/L)
01/98
01/99
01/00
02/01
02/02
02/03
03/04
03/05
03/06
04/07
04/08
04/09
05/10
05/11
05/12
06/13
06/14
06/15
07/16
07/17
07/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

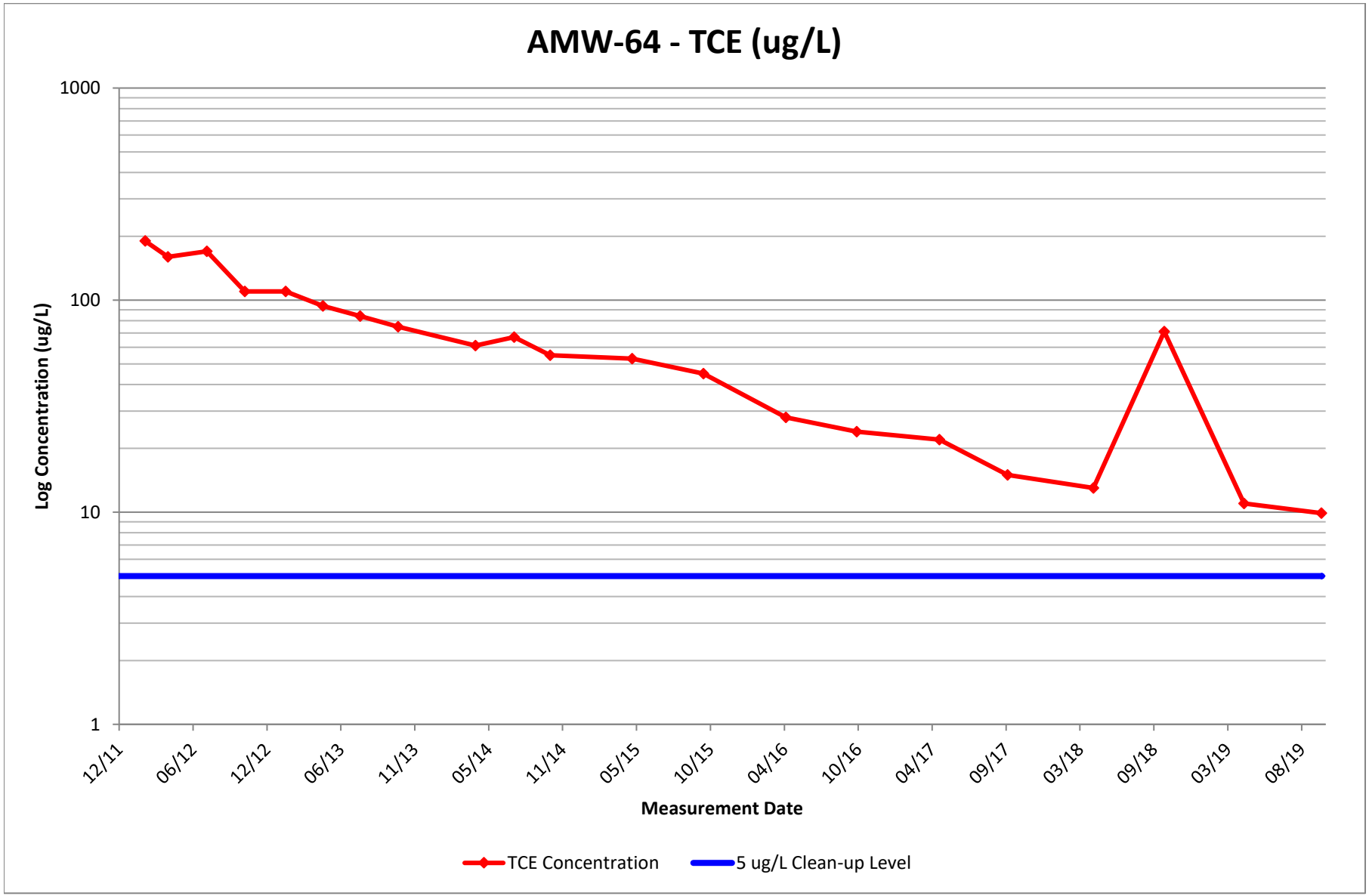

AMW-24 - TCE (ug/L)
Log Concentration (ug/L)
100
10
1
06/97
04/98
02/99
12/99
10/00
07/01
05/02
03/03
01/04
11/04
09/05
07/06
04/07
02/08
12/08
10/09
08/10
06/11
04/12
01/13
11/13
09/14
07/15
05/16
03/17
12/17
10/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

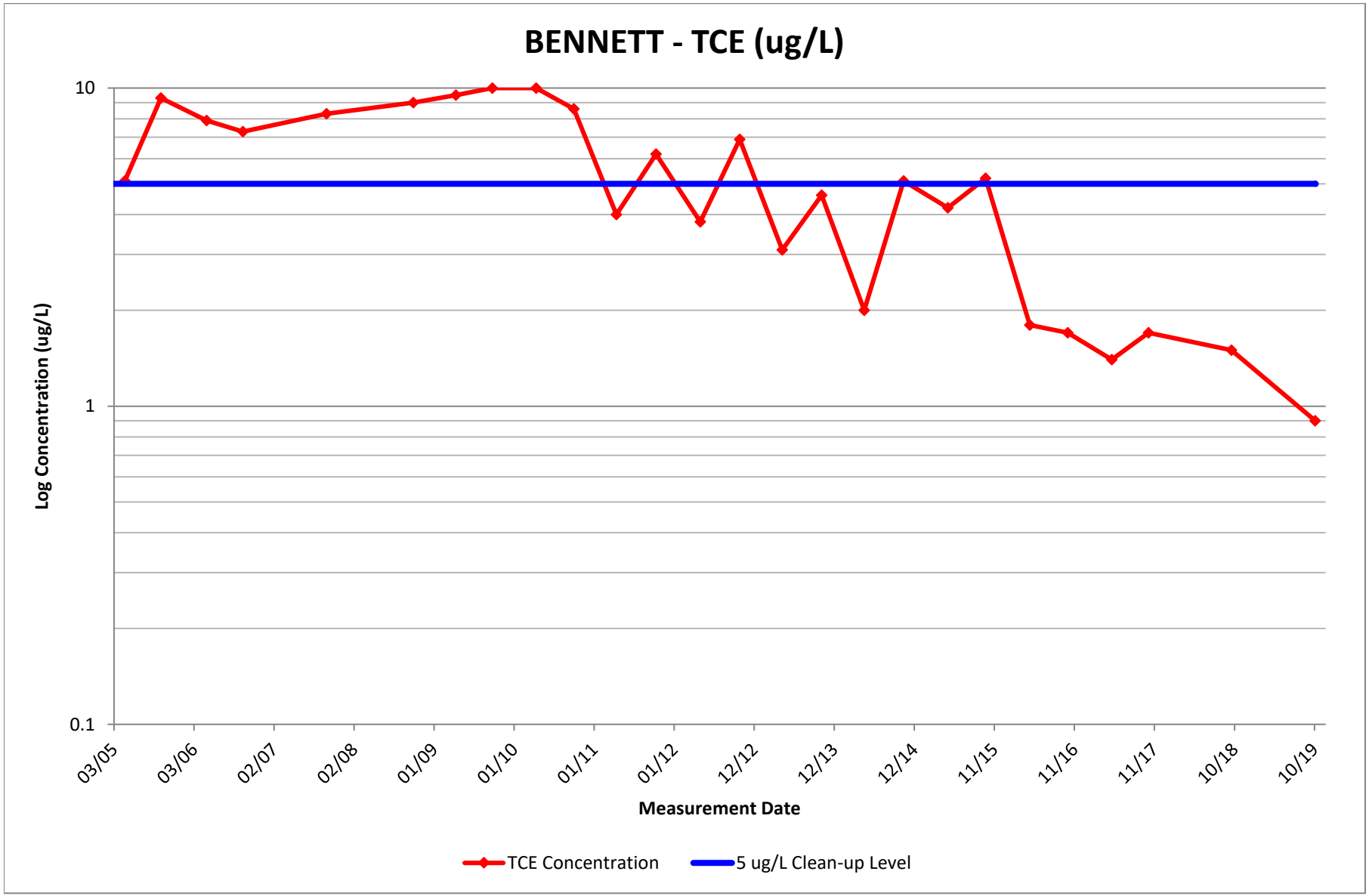

AMW-53A - TCE (ug/L)
Log Concentration (ug/L)
1000
100
10
1
0.1
06/03
07/04
07/05
07/06
08/07
08/08
08/09
09/10
09/11
09/12
10/13
10/14
10/15
11/16
11/17
11/18
12/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

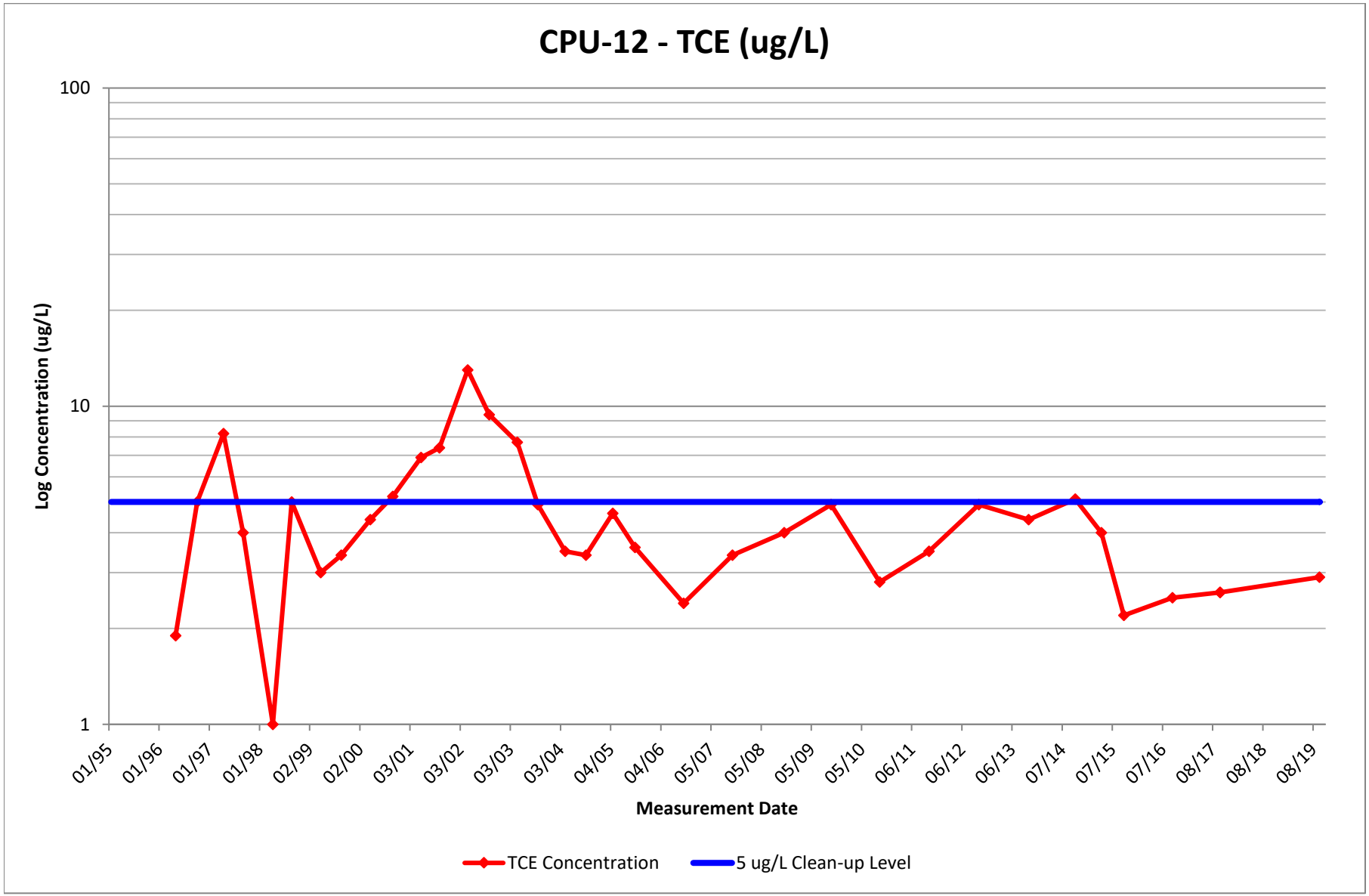

AMW-59 - TCE (ug/L)
Log Concentration (ug/L)
1000
100
10
1
11/04
09/05
07/06
04/07
02/08
12/08
10/09
08/10
06/11
04/12
01/13
11/13
09/14
07/15
05/16
03/17
01/18
10/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

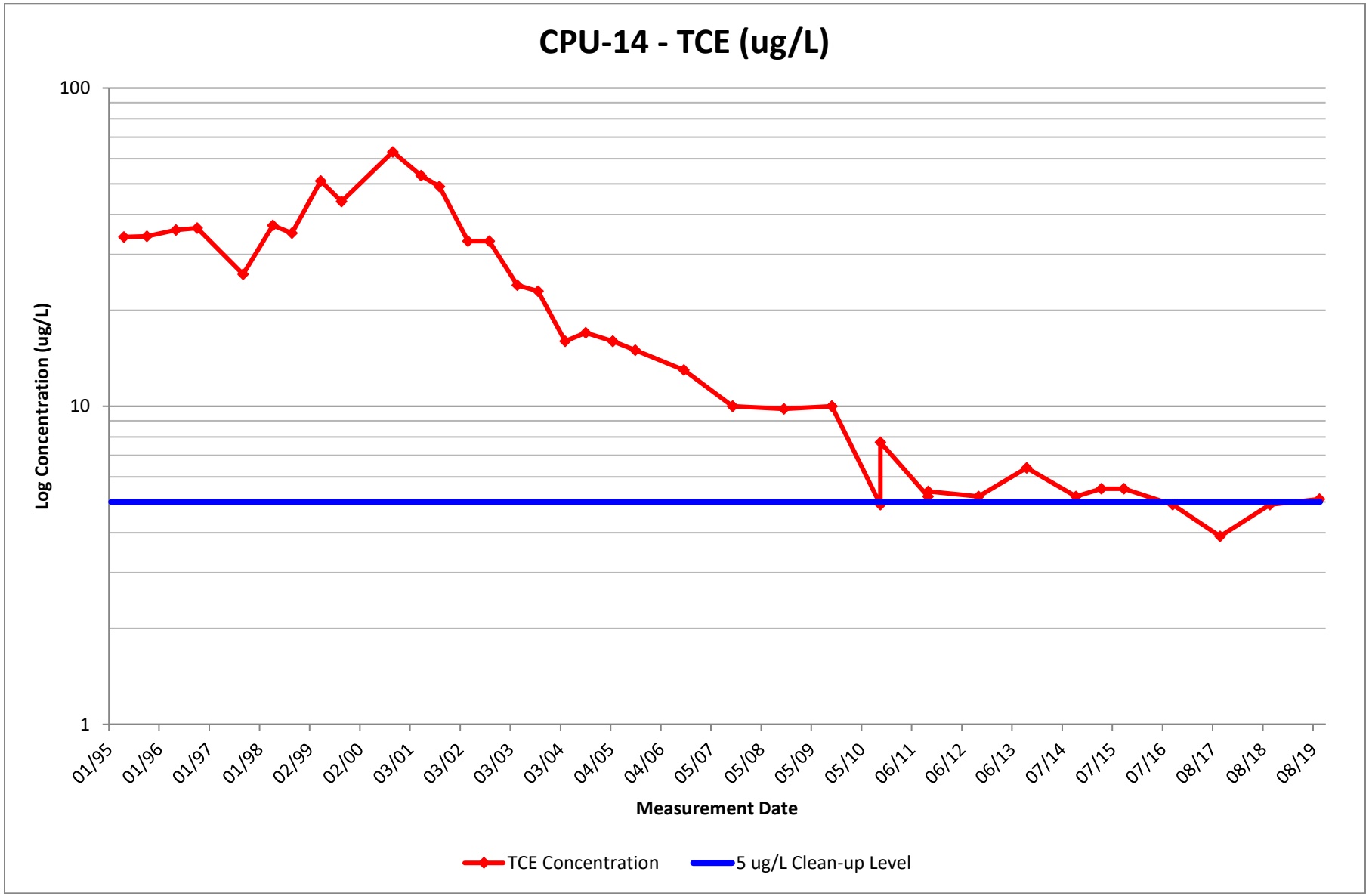

AMW-60 - TCE (ug/L)
10
1
0.1
Log Concentration (ug/L)
08/04
08/05
08/06
09/07
09/08
09/09
10/10
10/11
10/12
10/13
11/14
11/15
11/16
12/17
12/18
12/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

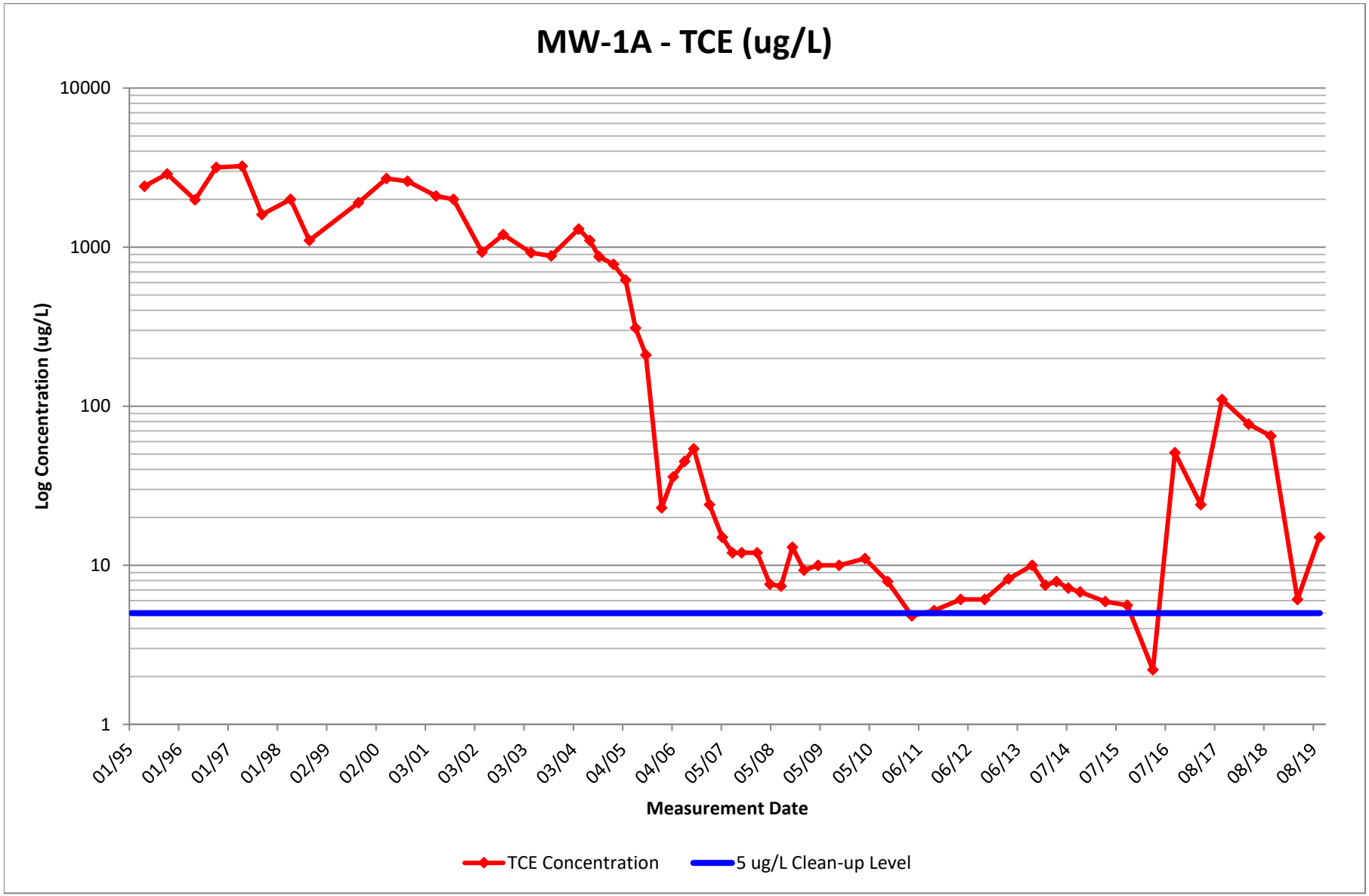

AMW-61 - TCE (ug/L)
100
10
1
Log Concentration (ug/L)
10/04
10/05
10/06
10/07
10/08
10/09
10/10
10/11
10/12
10/13
10/14
10/15
10/16
10/17
10/18
10/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

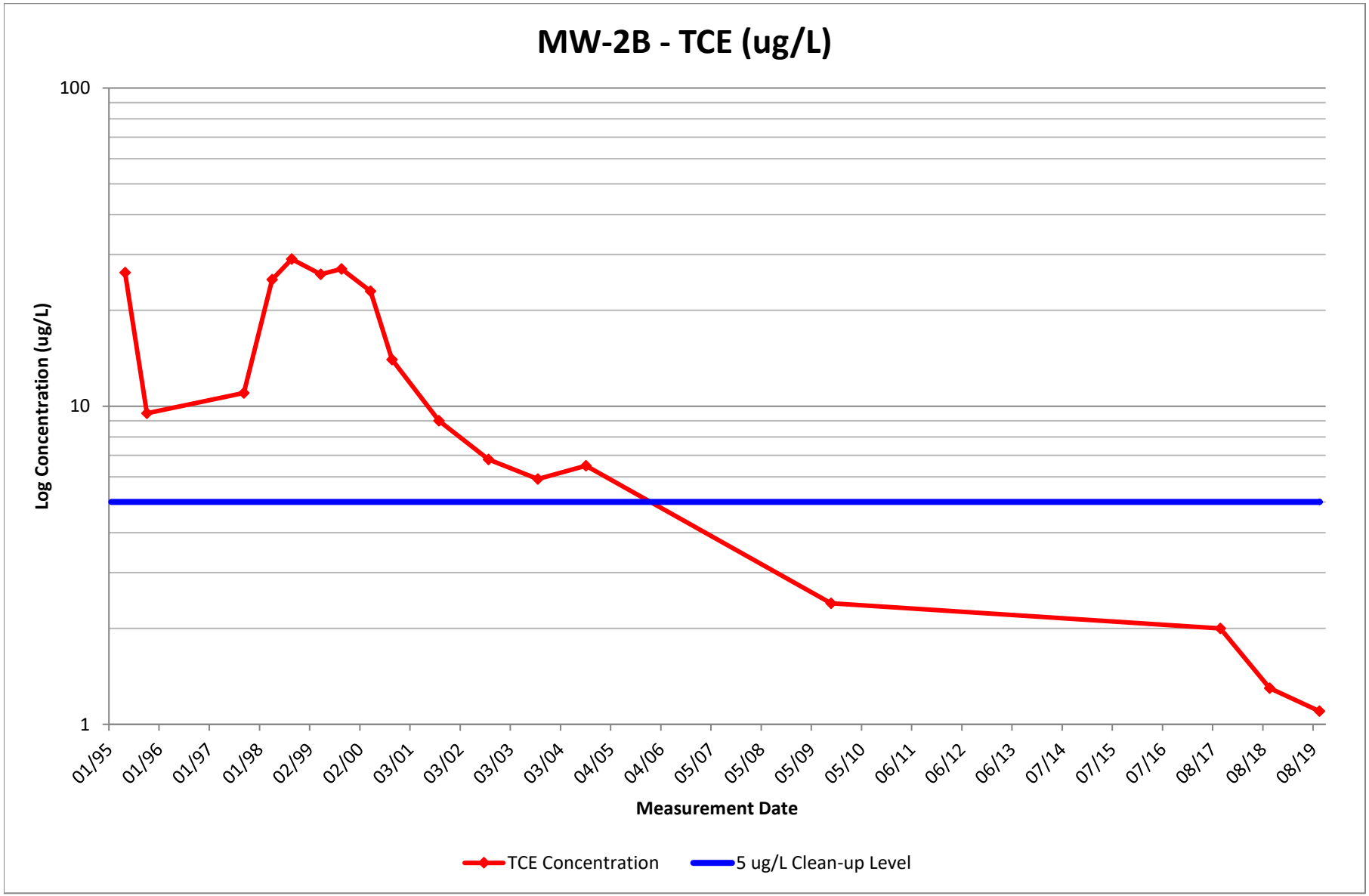

AMW-64 - TCE (ug/L)
1000
100
10
1
Log Concentration (ug/L)
12/11
06/12
12/12
06/13
11/13
05/14
11/14
05/15
10/15
04/16
10/16
04/17
09/17
03/18
09/18
03/19
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

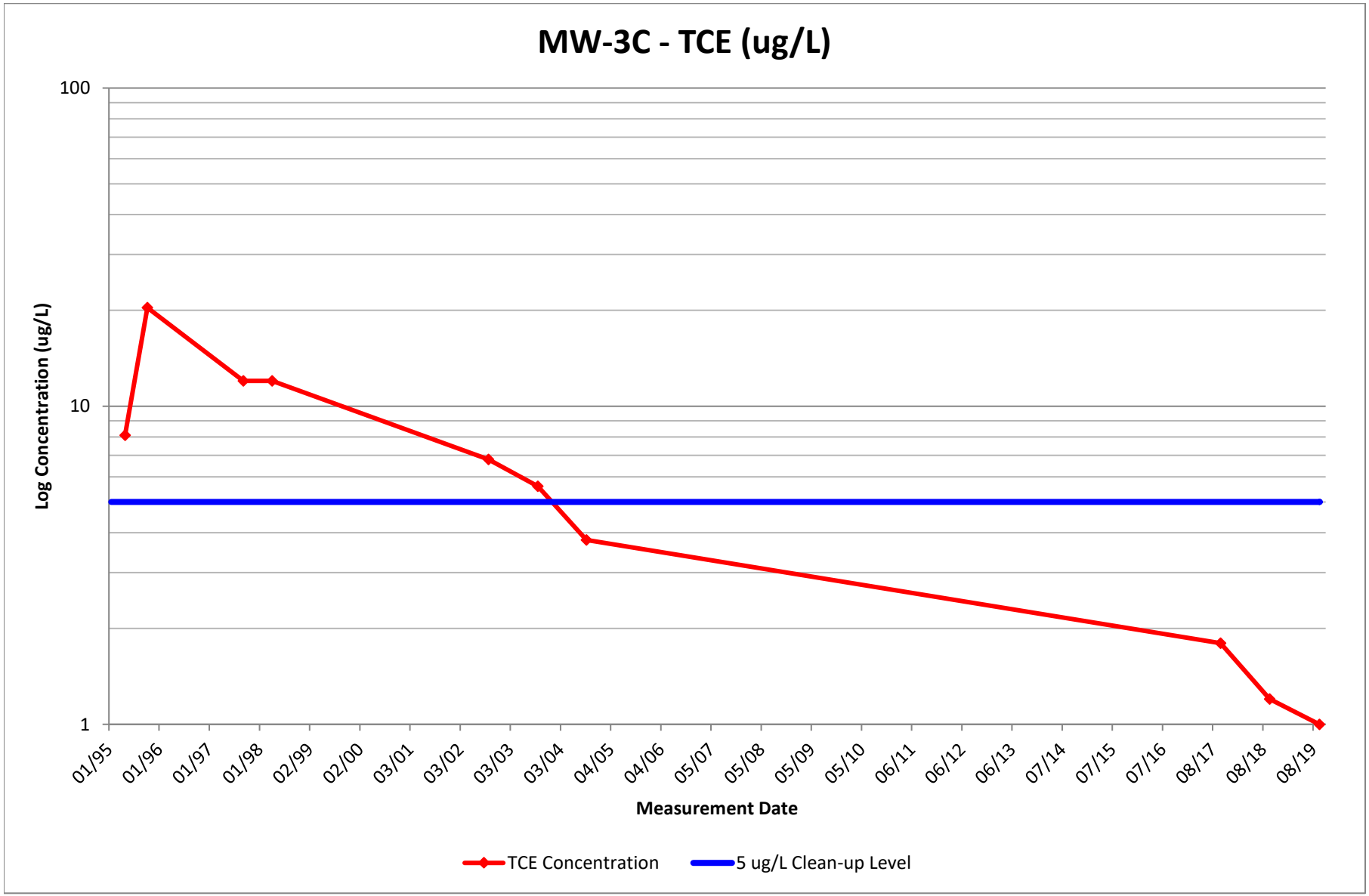

BENNETT - TCE (ug/L)
Log Concentration (ug/L)
10
1
0.1
03/05
03/06
02/07
02/08
01/09
01/10
01/11
01/12
12/12
12/13
12/14
11/15
11/16
11/17
10/18
10/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

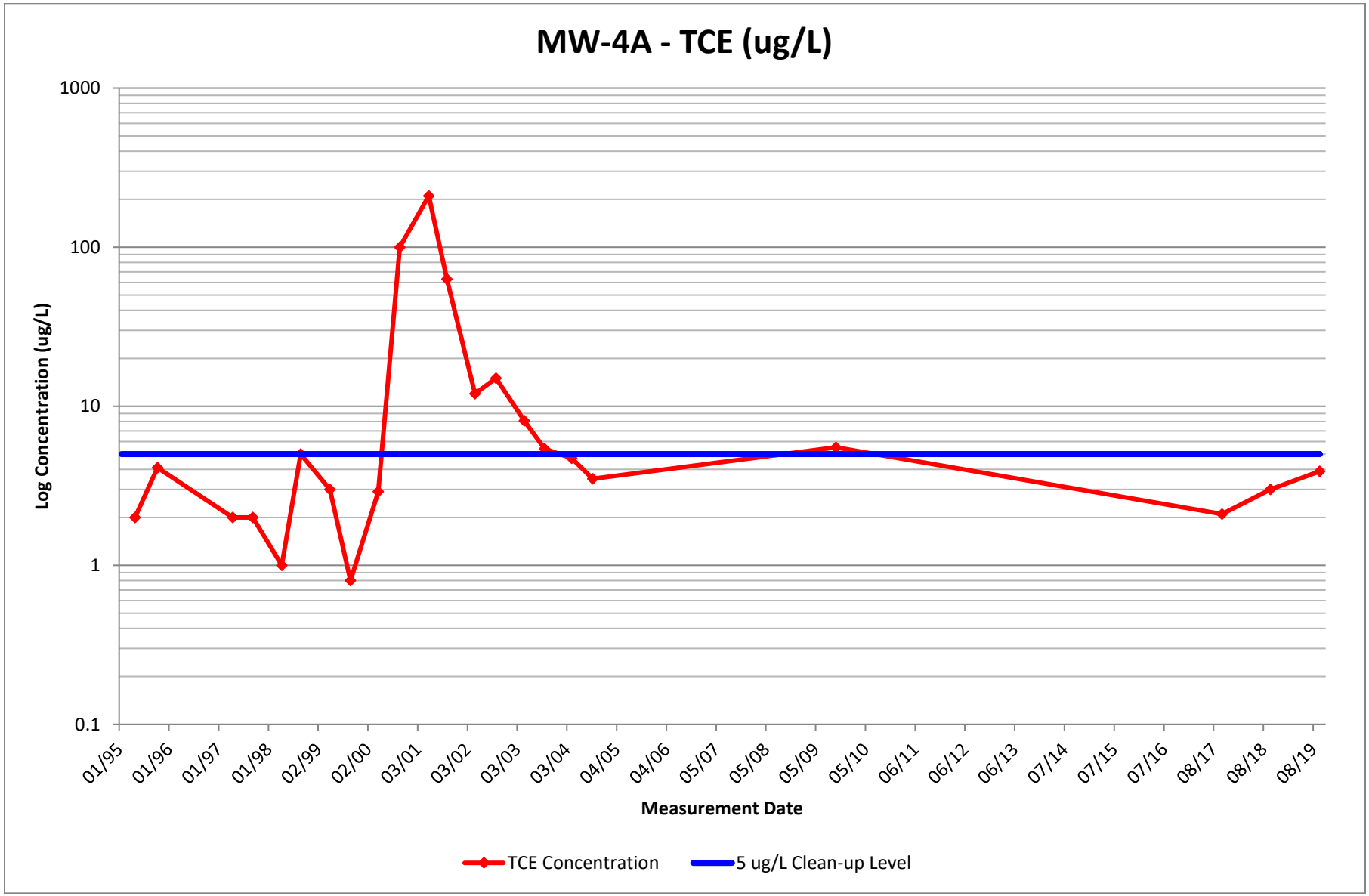

CPU-12 - TCE (ug/L)
100
10
1
Log Concentration (ug/L)
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

