2018 Site-wide Groundwater Remedial Program Annual Report Liberty Industrial Finishing Site Farmingdale, Nassau County, New York

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AMO ENVIRONMENTAL DECISIONS
Environmental Risk & Remediation Consultants

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Acronyms and Abbreviations

ASTM	American Society for Testing and Materials
bgs	below ground surface
CCB	continuing calibration blank
Cd	cadmium
Cr	chromium
Cr^{6+}	hexavalent chromium
CRI	Continued Remedial Investigation
DCA	dichloroethane
DCE	dichloroethene
DPC	Defense Plant Corporation
DUSR	data usability summary report
EEPC	Ecology and Environment Engineering, P.C.

Acronyms and Abbreviations

(continued)

EPA	(United States) Environmental Protection Agency
FPC	Farmington Plaza Cleaners
GAC	granulated activated carbon
gpm	gallons per minute
GRS	groundwater remediation system
lbs/Mgal	pounds per million gallons
µg/L	micrograms per liter
MA	Magothy Aquifer
MS/MSD	matrix spike/matrix spike duplicate
NCDPW	Nassau County Department of Public Works
NTCRA	non-time-critical removal action
NTU	nephelometric turbidity unit
NYSDEC	New York State Department of Environmental Conservation
ORP	oxygen-reduction potential
PCE	perchloroethylene (also known as tetrachloroethylene)
PRAP	Proposed Remedial Action Plan
PVC	polyvinyl chloride
QC	quality control
RI	remedial investigation
ROD	Record of Decision
SPDES	State Pollutant Discharge Elimination System
TCA	trichloroethane
TCE	trichloroethene
TCL	Target Compound List
UGA	Upper Glacial Aquifer
VOC	volatile organic compound
YU	YU & Associates, Inc.

1.0 INTRODUCTION

This report presents a summary of the groundwater remediation and monitoring tasks completed by AMO Environmental Decisions and P.W. Grosser Consulting in 2018 as part of the site-wide remedial program for the Liberty Industrial Finishing Site (the Site). The details of the site-wide monitoring program were previously presented in the Field Sampling Plan prepared by Ecology and Environment Engineering P.C. (EEEPC) in May 2010 (EEEPC 2010a) and in accordance with recommendations presented in subsequent Site-wide Groundwater Remedial Program Annual Reports. A summary of wells sampled in 2018 and the rationale for addition of several wells to the monitoring program are presented in **Table 1**. This report also includes evaluations of site-wide monitoring data and trends, and recovery well operations, as well as recommendations for monitoring and operational modifications for 2019.

2.0 SITE BACKGROUND

2.1 Site Location and Description

The Site is located in the town of Oyster Bay, Nassau County, New York. The Site includes Lots 326 and 327 of Block 518, Section 48, as recorded in the Nassau County Clerk's office. The Site is bordered by the Long Island Railroad to the north, Motor Avenue to the south, Main Street to the east, and Ellsworth Allen Park to the west. The surrounding area is primarily residential with several commercial establishments along the major roads.

The Site can be divided into a western portion (generally unpaved and limited current activity) and an eastern portion (previously redeveloped for retail use). Remedial activities on the western portion of the Site have ceased except for those associated with continued operation of the groundwater remediation system (GRS). The town of Oyster Bay is in the initial stages of redeveloping the western portion of the Site for future use as a public park. The eastern portion of the Site has been remediated and redeveloped and includes a large-scale grocery/retail store with a parking lot and facilities.

2.2 Site History

The original Site facilities were utilized starting in 1934 by Kirkham Engineering and Manufacturing Company, which manufactured aircraft-related equipment. In the 1940s, the Defense Plant Corporation (DPC) established operations at the Site for the manufacture of aircraft parts by the lessee, Liberty Aircraft Products Corporation. Liberty Aircraft Products Corporation and its various successors operated the facility as a metal plating operation until 1978. The remedial investigation (RI) report (Roy F. Weston, Inc. 1994) documented the history of the Site in detail, based on files compiled by the EPA and the New York State Department of Environmental Conservation (NYSDEC). A brief summary of the Site history was also presented in the final Continued Remedial Investigation (CRI) report (URS 2000).

In August 1998, the EPA issued a unilateral administrative order to the potentially responsible parties to initiate an interim groundwater action. This action ultimately resulted in construction and operation of an on-site groundwater pump-and-treat system operated as a non-time-critical removal action (NTCRA). The NTRCA was supplanted with the construction of the full site GRS in 2009 and 2010. This report is provided as part of the long-term operation and monitoring of the GRS.

Other remedial activities have occurred since operation of the NTCRA GRS began, including building demolition and removal of subsurface structures. In 2007, the Trust implemented a remedial action to excavate and dispose of contaminated soils at the Site. Approximately 80,000 tons of soil were removed from the Site and the on-site soil remediation was substantially completed in 2011. The town of Oyster Bay implemented additional on-site soil excavation and site grading in 2011 and 2012. The Trust also designed and implemented off-site sediment remediation at Pond A in Massapequa Preserve.

The Trust designed and constructed and continues to operate a site-wide GRS to recover and treat groundwater in both the Upper Glacial and Magothy aquifers. Construction of the site-wide GRS was substantially completed in February 2010. The off-site portion of the system includes a series of six recovery wells in what is identified as the "mid-field" portion of the plume along 1st Avenue near the Woodward Parkway Elementary School. Three of the mid-field wells are screened within the Upper Glacial Aquifer (UGA) and three are screened within the Magothy Aquifer (MA). In addition, one UGA recovery well was installed in the "far-field" portion of the plume in the Massapequa Preserve near 9th Avenue. The on-site portion of the system includes three UGA recovery wells, the treatment equipment and building, and two on-site groundwater infiltration galleries where a portion of the treated water is discharged to the UGA.

The Site's groundwater treatment system was designed and constructed as two separate treatment systems: the UGA system discharges primarily to the Nassau County sanitary sewer, and the MA system is blended with a portion of the UGA flow and discharges to groundwater via two on-site infiltration galleries. In order to resupply the aquifer and maintain groundwater elevations, the system was designed such that a portion of water from the mid-field and far-field UGA wells (RW-4, RW-5, RW-6, and RW-7) could be blended with the mid-field MA wells (RW-8, RW-9, and RW-10) for discharge to the infiltration galleries. The infiltration galleries were designed to receive a maximum of 300 gpm; however, the actual volume of water that can be blended and discharged to the infiltration galleries is limited by the chemical loading from the recovery wells and the chemical mass reduction by the treatment system. Effluent from the treatment plant is regulated by a Nassau County Department of Public Works (NCDPW) Industrial Discharge Permit for the UGA wells and a NYSDEC-issued State Pollutant Discharge Elimination System (SPDES) permit equivalency for the blended MA/UGA discharge to the infiltration galleries.

2.3 Site Hydrogeology

The principal aquifers beneath the Site are the UGA and underlying MA. On Long Island, only the deeper portions of the MA are developed for public water supply. The groundwater in the UGA exists under unconfined conditions, whereas partially confined conditions exist in the MA, where clay-rich deposits are present (URS 2005). The on-site GRS extracts water from the UGA. The off-site GRS includes recovery wells in both the UGA and MA, with the deepest MA well set at approximately 185 feet below grade, which is shallower than public water supply wells within the town of Oyster Bay.

Groundwater contamination extends southward from the Site and other upgradient sources. The plume extending from the Site is referred to as "Plume A." To the east of and mingling with Plume A is another groundwater contamination plume from a different source that is referred to as "Plume B." It is likely that Plume B is derived from multiple sources.

The contaminants in Plume A are cadmium (Cd) and chromium (Cr) as well as trichloroethene (TCE) and its daughter products. The contaminants in Plume B are tetrachloroethene, also known as perchloroethylene (PCE), and its daughter products, which include TCE. Lesser concentrations of other organic compounds, such as 1,1,1-trichloroethane (TCA) and its daughter products, methyl tertiary butyl ether, chlorobenzene, etc. have also been detected in groundwater in both plumes. Cd and Cr contamination associated with the Site is limited to the UGA throughout Plume A. Downgradient of the site, TCE is present to a limited extent in the UGA. In the MA, TCE is present downgradient of the site in an area where Plume B intersects Plume A to a maximum depth of approximately 200 feet. Remediation of Plume B was originally stipulated in the Liberty Site ROD and then removed and transferred to NYSDEC.

2.3.1 Static Groundwater Conditions

The CRI report (URS 2000) discussed groundwater flow under static (non-pumping) conditions. That report indicated that horizontal flow in both aquifers was towards the south-southwest. Within each aquifer, groundwater flow was observed to be predominantly horizontal. However, vertical hydraulic gradients (both upward and downward depending on location and hydrogeologic factors) were observed between the UGA and MA. The hydraulic connection of the UGA to the MA is believed to be limited in the vicinity of the Site due to a low-permeability layer identified between the UGA and the MA throughout much of the on-site and off-site areas (URS 2000; NYSDEC 2013).

2.3.2 Pumping Groundwater Conditions

Based on groundwater modeling results from the remedial design (EEEPC 2008a), the horizontal capture of on-site pumping wells at a combined flow rate of 110 gallons per minute (gpm) encompasses the extent of Plume A as it existed on site at the time. The on-site NTCRA GRS was supplanted in 2009 and 2010 with the site-wide GRS that incorporates on-site and off-site wells. Operations resulted in a combined average flow of 110 gpm (RW-1: 60 gpm; RW-2: 20 gpm; and RW-3A: 30 gpm) for 2010 and 2011. A pulse-pumping program was enacted for the on-site wells in 2012 and continued through 2017. Details regarding GRS operations are provided in **Section 6** of this report.

Off-site mid-field recovery wells RW-4, RW-5, and RW-6 were installed during the site-wide GRS construction to capture Cd and Cr from the UGA. These wells have a combined design flow rate of 160 gpm. Off-site recovery wells RW-8, RW-9, and RW-10 were installed during the site-wide GRS construction to capture volatile organic compounds (VOCs) from the MA. These wells have a combined design flow rate of 85 gpm (EEEPC 2008a) to capture the majority of the width of the TCE plume. Off-site far-field recovery well RW-7 was designed based on a 65 gpm flow rate to capture inorganics and organics from the UGA. These wells were brought on line in February 2010.

2.4 Plume B Remedial Status

In 2009, YU & Associates (YU) conducted a groundwater investigation for NYSDEC that was related to the Plume B groundwater contamination plume originating from the Farmingdale Plaza Cleaners (FPC) site (YU 2009). The FPC site is a 4-acre parcel located approximately 1,000 feet north of the Site and consisting of primarily retail outlets, whose occupants previously included a retail dry cleaner. The focus of the NYSDEC investigation was to identify the extent of Plume B contamination in the UGA as it migrates downgradient and interacts with Plume A. The NYSDEC report indicates that groundwater flow is primarily toward the south, with a downward vertical component of flow. The primary VOCs detected during the Plume B investigation were PCE, TCE, and cis-1,2-dichloroethene (cis-DCE). VOC contamination detected within the investigation area was determined to originate from multiple potential sources, including the FPC and unknown source(s) north of FPC. The presence of PCE and/or TCE in the upper and lower portions of the UGA upgradient of the Site implies the possibility that the VOC plume downgradient from the Site is a combination of two or more incoming upgradient plumes. The focus of the 2009 NYSDEC study was groundwater contamination in the UGA; however, several samples were collected from the uppermost portion of the MA and were found to contain PCE, TCE, and cis-DCE. This further supports the concept that a significant portion, if not all, of the VOCs in the MA that are captured and treated by the Site GRS may be related to Plume B or to an unknown plume unrelated to the Site. The lack of Plume A metals cadmium and chromium in the MA also support the concept of little to no migration from the UGA to the MA influenced by Plume A.

Based on the results of the 2009 investigation, NYSDEC listed the FPC site as a Class 2 Site in the State Registry of Inactive Hazardous Waste Sites and began an RI of the off-site portion of Plume B under New York's State Superfund Program. The FPC off-site RI was conducted in 2011 and 2012 and the final RI report was issued in 2013 (NYSDEC 2013). The FPC off-site RI included installing groundwater vertical profile borings and monitoring wells throughout the area south of both the Site and the FPC site. The FPC RI report stated that except for one sample near the FPC site, there was no groundwater contamination exceeding NYSDEC Class GA standards above a depth of 35 feet. In the UGA, PCE concentrations ranged from non-detect to 38 micrograms per liter (µg/L) and TCE concentrations ranged from non-detect to 120 µg/L. The maximum concentrations of each were detected near the bottom of the UGA at depths of approximately 75 to 95 feet. In the MA east of Plume A, PCE concentrations ranged from non-detect to 130 µg/L and TCE concentrations ranged from non-detect to 86 µg/L. Plume B has migrated horizontally in the MA as far south as Tomes Avenue, approximately 4,800 feet south of the FPC site, and to a depth of approximately 200 feet below ground surface (bgs).

The FPC off-site RI report concluded that the possibility of adverse health effects associated with Plume B is not reasonably anticipated because exposure pathways are not complete. Municipal groundwater supply wells have not been directly impacted by contamination. However, the UGA and MA are part of the EPA-designated, sole-source, Nassau-Suffolk Aquifer System and are impacted by VOC contamination.

NYSDEC evaluated remedial alternatives and issued a ROD for Plume B in March 2014. NYSDEC's selected remedy is referred to as "Modified Pump and Treat with Long-Term Monitoring." This remedy focuses on removal of VOCs from the MA near the leading edge of the PCE plume. NYSDEC intends to design and install a groundwater extraction system to capture "the areal and vertical extent of the area of elevated contamination near the leading edge of the plume that is not currently remediated by the Site groundwater extraction systems" (NYSDEC 2014). NYSDEC's design will include piping contaminated MA groundwater to the existing Site GRS and modifying the GRS to accommodate the flow. The selected alternative included costs for one new extraction well in the vicinity of Lyons Avenue and Vandewater Street that would be operated for a period of five years. Annual groundwater monitoring will be included as will expansion of the existing Operable Unit 1 (on-site soils and soil vapor) site management plan. At the time of this report writing, we are not aware of any activities associated with Plume B ROD implementation.

3.0 FIELD ACTIVITIES

This section describes the site-wide monitoring field activities that were performed in 2018. The number and locations of wells included in this event were completed in accordance with the *Site-Wide Groundwater Monitoring Program Annual Report 2017* (AMO, 2017).

Work performed at the Site during the reporting period included the following:

- Monitoring and recovery well inspections and maintenance;
- Groundwater elevation measurements; and
- Groundwater monitor well and recovery well sampling.

With the exception of 3 additional wells requested for inclusion in this sampling round (see **Table 1**), all activities were performed in accordance with the Field Sampling Plan prepared by EEEPC in May 2010

(EEEPC 2010a) and in accordance with recommendations presented in subsequent Site-wide Groundwater Remedial Program Annual Reports. The additional wells requested by EPA are summarized on **Table 1** and are shaded to correspond with rationale provided in the notes associated with **Table 1**.

3.1 Well Maintenance

During the reporting period, recovery and monitoring well maintenance activities were performed. Details of these activities are provided in the following subsections.

3.1.1 Recovery Well Maintenance

Recovery well maintenance activities were performed as needed in order to maintain GRS operation. Details of GRS and related recovery well operations and maintenance are provided in **Section 6**.

3.1.2 Monitoring Well Inspection and Maintenance

During the July 2018 sampling event, monitoring wells that were opened for water level measurement or sampling were visually inspected to identify maintenance needed to allow the wells to remain operational. Items inspected included the protective casings, locks, outside covers, inside caps, well risers, concrete pads, annular spaces, and determination of water level and total well depth. Several minor issues, such as replacement of cover bolts and or locks, were addressed at the time of inspection or sampling.

3.2 Water Level Measurements

AMO collected groundwater elevation measurements from accessible on- and off-site monitoring wells, recovery wells, and piezometers on July 9, 2018. The groundwater elevation measurements collected during July 2018 are summarized in **Table 2**, and well locations are shown on **Figures 2 through 5**. Groundwater elevation measurements for 2005 through 2016 were provided in previous reports.

AMO measured depth to groundwater using an electronic water-level indicator graduated to 0.01 foot. The probe of the instrument was lowered slowly until the indicator alarm sounded. The probe was then pulled above the water surface and the measurement was repeated. During the measurement of groundwater levels, monitor wells and piezometers with watertight caps were vented to allow the water in the well to equilibrate prior to static water level measurement. The depth to water was noted from a marked reference point on the top of the inner casing of each well and piezometer. In the absence of a mark, the north side of the top of inner casing was used for reference. The probe of the water level meter was decontaminated with Alconox and deionized water after each water level was taken.

3.3 Groundwater Sampling and Analytical Program

This section discusses the groundwater sampling conducted from July 9 to July 13, 2018. 22 groundwater monitoring wells/piezometers and 10 recovery wells were sampled. Monitor well MW-40B could not be accessed during this time due to a defective flush-mount road box cover. Repairs to the road box will be completed prior to the next scheduled sampling event.

All laboratory analyses were performed by TestAmerica Laboratories, Inc. (TestAmerica). TestAmerica is certified for the analyses performed by the NYS Department of Health Environmental Laboratory Approval Program. All analytical testing was performed at TestAmerica's lab in Edison, New Jersey. TestAmerica's Edison lab provided courier service for delivery of samples to the laboratory.

The monitoring well groundwater samples were submitted for the following analyses:

- Target Compound List (TCL) VOCs by EPA SW-846 Method 8260C (only at selected wells).
- Total metals analysis for Cd and Cr by EPA SW-846 Method 6010C.

A summary of wells sampled and the analytical program is provided in **Table 1**.

The recovery well samples were submitted for the following analyses:

- VOCs by EPA Method 624;
- Total metals (including Cd, Cr, cobalt, copper, iron, lead, magnesium, manganese, nickel, sodium, and zinc) by EPA Method 200.7 Revision 4.4;
- Dissolved iron by EPA Method 200.7 Revision 4.4; and,
- Sulfate by American Society for Testing and Materials (ASTM) Method D516-90.

The analyses and methods used for groundwater samples were selected for consistency with previous data. The analyses and methods used for recovery well samples were selected for evaluation of treatment system influent with respect to treatment operations and permit/permit equivalency discharge limitations. The corresponding methods are substantively equivalent with only minor differences in internal laboratory quality control (QC) limits.

As described below, low-flow methods were used to purge the monitoring wells and to collect the groundwater samples. The recovery wells that were sampled were actively pumping at the time of sample collection and did not require purging prior to sampling. The samples from all recovery wells were collected as grab samples from sample ports near the well heads or within the GRS building. The wells were turned off in order to depressurize the discharge lines and the sample ports were opened and purged until a gentle, steady flow was achieved prior to collecting the samples.

For the monitor wells, an adjustable rate submersible pump (110-volt Grundfos Redi-Flo 2 or 12-volt Monsoon) was placed in the center of the well screen and each well was purged at a steady flow rate that minimized water level drawdown. Flow rates ranged from 300 to 500 milliliters per minute (ml/min) during purging, and flow rates were reduced prior to sampling. All purge water was brought to the wellhead and then into a flow-through cell via 0.375-inch inside diameter, dedicated polyethylene tubing. Indicator parameters (i.e., pH, specific conductivity, temperature, dissolved oxygen, oxygen-reduction potential [ORP], and turbidity) were recorded at regular intervals during well purging. Each well was considered adequately purged and ready for sampling when water quality readings had stabilized (within three consecutive readings) and generally included pH to ±0.1 standard units, conductivity values to ±3%, ORP to ±10 millivolts, dissolved oxygen to ±10%, and ±10% or less than 5 nephelometric turbidity units (NTUs) for turbidity. These conditions were met within 0.1 to 3 static well volumes. The final field parameters are summarized in **Table 3**. Groundwater field data collection sheets are provided in **Appendix A**.

Laboratory sample containers were filled directly from the pump discharge line. VOC vials were filled first (at a reduced flow rate to prevent splashing/volatilization), followed by the containers for metals, then general chemistry, if needed. Groundwater samples for metals analyses were collected unfiltered (i.e., total metal analysis) with the exception of soluble iron analysis on recovery well samples. This sample portion was collected after all other unfiltered sample portions were collected. A 0.45-micron flow-through filter was then attached to the discharge tubing without interrupting the flow and the soluble iron sample portion was collected from the filter outlet. At the completion of well sampling, the pump and tubing were removed from each monitoring well. The tubing was wiped clean and stored inside a labeled, dedicated plastic bag for reuse during the next sampling event. The pump was decontaminated using a potable water and laboratory-grade detergent wash followed by a distilled or deionized water rinse. Analytical results are discussed in **Section 5**.

3.3.1 Quality Control Samples

Trip blanks are used to check for the possible introduction of VOCs between when samples were collected and when they were analyzed. One trip blank was included with each shipping container that contained samples for VOC analysis. Trip blanks were analyzed for VOCs only. Three (3) trip blanks (TB180710, TB180711, and TB180712) were shipped and analyzed during July 2018. The only VOCs detected at concentrations greater than the laboratory method detection limit in the trip blanks submitted for analysis were acetone, methylene chloride, and 2-Butanone (MEK). These three compounds were only detected in TB180710. Acteone was detected at a concentration of 19 ug/l, and methylene and MEK were detected at estimated concentrations of 2.9 ug/l and 0.59 ug/l, respectively. The concentrations were reported as estimates because they were detected at concentrations greater than the method detection limit, but less than the reporting limit. These three compounds are known to be common laboratory contaminants.

Field (rinsate) blanks are used to check decontamination methods and evaluate the possibility of cross contamination associated with reusable sampling equipment. Field blanks were collected from decontaminated sampling pumps by pouring laboratory-deionized water over and through the pumps used for sampling and capturing the rinse water in laboratory containers. Three (3) field blanks (FB180710, FB180711, and FB180712) were collected during sampling. Methylene chloride was detected in FB180710 at an estimated concentration of 0.67 ug/l. Acetone was detected at a concentration of 6.6 ug/l in FB180711, and methylene chloride and carbon disulfide were detected in FB180712 at estimated concentrations of 0.37 ug/l and 0.4 ug/l.

Several VOCs were reported as being outside of QC acceptance levels following analysis of the field blanks. The continuing calibration verification (CCV) analyzed in batch 460-537647 was outside the method criteria for the following analytes: Dichlorodifluoromethane (biased low) and Methyl acetate (biased high). A CCV standard at or below the reporting limit (RL) was analyzed with the affected samples and found to be acceptable. As indicated in the reference method, sample analysis may proceed; however, any detection for the affected analytes is considered estimated.

Consistency in both sample collection and sample analysis was checked through analysis of a duplicate samples. Two (2) field duplicate samples was collected during the July 2018 sampling event (DUP180712A and DUP180712B). In all cases, the relative percent difference between detections in the parent and field duplicate samples were acceptable and no data qualification was required.

MS/MSD analyses were performed by the laboratory to provide information about the effects that the sample matrix exerts on the digestion/extraction and measurement methodology. The following additional QC concerns were identified by the laboratory during review of the 2018 groundwater sample results:

- The laboratory control sample (LCS) for analytical batch 460-537647 recovered outside control limits for the following analyte: Dichlorodifluoromethane; it failed the recovery criteria low for LCS 460-537647/3. The LCS/LCSD % RPD was outside control limits for 1,4-Dioxane and Dichlorodifluoromethane. These analytes were not detected in the associated samples; therefore, the data have been reported. No other difficulties were encountered during the volatile organics or inorganics analyses.
- Chromium exceeded the RPD limit for the duplicate of sample 460-160475-1.
- The continuing calibration verification (CCV) associated with batch 460-536823 recovered above the upper control limit for Methyl acetate. The samples associated with this CCV were non-detects for the affected analyte; therefore, the data have been reported.
- The laboratory control sample (LCS) and / or laboratory control sample duplicate (LCSD) for analytical batch 460-536823 recovered outside control limits for the following analytes: 1,1,2,2-Tetrachloroethane, 1,4-Dioxane and Methyl acetate. These analytes were biased high in the LCS/LCSD and were not detected in the associated samples; therefore, the data have been reported.
- The continuing calibration verification (CCV) analyzed in batch 460-537538 was outside the method criteria for the following analyte: Bromoform. A CCV standard at or below the reporting limit (RL) was analyzed with the affected samples and found to be acceptable. As indicated in the reference method, sample analysis may proceed; however, any detection for the affected analyte is considered estimated.
- The laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) for analytical batch 460-537538 recovered outside control limits for the following analyte: 1,1,2,2-Tetrachloroethane. This analyte was biased high in the LCS/LCSD and was not detected in the associated samples; therefore, the data have been reported.
- The continuing calibration verification (CCV) analyzed in batch 460-537647 was outside the method criteria for the following analyte(s): Dichlorodifluoromethane (biased low) and Methyl acetate (biased high). A CCV standard at or below the reporting limit (RL) was analyzed with the affected samples and found to be acceptable. As indicated in the reference method, sample analysis may proceed; however, any detection for the affected analyte(s) is considered estimated.
- The laboratory control sample (LCS) for analytical batch 460-537647 recovered outside control limits for the following analyte: Dichlorodifluoromethane. The LCS/LCSD % RPD was outside control limits for 1,4-Dioxane and Dichlorodifluoromethane. These analytes were not detected in the associated samples; therefore, the data have been reported.
- The continuing calibration verification (CCV) analyzed in batch 460-537647 was outside the method criteria for the following analytes: Dichlorodifluoromethane (biased low) and Methyl acetate (biased high). A CCV standard at or below the reporting limit (RL) was analyzed with the affected samples and found to be acceptable. As indicated in the reference method, sample analysis may proceed; however, any detection for the affected analytes is considered estimated.
- The laboratory control sample (LCS) for analytical batch 460-537647 recovered outside control limits for the following analyte: Dichlorodifluoromethane; it failed the recovery criteria low for LCS 460-537647/3. The LCS/LCSD % RPD was outside control limits for 1,4-Dioxane and Dichlorodifluoromethane. These analytes were not detected in the associated samples; therefore, the data have been reported.

- Chromium exceeded the RPD limit for the duplicate of sample 460-160475-1.
- The laboratory control sample (LCS) for analytical batch 460-538895 recovered outside control limits for the following analyte: Methyl acetate. This analyte was biased high in the LCS and was not detected in the associated samples; therefore, the data have been reported.
- Cyclohexane failed the recovery criteria high for the matrix spike (MS) of sample RW01 (460-160518-3) in batch 460-538895. Cyclohexane and Methyl acetate failed the recovery criteria high for the matrix spike duplicate (MSD) of sample RW01 (460-160518-3) in batch 460-538895.
- The presence of the '4' qualifier in the data indicates analytes where the concentration in the unspiked sample exceeded four times the spiking amount.

3.3.2 Investigation-Derived Waste Management

All purge water was containerized at the well head, transported to the GRS building, and discharged into the on-site groundwater treatment system for treatment and discharge to the sanitary sewer.

3.4 Treatment System Discharge Sampling

Discharge from the groundwater treatment system is regulated by a NCDPW Industrial Discharge Permit for sewer discharge and a NYSDEC-issued SPDES permit equivalency for the infiltration gallery discharge. In accordance with the versions of these permits/equivalents in place during this reporting period, routine discharge sampling was conducted. Laboratory analyses were performed by TestAmerica Laboratories in Edison, New Jersey.

Sewer discharge samples were tested for the following parameters:

- VOC analysis by EPA Method 624;
- Total Cd, Cr, copper, nickel, and zinc by EPA Method 200.7 Revision 4.4;
- Cr^{6+} by Standard Method 3500 CR-D; and
- pH by Standard Method 4500 H+ B.

Infiltration gallery discharge samples were tested for the following parameters:

- VOC analysis by EPA Method 624;
- Total Cd, Cr, cobalt, copper, lead, magnesium, manganese, nickel, sodium, and zinc by EPA Method 200.7;
- Cr^{6+} by Standard Method 3500 CR-D;
- Dissolved iron by EPA Method 200.7;
- Sulfate by ASTM Method D-516-90; and
- pH by Standard Method 4500 H+ B.

In accordance with each permit, some of the analytes were tested on grab samples of the discharge and some were tested on 24-hour composite samples. Composite samples were obtained using an ISCO automated sampler. Semi-annual reports were prepared and submitted to the NCDPW for sewer discharges, and quarterly reports were prepared and submitted to NYSDEC for SPDES-equivalent discharges in accordance with each permit.

4.0 HYDROGEOLOGY

Groundwater flow in the upper portion of the UGA across the area has consistently been predominantly to the south at a very low horizontal gradient. In July 2018, site-wide groundwater flow remained generally to the south but with localized variability in flow direction and gradient magnitude due to a slight mounding effect associated with discharge to the infiltration galleries and an area of depression around the active pumping wells. As shown on figures produced in previous reports, when RW-01 and RW-03A are operating, the estimated capture zone encompasses the entire width of the site and extends more than 150 feet south of the site. With both wells off, flow is generally to the south. Although the pumping rate of RW-3A is lower than that of RW-1 when operating, the estimated capture zone around RW-3A was apparently larger than that of RW-1. However, in past years, when RW-1 only was running, the apparent capture zone was much larger (see Figure 4-1 in EEEPC 2014a). The reason for the difference in capture zone size observed in July 2014 is unclear and it is expected that the capture zone is of sufficient size to capture any remaining on-site contamination when either individual well is operating.

Horizontal gradients in the off-site area were consistent with historical calculations. In all three zones (the Upper Upper Glacial, the Lower Upper Glacial, and the Magothy aquifers), groundwater flow is generally to the south at horizontal gradients of approximately 0.0020 to 0.0025. In the vicinity of the mid-field pumping wells (along 1st Avenue), groundwater in all three zones is affected by the pumping wells and show radial flow towards the pumping wells.

Previous vertical gradient calculations demonstrated that the MA is confined or partly confined and vertical flow is upward at a shallow gradient across most of the area. The strongest upward vertical gradients have generally been near the UGA shallow active recovery wells. The July 2018 groundwater elevations showed that vertical gradients downgradient of the Site within the UGA were of a very low magnitude and varied in direction. An upward gradient was observed between UGA wells at clusters MW-9 and MW-11; a downward gradient existed at MW-36. Between the UGA and MA, the vertical gradient was downward at well clusters MW-9 and MW-11. Within the MA, the vertical gradient at well clusters MW-09 and MW-11 was upward at low magnitudes.

Vertical gradients have varied over time. The CRI report determined that vertical gradients are seasonal. In spring, vertical gradients were downward throughout the majority of the investigation area, including in the mid-field plume at the MW-11 cluster, but were upward in the far-field plume south of the MW-9 cluster. In the summer, vertical gradients were all downward (URS 2000).

5.0 ANALYTICAL DATA SUMMARY AND EVALUATION

The analytical results for the VOCs and metals detected in groundwater samples collected in July 2018 are summarized in **Table 4**. The results were compared with NYSDEC Class GA groundwater standards and guidance values, as presented in NYSDEC's Technical and Operational Guidance Series Memorandum 1.1.1 (NYSDEC 1998). These standards are consistent with the groundwater cleanup levels for the analytes specified in the EPA's ROD. In the data summary tables herein, analytical results for compounds with positive concentrations are printed in bold type and results that exceeded NYSDEC groundwater standards are shaded in orange for ease of review.

5.1 On-Site and Motor Avenue Boundary Well Sampling

5.1.1 Volatile Organic Compound Results

Table 4 presents summaries of the compounds detected on a well-specific basis. Graphs of historical results for selected wells are presented in **Appendix B and Appendix E**. Graphs of detected concentrations of Cd, Cr, TCE and PCE at selected onsite/boundary wells, midfield wells, and farfield wells are shown on **Figures 2 through 5**, along with groundwater elevation contours. **Figures 2 and 3** show groundwater elevation contours for the Upper UGA. Groundwater elevation contours were plotted for the Lower UGA; however, they were very similar to the contours presented on **Figures 2 and 3**, and are not presented in this report. **Figures 4 and 5** show groundwater elevation contours for the Magothy Aquifer.

During the 2018 sampling event, the only organic constituents detected at concentrations greater than the NYSDEC groundwater standards in the samples collected from on-site and Motor Avenue boundary wells completed within the UGA were 1,1,1-trichloroethane (1,1,1-TCA), trichloroethene (TCE), cis-1,2-dichloroethene (c-1,2-DCE), and vinyl chloride. The compound 1,1,1-TCA was detected at a concentration of 13 micrograms per liter (µg/l) in the groundwater sample collected from MW-7A. TCE and c-1,2-DCE were detected in the groundwater samples collected from MW-11C at concentrations of 83 ug/l and 8.8 ug/l, respectively. TCE and vinyl chloride were detected in the groundwater sample collected from RW-08 at concentrations of 16 and 2.1 ug/l, respectively.

Monitoring well MW-38B is the only Motor Avenue boundary well to have somewhat consistently contained TCE above groundwater standards (all sampling events between October 2002 (except November 2012) through 2014). Following the 2014 sampling event, TCE has been detected at concentrations less than the groundwater standard. The TCE concentration in MW-38B was highest (213 µg/l) in March 2004 and has shown a decreasing linear trend since that time (see **Appendix C**). The TCE concentration in this well has fluctuated near the groundwater standard since June 2011 (from non-detect to 13 µg/l).

Overall, the groundwater quality data for the organic constituents shown in **Table 4** indicate that VOC concentrations throughout the Site are generally decreasing and are below historic high levels measured since inception of the monitoring program in September 2000. With the few exceptions noted above, most VOC concentrations are below groundwater quality standards in the on-site and Motor Avenue boundary monitoring wells. Additional trend information is provided in **Section 5.3**.

5.1.2 Inorganic Results

Table 4 also presents the concentrations of detected inorganic analytes for the July 2018 sampling event.

Cadmium

Cadmium (Cd) was detected in the samples collected from the three active on-site recovery wells (RW-1, RW-2, and RW-3A), five on-site monitoring wells, and five Motor Avenue boundary wells at concentrations greater than the NYSDEC Class GA groundwater standard of 5 µg/l in 2018 (see **Table 4**). In the on-site wells near the middle of Plume A (MW-2AR and MW-2BR), Cd concentrations were historically higher in the upper portion of the UGA than the lower portion; however, the concentration in MW-2AR has declined significantly since June 2011 from 590 to 42.7 µg/l. The Cd concentration in MW-2AR has been declining since the groundwater monitoring program began. This well is within the capture zone of the on-site recovery wells. The Cd concentration in adjacent well MW-2BR has generally been much lower than in MW-2AR but did exhibit a historic high in June 2010 (74.3 µg/l) and has been declining since. The Cd concentration in MW-5 has remained consistent at concentrations slightly greater than the NYSDEC groundwater standard of 5 µg/l. In the Motor Avenue boundary monitoring wells downgradient of the former disposal basins (well pairs MW-38, MW-39, and MW-40), Cd concentrations in September 2018 ranged from 13 to 221 µg/l. All of these wells, except MW-38A and MW-39A, have shown decreasing trends in concentrations since 2010 when alterations were made to the on-site recovery well operations. Additional discussion of Motor Avenue boundary well concentration trends is provided in Section 5.3.

Detected Cd concentrations in samples collected from MW-38A and MW-39A have been increasing over the course of the past several sampling events. The detected cadmium concentration in the samples collected from MW-38A decreased from 127 µg/l to 45.5 µg/l between the 2017 and 2018 sampling events, and the detected cadmium concentration in the samples collected from MW-39A decreased from 512 µg/l to 221 µg/l.

Total Chromium

In July 2018, total Cr was detected at concentrations above the groundwater standard of 50 µg/l in samples collected from on-site and Motor Avenue boundary wells MW-2AR, MW-2BR, MW-5, MW-41AR, RW-01, RW-02, RW-3A, MW-38A, MW-38B, MW-39A, MW-39B, and MW-40A. The total Cr concentrations detected in samples collected from MW-38A, MW-39A, and MW-40A have fluctuated recently, but have been generally rising since 2013. Total chromium was detected in samples collected from all three wells during 2018 at concentrations greater than the NYSDEC Class GA groundwater standard of 50 µg/l. Chromium was detected in the sample collected from MW-39B at a concentration of 908 µg/l, significantly higher than the 13.5 µg/l detected in 2017. Spikes in detected concentrations have been observed previously. This detection will be re-evaluated following the July 2019 groundwater sampling event.

5.2 Off-Site Well Sampling

Table 4 presents summaries of the compounds detected in off-site wells during the July 2018 sampling event. Graphs of historical results for the mid-field and far-field plume wells are presented in **Appendix B,** and additional graphs are provided in **Appendix E**.

5.2.1 Volatile Organic Compound Results

During the 2018 sampling event, the only VOCs detected at concentrations exceeding NYSDEC Class GA groundwater standards in samples collected from the 20 off-site wells were cis-1,2-DCE, TCE and vinyl chloride. cis-1,2-DCE and TCE were detected in the groundwater sample collected from MW-11C at concentrations of 8.8 µg/l and 83 µg/l, respectively. TCE and vinyl chloride were detected in the sample collected from RW-8 at concentrations of 16 µg/l and 2.1 µg/l, respectively. Additional detections of TCE and other VOCs were reported in off-site well samples, but none at concentrations greater than the NYSDEC Class GA groundwater standards.

The maximum detected concentration of any VOC in the offsite groundwater samples was 83 µg/l of TCE in MW-11C. Detected TCE concentrations in MW-11C has fluctuated, ranging from 1,300 µg/l in July 1992 to non-detect in July 2010, with an overall decreasing trend. In June 2011, the TCE concentration in MW-11C was 500 µg/l. Since 2011, the concentrations have fluctuated, but show an overall decreasing trend.

5.2.2 Inorganic Results

Table 4 presents the concentrations of detected inorganic analytes for the July 2018 groundwater sampling event.

Cadmium

Cd was detected at concentrations exceeding the NYSDEC Class GA groundwater standard of 5 µg/l in seven of the off-site wells sampled in 2017. Cd is present at concentrations exceeding 5 µg/l in the three mid-field recovery wells (RW-4, RW-5, and RW-6) and mid-field monitoring wells MW-11B, MW-17B, MW-25B, and MW-29B. The farthest downgradient detections of Cd greater than the groundwater criteria in the UGA were at RW-7 and PZ-14 in the Massapequa Preserve off 9th Avenue. In general, the results are consistent with recent historical results. The maximum concentration of Cd detected within the UGA in Plume A in 2017 was 45.3 µg/l in the sample collected from midfield well MW-17B.

Chromium

Total Cr was detected at concentrations exceeding the NYSDEC Class GA groundwater standard of 50 µg/l in ten off-site wells sampled in 2018. This is generally consistent with historical results. In July 2018, the UGA samples that contained total Cr at concentrations greater than 50 µg/l included the three mid-field recovery wells (RW-4, RW-5, and RW-6), three mid-field monitoring wells (MW-17B, MW-25B, and MW-29B), three far-field monitoring wells (MW-9A, MW-9B and PZ-14), and one farfield recovery well (RW-7). Consistent with recent historical results, the maximum concentration of total Cr was detected at MW-9B (342 µg/l). The concentration of total Cr in far-field recovery well RW-7 has been slowly increasing and has been detected at concentrations greater than or equal to the groundwater standard of 50 µg/l since November 2012. The total Cr concentration in RW-7 in July 2018 was once again greater than the groundwater standard of 50 µg/l (122 µg/l). Generally, total Cr exceedances occur at the same wells as Cd exceedances (except MW-11B where total Cr has never exceeded the groundwater standard). In three of the mid-field, lower-UGA wells (MW-17B, MW-25B and MW-29B), the concentrations of total Cr increased from 1998 to 2011 and have fluctuated at concentrations greater than the groundwater standard since approximately 2012. Although the concentrations at MW-25B remain greater than the groundwater criteria, the concentrations have been decreasing since June 2015. In samples collected from MW-17B, total Cr concentrations increased through 2013 and have continued to fluctuate at concentrations greater than 250 µg/l since that time. This pattern may be related to mobilization of contaminants from the site during soil remediation, which continues to impact MW-17B. The decline at MW-25B is likely related to contaminant mass removal at the adjacent mid-field recovery wells.

5.3 Statistical Trend Analysis

In the Five-Year Review Report for the Site (EPA 2012), EPA requested that Mann-Kendall trend analysis of Cd, Cr, and Cr^{6+} concentrations for the Motor Avenue boundary monitoring wells, on-site recovery wells, and other on-site monitoring wells be completed. EEEPC completed a Mann-Kendall analysis for these wells as part of the 2013 Annual Summary Report (EEEPC 2014a).

In July 2014, EPA developed a statistical tool to aid in the evaluation of contaminant concentrations on a well-by-well basis to determine whether a groundwater restoration remedial action is complete. This tool was used to evaluate groundwater conditions at each of the monitoring and recovery wells sampled in 2018. Data used in this tool included up to the maximum of 20 historical sample results per well for Cd and total Cr. The results of the statistical tool analysis are presented in **Appendix C**. A summary of the results is presented in **Table 5**. Wells that did not contain contaminants at concentrations above the groundwater standards in at least five years and that were not showing an increase in concentration were not analyzed using this tool. Wells identified as showing 'no trend' may have an increasing or decreasing trend, but this trend is statistically insignificant.

Overall, there were no consistent trends in the data based on well groupings by location or by analyte. For example, Cd concentrations in the Motor Avenue boundary wells: MW-38B showed a decreasing trend, and MW-39A showed an increasing trend, and four wells (MW-38A, MW-39B, MW-40A, and MW-40B) showed no trend. Although no trend was determined, Cd concentrations in MW-39B and MW-40A have declined from historic maxima. All on-site monitoring and recovery wells sampled show either a decreasing trend or no trend for Cd, except for RW-3A, which showed an increasing trend. The increasing trend at RW-3A indicates enhanced capture by this recovery well during pulse pumping cycles.

Statistically, Cr concentrations in the Motor Avenue boundary wells exhibited no trends, except MW-39A and MW-39B, which exhibit increasing trends. Total Cr concentrations in on-site monitoring and recovery wells were increasing in two wells (MW-5 and MW-2BR), decreasing in one well (MW-2AR), and showed no trend in the remaining onsite and boundary wells.

At the mid-field monitoring and recovery wells, Cd concentrations are decreasing in one monitor well (MW-17A) and two recovery wells (RW-5 and RW-6), increasing in one recovery well (RW-4), and show no trend in the remaining four wells that were evaluated (MW-11B, MW-17B, MW-25B, and MW-29B). Three wells showed an increasing trend in total Cr concentrations (RW-4, RW-5, and MW-17B), three wells showed a decreasing trend (RW-6, MW-11B and MW-17A), and two wells showed no trend (MW-25B and MW-29B).

At the far-field monitoring and recovery wells, two well (MW-9A and MW-9B) showed no trend for cadmium. PZ-14 and RW-7 both show an increasing cadmium trend. The total Cr concentrations showed an increasing trend in samples collected from PZ-14 and RW-7, and no trends in the samples collected from MW-9A or MW-9B.

6.0 Groundwater Recovery System Operation

The groundwater recovery system operates 24 hours per day. **Table 6** indicates the design flow rate for each on- and off-site recovery well. Extracted groundwater is piped from the well locations into the on-site treatment building. Water pumped from the UGA recovery wells is processed through granulated activated carbon (GAC) vessels and then discharged to the sewer as treated effluent. Water pumped from the MA recovery wells is processed first through a filtration unit (5 to 10 microns) and then through GAC vessels prior to discharge to the infiltration gallery as treated effluent.

Discharge permits exist for both sewer discharge (350 gpm limit) and SPDES discharge (300 gpm limit) through an on-site groundwater infiltration gallery. MA wells (RW-8, RW-9, and RW-10) discharge to the on-site infiltration gallery. The remaining recovery wells (all UGA wells) discharge primarily to the sewer system. A portion of the UGA flow from mid-field wells RW-4, RW-5, and RW-6 and far-field well RW-7 can be blended into the infiltration gallery discharge in order to maximize treated groundwater discharge to the gallery while still meeting permitted discharge limitations.

During 2018, discharge to the sewer side of the system was operational approximately 91% of the year. Discharge to the SPDES side of the system was operational approximately 61% of the year. (During most of the downtime on the SPDES side, UGA groundwater extraction and sewer discharge continued.) For the periods of active operation in 2018, the average discharge rate to the sewer was 175 gpm, and the average discharge rate to the infiltration galleries was 51 gpm.

6.1 System Downtime

System downtime during the reporting period was primarily due to system maintenance and repairs of system components. Details pertaining to system downtime, maintenance, and repairs are provided in the monthly and quarterly reports prepared for the NCDPW and NYSDEC. These reports are also provided with the Monthly Progress reports prepared for the Site and submitted to the EPA.

Shutdowns during 2018 for maintenance and repairs included the following:

- Due to rapid re-fouling of the bag filters and subsequent increase in system pressures, the MA side of the system X11-5 filter must be placed in partial bypass approximately two weeks after the bag filter changes to maintain adequate operating pressure and to allow for blending. PWGC currently performs X11-5 filter change-outs monthly. X11-5 filter change-outs and maintenance are generally successful at reducing differential pressure and the overall operating pressure of the Magothy Aquifer (MA) portion of the system.
- Downtime of the onsite and offsite recovery wells was due to alarm shutdowns and recovery well failures. These shutdowns were mainly attributable to high differential pressure across granular activated carbon (GAC) filtration units, Magothy (MA) reverse flow, and inadequate backwash flow. The cause of these alarm shutdowns appears largely caused by the variability of system parameters during the pulse pump schedule and the general sensitivity of the system. Recovery well failures were repaired by a well subcontractor of PWGC.
- Issues have been encountered with maintaining adequate water levels during operation of RW-7. To continue system operation, the pumping rate of RW-7 has been decreased to below design flow rate. PWGC is evaluating options to correct this issue.

6.2 Contaminant Mass Removal

Average flow rates for the recovery wells for the reporting period are provided in **Table 7**. These average values represent flow during well operation and do not account for system downtime. Variances between the average flow rates for the period and the design flow rates are due to changes in operational status resulting from system maintenance and system alarms.

During calendar year 2018, a total of 108.8 million gallons of groundwater were extracted and treated. Approximately 2.5 pounds of TCE, 7 pounds of Cd, and 71 pounds of total Cr were removed during this period.

Overall, for the period October 2002 through December 2018, the groundwater recovery system extracted a total volume of 1,335 million gallons of water and approximately 33 pounds of TCE, 494 pounds of Cd, and 2,080 pounds of total Cr (see **Table 7**).

6.3 GRS Removal Efficiency

As part of the five-year review for the Site, the EPA requested that a trend analysis be performed for the mass discharge from the GRS in order to evaluate the effectiveness of the GRS. As part of the contaminant mass removal calculations (see **Section 6.2**), AMO/PWGC calculates the total pounds of Cd and total Cr removed by the system each year. To determine the effectiveness of the GRS, AMO determined the removal rate of each of these metals for the year (see **Appendix D**). Total Cr removal rates are considered representative of Cr^{6+} removal rates for the purpose of this analysis; however, Cr^{6+} generally occurs in slightly lower concentrations than total Cr.

Mass removal rates of Cd and total Cr for all the GRS recovery wells was highest between 2006 and 2009 (see **Appendix D**). The highest removal rate occurred in 2009, which can be attributed to disturbance of the contaminated soils during the soil removal remedy. The off-site recovery wells began operation in February 2010. Since that time, the removal efficiency of the wells has been relatively low and consistent. The observed decrease beginning in 2010 is due to the increase in volume pumped from the off-site wells at lower concentrations than the on-site wells. Pulsing of the on-site recovery wells began in March 2012, causing a 60% decrease in the total volume extracted from these three wells. However, removal efficiencies of the GRS continue to remain relatively consistent despite the decrease in pumping volume (see **Appendix D**).

Since the GRS began operation in 2010, the cumulative total pounds of Cd and Cr removed by all of the GRS recovery wells has continued to increase at a steady rate (average of 0.15 pounds per million gallons [lbs/Mgal] of Cd and 0.51 lbs/Mgal of total Cr during the past four years). Meanwhile, the cumulative mass removed by the on-site recovery wells has nearly leveled off relative to prior operations, but does continue to increase at an average rate of 0.39 lbs/Mgal of Cd and 0.45 lbs/Mgal of total Cr.

6.4 Discharge Blending

Blending began in August 2011 and has continued since that time at various blending rates. Besides the estimate of discharge concentrations, a controlling factor has been the pressure differential between the sewer discharge side of the system and the SPDES discharge side of the system. Blending is only possible when the sewer discharge side has higher pressure than the SPDES side so that water will flow from the sewer side to the SPDES side. In March 2014 a gate valve was added to the sewer side to provide the ability to add pressure for better control of blending rates.

Beginning in July 2013 and continuing through 2018, all flow from RW-7 was blended with the MA well flow and treated and discharged to the SPDES side of the system. Approximately 17.07 million gallons of groundwater from RW-7 was blended and discharged to the infiltration galleries in 2018. Starting in January 2014, a portion of the flow from RW-4, -5, and -6 was blended with the MA well flow and treated and discharged to the SPDES side of the system. Blending flow rates varied based on pressure, influent contaminant concentrations, and available volume of MA water. Approximately 1.61 million gallons of groundwater from RW-4, -5, and -6 was blended and discharged to the infiltration galleries in 2018, at an average flow rate of 13 gpm.

6.5 On-site Recovery Well Pulsing

Beginning in March 2012 EEEPC completed a 12-week pilot pulse pumping program for the on-site recovery wells. The initial pulsing program for RW-1, RW-2, and RW-3A consisted of a cycle where each well in sequence would run for 24 hours (one day) and then shut down for 48 hours (two days). After analysis of the pilot program a second pilot test was conducted starting in August of 2012 (16 weeks). During the second pilot program, the recovery wells cycled one day on and then three days off. EEEPC started a full pulsing program for the on-site recovery wells in February 2013 using the one-day-on and three-days-off cycle and continued the pulsing program throughout that year. Samples from the pulsing wells were collected monthly to evaluate the pulse pumping program. In January 2014, EEEPC submitted an evaluation of the 2013 Pulse Pumping Program (EEEPC 2014b) to the Trust. This evaluation summarized the pulsing operations of the system for 2013 and provided recommendations for the 2014 operational year. Recommendations included the continued pulsing of RW-3A on a one-day-on, three-days-off schedule; modifying the pulsing schedule for RW-1 to one day on and four days off; shutting down RW-2; and sampling influent from RW-1 and RW-3A quarterly. These changes to the pulsing program were implemented on April 1, 2014.

During the 2nd Quarter 2017, the pulse pumping schedule was modified to reduce system shutdowns during the pulse pump cycle. The new schedule prevents recovery wells RW-1 and RW-6 from pumping simultaneously. Because these two wells have a high pumping rate, operating them both at the same time can create high system pressure and potentially cause the entire system to shut down. Since the new pulse pump schedule has been implemented, system shutdowns due to high pressure have decreased and system uptime has increased.

High pressure on the Magothy Aquifer (MA) side of the system is typically due to iron buildup within the X11-5 filtration unit or granular activated carbon (GAC) units. PWGC is closely monitoring differential pressure across the X11-5 and has scheduled more frequent X11-5 bag filter change-outs (approximately monthly or as needed).

6.6 Off-site Recovery Well Pulsing

RW-6, one of the midfield recovery wells located on First Avenue, was placed on the pulse pumping schedule recommended in the 2014 Annual Groundwater Report prepared by Ecology and Environment Engineering, P.C., 2014. Pulse pumping of RW-6 was initiated during October 2015, and RW-6 is currently cycling one day on and two days off. The detected concentrations of cadmium and chromium have fluctuated but have shown decreasing concentration trends.

When blending is operational, the UGA mid-field recovery wells RW-4, RW-5, and RW-6 continue to blend approximately 20-gpm to the SPDES portion of the groundwater treatment system. Recovery well RW-7 continues to discharge approximately 55-gpm to the SPDES portion of the groundwater treatment system.

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 Long-term Groundwater Monitoring

Sampling performed in 2018 was consistent with the sampling plan described in the *Site-wide Groundwater Monitoring Program Annual Report 2014* (EEEPC 2014a). 22 groundwater monitor wells/piezometers and 10 recovery wells were sampled in July 2018. As discussed in **Section 5**, analytical results for the VOCs and metals of interest were generally consistent with historical results.

7.1.1 On-site Groundwater

In the Motor Avenue boundary wells (downgradient of the on-site recovery wells), TCE has previously been detected in both the upper and middle portions of the UGA. During the most recent sampling events in July 2018, TCE was not detected at a concentration exceeding the groundwater standard of 5 µg/l in any of the on-site recovery wells or Motor Avenue boundary wells. The concentration at MW-38B was 4 µg/l, and has decreased from a maximum of 213 µg/l (in March 2004). The detected concentration has been below 5 µg/l since 2014. TCE concentrations in all other boundary wells have also decreased from historical maxima and continue to remain below the groundwater standard (see **Appendix C** and **Appendix E**).

Previously, Cd concentrations were observed to increase with depth from the upper to middle portions of the aquifer while concentrations of Cr decreased. However, over the past several sampling events, Cd concentrations decreased with depth. Cd concentrations continue to exceed the groundwater standard of 5 µg/l in the on-site recovery wells and central Motor Avenue Boundary wells. However, with the exception of MW-38A and MW-39A, these concentrations continue to remain below historical maxima and generally exhibit a declining linear trend. During the 2018 sampling event, Cd concentrations detected in the samples collected from MW-38A and MW-39A were each near historic maxima observed.

The concentrations of Cr were below the groundwater standard of 50 µg/l in Motor Avenue boundary well MW-39B. On-site recovery well concentrations have fluctuated and were greater than 50 µg/l in RW-01 during 2018.

Overall, the concentrations of site-related constituents (i.e., Cd, Cr, and TCE) are lower than they have been historically in all wells. This trend is consistent with the recovery and treatment of these constituents in the on-site GRS and the removal of on-site sources. However, as discussed in **Section 7.1.3**, statistically significant trends in concentrations are inconsistent and change depending on the period of data and well being evaluated. Based on the most recent sampling event, Cd remains the most prevalent contaminant in groundwater at the wells tested in terms of the number of exceedances, but several wells do show decreasing trends. Detected TCE concentrations do not exceed the standard in any on-site or Motor Avenue boundary well.

7.1.2 Off-site Groundwater

The highest concentrations of chlorinated ethenes (PCE and TCE) occur in upper MA (C-level) wells. Investigation by NYSDEC in 2011 and 2012 has added to the understanding of contaminant distribution, particularly in the MA. The distribution of TCE within the UGA is no longer continuous due to migration, reduction in concentration, and capture by recovery wells. The highest concentration of TCE detected by NYSDEC in the UGA (120 µg/l) was from a temporary groundwater profile boring sampled by NYSDEC along Plitt Avenue upgradient of the mid-field recovery wells (NYSDEC 2013). No UGA wells sampled in

2018 as part of the Site sampling event contained TCE above the groundwater standard of 5 µg/l. The concentration of TCE in PZ-14 continues to decline from 47 µg/l in June 2010, detected when the piezometer was first sampled.

In the MA, TCE concentrations have generally decreased with time, with the exception of MW-11C and MW-11D. In well MW-11C, the TCE concentration has fluctuated significantly (from 1,300 µg/l to non-detect) and has recently ranged from 500 µg/l 64 µg/l since June 2011. Between July 2017 and July 2018, the TCE concentration decreased from 220 µg/l to 83 µg/l; the TCE concentrations detected in samples collected from MW-11C, however, continues to exhibit an overall decreasing trend. In MW-11D, until recently, the detected TCE concentrations have remained relatively stable, ranging between 120 and 180 µg/l since 1998. The detected TCE concentrations in samples collected from MW-11D have recently been declining, and TCE has not been detected at a concentration greater than the reporting limit in the samples collected from MW-11D since June 2015. MW-11C and MW-11D are within the capture zone of the mid-field MA recovery wells.

PCE was detected at low concentrations (below the groundwater standard of 5 µg/l) in several of the wells tested in 2018 as part of the Site sampling events. PCE was not detected above the standard in any well during the 2018 sampling event. Supplemental data from NYSDEC investigations shows PCE present upgradient and east of the Site in the UGA at concentrations below 40 µg/l and mostly below 10 µg/l (NYSDEC 2013). In the MA, the maximum PCE concentration detected by NYSDEC was 110 µg/l in the mid-field plume area. None of the MA wells tested for the Site sampling events in 2016 or 2017 contained PCE above the groundwater standard.

Total Cd and total Cr were not detected in any of the samples collected from MA wells during the 2018 sampling events. Metals contamination remains limited to the UGA. In mid-field monitoring and recovery wells, concentrations of Cd generally show long-term declines; however, Cd in MW-29B has remained relatively consistent near 30 µg/l. Although the detected concentration rose significantly in 2017, the 2018 results are in line with historical data. The detected Cd concentration in MW-17B has fluctuated significantly since 2010 although it has been steady over the past several sampling events. The detected Cd concentration in MW-25B, which had been increasing since June 2010, declined from 220 ug/l in 2014 to 28.2 ug/l in 2017 and 35 ug/l in 2018. MW-25B is adjacent to the mid-field recovery wells, which may affect the concentration in this monitoring well (Cd is being pulled into the area by the recovery wells). In far-field monitoring wells 9A and MW-9B, Cd concentrations have declined significantly since monitoring began. Total Cr concentrations in recent monitoring events have shown declines in wells near the site and an increase in mid-field well MW-25B. In far-field wells MW-9A and MW-9B, decreases in Cr have been observed in recent years. However, detected concentrations in the 2018 samples collected from these wells rebounded to near historic highs. As shown on the graphs in **Appendix E**, detected concentrations continue to fluctuate across the site.

7.1.3 Trend Evaluation

Based on the analysis of cumulative mass removal and mass removal efficiency presented in **Section 6.3**, it is clear that the bulk of the Cd and total Cr mass removal from groundwater occurred between 2006 and 2009. This is due to operational efficiencies put in place beginning in 2005 and due to the on-site soil removal in 2008 to 2009. Since the off-site recovery wells began operation in 2010, mass removal continues to increase on an annual basis due to the higher volumes being extracted, but at a relatively steady rate. The corresponding removal efficiency has remained relatively consistent for both Cd and Cr. For the on-site wells only, the mass removal per year has become asymptotic, increasing by only a relatively small amount per year. However, the removal efficiency has not been affected by the pulsing program and has remained relatively consistent since 2010.

Statistical trend analysis using EPA's diagnostic tool shows that the majority of the on-site and boundary wells exhibit no statistically significant increasing or decreasing trend in Cd and Cr concentrations. There were some exceptions to this and several wells showed an increasing trend, although concentrations have declined in recent years. In the mid-field UGA wells, no statistically significant trends in Cd concentrations were found for four wells, decreasing trends were observed at three wells, and one well exhibited an increasing trend. Total chromium in the midfield wells exhibited increasing trends in three wells, decreasing trends in three wells, and no trend in in two wells. Decreasing trends at the site and increasing trends in the mid-field suggest a diminishing plume at its source with migration and capture by the mid-field recovery wells. Similarly, detected Cd and Cr concentrations are increasing or remaining relatively consistent at the downgradient end of the plume at recovery well RW-7 and monitor well PZ-14 due to capture by RW-7.

7.2 Recommendations

7.2.1 Groundwater Monitoring Plan

As discussed in **Section 5.3**, statistical trend analysis using EPA's tool uses up to a maximum of 20 data points per well, and trends were calculated for all appropriate, recently sampled, on-site and Motor Avenue boundary wells. Because the trends are long-term and the collection of annual data will not significantly alter the ability to analyze future trends, it is recommended that the frequency of on-site and boundary well sampling remain annual, as implemented in 2014.

No changes are recommended to the sampling program for 2019. A summary of planned 2019 sampling activities is provided in **Table 1**. One annual sampling event will be conducted during the summer of 2019. A total of 33 wells (same wells sampled during 2017 minus two wells requested for sampling every five years by USEPA) are proposed for sampling: six Motor Avenue boundary wells (UGA), six on-site UGA wells, nine off-site UGA wells, two off-site MA wells, and 10 active recovery wells (seven UGA and three MA). Monitoring wells have been selected throughout the extent of Plume A based on historical data evaluation. A summary of the wells recommended for sampling is provided in **Table 1** and a summary of the proposed 2019 sampling event is provided below:

- Analytical testing will be identical to that performed in 2017 with the exception of MW-17A and MW-43A not being included in the 2019 monitoring program (see **Table 1**).
- Active recovery well monitoring frequency was reduced to annual in 2014 and will continue on an annual basis in 2019. Note that additional recovery well data are being collected on a regular basis as part of the pulse pumping program.

7.2.2 Supplemental Discharge Blending

Blending of UGA and MA flows from the GRS will continue in order to discharge as much treated water to the on-site infiltration galleries as possible, while still maintaining compliance with the SPDES permit equivalency. Discharge samples will continue to be collected in accordance with the requirements of the SPDES permit equivalency and sewer discharge permit and adjustments to the blending rate will be made accordingly.

8.0 References

Ecology and Environment Engineering, P.C. (EEEPC). 2015. *Site-wide Groundwater Monitoring Program Annual Report 2014, Liberty Industrial Finishing Site, Farmingdale, Nassau County, New York,* prepared for the Liberty Industrial Finishing Site Qualified Settlement Trust, Charlotte, North Carolina.

__________. 2014a. *Site-wide Groundwater Monitoring Program Annual Report 2013, Liberty Industrial Finishing Site, Farmingdale, Nassau County, New York,* prepared for the Liberty Industrial Finishing Site Qualified Settlement Trust, Charlotte, North Carolina.

__________. 2014b. *Pulsed Pumping for 2013 Summary, Liberty Industrial Finishing Site, Farmingdale, NY*, Memorandum from M. Gillings, EEEPC, to R. Golia, AMO Environmental Decisions, January 24, 2014.

__________. 2013. *Site-wide Groundwater Monitoring Program Annual Report 2012, Liberty Industrial Finishing Site, Farmingdale, Nassau County, New York,* prepared for the Liberty Industrial Finishing Site Qualified Settlement Trust, Charlotte, North Carolina.

__________. 2012. *Site-wide Groundwater Monitoring Program Report, Semiannual Period July to December 2011, Liberty Industrial Finishing Site, Farmingdale, Nassau County, New York,* prepared for the Liberty Industrial Finishing Site Qualified Settlement Trust, Charlotte, North Carolina.

__________. 2011a. *Site-wide Groundwater Monitoring Program Report, Semiannual Period, July to December 2010*, prepared for the Liberty Industrial Finishing Site Qualified Settlement Trust, Charlotte, North Carolina.

__________. 2011b. *Site-wide Groundwater Monitoring Program Report, Semiannual Period, January to June 2010*, prepared for the Liberty Industrial Finishing Site Qualified Settlement Trust, Charlotte, North Carolina.

__________. 2010a. *Field Sampling Plan for Remedial Program Monitoring, Liberty Industrial Finishing Site, Farmingdale, Nassau County, New York,* prepared for the Liberty Industrial Finishing Site Qualified Settlement Trust, Charlotte, North Carolina.

__________. 2010b. *Project-Specific Quality Assurance Project Plan, Groundwater Remedial Element III, Liberty Industrial Finishing Site, Farmingdale, Nassau County, New York,* prepared for the Liberty Industrial Finishing Site Qualified Settlement Trust, Charlotte, North Carolina.

__________. 2010c. *Site-wide Groundwater Monitoring Program Report, Semiannual Period, July to December2009,* prepared for the Liberty Industrial Finishing Site Qualified Settlement Trust, Charlotte, North Carolina.

__________. 2008a. *Final Engineering Design Report for the Liberty Industrial Finishing Superfund Site, Farmingdale, Nassau County, New York*, prepared for the Liberty Industrial Site Trust, Charlotte, North Carolina.

__________. 2008b. *Site-wide Groundwater Monitoring Program, Semiannual Report, January to June 2008, Liberty Industrial Finishing Site, Farmingdale, Nassau County, New York.*

New York State Department of Environmental Conservation (NYSDEC). 2014. *Record of Decision, Farmingdale Plaza Cleaners Operable Unit Number 02: On-site and Off-site Groundwater, State Superfund Project, Farmingdale, Nassau County, Site No. 130107*, prepared by the Division of Environmental Remediation, March, Albany, New York.

__________. 2013. *Final Remedial Investigation Report for the Farmingdale Plaza Cleaners Site, Operable Unit 2, Farmingdale, Nassau County, New York*, prepared by Ecology and Environment Engineering, P.C., Albany, New York.

__________. 2009. *CP-43: Groundwater Monitoring Well Decommissioning Policy.* November 2009.

__________. 1998. Ambient Water Quality Standards and Guidance Values, Division of Water, Technical and Operational Guidance Series Memorandum 1.1.1, with updates, Albany, New York.

Roy F. Weston, Inc. 1994. *Final Remedial Investigation Report for the Liberty Industrial Finishing Site, Farmingdale, New York, January 1994.*

URS Corporation (URS). 2005. *Groundwater Monitoring Report (4th Quarter 2004), Non-Time Critical Removal Action (NTCRA) Groundwater Treatment System, Liberty Industrial Finishing Site, Farmingdale, New York*, January 11, 2005, Fort Washington, Pennsylvania.

__________. 2004. *Groundwater Monitoring Report (2nd Quarter 2004), Non-Time Critical Removal Action (NTCRA) Groundwater Treatment System, Liberty Industrial Finishing Site, Farmingdale, New York*, July 30, 2004, Fort Washington, Pennsylvania.

__________. 2000. *Final Continued Remedial Investigation Report, Liberty Industrial Finishing Site, Farmingdale, New York.*

United States Environmental Protection Agency (EPA). June 2012. *Five-Year Review Report for the Liberty Industrial Finishing Site, Farmingdale, Town of Oyster Bay, Nassau County, New York*; USEPA Region II, New York, New York.

YU & Associates, Inc. 2009. *Immediate Investigation, Farmingdale Plaza Cleaners Site, Farmingdale, New York*, June 2009, Elmwood Park, New Jersey.

TABLES

Table 1

Summary of 2018 Groundwater Analytical Program
Liberty Industrial Finishing Site
Farmingdale, New York

Well ID	Chemicals Present [1]	Proposed Analytical Testing [2]	Location/Rationale
Motor Avenue Boundary Wells			
MW-38A	Cd, Cr	Cd, Cr	Upper UGA, within Plume A; no TCE/PCE exceedance in 27 events since 2003.
MW-38B	Cd	Cd, Cr, VOCs	Middle UGA, within Plume A; no current VOC exceedance but TCE remains at the cleanup level.
MW-39A	Cd, Cr	Cd, Cr	Upper UGA, within Plume A; no TCE/PCE exceedance in 16 events since 2006.
MW-39B	Cd	Cd, Cr	Middle UGA, within Plume A; no TCE/PCE exceedance in 14 events since 2007.
MW-40A	Cd, Cr	Cd, Cr	Upper UGA, within Plume A; no TCE/PCE exceedance in 11 events since 2008.
MW-40B	Cd	Cd, Cr	Middle UGA, within Plume A and B; no TCE/PCE exceedance in 6 events since 2010.
On-site Wells			
MW-2AR	Cd, Cr	Cd, Cr	Upgradient of recovery wells near center of site in upper UGA; no TCE/PCE exceedance in 6 events since 2006.
MW-2BR	Cd	Cd, Cr	Upgradient of recovery wells near center of site in middle UGA; no historic TCE/PCE exceedance
MW-5	Cd, Cr	Cd, Cr	Upgradient of recovery wells along western portion of site in upper UGA; historic TCE/PCE exceedance.
MW-7A	Cd, Cr, TCA	Cd, Cr, VOCs	In-line with recovery wells in the upper UGA; sample to replace missing wells MW-21AR and MW-42A, higher levels than adjacent well MW-7B.
MW-7B	None	Cd, Cr, VOCs	In-line with recovery wells in the UGA; provides vertical delineation for MW-7A and is within capture zone of pulse-pumping. Three clean sampling rounds since PCE, TCE, and Cd last exceeded standards in 2006.
MW-41AR	Cd, Cr	Cd, Cr	Well was last sampled in 2009 and contained Cd & Cr above standards; add well for monitoring of shallow zone on west side of plume near recovery wells; no TCE/PCE exceedance in 10 events since 2003.
Off-site Wells			
MW-9A	Cd, Cr	Cd, Cr, VOCs	Far-field well in upper UGA to monitor progress of Plume A remediation; will assist with monitoring of far-field area.
MW-9B	None	Cd, Cr, VOCs	Far-field well in lower UGA to monitor progress of Plume A remediation; no TCE/PCE exceedances since 2010 but continue to monitor VOCs in far-field area.
MW-11B	Cd	Cd, Cr, VOCs	Mid-field Plume A near Woodward Parkway School in the UGA.
MW-11C	TCE, DCE	VOCs	Mid-field well in the upper MA near Woodward Pkwy School; continue to monitor changes in TCE concentrations; never any Cd/Cr exceedances.
MW-11D	None	VOCs	Mid-field well in the upper MA near Woodward Pkwy School; continue to monitor changes in TCE concentrations; never any Cd/Cr exceedances.
MW-17A	None	Cd, Cr	Mid-field well in the upper UGA northwest of Woodward Pkwy School to monitor width of Plume A; no TCE/PCE exceedance in 6 events since 2006.

Table 1

Summary of 2018 Groundwater Analytical Program
Liberty Industrial Finishing Site
Farmingdale, New York

Well ID	Chemicals Present [1]	Proposed Analytical Testing [2]	Location/Rationale
MW-17B	Cd, Cr	Cd, Cr	Mid-field well in the lower UGA northwest of Woodward Pkwy School to monitor width of Plume A; no TCE/PCE exceedance in 6 events since 2006.
MW-25B	Cd, Cr	Cd, Cr	Mid-field lower UGA well for comparison with RW-4 and RW-5 results and monitor changes in Plume A metals; no TCE/PCE exceedances since 1998
MW-29B	Cd, Cr	Cd, Cr	Between the Site and mid-field plume area in UGA to monitor width of Plume A; no TCE/PCE exceedances since 2004.
MW-36B	None	Cd, Cr, VOCs	Far-field well in the lower UGA to monitor downgradient of Plumes A & B, near Pond A.
MW-43A	Cd, Cr, VOCs	Cd, Cr, VOCs	Upper glacial, within Plume A, no TCE/PCE detected since 2010
MW-44	Cd, Cr, VOCs	Cd, Cr, VOCs	Lower Upper Glacial Motor Avenue well, within Plume B, additional sampling requested by EPA
PZ-14	TCE, Cr	Cd, Cr, VOCs	Far-field lower UGA well to confirm results of RW-7; Cd/Cr concentrations increasing.
Recovery Wells			
RW-1	Cd	Cd, Cr, VOCs, others	On-site UGA
RW-2	Cd, Cr	Cd, Cr, VOCs, others	On-site UGA
RW-3A	Cd, Cr	Cd, Cr, VOCs, others	On-site UGA
RW-4	Cd, TCE	Cd, Cr, VOCs, others	Mid-field plume UGA
RW-5	Cd, Cr	Cd, Cr, VOCs, others	Mid-field plume UGA
RW-6	Cr	Cd, Cr, VOCs, others	Mid-field plume UGA
RW-7	None	Cd, Cr, VOCs, others	Far-field plume UGA
RW-8	TCE	Cd, Cr, VOCs, others	Mid-field plume MA
RW-9	None	Cd, Cr, VOCs, others	Mid-field plume MA
RW-10	None	Cd, Cr, VOCs, others	Mid-field plume MA

Notes:
1. Chemicals present above NYSDEC Class GA groundwater standards in most recent sampling round.
2. SW 846 methods were used for monitoring wells; 40CFR136 EPA methods were used for recovery wells in accordance with permit requirements. "Others" refers to other permit requirement for discharge sampling that were applied to recovery well "influent" samples.

Explanation:
1. Cd - cadmium.
2. Cr - chromium.
3. Cr6+ - hexavalent chromium.
4. 1,2-DCE - cis- and/or trans-1,2-dichloroethene.
5. UGA - Upper Glacial Aquifer.
6. TCE - trichloroethene.
7. PCE - perchloroethene.
8. VOC - volatile organic compound.
9. MA - Magothy Aquifer.
10. Orange shading indicates wells that were added to the monitoring program for 2017 at the request of USEPA and will be sampled every 5-years.
11. Blue shading indicates wells that were added to the monitoring program for 2017 at the request of USEPA and will be sampled annually.

