2015 Annual Status Report
Boomsnub/Airco Superfund Site
Hazel Dell, Washington

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LIST OF ACRONYMS AND ABBREVIATIONS

AFCEE	Air Force Center for Environmental Excellence
ALS	ALS Environmental
Boomsnub	Boomsnub Corporation
CD	Consent Decree
City	City of Vancouver
COC	Contaminant of concern
1,1-DCE	1,1-Dichloroethene
EA	EA Engineering, Science, and Technology, Inc., PBC
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
ft	Feet
IWS	In-well stripping
lb	Pound
Linde	Linde LLC
MAROS	Monitoring and Remediation Optimization System
µg/L	Micrograms per liter
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
TCE	Trichloroethene
UCL	Upper confidence limit
URS	URS Group, Inc.
VOC	Volatile organic compound

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EXECUTIVE SUMMARY

Introduction

This Annual Status Report summarizes information on activities that took place during 2015 at the Boomsnub/Airco Superfund Site (Site) in Hazel Dell, Washington. EA Engineering, Science, and Technology, Inc., PBC (EA), under contract to Linde LLC (Linde), is operating and maintaining a Site-wide groundwater extraction and treatment system. Work at the Site is conducted under a Consent Decree between the U.S. Environmental Protection Agency (EPA) and Linde (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 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 VOCs was detected and determined to be coming from the Linde 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 (Linde 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.

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) systems to remove VOCs from both the soil and groundwater. 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 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 Linde 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 Linde properties.

2013 OU-2 System Operations

The IWS system began operating in 2004 and was shut off on 9 August 2013, with EPA approval. Following removal of more than 97% of the TCE mass from groundwater, the system had reached asymptotic removal rates, and operation of the system was not effective at further removal of TCE. 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. Groundwater samples were collected from OU-2 monitoring wells on a quarterly basis during 2015. 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 will remain off.

2014 OU-3 System Operations

During the 2015 reporting period, 65,654,096 gallons of groundwater were treated and discharged to the Linde infiltration gallery. The groundwater extraction and treatment system operated within the performance standards established for the Site. The system was in operation approximately 99.9 percent of the reporting period. The percent availability includes actual minutes of operation and scheduled down time. 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 Spring 2015 and Fall 2015.

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.

Annual Screening of Groundwater Monitoring Data

Annual screening of groundwater monitoring data is conducted for each monitoring and extraction well currently sampled. The data are used to determine what changes, if any, should be made to current system operations and the well sampling schedule. The annual screening for this report was conducted in accordance with EPA's *Guidance for Evaluating Completion of*

Groundwater Restoration Remedial Actions (EPA 2013). A combination of quantitative and qualitative evaluations of the Site data was used to derive the recommendations for the annual screening.

Based on the results of the annual screening of groundwater monitoring data through 2015, the following conclusions and recommendations are made:

- Changes to sampling frequencies are recommended for 30 wells based on the results of the quantitative and qualitative reviews. Well sampling frequency recommendations for 2016 are provided in Table 2 and summarized in Table 3.
- Pumping rates and plume capture should be reviewed to determine if pumping should be reduced or discontinued in the following active extraction wells where TCE and chromium concentrations have been consistently below the cleanup levels for at least the last four sampling events: MW-6B, MW-21D, MW-22D, and PW-1B.

Status of Previous Recommendations for 2015

In order to meet the operating objectives for OU-2 and OU-3, planned activities for 2015 were recommended in the 2014 Annual Status report. The status of those planned activities is summarized below:

- **Well Sampling** – Wells were sampled in accordance with the updated sampling schedule and subsequent revisions approved by EPA.
- **Infrastructure Removal** – Submittal of a revised proposal for removal of selected infrastructure in the original Toe-of-Plume area was postponed and is currently planned for 2016.
- ***In Situ* Treatments** – In situ treatments were recommended in the of area of wells MW-35 and AMW-27, as described in the Work Plan for In Situ Treatment Areas of Residual Contamination (EA2012b). However, EPA approval of the work plan was never received. Because groundwater in the area of these two wells now meets the Site cleanup levels, no further remediation in these areas is planned.
- **Easement Agreements and Restrictive Covenants –** EA continued efforts toward obtaining access agreements from neighboring property owners. EPA has been asked to provide assistance obtaining easement agreements and restrictive covenants with non-responsive property owners.
- **IWS System Rebound Testing –** The planned two years of IWS shutdown monitoring was completed during 2015 and results were provided to EPA. It was agreed that the IWS system will remain off and that monitoring wells in this area will be sampled less frequently.
- **Padden Parkway Business Park –** The owner of Parcel no. 144527-000, a large parcel located southwest of the intersection of NE 78th Street and NE St. Johns Road, has plans to develop the property as the Padden Parkway Business Park. Although development of this parcel was anticipated to begin during 2015, the development

plans were modified and development activities were delayed. Development of this parcel is now anticipated to begin during 2016.

Recommendations and Planned Activities for 2016

The following activities are planned during the 2016 reporting period:

- **Well Sampling** – Sample wells in accordance with the updated sampling schedule (Table 3).
- **Monitoring Well MW-23D –** The TCE concentration in groundwater samples from MW-23D increased rapidly between Fall 2014 and Fall 2015, indicating the apparent arrival of the Northern Plume at this well. Therefore, in future reports, well MW-23D will be grouped with the Northern Plume monitoring wells for data reporting and evaluation.
- **Extraction Well Pumping Rates** – Evaluate pumping rates and plume capture to determine if pumping should be reduced or discontinued in the following active extraction wells where TCE and chromium concentrations have been consistently below the cleanup levels for at least the last four sampling events: MW-6B, MW-21D, MW-22D, and PW-1B.
- **Easement Agreements and Restrictive Covenants –** Continue to request EPA assistance to obtain the required agreements with non-responsive property owners including Clark County (various parcels) and parcels 144492-000, 144718-000, and 099630-000. EA will continue efforts to obtain agreements as opportunities arise.
- **Infrastructure Removal** – Submit a revised proposal for removal of selected infrastructure in the original Toe-of-Plume area. This infrastructure is no longer needed for Site remediation or monitoring, and is planned for removal to allow development of Parcel No. 144718-000.
- **Padden Parkway Business Park –** Work with the owner/developer of the Padden Parkway Business Park as they develop their property. Once the potential impacts of the development on Site infrastructure are clear, the planned modifications will be summarized and presented to EPA for approval.
- **Progress Reports** – It is recommended that the semiannual Site Progress Reports be combined with the semiannual Groundwater Sampling Reports. A proposed outline and schedule for this will be submitted to EPA for review and approval.
- **Closure Strategy/Closure Plan** – As contaminants in groundwater across the Site approach the cleanup levels, plans for achieving closure of the Site are essential. The Site closure strategy will be discussed with EPA and, once EPA comments on the draft Closure Plan (EA 2009) are received, the Closure Plan will be finalized.

1. INTRODUCTION

This Annual Status Report summarizes information on activities that took place during 2015 at the Boomsnub/Airco Superfund Site (Site) in Hazel Dell, Washington. EA Engineering, Science, and Technology, Inc., PBC (EA), under contract to Linde LLC (Linde), 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 Linde (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, in the area depicted on Figure 1. It includes two adjacent facilities, the former Boomsnub Corporation (Boomsnub) chrome plating facility and the Linde industrial gas production facility. The Linde 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 Linde property. Linde 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 overlap and are 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, Linde Soil; and OU-3, Site-wide Groundwater. EPA conducted soil removal actions at OU-1 in 1994 and 2001 to remove the majority of the hexavalent chromium-contaminated soils serving as a source for groundwater contamination. Linde has conducted numerous site investigations, conducted a removal action, and operated a VOC source removal system on their property at OU-2.

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, 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 known to contain elevated concentrations of chemicals detected at the Site.

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 handle the VOCs and chromium, to increase pumping and treatment capacity, and to increase removal efficiency. The monitoring and extraction well network for the Site is presented on Figure 2. 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 Linde 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 Record of Decision (ROD) for the Site, dated February 2000, 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.

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, Linde and EPA entered into 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 to implement the requirements of the Action Memorandum.

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

In October 2002, URS Group, Inc. (URS), working under contract with EPA and in cooperation with representatives from the EPA Environmental Services Assistance Team, 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 2003).

In September 2003, Linde 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 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 Linde 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 2012a). 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 Linde properties.

1.2 Purpose

The purpose of this report is to provide an overview of Site activities at OU-2 and OU-3. The reporting period is 1 January through 31 December 2015.

1.3 Operating Objectives

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 Linde 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.

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.
- Sections 2 and 3 present summaries of the system operations and monitoring for OU-2 and OU-3, respectively.
- 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 screening 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 2015, and presents recommendations and planned activities for 2016.
- 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 four semiannual sampling events are provided in Appendices A-1 and B-1, respectively. Only wells sampled during the 2015 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. All wells in the active sampling program 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 2015 reporting period are included.

Appendix C includes a list of the Site wells requiring no further sampling for TCE or chromium during the current remediation monitoring phase.

2. OU-2 SYSTEM OPERATIONS AND MONITORING

This section provides a summary of the OU-2 IWS system operations and monitoring conducted between 1 January and 31 December 2015. Groundwater sampling and analyses were conducted in accordance with the in-well stripping shutdown plan (EA 2013). Locations of the OU-2 treatment and monitoring wells are shown on Figure 3.

2.1 IWS System Operations

The IWS system began operating in 2004 and was shut off in August 2013, with EPA approval. Following removal of more than 97% of the TCE mass from groundwater, the system had reached asymptotic removal rates, and operation of the system was not effective at further removal of TCE. 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 in November 2015. It was agreed that the IWS system will remain off.

2.2 IWS System Monitoring

Groundwater samples were collected from thirteen OU-2 monitoring wells including two in January, five in April, two in July, and 13 in October. The samples were submitted to ALS Environmental (ALS) of Kelso, Washington and analyzed for VOCs using EPA Method 8260C.

During the reporting period, groundwater samples from five of the 13 wells sampled had TCE concentrations above the cleanup level of 5 μg/L; AMW-1A, AMW-2A, AMW-12A, AMW-53A, and MW-1A (EA 2015a, EA 2015e, and EA 2016). Section 4.2.2.1 provides a discussion and presents the TCE data from OU-2 wells sampled during the 2015 reporting period. Residual TCE contamination in OU-2 groundwater will continue to be monitored to evaluate the potential need for future remedial actions in this area. Recommendations for revised well sampling frequencies for OU-2 wells following completion of the IWS shutdown monitoring period are provided in Section 6.

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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 2015. Groundwater sampling and analyses were conducted in accordance with the procedures in the EPA-approved Site Quality Assurance and Sampling Plan (QASP; EA 2004), and subsequent EPA-approved QASP addenda.

3.1 System Operations

Routine system operation details are presented in the Progress Reports (EA 2015d and EA 2015g) submitted to EPA twice a year. 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. Other than minor fluctuations and adjustments, no changes were made to extraction well pumping rates during 2015.

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

Monthly influent and effluent sample concentrations were used to determine approximate chromium and TCE removal rates on a monthly basis. Based on this, the ion-exchange system had an annual average chromium removal rate of approximately 98 percent and the air stripper system an annual average VOC removal rate of approximately 98 percent.

3.1.2.2 Linde Infiltration Gallery

Treated groundwater from the Site treatment system is discharged back into the alluvial aquifer through an infiltration gallery. The infiltration gallery is located in the southeast corner of the Linde property and is designed to accept treated water at 160 gallons per minute. During 2015, the average system flow rate was approximately 124 gpm (Table 1). 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 2015 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 Reports (EA 2015d and EA 2015g).

3.2 System Performance

OU-3 system performance for 2015 is summarized in the following table. Additional details are provided in the Progress Reports.

OU-3 System Performance Summary, 2015

Month	Hours/Month	Hours of Operation/Month	Availability	Flow (gallons)
January	744	744	100	5,626,170
February	672	672	100	5,094,902
March	744	744	100	5,631,436
April	720	720	100	5,452,350
May	744	744	100	5,625,834
June	720	711.72	98.85	5,259,482
July	744	744	100	5,579,984
August	744	744	100	5,555,906
September	720	720	100	5,365,005
October	744	744	100	5,528,068
November	720	720	100	5,341,501
December	744	744	100	5,593,458
2015 Totals	**8760**	**8751.72**	**99.90%**	**65,654,096**

Note:
The percent availability includes actual minutes of operation and scheduled down time.

3.2.1 Water Treated

During the reporting period, 65,654,096 gallons of groundwater were treated and discharged to the Linde infiltration gallery.

3.2.2 System Availability

The treatment system was operational for 8,752 hours, or approximately 99.9 percent of the reporting period, exceeding the 90 percent requirement of the CD. Details are provided in the Progress Reports (EA 2015d and EA 2015g).

3.2.3 Mass Removal

The following table presents cumulative chromium and TCE removed in 2015, along with monthly influent data and flow.

OU-3 Chromium and TCE Removal Summary, 2015

Date	Monthly Flow (Gallons)	Influent Chromium (µg/L)	Influent TCE (µg/L)	Monthly Chromium Removal (lbs)	Monthly TCE Removal (lbs)	Cumulative Chromium Removed (lbs)	Cumulative TCE Removed (lbs)
January	5,626,170	52.3	15.0	2.5	0.7	22,364.3	2,207.3
February	5,094,902	51.8	16.0	2.2	0.7	22,366.5	2,208.0
March	5,631,436	53.6	15.0	2.5	0.7	22,369.0	2,208.7
April	5,452,350	53.7	16.0	2.4	0.7	22,371.5	2,209.4
May	5,625,834	50.2	13.0	2.4	0.6	22,373.8	2,210.1
June	5,259,482	49.7	15.0	2.2	0.7	22,376.0	2,210.7
July	5,579,984	51.5	16.0	2.4	0.7	22,378.4	2,211.5
August	5,555,906	51.5	17.0	2.4	0.8	22,380.8	2,212.2
September	5,365,005	49.5	16.0	2.2	0.7	22,383.0	2,213.0
October	5,528,068	51.6	15.0	2.4	0.7	22,385.4	2,213.7
November	5,341,501	51.0	14.0	2.3	0.6	22,387.7	2,214.3
December	5,593,458	48.9	13.0	2.3	0.6	22,389.9	2,214.9

On the basis of measured influent and effluent concentrations and the total monthly treatment system flow, over 28 pounds (lbs) of chromium and 8.3 lbs of TCE were removed by the groundwater extraction and treatment system during 2015. This brings the cumulative total mass of chromium and TCE removed to approximately 22,390 and 2,215 lbs, respectively, since initiating operations in 1990. 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.

Figure 4 shows the cumulative removal amounts for total chromium and TCE since June 1999. Figure 5 depicts the total chromium and TCE concentrations in the treatment system influent and effluent since 1999. Figure 6 provides a comparison of the average annual influent and effluent chromium and TCE concentrations over the last 15 years.

3.3 Plume Monitoring

3.3.1 Semiannual Site-wide Groundwater Monitoring

Semiannual Site-wide groundwater monitoring was conducted in Spring and Fall 2015, following EPA approval of the associated QASP addenda (EA 2015b and EA 2015f). The semiannual sampling events were conducted as planned and no significant issues or problems were encountered.

Groundwater samples were submitted to ALS of Kelso, Washington for analysis. The samples were analyzed for chromium using EPA Method 200.7 and/or VOCs using EPA Method 8260C.

Groundwater monitoring results and concentration trends are discussed in Section 4. Note that quarterly monitoring of a very limited number of wells, primarily in the OU-2 and Northern Plume areas, was also performed. Results of the quarterly monitoring are also provided in Section 4, where applicable.

3.3.2 Water Level Gauging Program

Depth-to-groundwater measurements were collected from monitoring and extraction wells at the Site during the Spring and Fall semiannual sampling events. Groundwater level data are collected to determine the groundwater flow direction and gradient. During both semiannual events in 2015, 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 2015 water level gauging events are provided in the Semiannual Groundwater Sampling Reports (EA 2015e and 2016). The groundwater elevation contours maps for the Fall event are also presented as Figures 7 and 8, herein. The flow direction and horizontal gradient in both aquifers were similar to those observed previously. The alluvial aquifer groundwater elevations measured in Fall 2015 were generally about 2 to 3 ft lower than those measured in Spring 2015, reflecting the seasonal variation in rainfall. In the deeper, semi-confined Troutdale aquifer, the groundwater elevations measured in Fall 2015 were generally about 2 ft lower than those measured in Spring 2015.

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 2015 water level gauging event. In the alluvial aquifer, the hydraulic gradient across the Linde property was approximately 0.008 ft/ft; this area is impacted by the infiltration gallery. Downgradient, within the plume area, (using an average from just west of the Linde property to the original toe of plume area) the gradient was approximately 0.004 ft/ft. 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 0.007 ft/ft. The flow direction in this aquifer is generally to the west-southwest.

4. GROUNDWATER MONITORING RESULTS AND TRENDS

This section presents the concentration trends observed in groundwater since 1995, when EPA assumed regulatory responsibility for the Site, with a focus on data collected during 2015. More detailed presentations of the 2015 groundwater monitoring data are provided in the Spring and Fall Semiannual Groundwater Monitoring reports (EA 2015e and EA 2016).

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 2004). Groundwater sampling and analysis of the OU-2 monitoring wells on the Linde property was conducted in accordance with the OU-2 shutdown plan (EA 2013). 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. The sampling schedule for 2015 was presented in the 2014 Annual Status Report (EA 2015c).

Table 2 presents the 2015 well sampling frequencies along with the recommended changes for 2016, based on the annual screening of groundwater monitoring data (see Section 6). Also included in Table 2 are well construction details and the most recent concentrations of TCE and chromium in each well in the current groundwater monitoring program.

The Spring 2015 sampling event included wells on a quarterly and semiannual sampling schedule. The Fall 2015 sampling event included wells on a quarterly, semiannual, and annual sampling schedule. Note that two small quarterly sampling events also took place during 2015; in Winter (January) and Summer (July). Selected wells, primarily associated with the OU-2 and Northern Plume areas, were sampled during these quarterly events. Results for these samples are included in the following discussions, as appropriate.

4.1 Well Groupings

To facilitate analysis of contaminant concentrations across the Site, sampling data 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 9. All wells except those identified as Troutdale aquifer wells are screened within or slightly below the alluvial aquifer.

4.2 Groundwater Trends

4.2.1 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 decreasing trends. The extent of impacted groundwater in the alluvial aquifer, as determined from groundwater sampling data obtained in 1995 and Fall 2015, is presented on Figure 10 for chromium and on Figure 11 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 2015 are presented in Appendices A-1 and B-1, respectively. The highest concentration of chromium during the 2015 reporting period was detected in the sample collected from well MW-4B (702 µg/L), located within the Proximal well group (in the chromium source area), during the Fall 2015 sampling event. The highest concentration of TCE was detected in the sample collected from well MW-23D (130 µg/L) in the Church of God well group during the Fall 2015 event. TCE concentrations in this well had been below the cleanup level of 5 µg/L since Fall 2006 and the spike in TCE concentration during the Fall 2015 sampling event appears to indicate the arrival of the Northern Plume at this well. The highest concentration of TCE detected within the OU-3 plume was in the groundwater sample from well MW-18E (69 µg/L), located in the Intermediate well group, during the Fall 2015 event. Wells with 2015 groundwater sampling results exceeding the Site cleanup levels of 80 µg/L for chromium and 5 µg/L TCE are highlighted on Figures 12 and 13, 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 2015 are provided along with prior results for comparison purposes. In data summary tables presented in this report, analytical results shown in 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.

4.2.2 Alluvial Aquifer

During the 2015 reporting period, groundwater samples were collected from wells in all well groups with the exception of the Upgradient well group. Wells in the Upgradient well group, located near the upgradient (eastern) Site boundary, are on a biennial sampling schedule and will be sampled next during 2016.

4.2.2.1 TCE Source Area Wells

The TCE Source Area wells are located on the western half of the Linde property (Figure 9), in the vicinity of 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.

During the 2015 reporting period, TCE concentrations were below the 5 µg/L cleanup level in groundwater samples collected from 8 of the 13 wells sampled, as presented in the following table.

TCE Source Area Well TCE Concentrations, in µg/L

Well	Spring 2014	Fall 2014	Winter 2015	Spring 2015	Summer 2015	Fall 2015
AMW-1A	0.73	2.3	--	**6.1**	--	**25**
AMW-2A	**5.6**	**60**	**19**	**57**	**67**	**63**
AMW-2B	--	0.34 J	--	--	--	0.41 J
AMW-3A	--	0.34 J	--	--	--	0.53
AMW-12A	**26**	**23**	--	**32**	--	**31**
AMW-13A	--	0.18 J	--	--	--	0.26 J
AMW-19A	--	1.2	--	--	--	1.4
AMW-52A	--	0.50 U	--	--	--	0.32 J
AMW-53A	**16**	0.13 J	**16**	**11**	**7.5**	**11**
AMW-54A	--	2.9	--	--	--	3.0
AMW-55A	--	1.0	--	--	--	1.0
AMW-56A	--	1.7	--	--	--	1.7
MW-1A	**7.9**	**6.8**	--	**5.9**	--	**5.6**

Notes:
-- No sample collected.
Results shown in **red 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. TCE concentrations were above the 5 µg/L groundwater cleanup level in five of the 13 wells sampled in this area: AMW-1A, AMW-2A, AMW-12A, AMW-53A, and MW-1A. TCE concentrations have fluctuated above and below the cleanup level in wells AMW-1A and AMW-53A in recent years. Note, however, that the results for wells AMW-1A and AMW-53A are suspect because very low water levels during the sampling event caused the PDB samplers to be only partially submerged. While several additional PDBs were not fully submerged (in wells AMW-3A, AMW-19A, AMW-54A, AMW-55A, and AMW-56A), TCE results for these wells have been below the cleanup level since at least 2006. Historically, the TCE concentrations in wells in this area tend to fluctuate, with an overall decreasing trend (Appendix B).

4.2.2.2 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 9). 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 2015 reporting period, chromium concentrations were below the 80 µg/L cleanup level in groundwater samples collected from five of the six wells sampled, as presented in the following table.

Proximal Well Chromium Concentrations, in µg/L

Well	Spring 2014	Fall 2014	Spring 2015	Fall 2015
MW-2A	--	**130**	--	39.8
MW-4B	--	**809**	--	**702**
MW-6B	39.4	14.8	25.7	13.5
MW-10B	37.6	34.1	35.2	33.5
MW-10C	**96.6**	67.3	71	58.8
PW-1B	46.5	35.7	39.1	38.6

Notes:
-- No sample collected.
Results shown in **red bold** exceed the established cleanup level of 80 µg/L.

Groundwater samples from well MW-4B continue to have some of the highest concentrations of chromium in groundwater at the Site. The chromium concentration in well MW-4B has consistently remained above the cleanup level. Chromium concentrations in well MW-10C have been fluctuating above and below the cleanup level for several years but have remained below the cleanup level for the last three sampling events. Historically, chromium concentrations in groundwater from wells in this area fluctuate, with an overall decreasing trend (Appendix A).

TCE

During the 2015 reporting period, TCE concentrations were below the 5 µg/L cleanup level in groundwater samples collected from three of the four wells sampled, as presented in the following table. The TCE concentration exceeded the cleanup level only in well MW-10B. In well MW-6B, the TCE concentration has been fluctuating above and below the cleanup level for several years but has remained below the cleanup level for the last five sampling events. Historically, TCE concentrations in groundwater samples from this area have been on a decreasing trend (Appendix B).

Proximal Well TCE Concentrations, in µg/L

Well	Spring 2014	Fall 2014	Spring 2015	Fall 2015
MW-6B	4.1	3.7	4.5	4.6
MW-10B	**12**	**11**	**13**	**11**
MW-10C	2.0	2.0	2.5	2.0
PW-1B	2.2	2.0	2.3	2.3

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

4.2.2.3 Intermediate Wells

The Intermediate wells are located west of NE St. Johns Road, north and south of NE 78th Street (Figure 9). All five extraction wells in this area (MW-14C, MW-14E, MW-18D, MW-19D, and MW-20D) were actively pumping during both the Spring and Fall 2015 sampling events.

Chromium

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

Intermediate Well Chromium Concentrations, in µg/L

Well	Spring 2014	Fall 2014	Spring 2015	Fall 2015
CPU-14	--	53.6	37.3 UJ	--
MW-14C	65	67.6	59.7	58.2
MW-14E	40.2	42	44.3	44.5
MW-18D	**92.3**	**91.1**	**88.9**	**87.2**
MW-19D	**95.9**	**91.7**	**88.9**	**91.7**
MW-20D	57.1	55.5	58	56.6

Note:
-- No sample collected.
Results shown in **red bold** exceed the established cleanup level of 80 µg/L.

Chromium concentrations exceeded the cleanup level only in wells MW-18D and MW-19D. Chromium concentrations in groundwater samples from wells in this area remained relatively stable. Historically, chromium concentrations in groundwater from wells in this area have been on a decreasing trend (Appendix A).

TCE

TCE concentrations exceeded the groundwater cleanup level of 5 µg/L in samples from 13 of the 14 wells sampled in this area (Appendix B). Sampling included five monitoring wells (AMW-16, AMW-17, AMW-18, AMW-64 and MW-38) which are impacted by the offsite Northern Plume. Northern Plume wells are sampled to evaluate potential impacts to the Site and treatment

system. TCE concentrations in samples collected from all five Northern Plume wells remain above the cleanup level as shown in the following table.

Northern Plume Well TCE Concentrations, in µg/L

Well	Spring 2014	Fall 2014	Spring 2015	Fall 2015
AMW-16	**27**	**72**	**94**	**80**
AMW-17	**130**	**120**	**120**	**110**
AMW-18	**27**	**34**	**34**	**42**
AMW-64	**61**	**55**	**53**	**45**
MW-38	**54**	**78**	**53**	**50**

Note:
Results shown in **red bold** exceed the established cleanup level of 80 µg/L.

TCE concentrations in groundwater from these wells remained relatively constant during 2015. Additional discussion of the Northern Plume, including previous monitoring results, is provided in Appendix E of the 2015 Fall Semiannual Sampling Report (EA 2016).

TCE concentrations in samples collected from the OU-3 plume remained above the 5 µg/L cleanup level in all wells sampled in this area with the exception MW-15E. TCE concentrations in groundwater samples collected from the OU-3 plume wells during 2015 remained relatively stable or decreased in comparison to previous sampling results, as shown in the following table.

Intermediate Well TCE Concentrations, in µg/L

Well	Spring 2014	Fall 2014	Spring 2015	Fall 2015
CPU-14	--	**5.2**	**5.5**	**5.5**
MW-14C	**12**	**12**	**14 J**	**11**
MW-14E	**55**	**51**	**70**	**64**
MW-15E	2.2	2.3	--	2.4
MW-18D	**32**	**31**	**36**	**34**
MW-18E	--	**96**	--	**69**
MW-19D	**21**	**21**	**24**	**24**
MW-20D	**27**	**27**	**32**	**31**
PZ-39	**29**	**45**	**34**	**36**

Notes:
-- No sample collected.
Results shown in **red bold** exceed the established cleanup level of 5 µg/L.

Historically, TCE concentrations in groundwater samples from wells in the Intermediate area have been on a decreasing trend, except where impacted by the Northern Plume (Appendix B).

4.2.2.4 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 9). Two extraction wells in this area (MW-21D and MW-22D) were actively pumping during both the Spring and Fall 2015 sampling events. Church of God wells sampled for chromium and TCE during 2015 are shown in the following tables.

Chromium

Chromium was not detected above the 80 µg/L cleanup level in groundwater from the two wells sampled, as shown in the following table.

Church of God Well Chromium Concentrations, in µg/L

Well	Spring 2014	Fall 2014	Spring 2015	Fall 2015
MW-21D	9.1	8.9	8.3	9.1
MW-22D	27.8	20.3	20	18.6

TCE

During the 2015 reporting period, TCE concentrations were below the 5 µg/L cleanup level in groundwater from four of the six wells sampled, as presented in the following table.

Church of God Well TCE Concentrations, in µg/L

Well	Spring 2014	Fall 2014	Winter 2015	Spring 2015	Fall 2015
AMW-27	4.1	1.6	4.0	4.2	3.3
AMW-61	--	**6.8**	--	--	**5.5**
CPU-12	--	**5.1**	--	4.0	2.2
MW-21D	2.9	2.4	--	3.2	2.8
MW-22D	4.0	2.6	--	3.3	2.8
MW-23D	--	1.4	--	--	**130**

Notes:
-- No sample collected.
Results shown in **red bold** exceed the established cleanup level of 5 µg/L.

Former extraction well AMW-27 was sampled on a quarterly basis during 2014 and winter 2015, following shut down of the pump in January 2013. TCE concentrations were above the 5 µg/L cleanup level in the groundwater samples collected from wells AMW-61 and MW-23D. The TCE concentrations in silt well AMW-61 fluctuate but continue on a decreasing trend. TCE concentrations in well MW-23D had been below the cleanup level since Fall 2006 and the spike in TCE concentration during the Fall 2015 sampling event appears to indicate the arrival of the Northern Plume at this well (EA 2016). Historically, TCE concentrations in samples collected from wells in this area have been on an overall decreasing trend (Appendix B).

4.2.2.5 Toe-of-Plume Wells

The Toe-of Plume wells are located west of the Church of God building (Figure 9). Groundwater samples were collected during the reporting period only from well MW-35. During the Fall 2015 sampling event, passive diffusion bag (PDB) samplers were used for sampling this well for the first time. Two samples were collected from different depths; one from a PDB deployed at 82-84 feet below ground surface (2.1 µg/L), and one from a PDB deployed at 86-88 feet below ground surface (3.7 µg/L). During subsequent sampling events, the depth exhibiting the highest TCE concentration will be sampled for TCE. The chromium concentration was below the 80 µg/L cleanup level during the Spring 2015 event, and TCE concentrations were below the 5 µg/L cleanup level during the Spring and Fall 2015 events.

4.2.3 Troutdale Aquifer Wells

The Troutdale aquifer serves as a municipal water supply for the City and Clark County. Groundwater samples were collected from three Troutdale aquifer wells, including the Bennett private well, during the 2015 reporting period.

Chromium
Chromium concentrations were below the 80 µg/L cleanup level in the one well sampled during the Spring event (Bennett, 4 U µg/L). This is consistent with previous results (Appendix A).

TCE
During the 2015 reporting period, TCE concentrations were above the 5 µg/L cleanup level in all three wells sampled, as presented in the following table. TCE concentrations in groundwater from wells AMW-24 and MW-33 have fluctuated somewhat but have consistently remained above the cleanup level. The TCE concentration in groundwater from the Bennett private well historically fluctuates above and below the cleanup level (Appendix B).

Troutdale Aquifer Well TCE Concentrations, in µg/L

Well	Spring 2014	Fall 2014	Spring 2015	Fall 2015
AMW-24	--	**10**	--	**9.9**
BENNETT	2.0	**5.1**	4.2	**5.2**
MW-33	--	**11**	--	**8.5**

Notes:
-- No sample collected.
Results shown in **red bold** exceed the established cleanup level of 5 µg/L.

4.2.4 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 (1,1-DCE); and cis-1,2-dichloroethene (EA 2016). Additional VOCs detected in only a few wells and at estimated concentrations (above the method detection limit but below the

method reporting limit) during 2015 were: bromodichloromethane, dibromochloromethane, methylene chloride, trans-1,2-DCE, and vinyl chloride.

None of the other detected VOCs exceeded the respective cleanup level during the 2015 reporting period, with the exception of 1,1-DCE. Detected concentrations of 1,1-DCE exceeded the 1.0 µg/L Site-specific cleanup level, as established in the ROD (EPA 2000), in four of the 27 groundwater samples analyzed for VOCs during the Spring 2015 event, and six of the 41 groundwater samples analyzed for VOCs during the Fall 2015 event (EA 2015e, 2016). During the reporting period, five wells with 1,1-DCE concentrations above the cleanup level were alluvial aquifer wells. Four of these wells are in the Intermediate well group, where the highest TCE concentrations remain, and one well (MW-23D) in the Church of God well group appears to be impacted by the Northern Plume. In addition, 1,1-DCE exceeded the cleanup level in one Troutdale aquifer well (1.1 µg/L in AMW-24) during the Fall sampling event.

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5. OTHER ACTIVITIES

During the 2015 reporting period, the following other activities were performed.

5.1 Easement Agreements and Restrictive Covenants

EA, on behalf of Linde, continued pursuing easement agreements and restrictive covenants for non-Linde owned properties, as required by Sections 25 and 26 of the CD (EPA 2007). Properties which include Site infrastructure but for which Linde 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.

5.2 Sustainability Practices

Linde 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.
- 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.
- 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.

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6. ANNUAL SCREENING OF GROUNDWATER MONITORING DATA

This section summarizes the annual screening of groundwater monitoring data for the Site. The purpose of this screening is to evaluate contaminant concentrations at each well currently being monitored, and to determine if any changes should be made to the current system operations and/or well monitoring schedule. The procedures used for this evaluation have been changed from previous years, due to recent comments and suggestions received from the EPA. This review incorporated procedures provided in recent EPA guidance, as discussed below.

In previous years, the annual screening was conducted in accordance with the Site Draft Closure Plan (EA 2009). The former screening procedure made use of the Air Force Center for Engineering and the Environment (AFCEE) Monitoring and Remediation Optimization System (MAROS) program (AFCEE 2012). Wells that were previously eliminated from the Site monitoring program based on the conservative MAROS evaluations are expected to remain so for the duration of the remediation monitoring phase (see Section 6.1.1).

The annual screening for this report was conducted in accordance with EPA's *Guidance for Evaluating Completion of Groundwater Restoration Remedial Actions* (hereinafter referred to as the guidance, EPA 2013). The annual screening evaluates TCE and chromium concentrations in groundwater samples collected from the Site for each monitoring and extraction well currently sampled. A combination of quantitative and qualitative evaluations of the Site data was used to derive the recommendations for the annual screening. The methodologies in *Recommended Approach for Evaluating Completion of Groundwater Restoration Remedial Actions at a Groundwater Monitoring Well* (EPA 2014) were used for the quantitative evaluation. The non-statistical or visual review process was performed to determine if groundwater concentrations are below cleanup levels. The qualitative evaluation consisted of a review of historical data trends, well use, and professional judgment based on Site experience.

6.1 Quantitative Evaluation

The EPA guidance considers whether a groundwater restoration remedial action is complete by evaluating groundwater data and information during the following two phases at each monitoring well: (1) the remediation monitoring phase and (2) the attainment monitoring phase. The following sections describe these two phases.

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. Completion of this phase at a monitoring well typically occurs when the data collected and evaluated demonstrate that the groundwater has reached the cleanup levels for all contaminants of concern (COCs) set forth in the record of decision (ROD). Because only TCE and chromium are commonly detected at concentrations exceeding the cleanup level at the Site, only these two parameters were evaluated. EPA recommends that a minimum of four data points be used for analyses during this phase

(EPA 2014). If certain COCs meet their cleanup level before other, more recalcitrant COCs in the well, the decision may be made to remove the COCs that are below the cleanup level from the monitoring program.

The evaluation can be performed using either a visual view method or statistical analysis method, as described in the following:

- Non-statistical or visual view of the data – If all COCs in the well are "non-detect", all detected COC concentrations are below the cleanup level, or a combination of the two, it may be appropriate to conclude that the remediation phase is complete in the monitoring well.
- Statistical method – If a non-statistical or visual view of the data did not provide sufficient information for making a decision, EPA recommends using one of the following two statistical analysis methods.
    - Mean Test: The mean contaminant concentration is calculated for each COC and the confidence limits around the mean. If the 95 percent upper confidence level (UCL) is at or below the cleanup level for the COC, it may be appropriate to conclude that the remediation monitoring phase is complete.
    - Trend Test: Trend analysis is conducted using the following steps. 1) Perform the Shapiro-Wilk test on the data to determine whether the data are normally distributed. 2) If the data follow a normal distribution, the trend is evaluated using the ordinary least squares method; otherwise, if the data are not normally distributed, the trend is evaluated using the Mann-Kendal testing method, using a Theil-Sen slope. 3) If the trend is statistically significant and decreasing, and the 95 percent UCL is at or below the cleanup level for the COCs, it may be appropriate to conclude that the remediation phase is complete.

6.1.2 Attainment Monitoring Phase

The attainment monitoring phase typically occurs after the remediation monitoring phase is complete. EPA recommends that the attainment data set used be limited to information collected after it has been demonstrated that groundwater in the well has reached post-remediation, steady-state, conditions. Since this site is currently operating, the analysis in this report will focus only on the remediation phase.

6.1.3 Annual Quantitative Evaluation

The Site is currently under the remediation monitoring phase as the groundwater extraction and treatment systems are still in operation in at least a portion of the Site. A non-statistical review of the data was used in the annual quantitative screening. Factors used in the quantitative evaluation 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. Note

that wells and parameters previously designated for no further sampling are not included in this evaluation.

Quantitative screening for each COC was performed using the most recent eight sample data points. A more conservative eight data points, instead of the minimum four data points recommended by EPA, were used for the evaluation to provide more confidence for optimizing system operations. If the concentrations of a COC are all "non-detect", all detected concentrations are below the cleanup level, or a combination of the two, it was concluded that the COC is below the cleanup level and the remediation monitoring phase for the specific COC is complete. Columns titled "Remediation Monitoring Phase is Completed?" in Table 2 show the results of this analysis for TCE and chromium in wells in the current monitoring program. Note that some wells are currently being monitored for only TCE or chromium. A few of the wells or parameters that did not meet the remediation monitoring phase completion criteria using the conservative eight data points, did meet the criteria using the minimum required four most recent data points. These wells are noted on Table 2.

6.2 Annual Qualitative Evaluation

As part of the annual screening, 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 whether TCE and chromium concentrations have been below the cleanup levels for at least the last eight sampling events, indicating that the remediation monitoring phase is completed. These factors are presented in Table 2. Additionally, a review of graphs of historical TCE and chromium concentrations in each well (presented in Appendices A and B) was performed during the evaluation of recommended sampling frequencies for 2016.

Recommended sampling frequencies for 2016 are included in Table 2 and summarized in Table 3. More detailed descriptions of the reasoning behind recommended changes in sampling frequencies are provided in Table 4. Wells designated for no further sampling as of the previous Annual Report (2014) have been removed from the sampling frequency tables. A list of the wells designated for no further sampling is provided in Appendix C; this includes a brief description of the basis for their removal from sampling.

For wells in which groundwater TCE and chromium concentrations have remained below the cleanup levels for at least the last eight sampling events, sampling will be discontinued for TCE and/or chromium unless the qualitative evaluation identified a need for data from the well. Table 4 provides a list of wells in the current monitoring program which met this conservative criterion for remediation monitoring complete for TCE and/or chromium. Table 4 also includes the reason for not removing certain wells/parameters from the monitoring program, based on the qualitative evaluation. Wells recommended for no further sampling will still be available for future sampling, if needed, and for attainment monitoring.

Changes to monitoring frequencies have been recommended for 29 wells (see Tables 2 and 4). The majority of these changes relate to the following: remediation monitoring is complete for

TCE and/or chromium in the well; the OU-2 IWS shutdown monitoring has been completed in the well; or the well is impacted by the offsite Northern Plume. These recommendations and the reason for the changes are summarized in Table 4.

6.3 Annual Well Screening Conclusions and Recommendations

Based on the results of the annual screening of groundwater monitoring data through 2015, the following conclusions and recommendations are made:

- Changes to sampling frequencies are recommended for 30 wells based on the results of the quantitative and qualitative reviews. Well sampling frequency recommendations for 2016 are provided in Table 2 and summarized in Table 3.
- Pumping rates and plume capture should be reviewed to determine if pumping should be reduced or discontinued in the following active extraction wells where TCE and chromium concentrations have been consistently below the cleanup levels for at least the last four sampling events: MW-6B, MW-21D, MW-22D, and PW-1B.

7. RECOMMENDATIONS AND PLANNED ACTIVITIES

The following sections summarize the status of activities recommended for 2015, as well as recommendations and planned activities for 2016.

7.1 Status of Previous Recommendations for 2015

In order to meet the operating objectives for OU-2 and OU-3, planned activities for 2015 were recommended in the 2014 Annual Status report. The status of those planned activities is summarized below:

- **Well Sampling** – Wells were sampled in accordance with the updated sampling schedule and subsequent revisions approved by EPA.
- **Infrastructure Removal** – Submittal of a revised proposal for removal of selected infrastructure in the original Toe-of-Plume area was postponed and is currently planned for 2016.
- ***In Situ* Treatments** – In situ treatments were recommended in the of area of wells MW-35 and AMW-27, as described in the Work Plan for In Situ Treatment Areas of Residual Contamination (EA2012b). However, EPA approval of the work plan was never received. Because groundwater in the area of these two wells now meets the Site cleanup levels, no further remediation in these areas is planned.
- **Easement Agreements and Restrictive Covenants –** EA continued efforts toward obtaining access agreements from neighboring property owners. EPA has been asked to provide assistance obtaining easement agreements and restrictive covenants with non-responsive property owners.
- **IWS System Rebound Testing –** The planned two years of IWS shutdown monitoring was completed during 2015 and results were provided to EPA. It was agreed that the IWS system will remain off and that monitoring wells in this area will be sampled less frequently.
- **Padden Parkway Business Park –** The owner of Parcel no. 144527-000, a large parcel located southwest of the intersection of NE 78th Street and NE St. Johns Road, has plans to develop the property as the Padden Parkway Business Park. Although development of this parcel was anticipated to begin during 2015, the development plans were modified and development activities were delayed. Development of this parcel is now anticipated to begin during 2016.

7.2 Recommendations and Planned Activities for 2016

The following activities are planned during the 2016 reporting period:

- **Well Sampling** – Sample wells in accordance with the updated sampling schedule (Table 3).
- **Monitoring Well MW-23D –** The TCE concentration in groundwater samples from MW-23D increased rapidly between Fall 2014 and Fall 2015, indicating the apparent arrival of the Northern Plume at this well. Therefore, in future reports, well MW-23D will be grouped with the Northern Plume monitoring wells for data reporting and evaluation.
- **Extraction Well Pumping Rates** – Evaluate pumping rates and plume capture to determine if pumping should be reduced or discontinued in the following active extraction wells where TCE and chromium concentrations have been consistently below the cleanup levels for at least the last four sampling events: MW-6B, MW-21D, MW-22D, and PW-1B.
- **Easement Agreements and Restrictive Covenants –** Continue to request EPA assistance to obtain the required agreements with non-responsive property owners including Clark County (various parcels) and parcels 144492-000, 144718-000, and 099630-000. EA will continue efforts to obtain agreements as opportunities arise.
- **Infrastructure Removal** – Submit a revised proposal for removal of selected infrastructure in the original Toe-of-Plume area. This infrastructure is no longer needed for Site remediation or monitoring, and is planned for removal to allow development of Parcel No. 144718-000.
- **Padden Parkway Business Park –** Work with the owner/developer of the Padden Parkway Business Park as they develop their property. Once the potential impacts of the development on Site infrastructure are clear, the planned modifications will be summarized and presented to EPA for approval.
- **Progress Reports** – It is recommended that the semiannual Site Progress Reports be combined with the semiannual Groundwater Sampling Reports. A proposed outline and schedule for this will be submitted to EPA for review and approval. .
- **Closure Strategy/Closure Plan** – As contaminants in groundwater across the Site approach the cleanup levels, plans for achieving closure of the Site are essential. The Site closure strategy will be discussed with EPA and, once EPA comments on the draft Closure Plan (EA 2009) are received, the Closure Plan will be finalized.

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FIGURES

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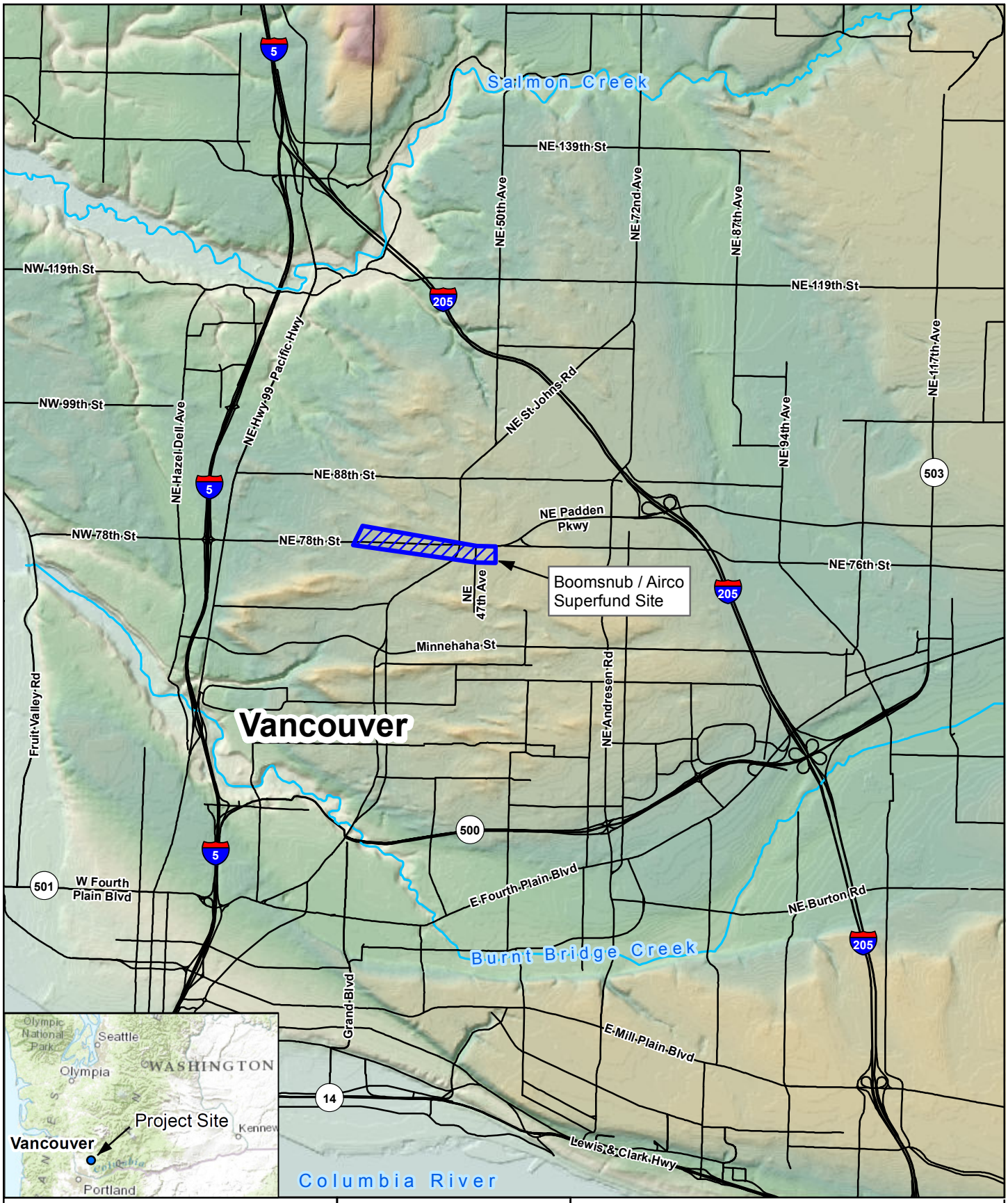

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FIGURE 1
SITE LOCATION MAP

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File Name: Fig_1_Site_Location

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
CV-21
CV-24
CV-23
MW-48
AMW-63
CV-20
AMW-42
MW-35
MW-31
MW-32
CV-19
MW-36
MW-24D
MW-29
MW-28
CPU-16
MW-37
CV-22
CV-18
N.E. 78th St.
CV-17
CPU-3D
CPU-3S

Church of God

CV-14
MW-25D
MW-49
CV-14A
AMW-27
AMW-61
CV-15
MW-26D
CV-16
FERGUSON
CPU-15
HORN
GARRISON

MW-27D
AMW-15
CPU-13
AMW-14
MW-23D
MW-21D
CV-13
MW-22D
CV-12
CV-11
CPU-12
CPU-1S, 1D

AMW-22
AMW-16
MW-20D
AMW-60
MW-38
MW-40, PZ-40
PZ-39, MW-39
CV-10
CV-9
MW-19D
CPU-10
CPU-14
CPU-2

AMW-64
AMW-17
CROCKFORD
AMW-18
N.E. St. John's Rd.
PERMALUME
COLUMBIA VET
N.E. 78th St.
EC-1
MW-15E
MW-18E
MW-17E
MW-18D
MW-16E
CV-8
AMW-59
MW-14C
MW-12C
MW-9C
MW-9B
CV-7
CV-6
CV-5
MW-14E
MW-10B, 10C
CV-4
MW-34
MW-13C
MW-5A, 5B
MW-6A
MW-6B
MW-6C
MW-6D
MW-33
See Inset A

Linde
Linde Infiltration Gallery
Former Boomsnub Corporation

AMW-62

GRIMM
ZENT
BENNETT
AMW-24
N.E. St. John's Rd.
N.E. 43rd Ave.
N.E. 51st Ave.
COLF
FITZGERALD
AMW-51
Lewis & Clark Railroad
N.E. 40th Ave.