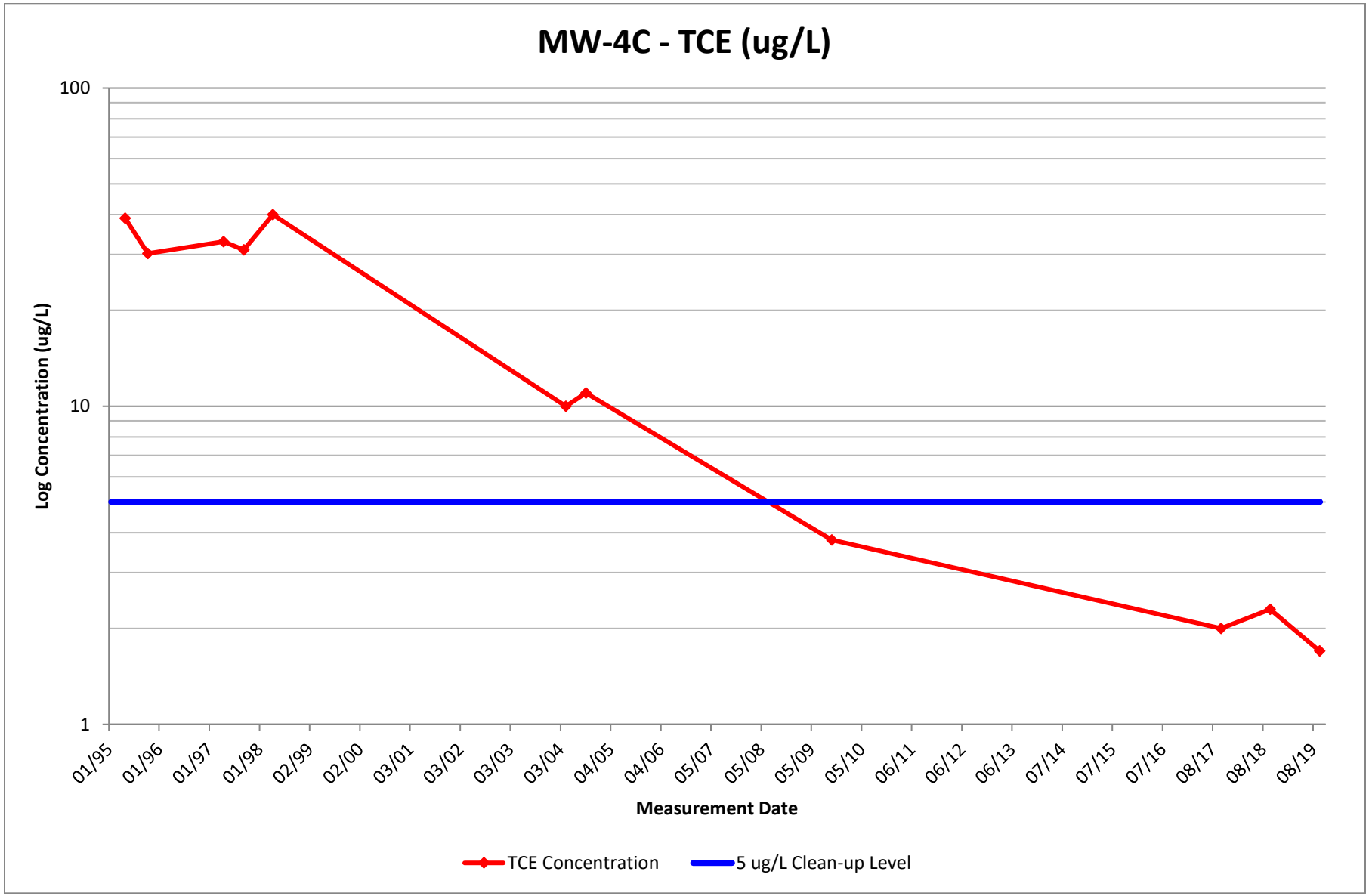

CPU-14 - TCE (ug/L)
100
10
1
Log Concentration (ug/L)
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

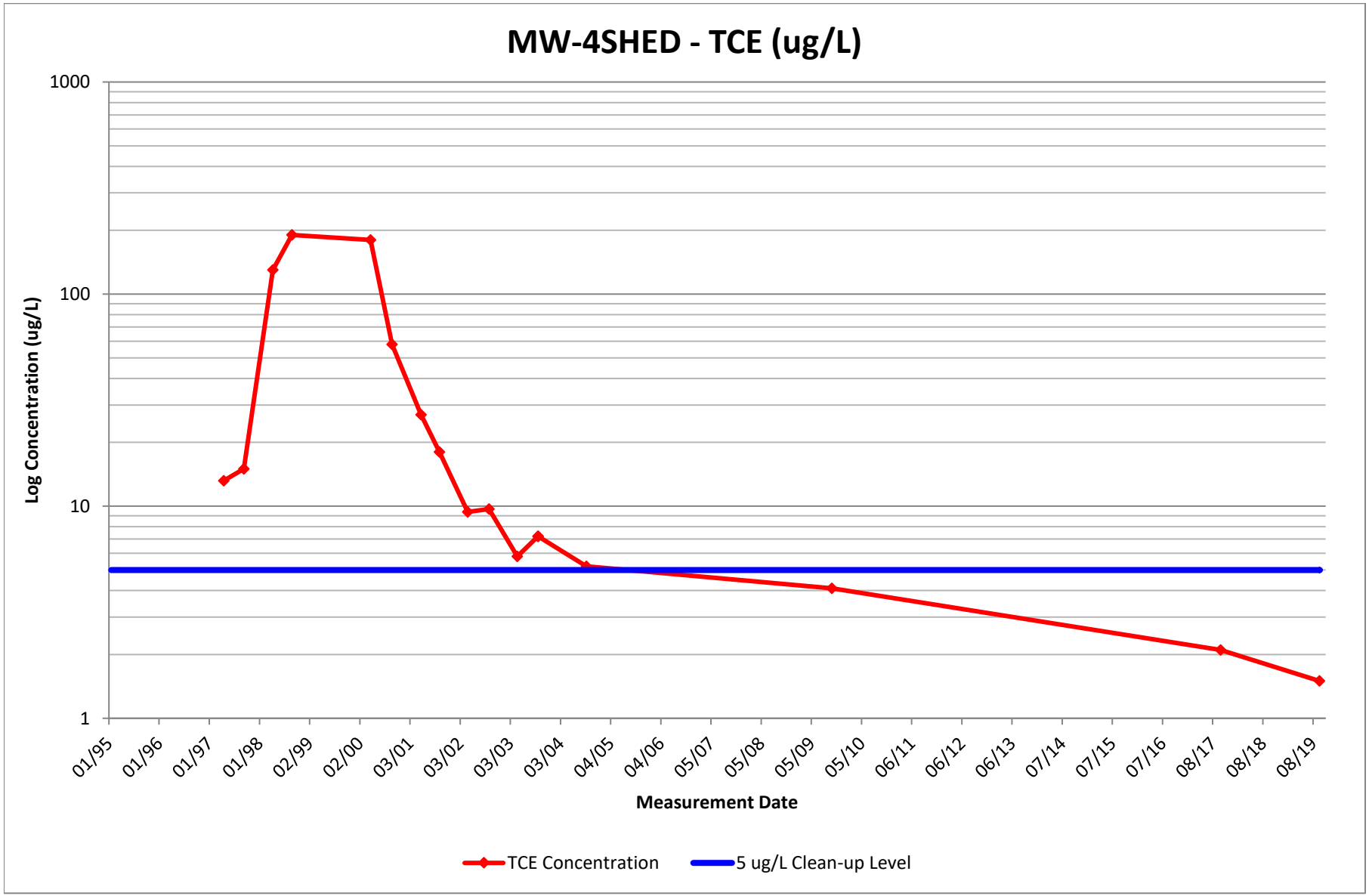

MW-1A - TCE (ug/L)
Log Concentration (ug/L)
10000
1000
100
10
1
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

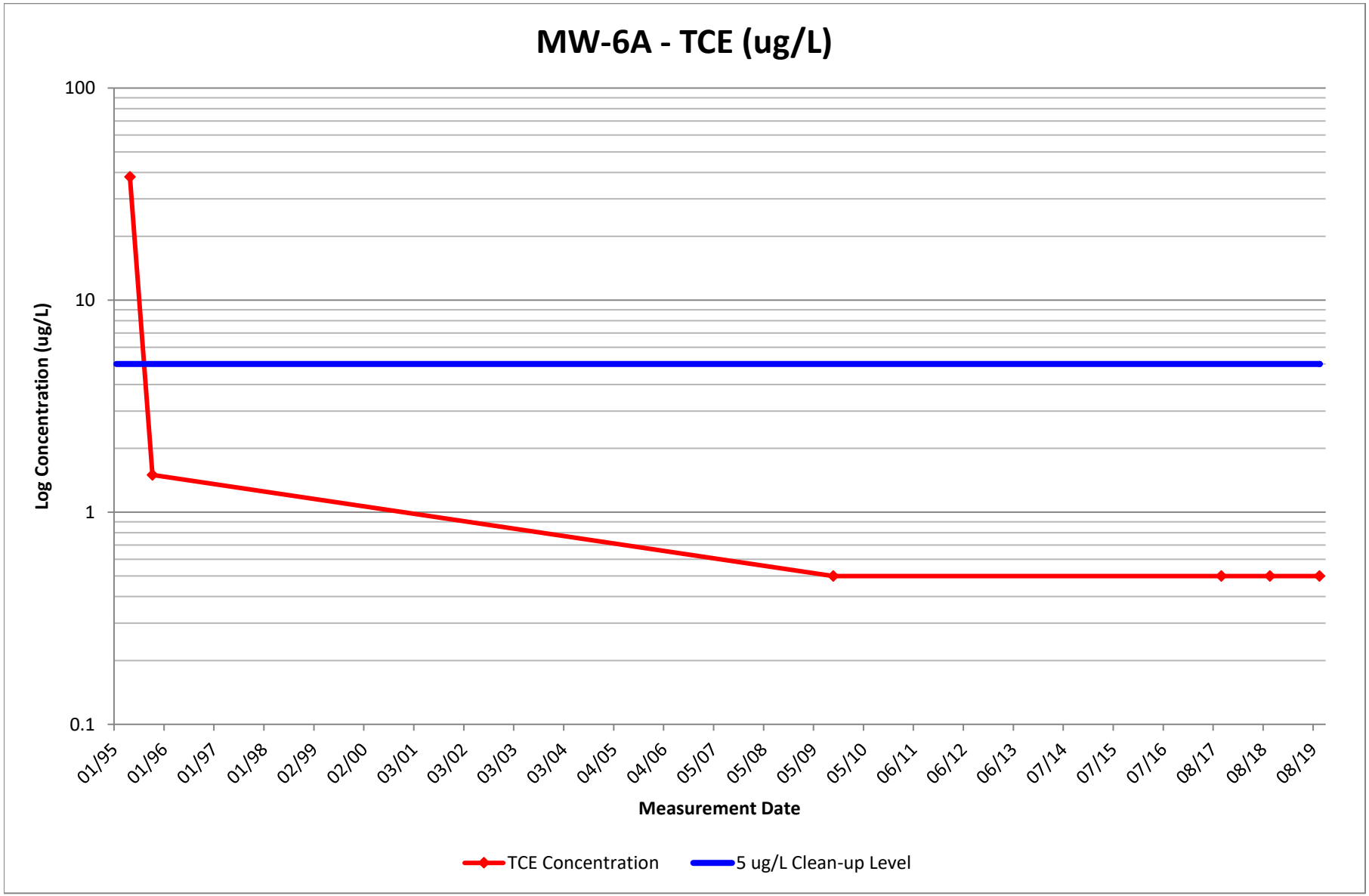

MW-2B - TCE (ug/L)
100
10
1
Log Concentration (ug/L)
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

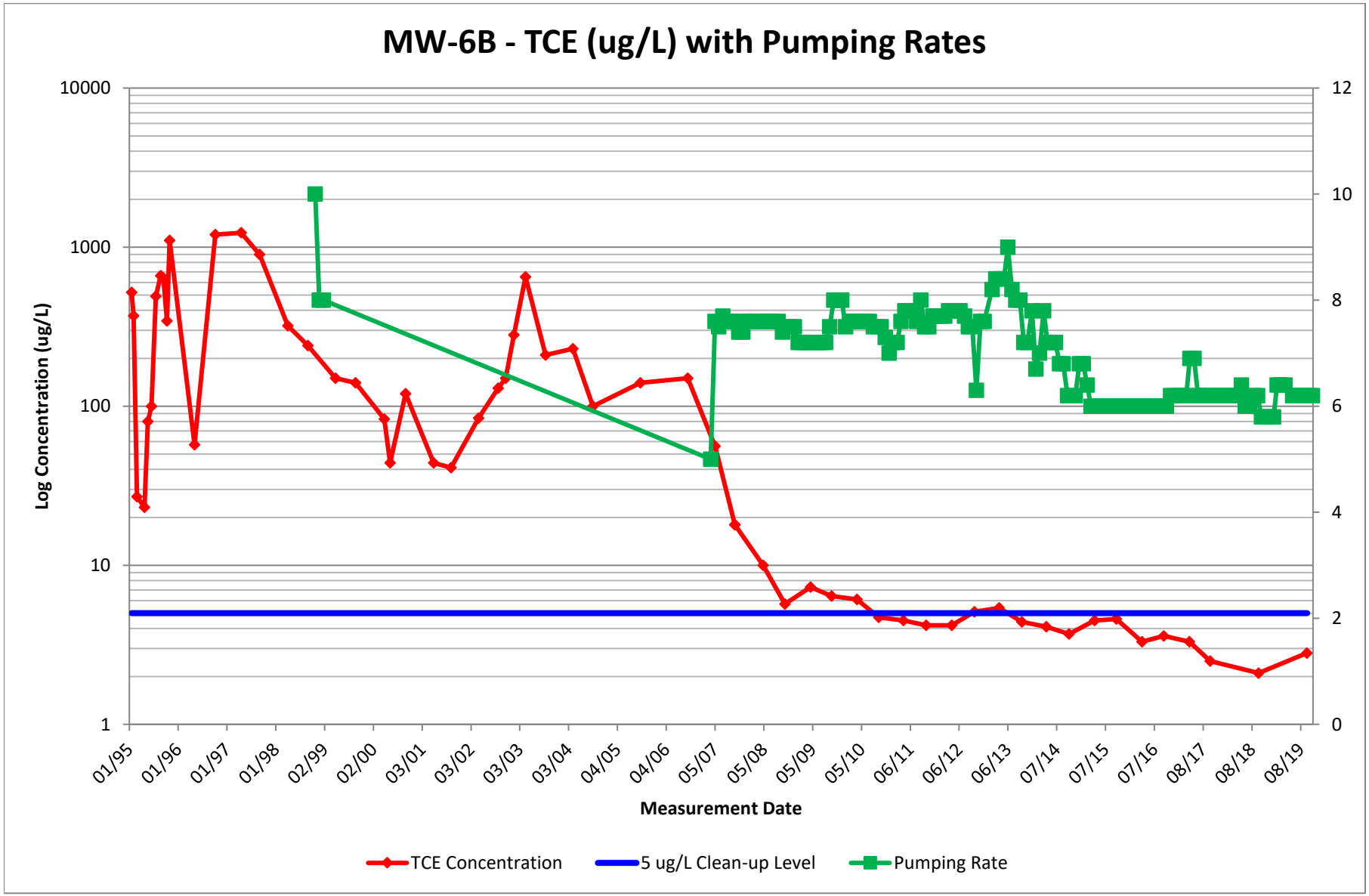

MW-3C - TCE (ug/L)
100
10
1
Log Concentration (ug/L)
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

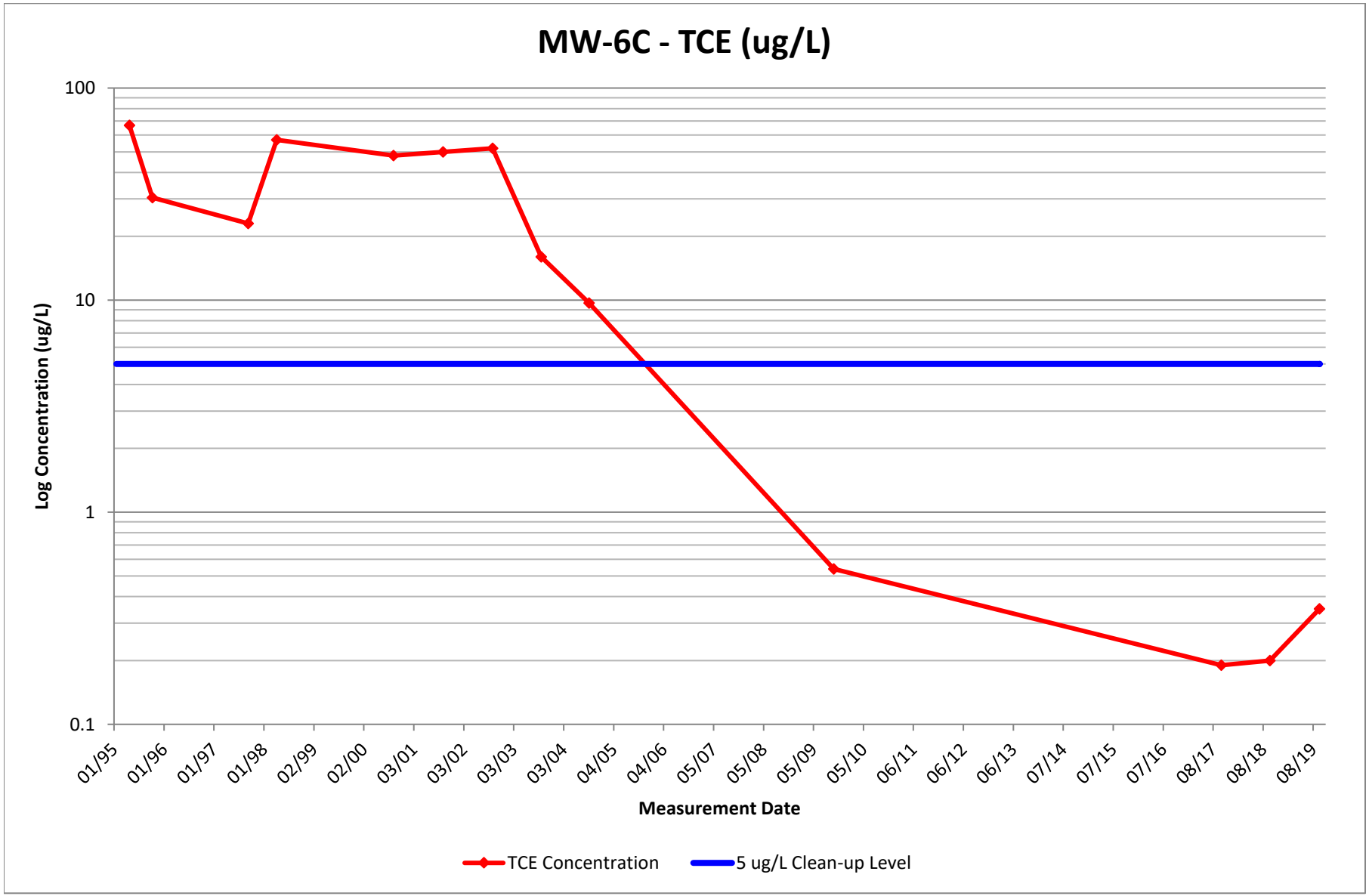

MW-4A - TCE (ug/L)
Log Concentration (ug/L)
1000
100
10
1
0.1
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

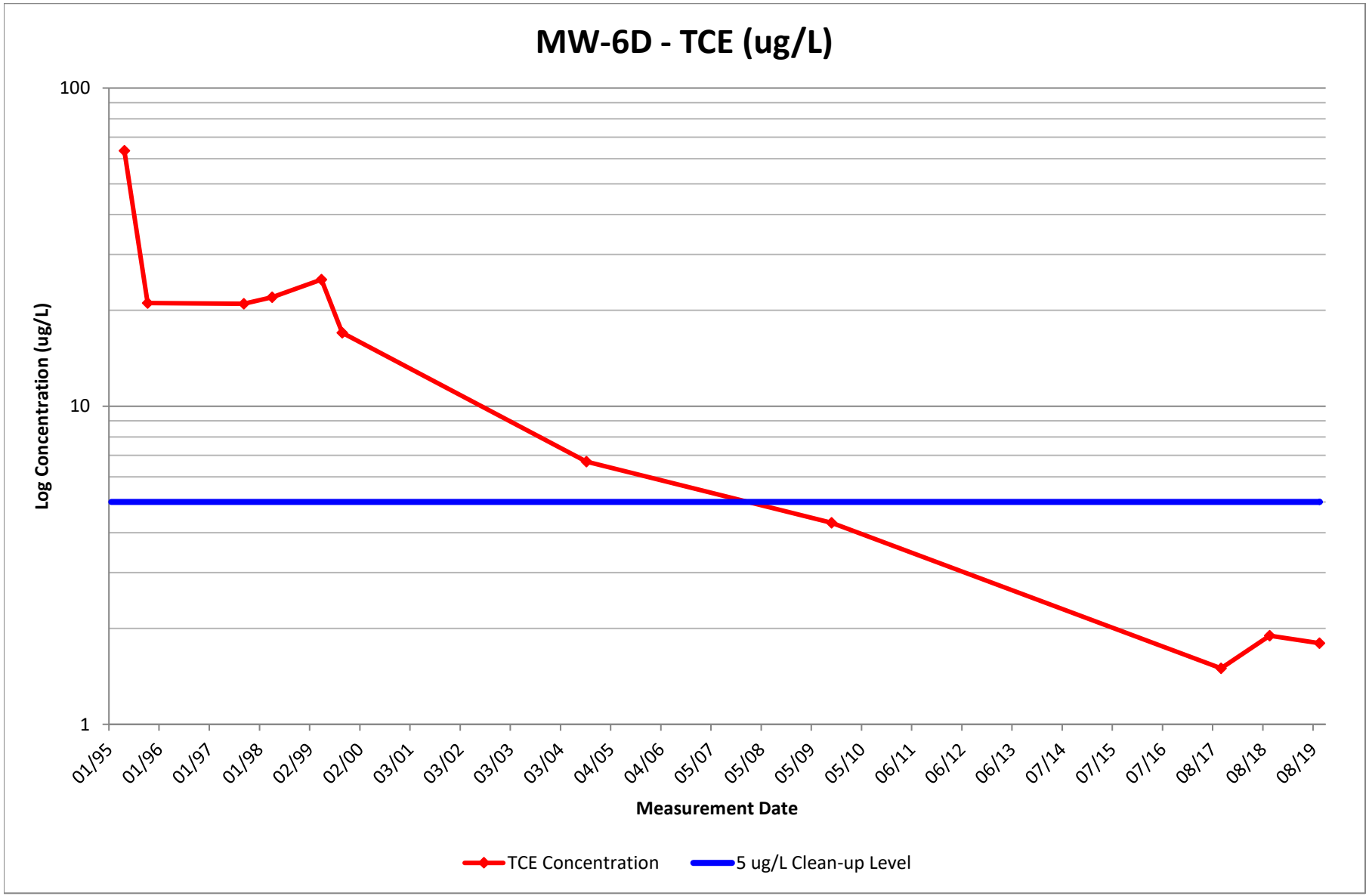

MW-4C - TCE (ug/L)
100
10
1
Log Concentration (ug/L)
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

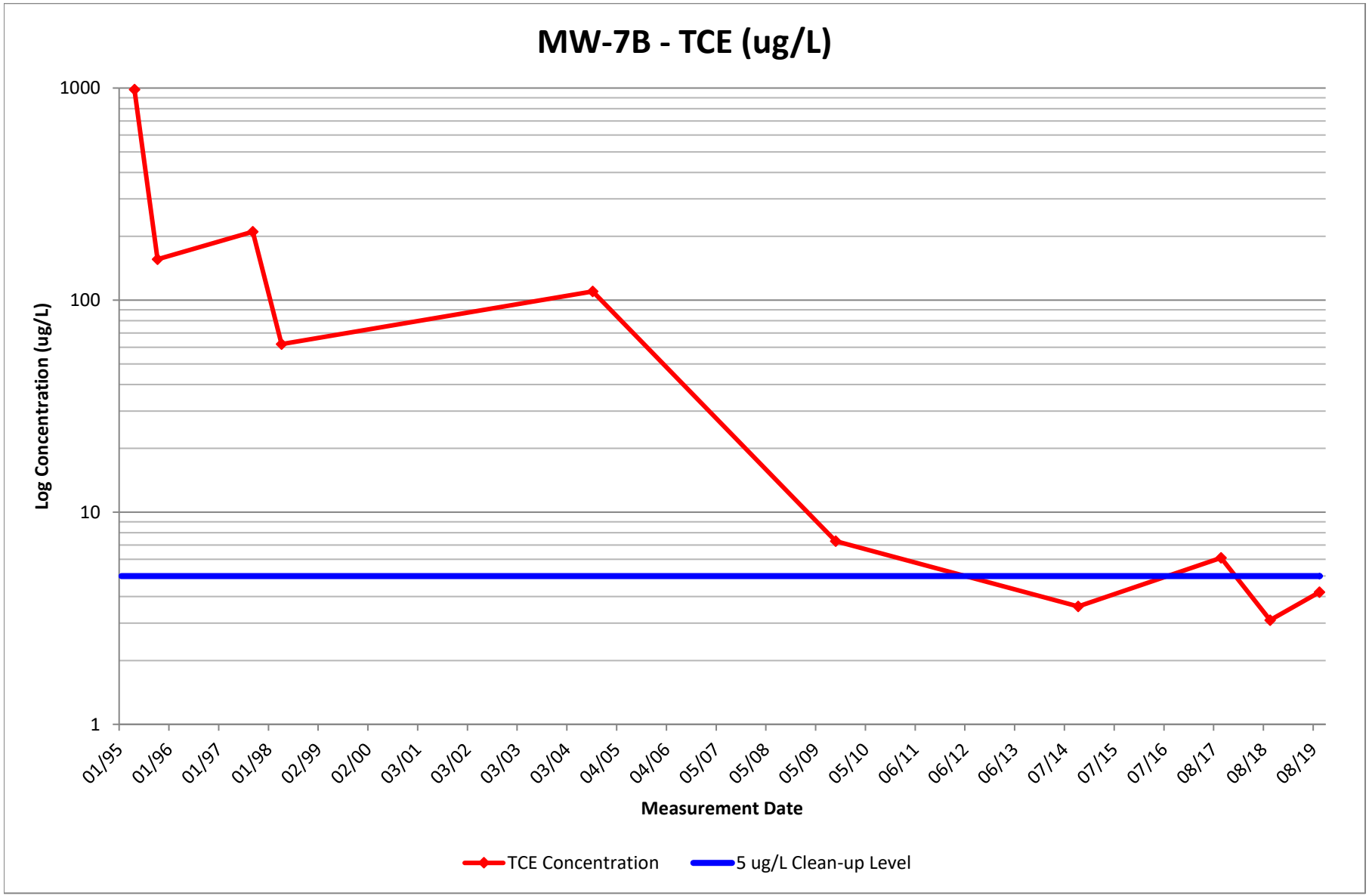

MW-4SHED - TCE (ug/L)
1000
100
10
1
Log Concentration (ug/L)
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

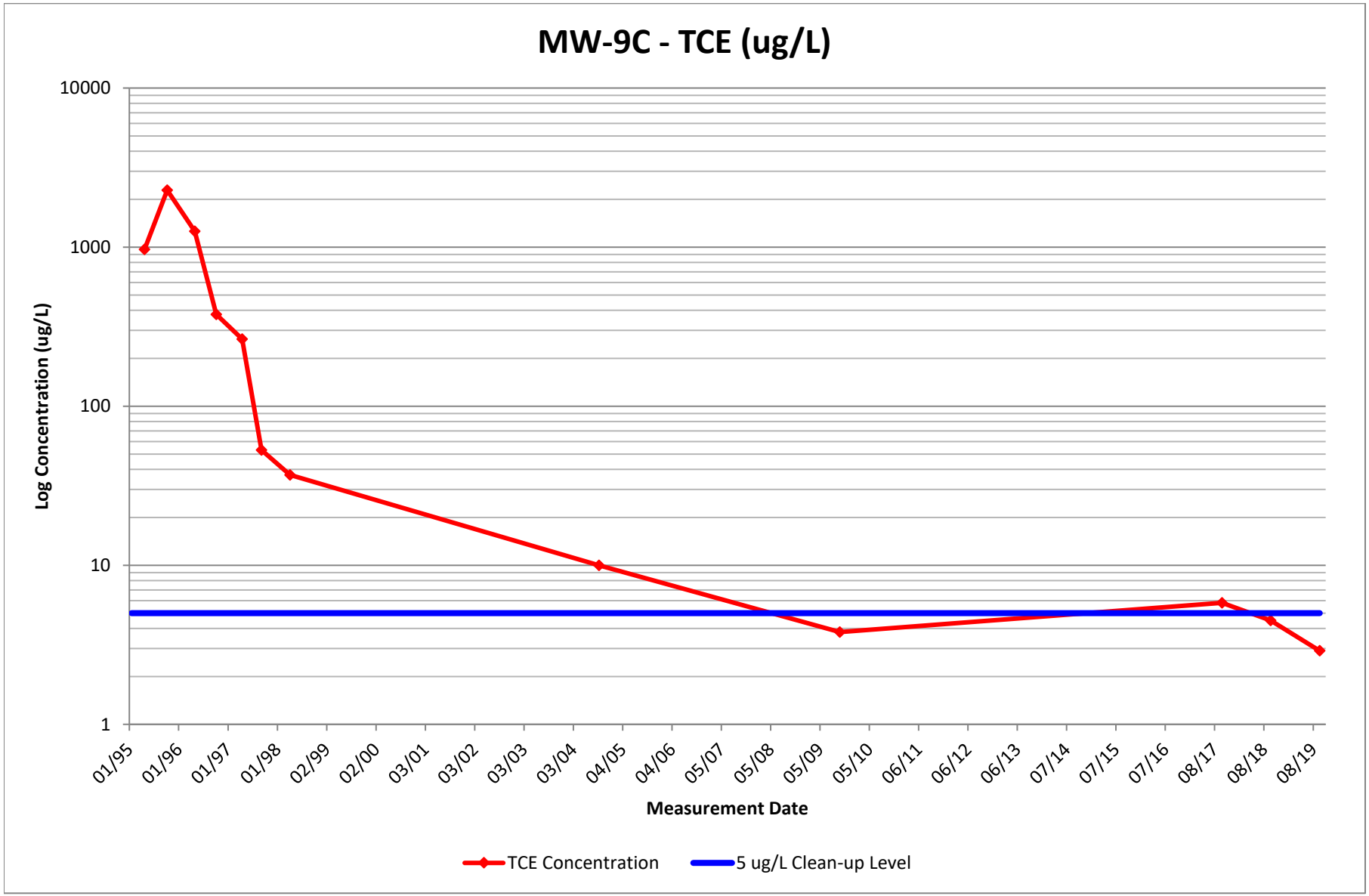

MW-6A - TCE (ug/L)
100
10
1
0.1
Log Concentration (ug/L)
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