Table 2

Summary of Depth to Water Measurements and Groundwater Elevations
July 9, 2018
Liberty Industrial Finishing Site
Farmingdale, New York

Well Id	Top of Inner Casing Elevation (feet above mean seal level)	Well Depth (feet below ground surface)	Depth to Groundwater (feet below to of inner casing)	Groundwater Elevation (feet above mean sea level)
MW-01AR	66.78	31.70	NM	NM
MW-02AR	63.76	29.20	17.41	46.35
MW-02BR	63.82	58.20	17.45	46.37
MW-03	68.61	29.00	21.58	47.03
MW-05	68.22	28.50	20.96	47.26
MW-06D	66.59	~137.6	NM	NM
MW-07A	66.26	27.90	20.19	46.07
MW-07B	65.62	61.90	19.64	45.98
MW-09A	40.40	13.50	3.69	36.71
MW-09B	40.42	49.80	3.70	36.72
MW-09C	40.69	100.30	5.38	35.31
MW-09D	40.43	163.50	5.67	34.76
MW-10A	33.03	12.40	NM	NM
MW-10B	32.93	39.50	NM	NM
MW-10C	32.60	96.00	NM	NM
MW-11A	50.16	9.80	8.95	41.21
MW-11B	50.12	73.50	10.67	39.45
MW-11C	50.06	119.80	10.42	39.64
MW-11D	50.19	179.40	8.95	41.24
MW-11E	50.18	220.10	10.81	39.37
MW-13	60.75	23.20	NM	NM
MW-14	60.80	24.00	16.35	44.45
MW-15	53.92	18.40	10.36	43.56
MW-16	56.48	27.00	20.62	35.86
MW-17A	51.40	22.60	9.65	41.75
MW-17B	51.21	54.30	9.51	41.70
MW-19	47.44	22.30	13.43	34.01
MW-21AR	64.21	30.60	NM	NM
MW-22A	68.29	28.70	20.41	47.88
MW-22B	67.67	49.30	19.77	47.90
MW-23B	34.88	59.40	6.40	28.48
MW-24B	43.95	60.30	NM	NM
MW-24C	44.03	142.00	NM	NM
MW-25B	44.31	47.20	6.33	37.98
MW-25C	45.42	114.20	7.66	37.76
MW-26C	50.44	95.50	10.24	40.20
MW-27C	61.00	118.50	16.64	44.36
MW-28B	56.21	55.70	13.96	42.25
MW-28C	56.06	121.80	14.43	41.63
MW-28D	56.41	180.50	14.70	41.71

Table 2

Summary of Depth to Water Measurements and Groundwater Elevations
July 9, 2018
Liberty Industrial Finishing Site
Farmingdale, New York

Well Id	Top of Inner Casing Elevation (feet above mean seal level)	Well Depth (feet below ground surface)	Depth to Groundwater (feet below to of inner casing)	Groundwater Elevation (feet above mean sea level)
MW-29B	60.47	50.90	16.55	43.92
MW-29D	60.64	188.40	17.55	43.09
MW-30C	60.81	110.90	18.85	41.96
MW-30D	60.75	177.10	15.96	44.79
MW-31B	53.48	61.90	13.44	40.04
MW-31C	53.44	119.80	14.95	38.49
MW-31D	53.30	189.50	15.21	38.09
MW-32B	50.03	59.50	13.22	36.81
MW-32C	49.92	111.40	14.69	35.23
MW-34B	63.14	45.10	16.81	46.33
MW-36A	37.57	15.00	4.47	33.10
MW-36B	37.40	49.50	4.45	32.95
MW-37C	55.26	118.80	13.11	42.15
MW-37D	50.35	176.50	13.73	36.62
MW-38A	62.37	29.40	16.98	45.39
MW-38B	62.26	57.70	16.88	45.38
MW-39A	63.08	29.60	17.55	45.53
MW-39B	62.85	58.30	17.23	45.62
MW-40A	63.14	30.00	17.45	45.69
MW-40B	63.36	57.10	NM	NM
MW-41AR	63.04	29.90	17.51	45.53
MW-42A	64.11	28.90	NM	NM
MW-43A	62.20	29.50	16.81	45.39
MW-44A	63.31	29.40	17.78	45.53
MW-45D	58.56	172.10	17.60	40.96
MW-46C	54.45	149.70	15.94	38.51
MW-46D	54.39	195.30	14.22	40.17
MW-47C	56.64	151.40	NM	NM
MW-48C	56.04	124.60	12.69	43.35
PZ-11A	49.71	48.00	10.31	39.40
PZ-11B	50.21	121.00	12.76	37.45
PZ-12	48.06	55.00	9.15	38.91
PZ-13	46.10	60.00	7.58	38.52
PZ-14	36.47	60.00	2.52	33.95
PZ-15	64.78	29.50	NM	NM
PZ-16	64.84	28.80	NM	NM
PZ-17	64.67	31.00	NM	NM
PZ-18	64.46	30.60	NM	NM
RW-01	65.61	40.00	NM	NM
RW-02	66.71	40.00	NM	NM

Table 2

Summary of Depth to Water Measurements and Groundwater Elevations
July 9, 2018
Liberty Industrial Finishing Site
Farmingdale, New York

Well Id	Top of Inner Casing Elevation (feet above mean seal level)	Well Depth (feet below ground surface)	Depth to Groundwater (feet below to of inner casing)	Groundwater Elevation (feet above mean sea level)
RW-03	67.26	40.00	NM	NM
RW-03A	63.50	51.00	18.40	45.10
RW-04	42.88	71.50	NM	NM
RW-05	44.32	57.00	NM	NM
RW-06	45.92	64.50	NM	NM
RW-07	36.59	60.00	NM	NM
RW-08	43.47	156.00	NM	NM
RW-09	44.69	185.00	NM	NM
RW-10	45.00	155.00	NM	NM
EPA-MW-14B	62.63	119.00	16.44	46.19

Explanation:
NM - not measured due to accessibility issues.

Table 3

Summary of Final Field Parameter Measurements
2018 Annual Groundwater Monitoring Event
Liberty Industrial Finishing Superfund Site
Farmingdale, New York

Well ID	Sample Date	pH (S.U.)	Temperature (^{o}C)	ORP (mV)	Specific Conductivity (µS/cm)	DO (mg/L)	Turbidity (NTU)
MW-02AR	7/11/2018	6.04	13.16	240	299	0.02	8.50
MW-02BR	7/11/2018	5.39	15.76	280	284	0.01	167.30
MW-05	7/11/2018	6.12	13.90	222	292	0.03	8.80
MW-07A	7/12/2018	6.55	14.91	226	750	0.04	5.40
MW-07B	7/12/2018	5.74	15.70	249	415	0.00	6.50
MW-09A	7/11/2018	5.77	15.40	222	243	0.12	23.20
MW-09B	7/11/2018	5.64	14.04	219	627	0.34	41.30
MW-11B	7/10/2018	6.12	16.14	11	400	0.00	10.60
MW-11C	7/10/2018	5.15	16.34	136	315	0.02	62.30
MW-11D	7/10/2018	5.82	16.56	-90	214	0.01	13.20
MW-17B	7/11/2018	5.79	16.14	272	322	0.09	24.80
MW-25B	7/10/2018	6.00	14.16	207	888	0.97	16.40
MW-29B	7/11/2018	5.99	15.68	259	490	0.03	2.70
MW-36B	7/11/2018	6.08	14.67	245	244	0.04	7.90
MW-38A	7/10/2018	6.00	12.57	230	373	0.07	5.00
MW-38B	7/10/2018	5.58	14.60	-92	286	0.02	88.40
MW-39A	7/10/2018	5.85	14.96	241	445	0.05	40.80
MW-39B	7/10/2018	5.58	15.39	221	289	0.03	40.10
MW-40A	7/10/2018	6.07	13..86	224	575	0.25	42.60
MW-40B	NA	NA	NA	NA	NA	NA	NA
MW-41AR	7/10/2018	5.85	13.64	199	382	4.88	29.40
MW-44A	7/10/2018	6.35	14.72	209	364	0.20	33.20
PZ-14	7/11/2018	5.63	13.77	252	424	0.56	24.90
RW-01	7/12/2018	NM	NM	NM	NM	NM	NM
RW-02	7/12/2018	NM	NM	NM	NM	NM	NM
RW-03A	7/12/2018	NM	NM	NM	NM	NM	NM
RW-04	7/12/2018	NM	NM	NM	NM	NM	NM
RW-05	7/12/2018	NM	NM	NM	NM	NM	NM
RW-06	7/12/2018	NM	NM	NM	NM	NM	NM
RW-07	7/12/2018	NM	NM	NM	NM	NM	NM
RW-08	7/12/2018	NM	NM	NM	NM	NM	NM
RW-09	7/12/2018	NM	NM	NM	NM	NM	NM
RW-10	7/12/2018	NM	NM	NM	NM	NM	NM

Explanation:
1. S.U. - standard units.
2. ^{o}C - degrees Celsius.
3. ORP - oxidation reduction potential.
4. mV - millivolts.
5. µS/cm - microsiemens per centimeter.
6. DO - dissolved oxygen.
7. mg/L - milligrams per liter.
8. NTU - nephelometric turbidity units.
9. NA - not accessible due to damaged manhole bolt.
10. NM - not measured.

Table 4

Summary of Groundwater Analytical Results
2018 Annual Sampling Event
Liberty Industrial Finishing Site
Farmingdale, New York

	NYSDEC Groundwater Criteria	Client ID	MW11B		MW11C		MW11D		MW17B		MW25B		MW29B		MW2AR		MW2BR		MW36B	
		Lab Sample ID	460-160235-10		460-160235-9		460-160235-8		460-160472-6		460-160518-19		460-160472-7		460-160518-1		460-160472-10		460-160472-5	
		Sample Date	7/10/2018		7/10/2018		7/10/2018		7/11/2018		7/10/2018		7/11/2018		7/11/2018		7/11/2018		7/11/2018	
Analytical Constituent		Units	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
1,1,1-Trichloroethane	5	ug/L	0.24	U	0.24	U	0.24	U	NA		NA		NA		NA		NA		0.24	U
1,1,2,2-Tetrachloroethane	5	ug/L	0.37	U *	0.37	U *	0.37	U *	NA		NA		NA		NA		NA		0.37	U
1,1,2-Trichloro-1,2,2-trifluoroethane	5	ug/L	0.31	U	0.31	U	0.31	U	NA		NA		NA		NA		NA		0.31	U
1,1,2-Trichloroethane	1	ug/L	0.43	U	0.66	J	0.43	U	NA		NA		NA		NA		NA		0.43	U
1,1-Dichloroethane	5	ug/L	0.69	J	2.4		0.53	J	NA		NA		NA		NA		NA		0.26	U
1,1-Dichloroethene	5	ug/L	0.12	U	1.7		0.12	U	NA		NA		NA		NA		NA		0.12	U
1,2,3-Trichlorobenzene	5	ug/L	0.36	U	0.36	U	0.36	U	NA		NA		NA		NA		NA		0.36	U
1,2,4-Trichlorobenzene	5	ug/L	0.37	U	0.37	U	0.37	U	NA		NA		NA		NA		NA		0.37	U
1,2-Dibromo-3-Chloropropane	0.04	ug/L	0.38	U	0.38	U	0.38	U	NA		NA		NA		NA		NA		0.38	U
1,2-Dibromoethane	0.0006	ug/L	0.5	U	0.5	U	0.5	U	NA		NA		NA		NA		NA		0.5	U
1,2-Dichlorobenzene	3	ug/L	0.43	U	0.43	U	0.43	U	NA		NA		NA		NA		NA		0.43	U
1,2-Dichloroethane	0.6	ug/L	0.43	U	0.51	J	0.43	U	NA		NA		NA		NA		NA		0.43	U
1,2-Dichloropropane	1	ug/L	0.35	U	0.35	U	0.72	J	NA		NA		NA		NA		NA		0.35	U
1,3-Dichlorobenzene	3	ug/L	0.34	U	0.34	U	0.34	U	NA		NA		NA		NA		NA		0.34	U
1,4-Dichlorobenzene	3	ug/L	0.76	U	0.76	U	0.76	U	NA		NA		NA		NA		NA		0.76	U
1,4-Dioxane	NE	ug/L	28	U	28	U *	28	U *	NA		NA		NA		NA		NA		28	U *
2-Butanone (MEK)	50	ug/L	1.9	U	1.9	U	1.9	U	NA		NA		NA		NA		NA		1.9	U
2-Hexanone	50	ug/L	2.9	U	2.9	U	2.9	U	NA		NA		NA		NA		NA		2.9	U
4-Methyl-2-pentanone	NE	ug/L	2.7	U	2.7	U	2.7	U	NA		NA		NA		NA		NA		2.7	U
Acetone	50	ug/L	5	U	5	U	5	U	NA		NA		NA		NA		NA		5	U
Benzene	1	ug/L	0.43	U	0.43	U	0.43	U	NA		NA		NA		NA		NA		0.43	U
Bromoform	50	ug/L	0.54	U	0.54	U	0.54	U	NA		NA		NA		NA		NA		0.54	U
Bromomethane	5	ug/L	1	U	1	U	1	U	NA		NA		NA		NA		NA		1	U
Cadmium	5	ug/L	**18.2**		NA		NA		**45.3**		**35**		**26.8**		**22.2**		**17.9**		0.22	U
Carbon disulfide	60	ug/L	0.16	U	0.16	U	0.16	U	NA		NA		NA		NA		NA		0.16	U
Carbon tetrachloride	5	ug/L	0.21	U	0.21	U	0.21	U	NA		NA		NA		NA		NA		0.21	U
Chlorobenzene	5	ug/L	0.5	J	0.38	U	0.38	U	NA		NA		NA		NA		NA		0.38	U
Chlorobromomethane	NE	ug/L	0.41	U	0.41	U	0.41	U	NA		NA		NA		NA		NA		0.41	U
Chloroethane	5	ug/L	0.32	U	0.32	U	0.32	U	NA		NA		NA		NA		NA		0.32	U
Chloroform	7	ug/L	0.33	U	0.33	U	0.33	U	NA		NA		NA		NA		NA		3.4	
Chloromethane	NE	ug/L	0.14	U	0.14	U	0.14	U	NA		NA		NA		NA		NA		0.14	U
Chromium	50	ug/L	7.7	J	NA		NA		**244**		**64.6**		**212**		**78.8**		**230**		5.7	J
cis-1,2-Dichloroethene	5	ug/L	2.8		**8.8**		0.22	U	NA		NA		NA		NA		NA		0.22	U
cis-1,3-Dichloropropene	0.4	ug/L	0.46	U	0.46	U	0.46	U	NA		NA		NA		NA		NA		0.46	U
Cobalt	NE	ug/L	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Copper	200	ug/L	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Cyclohexane	NE	ug/L	0.32	U	0.32	U	0.32	U	NA		NA		NA		NA		NA		0.32	U
Dibromochloromethane	50	ug/L	0.28	U	0.28	U	0.28	U	NA		NA		NA		NA		NA		0.28	U
Dichlorobromomethane	50	ug/L	0.34	U	0.34	U	0.34	U	NA		NA		NA		NA		NA		0.34	U
Dichlorodifluoromethane	5	ug/L	0.12	U	0.12	U	1		NA		NA		NA		NA		NA		0.12	U *
Ethylbenzene	5	ug/L	0.3	U	0.3	U	0.3	U	NA		NA		NA		NA		NA		0.3	U
Iron, Dissolved	300	ug/L	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Isopropylbenzene	5	ug/L	0.34	U	0.34	U	0.34	U	NA		NA		NA		NA		NA		0.34	U

Table 4

Summary of Groundwater Analytical Results
2018 Annual Sampling Event
Liberty Industrial Finishing Site
Farmingdale, New York

	NYSDEC Groundwater Criteria	Client ID	MW11B		MW11C		MW11D		MW17B		MW25B		MW29B		MW2AR		MW2BR		MW36B	
		Lab Sample ID	460-160235-10		460-160235-9		460-160235-8		460-160472-6		460-160518-19		460-160472-7		460-160518-1		460-160472-10		460-160472-5	
		Sample Date	7/10/2018		7/10/2018		7/10/2018		7/11/2018		7/10/2018		7/11/2018		7/11/2018		7/11/2018		7/11/2018	
Analytical Constituent		Units	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Lead	25	ug/L	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Magnesium	35,000	ug/L	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Manganese	300	ug/L	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Methyl acetate	NE	ug/L	0.31	U	0.31	U *	0.31	U *	NA		NA		NA		NA		NA		0.31	U
Methyl tert-butyl ether	10	ug/L	1.2		1.4		0.47	U	NA		NA		NA		NA		NA		0.47	U
Methylcyclohexane	NE	ug/L	0.26	U	0.26	U	0.26	U	NA		NA		NA		NA		NA		0.26	U
Methylene Chloride	5	ug/L	0.32	U	0.32	U	0.32	U	NA		NA		NA		NA		NA		0.32	U
m-Xylene & p-Xylene	5	ug/L	0.3	U	0.3	U	0.3	U	NA		NA		NA		NA		NA		0.3	U
Nickel	100	ug/L	NA		NA		NA		NA		NA		NA		NA		NA		NA	
o-Xylene	5	ug/L	0.36	U	0.36	U	0.36	U	NA		NA		NA		NA		NA		0.36	U
Sodium	20,000	ug/L	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Styrene	5	ug/L	0.42	U	0.42	U	0.42	U	NA		NA		NA		NA		NA		0.42	U
Sulfate	NE	mg/L	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Tetrachloroethene	5	ug/L	0.25	U	0.25	U	0.25	U	NA		NA		NA		NA		NA		0.25	U
Toluene	5	ug/L	0.38	U	0.38	U	0.38	U	NA		NA		NA		NA		NA		0.38	U
trans-1,2-Dichloroethene	5	ug/L	0.24	U	0.24	U	0.24	U	NA		NA		NA		NA		NA		0.24	U
trans-1,3-Dichloropropene	0.4	ug/L	0.49	U	0.49	U	0.49	U	NA		NA		NA		NA		NA		0.49	U
Trichloroethene	5	ug/L	0.65	J	**83**		0.31	U	NA		NA		NA		NA		NA		0.31	U
Trichlorofluoromethane	5	ug/L	0.14	U	0.14	U	0.14	U	NA		NA		NA		NA		NA		0.14	U
Vinyl chloride	2	ug/L	0.27	J	0.58	J	0.17	U	NA		NA		NA		NA		NA		0.17	U
Zinc	2,000	ug/L	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Total Detected VOC Compounds	NE	ug/L	6.11		99.05		2.25		NA		NA		NA		NA		NA		3.4	

1. ug/L - micrograms per liter.
2. mg/L - milligrams per liter.
3. NE - no groundwater criteria established by NYSDEC.
4. NA - not analyzed for this constituent.
5. U - not detected at a concentration greater than the laboratory reporting limit.
6. J - analyte was detected at a concentration greater than the method detection limit but less than the reporting limit. Reported concentration is an estimate.
7. * - indicates that the lab control sample or lab control sample duplicate is outside acceptance limits.
8. Orange shaded cells indicate that the analyte was detected at a concentration greater than the NYSDEC Class GA groundwater Standard.
9. All groundwater samples were analyzed by TestAmerica Laboratories of Edison, New Jersey.

Table 4

Summary of Groundwater Analytical Results
2018 Annual Sampling Event
Liberty Industrial Finishing Site
Farmingdale, New York

	NYSDEC Groundwater Criteria	Client ID	MW38A		MW38B		MW39A		MW39B		MW40A		MW41AR		MW44A		MW05		MW07A	
		Lab Sample ID	460-160235-2		460-160235-3		460-160235-5		460-160235-4		460-160235-6		460-160235-1		460-160235-7		460-160518-2		460-160518-15	
		Sample Date	7/10/2018		7/10/2018		7/10/2018		7/10/2018		7/10/2018		7/10/2018		7/10/2018		7/11/2018		7/12/2018	
Analytical Constituent		Units	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
1,1,1-Trichloroethane	5	ug/L	NA		0.24	U	NA		NA		NA		NA		0.24	U	NA		**13**	
1,1,2,2-Tetrachloroethane	5	ug/L	NA		0.37	U	NA		NA		NA		NA		0.37	U	NA		0.37	U
1,1,2-Trichloro-1,2,2-trifluoroethane	5	ug/L	NA		0.31	U	NA		NA		NA		NA		0.31	U	NA		0.31	U
1,1,2-Trichloroethane	1	ug/L	NA		0.43	U	NA		NA		NA		NA		0.43	U	NA		0.43	U
1,1-Dichloroethane	5	ug/L	NA		0.6	J	NA		NA		NA		NA		0.26	U	NA		1.3	
1,1-Dichloroethene	5	ug/L	NA		0.12	U	NA		NA		NA		NA		0.12	U	NA		0.12	U
1,2,3-Trichlorobenzene	5	ug/L	NA		0.36	U	NA		NA		NA		NA		0.36	U	NA		0.36	U
1,2,4-Trichlorobenzene	5	ug/L	NA		0.37	U	NA		NA		NA		NA		0.37	U	NA		0.37	U
1,2-Dibromo-3-Chloropropane	0.04	ug/L	NA		0.38	U	NA		NA		NA		NA		0.38	U	NA		0.38	U
1,2-Dibromoethane	0.0006	ug/L	NA		0.5	U	NA		NA		NA		NA		0.5	U	NA		0.5	U
1,2-Dichlorobenzene	3	ug/L	NA		0.43	U	NA		NA		NA		NA		0.43	U	NA		0.43	U
1,2-Dichloroethane	0.6	ug/L	NA		0.43	U	NA		NA		NA		NA		0.43	U	NA		0.43	U
1,2-Dichloropropane	1	ug/L	NA		0.35	U	NA		NA		NA		NA		0.35	U	NA		0.35	U
1,3-Dichlorobenzene	3	ug/L	NA		0.34	U	NA		NA		NA		NA		0.34	U	NA		0.34	U
1,4-Dichlorobenzene	3	ug/L	NA		0.76	U	NA		NA		NA		NA		0.76	U	NA		0.76	U
1,4-Dioxane	NE	ug/L	NA		28	U *	NA		NA		NA		NA		28	U *	NA		28	U
2-Butanone (MEK)	50	ug/L	NA		1.9	U	NA		NA		NA		NA		1.9	U	NA		1.9	U
2-Hexanone	50	ug/L	NA		2.9	U	NA		NA		NA		NA		2.9	U	NA		2.9	U
4-Methyl-2-pentanone	NE	ug/L	NA		2.7	U	NA		NA		NA		NA		2.7	U	NA		2.7	U
Acetone	50	ug/L	NA		5	U	NA		NA		NA		NA		5	U	NA		5.7	
Benzene	1	ug/L	NA		0.43	U	NA		NA		NA		NA		0.43	U	NA		0.43	U
Bromoform	50	ug/L	NA		0.54	U	NA		NA		NA		NA		0.54	U	NA		0.54	U
Bromomethane	5	ug/L	NA		1	U	NA		NA		NA		NA		1	U	NA		1	U
Cadmium	5	ug/L	**45.5**		**22.4**		**221**		**28.7**		**13**		**16.2**		2.5	J	**8.8**		**18.1**	
Carbon disulfide	60	ug/L	NA		0.16	U	NA		NA		NA		NA		0.16	U	NA		0.16	U
Carbon tetrachloride	5	ug/L	NA		0.21	U	NA		NA		NA		NA		0.21	U	NA		0.21	U
Chlorobenzene	5	ug/L	NA		0.38	U	NA		NA		NA		NA		0.38	U	NA		0.38	U
Chlorobromomethane	NE	ug/L	NA		0.41	U	NA		NA		NA		NA		0.41	U	NA		0.41	U
Chloroethane	5	ug/L	NA		0.32	U	NA		NA		NA		NA		0.32	U	NA		0.32	U
Chloroform	7	ug/L	NA		0.33	U	NA		NA		NA		NA		0.33	U	NA		0.33	J
Chloromethane	NE	ug/L	NA		0.14	U	NA		NA		NA		NA		0.14	U	NA		0.14	U
Chromium	50	ug/L	**90.7**		**908**		**311**		13.7		**176**		**113**		7.5	J	**81.9**		49.6	
cis-1,2-Dichloroethene	5	ug/L	NA		0.64	J	NA		NA		NA		NA		0.22	U	NA		4.7	
cis-1,3-Dichloropropene	0.4	ug/L	NA		0.46	U	NA		NA		NA		NA		0.46	U	NA		0.46	U
Cobalt	NE	ug/L	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Copper	200	ug/L	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Cyclohexane	NE	ug/L	NA		0.32	U	NA		NA		NA		NA		0.32	U	NA		0.32	U
Dibromochloromethane	50	ug/L	NA		0.28	U	NA		NA		NA		NA		0.28	U	NA		0.28	U
Dichlorobromomethane	50	ug/L	NA		0.34	U	NA		NA		NA		NA		0.34	U	NA		0.34	U
Dichlorodifluoromethane	5	ug/L	NA		0.12	U *	NA		NA		NA		NA		0.12	U *	NA		0.12	U
Ethylbenzene	5	ug/L	NA		0.3	U	NA		NA		NA		NA		0.3	U	NA		0.3	U
Iron, Dissolved	300	ug/L	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Isopropylbenzene	5	ug/L	NA		0.34	U	NA		NA		NA		NA		0.34	U	NA		0.34	U

Table 4

Summary of Groundwater Analytical Results
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Liberty Industrial Finishing Site
Farmingdale, New York

	NYSDEC Groundwater Criteria	Client ID	MW38A		MW38B		MW39A		MW39B		MW40A		MW41AR		MW44A		MW05		MW07A	
		Lab Sample ID	460-160235-2		460-160235-3		460-160235-5		460-160235-4		460-160235-6		460-160235-1		460-160235-7		460-160518-2		460-160518-15	
		Sample Date	7/10/2018		7/10/2018		7/10/2018		7/10/2018		7/10/2018		7/10/2018		7/10/2018		7/11/2018		7/12/2018	
Analytical Constituent		Units	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Lead	25	ug/L	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Magnesium	35,000	ug/L	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Manganese	300	ug/L	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Methyl acetate	NE	ug/L	NA		0.31	U	NA		NA		NA		NA		0.31	U	NA		0.31	U
Methyl tert-butyl ether	10	ug/L	NA		1.2		NA		NA		NA		NA		0.47	U	NA		0.47	U
Methylcyclohexane	NE	ug/L	NA		0.26	U	NA		NA		NA		NA		0.26	U	NA		0.26	U
Methylene Chloride	5	ug/L	NA		0.32	U	NA		NA		NA		NA		0.32	U	NA		0.32	U
m-Xylene & p-Xylene	5	ug/L	NA		0.3	U	NA		NA		NA		NA		0.3	U	NA		0.3	U
Nickel	100	ug/L	NA		NA		NA		NA		NA		NA		NA		NA		NA	
o-Xylene	5	ug/L	NA		0.36	U	NA		NA		NA		NA		0.36	U	NA		0.36	U
Sodium	20,000	ug/L	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Styrene	5	ug/L	NA		0.42	U	NA		NA		NA		NA		0.42	U	NA		0.42	U
Sulfate	NE	mg/L	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Tetrachloroethene	5	ug/L	NA		0.73	J	NA		NA		NA		NA		0.25	U	NA		0.48	J
Toluene	5	ug/L	NA		0.38	U	NA		NA		NA		NA		0.38	U	NA		0.38	U
trans-1,2-Dichloroethene	5	ug/L	NA		0.24	U	NA		NA		NA		NA		0.24	U	NA		0.24	U
trans-1,3-Dichloropropene	0.4	ug/L	NA		0.49	U	NA		NA		NA		NA		0.49	U	NA		0.49	U
Trichloroethene	5	ug/L	NA		4		NA		NA		NA		NA		0.31	U	NA		1.2	
Trichlorofluoromethane	5	ug/L	NA		0.14	U	NA		NA		NA		NA		0.14	U	NA		0.14	U
Vinyl chloride	2	ug/L	NA		0.17	U	NA		NA		NA		NA		0.17	U	NA		0.17	U
Zinc	2,000	ug/L	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Total Detected VOC Compounds	NE	ug/L	NA		7.17		NA		NA		NA		NA		0	U	NA		26.71	

1. ug/L - micrograms per liter.
2. mg/L - milligrams per liter.
3. NE - no groundwater criteria established by NYSDEC.
4. NA - not analyzed for this constituent.
5. U - not detected at a concentration greater than the laboratory reporting limit.
6. J - analyte was detected at a concentration greater than the method detection limit but less than the reporting limit. Reported concentration is an estimate.
7. * - indicates that the lab control sample or lab control sample duplicate is outside acceptance limits.
8. Orange shaded cells indicate that the analyte was detected at a concentration greater than the NYSDEC Class GA groundwater Standard.
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Liberty Industrial Finishing Site
Farmingdale, New York

	NYSDEC Groundwater Criteria	Client ID	MW07B		MW09A		MW09B		PZ14		RW01		DUP180712B		RW10		RW02		DUP180712A	
		Lab Sample ID	460-160518-16		460-160472-2		460-160472-3		460-160472-4		460-160518-3		460-160518-14		460-160518-12		460-160518-4		460-160518-13	
		Sample Date	7/12/2018		7/11/2018		7/11/2018		7/11/2018		7/12/2018		7/12/2018		7/12/2018		7/12/2018		7/12/2018	
Analytical Constituent		Units	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
1,1,1-Trichloroethane	5	ug/L	0.24	U	0.24	U	0.24	U	0.24	U	0.24	U	0.24	U	0.24	U	0.24	U	0.24	U
1,1,2,2-Tetrachloroethane	5	ug/L	0.37	U	0.37	U	0.37	U	0.37	U	0.37	U	0.37	U	0.37	U	0.37	U	0.37	U
1,1,2-Trichloro-1,2,2-trifluoroethane	5	ug/L	0.31	U	0.31	U	0.31	U	0.31	U	0.31	U	0.31	U	0.31	U	0.31	U	0.31	U
1,1,2-Trichloroethane	1	ug/L	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U
1,1-Dichloroethane	5	ug/L	0.3	J	0.26	U	0.26	U	0.26	U	0.69	J	1.2		1.3		0.26	U	0.66	J
1,1-Dichloroethene	5	ug/L	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U
1,2,3-Trichlorobenzene	5	ug/L	0.36	U	0.36	U	0.36	U	0.36	U	0.36	U	0.36	U	0.36	U	0.36	U	0.36	U
1,2,4-Trichlorobenzene	5	ug/L	0.37	U	0.37	U	0.37	U	0.37	U	0.37	U	0.37	U	0.37	U	0.37	U	0.37	U
1,2-Dibromo-3-Chloropropane	0.04	ug/L	0.38	U	0.38	U	0.38	U	0.38	U	0.38	U	0.38	U	0.38	U	0.38	U	0.38	U
1,2-Dibromoethane	0.0006	ug/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,2-Dichlorobenzene	3	ug/L	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U
1,2-Dichloroethane	0.6	ug/L	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.51	J	0.43	U	0.43	U
1,2-Dichloropropane	1	ug/L	0.35	U	0.35	U	0.35	U	0.35	U	0.35	U	0.35	U	0.35	U	0.35	U	0.35	U
1,3-Dichlorobenzene	3	ug/L	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U
1,4-Dichlorobenzene	3	ug/L	0.76	U	0.76	U	0.76	U	0.76	U	0.76	U	0.76	U	0.76	U	0.76	U	0.76	U
1,4-Dioxane	NE	ug/L	28	U	28	U *	28	U *	28	U *	28	U	28	U	28	U	28	U	28	U
2-Butanone (MEK)	50	ug/L	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U
2-Hexanone	50	ug/L	2.9	U	2.9	U	2.9	U	2.9	U	2.9	U	2.9	U	2.9	U	2.9	U	2.9	U
4-Methyl-2-pentanone	NE	ug/L	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U
Acetone	50	ug/L	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
Benzene	1	ug/L	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U
Bromoform	50	ug/L	0.54	U	0.54	U	0.54	U	0.54	U	0.54	U	0.54	U	0.54	U	0.54	U	0.54	U
Bromomethane	5	ug/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Cadmium	5	ug/L	4.2		**6.7**		**27.6**		**16.8**		**22.3**		2.1	U	2.1	U	**200**		**21.7**	
Carbon disulfide	60	ug/L	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.26	J	0.16	U
Carbon tetrachloride	5	ug/L	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U
Chlorobenzene	5	ug/L	0.38	U	0.38	U	0.38	U	0.38	U	0.38	U	0.38	U	0.38	U	0.38	U	0.38	U
Chlorobromomethane	NE	ug/L	0.41	U	0.41	U	0.41	U	0.41	U	NA		NA		NA		NA		NA	
Chloroethane	5	ug/L	0.32	U	0.32	U	0.32	U	0.32	U	0.32	U	0.32	U	0.32	U	0.32	U	0.32	U
Chloroform	7	ug/L	0.33	U	0.33	U	0.33	U	0.33	U	0.33	U	0.33	U	0.33	U	0.33	U	0.33	U
Chloromethane	NE	ug/L	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Chromium	50	ug/L	16.1		**103**		**342**		**101**		**114**		5.9	U	5.9	U	10.8		**109**	
cis-1,2-Dichloroethene	5	ug/L	0.29	J	0.22	U	0.22	U	0.22	U	0.69	J	1.4		1.5		0.27	J	0.61	J
cis-1,3-Dichloropropene	0.4	ug/L	0.46	U	0.46	U	0.46	U	0.46	U	0.46	U	0.46	U	0.46	U	0.46	U	0.46	U
Cobalt	NE	ug/L	NA		NA		NA		NA		5.5	U	5.5	U	5.5	U	7.3	J	5.5	U
Copper	200	ug/L	NA		NA		NA		NA		15.4	J	5.5	U	5.5	U	5.8	J	16.4	J
Cyclohexane	NE	ug/L	0.32	U	0.32	U	0.32	U	0.32	U	0.32	U *	0.32	U	0.32	U	0.32	U	0.32	U
Dibromochloromethane	50	ug/L	0.28	U	0.28	U	0.28	U	0.28	U	0.28	U	0.28	U	0.28	U	0.28	U	0.28	U
Dichlorobromomethane	50	ug/L	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U
Dichlorodifluoromethane	5	ug/L	0.12	U	0.12	U *	0.12	U *	0.12	U *	0.24	J	1.3		1.7		0.12	U	0.27	J
Ethylbenzene	5	ug/L	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U
Iron, Dissolved	300	ug/L	NA		NA		NA		NA		111	U	**4,150**		**4,080**		**32,100**		111	U
Isopropylbenzene	5	ug/L	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U

Table 4

Summary of Groundwater Analytical Results
2018 Annual Sampling Event
Liberty Industrial Finishing Site
Farmingdale, New York

	NYSDEC Groundwater Criteria	Client ID	MW07B		MW09A		MW09B		PZ14		RW01		DUP180712B		RW10		RW02		DUP180712A	
		Lab Sample ID	460-160518-16		460-160472-2		460-160472-3		460-160472-4		460-160518-3		460-160518-14		460-160518-12		460-160518-4		460-160518-13	
		Sample Date	7/12/2018		7/11/2018		7/11/2018		7/11/2018		7/12/2018		7/12/2018		7/12/2018		7/12/2018		7/12/2018	
Analytical Constituent		Units	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Lead	25	ug/L	NA		NA		NA		NA		3.8	U	3.8	U	3.8	U	4.8	J	3.8	U
Magnesium	35,000	ug/L	NA		NA		NA		NA		7,670		5,880		5,920		8,430		7,440	
Manganese	300	ug/L	NA		NA		NA		NA		67.2		284		287		**28,000**		64.9	
Methyl acetate	NE	ug/L	0.31	U	0.31	U	0.31	U	0.31	U	0.31	U *	0.31	U *	0.31	U *	0.31	U *	0.31	U *
Methyl tert-butyl ether	10	ug/L	0.47	U	0.47	U	0.47	U	0.47	U	1.2		1		1.1		0.47	U	1	
Methylcyclohexane	NE	ug/L	0.26	U	0.26	U	0.26	U	0.26	U	0.26	U	0.26	U	0.26	U	0.26	U	0.26	U
Methylene Chloride	5	ug/L	0.32	U	0.32	U	0.32	U	0.32	U	0.32	J	0.32	U	0.32	U	0.32	U	0.32	U
m-Xylene & p-Xylene	5	ug/L	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U
Nickel	100	ug/L	NA		NA		NA		NA		21.7	J	7.9	J	8	J	23.5	J	24.4	J
o-Xylene	5	ug/L	0.36	U	0.36	U	0.36	U	0.36	U	0.36	U	0.36	U	0.36	U	0.42	J	0.36	U
Sodium	20,000	ug/L	NA		NA		NA		NA		**39,200**		**36,100**		**36,600**		**36,700**		**38,200**	
Styrene	5	ug/L	0.42	U	0.42	U	0.42	U	0.42	U	0.42	U	0.42	U	0.42	U	0.42	U	0.42	U
Sulfate	NE	mg/L	NA		NA		NA		NA		62.9		38.9		40.3		40.2		62.8	
Tetrachloroethene	5	ug/L	0.64	J	0.25	U	0.74	J	0.41	J	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Toluene	5	ug/L	0.38	U	0.38	U	0.38	U	0.38	U	0.38	U	0.38	U	0.38	U	0.38	U	0.38	U
trans-1,2-Dichloroethene	5	ug/L	0.24	U	0.24	U	0.24	U	0.24	U	0.24	U	0.24	U	0.24	U	0.24	U	0.24	U
trans-1,3-Dichloropropene	0.4	ug/L	0.49	U	0.49	U	0.49	U	0.49	U	0.49	U	0.49	U	0.49	U	0.49	U	0.49	U
Trichloroethene	5	ug/L	1.2		0.31	U	0.44	J	0.35	J	2.7		0.52	J	0.55	J	1		2.5	
Trichlorofluoromethane	5	ug/L	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Vinyl chloride	2	ug/L	0.17	U	0.17	U	0.17	U	0.17	U	0.17	U	0.49	J	0.56	J	0.17	U	0.17	U
Zinc	2,000	ug/L	NA		NA		NA		NA		68.2		38.7		38.2		25.9	J	106	
Total Detected VOC Compounds	NE	ug/L	2.43		0	U	1.18		0.76		5.84		5.91		7.22		1.95		5.04	

1. ug/L - micrograms per liter.
2. mg/L - milligrams per liter.
3. NE - no groundwater criteria established by NYSDEC.
4. NA - not analyzed for this constituent.
5. U - not detected at a concentration greater than the laboratory reporting limit.
6. J - analyte was detected at a concentration greater than the method detection limit but less than the reporting limit. Reported concentration is an estimate.
7. * - indicates that the lab control sample or lab control sample duplicate is outside acceptance limits.
8. Orange shaded cells indicate that the analyte was detected at a concentration greater than the NYSDEC Class GA groundwater Standard.
9. All groundwater samples were analyzed by TestAmerica Laboratories of Edison, New Jersey.

Table 4

Summary of Groundwater Analytical Results
2018 Annual Sampling Event
Liberty Industrial Finishing Site
Farmingdale, New York

	NYSDEC Groundwater Criteria	Client ID	RW03A		RW04		RW05		RW06		RW07		RW08		RW09	
		Lab Sample ID	460-160518-5		460-160518-6		460-160518-7		460-160518-8		460-160518-9		460-160518-10		460-160518-11	
		Sample Date	7/12/2018		7/12/2018		7/12/2018		7/12/2018		7/12/2018		7/12/2018		7/12/2018	
Analytical Constituent		Units	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
1,1,1-Trichloroethane	5	ug/L	0.24	U	0.24	U	0.24	U	0.24	U	0.24	U	0.24	U	0.24	U
1,1,2,2-Tetrachloroethane	5	ug/L	0.37	U	0.37	U	0.37	U	0.37	U	0.37	U	0.37	U	0.37	U
1,1,2-Trichloro-1,2,2-trifluoroethane	5	ug/L	0.31	U	0.31	U	0.31	U	0.31	U	0.31	U	0.31	U	0.31	U
1,1,2-Trichloroethane	1	ug/L	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U
1,1-Dichloroethane	5	ug/L	0.63	J	0.26	U	0.26	U	0.26	U	0.26	U	1.9		0.47	J
1,1-Dichloroethene	5	ug/L	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.62	J	0.12	U
1,2,3-Trichlorobenzene	5	ug/L	0.36	U	0.36	U	0.36	U	0.36	U	0.36	U	0.36	U	0.36	U
1,2,4-Trichlorobenzene	5	ug/L	0.37	U	0.37	U	0.37	U	0.37	U	0.37	U	0.37	U	0.37	U
1,2-Dibromo-3-Chloropropane	0.04	ug/L	0.38	U	0.38	U	0.38	U	0.38	U	0.38	U	0.38	U	0.38	U
1,2-Dibromoethane	0.0006	ug/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,2-Dichlorobenzene	3	ug/L	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U
1,2-Dichloroethane	0.6	ug/L	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U
1,2-Dichloropropane	1	ug/L	0.35	U	0.35	U	0.35	U	0.35	U	0.35	U	0.35	U	0.35	U
1,3-Dichlorobenzene	3	ug/L	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U
1,4-Dichlorobenzene	3	ug/L	0.76	U	0.76	U	0.76	U	0.76	U	0.76	U	0.76	U	0.76	U
1,4-Dioxane	NE	ug/L	28	U	28	U	28	U	28	U	28	U	28	U	28	U
2-Butanone (MEK)	50	ug/L	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U
2-Hexanone	50	ug/L	2.9	U	2.9	U	2.9	U	2.9	U	2.9	U	2.9	U	2.9	U
4-Methyl-2-pentanone	NE	ug/L	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U
Acetone	50	ug/L	5	U	5	U	5	U	5	U	5	U	5	U	5	U
Benzene	1	ug/L	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U
Bromoform	50	ug/L	0.54	U	0.54	U	0.54	U	0.54	U	0.54	U	0.54	U	0.54	U
Bromomethane	5	ug/L	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Cadmium	5	ug/L	**21.6**		**13.5**		**11.5**		**8.6**		**5.3**		2.1	U	2.1	U
Carbon disulfide	60	ug/L	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U
Carbon tetrachloride	5	ug/L	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U
Chlorobenzene	5	ug/L	0.38	U	0.38	U	0.38	U	0.38	U	0.38	U	0.38	U	0.38	U
Chlorobromomethane	NE	ug/L	NA		NA		NA		NA		NA		NA		NA	
Chloroethane	5	ug/L	0.32	U	0.32	U	0.32	U	0.32	U	0.32	U	0.32	U	0.32	U
Chloroform	7	ug/L	0.33	U	0.39	J	0.48	J	0.4	J	0.33	U	0.33	U	0.33	U
Chloromethane	NE	ug/L	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Chromium	50	ug/L	**114**		**124**		**94.7**		**143**		**122**		5.9	U	5.9	U
cis-1,2-Dichloroethene	5	ug/L	0.63	J	0.28	J	0.22	U	0.22	U	0.22	U	2.6		0.22	U
cis-1,3-Dichloropropene	0.4	ug/L	0.46	U	0.46	U	0.46	U	0.46	U	0.46	U	0.46	U	0.46	U
Cobalt	NE	ug/L	5.5	U	5.5	U	5.5	U	5.5	U	5.5	U	5.5	U	7.3	J
Copper	200	ug/L	12	J	5.5	U	5.5	U	5.5	U	5.5	U	107		5.5	U
Cyclohexane	NE	ug/L	0.32	U	0.32	U	0.32	U	0.32	U	0.32	U	0.32	U	0.32	U
Dibromochloromethane	50	ug/L	0.28	U	0.28	U	0.28	U	0.28	U	0.28	U	0.28	U	0.28	U
Dichlorobromomethane	50	ug/L	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U
Dichlorodifluoromethane	5	ug/L	0.32	J	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.43	J
Ethylbenzene	5	ug/L	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U
Iron, Dissolved	300	ug/L	111	U	111	U	111	U	111	U	111	U	**2,340**		**18,500**	
Isopropylbenzene	5	ug/L	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U

Table 4

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	NYSDEC Groundwater Criteria	Client ID	RW03A		RW04		RW05		RW06		RW07		RW08		RW09	
		Lab Sample ID	460-160518-5		460-160518-6		460-160518-7		460-160518-8		460-160518-9		460-160518-10		460-160518-11	
		Sample Date	7/12/2018		7/12/2018		7/12/2018		7/12/2018		7/12/2018		7/12/2018		7/12/2018	
Analytical Constituent		Units	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Lead	25	ug/L	3.8	U	3.8	U	3.8	U	3.8	U	3.8	U	3.8	U	3.8	U
Magnesium	35,000	ug/L	7,600		4,280	J	3,960	J	4,140	J	2,100	J	5,210		4,470	J
Manganese	300	ug/L	66		169		5.7	J	43.1		31.7		145		206	
Methyl acetate	NE	ug/L	0.31	U *	0.31	U *	0.31	U *	0.31	U *	0.31	U *	0.31	U *	0.31	U *
Methyl tert-butyl ether	10	ug/L	1		0.47	U	0.47	U	0.47	U	0.47	U	4.8		1.8	
Methylcyclohexane	NE	ug/L	0.26	U	0.26	U	0.26	U	0.26	U	0.26	U	0.26	U	0.26	U
Methylene Chloride	5	ug/L	0.32	U	0.32	U	0.32	U	0.32	U	0.32	U	0.32	U	0.32	U
m-Xylene & p-Xylene	5	ug/L	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U
Nickel	100	ug/L	25.5	J	6.3	U	6.3	U	6.3	U	6.3	U	7.3	J	11.2	J
o-Xylene	5	ug/L	0.36	U	0.36	U	0.36	U	0.36	U	0.36	U	0.36	U	0.36	U
Sodium	20,000	ug/L	**38,400**		**53,400**		**47,700**		**52,400**		**36,800**		**31,200**		**33,600**	
Styrene	5	ug/L	0.42	U	0.42	U	0.42	U	0.42	U	0.42	U	0.42	U	0.42	U
Sulfate	NE	mg/L	64		26		21		26.4		19.8		37.4		30.3	
Tetrachloroethene	5	ug/L	0.25	U	0.36	J	0.25	U	0.46	J	0.25	U	0.25	U	0.25	U
Toluene	5	ug/L	0.38	U	0.38	U	0.38	U	0.38	U	0.38	U	0.38	U	0.38	U
trans-1,2-Dichloroethene	5	ug/L	0.24	U	0.24	U	0.24	U	0.24	U	0.24	U	0.24	J	0.24	U
trans-1,3-Dichloropropene	0.4	ug/L	0.49	U	0.49	U	0.49	U	0.49	U	0.49	U	0.49	U	0.49	U
Trichloroethene	5	ug/L	2.4		3.3		0.31	U	0.35	J	0.41	J	**16**		0.31	U
Trichlorofluoromethane	5	ug/L	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
Vinyl chloride	2	ug/L	0.17	U	0.17	U	0.17	U	0.17	U	0.17	U	**2.1**		0.3	J
Zinc	2,000	ug/L	90.9		8.1	J	52.7		5.4	U	6	J	56.5		**2,160**	
Total Detected VOC Compounds	NE	ug/L	4.98		4.33		0.48		1.21		0.41		28.26		3	

1. ug/L - micrograms per liter.
2. mg/L - milligrams per liter.
3. NE - no groundwater criteria established by NYSDEC.
4. NA - not analyzed for this constituent.
5. U - not detected at a concentration greater than the laboratory reporting limit.
6. J - analyte was detected at a concentration greater than the method detection limit but less than the reporting limit. Reported concentration is an estimate.
7. * - indicates that the lab control sample or lab control sample duplicate is outside acceptance limits.
8. Orange shaded cells indicate that the analyte was detected at a concentration greater than the NYSDEC Class GA groundwater Standard.
9. All groundwater samples were analyzed by TestAmerica Laboratories of Edison, New Jersey.

Table 5

Statistical Trend Analyses Results - 2018
Liberty Industrial Finishing Site
Farmingdale, New York

Onsite and Boundary Wells		
Well ID	Total Cadmium	Total Chromium
MW-02AR	Decreasing	Decreasing
MW-02BR	No Trend	Increasing
MW-05	Decreasing	Increasing
MW-07A	No Trend	No Trend
MW-07B	No Trend	No Trend
MW-38A	No Trend	No Trend
MW-38B	Decreasing	No Trend
MW-39A	Increasing	Increasing
MW-39B	No Trend	Increasing
MW-40A	No Trend	No Trend
MW-40B	No Trend	No Trend
MW-43A	Increasing	No Trend
MW-44A	No Trend	No Trend
RW-01	Decreasing	No Trend
RW-02	No Trend	No Trend
RW-03A	Increasing	No Trend
Midfield Wells		
Well ID	Total Cadmium	Total Chromium
MW-11B	No Trend	Decreasing
MW-17A	Decreasing	Decreasing
MW-17B	No Trend	Increasing
MW-25B	No Trend	No Trend
MW-29B	No Trend	No Trend
RW-04	Increasing	Increasing
RW-05	Decreasing	Increasing
RW-06	Decreasing	Decreasing
Farfield Wells		
Well ID	Total Cadmium	Total Chromium
MW-09A	No Trend	No Trend
MW-09B	No Trend	No Trend
PZ-14	Increasing	Increasing
RW-07	Increasing	Increasing

Notes:
1. NA - not applicable; either concentrations are below groundwater cleanup standards or trend could not be calculated due to insufficient positive detections.
2. The determination of the trend is based on the Mann-Kendall statistic, the confidence factor, and coefficient of variation. Categories are defined in the worksheets in Appendix D.

Table 6

Groundwater Remediation System Design Flow Rates
Liberty Industrial finishing Site
Farmingdale, New York

Well Identification	Flow Rate
On-Site Upper Glacial Aquifer Wells	
RW-1	60 GPM
RW-2	20 GPM
RW-3	0 GPM (standby only)
RW-3A	30 GPM
Total Flow	**110 GPM**
Off-Site Upper Glacial Aquifer Wells	
RW-4 (mid-field)	45 GPM
RW-5 (mid-field)	45 GPM
RW-6 (mid-field)	70 GPM
RW-7 (far-field)	65 GPM
Total Flow	**225 GPM**
Off-Site Magothy Aquifer Wells	
RW-8 (mid-field)	30 GPM
RW-9 (mid-field)	20 GPM
RW-10 (mid-field)	35 GPM
Total Flow	**85 GPM**

Explanation:
GPM - gallons per minute

Table 7

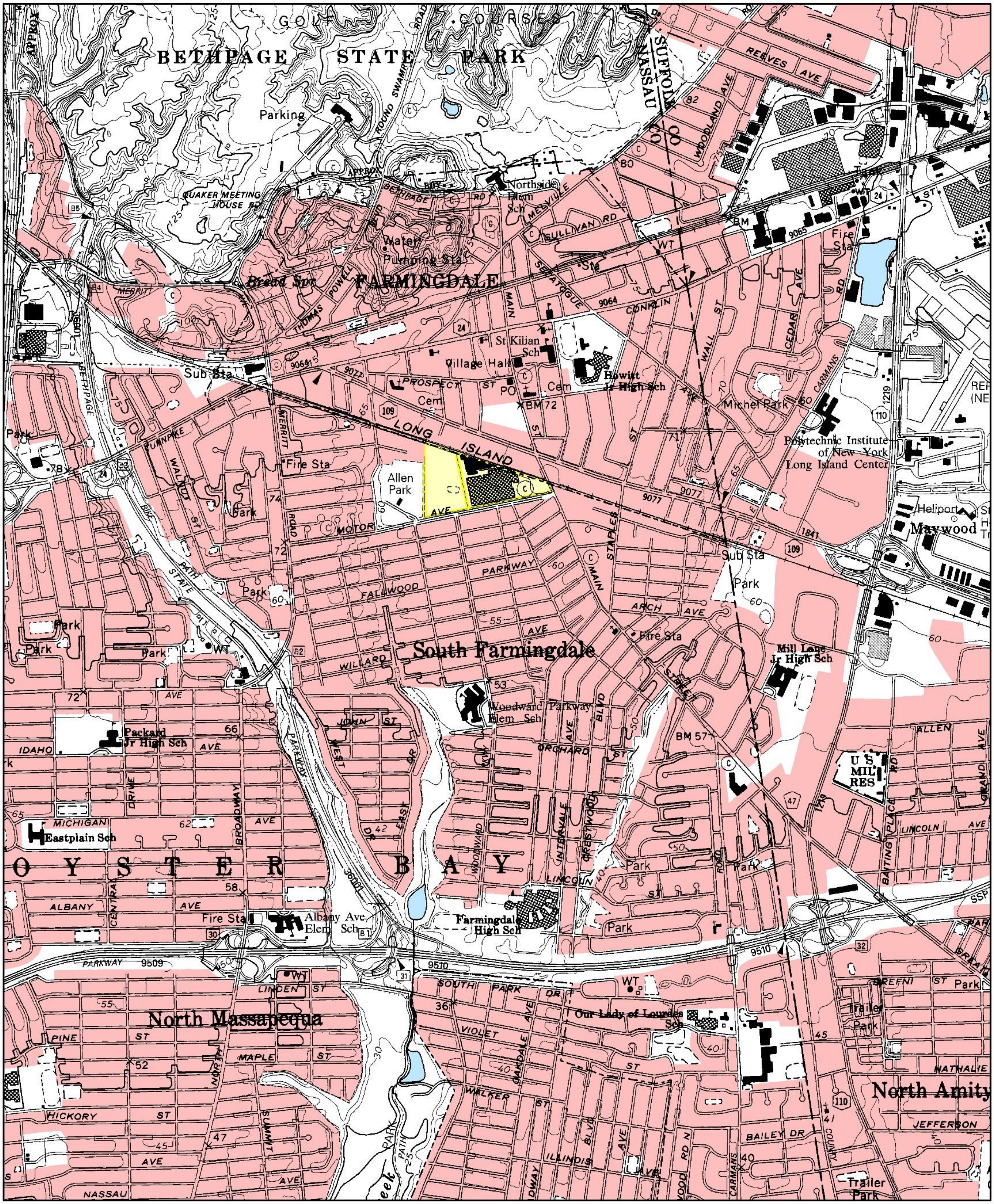
Groundwater Remediation System Contaminant Mass Removal
Liberty Industrial Finishing Site
Farmingdale, New York

	RW-1	RW-2	RW-3A	RW-4	RW-5	RW-6	RW-7	RW-8	RW-9	RW-10	Total
Run Times and Flow Rates, January - December 2018											
Run Time (hours)	1,485.58	0	1,704.25	7,012.17	7,568.25	2,031.50	7,122.83	6,605.25	5,336.75	5,629.17	-
Total Volume Extracted (Mgal)	5.35	0	3.04	18.55	20.43	8.53	17.09	12.25	10.76	12.8	108.8
Average Flow Rate (gpm)	60	0	29.7	44.1	45	70	40	30.9	33.6	37.9	-
Influent Contaminant Concentrations (µg/l), January - December 2018											
Trichloroethene	2.7	1	2.4	3.3	0	0.35	0.41	16	0	0.55	-
Cadmium	22.3	200	21.6	13.5	11.5	8.6	5.3	0	0	0	-
Chromium	114	10.8	114	124	94.7	143	122	0	0	0	-
Total Contaminant Mass Removal (Pounds)											
Trichloroethene	0.12	0	0.06	0.51	0	0.02	0.06	1.64	0	0.06	2.5
Cadmium	1	0	0.55	2.09	1.96	0.61	0.76	0	0	0	7.0
Chromium	5.09	0	2.89	19.22	16.17	10.19	17.43	0	0	0	71.0
Cumulative Totals from October 2002 through December 2018											

Total Volume Extracted (Mgal)	1334.7
Total Mass Removed (pounds)	
Trichloroethene	33.2
Cadmium	493.9
Chromium	2079.9

Notes:
1. Mgal - million gallons
2. gpm - gallons per minute
3. µg/l - micrograms per liter

FIGURES



Reference: Portion of Amityville, New York Topographic Quadrangle (USGS, 1996)

Original Scale: 1: 24,000
Contour Interval: 10 feet

0 1,000 2,000 4,000
Feet

FIGURE 1
Site Vicinity Map
Liberty Industrial Finishing Site
Farmingdale, New York

AMO Environmental Decisions
June 2016

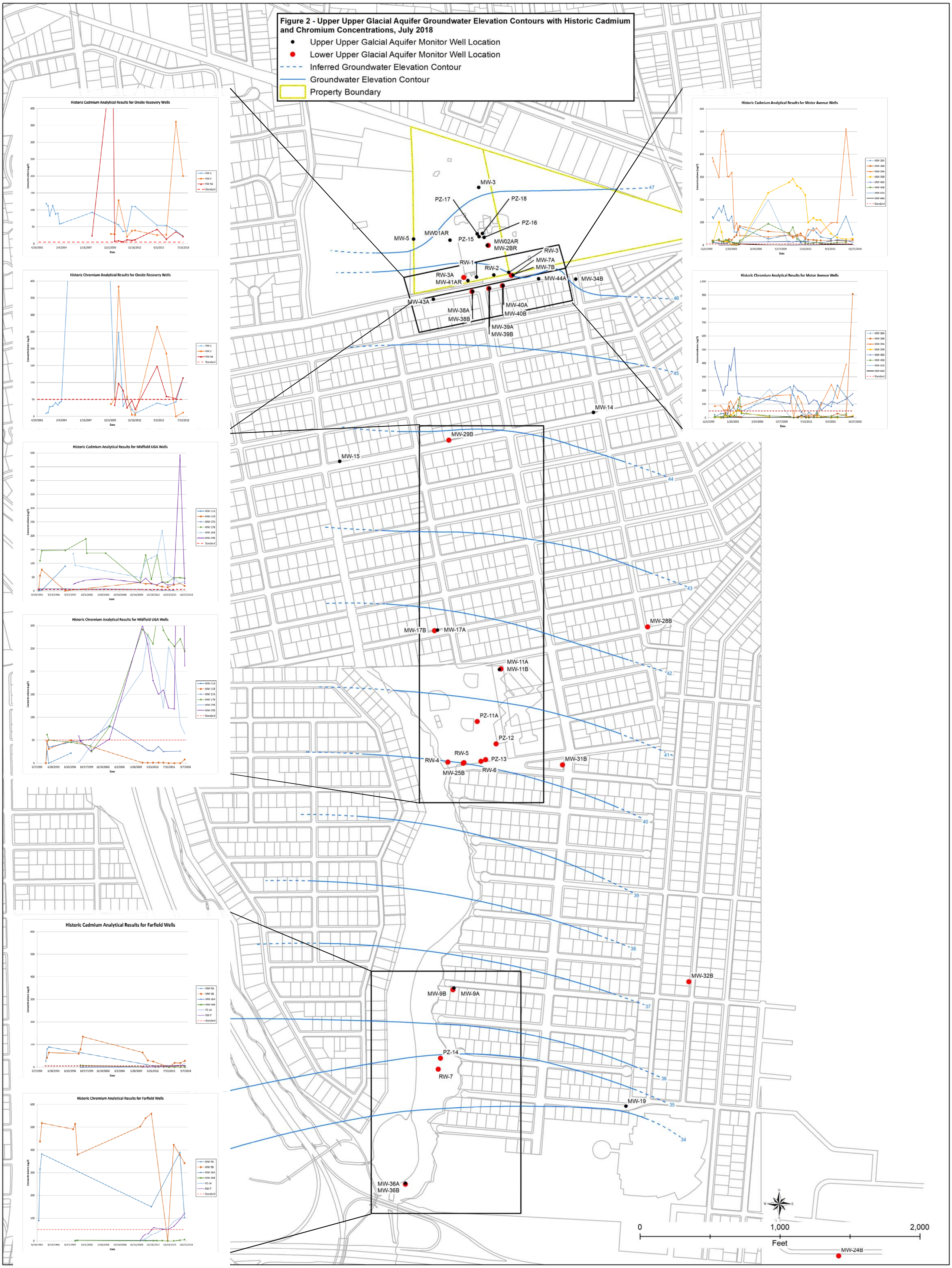


Figure 2 - Upper Upper Glacial Aquifer Groundwater Elevation Contours with Historic Cadmium and Chromium Concentrations, July 2018
Upper Upper Galcial Aquifer Monitor Well Location
Lower Upper Glacial Aquifer Monitor Well Location
Inferred Groundwater Elevation Contour
Groundwater Elevation Contour
Property Boundary
Historic Cadmium Analytical Results for Onsite Recovery Wells
Historic Chromium Analytical Results for Onsite Recovery Wells
Historic Cadmium Analytical Results for Midfield UGA Wells
Historic Chromium Analytical Results for Midfield UGA Wells
Historic Cadmium Analytical Results for Farfield Wells
Historic Chromium Analytical Results for Farfield Wells
Historic Cadmium Analytical Results for Motor Avenue Wells
Historic Chromium Analytical Results for Motor Avenue Wells
MW-3
PZ-17
PZ-18
PZ-16
MW-5
MW01AR
PZ-15
MW02AR
MW-2BR
RW-3
RW-1
MW-7A
MW-7B
RW-2
RW-3A
MW-41AR
MW-44A
MW-34B
MW-43A
MW-38A
MW-38B
MW-40A
MW-40B
MW-39A
MW-39B
MW-14
MW-29B
MW-15
MW-28B
MW-17B
MW-17A
MW-11A
MW-11B
PZ-11A
PZ-12
RW-4
RW-5
PZ-13
MW-31B
MW-25B
RW-6
MW-32B
MW-9B
MW-9A
PZ-14
RW-7
MW-19
MW-36A
MW-36B
MW-24B
47
46
45
44
43
42
41
40
39
38
37
36
35
34
0
1,000
2,000
Feet

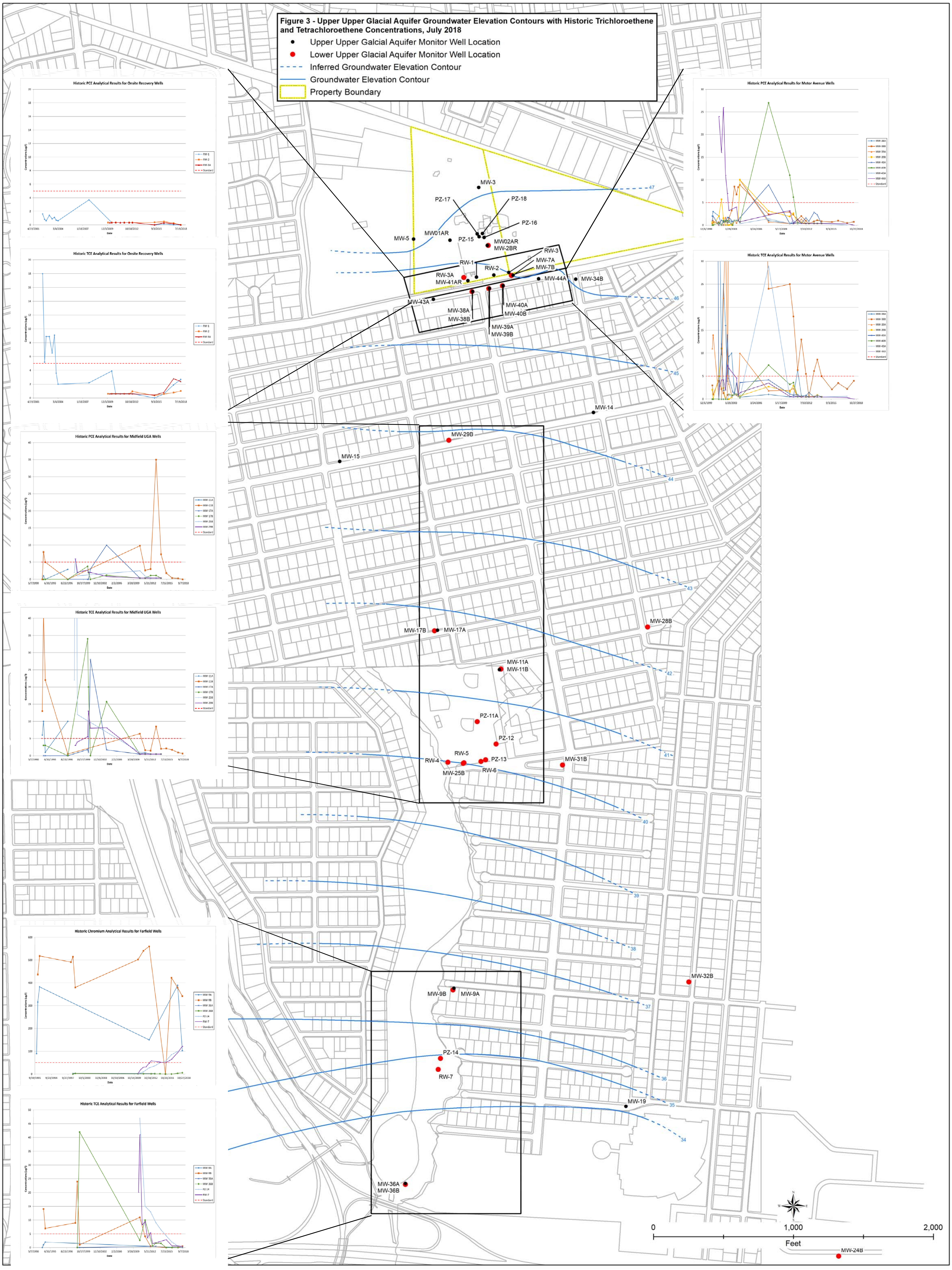


Figure 3 - Upper Upper Glacial Aquifer Groundwater Elevation Contours with Historic Trichloroethene and Tetrachloroethene Concentrations, July 2018

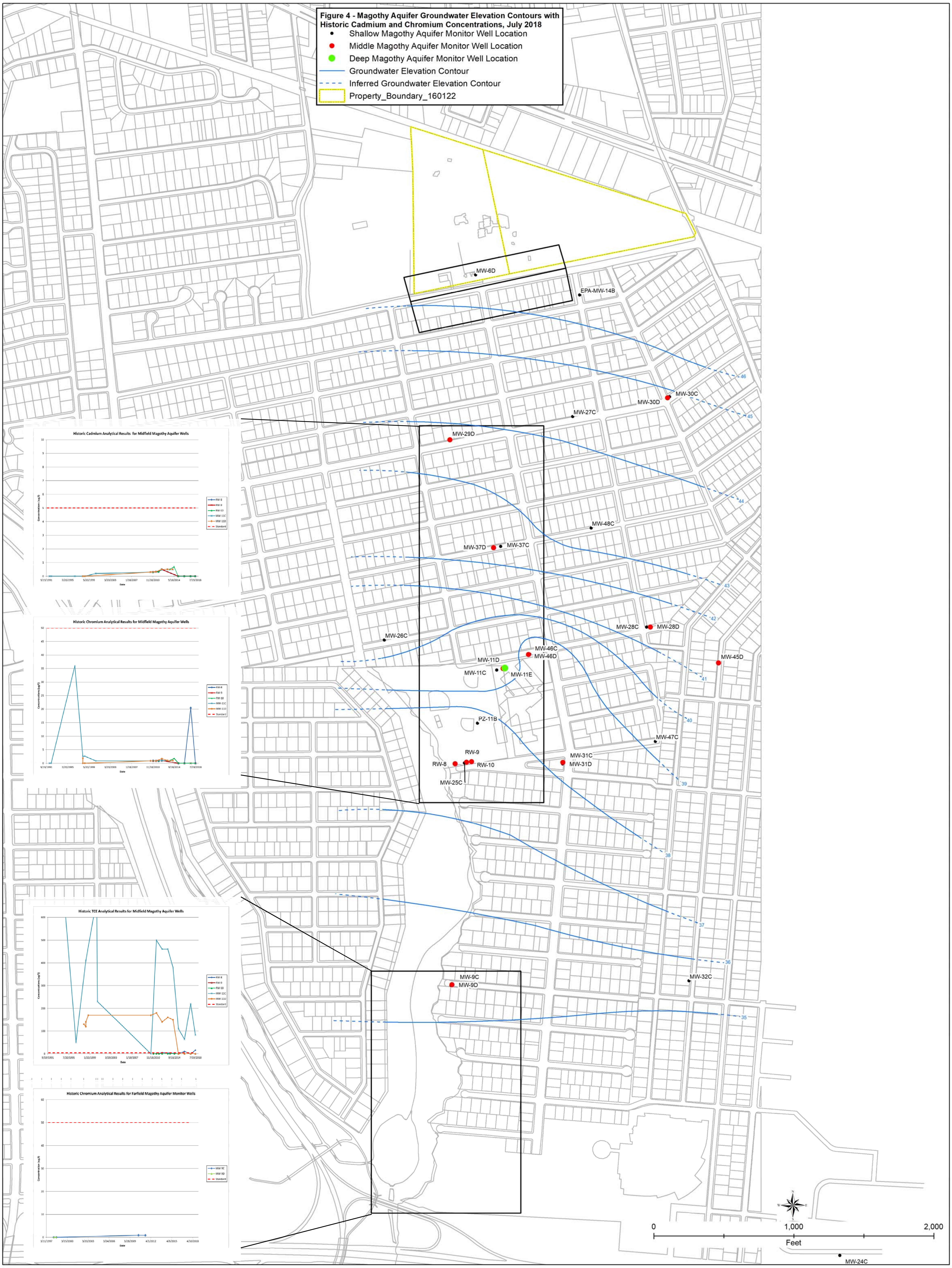


Figure 4 - Magothy Aquifer Groundwater Elevation Contours with Historic Cadmium and Chromium Concentrations, July 2018
Shallow Magothy Aquifer Monitor Well Location
Middle Magothy Aquifer Monitor Well Location
Deep Magothy Aquifer Monitor Well Location
Groundwater Elevation Contour
Inferred Groundwater Elevation Contour
Property_Boundary_160122
MW-6D
EPA-MW-14B
MW-30C
MW-30D
MW-27C
MW-29D
MW-48C
MW-37D
MW-37C
MW-28C
MW-28D
MW-26C
MW-46C
MW-46D
MW-45D
MW-11D
MW-11C
MW-11E
PZ-11B
MW-47C
RW-9
RW-8
RW-10
MW-31C
MW-31D
MW-25C
MW-9C
MW-9D
MW-32C
MW-24C
46
45
44
43
42
41
40
39
38
37
36
35
Historic Cadmium Analytical Results for Midfield Magothy Aquifer Wells
Historic Chromium Analytical Results for Midfield Magothy Aquifer Wells
Historic TCE Analytical Results for Midfield Magothy Aquifer Wells
Historic Chromium Analytical Results for Farfield Magothy Aquifer Monitor Wells
0
1,000
2,000
Feet

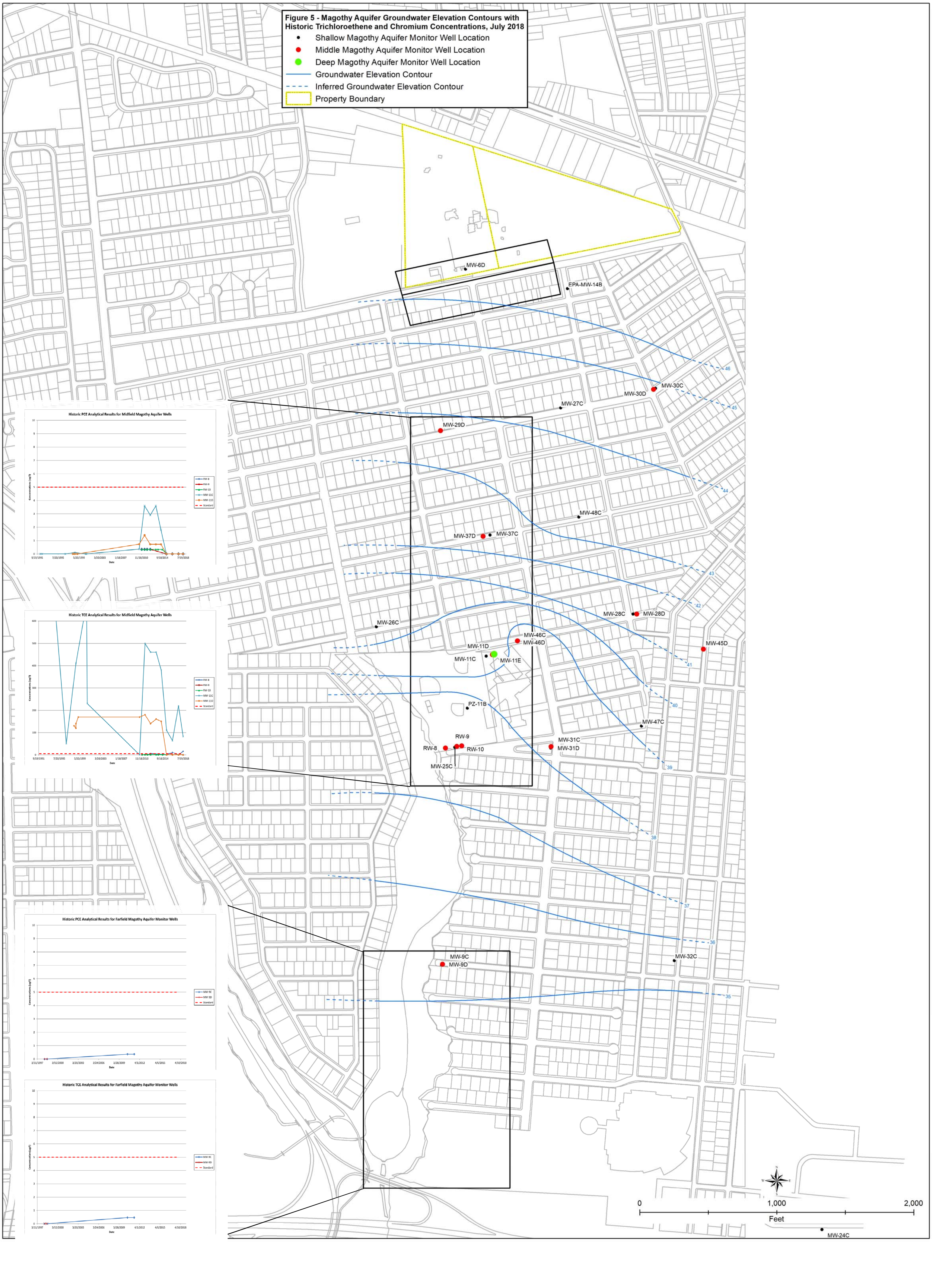


Figure 5 - Magothy Aquifer Groundwater Elevation Contours with Historic Trichloroethene and Chromium Concentrations, July 2018
Shallow Magothy Aquifer Monitor Well Location
Middle Magothy Aquifer Monitor Well Location
Deep Magothy Aquifer Monitor Well Location
Groundwater Elevation Contour
Inferred Groundwater Elevation Contour
Property Boundary
MW-6D
EPA-MW-14B
46
MW-30C
MW-30D
45
MW-27C
MW-29D
44
MW-48C
MW-37D
MW-37C
43
42
MW-28C
MW-28D
MW-26C
MW-46C
MW-46D
MW-11D
MW-11C
MW-11E
MW-45D
41
40
PZ-11B
MW-47C
RW-9
RW-8
RW-10
MW-31C
MW-31D
39
MW-25C
38
37
36
MW-9C
MW-9D
MW-32C
35
Historic PCE Analytical Results for Midfield Magothy Aquifer Wells
Historic TCE Analytical Results for Midfield Magothy Aquifer Wells
Historic PCE Analytical Results for Farfield Magothy Aquifer Monitor Wells
Historic TCE Analytical Results for Farfield Magothy Aquifer Monitor Wells
0
1,000
2,000
Feet
MW-24C

APPENDIX A

WELL PURGING AND SAMPLING LOGS (FLASH DRIVE)

Site:	Liberty Industrial Finishing Superfund Site	**Consulting Firm:**	AMO Environmental Decisions
Date:	7/10/18	**Field Personnel:**	T. Ruggerio, V. Piazza
Weather:			