Inset A
AMW-4A
AMW-25
AMW-9A
AMW-5A
AMW-8A
AMW-13A
N.E. 47th Ave.
MW-8B
AMW-52A
AMW-52C
CV-3
MW-4A
MW-4B
MW-4BSHED
MW-4C
IWS-8S
IWS-8D
AMW-26
AMW-10A
AMW-53A
AMW-53B
AMW-53C
CV-2
CV-1
PW-1B
AMW-1A
AMW-1C
AMW-1B
PZ-2
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
AMW-54A
AMW-54C
AMW-11A
MW-3A
MW-3B
MW-3C
MW-2A
MW-2B
MW-2C
AMW-56A
AMW-19B
AMW-55C
AMW-55A
IWS-2S
AMW-20
AMW-7A
PZ-1
AMW-57
AMW-3A
AMW-21
AMW-6A

Monitoring Well Sampled in 2015
Extraction Well Sampled in 2015
Private Well Sampled in 2015
Abandoned Monitoring Well
Monitoring Well
Extraction Well
Private Well
Screened in Troutdale Aquifer
Containment Vaults
Extraction System Forcemain

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FIGURE 2
MONITORING AND EXTRACTION WELL NETWORK

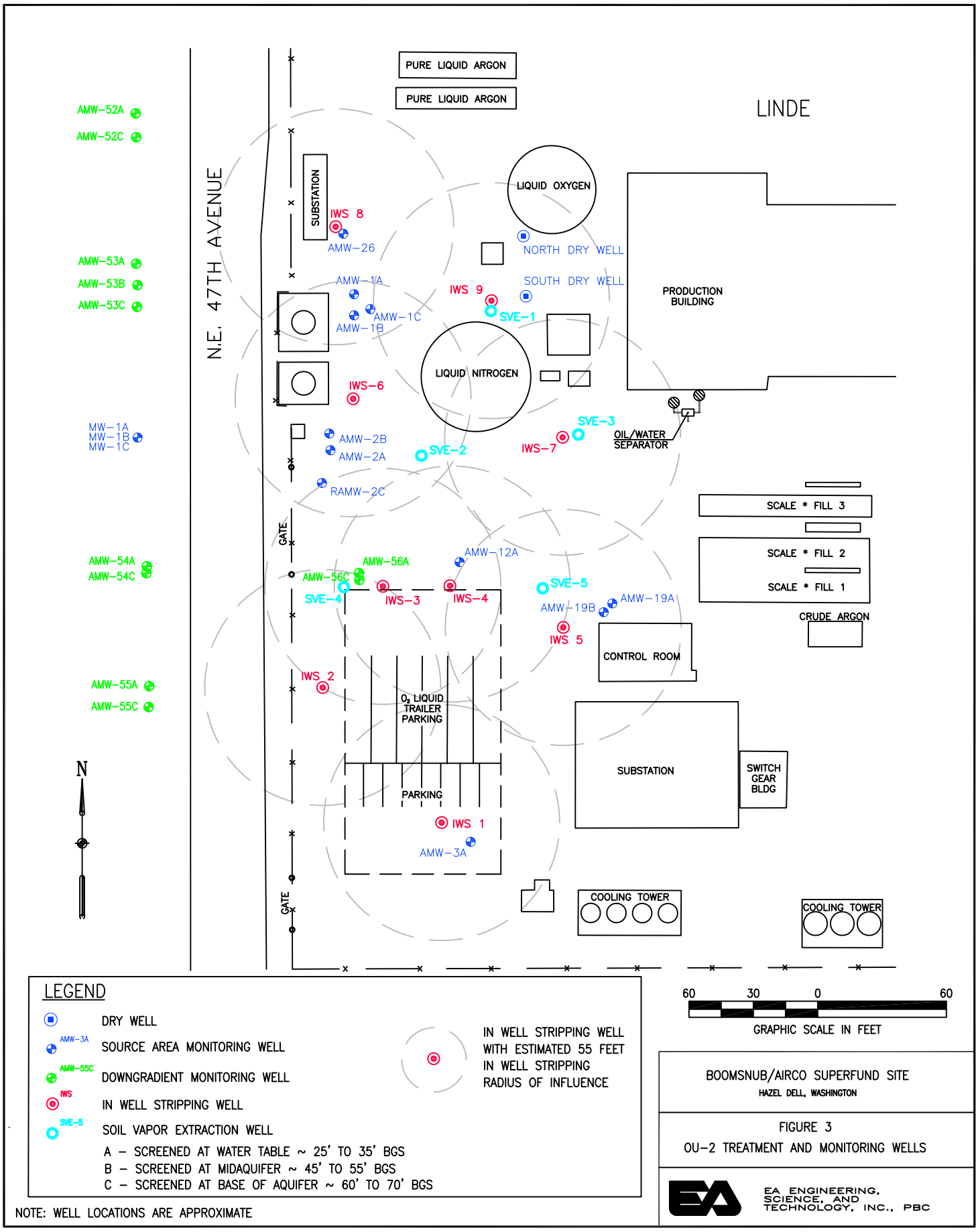
PURE LIQUID ARGON
PURE LIQUID ARGON
LINDE
AMW-52A
AMW-52C
N.E. 47TH AVENUE
SUBSTATION
IWS 8
AMW-26
LIQUID OXYGEN
NORTH DRY WELL
AMW-53A
AMW-53B
AMW-53C
AMW-1A
AMW-1C
AMW-1B
IWS 9
SVE-1
SOUTH DRY WELL
PRODUCTION BUILDING
LIQUID NITROGEN
IWS-6
MW-1A
MW-1B
MW-1C
AMW-2B
AMW-2A
SVE-2
SVE-3
IWS-7
OIL/WATER SEPARATOR
RAMW-2C
SCALE * FILL 3
SCALE * FILL 2
SCALE * FILL 1
CRUDE ARGON
GATE
AMW-54A
AMW-54C
AMW-56A
AMW-56C
SVE-4
IWS-3
IWS-4
AMW-12A
SVE-5
AMW-19B
AMW-19A
IWS 5
CONTROL ROOM
AMW-55A
AMW-55C
IWS 2
0, LIQUID TRAILER PARKING
PARKING
SUBSTATION
SWITCH GEAR BLDG
IWS 1
AMW-3A
N
GATE
COOLING TOWER
COOLING TOWER
LEGEND
DRY WELL
AMW-3A
SOURCE AREA MONITORING WELL
AMW-55C
DOWNGRADIENT MONITORING WELL
IWS
IN WELL STRIPPING WELL
SVE-5
SOIL VAPOR EXTRACTION WELL
A – SCREENED AT WATER TABLE ~ 25' TO 35' BGS
B – SCREENED AT MIDAQUIFER ~ 45' TO 55' BGS
C – SCREENED AT BASE OF AQUIFER ~ 60' TO 70' BGS
IN WELL STRIPPING WELL WITH ESTIMATED 55 FEET IN WELL STRIPPING RADIUS OF INFLUENCE
NOTE: WELL LOCATIONS ARE APPROXIMATE
60 30 0 60
GRAPHIC SCALE IN FEET
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FIGURE 3
OU-2 TREATMENT AND MONITORING WELLS
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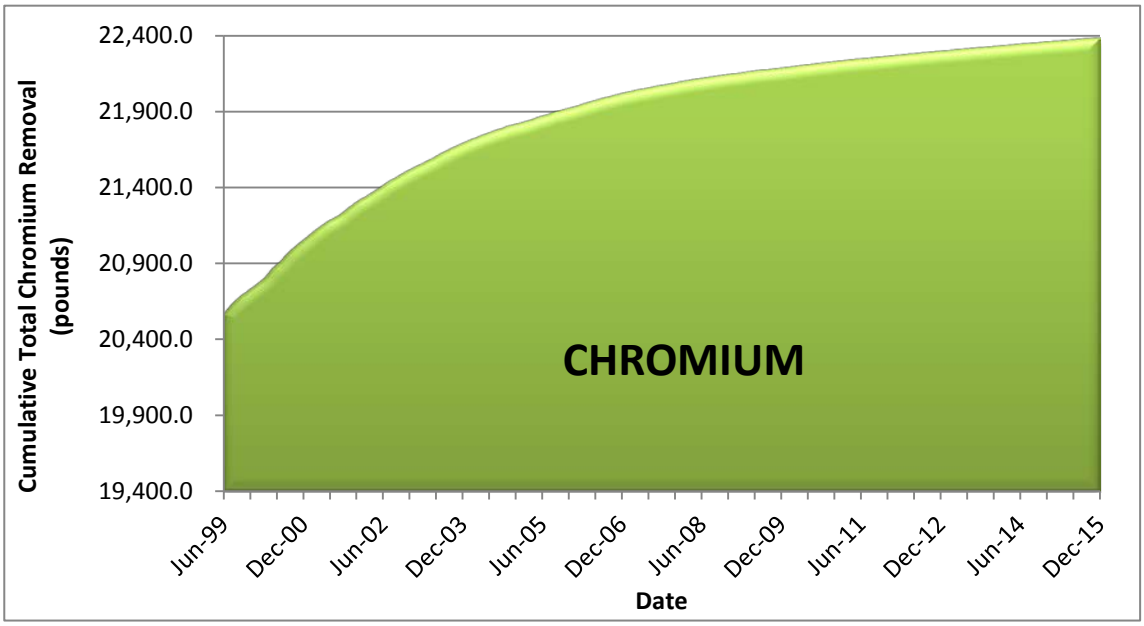
FIGURE 4. OU-3 CUMULATIVE TOTAL REMOVAL OVER TIME



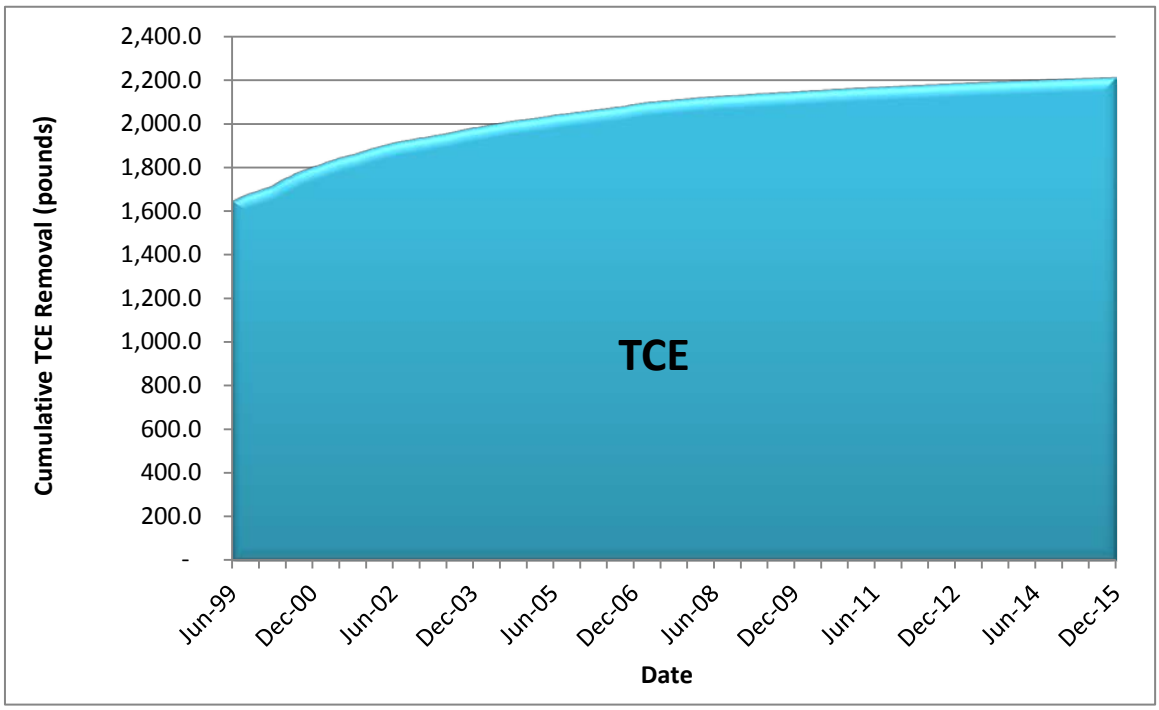
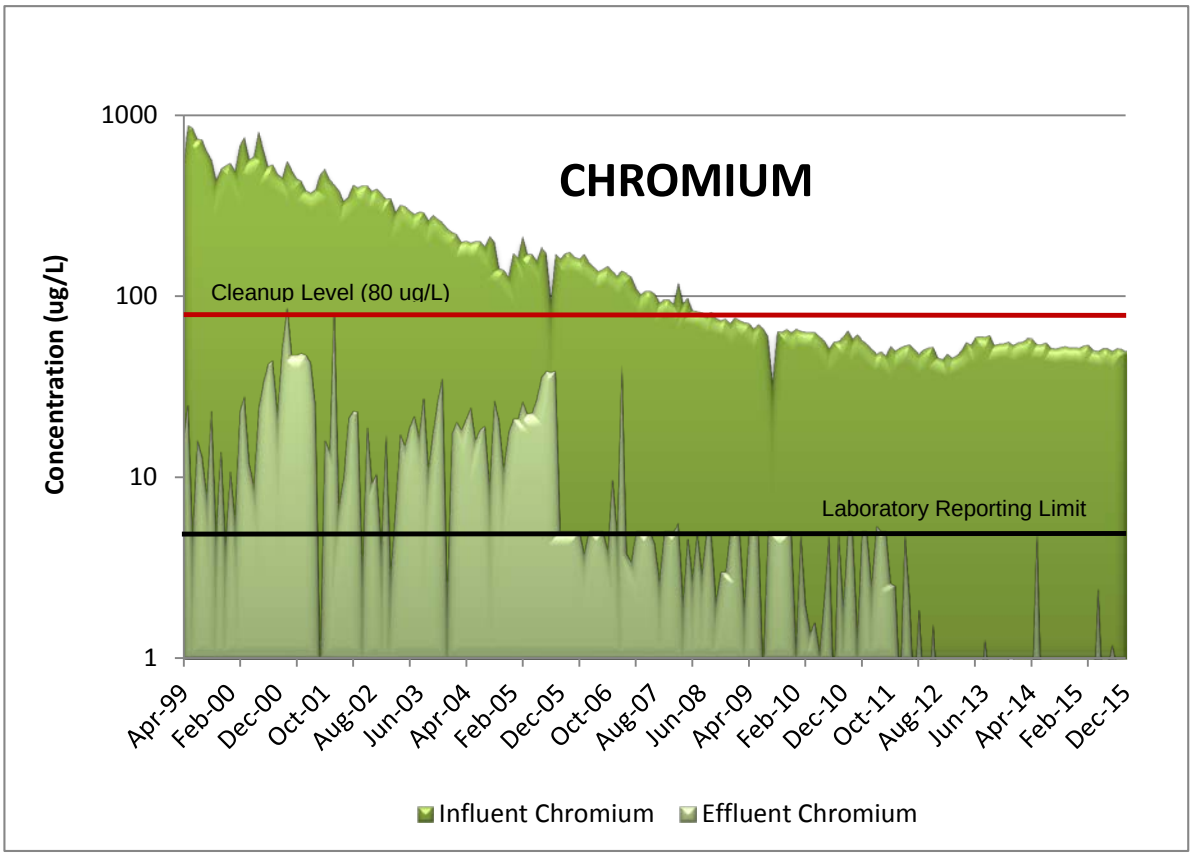


FIGURE 5. OU-3 INFLUENT AND EFFLUENT CONCENTRATIONS VERSUS TIME - LOGARITHMIC SCALE



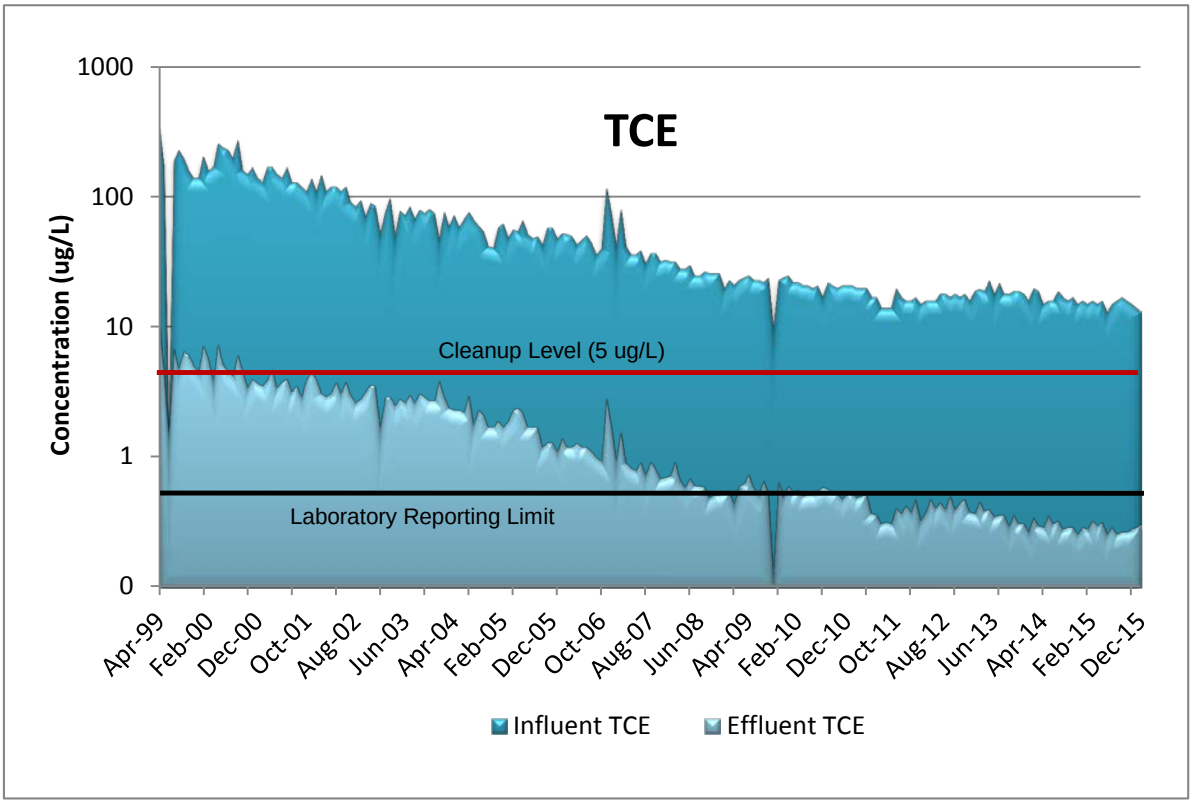
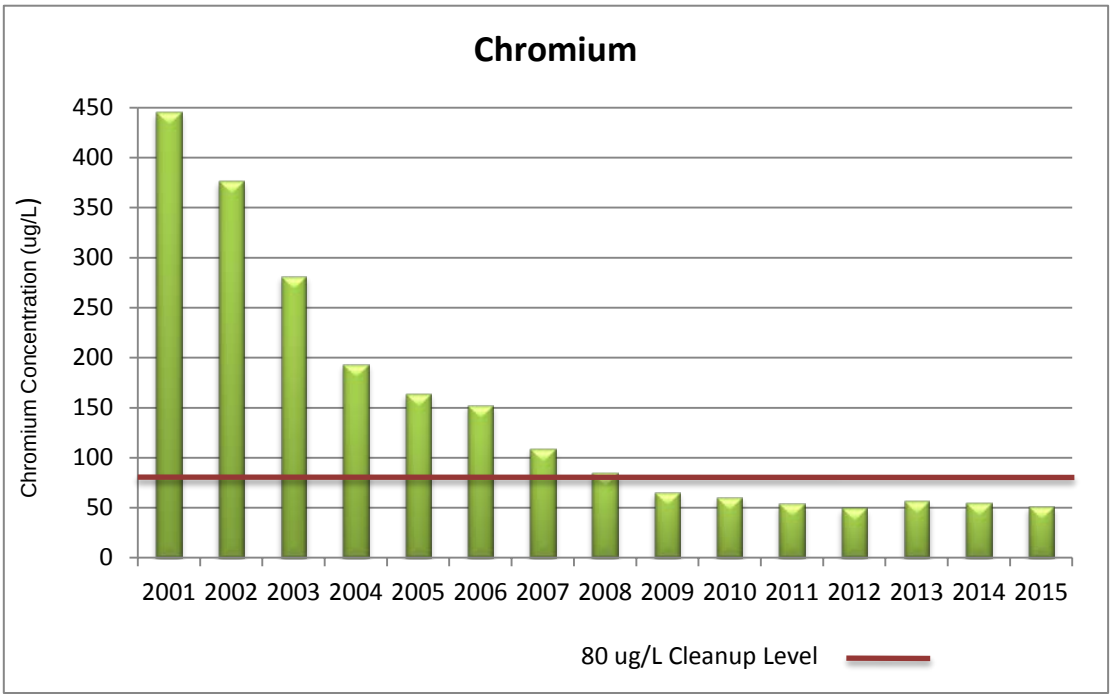
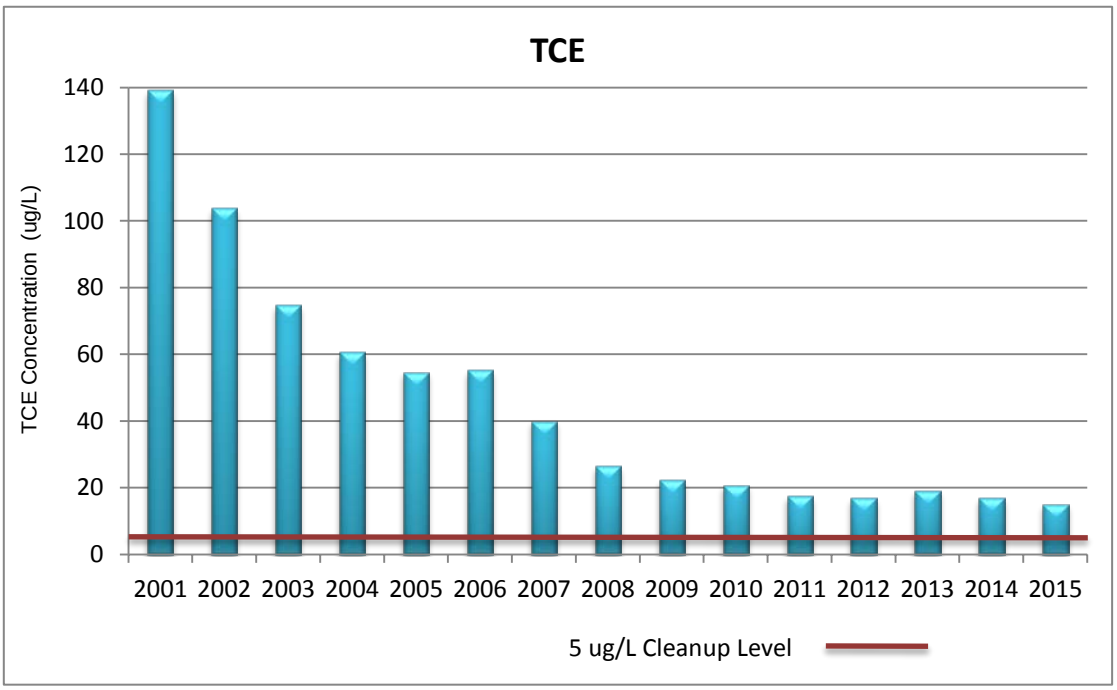


FIGURE 6. OU-3 INFLUENT CONCENTRATIONS OVER TIME





Note: Concentrations per year are an average of monthly data.

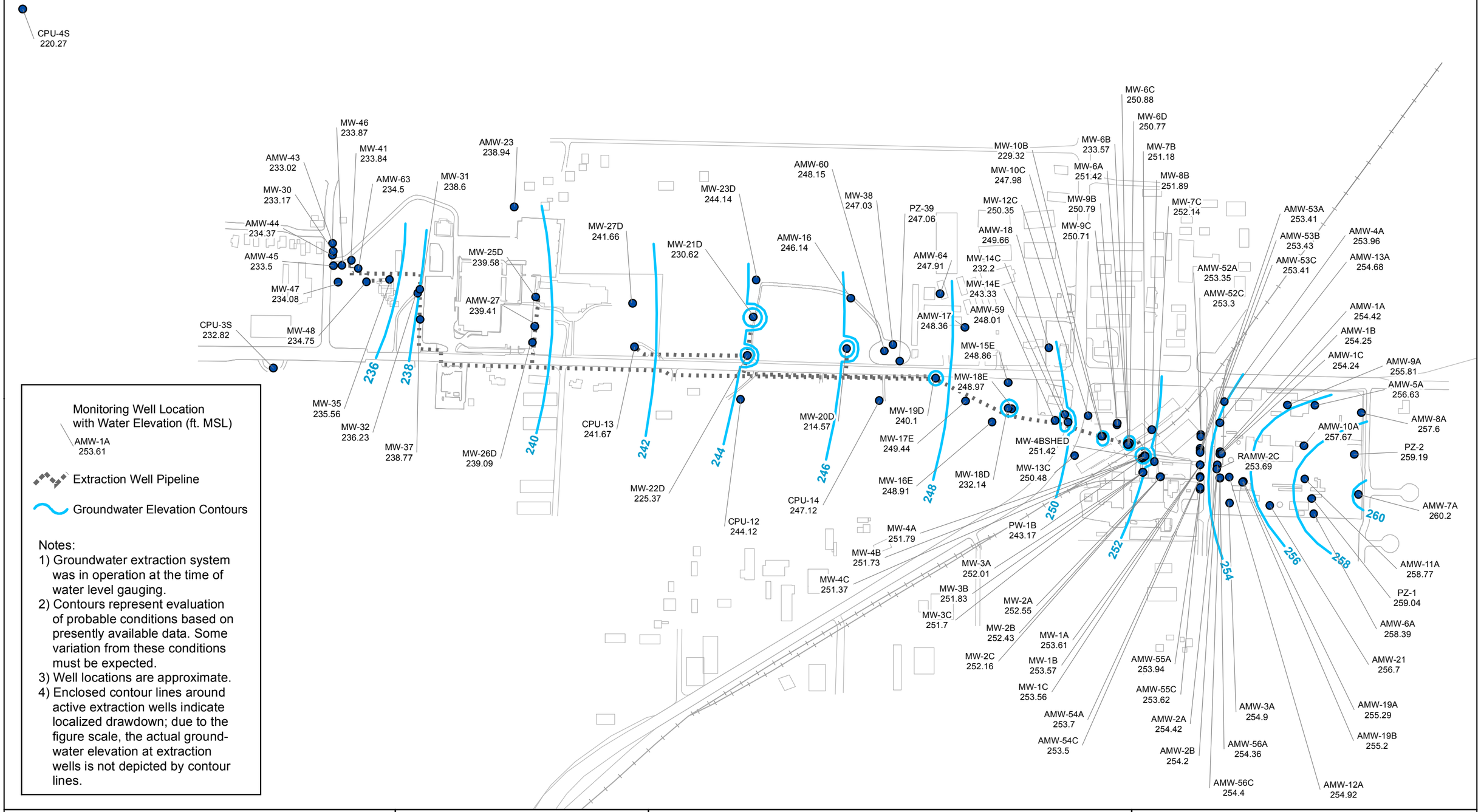


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FIGURE 7
ALLUVIAL AQUIFER GROUNDWATER CONTOURS
FALL 2015

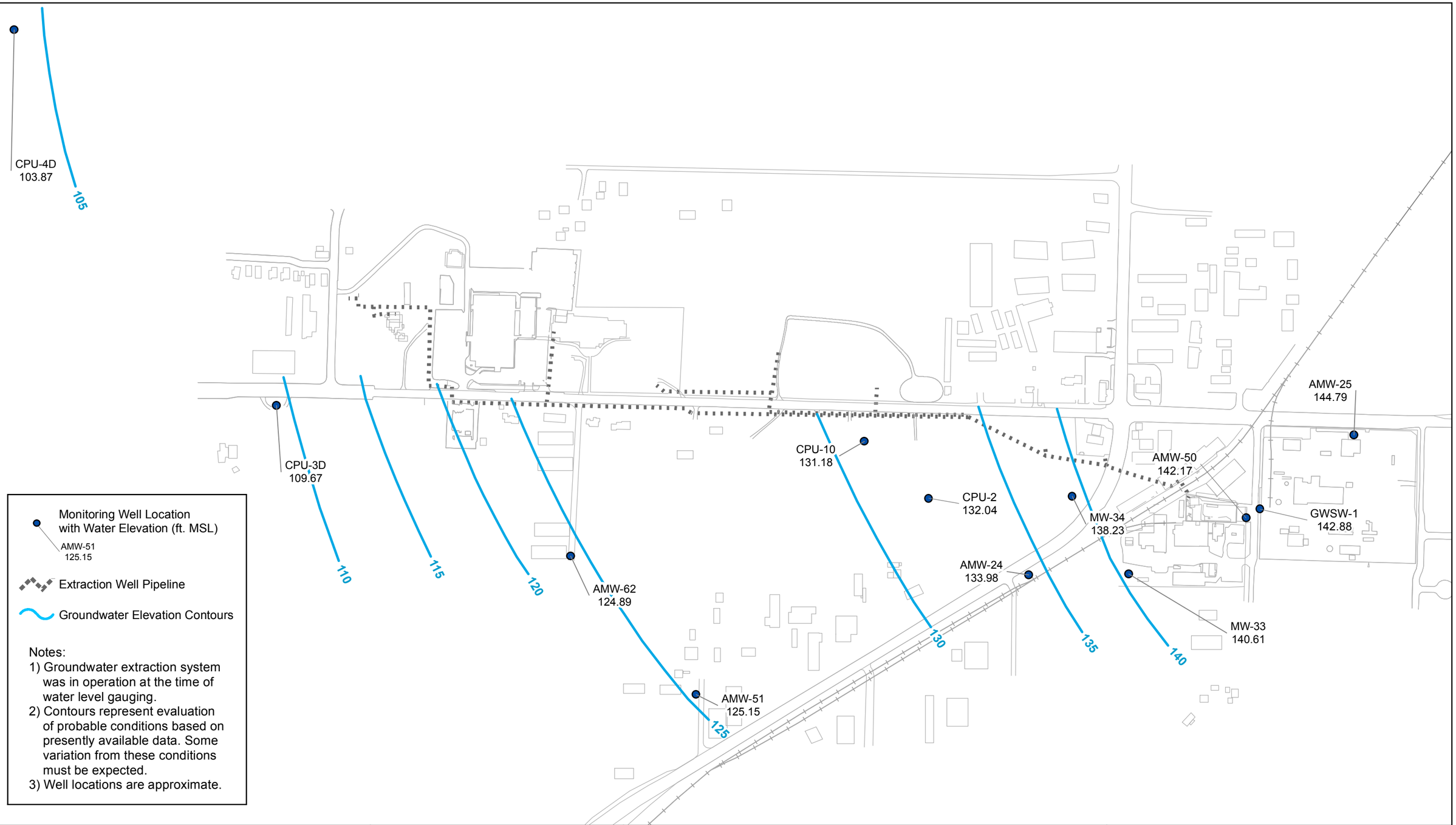

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FIGURE 8
TROUTDALE AQUIFER GROUNDWATER CONTOURS
FALL 2015

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.

AMW-23
AMW-43
MW-30
MW-41
AMW-63
AMW-44
AMW-45
AMW-42
MW-46
MW-47
MW-48
MW-35
MW-31
MW-32
MW-36
MW-29
MW-28
CPU-16
MW-37
Church of God
MW-24D
MW-25D
MW-27D
MW-23D
AMW-15
MW-21D
AMW-27
MW-49
AMW-61
MW-26D
CPU-13
MW-22D
AMW-14
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-17E
MW-18D
MW-16E
AMW-59
MW-14C
MW-12C
MW-9C
MW-9B
MW-14E
MW-10B, 10C
EC-1
PERMALUME
COLUMBIA VET
See Inset A
CPU-3D
CPU-3S
FERGUSON
HORN
CPU-15
GARRISON
CPU-12
CPU-10
CPU-14
CPU-1S, 1D
CPU-2
MW-34
MW-13C
MW-5A, 5B
MW-6A
MW-6B
MW-6C
MW-6D
MW-33
AMW-62
GRIMM
ZENT
BENNETT
AMW-24
Linde
Former Boomsnub Corporation
N.E. 51st Ave.
N.E. 43rd Ave.
COLF
FITZGERALD
AMW-51
N.E. 40th Ave.
Lewis & Clark Railroad

Inset A
N.E. 47th 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
PZ-2
AMW-53A
AMW-53B
AMW-53C
AMW-1A
AMW-1C
AMW-1B
PW-1B
MW-7B
MW-7C
AMW-58
MW-1A
MW-1B
MW-1C
GWSW-1
AMW-2B
AMW-2A
RAMW-2C
MW-11A, 11B
GWSW-2
AMW-50
AMW-54A
AMW-54C
AMW-56C
AMW-12A
AMW-19A
AMW-11A
MW-3A
MW-3B
MW-3C
MW-2A
MW-2B
MW-2C
AMW-56A
AMW-19B
AMW-55C
AMW-55A
IWS-2S
AMW-20
AMW-7A
PZ-1
AMW-57
AMW-3A
AMW-21
AMW-6A

- Monitoring Well
- Extraction Well
- Private Well
- Abandoned Monitoring Well
- Screened in Troutdale Aquifer
- Containment Vaults
- Extraction System Forcemain
- Toe-of-Plume Wells - Sentinel
- Toe-of-Plume Wells - Other
- Church of God Wells
- Intermediate Wells
- Proximal Wells
- TCE Source Wells
- Upgradient Wells

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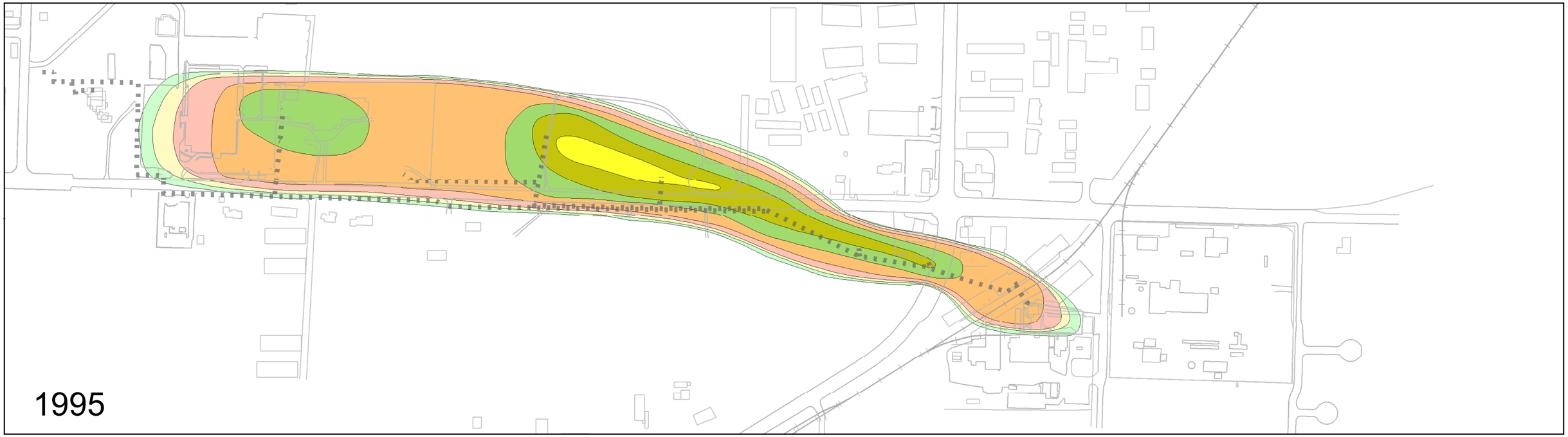
File Name: Fig_9_Well_Groupings

FIGURE 9
EXTRACTION AND MONITORING WELL GROUPINGS



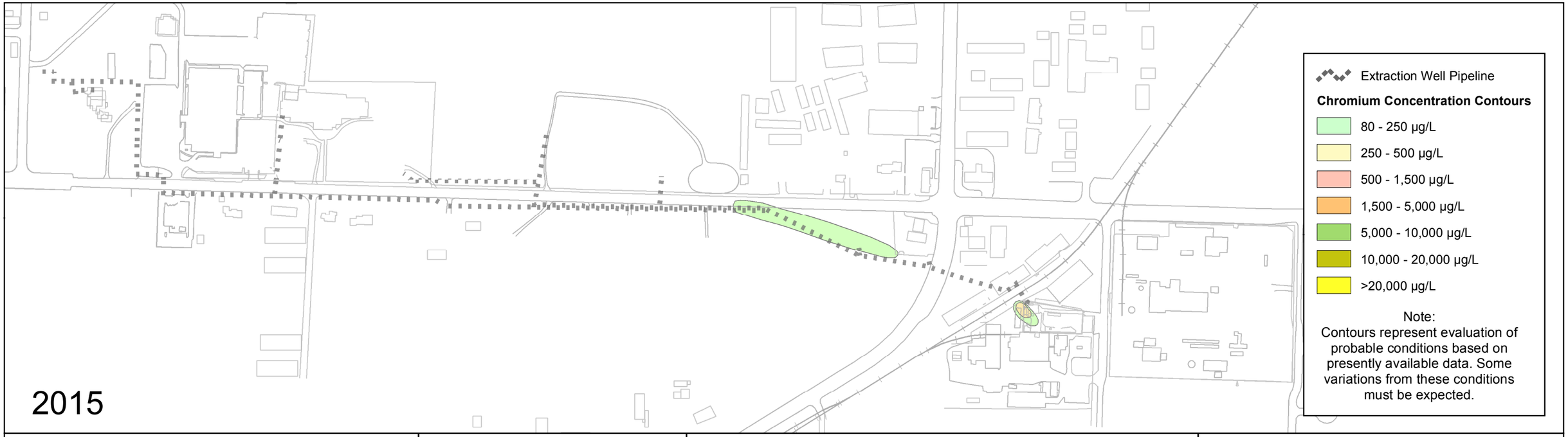


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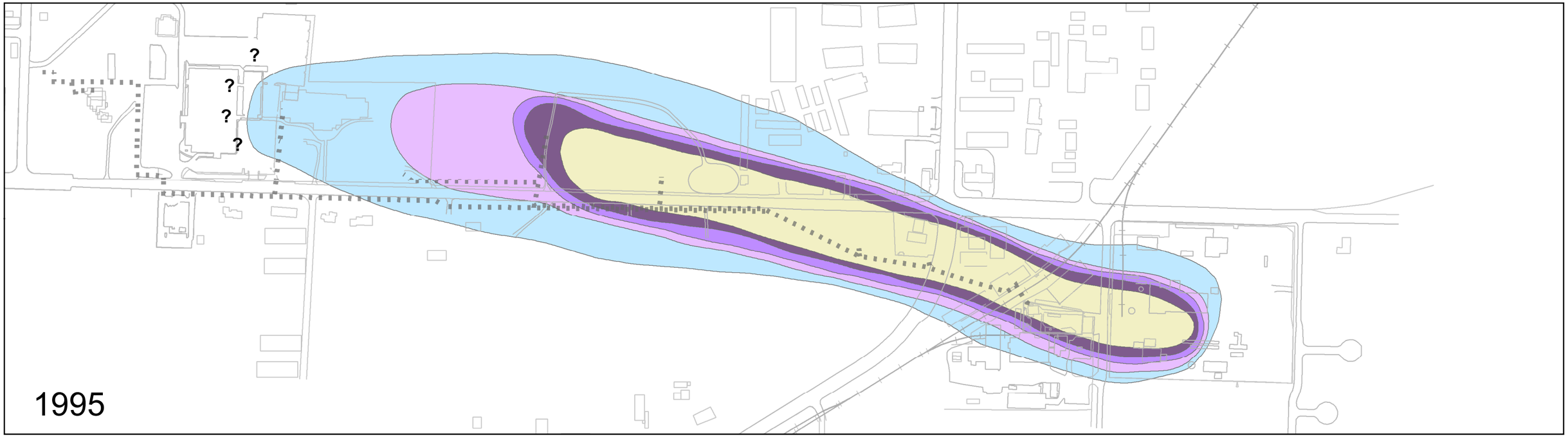
FIGURE 10
CHROMIUM PLUME COMPARISON
1995 VS. 2015



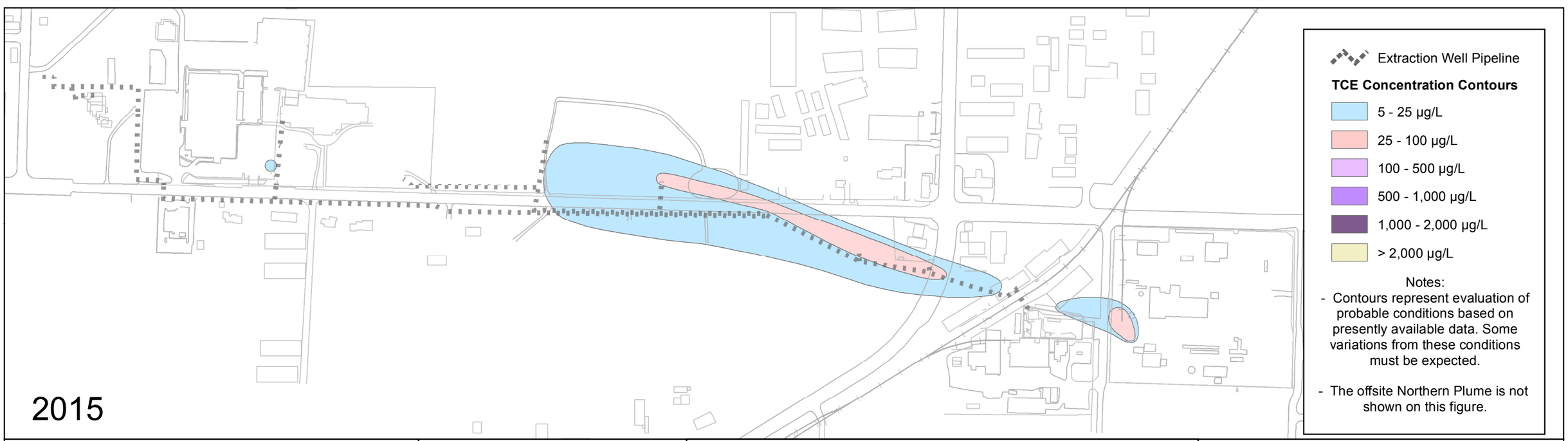


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FIGURE 11
TRICHLOROETHENE PLUME COMPARISON
1995 VS. 2015

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

Inset A
N.E. 47th 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
MW-7B
MW-7C
AMW-58
MW-1A
MW-1B
MW-1C
GWSW-1
AMW-2B
AMW-2A
RAMW-2C
MW-11A, 11B
GWSW-2
AMW-50
AMW-54A
AMW-54C
AMW-56C
AMW-12A
AMW-11A
AMW-19A
MW-3A
MW-3B
MW-3C
MW-2A
MW-2B
MW-2C
AMW-56A
AMW-19B
AMW-55C
AMW-55A
IWS-2S
AMW-20
AMW-7A
PZ-1
AMW-57
AMW-3A
AMW-21
AMW-6A

- Groundwater well with chromium concentration above the cleanup level of 80 µg/L during sampling in 2015
- Groundwater well with chromium concentration below the cleanup level of 80 µg/L during sampling in 2015
- Groundwater Monitoring Well
- Groundwater Extraction Well
- Groundwater Supply Well
- Abandoned Monitoring Well
- Screened in Troutdale
- Containment Vaults
- Extraction System Forcemain

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FIGURE 12
WELLS WITH CHROMIUM CONCENTRATIONS ABOVE THE CLEANUP LEVEL IN 2015

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
MW-41
AMW-63
AMW-44
AMW-45
AMW-42
MW-46
MW-47
MW-48
MW-35
MW-31
MW-32
MW-36
MW-24D
Church of God
MW-29
MW-28
CPU-16
MW-37
MW-25D
MW-49
AMW-27
AMW-61
MW-26D
CPU-13
MW-27D
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
AMW-59
MW-14C
MW-14E
MW-12C
MW-9C
MW-9B
MW-10B
MW-10C
MW-34
MW-13C
MW-5A, 5B
MW-6A
MW-6B
MW-6C
MW-6D
MW-33
EC-1
N.E. 78th St.
See Inset A
PERMALUME
COLUMBIA VET
Linde
Former Boomsnub Corporation
N.E. St. John's Rd.
N.E. 51st Ave.
N.E. 43rd Ave.
N.E. 40th Ave.
N.E. St. John's Rd.
N.E. 78th St.
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
AMW-51
COLF
FITZGERALD
Lewis & Clark Railroad

Inset A
N.E. 47th 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
AMW-53A
AMW-53B
AMW-53C
PW-1B
MW-7B
MW-7C
AMW-58
MW-1A
MW-1B
MW-1C
MW-11A, 11B
AMW-50
AMW-54A
AMW-54C
MW-3A
MW-3B
MW-3C
MW-2A
MW-2B
MW-2C
AMW-55C
AMW-55A
IWS-8S
IWS-8D
AMW-26
AMW-1A
AMW-1C
AMW-1B
GWSW-1
AMW-2B
AMW-2A
RAMW-2C
GWSW-2
AMW-56C
AMW-12A
AMW-19A
AMW-56A
AMW-19B
IWS-2S
AMW-3A
AMW-10A
PZ-2
AMW-11A
AMW-20
PZ-1
AMW-21
AMW-7A
AMW-57
AMW-6A

Groundwater Well with TCE concentration above the cleanup level of 5 µg/L during sampling in 2015
Groundwater Well with TCE concentration below the cleanup level of 5 µg/L during sampling in 2015
Groundwater Monitoring Well
Groundwater Extraction Well
Groundwater Supply Well
Abandoned Monitoring Well
Screened in Troutdale
Containment Vaults
Extraction System Forcemain

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FIGURE 13
WELLS WITH TCE CONCENTRATIONS
ABOVE THE CLEANUP LEVEL IN 2015

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TABLES

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TABLE 1. 2015 EXTRACTION WELL PUMPING RATES

Flow Rates (gpm)												
Well ID	**January**	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**
MW-6B	6.8	6.4	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
MW-10B	10.0	9.9	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
MW-10C	11.4	11.5	12.0	12.0	11.8	11.3	11.4	11.0	11.0	11.0	11.0	11.0
MW-14C	13.0	13.0	14.0	13.2	13.2	13.2	13.2	13.0	13.0	13.0	13.0	13.0
MW-14E	5.0	4.8	4.6	5.0	4.0	4.2	4.2	4.2	4.2	4.2	4.2	4.2
MW-18D	17.0	16.2	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
MW-19D	9.0	8.8	9.0	9.0	8.8	8.6	9.0	9.0	9.0	9.0	9.0	9.0
MW-20D	15.7	15.7	15.7	16.0	15.7	15.7	16.1	16.0	16.0	16.0	16.0	16.0
MW-21D	9.8	10.1	10.0	10.1	10.5	10.0	10.1	9.9	9.9	9.9	9.9	9.9
MW-22D	15.7	15.7	15.7	15.7	15.6	15.9	15.6	15.9	15.9	15.9	15.9	15.9
PW-1B	11.3	11.2	11.5	11.5	11.4	11.6	11.5	11.3	11.3	11.3	11.3	11.3
Total	**124.7**	**123.3**	**125.5**	**125.5**	**124**	**123.5**	**124.1**	**123.3**	**123.3**	**123.3**	**123.3**	**123.3**

Notes:
gpm = gallons per minute

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TABLE 2. WELLS AND RECOMMENDED SAMPLING FREQUENCIES

Well Name	Well Type	GW Model Layer	Top of Screen		Bottom of Screen		TCE Annual Evaluation (Last 8 Samples)								Chromium Annual Evaluation (Last 8 Samples)								2015 Sampling Frequency [1]		2016 Recommendations [2]		Well Use
			Depth	Elevation	Depth	Elevation	Sample Size	Starting sample Date	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Number of Conc. < Cleanup Goal	Remediation Monitoring Phase is Completed ? [3]	Sample Size	Starting sample Date	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Number of Conc. < Cleanup Goal	Remediation Monitoring Phase is Completed ? [3]	TCE	Chromium	TCE	Chromium	
Troutdale Wells																											
AMW-24	M/D	6	190	74.72	200	64.72	8	10/2012	10/2015	9.80	11.00	9.90	None	NO	8	10/2011	10/2014	2.60	13.60	13.30	8	**YES**	Annual	Every 5 Years	NC	NC	Troutdale well - TCE impacted
AMW-25	M/D	6	215	67.94	225	57.94	8	10/2000	10/2014	U	U	U	8	**YES**									Biennial	NFS(2014)	**NFS**	NA	Troutdale well - unimpacted; background well
AMW-50	M/D	6	185.19	97.59	195.19	87.59	8	10/2004	10/2014	U	U	U	8	**YES**									Biennial	NFS(2014)	**NFS**	NA	Troutdale well - unimpacted
AMW-51	M/D	6	185.7	72.74	195.7	62.74	8	05/2003	10/2014	U	0.24	0.15	8	**YES**									Biennial	NFS(2014)	**NFS**	NA	Troutdale well - unimpacted
AMW-62	M/D	6	185.73	72.93	195.73	62.93	8	10/2007	10/2014	U	U	U	8	**YES**									Biennial	NFS(2014)	**NFS**	NA	Troutdale well - unimpacted
CPU-2	M	6	186.13	73.4	196.13	63.4	8	10/2003	10/2014	U	U	U	8	**YES**									Biennial	NFS(2014)	**NFS**	NA	Troutdale well - unimpacted
CPU-3D	M/D	6	212.38	34.39	217.38	29.39	8	10/2003	10/2014	U	U	U	8	**YES**									Biennial	NFS(2014)	**NFS**	NA	Troutdale well - unimpacted
CPU-10	M	6	186.9	74.34	196.9	64.34	8	10/2003	10/2014	U	U	U	8	**YES**									Biennial	NFS(2014)	**NFS**	NA	Troutdale well - unimpacted
MW-33	M/D	6	205	67.55	215	57.55	8	10/2009	10/2015	8.50	14.00	8.50	None	NO	8	10/2009	10/2014	1.90	40.50	2.20	8	**YES**	Annual	Every 5 Years	NC	NC	Troutdale well - TCE impacted
MW-34	M/D	6	195	72.33	205	62.33	8	10/2003	10/2014	U	U	U	8	**YES**									Biennial	NFS(2014)	**NFS**	NA	Troutdale well - unimpacted
BENNETT	Other	N/A	N/A	N/A	180	N/A	8	10/2012	10/2015	2.00	6.90	5.20	4	NO	8	10/2011	04/2015	U	U	U	8	**YES**	Semiannual	Biennial	NC	**Every 5 years**	Troutdale well - TCE impacted; CPU request for semiannual TCE sampling
Upgradient Wells																											
AMW-6A	M/D	1	24	260.56	34	250.56	8	10/2008	10/2014	0.24	0.58	0.24	8	**YES**	8	10/2008	10/2014	5	11.5	9.60	8	**YES**	Biennial	Biennial	NC	NC	Infiltration gallery monitoring wel
AMW-7A	M/D	1	24.25	260.77	34.25	250.77	8	05/2008	10/2014	0.21	0.58	0.21	8	**YES**	8	05/2008	10/2014	U	4	0.70	8	**YES**	Biennial	Biennial	NC	NC	Infiltration gallery monitoring wel
AMW-8A	M	1	24.5	260.99	34.5	250.99	8	05/2009	10/2014	0.33	1.30	0.46	8	**YES**									Biennial	NA	NC	NC	TCE background well
AMW-10A	M/D	1	21.5	262.51	31.5	252.51	8	10/2008	10/2014	0.14	0.51	0.14	8	**YES**	8	10/2008	10/2014	2.8	18.7	8.30	8	**YES**	Biennial	Biennial	NC	NC	Infiltration gallery monitoring wel
AMW-11A	M/D	1	24	259.21	34	249.21	8	05/2008	10/2014	0.27	0.66	0.27	8	YES	8	05/2008	10/2014	1.7	5.9	1.70	8	**YES**	Biennial	Biennial	NC	NC	Infiltration gallery monitoring wel
TCE Source Wells																											
AMW-1A	M	1	24.24	259.85	34.24	249.85	8	04/2013	10/2015	0.55	25.00	25.00	3	NO									Semiannual	NA	NC	NA	OU2 well (TCE fluctuating above and below cleanup level)
AMW-2A	M	1	24.2	259.83	34.2	249.83	8	01/2015	10/2015	15.00	67.00	52.00	None	NO									Quarterly	NA	**Semiannual**	NA	OU-2 well; well cluster - most impacted (TCE fluctuating above and below cleanup level)
AMW-2B	M	1/2	47	237.11	57	227.11	8	01/2009	10/2015	0.34	0.69	0.41	8	**YES**									Annual	NA	**NFS**	NA	OU-2 well; well cluster - remediation monitoring complete
AMW-3A	M	1	24.5	259.42	34.5	249.42	8	05/2009	10/2015	0.34	0.85	0.53	8	**YES**									Annual	NA	**NFS**	NA	OU-2 well; remediation monitoring complete
AMW-12A	M	1	24.05	259.69	34.05	249.69	8	04/2013	10/2015	21.00	32.00	31.00	None	NO									Semiannual	NA	NC	NA	OU-2 well (TCE above cleanup level)
AMW-13A	M	1	23.8	260.08	33.8	250.08	8	05/2009	10/2015	U	0.94	0.26	8	**YES**									Annual	NA	**NFS**	NA	OU-2 well; remediation monitoring complete
AMW-19A	M	1	25	258.94	35	248.94	8	10/2009	10/2015	1.10	1.70	1.40	8	**YES**									Annual	NA	**Every 5 years**	NA	OU-2 boundary well
AMW-26	M	1	24.2	258.82	34.2	248.82	8	07/2008	10/2014	0.20	2.30	0.70	8	**YES**									Biennial	NA	**Every 5 years**	NA	OU-2 boundary well
AMW-52A	M	1	24.55	255.85	34.55	245.85	8	01/2009	10/2015	U	0.32	0.32	8	**YES**									Annual	NA	**NFS**	NA	OU-2 well; remediation monitoring complete
AMW-53A	M	1	22.2	258.85	32.2	248.85	8	01/2014	10/2015	0.13	31.00	11.00	1	NO									Quarterly	NA	**Semiannual**	NA	OU-2 well (TCE fluctuating above and below cleanup level)
AMW-54A	M	1	24.3	259.01	34.3	249.01	8	10/2010	10/2015	1.70	3.00	3.00	8	**YES**									Annual	Biennial	**Every 5 years**	NC	OU-2 boundary well and Cr background well
AMW-55A	M	1	20.83	261.28	30.83	251.28	8	01/2009	10/2015	0.82	1.30	1.00	8	**YES**									Annual	NA	**NFS**	NA	OU-2 well; remediation monitoring complete
AMW-56A	M	1	25.24	258.43	35.24	248.43	8	10/2009	10/2015	0.40	2.70	1.70	8	**YES**									Annual	NA	**Every 5 years**	NA	OU-2 boundary well
MW-1A	M	1	28.36	257.13	38.26	247.23	8	04/2013	10/2015	5.60	10.00	5.60	None	NO									Semiannual	NFS(2014)	NC	NA	OU-2 well (TCE fluctuating above and below cleanup level)
Proximal Wells																											
MW-2A	M	1	32.09	250.48	37.09	245.48	8	10/2004	10/2014	1.70	7.30	1.90	7	NO [4]	8	10/2011	10/2015	38.5	489	38.50	2	NO	Biennial	Annual	NC	NC	Well cluster - most impacted and Cr residual contamination
MW-3A	M	1	22.34	257.87	32.34	247.87									8	05/2003	10/2014	54.5	342	63.60	4	NO [4]	NFS(2009)	Biennial	NA	NC	Well cluster - most Cr impacted; TCE statistically below cleanup level, Cr below cleanup level
MW-3B	M	1	51.39	228.94	56.39	223.94	8	10/1999	10/2014	1.40	32.00	1.40	5	NO [4]									Biennial	NFS(2009)	NC	NA	Well cluster - most TCE impacted; Cr statistically below cleanup level
MW-4A	M	1	26.81	253.49	36.81	243.49									8	05/2003	10/2014	362	832	495.00	None	NO	NFS(2010)	Every 5 years	NA	NC	Well cluster - not optimal depth
MW-4B	M	1	39.7	240.45	44.7	235.45	8	10/1999	10/2014	3.40	380.00	3.40	3	NO	8	10/2009	10/2015	407	809	702.00	None	NO	Biennial	Annual	NC	NC	Well cluster - most impacted and Cr residual contamination
MW-6A	M	1	18.25	260.52	28.25	250.52									6	05/2003	10/2013	U	167	133.00	4	NO	NFS(2009)	Every 5 years	NA	NC	Well cluster - not optimal depth.
MW-6B	E	1	45.75	227.57	55.75	217.57	8	10/2012	10/2015	3.70	5.40	4.60	6	NO [4]	8	10/2012	10/2015	13.5	39.4	13.50	8	**YES**	Semiannual	Semiannual	NC	NC	Extraction well - active (also well cluster, most impacted)
MW-7B	M	1	47	233.02	57	223.02	7	04/1995	10/2014	3.60	984.00	3.60	1	NO									Every 5 years	NFS(2009)	NC	NA	Well cluster - adjacent to MW-4 cluster, less frequent sampling; Cr below cleanup level since 1998