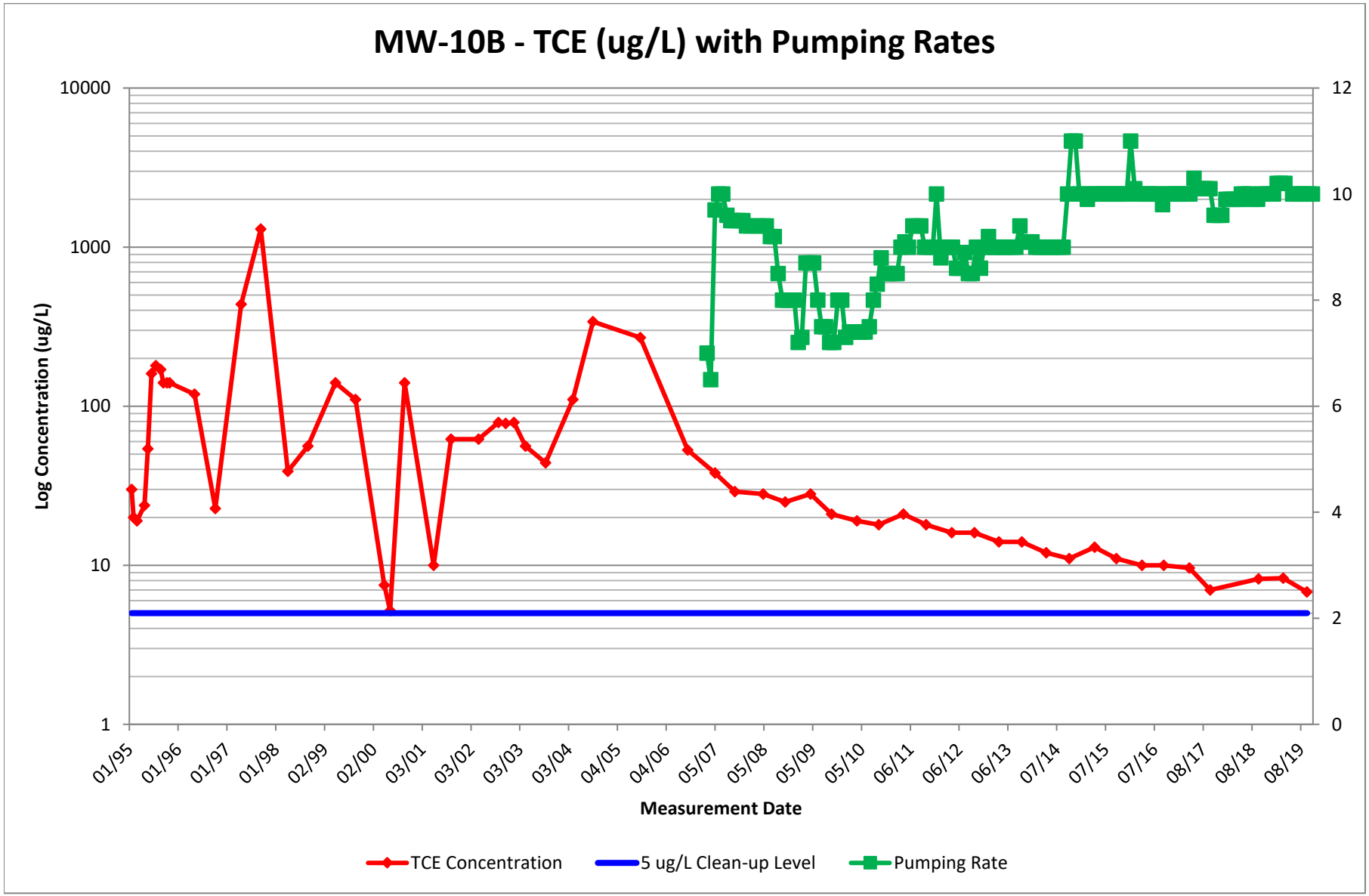

MW-6B - TCE (ug/L) with Pumping Rates
Log Concentration (ug/L)
10000
1000
100
10
1
12
10
8
6
4
2
0
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level
Pumping Rate

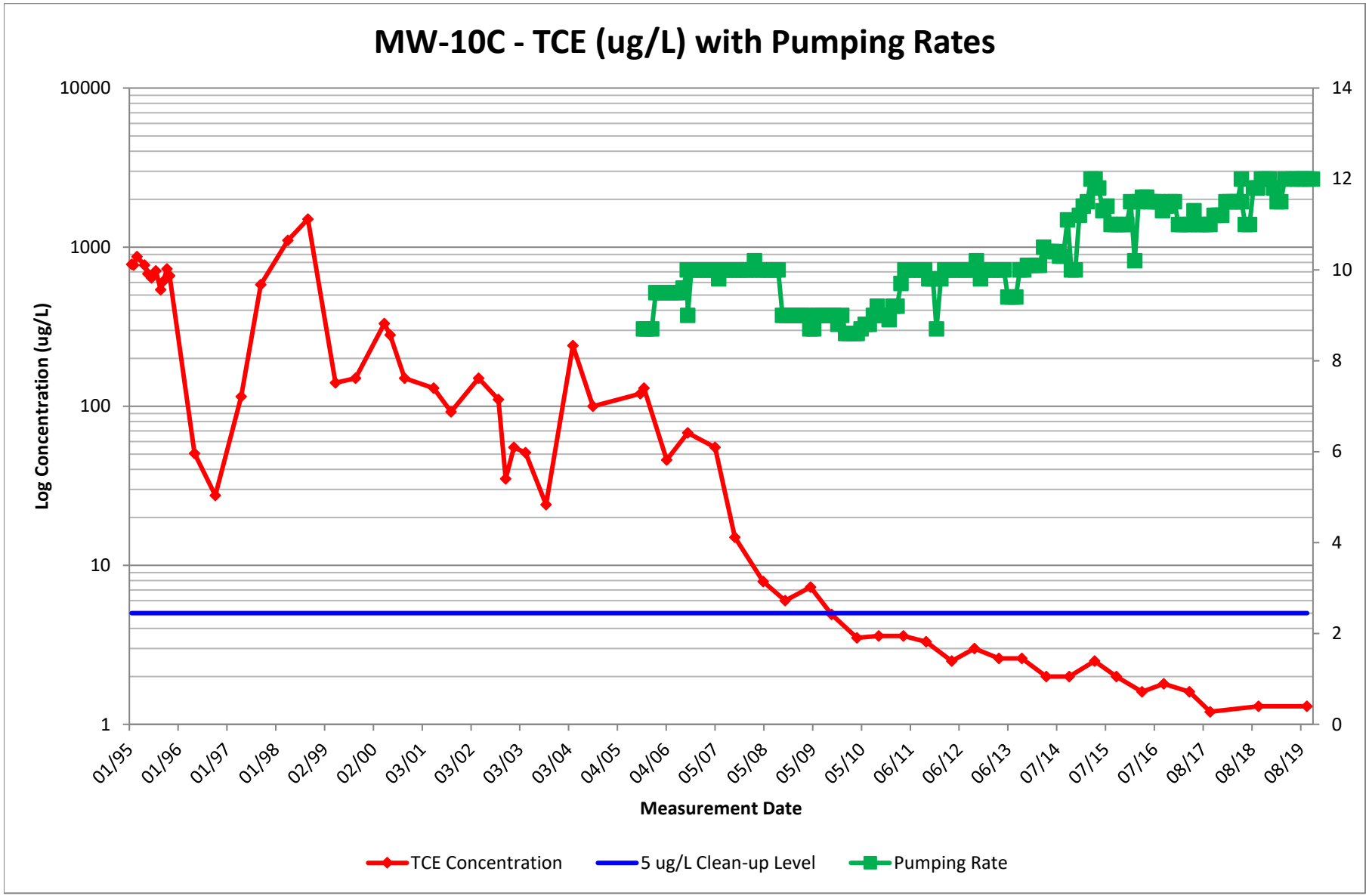

MW-6C - TCE (ug/L)
100
10
1
0.1
Log Concentration (ug/L)
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

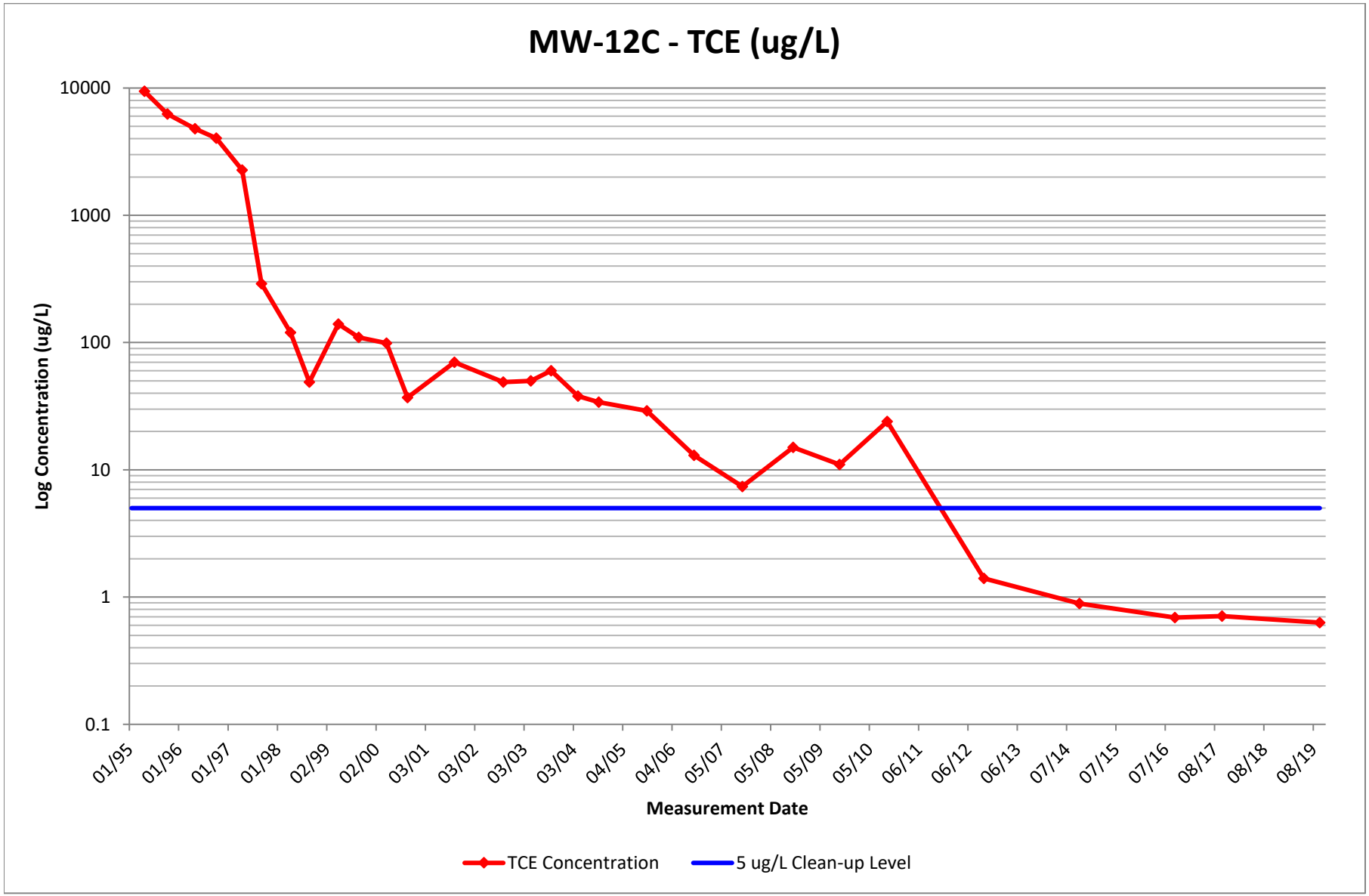

MW-6D - TCE (ug/L)
100
10
1
Log Concentration (ug/L)
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

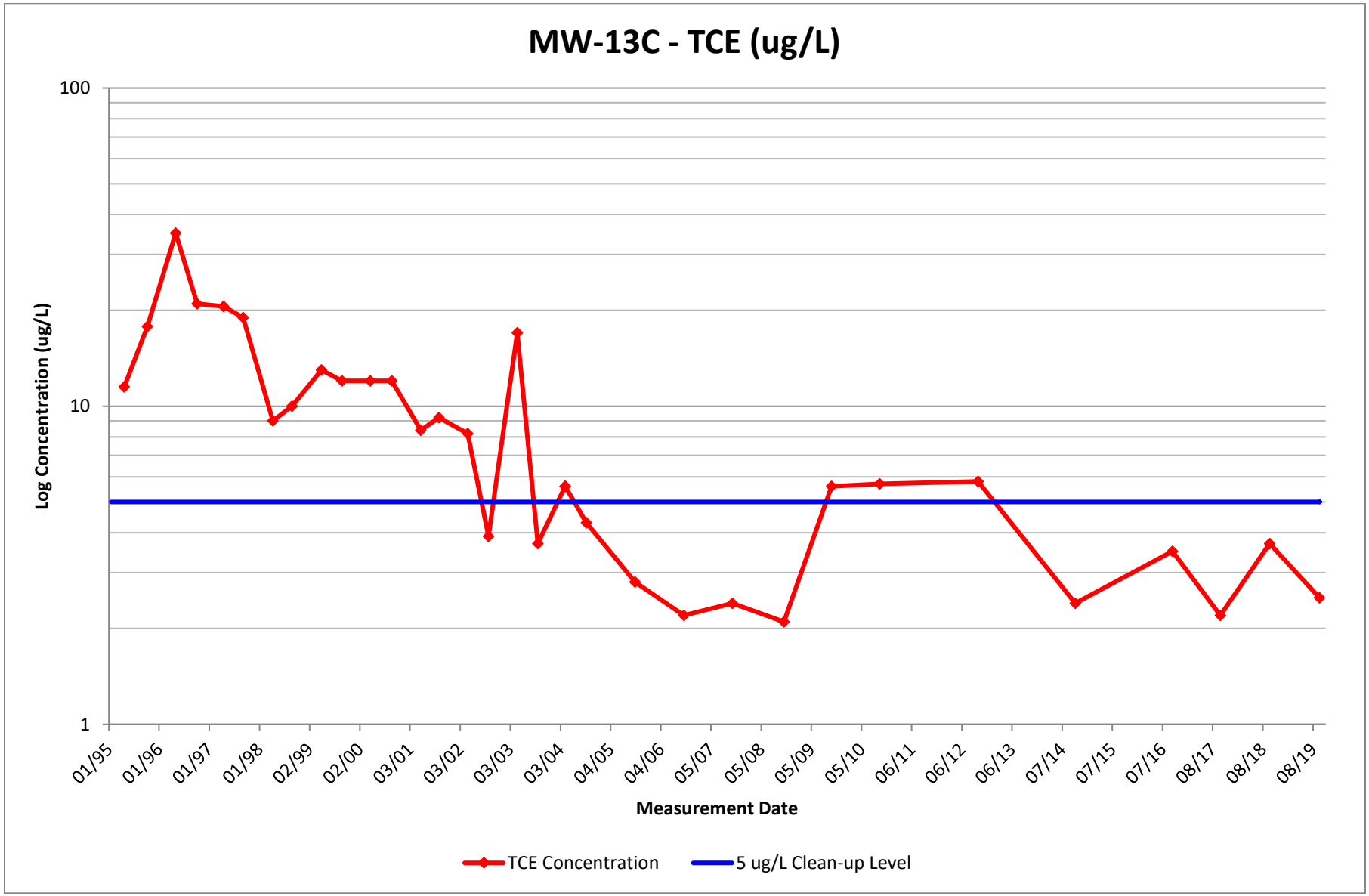

MW-7B - TCE (ug/L)
Log Concentration (ug/L)
1000
100
10
1
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

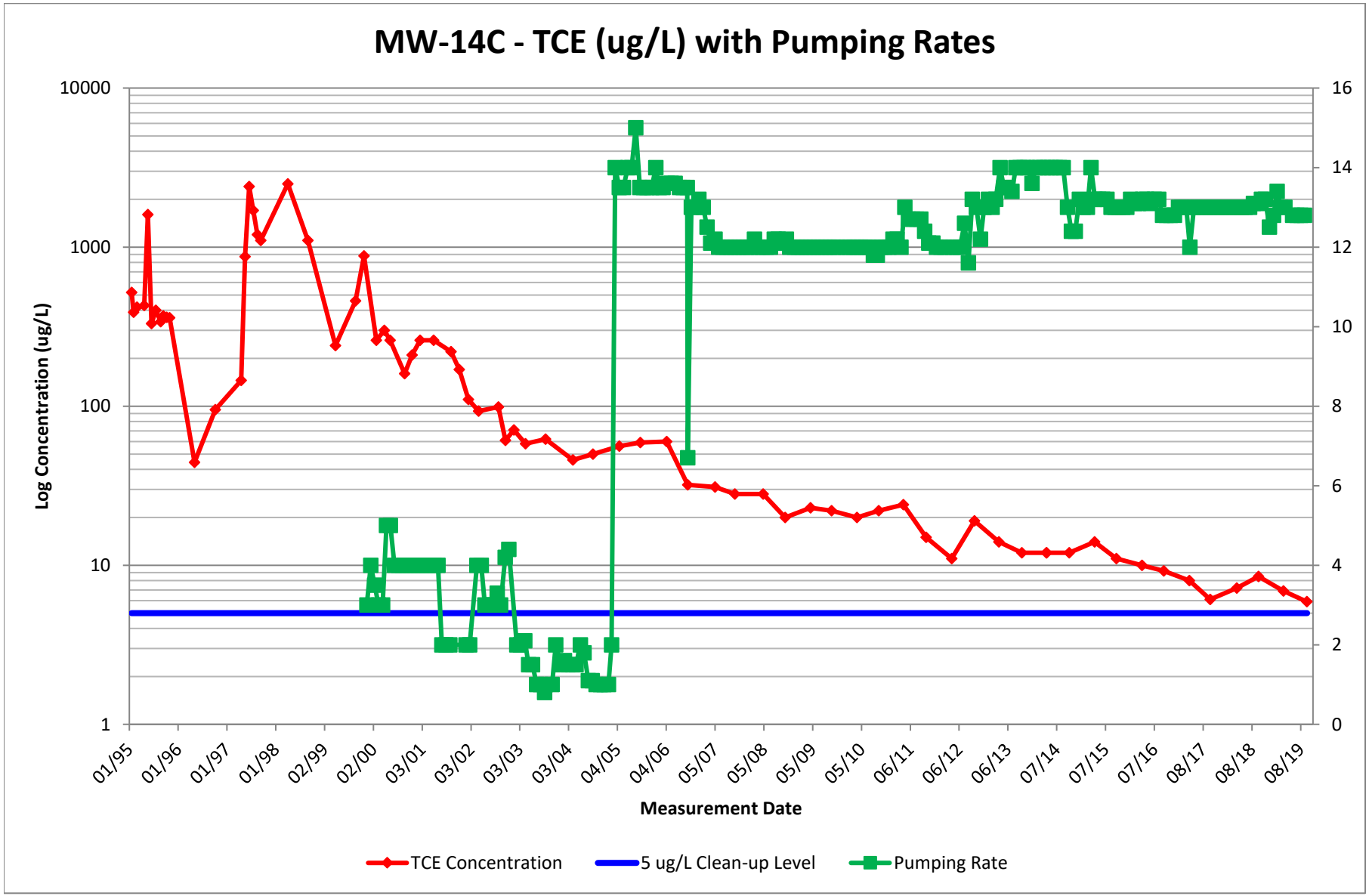

MW-9C - TCE (ug/L)
Log Concentration (ug/L)
10000
1000
100
10
1
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

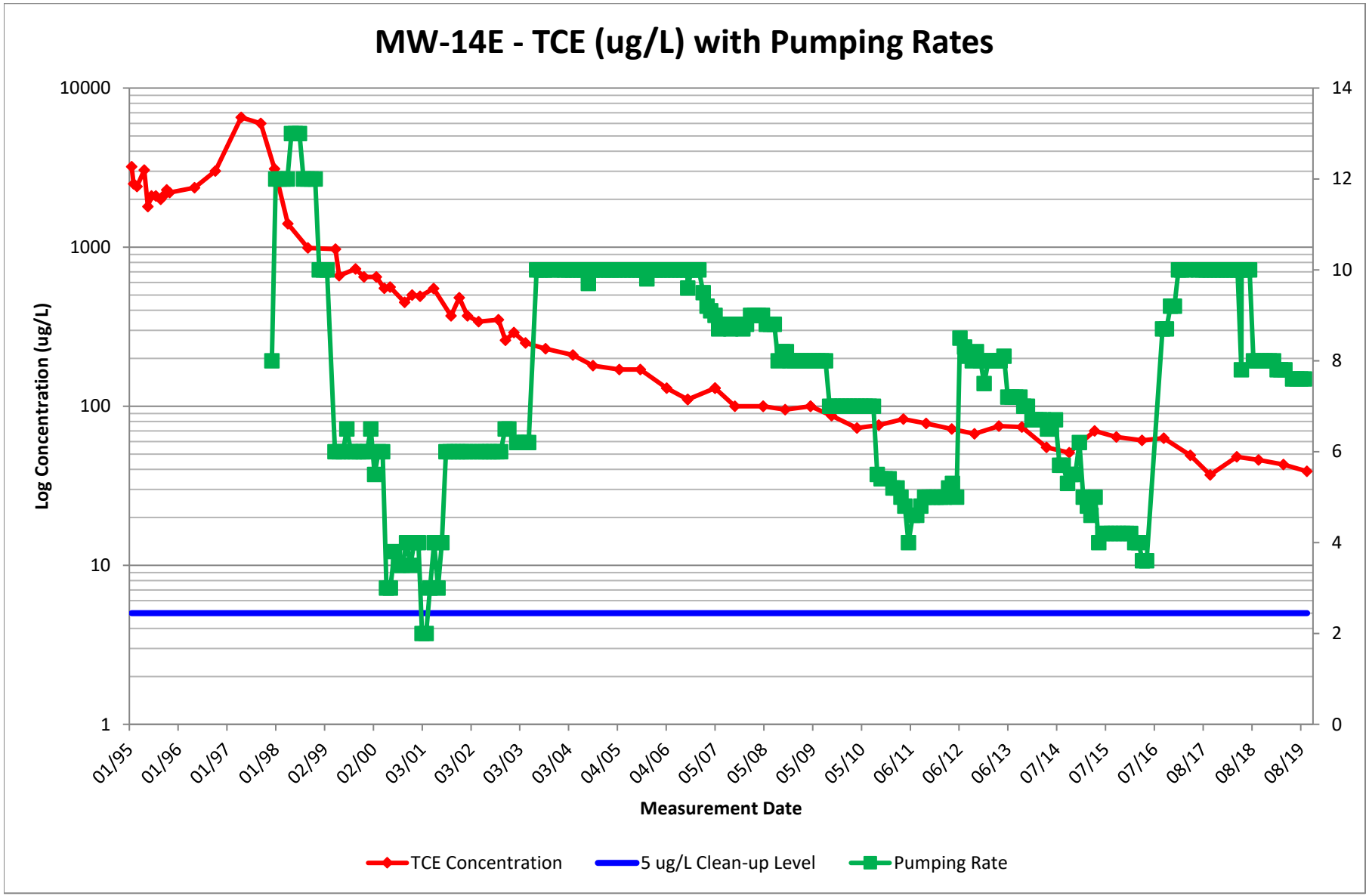

MW-10B - TCE (ug/L) with Pumping Rates
Log Concentration (ug/L)
10000
1000
100
10
1
12
10
8
6
4
2
0
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level
Pumping Rate

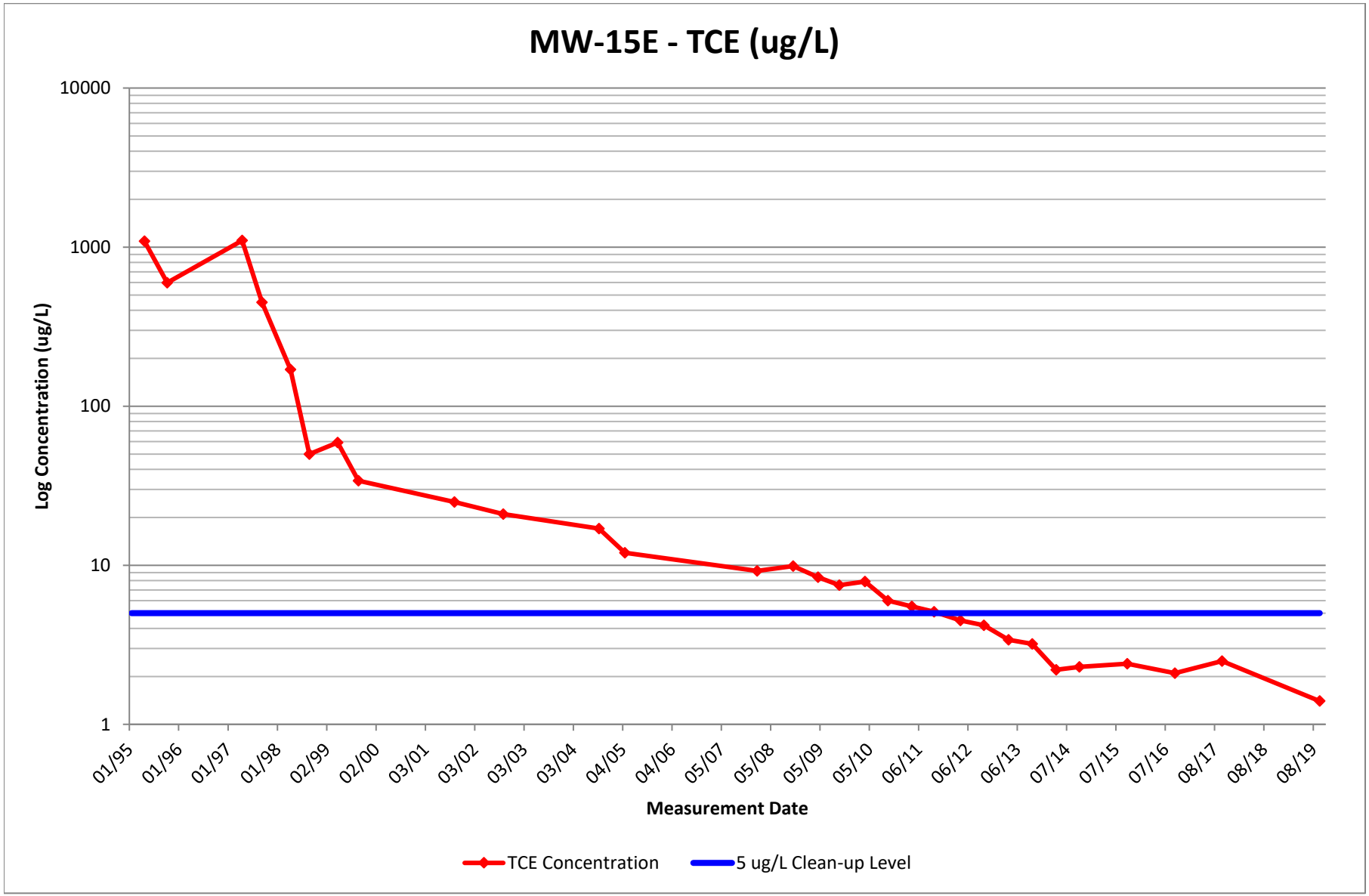

MW-10C - TCE (ug/L) with Pumping Rates
Log Concentration (ug/L)
10000
1000
100
10
1
14
12
10
8
6
4
2
0
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level
Pumping Rate

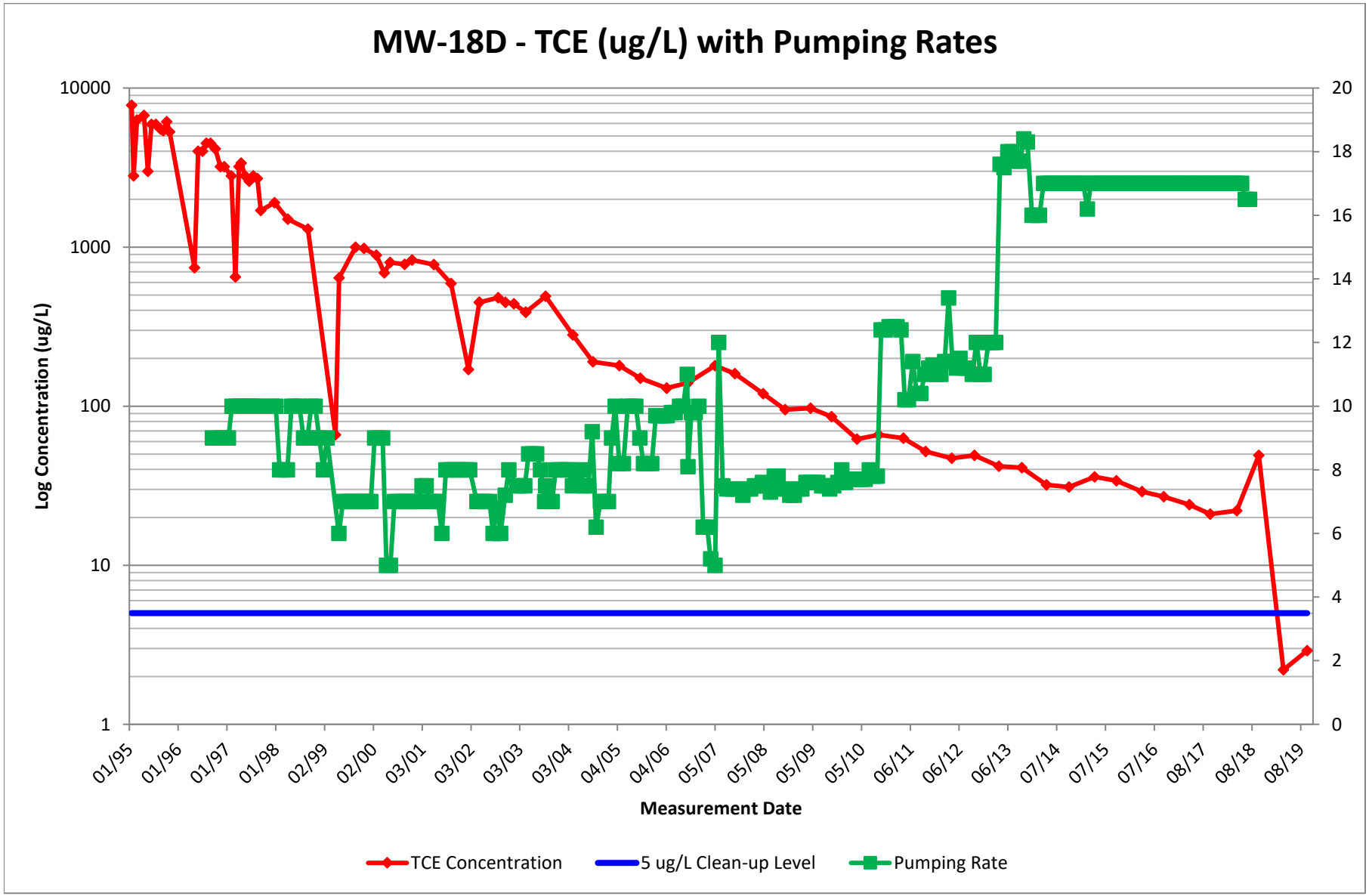

MW-12C - TCE (ug/L)
Log Concentration (ug/L)
10000
1000
100
10
1
0.1
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