Monitor Well #:	41AR	**Well Depth:**	29.90'	**Screened Interval:**	
Well Permit #:		**Well Diameter:**	4"		

PID Reading (ppm)

Background:	0	**Pump Intake Depth:**	25'	**ft. below TOC**
Beneath Outer Cap:	0	**DTW Before Pump Installed:**	17.51	**ft. below TOC**
Beneath Inner Cap:	0			

Time	Purge	Sample	pH (Standard Units) Reading	pH Change	Specific Conductivity (mS/cm) Reading	Specific Conductivity Change	Redox Potential (mv) Reading	Redox Potential Change	Dissolved Oxygen (mg/l) Reading	Dissolved Oxygen Change	Turbidity (NTU) Reading	Turbidity Change	Temperature (Degrees C) Reading	Temperature Change	Pump Rate (g/min)	DTW (ft. below TOC)
600	X		6.01		.390		173.8		8.48		1390.2		15.88			
603	X		5.77		.381		186.3		8.02		709.2		15.22			
606	X		5.77		.378		188.7		7.17		344.0		14.91			
609	X		5.78		.380		188.6		6.49		216.5		14.85			
612	X		5.79		.385		188.6		5.89		115.2		14.54			
615	X		5.79		.383		190.2		5.51		82.9		13.94			
618	X		5.80		.383		192.5		5.31		62.6		13.84			
621	X		5.81		.383		192.8		5.08		53.6		13.80			
624	X		5.83		.382		194.2		5.00		41.4		13.55			
627	X		5.83		.382		196.6		4.90		33.3		13.67			
630		X	5.85		.382		199.0		4.88		29.4		13.64			
Stability Criteria:			+/- 0.1 S.U.		+/- 3%		+/- 10mV		+/- 10%		+/- 10%		+/- 3%		<500 ml/min	<0.3'

Comments:

transparent, colorless, odorless

Site: Liberty Industrial Finishing Superfund Site
Date: 7/10/18
Weather: cloudy

Consulting Firm: AMO Environmental Decisions
Field Personnel: T. Ruggerio, V. Piazza

Monitor Well #: 38A
Well Permit #:
Well Depth: 29.40'
Well Diameter: 4"
Screened Interval:

PID Reading (ppm)
Background: 0
Beneath Outer Cap: 0
Beneath Inner Cap: 0

Pump Intake Depth: 25' ft. below TOC
DTW Before Pump Installed: 16.98' ft. below TOC

Time	Purge	Sample	pH (Standard Units) Reading	pH Change	Specific Conductivity (mS/cm) Reading	Specific Conductivity Change	Redox Potential (mv) Reading	Redox Potential Change	Dissolved Oxygen (mg/l) Reading	Dissolved Oxygen Change	Turbidity (NTU) Reading	Turbidity Change	Temperature (Degrees C) Reading	Temperature Change	Pump Rate (g/min)	DTW (ft. below TOC)
6 45	X		6.12		.365		222.2		0.40		120.8		1256			
6 50	X		6.03		.372		228.6		0.20		55.4		12.31			
6 55	X		6.02		.368		231.3		0.12		12.5		12.39			
700	X		6.01		.368		230.7		0.10		8.0		1230			
705	X		6.01		.370		230.6		0.08		7.0		12.55			
710		X	6.00		.373		230.1		0.07		5.0		12.57			
Stability Criteria:			+/- 0.1 S.U.		+/- 3%		+/- 10mV		+/- 10%		+/- 10%		+/- 3%		<500 ml/min	<0.3'

Comments:

transparent, colorless, odorless

Site: Liberty Industrial Finishing Superfund Site
Date: 7/10/18
Weather: 74°
Consulting Firm: AMO Environmental Decisions
Field Personnel: T. Ruggerio, V. Piazza

Monitor Well #: 38B
Well Permit #:
Well Depth: 57.7'
Well Diameter: 4"
Screened Interval:

PID Reading (ppm)
Background: 0
Beneath Outer Cap: 0
Beneath Inner Cap: 0
Pump Intake Depth: 55' ft. below TOC
DTW Before Pump Installed: 16.88' ft. below TOC

Time	Purge	Sample	pH (Standard Units)		Specific Conductivity (mS/cm)		Redox Potential (mv)		Dissolved Oxygen (mg/l)		Turbidity (NTU)		Temperature (Degrees C)		Pump Rate (g/min)	DTW (ft. below TOC)
			Reading	Change	Reading	Change	Reading	Change	Reading	Change	Reading	Change	Reading	Change		
7:20	X		5.67		.287		195.2		0.13		1630.2		14.02			
725	X		5.60		.286		130.6		0.02		256.9		14.30			
730	X		5.60		.288		55.5		0.02		177.9		14.62			
735	X		5.59		.288		-10.6		0.02		132.5		14.60			
740	X		5.57		.286		-32.0		0.02		108.3		14.48			
745	X		5.58		.286		-88.5		0.02		95.8		14.54			
750	X		5.58		.286		-90.2		0.02		90.2		14.58			
755		X	5.58		.286		-92.4		0.02		88.4		14.60			
Stability Criteria:			+/- 0.1 S.U.		+/- 3%		+/- 10mV		+/- 10%		+/- 10%		+/- 3%		<500 ml/min	<0.3'

Comments:
transparent, colorless, odorless

Site: Liberty Industrial Finishing Superfund Site
Date: 7/10/18
Weather: 77

Consulting Firm: AMO Environmental Decisions
Field Personnel: T. Ruggerio, V. Piazza

Monitor Well #: 39B
Well Permit #:
Well Depth: 58.30'
Well Diameter: 4"
Screened Interval:

PID Reading (ppm)
Background: 0
Beneath Outer Cap: 0
Beneath Inner Cap: 0

Pump Intake Depth: 55' ft. below TOC
DTW Before Pump Installed: 17.23' ft. below TOC

Time	Purge	Sample	pH (Standard Units)		Specific Conductivity (mS/cm)		Redox Potential (mv)		Dissolved Oxygen (mg/l)		Turbidity (NTU)		Temperature (Degrees C)		Pump Rate (g/min)	DTW (ft. below TOC)
			Reading	Change	Reading	Change	Reading	Change	Reading	Change	Reading	Change	Reading	Change		
815	X		5.59		.290		215.9		0.75		51.5		15.32			
820	X		5.57		.289		219.9		0.24		47.4		15.27			
825	X		5.58		.290		219.7		0.11		45.3		15.44			
830	X		5.58		.289		219.6		0.05		41.3		15.31			
835	X		5.58		.289		220.1		0.04		40.3		15.36			
840		X	5.58		.289		220.8		0.03		40.1		15.39			
Stability Criteria:			+/- 0.1 S.U.		+/- 3%		+/- 10mV		+/- 10%		+/- 10%		+/- 3%		<500 ml/min	<0.3'

Comments:

transparent, colorless, odorless

Site: Liberty Industrial Finishing Superfund Site
Date: 7/10/18
Weather: 78°

Consulting Firm: AMO Environmental Decisions
Field Personnel: T. Ruggerio, V. Piazza

Monitor Well #: 39A
Well Permit #:
Well Depth: 29.60
Well Diameter: 4"
Screened Interval:

PID Reading (ppm)
Background: 0
Beneath Outer Cap: 0
Beneath Inner Cap: 0

Pump Intake Depth: 25' ft. below TOC
DTW Before Pump Installed: 17.55' ft. below TOC

Time	Purge	Sample	pH (Standard Units)		Specific Conductivity (mS/cm)		Redox Potential (mv)		Dissolved Oxygen (mg/l)		Turbidity (NTU)		Temperature (Degrees C)		Pump Rate (g/min)	DTW (ft. below TOC)
			Reading	Change	Reading	Change	Reading	Change	Reading	Change	Reading	Change	Reading	Change		
850	X		5.86		.451	L	246.3		0.08		143.7		14.67			
855	X		5.86		.446		243.8		0.05		70.4		14.84			
900	X		5.86		.446		242.0		0.04		52.0		14.85			
905	X		5.86		.443		242.3		0.05		46.6		14.88			
910	X		5.85		.444		242.0		0.05		42.2		14.94			
915		X	5.85		.445		240.8		0.05		40.8		14.96			
Stability Criteria:			+/- 0.1 S.U.		+/- 3%		+/- 10mV		+/- 10%		+/- 10%		+/- 3%		<500 ml/min	<0.3'

Comments:
transparent, colorless, odorless

Site: Liberty Industrial Finishing Superfund Site
Date: 7/10/18
Weather: 78°

Consulting Firm: AMO Environmental Decisions
Field Personnel: T. Ruggerio, V. Piazza

Monitor Well #: 40A
Well Permit #:
Well Depth: 30'
Well Diameter: 4"
Screened Interval:

PID Reading (ppm)
Background: 0
Beneath Outer Cap: 0
Beneath Inner Cap: 0

Pump Intake Depth: ft. below TOC
DTW Before Pump Installed: 17.45 ft. below TOC

Time	Purge	Sample	pH (Standard Units)		Specific Conductivity (mS/cm)		Redox Potential (mv)		Dissolved Oxygen (mg/l)		Turbidity (NTU)		Temperature (Degrees C)		Pump Rate (g/min)	DTW (ft. below TOC)
			Reading	Change	Reading	Change	Reading	Change	Reading	Change	Reading	Change	Reading	Change		
930	X		6.08		0.558		233.2		0.23		134.0		13.79			
935	X		6.14		0.561		229.5		0.21		80.5		13.74			
940	X		6.14		0.559		231.3		0.18		58.8		13.62			
945	X		6.11		0.572		233.3		0.22		55.8		13.70			
950	X		6.10		0.577		230.2		0.24		47.3		13.80			
955			6.09		0.580		228.1		0.26		44.5		13.84			
10 00		X	6.07		0.575		223.7		0.25		42.6		13.86			
Stability Criteria:			+/- 0.1 S.U.		+/- 3%		+/- 10mV		+/- 10%		+/- 10%		+/- 3%		<500 ml/min	<0.3'

Comments: transparent, colorless, odorless

Site: Liberty Industrial Finishing Superfund Site
Date: 7/10/18
Weather: 80°

Consulting Firm: AMO Environmental Decisions
Field Personnel: T. Ruggerio, V. Piazza

Monitor Well #: 44A
Well Permit #:
Well Depth: 29.40'
Well Diameter: 4"
Screened Interval:

PID Reading (ppm)
Background: 0
Beneath Outer Cap: 8
Beneath Inner Cap: 0

Pump Intake Depth: 25' ft. below TOC
DTW Before Pump Installed: 17.78' ft. below TOC

Time	Purge	Sample	pH (Standard Units) Reading	pH Change	Specific Conductivity (mS/cm) Reading	Change	Redox Potential (mv) Reading	Change	Dissolved Oxygen (mg/l) Reading	Change	Turbidity (NTU) Reading	Change	Temperature (Degrees C) Reading	Change	Pump Rate (g/min)	DTW (ft. below TOC)
1020	X		6.32		.313		221.0		0.78		249.4		14.86			
1025	X		6.36		.330		213.0		0.36		121.4		14.67			
1030	X		6.36		.347		207.1		0.26		54.3		14.81			
1035	X		6.35		.370		207.3		0.30		36.1		14.95			
1040	X		6.34		.360		207.1		0.20		33.1		14.50			
1045	X		6.35		.363		207.8		0.21		33.8		14.80			
1050		X	6.35		.364		209.3		0.20		33.2		14.72			
Stability Criteria:			+/- 0.1 S.U.		+/- 3%		+/- 10mV		+/- 10%		+/- 10%		+/- 3%		<500 ml/min	<0.3'

Comments:

transparent, colorless, odorless

Site:	Liberty Industrial Finishing Superfund Site	**Consulting Firm:**	AMO Environmental Decisions
Date:	7/10/18	**Field Personnel:**	T. Ruggerio, V. Piazza
Weather:	82		

Monitor Well #:	11D	**Well Depth:**	179.40'	**Screened Interval:**	
Well Permit #:		**Well Diameter:**	4"		

PID Reading (ppm)

Background:	0	**Pump Intake Depth:**	170'	**ft. below TOC**
Beneath Outer Cap:	0	**DTW Before Pump Installed:**	8.95'	**ft. below TOC**
Beneath Inner Cap:	0			

Time	Purge	Sample	pH (Standard Units) Reading	pH Change	Specific Conductivity (mS/cm) Reading	Specific Conductivity Change	Redox Potential (mv) Reading	Redox Potential Change	Dissolved Oxygen (mg/l) Reading	Dissolved Oxygen Change	Turbidity (NTU) Reading	Turbidity Change	Temperature (Degrees C) Reading	Temperature Change	Pump Rate (g/min)	DTW (ft. below TOC)
1200	X		5.86		.211		-62.9		0.24		22.3		15.96			
1205	X		5.79		.212		-64.3		0.09		14.2		16.00			
1210	X		5.82		.213		-73.2		0.05		13.4		16.30			
1215	X		5.82		.213		-79.1		0.03		14.6		16.38			
1220	X		5.82		.214		-84.2		0.01		13.2		16.41			
1225			5.81		.214		-87.4		0.01		13.3		16.50			
1230			5.82		.214		-90.0		0.01		13.2		16.56			
Stability Criteria:			+/- 0.1 S.U.		+/- 3%		+/- 10mV		+/- 10%		+/- 10%		+/- 3%		<500 ml/min	<0.3'

Comments:

transparent, colorless, odorless

Site: Liberty Industrial Finishing Superfund Site
Date: 7/10/18
Weather: 82°

Consulting Firm: AMO Environmental Decisions
Field Personnel: T. Ruggerio, V. Piazza

Monitor Well #: 11B
Well Permit #:
Well Depth: 73.50'
Well Diameter: 4"
Screened Interval:

PID Reading (ppm)
Background: 0
Beneath Outer Cap: 0
Beneath Inner Cap: 0

Pump Intake Depth: 70' ft. below TOC
DTW Before Pump Installed: 12.67' ft. below TOC

Time	Purge	Sample	pH (Standard Units)		Specific Conductivity (mS/cm)		Redox Potential (mv)		Dissolved Oxygen (mg/l)		Turbidity (NTU)		Temperature (Degrees C)		Pump Rate (g/min)	DTW (ft. below TOC)
			Reading	Change	Reading	Change	Reading	Change	Reading	Change	Reading	Change	Reading	Change		
1245	X		6.12		.399		-14.0		0.01		18.0		16.40			
1250	X		6.13		.396		4.8		0.00		10.8		16.43			
1255	X		6.13		.396		10.7		0.00		9.0		16.28			
1300	X		6.13		.394		10.6		0.00		10.5		16.21			
1305	X		6.13		.397		10.9		0.00		11.0		16.17			
1310		X	6.12		.400		11.2		0.00		10.6		16.14			
Stability Criteria:			+/- 0.1 S.U.		+/- 3%		+/- 10mV		+/- 10%		+/- 10%		+/- 3%		<500 ml/min	<0.3'

Comments: transparent, colorless, odorless

Site:	Liberty Industrial Finishing Superfund Site	**Consulting Firm:**	AMO Environmental Decisions
Date:	7/10/18	**Field Personnel:**	T. Ruggerio, V. Piazza
Weather:	830		

Monitor Well #:	11C	**Well Depth:**	119.80'	**Screened Interval:**	
Well Permit #:		**Well Diameter:**	4"		

PID Reading (ppm)

Background:	0	**Pump Intake Depth:**	110'	**ft. below TOC**
Beneath Outer Cap:	8	**DTW Before Pump Installed:**	~~[illegible]~~ 10.42	**ft. below TOC**
Beneath Inner Cap:	0			

Time	Purge	Sample	pH (Standard Units) Reading	pH Change	Specific Conductivity (mS/cm) Reading	Specific Conductivity Change	Redox Potential (mv) Reading	Redox Potential Change	Dissolved Oxygen (mg/l) Reading	Dissolved Oxygen Change	Turbidity (NTU) Reading	Turbidity Change	Temperature (Degrees C) Reading	Temperature Change	Pump Rate (g/min)	DTW (ft. below TOC)
1325	X		5.15		.315		118.2		0.05		44.1		16.25			
1330	X		5.15		.315		125.7		0.03		40.7		16.22			
1335	X		5.15		.315		128.9		0.02		53.5		16.25			
1340	X		5.15		.315		131.3		0.02		59.3		16.33			
1345	X		5.15		.315		133.8		0.02		60.4		16.29			
1350		X	5.15		.315		136.3		0.02		62.3		16.34			
Stability Criteria:			+/- 0.1 S.U.		+/- 3%		+/- 10mV		+/- 10%		+/- 10%		+/- 3%		<500 ml/min	<0.3'

Comments:

translucent, light tan, odorless

Site: Liberty Industrial Finishing Superfund Site
Date: 7/10/18 8/9
Weather:

Consulting Firm: AMO Environmental Decisions
Field Personnel: T. Ruggerio, V. Piazza

Monitor Well #: 25B
Well Permit #:
Well Depth: 47.20'
Well Diameter: 4"
Screened Interval:

PID Reading (ppm)
Background: 0
Beneath Outer Cap: 0
Beneath Inner Cap: 0

Pump Intake Depth: 45' **ft. below TOC**
DTW Before Pump Installed: 6.33' **ft. below TOC**

Time	Purge	Sample	pH (Standard Units)		Specific Conductivity (mS/cm)		Redox Potential (mv)		Dissolved Oxygen (mg/l)		Turbidity (NTU)		Temperature (Degrees C)		Pump Rate (g/min)	DTW (ft. below TOC)
			Reading	Change	Reading	Change	Reading	Change	Reading	Change	Reading	Change	Reading	Change		
1450	X		6.42		.275		131.8		3.23		37.0		16.50			
1455	X		Flow	too	low	restarting										
1500	X		6.10		.317		165.8		2.41		36.3		15.4			
1505	X		6.06		.360		176.8		1.66		32.3		15.62			
1510	X		6.09		.354		179.4		1.24		15.2		14.02			
1515	X		5.97		.768		195.8		0.91		14.3		14.03			
1520	X		5.96		.887		199.8		1.02		15.4		14.12			
1525	X		5.97		.896		204.0		1.07		16.8		14.10			
1530		X	6.00		.888		207.0		0.97		16.4		14.16			
Stability Criteria:			+/- 0.1 S.U.		+/- 3%		+/- 10mV		+/- 10%		+/- 10%		+/- 3%		<500 ml/min	<0.3'

Comments:

transparent, colorless, odorless

Site:	Liberty Industrial Finishing Superfund Site	**Consulting Firm:**	AMO Environmental Decisions
Date:	7/11/18	**Field Personnel:**	T. Ruggerio, V. Piazza
Weather:			

Monitor Well #:	MW09A	**Well Depth:**	13.5'	**Screened Interval:**	
Well Permit #:		**Well Diameter:**	4"		

PID Reading (ppm)

Background:	0	**Pump Intake Depth:**	13'	**ft. below TOC**
Beneath Outer Cap:	0	**DTW Before Pump Installed:**	3.69'	**ft. below TOC**
Beneath Inner Cap:	0			

Time	Purge	Sample	pH (Standard Units) Reading	pH Change	Specific Conductivity (mS/cm) Reading	Specific Conductivity Change	Redox Potential (mv) Reading	Redox Potential Change	Dissolved Oxygen (mg/l) Reading	Dissolved Oxygen Change	Turbidity (NTU) Reading	Turbidity Change	Temperature (Degrees C) Reading	Temperature Change	Pump Rate (g/min)	DTW (ft. below TOC)
0725	X		6.27		.250		176.4		2.71		48.2		15.42			
0730	X		5.70		.246		196.2		1.73		49.2		15.25			
0735	X		5.73		.246		207.3		1.39		42.0		15.44			
0740	X		5.79		.246		211.4		1.04		42.5		15.60			
0745	X		5.79		.244		216.5		0.16		26.5		15.49			
0750	X		5.76		.241		220.0		0.12		24.8		15.45			
0755		X	5.77		.243		222.3		0.12		23.2		15.40			
Stability Criteria:			+/- 0.1 S.U.		+/- 3%		+/- 10mV		+/- 10%		+/- 10%		+/- 3%		<500 ml/min	<0.3'

Comments:

transparent, colorless, odorless

Site:	Liberty Industrial Finishing Superfund Site	**Consulting Firm:**	AMO Environmental Decisions
Date:	7/4/18	**Field Personnel:**	T. Ruggerio, V. Piazza
Weather:			

Monitor Well #:	MW09B	**Well Depth:**	49.80'	**Screened Interval:**	
Well Permit #:		**Well Diameter:**	4		

PID Reading (ppm)

Background:	0	**Pump Intake Depth:**	45'	**ft. below TOC**
Beneath Outer Cap:	0	**DTW Before Pump Installed:**	3.70'	**ft. below TOC**
Beneath Inner Cap:	0			

Time	Purge	Sample	pH (Standard Units)		Specific Conductivity (mS/cm)		Redox Potential (mv)		Dissolved Oxygen (mg/l)		Turbidity (NTU)		Temperature (Degrees C)		Pump Rate (g/min)	DTW (ft. below TOC)
			Reading	Change	Reading	Change	Reading	Change	Reading	Change	Reading	Change	Reading	Change		
0805	X		6.03		.699		88.9		0.14		178.2		14.28			
0810	X		5.67		.644		177.6		0.27		51.1		14.10			
0815	X		5.64		.633		213.1		0.30		46.9		13.99			
0820	X		5.64		.629		220.4		0.32		44.0		13.98			
0825		X	5.64		.627		218.7		0.34		41.3		14.04			
Stability Criteria:			+/- 0.1 S.U.		+/- 3%		+/- 10mV		+/- 10%		+/- 10%		+/- 3%		<500 ml/min	<0.3'

Comments:

transparent, colorless, odorless

Site:	Liberty Industrial Finishing Superfund Site	**Consulting Firm:**	AMO Environmental Decisions
Date:	7/11/18	**Field Personnel:**	T. Ruggerio, V. Piazza
Weather:	78°		

Monitor Well #:	PZ14	**Well Depth:**	60'	**Screened Interval:**	
Well Permit #:		**Well Diameter:**	2"		

PID Reading (ppm)

Background:	0	**Pump Intake Depth:**	55'	**ft. below TOC**
Beneath Outer Cap:	0	**DTW Before Pump Installed:**	25.2'	**ft. below TOC**
Beneath Inner Cap:	0			

Time	Purge	Sample	pH (Standard Units)		Specific Conductivity (mS/cm)		Redox Potential (mv)		Dissolved Oxygen (mg/l)		Turbidity (NTU)		Temperature (Degrees C)		Pump Rate (g/min)	DTW (ft. below TOC)
			Reading	Change	Reading	Change	Reading	Change	Reading	Change	Reading	Change	Reading	Change		
0840	X		6.13		.354		209.6		2.66		26.4		14.30			
0845	X		6.00		.370		221.9		1.55		25.0		13.73			
0850	X		5.64		.422		247.8		0.62		24.9		13.72			
0855	X		5.62		.424		254.6		0.58		25.1		13.73			
0900		X	5.63		.424		252.3		0.56		24.9		13.77			
Stability Criteria:			+/- 0.1 S.U.		+/- 3%		+/- 10mV		+/- 10%		+/- 10%		+/- 3%		<500 ml/min	<0.3'

Comments:

transparent, colorless, odorless

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Site:	Liberty Industrial Finishing Superfund Site	**Consulting Firm:**	AMO Environmental Decisions
Date:	7/26/18	**Field Personnel:**	T. Ruggerio, V. Piazza
Weather:			

Monitor Well #:	MW 36B	**Well Depth:**	49.50	**Screened Interval:**	
Well Permit #:		**Well Diameter:**	4"		

PID Reading (ppm)

Background:	0	**Pump Intake Depth:**	45'	**ft. below TOC**
Beneath Outer Cap:	0	**DTW Before Pump Installed:**	4.45'	**ft. below TOC**
Beneath Inner Cap:	0			

Time	Purge	Sample	pH (Standard Units)		Specific Conductivity (mS/cm)		Redox Potential (mv)		Dissolved Oxygen (mg/l)		Turbidity (NTU)		Temperature (Degrees C)		Pump Rate (g/min)	DTW (ft. below TOC)
			Reading	Change	Reading	Change	Reading	Change	Reading	Change	Reading	Change	Reading	Change		
0920	X		6.09		.245		234.3		0.66		15.7		14.84			
0925	X		6.05		.245		238.4		0.20		14.3		14.74			
0930	X		6.07		.244		240.7		0.08		8.6		14.60			
0935	X		6.08		.244		243.0		0.05		7.0		14.61			
0940	X		6.08		.244		244.3		0.04		8.1		14.70			
0945		X	6.08		.244		245.4		0.04		7.9		14.67			
Stability Criteria:			+/- 0.1 S.U.		+/- 3%		+/- 10mV		+/- 10%		+/- 10%		+/- 3%		<500 ml/min	<0.3'

Comments:

transparent, colorless, odorless

Site:	Liberty Industrial Finishing Superfund Site	**Consulting Firm:**	AMO Environmental Decisions
Date:	7/11/18	**Field Personnel:**	T. Ruggerio, V. Piazza
Weather:	80°		

Monitor Well #:	17B	**Well Depth:**	54.30'	**Screened Interval:**	
Well Permit #:		**Well Diameter:**	4"		

PID Reading (ppm)

Background:	0	**Pump Intake Depth:**	50'	**ft. below TOC**
Beneath Outer Cap:	0	**DTW Before Pump Installed:**	9.51'	**ft. below TOC**
Beneath Inner Cap:	0			

Time	Purge	Sample	pH (Standard Units)		Specific Conductivity (mS/cm)		Redox Potential (mv)		Dissolved Oxygen (mg/l)		Turbidity (NTU)		Temperature (Degrees C)		Pump Rate (g/min)	DTW (ft. below TOC)
			Reading	Change	Reading	Change	Reading	Change	Reading	Change	Reading	Change	Reading	Change		
1035	X		5.82		.326		259.3		0.62		1003.4		16.14			
1040	X		5.77		.324		265.1		0.26		21.0		16.10			
1045	X		5.79		.322		267.3		0.14		23.2		16.05			
1050	X		5.79		.322		268.8		0.11		23.4		16.07			
1055	X		5.79		.322		270.6		0.10		24.9		16.10			
1100	X		5.79		.322		271.8		0.09		26.4		16.12			
1105		X	5.79		.322		272.7		0.09		24.8		16.14			
Stability Criteria:			+/- 0.1 S.U.		+/- 3%		+/- 10mV		+/- 10%		+/- 10%		+/- 3%		<500 ml/min	<0.3'

Comments:

transparent, colorless, odorless

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Site:	Liberty Industrial Finishing Superfund Site	**Consulting Firm:**	AMO Environmental Decisions
Date:	7/11/18	**Field Personnel:**	T. Ruggerio, V. Piazza
Weather:	82°		

Monitor Well #:	29B	**Well Depth:**	50.90'	**Screened Interval:**	
Well Permit #:		**Well Diameter:**	4"		

PID Reading (ppm)

Background:	0	**Pump Intake Depth:**	45'	**ft. below TOC**
Beneath Outer Cap:	0	**DTW Before Pump Installed:**	16.55'	**ft. below TOC**
Beneath Inner Cap:	0			

Time	Purge	Sample	pH (Standard Units) Reading	pH Change	Specific Conductivity (mS/cm) Reading	Specific Conductivity Change	Redox Potential (mv) Reading	Redox Potential Change	Dissolved Oxygen (mg/l) Reading	Dissolved Oxygen Change	Turbidity (NTU) Reading	Turbidity Change	Temperature (Degrees C) Reading	Temperature Change	Pump Rate (g/min)	DTW (ft. below TOC)
1200	X		5.94		.509		258.6		0.16		2.9		15.83			
1208	X		6.00		.505		256.0		0.06		3.1		15.65			
1210	X		6.00		.501		256.6		0.03		3.3		15.62			
1215	X		6.00		.498		257.6		0.03		2.9		15.65			
1220	X		6.00		.494		258.4		0.03		2.8		15.62			
1225		X	5.99		.490		259.1		0.03		2.7		15.68			
Stability Criteria:			+/- 0.1 S.U.		+/- 3%		+/- 10mV		+/- 10%		+/- 10%		+/- 3%		<500 ml/min	<0.3'

Comments:

transparent, colorless, odorless

Site:	Liberty Industrial Finishing Superfund Site	**Consulting Firm:**	AMO Environmental Decisions
Date:	7/11/18	**Field Personnel:**	T. Ruggerio, V. Piazza
Weather:	83°		

Monitor Well #:	2BR	**Well Depth:**	58.20'	**Screened Interval:**	
Well Permit #:		**Well Diameter:**	2"		

PID Reading (ppm)

Background:	0	**Pump Intake Depth:**	55'	**ft. below TOC**
Beneath Outer Cap:	0	**DTW Before Pump Installed:**	17.45'	**ft. below TOC**
Beneath Inner Cap:	0			

Time	Purge	Sample	pH (Standard Units)		Specific Conductivity (mS/cm)		Redox Potential (mv)		Dissolved Oxygen (mg/l)		Turbidity (NTU)		Temperature (Degrees C)		Pump Rate (g/min)	DTW (ft. below TOC)
			Reading	Change	Reading	Change	Reading	Change	Reading	Change	Reading	Change	Reading	Change		
1325	X		5.42		0.280		246.5		0.26		1757.6		15.26			
1330	X		5.32		.281		258.7		0.06		1524.5		15.41			
1335	X		5.41		.282		265.4		0.02		592.1		15.44			
1340	X		5.40		.285		272.8		0.01		330.3		15.81			
1345	X		5.39		.288		276.2		0.01		226.3		15.84			
1350	X		5.39		.290		277.5		0.01		161.1		15.86			
1355	X		5.39		.286		278.5		0.01		170.9		15.80			
1400		X	5.39		.284		277.9		0.01		167.3		15.76			
Stability Criteria:			+/- 0.1 S.U.		+/- 3%		+/- 10mV		+/- 10%		+/- 10%		+/- 3%		<500 ml/min	<0.3'

Comments:

tan color, translucent, odorless

Site:	Liberty Industrial Finishing Superfund Site	**Consulting Firm:**	AMO Environmental Decisions
Date:	7/11/18	**Field Personnel:**	T. Ruggerio, V. Piazza
Weather:	84°		

Monitor Well #:	2AR	**Well Depth:**	29.20'	**Screened Interval:**	
Well Permit #:		**Well Diameter:**	2"		

PID Reading (ppm)

Background:	0	**Pump Intake Depth:**	28'	**ft. below TOC**
Beneath Outer Cap:	0	**DTW Before Pump Installed:**	17.41'	**ft. below TOC**
Beneath Inner Cap:	0			

Time	Purge	Sample	pH (Standard Units)		Specific Conductivity (mS/cm)		Redox Potential (mv)		Dissolved Oxygen (mg/l)		Turbidity (NTU)		Temperature (Degrees C)		Pump Rate (g/min)	DTW (ft. below TOC)
			Reading	Change	Reading	Change	Reading	Change	Reading	Change	Reading	Change	Reading	Change		
1425	X		6.27		.361		267.4		0.27		106.7		14.17			
1430	X		6.31		.350		253.2		0.12		74.5		13.78			
1435	X		6.19		.313		233.5		0.04		18.1		13.54			
1440	X		6.08		.299		236.2		0.02		8.9		13.06			
1445	X		6.06		.303		238.7		0.02		8.9		13.20			
1450		X	6.04		.299		240.2		0.02		8.5		13.16			
Stability Criteria:			+/- 0.1 S.U.		+/- 3%		+/- 10mV		+/- 10%		+/- 10%		+/- 3%		<500 ml/min	<0.3'

Comments:

transparent, colorless, odorless

Site: Liberty Industrial Finishing Superfund Site
Date: 7/11/18
Weather: 85°

Consulting Firm: AMO Environmental Decisions
Field Personnel: T. Ruggerio, V. Piazza

Monitor Well #: 5
Well Permit #:
Well Depth: 28.50'
Well Diameter: 4"
Screened Interval:

PID Reading (ppm)
Background: 0
Beneath Outer Cap: 0
Beneath Inner Cap: 0

Pump Intake Depth: 28' ft. below TOC
DTW Before Pump Installed: 20.96' ft. below TOC

Time	Purge	Sample	pH (Standard Units)		Specific Conductivity (mS/cm)		Redox Potential (mv)		Dissolved Oxygen (mg/l)		Turbidity (NTU)		Temperature (Degrees C)		Pump Rate (g/min)	DTW (ft. below TOC)
			Reading	Change	Reading	Change	Reading	Change	Reading	Change	Reading	Change	Reading	Change		
1505	X		6.08		.292		230.2		0.08		18.2		14.05			
1510	X		6.10		.288		221.9		0.01		13.4		13.98			
1515	X		6.11		.290		221.1		0.04		11.1		13.97			
1520	X		6.11		.293		221.4		0.04		8.7		13.93			
1525	X		6.12		.292		221.9		0.04		8.6		13.87			
1530		X	6.12		.292		222.2		0.03		8.8		13.90			
Stability Criteria:			+/- 0.1 S.U.		+/- 3%		+/- 10mV		+/- 10%		+/- 10%		+/- 3%		<500 ml/min	<0.3'

Comments: transparent, colorless, odorless

Site: Liberty Industrial Finishing Superfund Site
Date: 7/12/18
Weather:

Consulting Firm: AMO Environmental Decisions
Field Personnel: T. Ruggerio, V. Piazza

Monitor Well #: 7A
Well Permit #: 82
Well Depth: 27.90'
Well Diameter: 4"
Screened Interval:

PID Reading (ppm)
Background: 0
Beneath Outer Cap: 0
Beneath Inner Cap: 0

Pump Intake Depth: 26' ft. below TOC
DTW Before Pump Installed: 20.19" ft. below TOC

Time	Purge	Sample	pH (Standard Units)		Specific Conductivity (mS/cm)		Redox Potential (mv)		Dissolved Oxygen (mg/l)		Turbidity (NTU)		Temperature (Degrees C)		Pump Rate (g/min)	DTW (ft. below TOC)
			Reading	Change	Reading	Change	Reading	Change	Reading	Change	Reading	Change	Reading	Change		
1115	X		7.09		.782		224.7		0.00		28.7		15.21			
1120	X		6.65		.776		229.9		0.05		18.3		14.90			
1125	X		6.57		.758		227.9		0.04		8.2		14.78			
1130	X		6.56		.754		226.7		0.04		6.4		14.96			
1135	X		6.55		.751		226.2		0.04		5.8		14.98			
1140		X	6.55		.750		225.8		0.04		5.4		14.91			
Stability Criteria:			+/- 0.1 S.U.		+/- 3%		+/- 10mV		+/- 10%		+/- 10%		+/- 3%		<500 ml/min	<0.3'

Comments: transparent, colorless, odorless

Site: Liberty Industrial Finishing Superfund Site
Date: 7/12/18
Weather: 82°

Consulting Firm: AMO Environmental Decisions
Field Personnel: T. Ruggerio, V. Piazza

Monitor Well #: 7B
Well Permit #:
Well Depth: 61.90'
Well Diameter: 4"
Screened Interval:

PID Reading (ppm)
Background: 0
Beneath Outer Cap: 0
Beneath Inner Cap: 0

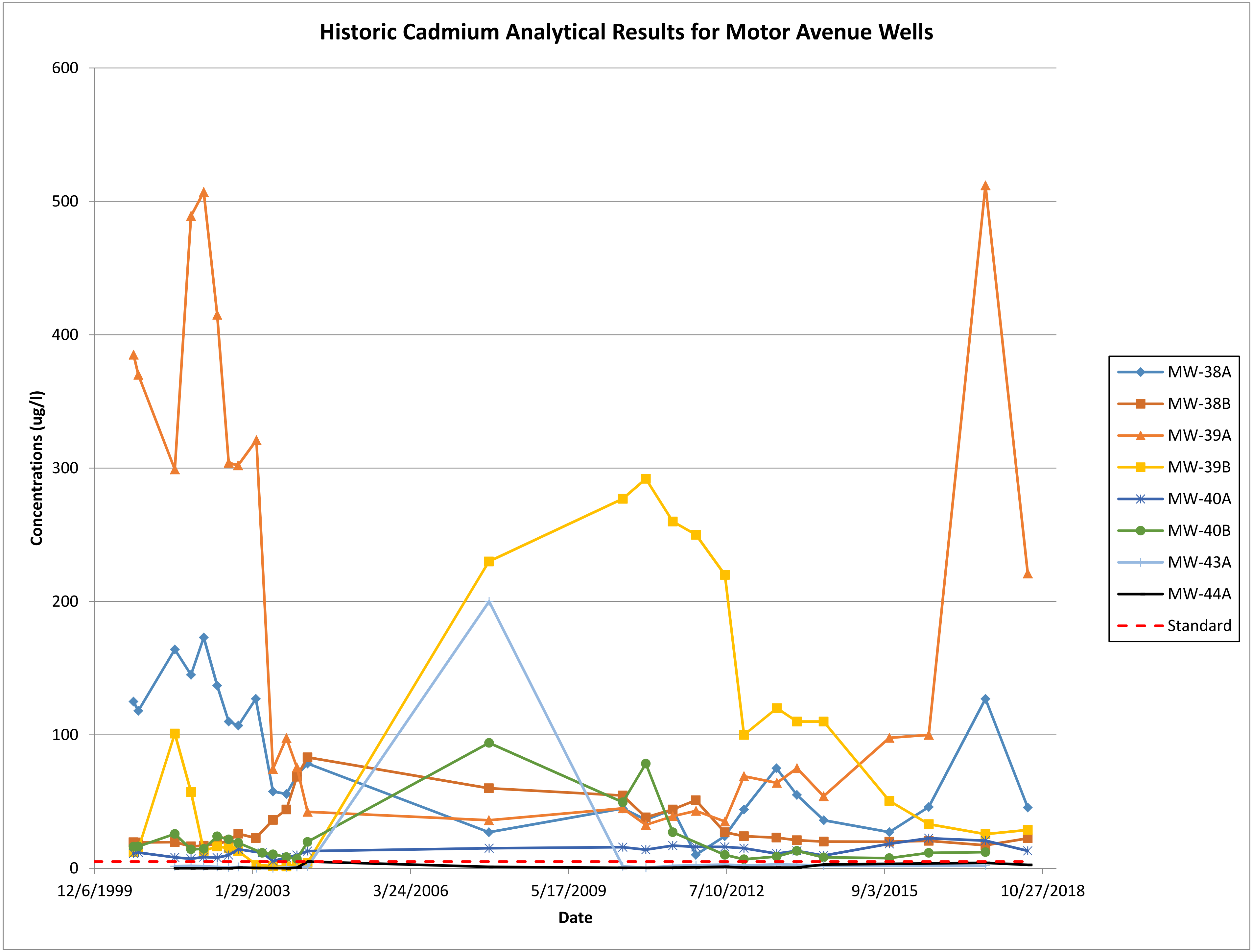
Pump Intake Depth: 60' ft. below TOC
DTW Before Pump Installed: 19.64' ft. below TOC

Time	Purge	Sample	pH (Standard Units) Reading	pH Change	Specific Conductivity (mS/cm) Reading	Specific Conductivity Change	Redox Potential (mv) Reading	Redox Potential Change	Dissolved Oxygen (mg/l) Reading	Dissolved Oxygen Change	Turbidity (NTU) Reading	Turbidity Change	Temperature (Degrees C) Reading	Temperature Change	Pump Rate (g/min)	DTW (ft. below TOC)
1150	X		5.89		.419		252.9		0.03		40.9		15.98			
1155	X		5.76		.419		253.4		0.00		14.3		15.81			
1200	X		5.75		.420		252.2		0.00		8.9		15.65			
1205	X		5.74		.419		251.2		0.00		7.0		15.58			
1210	X		5.74		.417		250.0		0.00		6.8		15.60			
1215		X	5.74		.415		248.9		0.00		6.5		15.70			
Stability Criteria:			+/- 0.1 S.U.		+/- 3%		+/- 10mV		+/- 10%		+/- 10%		+/- 3%		<500 ml/min	<0.3'

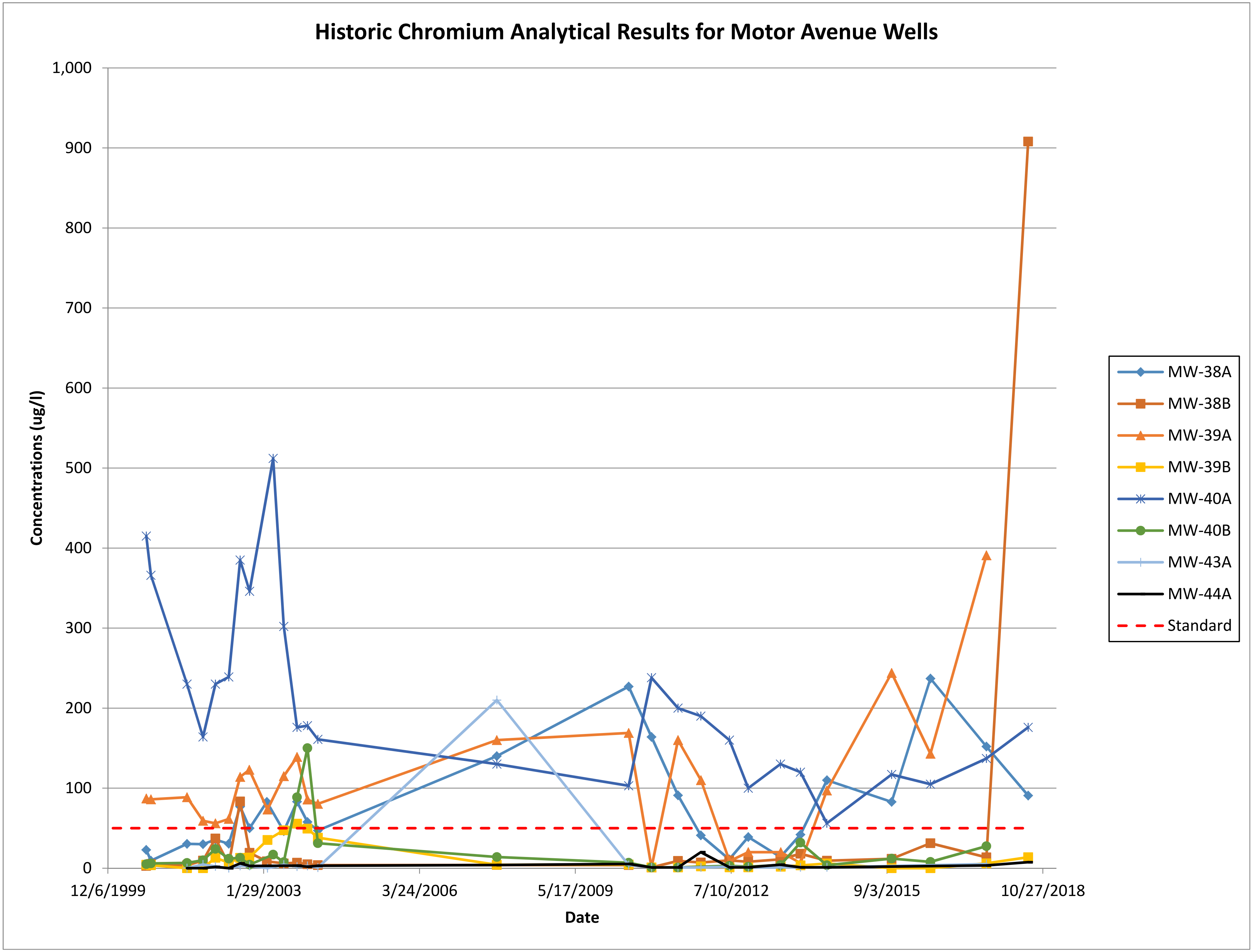
Comments:
transport, colorless, odorless

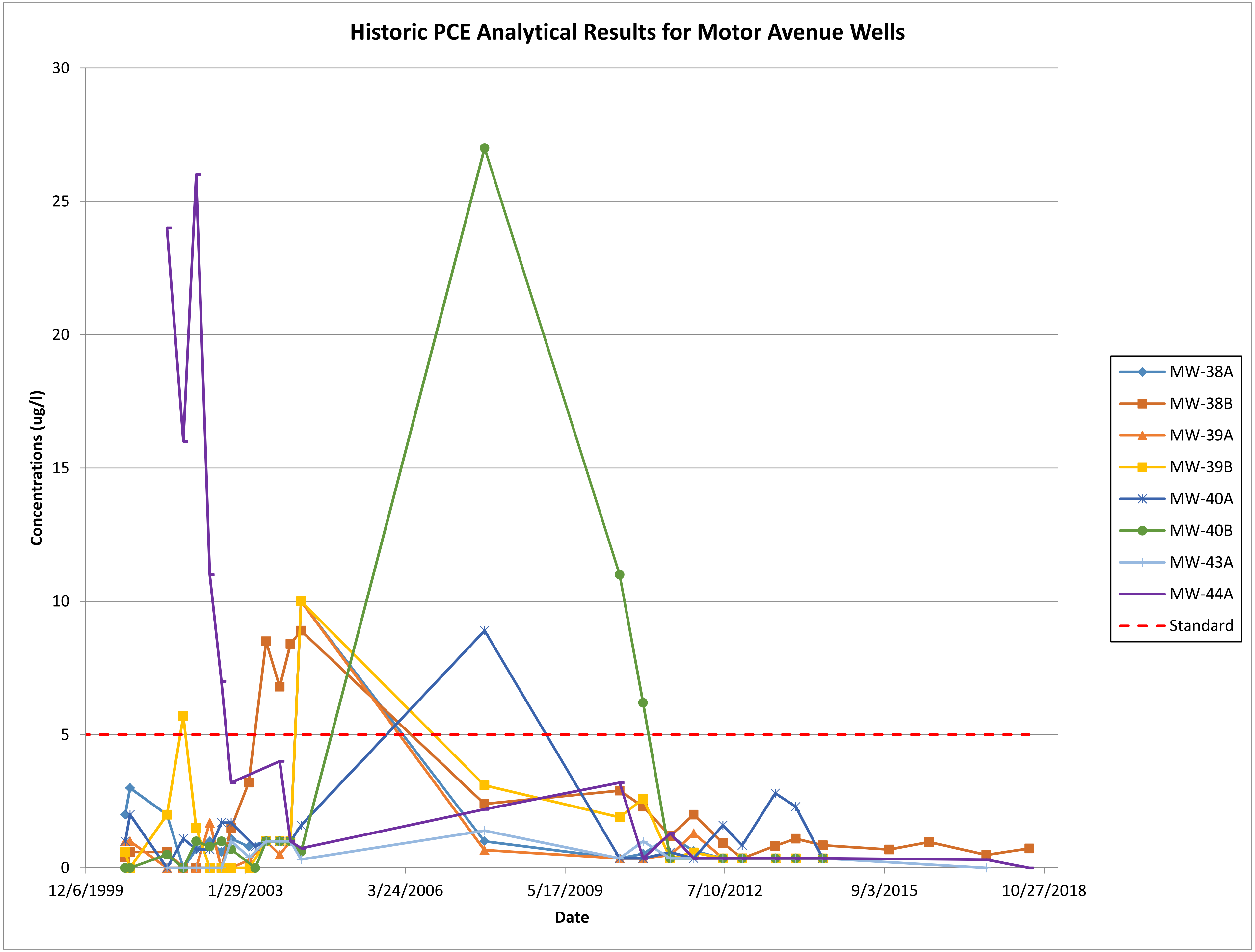
APPENDIX B

HISTORIC DATA GRAPHS

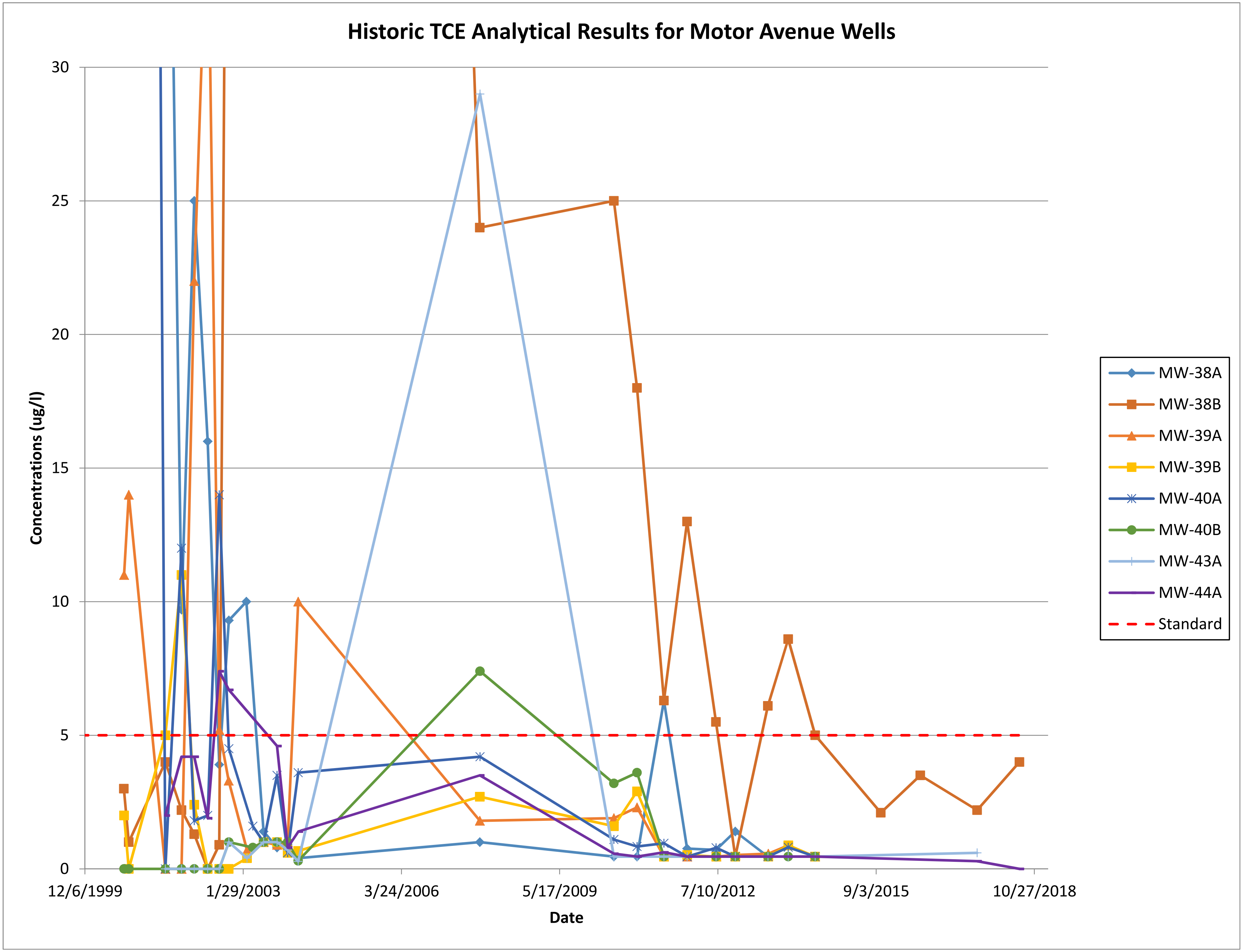


Historic Cadmium Analytical Results for Motor Avenue Wells
600
500
400
300
200
100
0
Concentrations (ug/l)
12/6/1999
1/29/2003
3/24/2006
5/17/2009
7/10/2012
9/3/2015
10/27/2018
Date
MW-38A
MW-38B
MW-39A
MW-39B
MW-40A
MW-40B
MW-43A
MW-44A
Standard

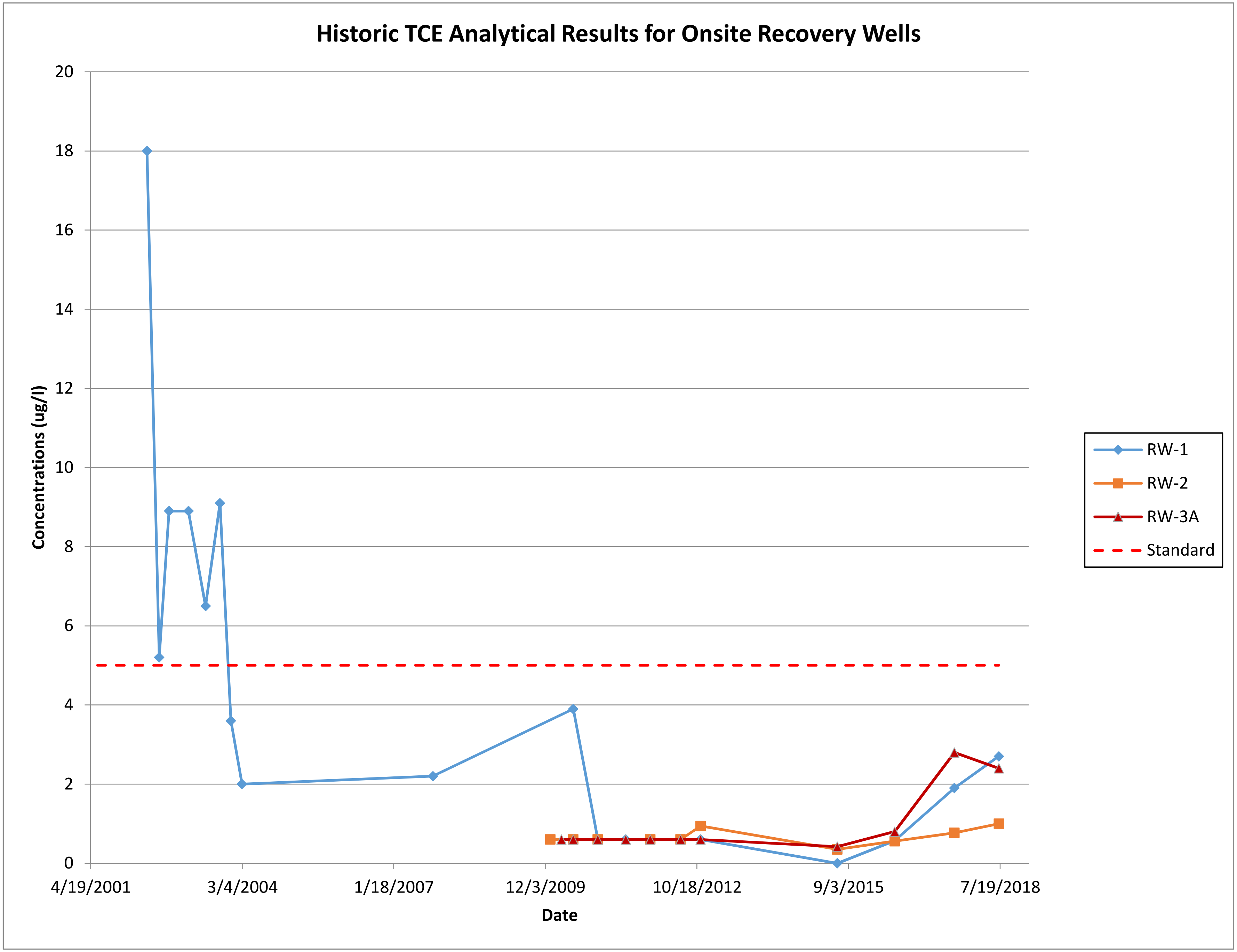

Historic Chromium Analytical Results for Motor Avenue Wells
Concentrations (ug/l)
1,000
900
800
700
600
500
400
300
200
100
0
12/6/1999
1/29/2003
3/24/2006
5/17/2009
7/10/2012
9/3/2015
10/27/2018
Date
MW-38A
MW-38B
MW-39A
MW-39B
MW-40A
MW-40B
MW-43A
MW-44A
Standard



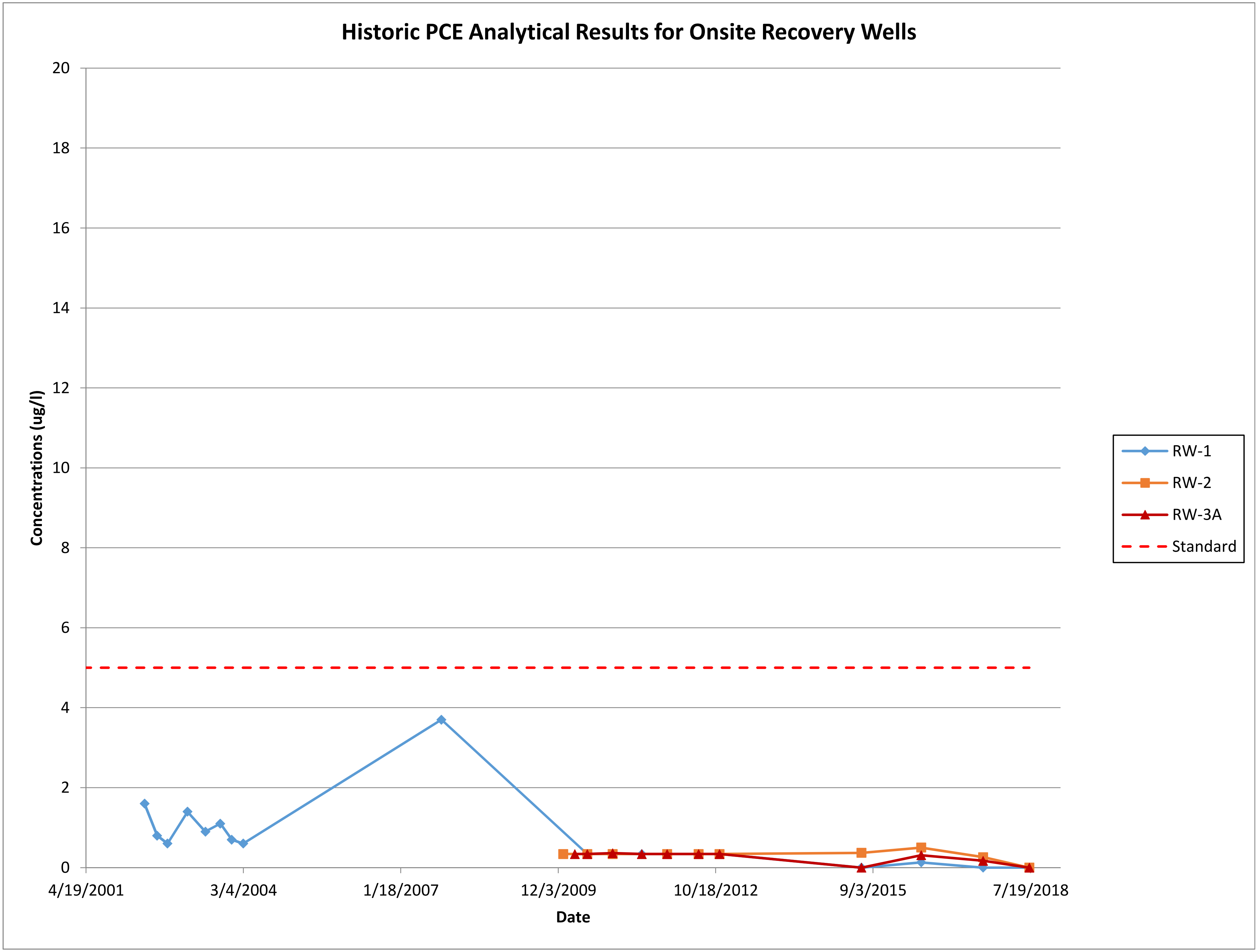
Historic PCE Analytical Results for Motor Avenue Wells
Concentrations (ug/l)
30
25
20
15
10
5
0
12/6/1999
1/29/2003
3/24/2006
5/17/2009
7/10/2012
9/3/2015
10/27/2018
Date
MW-38A
MW-38B
MW-39A
MW-39B
MW-40A
MW-40B
MW-43A
MW-44A
Standard

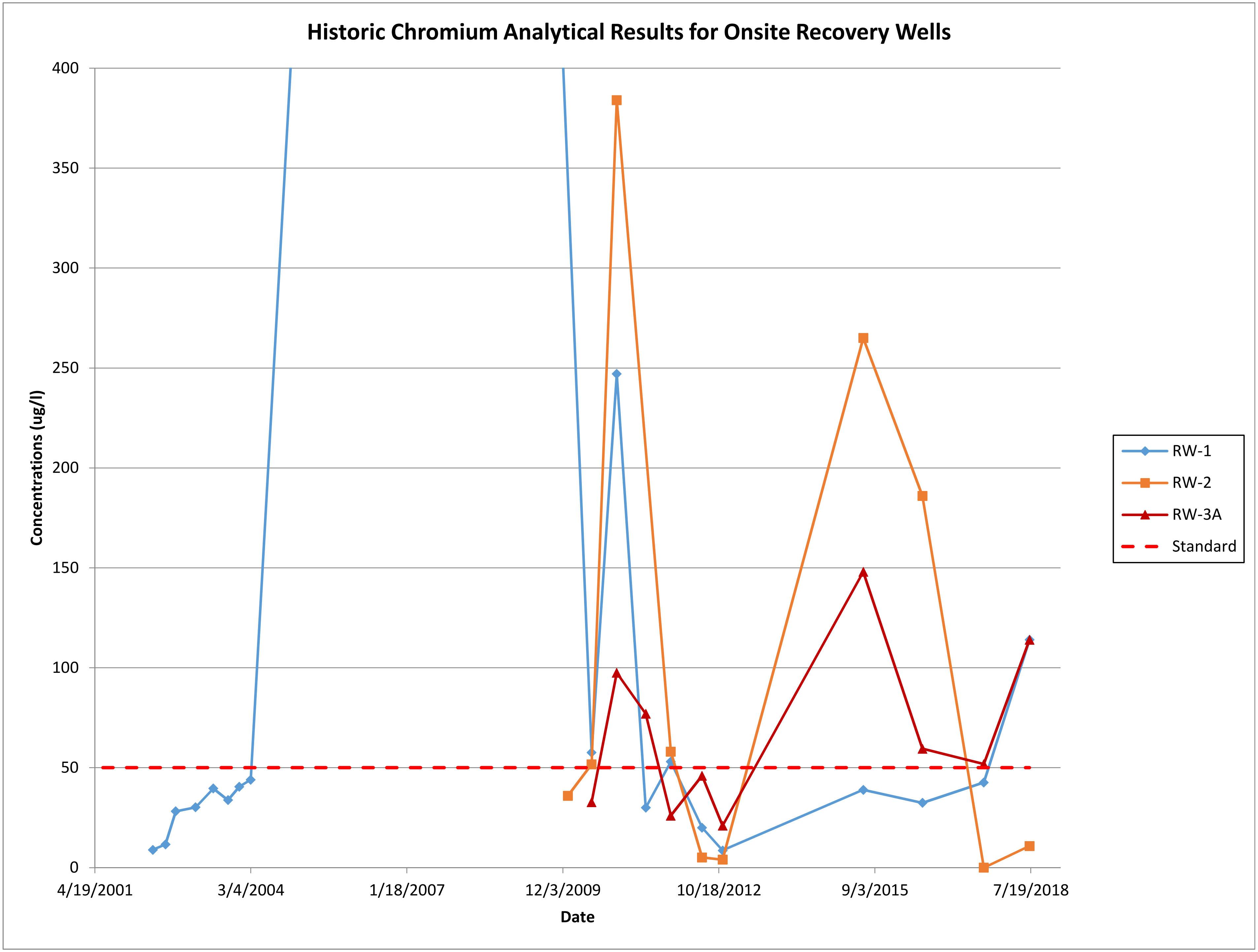


Historic TCE Analytical Results for Motor Avenue Wells
Concentrations (ug/l)
30
25
20
15
10
5
0
12/6/1999
1/29/2003
3/24/2006
5/17/2009
7/10/2012
9/3/2015
10/27/2018
Date
MW-38A
MW-38B
MW-39A
MW-39B
MW-40A
MW-40B
MW-43A
MW-44A
Standard

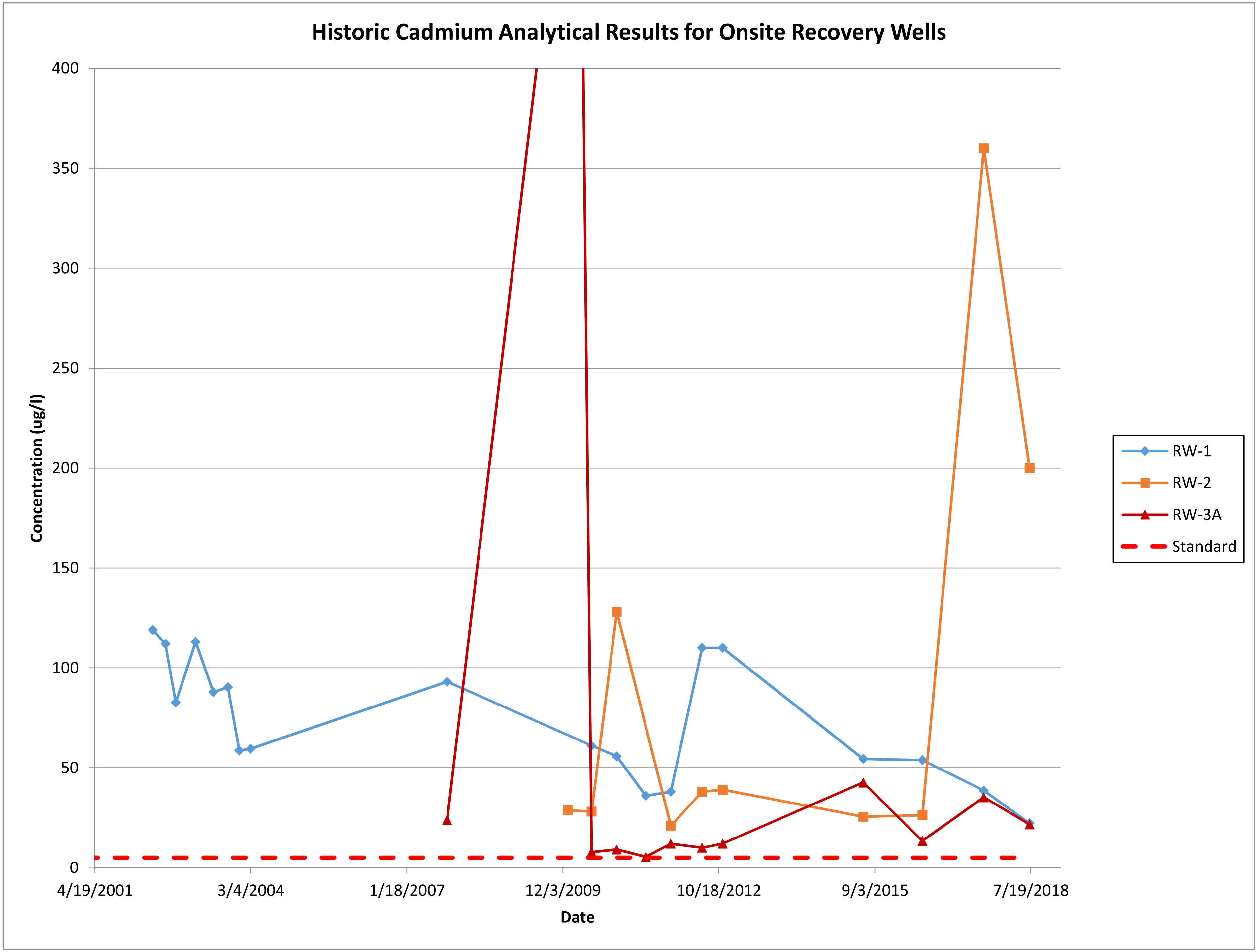


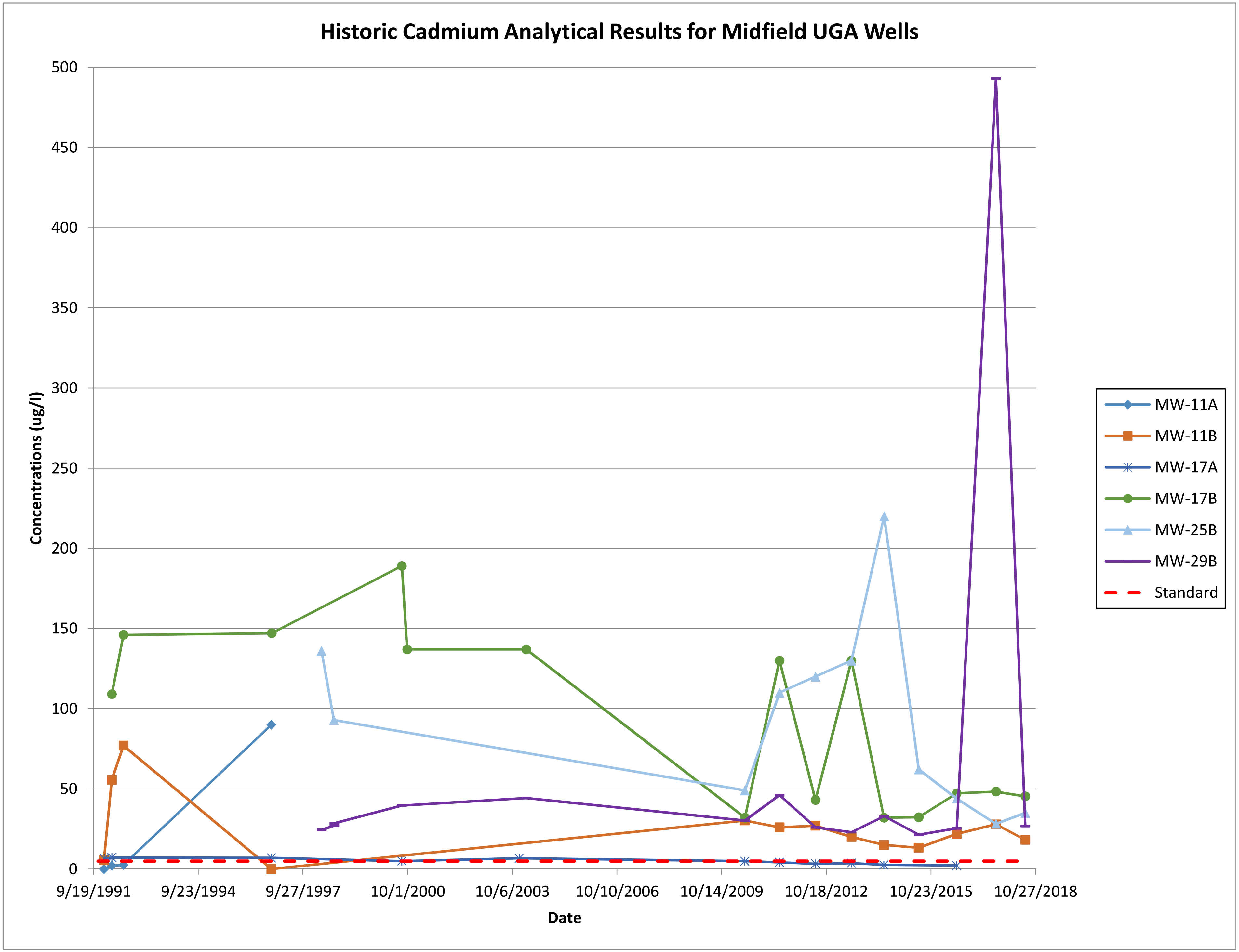
Historic TCE Analytical Results for Onsite Recovery Wells
Concentrations (ug/l)
20
18
16
14
12
10
8
6
4
2
0
4/19/2001
3/4/2004
1/18/2007
12/3/2009
10/18/2012
9/3/2015
7/19/2018
Date
RW-1
RW-2
RW-3A
Standard


Historic PCE Analytical Results for Onsite Recovery Wells
Concentrations (ug/l)
20
18
16
14
12
10
8
6
4
2
0
4/19/2001
3/4/2004
1/18/2007
12/3/2009
10/18/2012
9/3/2015
7/19/2018
Date
RW-1
RW-2
RW-3A
Standard