TABLE 2. WELLS AND RECOMMENDED SAMPLING FREQUENCIES

Well Name	Well Type	GW Model Layer	Top of Screen		Bottom of Screen		TCE Annual Evaluation (Last 8 Samples)								Chromium Annual Evaluation (Last 8 Samples)								2015 Sampling Frequency [1]		2016 Recommendations [2]		Well Use
			Depth	Elevation	Depth	Elevation	Sample Size	Starting sample Date	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Number of Conc. < Cleanup Goal	Remediation Monitoring Phase is Completed ? [3]	Sample Size	Starting sample Date	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Number of Conc. < Cleanup Goal	Remediation Monitoring Phase is Completed ? [3]	TCE	Chromium	TCE	Chromium	
MW-8B	M	1	46.9	233.8	56.9	223.8	8	05/1998	10/2014	1.80	41.00	1.80	3	NO									Every 5 years	NFS(2009)	NC	NA	Plume area - not included in any other category; Cr statistically below cleanup level, TCE below cleanup level
MW-9B	M	1	44.9	230.52	54.9	220.52	8	10/1999	10/2014	2.80	55.00	2.80	3	NO									Biennial	NFS(2009)	NC	NA	Well cluster - most TCE impacted; Cr below cleanup level since 1997, TCE below cleanup level since 2012
MW-10B	E	1	48	225.24	58	215.24	8	04/2012	10/2015	11.00	16.00	11.00	None	NO	8	04/2012	10/2015	33.5	39.6	33.50	8	**YES**	Semiannual	Semiannual	NC	NC	Extraction well - active (also well cluster)
MW-10C	E	1	70	203.25	80	193.25	8	04/2012	10/2015	2.00	3.00	2.00	8	**YES**	8	04/2012	10/2015	58.8	116	58.80	4	NO	Semiannual	Semiannual	NC	NC	Extraction well - active (also well cluster)
MW-12C	M	1	71.2	203.11	81.2	193.11	8	10/2005	10/2014	0.89	29.00	0.89	2	NO									Biennial	NFS(2010)	NC	NA	TCE Plume boundary; Cr statistically below cleanup level
MW-13C	M	1	65.03	206.94	75.03	196.94	8	10/2008	10/2014	1.90	5.80	2.40	4	NO									Biennial	NFS(2010)	NC	NA	TCE Plume boundary; Cr statistically below cleanup level, TCE fluctuates above and below cleanup level
PW-1B	E	1	48	228.56	58	218.56	8	04/2013	10/2015	2.00	2.90	2.30	8	**YES**	8	04/2013	10/2015	34.4	46.5	38.60	8	**YES**	Semiannual	Semiannual	NC	NC	Extraction well - active
Intermediate Wells																											
AMW-16	M	2	76.83	185.15	86.83	175.15	8	04/2012	10/2015	0.17	94.00	80.00	4	NO									Semiannual	NFS(2010)	NC	NA	**Northern Plume** monitoring well; Cr statistically below the cleanup level
AMW-17	M/D	1	81	180.87	91	170.87	8	07/2013	10/2015	110.00	230.00	110.00	None	NO									Semiannual	NFS(2008)	NC	NA	**Northern Plume** monitoring well; Cr statistically below the cleanup level
AMW-18	M	1	92.69	186.15	102.69	176.15	8	07/2013	10/2015	27.00	42.00	42.00	None	NO									Semiannual	NFS(2008)	NC	NA	**Northern Plume** monitoring well; Cr statistically below the cleanup level
AMW-59	M/D	3	134.74	134.6295	139.74	129.6295	8	10/2006	10/2014	58.00	310.00	58.00	None	NO									Biennial	NFS(2009)	NC	NA	Plume area - silt well; Cr statistically below the cleanup level
AMW-64	M	2	88.4	177.73	98.4	167.73	8	04/2013	10/2015	45.00	94.00	45.00	None	NO									Semiannual	NA	NC	NA	**Northern Plume** monitoring well
CPU-14	M	2	60.43	197.13	70.43	187.13	8	10/2009	10/2015	5.20	10.00	5.50	None	NO	8	10/2009	04/2015	U	77.4	U	8	YES	Annual	Biennial	NC	NC	Plume boundary
MW-14C	E	1	70	201.22	80	191.22	8	04/2013	10/2015	10.00	14.00	11.00	None	NO	8	04/2013	10/2015	58.2	67.6	58.20	8	YES	Semiannual	Semiannual	NC	NC	Extraction well - active (also well cluster)
MW-14E	E	2	115	153.95	125	143.95	8	04/2012	10/2015	51.00	75.00	64.00	None	NO	8	04/2012	10/2015	39.9	44.5	44.50	8	**YES**	Semiannual	Semiannual	NC	NC	Extraction well - active (also well cluster)
MW-15E	M	3	95.7	168.97	105.7	158.97	8	10/2011	10/2015	2.20	5.10	2.40	7	NO [4]									Annual	NFS (2008)	NC	NA	Monitoring for potential **Northern Plume** impacts; Cr statistically below the cleanup level, TCE below cleanup level since 2012.
MW-18D	E	1	73.4	189.34	93.4	169.34	8	04/2012	10/2015	31.00	49.00	34.00	None	NO	8	04/2012	10/2015	87.2	109	87.20	None	NO	Semiannual	Semiannual	NC	NC	Extraction well - active (also well cluster)
MW-18E	M/D	3	112.57	149.1965	122.57	139.1965	8	10/2008	10/2015	69.00	250.00	69.00	None	NO									Annual	NFS(2010)	NC	NA	Plume area - TCE residual contamination
MW-19D	E	1	76.2	181.78	91.2	166.78	8	04/2012	10/2015	21.00	34.00	24.00	None	NO	8	04/2012	10/2015	88.9	113	91.70	None	NO	Semiannual	Semiannual	NC	NC	Extraction well - active
MW-20D	E	2	79.7	193.45	89.7	183.45	8	10/2013	10/2015	25.00	39.00	30.00	None	NO	8	10/2013	10/2015	54.6	58	56.60	8	**YES**	Semiannual	Semiannual	NC	NC	Extraction well - active
MW-38	M	1	77	187.2	82	182.2	8	04/2011	10/2015	7.40	78.00	50.00	None	NO									Semiannual	NA	NC	NA	**Northern Plume** monitoring well
PZ-39	M	2	88	176.37	90	174.37	8	04/2012	10/2015	29.00	56.00	36.00	None	NO									Semiannual	NFS(2010)	NC	NA	Monitoring for potential **Northern Plume** impacts
Church of God Wells																											
AMW-27	E/M	3	78	194.60	88	184.6	8	01/2014	10/2015	1.60	5.30	3.30	6	NO [4]	8	10/2011	10/2014	U	38.6	U	8	**YES**	Semiannual	Every 5 Years	**Annual**	**NFS**	Extraction well - inactive; TCE below cleanup level, Cr remediation monitoring complete
AMW-61	M	3	91.86	181.92	96.86	176.92	8	10/2006	10/2015	2.40	43.00	5.50	1	NO									Annual	NFS(2010)	NC	NA	Plume area - silt well (Cr below cleanup level)
CPU-12	M	2	61.12	214.11	71.12	204.11	8	10/2009	10/2015	2.20	5.10	2.20	7	NO									Biennial	NFS(2010)	NC	NA	TCE Plume boundary (Cr below cleanup level)
CPU-13	E	3	80	198.99	90	188.99	8	04/2011	10/2014	0.92	1.80	0.94	8	**YES**	8	04/2011	10/2014	16.4	54.8	45.70	8	**YES**	Biennial	Biennial	**Every 5 years**	**Every 5 years**	New sentinel well; TCE and Cr below cleanup levels
MW-21D	E	2	56	201.56	66	191.56	8	10/2012	10/2015	2.40	5.30	2.80	6	NO [4]	8	10/2012	10/2015	8.3	12	9.10	8	**YES**	Semiannual	Semiannual	NC	NC	Extraction well - active
MW-22D	E	3	54	215.02	64	205.02	8	04/2012	10/2015	2.60	6.80	2.80	6	NO [4]	8	04/2012	10/2015	18.6	28.5	18.60	8	**YES**	Semiannual	Semiannual	NC	NC	Extraction well - active
MW-23D	M	3	75.86	191.70	90.86	176.70	8	10/2008	10/2015	1.20	130.00	130.00	7	NO									Annual	NFS(2010)	**Semiannual**	NA	**Northern Plume** monitoring well; Cr statistically below cleanup level
MW-25D	E	2	70	202.13	80	192.13	8	04/2011	10/2014	1.30	3.00	1.60	8	**YES**	8	04/2011	10/2014	U	6.3	6.30	8	**YES**	Biennial	Biennial	**NFS**	**NFS**	Former extraction well; TCE and Cr remediation monitoring complete
MW-26D	E	3	83	189.86	93	179.86	8	10/2010	10/2014	0.35	2.10	0.35	8	**YES**	8	10/2010	10/2014	6.6	38.6	11.40	8	**YES**	Biennial	Biennial	**NFS**	**NFS**	Former extraction well; TCE and Cr remediation monitoring complete
MW-27D	E	2	61.1	208.15	71.1	198.15	8	10/2010	10/2014	0.63	1.50	1.50	8	**YES**	8	10/2010	10/2014	U	12.2	U	8	**YES**	Biennial	Biennial	**Every 5 years**	**Every 5 years**	New sentinel well; TCE and Cr below cleanup levels

TABLE 2. WELLS AND RECOMMENDED SAMPLING FREQUENCIES

Well Name	Well Type	GW Model Layer	Top of Screen		Bottom of Screen		TCE Annual Evaluation (Last 8 Samples)								Chromium Annual Evaluation (Last 8 Samples)								2015 Sampling Frequency [1]		2016 Recommendations [2]		Well Use
			Depth	Elevation	Depth	Elevation	Sample Size	Starting sample Date	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Number of Conc. < Cleanup Goal	Remediation Monitoring Phase is Completed ? [3]	Sample Size	Starting sample Date	Most Recent Sample Date	Min. Conc. (ug/L)	Max. Conc. (ug/L)	Most Recent Conc. (ug/L)	Number of Conc. < Cleanup Goal	Remediation Monitoring Phase is Completed ? [3]	TCE	Chromium	TCE	Chromium	
MW-49	E	2	71.2	200.48	81.2	190.48	8	04/2010	10/2014	1.10	2.40	1.60	8	**YES**	8	04/2010	10/2014	9.3	18.3	12.20	8	**YES**	Biennial	Biennial	**NFS**	**NFS**	Former extraction well; TCE and Cr remediation monitoring complete
Toe Wells																											
AMW-42	E	3	87	168.88	102	153.88	8	10/2006	10/2014	0.34	1.30	0.65	8	**YES**	8	10/2006	10/2014	U	32.2	U	8	**YES**	Every 5 years	Every 5 years	**NFS**	**NFS**	TCE and Cr remediation monitoring complete
AMW-63	M	2	76.13	181.29	86.13	171.29	8	07/2007	10/2014	U	0.17	0.17	8	**YES**	8	07/2007	10/2014	U	12.4	U	8	**YES**	Every 5 years	Every 5 years	NC	NC	TCE and Cr are statistically below cleanup level. EPA request for sampling every 5 years.
MW-31	E	2	75	187.88	85	177.88	8	10/2004	10/2012	0.20	0.57	0.26	8	**YES**	8	10/2004	10/2012	7.3	12.9	11.40	8	**YES**	Every 5 years	Every 5 years	**NFS**	**NFS**	TCE and Cr remediation monitoring complete
MW-35	E/M	2	79.5	176.20	89.5	166.20	8	10/2011	10/2015	2.10	5.40	3.70	5	NO [4]	8	10/2009	04/2015	U	30.6	U	8	**YES**	Semiannual	Biennial	NC	**NFS**	TCE below the cleanup level; Cr remediation monitoring complete
MW-41	E/M	2	74	179.08	84	169.08	8	05/2008	10/2014	U	U	U	8	**YES**	8	05/2008	10/2014	U	U	U	8	**YES**	Every 5 years	Every 5 years	NC	NC	TCE and Cr are statistically below cleanup level. EPA request for sampling every 5 years.

NOTES:

[1] The 2015 sampling frequencies shown are those recommended in the 2014 Annual Status Report for the Boomsnub/Airco Superfund Site.

[2] For wells with 2016 recommendations for a change in sampling frequency, additional explanation is provided in Table 4.

[3] The "Remediation Monitoring Phase is Completed" determination is per EPA Guidance (EPA 2013) based on the conservative most recent eight sample data points. The remediation monitoring phase is completed when the last eight sample concentrations (the guidance specifies a minimum of four) are lower than the cleanup level. This does not meet the EPA requirements for determining site closure.

[4] The remediation monitoring phase is complete for this parameter if using the minimum four most recent sample data points instead of eight.

Cr = Chromium.
E = Extraction well.
E/M = Extraction well with pump pulled; now sampled as a monitoring well.
EPA = U.S. Environmental Protection Agency.
GW = Groundwater.
IWS = In-well stripping
M = Monitoring well.
MAROS = Monitoring and Remediation Optimization System.
M/D = Monitoring well with dedicated pump installed.
NA = Not applicable.
NFS = No further sampling (dates in parentheses indicate the Annual Report in which this recommendation was first made.)
NC = No change to the current sampling frequency.
TCE = Trichloroethene.
TOPPS = Toe of plume pilot study.
U = Analyte not detected above the specified reporting limit.
µg/L = Micrograms per liter.
Data used for the Annual Screening are from 1995 to the present. Maximum concentrations presented are based on data collected from 1995 through the present.
Biennial sampling - these wells will be sampled next in Fall 2016.
Every 5 years - these wells will be sampled next in Fall 2019.
Wells designated NFS in previous Annual Reports have been deleted from this table.
Where no entries are present for one of the two constitutents (TCE or Cr), that constituent is not being sampled in that well.
Bold, highlighted text indicates changes from the 2014 Annual Report for recommendations for sampling frequency.

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TABLE 3. SUMMARY OF 2016 WELL SAMPLING FREQUENCIES

Well Name	Recommendation					Rationale for Recommendation
	Well Type	Semi-annual	Annual	Biennial	Every 5 Years	
Troutdale wells						
AMW-24	M/D		TCE		Cr	Troutdale well - TCE impacted
MW-33	M/D		TCE		Cr	Troutdale well - TCE impacted
BENNETT	Other	TCE			Cr	Troutdale well - TCE impacted; CPU request for semiannual TCE sampling
Upgradient Wells						
AMW-6A	M/D			X		Infiltration gallery monitoring well
AMW-7A	M/D			X		Infiltration gallery monitoring well
AMW-8A	M			TCE		TCE background well
AMW-10A	M/D			X		Infiltration gallery monitoring well
AMW-11A	M/D			X		Infiltration gallery monitoring well
TCE Source Wells						
AMW-1A	M	TCE				OU2 well (TCE fluctuating above and below cleanup level)
AMW-2A	M	TCE				OU-2 well; well cluster - most impacted (TCE fluctuating above and below cleanup level)
AMW-12A	M	TCE				OU-2 well (TCE above cleanup level)
AMW-19A	M				TCE	OU-2 boundary well
AMW-26	M				TCE	OU-2 boundary well
AMW-53A	M	TCE				OU-2 well (TCE fluctuating above and below cleanup level)
AMW-54A	M			Cr	TCE	OU-2 boundary well and Cr background well
AMW-56A	M				TCE	OU-2 boundary well
MW-1A	M	TCE				OU-2 well (TCE fluctuating above and below cleanup level)
Proximal Wells						
MW-2A	M		Cr	TCE		Well cluster - most impacted and Cr residual contamination
MW-3A	M			Cr		Well cluster - most Cr impacted; TCE statistically below cleanup level, Cr below cleanup level
MW-3B	M			TCE		Well cluster - most TCE impacted; Cr statistically below cleanup level
MW-4A	M				Cr	Well cluster - not optimal depth
MW-4B	M		Cr	TCE		Well cluster - most impacted and Cr residual contamination
MW-6A	M				Cr	Well cluster - not optimal depth.
MW-6B	E	X				Extraction well - active (also well cluster, most impacted)
MW-7B	M				TCE	Well cluster - adjacent to MW-4 cluster, less frequent sampling; Cr below cleanup level since 1998
MW-8B	M				TCE	Plume area - not included in any other category; Cr statistically below cleanup level, TCE below cleanup level
MW-9B	M			TCE		Well cluster - most TCE impacted; Cr below cleanup level since 1997, TCE below cleanup level since 2012
MW-10B	E	X				Extraction well - active (also well cluster)
MW-10C	E	X				Extraction well - active (also well cluster)
MW-12C	M			TCE		TCE Plume boundary; Cr statistically below cleanup level
MW-13C	M			TCE		TCE Plume boundary; Cr statistically below cleanup level, TCE fluctuates above and below cleanup level
PW-1B	E	X				Extraction well - active

TABLE 3. SUMMARY OF 2016 WELL SAMPLING FREQUENCIES

Well Name	Recommendation					Rationale for Recommendation
	Well Type	Semi-annual	Annual	Biennial	Every 5 Years	
Intermediate Wells						
AMW-16	M	TCE				Northern Plume monitoring well; Cr statistically below the cleanup level
AMW-17	M	TCE				Northern Plume monitoring well; Cr statistically below the cleanup level
AMW-18	M	TCE				Northern Plume monitoring well; Cr statistically below the cleanup level
AMW-59	M/D			TCE		Plume area - silt well; Cr statistically below the cleanup level
AMW-64	M	TCE				Northern Plume monitoring well
CPU-14	M		TCE	Cr		Plume boundary
MW-14C	E	X				Extraction well - active (also well cluster)
MW-14E	E	X				Extraction well - active (also well cluster)
MW-15E	M		TCE			Monitoring for potential Northern Plume impacts; Cr statistically below the cleanup level, TCE below cleanup level since 2012.
MW-18D	E	X				Extraction well - active (also well cluster)
MW-18E	M		TCE			Plume area - TCE residual contamination
MW-19D	E	X				Extraction well - active
MW-20D	E	X				Extraction well - active
MW-38	M	TCE				Northern Plume monitoring well
PZ-39	M	TCE				Monitoring for potential Northern Plume impacts
Church of God Wells						
AMW-27	E/M		TCE			Extraction well - inactive; TCE below cleanup level, Cr remediation monitoring complete
AMW-61	M		TCE			Plume area - silt well (Cr below cleanup level)
CPU-12	M			TCE		TCE Plume boundary (Cr below cleanup level)
CPU-13	E/M				X	New sentinel well; TCE and Cr below cleanup levels
MW-21D	E	X				Extraction well - active
MW-22D	E	X				Extraction well - active
MW-23D	M	TCE				Northern Plume monitoring well; Cr statistically below cleanup level
MW-27D	E/M				X	New sentinel well; TCE and Cr below cleanup levels
Other Toe Wells						
AMW-63	M				X	TCE and Cr are statistically below cleanup level. EPA request for sampling every 5 years.
MW-35	E/M	TCE				TCE below the cleanup level; Cr remediation monitoring complete
MW-41	E/M				X	TCE and Cr are statistically below cleanup level. EPA request for sampling every 5 years.
						Total Wells
Total Wells:		25	9	16	15	65

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

NOTES:

Wells designated no further sampling (NFS) have been deleted from this table.

Cr	= Chromium	EPA	= U.S. Environmental Protection Agency
TCE	= Trichloroethene	E	= Extraction well
X	= TCE and chromium	E/M	= Extraction well with pump pulled; now sampled as a monitoring well
		M	= Monitoring well
		M/D	= Monitoring well with dedicated pump installed

Wells for biennial sampling will be sampled next in Fall 2016.

Wells for sampling every five years will be sampled next in Fall 2019.

TABLE 4. WELLS WITH REMEDIATION MONITORING COMPLETE AND/OR SAMPLING FREQUENCY CHANGE RECOMMENDED FOR 2016

Well Group	Well ID	Remediation Monitoring Complete		Recommended Sampling Frequency and Reason
		TCE	Cr	
Wells with Remediation Monitoring Complete for TCE and/or Cr				
Troutdale	AMW-25	Yes	NFS	Change TCE from biennial to NFS. Per EPA Guidance, remediation monitoring is complete.
	AMW-50	Yes	NFS	Change TCE from biennial to NFS. Per EPA Guidance, remediation monitoring is complete.
	AMW-51	Yes	NFS	Change TCE from biennial to NFS. Per EPA Guidance, remediation monitoring is complete.
	AMW-62	Yes	NFS	Change TCE from biennial to NFS. Per EPA Guidance, remediation monitoring is complete.
	CPU-2	Yes	NFS	Change TCE from biennial to NFS. Per EPA Guidance, remediation monitoring is complete.
	CPU-3D	Yes	NFS	Change TCE from biennial to NFS. Per EPA Guidance, remediation monitoring is complete.
	CPU-10	Yes	NFS	Change TCE from biennial to NFS. Per EPA Guidance, remediation monitoring is complete.
	MW-34	Yes	NFS	Change TCE from biennial to NFS. Per EPA Guidance, remediation monitoring is complete.
	Bennett	No	Yes	Change Cr from biennial to every 5 years for consistency with other TCE-impacted Troutdale wells
Upgradient	AMW-6A	Yes	Yes	No change for TCE or Cr - Infiltration gallery montoring well.
	AMW-7A	Yes	Yes	No change for TCE or Cr - Infiltration gallery montoring well.
	AMW-10A	Yes	Yes	No change for TCE or Cr - Infiltration gallery montoring well.
	AMW-11A	Yes	Yes	No change for TCE or Cr - Infiltration gallery montoring well.
TCE Source	AMW-2B	Yes	NA	Change TCE from annual to NFS. Per EPA Guidance, remediation monitoring is complete. Also, well screened deeper than contamination.
	AMW-3A	Yes	NA	Change TCE from annual to NFS. Per EPA Guidance, remediation monitoring is complete. Also, well is south of OU-2 contamination.
	AMW-13A	Yes	NA	Change TCE from annual to NFS. Per EPA Guidance, remediation monitoring is complete. Also, well is north of OU-2 contamination.
	AMW-19A	Yes	NA	Change TCE from annual to every 5 years. Per EPA Guidance, remediation monitoring is complete; however will continue to use well to monitor southeast boundary of OU-2.
	AMW-26	Yes	NA	Change TCE from annual to every 5 years. Per EPA Guidance, remediation monitoring is complete; however will continue to use well to monitor northern boundary of OU-2.
	AMW-52A	Yes	NA	Change TCE from annual to NFS. Per EPA Guidance, remediation monitoring is complete. Also, well is north of the OU-2 contamination.
	AMW-54A	Yes	NA	Change TCE from annual to every 5 years. Per EPA Guidance, remediation monitoring is complete; however will continue to use well to monitor the south boundary of OU-2.
	AMW-55A	Yes	NA	Change TCE from annual to NFS. Per EPA Guidance, remediation monitoring is complete. Also, well is south of OU-2 contamination.
	AMW-56A	Yes	NA	Change TCE from annual to every 5 years. Per EPA Guidance, remediation monitoring is complete; however will continue to use well to monitor south boundary of OU-2.
Proximal	MW-6B	No*	Yes	No change - extraction well.
	MW-10B	No	Yes	No change - extraction well.
	MW-10C	Yes	No	No change - extraction well.
	PW-1B	Yes	Yes	No change - extraction well.

TABLE 4. WELLS WITH REMEDIATION MONITORING COMPLETE AND/OR SAMPLING FREQUENCY CHANGE RECOMMENDED FOR 2016

Well Group	Well ID	Remediation Monitoring Complete		Recommended Sampling Frequency and Reason
		TCE	Cr	
Intermediate	CPU-14	No	Yes	No change - keep sampling as a Cr boundary well.
	MW-14C	No	Yes	No change - extraction well.
	MW-14E	No	Yes	No change - extraction well.
	MW-20D	No	Yes	No change - extraction well.
Church of God	AMW-27	No*	Yes	Change TCE from semiannual to annual as concentrations are below the cleanup level; change Cr from every 5 years to NFS based on remediation monitoring complete.
	CPU-13	Yes	Yes	Change TCE and Cr from biennial to every 5 years; use as new sentinel wells
	MW-21D	No*	Yes	No change - extraction well.
	MW-22D	No*	Yes	No change - extraction well.
	MW-25D	Yes	Yes	Change TCE and Cr from biennial to NFS. Per EPA Guidance, remediation monitoring is complete.
	MW-26D	Yes	Yes	Change TCE and Cr from biennial to NFS. Per EPA Guidance, remediation monitoring is complete.
	MW-27D	Yes	Yes	Change TCE and Cr from biennial to every 5 years; use as new sentinel wells.
	MW-49	Yes	Yes	Change TCE and Cr from biennial to NFS. Per EPA Guidance, remediation monitoring is complete
Toe of Plume	AMW-42	Yes	Yes	Change TCE and Cr from every 5 years to NFS. Per EPA Guidance, remediation monitoring is complete.
	AMW-63	Yes	Yes	No change - EPA request for sampling every 5 years.
	MW-31	Yes	Yes	Change TCE and Cr from every 5 years to NFS. Per EPA Guidance, remediation monitoring is complete.
	MW-35	No*	Yes	No change for TCE; change Cr sampling from biennial to NFS based on remediation monitoring complete.
	MW-41	Yes	Yes	No change - EPA request for sampling every 5 years.
Wells with Remediation Not Complete but Sampling Frequency Change Recommended				
TCE Source	AMW-2A	No	NFS	Change TCE from quarterly to semiannual as agreed with EPA; OU-2 shutdown monitoring complete.
	AMW-53A	No	NFS	Change TCE from quarterly to semiannual as agreed with EPA; OU-2 shutdown monitoring complete
Church of God	MW-23D	No	NFS	Change TCE from annual to semiannual due to Northern Plume impacts

Notes:
* = The remediation monitoring phase is complete for this parameter if using the minimum four most recent sample data points instead of eight.
Cr = chromium
NA = Not applicable (this well was not sampled for this parameter)
NFS = parameter not evaluated since it is no longer monitored
TCE = trichloroethene
Blue **text indicates changes from the 2014 Annual Report for recommendations for sampling frequency.**

APPENDIX A

CHROMIUM CONCENTRATIONS IN GROUNDWATER

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APPENDIX A-1

CHROMIUM CONCENTRATIONS – SUMMARY TABLE

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A-1. Chromium Concentration Summary

Well Group	Well	Spring 2014	Fall 2014	Spring 2015	Fall 2015
Proximal	MW-2A	--	**130**	--	39.8
	MW-4B	--	**809**	--	**702**
	MW-6B	39.4	14.8	25.7	13.5
	MW-10B	37.6	34.1	35.2	33.5
	MW-10C	**96.6**	67.3	71	58.8
	PW-1B	46.5	35.7	39.1	38.6
Intermediate	CPU-14	--	53.6	37.3 UJ	--
	MW-14C	65	67.6	59.7	58.2
	MW-14E	40.2	42	44.3	44.5
	MW-18D	**92.3**	**91.1**	**88.9**	**87.2**
	MW-19D	**95.9**	**91.7**	**88.9**	**91.7**
	MW-20D	57.1	55.5	58	56.6
Church of God	MW-21D	9.1	8.9	8.3	9.1
	MW-22D	27.8	20.3	20	18.6
Toe of Plume	MW-35	--	29.3	14.7 UJ	--
Troutdale Aquifer	BENNETT	4.0 U	4.0 U	4.0 U	--

NOTES:

Only wells sampled for chromium during 2015 are included in this table.
Results are for total chromium in micrograms per liter (µg/L).
Results shown in **red bold** exceed the Site cleanup level of 80 µg/L.

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.
-- = Well not sampled during that monitoring event.
U = Analyte not detected above the specified reporting limit.
UJ = The analyte was not detected, but the associated limit of quantitation is estimated due to discrepancies in the quality control criteria.

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APPENDIX A-2

CHROMIUM CONCENTRATIONS – BY WELL GROUPING

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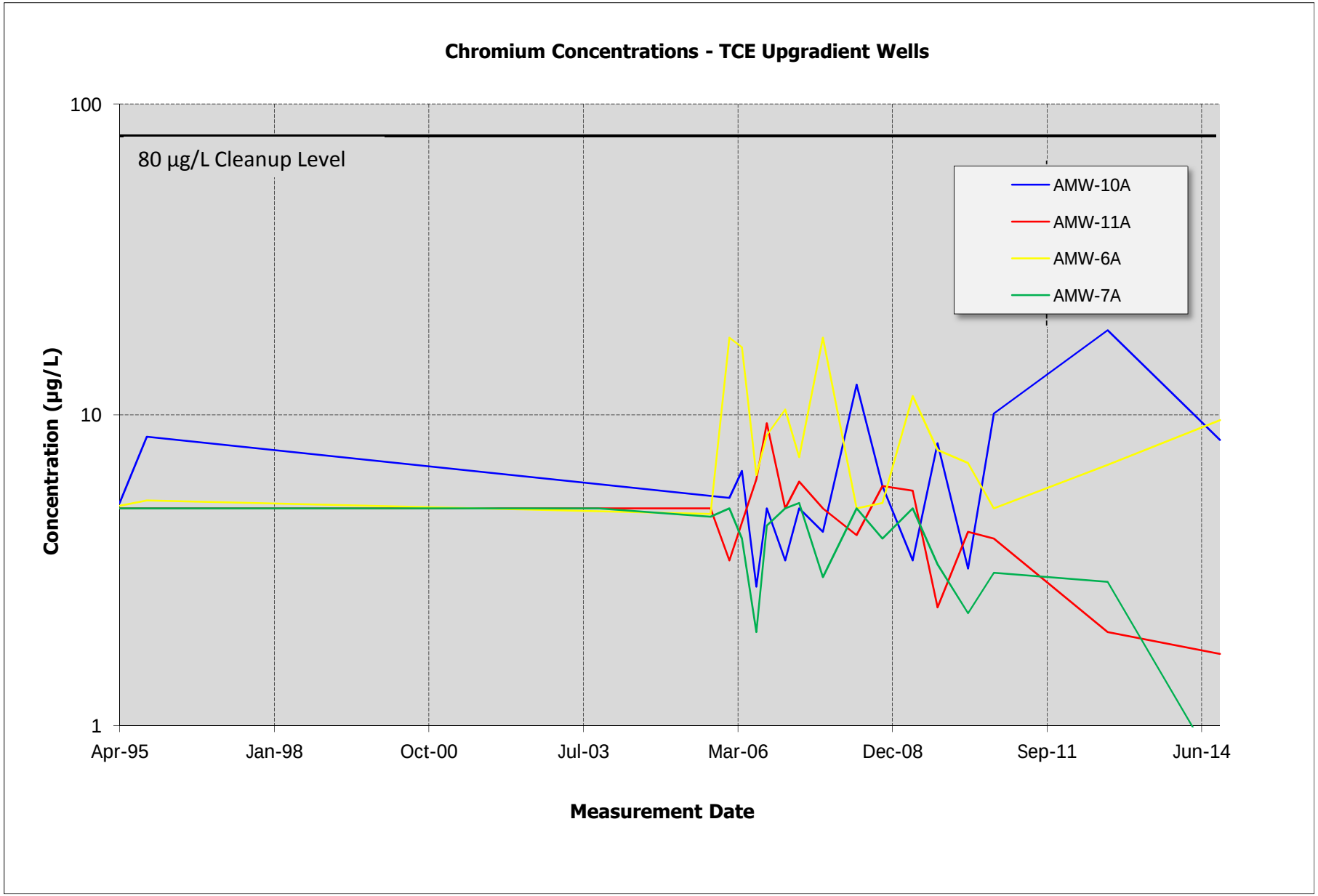
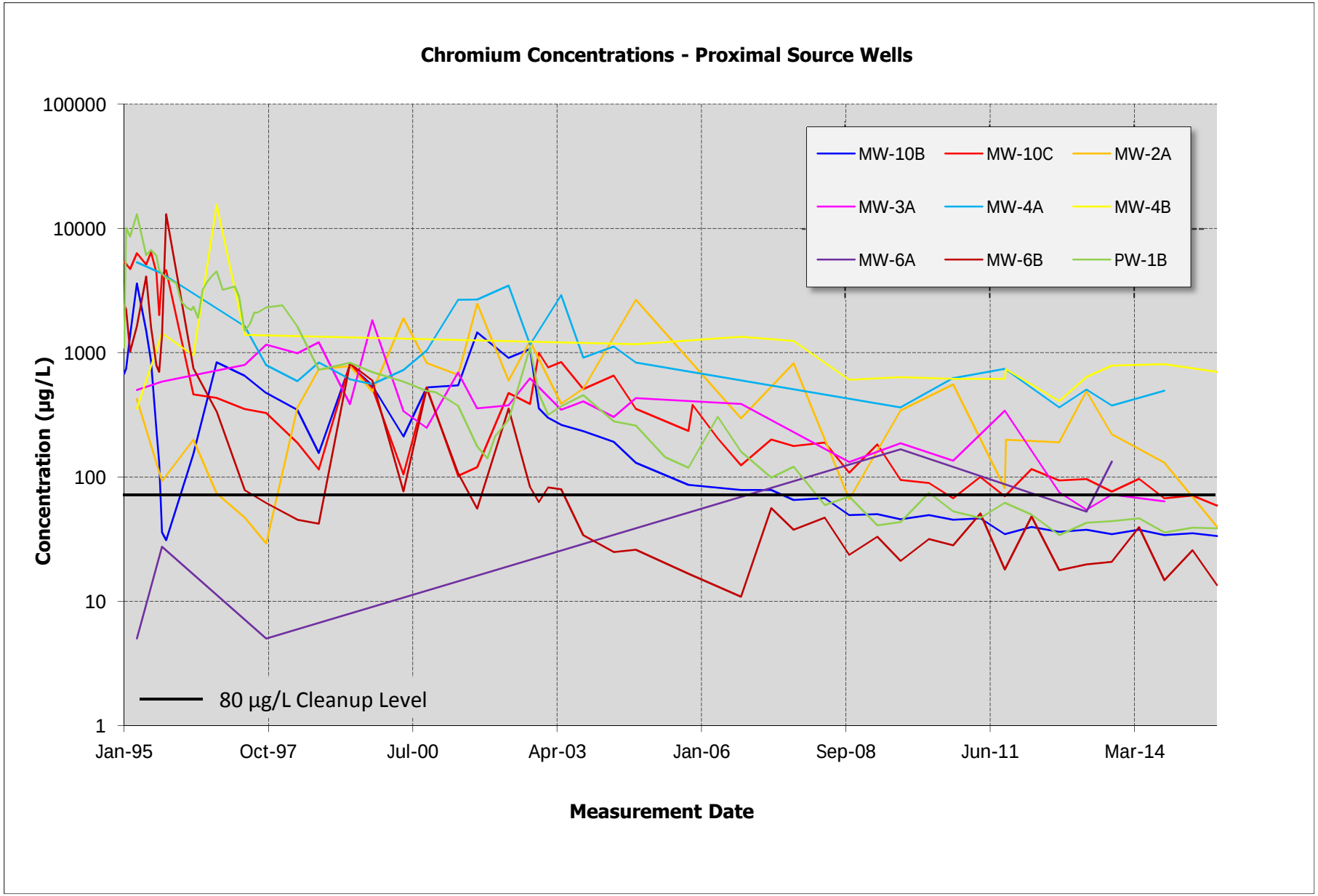
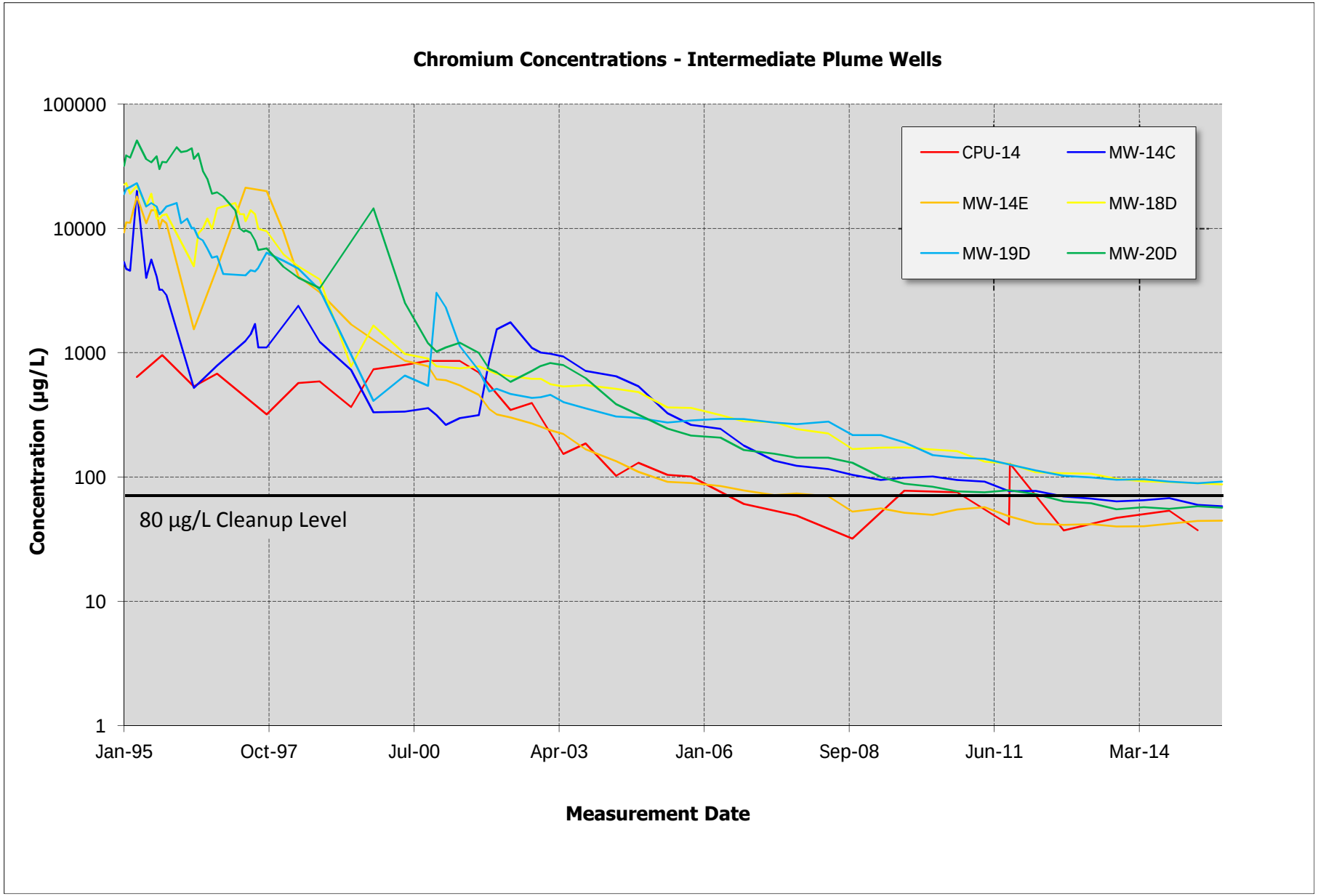
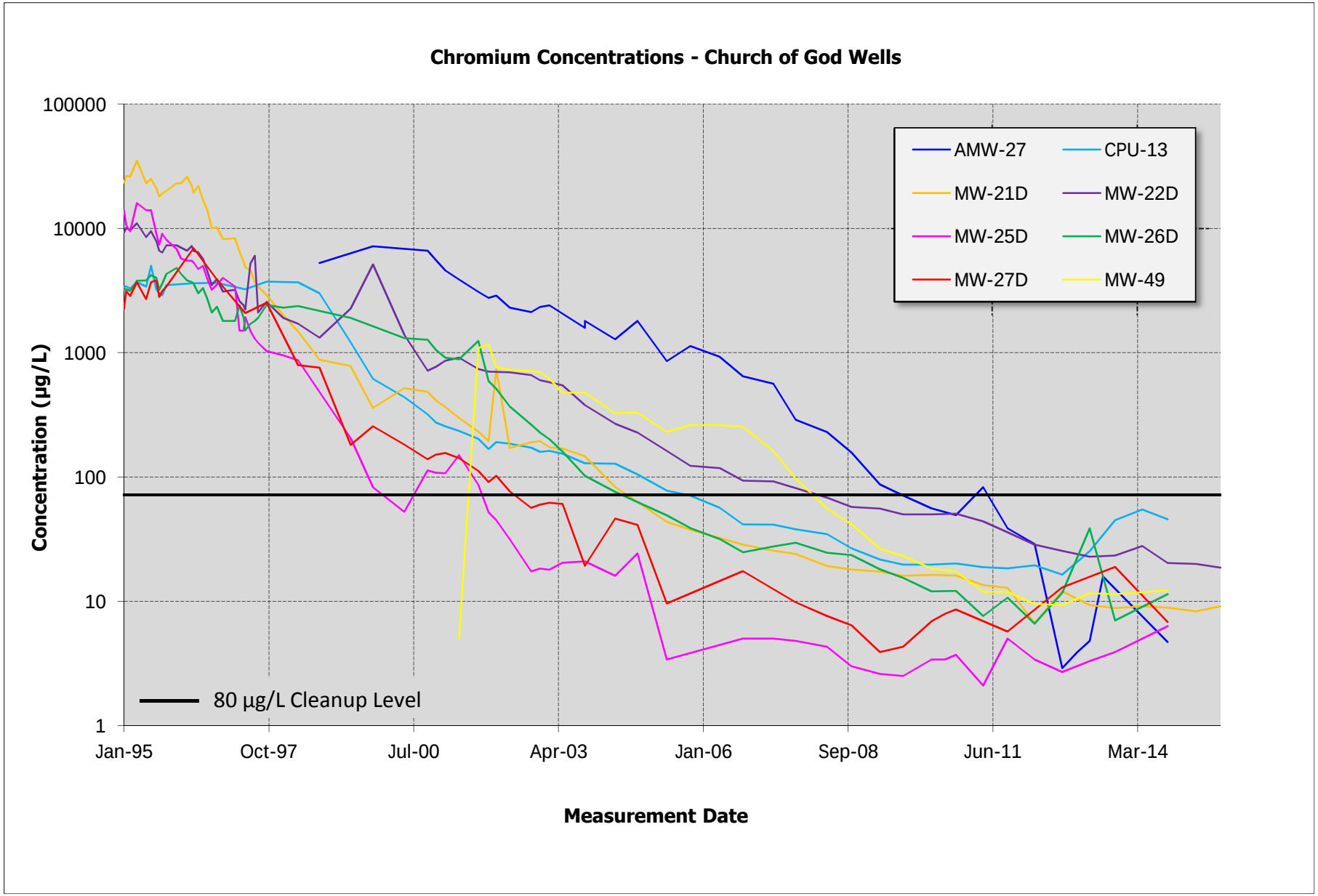
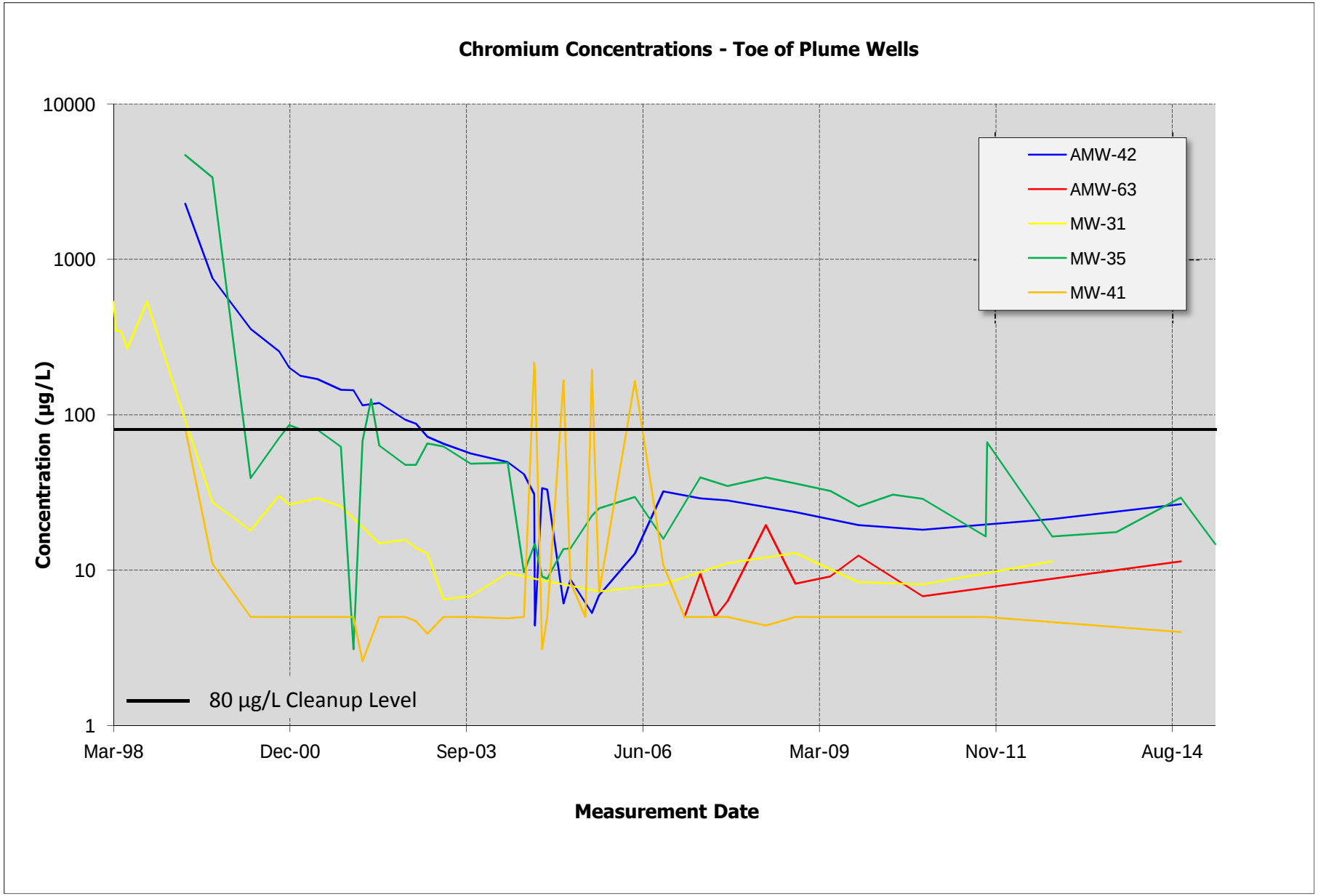
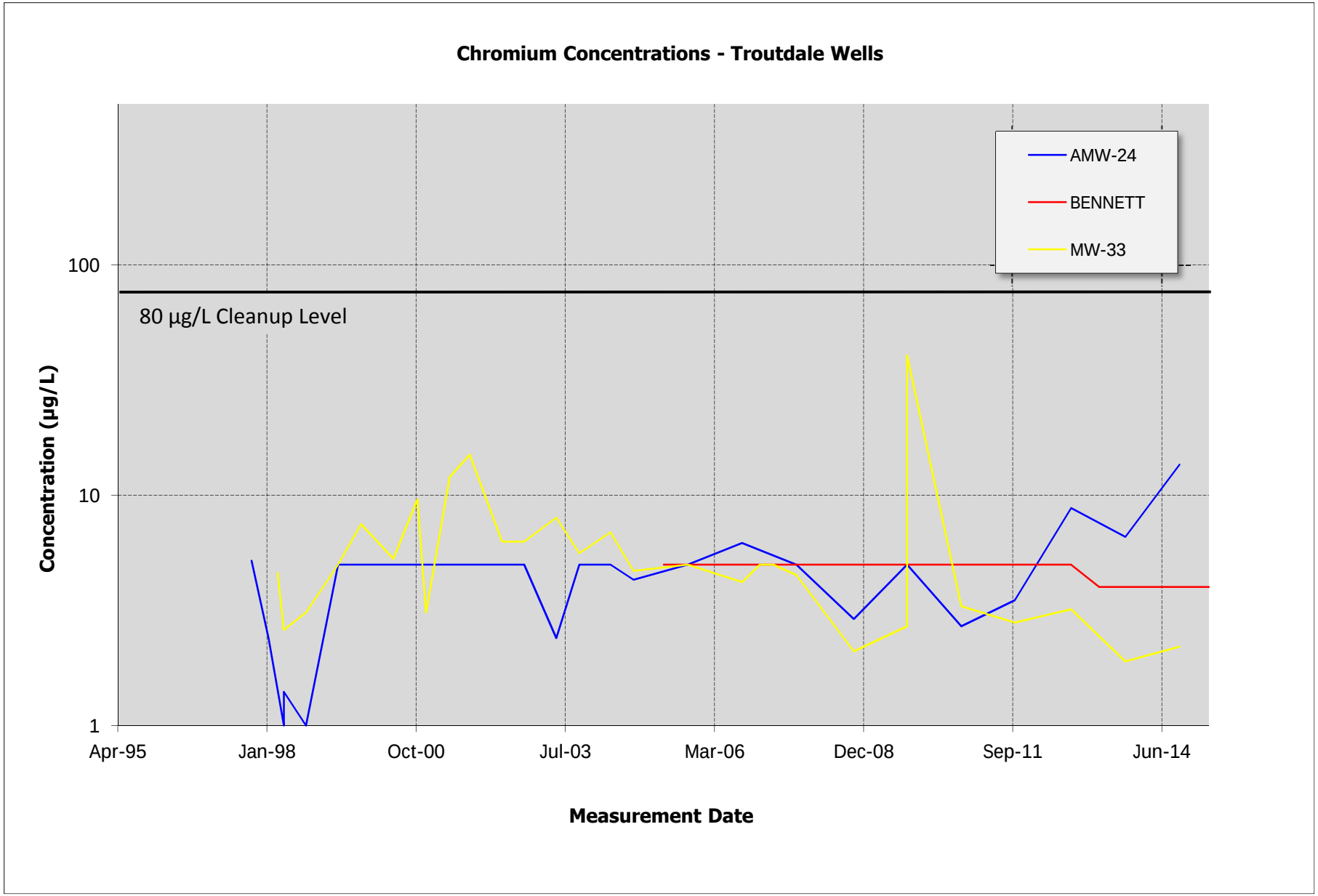

Chromium Concentrations - TCE Upgradient Wells
100
10
1
80 µg/L Cleanup Level
AMW-10A
AMW-11A
AMW-6A
AMW-7A
Concentration (µg/L)
Apr-95
Jan-98
Oct-00
Jul-03
Mar-06
Dec-08
Sep-11
Jun-14
Measurement Date


Chromium Concentrations - Proximal Source Wells
100000
10000
1000
100
10
1
Concentration (µg/L)
Jan-95
Oct-97
Jul-00
Apr-03
Jan-06
Sep-08
Jun-11
Mar-14
Measurement Date
MW-10B
MW-10C
MW-2A
MW-3A
MW-4A
MW-4B
MW-6A
MW-6B
PW-1B
80 µg/L Cleanup Level


Chromium Concentrations - Intermediate Plume Wells
100000
10000
1000
100
10
1
Concentration (µg/L)
80 µg/L Cleanup Level
CPU-14
MW-14C
MW-14E
MW-18D
MW-19D
MW-20D
Jan-95
Oct-97
Jul-00
Apr-03
Jan-06
Sep-08
Jun-11
Mar-14
Measurement Date


Chromium Concentrations - Church of God Wells
Concentration (µg/L)
100000
10000
1000
100
10
1
Jan-95
Oct-97
Jul-00
Apr-03
Jan-06
Sep-08
Jun-11
Mar-14
Measurement Date
AMW-27
CPU-13
MW-21D
MW-22D
MW-25D
MW-26D
MW-27D
MW-49
80 µg/L Cleanup Level


Chromium Concentrations - Toe of Plume Wells
10000
1000
100
10
1
Concentration (µg/L)
AMW-42
AMW-63
MW-31
MW-35
MW-41
80 µg/L Cleanup Level
Mar-98
Dec-00
Sep-03
Jun-06
Mar-09
Nov-11
Aug-14
Measurement Date


Chromium Concentrations - Troutdale Wells
AMW-24
BENNETT
MW-33
80 µg/L Cleanup Level
100
10
1
Concentration (µg/L)
Apr-95
Jan-98
Oct-00
Jul-03
Mar-06
Dec-08
Sep-11
Jun-14
Measurement Date