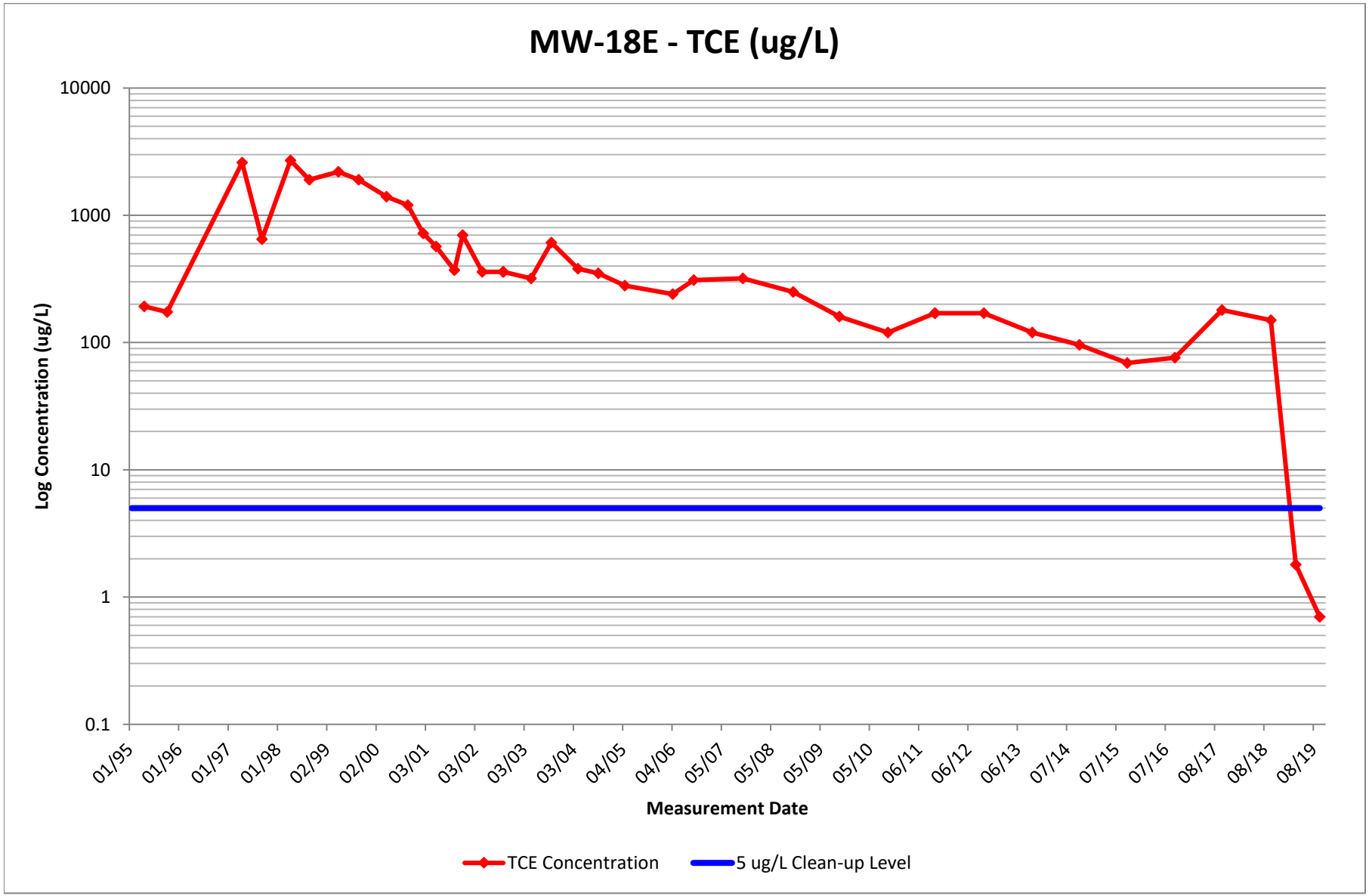

MW-13C - TCE (ug/L)
100
10
1
Log Concentration (ug/L)
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

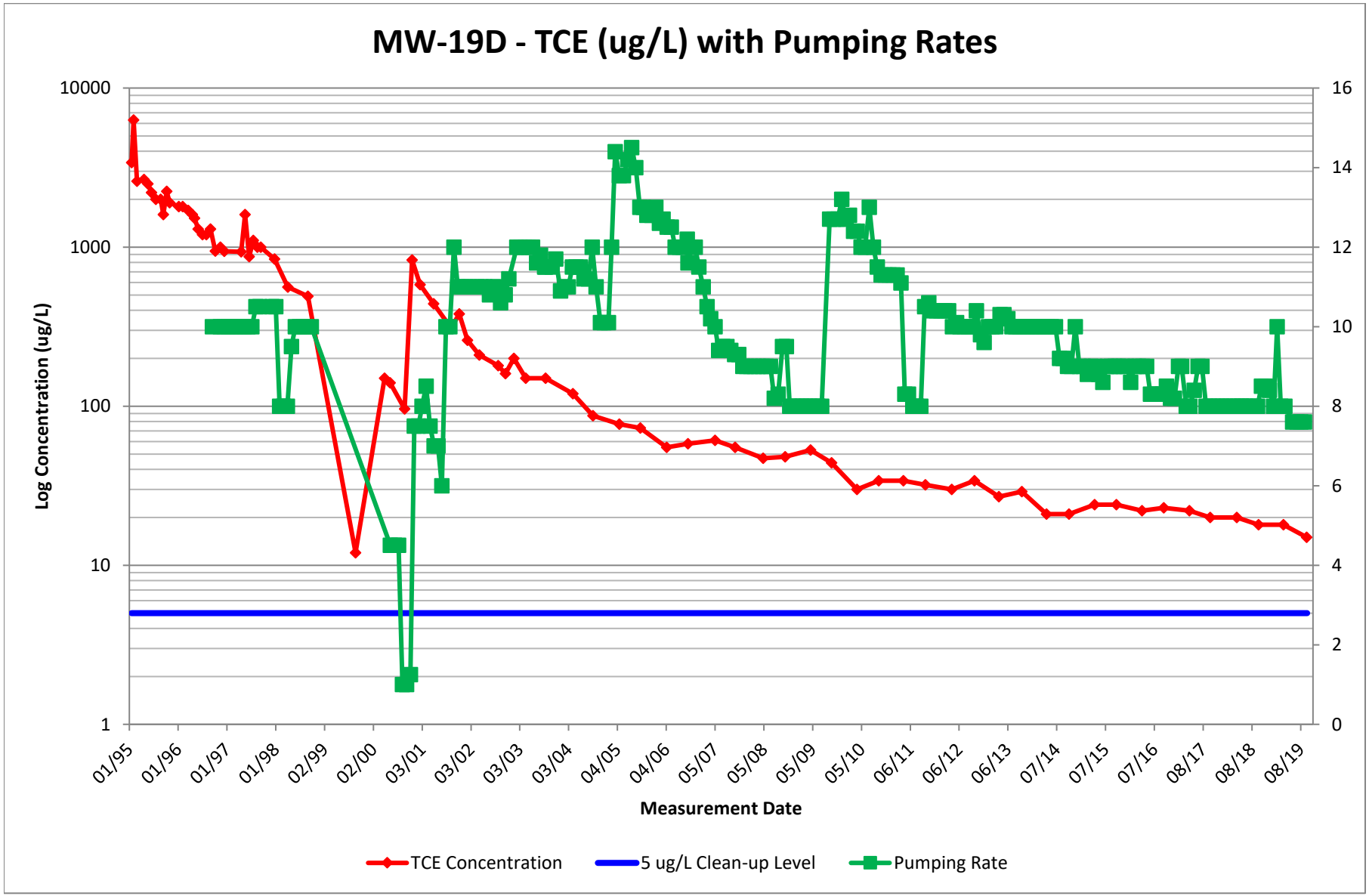

MW-14C - TCE (ug/L) with Pumping Rates
Log Concentration (ug/L)
10000
1000
100
10
1
16
14
12
10
8
6
4
2
0
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level
Pumping Rate

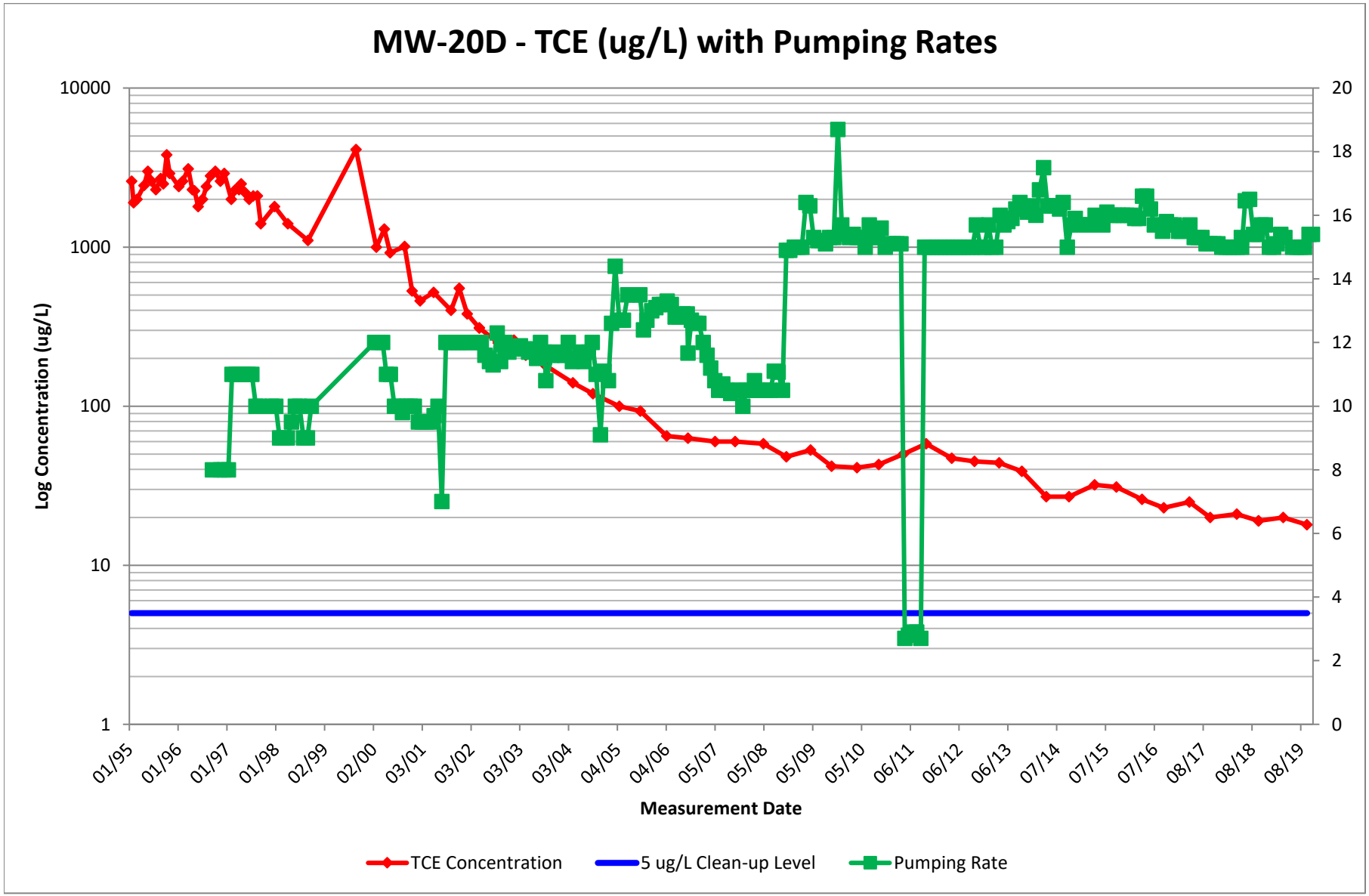

MW-14E - TCE (ug/L) with Pumping Rates
Log Concentration (ug/L)
10000
1000
100
10
1
14
12
10
8
6
4
2
0
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level
Pumping Rate

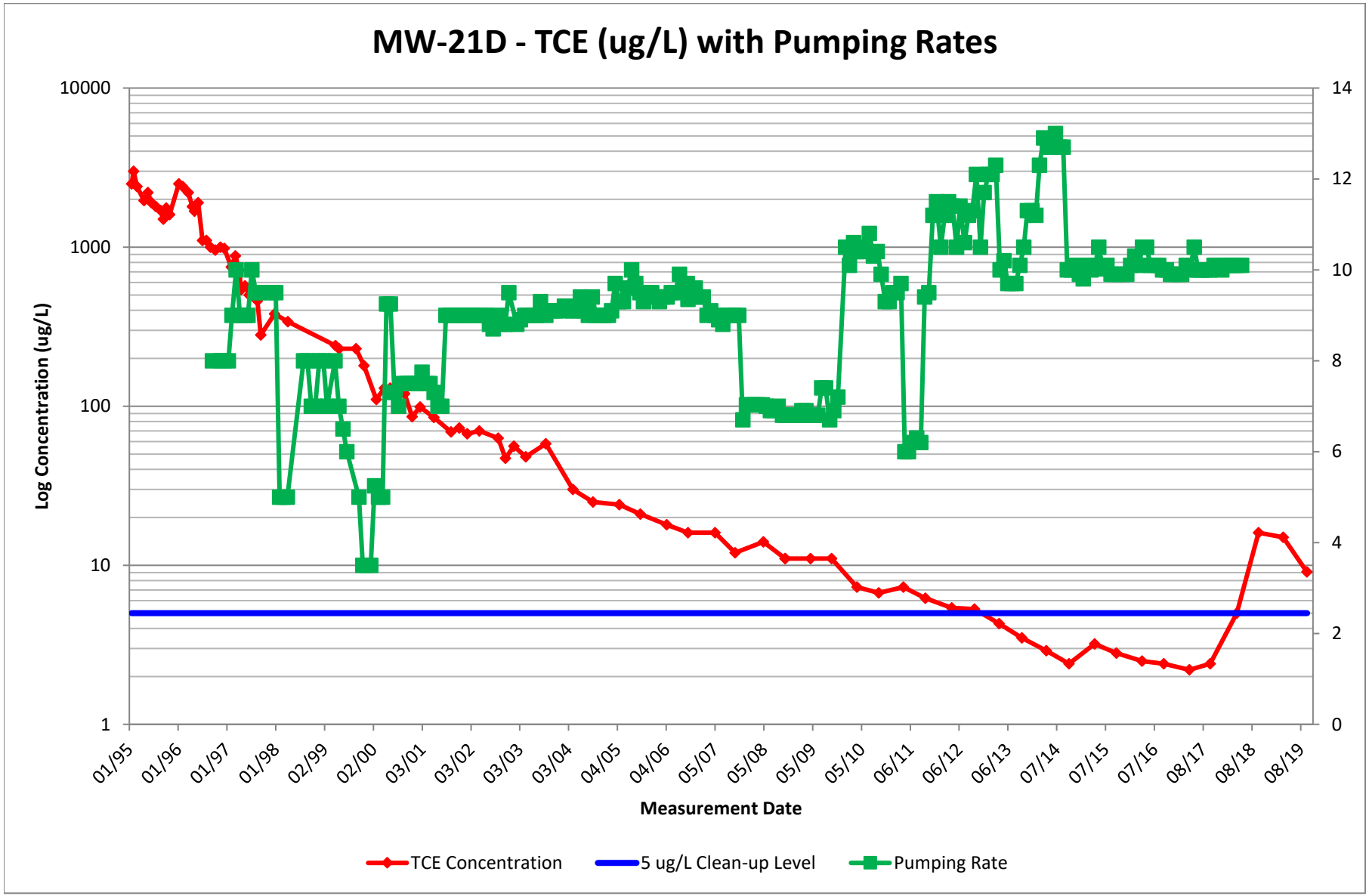

MW-15E - TCE (ug/L)
Log Concentration (ug/L)
10000
1000
100
10
1
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

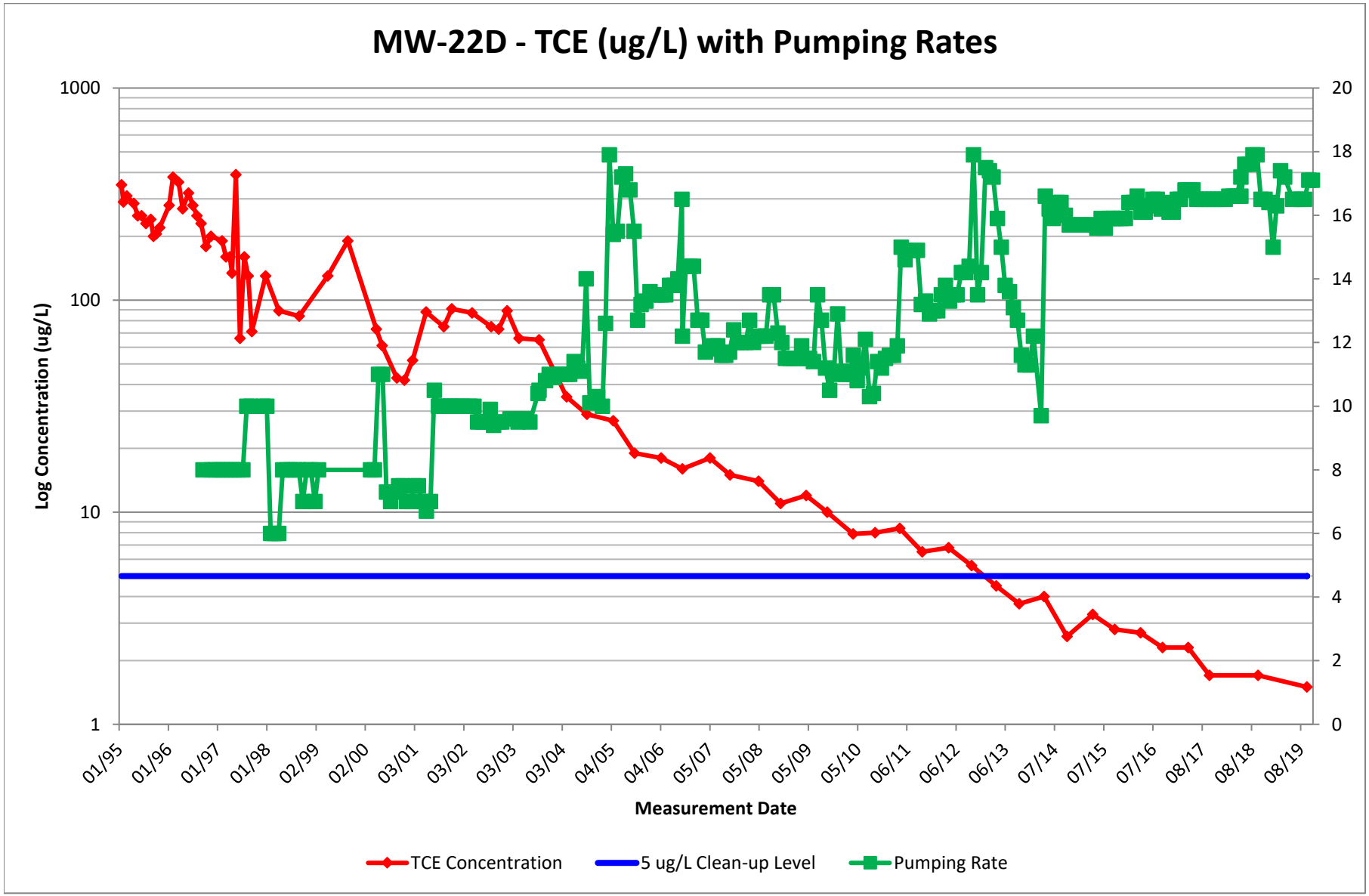

MW-18D - TCE (ug/L) with Pumping Rates
Log Concentration (ug/L)
10000
1000
100
10
1
20
18
16
14
12
10
8
6
4
2
0
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level
Pumping Rate

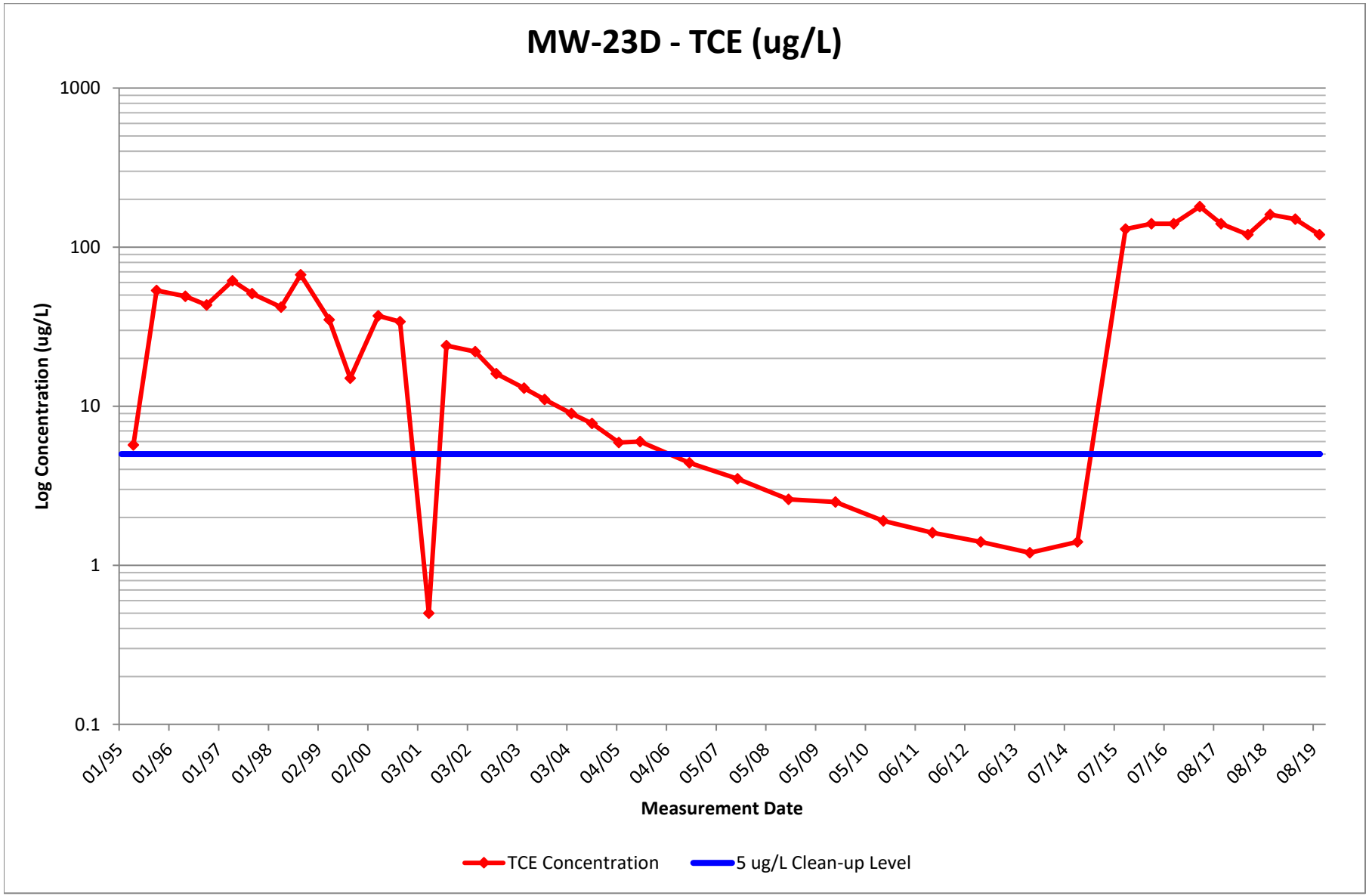

MW-18E - TCE (ug/L)
Log Concentration (ug/L)
10000
1000
100
10
1
0.1
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

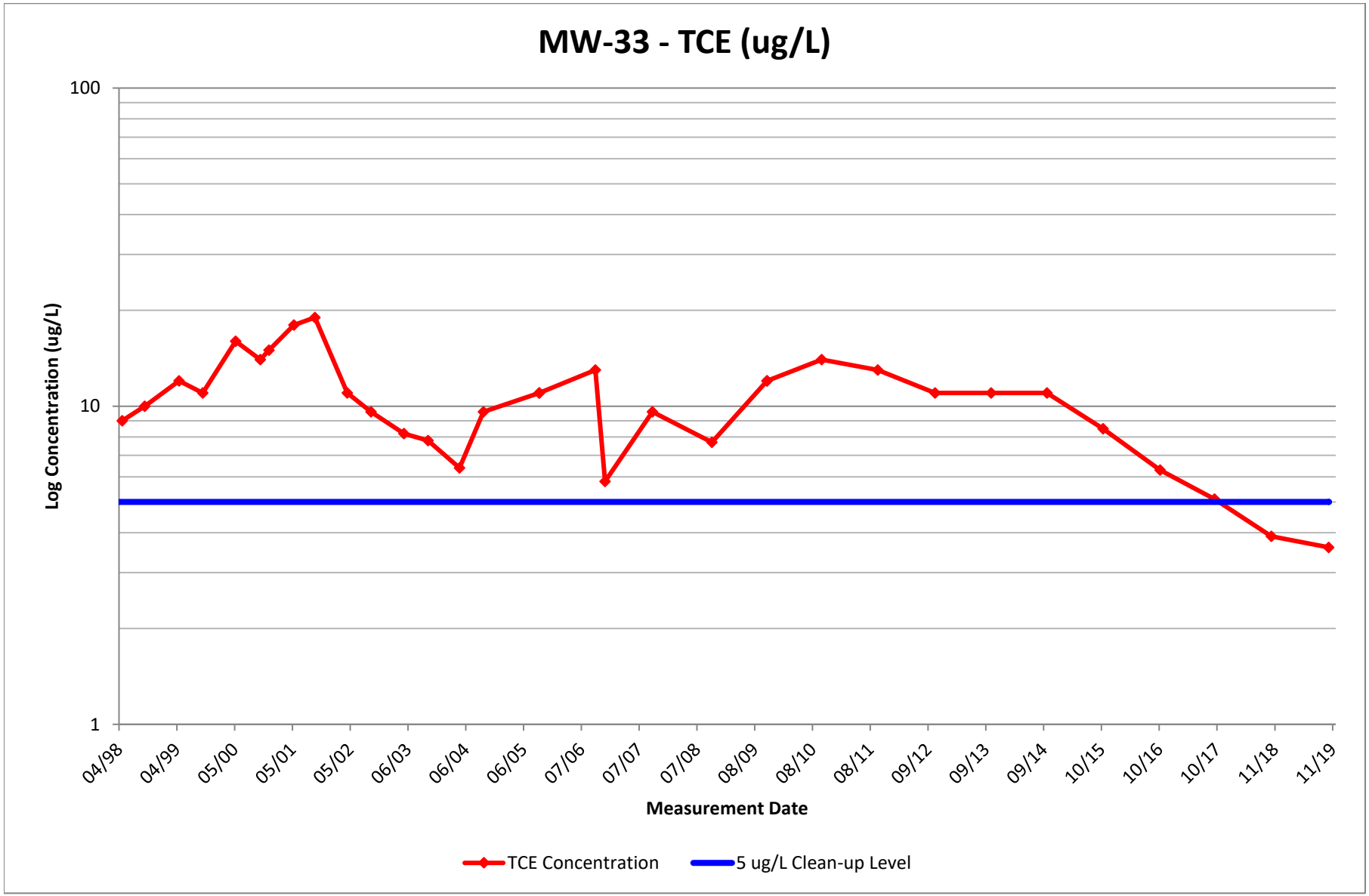

MW-19D - TCE (ug/L) with Pumping Rates
Log Concentration (ug/L)
10000
1000
100
10
1
16
14
12
10
8
6
4
2
0
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level
Pumping Rate

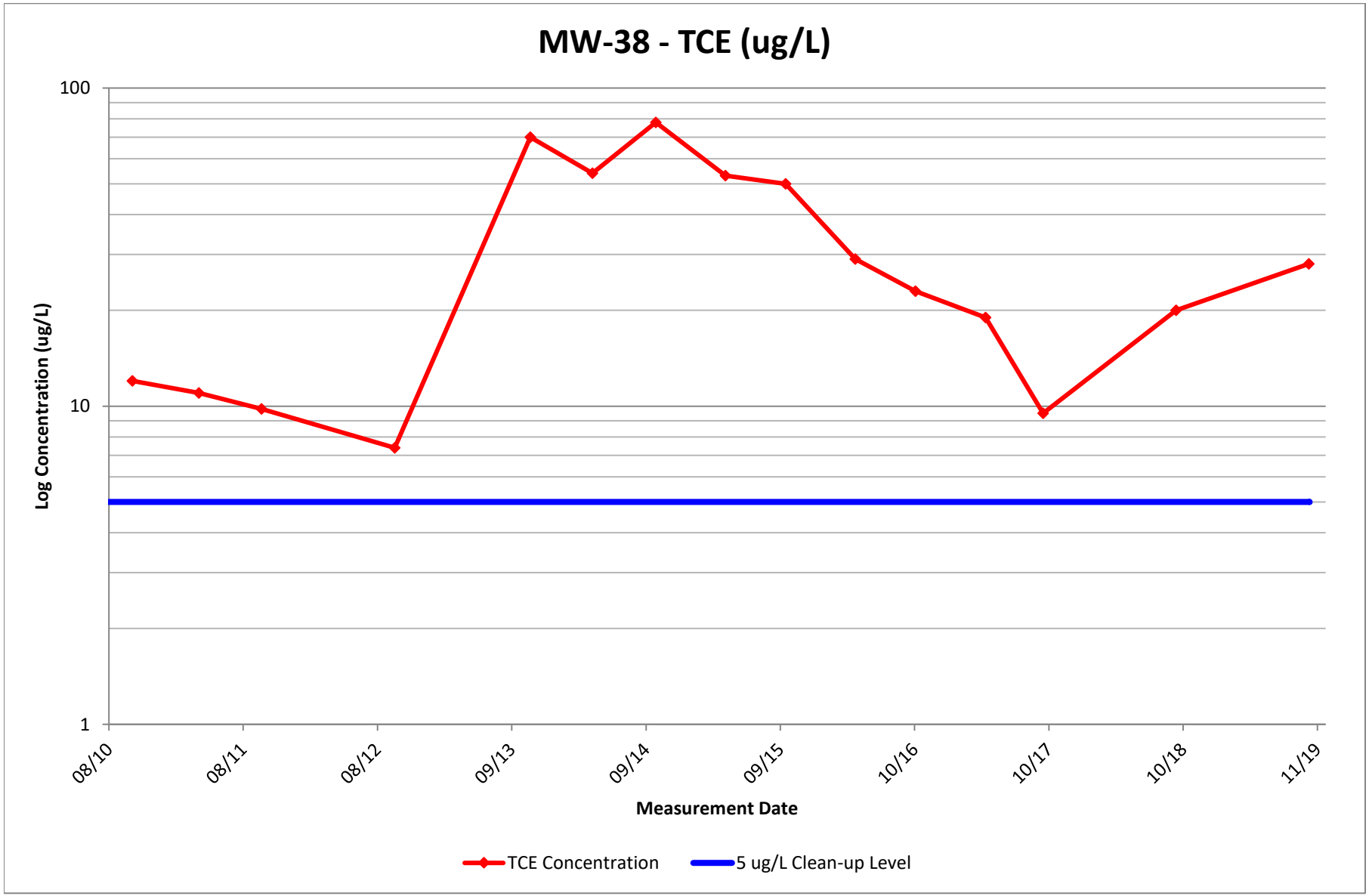

MW-20D - TCE (ug/L) with Pumping Rates
Log Concentration (ug/L)
10000
1000
100
10
1
20
18
16
14
12
10
8
6
4
2
0
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level
Pumping Rate