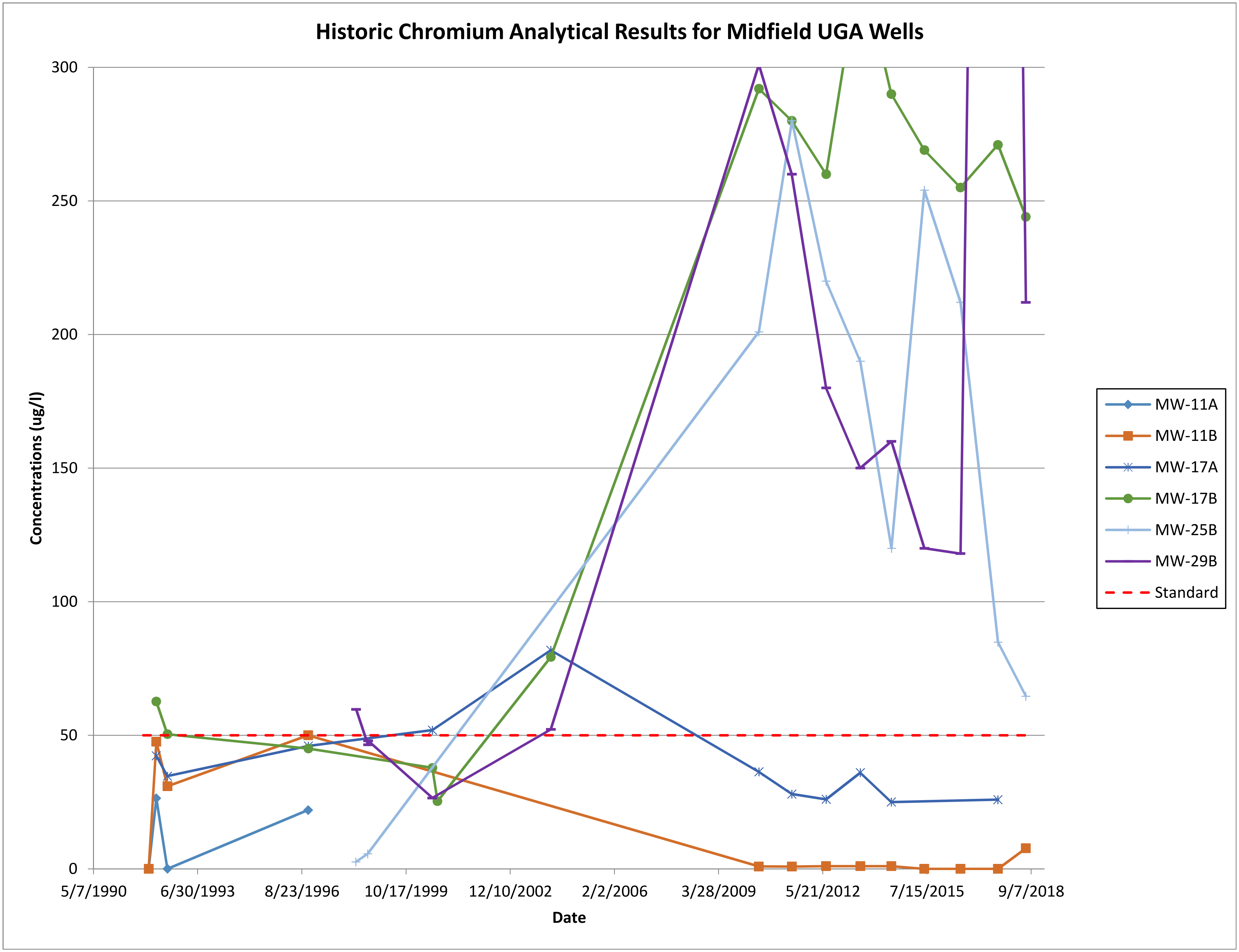


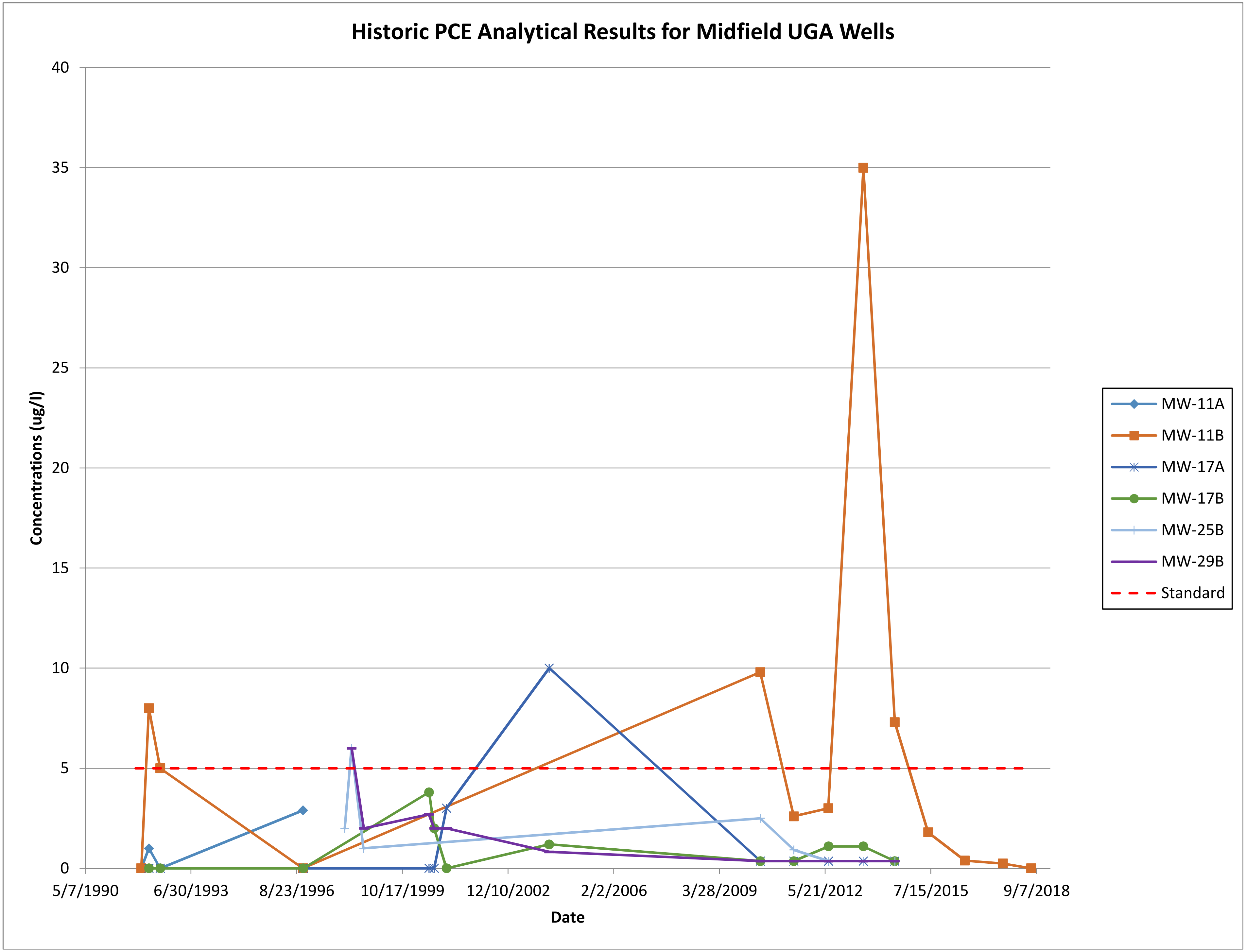
Historic Chromium Analytical Results for Onsite Recovery Wells
Concentrations (ug/l)
400
350
300
250
200
150
100
50
0
4/19/2001
3/4/2004
1/18/2007
12/3/2009
10/18/2012
9/3/2015
7/19/2018
Date
RW-1
RW-2
RW-3A
Standard

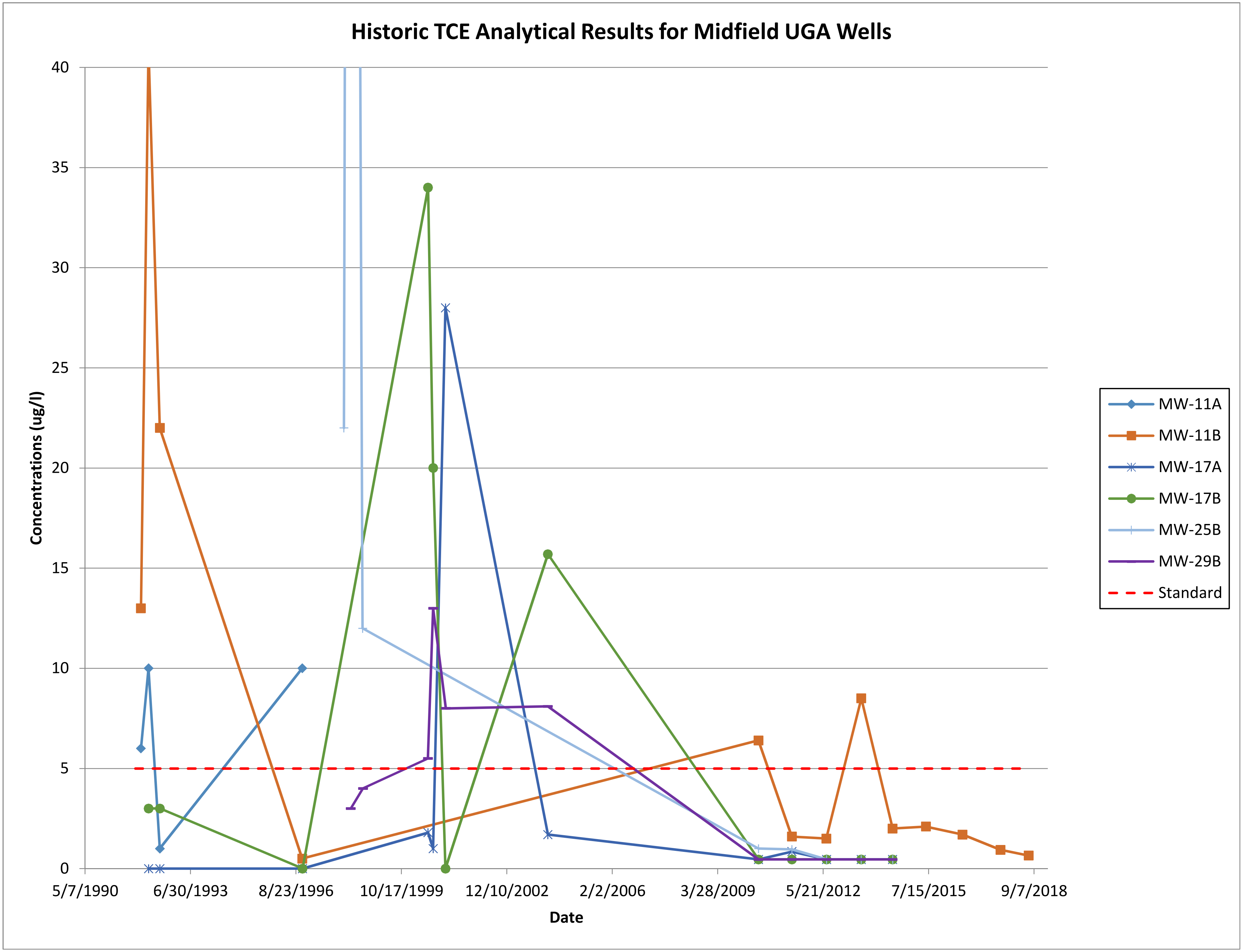

Historic Cadmium Analytical Results for Onsite Recovery Wells
Concentration (ug/l)
400
350
300
250
200
150
100
50
0
4/19/2001
3/4/2004
1/18/2007
12/3/2009
10/18/2012
9/3/2015
7/19/2018
Date
RW-1
RW-2
RW-3A
Standard

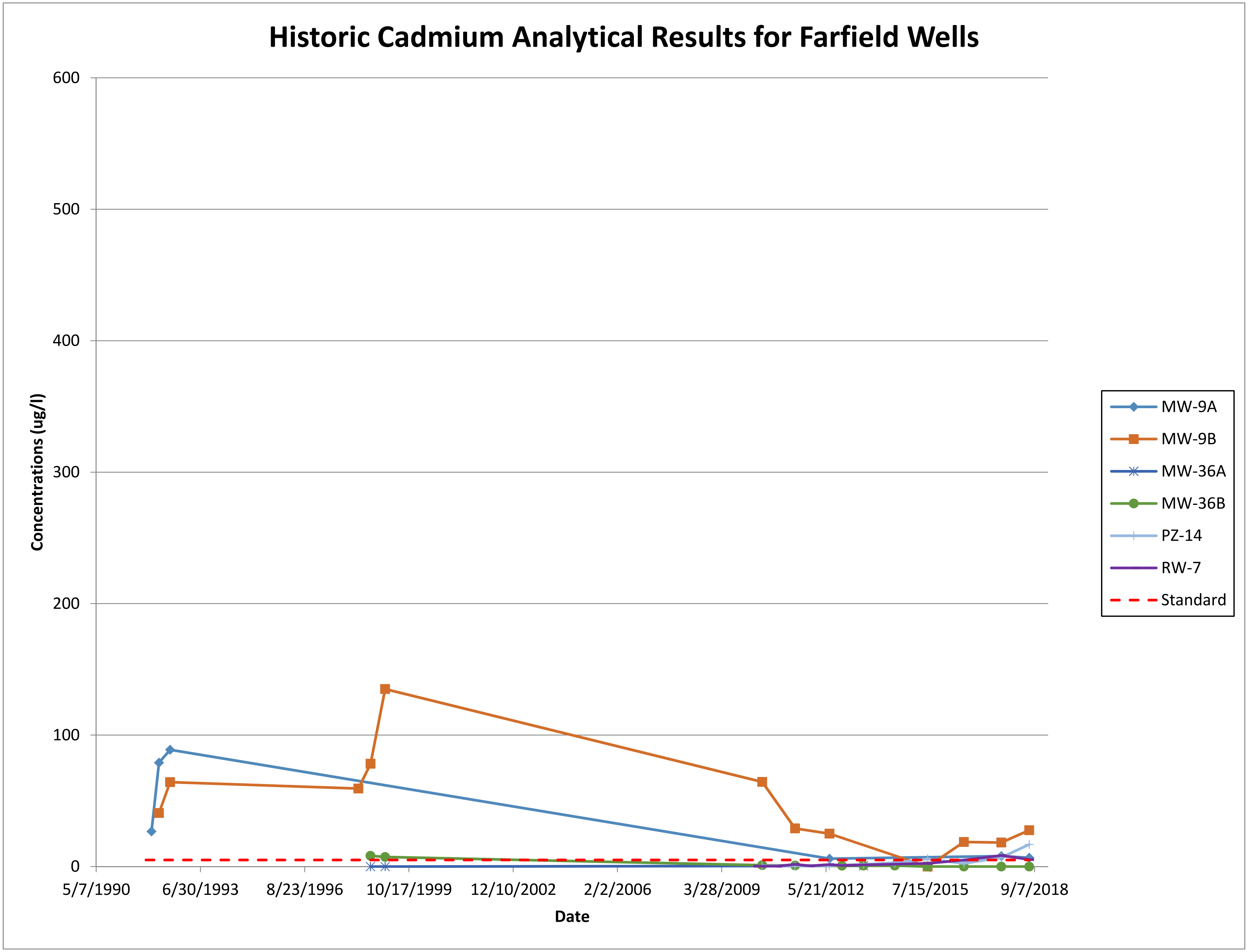


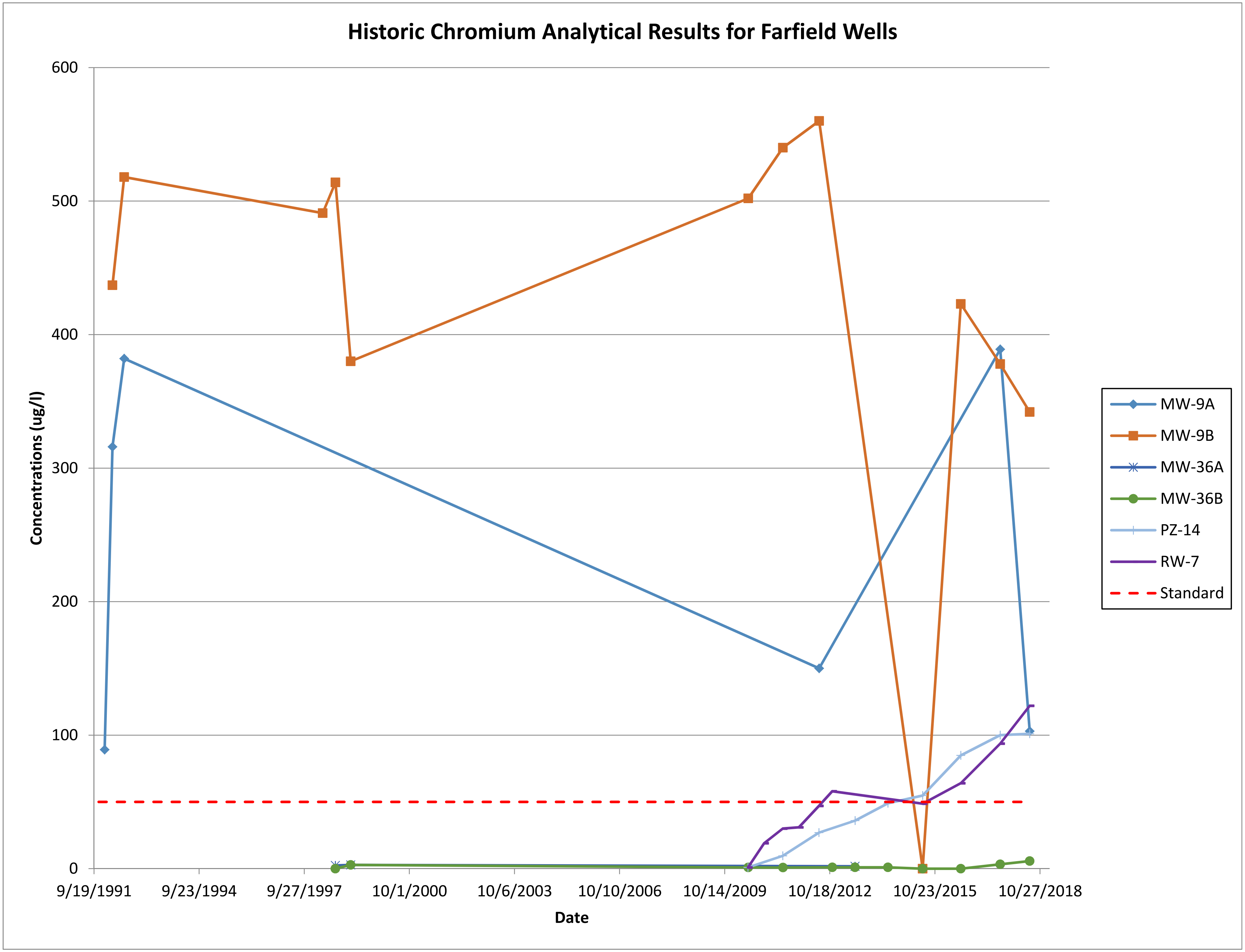
Historic Cadmium Analytical Results for Midfield UGA Wells
Concentrations (ug/l)
500
450
400
350
300
250
200
150
100
50
0
9/19/1991
9/23/1994
9/27/1997
10/1/2000
10/6/2003
10/10/2006
10/14/2009
10/18/2012
10/23/2015
10/27/2018
Date
MW-11A
MW-11B
MW-17A
MW-17B
MW-25B
MW-29B
Standard


Historic Chromium Analytical Results for Midfield UGA Wells
Concentrations (ug/l)
300
250
200
150
100
50
0
5/7/1990
6/30/1993
8/23/1996
10/17/1999
12/10/2002
2/2/2006
3/28/2009
5/21/2012
7/15/2015
9/7/2018
Date
MW-11A
MW-11B
MW-17A
MW-17B
MW-25B
MW-29B
Standard

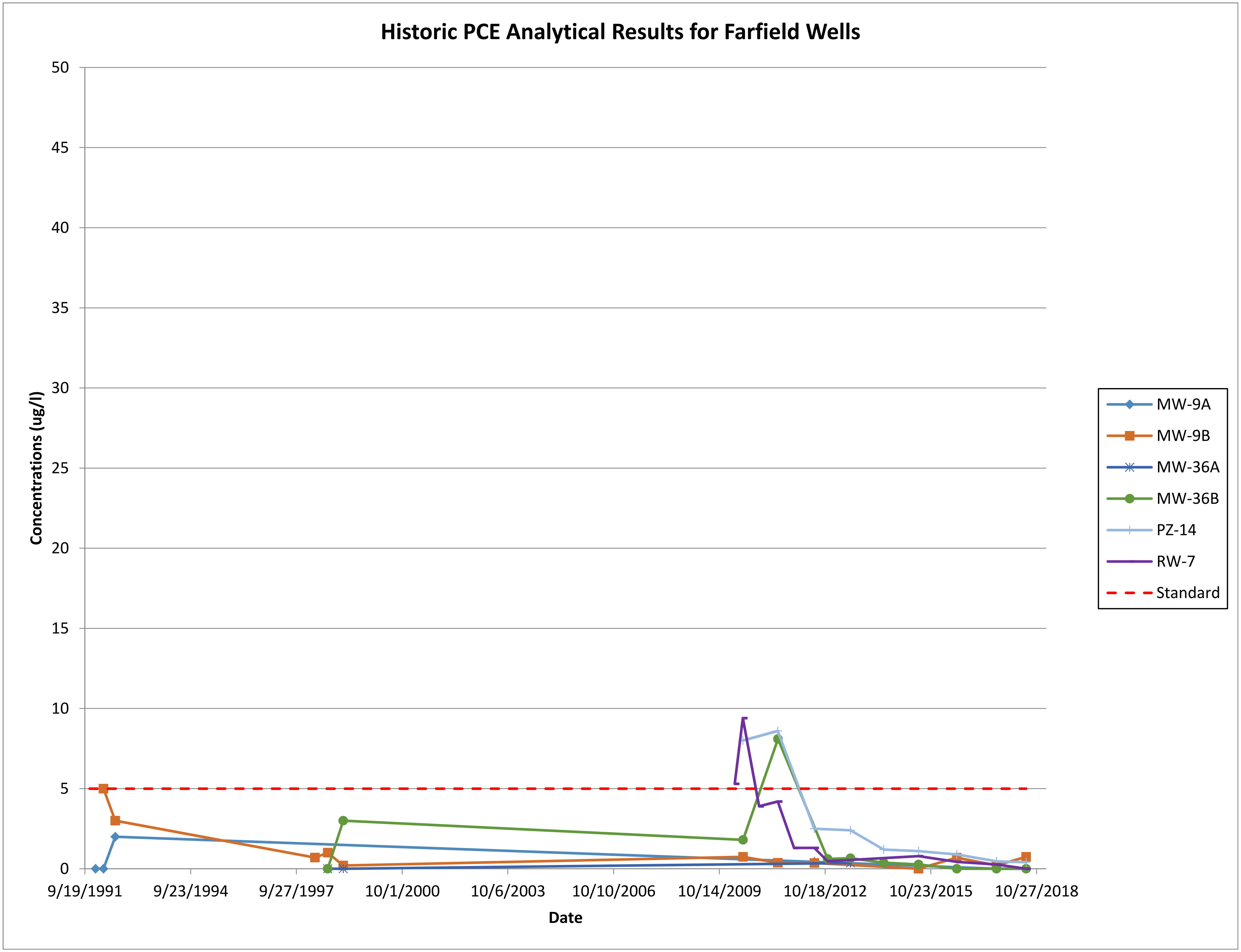

Historic PCE Analytical Results for Midfield UGA Wells
Concentrations (ug/l)
40
35
30
25
20
15
10
5
0
5/7/1990
6/30/1993
8/23/1996
10/17/1999
12/10/2002
2/2/2006
3/28/2009
5/21/2012
7/15/2015
9/7/2018
Date
MW-11A
MW-11B
MW-17A
MW-17B
MW-25B
MW-29B
Standard


Historic TCE Analytical Results for Midfield UGA Wells
Concentrations (ug/l)
40
35
30
25
20
15
10
5
0
5/7/1990
6/30/1993
8/23/1996
10/17/1999
12/10/2002
2/2/2006
3/28/2009
5/21/2012
7/15/2015
9/7/2018
Date
MW-11A
MW-11B
MW-17A
MW-17B
MW-25B
MW-29B
Standard

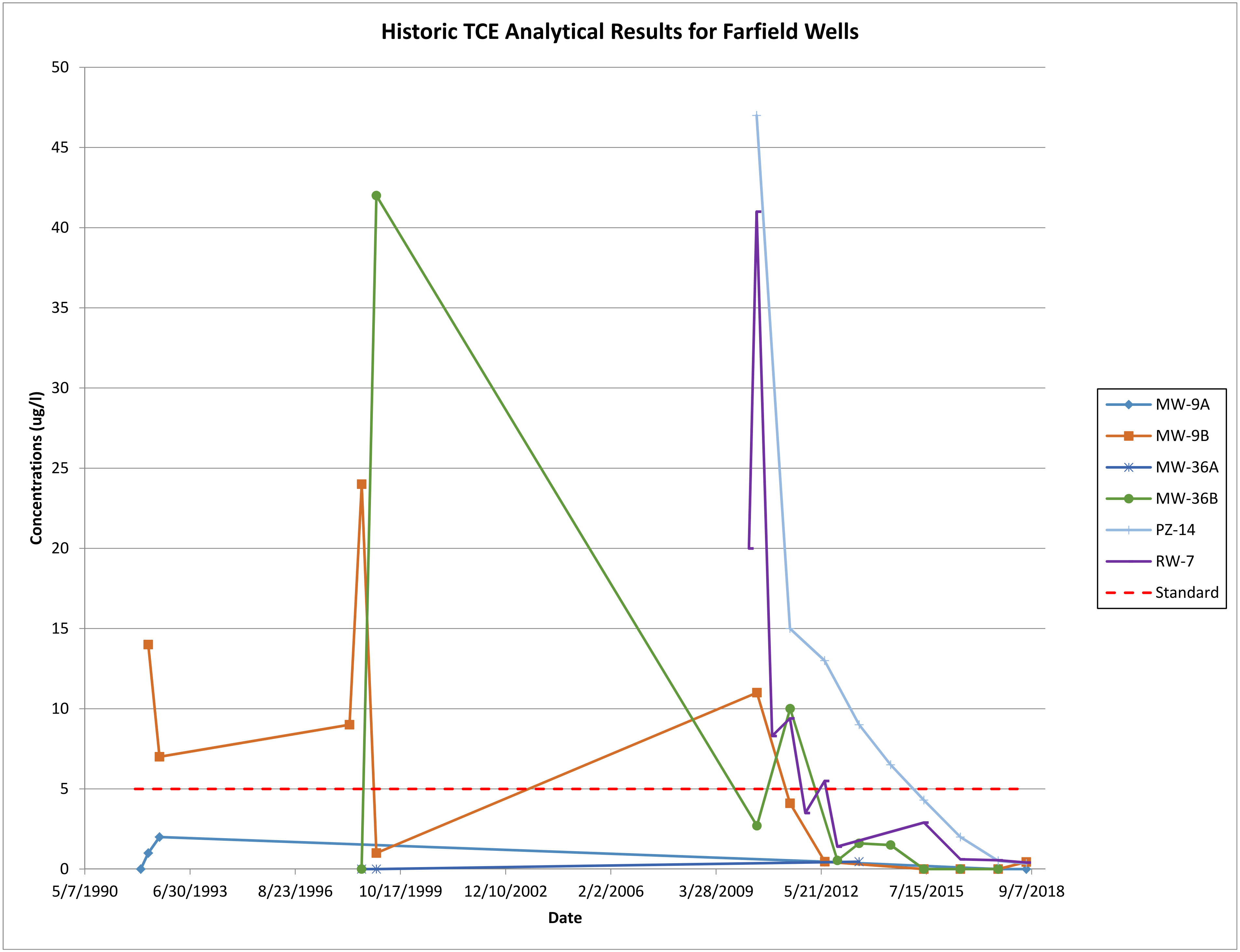

Historic Cadmium Analytical Results for Farfield Wells
600
500
400
300
200
100
0
Concentrations (ug/l)
5/7/1990
6/30/1993
8/23/1996
10/17/1999
12/10/2002
2/2/2006
3/28/2009
5/21/2012
7/15/2015
9/7/2018
Date
MW-9A
MW-9B
MW-36A
MW-36B
PZ-14
RW-7
Standard



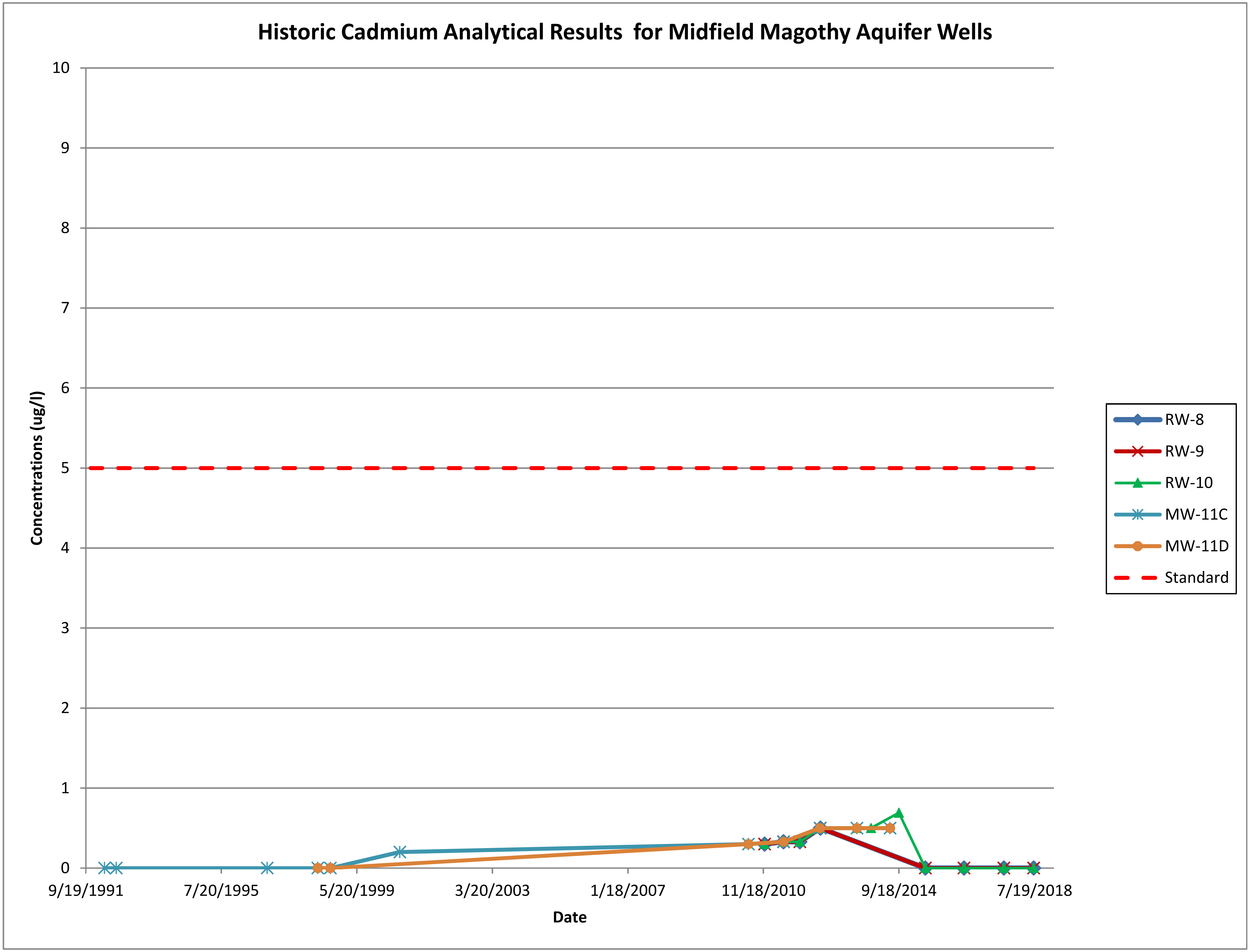
Historic Chromium Analytical Results for Farfield Wells
Concentrations (ug/l)
600
500
400
300
200
100
0
9/19/1991
9/23/1994
9/27/1997
10/1/2000
10/6/2003
10/10/2006
10/14/2009
10/18/2012
10/23/2015
10/27/2018
Date
MW-9A
MW-9B
MW-36A
MW-36B
PZ-14
RW-7
Standard

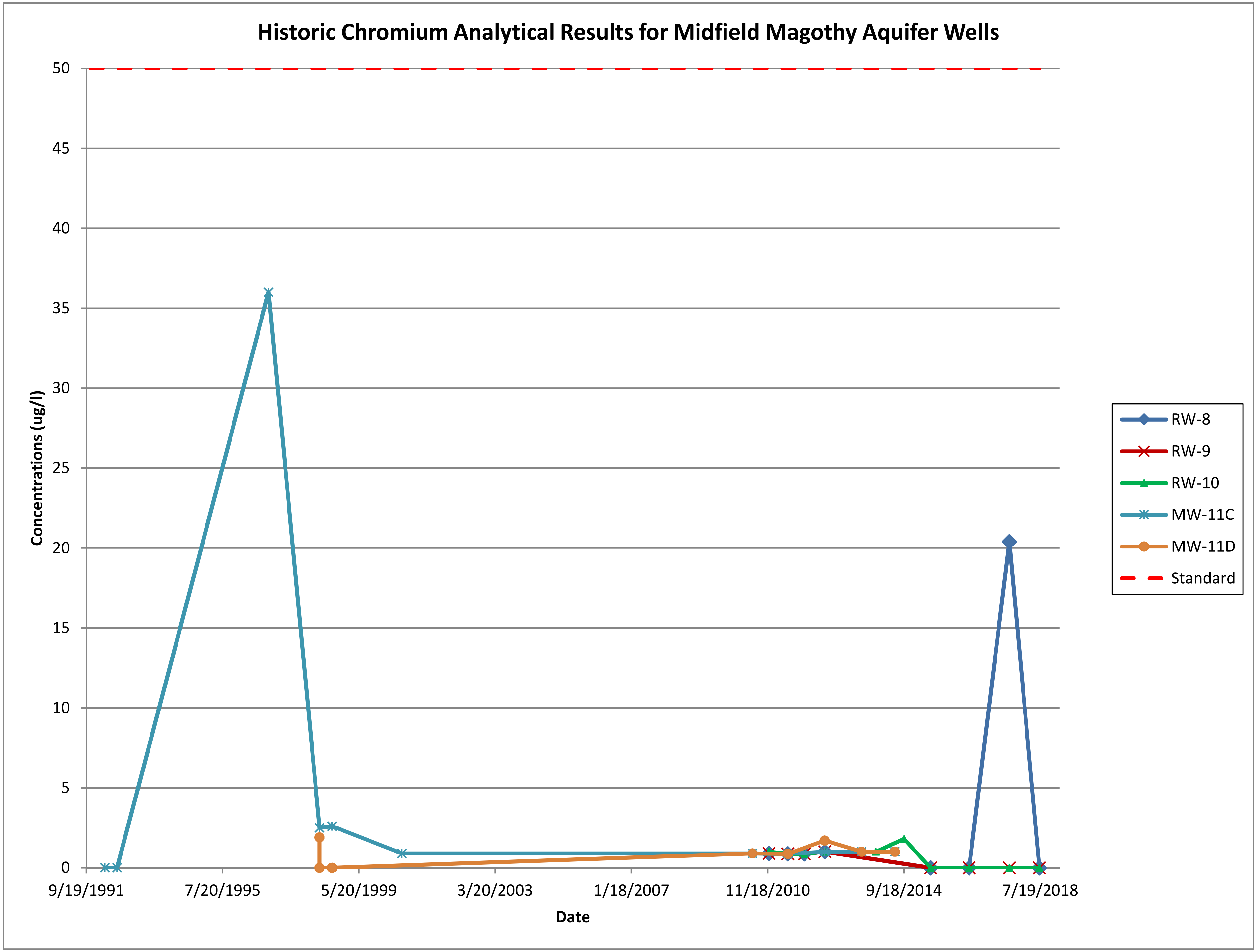


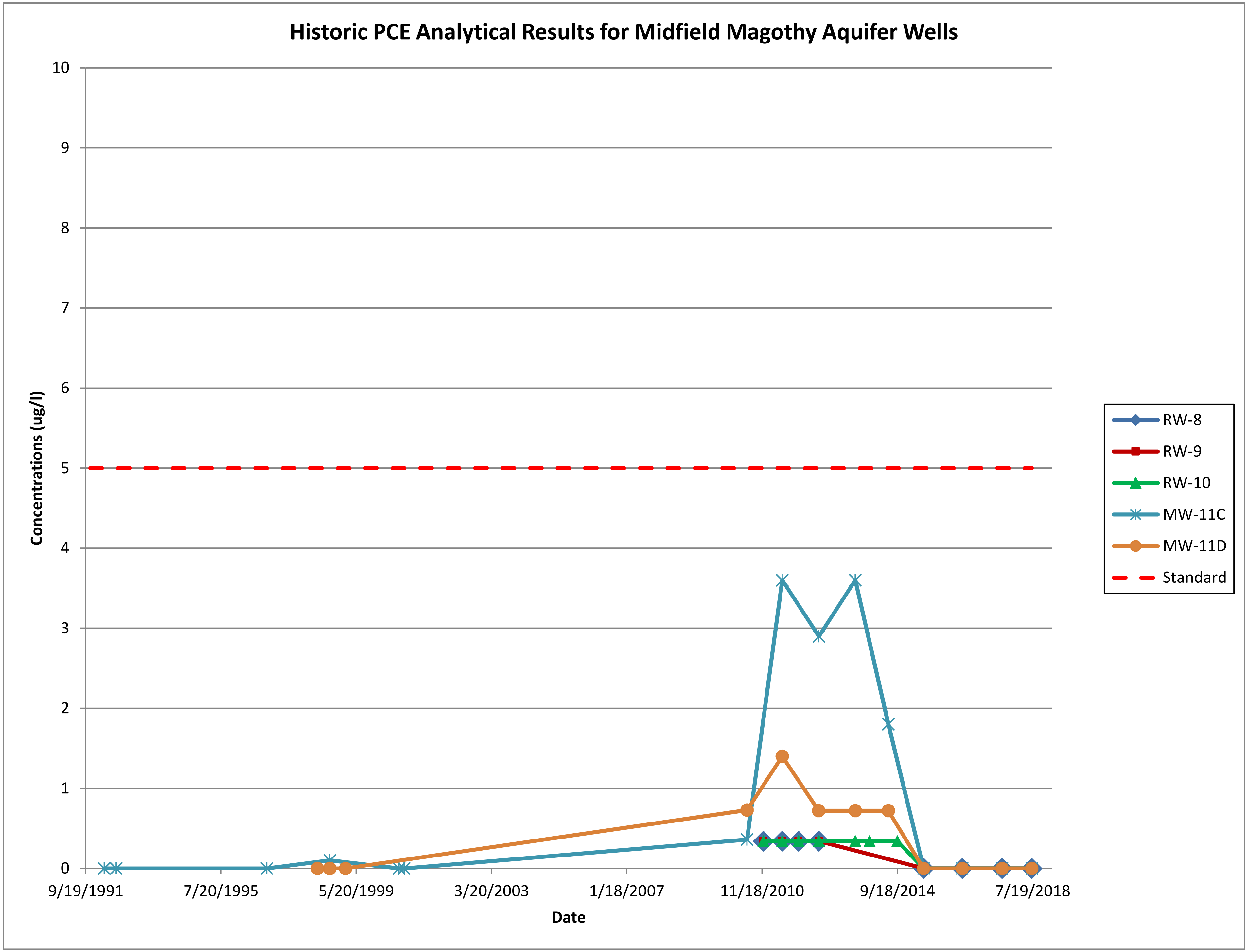
Historic PCE Analytical Results for Farfield Wells
Concentrations (ug/l)
50
45
40
35
30
25
20
15
10
5
0
9/19/1991
9/23/1994
9/27/1997
10/1/2000
10/6/2003
10/10/2006
10/14/2009
10/18/2012
10/23/2015
10/27/2018
Date
MW-9A
MW-9B
MW-36A
MW-36B
PZ-14
RW-7
Standard

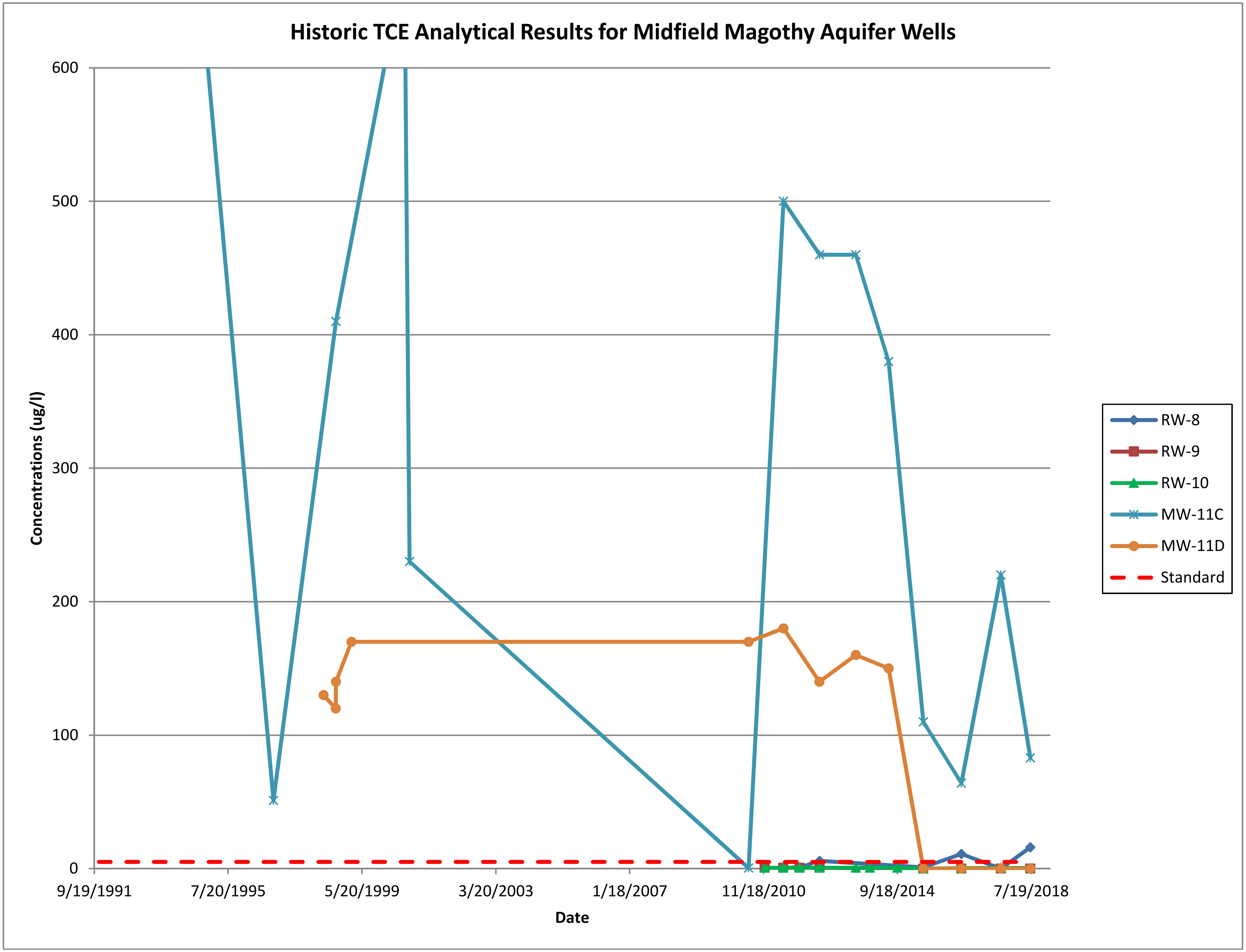


Historic TCE Analytical Results for Farfield Wells
Concentrations (ug/l)
50
45
40
35
30
25
20
15
10
5
0
5/7/1990
6/30/1993
8/23/1996
10/17/1999
12/10/2002
2/2/2006
3/28/2009
5/21/2012
7/15/2015
9/7/2018
Date
MW-9A
MW-9B
MW-36A
MW-36B
PZ-14
RW-7
Standard

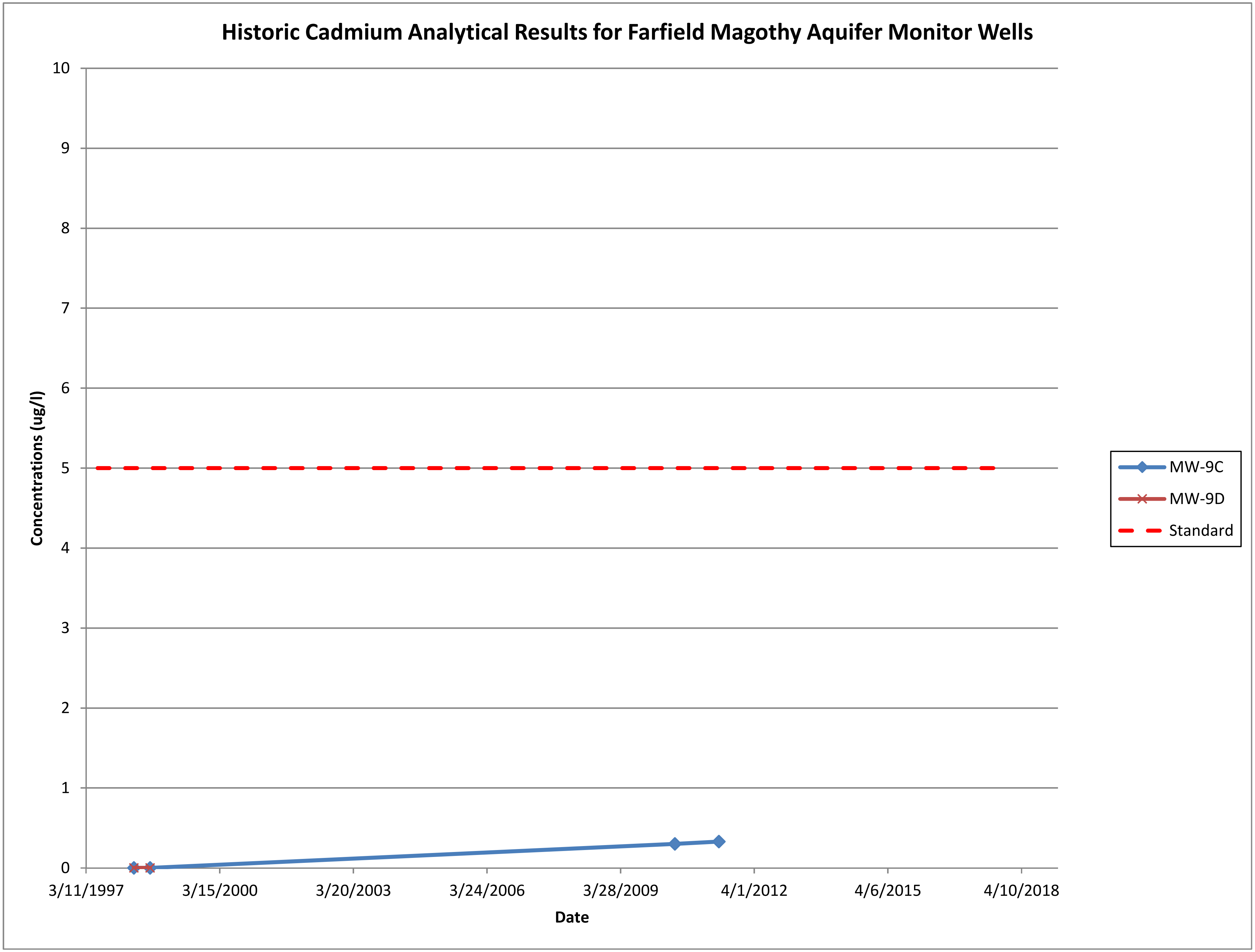

Historic Cadmium Analytical Results for Midfield Magothy Aquifer Wells
Concentrations (ug/l)
10
9
8
7
6
5
4
3
2
1
0
9/19/1991
7/20/1995
5/20/1999
3/20/2003
1/18/2007
11/18/2010
9/18/2014
7/19/2018
Date
RW-8
RW-9
RW-10
MW-11C
MW-11D
Standard

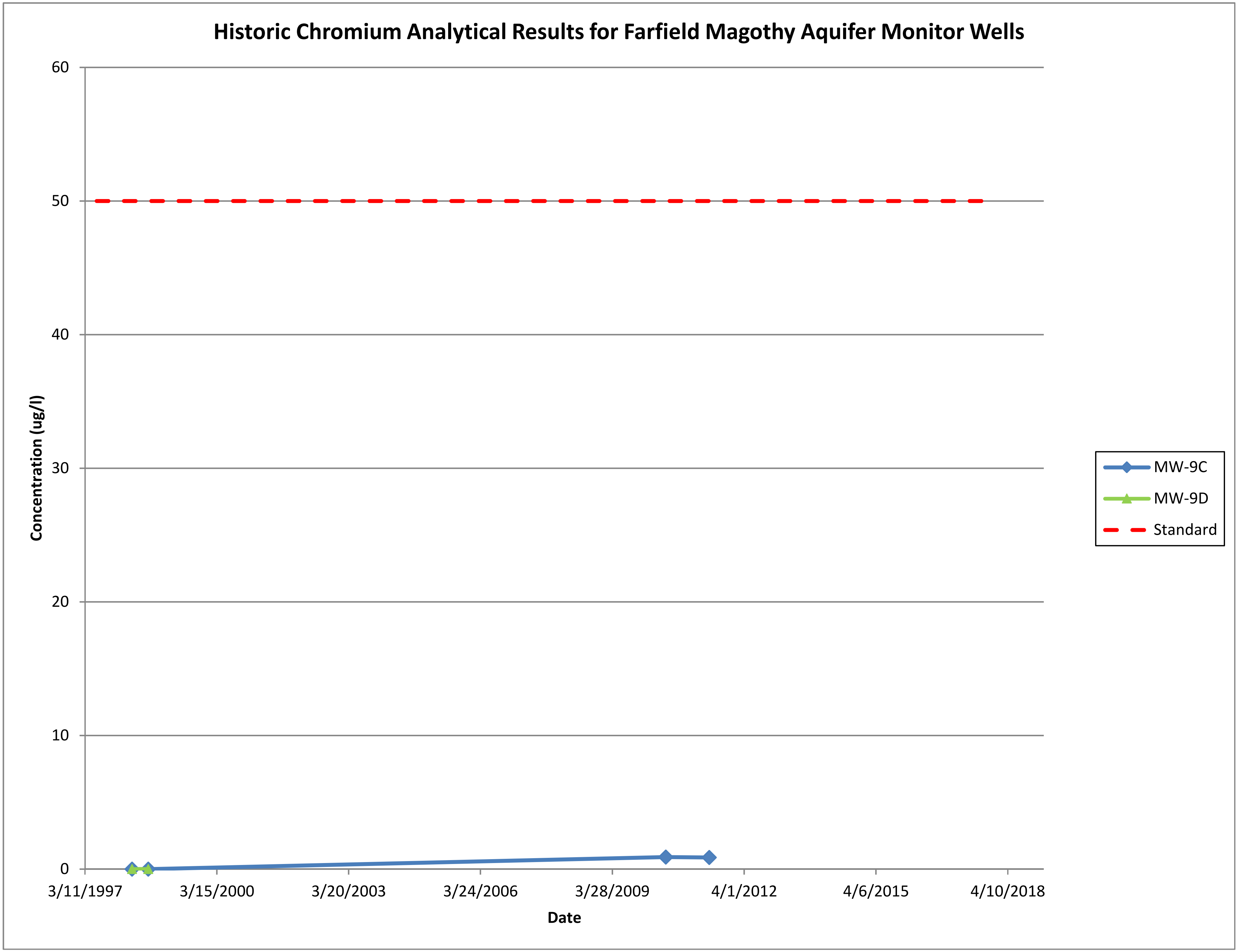

Historic Chromium Analytical Results for Midfield Magothy Aquifer Wells
Concentrations (ug/l)
50
45
40
35
30
25
20
15
10
5
0
9/19/1991
7/20/1995
5/20/1999
3/20/2003
1/18/2007
11/18/2010
9/18/2014
7/19/2018
Date
RW-8
RW-9
RW-10
MW-11C
MW-11D
Standard

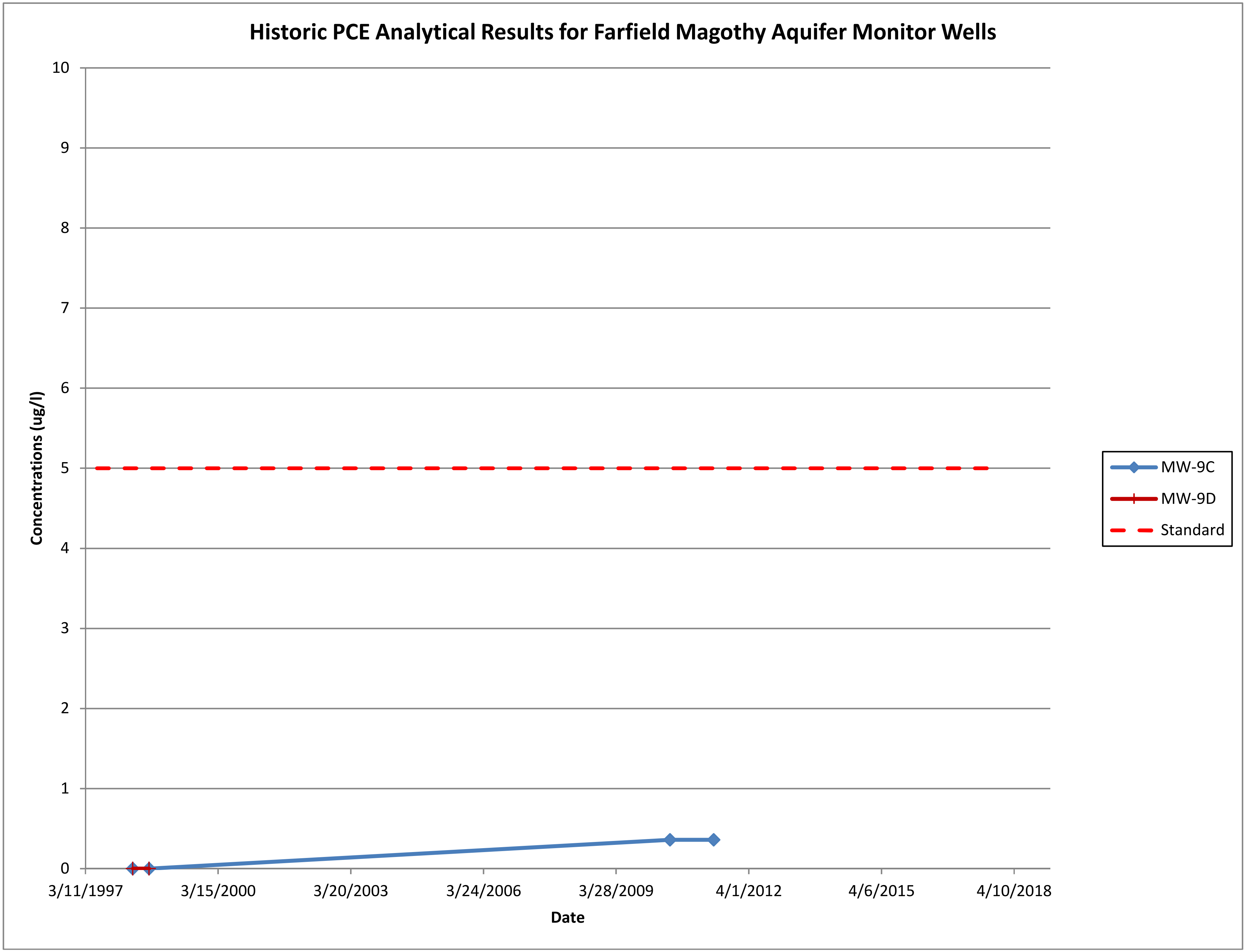

Historic PCE Analytical Results for Midfield Magothy Aquifer Wells
Concentrations (ug/l)
10
9
8
7
6
5
4
3
2
1
0
9/19/1991
7/20/1995
5/20/1999
3/20/2003
1/18/2007
11/18/2010
9/18/2014
7/19/2018
Date
RW-8
RW-9
RW-10
MW-11C
MW-11D
Standard

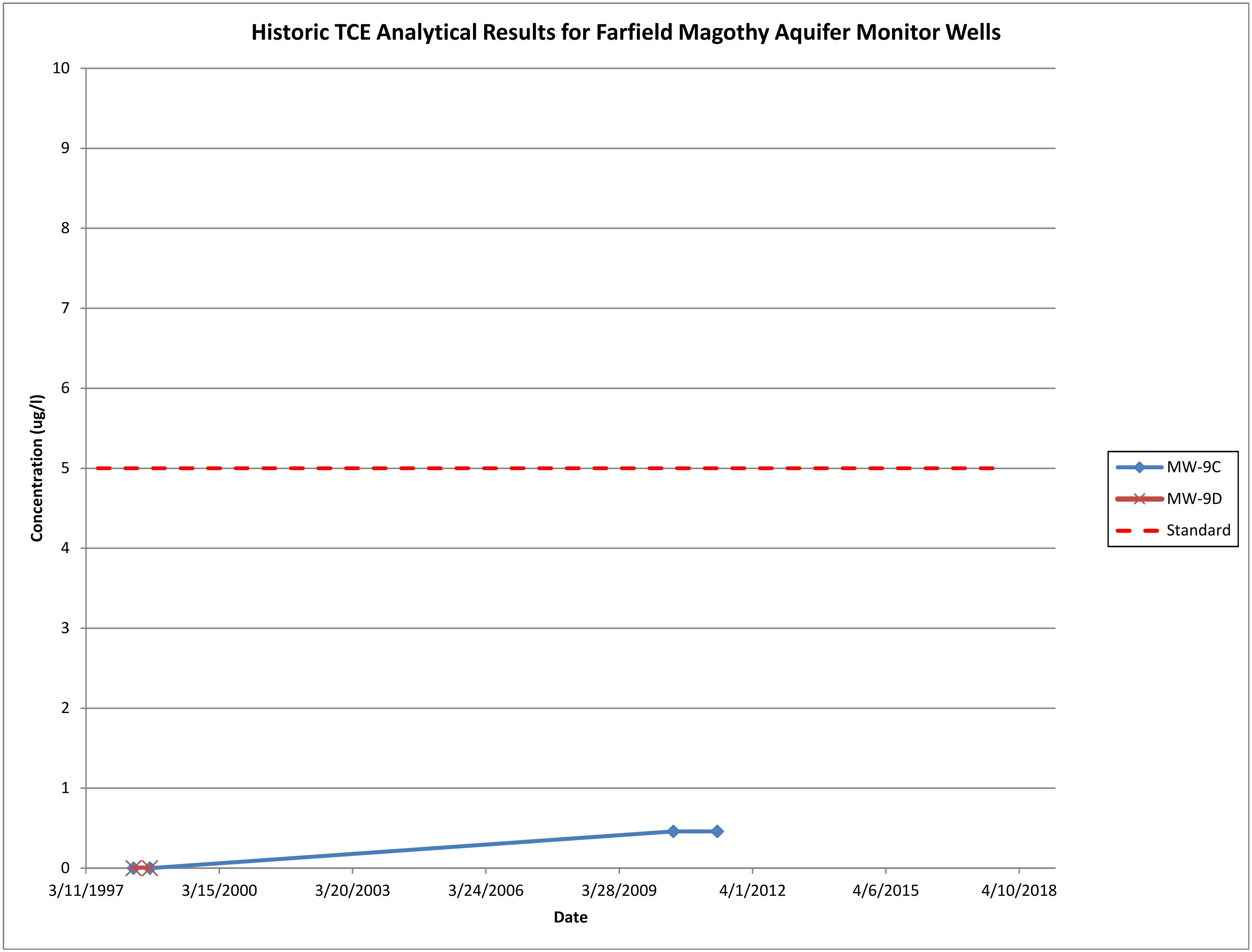


Historic TCE Analytical Results for Midfield Magothy Aquifer Wells
600
500
400
300
200
100
0
Concentrations (ug/l)
9/19/1991
7/20/1995
5/20/1999
3/20/2003
1/18/2007
11/18/2010
9/18/2014
7/19/2018
Date
RW-8
RW-9
RW-10
MW-11C
MW-11D
Standard


Historic Cadmium Analytical Results for Farfield Magothy Aquifer Monitor Wells
10
9
8
7
6
5
4
3
2
1
0
Concentrations (ug/l)
3/11/1997
3/15/2000
3/20/2003
3/24/2006
3/28/2009
4/1/2012
4/6/2015
4/10/2018
Date
MW-9C
MW-9D
Standard


Historic Chromium Analytical Results for Farfield Magothy Aquifer Monitor Wells
Concentration (ug/l)
60
50
40
30
20
10
0
3/11/1997
3/15/2000
3/20/2003
3/24/2006
3/28/2009
4/1/2012
4/6/2015
4/10/2018
Date
MW-9C
MW-9D
Standard


Historic PCE Analytical Results for Farfield Magothy Aquifer Monitor Wells
Concentrations (ug/l)
10
9
8
7
6
5
4
3
2
1
0
3/11/1997
3/15/2000
3/20/2003
3/24/2006
3/28/2009
4/1/2012
4/6/2015
4/10/2018
Date
MW-9C
MW-9D
Standard



Historic TCE Analytical Results for Farfield Magothy Aquifer Monitor Wells
Concentration (ug/l)
10
9
8
7
6
5
4
3
2
1
0
3/11/1997
3/15/2000
3/20/2003
3/24/2006
3/28/2009
4/1/2012
4/6/2015
4/10/2018
Date
MW-9C
MW-9D
Standard

APPENDIX C

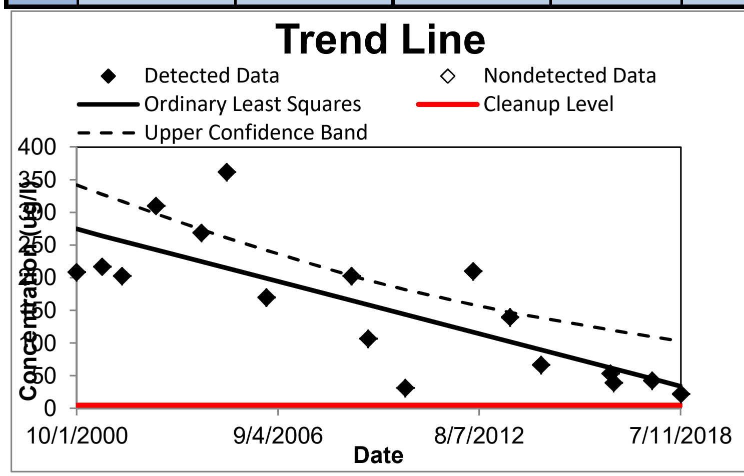
STATISTICAL TREND ANALYSIS (FLASH DRIVE)

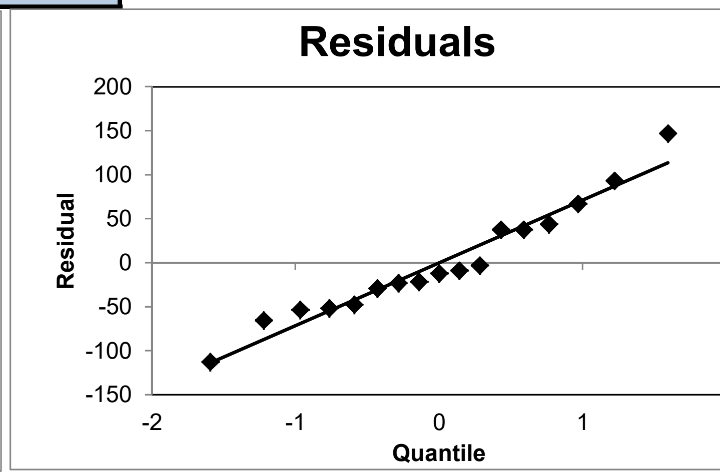
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	10/1/2000	209	275	-66	342
2	7/1/2001	217	264	-47	328
3	2/1/2002	203	256	-53	317
4	2/1/2003	310	243	67	298
5	6/1/2004	269	225	44	274
6	3/1/2005	362	215	147	261
7	5/1/2006	170	199	-29	242
8	11/1/2008	203	165	38	203
9	5/1/2009	107	159	-52	196
10	6/1/2010	31.4	144	-112.6	182
11	6/1/2012	210	117	93	159
12	7/1/2013	140	102	38	147
13	6/1/2014	67	89.7	-22.7	139
14	6/16/2016	53.5	62.1	-8.6	120
15	7/20/2016	39.5	60.9	-21.4	119
16	9/6/2017	42.7	45.6	-2.9	110
17	7/11/2018	22.2	34.2	-12	103
18					
19					
20					

Ordinary Least Squares	
Slope	-0.037027429
Intercept	1637.158428
Correlation, R^2	0.6183
Test Result	Decreasing
Test Statistic	-4.929
Critical Value	1.753
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





MW-02AR Cadmium

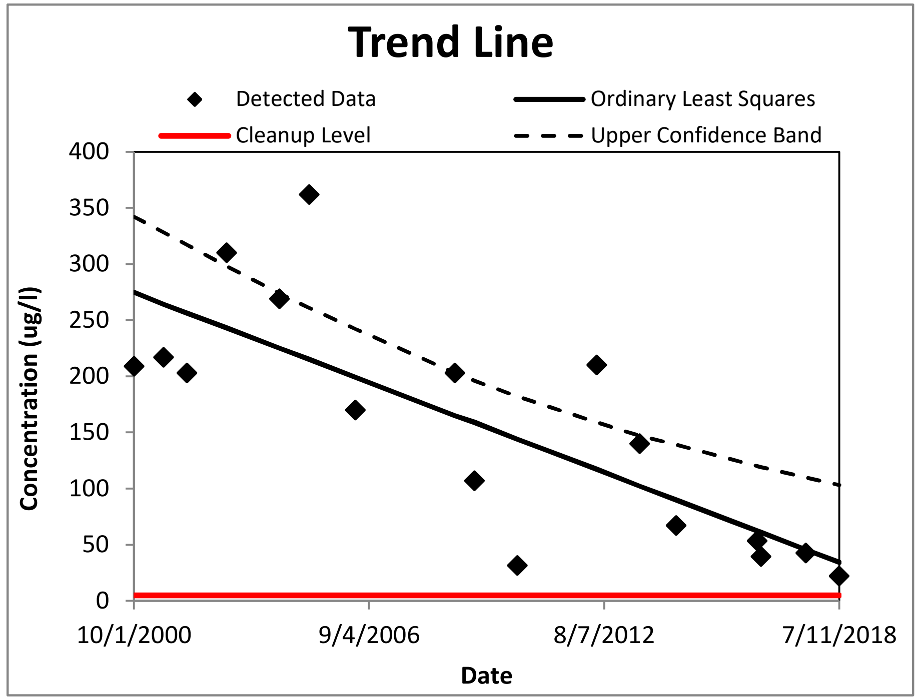
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/29/2018
Person performing analysis	VP

Chemical of Concern	Cd
Well Name/Number	MW02AR
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	17
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	156
Standard deviation of concentration	104
t-value for UCL calculation	1.746



95% Upper Confidence Limit (UCL)	200
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	103
Trend calculation method	Ordinary Least Squares
Cleanup level	5
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	Yes

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

MW-02AR Cadmium

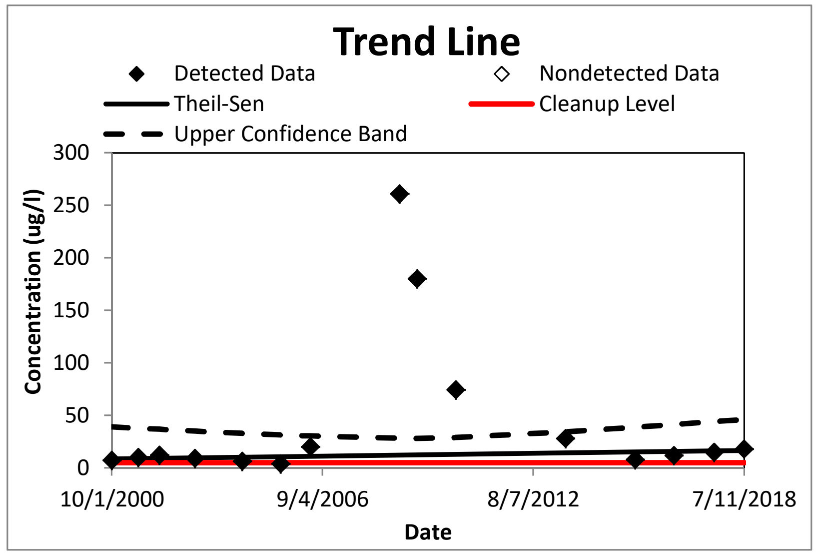
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

i	t (Date)	C (ug/l)	C Predicted	Residual	Upper Confidence Band
1	10/1/2000	7.4	8.53	-1.13	39.1
2	7/1/2001	10.2	8.87	1.33	37.8
3	2/1/2002	12.1	9.14	2.96	36.9
4	2/1/2003	9.3	9.59	-0.29	35.2
5	6/1/2004	6.3	10.2	-3.9	33
6	7/1/2005	4	10.7	-6.7	31.4
7	5/1/2006	20	11.1	8.9	30.5
8	11/1/2008	261	12.2	248.8	28.5
9	5/1/2009	180	12.4	167.6	28.1
10	6/1/2010	74.3	12.9	61.4	29
11	7/1/2013	28	14.3	13.7	34.6
12	6/16/2015	7.8	15.2	-7.4	39
13	7/20/2016	11.8	15.7	-3.9	41.7
14	9/6/2017	15	16.2	-1.2	44.3
15	7/11/2018	17.9	16.6	1.3	46.2
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	No trend
Test Statistic (S)	23
Normalized S	1.089
Critical Value	1.645

Theil-Sen	
Slope	0.00124
Intercept	-37.1
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing



MW-02BR Cadmium

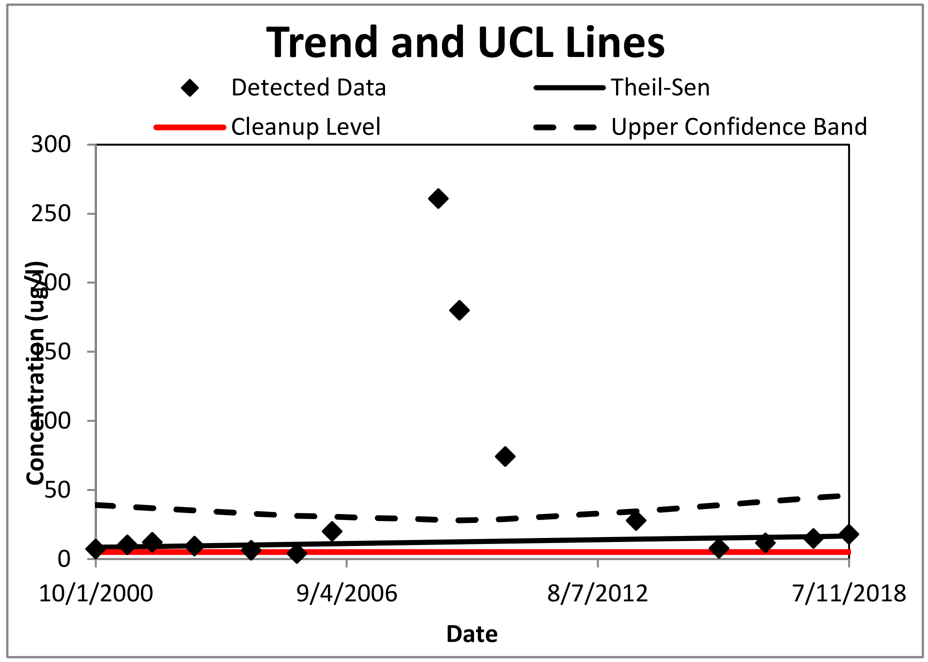
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/29/2018
Person performing analysis	VP

Chemical of Concern	Cd
Well Name/Number	MW02BR
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	15
Number < cleanup level	1
Are any potential outliers present?	Yes
Mean of concentration	44.3
Standard deviation of concentration	75.1



95% Upper Confidence Limit (UCL)	128.8
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	46.2
Trend calculation method	Theil-Sen/Mann-Kendall
Cleanup level	5
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Random Seed Used	41639.55078
Message: None.	