APPENDIX A-3

CHROMIUM CONCENTRATIONS – INDIVIDUAL WELLS

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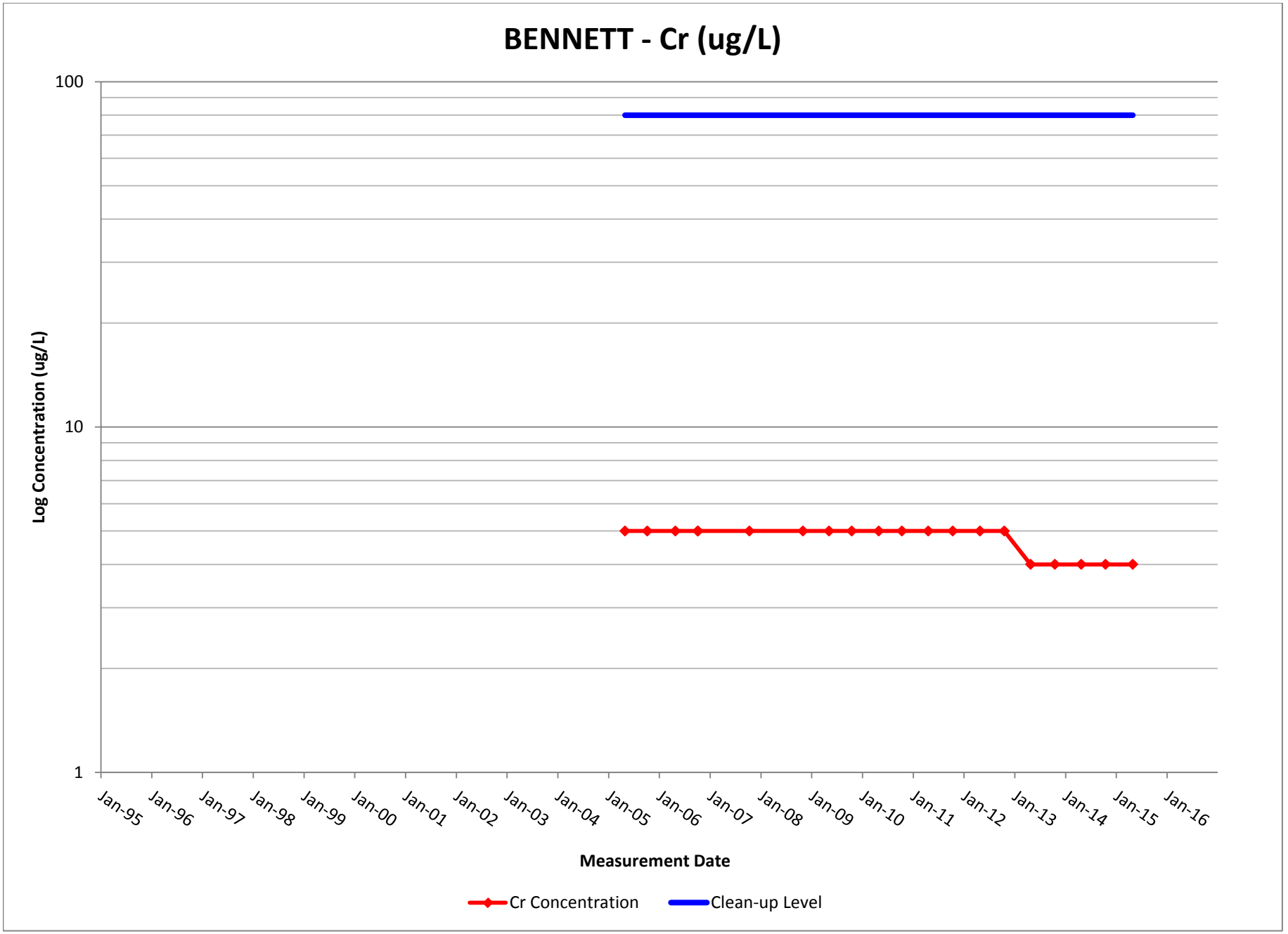
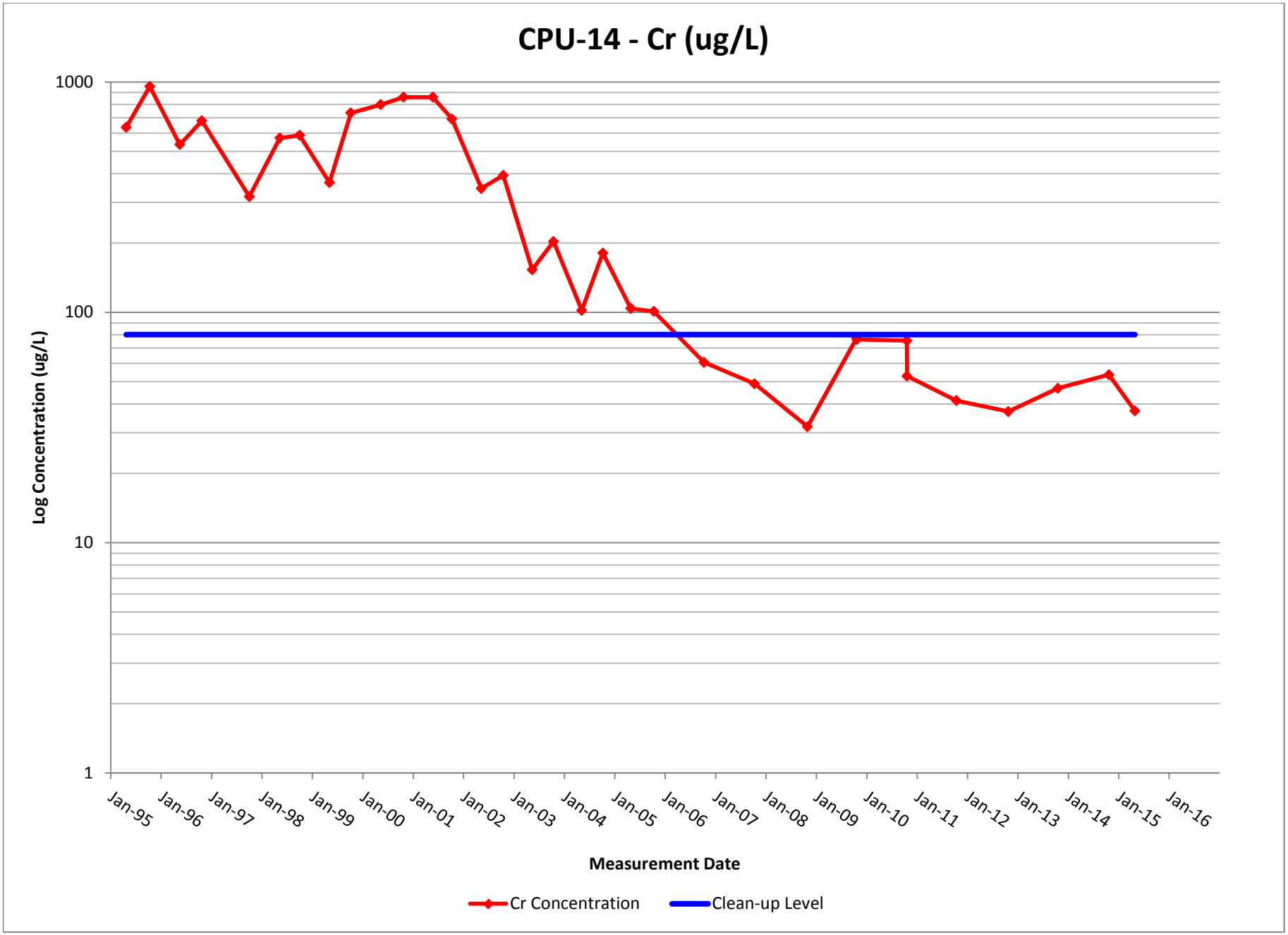
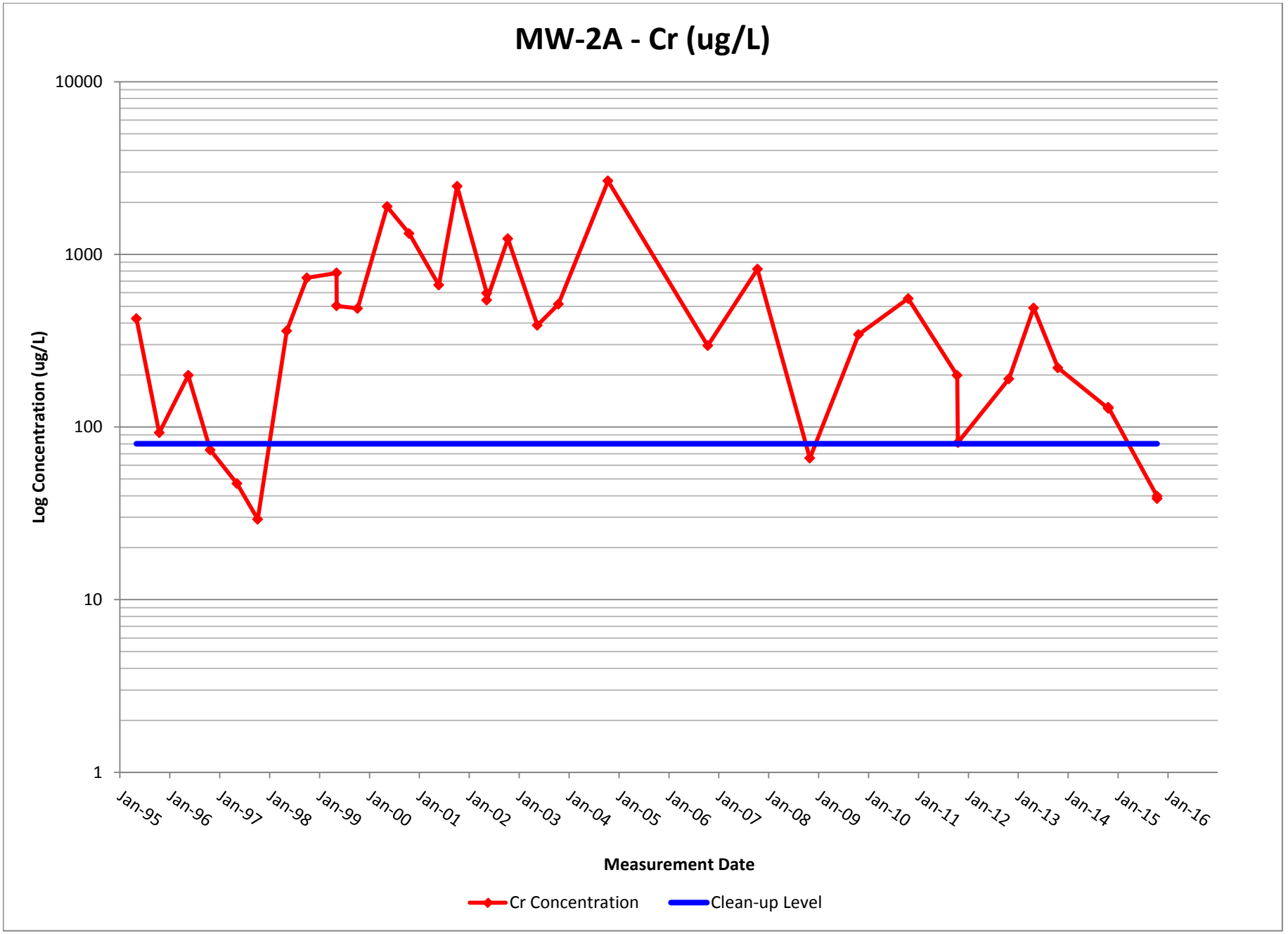
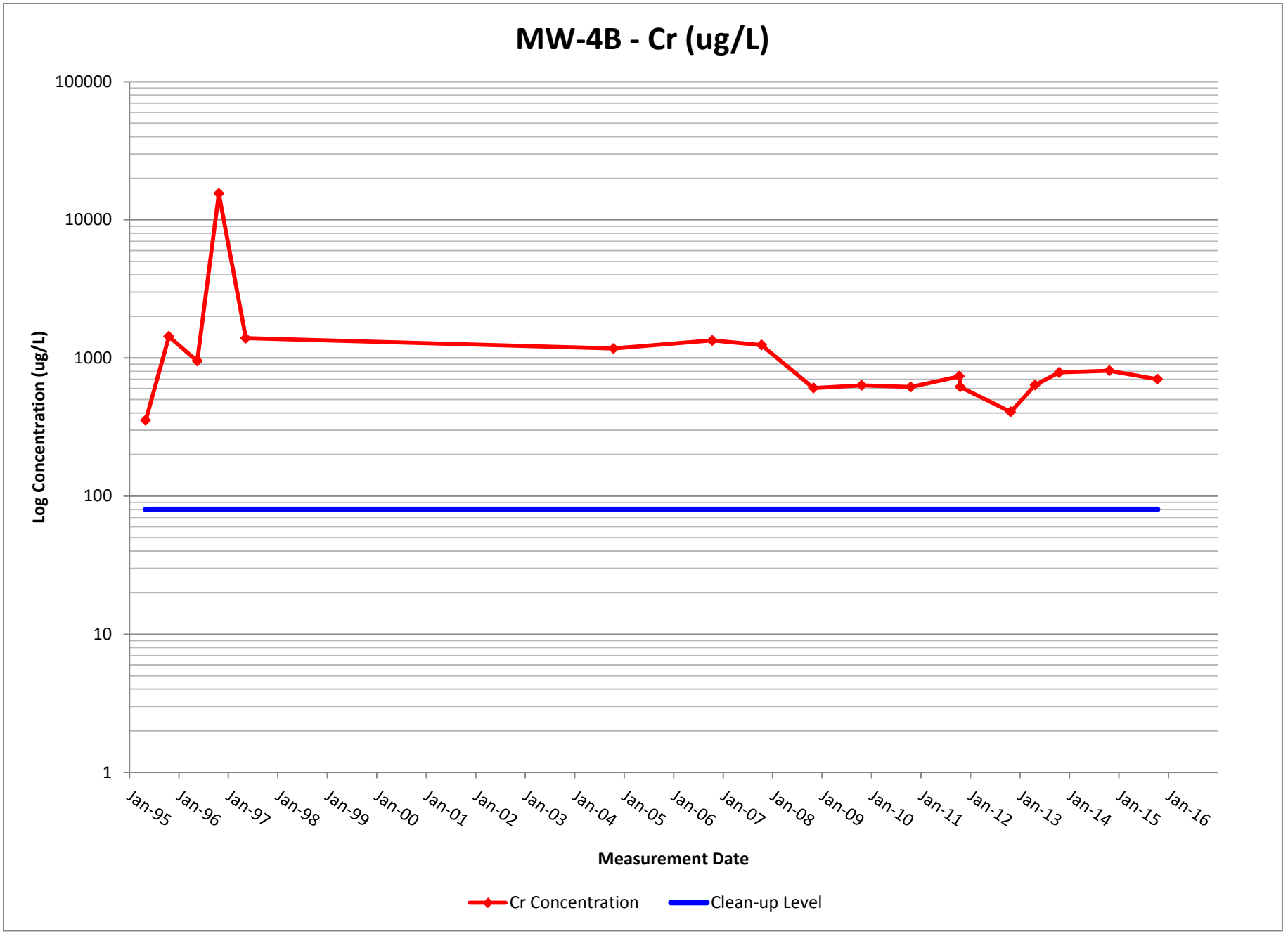
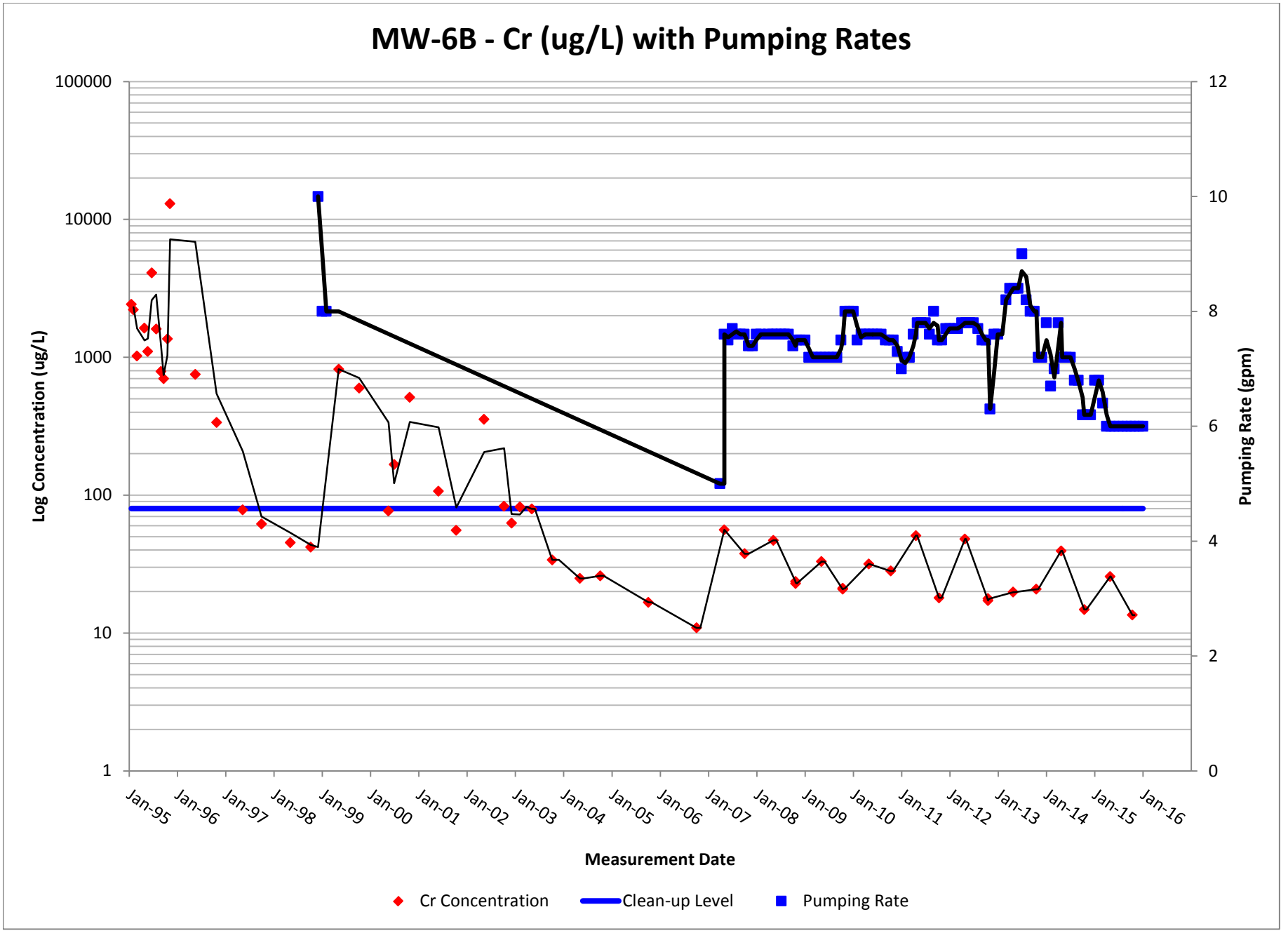
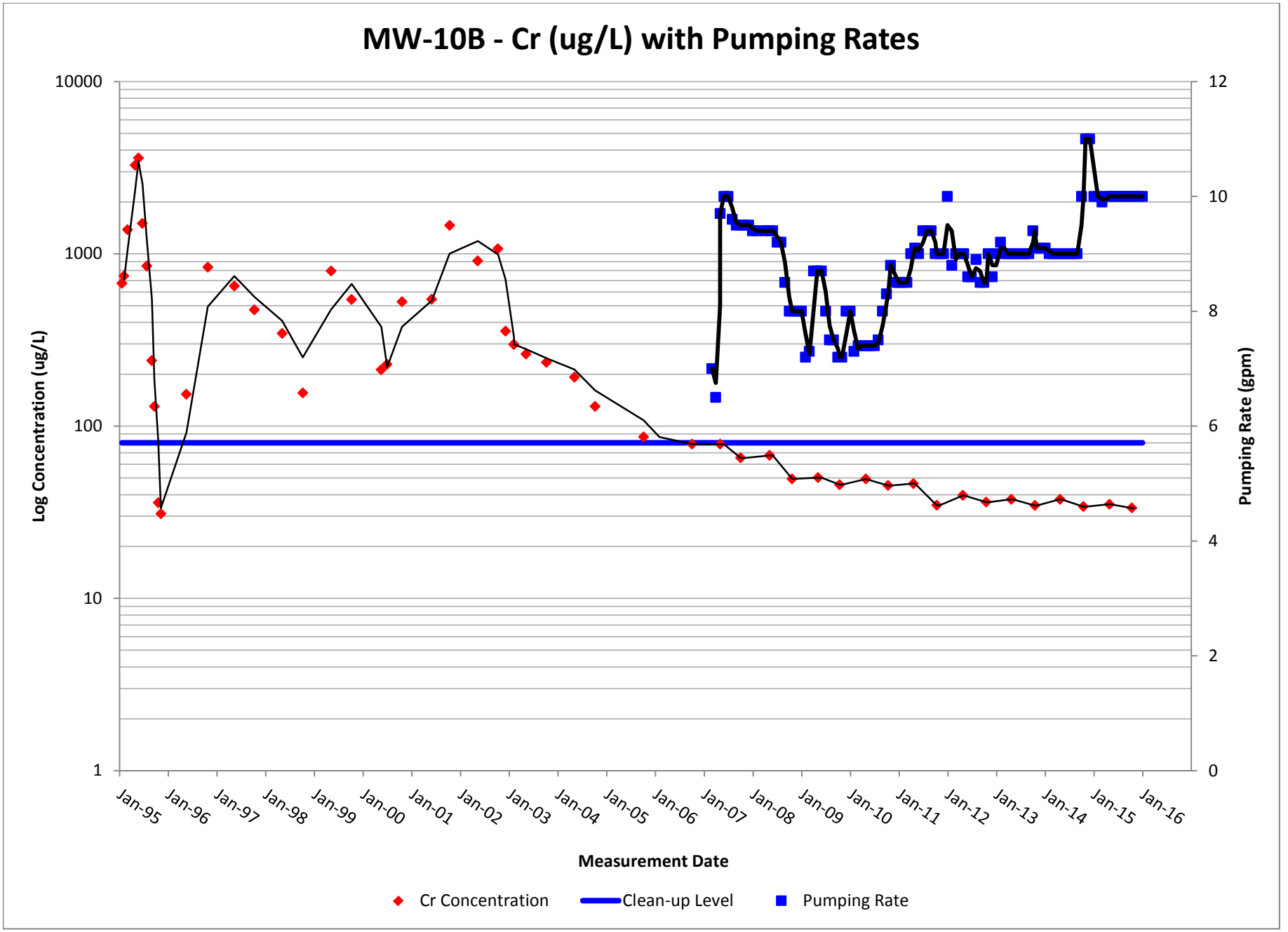

BENNETT - Cr (ug/L)
100
10
1
Log Concentration (ug/L)
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
Cr Concentration
Clean-up Level

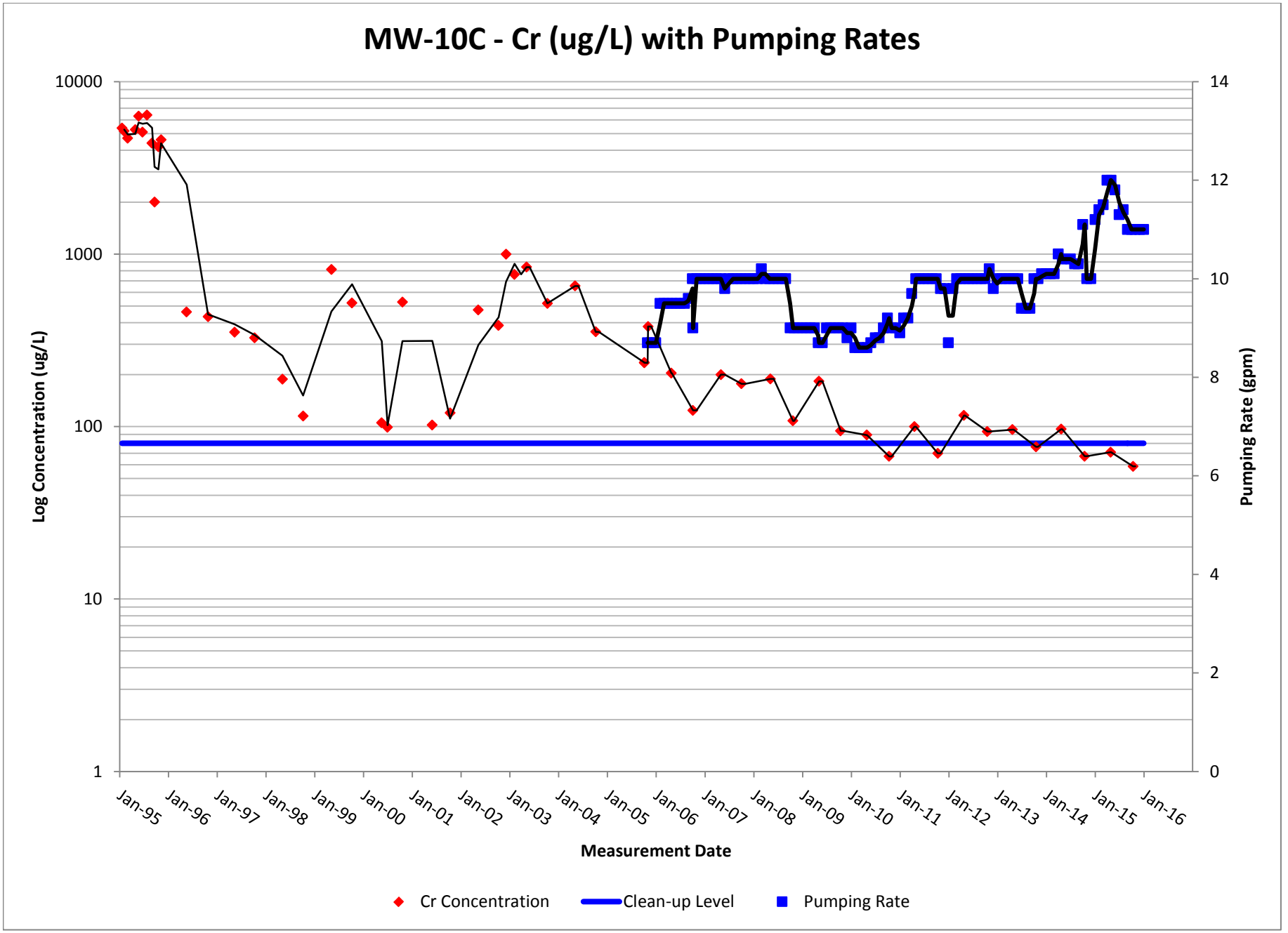

CPU-14 - Cr (ug/L)
1000
100
10
1
Log Concentration (ug/L)
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
Cr Concentration
Clean-up Level

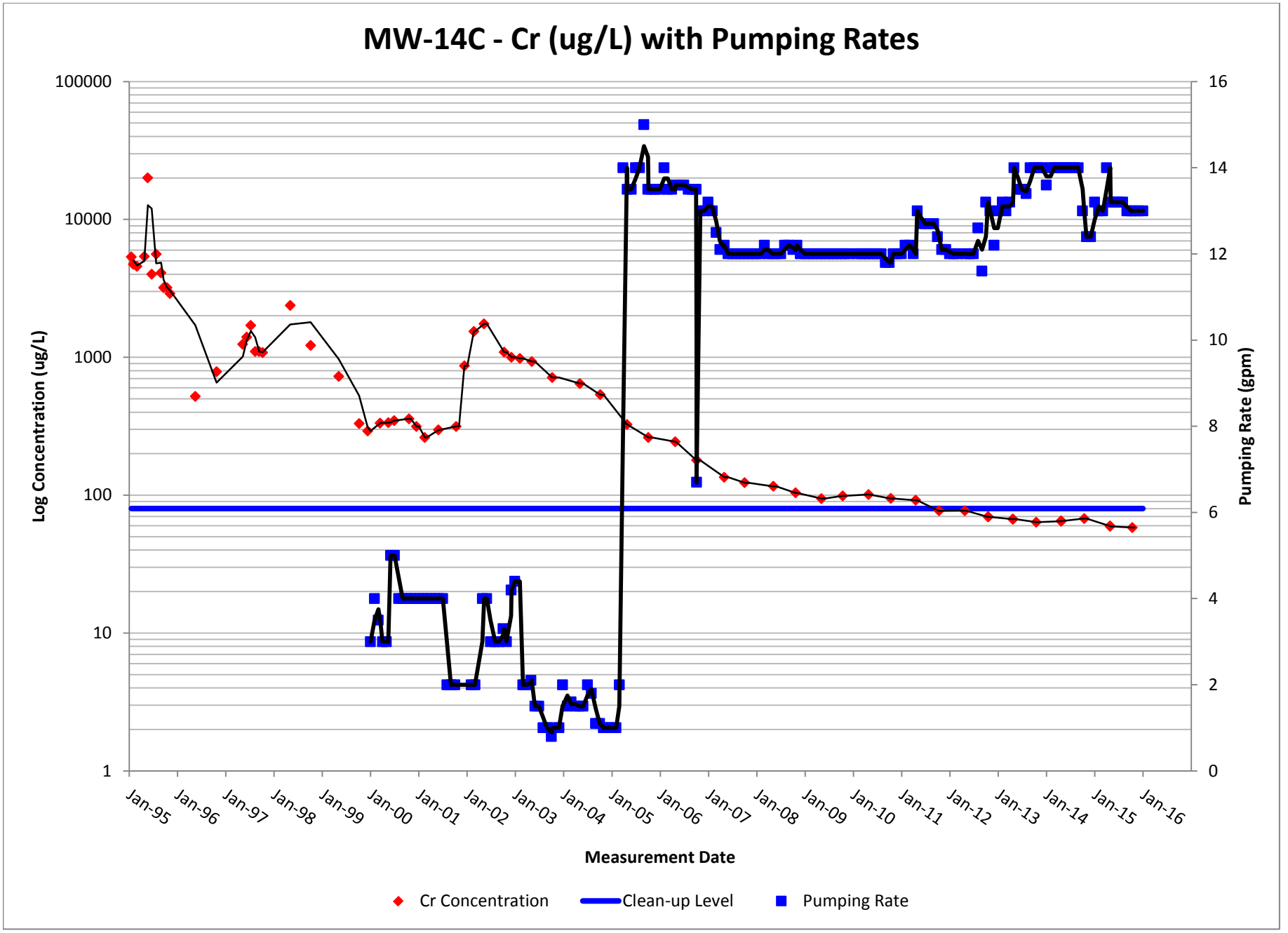

MW-2A - Cr (ug/L)
10000
1000
100
10
1
Log Concentration (ug/L)
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
Cr Concentration
Clean-up Level

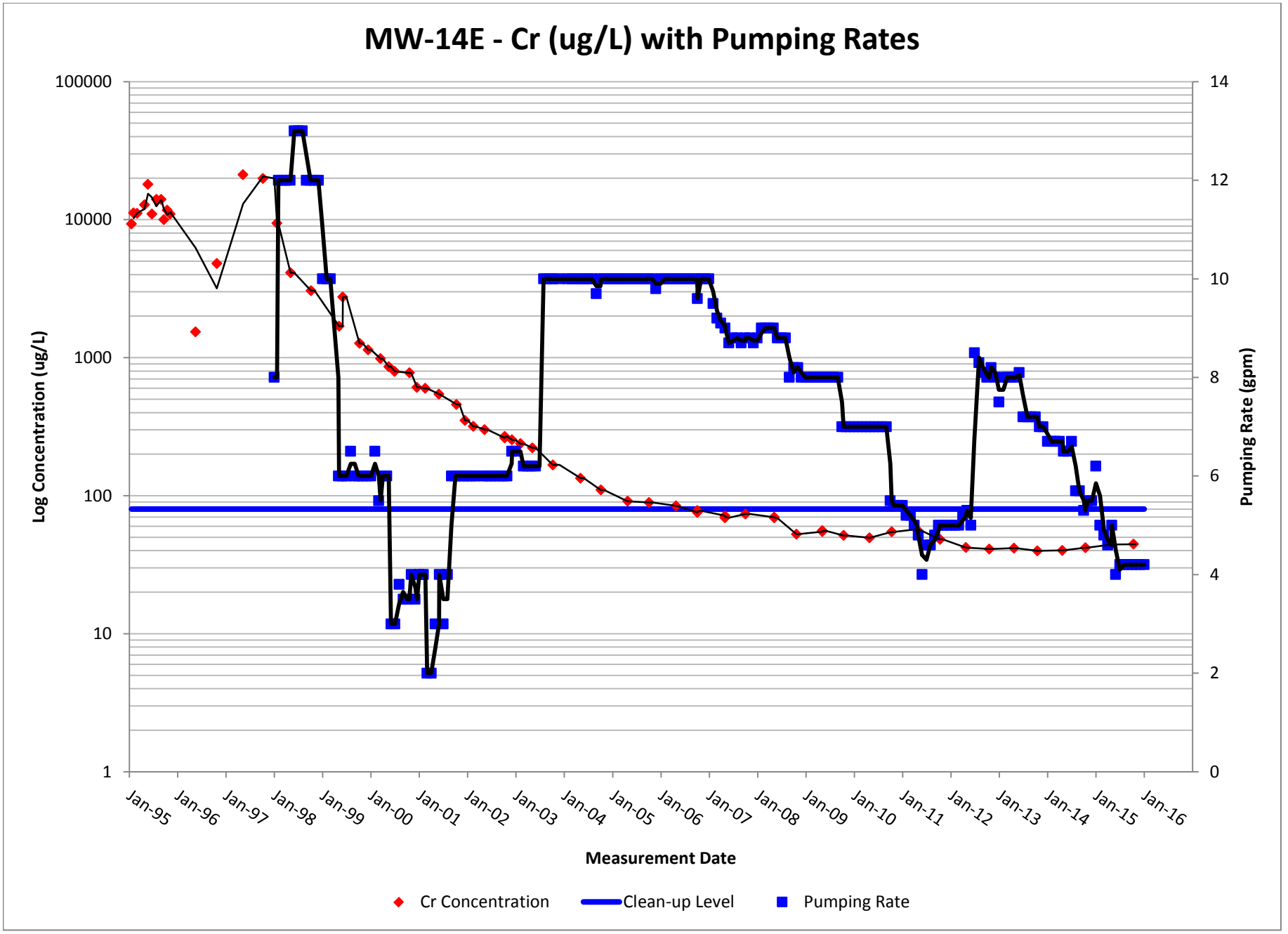

MW-4B - Cr (ug/L)
Log Concentration (ug/L)
100000
10000
1000
100
10
1
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
Cr Concentration
Clean-up Level

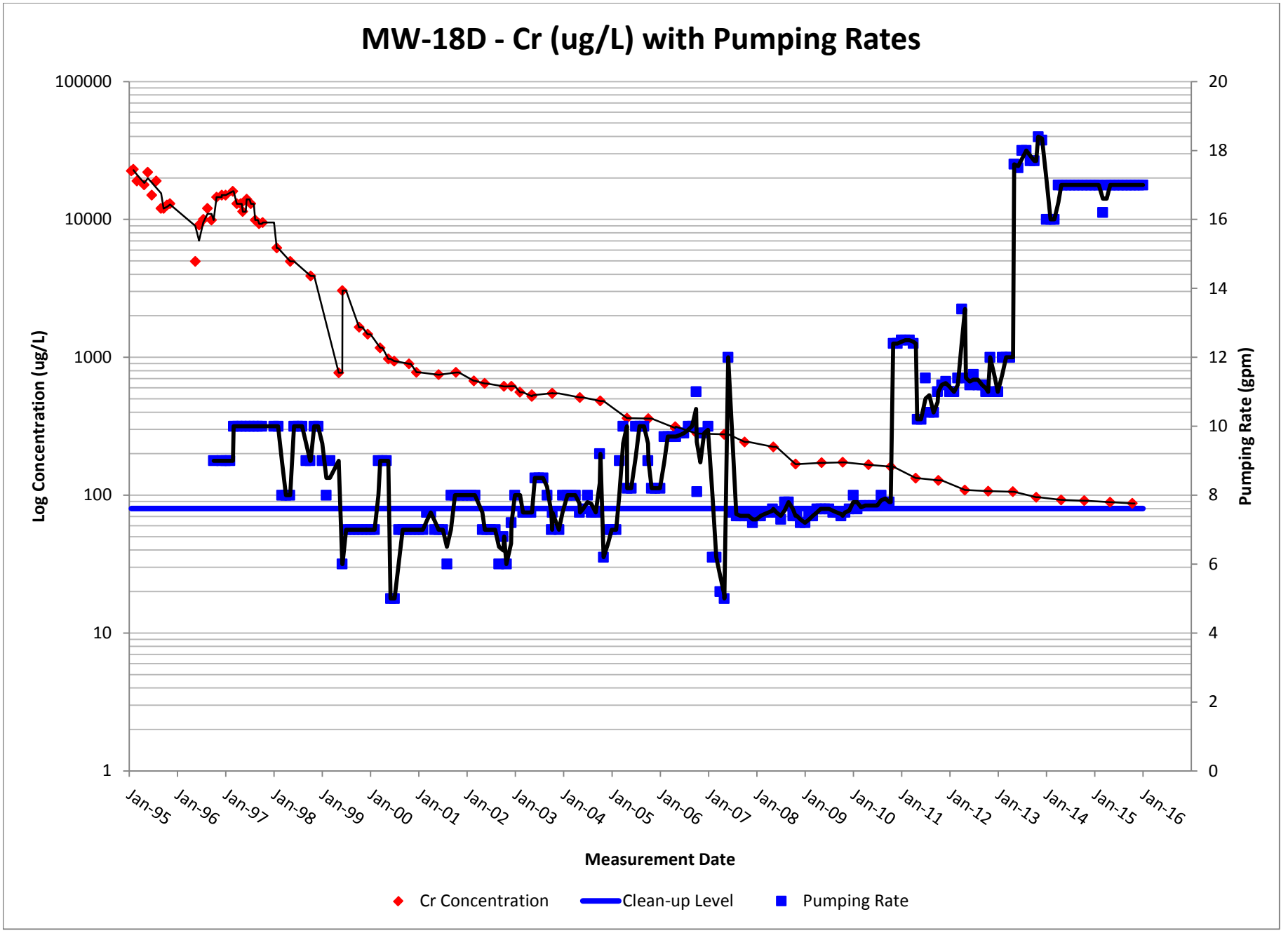

MW-6B - Cr (ug/L) with Pumping Rates
Log Concentration (ug/L)
100000
10000
1000
100
10
1
Pumping Rate (gpm)
12
10
8
6
4
2
0
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
Cr Concentration
Clean-up Level
Pumping Rate

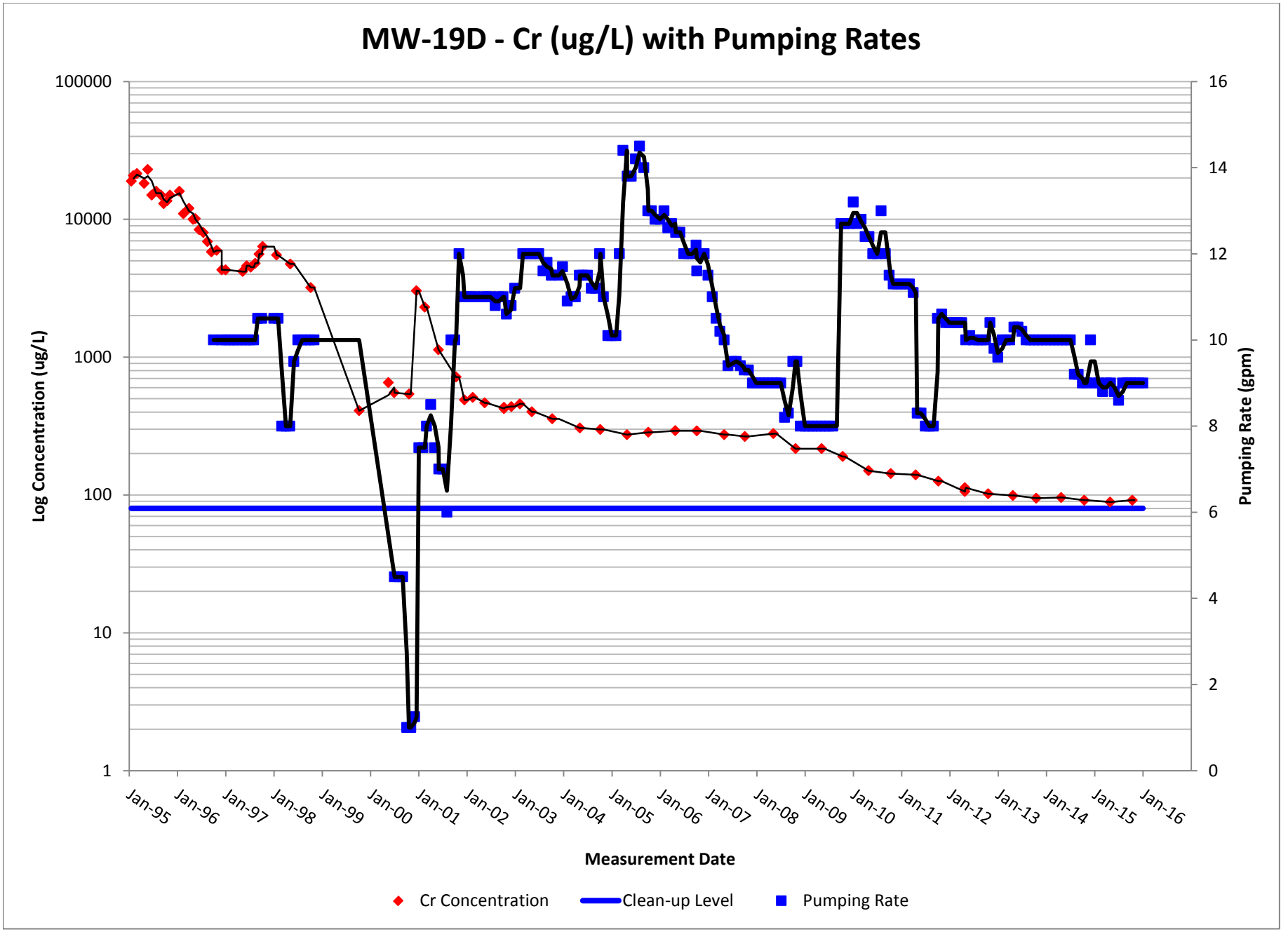

MW-10B - Cr (ug/L) with Pumping Rates
Log Concentration (ug/L)
10000
1000
100
10
1
Pumping Rate (gpm)
12
10
8
6
4
2
0
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
Cr Concentration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

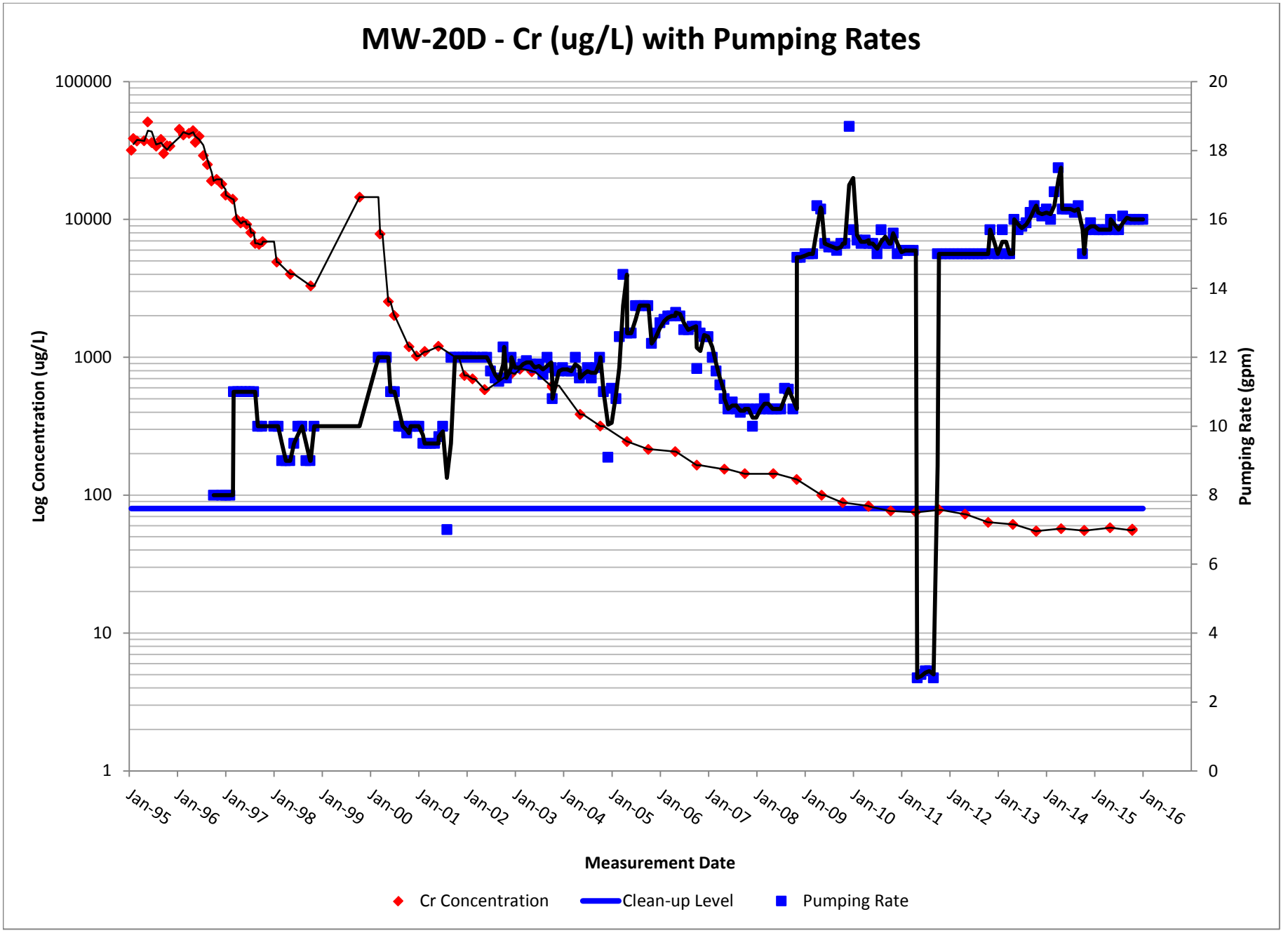

MW-10C - Cr (ug/L) with Pumping Rates
Log Concentration (ug/L)
10000
1000
100
10
1
Pumping Rate (gpm)
14
12
10
8
6
4
2
0
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
Cr Concentration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

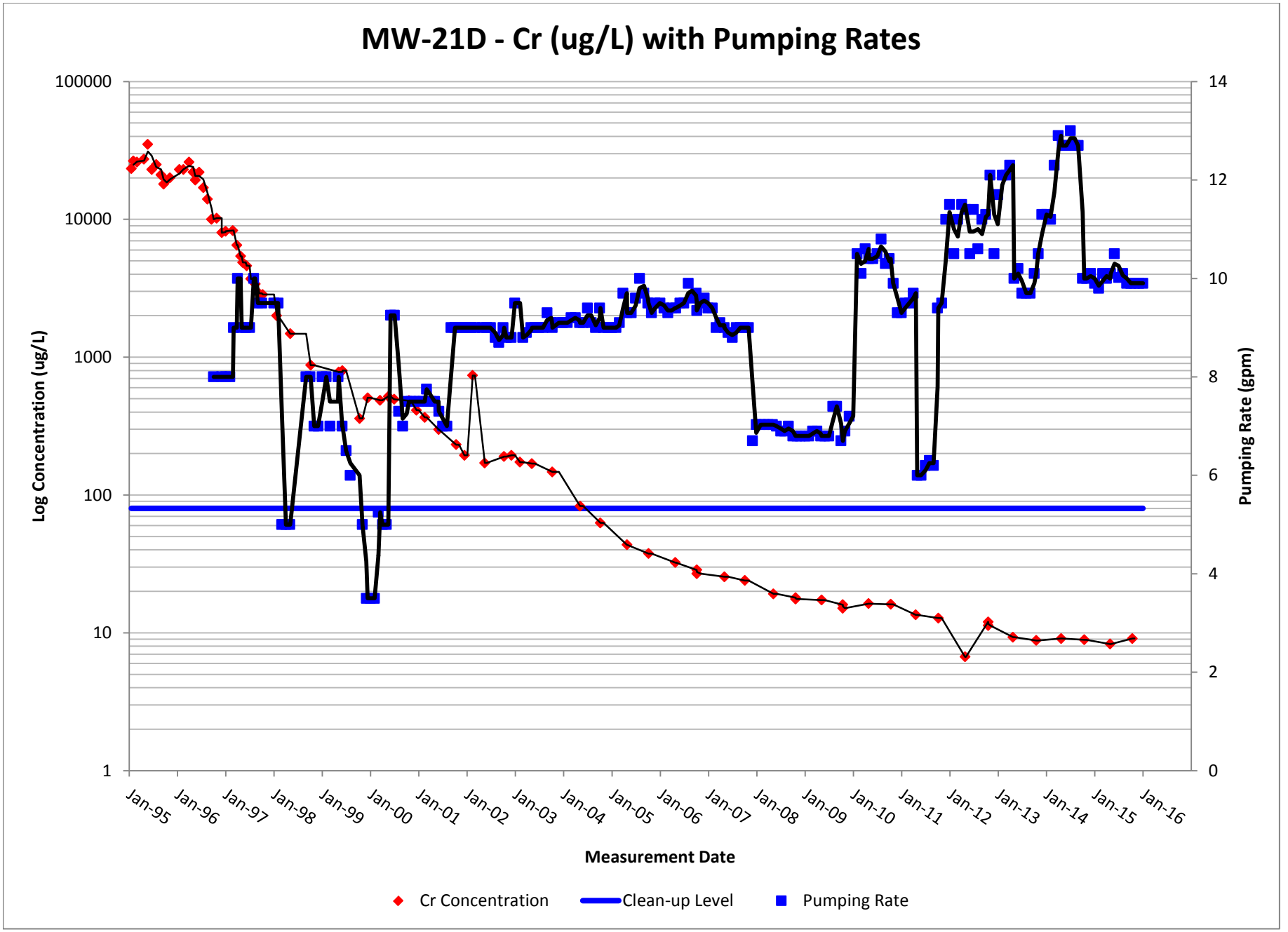

MW-14C - Cr (ug/L) with Pumping Rates
Log Concentration (ug/L)
100000
10000
1000
100
10
1
Pumping Rate (gpm)
16
14
12
10
8
6
4
2
0
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
Cr Concentration
Clean-up Level
Pumping Rate

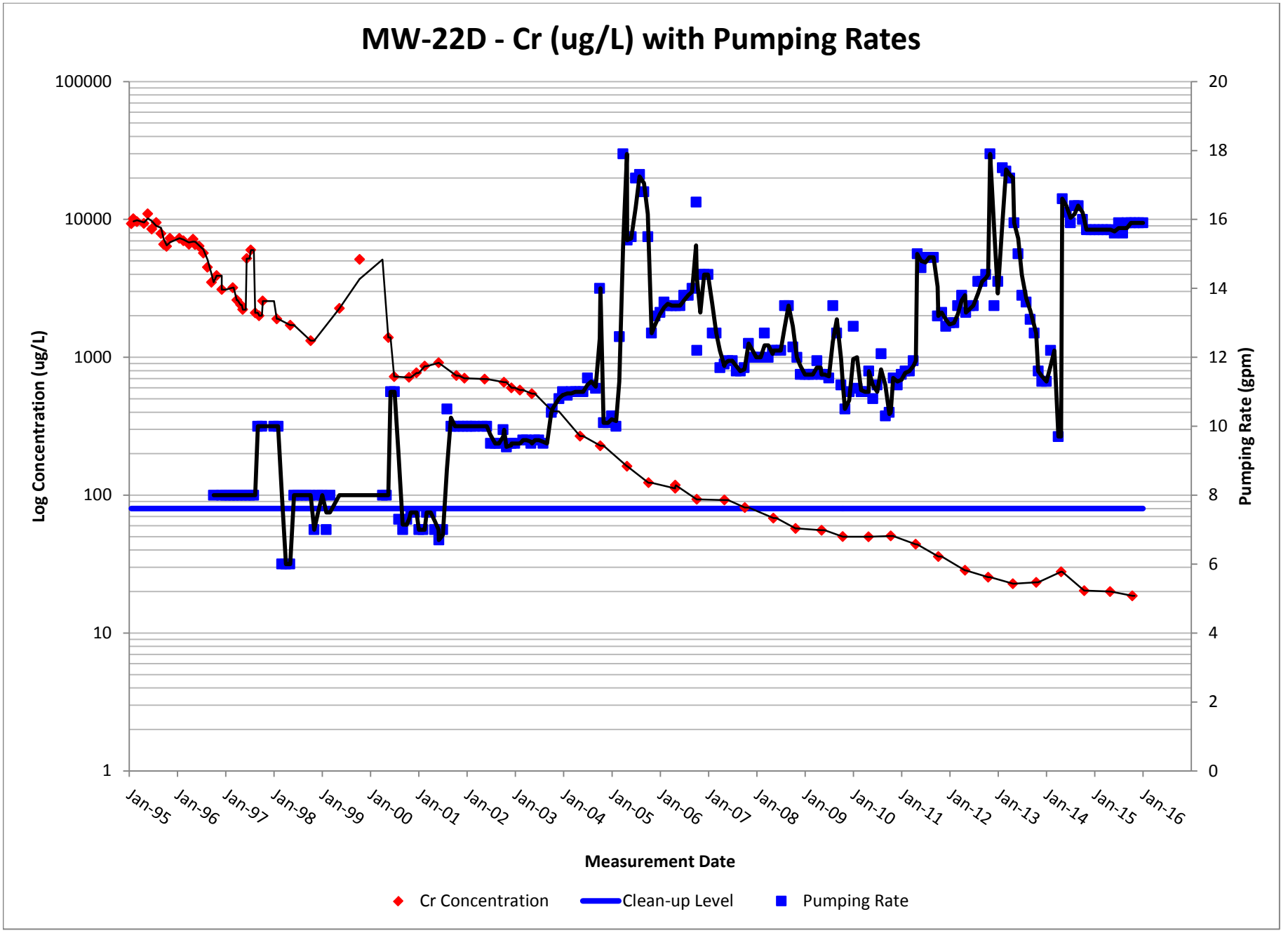

MW-14E - Cr (ug/L) with Pumping Rates
Log Concentration (ug/L)
100000
10000
1000
100
10
1
Pumping Rate (gpm)
14
12
10
8
6
4
2
0
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
Cr Concentration
Clean-up Level
Pumping Rate

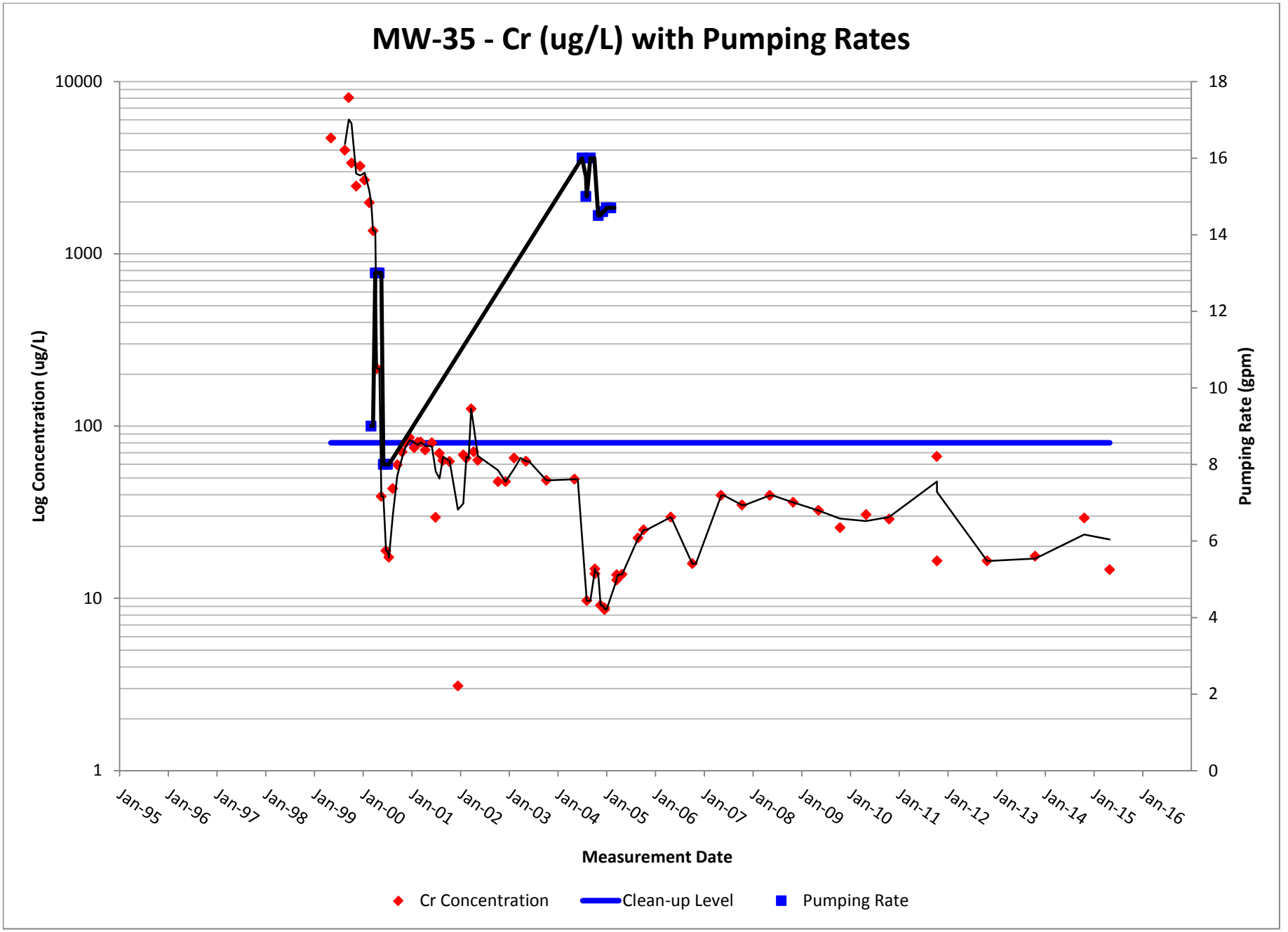

MW-18D - Cr (ug/L) with Pumping Rates
Log Concentration (ug/L)
100000
10000
1000
100
10
1
Pumping Rate (gpm)
20
18
16
14
12
10
8
6
4
2
0
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
Cr Concentration
Clean-up Level
Pumping Rate