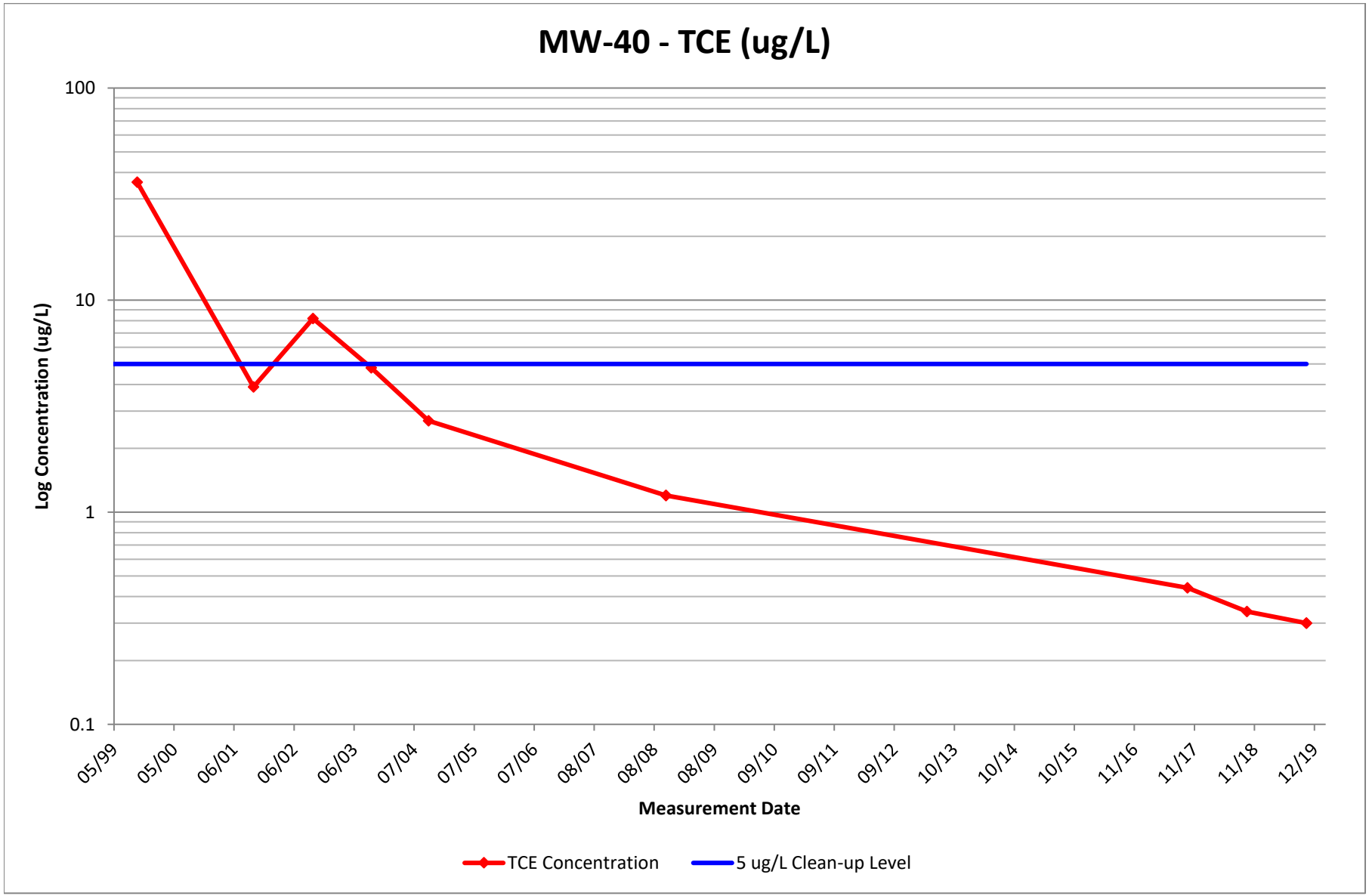

MW-21D - TCE (ug/L) with Pumping Rates
Log Concentration (ug/L)
10000
1000
100
10
1
14
12
10
8
6
4
2
0
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level
Pumping Rate

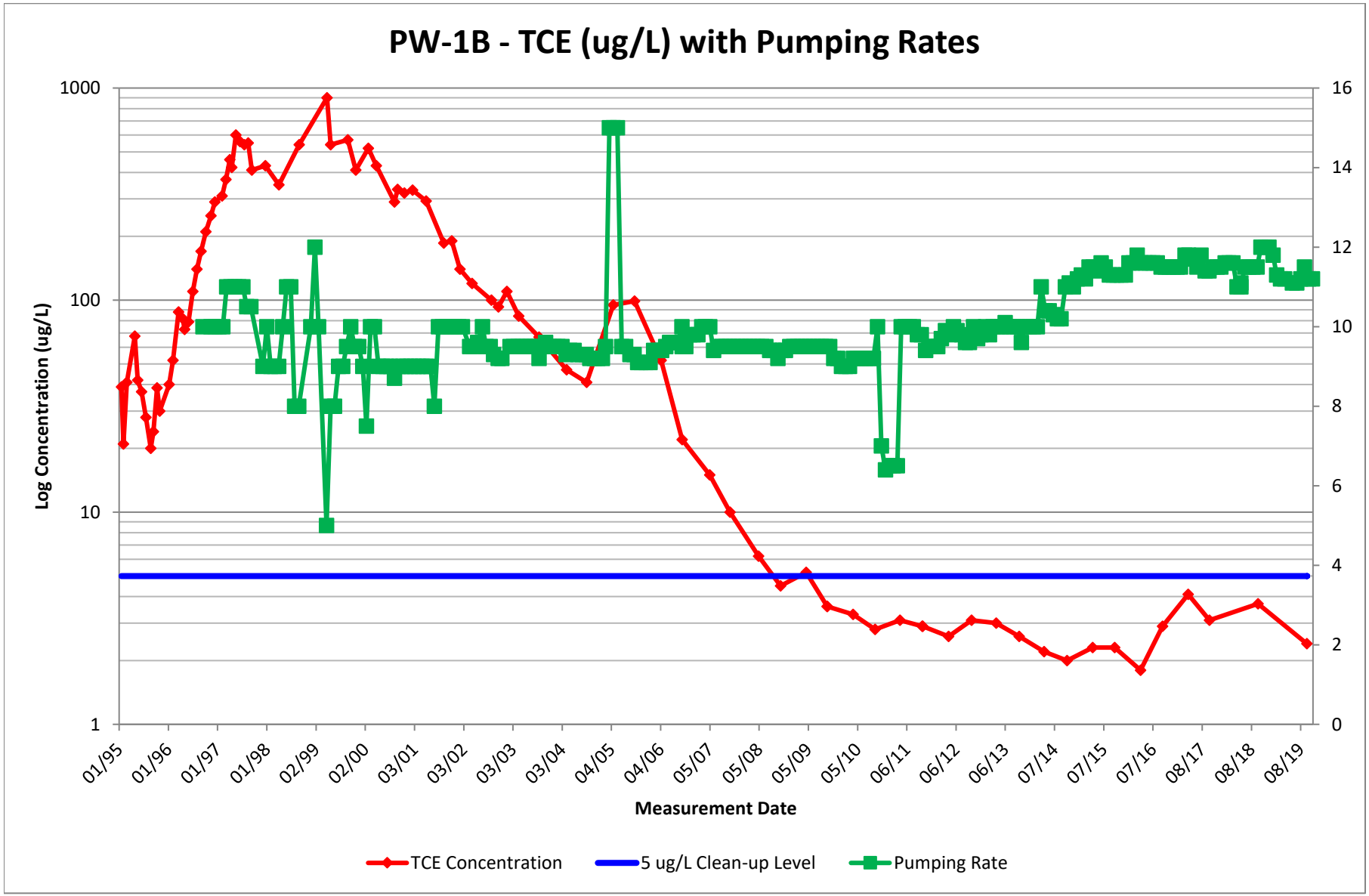

MW-22D - TCE (ug/L) with Pumping Rates
Log Concentration (ug/L)
1000
100
10
1
20
18
16
14
12
10
8
6
4
2
0
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level
Pumping Rate

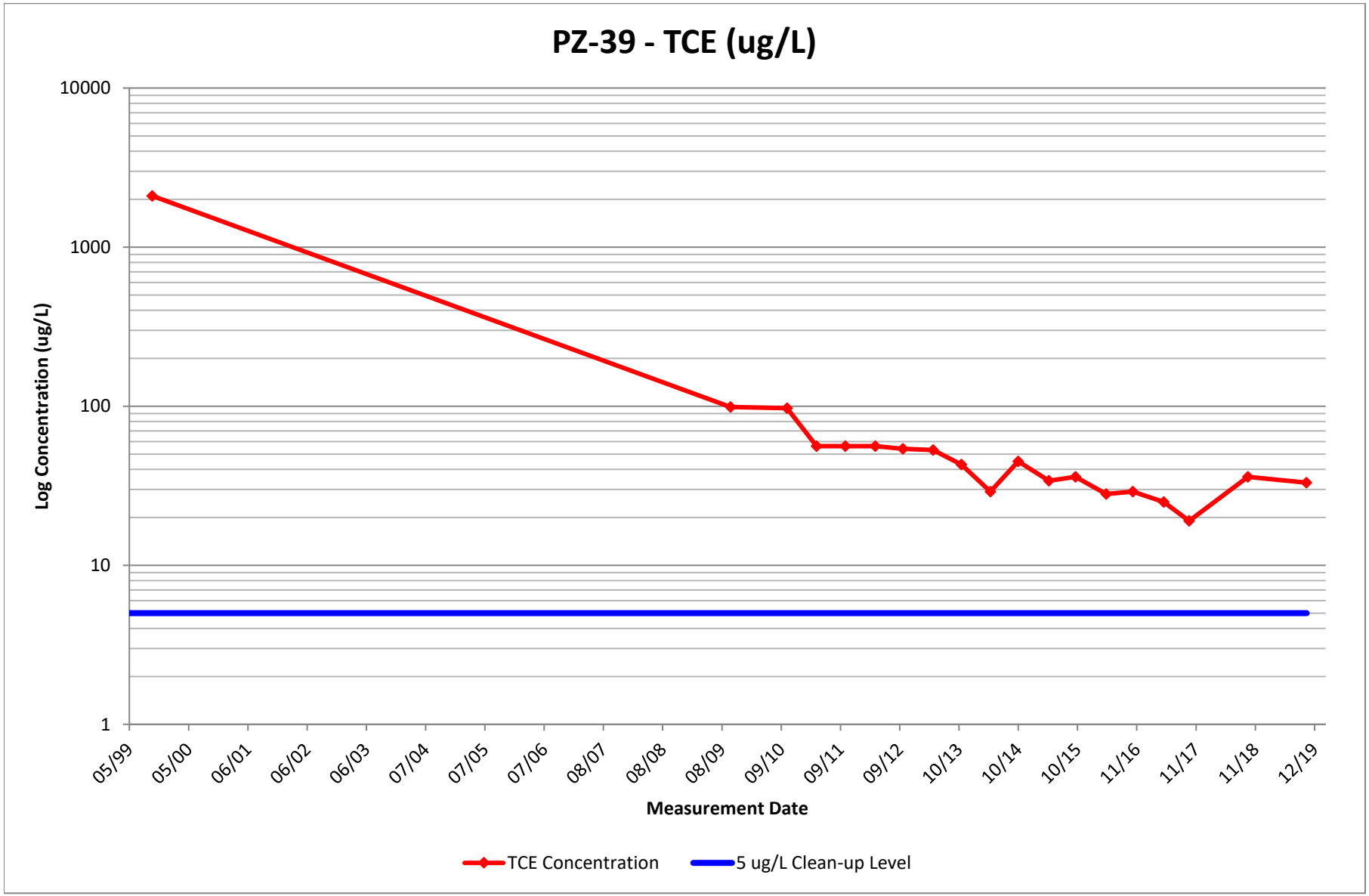

MW-23D - TCE (ug/L)
Log Concentration (ug/L)
1000
100
10
1
0.1
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level


MW-33 - TCE (ug/L)
100
10
1
Log Concentration (ug/L)
04/98
04/99
05/00
05/01
05/02
06/03
06/04
06/05
07/06
07/07
07/08
08/09
08/10
08/11
09/12
09/13
09/14
10/15
10/16
10/17
11/18
11/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level


MW-38 - TCE (ug/L)
100
10
1
Log Concentration (ug/L)
08/10
08/11
08/12
09/13
09/14
09/15
10/16
10/17
10/18
11/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level


MW-40 - TCE (ug/L)
100
10
1
0.1
Log Concentration (ug/L)
05/99
05/00
06/01
06/02
06/03
07/04
07/05
07/06
08/07
08/08
08/09
09/10
09/11
09/12
10/13
10/14
10/15
11/16
11/17
11/18
12/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level


PW-1B - TCE (ug/L) with Pumping Rates
Log Concentration (ug/L)
1000
100
10
1
16
14
12
10
8
6
4
2
0
01/95
01/96
01/97
01/98
02/99
02/00
03/01
03/02
03/03
03/04
04/05
04/06
05/07
05/08
05/09
05/10
06/11
06/12
06/13
07/14
07/15
07/16
08/17
08/18
08/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level
Pumping Rate


PZ-39 - TCE (ug/L)
10000
1000
100
10
1
Log Concentration (ug/L)
05/99
05/00
06/01
06/02
06/03
07/04
07/05
07/06
08/07
08/08
08/09
09/10
09/11
09/12
10/13
10/14
10/15
11/16
11/17
11/18
12/19
Measurement Date
TCE Concentration
5 ug/L Clean-up Level

APPENDIX C

DATA FOR CLOSURE MONITORING

APPENDIX C-1

WELLS EXCLUDED FROM CLOSURE MONITORING

Appendix C-1. Wells Excluded from the Closure Monitoring Program

Well Name	Justification	Well ID	Justification
RAMW-2C	COC never detected above CUL	IWS-1	Remediation Well
AMW-5A	COC never detected above CUL	IWS-1PZ	Remediation Well
AMW-6A*	COC never detected above CUL	IWS-2	Remediation Well
AMW-7A*	COC never detected above CUL	IWS-2PZ	Remediation Well
AMW-9A	COC never detected above CUL	IWS-3	Remediation Well
AMW-10A*	COC never detected above CUL	IWS-3PZ	Remediation Well
AMW-11A*	COC never detected above CUL	IWS-4	Remediation Well
AMW-14	Abandoned	IWS-4PZ	Remediation Well
AMW-15	Abandoned	IWS-5	Remediation Well
AMW-16	Impacted by Northern Plume	IWS-5PZ	Remediation Well
AMW-17	Impacted by Northern Plume	IWS-6	Remediation Well
AMW-18	Impacted by Northern Plume	IWS-6PZ	Remediation Well
AMW-19B	COC never detected above CUL	IWS-7	Remediation Well
AMW-20	COC never detected above CUL	IWS-7PZ	Remediation Well
AMW-21	COC never detected above CUL	IWS-8	Remediation Well
AMW-22	Abandoned	IWS-8PZ	Remediation Well
AMW-23	Impacted by Northern Plume	IWS-9	Remediation Well
AMW-25	COC never detected above CUL	IWS-9PZ	Remediation Well
AMW-43	COC never detected above CUL	LAVALLEY	Never in monitoring program
AMW-44	COC never detected above CUL	LV	Never in monitoring program
AMW-45	COC never detected above CUL	MILLER	Never in monitoring program
AMW-50	COC never detected above CUL	MW-1	Never in monitoring program (Clark County well)
AMW-51	COC never detected above CUL	MW-2	Never in monitoring program (Clark County well)
AMW-52C	COC never detected above CUL	MW-3	Never in monitoring program (Clark County well)
AMW-53B	COC never detected above CUL	MW-4	Never in monitoring program (Clark County well)
AMW-53C	COC never detected above CUL	MW-5	Never in monitoring program (Clark County well)
AMW-54C	COC never detected above CUL	MW-5A	Abandoned
AMW-55C	COC never detected above CUL	MW-5B	Abandoned
AMW-56C	COC never detected above CUL	MW-11A	Abandoned
AMW-57	COC never detected above CUL	MW-11B	Abandoned
AMW-62	COC never detected above CUL	MW-17E	COC never detected above CUL
AMW-63	COC never detected above CUL	MW-23D	Impacted by Northern Plume
AMW-64	Impacted by Northern Plume	MW-24D	Abandoned
COLF	Never in monitoring program	MW-28	Abandoned
COLUMBIA VE	Never in monitoring program	MW-29	Abandoned
CPU-1D	Abandoned	MW-30	COC never detected above CUL
CPU-1S	Abandoned	MW-31	Abandoned
CPU-2	COC never detected above CUL	MW-32	Abandoned
CPU-3D	COC never detected above CUL	MW-34	COC never detected above CUL
CPU-3S	COC never detected above CUL	MW-35	Abandoned
CPU-4D	Water levels only, never sampled	MW-36	Abandoned
CPU-4S	Water levels only, COC never detected above CUL	MW-37	Abandoned
CPU-10	COC never detected above CUL	MW-39	Never in monitoring program; pilot study well
CPU-15	COC never detected above CUL	MW-46	COC never detected above CUL
CPU-16	Abandoned	MW-47	COC never detected above CUL
CROCKFORD	Never in monitoring program	PERMALUME	Never in monitoring program/abandoned
EC-1	COC never detected above CUL	PZ-1	Water levels only, COC never detected above CUL
FERGUSON	Never in monitoring program	PZ-2	Water levels only, COC never detected above CUL
FITZGERALD	Never in monitoring program	PZ-40	Water levels only, COC never detected above CUL
GARRISON	Never in monitoring program	SW-1	Abandoned
GRIMM	Never in monitoring program	WELCH	Never in monitoring program
GWSW-1	Production well, COC never detected above CUL	WILLIAMS	Never in monitoring program
GWSW-2	Production well, COC never detected above CUL	WOODAEGE	Never in monitoring program
HASTAY	Never in monitoring program	ZENT	Never in monitoring program
HORN	Never in monitoring program		

Notes:
COC = Contaminant of Concern identified for the Site.
CUL = Cleanup level identified in the Site Record of Decision.
* = Well sampled as part of the Messer infiltration gallery monitoring.

APPENDIX C-2

REMEDIATION MONITORING ANALYSIS

Appendix C-2.1 - Remediation Monitoring Analysis
CHLORODIBROMOMETHANE (Last 4 Samples)

Well Name	Well Type	Total Number of Datapoints	Date of First of the Most Recent Four Samples	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Number of Conc. < Cleanup Goal (1 ug/L)	Remediation Monitoring Phase is Completed? [a]
Closure Monitoring Program Wells									
Upgradient Wells									
AMW-8A	M	37	10/2014	10/2019	U	U	U	4	YES
TCE Source Wells									
AMW-1A	M	60	04/2018	10/2019	U	U	U	4	YES
AMW-1B	M	31	01/2009	10/2010	U	U	U	4	YES
AMW-1C	M	24	10/2007	10/2009	U	U	U	4	YES
AMW-2A	M	63	04/2018	10/2019	U	U	U	4	YES
AMW-2B	M	36	10/2012	10/2015	U	U	U	4	YES
AMW-3A	M	47	10/2015	10/2019	U	0.29	U	4	YES
AMW-4A	M	15	10/2009	10/2019	U	0.68	U	4	YES
AMW-12A	M	62	04/2018	10/2019	U	U	U	4	YES
AMW-13A	M	44	10/2012	10/2015	U	U	U	4	YES
AMW-19A	M	43	10/2013	10/2017	U	U	U	4	YES
AMW-26	M	29	10/2010	10/2017	U	U	U	4	YES
AMW-52A	M	28	10/2012	10/2015	U	0.29	U	4	YES
AMW-53A	M	47	04/2018	10/2019	U	U	U	4	YES
AMW-54A	M	30	10/2013	10/2017	U	U	U	4	YES
AMW-55A	M	23	10/2012	10/2015	U	U	U	4	YES
AMW-56A	M	29	10/2013	10/2017	U	U	U	4	YES
MW-1A	M	61	04/2018	10/2019	U	U	U	4	YES
MW-1B	M	25	10/2006	10/2009	U	U	U	4	YES
MW-1C	M	20	10/2006	10/2009	U	U	U	4	YES
Proximal Wells									
AMW-58	M	9	10/2006	10/2012	U	U	U	4	YES
MW-2A	M	26	10/2011	10/2016	U	0.32	0.32	4	YES
MW-2B	M	16	10/2009	10/2019	U	U	U	4	YES
MW-2C	M	8	10/2002	10/2009	U	U	U	4	YES
MW-3A	M	18	05/2004	10/2008	U	U	U	4	YES
MW-3B	M	15	10/2010	10/2016	U	U	U	4	YES
MW-3C	M	10	10/2004	10/2019	U	U	U	4	YES
MW-4A	M	21	10/2009	10/2019	U	U	U	4	YES
MW-4B	M	16	10/2011	10/2016	U	U	U	4	YES
MW-4BSHED	M	16	10/2004	10/2019	U	U	U	4	YES
MW-4C	M	11	10/2009	10/2019	U	U	U	4	YES
MW-6A	M	7	05/1995	10/2019	U	U	U	4	YES
MW-6B	E	51	04/2017	10/2019	U	0.14	U	4	YES
MW-6C	M	13	10/2009	10/2019	U	U	U	4	YES
MW-6D	M	11	10/2009	10/2019	U	U	U	4	YES
MW-7B	M	10	10/2014	10/2019	U	0.22	U	4	YES
MW-7C	M	6	05/1995	10/2009	U	U	U	4	YES
MW-8B	M	15	10/2010	10/2017	U	0.19	0.19	4	YES

Appendix C-2.1 - Remediation Monitoring Analysis
CHLORODIBROMOMETHANE (Last 4 Samples)

Well Name	Well Type	Total Number of Datapoints	Date of First of the Most Recent Four Samples	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Number of Conc. < Cleanup Goal (1 ug/L)	Remediation Monitoring Phase is Completed? [a]
MW-9B	M	18	10/2012	10/2017	U	U	U	4	YES
MW-9C	M	12	10/2009	10/2019	U	U	U	4	YES
MW-10B	E	52	10/2017	10/2019	U	U	U	4	YES
MW-10C	E	53	04/2017	10/2019	U	0.12	U	4	YES
MW-12C	M	28	10/2014	10/2019	U	U	U	4	YES
MW-13C	M	31	10/2016	10/2019	U	0.039	U	4	YES
PW-1B	E	61	04/2017	10/2019	U	U	U	4	YES
Intermediate Wells									
AMW-59	E/O	15	10/2014	10/2019	U	U	U	4	YES
AMW-60	M	7	11/2004	10/2019	U	U	U	4	YES
CPU-14	M	37	10/2016	10/2019	U	U	U	4	YES
MW-14C*	E/M	60	04/2018	10/2019	U	U	U	4	YES
MW-14E*	E/M	62	04/2018	10/2019	U	U	U	4	YES
MW-15E	M	30	10/2015	10/2019	U	U	U	4	YES
MW-18D*	E/M	60	04/2018	10/2019	U	U	U	4	YES
MW-18E	E/O	37	10/2017	10/2019	U	U	U	4	YES
MW-19D	E/M	59	04/2018	10/2019	U	U	U	4	YES
MW-20D	E	60	04/2018	10/2019	U	U	U	4	YES
MW-38	M	15	04/2017	10/2019	U	U	U	4	YES
MW-40	M	9	10/2008	10/2019	U	U	U	4	YES
PZ-39	PZ	19	04/2017	10/2019	U	U	U	4	YES
Church of God Wells									
AMW-27	M	51	04/2015	10/2016	U	U	U	4	YES
AMW-61	M	16	04/2017	10/2019	U	U	U	4	YES
CPU-12	M	35	10/2015	10/2019	U	U	U	4	YES
CPU-13	E/O	52	04/2013	10/2014	U	U	U	4	YES
MW-21D	E/O	62	04/2018	10/2019	U	U	U	4	YES
MW-22D	E	56	04/2017	10/2019	U	U	U	4	YES
MW-25D	E/O	52	10/2012	10/2014	U	U	U	4	YES
MW-26D	E/O	51	10/2012	10/2014	U	U	U	4	YES
MW-27D	E/M	43	10/2011	10/2014	U	U	U	4	YES
MW-49	E/O	30	10/2012	10/2014	U	U	U	4	YES
Toe Wells									
AMW-42	M	38	10/2009	10/2014	U	U	U	4	YES
MW-31	M	25	10/2008	10/2012	U	U	U	4	YES
MW-35	M	42	10/2015	04/2017	U	U	U	4	YES
MW-41	M	44	10/2010	10/2017	U	U	U	4	YES
MW-48	M	30	10/2006	10/2009	U	U	U	4	YES
Troutdale Wells									
AMW-24	M/D	29	10/2016	10/2019	U	U	U	4	YES
MW-33	M/D	29	10/2016	10/2019	U	U	U	4	YES
BENNETT	M	26	04/2017	10/2019	U	U	U	4	YES

Appendix C-2.1 - Remediation Monitoring Analysis
CHLORODIBROMOMETHANE (Last 4 Samples)

Well Name	Well Type	Total Number of Datapoints	Date of First of the Most Recent Four Samples	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Number of Conc. < Cleanup Goal (1 ug/L)	Remediation Monitoring Phase is Completed? [a]

NOTES:

[a] The "Remediation Monitoring Phase is Completed" determinations are per EPA Guidance (EPA 2013) based on the most recent four sample data points for each COC. The remediation monitoring phase is completed when the last four sample concentrations are lower than the cleanup level.

* The pumps in wells MW-14C and MW14E were turned off and removed on 10/16/2019; and the pump in well MW-19D was turned off and removed 10/14/2019.

COC = Contaminant of Concern.
E = Extraction well.
E/M = Extraction well with pump pulled; now sampled as a monitoring well.
E/O = Extraction well with pump turned off; pump is turned on for sampling.
EPA = U.S. Environmental Protection Agency.
M = Monitoring well.
M/D = Monitoring well with dedicated pump installed.
U = Analyte not detected above the specified reporting limit.
µg/L = Micrograms per liter.

Appendix C-2.2 - Remediation Monitoring Analysis
1,1-DICHLOROETHENE (Last 4 Samples)

Well Name	Well Type	Total Number of Datapoints	Date of First of the Most Recent Four Samples	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Number of Conc. < Cleanup Goal (1 ug/L)	Remediation Monitoring Phase is Completed ? [a]
Closure Monitoring Program Wells									
Upgradient Wells									
AMW-8A	M	38	10/2014	10/2019	U	U	U	4	YES
TCE Source Wells									
AMW-1A	M	61	04/2018	10/2019	U	1	0.65	2	NO
AMW-1B	M	31	01/2009	10/2010	U	U	U	4	YES
AMW-1C	M	24	10/2007	10/2009	U	U	U	4	YES
AMW-2A	M	64	04/2018	10/2019	U	0.16	0.16	4	YES
AMW-2B	M	36	10/2012	10/2015	U	U	U	4	YES
AMW-3A	M	48	10/2015	10/2019	U	U	U	4	YES
AMW-4A	M	15	10/2009	10/2019	U	U	U	4	YES
AMW-12A	M	62	04/2018	10/2019	U	0.17	0.11	4	YES
AMW-13A	M	45	10/2012	10/2015	U	U	U	4	YES
AMW-19A	M	43	10/2013	10/2017	U	U	U	4	YES
AMW-26	M	29	10/2010	10/2017	U	0.2	0.2	4	YES
AMW-52A	M	28	10/2012	10/2015	U	U	U	4	YES
AMW-53A	M	47	04/2018	10/2019	U	0.49	0.43	4	YES
AMW-54A	M	30	10/2013	10/2017	U	U	U	4	YES
AMW-55A	M	23	10/2012	10/2015	U	U	U	4	YES
AMW-56A	M	29	10/2013	10/2017	U	0.037	0.037	4	YES
MW-1A	M	62	04/2018	10/2019	U	0.48	0.08	4	YES
MW-1B	M	26	10/2006	10/2009	U	U	U	4	YES
MW-1C	M	20	10/2006	10/2009	U	U	U	4	YES
Proximal Wells									
AMW-58	M	9	10/2006	10/2012	U	0.22	U	4	YES
MW-2A	M	27	10/2011	10/2016	U	U	U	4	YES
MW-2B	M	17	10/2009	10/2019	U	U	U	4	YES
MW-2C	M	8	10/2002	10/2009	U	U	U	4	YES
MW-3A	M	19	05/2004	10/2008	U	U	U	4	YES
MW-3B	M	15	10/2010	10/2016	U	U	U	4	YES
MW-3C	M	10	10/2004	10/2019	U	U	U	4	YES
MW-4A	M	22	10/2009	10/2019	U	U	U	4	YES
MW-4B	M	16	10/2011	10/2016	U	U	U	4	YES
MW-4BSHED	M	16	10/2004	10/2019	U	0.19	U	4	YES
MW-4C	M	11	10/2009	10/2019	U	U	U	4	YES
MW-6A	M	7	05/1995	10/2019	U	U	U	4	YES
MW-6B	E	52	04/2017	10/2019	U	U	U	4	YES
MW-6C	M	13	10/2009	10/2019	U	U	U	4	YES
MW-6D	M	11	10/2009	10/2019	U	0.75	0.25	4	YES
MW-7B	M	10	10/2014	10/2019	U	0.1	U	4	YES
MW-7C	M	6	05/1995	10/2009	U	U	U	4	YES

Appendix C-2.2 - Remediation Monitoring Analysis
1,1-DICHLOROETHENE (Last 4 Samples)

Well Name	Well Type	Total Number of Datapoints	Date of First of the Most Recent Four Samples	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Number of Conc. < Cleanup Goal (1 ug/L)	Remediation Monitoring Phase is Completed ? [a]
MW-8B	M	15	10/2010	10/2017	U	0.079	0.079	4	YES
MW-9B	M	18	10/2012	10/2017	U	0.11	0.066	4	YES
MW-9C	M	12	10/2009	10/2019	U	U	U	4	YES
MW-10B	E	53	10/2017	10/2019	U	0.08	U	4	YES
MW-10C	E	54	04/2017	10/2019	U	U	U	4	YES
MW-12C	M	29	10/2014	10/2019	U	U	U	4	YES
MW-13C	M	32	10/2016	10/2019	U	U	U	4	YES
PW-1B	E	62	04/2017	10/2019	U	U	U	4	YES
Intermediate Wells									
AMW-59	E/O	15	10/2014	10/2019	4.3	10	4.6	None	NO
AMW-60	M	7	11/2004	10/2019	0.33	1.9	1.9	None	NO
CPU-14	M	38	10/2016	10/2019	0.1	0.19	0.1	4	YES
MW-14C*	E/M	61	04/2018	10/2019	U	U	U	4	YES
MW-14E*	E/M	63	04/2018	10/2019	1.4	1.8	1.4	None	NO
MW-15E	M	30	10/2015	10/2019	U	0.043	U	4	YES
MW-18D	E/M	60	04/2018	10/2019	U	0.31	U	4	YES
MW-18E	E/O	38	10/2017	10/2019	0.25	9.1	0.25	2	NO
MW-19D*	E/M	59	04/2018	10/2019	0.5	0.7	0.5	4	YES
MW-20D	E	60	04/2018	10/2019	0.85	1.2	0.85	1	NO
MW-38	M	15	04/2017	10/2019	0.08	0.16	0.08	4	YES
MW-40	M	9	10/2008	10/2019	U	0.1	U	4	YES
PZ-39	PZ	19	04/2017	10/2019	1.4	2.1	2	None	NO
Church of God Wells									
AMW-27	M	52	04/2015	10/2016	0.08	0.13	0.11	4	YES
AMW-61	M	16	04/2017	10/2019	0.21	0.35	0.23	4	YES
CPU-12	M	36	10/2015	10/2019	U	0.029	U	4	YES
CPU-13	E/O	53	04/2013	10/2014	U	U	U	4	YES
MW-21D	E/O	63	04/2018	10/2019	0.41	0.95	0.41	4	YES
MW-22D	E	57	04/2017	10/2019	U	0.1	U	4	YES
MW-25D	E/O	53	10/2012	10/2014	0.15	0.33	0.15	4	YES
MW-26D	E/O	52	10/2012	10/2014	U	U	U	4	YES
MW-27D	E/M	44	10/2011	10/2014	U	U	U	4	YES
MW-49	E/O	30	10/2012	10/2014	U	0.08	U	4	YES
Toe Wells									
AMW-42	M	39	10/2009	10/2014	U	U	U	4	YES
MW-31	M	26	10/2008	10/2012	U	U	U	4	YES
MW-35	M	43	10/2015	04/2017	U	0.09	0.09	4	YES
MW-41	M	45	10/2010	10/2017	U	U	U	4	YES
MW-48	M	31	10/2006	10/2009	U	U	U	4	YES
Troutdale Wells									
AMW-24	M/D	30	10/2016	10/2019	0.65	1.1	0.65	3	NO
MW-33	M/D	30	10/2016	10/2019	0.34	0.71	0.34	4	YES
BENNETT	M	26	04/2017	10/2019	0.08	0.25	0.08	4	YES

Appendix C-2.2 - Remediation Monitoring Analysis
1,1-DICHLOROETHENE (Last 4 Samples)

Well Name	Well Type	Total Number of Datapoints	Date of First of the Most Recent Four Samples	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Number of Conc. < Cleanup Goal (1 ug/L)	Remediation Monitoring Phase is Completed ? [a]

NOTES:

[a] The "Remediation Monitoring Phase is Completed" determinations are per EPA Guidance (EPA 2013) based on the most recent four sample data points for each COC. The remediation monitoring phase is completed when the last four sample concentrations are lower than the cleanup level.