MW-02BR Cadmium

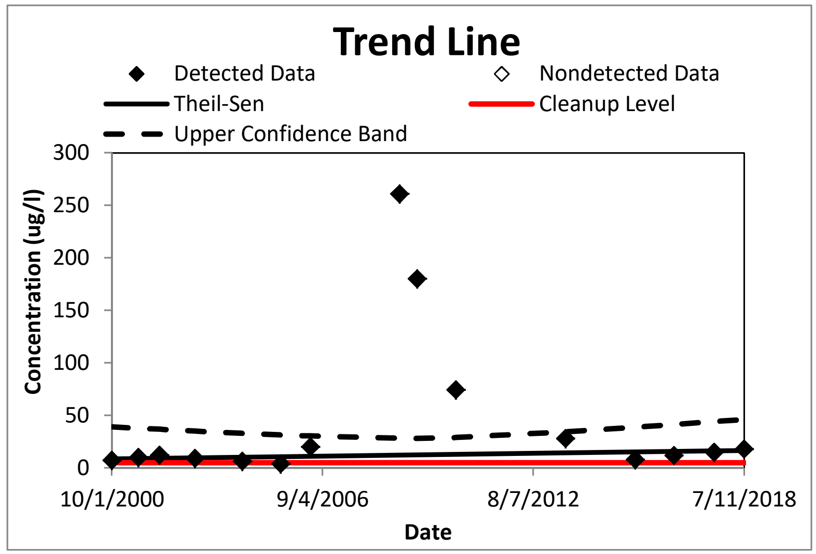
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

i	t (Date)	C (ug/l)	C Predicted	Residual	Upper Confidence Band
1	10/1/2000	7.4	8.53	-1.13	39.1
2	7/1/2001	10.2	8.87	1.33	37.8
3	2/1/2002	12.1	9.14	2.96	36.9
4	2/1/2003	9.3	9.59	-0.29	35.2
5	6/1/2004	6.3	10.2	-3.9	33
6	7/1/2005	4	10.7	-6.7	31.4
7	5/1/2006	20	11.1	8.9	30.5
8	11/1/2008	261	12.2	248.8	28.5
9	5/1/2009	180	12.4	167.6	28.1
10	6/1/2010	74.3	12.9	61.4	29
11	7/1/2013	28	14.3	13.7	34.6
12	6/16/2015	7.8	15.2	-7.4	39
13	7/20/2016	11.8	15.7	-3.9	41.7
14	9/6/2017	15	16.2	-1.2	44.3
15	7/11/2018	17.9	16.6	1.3	46.2
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	No trend
Test Statistic (S)	23
Normalized S	1.089
Critical Value	1.645

Theil-Sen	
Slope	0.00124
Intercept	-37.1
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing



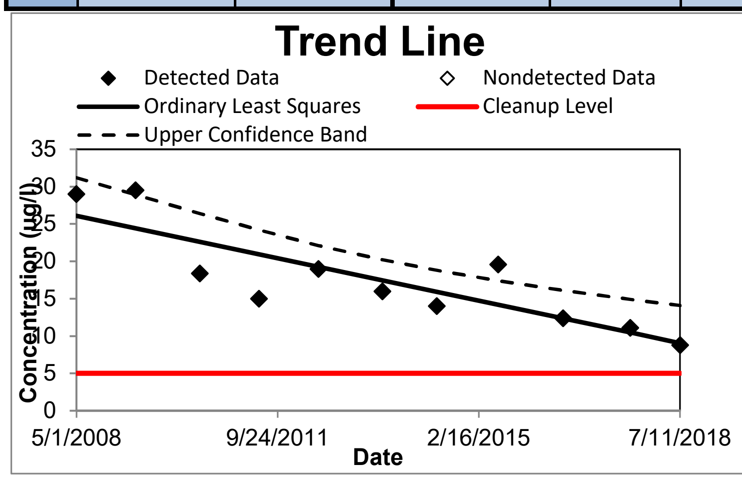
MW-02BR Cadmium

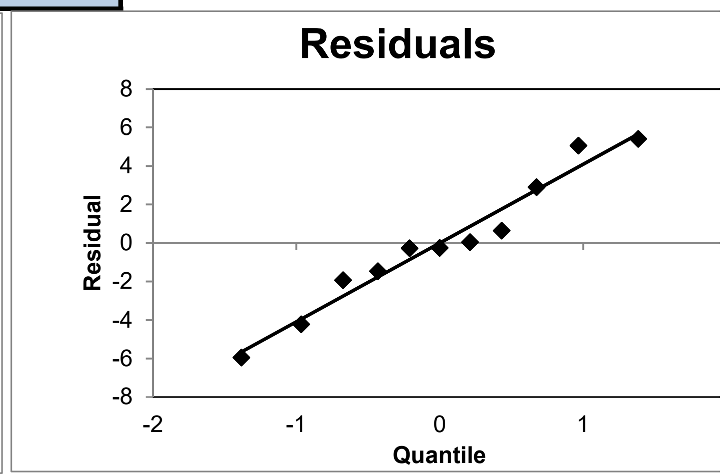
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	5/1/2008	29	26.1	2.9	31.2
2	5/1/2009	29.5	24.4	5.1	28.9
3	6/1/2010	18.4	22.6	-4.2	26.4
4	6/1/2011	15	20.9	-5.9	24.2
5	6/1/2012	19	19.3	-0.3	22.1
6	7/1/2013	16	17.5	-1.5	20.2
7	6/1/2014	14	15.9	-1.9	18.8
8	6/16/2015	19.6	14.2	5.4	17.4
9	7/20/2016	12.4	12.4	0	16.1
10	9/6/2017	11.1	10.5	0.6	14.9
11	7/11/2018	8.8	9.05	-0.25	14.1
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	-0.004580729
Intercept	207.3585131
Correlation, R^2	0.7251
Test Result	Decreasing
Test Statistic	-4.872
Critical Value	1.833
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





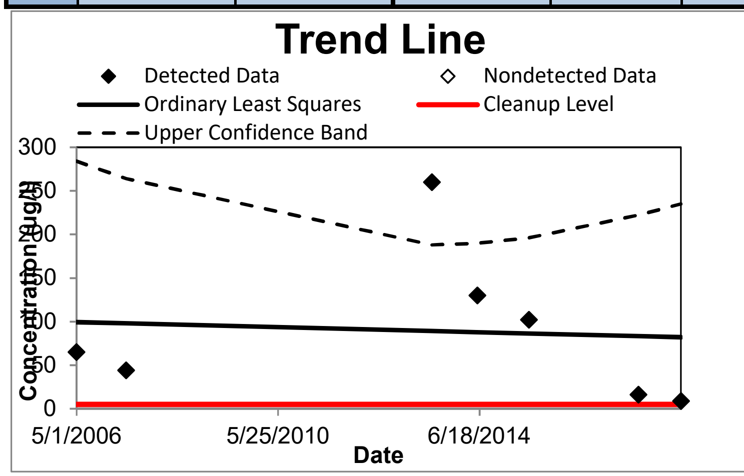
MW-05 Cadmium

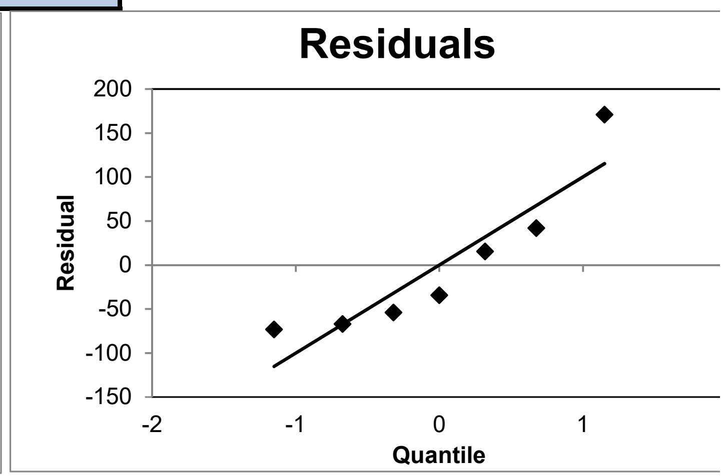
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	5/1/2006	65	99.3	-34.3	284
2	5/1/2007	44	97.9	-53.9	264
3	7/1/2013	260	89.2	170.8	188
4	6/1/2014	130	87.9	42.1	190
5	6/16/2015	102	86.4	15.6	196
6	9/1/2017	16.2	83.3	-67.1	222
7	7/11/2018	8.8	82	-73.2	235
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	-0.003880491
Intercept	250.0420739
Correlation, R^2	0.0060
Test Result	No trend
Test Statistic	-0.174
Critical Value	2.015
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





MW07A Cadmium

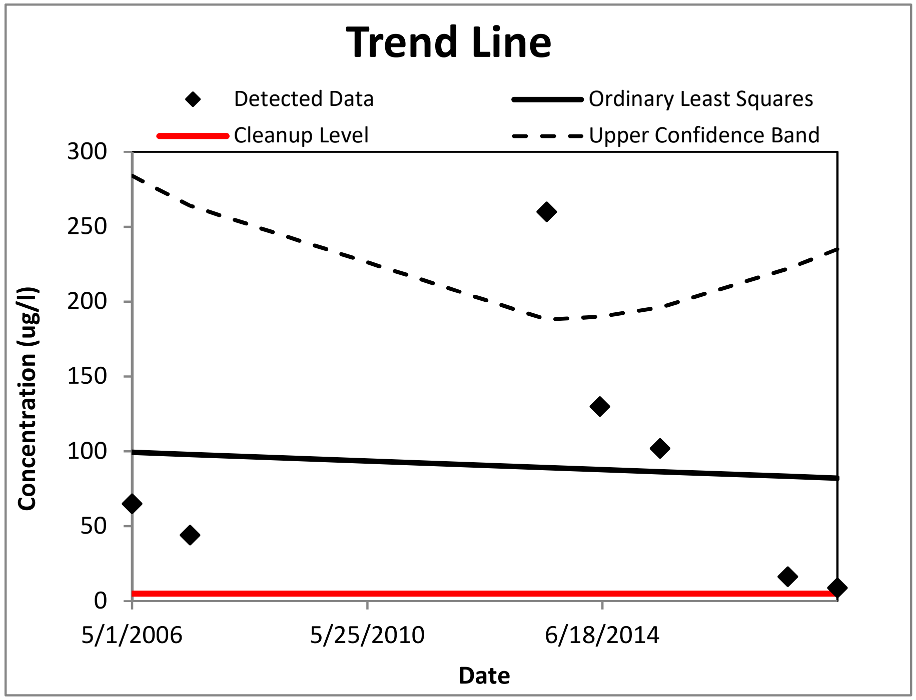
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/25/2018
Person performing analysis	VP

Chemical of Concern	Cd
Well Name/Number	MW07A
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	7
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	89.4
Standard deviation of concentration	87
t-value for UCL calculation	1.943



95% Upper Confidence Limit (UCL)	153
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	235
Trend calculation method	Ordinary Least Squares
Cleanup level	5
Source of cleanup level	0
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

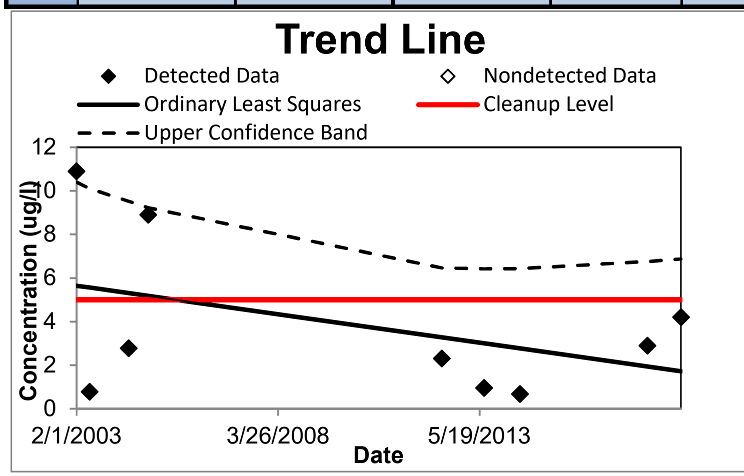
MW07A Cadmium

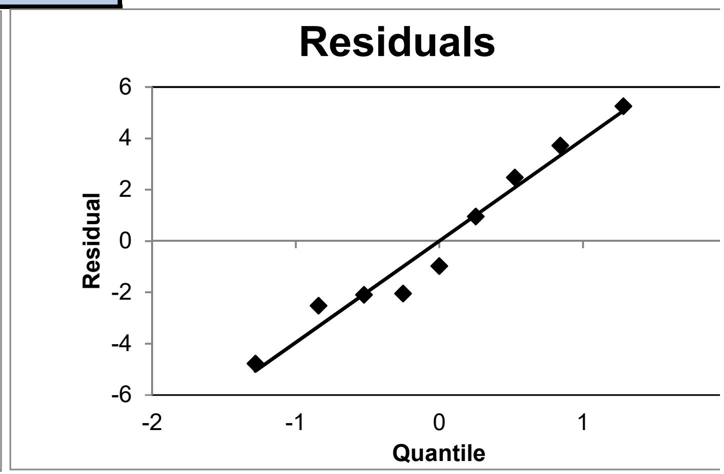
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	2/1/2003	10.9	5.64	5.26	10.4
2	6/1/2003	0.78	5.56	-4.78	10.1
3	6/1/2004	2.78	5.3	-2.52	9.52
4	12/1/2004	8.9	5.18	3.72	9.22
5	6/1/2012	2.3	3.27	-0.97	6.47
6	7/1/2013	0.96	3	-2.04	6.42
7	6/1/2014	0.67	2.77	-2.1	6.43
8	9/1/2017	2.9	1.94	0.96	6.75
9	7/11/2018	4.2	1.72	2.48	6.88
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	-0.000694816
Intercept	31.80414175
Correlation, R^2	0.1894
Test Result	No trend
Test Statistic	-1.279
Critical Value	1.895
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





MW07B Cadmium

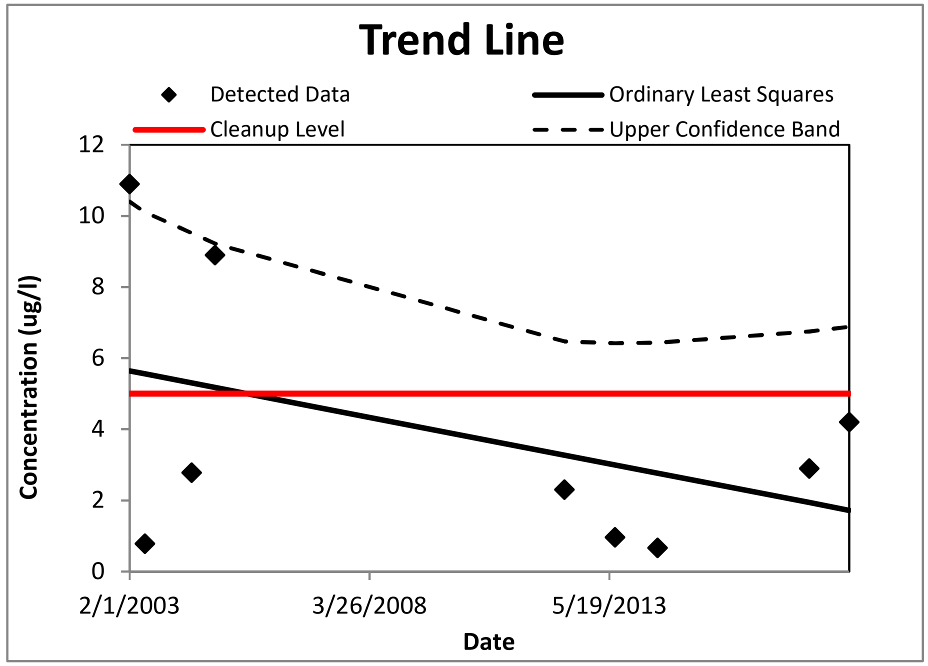
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/25/2018
Person performing analysis	VP

Chemical of Concern	Cd
Well Name/Number	MW07B
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	9
Number < cleanup level	7
Are any potential outliers present?	No
Mean of concentration	3.82
Standard deviation of concentration	3.67



95% Upper Confidence Limit (UCL)	9.15
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	6.88
Trend calculation method	Ordinary Least Squares
Cleanup level	5
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	Yes

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Random Seed Used	0
Message: None.	

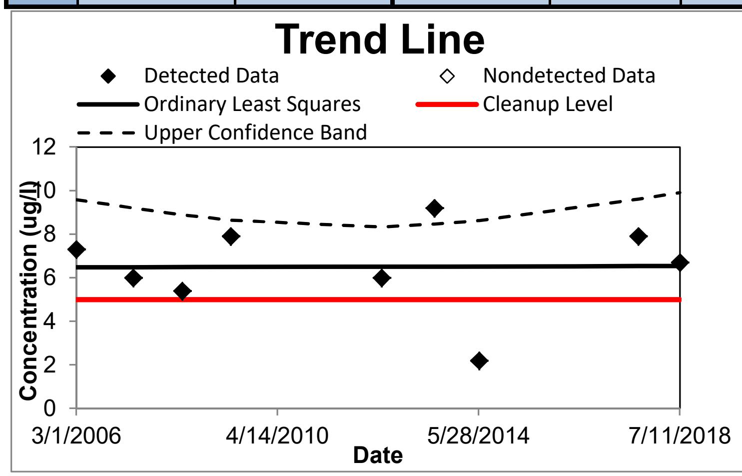
MW07B Cadmium

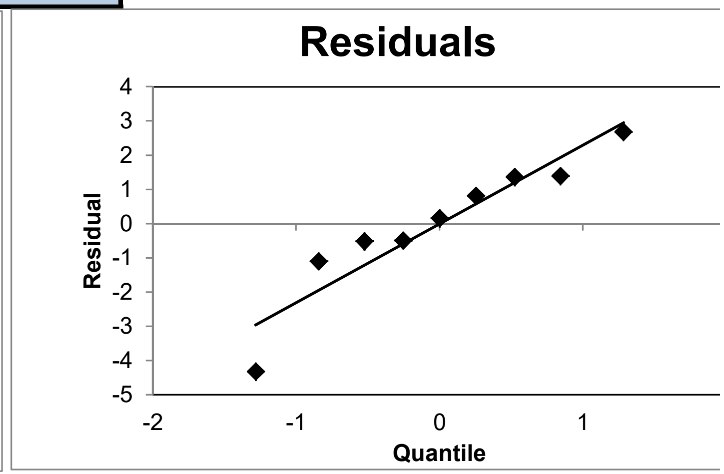
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	3/1/2006	7.3	6.49	0.81	9.59
2	5/1/2007	6	6.49	-0.49	9.2
3	5/1/2008	5.4	6.5	-1.1	8.9
4	5/1/2009	7.9	6.5	1.4	8.65
5	6/1/2012	6	6.51	-0.51	8.34
6	7/1/2013	9.2	6.52	2.68	8.46
7	6/1/2014	2.2	6.52	-4.32	8.63
8	9/5/2017	7.9	6.54	1.36	9.61
9	7/11/2018	6.7	6.54	0.16	9.91
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	1.1568E-05
Intercept	6.038025598
Correlation, R^2	0.0001
Test Result	No trend
Test Statistic	0.025
Critical Value	1.895
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





MW-09A Cadmium

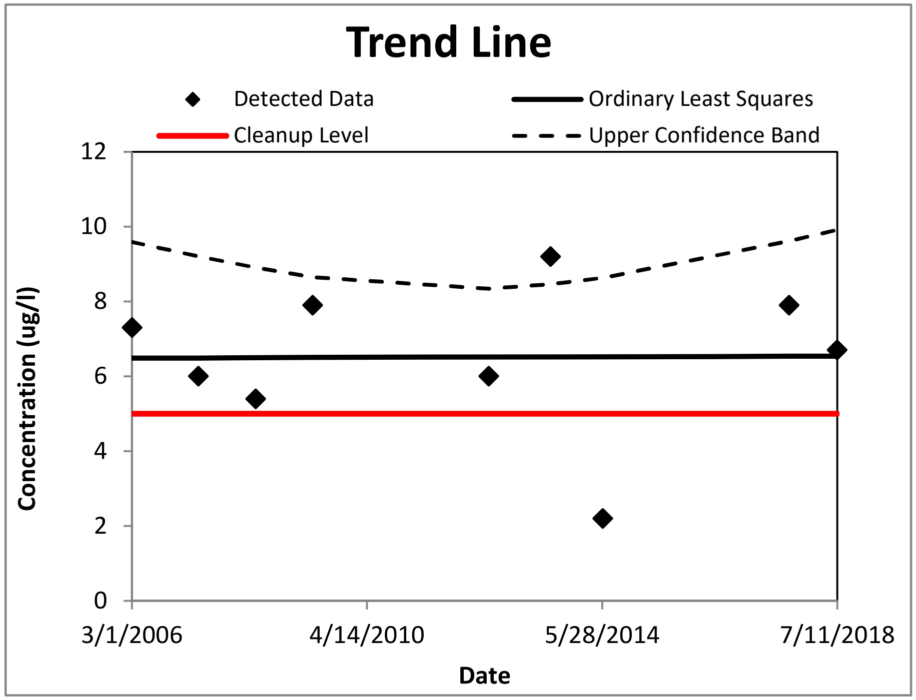
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/26/2018
Person performing analysis	VP

Chemical of Concern	Cd
Well Name/Number	MW09A
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	9
Number < cleanup level	1
Are any potential outliers present?	No
Mean of concentration	6.51
Standard deviation of concentration	2
t-value for UCL calculation	1.860



95% Upper Confidence Limit (UCL)	7.75
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	9.91
Trend calculation method	Ordinary Least Squares
Cleanup level	5
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

MW-09A Cadmium

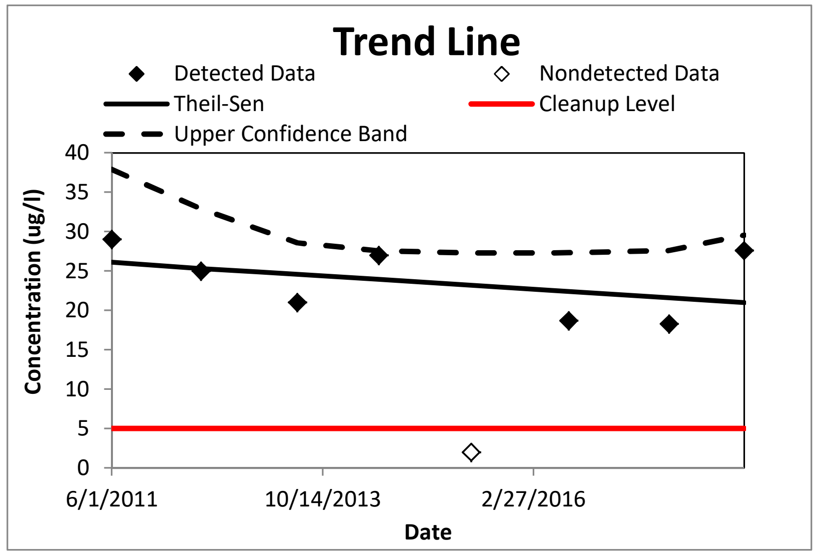
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

i	t (Date)	C (ug/l)	C Predicted	Residual	Upper Confidence Band
1	6/1/2011	29	26.1	2.9	37.9
2	6/1/2012	25	25.3	-0.3	32.9
3	7/1/2013	21	24.6	-3.6	28.6
4	6/1/2014	27	23.9	3.1	27.6
5	6/16/2015	2	23.2	-21.2	27.3
6	7/20/2016	18.7	22.4	-3.7	27.3
7	9/5/2017	18.3	21.6	-3.3	27.6
8	7/11/2018	27.6	21	6.6	29.6
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	No trend
Test Statistic (S)	-8
Normalized S	-0.866
Critical Value	1.645

Theil-Sen	
Slope	-0.00194
Intercept	105
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing



MW-9B Cadmium

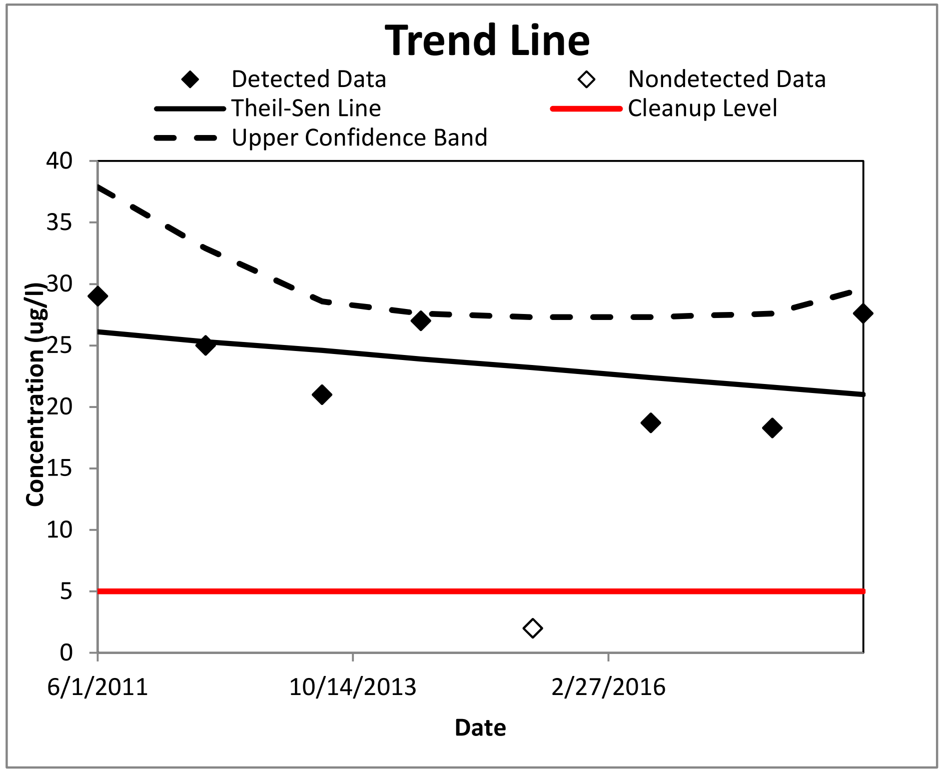
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets with nondetects

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/26/2018
Person performing analysis	VP

Chemical of Concern	Cd
Well Name/Number	MW09B
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	8
Number of detected results	7
Number of non-detected results	1
Detection frequency	88%
Number at or below cleanup level	1
Are any potential outliers present?	No
Mean of concentration	21.1
Standard deviation of concentration	8.08



95% Upper Confidence Limit (UCL)	34.4
Method for calculating UCL	KM Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	29.6
Trend calculation method	Theil-Sen/Mann-Kendall
Cleanup level	5
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	Yes

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

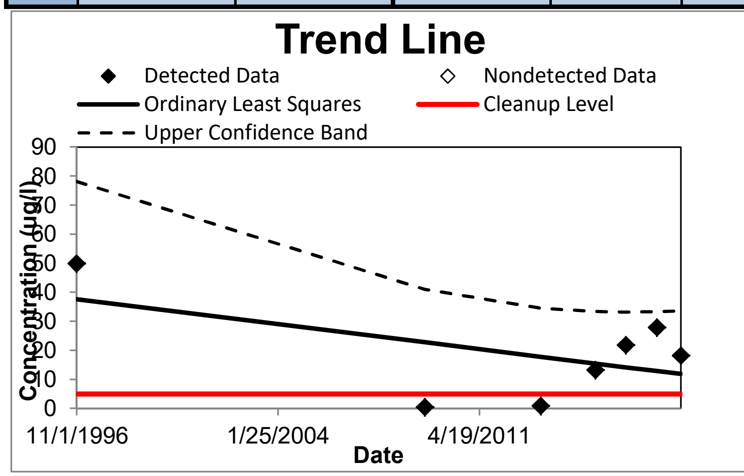
MW-09B Cadmium

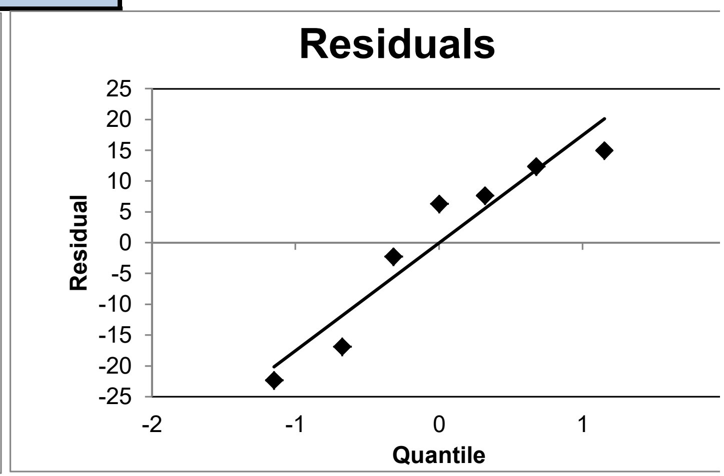
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	11/1/1996	50	37.6	12.4	78.1
2	5/1/2009	0.5	22.8	-22.3	41
3	7/1/2013	1	17.8	-16.8	34.5
4	6/16/2015	13.3	15.5	-2.2	33.4
5	7/20/2016	21.9	14.2	7.7	33.2
6	8/31/2017	27.9	12.9	15	33.3
7	7/11/2018	18.2	11.9	6.3	33.6
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	-0.003249339
Intercept	152.5526908
Correlation, R^2	0.2776
Test Result	No trend
Test Statistic	-1.386
Critical Value	2.015
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





MW-11B Cadmium

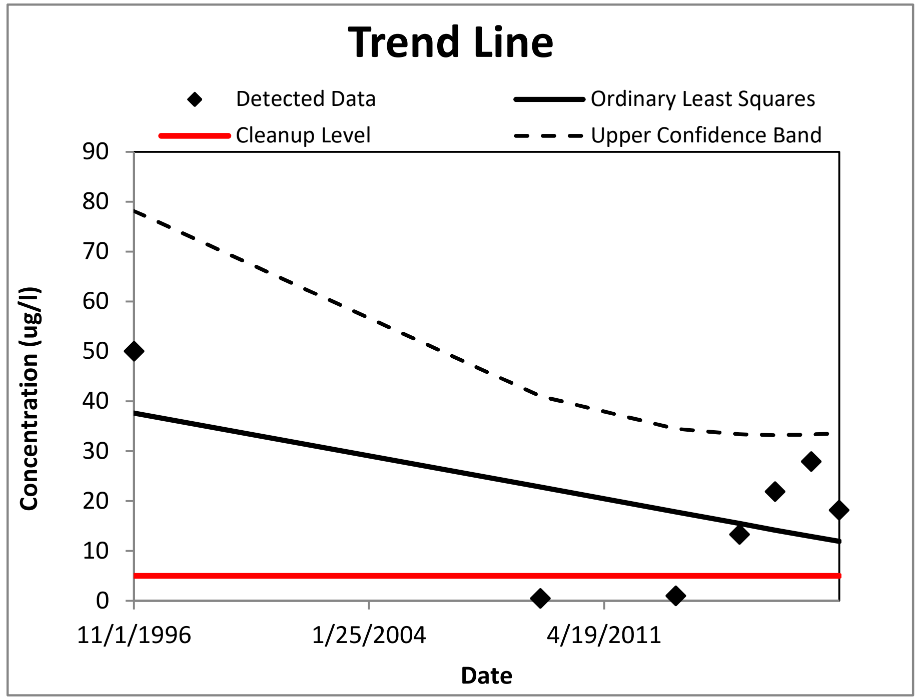
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/26/2018
Person performing analysis	VP

Chemical of Concern	Cd
Well Name/Number	MW11B
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	7
Number < cleanup level	2
Are any potential outliers present?	No
Mean of concentration	19
Standard deviation of concentration	17.1
t-value for UCL calculation	1.943



95% Upper Confidence Limit (UCL)	31.6
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	33.6
Trend calculation method	Ordinary Least Squares
Cleanup level	5
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	Yes

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

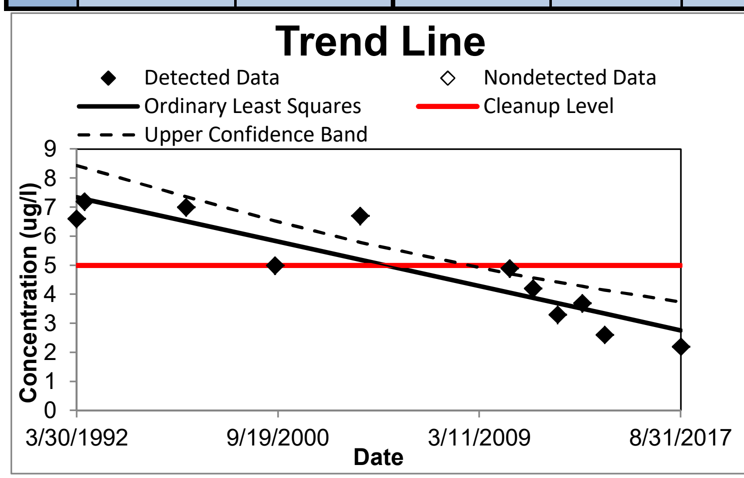
MW-11B Cadmium

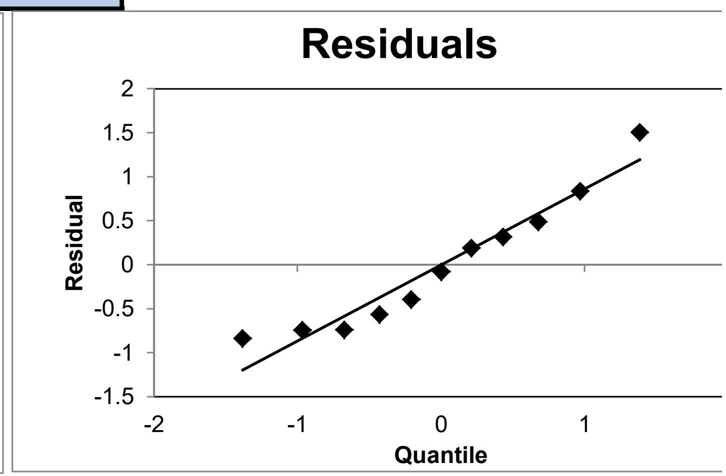
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	3/30/1992	6.6	7.34	-0.74	8.43
2	7/31/1992	7.2	7.28	-0.08	8.35
3	11/4/1996	7	6.51	0.49	7.36
4	8/3/2000	5	5.84	-0.84	6.53
5	3/2/2004	6.7	5.19	1.51	5.79
6	6/17/2010	4.9	4.06	0.84	4.71
7	6/15/2011	4.2	3.88	0.32	4.57
8	6/28/2012	3.3	3.69	-0.39	4.42
9	7/10/2013	3.7	3.51	0.19	4.28
10	6/17/2014	2.6	3.34	-0.74	4.15
11	8/31/2017	2.2	2.76	-0.56	3.74
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	-0.000492707
Intercept	23.93859561
Correlation, R^2	0.8289
Test Result	Decreasing
Test Statistic	-6.603
Critical Value	1.833
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





MW-17A Cadmium

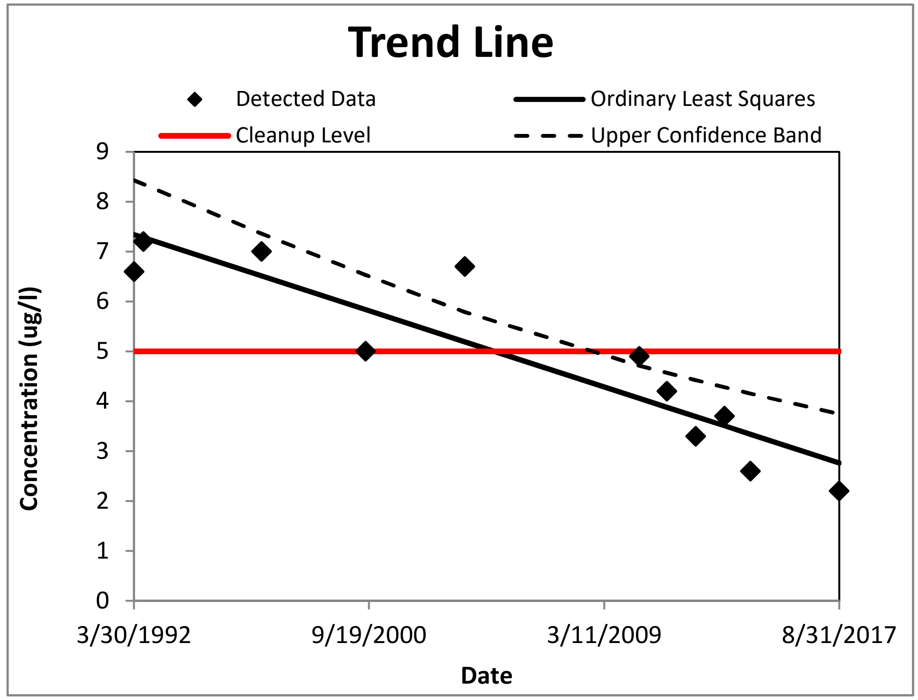
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/26/2018
Person performing analysis	VP

Chemical of Concern	Cd
Well Name/Number	MW17A
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	11
Number < cleanup level	6
Are any potential outliers present?	No
Mean of concentration	4.85
Standard deviation of concentration	1.81
t-value for UCL calculation	1.812



95% Upper Confidence Limit (UCL)	5.84
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	3.74
Trend calculation method	Ordinary Least Squares
Cleanup level	5
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

MW-17A Cadmium

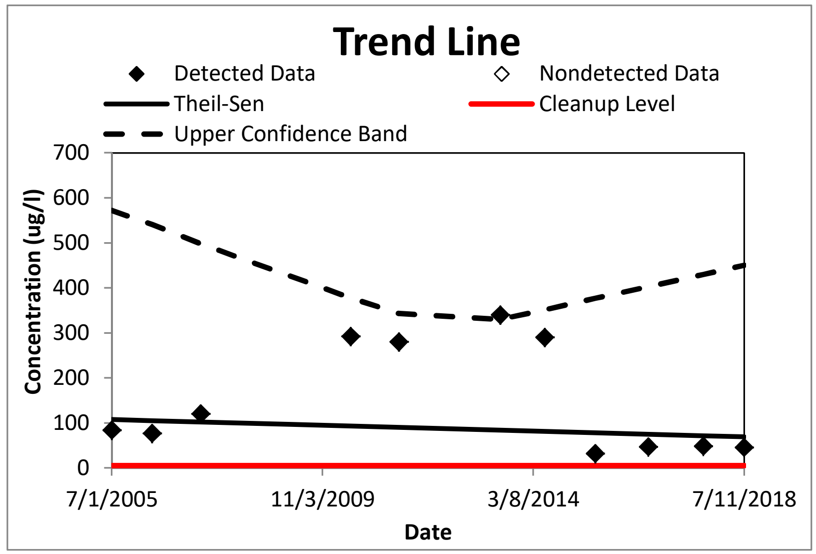
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

i	t (Date)	C (ug/l)	C Predicted	Residual	Upper Confidence Band
1	7/1/2005	84	108	-24	572
2	5/1/2006	77	105	-28	541
3	5/1/2007	120	102	18	498
4	6/1/2010	292	93.1	198.9	378
5	6/1/2011	280	90.1	189.9	343
6	7/1/2013	340	84	256	330
7	6/1/2014	290	81.2	208.8	352
8	6/16/2015	32.3	78.1	-45.8	377
9	7/20/2016	47.2	74.9	-27.7	403
10	9/5/2017	48.3	71.5	-23.2	430
11	7/11/2018	45.3	69	-23.7	451
12					
13					
14					
15					
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	No trend
Test Statistic (S)	-13
Normalized S	-0.934
Critical Value	1.645

Theil-Sen	
Slope	-0.00813
Intercept	421
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing



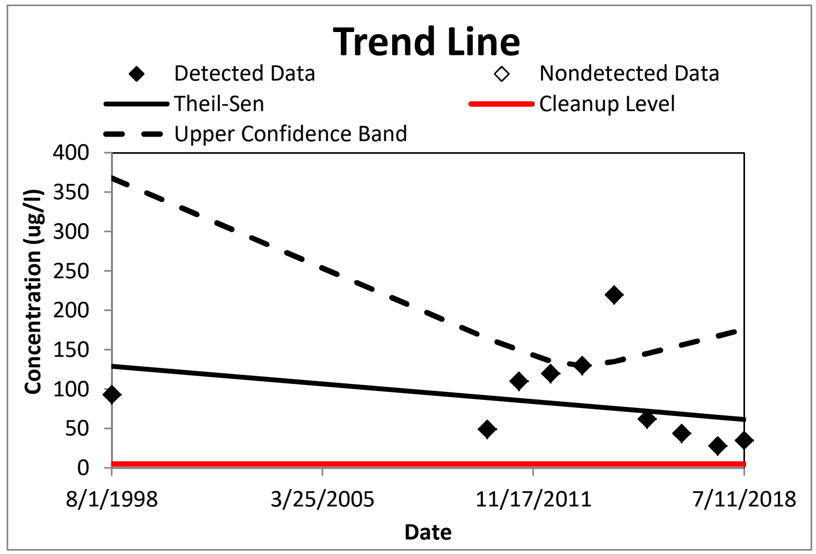
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

i	t (Date)	C (ug/l)	C Predicted	Residual	Upper Confidence Band
1	8/1/1998	92.9	129	-36.1	368
2	6/1/2010	49	89.1	-40.1	165
3	6/1/2011	110	85.8	24.2	150
4	6/1/2012	120	82.4	37.6	136
5	6/1/2013	130	79	51	130
6	6/1/2014	220	75.6	144.4	135
7	6/16/2015	62.1	72.1	-10	145
8	7/20/2016	43.9	68.4	-24.5	156
9	9/6/2017	28.2	64.5	-36.3	168
10	7/11/2018	35	61.7	-26.7	176
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	No trend
Test Statistic (S)	-13
Normalized S	-1.073
Critical Value	1.645

Theil-Sen	
Slope	-0.00927
Intercept	463
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing



MW25B Cadmium

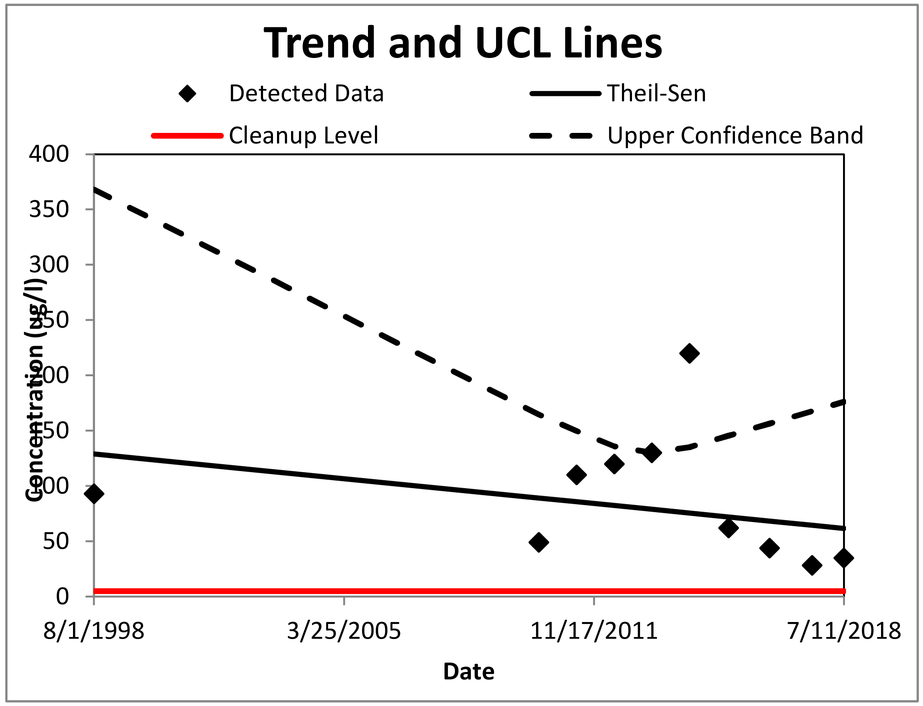
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/26/2018
Person performing analysis	VP

Chemical of Concern	Cd
Well Name/Number	MW25B
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	10
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	89.1
Standard deviation of concentration	58.9
t-value for UCL calculation	1.833



95% Upper Confidence Limit (UCL)	123
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	176
Trend calculation method	Theil-Sen/Mann-Kendall
Cleanup level	5
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

MW-25B Cadmium

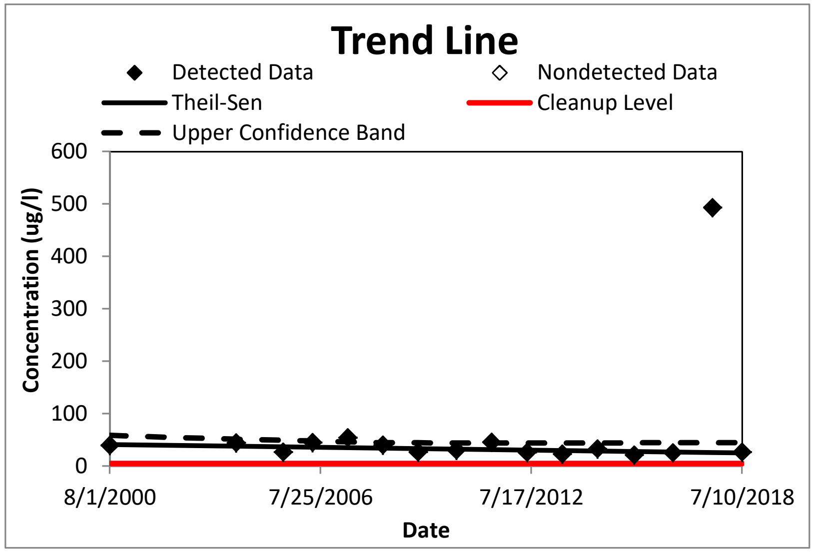
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

i	t (Date)	C (ug/l)	C Predicted	Residual	Upper Confidence Band
1	8/1/2000	39.6	41.1	-1.5	58.4
2	3/1/2004	44.3	37.9	6.4	51.6
3	7/1/2005	27	36.7	-9.7	49.4
4	5/1/2006	45	36	9	48.2
5	5/1/2007	54	35.1	18.9	46.5
6	5/1/2008	40	34.2	5.8	44.9
7	5/1/2009	26.8	33.4	-6.6	44.5
8	6/1/2010	30.2	32.4	-2.2	44.2
9	6/1/2011	46	31.5	14.5	44.3
10	6/1/2012	26	30.6	-4.6	43.9
11	6/1/2013	23	29.7	-6.7	43.9
12	6/1/2014	33	28.9	4.1	44.4
13	6/16/2015	21.4	27.9	-6.5	44.6
14	7/20/2016	25.4	27	-1.6	44.6
15	9/6/2017	493	26	467	44.8
16	7/11/2018	26.8	25.2	1.6	45
17					
18					
19					
20					

Mann-Kendall	
Test Result	No trend
Test Statistic (S)	-31
Normalized S	-1.352
Critical Value	1.645

Theil-Sen	
Slope	-0.00242
Intercept	130
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing



MW-29B Cadmium

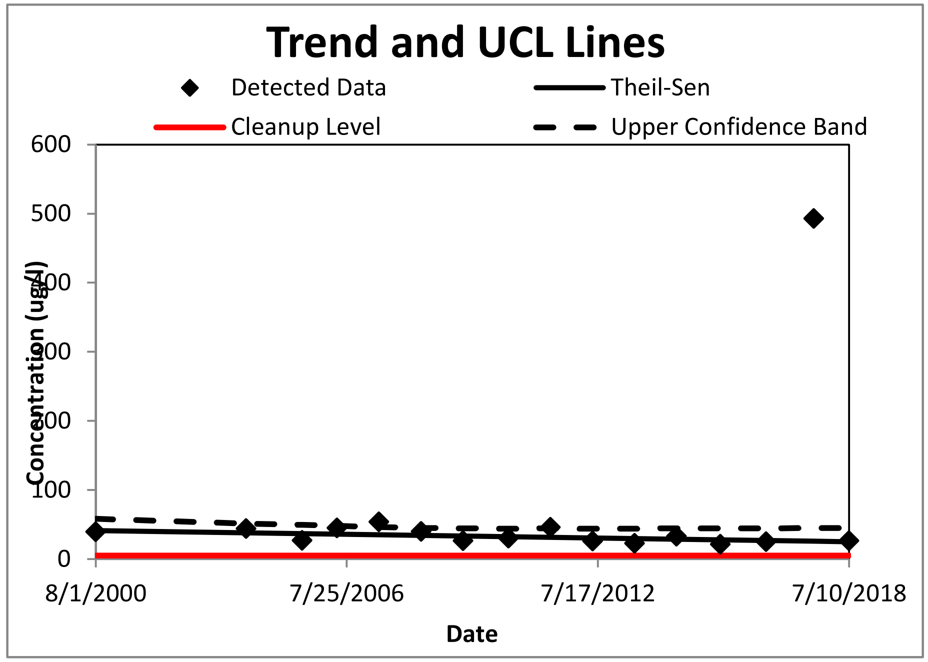
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/26/2018
Person performing analysis	VP

Chemical of Concern	Cd
Well Name/Number	MW29B
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	16
Number < cleanup level	0
Are any potential outliers present?	Yes
Mean of concentration	62.6
Standard deviation of concentration	115



95% Upper Confidence Limit (UCL)	187.9
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	45
Trend calculation method	Theil-Sen/Mann-Kendall
Cleanup level	5
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	Yes

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Random Seed Used	41639.55078
Message: None.	

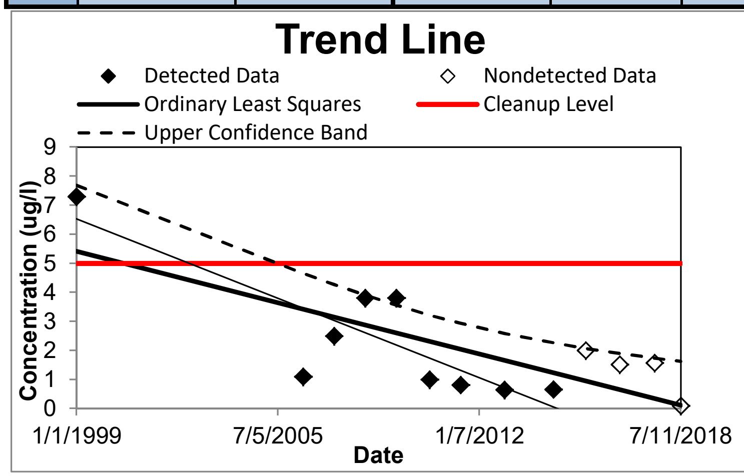
MW-29B Cadmium

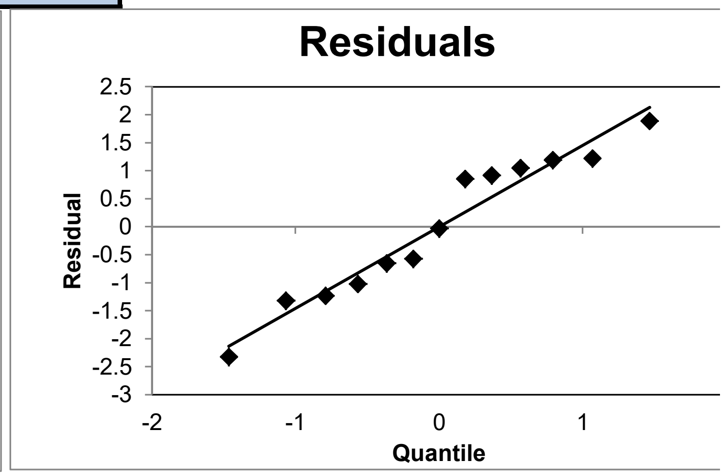
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	1/1/1999	7.3	5.41	1.89	7.68
2	5/1/2006	1.1	3.42	-2.32	4.65
3	5/1/2007	2.5	3.15	-0.65	4.27
4	5/1/2008	3.8	2.88	0.92	3.9
5	5/1/2009	3.8	2.61	1.19	3.56
6	6/1/2010	1	2.31	-1.31	3.21
7	6/1/2011	0.81	2.04	-1.23	2.93
8	11/1/2012	0.64	1.66	-1.02	2.58
9	6/1/2014	0.66	1.23	-0.57	2.26
10	6/16/2015	2	0.948	1.052	2.07
11	7/20/2016	1.51	0.651	0.859	1.9
12	9/5/2017	1.57	0.345	1.225	1.74
13	7/11/2018	0.09	0.116	-0.026	1.62
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	-0.000742443
Intercept	32.25754862
Correlation, R^2	0.7123
Test Result	Decreasing
Test Statistic	-3.826
Critical Value	1.796
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





MW-36B Cadmium

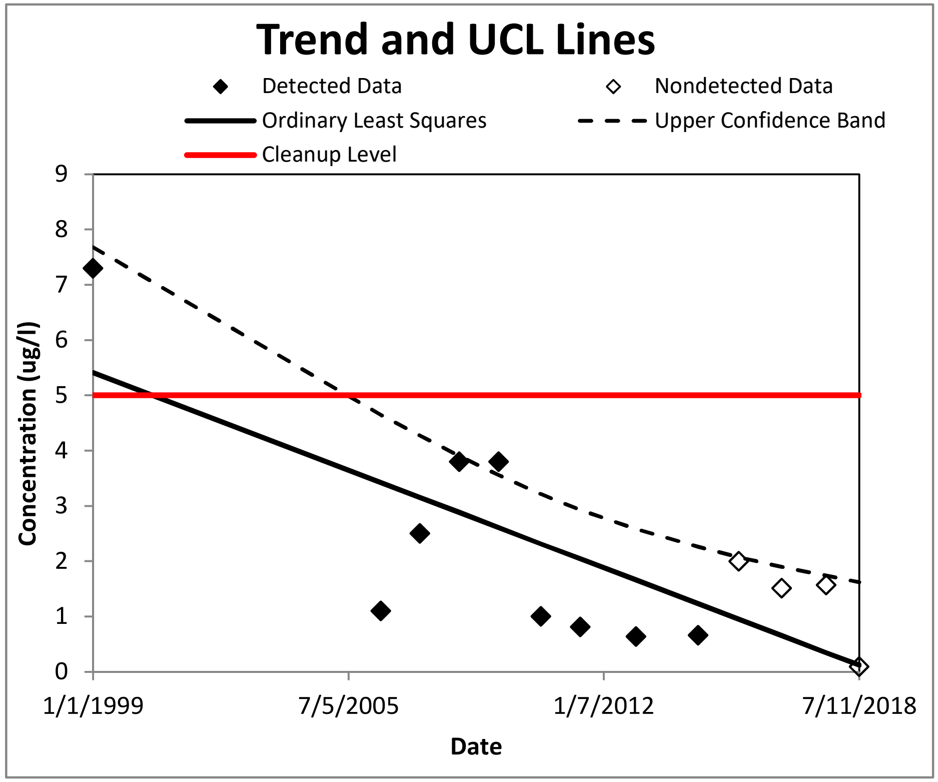
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets with nondetects

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/26/2018
Person performing analysis	VP

Chemical of Concern	Cd
Well Name/Number	MW36B
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	13
Number of detected results	9
Number of non-detected results	4
Detection frequency	69%
Number at or below cleanup level	12
Are any potential outliers present?	No
Mean of concentration	1.85
Standard deviation of concentration	1.95



95% Upper Confidence Limit (UCL)	4.35
Method for calculating UCL	KM Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	1.62
Trend calculation method	Ordinary Least Squares
Cleanup level	5
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	Yes

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

MW-36B Cadmium

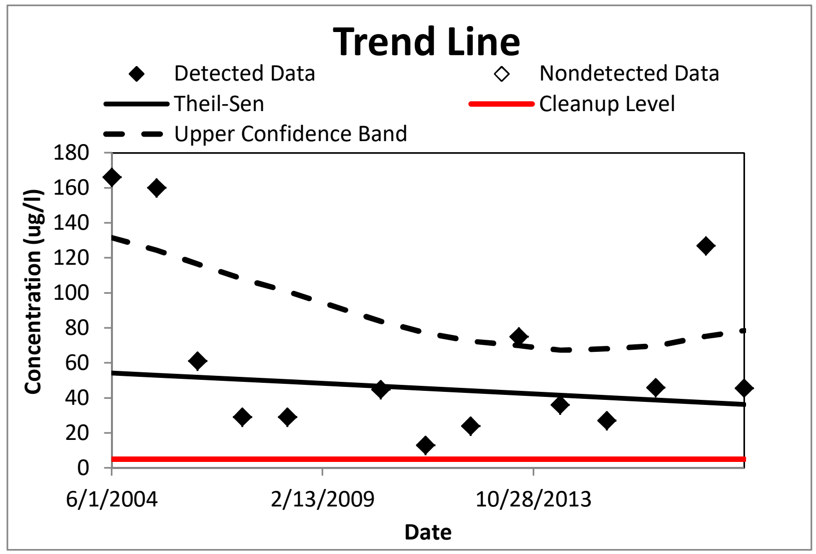
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

i	t (Date)	C (ug/l)	C Predicted	Residual	Upper Confidence Band
1	6/1/2004	166	54.3	111.7	132
2	6/1/2005	160	53	107	125
3	5/1/2006	61	51.8	9.2	117
4	5/1/2007	29	50.6	-21.6	108
5	5/1/2008	29	49.3	-20.3	101
6	6/1/2010	44.8	46.7	-1.9	83.9
7	6/1/2011	13	45.4	-32.4	77.3
8	6/1/2012	24	44.1	-20.1	72.4
9	7/1/2013	75	42.7	32.3	70
10	6/1/2014	36	41.6	-5.6	67.5
11	6/16/2015	27.1	40.2	-13.1	68.2
12	7/20/2016	45.9	38.9	7	69.8
13	8/31/2017	127	37.4	89.6	75.3
14	7/11/2018	45.5	36.3	9.2	78.6
15					
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	No trend
Test Statistic (S)	-12
Normalized S	-0.603
Critical Value	1.645

Theil-Sen	
Slope	-0.00348
Intercept	187
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing



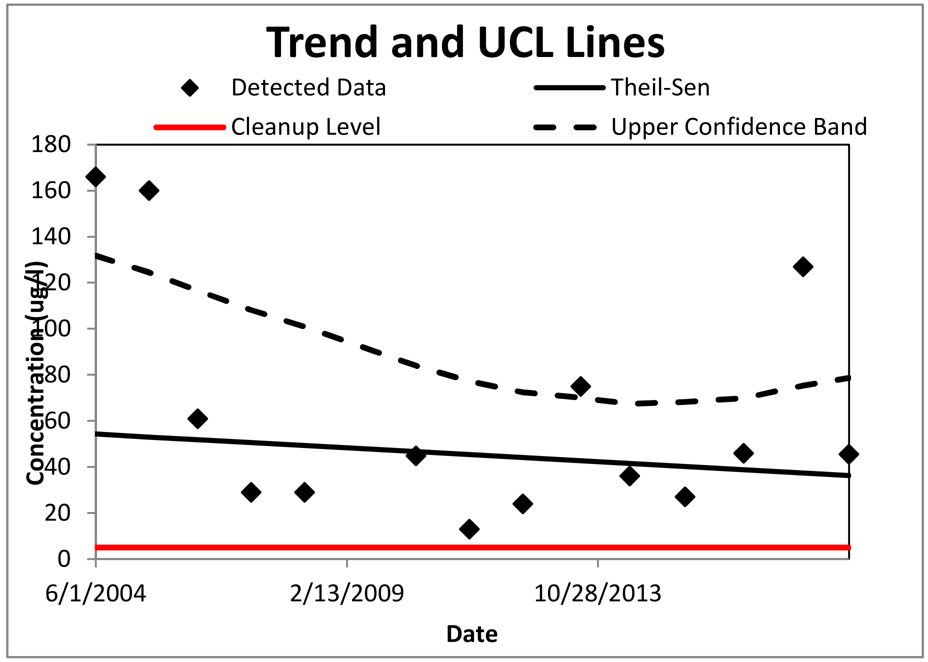
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/26/2018
Person performing analysis	VP

Chemical of Concern	Cd
Well Name/Number	MW38A
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	14
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	63.1
Standard deviation of concentration	50.8



95% Upper Confidence Limit (UCL)	122.3
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	78.6
Trend calculation method	Theil-Sen/Mann-Kendall
Cleanup level	5
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	Yes

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Random Seed Used	41639.55078
Message: None.	

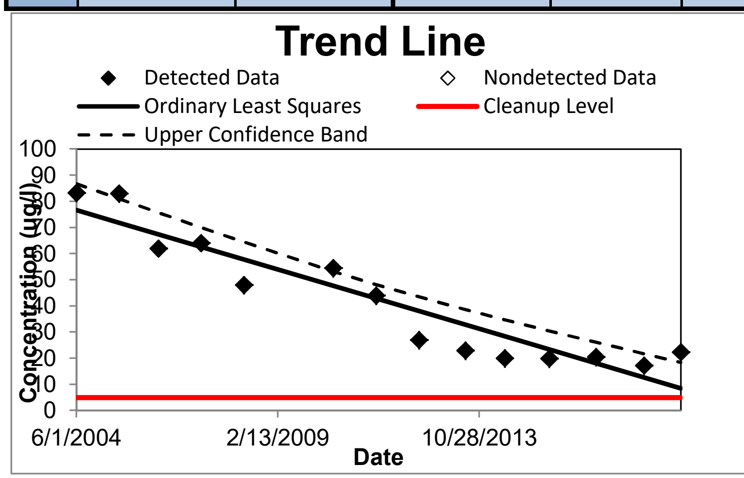
MW-38A Cadmium

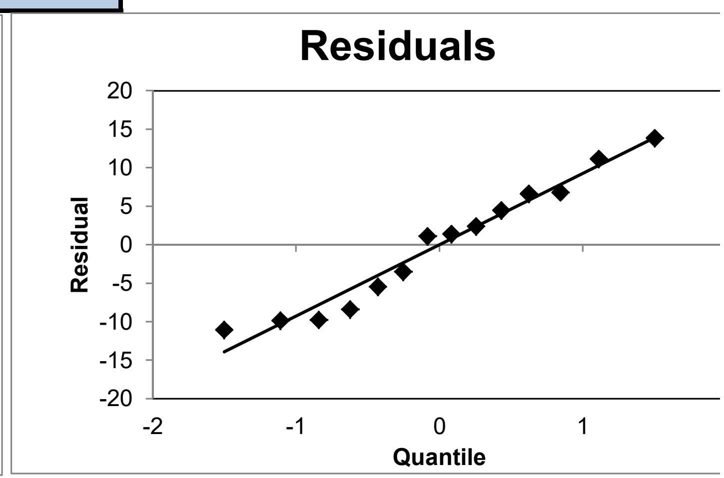
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	6/1/2004	83.3	76.7	6.6	86.7
2	6/1/2005	83	71.8	11.2	80.9
3	5/1/2006	62	67.4	-5.4	75.7
4	5/1/2007	64	62.6	1.4	70
5	5/1/2008	48	57.8	-9.8	64.4
6	6/1/2010	54.5	47.7	6.8	53.2
7	6/1/2011	44	42.9	1.1	48.2
8	6/1/2012	27	38	-11	43.5
9	7/1/2013	23	32.8	-9.8	38.6
10	6/1/2014	20	28.4	-8.4	34.7
11	6/16/2015	19.9	23.4	-3.5	30.4
12	7/20/2016	20.5	18.1	2.4	26.1
13	8/31/2017	17.2	12.7	4.5	21.7
14	7/11/2018	22.4	8.55	13.85	18.4
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	-0.013217435
Intercept	580.7601484
Correlation, R^2	0.8849
Test Result	Decreasing
Test Statistic	-9.607
Critical Value	1.782
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





MW-38B Cadmium

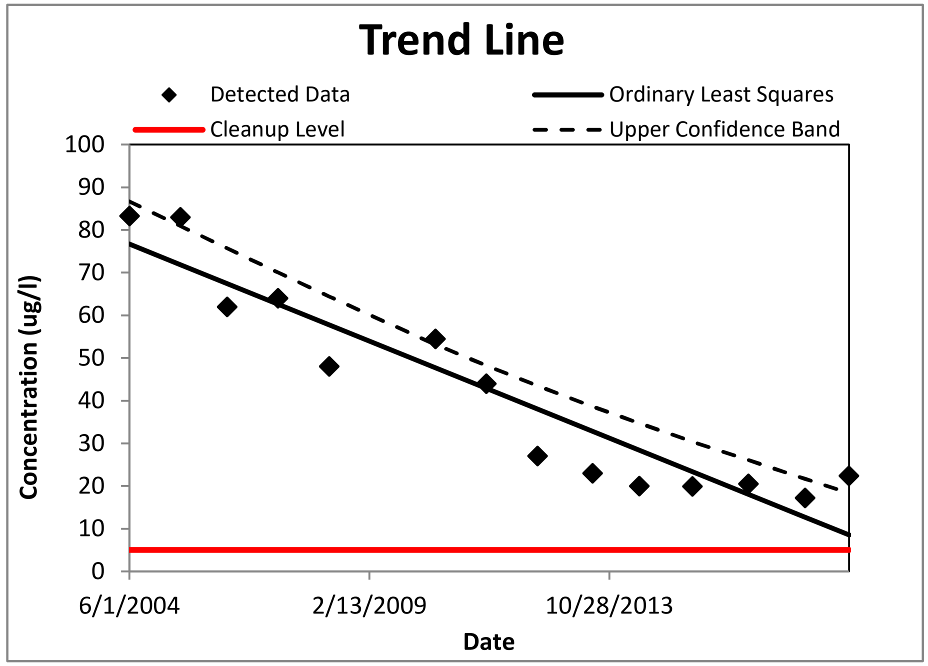
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/26/2018
Person performing analysis	VP

Chemical of Concern	Cd
Well Name/Number	MW38B
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	14
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	42.1
Standard deviation of concentration	24



95% Upper Confidence Limit (UCL)	70.1
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	18.4
Trend calculation method	Ordinary Least Squares
Cleanup level	5
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	Yes

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Random Seed Used	41639.55078
Message: None.	

MW-38B Cadmium

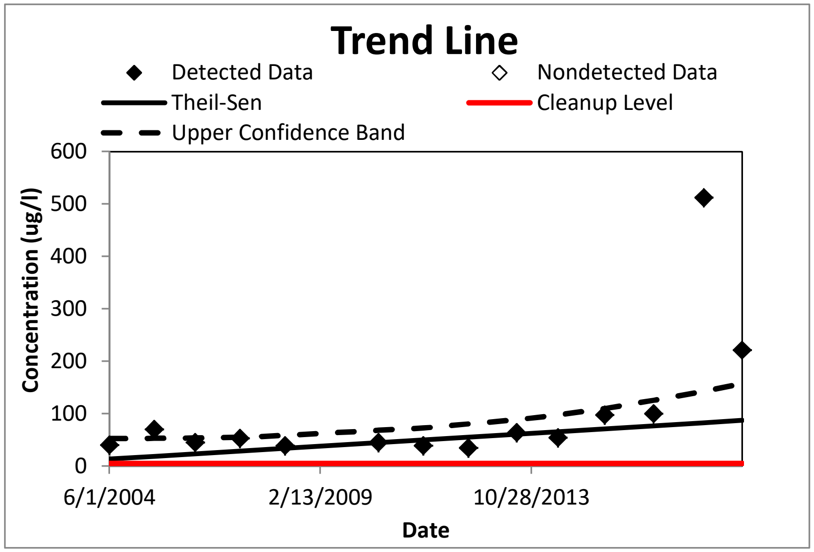
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

i	t (Date)	C (ug/l)	C Predicted	Residual	Upper Confidence Band
1	6/1/2004	40	13.4	26.6	52.9
2	6/1/2005	70	18.6	51.4	53.3
3	5/1/2006	45	23.4	21.6	53.8
4	5/1/2007	53	28.6	24.4	55
5	5/1/2008	39	33.8	5.2	58.5
6	6/1/2010	45	44.7	0.3	68.6
7	6/1/2011	39	49.9	-10.9	72.8
8	6/1/2012	35	55.2	-20.2	80.4
9	7/1/2013	64	60.8	3.2	88.7
10	6/1/2014	54	65.6	-11.6	97.8
11	6/16/2015	97.8	71	26.8	110
12	7/20/2016	100	76.8	23.2	126
13	8/31/2017	512	82.6	429.4	143
14	7/11/2018	221	87.1	133.9	158
15					
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	Increasing
Test Statistic (S)	41
Normalized S	2.196
Critical Value	1.645

Theil-Sen	
Slope	0.0143
Intercept	-532
When is the concentration predicted to exceed the cleanup level?	MCL is already exceeded



MW-39A Cadmium

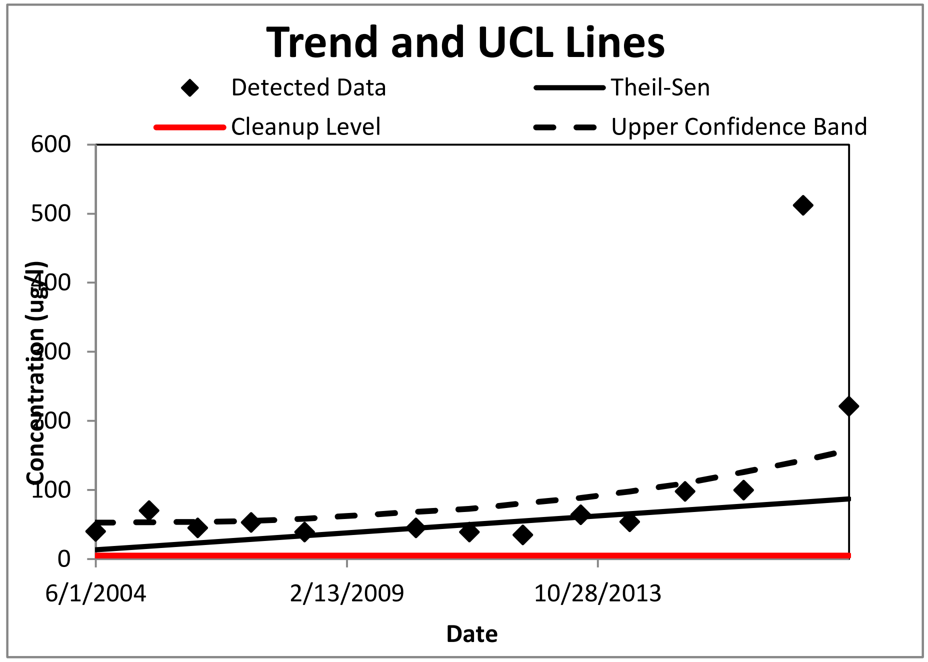
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/26/2018
Person performing analysis	VP

Chemical of Concern	Cd
Well Name/Number	MW39A
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	14
Number < cleanup level	0
Are any potential outliers present?	Yes
Mean of concentration	101
Standard deviation of concentration	128



95% Upper Confidence Limit (UCL)	250
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	158
Trend calculation method	Theil-Sen/Mann-Kendall
Cleanup level	5
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	**No**

When is the concentration predicted to exceed the MCL?	MCL is already exceeded
Random Seed Used	41639.55078
Message: None.	