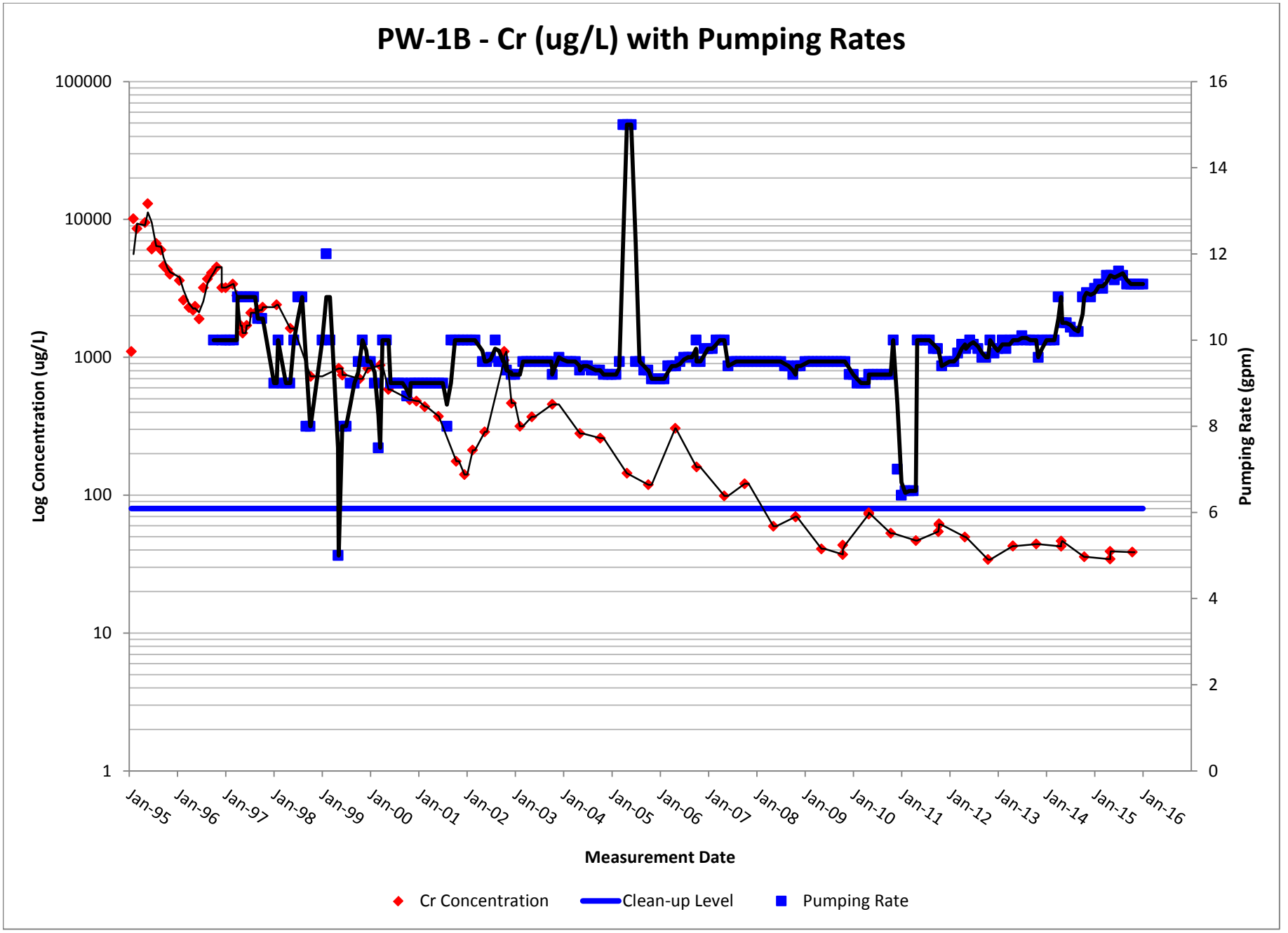

MW-19D - Cr (ug/L) with Pumping Rates
Log Concentration (ug/L)
100000
10000
1000
100
10
1
Pumping Rate (gpm)
16
14
12
10
8
6
4
2
0
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
Cr Concentration
Clean-up Level
Pumping Rate


MW-20D - Cr (ug/L) with Pumping Rates
Log Concentration (ug/L)
100000
10000
1000
100
10
1
Pumping Rate (gpm)
20
18
16
14
12
10
8
6
4
2
0
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
Cr Concentration
Clean-up Level
Pumping Rate


MW-21D - Cr (ug/L) with Pumping Rates
Log Concentration (ug/L)
100000
10000
1000
100
10
1
Pumping Rate (gpm)
14
12
10
8
6
4
2
0
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
Cr Concentration
Clean-up Level
Pumping Rate


MW-22D - Cr (ug/L) with Pumping Rates
Log Concentration (ug/L)
100000
10000
1000
100
10
1
Pumping Rate (gpm)
20
18
16
14
12
10
8
6
4
2
0
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
Cr Concentration
Clean-up Level
Pumping Rate


MW-35 - Cr (ug/L) with Pumping Rates
Log Concentration (ug/L)
10000
1000
100
10
1
Pumping Rate (gpm)
18
16
14
12
10
8
6
4
2
0
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
Cr Concentration
Clean-up Level
Pumping Rate


PW-1B - Cr (ug/L) with Pumping Rates
Log Concentration (ug/L)
100000
10000
1000
100
10
1
Pumping Rate (gpm)
16
14
12
10
8
6
4
2
0
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
Cr Concentration
Clean-up Level
Pumping Rate

APPENDIX B

TCE CONCENTRATIONS IN GROUNDWATER

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APPENDIX B-1

TCE CONCENTRATIONS – SUMMARY TABLE

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B-1. TCE Concentration Summary

Well Group	Well	Spring 2014	Fall 2014	Winter 2015	Spring 2015	Summer 2015	Fall 2015
TCE Source (OU-2)	AMW-1A	0.73	2.3	--	**6.1**	--	**25**
	AMW-2A	**5.6**	**60**	**19**	**57**	**67**	**63**
	AMW-2B	--	0.34 J	--	--	--	0.41 J
	AMW-3A	--	0.34 J	--	--	--	0.53
	AMW-12A	**26**	**23**	--	**32**	--	**31**
	AMW-13A	--	0.18 J	--	--	--	0.26 J
	AMW-19A	--	1.2	--	--	--	1.4
	AMW-52A	--	0.50 U	--	--	--	0.32 J
	AMW-53A	**16**	0.13 J	**16**	**11**	**7.5**	**11**
	AMW-54A	--	2.9	--	--	--	3.0
	AMW-55A	--	1.0	--	--	--	1.0
	AMW-56A	--	1.7	--	--	--	1.7
	MW-1A	**7.9**	**6.8**	--	**5.9**	--	**5.6**
Proximal	MW-6B	4.1	3.7	--	4.5	--	4.6
	MW-10B	**12**	**11**	--	**13**	--	**11**
	MW-10C	2.0	2.0	--	2.5	--	2.0
	PW-1B	2.2	2.0	--	2.3	--	2.3
Intermediate	CPU-14	--	**5.2**	--	**5.5**	--	**5.5**
	MW-14C	**12**	**12**	--	**14 J**	--	**11**
	MW-14E	**55**	**51**	--	**70**	--	**64**
	MW-15E	2.2	2.3	--	--	--	2.4
	MW-18D	**32**	**31**	--	**36**	--	**34**
	MW-18E	--	**96**	--	--	--	**69**
	MW-19D	**21**	**21**	--	**24**	--	**24**
	MW-20D	**27**	**27**	--	**32**	--	**31**
	PZ-39	**29**	**45**	--	**34**	--	**36**
Northern Plume	AMW-16	**27**	**72**	--	**94**	--	**80**
	AMW-17	**130**	**120**	--	**120**	--	**110**
	AMW-18	**27**	**34**	--	**34**	--	**42**
	AMW-64	**61**	**55**	--	**53**	--	**45**
	MW-38	**54**	**78**	--	**53**	--	**50**
Church of God	AMW-27	4.1	1.6	4.0	4.2	--	3.3
	AMW-61	--	**6.8**	--	--	--	**5.5**
	CPU-12	--	**5.1**	--	4.0	--	2.2
	MW-21D	2.9	2.4	--	3.2	--	2.8

B-1. TCE Concentration Summary

Well Group	Well	Spring 2014	Fall 2014	Winter 2015	Spring 2015	Summer 2015	Fall 2015
Church of God Cont.	MW-22D	4.0	2.6	--	3.3	--	2.8
	MW-23D	--	1.4	--	--	--	**130**
Toe of Plume	MW-35*	--	2.8	--	2.8	--	3.7
Troutdale Aquifer	AMW-24	--	**10**	--	--	--	**9.9**
	BENNETT	2.0	**5.1**	--	4.2	--	**5.2**
	MW-33	--	**11**	--	--	--	**8.5**

NOTES:

Only wells sampled for TCE during 2015 are included in this table.
Results are in micrograms per liter (µg/L).
Results shown in **red bold** exceed the Site cleanup level of 5 µg/L.
*Two samples were collected from well MW-35 in Fall 2015; one from a PDB deployed at 82-84 feet below ground surface (2.1 µg/L), and one from a PDB deployed at 86-88 feet below ground surface (3.7 µg/L).

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.
-- = Well not sampled during that monitoring event.
TCE = Trichloroethene.
U = Analyte not detected above the specified reporting limit.

APPENDIX B-2

TCE CONCENTRATIONS –
BY WELL GROUPING

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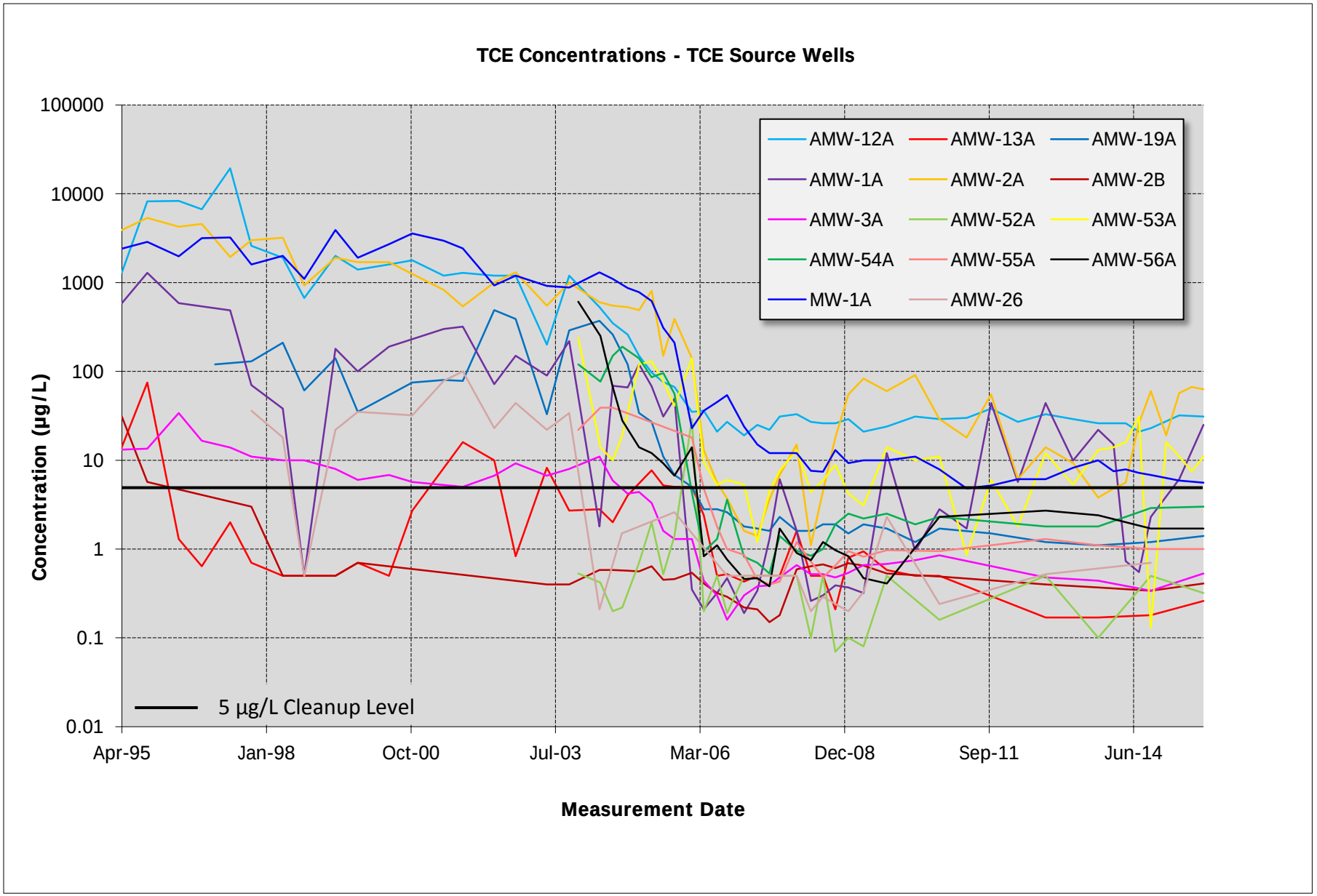
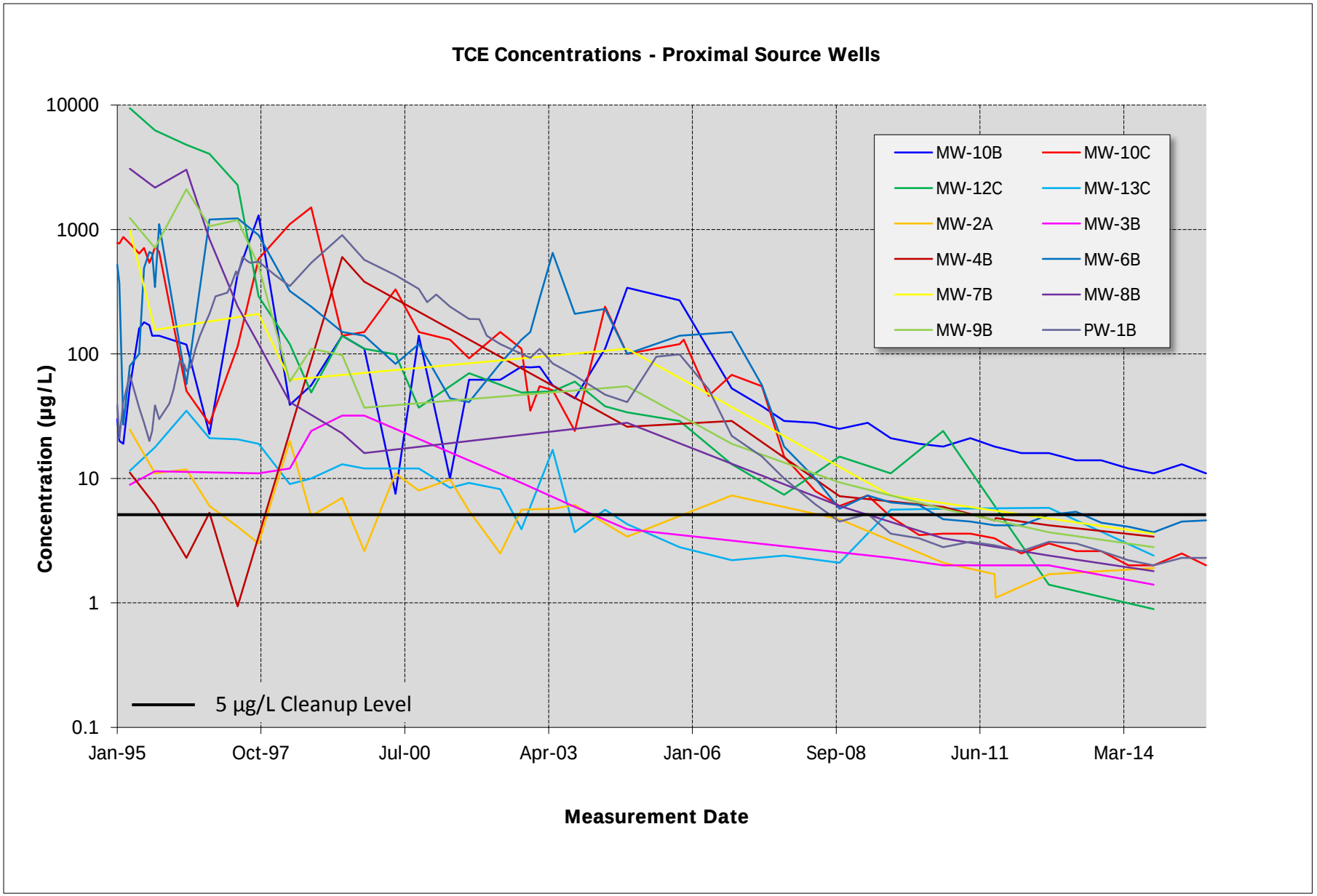
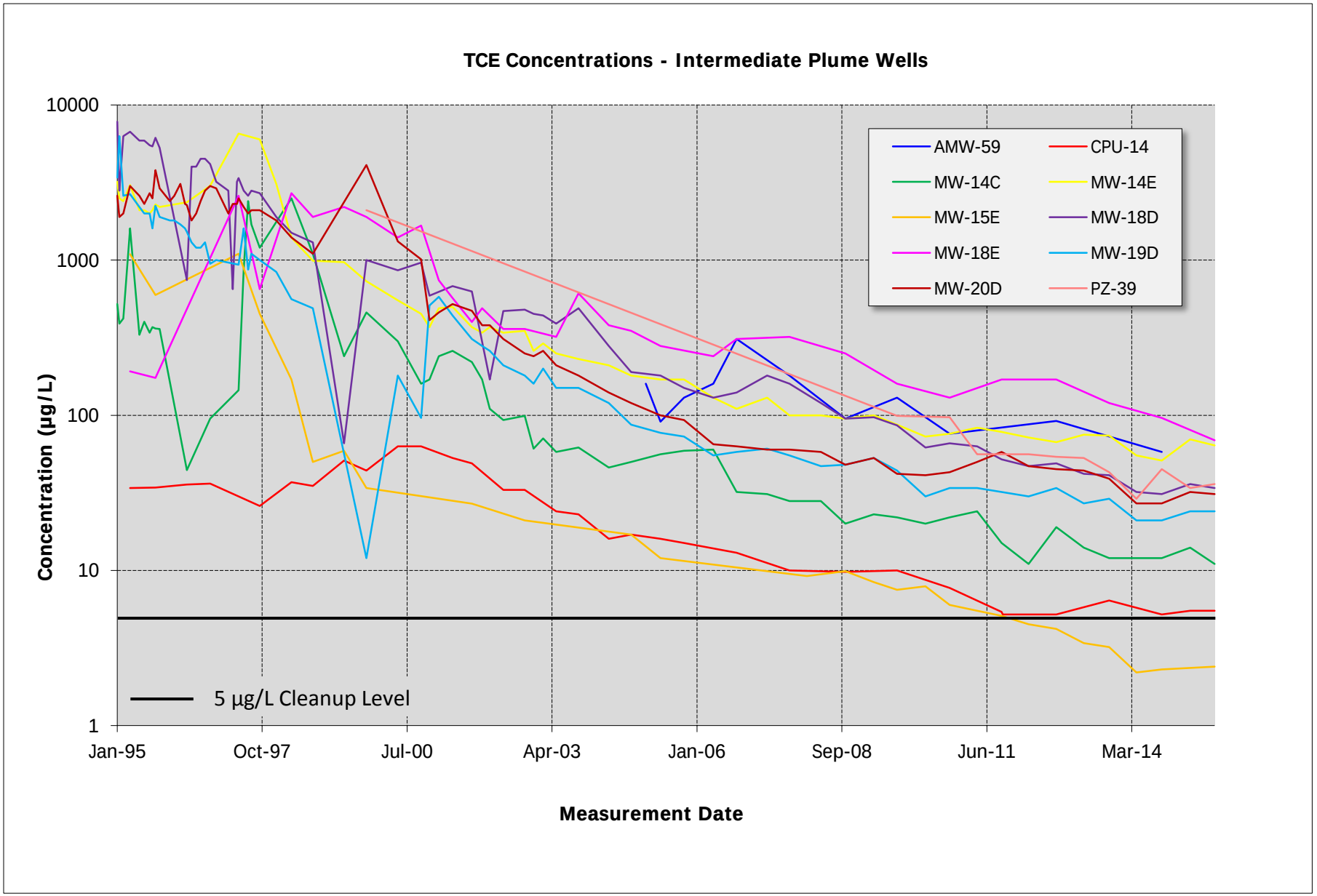
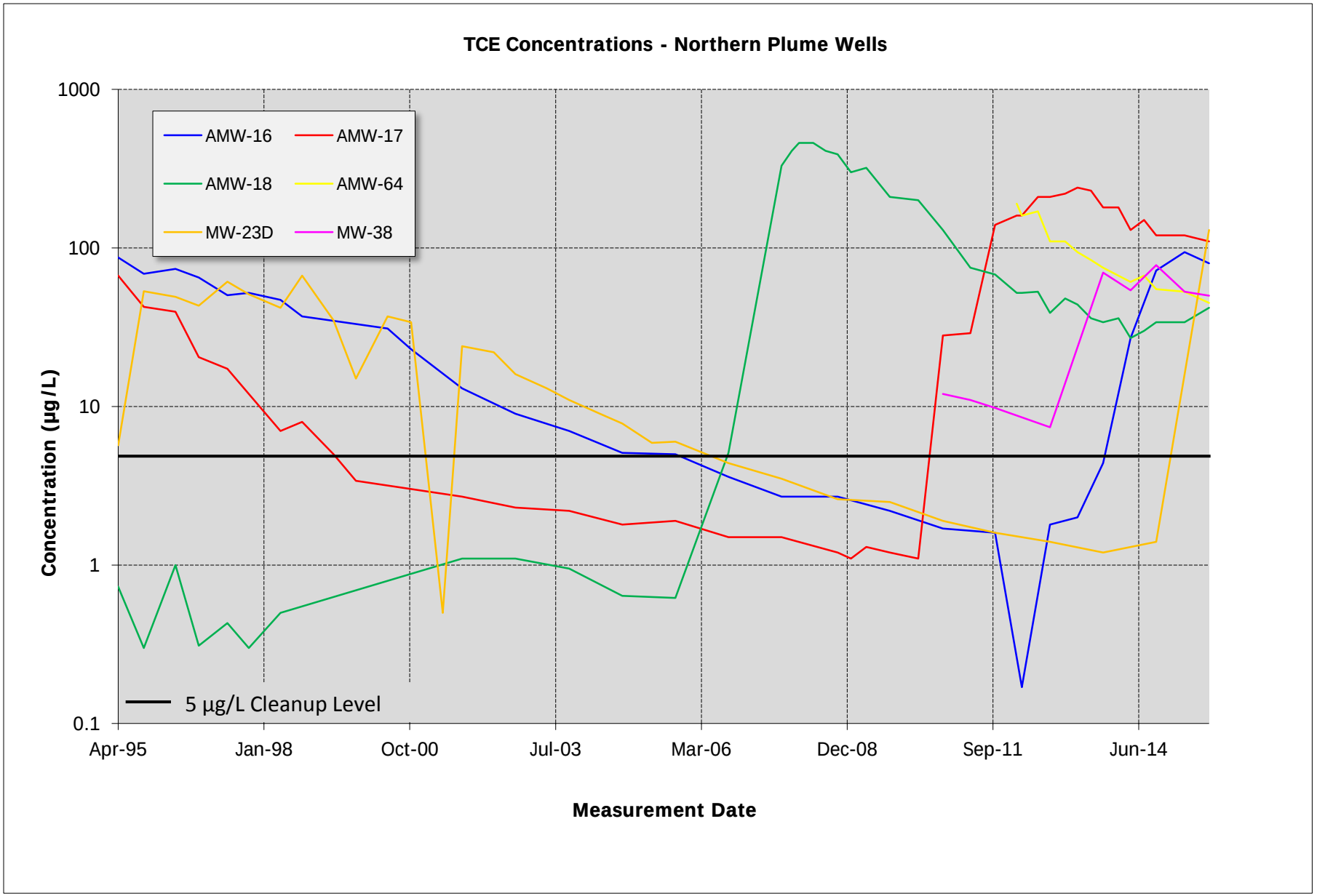
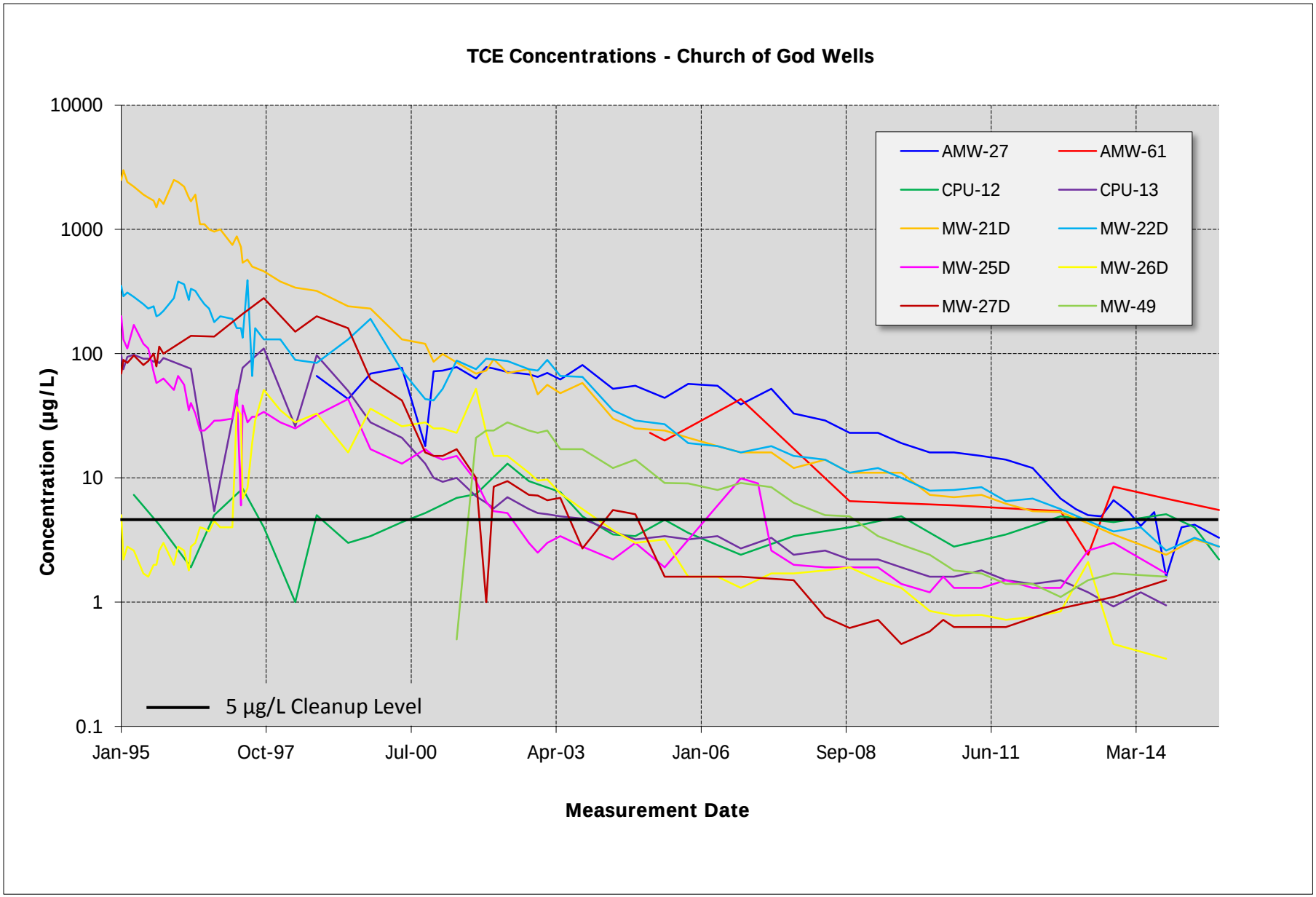
TCE Concentration - TCE Upgradient Wells
1000
100
10
1
0.1
Concentration (µg/L)
5 µg/L Cleanup Level
AMW-8A
AMW-6A
AMW-7A
AMW-10A
AMW-11A
Apr-95
Jan-98
Oct-00
Jul-03
Mar-06
Dec-08
Sep-11
Jun-14
Measurement Date

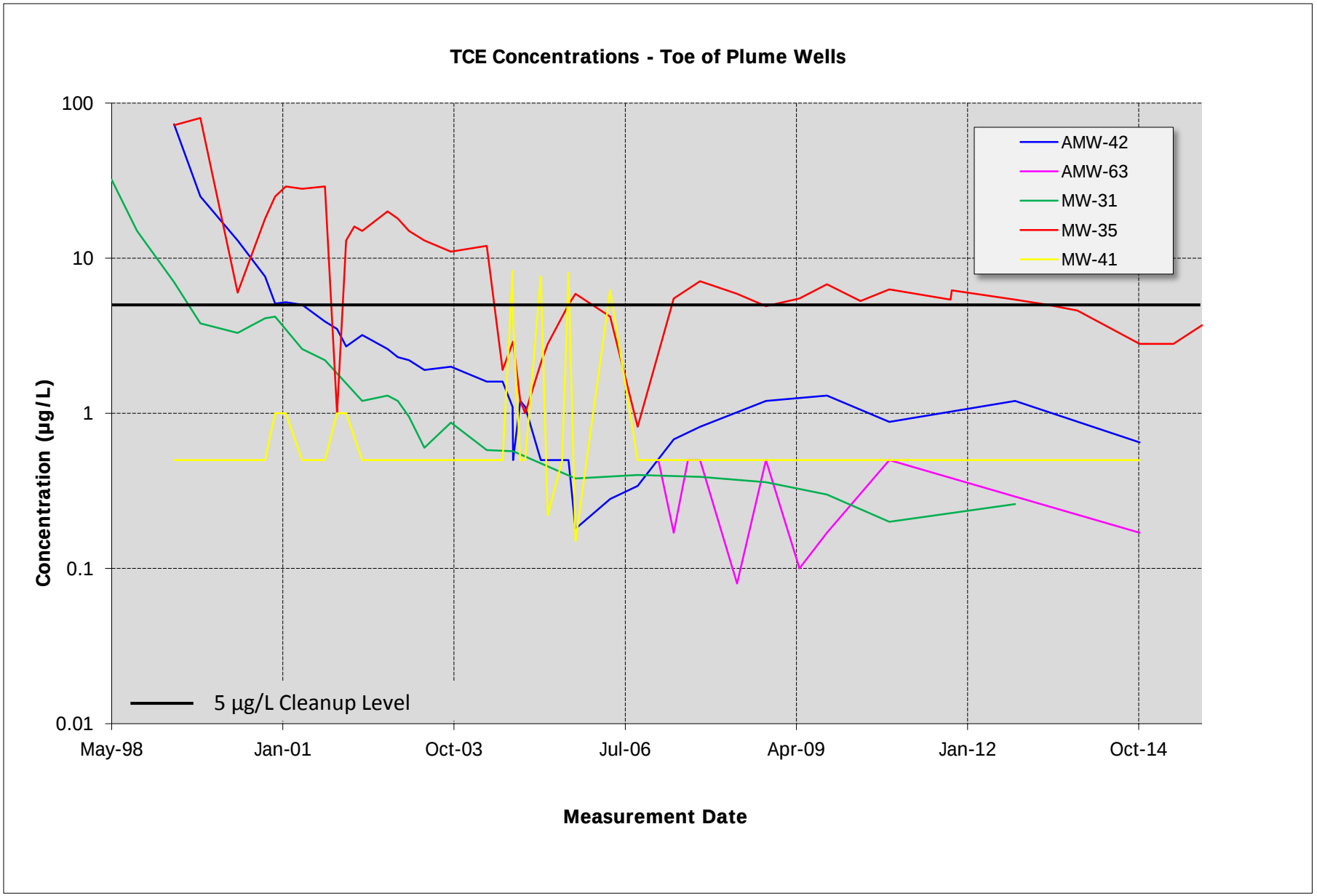

TCE Concentrations - TCE Source Wells
Concentration (µg/L)
100000
10000
1000
100
10
1
0.1
0.01
Apr-95
Jan-98
Oct-00
Jul-03
Mar-06
Dec-08
Sep-11
Jun-14
Measurement Date
AMW-12A
AMW-13A
AMW-19A
AMW-1A
AMW-2A
AMW-2B
AMW-3A
AMW-52A
AMW-53A
AMW-54A
AMW-55A
AMW-56A
MW-1A
AMW-26
5 µg/L Cleanup Level

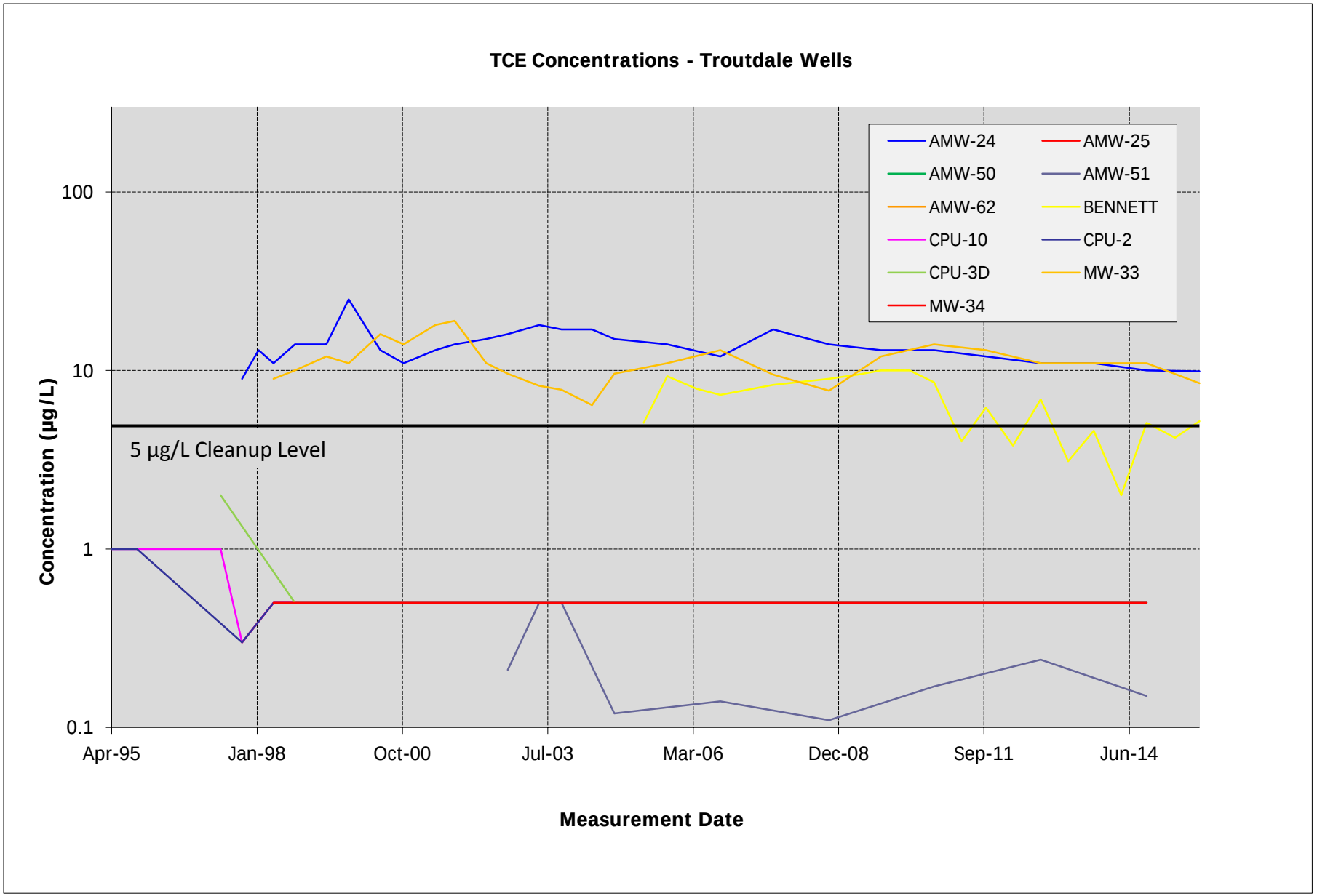

TCE Concentrations - Proximal Source Wells
Concentration (µg/L)
10000
1000
100
10
1
0.1
Jan-95
Oct-97
Jul-00
Apr-03
Jan-06
Sep-08
Jun-11
Mar-14
Measurement Date
MW-10B
MW-10C
MW-12C
MW-13C
MW-2A
MW-3B
MW-4B
MW-6B
MW-7B
MW-8B
MW-9B
PW-1B
5 µg/L Cleanup Level


TCE Concentrations - Intermediate Plume Wells
10000
1000
100
10
1
Concentration (µg/L)
Jan-95
Oct-97
Jul-00
Apr-03
Jan-06
Sep-08
Jun-11
Mar-14
Measurement Date
AMW-59
CPU-14
MW-14C
MW-14E
MW-15E
MW-18D
MW-18E
MW-19D
MW-20D
PZ-39
5 µg/L Cleanup Level


TCE Concentrations - Northern Plume Wells
1000
100
10
1
0.1
Concentration (µg/L)
AMW-16
AMW-17
AMW-18
AMW-64
MW-23D
MW-38
5 µg/L Cleanup Level
Apr-95
Jan-98
Oct-00
Jul-03
Mar-06
Dec-08
Sep-11
Jun-14
Measurement Date


TCE Concentrations - Church of God Wells
Concentration (µg/L)
10000
1000
100
10
1
0.1
Jan-95
Oct-97
Jul-00
Apr-03
Jan-06
Sep-08
Jun-11
Mar-14
Measurement Date
AMW-27
AMW-61
CPU-12
CPU-13
MW-21D
MW-22D
MW-25D
MW-26D
MW-27D
MW-49
5 µg/L Cleanup Level


TCE Concentrations - Toe of Plume Wells
100
10
1
0.1
0.01
Concentration (µg/L)
May-98
Jan-01
Oct-03
Jul-06
Apr-09
Jan-12
Oct-14
Measurement Date
AMW-42
AMW-63
MW-31
MW-35
MW-41
5 µg/L Cleanup Level


TCE Concentrations - Troutdale Wells
AMW-24
AMW-25
AMW-50
AMW-51
AMW-62
BENNETT
CPU-10
CPU-2
CPU-3D
MW-33
MW-34
5 µg/L Cleanup Level
Concentration (µg/L)
100
10
1
0.1
Apr-95
Jan-98
Oct-00
Jul-03
Mar-06
Dec-08
Sep-11
Jun-14
Measurement Date

APPENDIX B-3

TCE CONCENTRATIONS – INDIVIDUAL WELLS

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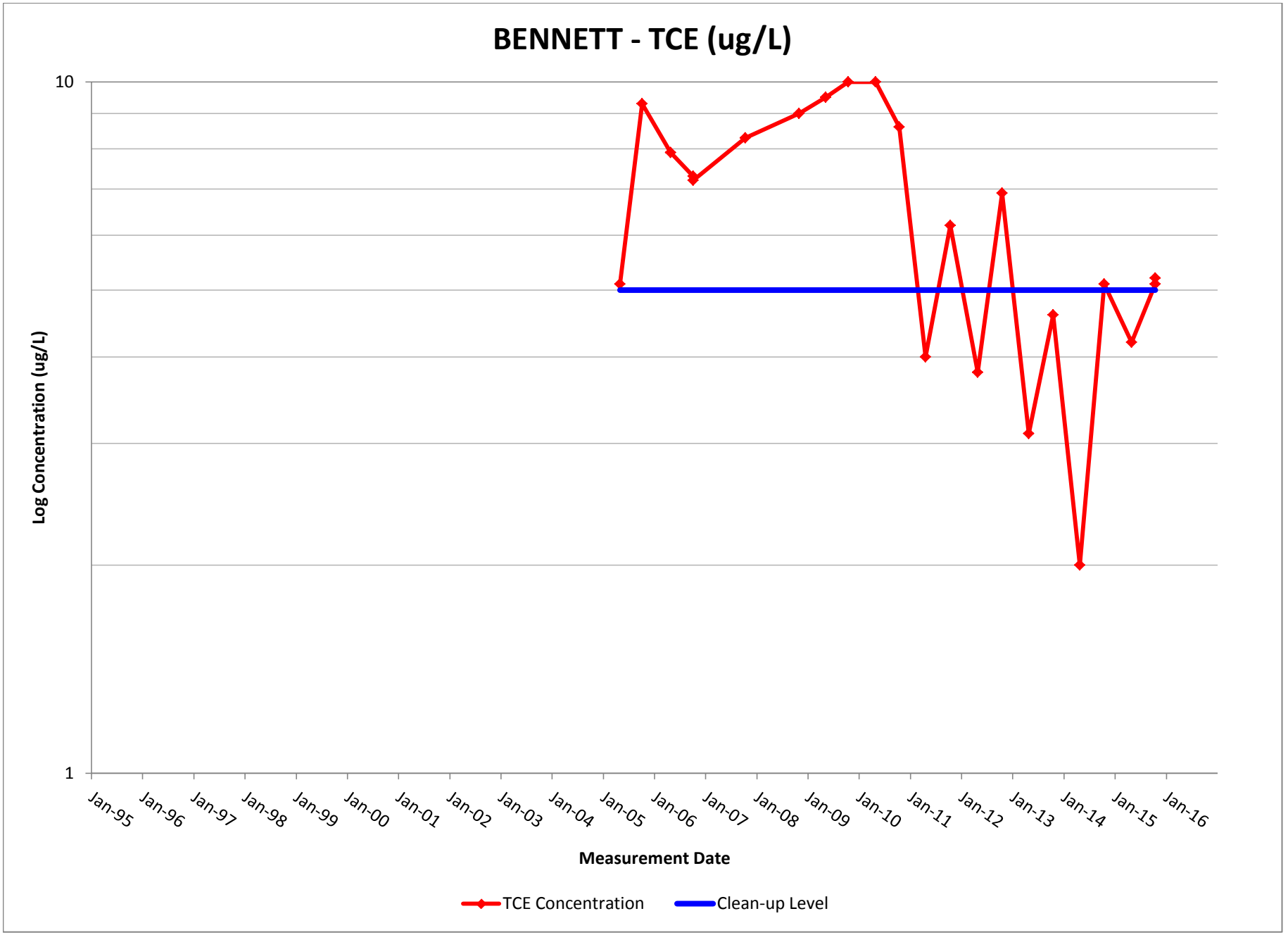
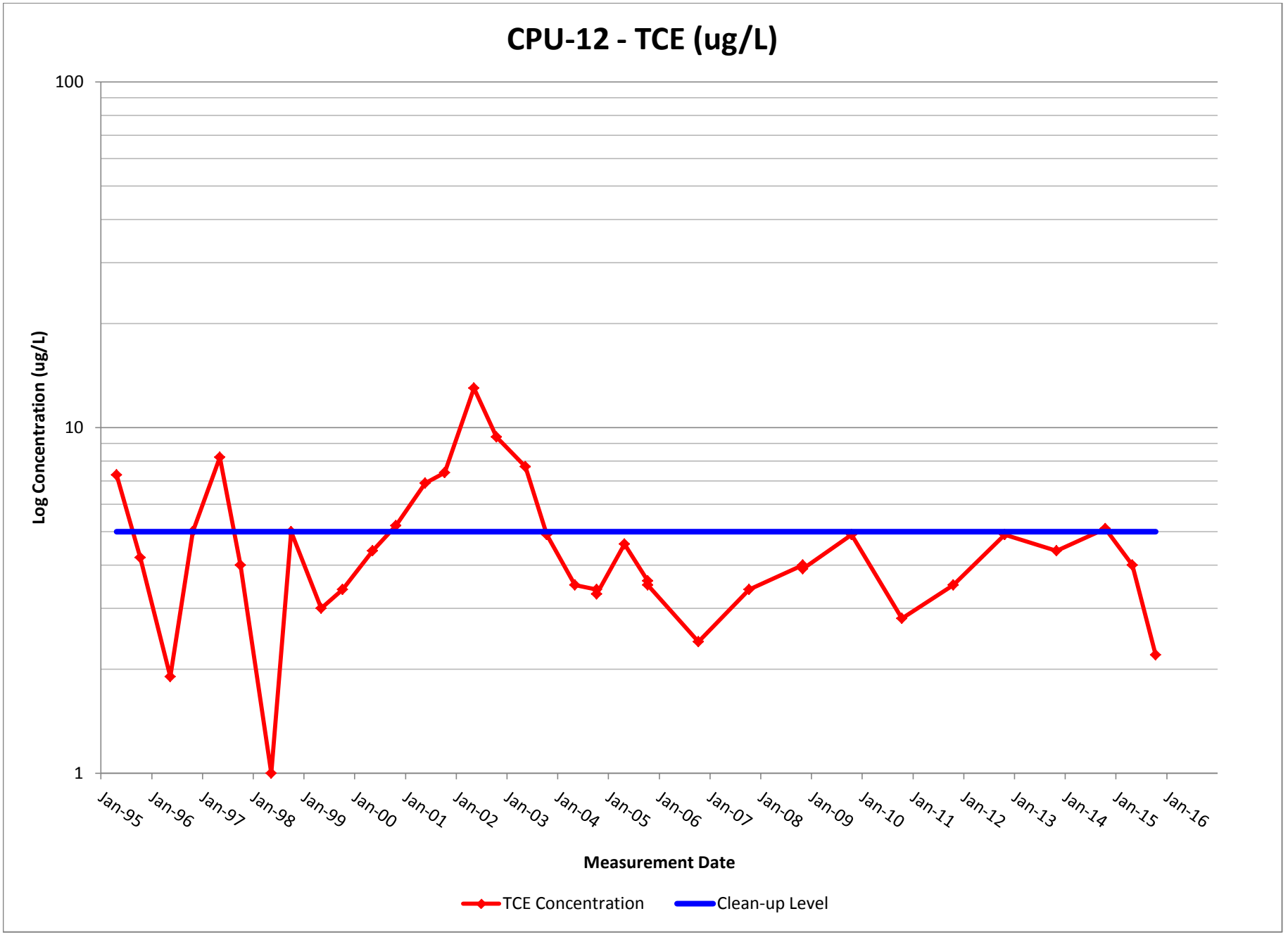
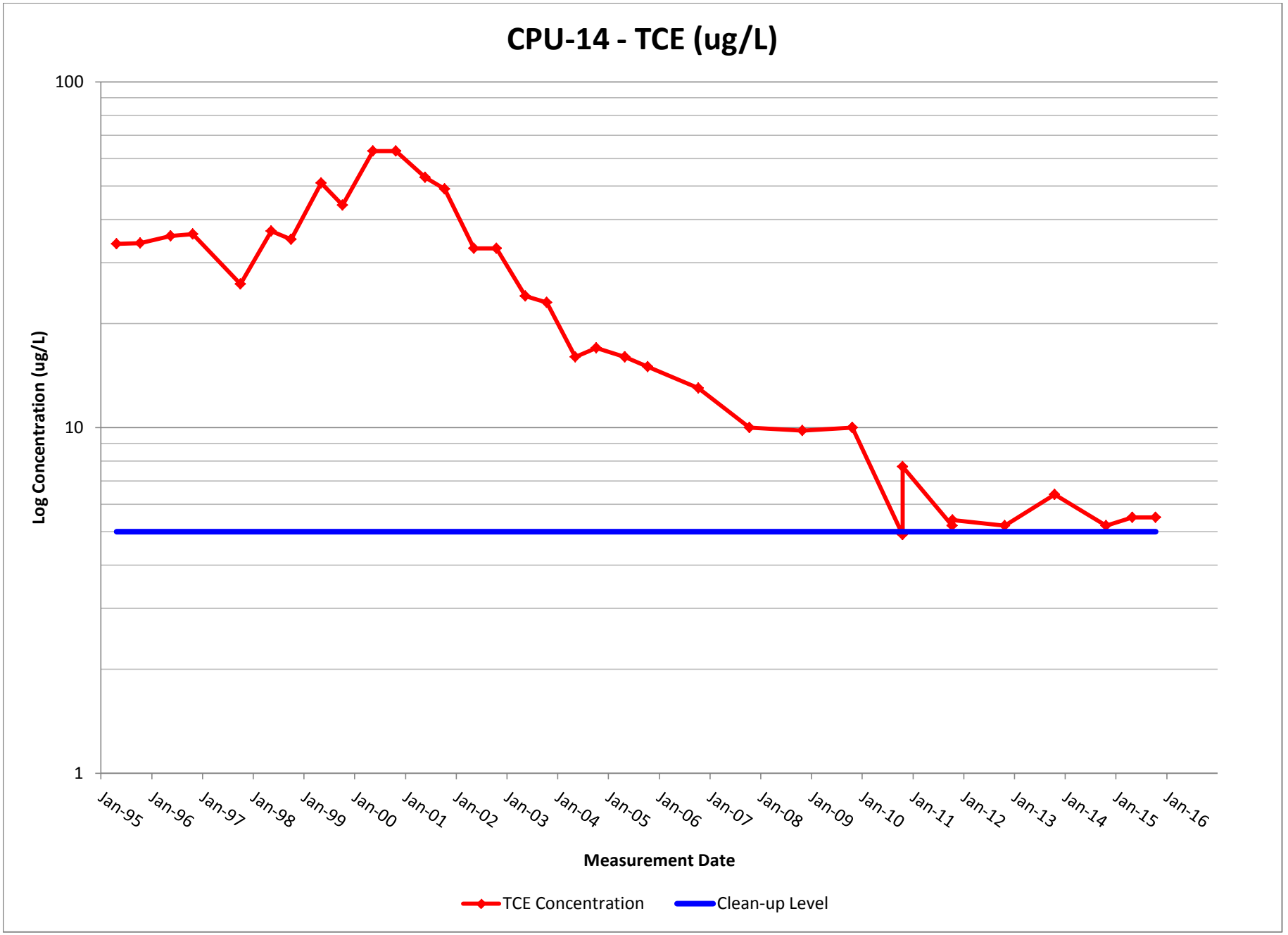
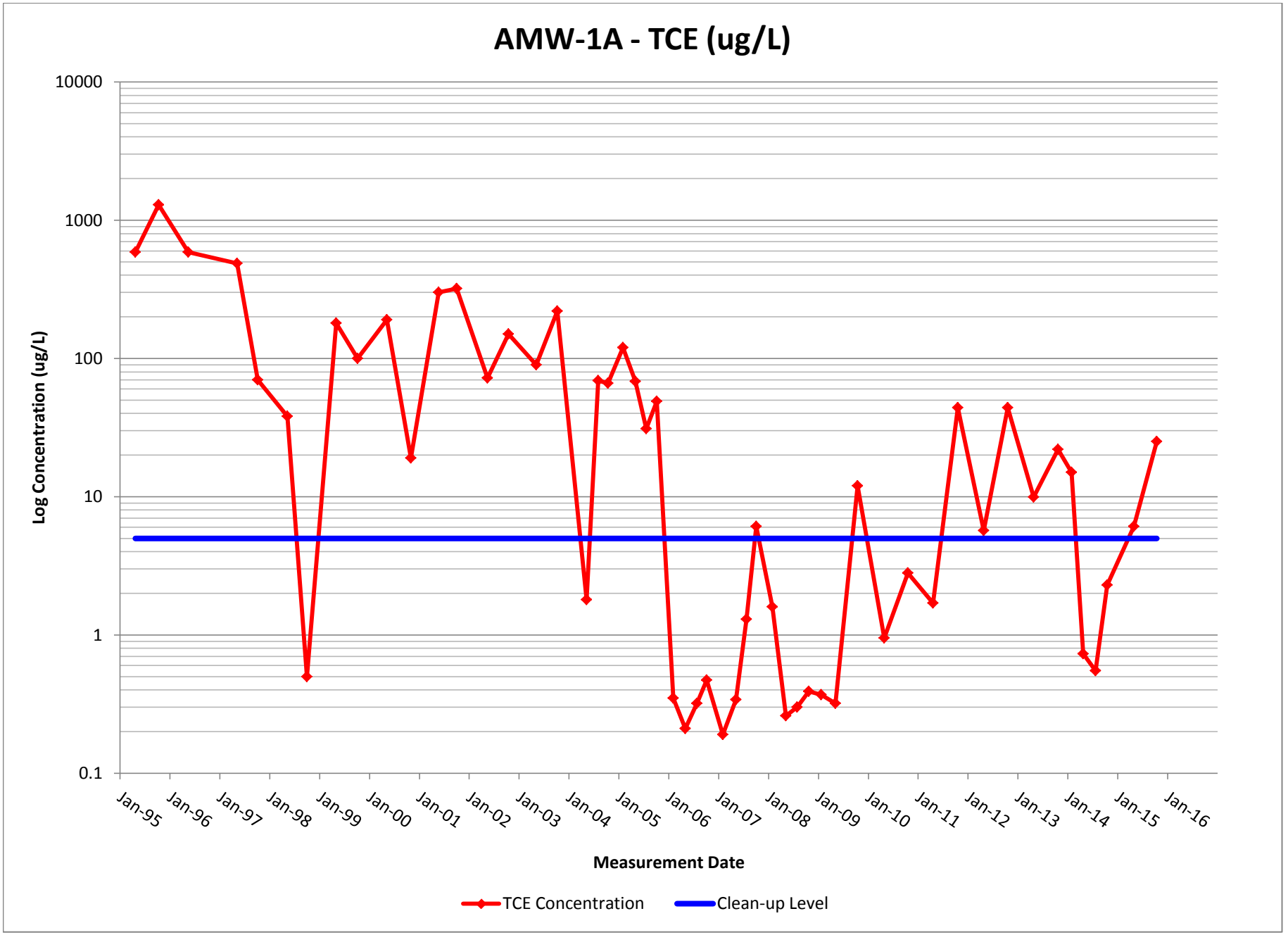
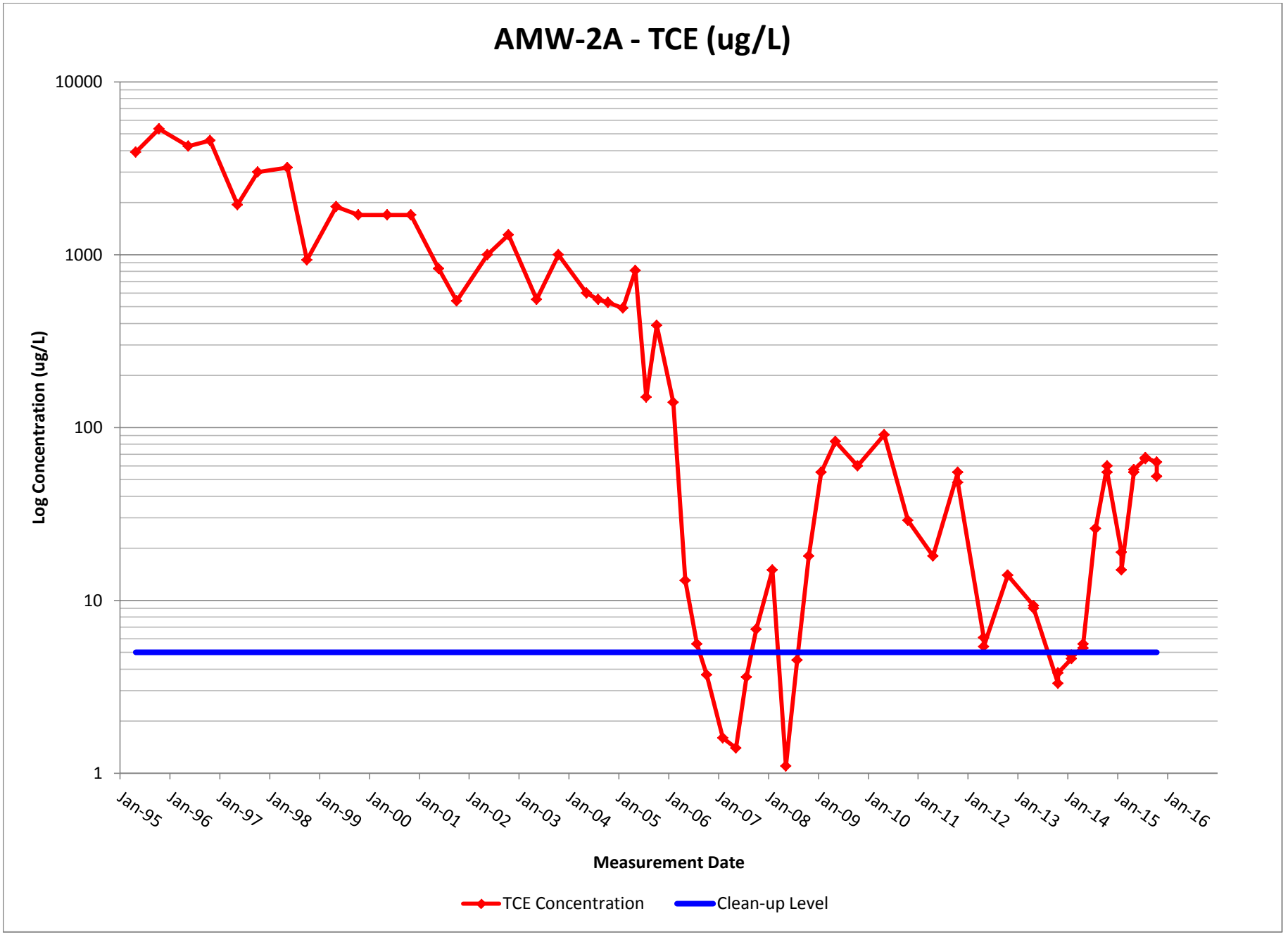
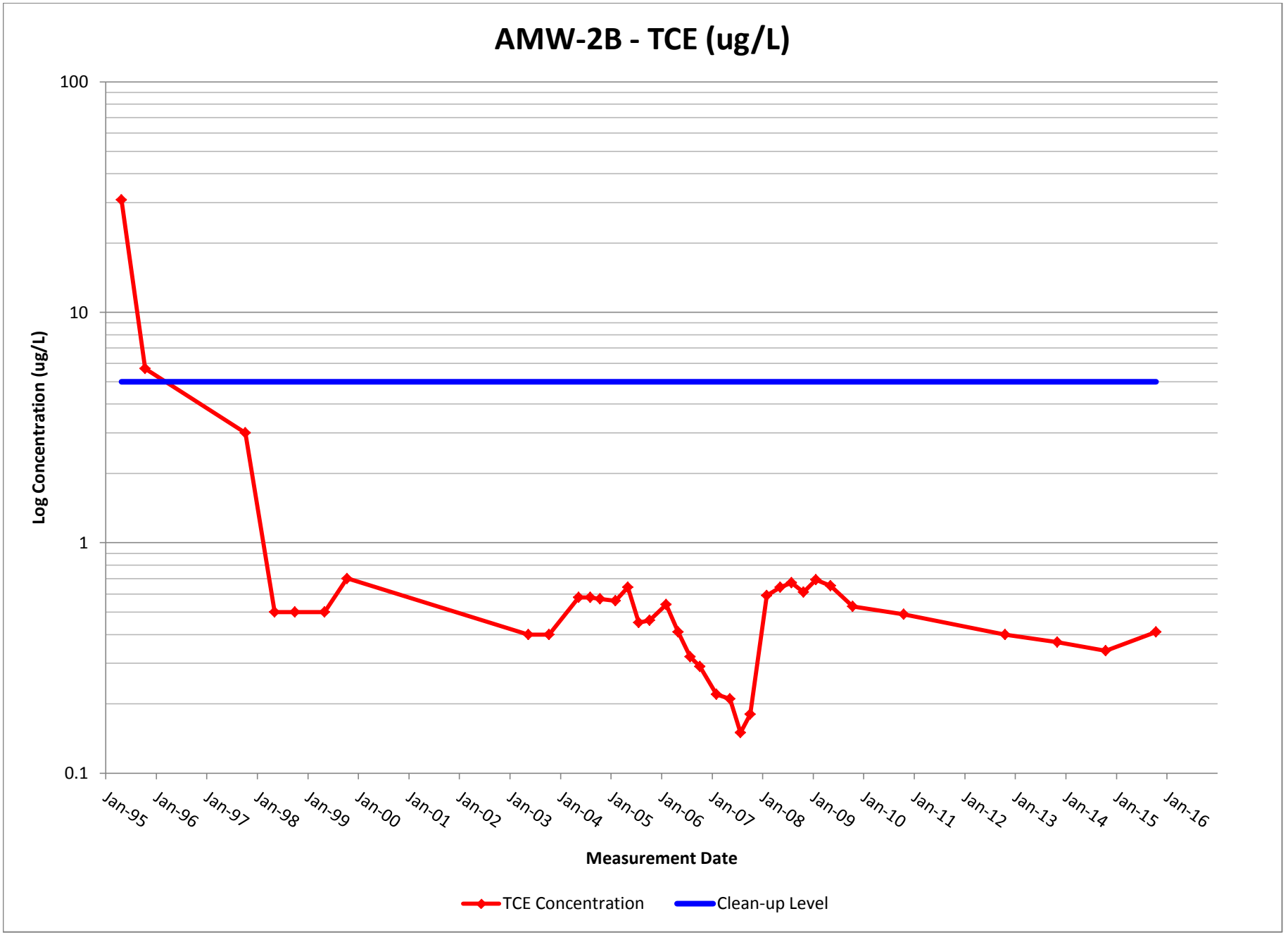