* The pumps in wells MW-14C and MW14E were turned off and removed on 10/16/2019; and the pump in well MW-19D was turned off and removed 10/14/2019.

COC = Contaminant of Concern.
E = Extraction well.
E/O = Extraction well with pump turned off; pump is turned on for sampling.
E/M = Extraction well with pump pulled; now sampled as a monitoring well.
EPA = U.S. Environmental Protection Agency.
M = Monitoring well.
M/D = Monitoring well with dedicated pump installed.
U = Analyte not detected above the specified reporting limit.
µg/L = Micrograms per liter.

Appendix C-2.3 - Remediation Monitoring Analysis
1,2-DICHLOROETHANE (Last 4 Samples)

Well Name	Well Type	Total Number of Datapoints	Date of First of the Most Recent Four Samples	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Number of Conc. < Cleanup Goal (5 ug/L)	Remediation Monitoring Phase is Completed ? [a]
Closure Monitoring Program Wells									
Upgradient Wells									
AMW-8A	M	38	10/2014	10/2019	U	U	U	4	YES
TCE Source Wells									
AMW-1A	M	61	04/2018	10/2019	2.6	8.8	2.6	4	YES
AMW-1B	M	31	01/2009	10/2010	U	U	U	4	YES
AMW-1C	M	24	10/2007	10/2009	U	U	U	4	YES
AMW-2A	M	64	04/2018	10/2019	0.14	0.87	0.43	4	YES
AMW-2B	M	36	10/2012	10/2015	U	U	U	4	YES
AMW-3A	M	48	10/2015	10/2019	U	U	U	4	YES
AMW-4A	M	15	10/2009	10/2019	U	U	U	4	YES
AMW-12A	M	62	04/2018	10/2019	0.24	0.45	0.36	4	YES
AMW-13A	M	45	10/2012	10/2015	U	0.11	U	4	YES
AMW-19A	M	43	10/2013	10/2017	U	U	U	4	YES
AMW-26	M	29	10/2010	10/2017	U	1.3	1.3	4	YES
AMW-52A	M	28	10/2012	10/2015	U	U	U	4	YES
AMW-53A	M	47	04/2018	10/2019	0.73	2.3	1.9	4	YES
AMW-54A	M	30	10/2013	10/2017	U	0.19	0.19	4	YES
AMW-55A	M	23	10/2012	10/2015	U	U	U	4	YES
AMW-56A	M	29	10/2013	10/2017	U	0.23	0.23	4	YES
MW-1A	M	62	04/2018	10/2019	0.18	1.8	0.26	4	YES
MW-1B	M	26	10/2006	10/2009	U	U	U	4	YES
MW-1C	M	20	10/2006	10/2009	U	U	U	4	YES
Proximal Wells									
AMW-58	M	9	10/2006	10/2012	U	U	U	4	YES
MW-2A	M	27	10/2011	10/2016	U	U	U	4	YES
MW-2B	M	17	10/2009	10/2019	U	U	U	4	YES
MW-2C	M	8	10/2002	10/2009	U	0.25	U	4	YES
MW-3A	M	19	05/2004	10/2008	U	U	U	4	YES
MW-3B	M	15	10/2010	10/2016	U	U	U	4	YES
MW-3C	M	10	10/2004	10/2019	U	0.17	U	4	YES
MW-4A	M	22	10/2009	10/2019	0.07	0.15	0.15	4	YES
MW-4B	M	16	10/2011	10/2016	U	0.09	0.09	4	YES
MW-4BSHED	M	16	10/2004	10/2019	U	0.18	U	4	YES
MW-4C	M	11	10/2009	10/2019	U	U	U	4	YES
MW-6A	M	7	05/1995	10/2019	U	U	U	4	YES
MW-6B	E	52	04/2017	10/2019	0.13	0.32	0.32	4	YES
MW-6C	M	13	10/2009	10/2019	U	U	U	4	YES
MW-6D	M	11	10/2009	10/2019	U	U	U	4	YES
MW-7B	M	10	10/2014	10/2019	U	0.27	0.12	4	YES
MW-7C	M	6	05/1995	10/2009	U	0.8	U	4	YES
MW-8B	M	15	10/2010	10/2017	U	0.3	0.3	4	YES

Appendix C-2.3 - Remediation Monitoring Analysis
1,2-DICHLOROETHANE (Last 4 Samples)

Well Name	Well Type	Total Number of Datapoints	Date of First of the Most Recent Four Samples	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Number of Conc. < Cleanup Goal (5 ug/L)	Remediation Monitoring Phase is Completed ? [a]
MW-9B	M	18	10/2012	10/2017	U	U	U	4	YES
MW-9C	M	12	10/2009	10/2019	U	U	U	4	YES
MW-10B	E	53	10/2017	10/2019	U	U	U	4	YES
MW-10C	E	54	04/2017	10/2019	U	U	U	4	YES
MW-12C	M	29	10/2014	10/2019	U	U	U	4	YES
MW-13C	M	32	10/2016	10/2019	U	U	U	4	YES
PW-1B	E	62	04/2017	10/2019	U	U	U	4	YES
Intermediate Wells									
AMW-59	E/O	15	10/2014	10/2019	U	U	U	4	YES
AMW-60	M	7	11/2004	10/2019	0.08	0.19	0.08	4	YES
CPU-14	M	38	10/2016	10/2019	U	U	U	4	YES
MW-14C	E/M	61	04/2018	10/2019	U	U	U	4	YES
MW-14E*	E/M	63	04/2018	10/2019	U	U	U	4	YES
MW-15E*	M	30	10/2015	10/2019	U	U	U	4	YES
MW-18D	E/M	60	04/2018	10/2019	U	U	U	4	YES
MW-18E	E/O	38	10/2017	10/2019	U	U	U	4	YES
MW-19D*	E/M	59	04/2018	10/2019	U	U	U	4	YES
MW-20D	E	60	04/2018	10/2019	U	U	U	4	YES
MW-38	M	15	04/2017	10/2019	U	U	U	4	YES
MW-40	M	9	10/2008	10/2019	U	U	U	4	YES
PZ-39	PZ	19	04/2017	10/2019	U	U	U	4	YES
Church of God Wells									
AMW-27	M	52	04/2015	10/2016	U	U	U	4	YES
AMW-61	M	16	04/2017	10/2019	U	0.08	U	4	YES
CPU-12	M	36	10/2015	10/2019	U	U	U	4	YES
CPU-13	E/O	53	04/2013	10/2014	U	U	U	4	YES
MW-21D	E/O	63	04/2018	10/2019	U	U	U	4	YES
MW-22D	E	57	04/2017	10/2019	U	U	U	4	YES
MW-25D	E/O	53	10/2012	10/2014	U	U	U	4	YES
MW-26D	E/O	52	10/2012	10/2014	U	U	U	4	YES
MW-27D	E/M	44	10/2011	10/2014	U	0.09	U	4	YES
MW-49	E/O	30	10/2012	10/2014	U	U	U	4	YES
Toe Wells									
AMW-42	M	39	10/2009	10/2014	U	U	U	4	YES
MW-31	M	26	10/2008	10/2012	U	U	U	4	YES
MW-35	M	43	10/2015	04/2017	U	0.08	U	4	YES
MW-41	M	45	10/2010	10/2017	U	U	U	4	YES
MW-48	M	31	10/2006	10/2009	U	U	U	4	YES
Troutdale Wells									
AMW-24	M/D	30	10/2016	10/2019	U	0.023	U	4	YES
MW-33	M/D	30	10/2016	10/2019	U	0.032	U	4	YES
BENNETT	M	26	04/2017	10/2019	U	U	U	4	YES

Appendix C-2.3 - Remediation Monitoring Analysis
1,2-DICHLOROETHANE (Last 4 Samples)

Well Name	Well Type	Total Number of Datapoints	Date of First of the Most Recent Four Samples	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Number of Conc. < Cleanup Goal (5 ug/L)	Remediation Monitoring Phase is Completed ? [a]

NOTES:

[a] The "Remediation Monitoring Phase is Completed" determinations are per EPA Guidance (EPA 2013) based on the most recent four sample data points for each COC. The remediation monitoring phase is completed when the last four sample concentrations are lower than the cleanup level.

* The pumps in wells MW-14C and MW14E were turned off and removed on 10/16/2019; and the pump in well MW-19D was turned off and removed 10/14/2019.

COC = Contaminant of Concern.
E = Extraction well.
E/O = Extraction well with pump turned off; pump is turned on for sampling.
E/M = Extraction well with pump pulled; now sampled as a monitoring well.
EPA = U.S. Environmental Protection Agency.
M = Monitoring well.
M/D = Monitoring well with dedicated pump installed.
U = Analyte not detected above the specified reporting limit.
µg/L = Micrograms per liter.

Appendix C-2.4 - Remediation Monitoring Analysis
1,1,1-TRICHLOROETHANE (Last 4 Samples)

Well Name	Well Type	Total Number of Datapoints	Date of First of the Most Recent Four Samples	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Number of Conc. < Cleanup Goal (200 ug/L)	Remediation Monitoring Phase is Completed ? [a]
Closure Monitoring Program Wells									
Upgradient Wells									
AMW-8A	M	38	10/2014	10/2019	U	U	U	4	YES
TCE Source Wells									
AMW-1A	M	61	04/2018	10/2019	2.6	8.8	2.6	4	YES
AMW-1B	M	31	01/2009	10/2010	U	U	U	4	YES
AMW-1C	M	24	10/2007	10/2009	U	U	U	4	YES
AMW-2A	M	64	04/2018	10/2019	0.14	0.87	0.43	4	YES
AMW-2B	M	36	10/2012	10/2015	U	U	U	4	YES
AMW-3A	M	48	10/2015	10/2019	U	U	U	4	YES
AMW-4A	M	15	10/2009	10/2019	U	U	U	4	YES
AMW-12A	M	62	04/2018	10/2019	0.24	0.45	0.36	4	YES
AMW-13A	M	45	10/2012	10/2015	U	0.11	U	4	YES
AMW-19A	M	43	10/2013	10/2017	U	U	U	4	YES
AMW-26	M	29	10/2010	10/2017	U	1.3	1.3	4	YES
AMW-52A	M	28	10/2012	10/2015	U	U	U	4	YES
AMW-53A	M	47	04/2018	10/2019	0.73	2.3	1.9	4	YES
AMW-54A	M	30	10/2013	10/2017	U	0.19	0.19	4	YES
AMW-55A	M	23	10/2012	10/2015	U	U	U	4	YES
AMW-56A	M	29	10/2013	10/2017	U	0.23	0.23	4	YES
MW-1A	M	62	04/2018	10/2019	0.18	1.8	0.26	4	YES
MW-1B	M	26	10/2006	10/2009	U	U	U	4	YES
MW-1C	M	20	10/2006	10/2009	U	U	U	4	YES
Proximal Wells									
AMW-58	M	9	10/2006	10/2012	U	U	U	4	YES
MW-2A	M	27	10/2011	10/2016	U	U	U	4	YES
MW-2B	M	17	10/2009	10/2019	U	U	U	4	YES
MW-2C	M	8	10/2002	10/2009	U	0.25	U	4	YES
MW-3A	M	19	05/2004	10/2008	U	U	U	4	YES
MW-3B	M	15	10/2010	10/2016	U	U	U	4	YES
MW-3C	M	10	10/2004	10/2019	U	0.17	U	4	YES
MW-4A	M	22	10/2009	10/2019	0.07	0.15	0.15	4	YES
MW-4B	M	16	10/2011	10/2016	U	0.09	0.09	4	YES
MW-4BSHED	M	16	10/2004	10/2019	U	0.18	U	4	YES
MW-4C	M	11	10/2009	10/2019	U	U	U	4	YES
MW-6A	M	7	05/1995	10/2019	U	U	U	4	YES
MW-6B	E	52	04/2017	10/2019	0.13	0.32	0.32	4	YES
MW-6C	M	13	10/2009	10/2019	U	U	U	4	YES
MW-6D	M	11	10/2009	10/2019	U	U	U	4	YES
MW-7B	M	10	10/2014	10/2019	U	0.27	0.12	4	YES
MW-7C	M	6	05/1995	10/2009	U	0.8	U	4	YES

Appendix C-2.4 - Remediation Monitoring Analysis
1,1,1-TRICHLOROETHANE (Last 4 Samples)

Well Name	Well Type	Total Number of Datapoints	Date of First of the Most Recent Four Samples	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Number of Conc. < Cleanup Goal (200 ug/L)	Remediation Monitoring Phase is Completed ? [a]
MW-8B	M	15	10/2010	10/2017	U	0.3	0.3	4	YES
MW-9B	M	18	10/2012	10/2017	0.19	0.29	0.22	4	YES
MW-9C	M	12	10/2009	10/2019	U	U	U	4	YES
MW-10B	E	53	10/2017	10/2019	U	0.09	U	4	YES
MW-10C	E	54	04/2017	10/2019	U	0.11	0.08	4	YES
MW-12C	M	29	10/2014	10/2019	U	U	U	4	YES
MW-13C	M	32	10/2016	10/2019	U	U	U	4	YES
PW-1B	E	62	04/2017	10/2019	U	0.17	U	4	YES
Intermediate Wells									
AMW-59	E/O	15	10/2014	10/2019	U	U	U	4	YES
AMW-60	M	7	11/2004	10/2019	U	U	U	4	YES
CPU-14	M	38	10/2016	10/2019	0.14	0.26	0.14	4	YES
MW-14C*	E/M	61	04/2018	10/2019	U	U	U	4	YES
MW-14E*	E/M	63	04/2018	10/2019	U	0.08	U	4	YES
MW-15E	M	30	10/2015	10/2019	U	0.41	U	4	YES
MW-18D	E/M	60	04/2018	10/2019	U	0.18	U	4	YES
MW-18E	E/O	38	10/2017	10/2019	U	U	U	4	YES
MW-19D*	E/M	59	04/2018	10/2019	U	0.08	U	4	YES
MW-20D	E	60	04/2018	10/2019	U	0.13	U	4	YES
MW-38	M	15	04/2017	10/2019	0.12	0.33	0.12	4	YES
MW-40	M	9	10/2008	10/2019	U	0.27	U	4	YES
PZ-39	PZ	19	04/2017	10/2019	0.46	0.55	0.46	4	YES
Church of God Wells									
AMW-27	M	52	04/2015	10/2016	U	0.16	0.16	4	YES
AMW-61	M	16	04/2017	10/2019	0.09	0.15	0.09	4	YES
CPU-12	M	36	10/2015	10/2019	U	0.12	0.09	4	YES
CPU-13	E/O	53	04/2013	10/2014	U	U	U	4	YES
MW-21D	E/O	63	04/2018	10/2019	0.1	0.48	0.19	4	YES
MW-22D	E	57	04/2017	10/2019	U	U	U	4	YES
MW-25D	E/O	53	10/2012	10/2014	0.11	0.17	0.11	4	YES
MW-26D	E/O	52	10/2012	10/2014	U	U	U	4	YES
MW-27D	E/M	44	10/2011	10/2014	U	0.1	U	4	YES
MW-49	E/O	30	10/2012	10/2014	U	0.09	U	4	YES
Toe Wells									
AMW-42	M	39	10/2009	10/2014	U	0.14	U	4	YES
MW-31	M	26	10/2008	10/2012	U	0.26	U	4	YES
MW-35	M	43	10/2015	04/2017	U	0.12	0.12	4	YES
MW-41	M	45	10/2010	10/2017	U	U	U	4	YES
MW-48	M	31	10/2006	10/2009	U	U	U	4	YES
Troutdale Wells									
AMW-24	M/D	30	10/2016	10/2019	0.1	0.17	0.1	4	YES
MW-33	M/D	30	10/2016	10/2019	U	0.082	U	4	YES
BENNETT	M	26	04/2017	10/2019	U	0.09	U	4	YES

Appendix C-2.4 - Remediation Monitoring Analysis
1,1,1-TRICHLOROETHANE (Last 4 Samples)

Well Name	Well Type	Total Number of Datapoints	Date of First of the Most Recent Four Samples	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Number of Conc. < Cleanup Goal (200 ug/L)	Remediation Monitoring Phase is Completed ? [a]

NOTES:

[a] The "Remediation Monitoring Phase is Completed" determinations are per EPA Guidance (EPA 2013) based on the most recent four sample data points for each COC. The remediation monitoring phase is completed when the last four sample concentrations are lower than the cleanup level.

* The pumps in wells MW-14C and MW14E were turned off and removed on 10/16/2019; and the pump in well MW-19D was turned off and removed 10/14/2019.

COC = Contaminant of Concern.
E = Extraction well.
E/M = Extraction well with pump pulled; now sampled as a monitoring well.
E/O = Extraction well with pump turned off; pump is turned on for sampling.
EPA = U.S. Environmental Protection Agency.
M = Monitoring well.
M/D = Monitoring well with dedicated pump installed.
U = Analyte not detected above the specified reporting limit.
µg/L = Micrograms per liter.

Appendix C-2.5 - Remediation Monitoring Analysis
CARBON TETRACHLORIDE (Last 4 Samples)

Well Name	Well Type	Total Number of Datapoints	Date of First of the Most Recent Four Samples	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Number of Conc. < Cleanup Goal (1 ug/L)	Remediation Monitoring Phase is Completed ? [a]
Closure Monitoring Program Wells									
Upgradient Wells									
AMW-8A	M	38	10/2014	10/2019	U	U	U	4	YES
TCE Source Wells									
AMW-1A	M	61	04/2018	10/2019	U	0.55	U	4	YES
AMW-1B	M	31	01/2009	10/2010	U	U	U	4	YES
AMW-1C	M	24	10/2007	10/2009	U	U	U	4	YES
AMW-2A	M	64	04/2018	10/2019	U	0.16	U	4	YES
AMW-2B	M	36	10/2012	10/2015	U	U	U	4	YES
AMW-3A	M	48	10/2015	10/2019	U	U	U	4	YES
AMW-4A	M	15	10/2009	10/2019	U	U	U	4	YES
AMW-12A	M	62	04/2018	10/2019	U	U	U	4	YES
AMW-13A	M	45	10/2012	10/2015	U	U	U	4	YES
AMW-19A	M	43	10/2013	10/2017	U	U	U	4	YES
AMW-26	M	29	10/2010	10/2017	U	U	U	4	YES
AMW-52A	M	28	10/2012	10/2015	U	U	U	4	YES
AMW-53A	M	47	04/2018	10/2019	U	U	U	4	YES
AMW-54A	M	30	10/2013	10/2017	U	U	U	4	YES
AMW-55A	M	23	10/2012	10/2015	U	U	U	4	YES
AMW-56A	M	29	10/2013	10/2017	U	U	U	4	YES
MW-1A	M	62	04/2018	10/2019	U	U	U	4	YES
MW-1B	M	26	10/2006	10/2009	U	U	U	4	YES
MW-1C	M	20	10/2006	10/2009	U	U	U	4	YES
Proximal Wells									
AMW-58	M	9	10/2006	10/2012	U	U	U	4	YES
MW-2A	M	27	10/2011	10/2016	U	U	U	4	YES
MW-2B	M	17	10/2009	10/2019	U	U	U	4	YES
MW-2C	M	8	10/2002	10/2009	U	U	U	4	YES
MW-3A	M	19	05/2004	10/2008	U	U	U	4	YES
MW-3B	M	15	10/2010	10/2016	U	U	U	4	YES
MW-3C	M	10	10/2004	10/2019	U	U	U	4	YES
MW-4A	M	22	10/2009	10/2019	U	U	U	4	YES
MW-4B	M	16	10/2011	10/2016	U	U	U	4	YES
MW-4BSHED	M	16	10/2004	10/2019	U	U	U	4	YES
MW-4C	M	11	10/2009	10/2019	U	U	U	4	YES
MW-6A	M	7	05/1995	10/2019	U	U	U	4	YES
MW-6B	E	52	04/2017	10/2019	U	U	U	4	YES
MW-6C	M	13	10/2009	10/2019	U	U	U	4	YES
MW-6D	M	11	10/2009	10/2019	U	U	U	4	YES
MW-7B	M	10	10/2014	10/2019	U	U	U	4	YES
MW-7C	M	6	05/1995	10/2009	U	U	U	4	YES
MW-8B	M	15	10/2010	10/2017	U	U	U	4	YES

Appendix C-2.5 - Remediation Monitoring Analysis
CARBON TETRACHLORIDE (Last 4 Samples)

Well Name	Well Type	Total Number of Datapoints	Date of First of the Most Recent Four Samples	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Number of Conc. < Cleanup Goal (1 ug/L)	Remediation Monitoring Phase is Completed ? [a]
MW-9B	M	18	10/2012	10/2017	U	U	U	4	YES
MW-9C	M	12	10/2009	10/2019	U	U	U	4	YES
MW-10B	E	53	10/2017	10/2019	U	U	U	4	YES
MW-10C	E	54	04/2017	10/2019	U	U	U	4	YES
MW-12C	M	29	10/2014	10/2019	U	U	U	4	YES
MW-13C	M	32	10/2016	10/2019	U	U	U	4	YES
PW-1B	E	62	04/2017	10/2019	U	U	U	4	YES
Intermediate Wells									
AMW-59	E/O	15	10/2014	10/2019	U	U	U	4	YES
AMW-60	M	7	11/2004	10/2019	U	U	U	4	YES
CPU-14	M	38	10/2016	10/2019	U	U	U	4	YES
MW-14C*	E/M	61	04/2018	10/2019	U	U	U	4	YES
MW-14E*	E/M	63	04/2018	10/2019	U	U	U	4	YES
MW-15E	M	30	10/2015	10/2019	U	U	U	4	YES
MW-18D	E/M	60	04/2018	10/2019	U	U	U	4	YES
MW-18E	E/O	38	10/2017	10/2019	U	U	U	4	YES
MW-19D*	E/M	59	04/2018	10/2019	U	U	U	4	YES
MW-20D	E	60	04/2018	10/2019	U	U	U	4	YES
MW-38	M	15	04/2017	10/2019	U	U	U	4	YES
MW-40	M	9	10/2008	10/2019	U	U	U	4	YES
PZ-39	PZ	19	04/2017	10/2019	U	U	U	4	YES
Church of God Wells									
AMW-27	M	52	04/2015	10/2016	U	U	U	4	YES
AMW-61	M	16	04/2017	10/2019	U	U	U	4	YES
CPU-12	M	36	10/2015	10/2019	U	U	U	4	YES
CPU-13	E/O	53	04/2013	10/2014	U	U	U	4	YES
MW-21D	E/O	63	04/2018	10/2019	U	U	U	4	YES
MW-22D	E	57	04/2017	10/2019	U	U	U	4	YES
MW-25D	E/O	53	10/2012	10/2014	U	U	U	4	YES
MW-26D	E/O	52	10/2012	10/2014	U	U	U	4	YES
MW-27D	E/M	44	10/2011	10/2014	U	U	U	4	YES
MW-49	E/O	30	10/2012	10/2014	U	U	U	4	YES
Toe Wells									
AMW-42	M	39	10/2009	10/2014	U	U	U	4	YES
MW-31	M	26	10/2008	10/2012	U	U	U	4	YES
MW-35	M	43	10/2015	04/2017	U	U	U	4	YES
MW-41	M	45	10/2010	10/2017	U	U	U	4	YES
MW-48	M	31	10/2006	10/2009	U	U	U	4	YES
Troutdale Wells									
AMW-24	M/D	30	10/2016	10/2019	U	U	U	4	YES
MW-33	M/D	30	10/2016	10/2019	U	U	U	4	YES
BENNETT	M	26	04/2017	10/2019	U	U	U	4	YES

Appendix C-2.5 - Remediation Monitoring Analysis
CARBON TETRACHLORIDE (Last 4 Samples)

Well Name	Well Type	Total Number of Datapoints	Date of First of the Most Recent Four Samples	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Number of Conc. < Cleanup Goal (1 ug/L)	Remediation Monitoring Phase is Completed ? [a]

NOTES:

[a] The "Remediation Monitoring Phase is Completed" determinations are per EPA Guidance (EPA 2013) based on the most recent four sample data points for each COC. The remediation monitoring phase is completed when the last four sample concentrations are lower than the cleanup level.

* The pumps in wells MW-14C and MW14E were turned off and removed on 10/16/2019; and the pump in well MW-19D was turned off and removed 10/14/2019.

COC = Contaminant of Concern.
E = Extraction well.
E/M = Extraction well with pump pulled; now sampled as a monitoring well.
E/O = Extraction well with pump turned off; pump is turned on for sampling.
EPA = U.S. Environmental Protection Agency.
M = Monitoring well.
M/D = Monitoring well with dedicated pump installed.
U = Analyte not detected above the specified reporting limit.
µg/L = Micrograms per liter.

Appendix C-2.6 - Remediation Monitoring Analysis
BROMODICHLOROMETHANE (Last 4 Samples)

Well Name	Well Type	Total Number of Datapoints	Date of First of the Most Recent Four Samples	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Number of Conc. < Cleanup Goal (1 ug/L)	Remediation Monitoring Phase is Completed ? [a]
Closure Monitoring Program Wells									
Upgradient Wells									
AMW-8A	M	37	10/2014	10/2019	U	U	U	4	YES
TCE Source Wells									
AMW-1A	M	60	04/2018	10/2019	U	U	U	4	YES
AMW-1B	M	31	01/2009	10/2010	U	U	U	4	YES
AMW-1C	M	24	10/2007	10/2009	U	0.25	U	4	YES
AMW-2A	M	63	04/2018	10/2019	U	U	U	4	YES
AMW-2B	M	36	10/2012	10/2015	U	U	U	4	YES
AMW-3A	M	47	10/2015	10/2019	U	0.18	0.12	4	YES
AMW-4A	M	15	10/2009	10/2019	0.084	1.6	0.1	1	NO
AMW-12A	M	62	04/2018	10/2019	U	U	U	4	YES
AMW-13A	M	44	10/2012	10/2015	0.17	0.28	0.23	4	YES
AMW-19A	M	43	10/2013	10/2017	U	0.12	0.037	4	YES
AMW-26	M	29	10/2010	10/2017	U	0.16	0.16	4	YES
AMW-52A	M	28	10/2012	10/2015	U	0.71	U	4	YES
AMW-53A	M	47	04/2018	10/2019	U	0.19	U	4	YES
AMW-54A	M	30	10/2013	10/2017	U	U	U	4	YES
AMW-55A	M	23	10/2012	10/2015	U	U	U	4	YES
AMW-56A	M	29	10/2013	10/2017	U	0.24	0.24	4	YES
MW-1A	M	61	04/2018	10/2019	U	U	U	4	YES
MW-1B	M	25	10/2006	10/2009	U	U	U	4	YES
MW-1C	M	20	10/2006	10/2009	U	U	U	4	YES
Proximal Wells									
AMW-58	M	9	10/2006	10/2012	U	U	U	4	YES
MW-2A	M	26	10/2011	10/2016	U	0.65	0.65	4	YES
MW-2B	M	16	10/2009	10/2019	U	0.035	U	4	YES
MW-2C	M	8	10/2002	10/2009	U	U	U	4	YES
MW-3A	M	18	05/2004	10/2008	U	U	U	4	YES
MW-3B	M	15	10/2010	10/2016	U	U	U	4	YES
MW-3C	M	10	10/2004	10/2019	U	U	U	4	YES
MW-4A	M	21	10/2009	10/2019	U	U	U	4	YES
MW-4B	M	16	10/2011	10/2016	U	0.1	0.1	4	YES
MW-4BSHED	M	16	10/2004	10/2019	U	0.048	U	4	YES
MW-4C	M	11	10/2009	10/2019	U	U	U	4	YES
MW-6A	M	7	05/1995	10/2019	U	U	U	4	YES
MW-6B	E	51	04/2017	10/2019	U	0.43	U	4	YES
MW-6C	M	13	10/2009	10/2019	U	0.13	U	4	YES
MW-6D	M	11	10/2009	10/2019	U	U	U	4	YES
MW-7B	M	10	10/2014	10/2019	U	0.46	U	4	YES
MW-7C	M	6	05/1995	10/2009	U	U	U	4	YES
MW-8B	M	15	10/2010	10/2017	U	0.56	0.56	4	YES

Appendix C-2.6 - Remediation Monitoring Analysis
BROMODICHLOROMETHANE (Last 4 Samples)

Well Name	Well Type	Total Number of Datapoints	Date of First of the Most Recent Four Samples	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Number of Conc. < Cleanup Goal (1 ug/L)	Remediation Monitoring Phase is Completed ? [a]
MW-9B	M	18	10/2012	10/2017	U	0.1	0.047	4	YES
MW-9C	M	12	10/2009	10/2019	U	U	U	4	YES
MW-10B	E	52	10/2017	10/2019	U	0.14	U	4	YES
MW-10C	E	53	04/2017	10/2019	0.14	0.49	0.14	4	YES
MW-12C	M	28	10/2014	10/2019	U	U	U	4	YES
MW-13C	M	31	10/2016	10/2019	0.13	0.68	0.25	4	YES
PW-1B	E	61	04/2017	10/2019	U	0.1	U	4	YES
Intermediate Wells									
AMW-59	E/O	15	10/2014	10/2019	U	U	U	4	YES
AMW-60	M	7	11/2004	10/2019	U	U	U	4	YES
CPU-14	M	37	10/2016	10/2019	U	0.07	U	4	YES
MW-14C*	E/M	60	04/2018	10/2019	0.13	0.18	0.16	4	YES
MW-14E*	E/M	62	04/2018	10/2019	U	U	U	4	YES
MW-15E	M	30	10/2015	10/2019	U	0.042	U	4	YES
MW-18D*	E/M	60	04/2018	10/2019	U	U	U	4	YES
MW-18E	E/O	37	10/2017	10/2019	U	U	U	4	YES
MW-19D	E/M	59	04/2018	10/2019	U	0.14	U	4	YES
MW-20D	E	60	04/2018	10/2019	U	U	U	4	YES
MW-38	M	15	04/2017	10/2019	U	U	U	4	YES
MW-40	M	9	10/2008	10/2019	U	0.15	U	4	YES
PZ-39	PZ	19	04/2017	10/2019	U	U	U	4	YES
Church of God Wells									
AMW-27	M	51	04/2015	10/2016	U	U	U	4	YES
AMW-61	M	16	04/2017	10/2019	U	U	U	4	YES
CPU-12	M	35	10/2015	10/2019	U	0.03	U	4	YES
CPU-13	E/O	52	04/2013	10/2014	U	0.1	U	4	YES
MW-21D	E/O	62	04/2018	10/2019	U	U	U	4	YES
MW-22D	E	56	04/2017	10/2019	U	U	U	4	YES
MW-25D	E/O	52	10/2012	10/2014	U	U	U	4	YES
MW-26D	E/O	51	10/2012	10/2014	U	U	U	4	YES
MW-27D	E/M	43	10/2011	10/2014	U	U	U	4	YES
MW-49	E/O	30	10/2012	10/2014	U	U	U	4	YES
Toe Wells									
AMW-42	M	38	10/2009	10/2014	U	U	U	4	YES
MW-31	M	25	10/2008	10/2012	U	U	U	4	YES
MW-35	M	42	10/2015	04/2017	U	U	U	4	YES
MW-41	M	44	10/2010	10/2017	U	U	U	4	YES
MW-48	M	30	10/2006	10/2009	U	U	U	4	YES
Troutdale Wells									
AMW-24	M/D	29	10/2016	10/2019	U	U	U	4	YES
MW-33	M/D	29	10/2016	10/2019	U	U	U	4	YES
BENNETT	M	26	04/2017	10/2019	U	U	U	4	YES

Appendix C-2.6 - Remediation Monitoring Analysis
BROMODICHLOROMETHANE (Last 4 Samples)

Well Name	Well Type	Total Number of Datapoints	Date of First of the Most Recent Four Samples	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Number of Conc. < Cleanup Goal (1 ug/L)	Remediation Monitoring Phase is Completed ? [a]

NOTES:

[a] The "Remediation Monitoring Phase is Completed" determinations are per EPA Guidance (EPA 2013) based on the most recent four sample data points for each COC. The remediation monitoring phase is completed when the last four sample concentrations are lower than the cleanup level.