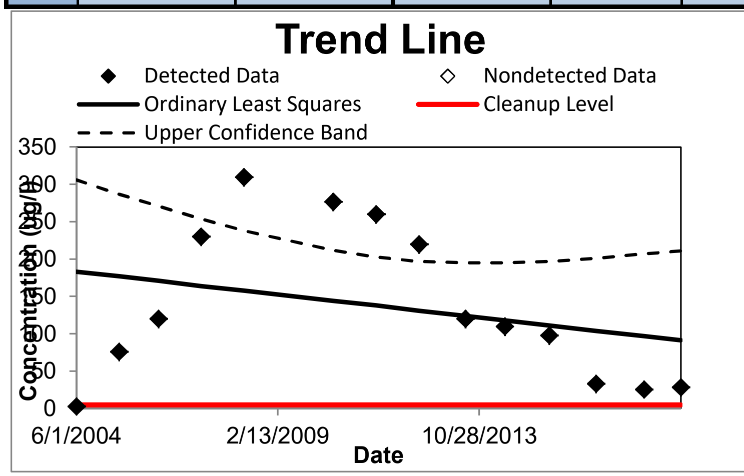
MW-39A Cadmium

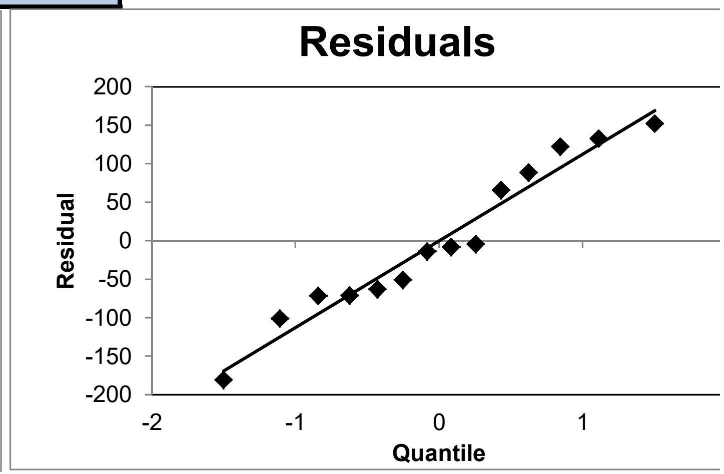
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	6/1/2004	2.67	183	-180.33	306
2	6/1/2005	76	177	-101	287
3	5/1/2006	120	171	-51	271
4	5/1/2007	230	164	66	254
5	5/1/2008	310	158	152	238
6	6/1/2010	277	144	133	212
7	6/1/2011	260	138	122	203
8	6/1/2012	220	131	89	197
9	7/1/2013	120	124	-4	195
10	6/1/2014	110	118	-8	195
11	6/16/2015	97.8	111	-13.2	197
12	7/20/2016	33.1	104	-70.9	201
13	8/31/2017	25.6	96.9	-71.3	207
14	7/11/2018	28.7	91.3	-62.6	211
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	-0.017829067
Intercept	863.1500046
Correlation, R^2	0.0863
Test Result	No trend
Test Statistic	-1.064
Critical Value	1.782
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





MW-39B Cadmium

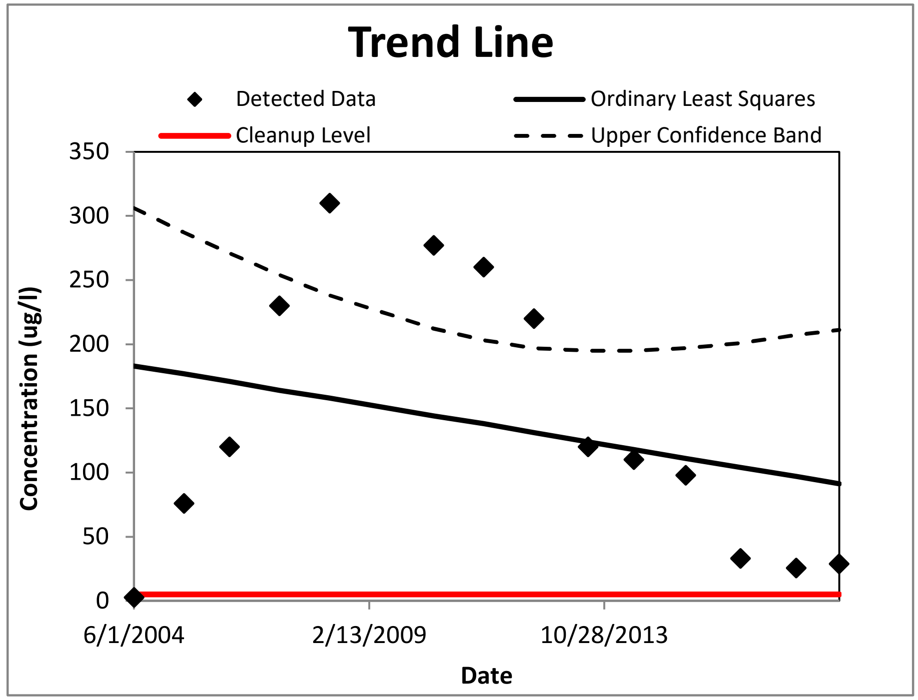
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/26/2018
Person performing analysis	VP

Chemical of Concern	Cd
Well Name/Number	MW39B
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	14
Number < cleanup level	1
Are any potential outliers present?	No
Mean of concentration	136
Standard deviation of concentration	104
t-value for UCL calculation	1.771



95% Upper Confidence Limit (UCL)	185
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	211
Trend calculation method	Ordinary Least Squares
Cleanup level	5
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	Yes

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

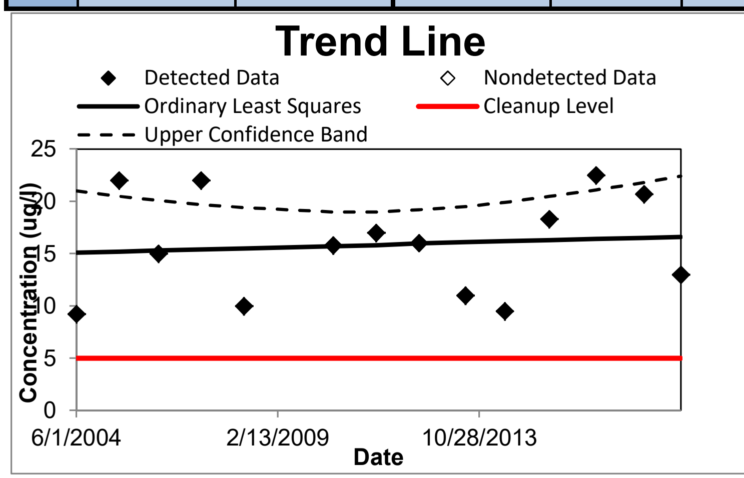
MW-39B Cadmium

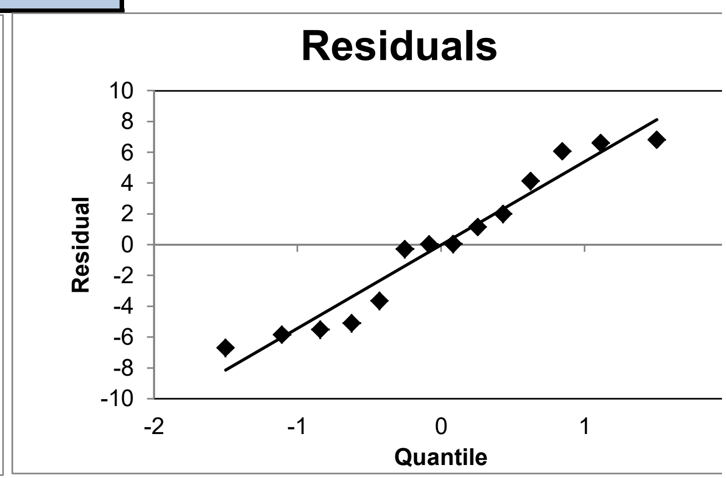
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	6/1/2004	9.22	15.1	-5.88	21
2	6/1/2005	22	15.2	6.8	20.5
3	5/1/2006	15	15.3	-0.3	20.1
4	5/1/2007	22	15.4	6.6	19.7
5	5/1/2008	10	15.5	-5.5	19.4
6	6/1/2010	15.8	15.7	0.1	19
7	6/1/2011	17	15.8	1.2	19
8	6/1/2012	16	16	0	19.2
9	7/1/2013	11	16.1	-5.1	19.5
10	6/1/2014	9.5	16.2	-6.7	19.9
11	6/16/2015	18.3	16.3	2	20.5
12	7/20/2016	22.5	16.4	6.1	21.1
13	8/31/2017	20.7	16.5	4.2	21.8
14	7/11/2018	13	16.6	-3.6	22.4
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.000306911
Intercept	3.349801151
Correlation, R^2	0.0118
Test Result	No trend
Test Statistic	0.379
Critical Value	1.782
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





MW-40A Cadmium

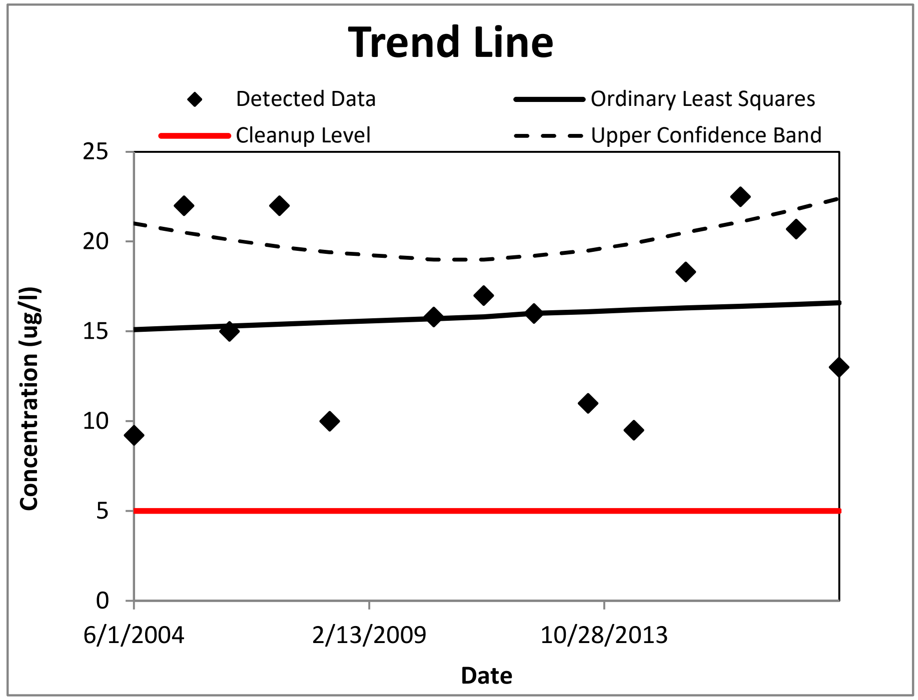
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/26/2018
Person performing analysis	VP

Chemical of Concern	Cd
Well Name/Number	MW40A
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	14
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	15.9
Standard deviation of concentration	4.82
t-value for UCL calculation	1.771



95% Upper Confidence Limit (UCL)	18.2
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	22.4
Trend calculation method	Ordinary Least Squares
Cleanup level	5
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	Yes

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

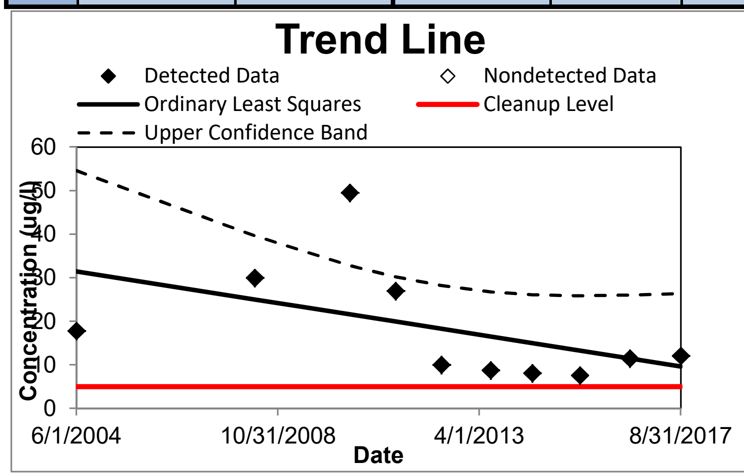
MW-40A Cadmium

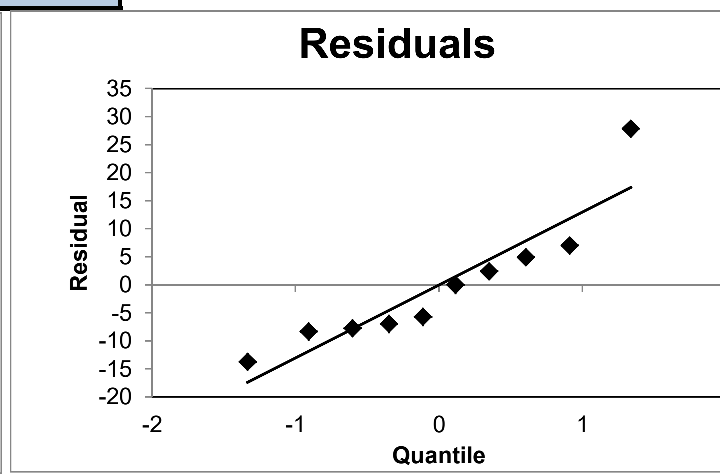
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	6/1/2004	17.8	31.5	-13.7	54.6
2	5/1/2008	30	25	5	39.6
3	6/1/2010	49.5	21.6	27.9	32.8
4	6/1/2011	27	20	7	30.2
5	6/1/2012	10	18.3	-8.3	28.2
6	7/1/2013	8.8	16.5	-7.7	26.8
7	6/1/2014	8.1	15	-6.9	26.1
8	6/16/2015	7.6	13.3	-5.7	25.9
9	7/20/2016	11.5	11.5	0	26
10	8/31/2017	12.1	9.65	2.45	26.4
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	-0.004517028
Intercept	203.7818917
Correlation, R^2	0.2389
Test Result	No trend
Test Statistic	-1.585
Critical Value	1.860
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





MW-40B Cadmium

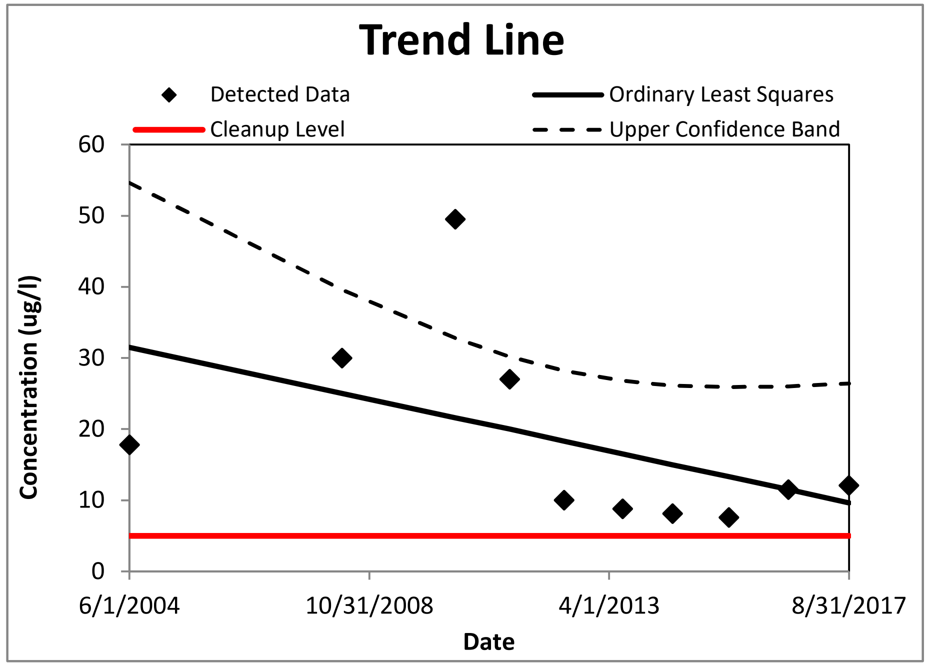
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/26/2018
Person performing analysis	VP

Chemical of Concern	Cd
Well Name/Number	MW40B
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	10
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	18.2
Standard deviation of concentration	13.5



95% Upper Confidence Limit (UCL)	36.8
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	26.4
Trend calculation method	Ordinary Least Squares
Cleanup level	5
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Random Seed Used	41639.55078
Message: None.	

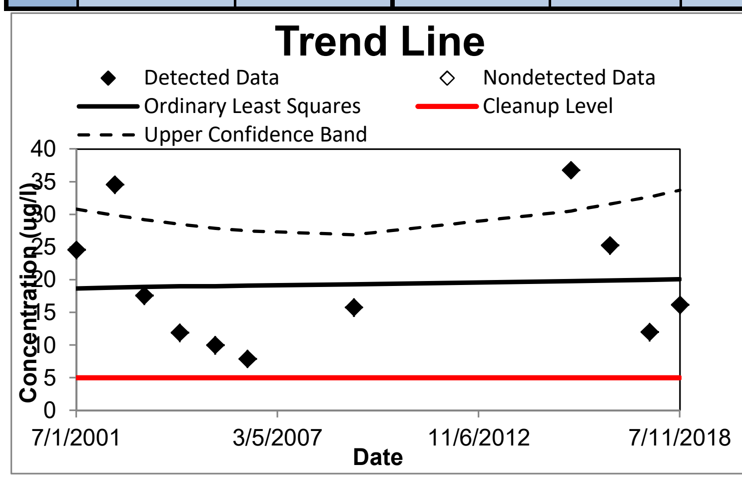
MW-40B Cadmium

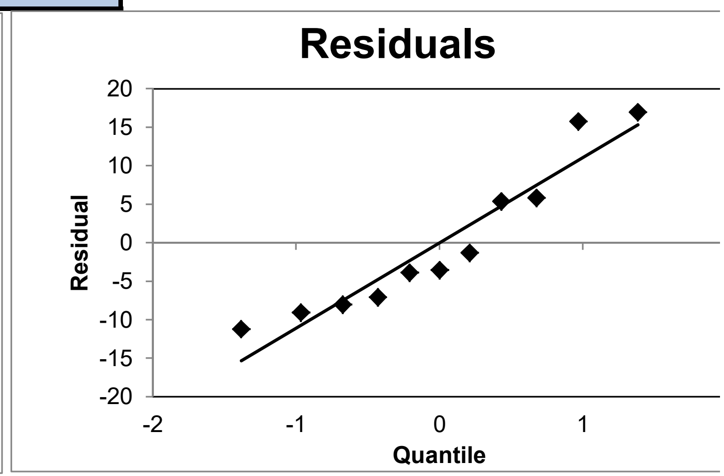
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	7/1/2001	24.6	18.7	5.9	30.8
2	8/1/2002	34.6	18.8	15.8	29.9
3	6/1/2003	17.6	18.9	-1.3	29.2
4	6/1/2004	11.9	19	-7.1	28.5
5	6/1/2005	10	19	-9	27.9
6	5/1/2006	7.9	19.1	-11.2	27.5
7	5/1/2009	15.8	19.3	-3.5	26.9
8	6/16/2015	36.8	19.8	17	30.5
9	7/20/2016	25.3	19.9	5.4	31.6
10	9/1/2017	12	20	-8	32.7
11	7/11/2018	16.2	20.1	-3.9	33.7
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.000211175
Intercept	10.91350999
Correlation, R^2	0.0027
Test Result	No trend
Test Statistic	0.156
Critical Value	1.833
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





MW-41AR Cadmium

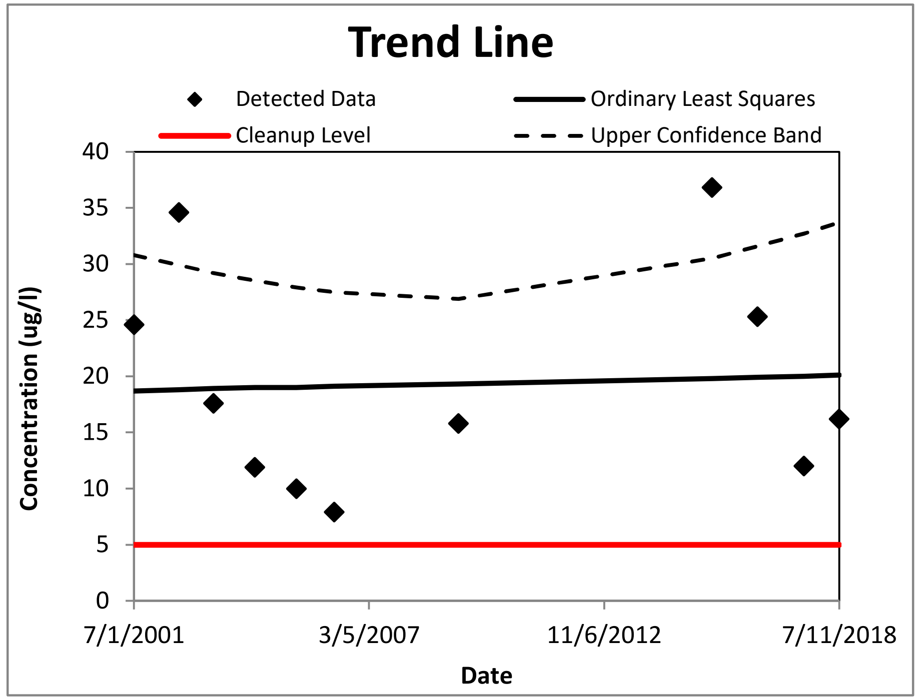
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/26/2018
Person performing analysis	VP

Chemical of Concern	Cd
Well Name/Number	MW41AR
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	11
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	19.3
Standard deviation of concentration	9.77
t-value for UCL calculation	1.812



95% Upper Confidence Limit (UCL)	24.6
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	33.7
Trend calculation method	Ordinary Least Squares
Cleanup level	5
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	Yes

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

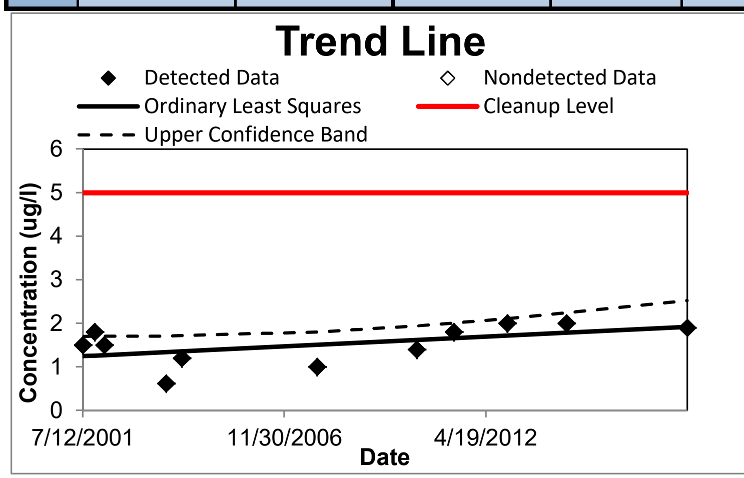
MW-41AR Cadmium

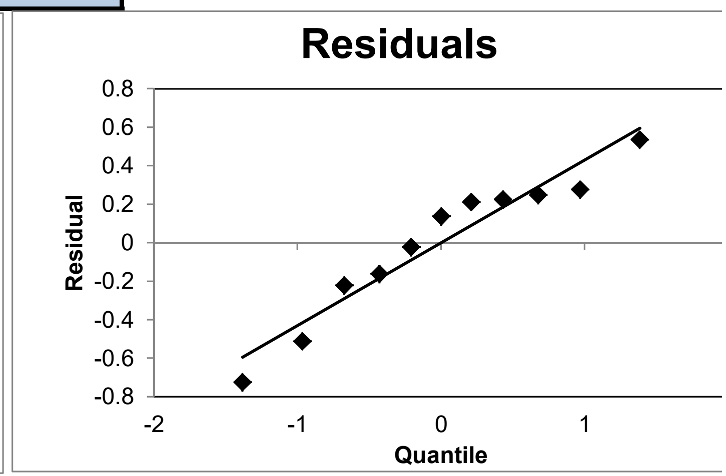
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	7/12/2001	1.5	1.25	0.25	1.7
2	11/7/2001	1.8	1.26	0.54	1.71
3	2/7/2002	1.5	1.27	0.23	1.71
4	10/2/2003	0.62	1.34	-0.72	1.71
5	3/4/2004	1.2	1.36	-0.16	1.72
6	10/16/2007	1	1.51	-0.51	1.8
7	6/15/2010	1.4	1.62	-0.22	1.94
8	6/14/2011	1.8	1.66	0.14	2.01
9	11/14/2012	2	1.72	0.28	2.11
10	6/17/2014	2	1.79	0.21	2.24
11	9/6/2017	1.9	1.92	-0.02	2.52
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.000113738
Intercept	-2.96713853
Correlation, R^2	0.2856
Test Result	Increasing
Test Statistic	1.897
Critical Value	1.833
When is the concentration predicted to exceed the cleanup level?	70000





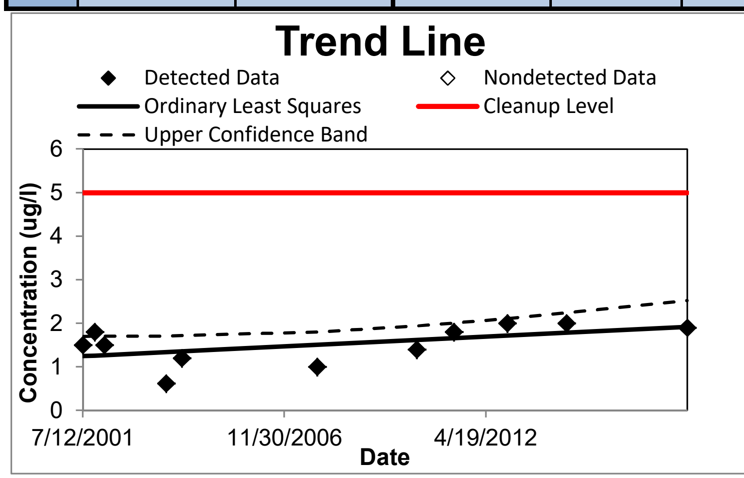
MW-43A Cadmium

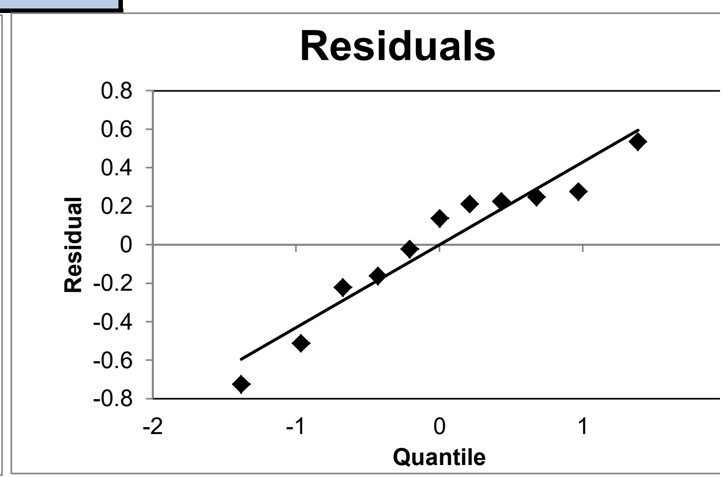
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	7/12/2001	1.5	1.25	0.25	1.7
2	11/7/2001	1.8	1.26	0.54	1.71
3	2/7/2002	1.5	1.27	0.23	1.71
4	10/2/2003	0.62	1.34	-0.72	1.71
5	3/4/2004	1.2	1.36	-0.16	1.72
6	10/16/2007	1	1.51	-0.51	1.8
7	6/15/2010	1.4	1.62	-0.22	1.94
8	6/14/2011	1.8	1.66	0.14	2.01
9	11/14/2012	2	1.72	0.28	2.11
10	6/17/2014	2	1.79	0.21	2.24
11	9/6/2017	1.9	1.92	-0.02	2.52
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.000113738
Intercept	-2.96713853
Correlation, R^2	0.2856
Test Result	Increasing
Test Statistic	1.897
Critical Value	1.833
When is the concentration predicted to exceed the cleanup level?	70000





MW-43A Cadmium

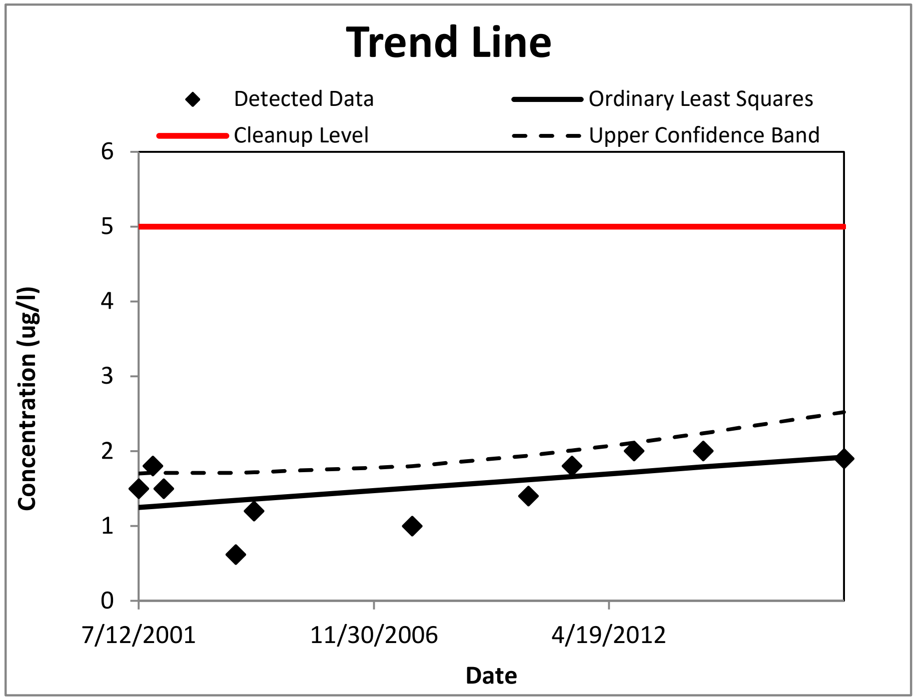
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/26/2018
Person performing analysis	VP

Chemical of Concern	Cd
Well Name/Number	MW43A
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	11
Number < cleanup level	11
Are any potential outliers present?	No
Mean of concentration	1.52
Standard deviation of concentration	0.443
t-value for UCL calculation	1.812



95% Upper Confidence Limit (UCL)	1.76
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	2.52
Trend calculation method	Ordinary Least Squares
Cleanup level	5
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	**No**

When is the concentration predicted to exceed the MCL?	70000
Message: None.	

MW-43A Cadmium

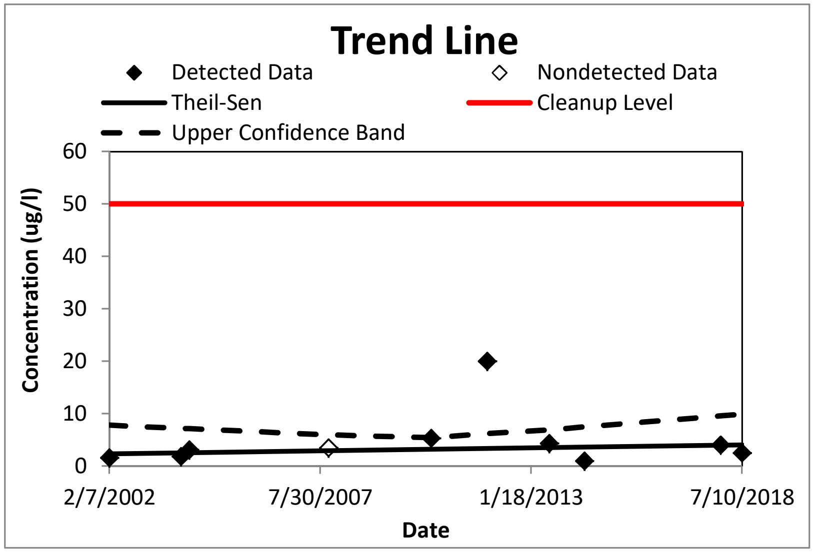
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

i	t (Date)	C (ug/l)	C Predicted	Residual	Upper Confidence Band
1	2/7/2002	1.6	2.33	-0.73	7.85
2	12/18/2003	1.8	2.53	-0.73	7.21
3	3/5/2004	3.1	2.55	0.55	7.15
4	10/15/2007	3.48	2.93	0.55	6.02
5	6/15/2010	5.3	3.21	2.09	5.47
6	11/29/2011	20	3.36	16.64	6.23
7	7/8/2013	4.3	3.53	0.77	6.89
8	6/7/2014	1	3.63	-2.63	7.52
9	12/20/2017	4	4	0	9.58
10	7/11/2018	2.5	4.06	-1.56	9.92
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	No trend
Test Statistic (S)	9
Normalized S	0.716
Critical Value	1.645

Theil-Sen	
Slope	0.000288
Intercept	-8.41
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing



MW-44A Chromium

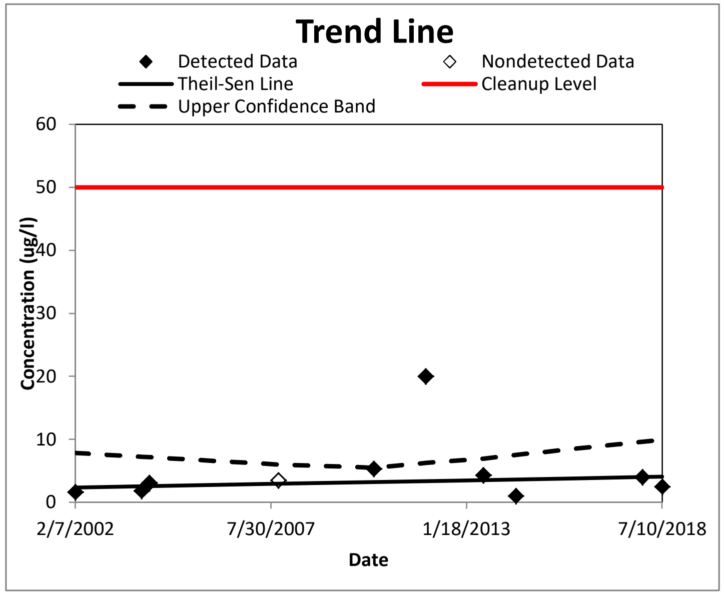
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets with nondetects

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/26/2018
Person performing analysis	VP

Chemical of Concern	Cr
Well Name/Number	MW44A
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	10
Number of detected results	9
Number of non-detected results	1
Detection frequency	90%
Number at or below cleanup level	10
Are any potential outliers present?	Yes
Mean of concentration	4.59
Standard deviation of concentration	5.3



95% Upper Confidence Limit (UCL)	12.4
Method for calculating UCL	KM Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	9.92
Trend calculation method	Theil-Sen/Mann-Kendall
Cleanup level	50
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	Yes

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

Data, including imputed values

Date (Date)	Cr Concentration (ug/l)	Data Qualifier	Imputed value*
37294	1.6	B	1.6
37973	1.8		1.8
38051	3.1	J	3.1
39370	4	U	3.48
40344	5.3		5.3
40876	20		20
41463	4.3		4.3
41797	1	J	1
43089	4		4
43292	2.5	J	2.5

* Note that the imputed value column also includes the actual value for detected samples. This is for convenience in copying and pasting the data.

Random Seed Used	41639.55078

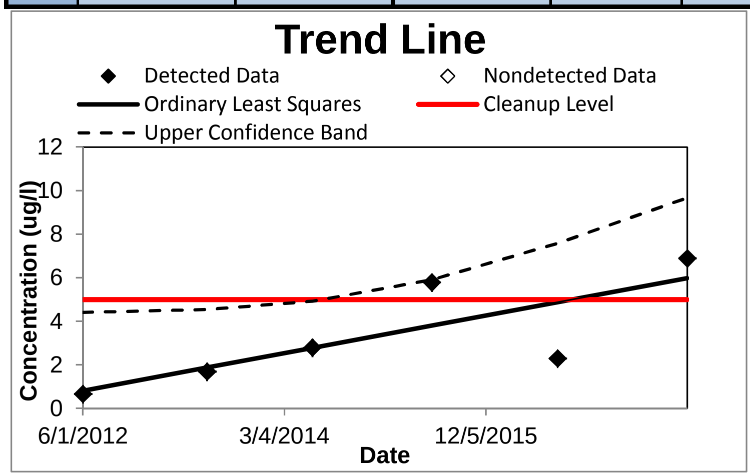
MW-44A Chromium

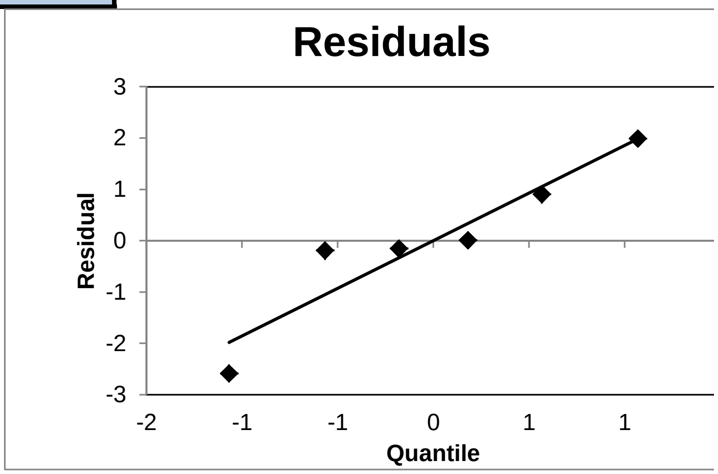
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	6/1/2012	0.67	0.822	-0.152	4.41
2	7/1/2013	1.7	1.88	-0.18	4.55
3	6/1/2014	2.8	2.78	0.02	4.93
4	6/16/2015	5.8	3.81	1.99	5.91
5	7/20/2016	2.3	4.88	-2.58	7.58
6	9/5/2017	6.9	5.99	0.91	9.67
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.002689134
Intercept	-109.596752
Correlation, R^2	0.6147
Test Result	Increasing
Test Statistic	2.526
Critical Value	2.132
When is the concentration predicted to exceed the cleanup level?	MCL is already exceeded





PZ-14 Cadmium

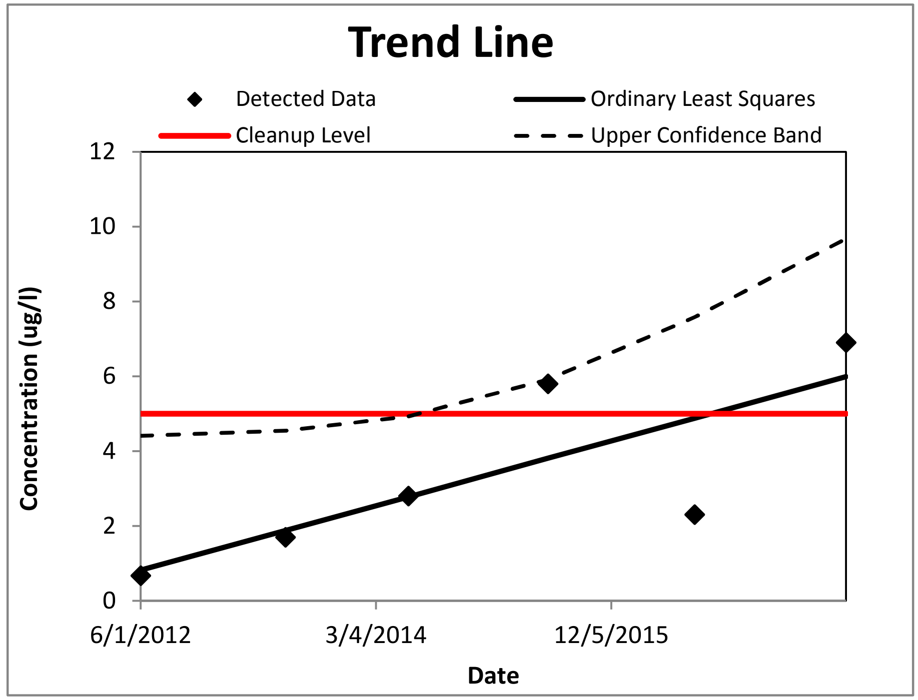
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	9/26/2017
Person performing analysis	VP

Chemical of Concern	Cd
Well Name/Number	PZ14
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	6
Number < cleanup level	4
Are any potential outliers present?	No
Mean of concentration	3.36
Standard deviation of concentration	2.45
t-value for UCL calculation	2.015



95% Upper Confidence Limit (UCL)	5.38
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	9.67
Trend calculation method	Ordinary Least Squares
Cleanup level	5
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	**No**

When is the concentration predicted to exceed the MCL?	MCL is already exceeded
Message: None.	

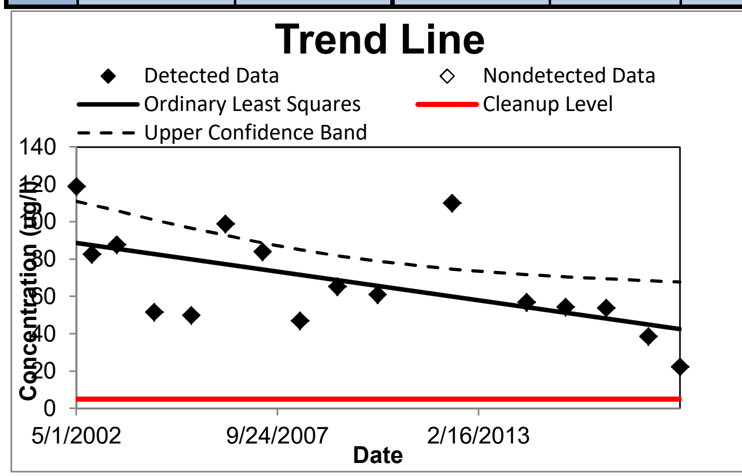
PZ-14 Cadmium

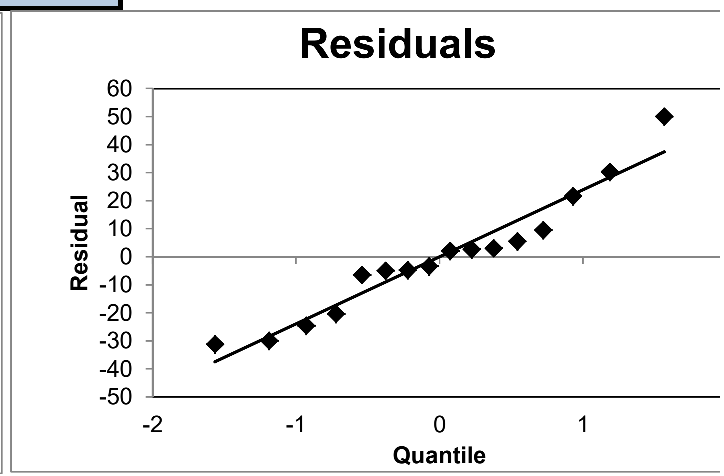
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	5/1/2002	119	88.7	30.3	111
2	10/1/2002	82.6	87.5	-4.9	109
3	6/1/2003	87.8	85.6	2.2	106
4	6/1/2004	51.6	82.7	-31.1	101
5	6/1/2005	50	79.9	-29.9	96.6
6	5/1/2006	99	77.3	21.7	92.7
7	5/1/2007	84	74.4	9.6	88.7
8	5/1/2008	47	71.6	-24.6	85.1
9	5/1/2009	65.4	68.8	-3.4	81.9
10	6/1/2010	61	65.7	-4.7	78.9
11	6/1/2012	110	60	50	74.6
12	6/1/2014	57	54.3	2.7	71.7
13	6/16/2015	54.4	51.3	3.1	70.5
14	7/20/2016	53.8	48.2	5.6	69.4
15	9/5/2017	38.6	45	-6.4	68.4
16	7/11/2018	22.3	42.6	-20.3	67.8
17					
18					
19					
20					

Ordinary Least Squares	
Slope	-0.007793944
Intercept	379.995769
Correlation, R^2	0.3465
Test Result	Decreasing
Test Statistic	-2.725
Critical Value	1.761
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





RW-01 Cadmium

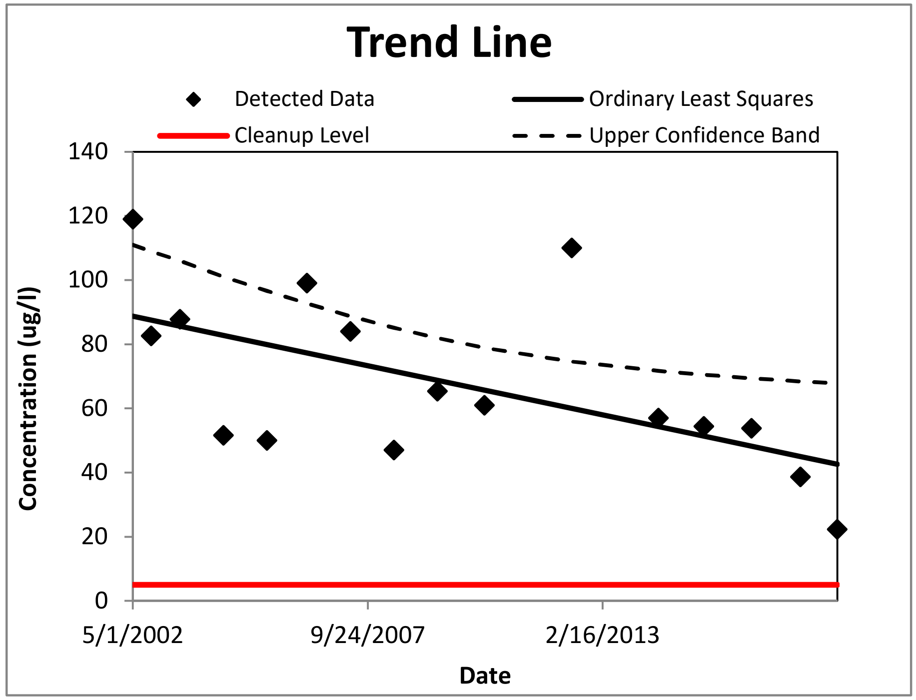
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/26/2018
Person performing analysis	VP

Chemical of Concern	Cd
Well Name/Number	RW01
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	16
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	67.7
Standard deviation of concentration	26.8
t-value for UCL calculation	1.753



95% Upper Confidence Limit (UCL)	79.4
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	67.8
Trend calculation method	Ordinary Least Squares
Cleanup level	5
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	Yes

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

RW-01 Cadmium

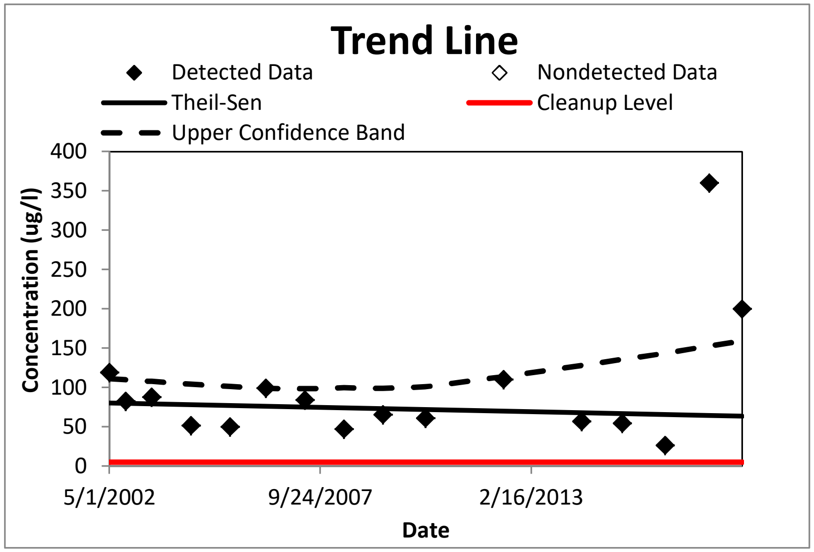
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

i	t (Date)	C (ug/l)	C Predicted	Residual	Upper Confidence Band
1	5/1/2002	119	80.1	38.9	111
2	10/1/2002	82.6	79.7	2.9	110
3	6/1/2003	87.8	79	8.8	108
4	6/1/2004	51.6	78	-26.4	104
5	6/1/2005	50	77	-27	101
6	5/1/2006	99	76	23	99
7	5/1/2007	84	75	9	98.4
8	5/1/2008	47	74	-27	99.6
9	5/1/2009	65.4	73	-7.6	99.1
10	6/1/2010	61	71.9	-10.9	101
11	6/1/2012	110	69.9	40.1	114
12	6/1/2014	57	67.8	-10.8	128
13	6/16/2015	54.4	66.8	-12.4	136
14	7/20/2016	26.3	65.7	-39.4	143
15	9/5/2017	360	64.5	295.5	153
16	7/11/2018	200	63.6	136.4	159
17					
18					
19					
20					

Mann-Kendall	
Test Result	No trend
Test Statistic (S)	-6
Normalized S	-0.225
Critical Value	1.645

Theil-Sen	
Slope	-0.00278
Intercept	184
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing



RW-02 Cadmium

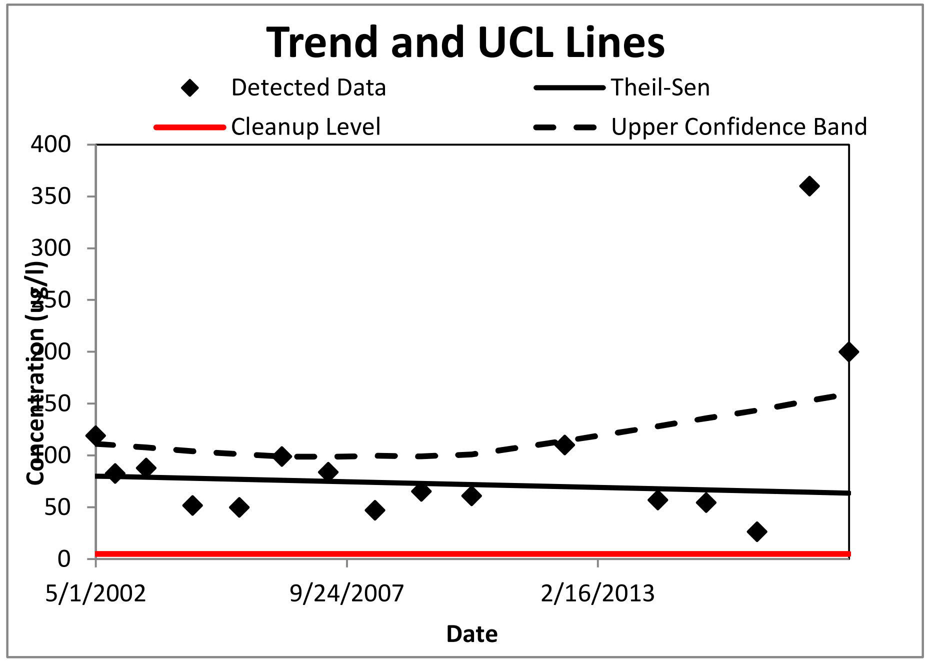
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/26/2018
Person performing analysis	VP

Chemical of Concern	Cd
Well Name/Number	RW01
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	16
Number < cleanup level	0
Are any potential outliers present?	Yes
Mean of concentration	97.2
Standard deviation of concentration	81



95% Upper Confidence Limit (UCL)	185
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	159
Trend calculation method	Theil-Sen/Mann-Kendall
Cleanup level	5
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Random Seed Used	41639.55078
Message: None.	

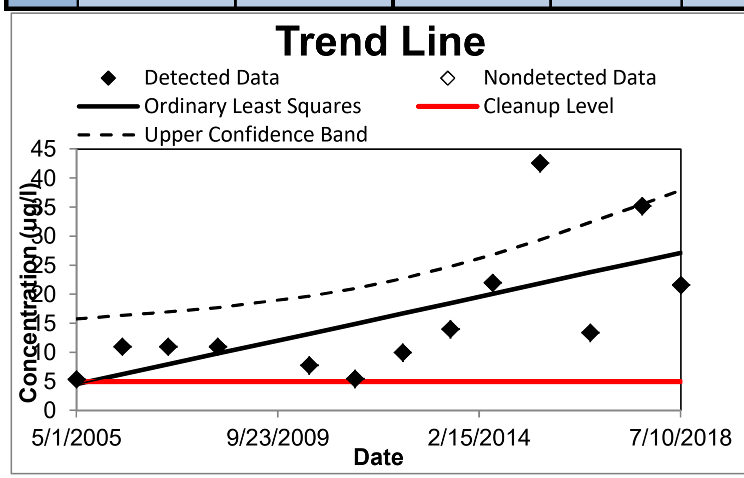
RW-02 Cadmium

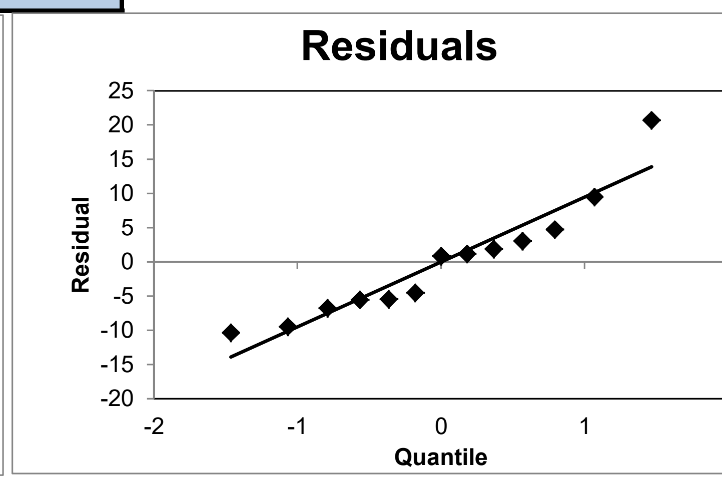
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	5/1/2005	5.4	4.52	0.88	15.8
2	5/1/2006	11	6.24	4.76	16.4
3	5/1/2007	11	7.95	3.05	17
4	6/1/2008	11	9.81	1.19	17.7
5	6/1/2010	7.8	13.2	-5.4	19.7
6	6/1/2011	5.5	14.9	-9.4	21
7	6/16/2012	10	16.7	-6.7	22.7
8	7/1/2013	14	18.5	-4.5	24.8
9	6/1/2014	22	20.1	1.9	26.8
10	6/16/2015	42.6	21.9	20.7	29.4
11	7/20/2016	13.4	23.8	-10.4	32.4
12	9/5/2017	35.2	25.7	9.5	35.5
13	7/11/2018	21.6	27.1	-5.5	37.9
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.004691733
Intercept	-175.9807274
Correlation, R^2	0.4337
Test Result	Increasing
Test Statistic	2.903
Critical Value	1.796
When is the concentration predicted to exceed the cleanup level?	MCL is already exceeded





RW-03A Cadmium

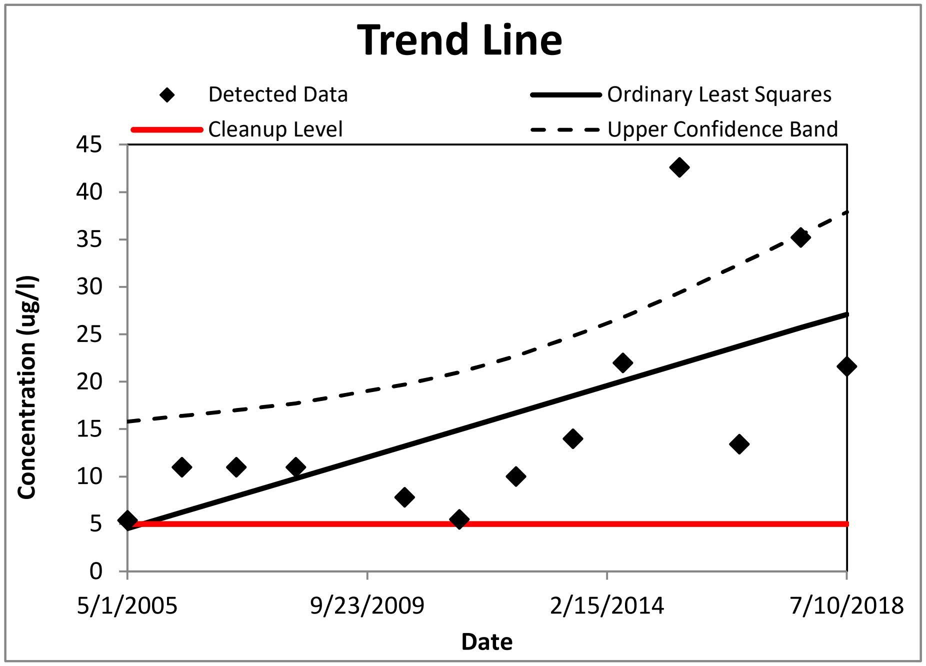
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/26/2018
Person performing analysis	VP

Chemical of Concern	Cd
Well Name/Number	RW03
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	13
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	16.2
Standard deviation of concentration	11.4



95% Upper Confidence Limit (UCL)	30
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	37.9
Trend calculation method	Ordinary Least Squares
Cleanup level	5
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	**No**

When is the concentration predicted to exceed the MCL?	MCL is already exceeded
Random Seed Used	41639.55078
Message: None.	

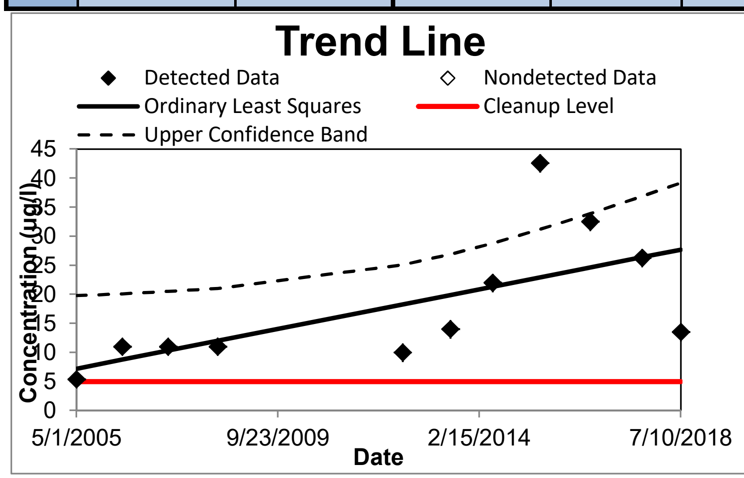
RW-03A Cadmium

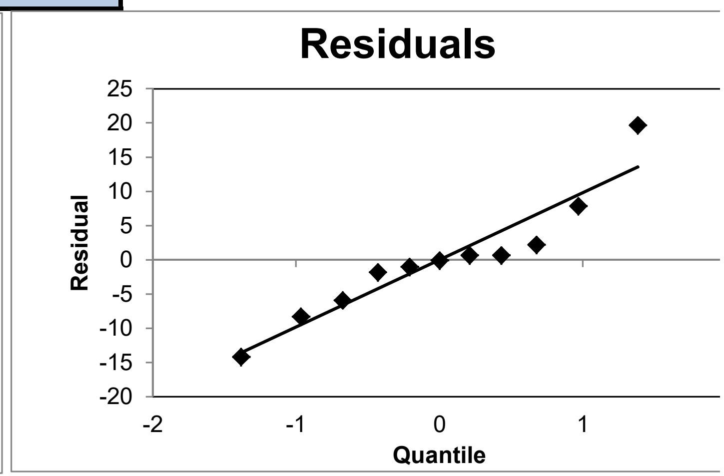
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	5/1/2005	5.4	7.21	-1.81	19.8
2	5/1/2006	11	8.76	2.24	20.1
3	5/1/2007	11	10.3	0.7	20.5
4	6/1/2008	11	12	-1	21
5	6/16/2012	10	18.3	-8.3	25.1
6	7/1/2013	14	19.9	-5.9	26.9
7	6/1/2014	22	21.3	0.7	28.8
8	6/16/2015	42.6	22.9	19.7	31.2
9	7/20/2016	32.5	24.6	7.9	33.9
10	9/5/2017	26.3	26.4	-0.1	36.9
11	7/11/2018	13.5	27.7	-14.2	39.2
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.004245354
Intercept	-156.1165612
Correlation, R^2	0.4153
Test Result	Increasing
Test Statistic	2.528
Critical Value	1.833
When is the concentration predicted to exceed the cleanup level?	MCL is already exceeded





RW-04 Cadmium

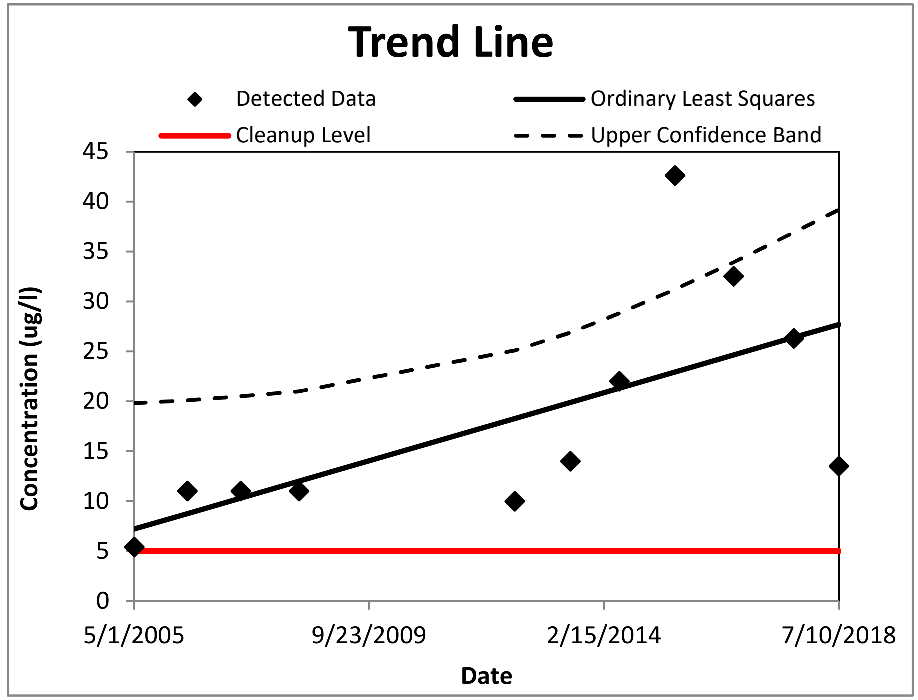
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/26/2018
Person performing analysis	VP

Chemical of Concern	Cd
Well Name/Number	RW04
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	11
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	18.1
Standard deviation of concentration	11.4
t-value for UCL calculation	1.812



95% Upper Confidence Limit (UCL)	24.3
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	39.2
Trend calculation method	Ordinary Least Squares
Cleanup level	5
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	No

When is the concentration predicted to exceed the MCL?	MCL is already exceeded
Message: None.	

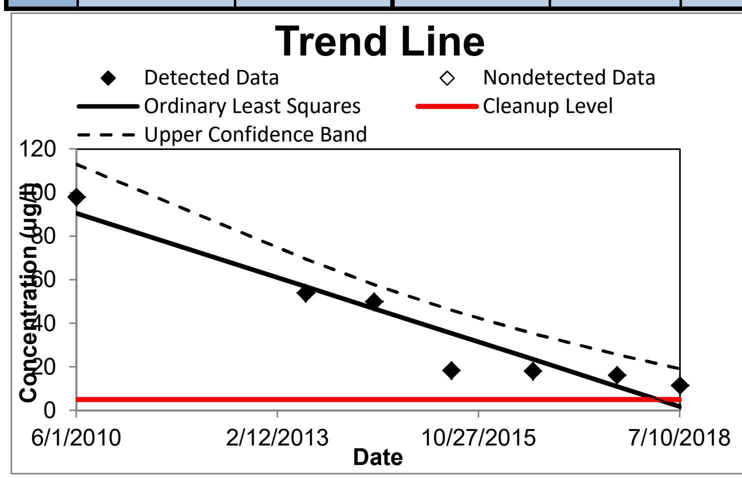
RW-04 Cadmium

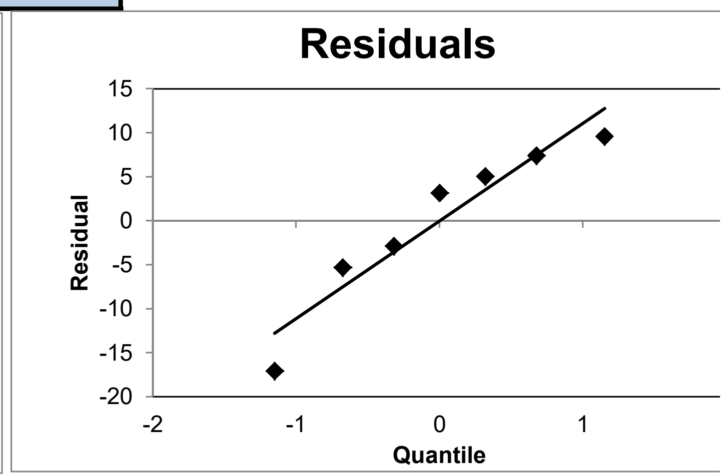
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	6/1/2010	98	90.6	7.4	113
2	7/1/2013	54	56.9	-2.9	69.5
3	6/1/2014	50	46.8	3.2	57.8
4	6/16/2015	18.4	35.5	-17.1	46
5	7/20/2016	18.2	23.5	-5.3	35.3
6	9/5/2017	16.2	11.1	5.1	25.7
7	7/11/2018	11.5	1.89	9.61	19.1
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	-0.029949555
Intercept	1298.465597
Correlation, R^2	0.9143
Test Result	Decreasing
Test Statistic	-7.306
Critical Value	2.015
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





RW-05 Cadmium

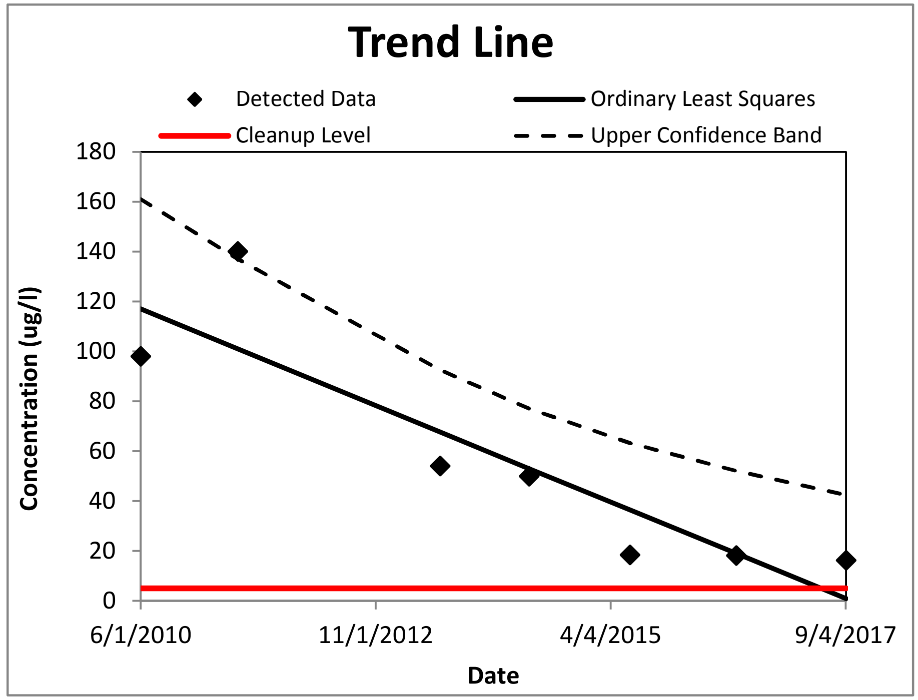
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	9/26/2017
Person performing analysis	VP

Chemical of Concern	Cd
Well Name/Number	RW05
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	7
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	56.4
Standard deviation of concentration	47.1
t-value for UCL calculation	1.943



95% Upper Confidence Limit (UCL)	91
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	42.4
Trend calculation method	Ordinary Least Squares
Cleanup level	5
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	Yes

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

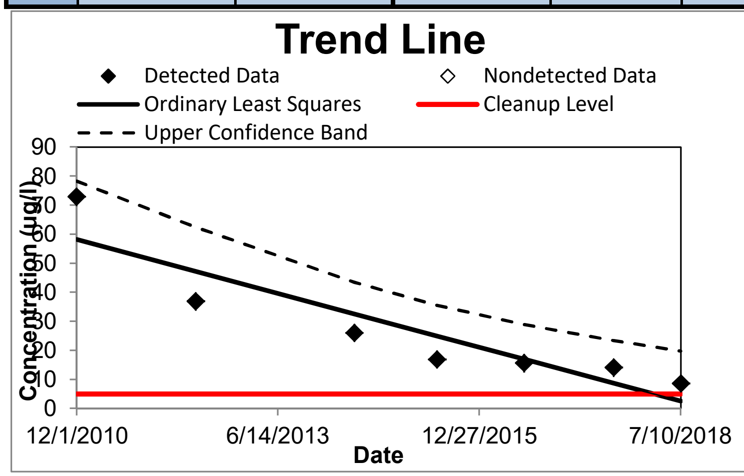
RW-05 Cadmium

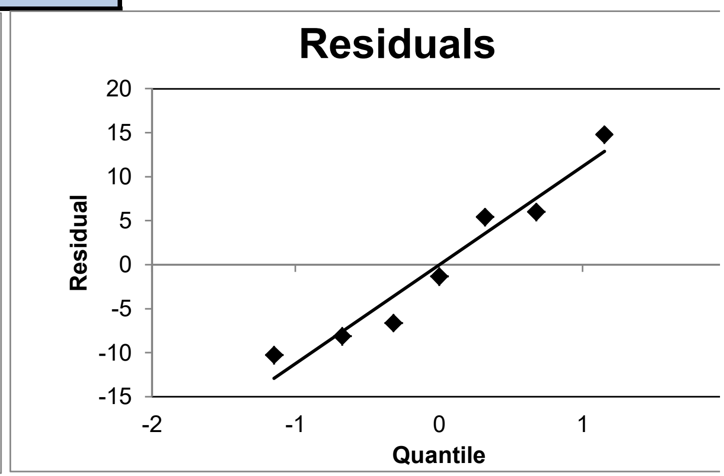
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	12/1/2010	73	58.2	14.8	78.3
2	6/1/2012	37	47.2	-10.2	62.4
3	6/1/2014	26	32.6	-6.6	43.4
4	6/16/2015	16.9	25	-8.1	35.5
5	7/20/2016	15.7	17	-1.3	28.9
6	9/5/2017	14.2	8.76	5.44	23.4
7	7/11/2018	8.6	2.57	6.03	19.8
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	-0.020019221
Intercept	869.242637
Correlation, R^2	0.8301
Test Result	Decreasing
Test Statistic	-4.942
Critical Value	2.015
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





RW-06 Cadmium

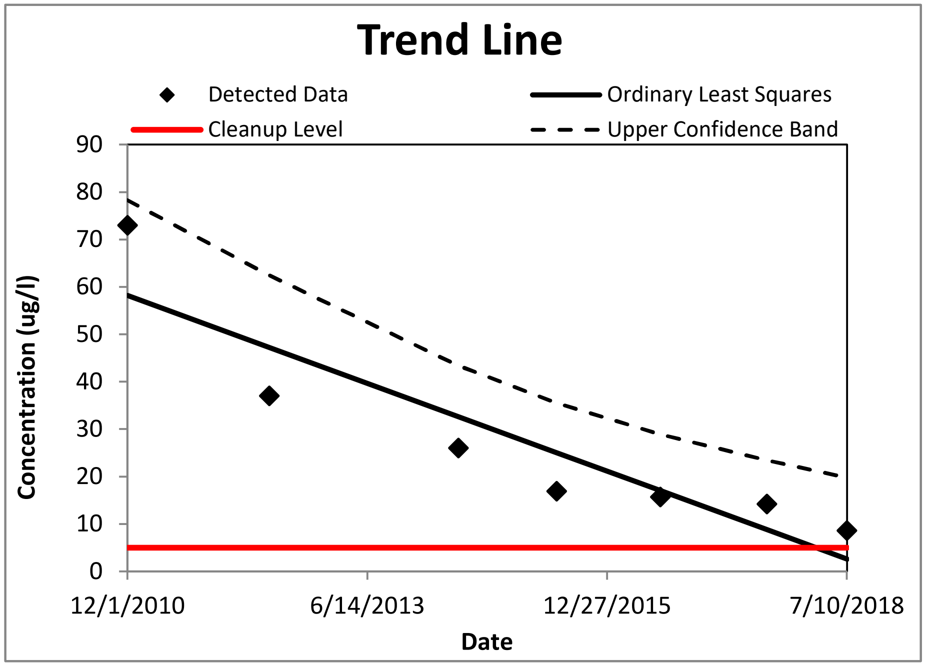
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/26/2018
Person performing analysis	VP

Chemical of Concern	Cd
Well Name/Number	RW06
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	7
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	27.3
Standard deviation of concentration	22.2



95% Upper Confidence Limit (UCL)	63.9
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	19.8
Trend calculation method	Ordinary Least Squares
Cleanup level	5
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	Yes

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Random Seed Used	41639.55078
Message: None.	

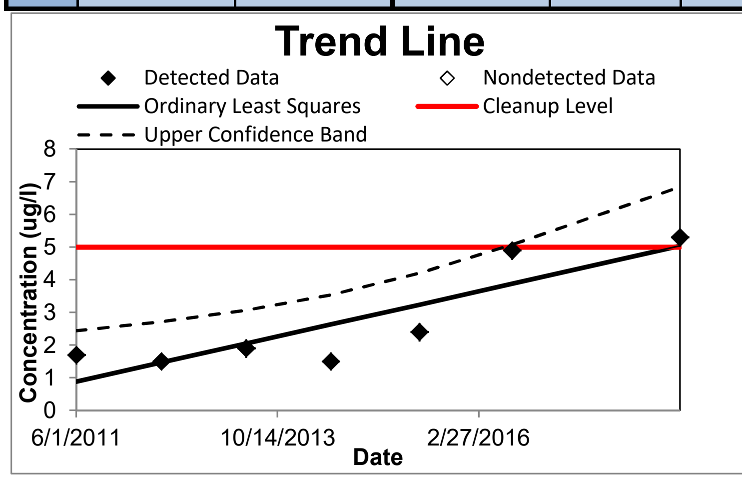
RW-06 Cadmium

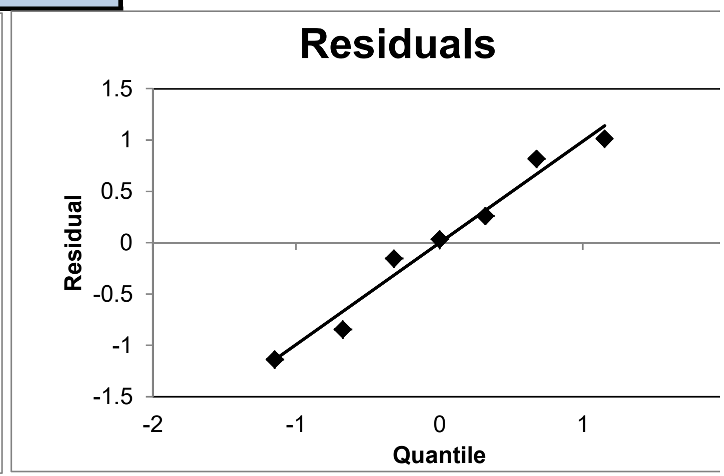
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	6/1/2011	1.7	0.881	0.819	2.44
2	6/1/2012	1.5	1.47	0.03	2.72
3	6/1/2013	1.9	2.05	-0.15	3.07
4	6/1/2014	1.5	2.64	-1.14	3.54
5	6/16/2015	2.4	3.24	-0.84	4.21
6	7/20/2016	4.9	3.88	1.02	5.08
7	7/11/2018	5.3	5.04	0.26	6.84
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.001600397
Intercept	-64.24678273
Correlation, R^2	0.7656
Test Result	Increasing
Test Statistic	4.041
Critical Value	2.015
When is the concentration predicted to exceed the cleanup level?	MCL is already exceeded





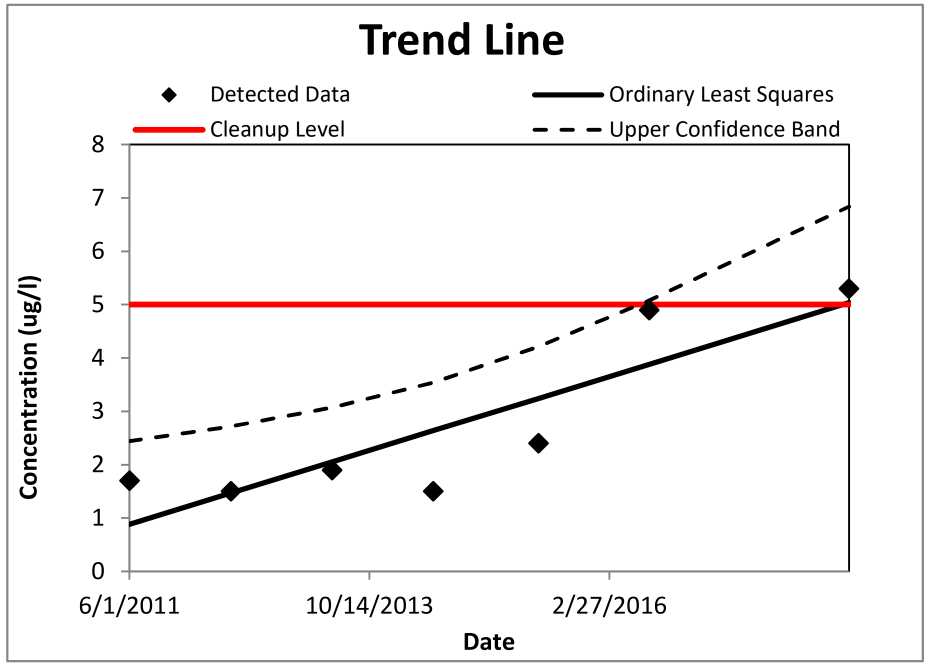
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	3/10/2016
Person performing analysis	VP

Chemical of Concern	Cd
Well Name/Number	RW07
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	7
Number < cleanup level	6
Are any potential outliers present?	No
Mean of concentration	2.74
Standard deviation of concentration	1.64



95% Upper Confidence Limit (UCL)	5.44
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	6.84
Trend calculation method	Ordinary Least Squares
Cleanup level	5
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	**No**

When is the concentration predicted to exceed the MCL?	MCL is already exceeded
Random Seed Used	41639.55078
Message: None.	