BENNETT - TCE (ug/L)
10
1
Log Concentration (ug/L)
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration
Clean-up Level

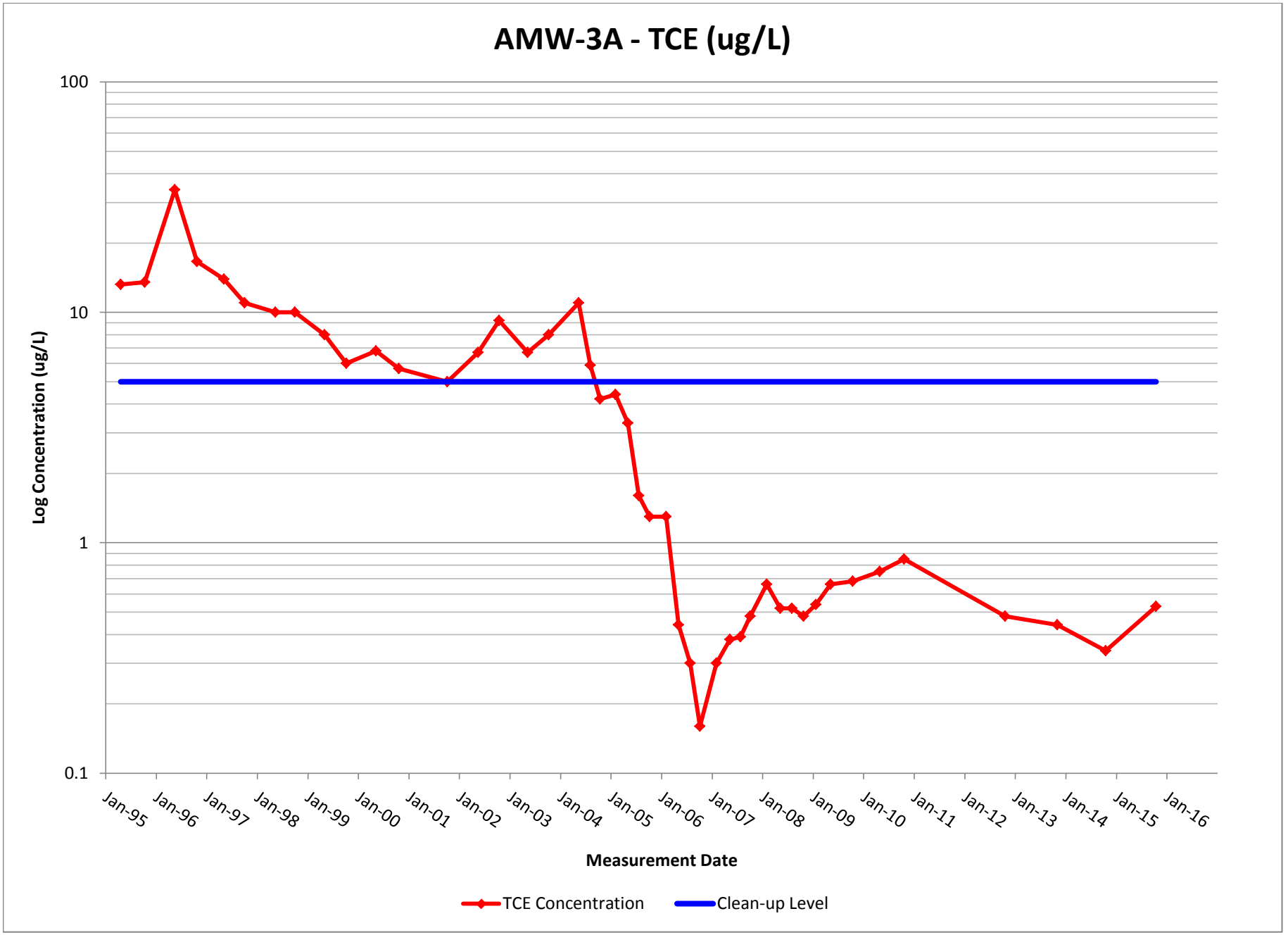

CPU-12 - TCE (ug/L)
100
10
1
Log Concentration (ug/L)
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration
Clean-up Level

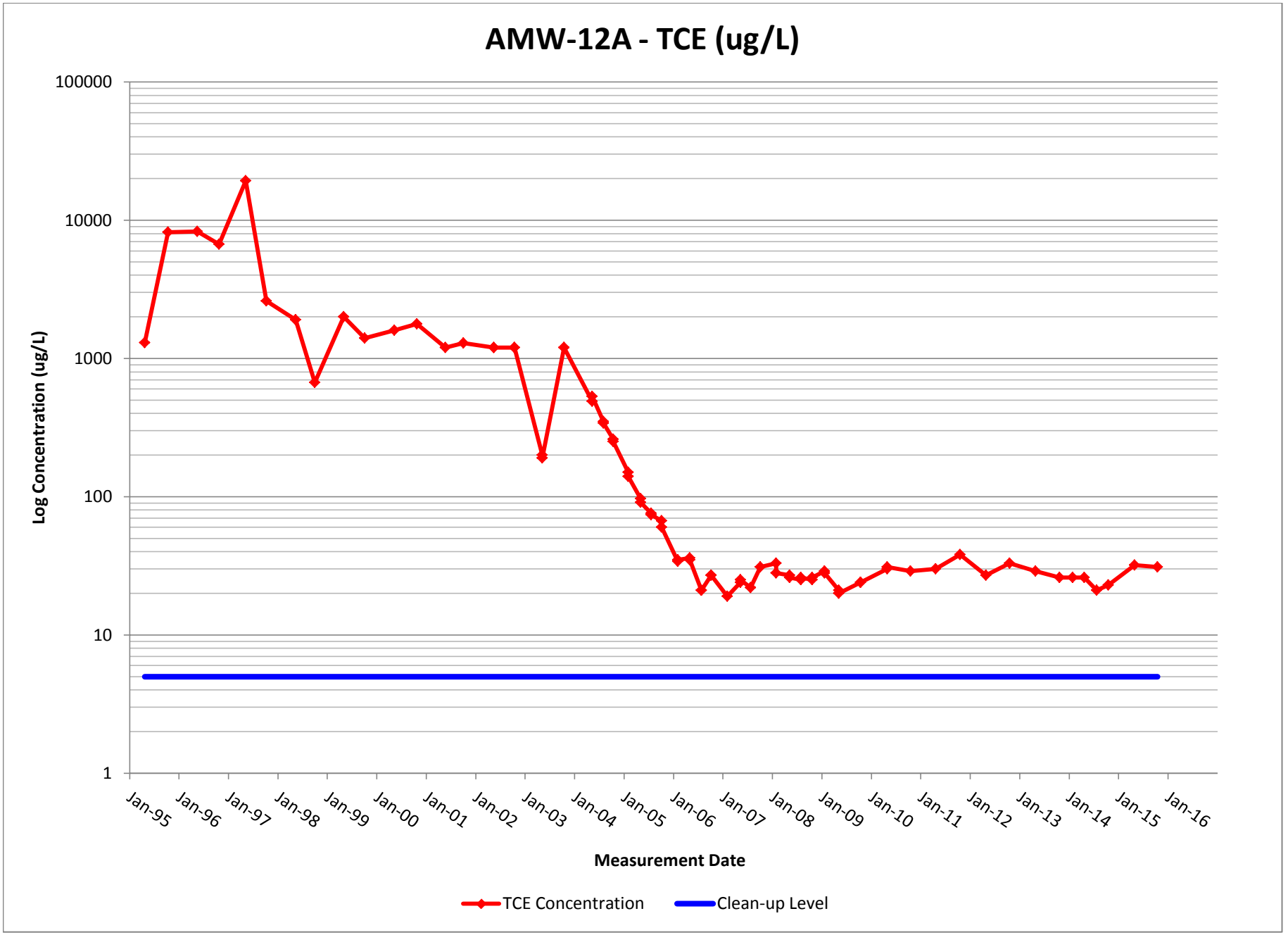

CPU-14 - TCE (ug/L)
100
10
1
Log Concentration (ug/L)
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration
Clean-up Level

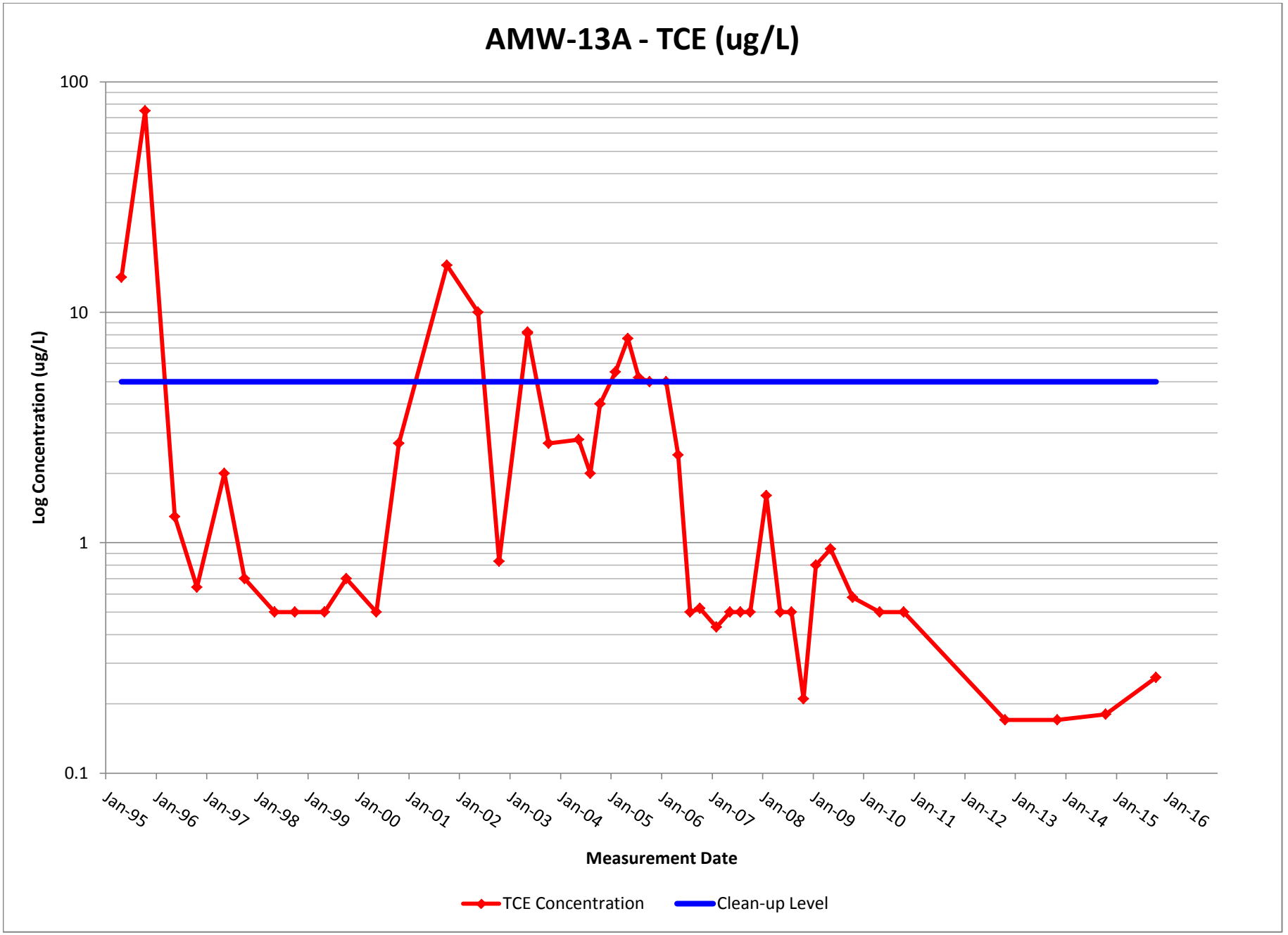

AMW-1A - TCE (ug/L)
Log Concentration (ug/L)
10000
1000
100
10
1
0.1
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration
Clean-up Level

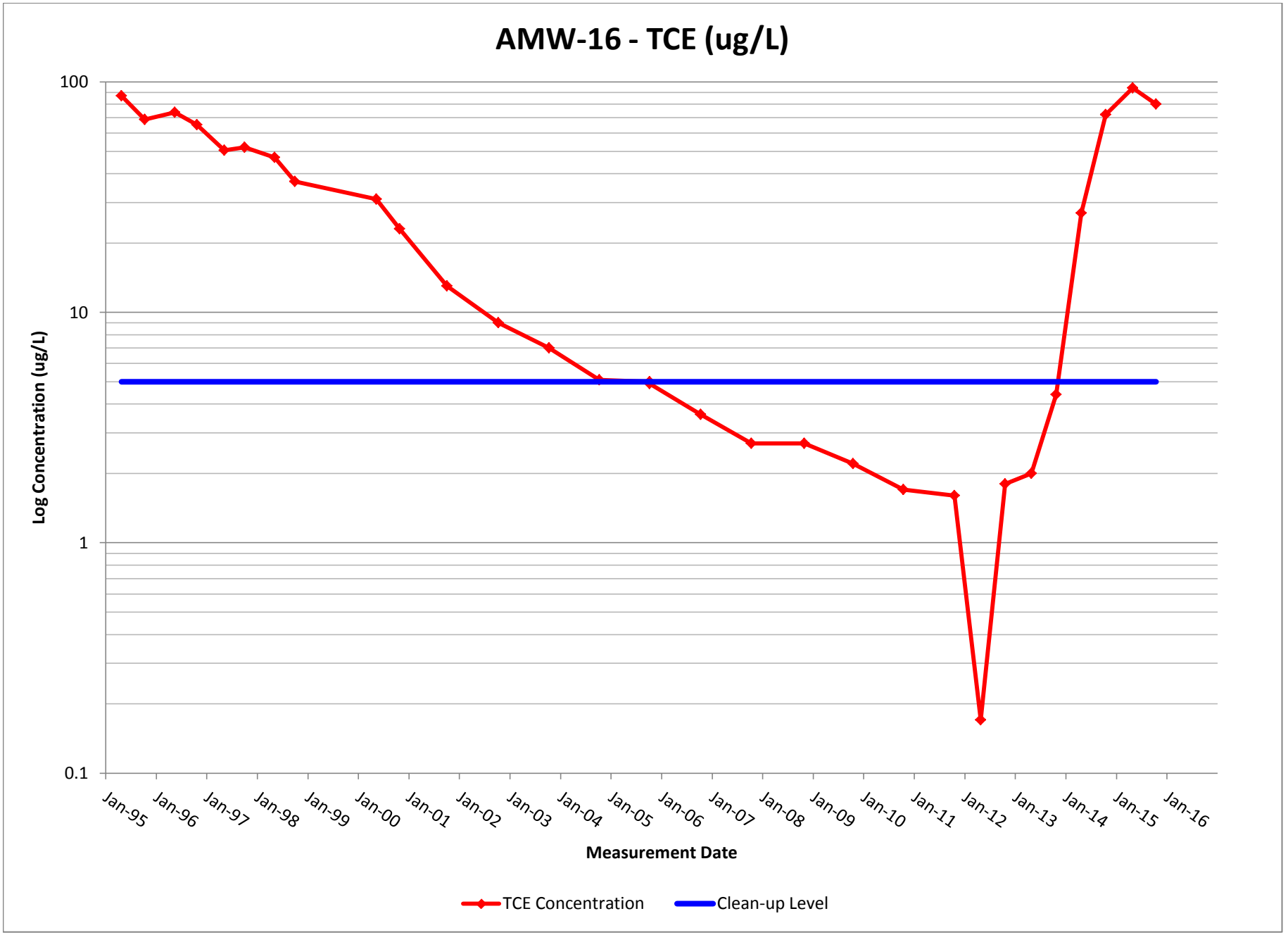

AMW-2A - TCE (ug/L)
10000
1000
100
10
1
Log Concentration (ug/L)
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration
Clean-up Level

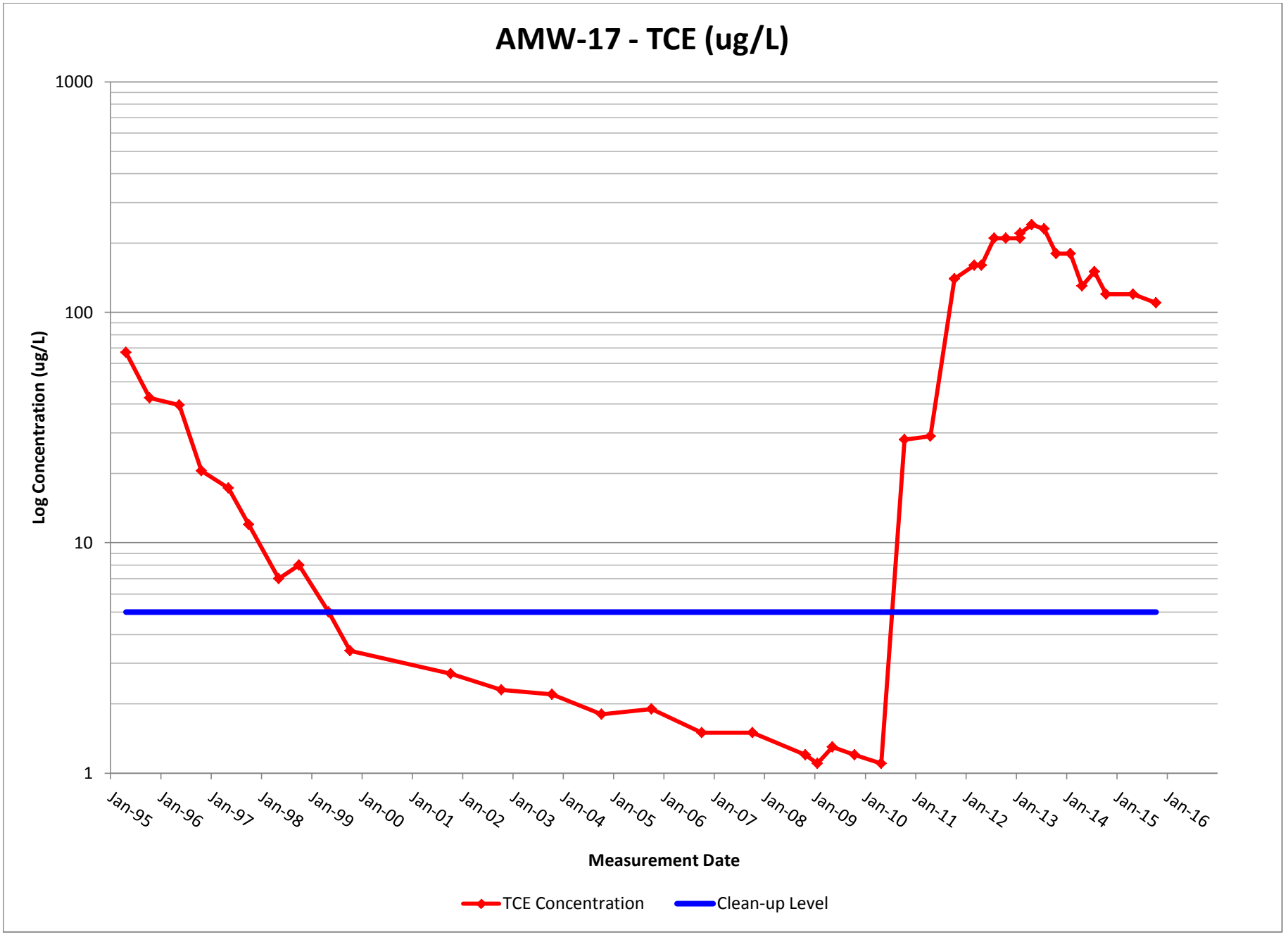

AMW-2B - TCE (ug/L)
100
10
1
0.1
Log Concentration (ug/L)
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration
Clean-up Level

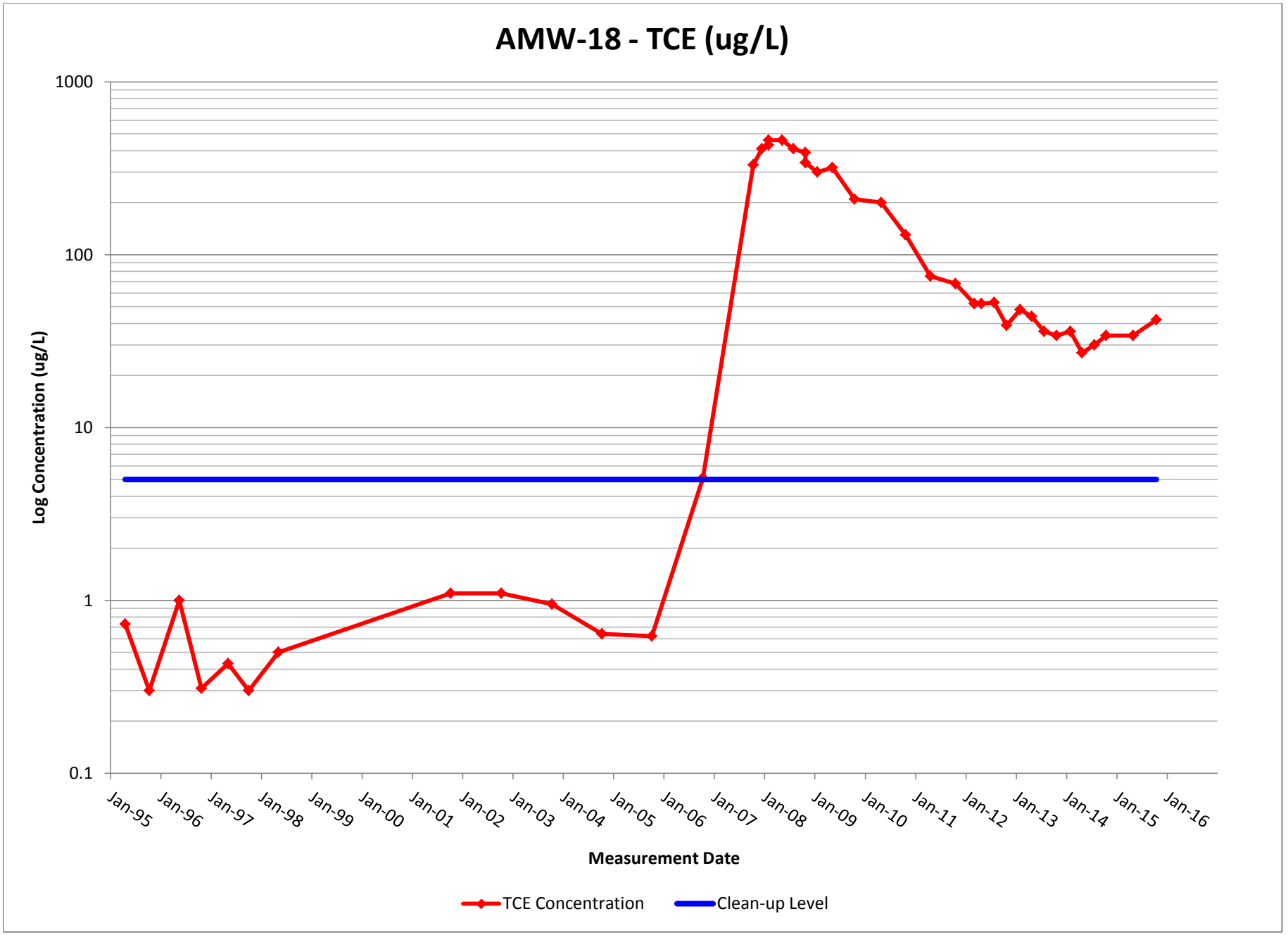

AMW-3A - TCE (ug/L)
100
10
1
0.1
Log Concentration (ug/L)
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration
Clean-up Level

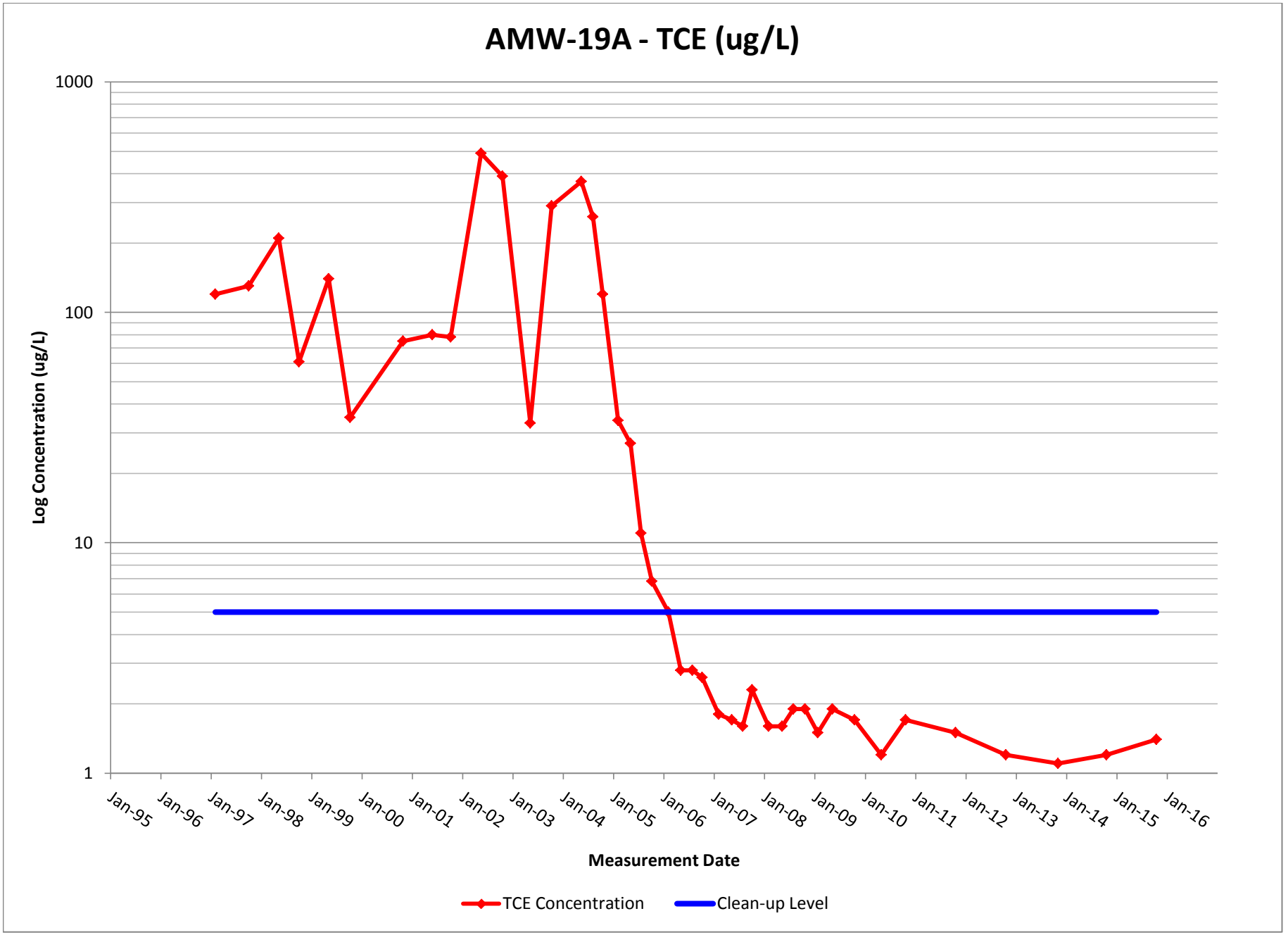

AMW-12A - TCE (ug/L)
Log Concentration (ug/L)
100000
10000
1000
100
10
1
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration
Clean-up Level

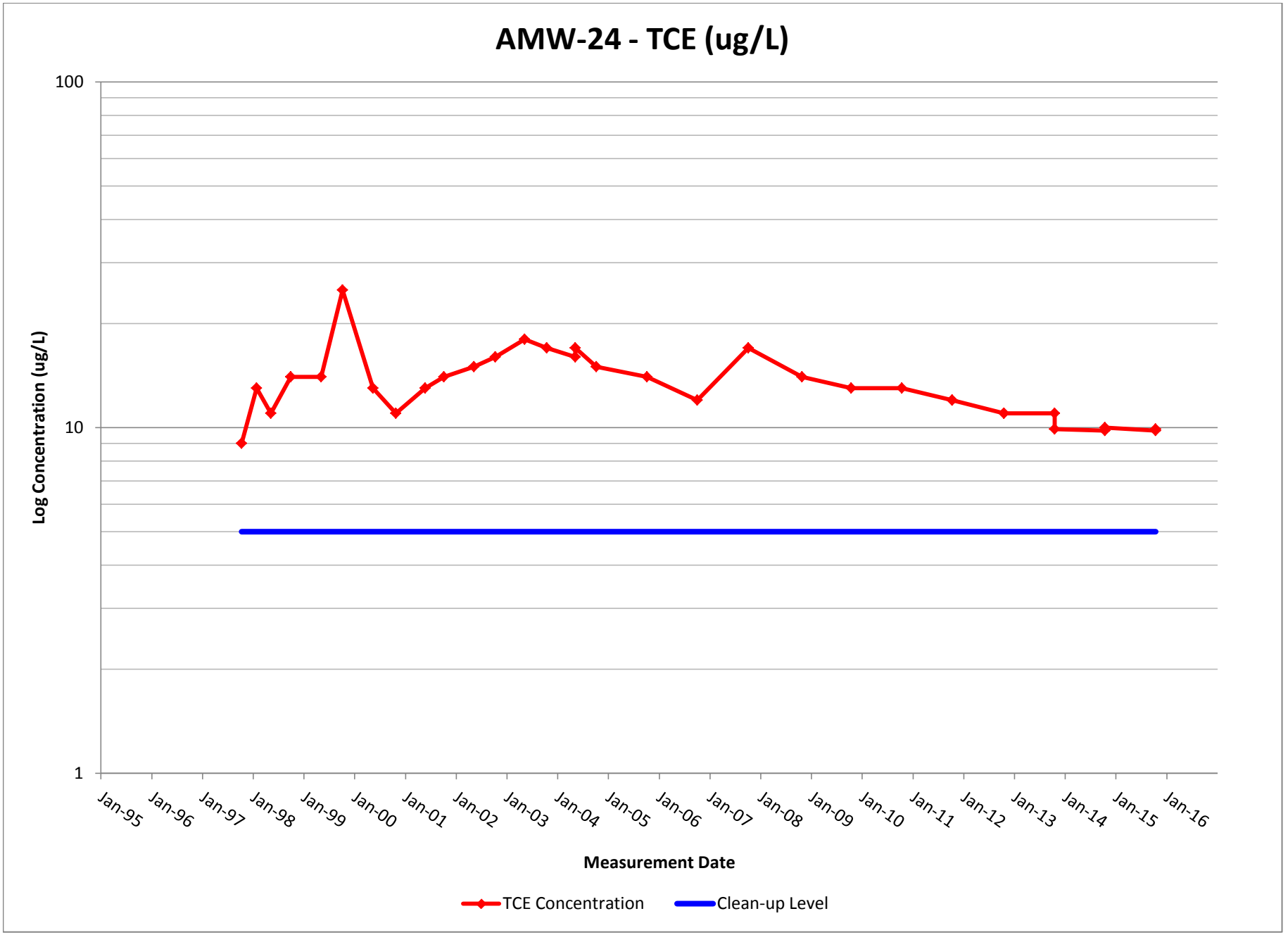

AMW-13A - TCE (ug/L)
100
10
1
0.1
Log Concentration (ug/L)
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration
Clean-up Level

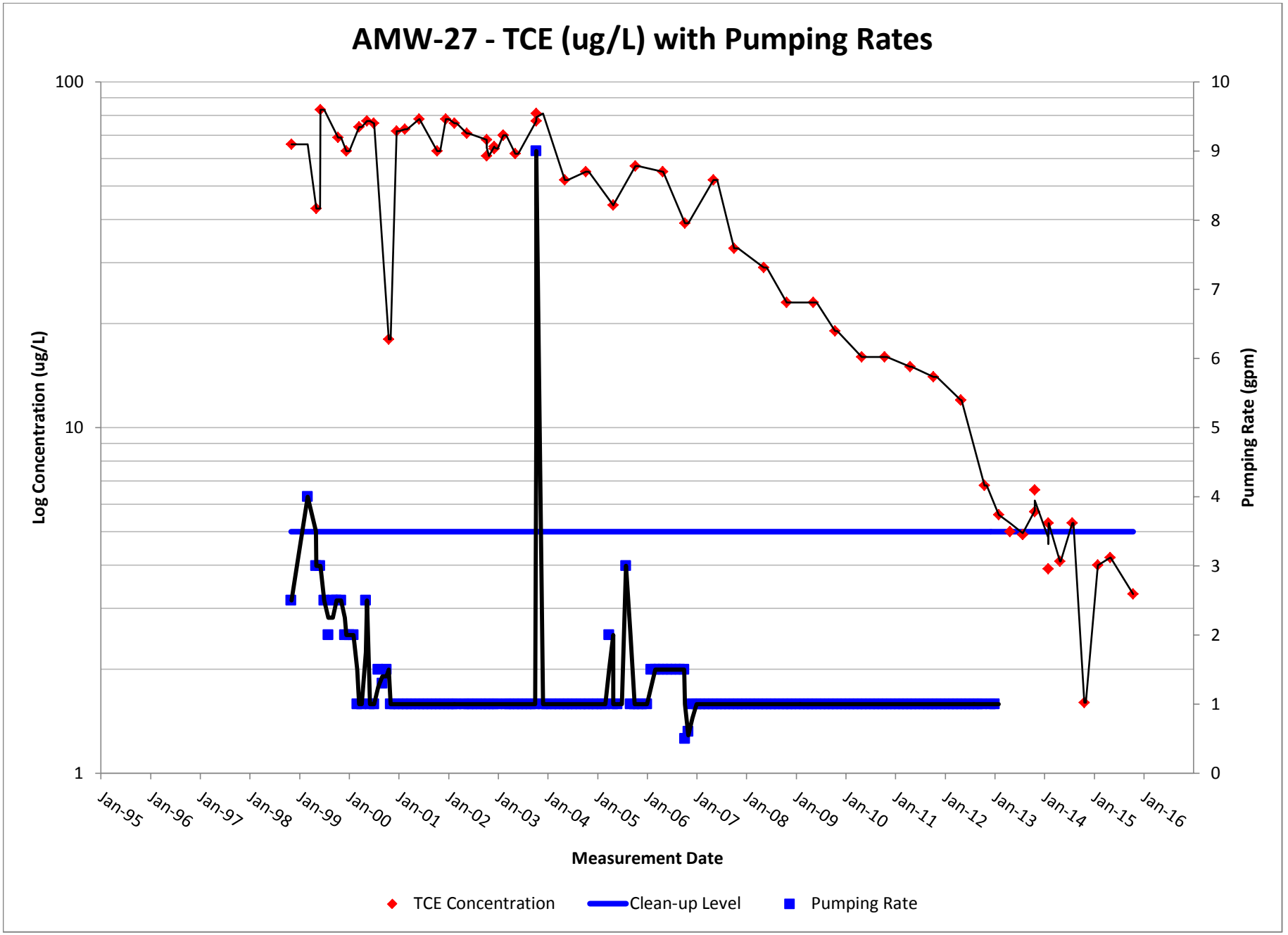

AMW-16 - TCE (ug/L)
100
10
1
0.1
Log Concentration (ug/L)
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration
Clean-up Level

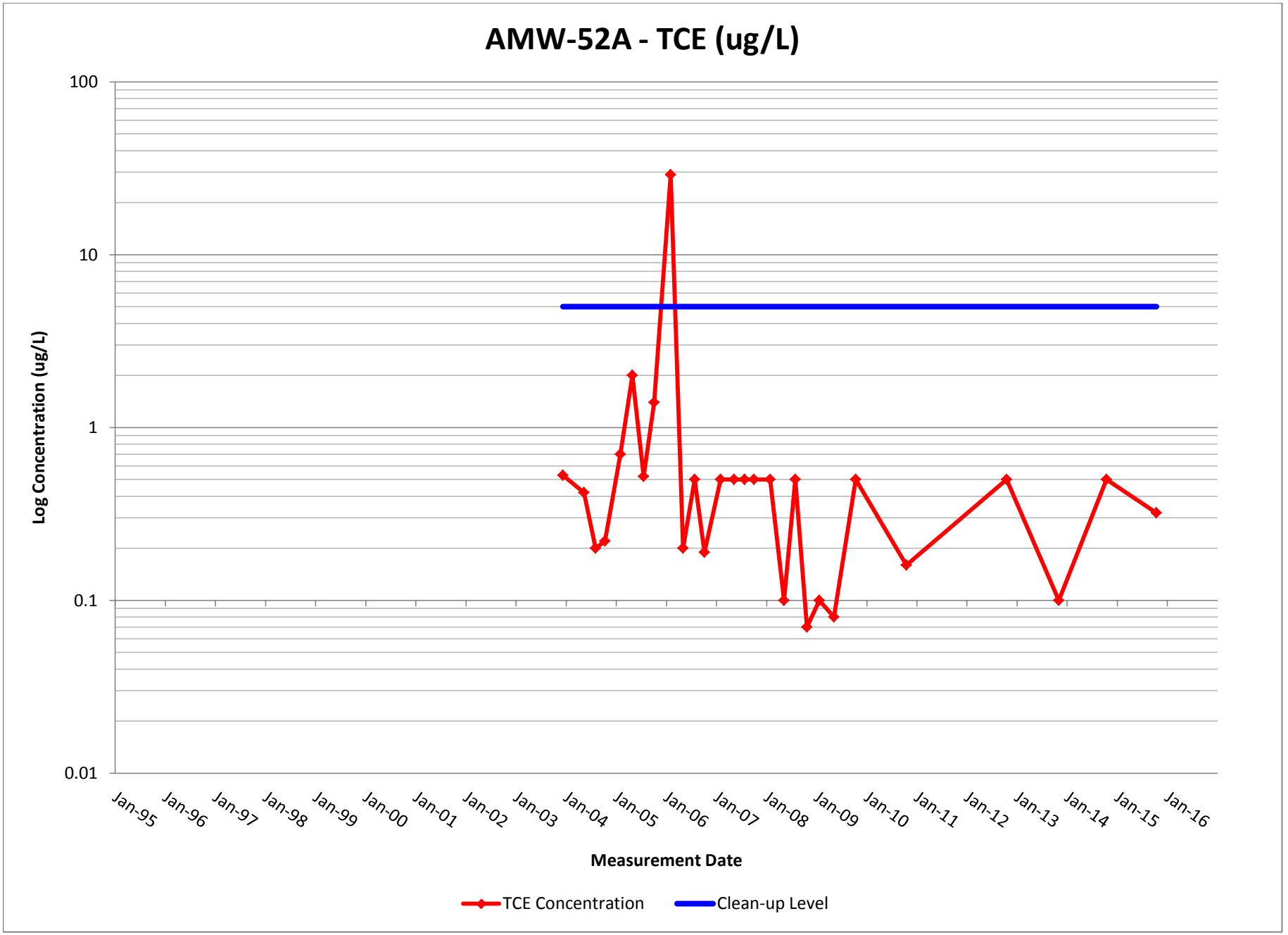

AMW-17 - TCE (ug/L)
1000
100
10
1
Log Concentration (ug/L)
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration
Clean-up Level

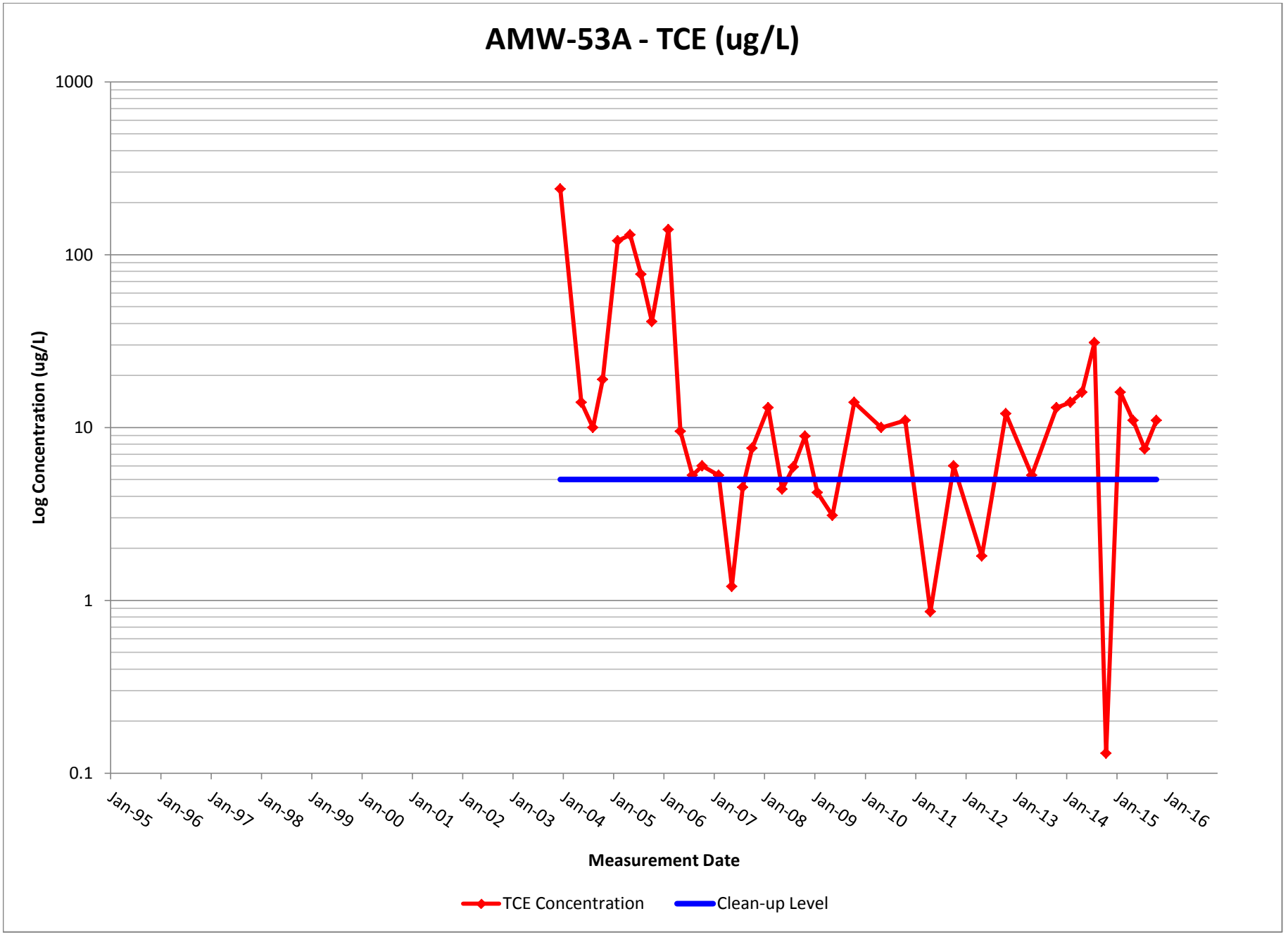

AMW-18 - TCE (ug/L)
1000
100
10
1
0.1
Log Concentration (ug/L)
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration
Clean-up Level

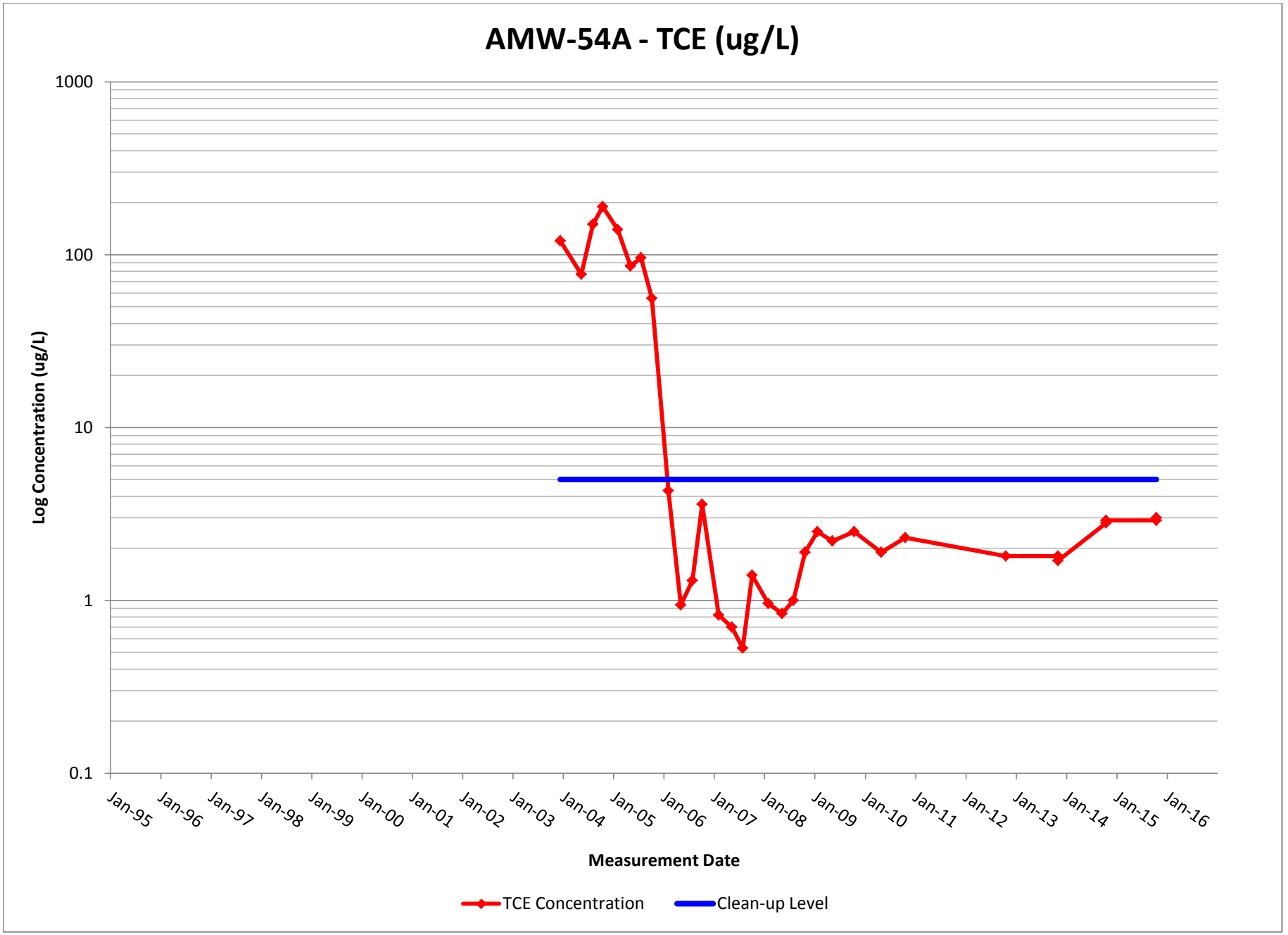

AMW-19A - TCE (ug/L)
1000
100
10
1
Log Concentration (ug/L)
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration
Clean-up Level