* The pumps in wells MW-14C and MW14E were turned off and removed on 10/16/2019; and the pump in well MW-19D was turned off and removed 10/14/2019.

COC = Contaminant of Concern.
E = Extraction well.
E/M = Extraction well with pump pulled; now sampled as a monitoring well.
E/O = Extraction well with pump turned off; pump is turned on for sampling.
EPA = U.S. Environmental Protection Agency.
M = Monitoring well.
M/D = Monitoring well with dedicated pump installed.
U = Analyte not detected above the specified reporting limit.
µg/L = Micrograms per liter.

Appendix C-2.7 - Remediation Monitoring Analysis
TETRACHLOROETHENE (Last 4 Samples)

Well Name	Well Type	Total Number of Datapoints	Date of First of the Most Recent Four Samples	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Number of Conc. < Cleanup Goal (5 ug/L)	Remediation Monitoring Phase is Completed ? [a]
Closure Monitoring Program Wells									
Upgradient Wells									
AMW-8A	M	38	10/2014	10/2019	U	0.025	U	4	YES
TCE Source Wells									
AMW-1A	M	61	04/2018	10/2019	0.61	1.3	0.77	4	YES
AMW-1B	M	31	01/2009	10/2010	U	U	U	4	YES
AMW-1C	M	24	10/2007	10/2009	U	U	U	4	YES
AMW-2A	M	64	04/2018	10/2019	0.57	0.86	0.73	4	YES
AMW-2B	M	36	10/2012	10/2015	U	U	U	4	YES
AMW-3A	M	48	10/2015	10/2019	0.3	0.51	0.3	4	YES
AMW-4A	M	15	10/2009	10/2019	U	U	U	4	YES
AMW-12A	M	62	04/2018	10/2019	0.41	0.62	0.5	4	YES
AMW-13A	M	45	10/2012	10/2015	U	0.11	0.11	4	YES
AMW-19A	M	43	10/2013	10/2017	0.29	0.33	0.29	4	YES
AMW-26	M	29	10/2010	10/2017	U	0.42	0.42	4	YES
AMW-52A	M	28	10/2012	10/2015	U	0.12	0.1	4	YES
AMW-53A	M	47	04/2018	10/2019	0.55	1.1	1.1	4	YES
AMW-54A	M	30	10/2013	10/2017	0.14	0.4	0.16	4	YES
AMW-55A	M	23	10/2012	10/2015	0.21	0.34	0.34	4	YES
AMW-56A	M	29	10/2013	10/2017	0.43	0.61	0.43	4	YES
MW-1A	M	62	04/2018	10/2019	0.64	1	0.79	4	YES
MW-1B	M	26	10/2006	10/2009	U	U	U	4	YES
MW-1C	M	20	10/2006	10/2009	U	U	U	4	YES
Proximal Wells									
AMW-58	M	9	10/2006	10/2012	U	U	U	4	YES
MW-2A	M	27	10/2011	10/2016	0.75	1.1	1.1	4	YES
MW-2B	M	17	10/2009	10/2019	0.28	0.77	0.31	4	YES
MW-2C	M	8	10/2002	10/2009	0.29	1.5	0.29	4	YES
MW-3A	M	19	05/2004	10/2008	0.21	0.4	0.21	4	YES
MW-3B	M	15	10/2010	10/2016	0.54	0.89	0.67	4	YES
MW-3C	M	10	10/2004	10/2019	0.25	1.6	0.25	4	YES
MW-4A	M	22	10/2009	10/2019	0.45	0.72	0.45	4	YES
MW-4B	M	16	10/2011	10/2016	0.5	0.64	0.62	4	YES
MW-4BSHED	M	16	10/2004	10/2019	0.51	1.6	0.51	4	YES
MW-4C	M	11	10/2009	10/2019	0.33	0.84	0.33	4	YES
MW-6A	M	7	05/1995	10/2019	U	U	U	4	YES
MW-6B	E	58	04/2017	10/2019	0.35	0.49	0.41	4	YES
MW-6C	M	13	10/2009	10/2019	U	0.19	U	4	YES
MW-6D	M	11	10/2009	10/2019	U	0.11	U	4	YES
MW-7B	M	10	10/2014	10/2019	0.39	0.57	0.42	4	YES
MW-7C	M	6	05/1995	10/2009	0.12	0.5	0.12	4	YES
MW-8B	M	15	10/2010	10/2017	0.77	1.6	0.77	4	YES

Appendix C-2.7 - Remediation Monitoring Analysis
TETRACHLOROETHENE (Last 4 Samples)

Well Name	Well Type	Total Number of Datapoints	Date of First of the Most Recent Four Samples	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Number of Conc. < Cleanup Goal (5 ug/L)	Remediation Monitoring Phase is Completed ? [a]
MW-9B	M	18	10/2012	10/2017	0.95	2	0.95	4	YES
MW-9C	M	12	10/2009	10/2019	0.2	0.35	0.26	4	YES
MW-10B	E	59	10/2017	10/2019	0.66	0.78	0.68	4	YES
MW-10C	E	60	04/2017	10/2019	0.46	0.59	0.49	4	YES
MW-12C	M	29	10/2014	10/2019	0.29	0.36	0.29	4	YES
MW-13C	M	32	10/2016	10/2019	0.64	1	0.7	4	YES
PW-1B	E	86	04/2017	10/2019	0.32	0.47	0.35	4	YES
Intermediate Wells									
AMW-59	E/O	15	10/2014	10/2019	U	U	U	4	YES
AMW-60	M	7	11/2004	10/2019	U	0.09	U	4	YES
CPU-14	M	38	10/2016	10/2019	U	0.12	U	4	YES
MW-14C*	E/M	72	04/2018	10/2019	0.49	0.61	0.59	4	YES
MW-14E*	E/M	70	04/2018	10/2019	1.4	1.8	1.5	4	YES
MW-15E	M	30	10/2015	10/2019	0.31	0.42	0.31	4	YES
MW-18D	E/M	81	04/2018	10/2019	U	1.1	0.51	4	YES
MW-18E	E/O	38	10/2017	10/2019	U	0.63	0.2	4	YES
MW-19D*	E/M	80	04/2018	10/2019	0.82	1	0.82	4	YES
MW-20D	E	84	04/2018	10/2019	0.57	0.8	0.62	4	YES
MW-38	M	15	04/2017	10/2019	0.6	0.78	0.65	4	YES
MW-40	M	9	10/2008	10/2019	U	U	U	4	YES
PZ-39	PZ	19	04/2017	10/2019	0.63	0.89	0.63	4	YES
Church of God Wells									
AMW-27	M	52	04/2015	10/2016	0.92	1	1	4	YES
AMW-61	M	16	04/2017	10/2019	0.89	2	1.9	4	YES
CPU-12	M	36	10/2015	10/2019	U	U	U	4	YES
CPU-13	E/O	59	04/2013	10/2014	0.68	0.87	0.87	4	YES
MW-21D	E/O	87	04/2018	10/2019	U	0.12	U	4	YES
MW-22D	E	80	04/2017	10/2019	0.57	0.8	0.58	4	YES
MW-25D	E/O	77	10/2012	10/2014	U	U	U	4	YES
MW-26D	E/O	76	10/2012	10/2014	0.2	0.86	0.2	4	YES
MW-27D	E/M	50	10/2011	10/2014	U	U	U	4	YES
MW-49	E/O	35	10/2012	10/2014	0.27	0.49	0.49	4	YES
Toe Wells									
AMW-42	M	52	10/2009	10/2014	U	U	U	4	YES
MW-31	M	40	10/2008	10/2012	U	0.19	0.12	4	YES
MW-35	M	70	10/2015	04/2017	0.41	0.51	0.41	4	YES
MW-41	M	58	10/2010	10/2017	U	U	U	4	YES
MW-48	M	38	10/2006	10/2009	U	U	U	4	YES
Troutdale Wells									
AMW-24	M/D	31	10/2016	10/2019	U	0.16	U	4	YES
MW-33	M/D	31	10/2016	10/2019	U	0.2	0.13	4	YES
BENNETT	M	26	04/2017	10/2019	U	0.058	U	4	YES

Appendix C-2.7 - Remediation Monitoring Analysis
TETRACHLOROETHENE (Last 4 Samples)

Well Name	Well Type	Total Number of Datapoints	Date of First of the Most Recent Four Samples	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Number of Conc. < Cleanup Goal (5 ug/L)	Remediation Monitoring Phase is Completed ? [a]

NOTES:

[a] The "Remediation Monitoring Phase is Completed" determinations are per EPA Guidance (EPA 2013) based on the most recent four sample data points for each COC. The remediation monitoring phase is completed when the last four sample concentrations are lower than the cleanup level.

* The pumps in wells MW-14C and MW14E were turned off and removed on 10/16/2019; and the pump in well MW-19D was turned off and removed 10/14/2019.

COC = Contaminant of Concern.
E = Extraction well.
E/M = Extraction well with pump pulled; now sampled as a monitoring well.
E/O = Extraction well with pump turned off; pump is turned on for sampling.
EPA = U.S. Environmental Protection Agency.
M = Monitoring well.
M/D = Monitoring well with dedicated pump installed.
U = Analyte not detected above the specified reporting limit.
µg/L = Micrograms per liter.

Appendix D

Northern Plume Monitoring Summary

APPENDIX D
NORTHERN PLUME MONITORING SUMMARY

1. INTRODUCTION

This summary presents the analytical results from the latest round of sampling of monitoring wells in the area of the Northern Plume. This plume is north of the Boomsnub/Airco Superfund Site (Site) Operable Unit (OU)-3 trichloroethene (TCE) and chromium plumes, which are referred to collectively as the OU-3 plume. Previous sampling results for wells in the Northern Plume area were reported in Appendix G of the *Boomsnub/Airco Superfund Site Progress and Groundwater Monitoring Reports*[1]. Northern Plume monitoring well locations are shown on Figure D-1.

Monitoring data indicate that the OU-3 TCE and chromium plumes had shown significant decreases in concentration and size since 1995[2]. In 2007 and 2008, however, routine monitoring data showed an unexpected increase in the TCE concentration in groundwater samples from well AMW-18, located north of the boundary of the OU-3 Plume.

In May 2008, a direct push drilling and sampling investigation was performed to evaluate the depth and concentration of TCE in groundwater in the vicinity of well AMW-18, and to evaluate possible source areas for the TCE detected in this well. The source of the TCE groundwater contamination in this area was not identified; however, based on the data, it was concluded that the source was not from the same source as the OU-3 plume[3].

Well AMW-17 is located approximately 400 feet downgradient of well AMW-18. TCE concentrations in this well had been below the Site-specific cleanup level of 5 micrograms per liter (µg/L) since 1999. However, in Fall 2010, TCE in groundwater from this well increased to a concentration exceeding the cleanup level, indicating the apparent arrival of the Northern Plume at the AMW-17 location.

The U.S. Environmental Protection Agency (EPA) and Messer LLC (Messer), formerly Linde LLC (Linde) performed a joint investigation of the Northern Plume area in May 2011 to get a better understanding of the source, extent, and concentrations of volatile organic compounds (VOCs) in this plume. Results were provided in a separate report[4]. The report concluded that the Northern Plume contamination is not the result of actions by Messer or its predecessors. Therefore, EPA is leading efforts to characterize and remediate the Northern Plume.

A new monitoring well (AMW-64) was installed in February 2012, at the request of the EPA, to monitor the Northern Plume northwest of well AMW-17. Analytical results for groundwater

[1] *Boomsnub/Airco Superfund Site Progress and Groundwater Monitoring Reports: April-June 2016; July-December 2016; April-June 2017; July-December 2017; April-June 2018; and June-December 2018*.
[2] *2017 Annual Status Report for the Boomsnub/Airco Superfund Site,* Revision 0. March 2018.
[3] *AMW-18 Area Investigation Report, Boomsnub/Airco Superfund Site*. Revision 0. August 2008.
[4] *Northern Plume Investigation Report, Hazel Dell, Washington*. Revision 1. December 2011.

samples collected from this well shortly after installation indicated TCE concentrations above the Site cleanup level.

Well MW-38 is located approximately 400 feet west-southwest (generally downgradient) of well AMW-17. Well MW-38 was installed as part of a groundwater treatment pilot study in 1998; this well has not been sampled historically as part of the OU-3 monitoring. However, beginning in October 2010, EPA requested that Messer sample well MW-38 as part of the Northern Plume investigation/monitoring. TCE concentrations detected in groundwater samples from well MW-38 during October 2010 through October 2012 were above the Site-specific cleanup level, but on a decreasing trend (based on four groundwater samples). However, in October 2013, the TCE concentration increased approximately one order of magnitude, indicating the apparent arrival of the Northern Plume at well MW-38.

Well AMW-16 is located approximately 600 feet west-northwest (downgradient) of well AMW-17. Well AMW-16 is located near the northern edge of the historic OU-3 TCE plume. TCE concentrations in groundwater from this well had been on a decreasing trend since the well was first sampled in 1995. TCE concentrations had been below the Site-specific cleanup level since 2005. However, in Spring 2014, TCE in groundwater from this well increased to a concentration exceeding the cleanup level, indicating the apparent arrival of the Northern Plume at the AMW-16 location.

Well MW-23D is located approximately 500 feet west-northwest (downgradient) of well AMW-16. Well MW-23D is located near the northern edge of the historic OU-3 TCE plume. TCE concentrations in groundwater from this well had been on a decreasing trend since the late 1990s. TCE concentrations had been below the Site-specific cleanup level since 2006. However, during the Fall 2015 sampling event, TCE in groundwater from this well increased to a concentration exceeding the cleanup level, indicating the apparent arrival of the Northern Plume at the MW-23D location. AMW-23 is the next well downgradient from MW-23D, located approximately 1,300 feet northwest of MW-23D. Concentrations of TCE in this well were below the cleanup level for TCE until October 2018, when the measured concentration was 8 µg/L.

The Northern Plume continues to be monitored along with the OU-3 plume to evaluate potential impacts to the Site and treatment system. Wells AMW-16, AMW-17, AMW-18, AMW-23, AMW-64, and MW-23D are currently being sampled using passive diffusion bag samplers.

Well construction details, along with water level measurements during the Fall 2018 sampling event, are summarized in Table D-1. Water levels measured during Fall 2019 were approximately 2 to 3½ feet higher than those measured during Fall 2018.

2. ANALYTICAL RESULTS

A summary of the VOCs detected in Fall (October) 2019 Northern Plume area monitoring well groundwater samples is provided in Table D-2. All six Northern Plume impacted monitoring wells were sampled during the 2019 reporting period (AMW-16, AMW-17, AMW-18, AMW-23, AMW-64, and MW-23D). TCE concentrations exceeded the Site-specific cleanup level of 5 µg/L in groundwater samples from five of the six Northern Plume impacted monitoring wells period (AMW-16, AMW-17, AMW-18, AMW-64, and MW-23D).

Two wells (MW-21D and MW-38) monitored as part of Boomsnub/Airco Superfund Site also appear to be impacted by the Northern Plume. TCE concentrations decreased in all wells between Spring and Fall 2019 except for concentrations in well MW-38 which increased. The highest TCE concentration continues to be detected in groundwater from well MW-23D (120 µg/L). Additional detected VOCs were at concentrations below the respective cleanup levels, with one exception. In well MW-23D, the concentration of 1,1-dichloroethene (DCE; 1.5 µg/L) exceeded the Site-specific cleanup level of 1.0 µg/L (Table D-2).

Historical VOC analytical results for Northern Plume wells, and wells potentially impacted by the Northern Plume are summarized in Tables D-3 (AMW-16), D-4 (AMW-17), D-5 (AMW-18), D-6 (AMW-23), D-7 (AMW-64), D-8 (MW-21D), D-9 (MW- 23D), and D-10 (MW-38). The Fall 2019 TCE results for these eight wells are also indicated on Figure D-1. No quality assurance/quality control issues were noted which would impact the analytical results.

2.1 Well AMW-16

TCE was detected at a concentration of 39 µg/L in the groundwater sample collected from well AMW-16 in Spring 2019 but dropped to a concentration of 36 µg/L during the Fall 2019 sampling event (Table D-3). TCE concentrations in this well appear to be fluctuating. Cis-1,2-DCE, 1,1-trichloroethane (TCA), and 1,1-DCE were the other VOCs detected, but at concentrations below the cleanup level.

2.2 Well AMW-17

TCE was detected at a concentration of 48 µg/L in the groundwater sample collected from well AMW-17 in Fall 2019 (Table D-4). This is a decrease from the concentration detected in Spring 2019 (66 µg/L). TCE concentrations in this well appear to be fluctuating. Tetrachloroethane (PCE) and 1,1,1-TCA were the other VOCs detected, but at concentrations below the cleanup level.

2.3 Well AMW-18

TCE concentrations in groundwater collected from well AMW-18 dropped below the cleanup level (5 µg/L) in Fall 2018 (Table D-5), for the first time since it exceeded the cleanup level in Fall 2006. TCE concentrations were above the cleanup level in Spring 2019 (20 µg/L) and

remained above the cleanup level during Fall 2019 (18 µg/L). No other VOCs were detected in Fall 2019.

2.4 Well AMW-23

Concentrations in well AMW-23 exceeded the cleanup level for TCE for the first time in October 2018 at 8 µg/L potentially indicating the arrival of the Northern Plume and as such is being analyzed along with existing Northern Plume wells. Well AMW-23 had TCE concentrations below the cleanup level in Spring and Fall 2019.

2.5 Well AMW-64

TCE was detected at a concentration of 13 µg/L in the groundwater sample collected from well AMW-64 in Spring 2018, significantly increased to a concentration of 71 µg/L in Fall 2018, then significantly decreased to 9.9 µg/L in Fall 2019 (Table D-7). Historically, concentrations in this well have steadily decreased. 1,1,1-TCA and cis-1,2-DCE were the other VOCs detected, but at concentrations lower than their respective cleanup levels.

2.6 Well MW-23D

TCE was detected at a concentration of 120 µg/L in the groundwater sample collected from well MW-23D in Fall 2019 (Table D-9). This is a decrease from the concentration detected in Spring 2019 (150 µg/L). Additionally, 1,1-DCE was detected in Fall 2019 at 1.5 µg/L, exceeding the cleanup level of 1 µg/L, similar to previous results. 1,1-TCA was the other VOC detected, but at a concentration below the cleanup level.

2.7 Wells Potentially Impacted by the Northern Plume

MW-21D

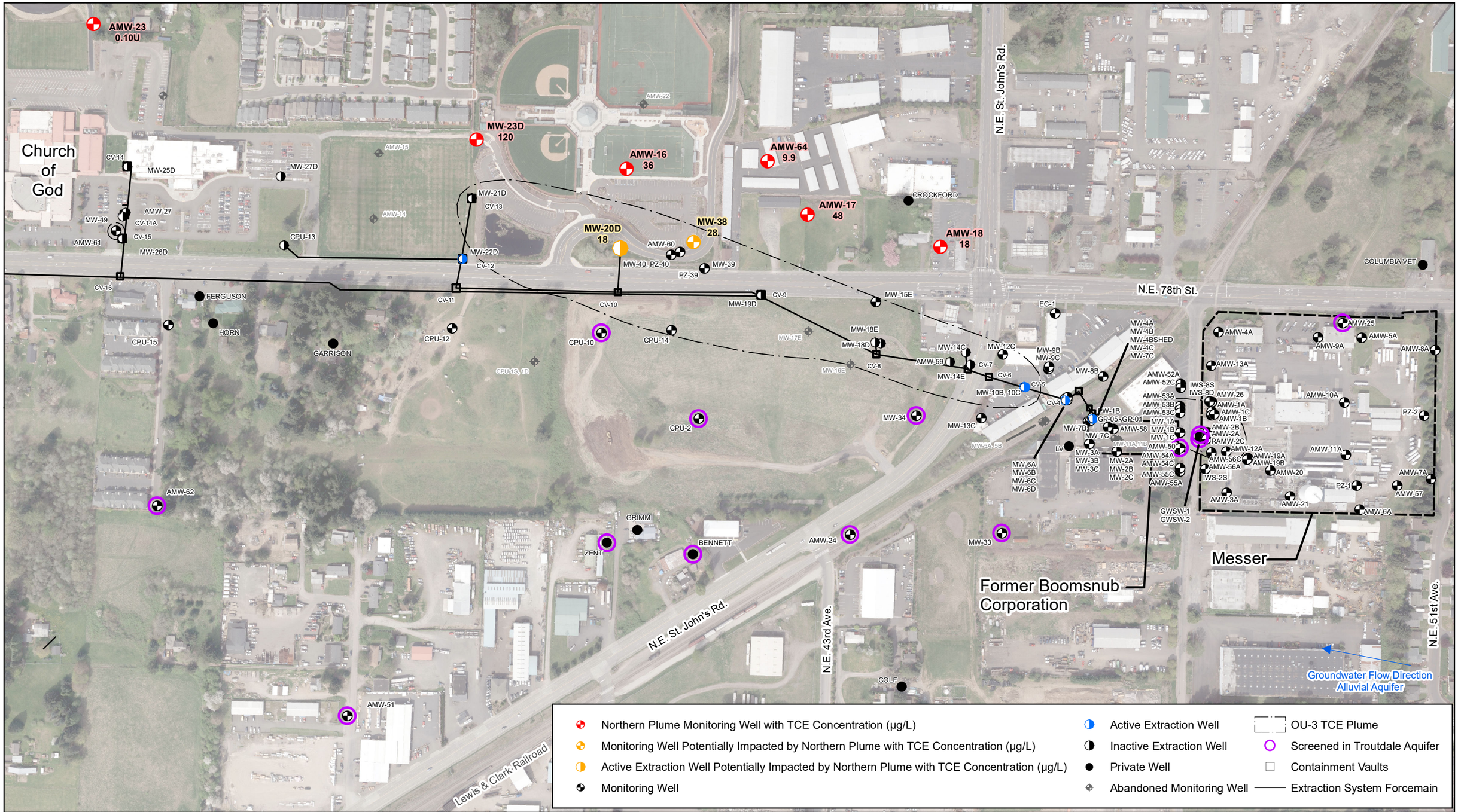
Extraction well MW-21D is not monitored as a Northern Plume well but is being sampled on a semiannual basis as part of the Boomsnub/Airco Superfund Site monitoring (Table D-8). Well MW-21D is located approximately 250 feet south of monitoring well MW-23D. TCE concentrations in this well had been below the Site-specific cleanup level since 2013. However, during the Spring 2018 sampling, TCE concentrations in groundwater from this well increased to a concentration at the cleanup level (5 µg/L). This may indicate that the Northern Plume was being pulled into the treatment system by extraction well MW-21D. For this reason, and after consultation with and approval from EPA, the extraction pump in MW-21D was shut off in June 2018. In Fall 2018, TCE in well MW-21D (16 µg/L) remained above the cleanup level of 5 µg/L but dropped to 9.1 µg/L in Fall 2019. Four other VOCs were detected in Fall 2019, but at concentrations lower than their respective cleanup levels: 1,1,1-TCA; 1,1-DCE; cis-1,2-DCE; and trichlorofluoromethane (CFC-11).

MW-38

MW-38 was first monitored to measure impacts on the Northern Plume on the Northern boundary of the OU-3 plume associated with the Boomsnub/Airco Superfund Site (Table D-10).

The initial concentration of TCE in the groundwater, when first tested in October 2010, was 12 µg/L. Concentrations were on a decreasing trend and reached 7.4 µg/L in October 2012 before increasing to 70 µg/L in 2013, when it appears to have been impacted by the Northern Plume.

Concentrations were reported as high as 78 µg/L and appeared to be decreasing from October 2014 through October 2017, when the reported concentration was 9.5 µg/L. The concentration of TCE in groundwater in Fall 2019 was 28 µg/L. Monitoring well MW-38 is sampled on an annual basis and was not sampled during the Spring 2019 event.



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File Name: Fig_D1_TCE_NorthPlume_2019

FIGURE D-1
NORTHERN PLUME MONITORING WELL LOCATIONS AND TRICHLOROETHENE CONCENTRATIONS, FALL 2019

Table D-1. Summary of Water Level Gauging Data and Groundwater Surface Elevations – Fall 2019

Well ID	Well Type	Total Depth (ft btoc)	Screened Interval (ft btoc)	Screen Length (ft)	PDB Sampler Interval (ft btoc)	TOC Elevation (ft MSL)	Depth to Water (ft btoc)	Groundwater Surface Elevation (ft MSL)
AMW-16	M	92.13	81.13 – 91.13	10	87.28 – 89.28	266.11	17.86	248.25
AMW-17	M/D	90.55	81 – 91	10	87 – 89	260.42	9.98	250.44
AMW-18	M	103.65	92.65 – 102.65	10	99.5 – 101.5	278.80	27.29	251.51
AMW-23	M	85	75 – 85	10	79 – 81.06	278.26	37.20	241.06
AMW-64	M	98.7	88.4 – 98.4	10	92.9 – 94.9	266.13	16.38	249.75
MW-23D	M	88.06	71.86 – 86.86	15	78.65 – 80.65	265.33	18.96	246.37
MW-21D	E	75.4	64.4 – 74.4	10	NA	265.98	34.93	231.05
MW-38	M	81.92	76.92 – 81.92	5	78 – 80	263.92	14.85	249.07

NOTES:

btoc	=	Below top of casing
ft	=	Feet
E	=	Extraction Well
M	=	Monitoring well
M/D	=	Monitoring well with dedicated pump
MSL	=	Mean sea level
NA	=	Not applicable
PDB	=	Passive diffusion bag
TOC	=	Top of casing

Wells that are shaded are potentially impacted by the Northern Plume.
Groundwater surface elevation is determined by subtracting the depth to water from the top-of-casing elevation.

Table D-2. Volatile Organic Compounds Detected in Groundwater Samples (in µg/L) Fall 2019

Well ID	Date Sampled	TCE	PCE	1,1,1-TCA	1,1-DCE	Cis-1,2-DCE	CFC-11
AMW-16	16-Oct-2019	**36**	0.5 U	0.19 J	0.35 J	0.09 J	0.5 U
AMW-17	16-Oct-2019	**48**	0.18 J	0.19 J	0.5 U	0.5 U	0.5 U
AMW-18	16-Oct-2019	**18**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
AMW-23	16-Oct-2019	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
AMW-64	16-Oct-2019	**9.9**	0.1 J	0.11 J	0.5 U	0.09 J	0.5 U
MW-23D	16-Oct-2019	**120**	0.5 U	1.1	**1.5**	0.08 J	0.5 U
MW-21D	15-Oct-2019	**16**	0.5 U	0.45 J	0.95	0.39 J	0.14 J
MW-38	15-Oct-2019	**20**	0.6	0.19 J	0.09 J	0.5 U	0.5 U
Cleanup Level		5	5	200	1	70	2400

NOTES:
Only detected compounds are shown.
Results shown in **blue bold** exceed the Boomsnub/Airco Site-specific cleanup level.
CFC-11 = Trichlorofluoromethane
cis-1,2-DCE = cis-1,2-Dichloroethene
1,1-DCE = 1,1-Dichloroethene
J = The result is an estimated concentration that is less than the method reporting limit but greater than or equal to the method detection limit.
PCE = Tetrachloroethene
1,1,1-TCA = 1,1,1-Trichloroethane
TCE = Trichloroethene
U = The analyte was not detected above the specified reporting limit.
µg/L = Micrograms per liter

Table D-3. Historical VOC Concentrations in Well AMW-16 Groundwater Samples (in µg/L)

Date Sampled	TCE	PCE	1,1,1-TCA	1,1-DCE	Cis-1,2-DCE	CFC-11
Apr-95	**87**	1 U	7.7	**16.6**	23.4	365 J
Oct-95	**68.7**	1 U	7.2	**16.8**	29.5	345 J
May-96	**73.8**	1 U	5.8	**12.2**	24.5	243
Oct-96	**65.2**	1 U	5	**8.8**	29.5	70.7
May-97	**50.4**	1 U	3.1	**4.8**	29.2	88.6 J
Oct-97	**52**	0.4 U	2	0.4 U	--	50
May-98	**47**	0.6 U	2 U	**2**	15	20
Sep-98	**37**	0.6 UJ	2 U	**3**	14	14
May-00	**31**	0.5 U	3.5	**1.8**	4.5	15
Oct-00	**23**	0.5 U	2.3	**1.4**	2.9	6.4
Oct-01	**13**	0.5 U	2.4	0.99	0.84	1.3
Oct-02	**9**	0.5 U	1.2	0.97	0.56	0.58
Oct-03	**7**	0.5 U	0.69	0.91	0.59	0.53
Oct-04	**5.1**	0.5 U	0.63	0.64	0.5	0.29 J
Oct-05	5	0.5 U	0.38 J	0.49 J	0.52	0.33 J
Oct-06	3.6	0.5 U	0.17 J	0.38 J	0.36 J	0.26 J
Oct-07	2.7	0.5 U	0.12 J	0.26 J	0.31 J	0.5 U
Oct-08	2.7	0.5 U	0.1 J	0.22 J	0.27 J	0.12 J
Oct-09	2.2	0.5 U	0.09 J	0.25 J	0.23 J	0.23 J
Oct-10	1.7	0.5 U	0.5 U	0.5 U	0.19 J	0.5 U
Oct-11	1.6	0.5 U	0.13 J	0.14 J	0.12 J	0.5 U
Apr-12	0.17 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Oct-12	1.8	0.5 U	2.2	0.66	0.23 J	0.5 U
Apr-13	2	0.5 U	2.8	**1.4**	0.16 J	0.5 U
Oct-13	4.4	0.5 U	1.9	**2**	0.15 J	0.5 U
Apr-14	**27**	0.5 U	1.1	**1.2**	0.11 J	0.5 U
Oct-14	**72**	0.5 U	1.1	**1.3**	0.15 J	0.5 U
Apr-15	**94**	0.5 U	0.53	0.85	0.11 J	0.5 U
Oct-15	**80**	0.5 U	0.34 J	0.65	0.12 J	0.5 U
Apr-16	**71**	0.5 U	0.20 J	0.47 J	0.1 J	0.5 U
Oct-16	**67**	0.5 U	0.19 J	0.48 J	0.08 J	0.5 U
Apr-17	**53**	0.5 U	0.16 J	0.43 J	0.09 J	0.5 U
Oct-17	**41**	0.083 J	0.15 J	0.36 J	0.5 U	0.5 U
Apr-18	**45**	0.5 U	0.12 J	0.35 J	0.07 J	0.5 U
Oct-18	**13**	0.5 U	0.5 U	0.5 U	0.17 J	0.5 U
Apr-19	**39**	0.5 U	0.23 J	0.35 J	0.12 J	0.5 U
Oct-19	**36**	0.5 U	0.19 J	0.35 J	0.09 J	0.5 U
Cleanup Level	5	5	200	1	70	2,400

Table D-3. Historical VOC Concentrations in Well AMW-16 Groundwater Samples (in µg/L)

NOTES:

Only detected compounds are included in this table.

Results shown in **blue bold** exceed the Boomsnub/Airco Site-specific cleanup level.

Concentrations presented are the highest of the sample and duplicate results, where applicable.

-- = Not available

CFC-11 = Trichlorofluoromethane

cis-1,2-DCE = cis-1,2-Dichloroethene

1,1-DCE = 1,1-Dichloroethene

J = The result is an estimated concentration that is less than the method reporting limit but greater than or equal to the method detection limit.