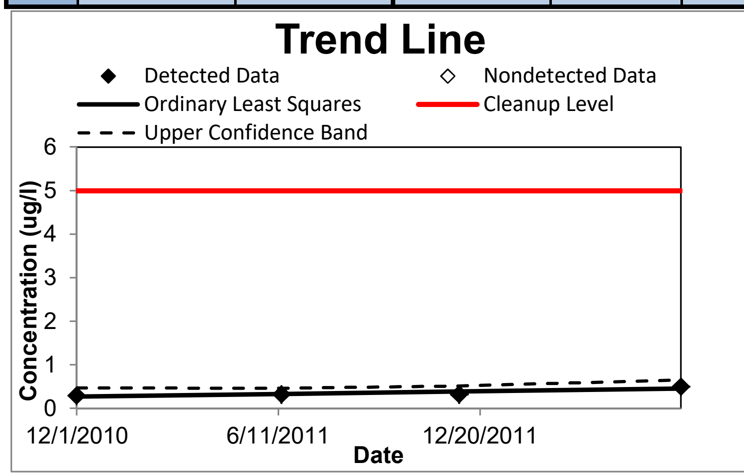
RW-07 Cadmium

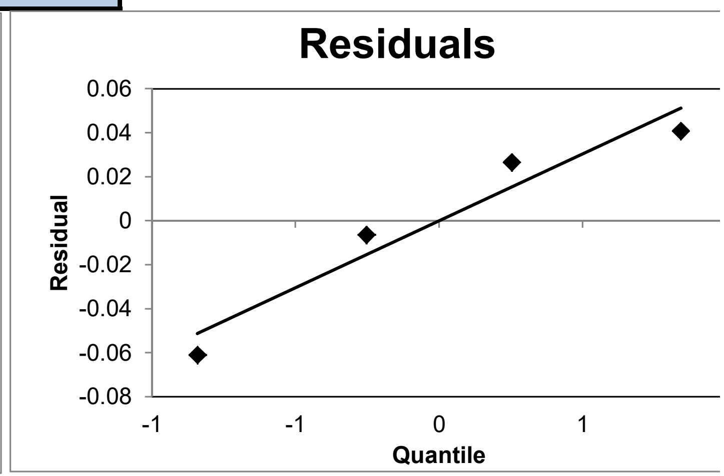
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	12/1/2010	0.3	0.273	0.027	0.47
2	6/14/2011	0.33	0.336	-0.006	0.464
3	11/30/2011	0.33	0.391	-0.061	0.517
4	6/28/2012	0.5	0.459	0.041	0.659
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.000323171
Intercept	-12.81926106
Correlation, R^2	0.7535
Test Result	No trend
Test Statistic	2.473
Critical Value	2.920
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





RW08 Cadmium

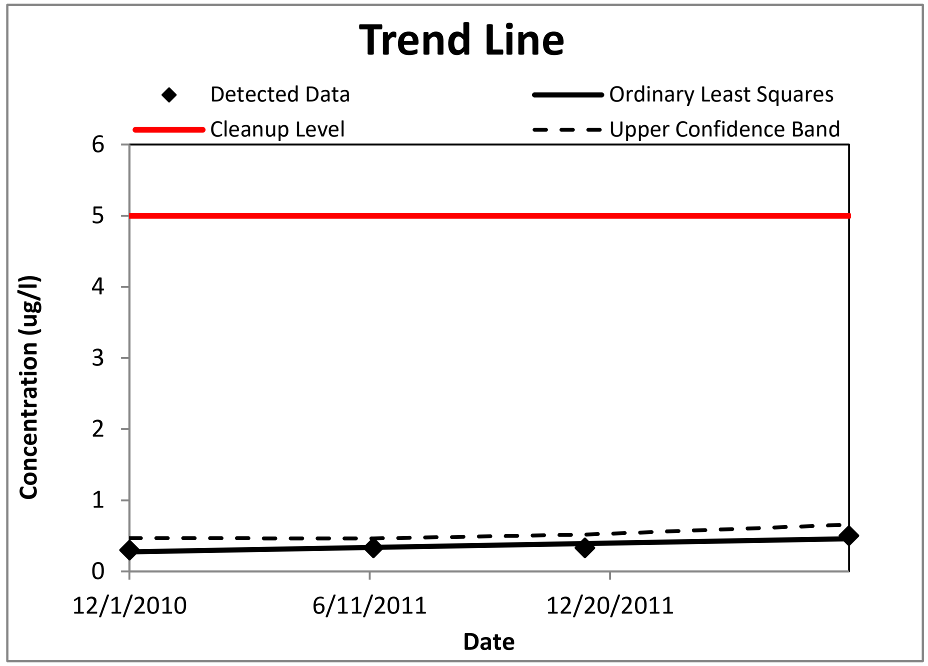
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/29/2018
Person performing analysis	0

Chemical of Concern	Cd
Well Name/Number	RW08
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	4
Number < cleanup level	4
Are any potential outliers present?	No
Mean of concentration	0.365
Standard deviation of concentration	0.0911



95% Upper Confidence Limit (UCL)	0.56
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	0.659
Trend calculation method	Ordinary Least Squares
Cleanup level	5
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	Yes

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Random Seed Used	0
Message: None.	

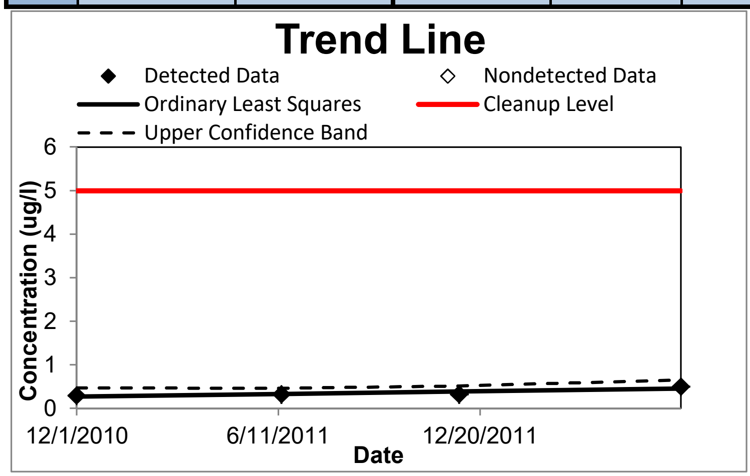
RW08 Cadmium

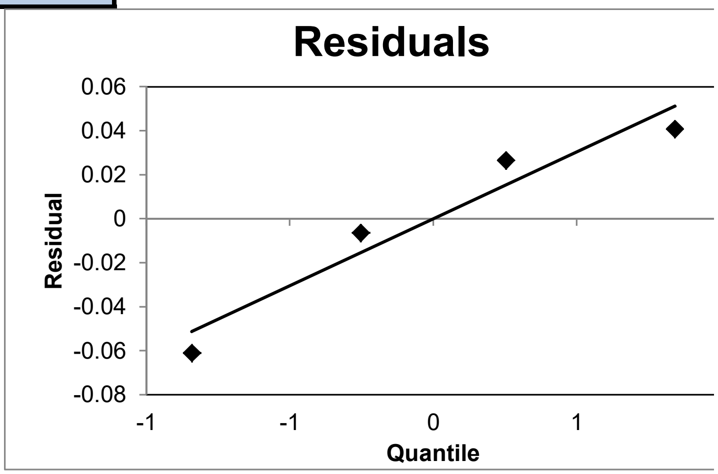
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	12/1/2010	0.3	0.273	0.027	0.47
2	6/14/2011	0.33	0.336	-0.006	0.464
3	11/30/2011	0.33	0.391	-0.061	0.517
4	6/28/2012	0.5	0.459	0.041	0.659
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.000323171
Intercept	-12.81926106
Correlation, R^2	0.7535
Test Result	No trend
Test Statistic	2.473
Critical Value	2.920
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





RW09 Cadmium

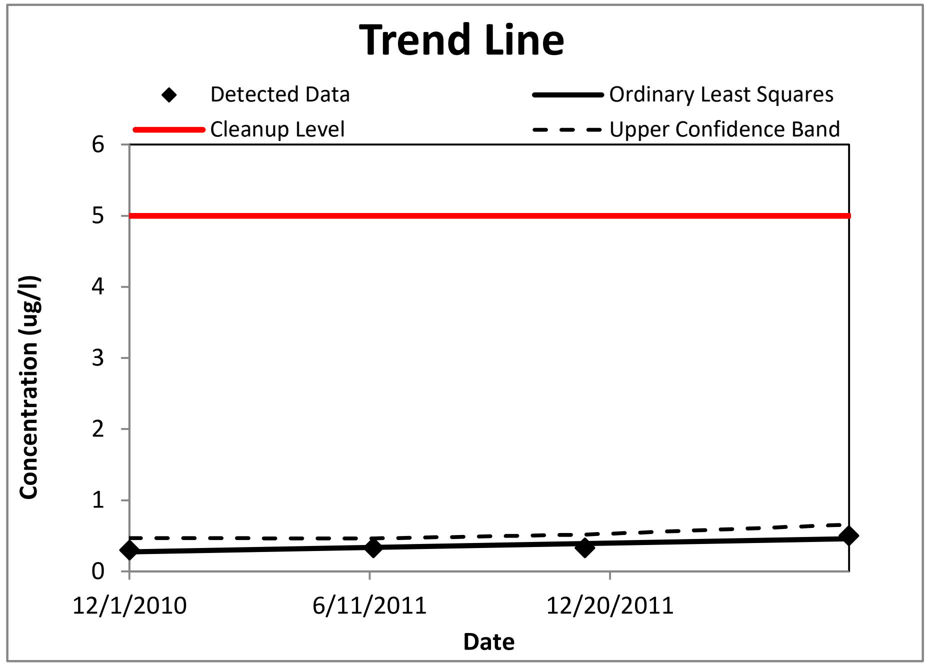
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/29/2018
Person performing analysis	0

Chemical of Concern	Cd
Well Name/Number	RW09
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	4
Number < cleanup level	4
Are any potential outliers present?	No
Mean of concentration	0.365
Standard deviation of concentration	0.0911



95% Upper Confidence Limit (UCL)	0.56
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	0.659
Trend calculation method	Ordinary Least Squares
Cleanup level	5
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	Yes

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Random Seed Used	0
Message: None.	

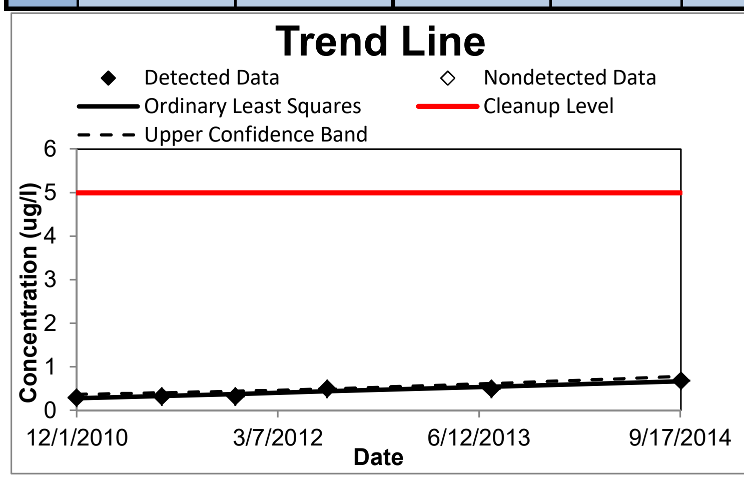
RW09 Cadmium

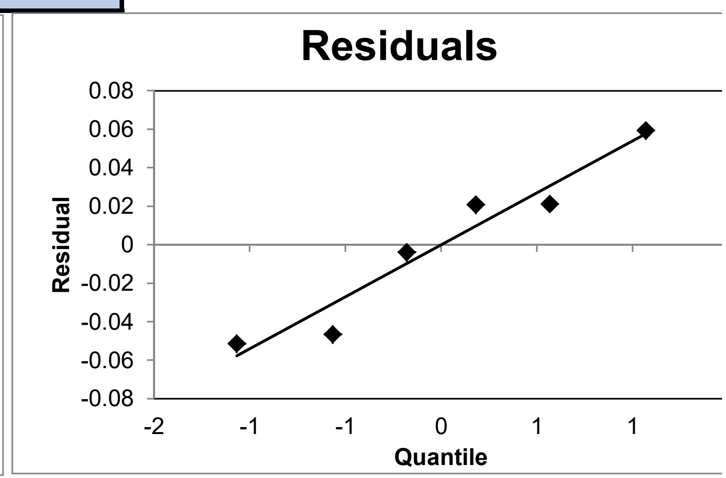
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	12/1/2010	0.3	0.279	0.021	0.371
2	6/14/2011	0.33	0.334	-0.004	0.408
3	11/30/2011	0.33	0.381	-0.051	0.445
4	6/28/2012	0.5	0.441	0.059	0.498
5	7/10/2013	0.5	0.547	-0.047	0.62
6	9/18/2014	0.69	0.669	0.021	0.784
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.000280932
Intercept	-11.10234195
Correlation, R^2	0.9187
Test Result	Increasing
Test Statistic	6.721
Critical Value	2.132
When is the concentration predicted to exceed the cleanup level?	57300





RW10 Cadmium

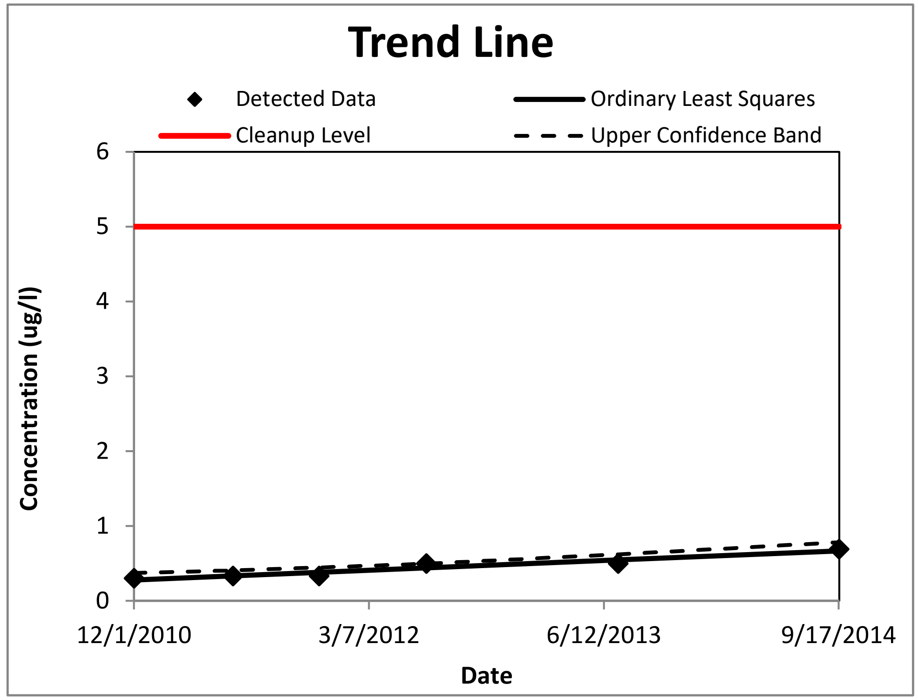
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/29/2018
Person performing analysis	0

Chemical of Concern	Cd
Well Name/Number	RW10
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	6
Number < cleanup level	6
Are any potential outliers present?	No
Mean of concentration	0.442
Standard deviation of concentration	0.151
t-value for UCL calculation	2.015



95% Upper Confidence Limit (UCL)	0.566
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	0.784
Trend calculation method	Ordinary Least Squares
Cleanup level	5
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	**No**

When is the concentration predicted to exceed the MCL?	57300
Message: None.	

RW-10 Cadmium

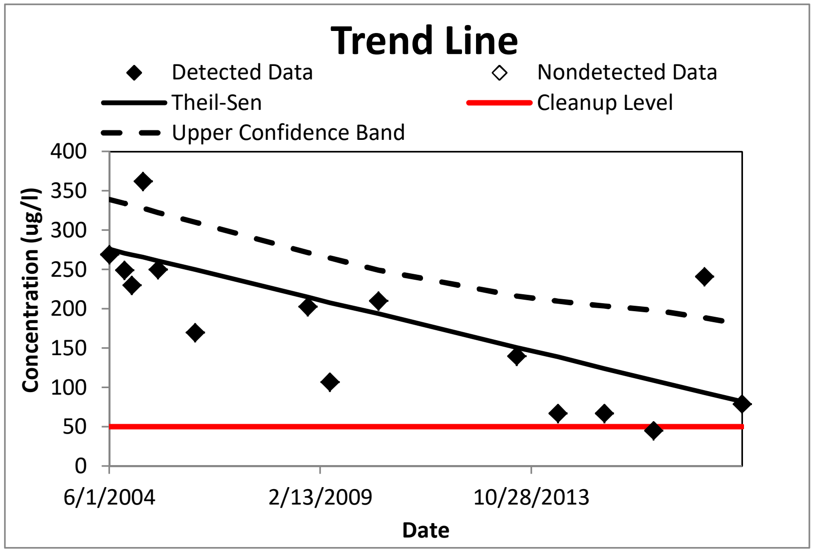
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

i	t (Date)	C (ug/l)	C Predicted	Residual	Upper Confidence Band
1	6/1/2004	269	276	-7	339
2	10/1/2004	249	271	-22	334
3	12/1/2004	230	269	-39	332
4	3/1/2005	362	266	96	328
5	7/1/2005	250	261	-11	322
6	5/1/2006	170	250	-80	310
7	11/1/2008	203	215	-12	272
8	5/1/2009	107	208	-101	265
9	6/1/2010	210	194	16	249
10	7/1/2013	140	151	-11	217
11	6/1/2014	67	139	-72	210
12	6/15/2015	67.1	124	-56.9	204
13	7/20/2016	45.3	109	-63.7	198
14	9/6/2017	241	93.8	147.2	189
15	7/11/2018	78.8	82.2	-3.4	181
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	Decreasing
Test Statistic (S)	-59
Normalized S	-2.870
Critical Value	1.645

Theil-Sen	
Slope	-0.0376
Intercept	1710
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing



MW-02AR Chromium

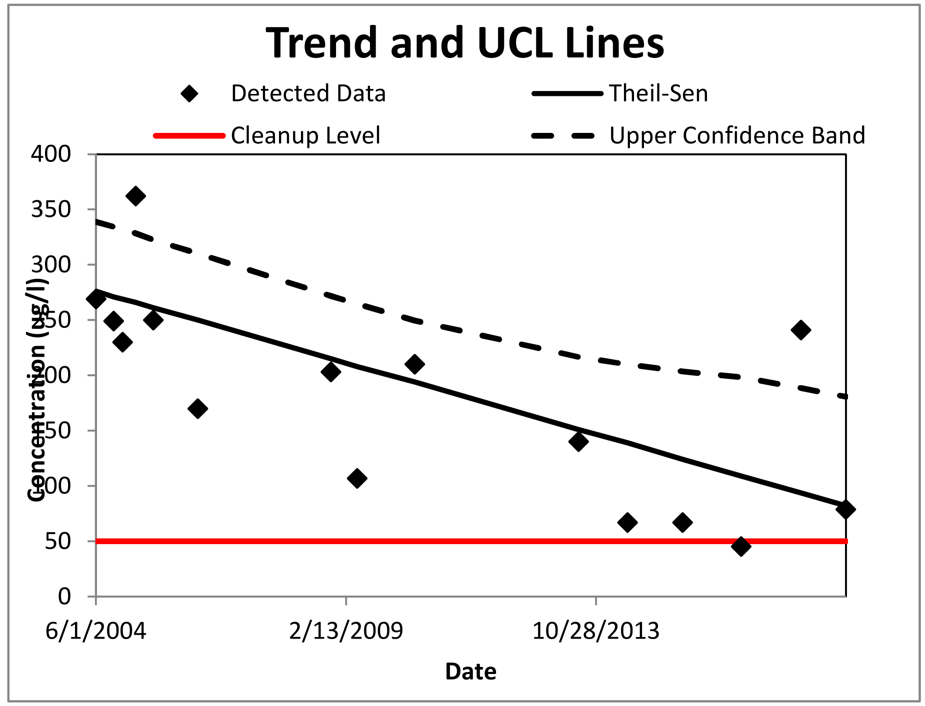
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/29/2018
Person performing analysis	VP

Chemical of Concern	Cr
Well Name/Number	MW02AR
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	15
Number < cleanup level	1
Are any potential outliers present?	No
Mean of concentration	179
Standard deviation of concentration	92.3
t-value for UCL calculation	1.761



95% Upper Confidence Limit (UCL)	221
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	181
Trend calculation method	Theil-Sen/Mann-Kendall
Cleanup level	50
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	Yes

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

MW-02AR Chromium

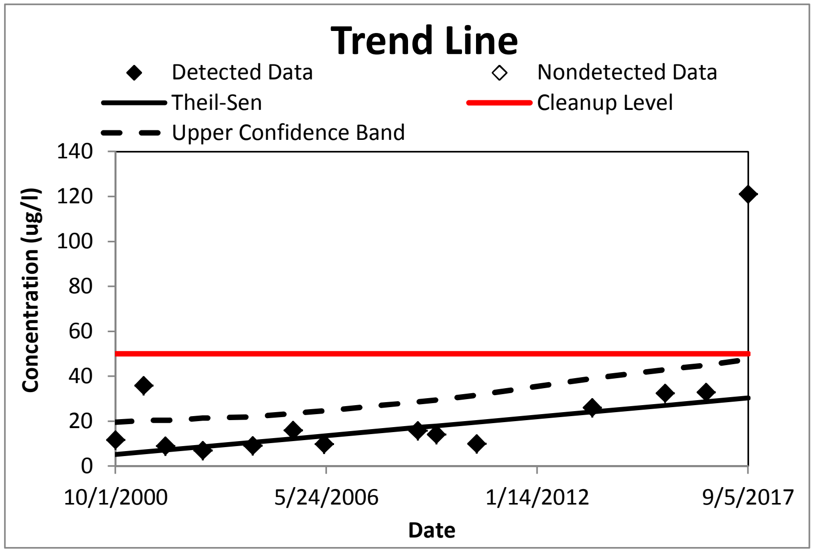
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

i	t (Date)	C (ug/l)	C Predicted	Residual	Upper Confidence Band
1	10/1/2000	11.7	5.14	6.56	19.6
2	7/1/2001	35.8	6.26	29.54	20.5
3	2/1/2002	9	7.14	1.86	20.5
4	2/1/2003	7	8.62	-1.62	21.4
5	6/1/2004	9.1	10.6	-1.5	22
6	7/1/2005	16	12.2	3.8	23.5
7	5/1/2006	9.8	13.5	-3.7	24.6
8	11/1/2008	15.8	17.2	-1.4	28.7
9	5/1/2009	14.1	17.9	-3.8	29.5
10	6/1/2010	10	19.5	-9.5	31.7
11	7/1/2013	26	24.1	1.9	39
12	6/16/2015	32.5	27.1	5.4	43
13	7/20/2016	32.9	28.7	4.2	44.9
14	9/6/2017	121	30.4	90.6	47.6
15					
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	Increasing
Test Statistic (S)	43
Normalized S	2.299
Critical Value	1.645

Theil-Sen	
Slope	0.00408
Intercept	-145
When is the concentration predicted to exceed the cleanup level?	MCL is already exceeded



MW-02BR Chromium

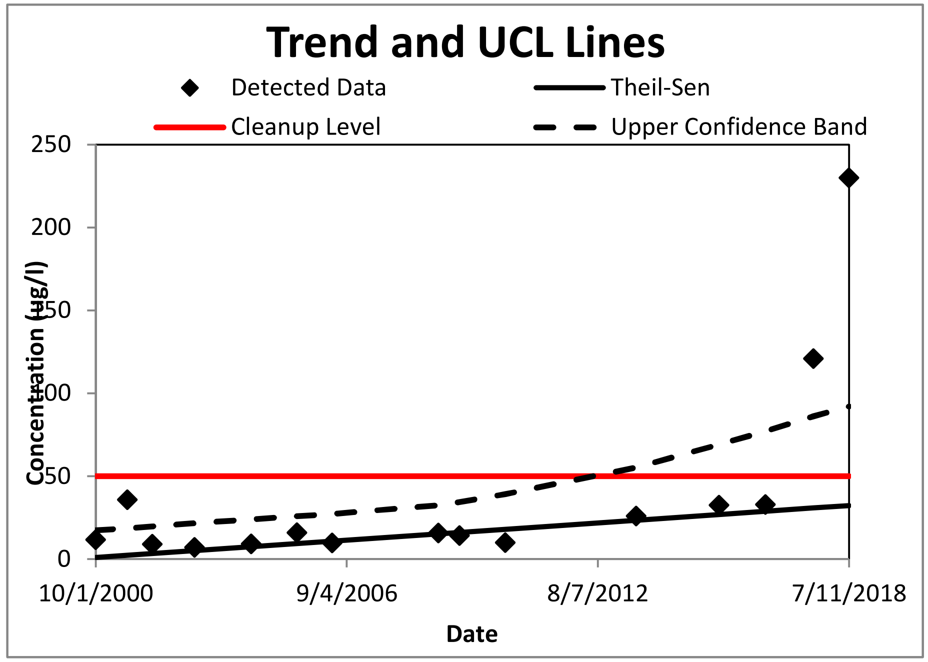
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/29/2018
Person performing analysis	VP

Chemical of Concern	Cr
Well Name/Number	MW02BR
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	15
Number < cleanup level	13
Are any potential outliers present?	Yes
Mean of concentration	38.7
Standard deviation of concentration	60



95% Upper Confidence Limit (UCL)	106.2
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	92.1
Trend calculation method	Theil-Sen/Mann-Kendall
Cleanup level	50
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	**No**

When is the concentration predicted to exceed the MCL?	MCL is already exceeded
Random Seed Used	41639.55078
Message: None.	

MW-02BR Chromium

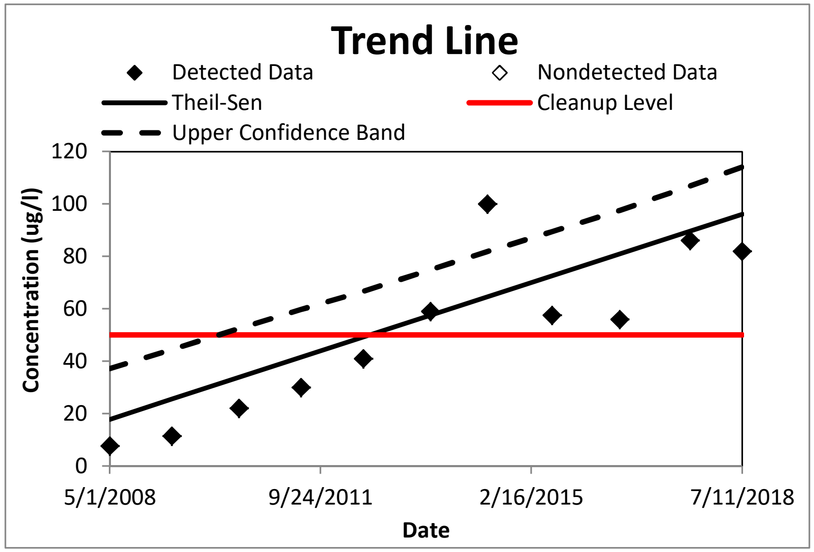
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

i	t (Date)	C (ug/l)	C Predicted	Residual	Upper Confidence Band
1	5/1/2008	7.7	17.9	-10.2	37.2
2	5/1/2009	11.5	25.6	-14.1	44.5
3	6/1/2010	22.1	33.9	-11.8	52.5
4	6/1/2011	30	41.6	-11.6	59.8
5	6/1/2012	41	49.3	-8.3	66.7
6	7/1/2013	59	57.6	1.4	74.9
7	6/1/2014	100	64.6	35.4	81.9
8	6/16/2015	57.6	72.6	-15	89.5
9	7/20/2016	56	81	-25	97.6
10	9/6/2017	86.1	89.7	-3.6	107
11	7/11/2018	81.9	96.1	-14.2	114
12					
13					
14					
15					
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	Increasing
Test Statistic (S)	39
Normalized S	2.958
Critical Value	1.645

Theil-Sen	
Slope	0.021
Intercept	-813
When is the concentration predicted to exceed the cleanup level?	MCL is already exceeded



MW-05 Chromium

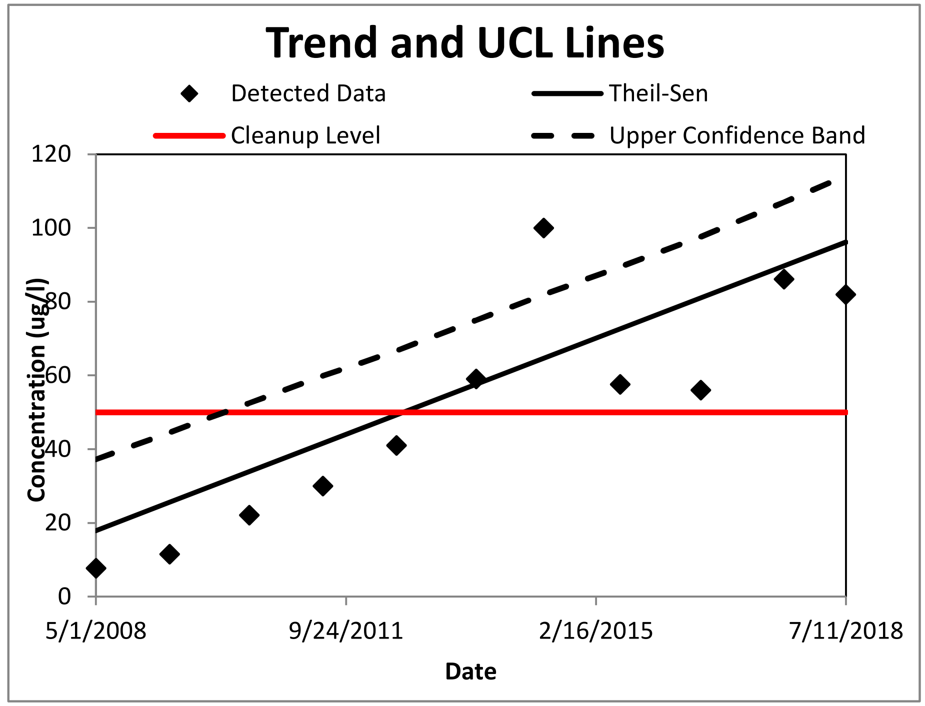
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/29/2018
Person performing analysis	VP

Chemical of Concern	Cr
Well Name/Number	MW05
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	11
Number < cleanup level	5
Are any potential outliers present?	No
Mean of concentration	50.3
Standard deviation of concentration	30.9
t-value for UCL calculation	1.812



95% Upper Confidence Limit (UCL)	67.2
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	114
Trend calculation method	Theil-Sen/Mann-Kendall
Cleanup level	50
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	**No**

When is the concentration predicted to exceed the MCL?	MCL is already exceeded
Message: None.	

MW-05 Chromium

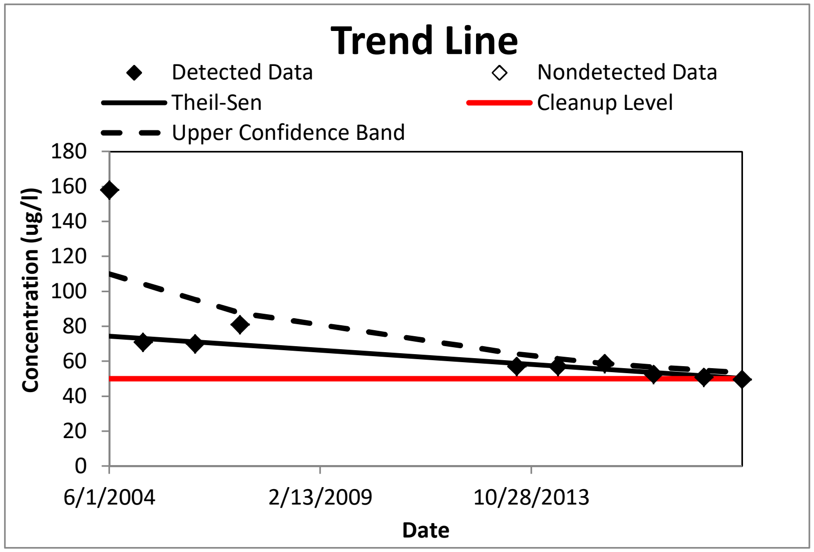
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

i	t (Date)	C (ug/l)	C Predicted	Residual	Upper Confidence Band
1	38139	158	74.4	83.6	110
2	38412	71	73.1	-2.1	104
3	38838	70	71.1	-1.1	95.4
4	39203	81	69.4	11.6	87.7
5	41456	57	58.7	-1.7	64.2
6	41791	57	57.2	-0.2	61.6
7	42171	58.7	55.4	3.3	58.7
8	42571	52.4	53.5	-1.1	56.8
9	42979	50.8	51.6	-0.8	54.9
10	43292	49.6	50.1	-0.5	53.4
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	Decreasing
Test Statistic (S)	-36
Normalized S	-3.143
Critical Value	1.645

Theil-Sen	
Slope	-0.00471
Intercept	254
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing



MW-7A Chromium

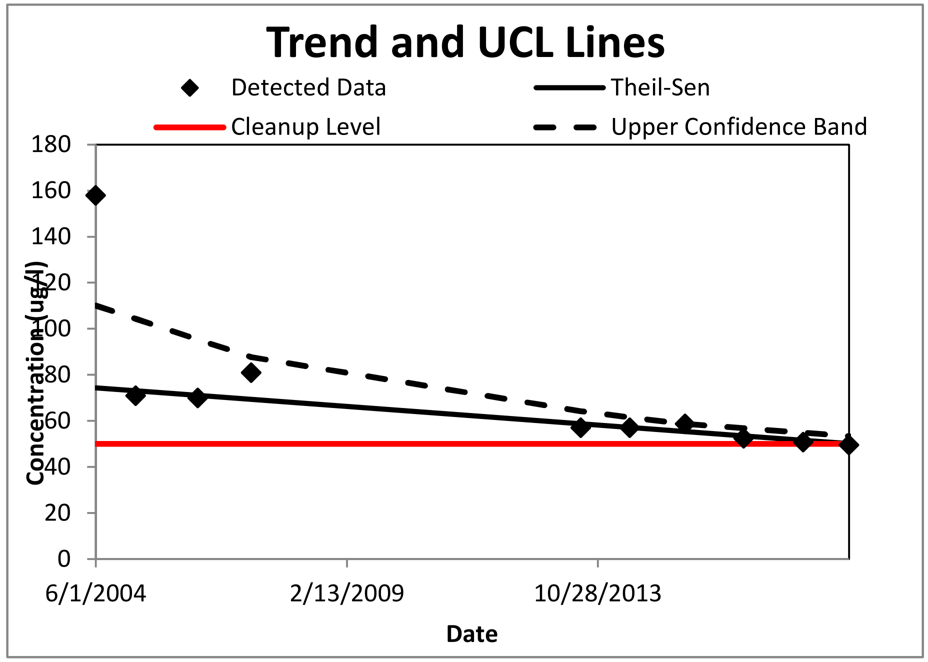
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/29/2018
Person performing analysis	VP

Chemical of Concern	Cr
Well Name/Number	MW07A
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	10
Number < cleanup level	1
Are any potential outliers present?	Yes
Mean of concentration	70.6
Standard deviation of concentration	32.4



95% Upper Confidence Limit (UCL)	115.3
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	53.4
Trend calculation method	Theil-Sen/Mann-Kendall
Cleanup level	50
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	Yes

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Random Seed Used	41639.55078
Message: None.	

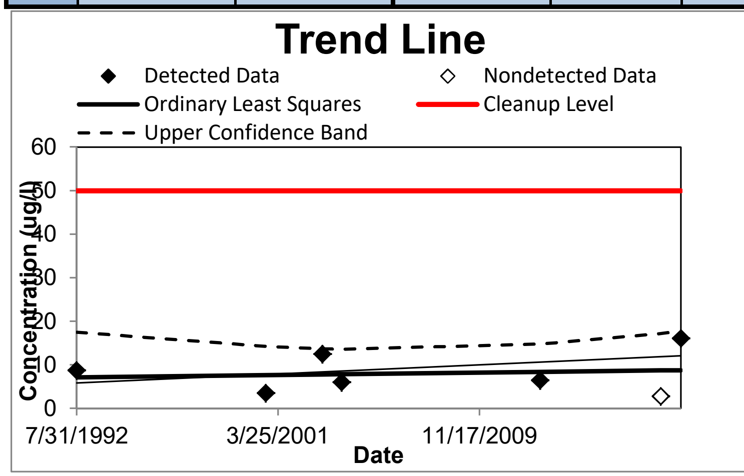
MW-07A Chromium

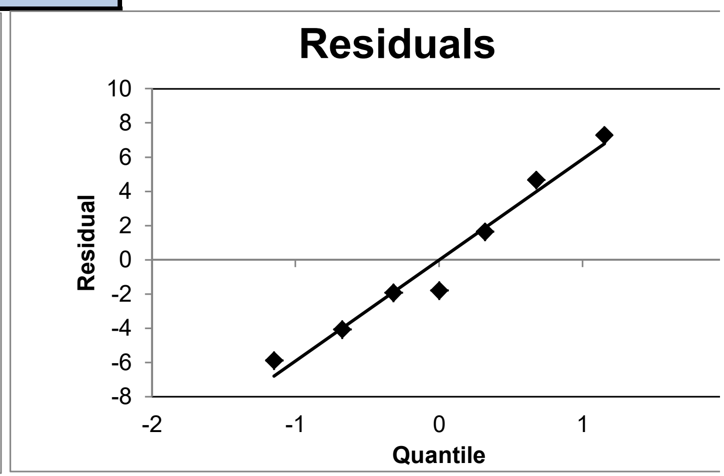
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	33816	8.8	7.15	1.65	17.5
2	36783	3.6	7.67	-4.07	14.3
3	37671	12.5	7.82	4.68	13.7
4	37971	6.1	7.87	-1.77	13.6
5	41086	6.5	8.42	-1.92	14.8
6	42979	2.87	8.75	-5.88	17.2
7	43292	16.1	8.8	7.3	17.7
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.000174475
Intercept	1.247720991
Correlation, R^2	0.2239
Test Result	No trend
Test Statistic	0.286
Critical Value	2.015
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





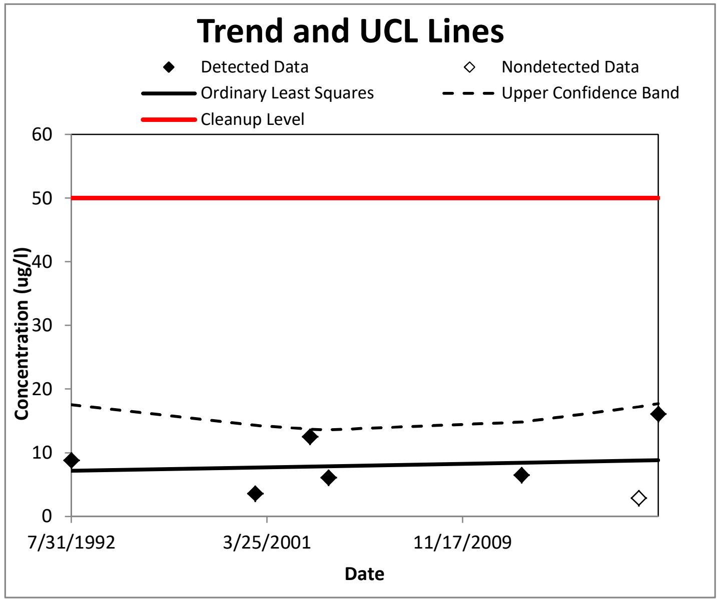
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets with nondetects

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/29/2018
Person performing analysis	VP

Chemical of Concern	Cr
Well Name/Number	MW07B
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	7
Number of detected results	6
Number of non-detected results	1
Detection frequency	86%
Number at or below cleanup level	7
Are any potential outliers present?	No
Mean of concentration	8.13
Standard deviation of concentration	4.37



95% Upper Confidence Limit (UCL)	15.9
Method for calculating UCL	KM Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	17.7
Trend calculation method	Ordinary Least Squares
Cleanup level	50
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

Data, including imputed values

Date (Date)	Cr Concentration (ug/l)	Data Qualifier	Imputed value*
33816	8.8		8.8
36783	3.6		3.6
37671	12.5		12.5
37971	6.1		6.1
41086	6.5		6.5
42979	3.3	U	2.87
43292	16.1		16.1

* Note that the imputed value column also includes the actual value for detected samples. This is for convenience in copying and pasting the data.

Random Seed Used	41639.55078

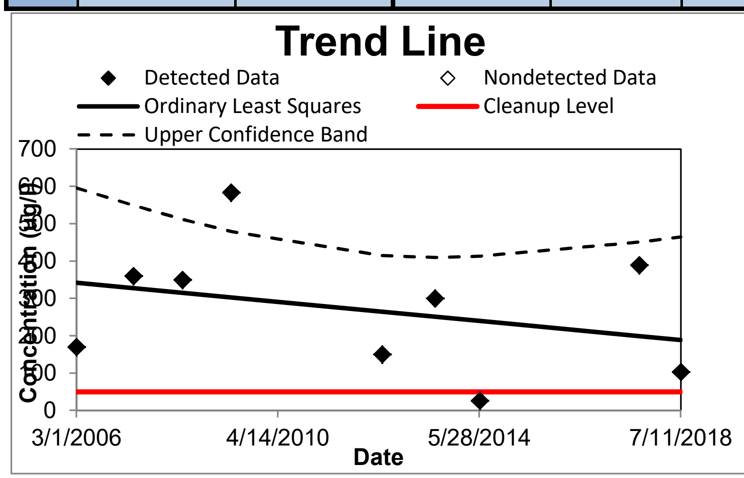
MW-07B Chromium

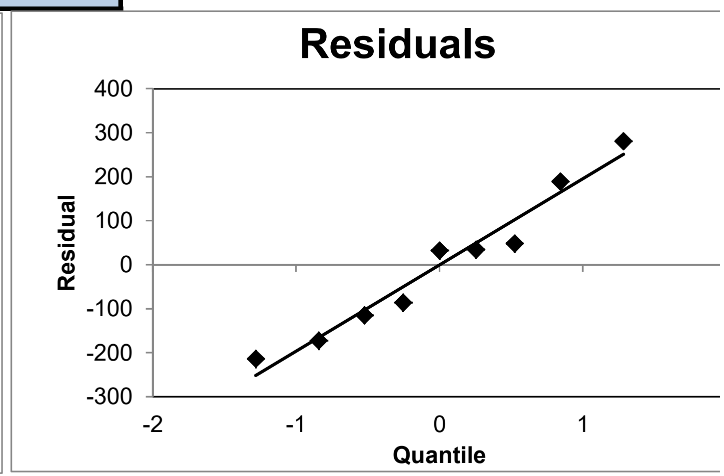
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	3/1/2006	170	342	-172	596
2	5/1/2007	360	328	32	550
3	5/1/2008	350	315	35	512
4	5/1/2009	584	303	281	479
5	6/1/2012	150	265	-115	415
6	7/1/2013	300	251	49	410
7	6/1/2014	26	240	-214	413
8	9/5/2017	389	199	190	451
9	7/11/2018	103	189	-86	465
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	-0.03392025
Intercept	1657.432321
Correlation, R^2	0.1020
Test Result	No trend
Test Statistic	-0.892
Critical Value	1.895
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





MW-09A Chromium

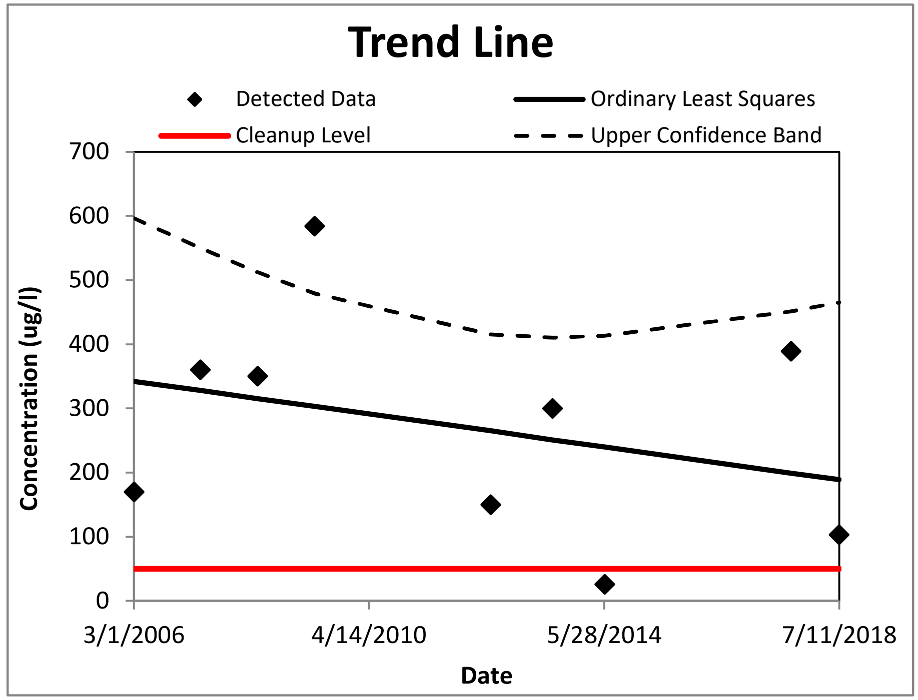
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/29/2018
Person performing analysis	VP

Chemical of Concern	Cr
Well Name/Number	MW09A
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	9
Number < cleanup level	1
Are any potential outliers present?	No
Mean of concentration	270
Standard deviation of concentration	173
t-value for UCL calculation	1.860



95% Upper Confidence Limit (UCL)	377
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	465
Trend calculation method	Ordinary Least Squares
Cleanup level	50
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

MW-09A Chromium

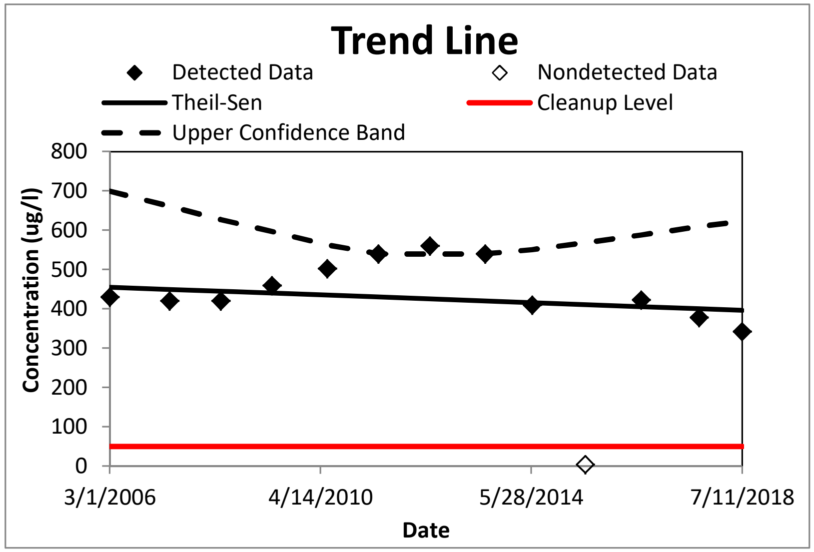
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

i	t (Date)	C (ug/l)	C Predicted	Residual	Upper Confidence Band
1	3/1/2006	430	455	-25	700
2	5/1/2007	420	449	-29	661
3	5/1/2008	420	445	-25	627
4	5/1/2009	459	440	19	597
5	6/1/2010	502	435	67	563
6	6/1/2011	540	430	110	540
7	6/1/2012	560	425	135	540
8	7/1/2013	540	420	120	540
9	6/1/2014	410	416	-6	551
10	6/16/2015	3.92	411	-407.08	568
11	7/20/2016	423	405	18	588
12	9/5/2017	378	400	-22	609
13	7/11/2018	342	396	-54	623
14					
15					
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	No trend
Test Statistic (S)	-18
Normalized S	-1.041
Critical Value	1.645

Theil-Sen	
Slope	-0.0131
Intercept	963
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing



MW-09B Chromium

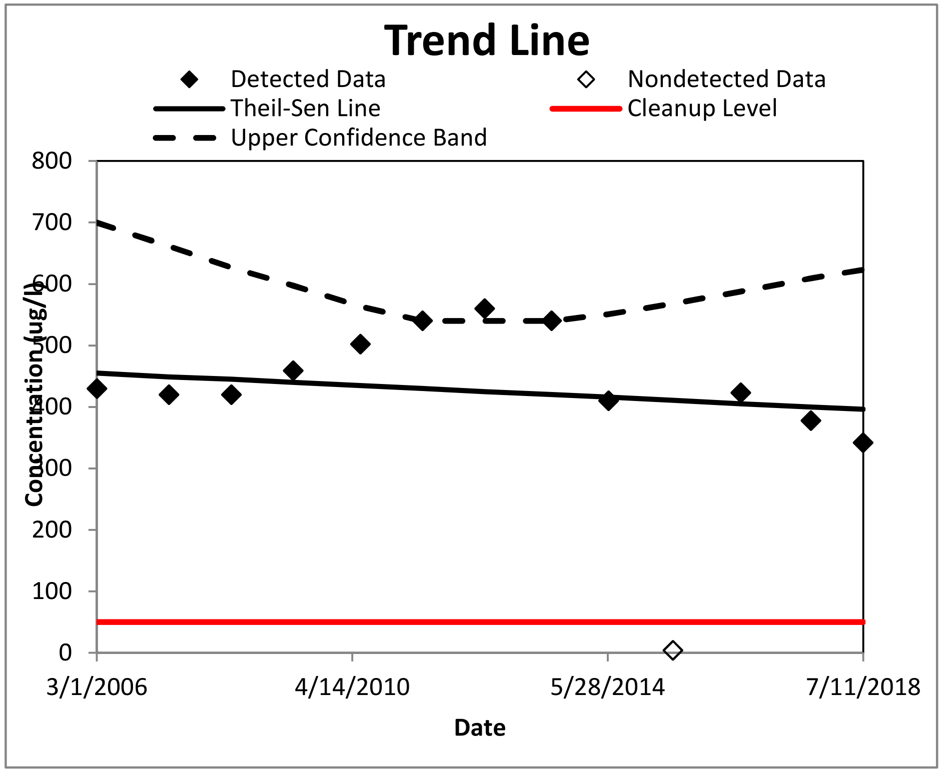
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets with nondetects

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/29/2018
Person performing analysis	VP

Chemical of Concern	Cr
Well Name/Number	MW09B
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	13
Number of detected results	12
Number of non-detected results	1
Detection frequency	92%
Number at or below cleanup level	1
Are any potential outliers present?	Yes
Mean of concentration	418
Standard deviation of concentration	135



95% Upper Confidence Limit (UCL)	588
Method for calculating UCL	KM Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	623
Trend calculation method	Theil-Sen/Mann-Kendall
Cleanup level	50
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	Yes

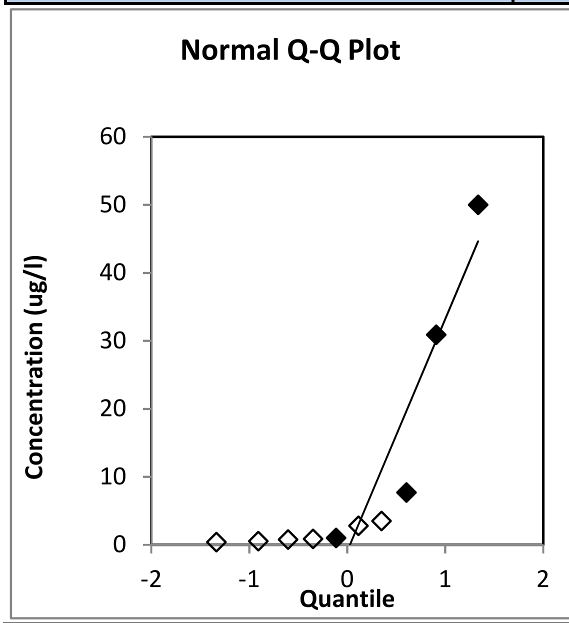
When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

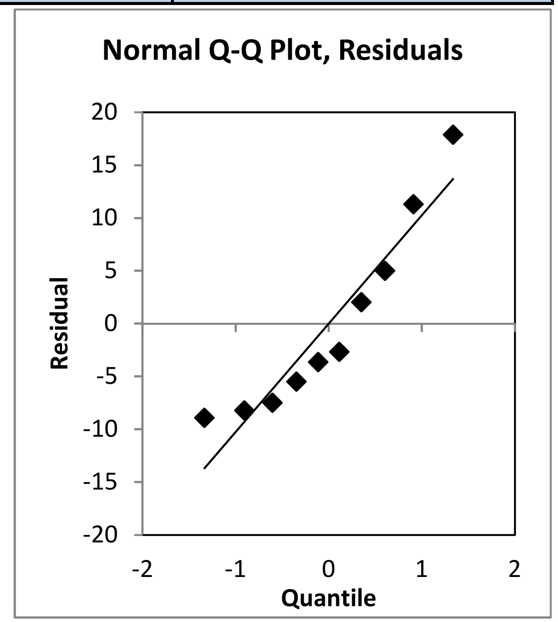
MW-09B Chromium

Groundwater Statistics Tool

Normality Testing Worksheet

Normality Test Results			
Parameter	**All Data**	**Minus Outliers**	**Residuals**
Number of data points	10	10	10
Shapiro-Wilk alpha value	5%	N/A	5%
Slope	15.93343441	N/A	10.25955484
Intercept	9.858	N/A	-2.26641E-14
Correlation, R	0.784327998	N/A	0.946875414
Exact Test Value	0.633265574	N/A	0.886043299
Critical Value	0.842	N/A	0.842
Conclude sample distribution:	Does not appear normal	N/A	Appears normal





Previous Step: Outliers Screen

Next Step: Trend Screen

Skip Step: UCL Screen

MW-11B Chromium

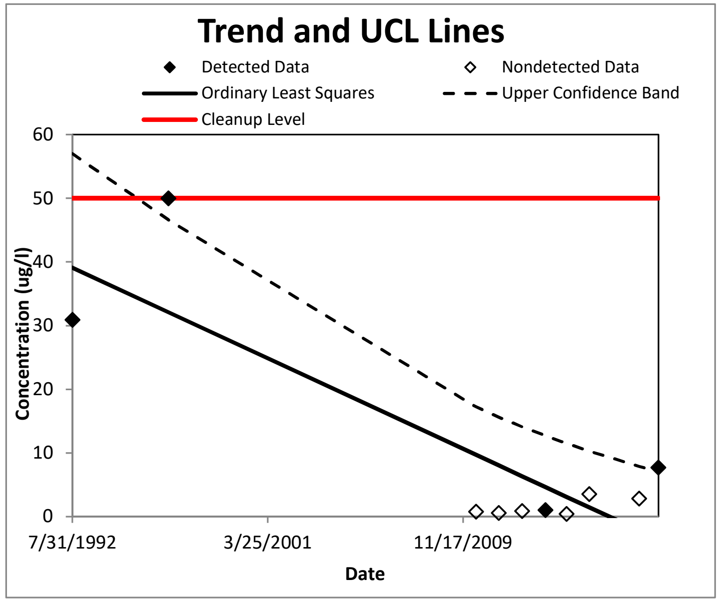
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets with nondetects

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/29/2018
Person performing analysis	VP

Chemical of Concern	Cr
Well Name/Number	MW11B
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	10
Number of detected results	4
Number of non-detected results	6
Detection frequency	40%
Number at or below cleanup level	10
Are any potential outliers present?	No
Mean of concentration	9.49
Standard deviation of concentration	16.2



95% Upper Confidence Limit (UCL)	34.4
Method for calculating UCL	KM Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	#N/A
Trend calculation method	Theil-Sen/Mann-Kendall
Cleanup level	50
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	Yes

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

Data, including imputed values

Date (Date)	Cr Concentration (ug/l)	Data Qualifier	Imputed value*
33816	30.9		30.9
35369	50		50
40345	0.9	U	0.78
40709	0.87	U	0.57
41085	1	U	0.87
41466	1	J	1
41808	1	U	0.43
42171	4.5	U	3.5
42978	3.3	U	2.83
43292	7.7	J	7.7

* Note that the imputed value column also includes the actual value for detected samples. This is for convenience in copying and pasting the data.

Random Seed Used	41639.55078

MW-11B Chromium

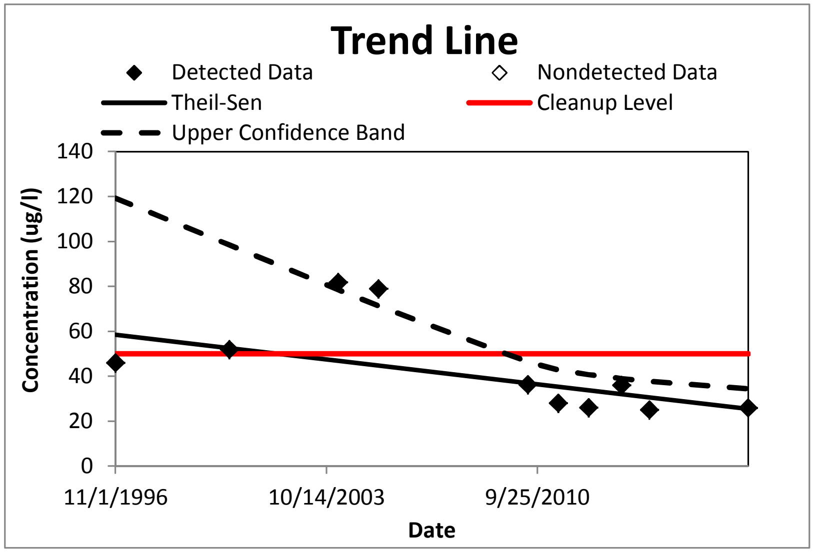
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

i	t (Date)	C (ug/l)	C Predicted	Residual	Upper Confidence Band
1	11/1/1996	46	58.5	-12.5	119
2	8/1/2000	51.9	52.6	-0.7	98.5
3	3/1/2004	81.8	46.9	34.9	78.7
4	7/1/2005	79	44.8	34.2	71.3
5	6/1/2010	36.3	37	-0.7	46.4
6	6/1/2011	28	35.4	-7.4	42.9
7	6/1/2012	26	33.8	-7.8	40.7
8	7/1/2013	36	32.1	3.9	39
9	6/1/2014	25	30.6	-5.6	37.8
10	9/5/2017	25.9	25.5	0.4	34.5
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	Decreasing
Test Statistic (S)	-29
Normalized S	-2.504
Critical Value	1.645

Theil-Sen	
Slope	-0.00434
Intercept	212
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing



MW-17A Chromium

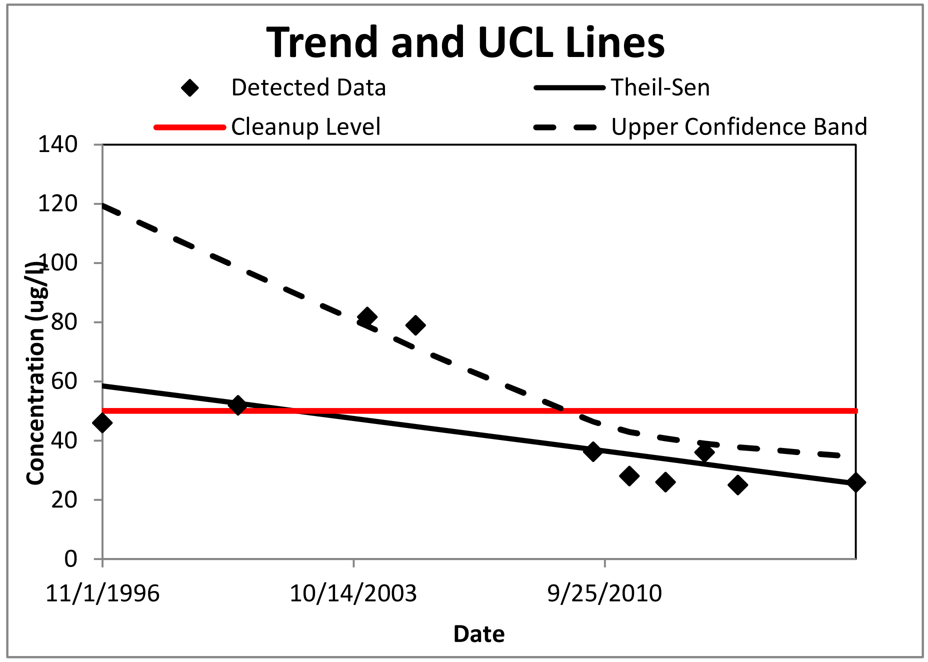
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	9/26/2017
Person performing analysis	VP

Chemical of Concern	Cr
Well Name/Number	MW17A
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	10
Number < cleanup level	7
Are any potential outliers present?	No
Mean of concentration	43.6
Standard deviation of concentration	21.4



95% Upper Confidence Limit (UCL)	73.1
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	34.5
Trend calculation method	Theil-Sen/Mann-Kendall
Cleanup level	50
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	Yes

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Random Seed Used	41639.55078
Message: None.	

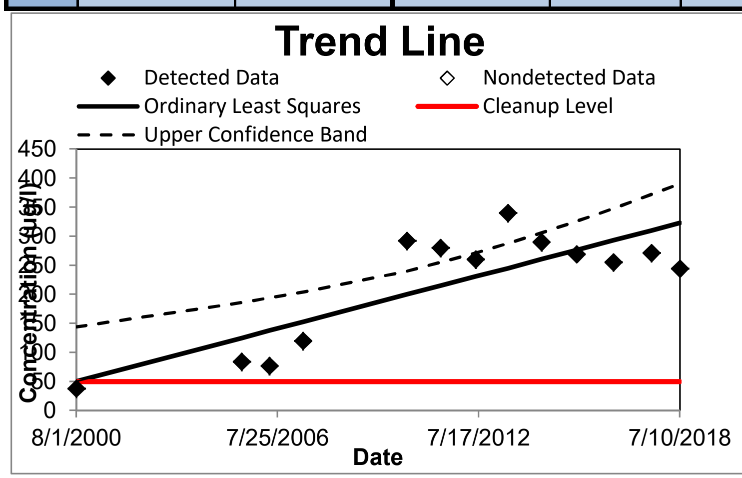
MW-17A Chromium

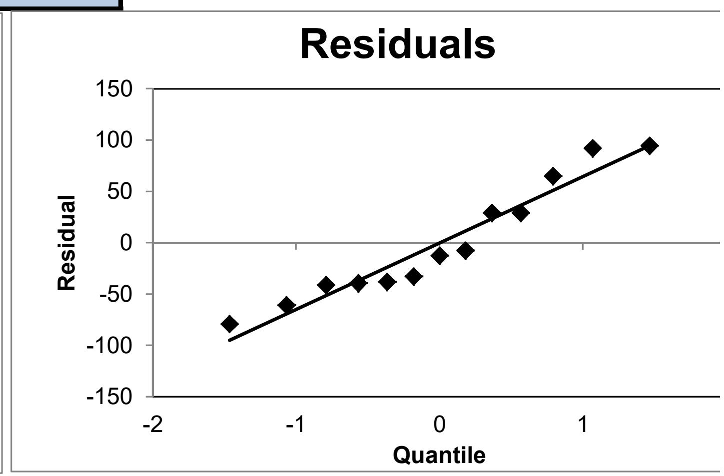
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	8/1/2000	37.8	50.2	-12.4	144
2	7/1/2005	84	125	-41	186
3	5/1/2006	77	138	-61	194
4	5/1/2007	120	153	-33	204
5	6/1/2010	292	200	92	240
6	6/1/2011	280	215	65	255
7	6/16/2012	260	231	29	271
8	6/1/2013	340	245	95	288
9	6/1/2014	290	261	29	306
10	6/16/2015	269	276	-7	326
11	7/20/2016	255	293	-38	348
12	9/5/2017	271	310	-39	372
13	7/11/2018	244	323	-79	390
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.041652845
Intercept	-1480.122129
Correlation, R^2	0.6684
Test Result	Increasing
Test Statistic	4.709
Critical Value	1.796
When is the concentration predicted to exceed the cleanup level?	MCL is already exceeded





MW-17B Chromium

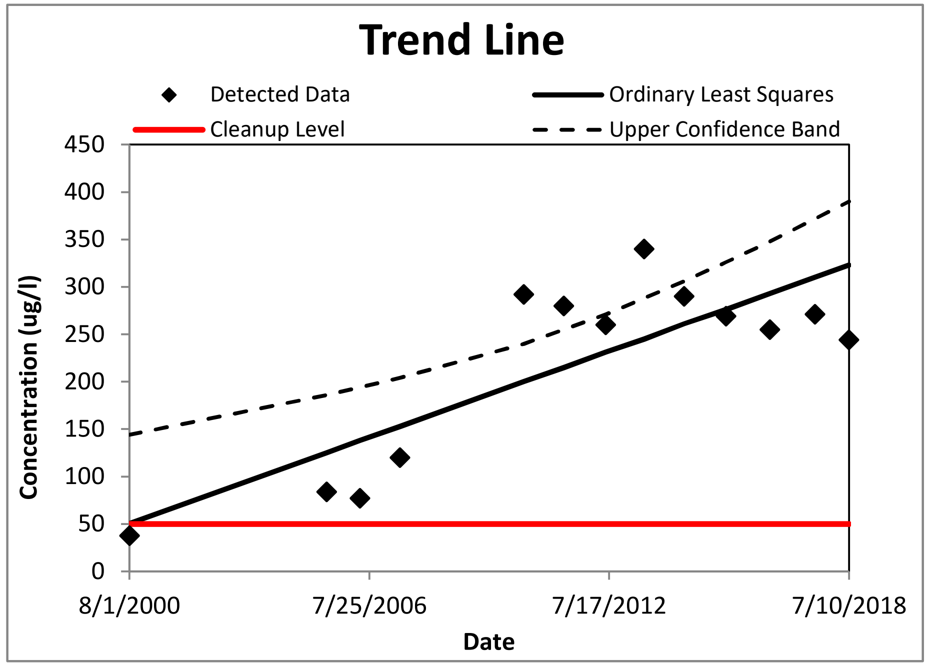
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/29/2018
Person performing analysis	VP

Chemical of Concern	Cr
Well Name/Number	MW17B
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	13
Number < cleanup level	1
Are any potential outliers present?	No
Mean of concentration	217
Standard deviation of concentration	99.4



95% Upper Confidence Limit (UCL)	337
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	390
Trend calculation method	Ordinary Least Squares
Cleanup level	50
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	**No**

When is the concentration predicted to exceed the MCL?	MCL is already exceeded
Random Seed Used	41639.55078
Message: None.	

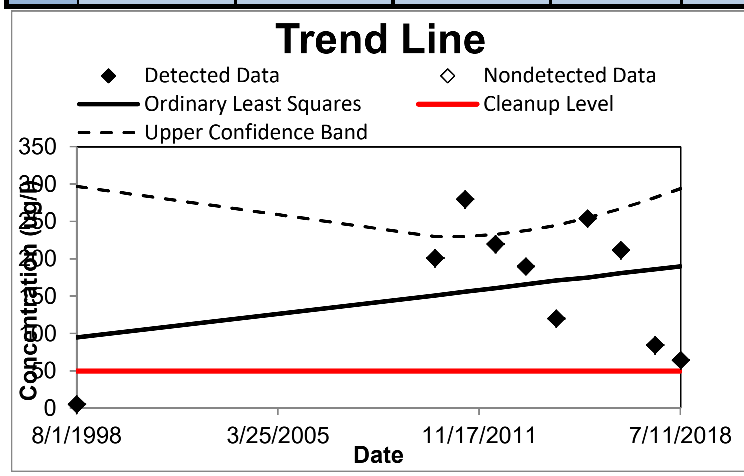
MW-17B Chromium

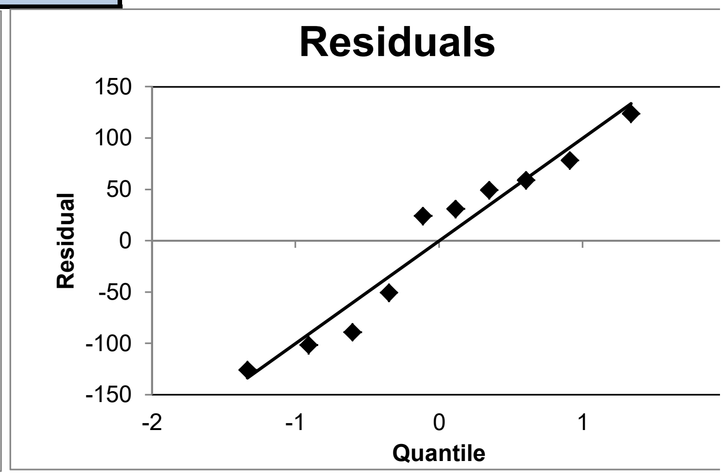
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	8/1/1998	5.6	94.7	-89.1	297
2	6/1/2010	201	151	50	230
3	6/1/2011	280	156	124	230
4	6/1/2012	220	161	59	233
5	6/1/2013	190	166	24	238
6	6/1/2014	120	171	-51	245
7	6/16/2015	254	175	79	255
8	7/20/2016	212	181	31	267
9	9/6/2017	84.8	186	-101.2	282
10	7/11/2018	64.6	190	-125.4	294
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.013105374
Intercept	-377.1725752
Correlation, R^2	0.0922
Test Result	No trend
Test Statistic	0.901
Critical Value	1.860
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





MW-25B Chromium

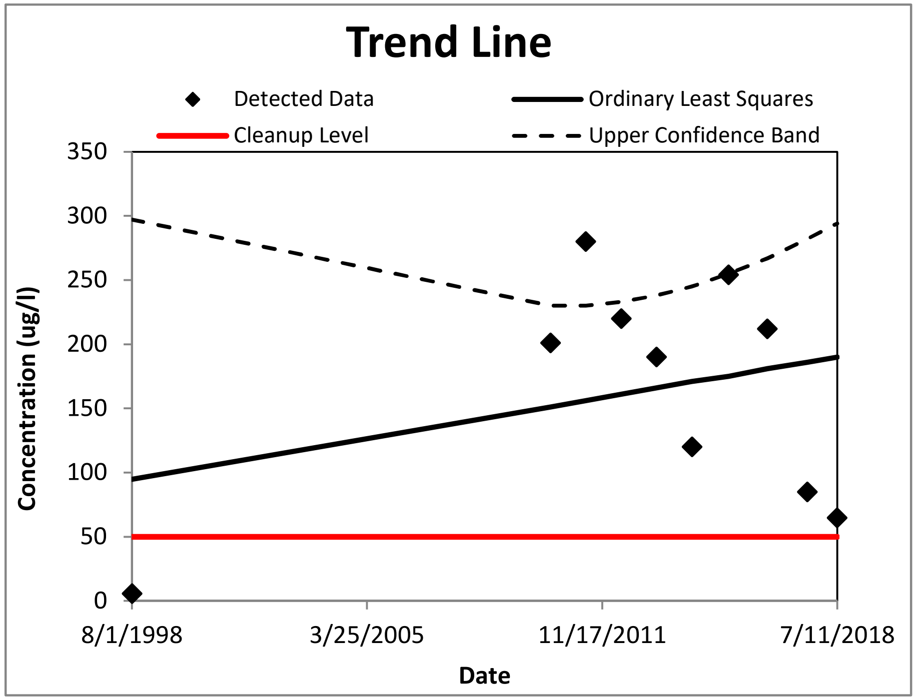
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/29/2018
Person performing analysis	VP

Chemical of Concern	Cr
Well Name/Number	MW25B
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	10
Number < cleanup level	1
Are any potential outliers present?	No
Mean of concentration	163
Standard deviation of concentration	89.6
t-value for UCL calculation	1.833



95% Upper Confidence Limit (UCL)	215
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	294
Trend calculation method	Ordinary Least Squares
Cleanup level	50
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

MW-25B Chromium

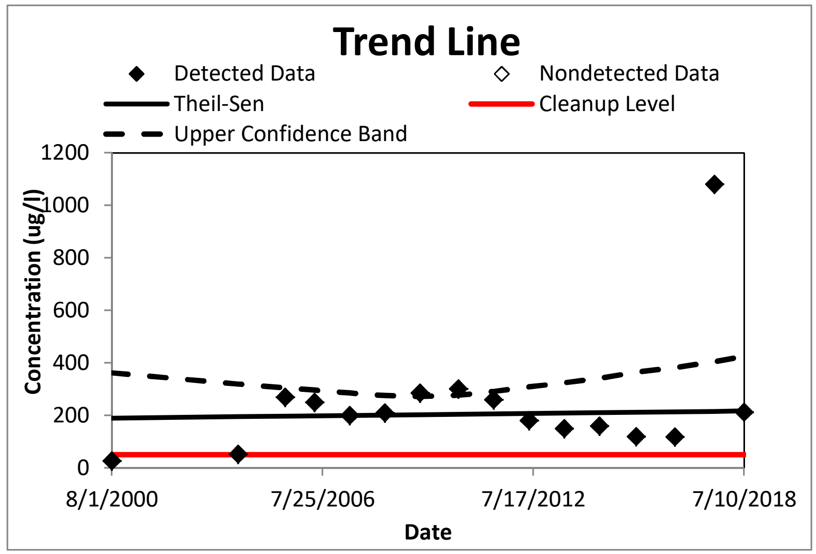
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

i	t (Date)	C (ug/l)	C Predicted	Residual	Upper Confidence Band
1	8/1/2000	26.5	189	-162.5	363
2	3/1/2004	52.2	195	-142.8	320
3	7/1/2005	270	197	73	306
4	5/1/2006	250	198	52	297
5	5/1/2007	200	200	0	286
6	5/1/2008	210	201	9	276
7	5/1/2009	285	203	82	272
8	6/1/2010	301	204	97	277
9	6/1/2011	260	206	54	292
10	6/1/2012	180	207	-27	309
11	6/1/2013	150	209	-59	325
12	6/1/2014	160	210	-50	342
13	6/16/2015	120	212	-92	365
14	7/20/2016	118	214	-96	382
15	9/6/2017	1080	215	865	405
16	7/11/2018	212	217	-5	426
17					
18					
19					
20					

Mann-Kendall	
Test Result	No trend
Test Statistic (S)	4
Normalized S	0.135
Critical Value	1.645

Theil-Sen	
Slope	0.00416
Intercept	36.5
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing



MW-29B Chromium

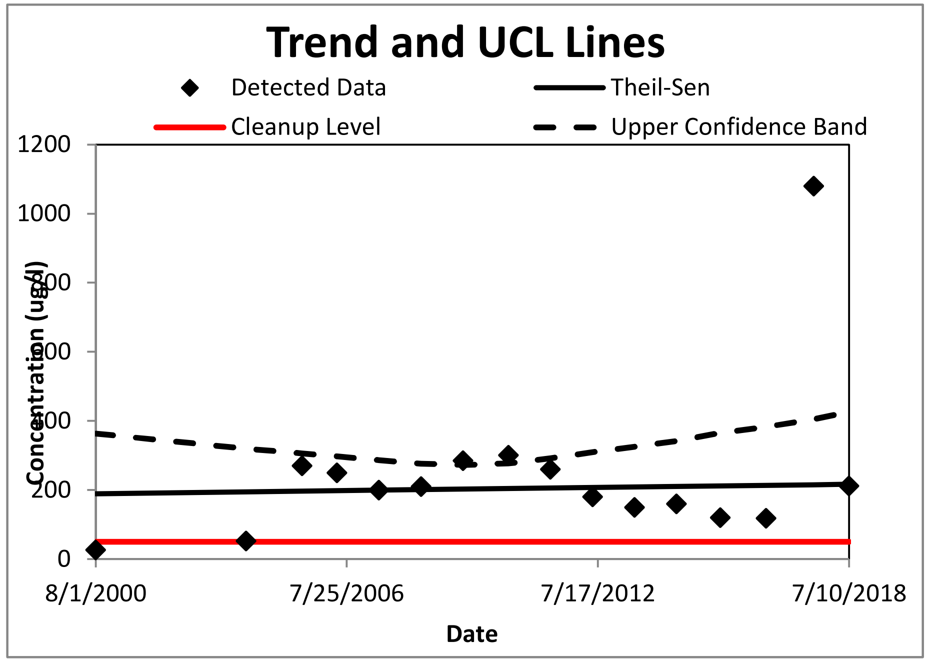
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/29/2018
Person performing analysis	VP

Chemical of Concern	Cr
Well Name/Number	MW29B
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	16
Number < cleanup level	1
Are any potential outliers present?	Yes
Mean of concentration	242
Standard deviation of concentration	237



95% Upper Confidence Limit (UCL)	500
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	426
Trend calculation method	Theil-Sen/Mann-Kendall
Cleanup level	50
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	Yes

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Random Seed Used	41639.55078
Message: None.	