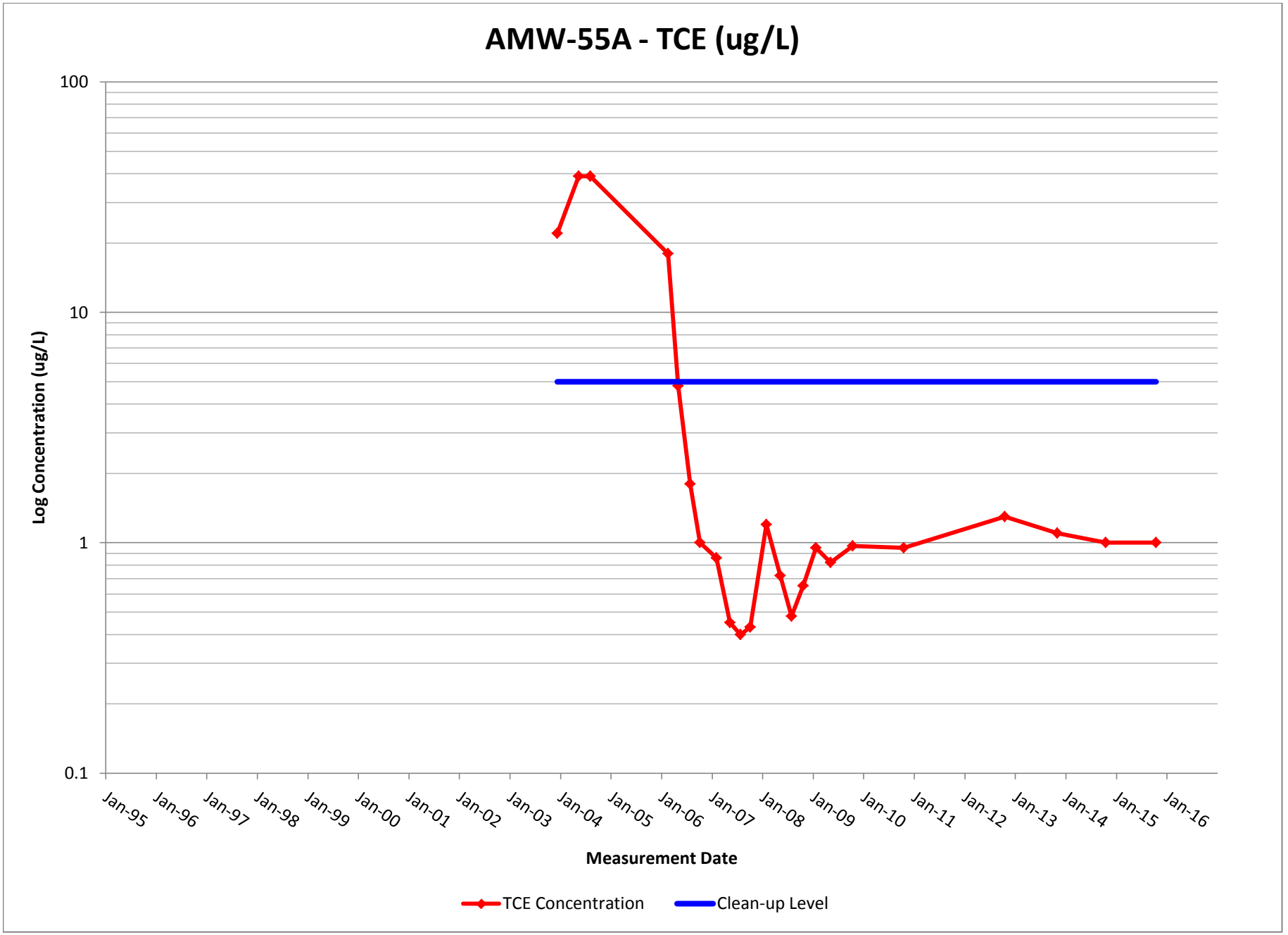

AMW-24 - TCE (ug/L)
100
10
1
Log Concentration (ug/L)
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration
Clean-up Level

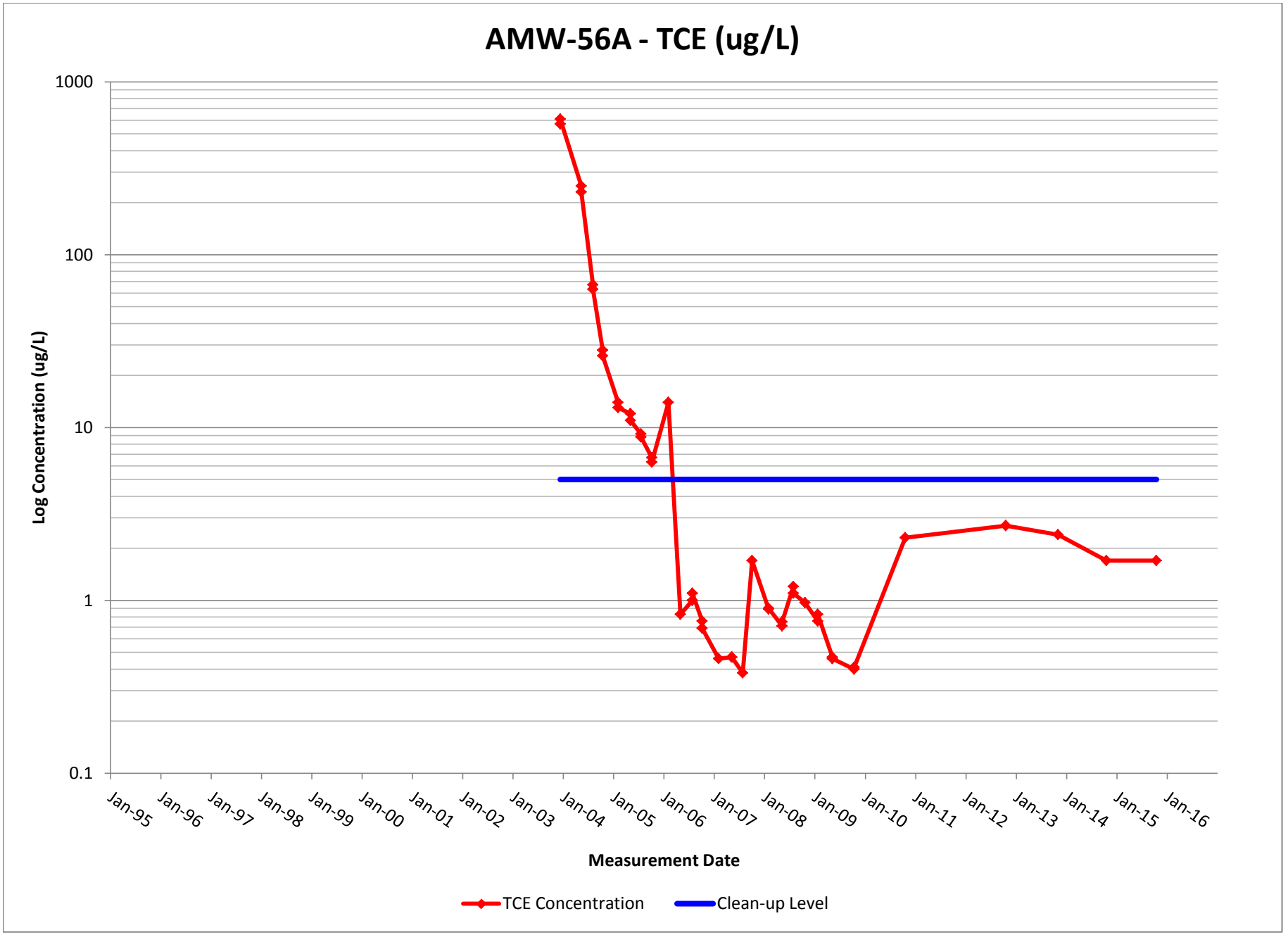

AMW-27 - TCE (ug/L) with Pumping Rates
Log Concentration (ug/L)
100
10
1
Pumping Rate (gpm)
10
9
8
7
6
5
4
3
2
1
0
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration
Clean-up Level
Pumping Rate

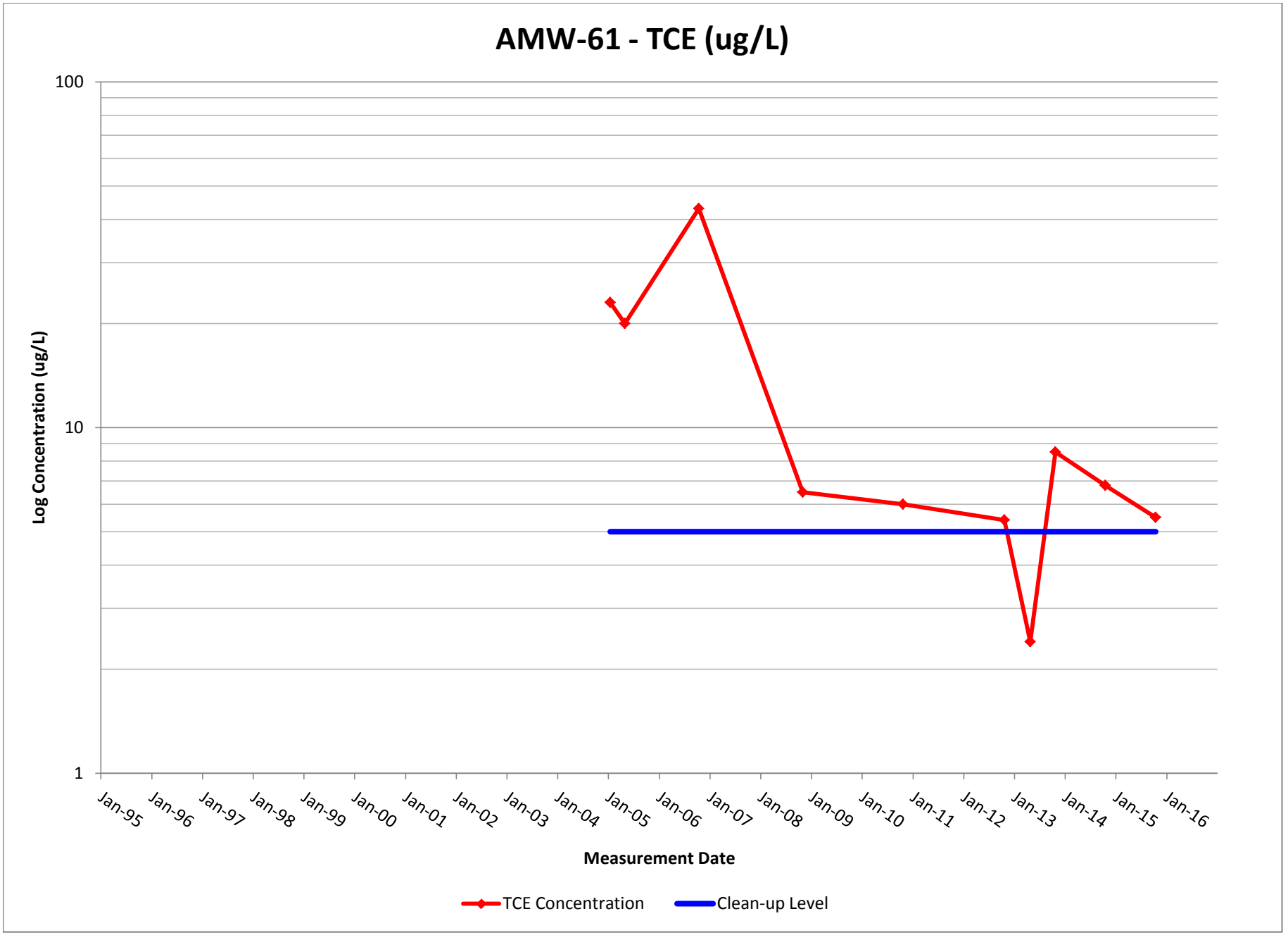

AMW-52A - TCE (ug/L)
100
10
1
0.1
0.01
Log Concentration (ug/L)
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration
Clean-up Level

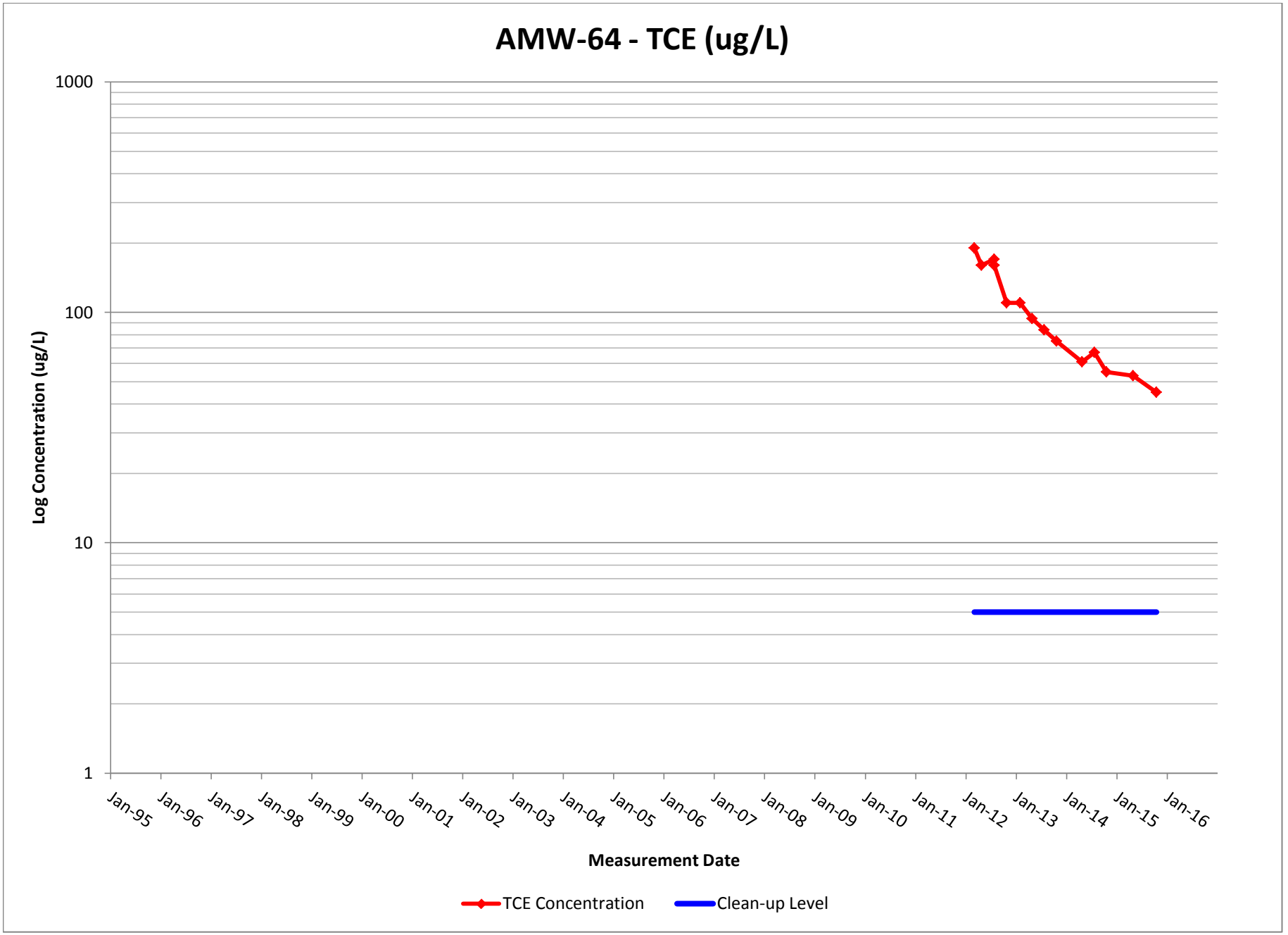

AMW-53A - TCE (ug/L)
1000
100
10
1
0.1
Log Concentration (ug/L)
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration
Clean-up Level

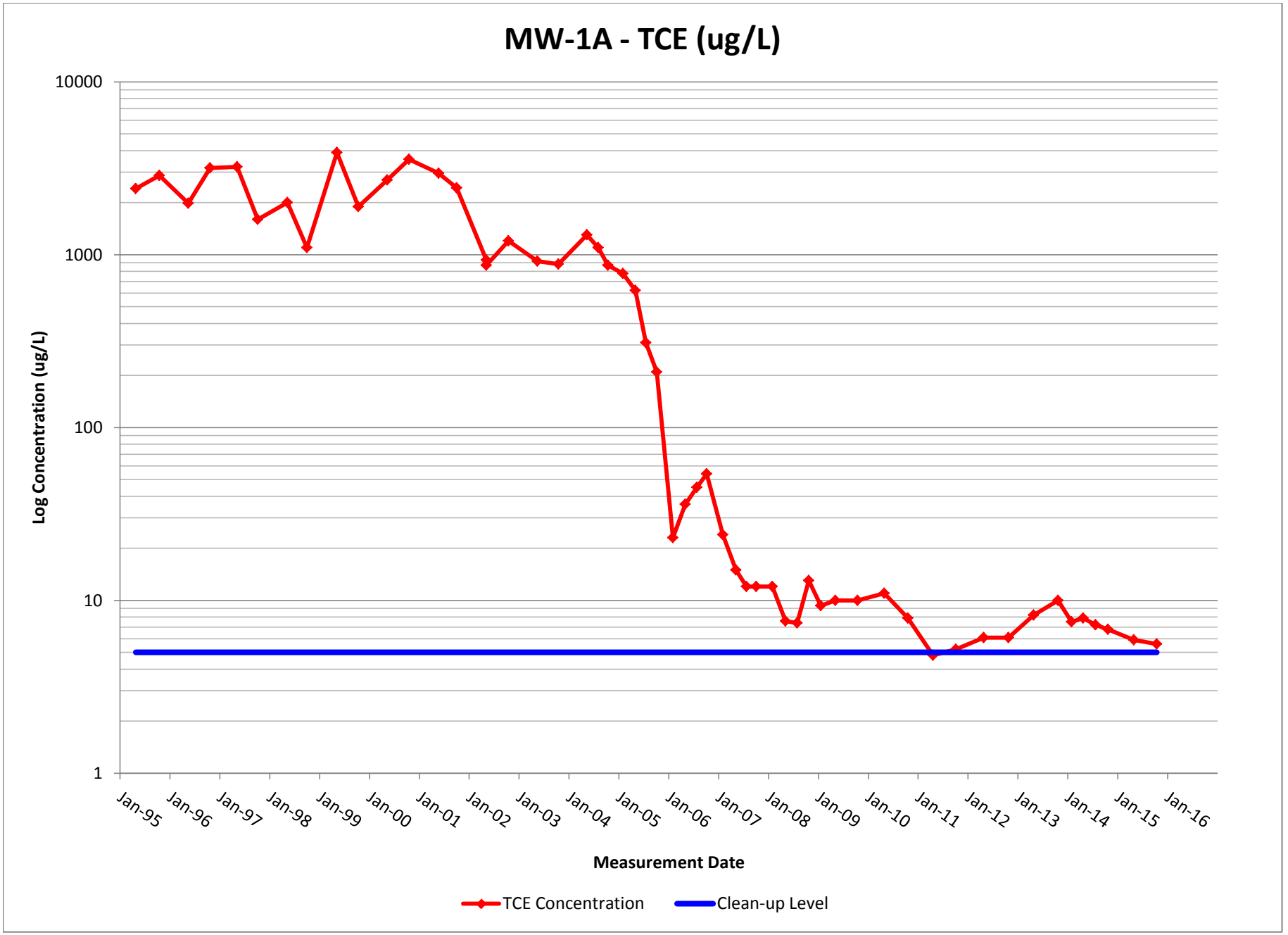

AMW-54A - TCE (ug/L)
1000
100
10
1
0.1
Log Concentration (ug/L)
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration
Clean-up Level

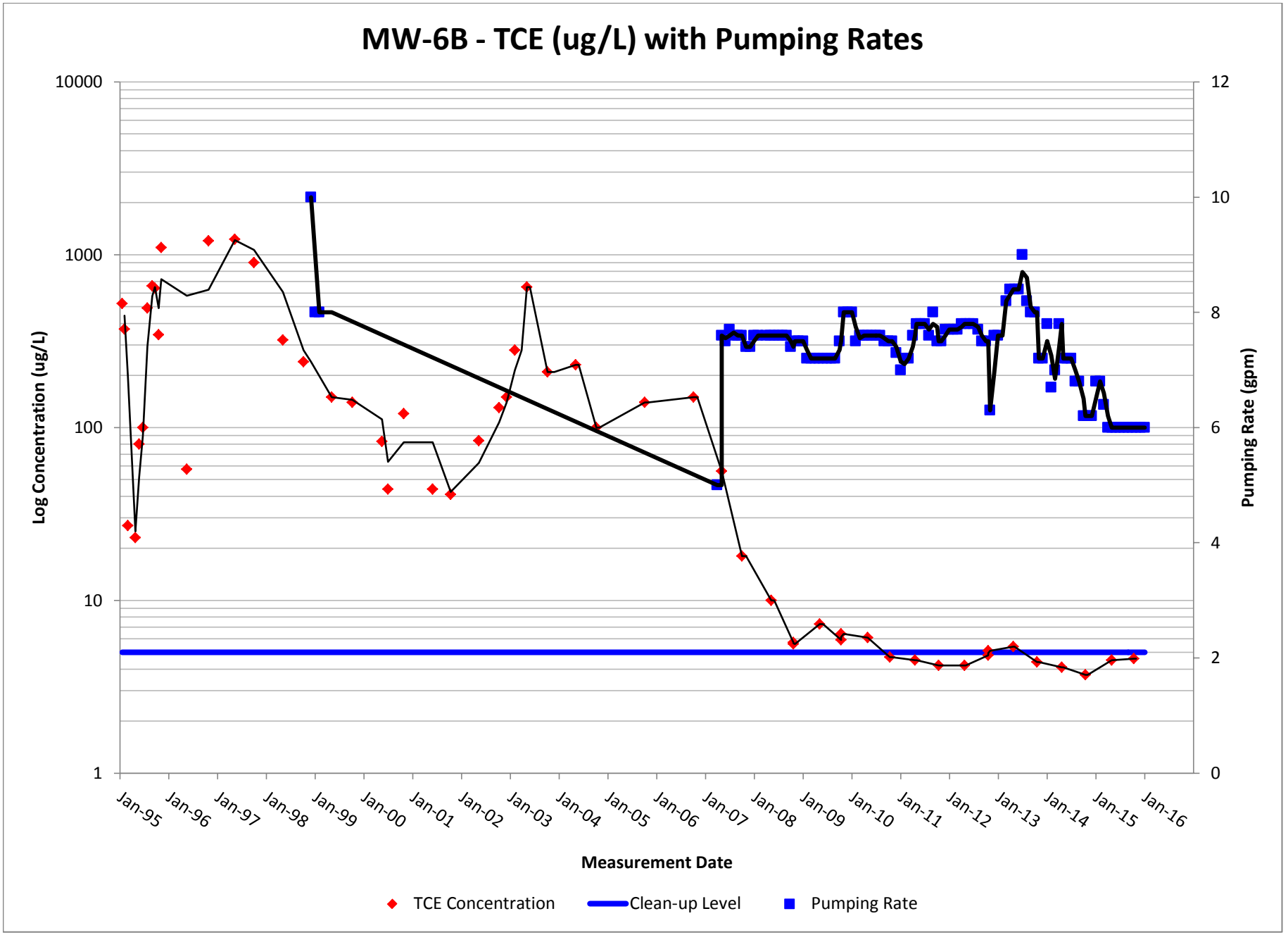

AMW-55A - TCE (ug/L)
100
10
1
0.1
Log Concentration (ug/L)
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration
Clean-up Level

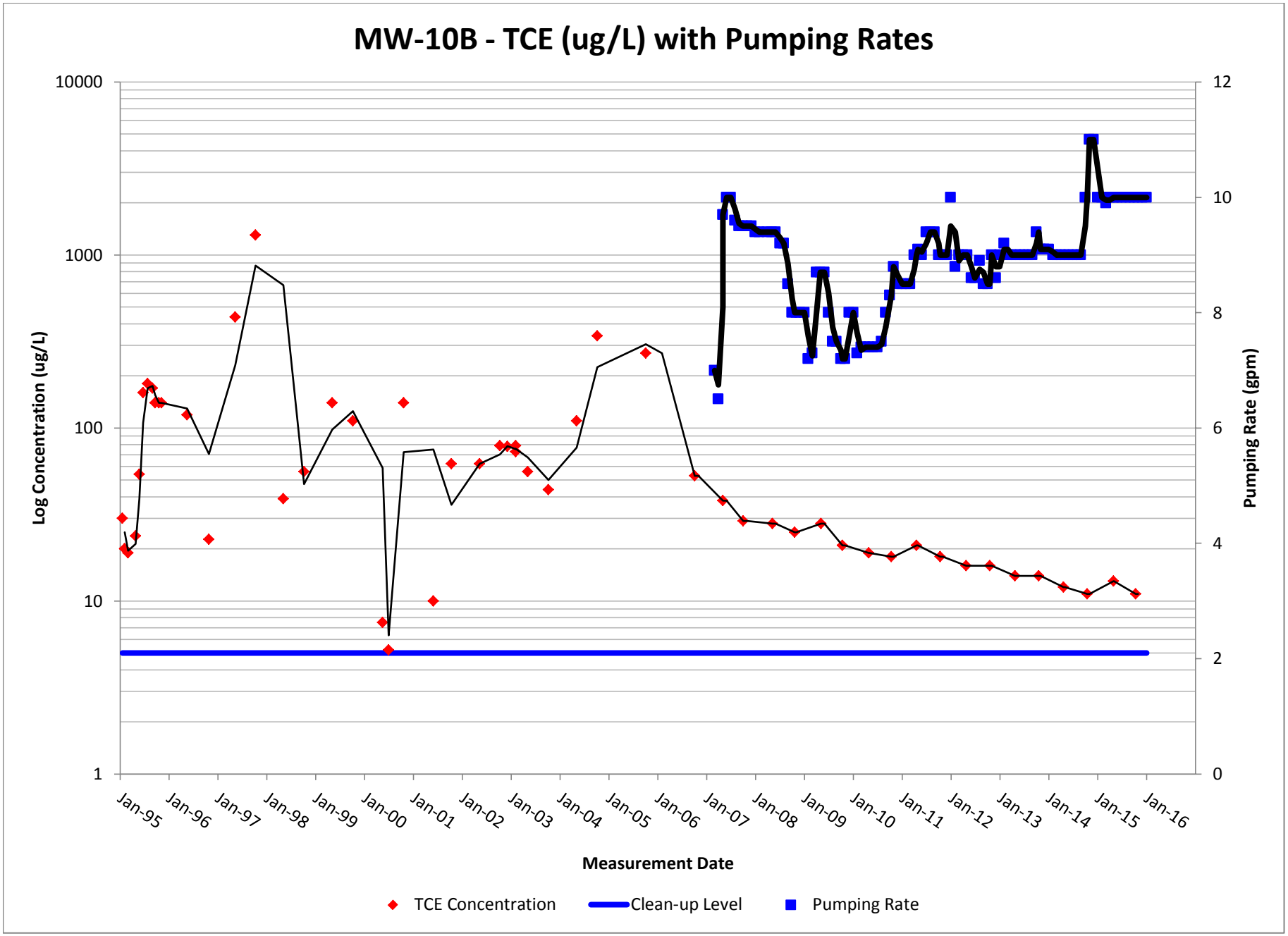

AMW-56A - TCE (ug/L)
1000
100
10
1
0.1
Log Concentration (ug/L)
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration
Clean-up Level

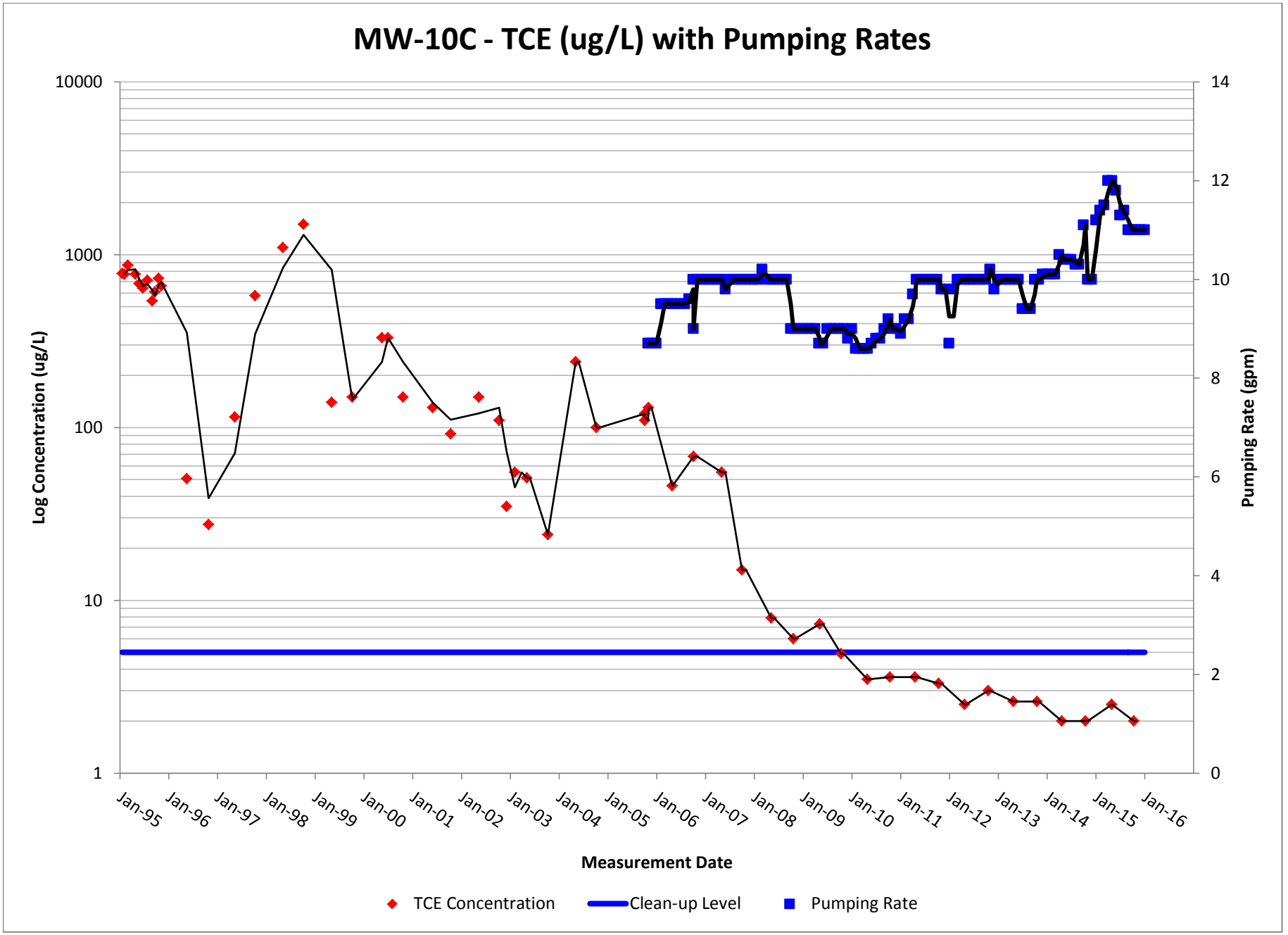

AMW-61 - TCE (ug/L)
100
10
1
Log Concentration (ug/L)
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration
Clean-up Level

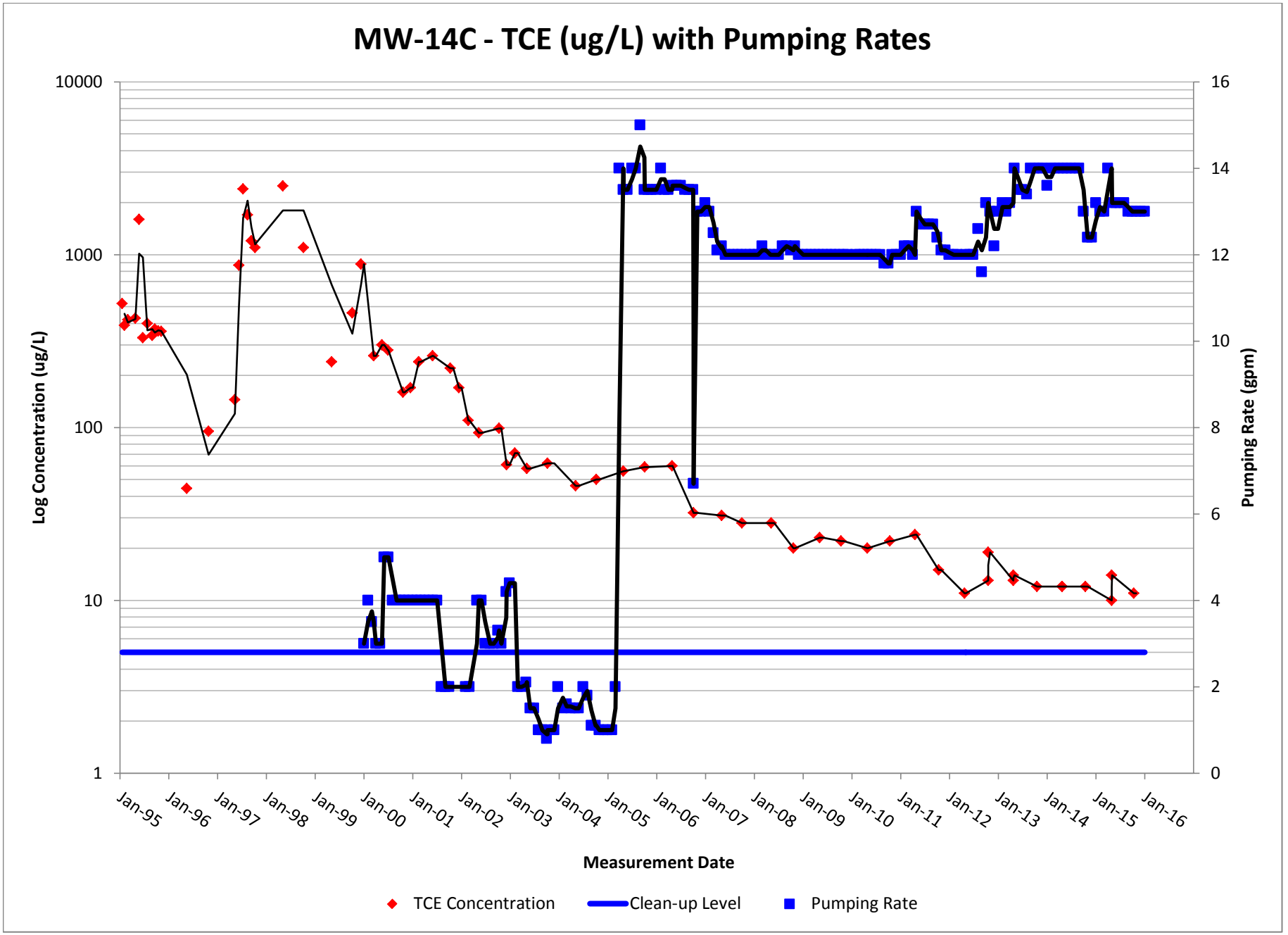

AMW-64 - TCE (ug/L)
1000
100
10
1
Log Concentration (ug/L)
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration
Clean-up Level

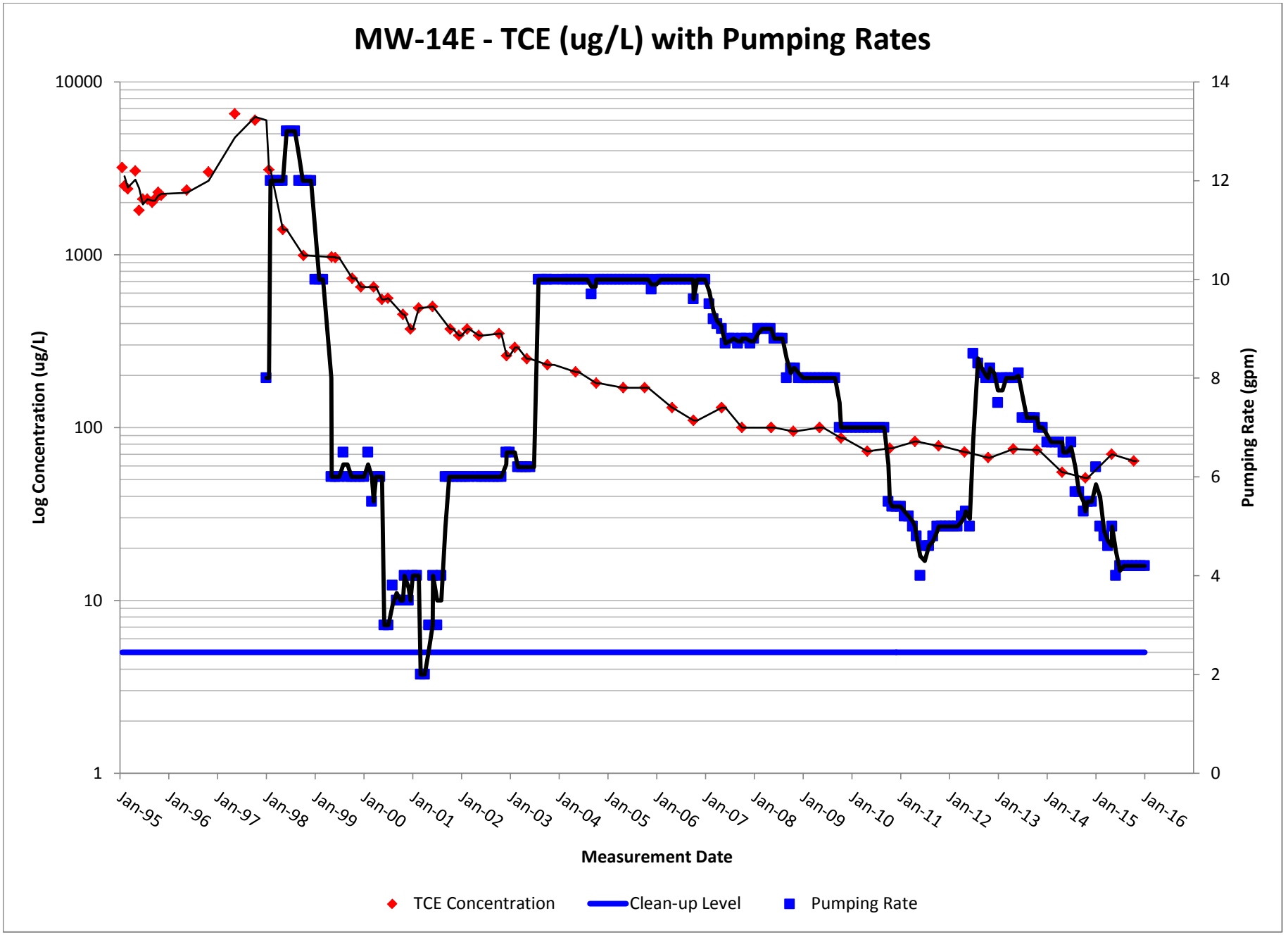

MW-1A - TCE (ug/L)
10000
1000
100
10
1
Log Concentration (ug/L)
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration
Clean-up Level

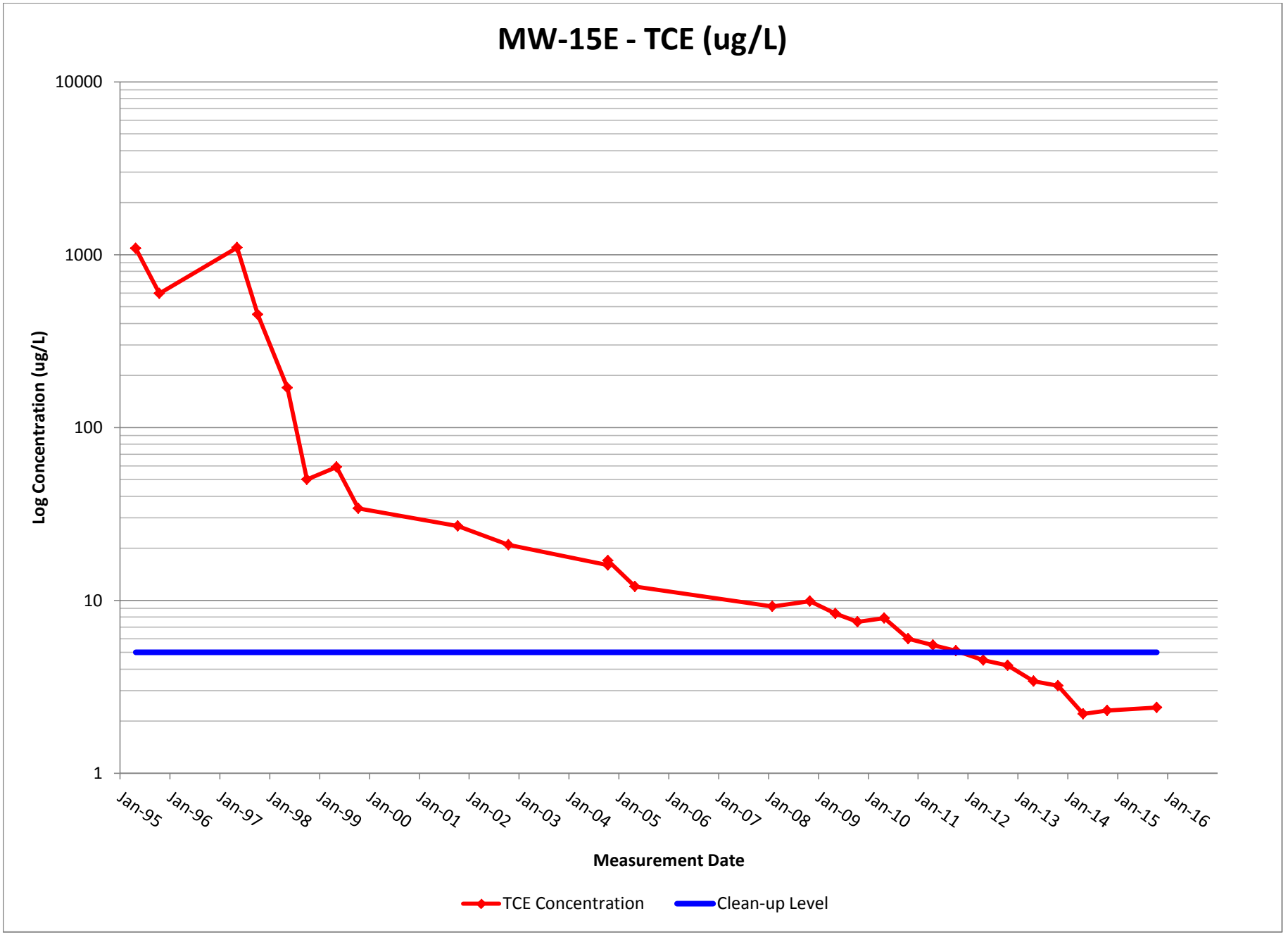

MW-6B - TCE (ug/L) with Pumping Rates
Log Concentration (ug/L)
10000
1000
100
10
1
Pumping Rate (gpm)
12
10
8
6
4
2
0
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration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

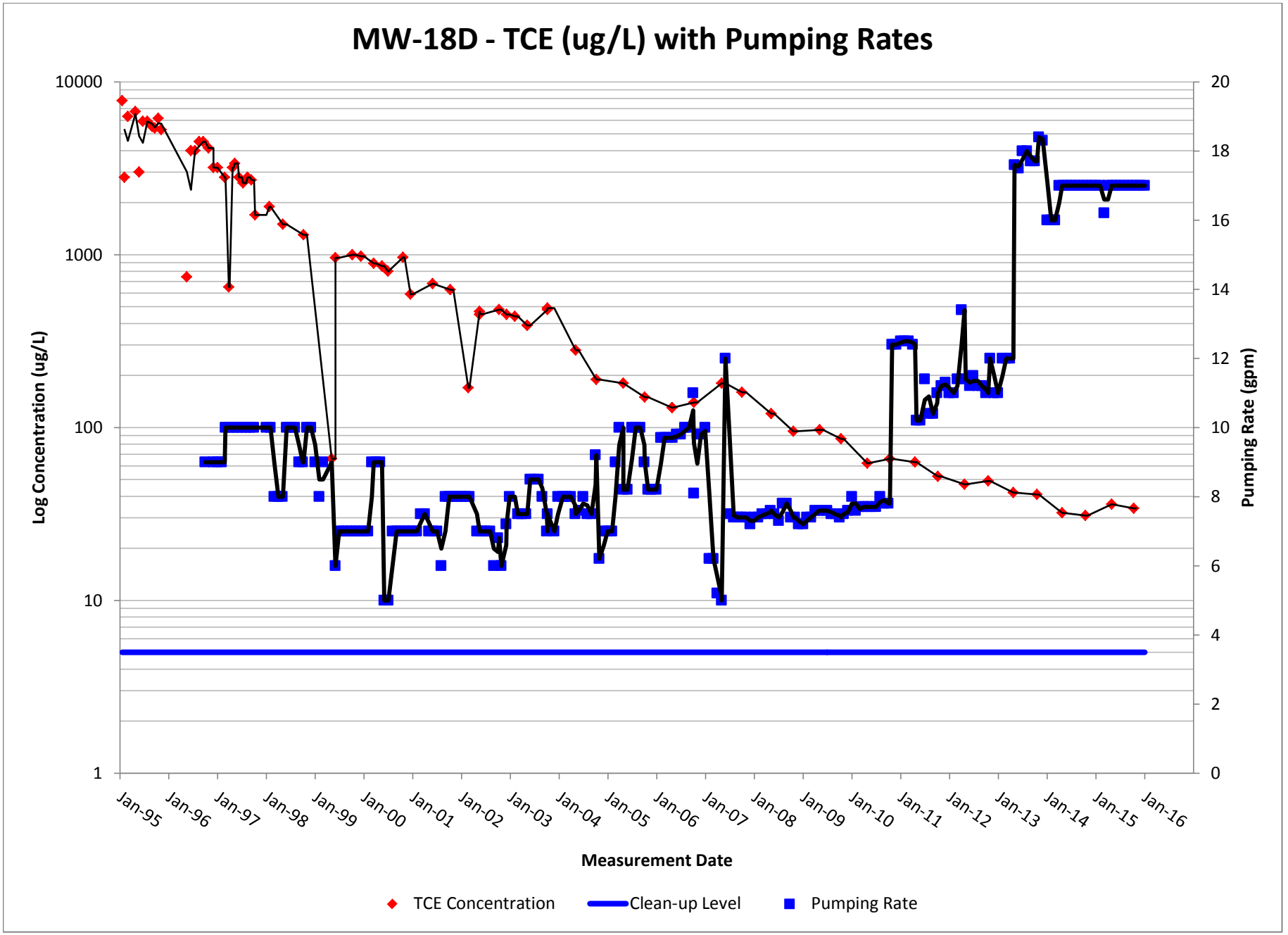

MW-10B - TCE (ug/L) with Pumping Rates
Log Concentration (ug/L)
10000
1000
100
10
1
Pumping Rate (gpm)
12
10
8
6
4
2
0
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration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

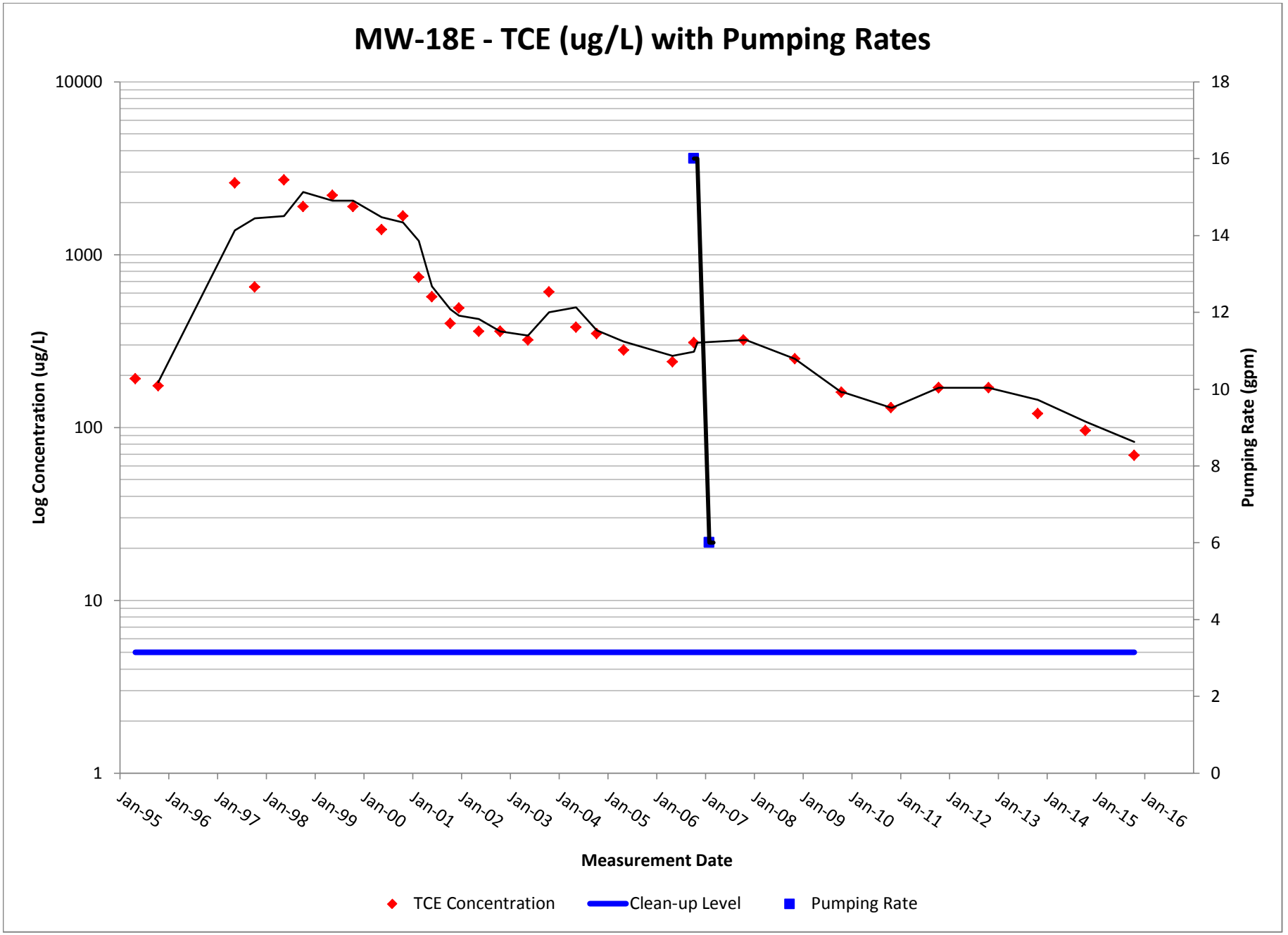

MW-10C - TCE (ug/L) with Pumping Rates
Log Concentration (ug/L)
10000
1000
100
10
1
Pumping Rate (gpm)
14
12
10
8
6
4
2
0
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration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