PCE = Tetrachloroethene

1,1,1-TCA = 1,1,1-Trichloroethane

TCE = Trichloroethene

U = The analyte was not detected above the specified reporting limit.

UJ = The analyte was not detected, but the associated limit of quantitation is estimated.

µg/L = Micrograms per liter

VOC = Volatile organic compound

Table D-4. Historical VOC Concentrations in Well AMW-17 Groundwater Samples (in µg/L)

Date Sampled	TCE	PCE	1,1,1-TCA	1,1-DCE	Cis-1,2-DCE	CFC-11
Apr-95	**66.9**	1 U	5.8	**1.6 J**	21	10.6
Oct-95	**42.5**	1 U	36.1	**5.4**	12.7	19.2 J
May-96	**39.6**	1 U	52.6	**9.7**	9.2	10.1
Oct-96	**20.5**	1 U	169	**25.9**	3.5	19.7
May-97	**17.3**	1 U	89.6	**23.8**	2.1	23.3
Oct. 97	**12**	0.4 U	67	**9**	--	14
May-98	**7**	0.6 U	48	**9**	0.7 U	9
Sep-98	**8**	0.6 U	52	**9**	0.7 U	6
May-99	**5**	0.6 UJ	12 J	**8.0 J**	0.7 UJ	5 J
Oct-99	3.4	0.5 U	3	**1.2**	0.5 U	0.5
Oct-01	2.7	0.5 U	4.2	**1.8**	0.39 J	0.52
Oct-02	2.3	0.5 U	2.2	0.74	0.22 J	0.35 J
Oct-03	2.2	0.5 U	1.1	0.45 J	0.12 J	0.25 J
Oct-04	1.8	0.5 U	0.9	0.32 J	0.5 U	0.19 J
Oct-05	1.9	0.5 U	0.85	0.29 J	0.5 U	0.5 U
Oct-06	1.5	0.5 U	0.69	0.23 J	0.5 U	0.5 U
Oct-07	1.5	0.5 U	1.1	0.5 U	0.5 U	0.5 U
Oct-08	1.2	0.09 J	0.2 J	0.5 U	0.5 U	0.5 U
Jan-09	1.1	0.09 J	0.17 J	0.5 U	0.5 U	0.5 U
May-09	1.3	0.08 J	0.31 J	0.13 J	0.5 U	0.5 U
Oct-09	1.2	0.07 J	0.8	0.22 J	0.5 U	0.5 U
Apr-10	1.1	0.09 J	1	0.33 J	0.5 U	0.5 U
Oct-10	**28**	0.21 J	2.6	**1.4**	0.5 U	0.5 U
Apr-11	**29**	0.27 J	1.3	0.89	0.5 U	0.5 U
Oct-11	**140**	0.68	2.3	1	0.5 U	0.5 U
Mar-12	**160**	0.81	1.5	0.82	0.5 U	0.5 U
Apr-12	**160**	0.85	1.3	0.76	0.5 U	0.5 U
Jul-12	**210**	1	2.3	**1.1**	0.5 U	0.5 U
Oct-12	**210**	0.90	2.5	**1.2**	0.5 U	0.5 U
Jan-13	**220**	0.87	1.8	**1.1**	0.5 U	0.5 U
Apr-13	**240**	0.83	2	1	0.5 U	0.5 U
Jul-13	**230**	0.82	2	0.94	0.5 U	0.5 U
Oct-13	**180**	0.59	1.4	0.69	0.5 U	0.5 U
Jan-14	**180**	0.54	0.97	0.55	0.5 U	0.5 U
Apr-14	**130**	0.46 J	0.82	0.34 J	0.5 U	0.5 U
Jul-14	**150**	0.67	1.1	0.54	0.5 U	0.5 U
Oct-14	**120**	0.57	0.86	0.41 J	0.5 U	0.5 U
Apr-15	**120**	0.49 J	0.75	0.33 J	0.5 U	0.5 U

Table D-4. Historical VOC Concentrations in Well AMW-17 Groundwater Samples (in µg/L)

Date Sampled	TCE	PCE	1,1,1-TCA	1,1-DCE	Cis-1,2-DCE	CFC-11
Oct-15	**110**	0.40 J	0.57	0.29 J	0.5 U	0.5 U
Apr-16 upper[a]	**63**	0.34 J	0.35 J	0.17 J	0.5 U	0.5 U
Apr-16 lower[a]	**64**	0.35 J	0.34 J	0.17 J	0.5 U	0.5 U
Oct-16 upper[a]	**74**	0.35 J	0.28 J	0.15 J	0.5 U	0.5 U
Oct-16 lower[a]	**96**	0.44 J	0.34 J	0.27 J	0.5 U	0.5 U
Apr-17	**70**	0.38 J	0.39 J	0.12 J	0.5 U	0.5 U
Oct-17	**79**	0.37 J	0.25 J	0.12 J	0.5 U	0.5 U
Apr-18	**65**	0.3 J	0.22 J	0.1 J	0.5 U	0.5 U
Oct-18	**23**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Apr-19	**66**	0.32 J	0.29 J	0.11 J	0.5 U	0.5 U
Oct-19	**48**	0.18 J	0.19 J	0.5 U	0.5 U	0.5 U
Cleanup Level	5	5	200	1	70	2,400

NOTES:

Results shown in **blue bold** exceed the Boomsnub/Airco Site-specific cleanup level.

Only detected compounds are included in this table.

Concentrations presented are the highest of the sample and duplicate results, where applicable.

[a] = Two samplers were deployed in April and October 2016 - one near the top of the screened interval (upper) and one near the bottom (lower).

-- = Not available

CFC-11 = Trichlorofluoromethane

cis-1,2-DCE = cis-1,2-Dichloroethene

1,1-DCE = 1,1-Dichloroethene

J = The result is an estimated concentration that is less than the method reporting limit but greater than or equal to the method detection limit.

PCE = Tetrachloroethene

1,1,1-TCA = 1,1,1-Trichloroethane

TCE = Trichloroethene

U = The analyte was not detected above the specified reporting limit.

UJ = The analyte was not detected, but the associated limit of quantitation is estimated.

µg/L = Micrograms per liter

VOC = Volatile organic compound

Table D-5. Historical VOC Concentrations in Well AMW-18 Groundwater Samples (in µg/L)

Date Sampled	TCE	PCE	1,1,1-TCA	1,1-DCE	Cis-1,2-DCE	CFC-11
Apr-95	0.73 J	1 U	2.9	0.87 J	1 U	1 UJ
Oct-95	0.3 J	1 U	1	0.53 J	1 U	1 U
May-96	1 U	1 U	0.52 J	1 U	1 U	1 U
Oct-96	0.31 J	1 U	0.48 J	1 U	1 U	1 U
May-97	0.43 J	1 U	0.44 J	1 U	1 U	1 UJ
Oct. 97	0.3 U	0.4 U	0.4 U	0.4 U	--	0.5 U
May-98	0.5 U	0.6 U	2 U	1 U	0.7 U	2 U
Oct-01	1.1	0.15 J	0.19 J	0.12 J	0.5 U	0.5 U
Oct-02	1.1	0.26 J	0.25 J	0.5 U	0.5 U	0.5 U
Oct-03	0.95	0.29 J	0.17 J	0.5 U	0.5 U	0.5 U
Oct-04	0.64	0.28 J	0.17 J	0.5 U	0.5 U	0.5 U
Oct-05	0.62	0.24 J	0.78	0.13 J	0.5 U	0.5 U
Oct-06	**5.1**	0.43 J	2.4	0.78	0.5 U	0.5 U
Oct-07	**330**	1.6	6.5	**2.7**	0.5 U	0.5 U
Dec-07	**410**	2.1	7.5	**2.9**	0.5 U	0.5 U
Jan-08 upper [a]	**430**	1.9	6.9	**2.6**	1 U	1.0 U
Jan-08 lower [a]	**460**	1.9	6.9	**2.7**	1 U	1 U
May-08	**460**	2.3	6	**2.4**	0.5 U	0.5 U
Jul-08	**410**	1.4	4.8	**1.7**	1 U	1 U
Oct-08 [b]	**390**	1.4	4.5	**1.4**	1 U	1 U
Jan-09	**300**	1.5	3.2	**1.3**	0.5 U	0.5 U
May-09	**320**	1.4	2.6	**1.1**	0.5 U	0.5 U
Oct-09	**210**	0.75	1.8	0.75	0.5 U	0.5 U
Apr-10	**200**	0.66	2.1	0.61	0.5 U	0.5 U
Oct-10	**130**	0.47 J	0.85	0.35 J	0.5 U	0.5 U
Apr-11	**75**	0.31 J	0.71	0.18 J	0.5 U	0.5 U
Oct-11	**68**	0.29 J	0.56	0.18 J	0.5 U	0.22 J
Mar-12	**52**	0.2 J	0.37 J	0.09 J	0.5 U	1
Apr-12	**52**	0.19 J	0.29 J	0.09 J	0.5 U	0.53
Jul-12	**53**	0.22 J	0.3 J	0.5 U	0.5 U	0.6
Oct-12	**39**	0.15 J	0.16 J	0.5 U	0.5 U	0.43 J
Jan-13	**48**	0.17 J	0.1 J	0.5 U	0.5 U	0.4 J
Apr-13	**44**	0.15 J	0.08 J	0.5 U	0.5 U	0.26 J
Jul-13	**36**	0.2 J	0.11 J	0.5 U	0.5 U	0.19 J
Oct-13	**34**	0.15 J	0.11 J	0.5 U	0.5 U	0.15 J
Jan-14	**36**	0.11 J	0.09 J	0.5 U	0.5 U	0.5 U
Apr-14	**27**	0.5 U	0.08 J	0.5 U	0.5 U	0.5 U
Jul-14	**30**	0.18 J	0.16 J	0.5 U	0.5 U	0.5 U
Oct-14	**34**	0.12 J	0.16 J	0.5 U	0.5 U	0.5 U

Table D-5. Historical VOC Concentrations in Well AMW-18 Groundwater Samples (in µg/L)

Date Sampled	TCE	PCE	1,1,1-TCA	1,1-DCE	Cis-1,2-DCE	CFC-11
Apr-15	**34**	0.11 J	0.18 J	0.5 U	0.5 U	0.5 U
Oct-15	**42**	0.11 J	0.17 J	0.5 U	0.5 U	0.5 U
Apr-16	**40**	0.14 J	0.1 J	0.5 U	0.5 U	0.5 U
Oct-16	**40**	0.1 J	0.09 J	0.5 U	0.5 U	0.5 U
Apr-17	**43**	0.14 J	0.13 J	0.5 U	0.5 U	0.5 U
Oct-17	**28**	0.13 J	0.081 J	0.5 U	0.5 U	0.062 J
Apr-18	**28**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Oct-18	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Apr-19	**20**	0.11 J	0.5 U	0.5 U	0.5 U	0.5 U
Oct-19	**18**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cleanup Level	5	5	200	1	70	2,400

NOTES:

Results shown in **blue bold** exceed the Boomsnub/Airco Site-specific cleanup level.

Only detected compounds are included in this table.

Concentrations presented are the highest of the sample and duplicate results.

[a] = Two samplers were deployed in January 2008 - one near the top of the screened interval (upper) and one near the bottom (lower).

-- = Not available

CFC-11 = Trichlorofluoromethane

cis-1,2-DCE = cis-1,2-Dichloroethene

1,1-DCE = 1,1-Dichloroethene

J = The result is an estimated concentration that is less than the method reporting limit but greater than or equal to the method detection limit.

PCE = Tetrachloroethene

1,1,1-TCA = 1,1,1-Trichloroethane

TCE = Trichloroethene

U = The analyte was not detected above the specified reporting limit.

UJ = The analyte was not detected, but the associated limit of quantitation is estimated.

µg/L = Micrograms per liter

VOC = Volatile organic compound

Table D-6. Historical VOC Concentrations in Well AMW-23 Groundwater Samples (in µg/L)

Date Sampled	TCE	PCE	1,1,1-TCA	1,1-DCE	Cis-1,2-DCE	CFC-11
Oct. 97	0.5 U	0.5 U	0.5 U	0.5 U	NA	0.5 U
May-98	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Sep-98	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
May-99	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Oct-99	0.5 U	0.5 U	0.3 J	0.5 U	0.5 U	0.5 U
Oct-00	0.5 U	0.5 U	0.5 J	0.5 U	0.5 U	0.5 U
Oct-01	0.5 U	0.5 U	0.74	0.5 U	0.5 U	0.5 U
Oct-02	0.5 U	0.5 U	0.78	0.5 U	0.5 U	0.5 U
Oct-03	0.5 U	0.5 U	0.57	0.5 U	0.5 U	0.5 U
Oct-16	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Oct-17	0.1 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Oct-18	**8**	0.85	0.5 U	0.5 U	0.8 J	0.13 J
Apr-19	0.15 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Oct-19	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cleanup Level	5	5	200	1	70	2,400

NOTES:

Results shown in **blue bold** exceed the Boomsnub/Airco Site-specific cleanup level.

Only detected compounds are included in this table.

Concentrations presented are the highest of the sample and duplicate results.

-- = Not available

CFC-11 = Trichlorofluoromethane

cis-1,2-DCE = cis-1,2-Dichloroethene

1,1-DCE = 1,1-Dichloroethene

J = The result is an estimated concentration that is less than the method reporting limit but greater than or equal to the method detection limit.

PCE = Tetrachloroethene

1,1,1-TCA = 1,1,1-Trichloroethane

TCE = Trichloroethene

U = The analyte was not detected above the specified reporting limit.

UJ = The analyte was not detected, but the associated limit of quantitation is estimated.

µg/L = Micrograms per liter

VOC = Volatile organic compound

Table D-7. Historical VOC Concentrations in Well AMW-64 Groundwater Samples (in µg/L)

Date Sampled	TCE	PCE	1,1,1-TCA	1,1-DCE	Cis-1,2-DCE	CFC-11
Mar-12	**190**	0.27 J	3.5	**2.7**	0.11 J	0.5 U
Apr-12	**160**	0.31 J	1.7	**2.5**	0.43 J	0.5 U
Jul-12	**170**	0.4 J	2.4	**2.7**	0.68	0.5 U
Oct-12	**110**	0.27 J	1.2	**1.5**	1	0.5 U
Jan-13	**110**	0.24 J	0.79	**1.7**	1.2	0.5 U
Apr-13	**94**	0.23 J	0.57	**1.4**	1.4	0.5 U
Jul-13	**84**	0.26 J	0.33 J	**1.1**	1.5 *	0.5 U
Oct-13	**75**	0.29 J	0.24 J	1	1.5	0.5 U
Jan-14	Not Sampled (well inaccessible)					
Apr-14	**61**	0.18 J	0.1 J	0.59	1.6 *	0.5 U
Jul-14	**67**	0.26 J	0.16 J	0.65	1.8 *	0.5 U
Oct-14	**55**	0.2 J	0.16 J	0.46 J	1.6 *	0.5 U
Apr-15	**53**	0.21 J	0.12 J	0.35 J	1.3 *	0.5 U
Oct-15	**45**	0.21 J	0.09 J	0.2 J	1.2 *	0.5 U
Apr-16	**28**	0.18 J	0.5 U	0.11 J	0.65	0.5 U
Oct-16	**24**	0.18 J	0.5 U	0.09 J	0.61	0.5 U
Apr-17	**22**	0.17 J	0.13 J	0.5 U	0.39 J	0.5 U
Oct-17	**15**	0.15 J	0.5 U	0.034 J	0.35 J	0.5 U
Apr-18	**13**	0.5 U	0.11 J	0.5 U	0.22 J	0.5 U
Oct-18	**71**	0.24 J	0.16 J	0.17 J	0.5 U	0.23 J
Apr-19	**11**	0.11 J	0.14 J	0.5 U	0.07 J	0.5 U
Oct-19	**9.9**	0.1 U	0.11 J	0.5 U	0.09 J	0.5 U
Cleanup Level	5	5	200	1	70	2,400

NOTES:

Results shown in **blue bold** exceed the Boomsnub/Airco Site-specific cleanup level.

Concentrations presented are the highest of the sample and duplicate results, where applicable.

* Trans-1,2-dichloroethene was also detected during the following events: July 2013 at 0.28 J µg/L, April 2014 at 0.30 J µg/L, July 2014 at 0.32 J µg/L, October 2014 at 0.21 J µg/L, April 2015 at 0.15 J µg/L, and October 2015 at 0.080 J µg/L.

CFC-11 = Trichlorofluoromethane

cis-1,2-DCE = cis-1,2-Dichloroethene

1,1-DCE = 1,1-Dichloroethene

J = The result is an estimated concentration that is less than the method reporting limit but greater than or equal to the method detection limit.

PCE = Tetrachloroethene

1,1,1-TCA = 1,1,1-Trichloroethane

TCE = Trichloroethene

U = The analyte was not detected above the specified reporting limit.

µg/L = Micrograms per liter

VOC = Volatile organic compound

Table D-8. Historical VOC Concentrations in Well MW-21D Groundwater Samples (in µg/L)

Date Sampled	TCE	PCE	1,1,1-TCA	1,1-DCE	Cis-1,2-DCE	CFC-11
Jan-95	2,500 J	200 U	200 U	46 J	--	--
Feb-95	3,000 J	33 J	38 J	78	--	--
Mar-95	2,400	28	40	50	--	--
Apr-95	1,960	35.5	46.3	57.7 J	2.9	6.1
May-95	2,200 J	31	--	--	--	--
Jun-95	1,900	27	--	--	--	--
Jul-95	1,800	24	--	--	--	--
Aug-95	1,700	14	--	--	--	--
Sep-95	1,500	22	--	--	--	--
Oct-95	1,760	24.8	34.6	52.7	2.8	18.8 J
Nov-95	1,600	21	--	--	--	--
Jan-96	2,500	23	--	--	--	--
Feb-96	2,400	33	--	--	--	--
Mar-96	2,200	24	--	--	--	--
Apr-96	1,800	17	--	--	--	--
May-96	1,680	26.3	25.8	50.7	3.1	24.3 J
Jun-96	1,900	18	--	--	--	--
Jul-96	1,100	13	--	--	--	--
Aug-96	1,100	12	--	--	--	--
Sep-96	1,000	11	--	--	--	--
Oct-96	958	13.8	15.6	19	10 U	90.4
Dec-96	1,000	12	--	--	--	--
Dec-96	980	14	--	--	--	--
Feb-97	750	10	--	--	--	--
Mar-97	880	15	--	--	--	--
Apr-97	720	12	--	--	--	--
May-97	540	2.9 J	20 U	1.7 J	20 U	127
Jun-97	570	8	--	--	--	--
Jul-97	500	10	--	--	--	--
Aug-97	490	9	--	--	--	--
Sep-97	460	8	--	--	--	--
Oct-97	280	4	8	13	1	91
Jan-98	380	6	--	--	--	--
May-98	340	2	6	21	0.7 U	150
Oct-98	320 J	3	10	21	0.7 U	120
May-99	240	0.6 UJ	14	46	0.7 U	180
Jun-99	220	2.7	13	18	1.5	68
Oct-99	230	1.8	43	18	1.7	88
Dec-99	180	1.6	20 J	17	1.3	74

Table D-8. Historical VOC Concentrations in Well MW-21D Groundwater Samples (in µg/L)

Date Sampled	TCE	PCE	1,1,1-TCA	1,1-DCE	Cis-1,2-DCE	CFC-11
Mar-00	**110**	1.2	18	**12**	1.2	39
May-00	**130**	2.5 U	23	**19**	ND	75
Jun-00	**130**	1.8	16 J	**16 J**	1.4	70
Oct-00	**120**	1.8	15	**13**	1.9	53
Dec-00	**86**	1.2	13	**10**	1.6	53
Feb-01	**99**	1.2	13	**13**	2.2	65
May-01	**85**	1.3	15	**12**	2.3	64
Oct-01	**69**	1.2	11	**9**	2.1	39
Dec-01	**73**	1 U	10	**7.9**	1.9	45
Feb-02	**90**	**9.69**	9.5	**6.59**	1.6	51
May-02	**70**	1.1	14	**8.4**	2.2	41
Oct-02	**75**	1	15	**8.9**	2.3	39
Oct-02	**63**	1	14	**8.2**	2.1	34
Dec-02	**47**	0.85	12	**7**	1.8	24
Feb-03	**56**	0.82	17	**11**	2	37 J
May-03	**48**	0.87	15	**12**	1.8	27
Oct-03	**58**	0.65	14	**7.9**	1.4	24
May-04	**30**	0.6	8.2	**6.2**	1.5	12
Oct-04	**25**	0.48 J	5.9	**4.6**	1.2	8.5
Apr-05	**24**	0.42 J	5.1	**4.6**	1.3	8.2
Oct-05	**21**	0.33 J	3.7	**3.4**	1	6.4
Apr-06	**18**	0.32 J	2.6	**3**	0.87	5.4
Oct-06	**16**	0.34 J	2.2	**2.7**	0.77	3.9
Oct-06	**15**	0.33 J	2	**2.6**	0.75	3.8
May-07	**16 J**	0.28 J	2.1	**2.7**	0.79	4.9 J
Oct-07	**12**	0.23 J	1.5	**2.2**	0.58	3.2
May-08	**14**	0.21 J	1.4	**2.2**	0.69	3.3
Oct-08	**11**	0.22 J	0.8	**2.1**	0.55	2.7
Oct-08	**11**	0.23 J	0.82	**2.2**	0.56	2.8
May-09	**11**	0.18 J	0.86	**2.1**	0.63	2.5
Oct-09	**11**	0.21 J	0.59 J	**2.1 J**	0.58	2.3 J
Oct-09	**9.9**	0.18 J	0.53 J	**1.7 J**	0.49 J	1.9 J
Apr-10	**7.3**	0.15 J	0.31 J	**1.3**	0.39 J	1.1
Oct-10	**7**	0.16 J	0.29 J	1	0.41 J	0.9
Apr-11	**7.3**	0.19 J	0.21 J	**1.3**	0.49 J	0.74
Oct-11	**6.2**	0.13 J	0.25 J	**1.1**	0.48 J	0.59
Apr-12	**5.4**	0.15 J	0.16 J	0.99	0.48 J	0.44 J
Oct-12	**5.2**	0.13 J	0.20 J	1	0.61	0.32 J
Oct-12	**5.3**	0.13 J	0.18 J	1	0.61	0.32 J

Table D-8. Historical VOC Concentrations in Well MW-21D Groundwater Samples (in µg/L)

Date Sampled	TCE	PCE	1,1,1-TCA	1,1-DCE	Cis-1,2-DCE	CFC-11
Apr-13	4.3	0.10 J	0.12 J	0.85	0.44 J	0.25 J
Oct-13	3.5	0.13 J	0.13 J	0.71	0.32 J	0.18 J
Apr-14	2.9	0.5 U	0.5 U	0.5	0.29 J	0.14 J
Oct-14	2.4	0.11 J	0.08 J	0.43 J	0.29 J	0.5 U
Apr-15	3.2	0.10 J	0.09 J	0.51	0.33 J	0.5 U
Oct-15	2.8	0.5 U	0.5 U	0.44 J	0.26 J	0.5 U
Apr-16	2.5	0.5 U	0.09 J	0.45 J	0.27 J	0.5 U
Oct-16	2.4	0.5 U	0.10 J	0.36 J	0.25 J	0.5 U
Apr-17	2.2	0.11 J	0.18 J	0.41 J	0.25 J	0.5 U
Oct-17	2.4	0.11 J	0.17 J	0.42 J	0.24 J	0.075 J
Apr-18	5	0.5 U	0.10 J	0.44 J	0.21 J	0.5 U
Oct-18	**16**	0.5 U	0.45 J	0.95	0.39 J	0.14 J
Apr-19	**15**	0.12 U	0.48 J	0.71	0.29 J	0.17 J
Oct-19	**9.1**	0.5 U	0.19 J	0.41	0.22 J	0.12 J
Cleanup Level	5	5	200	1	70	2,400

NOTES:

Results shown in **blue bold** exceed the Boomsnub/Airco Site-specific cleanup level.

Only detected compounds are included in this table.

Concentrations presented are the highest of the sample and duplicate results, where applicable.

-- = Not analyzed

CFC-11 = Trichlorofluoromethane

cis-1,2-DCE = cis-1,2-Dichloroethene

1,1-DCE = 1,1-Dichloroethene

J = The result is an estimated concentration that is less than the method reporting limit but greater than or equal to the method detection limit.

ND = Analyte not detected, mtheod detection limist not provided.

PCE = Tetrachloroethene

1,1,1-TCA = 1,1,1-Trichloroethane

TCE = Trichloroethene

U = The analyte was not detected above the specified reporting limit.

UJ = The analyte was not detected, but the associated limit of quantitation is estimated.

µg/L = Micrograms per liter

VOC = Volatile organic compound

Table D-9. Historical VOC Concentrations in Well MW-23D Groundwater Samples (in µg/L)

Date Sampled	TCE	PCE	1,1,1-TCA	1,1-DCE	Cis-1,2-DCE	CFC-11
Apr-95	**5.7**	1 U	37.6	**56.8**	6.4	1.5 J
Oct-95	**53.4**	1 U	24.8	**55.1**	12.8	3.4
May-96	**49.1**	1 U	24.6	**52.6**	8.4	25.9 J
Oct-96	**43.3**	1 U	20	**32.6**	10	95.5
May-97	**61.3 J**	1 U	14.4	**36.4**	10.7	224 J
Oct-97	**51**	0.4 U	14	**30**	--	89
May-98	**42**	0.6 U	10	**28**	23	35
Oct-98	**67**	3 J	3	1 U	3	3
May-99	**35 J**	0.6 UJ	6 J	**45 J**	27 J	16 J
Oct-99	**15**	0.5 U	4.7	**8.4**	5.3	5.4
May-00	**37**	0.5 U	2.5	**8.1**	29	2.1
Oct-00	**34**	0.5 U	1.2	**4.4**	14	1.1
May-01	0.5 U	0.5 U	0.71	0.5 U	0.5 U	0.5 U
Oct-01	**24**	0.5 U	0.88	**3.5**	5	0.96
May-02	**22**	0.5 U	1.2	**4.4**	4.3	1.5
Oct-02	**16**	0.5 U	1.4	**2.8**	1.7	0.64
May-03	**13**	0.5 U	2.4	**2.7**	1.2	0.49 J
Oct-03	**11**	0.5 U	2.3	**3.2**	0.9	0.47 J
May-04	**9**	0.5 U	1.6	**2.5**	0.6	0.33 J
Oct-04	**7.8**	0.5 U	1.1	**2.4**	0.5	0.25 J
Apr-05	**5.9**	0.5 U	0.74	**2**	0.57	0.21 J
Oct-05	**6**	0.5 U	0.66	**2**	0.62	0.2 J
Oct-06	4.4	0.5 U	0.36 J	**1.6**	0.58	0.5 U
Oct-07	3.5	0.5 U	0.3 J	**1.1**	0.58	0.14 J
Oct-08	2.6	0.5 U	0.43 J	**1.4**	0.46 J	0.2 J
Oct-09	2.5	0.5 U	0.19 J	0.77	0.29 J	0.15 J
Oct-10	1.9	0.5 U	0.13 J	0.49 J	0.24 J	0.5 U
Oct-11	1.6	0.5 U	0.14 J	0.5	0.18 J	0.13 J
Oct-12	1.4	0.5 U	0.27 J	0.54	0.27 J	0.29 J
Oct-13	1.2	0.5 U	0.42 J	0.66	0.16 J	0.25 J
Oct-14	1.4	0.5 U	2.4	**2.7**	0.16 J	0.24 J
Oct-15	**130**	0.5 U	2.7	**2.7**	0.12 J	0.14 J
Apr-16 upper[a]	**140**	0.5 U	2.1	**2.3**	0.08 J	0.12 J
Apr-16 lower[a]	**62**	0.5 U	2.5	**2.3**	0.10 J	0.21 J
Oct-16 upper[a]	**140**	0.5 U	2.5	**2.9**	0.08 J	0.13 J
Oct-16 lower[a]	**84**	0.5 U	3.6	**3.3**	0.12 J	0.22 J
Apr-17	**180**	0.5 U	3.3	**3.1**	0.14 J	0.17 J
Oct-17	**140**	0.078 J	1.9	**1.8**	0.14 J	0.1 J
Apr-18	**120**	0.5 U	1	**1.4**	0.5 U	0.5 U

Table D-9. Historical VOC Concentrations in Well MW-23D Groundwater Samples (in µg/L)

Date Sampled	TCE	PCE	1,1,1-TCA	1,1-DCE	Cis-1,2-DCE	CFC-11
Oct-18	**160**	0.5 U	2.1	**2.2**	0.07 J	0.5 U
Apr-19	**150 E**	0.14 J	1.5	**1.5**	0.22 J	0.12 J
Oct-19	**120**	0.5 U	1.1	**1.5**	0.08 J	0.5 U
Cleanup Level	5	5	200	1	70	2,400

NOTES:

Results shown in **blue bold** exceed the Boomsnub/Airco Site-specific cleanup level.

Only detected compounds are included in this table.

Concentrations presented are the highest of the sample and duplicate results, where applicable.

[a] = Two samplers were deployed in April and October 2016 - one near the top of the screened interval (upper) and one near the bottom (lower).

-- = Not available

CFC-11 = Trichlorofluoromethane

cis-1,2-DCE = cis-1,2-Dichloroethene

1,1-DCE = 1,1-Dichloroethene

J = The result is an estimated concentration that is less than the method reporting limit but greater than or equal to the method detection limit.

PCE = Tetrachloroethene

1,1,1-TCA = 1,1,1-Trichloroethane

TCE = Trichloroethene

U = The analyte was not detected above the specified reporting limit.

UJ - The analyte was not detected, but the associated limit of quantitation is estimated.

µg/L = Micrograms per liter

VOC = Volatile organic compound

Table D-10. Historical VOC Concentrations in Well MW-38 Groundwater Samples (in µg/L)

Date Sampled	TCE	PCE	1,1,1-TCA	1,1-DCE	Cis-1,2-DCE	CFC-11
Oct-10	**12**	0.77	0.33 J	0.68	0.21 J	0.47 J
Apr-11	**11**	1.0	0.21 J	0.23 J	0.19 J	0.19 J
Oct-11	**9.8**	1.1	0.28 J	0.20 J	0.14 J	0.26 J
Oct-12	**7.4**	1.7	0.69	0.33 J	0.24 J	0.22 J
Oct-13	**70**	2.0	1.8	**1.2**	0.12 J	0.32 J
Apr-14	**54**	1.4	0.68	0.47 J	0.080 J	0.25 J
Oct-14	**78**	1.9	0.64	0.43 J	0.09 J	0.19 J
Apr-15	**53**	1.3	0.40 J	0.30 J	0.070 J	0.20 J
Oct-15	**50**	1.3	0.40 J	0.22 J	0.50 U	0.15 J
Apr-16	**29**	1.0	0.26 J	0.19 J	0.50 U	0.50 U
Oct-16	**23**	0.85	0.25 J	0.15 J	0.50 U	0.50 U
Apr-17	**19**	0.75	0.33 J	0.16 J	0.50 U	0.50 U
Oct-17	**9.5**	0.78	0.24 J	0.13 J	0.5 U	0.5 U
Oct-18	**20**	0.6	0.19 J	0.09 J	0.5 U	0.5 U
Oct-19	**28**	0.65	0.12 J	0.08 J	0.5 U	0.5 U
Cleanup Level	5	5	200	1	70	2,400

NOTES:

Results shown in **blue bold** exceed the Boomsnub/Airco Site-specific cleanup level.

CFC-11 = Trichlorofluoromethane

cis-1,2-DCE = cis-1,2-Dichloroethene

1,1-DCE = 1,1-Dichloroethene

J = The result is an estimated concentration that is less than the method reporting limit but greater than or equal to the method detection limit.

PCE = Tetrachloroethene

1,1,1-TCA = 1,1,1-Trichloroethane

TCE = Trichloroethene

U = The analyte was not detected above the specified reporting limit.

µg/L = Micrograms per liter

VOC = Volatile organic compound