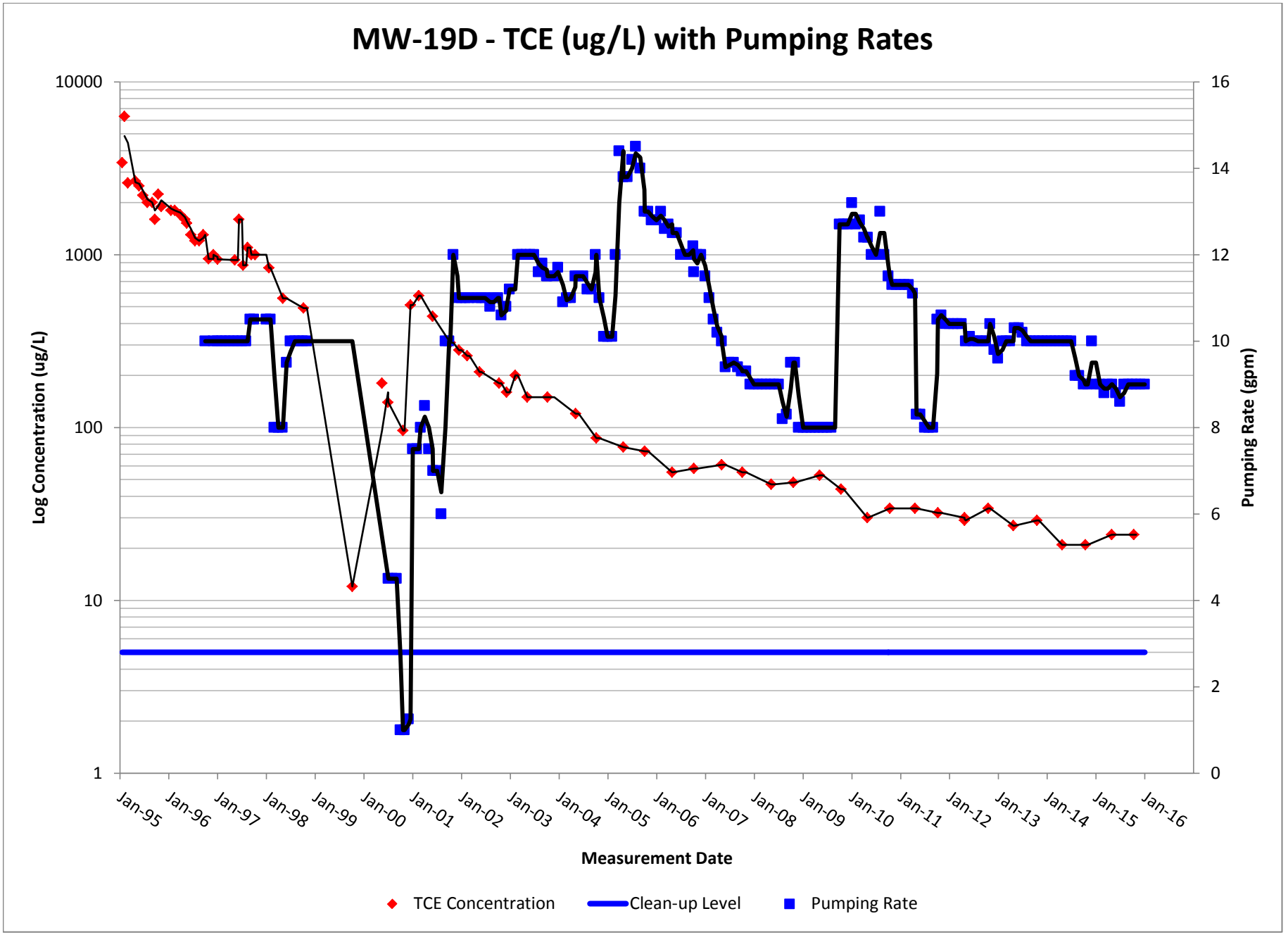

MW-14C - TCE (ug/L) with Pumping Rates
Log Concentration (ug/L)
10000
1000
100
10
1
Pumping Rate (gpm)
16
14
12
10
8
6
4
2
0
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration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

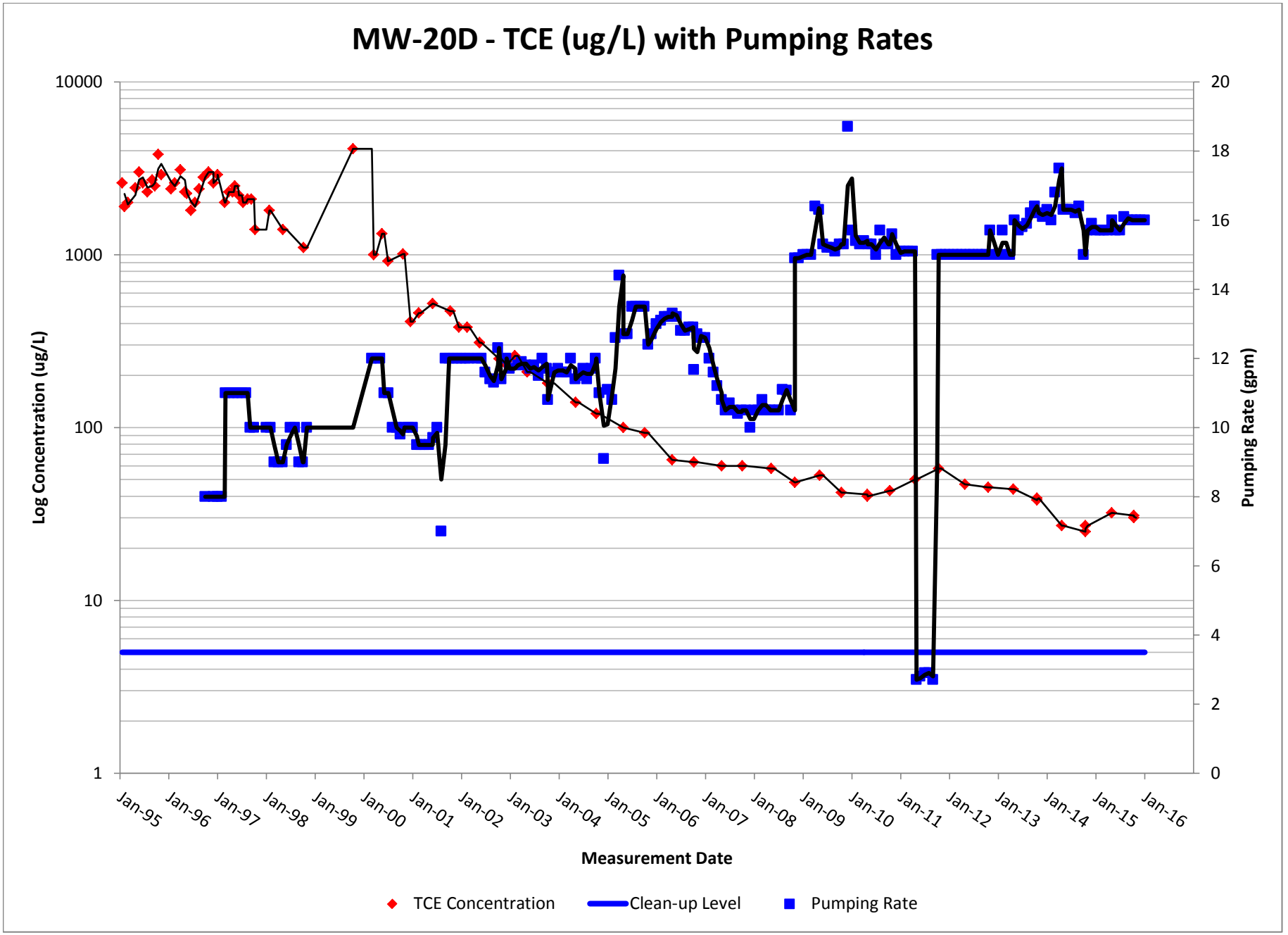

MW-14E - TCE (ug/L) with Pumping Rates
Log Concentration (ug/L)
10000
1000
100
10
1
Pumping Rate (gpm)
14
12
10
8
6
4
2
0
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration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

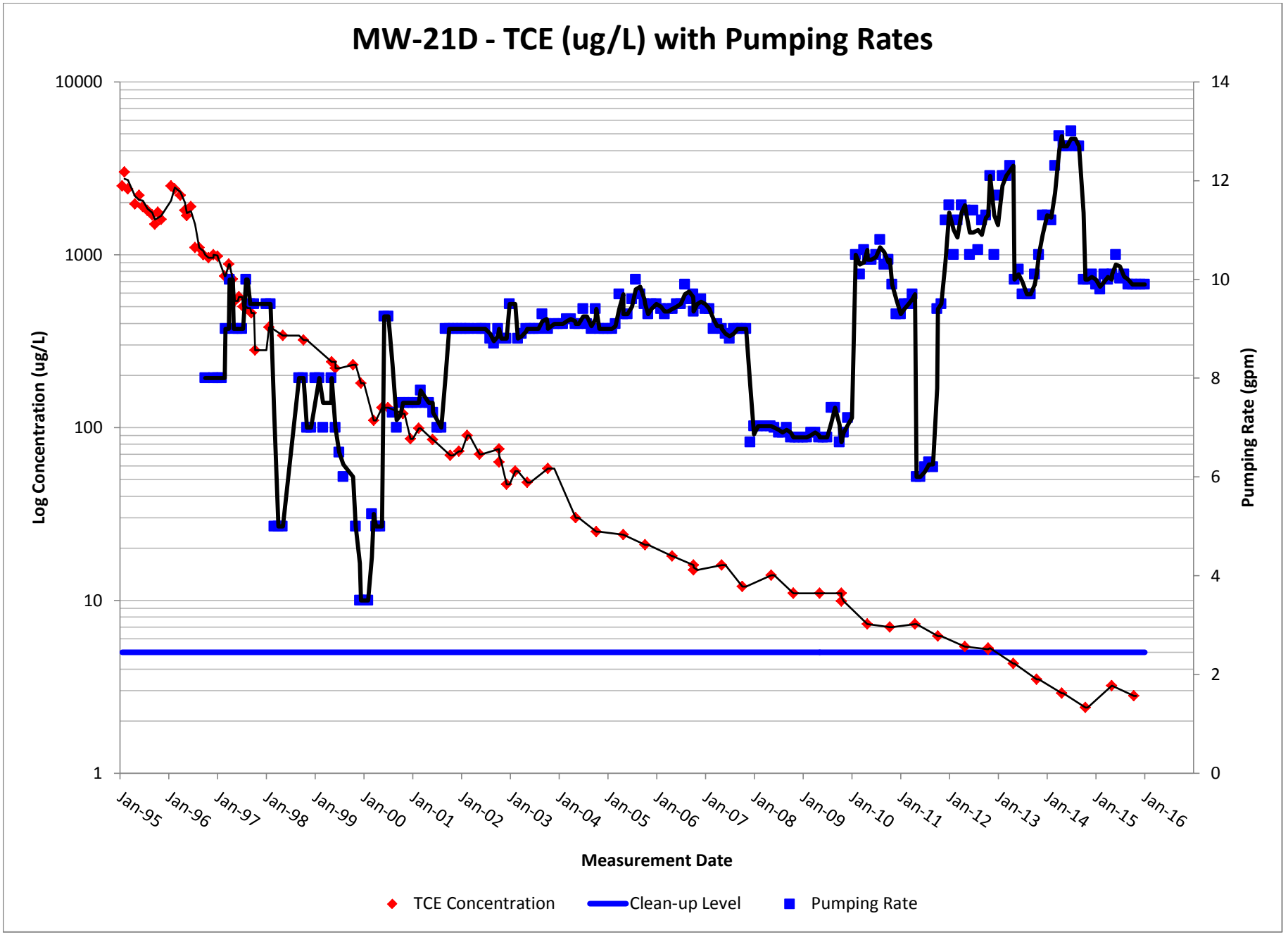

MW-15E - TCE (ug/L)
10000
1000
100
10
1
Log Concentration (ug/L)
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration
Clean-up Level

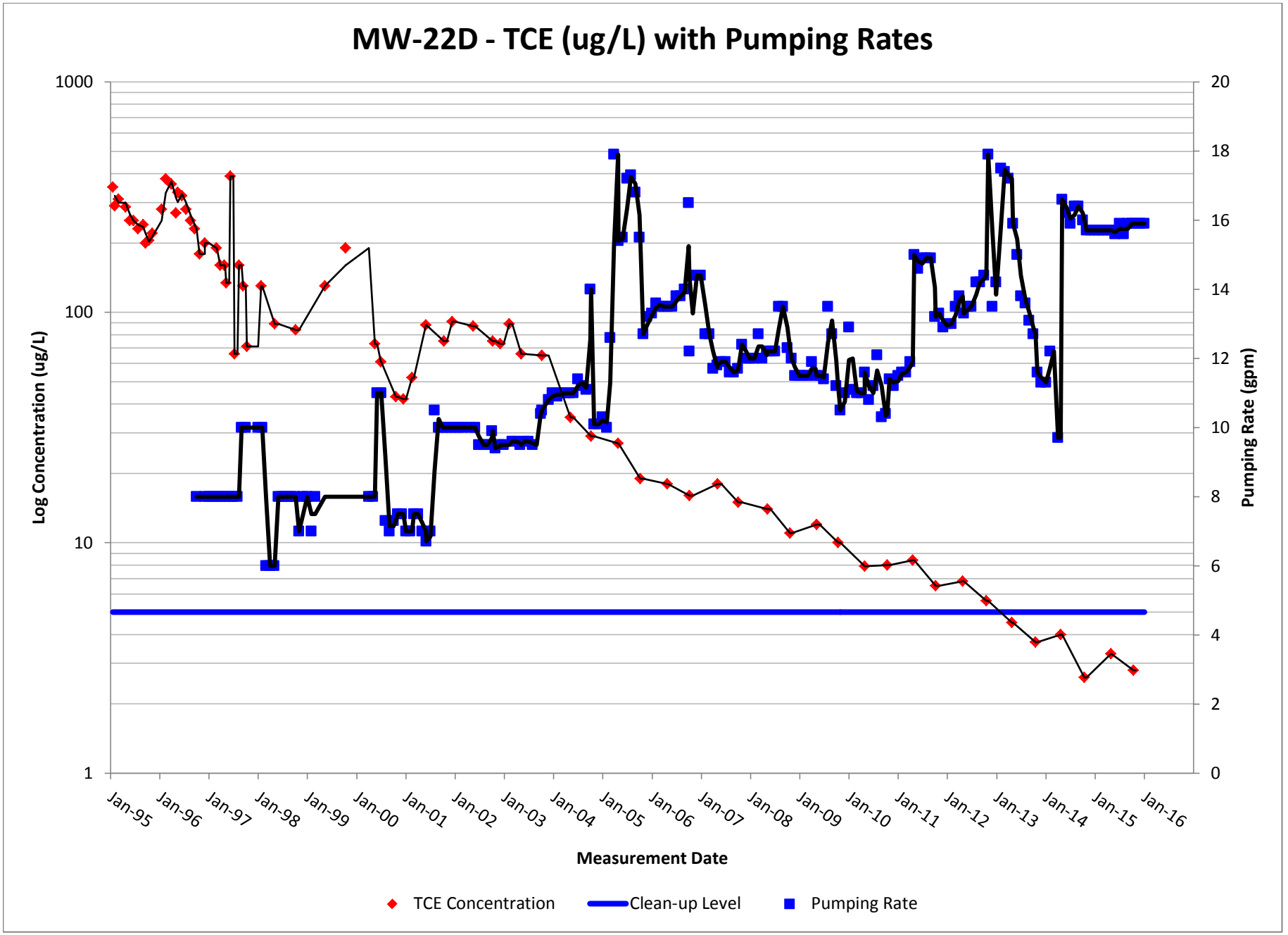

MW-18D - TCE (ug/L) with Pumping Rates
Log Concentration (ug/L)
10000
1000
100
10
1
Pumping Rate (gpm)
20
18
16
14
12
10
8
6
4
2
0
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date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

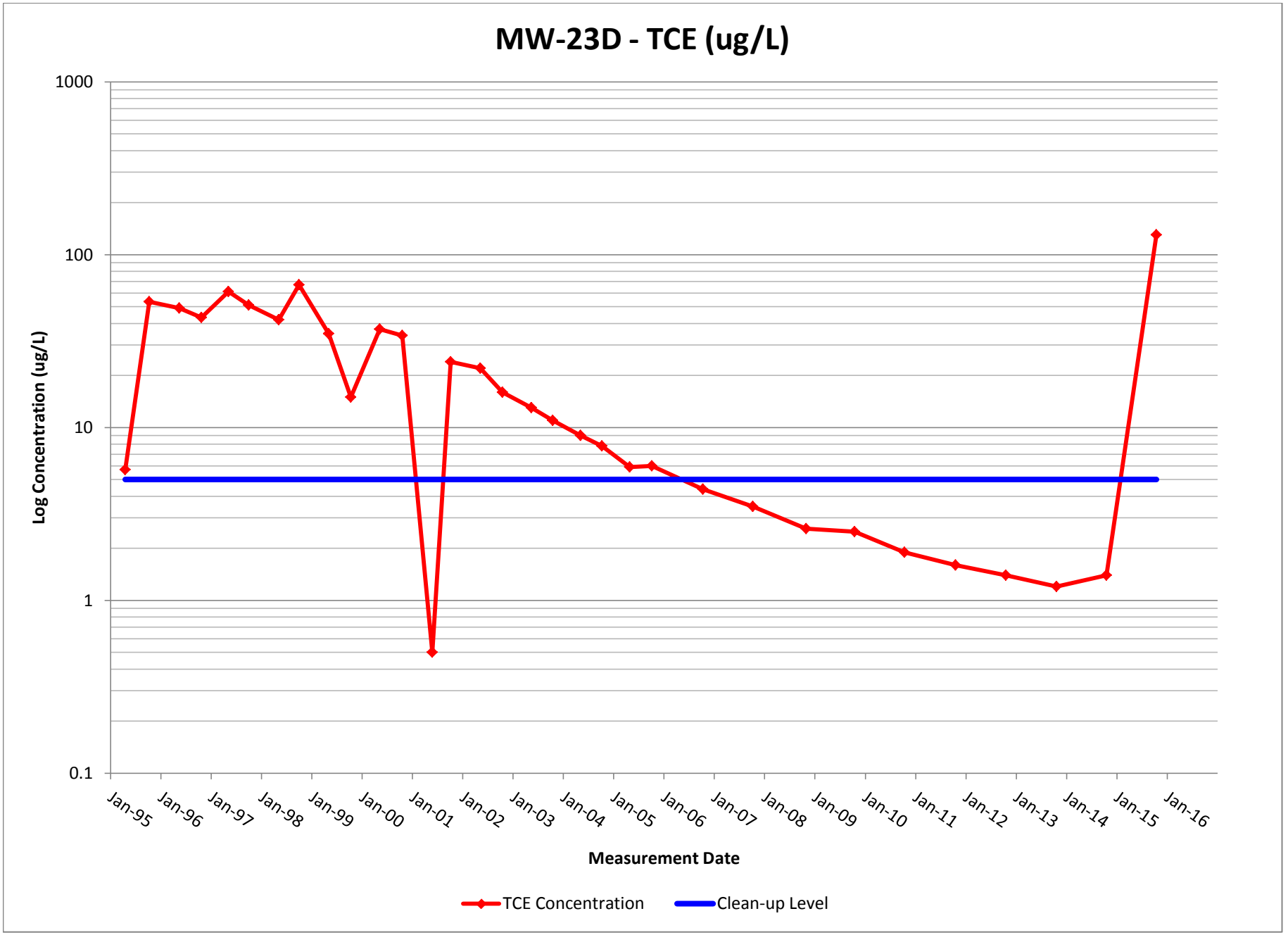

MW-18E - TCE (ug/L) with Pumping Rates
Log Concentration (ug/L)
10000
1000
100
10
1
Pumping Rate (gpm)
18
16
14
12
10
8
6
4
2
0
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE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

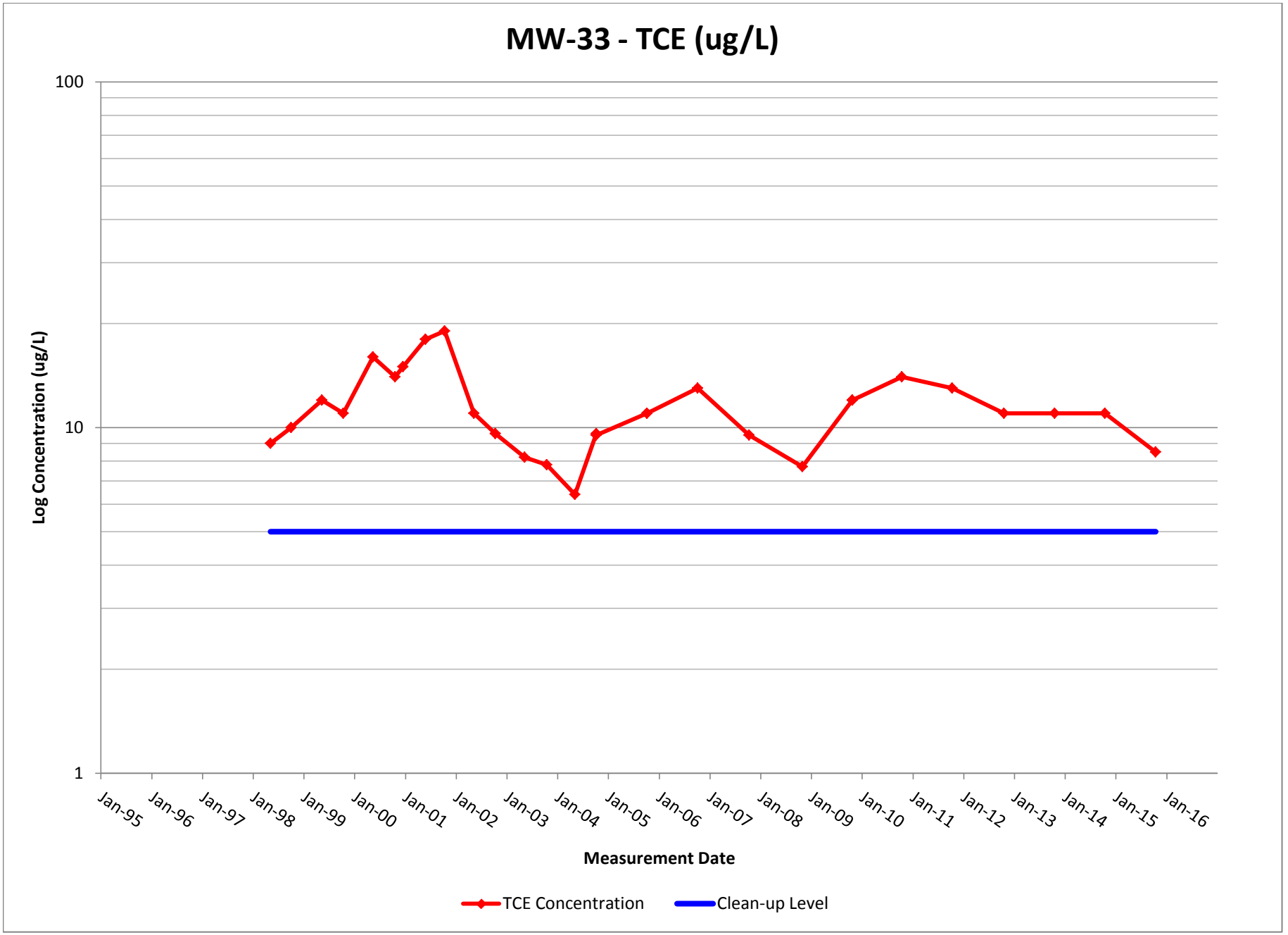

MW-19D - TCE (ug/L) with Pumping Rates
Log Concentration (ug/L)
10000
1000
100
10
1
Pumping Rate (gpm)
16
14
12
10
8
6
4
2
0
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration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

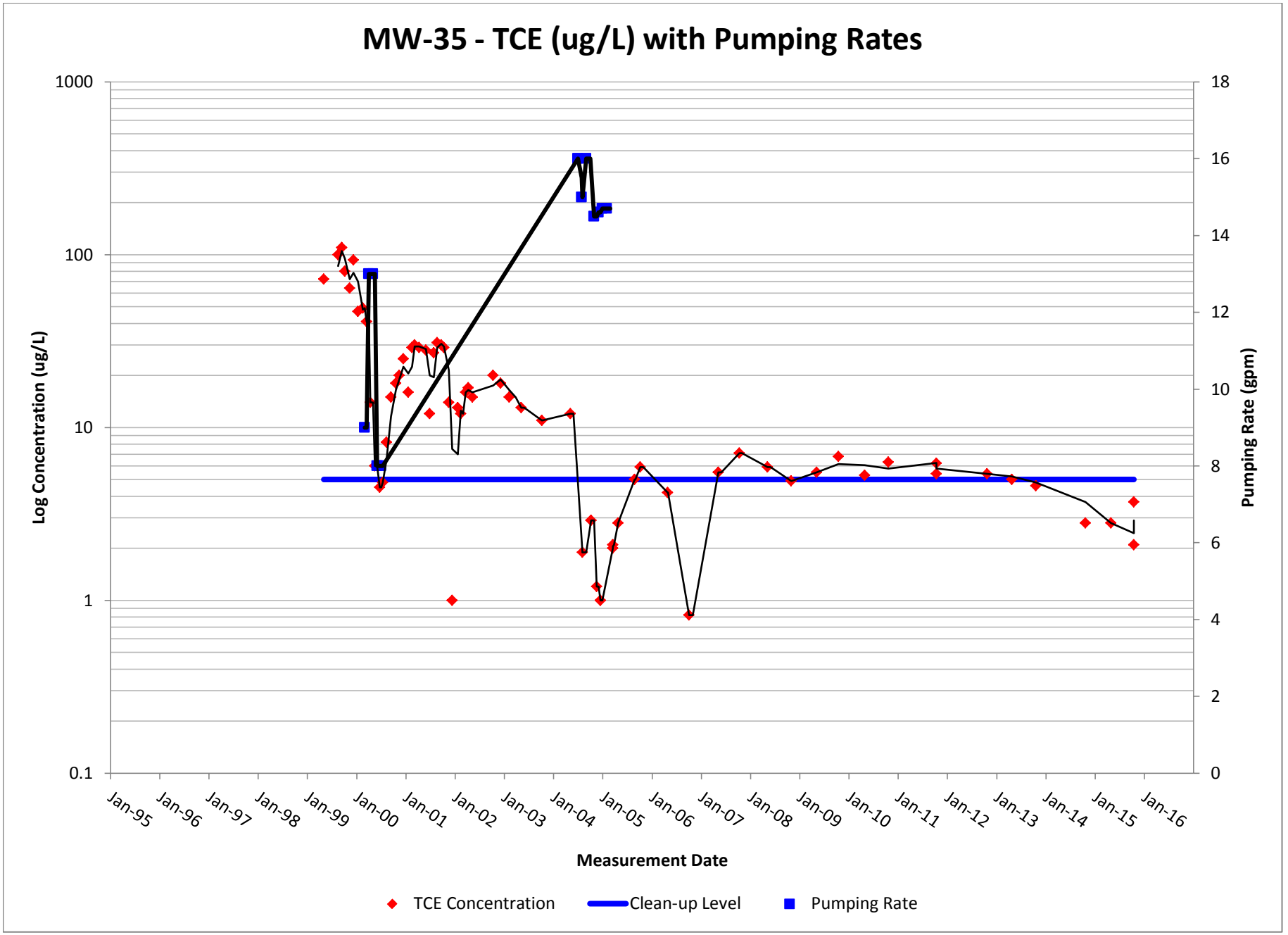

MW-20D - TCE (ug/L) with Pumping Rates
Log Concentration (ug/L)
10000
1000
100
10
1
Pumping Rate (gpm)
20
18
16
14
12
10
8
6
4
2
0
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date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

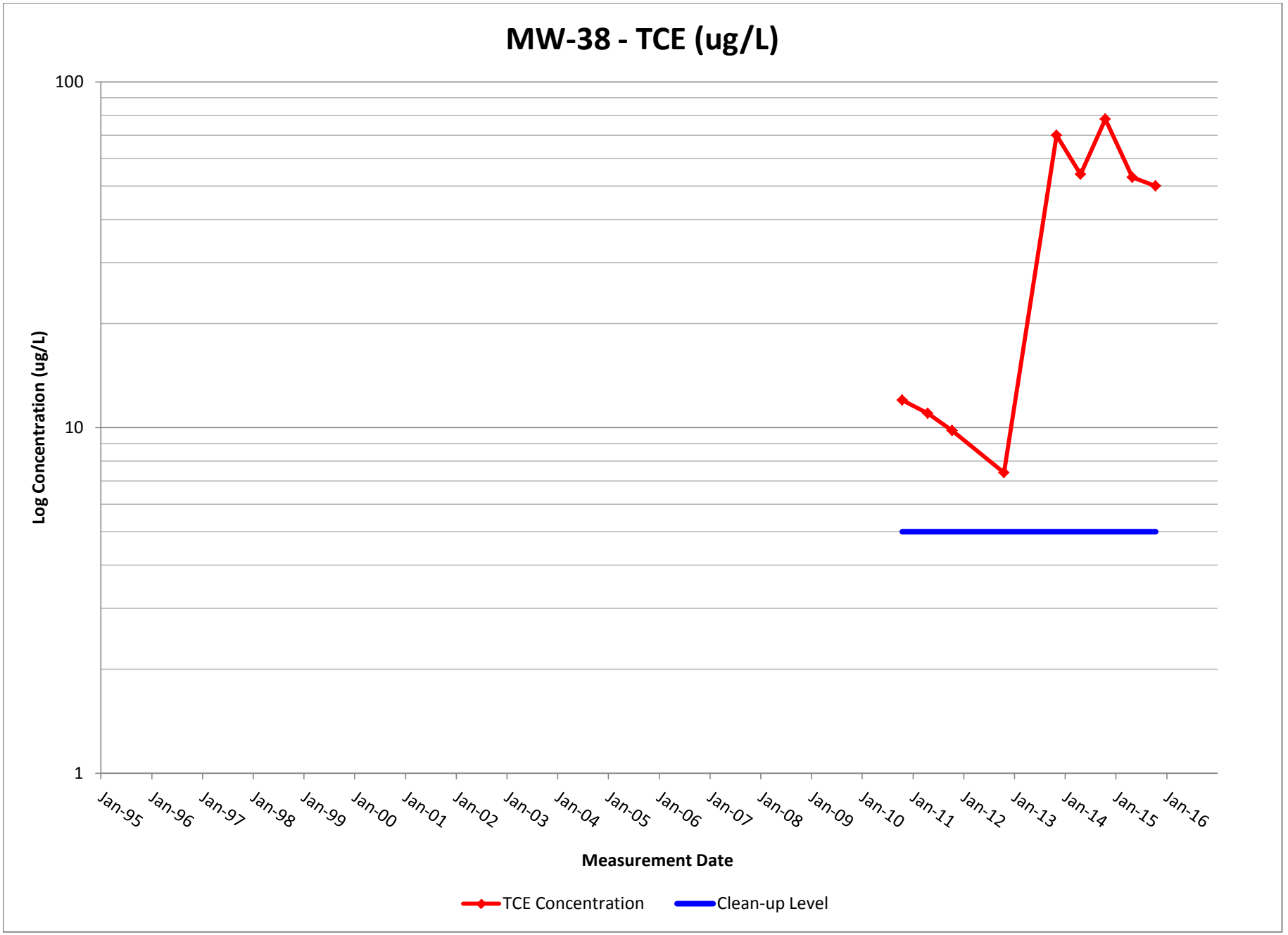

MW-21D - TCE (ug/L) with Pumping Rates
Log Concentration (ug/L)
10000
1000
100
10
1
Pumping Rate (gpm)
14
12
10
8
6
4
2
0
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration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

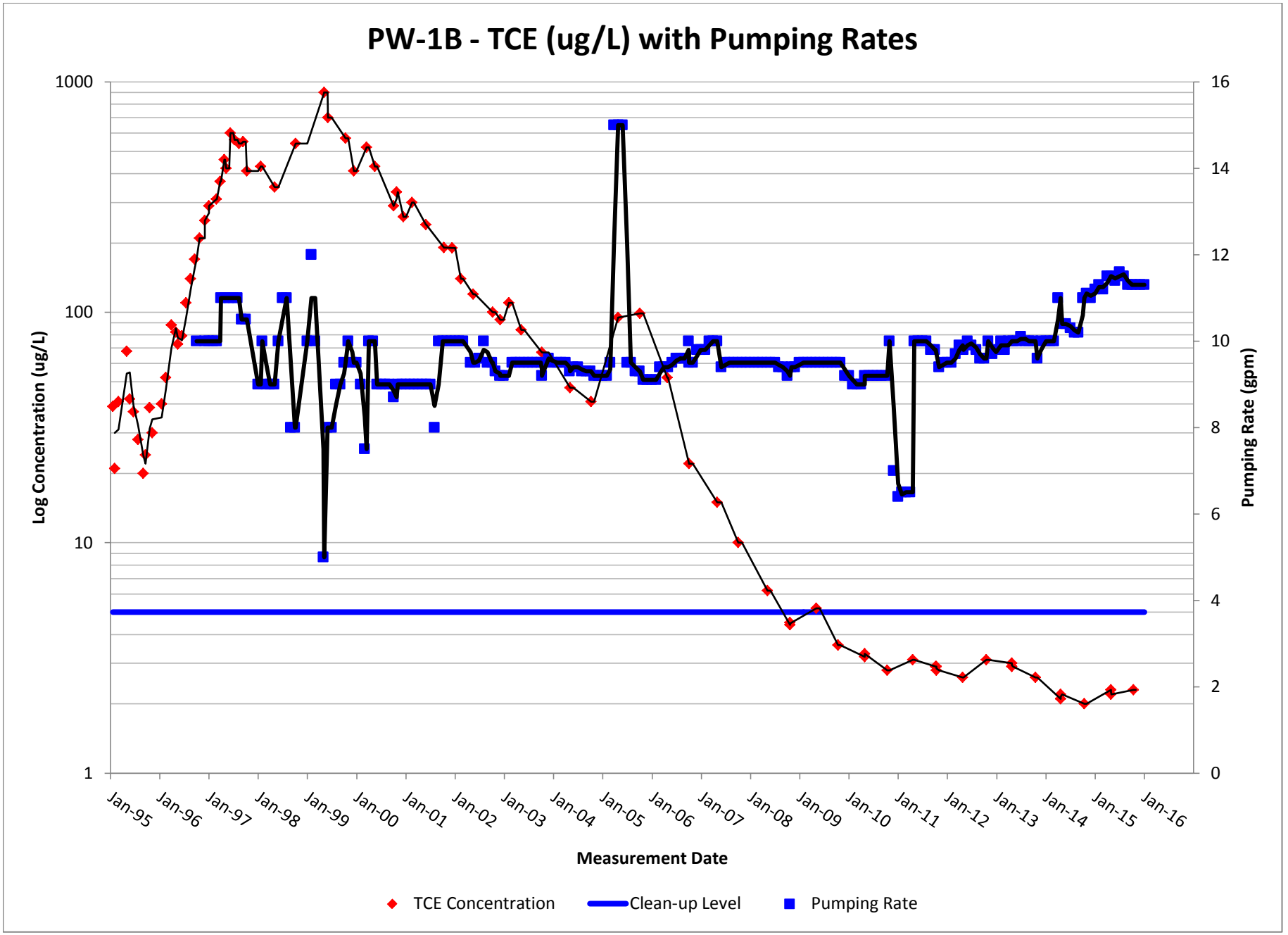

MW-22D - TCE (ug/L) with Pumping Rates
Log Concentration (ug/L)
1000
100
10
1
Pumping Rate (gpm)
20
18
16
14
12
10
8
6
4
2
0
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration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

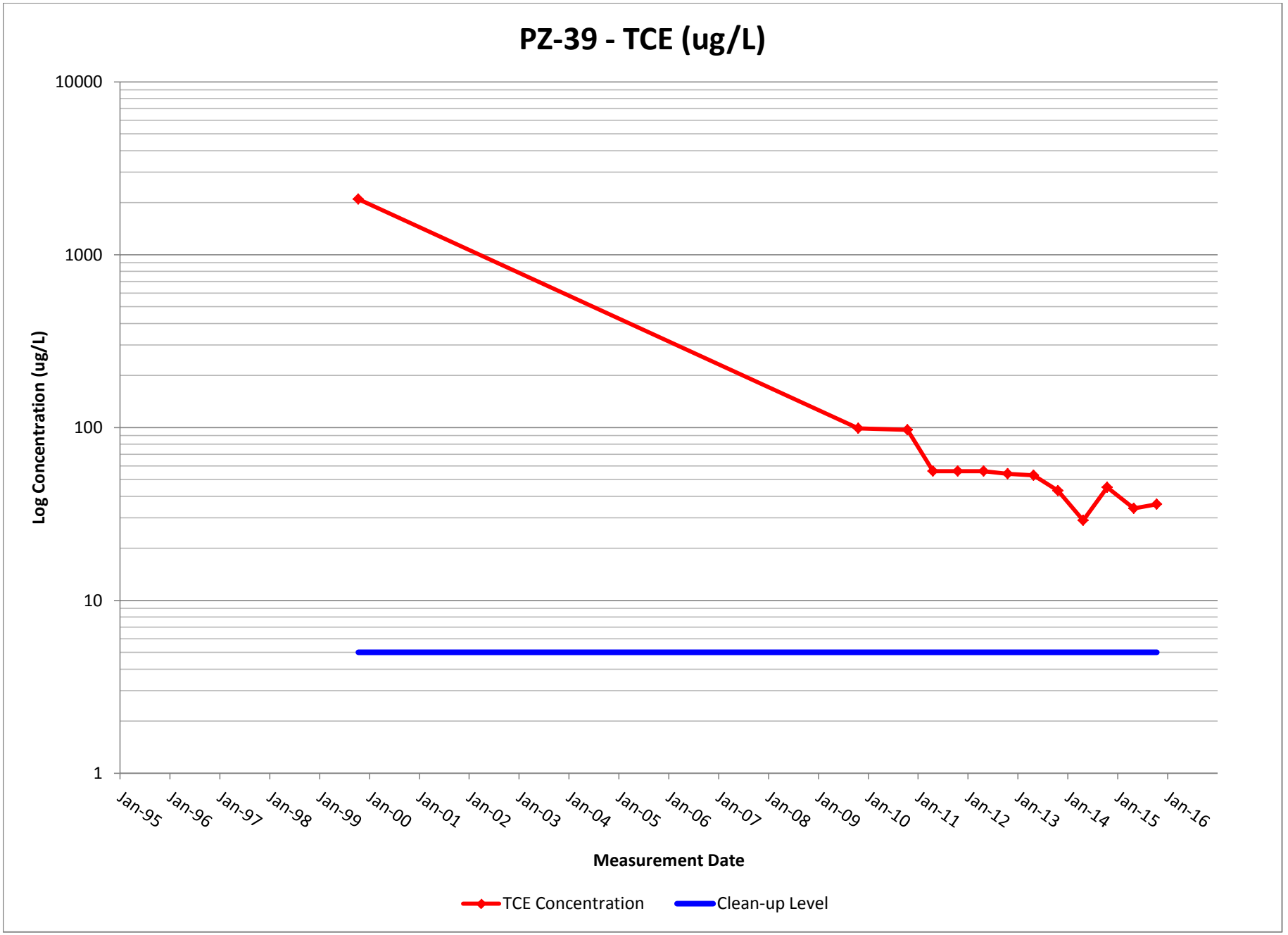

MW-23D - TCE (ug/L)
1000
100
10
1
0.1
Log Concentration (ug/L)
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration
Clean-up Level


MW-33 - TCE (ug/L)
100
10
1
Log Concentration (ug/L)
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration
Clean-up Level


MW-35 - TCE (ug/L) with Pumping Rates
Log Concentration (ug/L)
1000
100
10
1
0.1
Pumping Rate (gpm)
18
16
14
12
10
8
6
4
2
0
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration
Clean-up Level
Pumping Rate


MW-38 - TCE (ug/L)
100
10
1
Log Concentration (ug/L)
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration
Clean-up Level


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


PZ-39 - TCE (ug/L)
10000
1000
100
10
1
Log Concentration (ug/L)
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Measurement Date
TCE Concentration
Clean-up Level

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APPENDIX C

WELLS REQUIRING NO FURTHER SAMPLING

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TABLE C-1. SUMMARY OF WELLS REQUIRING NO FURTHER SAMPLING FOR TCE AND/OR CHROMIUM REMEDIATION MONITORING PHASE COMPLETE

Well Name	TCE		Chromium	
	NFS Year[1]	NFS Rationale	NFS Year[1]	NFS Rationale
Troutdale Wells				
AMW-25	2015	Remediation monitoring complete based on 8 samples	2014	All results have been below the cleanup level.
AMW-50	2015	Remediation monitoring complete based on 8 samples	2014	All results have been below the cleanup level.
AMW-51	2015	Remediation monitoring complete based on 8 samples	2014	All results have been below the cleanup level.
AMW-62	2015	Remediation monitoring complete based on 8 samples	2014	All results have been below the cleanup level.
CPU-2	2015	Remediation monitoring complete based on 8 samples	2014	All results have been below the cleanup level.
CPU-3D	2015	Remediation monitoring complete based on 8 samples	2014	All results have been below the cleanup level.
CPU-10	2015	Remediation monitoring complete based on 8 samples	2014	All results have been below the cleanup level.
MW-34	2015	Remediation monitoring complete based on 8 samples	2014	All results have been below the cleanup level.
TCE Source Wells				
RAMW-2C	2009	All results except the first sample have been below the cleanup level and MRL. TCE is statistically below the cleanup level according to the MAROS evaluation.	NA	Not sampled for chromium. Well is upgradient of the chromium plume.
AMW-1B	2010	All results since 1999 have been below the cleanup level.	NA	Not sampled for chromium. Well is upgradient of the chromium plume.
AMW-1C	2009	All results since 1997 (22 samples) have been below the cleanup level and MRL.	NA	Not sampled for chromium. Well is upgradient of the chromium plume.
AMW-2B	2015	Remediation monitoring complete based on 8 samples	NA	Not sampled for chromium. Well is upgradient of the chromium plume.
AMW-3A	2015	Remediation monitoring complete based on 8 samples	NA	Not sampled for chromium. Well is upgradient of the chromium plume.
AMW-4A	2009	All results have been below the cleanup level and MRL. TCE is statistically below the cleanup level according to the MAROS evaluation.	NA	Not sampled for chromium. Well is upgradient of the chromium plume.
AMW-13A	2015	Remediation monitoring complete based on 8 samples	NA	Not sampled for chromium. Well is upgradient of the chromium plume.

TABLE C-1. SUMMARY OF WELLS REQUIRING NO FURTHER SAMPLING FOR TCE AND/OR CHROMIUM REMEDIATION MONITORING PHASE COMPLETE

Well Name	TCE		Chromium	
	NFS Year[1]	NFS Rationale	NFS Year[1]	NFS Rationale
AMW-19B	2009	All results have been below the cleanup level and <1 ug/L. TCE is statistically below the cleanup level according to the MAROS evaluation.	NA	Not sampled for chromium. Well is upgradient of the chromium plume.
AMW-52A	2015	Remediation monitoring complete based on 8 samples	NA	Not sampled for chromium. Well is upgradient of the chromium plume.
AMW-52C	2009	All results have been below the cleanup level and MRL. TCE is statistically below the cleanup level according to the MAROS evaluation.	NA	Not sampled for chromium. Well is upgradient of the chromium plume.
AMW-53B	2009	All results have been below the cleanup level. TCE is statistically below the cleanup level according to the MAROS evaluation.	NA	Not sampled for chromium. Well is upgradient of the chromium plume.
AMW-53C	2009	All results have been below the cleanup level and MRL. TCE is statistically below the cleanup level according to the MAROS evaluation.	NA	Not sampled for chromium. Well is upgradient of the chromium plume.
AMW-54C	2009	All results have been below the cleanup level and MRL. TCE is statistically below the cleanup level according to the MAROS evaluation.	NA	Not sampled for chromium. Well is upgradient of the chromium plume.
AMW-55A	2015	Remediation monitoring complete based on 8 samples	NA	Not sampled for chromium. Well is upgradient of the chromium plume.
AMW-55C	2009	All results have been below the cleanup level and MRL. TCE is statistically below the cleanup level according to the MAROS evaluation.	NA	Not sampled for chromium. Well is upgradient of the chromium plume.
AMW-56C	2009	All results have been below the cleanup level and MRL. TCE is statistically below the cleanup level according to the MAROS evaluation.	NA	Not sampled for chromium. Well is upgradient of the chromium plume.
MW-1A	NA	NA (still sampling)	2014	This well has been sampled as an upgradient well for chromium; however, due to continued difficulties obtaining samples using a pump in this well, another well will be sampled as the chromium background well in the future. The chromium concentration in this well has been below the cleanup level since 2000.

TABLE C-1. SUMMARY OF WELLS REQUIRING NO FURTHER SAMPLING FOR TCE AND/OR CHROMIUM REMEDIATION MONITORING PHASE COMPLETE

Well Name	TCE		Chromium	
	NFS Year[1]	NFS Rationale	NFS Year[1]	NFS Rationale
MW-1B	2009	All results have been below the cleanup level and MRL since 2000 (22 samples).	NA	Not sampled for chromium. Well is upgradient of the chromium plume.
MW-1C	2009	All results except the first sample have been below the cleanup level. Since 1997, all results have been below the MRL. TCE is statistically below the cleanup level according to the MAROS evaluation.	2009	All results have been below the cleanup level. Chromium is statistically below the cleanup level according to the MAROS evaluation.
Proximal Wells				
AMW-58	2012	TCE concentrations in this silt well have been below the cleanup level since 2005.	2010	All results have been below the cleanup level. Chromium is statistically below the cleanup level according to the MAROS evaluation.
MW-2B	2010	This well is part of a well cluster but is not the most impacted well in the cluster and therefore provides data of limited usefulness. TCE is currently below the cleanup level.	2009	All results have been below the cleanup level. Chromium is statistically below the cleanup level according to the MAROS evaluation.
MW-2C	2009	This well is part of a well cluster but is not the most impacted well in the cluster and therefore provides data of limited usefulness. TCE has been below the cleanup level since 2002 (4 samples).	2009	All results have been below the cleanup level. Chromium is statistically below the cleanup level according to the MAROS evaluation.
MW-3A	2009	All results have been below the cleanup level. TCE is statistically below the cleanup level according to the MAROS evaluation.	NA	NA (still sampling)
MW-3B	NA	NA (still sampling)	2009	All results have been below the cleanup level. Chromium is statistically below the cleanup level according to the MAROS evaluation.
MW-3C	2008	This well is redundant for TCE, according to the MAROS evaluation.	2008	All results have been below the cleanup level. Chromium is statistically below the cleanup level according to the MAROS evaluation.

TABLE C-1. SUMMARY OF WELLS REQUIRING NO FURTHER SAMPLING FOR TCE AND/OR CHROMIUM REMEDIATION MONITORING PHASE COMPLETE

Well Name	TCE		Chromium	
	NFS Year[1]	NFS Rationale	NFS Year[1]	NFS Rationale
MW-4A	2010	This well is part of a well cluster but is not the most impacted well in the cluster and therefore provides data of limited usefulness.	NA	NA (still sampling)
MW-4BShed	2010	This well is part of a well cluster but is not the most impacted well in the cluster and therefore provides data of limited usefulness.	2013	This well is part of a well cluster but is not the most impacted well in the cluster and therefore provides data of limited usefulness.
MW-4C	2009	This well is part of a well cluster but is not the most impacted well in the cluster and therefore provides data of limited usefulness. TCE has been on a decreasing trend and is currently below the cleanup level (1 sample).	2009	This well is part of a well cluster but is not the most impacted well in the cluster and therefore provides data of limited usefulness. Chromium has been on a decreasing trend and was below the cleanup level (one sample).
MW-6A	2009	This well is part of a well cluster but is not the most impacted well in the cluster and therefore provides data of limited usefulness. TCE has been below the cleanup level since 1995 (4 samples) and below the detection limit since 1997.	NA	NA (still sampling)
MW-6C	2010	This well is part of a well cluster but is not the most impacted well in the cluster and therefore provides data of limited usefulness.	2009	This well is part of a well cluster but is not the most impacted well in the cluster and therefore provides data of limited usefulness. Chromium has been below the cleanup level since 1995 (9 samples).
MW-6D	2010	This well is part of a well cluster but is not the most impacted well in the cluster and therefore provides data of limited usefulness.	2009	All results have been below the cleanup level. Chromium is statistically below the cleanup level according to the MAROS evaluation.
MW-7B	NA	NA (still sampling)	2009	This well is part of a well cluster but is not the most impacted well in the cluster and therefore provides data of limited usefulness. Chromium has been below the cleanup level since 1997 (4 samples).

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Well Name	TCE		Chromium	
	NFS Year[1]	NFS Rationale	NFS Year[1]	NFS Rationale
MW-7C	2009	This well is part of a well cluster (adjacent to the MW-4 cluster) but is not the most impacted well in the cluster and therefore provides data of limited usefulness. TCE has been below the cleanup level since 1997 (4 samples).	2009	This well is part of a well cluster but is not the most impacted well in the cluster and therefore provides data of limited usefulness. Chromium has been below the cleanup level since 1995 (7 samples).
MW-8B	NA	NA (still sampling)	2009	All results have been below the cleanup level. Chromium is statistically below the cleanup level according to the MAROS evaluation.
MW-9B	NA	NA (still sampling)	2009	Chromium has been below the cleanup level since 1997 (12 samples).
MW-9C	2010	This well is part of a well cluster but is not the most impacted well in the cluster and therefore provides data of limited usefulness.	2010	This well is part of a well cluster but is not the most impacted well in the cluster and therefore provides data of limited usefulness. Chromium has never exceeded the cleanup level.
MW-12C	NA	NA (still sampling)	2010	Chromium is statistically below the cleanup level according to the MAROS evaluation.
MW-13C	NA	NA (still sampling)	2010	Chromium is statistically below the cleanup level according to the MAROS evaluation.
Intermediate Wells				
AMW-16	NA	NA (still sampling)	2010	Chromium is statistically below the cleanup level according to the MAROS evaluation.
AMW-17	NA	NA (still sampling)	2008	All results have been below the cleanup level and all have been below the MRL except one. Chromium is statistically below the cleanup level according to the MAROS evaluation.
AMW-18	NA	NA (still sampling)	2008	Allresults have been below the cleanup level and all have been below the MRL except one. Chromium is statistically below the cleanup level according to the MAROS evaluation.

TABLE C-1. SUMMARY OF WELLS REQUIRING NO FURTHER SAMPLING FOR TCE AND/OR CHROMIUM REMEDIATION MONITORING PHASE COMPLETE

Well Name	TCE		Chromium	
	NFS Year[1]	NFS Rationale	NFS Year[1]	NFS Rationale
AMW-59	NA	NA (still sampling)	2009	All results have been below the cleanup level and all but one have been below the MRL. Chromium is statistically below the cleanup level according to the MAROS evaluation.
AMW-60	2009	All results have been below the cleanup level and near or below the MRL. This is a silt well.	2009	All results have been below the cleanup level and near or below the MRL. This is a silt well.
MW-15E	NA	NA (still sampling)	2008	All results have been below the cleanup level. Chromium is statistically below the cleanup level according to the MAROS evaluation.
MW-16E	2013	TCE is statistically below the cleanup level according to the MAROS evaluation.	2010	Chromium is statistically below the cleanup level according to the MAROS evaluation.
MW-17E	2008	All results have been below the cleanup level and MRL. TCE is statistically below the cleanup level according to the MAROS evaluation.	2008	All results have been below the cleanup level and the MRL. Chromium is statistically below the cleanup level according to the MAROS evaluation.
MW-18E	NA	NA (still sampling)	2010	With the exception of three outliers, chromium concentrations have been below the cleanup level in all samples collected since the well was installed in 1993.
PZ-39	NA	NA (still sampling)	2010	Chromium has never exceeded the cleanup level.
MW-40	2009	Replaced with PZ-39.	2009	Replaced with PZ-39.
Church of God Wells				
AMW-14	2012	Decommissioned	2012	Decommissioned
AMW-27	NA	NA (still sampling)	2015	Remediation monitoring complete based on 8 samples
AMW-61	NA	NA (still sampling)	2010	Chromium is below the cleanup level. Due to excessive drawdown during low-flow pumping of this silt well, use of a PDB is recommended for VOC sampling only.
CPU-12	NA	NA (still sampling)	2010	Chromium concentrations have been below the cleanup level since 2002.

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Well Name	TCE		Chromium	
	NFS Year[1]	NFS Rationale	NFS Year[1]	NFS Rationale
MW-23D	NA	NA (still sampling)	2010	Chromium is statistically below the cleanup level according to the MAROS evaluation.
MW-25D	2015	Remediation monitoring complete based on 8 samples	2015	Remediation monitoring complete based on 8 samples
MW-26D	2015	Remediation monitoring complete based on 8 samples	2015	Remediation monitoring complete based on 8 samples
MW-49	2015	Remediation monitoring complete based on 8 samples	2015	Remediation monitoring complete based on 8 samples
Other Toe Wells				
MW-37	2008	All results have been below the cleanup level and MRL. TCE is statistically below the cleanup level according to the MAROS evaluation.	2008	All results have been below the cleanup level. Chromium is statistically below the cleanup level according to the MAROS evaluation.
MW-46	2009	All results have been below the cleanup level and MRL. TCE is statistically below the cleanup level according to the MAROS evaluation.	2009	All results have been below the cleanup level.
MW-48	2009	All results have been below the cleanup level and MRL except one outlier in 2001. TCE is statistically below the cleanup level according to the MAROS evaluation (outlier excluded).	2009	All results have been below the cleanup level.
Sentinel Toe Wells				
AMW-42	2015	Remediation monitoring complete based on 8 samples	2015	Remediation monitoring complete based on 8 samples
AMW-43	2009	All results have been below the cleanup level and MRL. TCE is statistically below the cleanup level according to the MAROS evaluation.	2009	All results have been below the cleanup level. Chromium is statistically below the cleanup level according to the MAROS evaluation.
AMW-44	2008	All results have been below the cleanup level and MRL. TCE is statistically below the cleanup level according to the MAROS evaluation.	2008	All results have been below the cleanup level. Chromium is statistically below the cleanup level according to the MAROS evaluation.
AMW-45	2008	All results have been below the cleanup level and MRL. TCE is statistically below the cleanup level according to the MAROS evaluation.	2008	All results have been below the cleanup level. Chromium is statistically below the cleanup level according to the MAROS evaluation.

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Well Name	TCE		Chromium	
	NFS Year[1]	NFS Rationale	NFS Year[1]	NFS Rationale
MW-30	2008	All results have been below the cleanup level and MRL. TCE is statistically below the cleanup level according to the MAROS evaluation.	2008	All results have been below the cleanup level. Chromium is statistically below the cleanup level according to the MAROS evaluation.
MW-31	2015	Remediation monitoring complete based on 8 samples	2015	Remediation monitoring complete based on 8 samples
MW-35	NA	NA (still sampling)	2015	Remediation monitoring complete based on 8 samples
MW-47	2008	All results have been below the cleanup level and MRL. TCE is statistically below the cleanup level according to the MAROS evaluation.	2008	All results have been below the cleanup level. Chromium is statistically below the cleanup level according to the MAROS evaluation.

Notes:

Highlighted wells indicate additions since the previous annual status report.

[1] Year = the Annual Status Report in which this recommendation was made.

MAROS = Monitoring and Remediation Optimization Software.

NA = Not applicable.

NFS = No further sampling.

TCE = Trichloroethene.

U = Analyte not detected above the specified reporting limit.