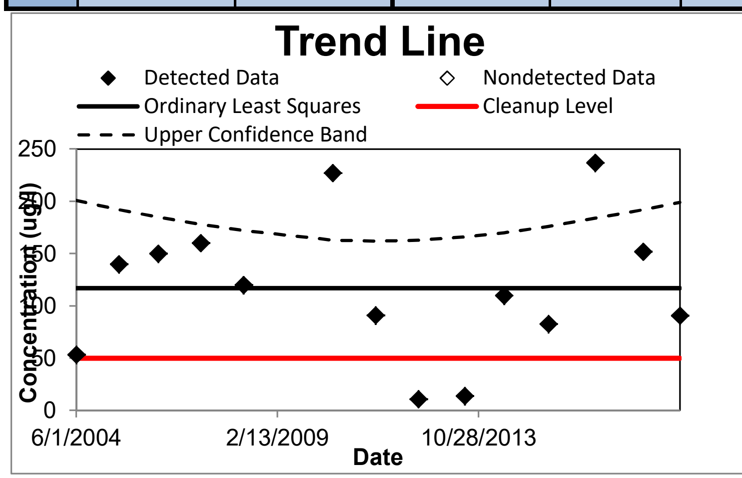
MW-29B Chromium

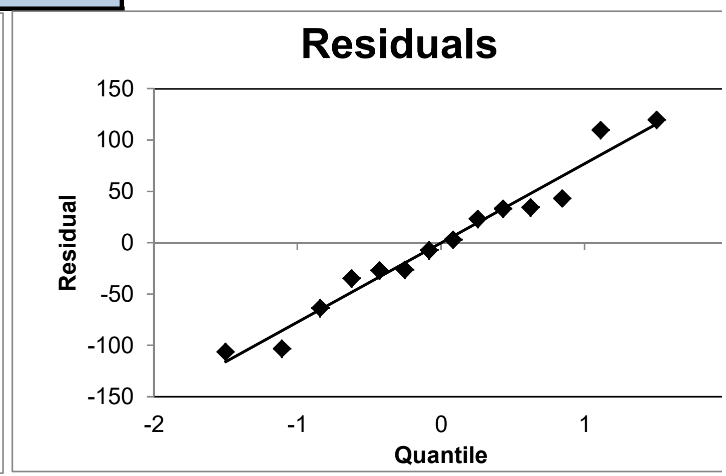
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	6/1/2004	53.3	117	-63.7	201
2	6/1/2005	140	117	23	192
3	5/1/2006	150	117	33	185
4	5/1/2007	160	117	43	178
5	5/1/2008	120	117	3	172
6	6/1/2010	227	117	110	163
7	6/1/2011	91	117	-26	162
8	6/1/2012	11	117	-106	163
9	7/1/2013	14	117	-103	166
10	6/1/2014	110	117	-7	170
11	6/16/2015	82.8	117	-34.2	176
12	7/20/2016	237	117	120	184
13	8/31/2017	152	117	35	192
14	7/11/2018	90.7	117	-26.3	199
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.000126655
Intercept	111.8950481
Correlation, R^2	0.0000
Test Result	No trend
Test Statistic	0.011
Critical Value	1.782
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





MW-38A Chromium

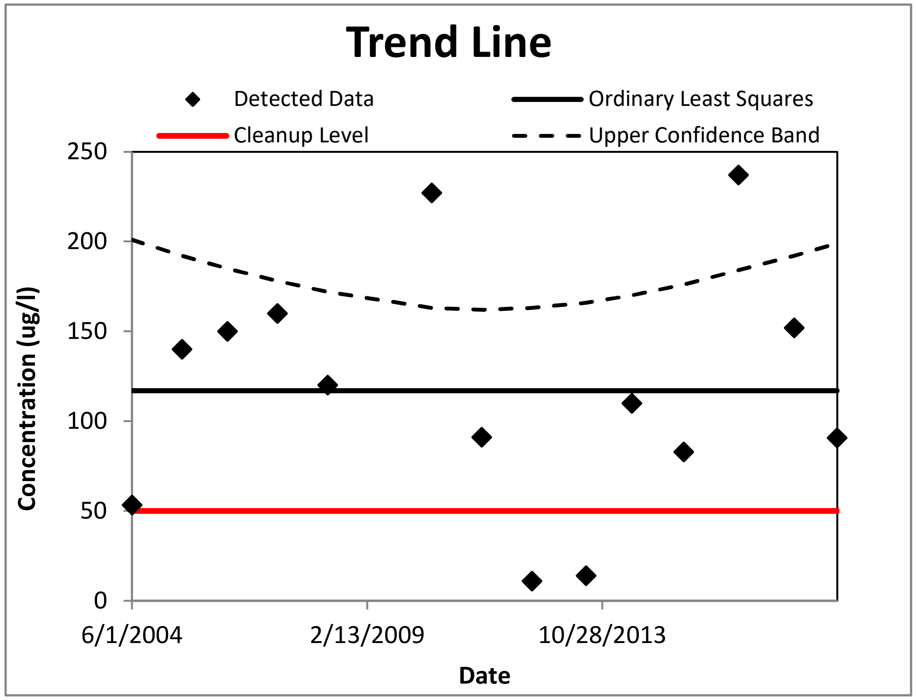
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/29/2018
Person performing analysis	VP

Chemical of Concern	Cr
Well Name/Number	MW38A
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	14
Number < cleanup level	2
Are any potential outliers present?	No
Mean of concentration	117
Standard deviation of concentration	67.8
t-value for UCL calculation	1.771



95% Upper Confidence Limit (UCL)	149
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	199
Trend calculation method	Ordinary Least Squares
Cleanup level	50
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	Yes

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

MW-38A Chromium

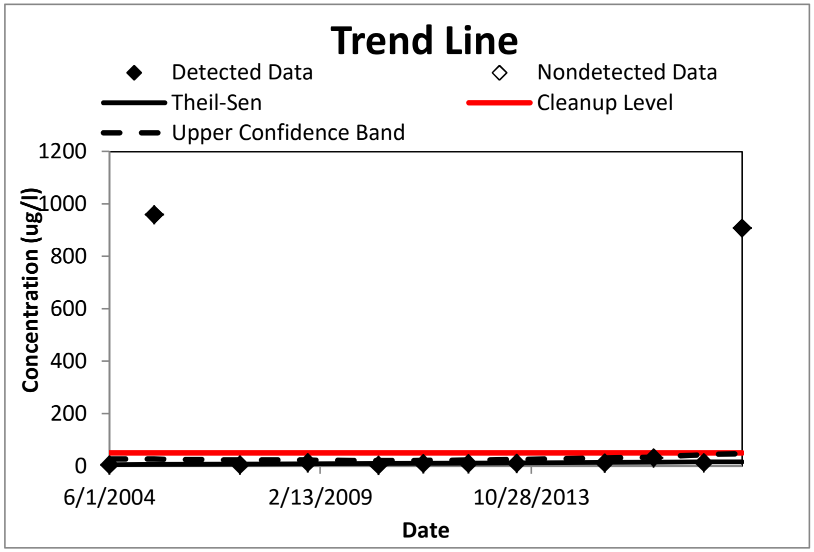
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

i	t (Date)	C (ug/l)	C Predicted	Residual	Upper Confidence Band
1	6/1/2004	5.22	5.07	0.15	27.5
2	6/1/2005	960	5.88	954.12	27.1
3	5/1/2007	5.1	7.43	-2.33	23.6
4	11/1/2008	13.9	8.65	5.25	23.2
5	6/1/2010	3.8	9.93	-6.13	21.5
6	6/1/2011	9.2	10.7	-1.5	22.7
7	6/1/2012	9.8	11.6	-1.8	23.4
8	7/1/2013	11	12.4	-1.4	25.9
9	6/16/2015	11.7	14	-2.3	31.1
10	7/20/2016	31.2	14.9	16.3	34.6
11	8/31/2017	13.5	15.8	-2.3	44.5
12	7/11/2018	908	16.5	891.5	47.9
13					
14					
15					
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	Increasing
Test Statistic (S)	26
Normalized S	1.714
Critical Value	1.645

Theil-Sen	
Slope	0.00222
Intercept	-79.6
When is the concentration predicted to exceed the cleanup level?	MCL is already exceeded



MW-38B Chromium

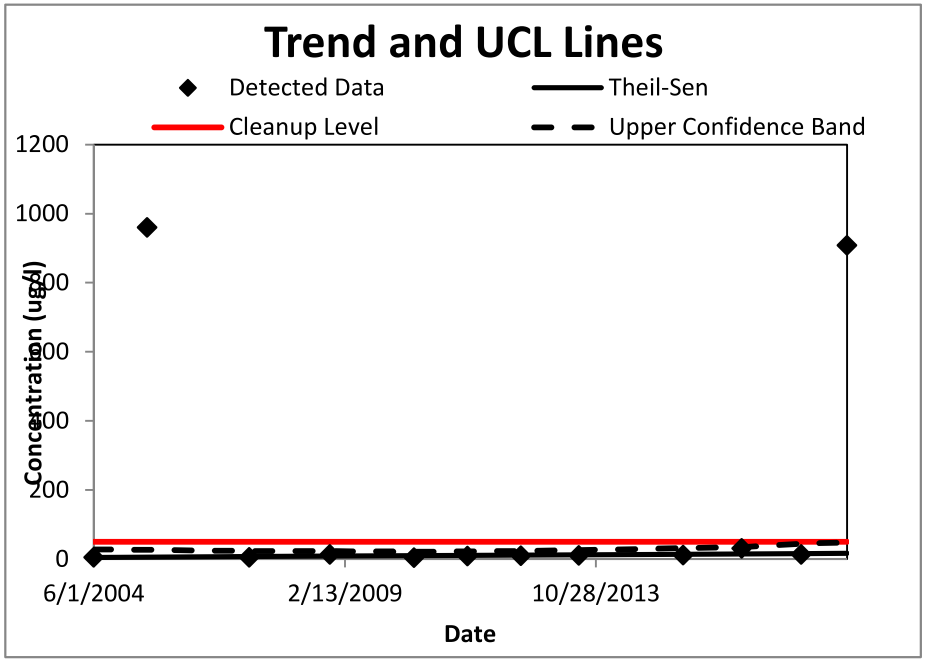
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	10/29/2018
Person performing analysis	VP

Chemical of Concern	Cr
Well Name/Number	MW38B
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	12
Number < cleanup level	10
Are any potential outliers present?	Yes
Mean of concentration	165
Standard deviation of concentration	359



95% Upper Confidence Limit (UCL)	617
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	47.9
Trend calculation method	Theil-Sen/Mann-Kendall
Cleanup level	50
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	**No**

When is the concentration predicted to exceed the MCL?	MCL is already exceeded
Random Seed Used	41639.55078
Message: None.	

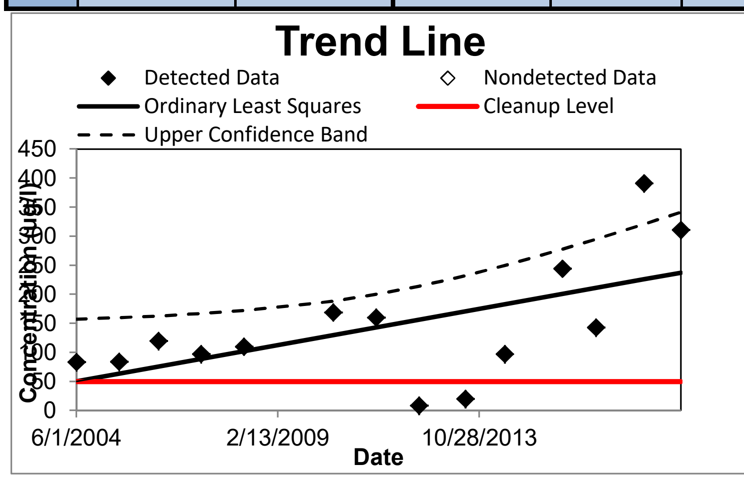
MW-38B Chromium

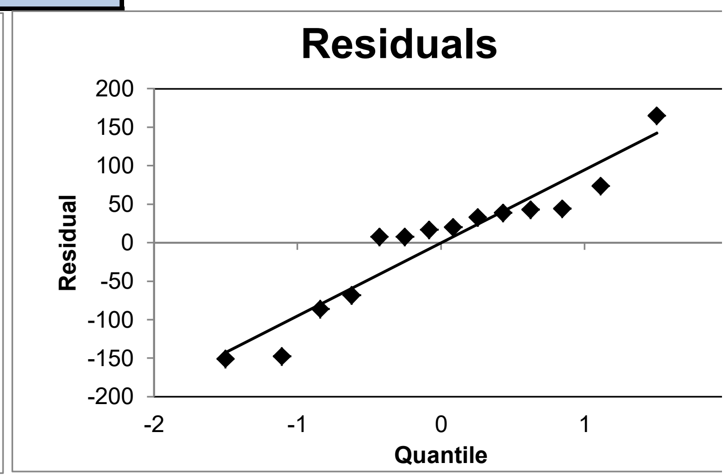
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	6/1/2004	83.3	50.3	33	157
2	6/1/2005	84	63.5	20.5	160
3	5/1/2006	120	75.7	44.3	163
4	5/1/2007	97	88.9	8.1	167
5	5/1/2008	110	102	8	172
6	6/1/2010	169	130	39	188
7	6/1/2011	160	143	17	200
8	6/1/2012	8.8	156	-147.2	214
9	7/1/2013	20	171	-151	232
10	6/1/2014	97	183	-86	250
11	10/7/2015	244	201	43	278
12	7/20/2016	143	211	-68	295
13	8/31/2017	391	226	165	321
14	7/11/2018	311	237	74	341
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.036286901
Intercept	-1333.659557
Correlation, R^2	0.3431
Test Result	Increasing
Test Statistic	2.503
Critical Value	1.782
When is the concentration predicted to exceed the cleanup level?	MCL is already exceeded





MW-39A Chromium

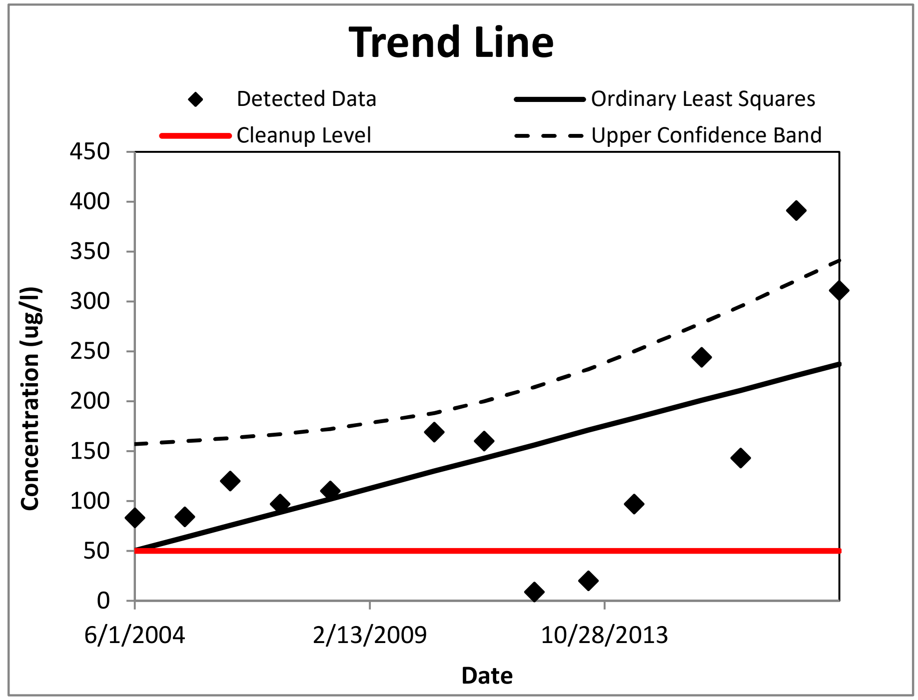
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	11/2/2018
Person performing analysis	VP

Chemical of Concern	Cr
Well Name/Number	MW39A
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	14
Number < cleanup level	2
Are any potential outliers present?	No
Mean of concentration	146
Standard deviation of concentration	106
t-value for UCL calculation	1.771



95% Upper Confidence Limit (UCL)	196
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	341
Trend calculation method	Ordinary Least Squares
Cleanup level	50
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	**No**

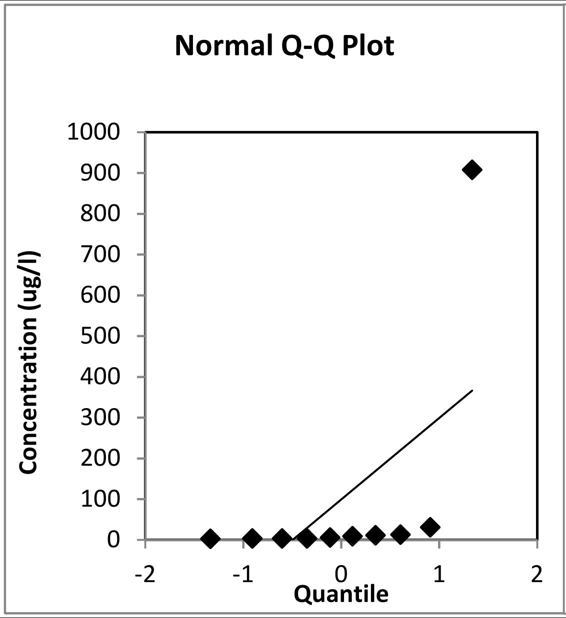
When is the concentration predicted to exceed the MCL?	MCL is already exceeded
Message: None.	

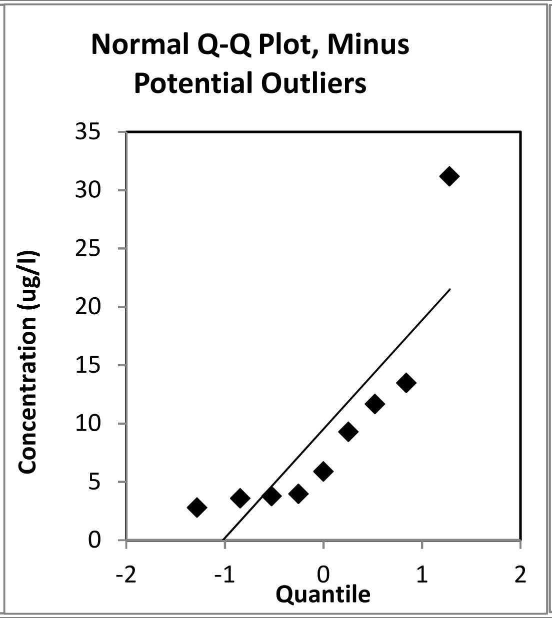
MW-39A Chromium

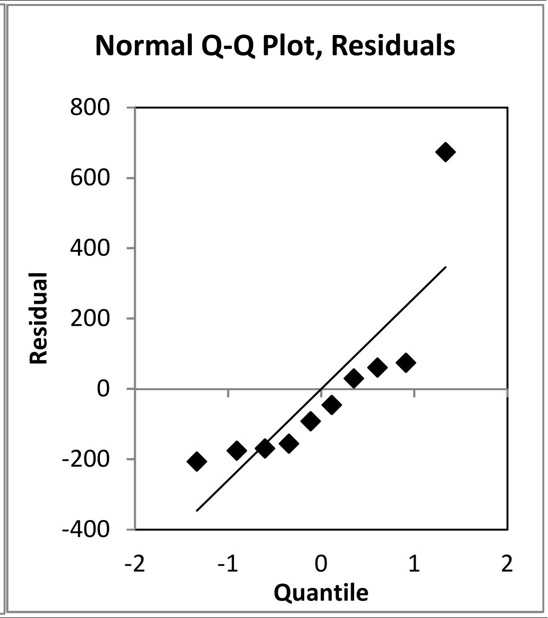
Groundwater Statistics Tool

Normality Testing Worksheet

Normality Test Results			
Parameter	**All Data**	**Minus Outliers**	**Residuals**
Number of data points	10	9	10
Shapiro-Wilk alpha value	5%	10%	5%
Slope	199.8937376	9.333797944	259.1915401
Intercept	99.38	9.533333333	-2.44072E-13
Correlation, R	0.584455202	0.851008941	0.833874853
Exact Test Value	0.388823974	0.747640356	0.727813116
Critical Value	0.842	0.859	0.842
Conclude sample distribution:	Does not appear normal	Does not appear normal	Does not appear normal







Previous Step: Outliers Screen

Next Step: Trend Screen

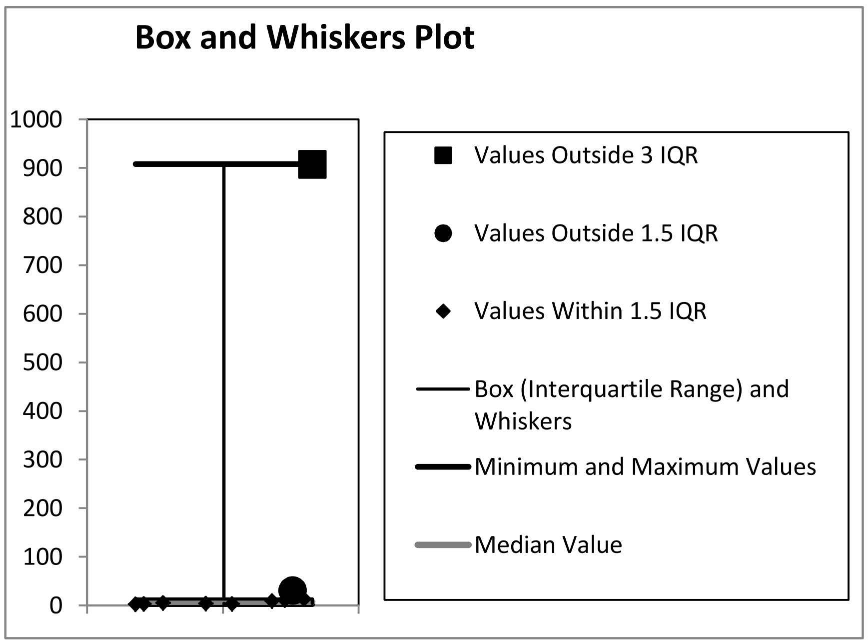
Skip Step: UCL Screen

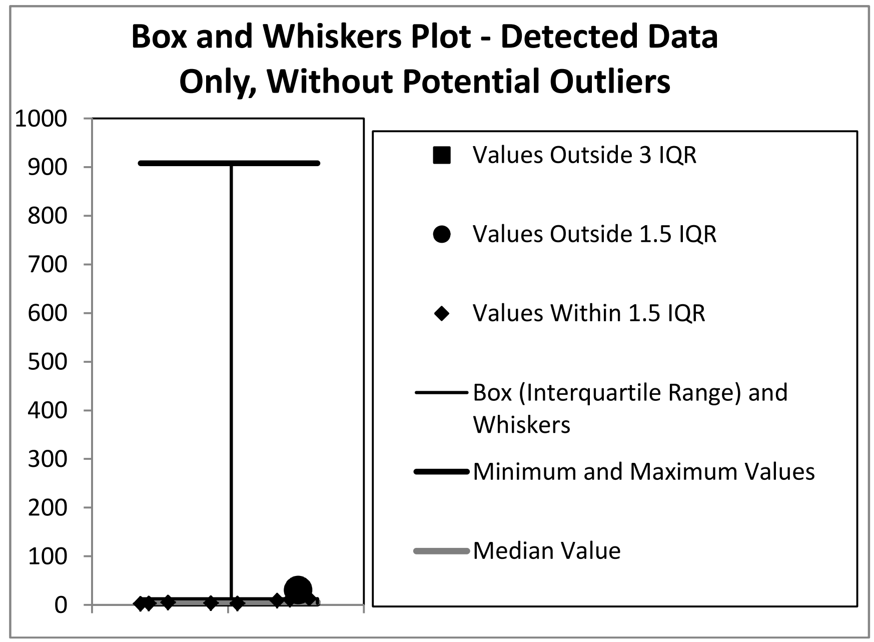
MW-39B Chromium

Groundwater Statistics Tool

Outlier testing worksheet

Dixon's Outlier Test Results		
Number of data points	10	
Risk of false rejection	1%	
Critical value	0.597	
Outlier type	**Low**	**High**
Test statistic	0.0282	0.9695
Potential Outlier?	No	Yes
Validity of Dixon'sTest	Not Valid - data do not appear normal after removal of outlier.	



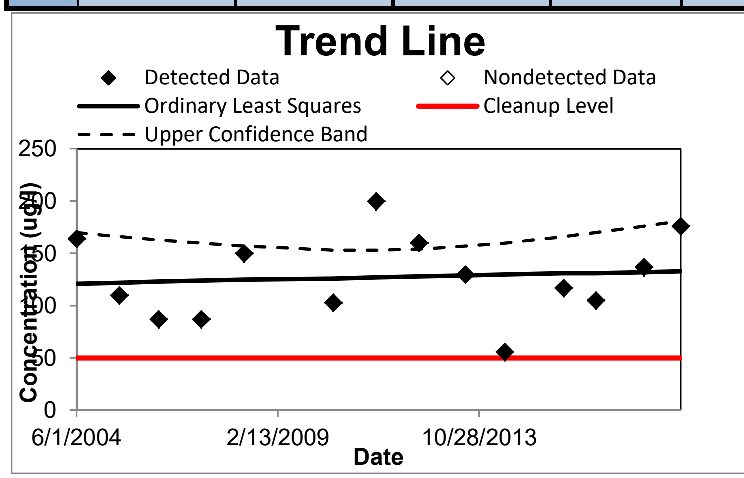


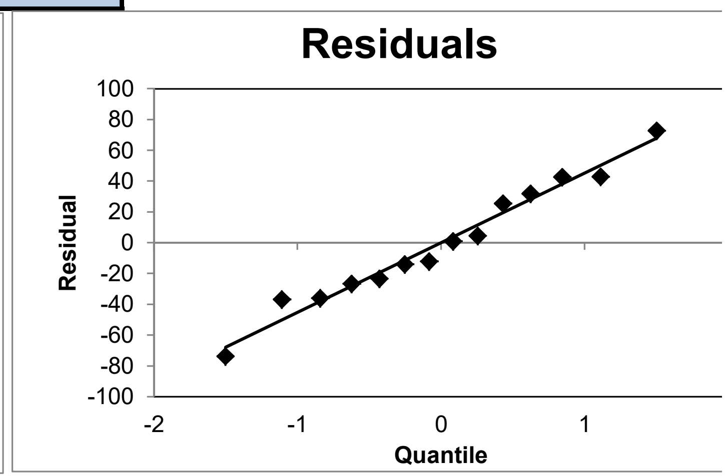
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	6/1/2004	164	121	43	170
2	6/1/2005	110	122	-12	166
3	5/1/2006	87	123	-36	163
4	5/1/2007	87	124	-37	160
5	5/1/2008	150	125	25	157
6	6/1/2010	103	126	-23	153
7	6/1/2011	200	127	73	153
8	6/1/2012	160	128	32	154
9	7/1/2013	130	129	1	157
10	6/1/2014	56	130	-74	160
11	10/16/2015	117	131	-14	166
12	7/20/2016	105	131	-26	170
13	8/31/2017	137	132	5	176
14	7/11/2018	176	133	43	181
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.002314086
Intercept	32.95034513
Correlation, R^2	0.0100
Test Result	No trend
Test Statistic	0.348
Critical Value	1.782
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





MW-40A Chromium

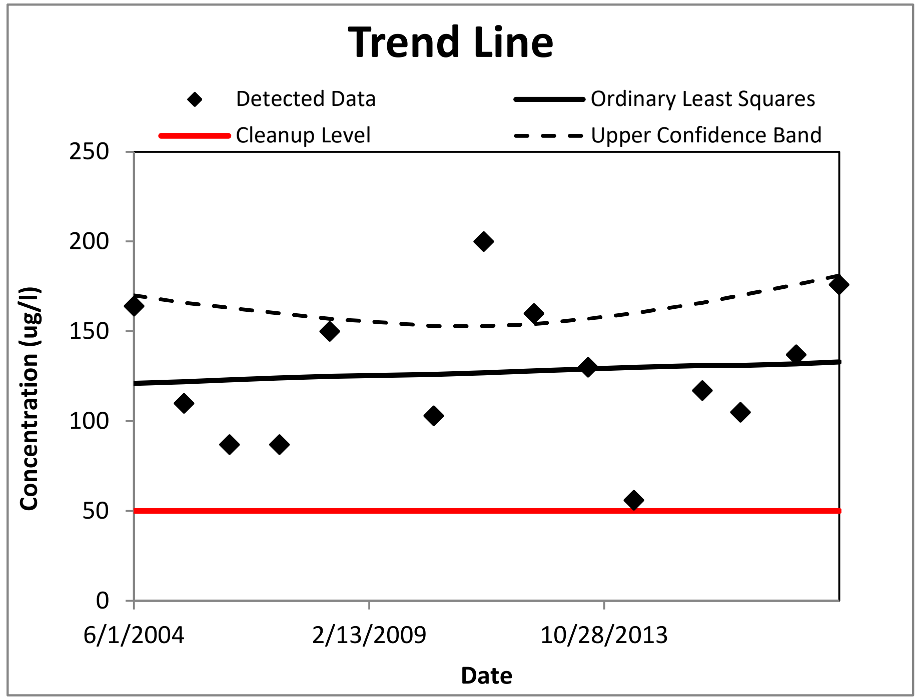
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	11/2/2018
Person performing analysis	VP

Chemical of Concern	Cr
Well Name/Number	MW40A
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	14
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	127
Standard deviation of concentration	39.7
t-value for UCL calculation	1.771



95% Upper Confidence Limit (UCL)	146
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	181
Trend calculation method	Ordinary Least Squares
Cleanup level	50
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

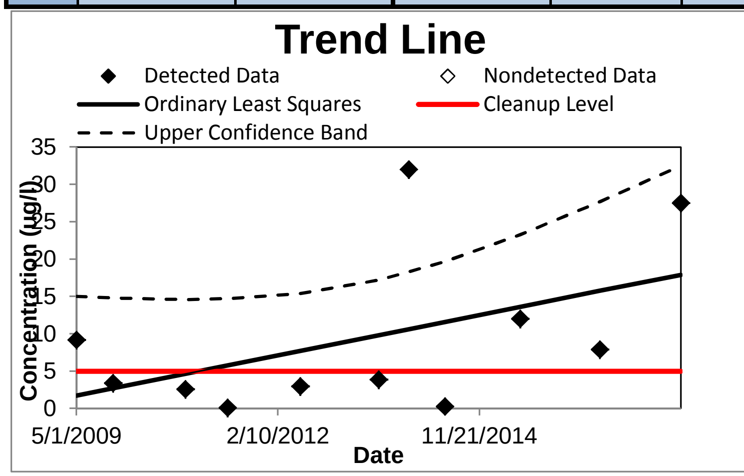
MW-40A Chromium

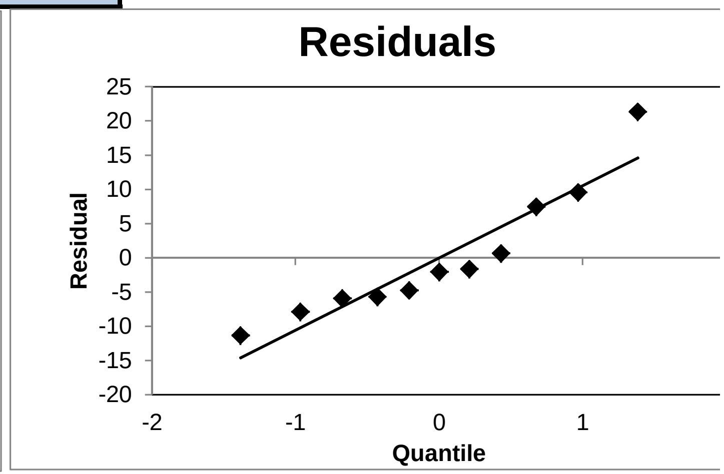
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	5/1/2009	9.2	1.72	7.48	15
2	11/1/2009	3.4	2.7	0.7	14.8
3	11/1/2010	2.6	4.64	-2.04	14.6
4	6/1/2011	0.1	5.77	-5.67	14.7
5	6/1/2012	3	7.72	-4.72	15.4
6	7/1/2013	3.9	9.82	-5.92	17.2
7	12/1/2013	32	10.6	21.4	18.3
8	6/1/2014	0.28	11.6	-11.32	19.7
9	6/15/2015	12	13.6	-1.6	23.3
10	7/20/2016	7.9	15.8	-7.9	27.7
11	8/31/2017	27.5	17.9	9.6	32.5
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.005320283
Intercept	-210.7396156
Correlation, R^2	0.2388
Test Result	No trend
Test Statistic	1.680
Critical Value	1.833
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





MW-40B Chromium

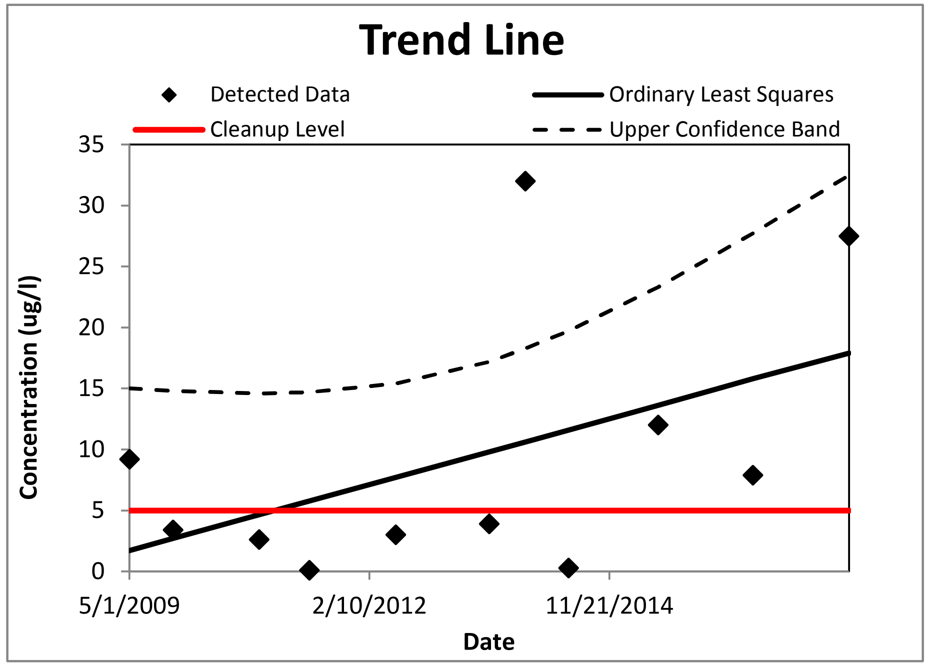
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	9/26/2017
Person performing analysis	VP

Chemical of Concern	Cr
Well Name/Number	MW40B
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	11
Number < cleanup level	6
Are any potential outliers present?	No
Mean of concentration	9.26
Standard deviation of concentration	10.8



95% Upper Confidence Limit (UCL)	23.5
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	32.5
Trend calculation method	Ordinary Least Squares
Cleanup level	5
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Random Seed Used	41639.55078
Message: None.	

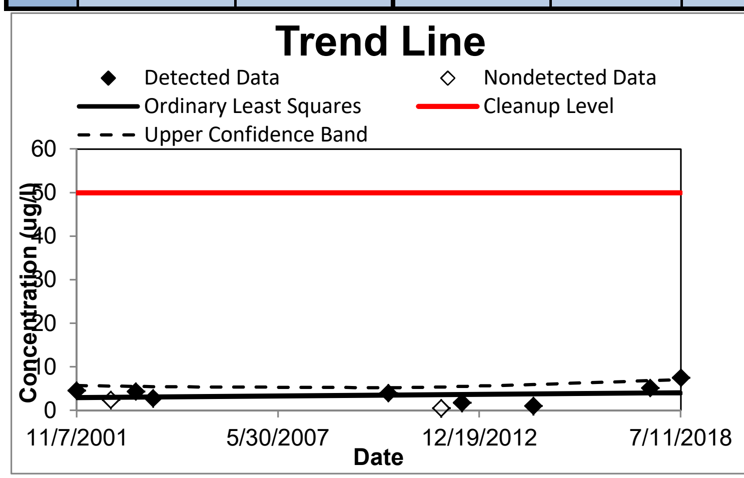
MW-40B Chromium

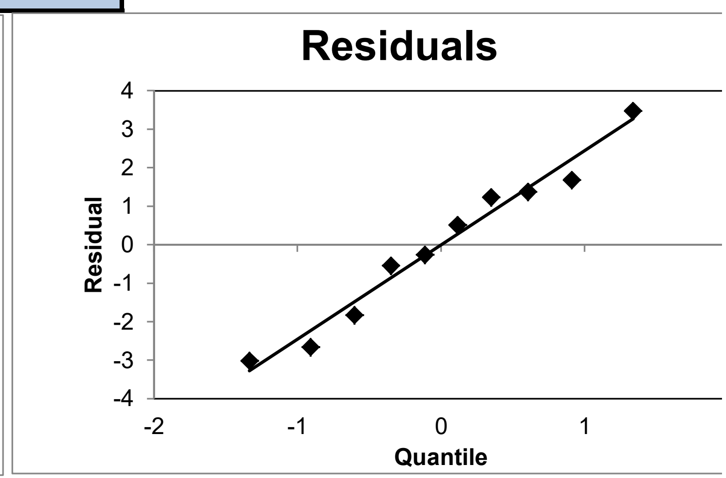
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	11/7/2001	4.6	2.92	1.68	5.78
2	10/17/2002	2.44	2.98	-0.54	5.63
3	6/26/2003	4.4	3.02	1.38	5.53
4	12/18/2003	2.8	3.06	-0.26	5.46
5	6/15/2010	4	3.49	0.51	5.23
6	11/30/2011	0.57	3.58	-3.01	5.42
7	6/27/2012	1.8	3.62	-1.82	5.52
8	6/17/2014	1.1	3.75	-2.65	5.95
9	9/6/2017	5.2	3.97	1.23	6.83
10	7/11/2018	7.5	4.02	3.48	7.09
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.000181432
Intercept	-3.832797063
Correlation, R^2	0.0487
Test Result	No trend
Test Statistic	0.573
Critical Value	1.860
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





MW-43A Chromium

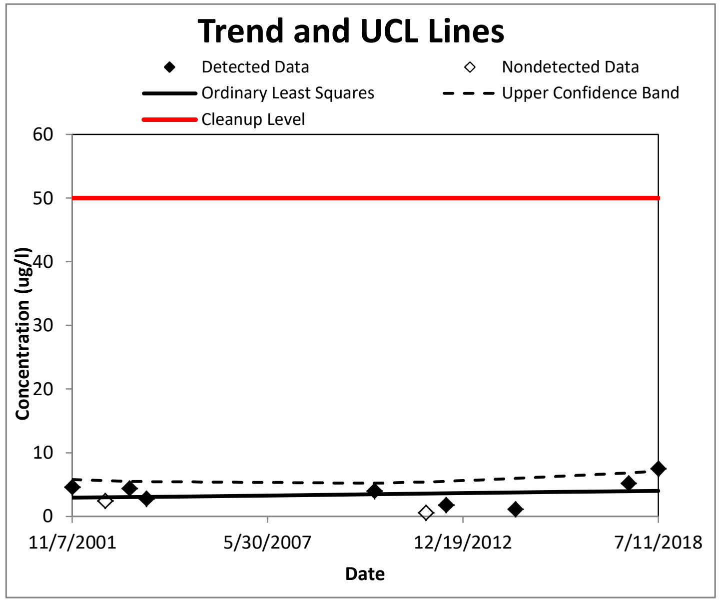
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets with nondetects

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	11/2/2018
Person performing analysis	VP

Chemical of Concern	Cr
Well Name/Number	MW44A
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	10
Number of detected results	8
Number of non-detected results	2
Detection frequency	80%
Number at or below cleanup level	10
Are any potential outliers present?	No
Mean of concentration	3.39
Standard deviation of concentration	2.03



95% Upper Confidence Limit (UCL)	6.38
Method for calculating UCL	KM Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	7.09
Trend calculation method	Ordinary Least Squares
Cleanup level	50
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	Yes

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

Data, including imputed values

Date (Date)	Cr Concentration (ug/l)	Data Qualifier	Imputed value*
37202	4.6	B	4.6
37546	2.8	U	2.44
37798	4.4	B	4.4
37973	2.8		2.8
40344	4		4
40877	0.87	U	0.57
41087	1.8	J	1.8
41807	1.1	J	1.1
42984	5.2	J	5.2
43292	7.5	J	7.5

* Note that the imputed value column also includes the actual value for detected samples. This is for convenience in copying and pasting the data.

Random Seed Used	41639.55078

MW-43A Chromium

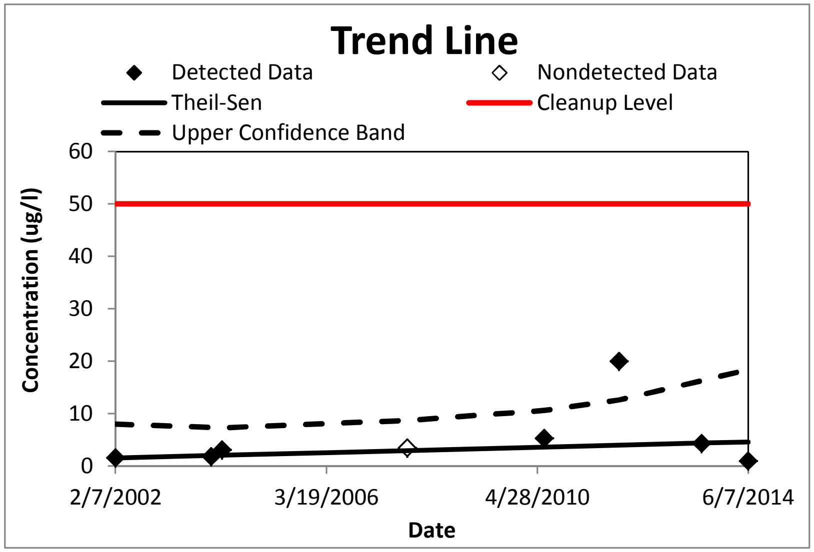
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

i	t (Date)	C (ug/l)	C Predicted	Residual	Upper Confidence Band
1	2/7/2002	1.6	1.53	0.07	8.01
2	12/18/2003	1.8	2	-0.2	7.41
3	3/5/2004	3.1	2.05	1.05	7.34
4	10/15/2007	3.48	2.95	0.53	8.76
5	6/15/2010	5.3	3.61	1.69	10.6
6	11/29/2011	20	3.98	16.02	12.7
7	7/8/2013	4.3	4.38	-0.08	16.3
8	6/7/2014	1	4.61	-3.61	18.4
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	No trend
Test Statistic (S)	10
Normalized S	1.113
Critical Value	1.645

Theil-Sen	
Slope	0.000682
Intercept	-23.9
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing



MW-44A Chromium

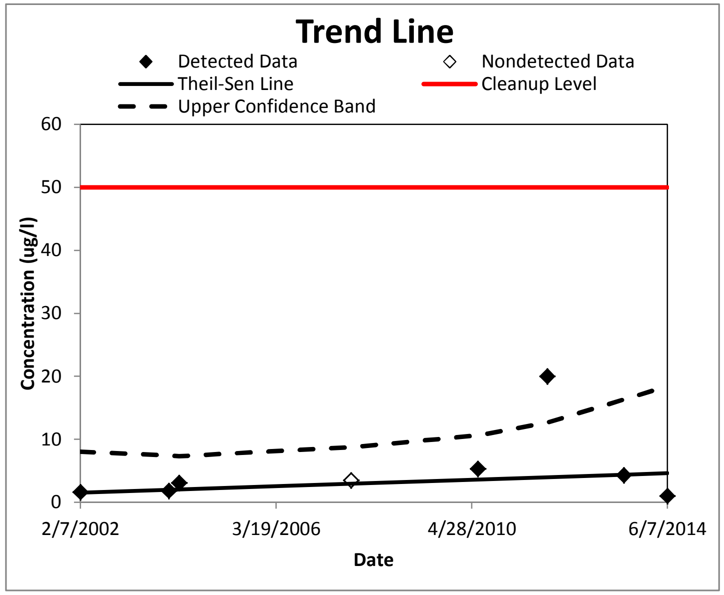
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets with nondetects

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	9/26/2017
Person performing analysis	VP

Chemical of Concern	Cr
Well Name/Number	MW44A
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	8
Number of detected results	7
Number of non-detected results	1
Detection frequency	88%
Number at or below cleanup level	8
Are any potential outliers present?	Yes
Mean of concentration	4.87
Standard deviation of concentration	5.89



95% Upper Confidence Limit (UCL)	14.7
Method for calculating UCL	KM Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	18.4
Trend calculation method	Theil-Sen/Mann-Kendall
Cleanup level	50
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	Yes

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

Data, including imputed values

Date (Date)	Cr Concentration (ug/l)	Data Qualifier	Imputed value*
37294	1.6	B	1.6
37973	1.8		1.8
38051	3.1	J	3.1
39370	4	U	3.48
40344	5.3		5.3
40876	20		20
41463	4.3		4.3
41797	1	J	1

* Note that the imputed value column also includes the actual value for detected samples. This is for convenience in copying and pasting the data.

Random Seed Used	41639.55078

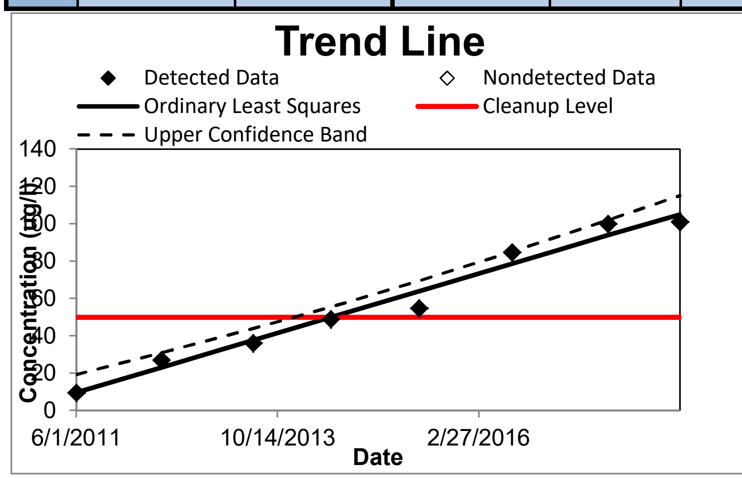
MW-44A Chromium

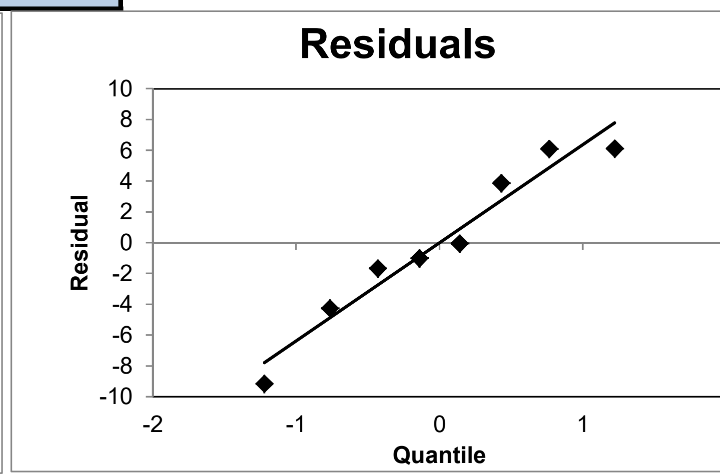
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	6/1/2011	9.6	9.65	-0.05	19.3
2	6/1/2012	27	23.1	3.9	31
3	7/1/2013	36	37.7	-1.7	44
4	6/1/2014	49	50	-1	55.5
5	6/15/2015	54.8	63.9	-9.1	69.4
6	7/20/2016	84.8	78.7	6.1	85.1
7	9/5/2017	100	93.9	6.1	102
8	7/11/2018	101	105	-4	115
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.036810144
Intercept	-1488.338459
Correlation, R^2	0.9762
Test Result	Increasing
Test Statistic	15.698
Critical Value	1.943
When is the concentration predicted to exceed the cleanup level?	MCL is already exceeded





PZ-14 Chromium

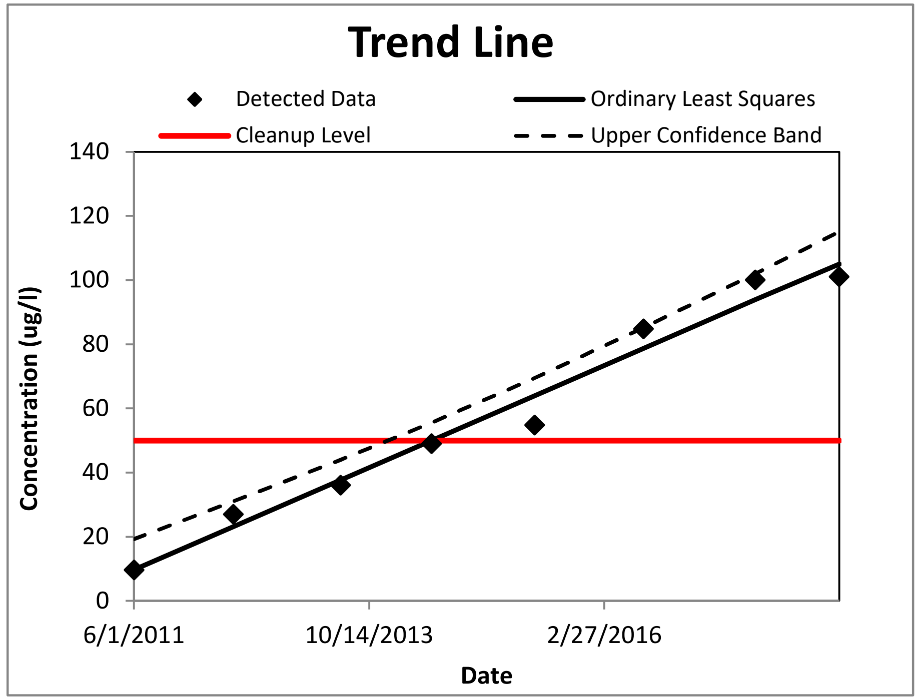
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	11/2/2018
Person performing analysis	VP

Chemical of Concern	Cr
Well Name/Number	PZ14
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	8
Number < cleanup level	4
Are any potential outliers present?	No
Mean of concentration	57.8
Standard deviation of concentration	34.2
t-value for UCL calculation	1.895



95% Upper Confidence Limit (UCL)	80.7
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	115
Trend calculation method	Ordinary Least Squares
Cleanup level	50
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	**No**

When is the concentration predicted to exceed the MCL?	MCL is already exceeded
Message: None.	

PZ-14 Chromium

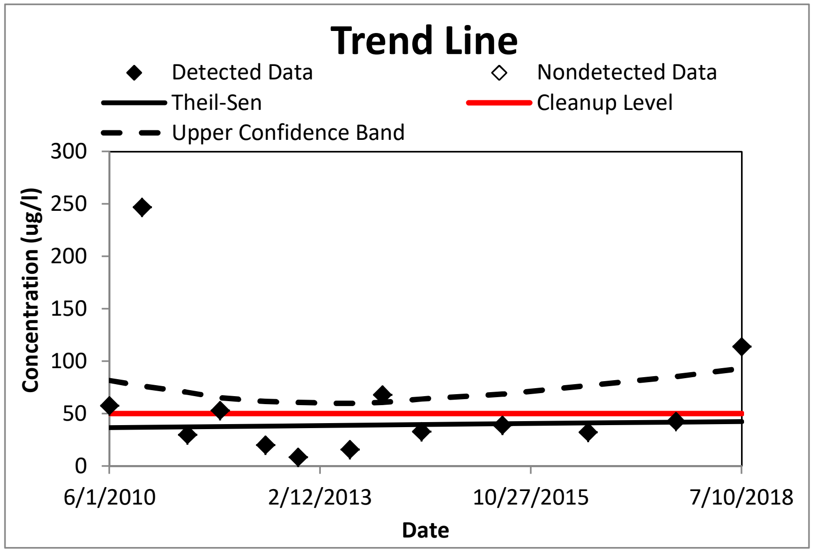
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

i	t (Date)	C (ug/l)	C Predicted	Residual	Upper Confidence Band
1	6/1/2010	57.6	36.7	20.9	81.7
2	11/1/2010	247	37	210	76.7
3	6/1/2011	30	37.4	-7.4	70.6
4	11/1/2011	53	37.7	15.3	65.4
5	6/1/2012	20	38.1	-18.1	61.6
6	11/1/2012	8.6	38.4	-29.8	60.7
7	7/1/2013	16	38.9	-22.9	59.9
8	12/1/2013	68	39.2	28.8	60.8
9	6/1/2014	33	39.6	-6.6	64.3
10	6/15/2015	38.9	40.4	-1.5	68.8
11	7/20/2016	32.4	41.2	-8.8	77
12	9/5/2017	42.6	42	0.6	85.4
13	7/11/2018	114	42.6	71.4	93.3
14					
15					
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	No trend
Test Statistic (S)	2
Normalized S	0.061
Critical Value	1.645

Theil-Sen	
Slope	0.00201
Intercept	-44.4
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing



RW-01 Chromium

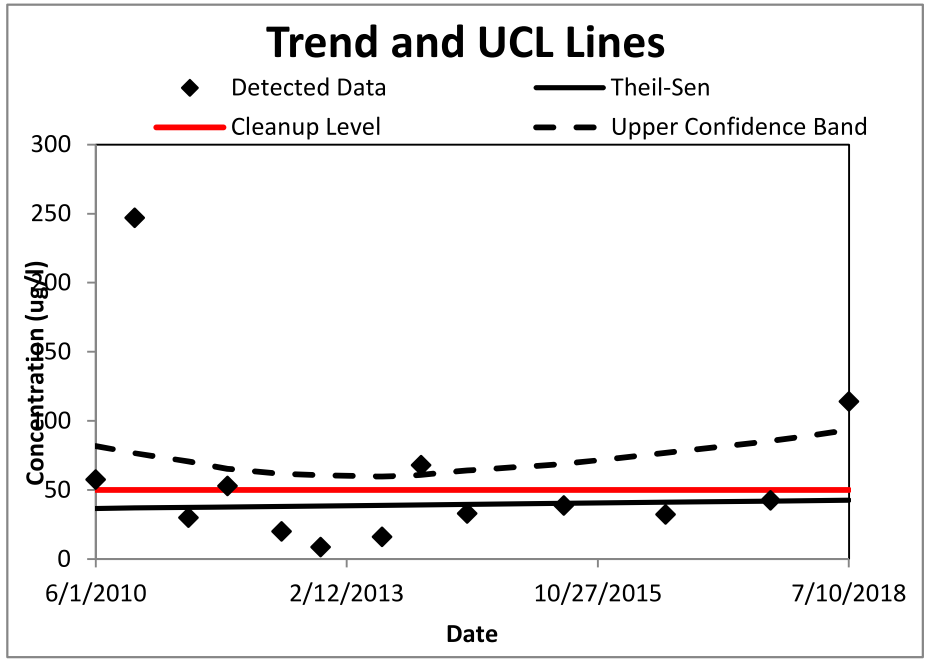
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	11/2/2018
Person performing analysis	VP

Chemical of Concern	Cr
Well Name/Number	RW01
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	13
Number < cleanup level	8
Are any potential outliers present?	Yes
Mean of concentration	58.5
Standard deviation of concentration	62.8



95% Upper Confidence Limit (UCL)	134.4
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	93.3
Trend calculation method	Theil-Sen/Mann-Kendall
Cleanup level	50
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Random Seed Used	41639.55078
Message: None.	

RW-01 Chromium

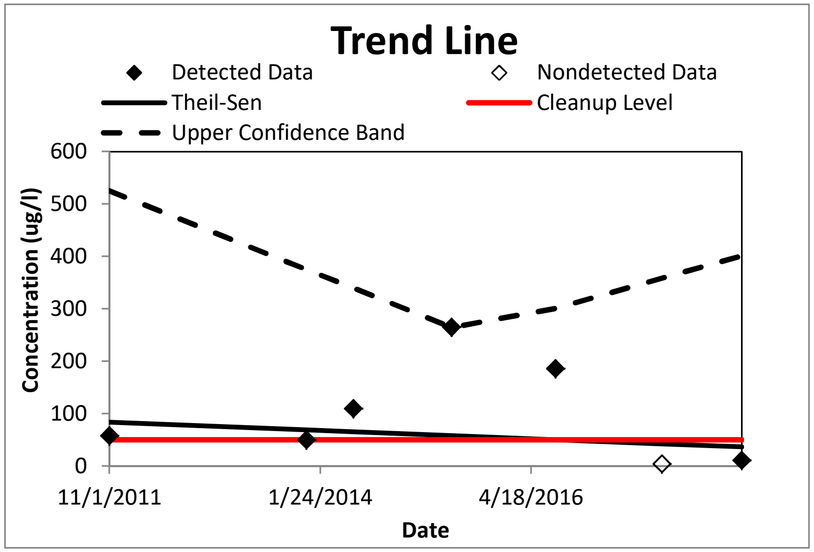
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

i	t (Date)	C (ug/l)	C Predicted	Residual	Upper Confidence Band
1	11/1/2011	58	83.6	-25.6	525
2	12/1/2013	50	68.9	-18.9	376
3	6/1/2014	110	65.4	44.6	340
4	6/15/2015	265	58.1	206.9	265
5	7/20/2016	186	50.4	135.6	301
6	9/5/2017	4	42.4	-38.4	359
7	7/11/2018	10.8	36.5	-25.7	401
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	No trend
Test Statistic (S)	-3
Normalized S	-0.300
Critical Value	1.645

Theil-Sen	
Slope	-0.0193
Intercept	872
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing

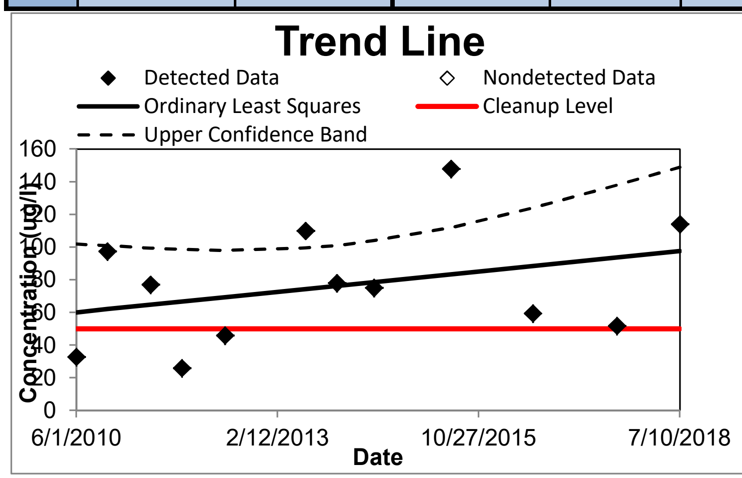


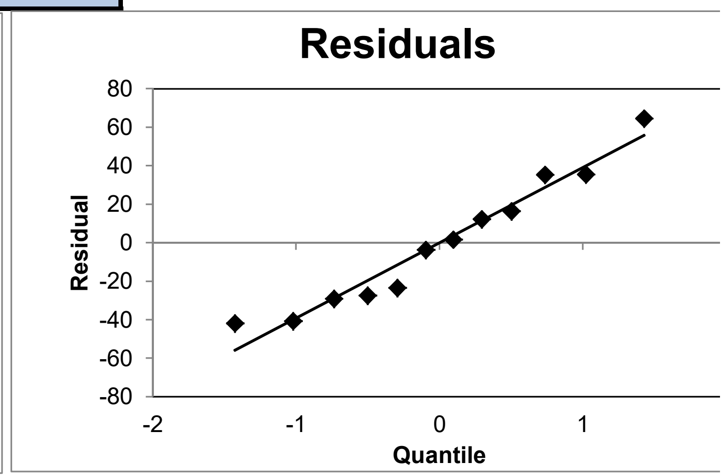
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	6/1/2010	32.8	60.1	-27.3	102
2	11/1/2010	97.5	62.1	35.4	101
3	6/1/2011	77	64.8	12.2	99.4
4	11/1/2011	26	66.7	-40.7	98.6
5	6/1/2012	46	69.4	-23.4	98.1
6	7/1/2013	110	74.4	35.6	99.6
7	12/1/2013	78	76.3	1.7	101
8	6/1/2014	75	78.6	-3.6	104
9	6/15/2015	148	83.4	64.6	112
10	7/20/2016	59.5	88.5	-29	124
11	9/5/2017	51.8	93.7	-41.9	138
12	7/11/2018	114	97.6	16.4	149
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.012642829
Intercept	-449.7354368
Correlation, R^2	0.1183
Test Result	No trend
Test Statistic	1.158
Critical Value	1.812
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





RW-03A Chromium

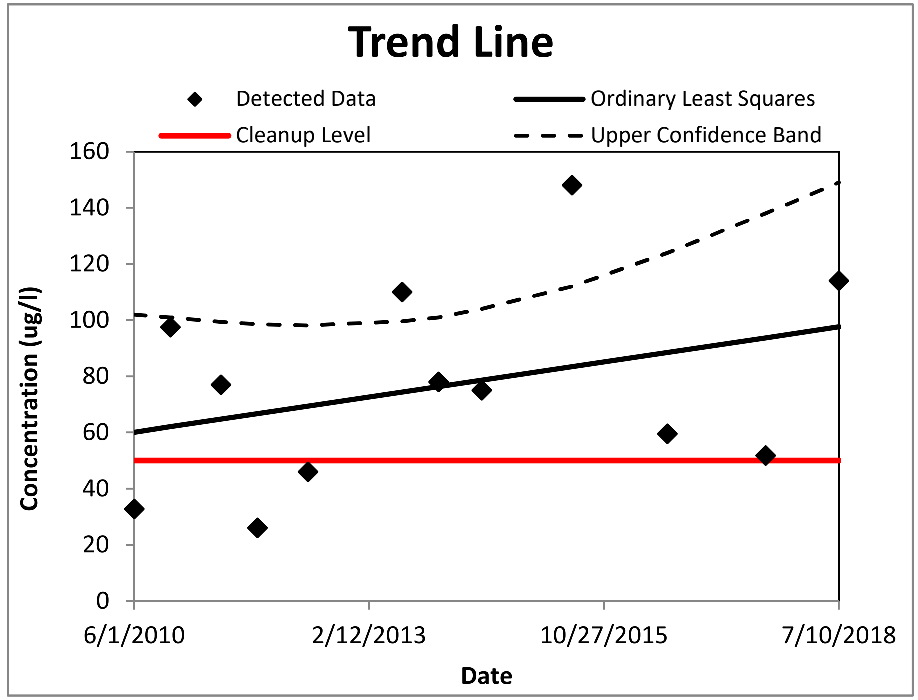
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	11/2/2018
Person performing analysis	VP

Chemical of Concern	Cr
Well Name/Number	RW03A
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	12
Number < cleanup level	3
Are any potential outliers present?	No
Mean of concentration	76.3
Standard deviation of concentration	36.2
t-value for UCL calculation	1.796



95% Upper Confidence Limit (UCL)	95.1
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	149
Trend calculation method	Ordinary Least Squares
Cleanup level	50
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	Yes

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

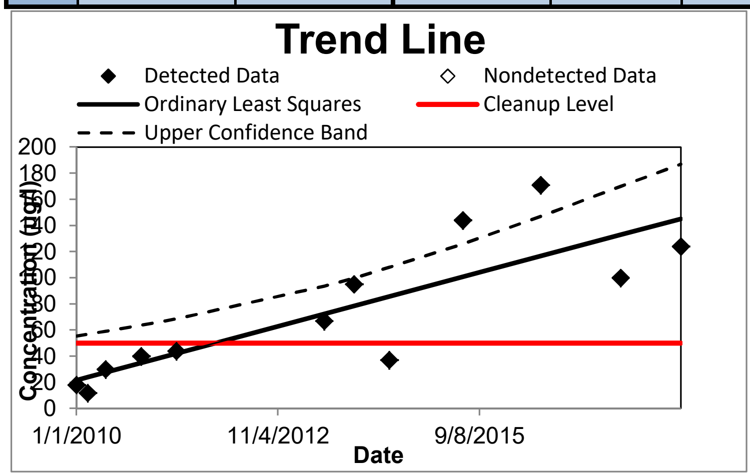
RW-03A Chromium

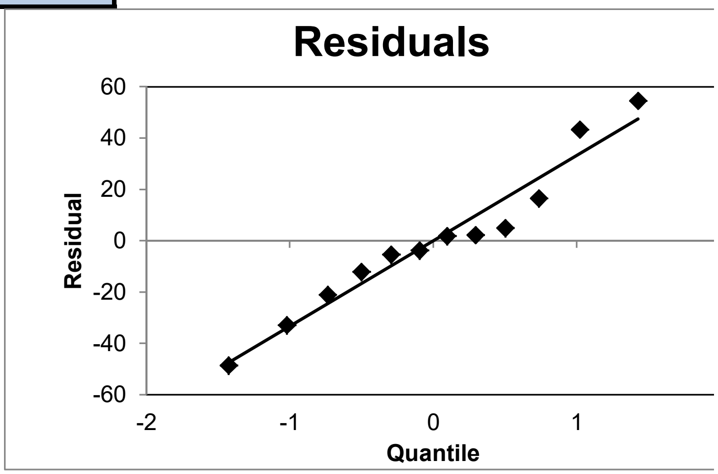
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	1/1/2010	18	21.7	-3.7	55.4
2	3/1/2010	12	24.1	-12.1	56.9
3	6/1/2010	30	27.7	2.3	59.1
4	12/1/2010	40	35	5	63.8
5	6/1/2011	44	42.2	1.8	68.7
6	7/1/2013	67	72.3	-5.3	93.6
7	12/1/2013	95	78.4	16.6	99.7
8	6/1/2014	37	85.6	-48.6	108
9	6/15/2015	144	101	43	126
10	7/20/2016	171	117	54	147
11	9/5/2017	100	133	-33	170
12	7/11/2018	124	145	-21	187
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.039616226
Intercept	-1570.00224
Correlation, R^2	0.6954
Test Result	Increasing
Test Statistic	4.778
Critical Value	1.812
When is the concentration predicted to exceed the cleanup level?	MCL is already exceeded





RW-04 Chromium

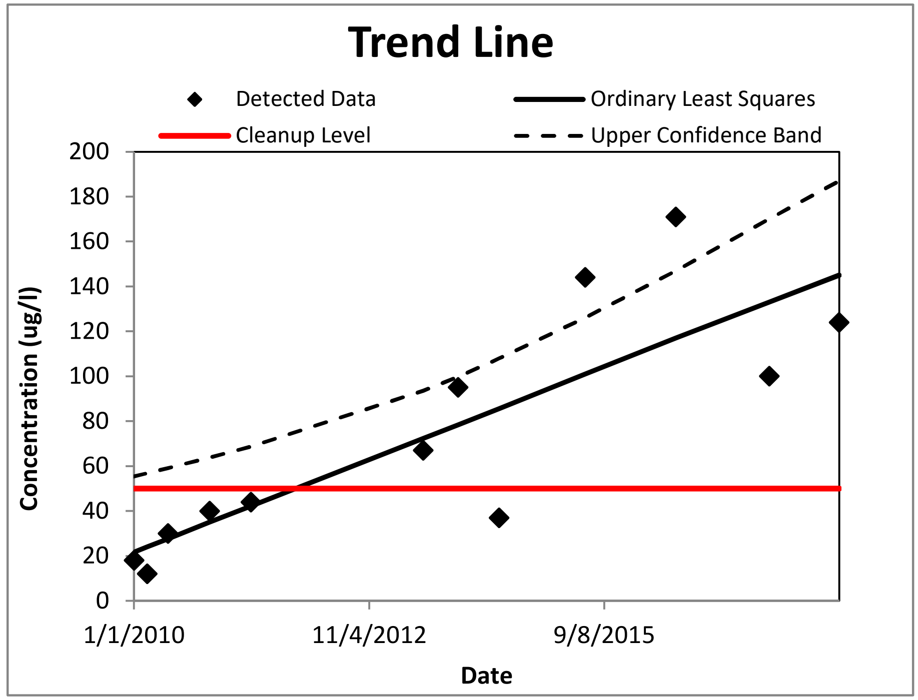
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	11/2/2018
Person performing analysis	VP

Chemical of Concern	Cr
Well Name/Number	RW04
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	12
Number < cleanup level	6
Are any potential outliers present?	No
Mean of concentration	73.5
Standard deviation of concentration	52.5
t-value for UCL calculation	1.796



95% Upper Confidence Limit (UCL)	101
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	187
Trend calculation method	Ordinary Least Squares
Cleanup level	50
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	**No**

When is the concentration predicted to exceed the MCL?	MCL is already exceeded
Message: None.	

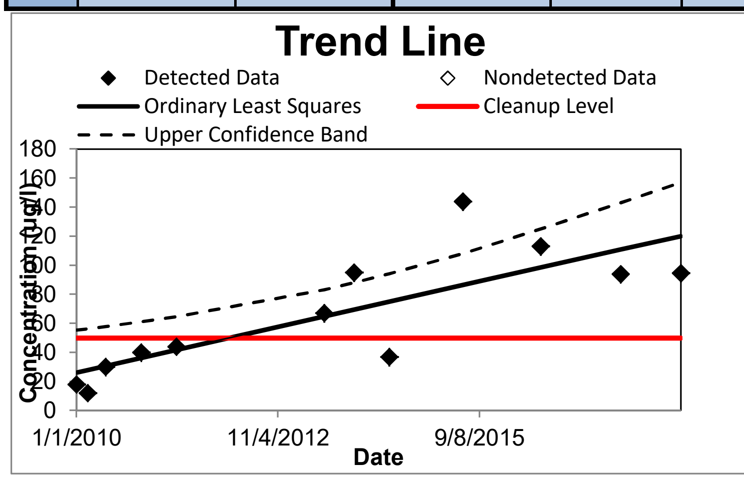
RW-04 Chromium

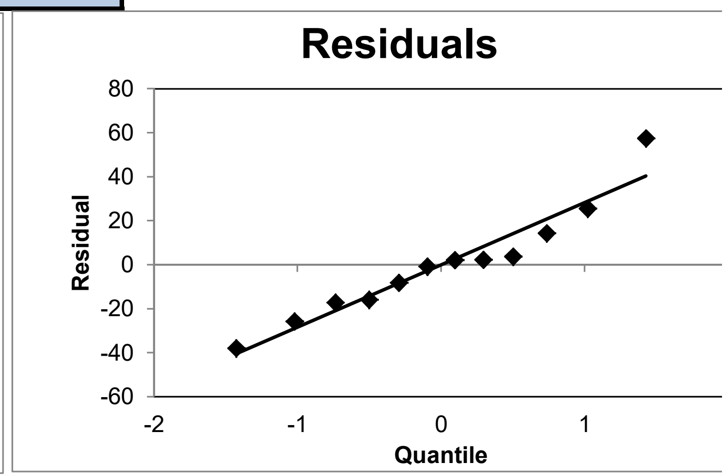
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	1/1/2010	18	26.1	-8.1	55.3
2	3/1/2010	12	27.9	-15.9	56.3
3	6/1/2010	30	30.7	-0.7	57.9
4	12/1/2010	40	36.2	3.8	61.2
5	6/1/2011	44	41.8	2.2	64.7
6	7/1/2013	67	64.8	2.2	83.2
7	12/1/2013	95	69.5	25.5	87.9
8	6/1/2014	37	75	-38	94.1
9	6/15/2015	144	86.5	57.5	108
10	7/20/2016	113	98.6	14.4	125
11	9/5/2017	94	111	-17	143
12	7/11/2018	94.7	120	-25.3	157
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.030319517
Intercept	-1192.097837
Correlation, R^2	0.6411
Test Result	Increasing
Test Statistic	4.227
Critical Value	1.812
When is the concentration predicted to exceed the cleanup level?	MCL is already exceeded





RW-05 Chromium

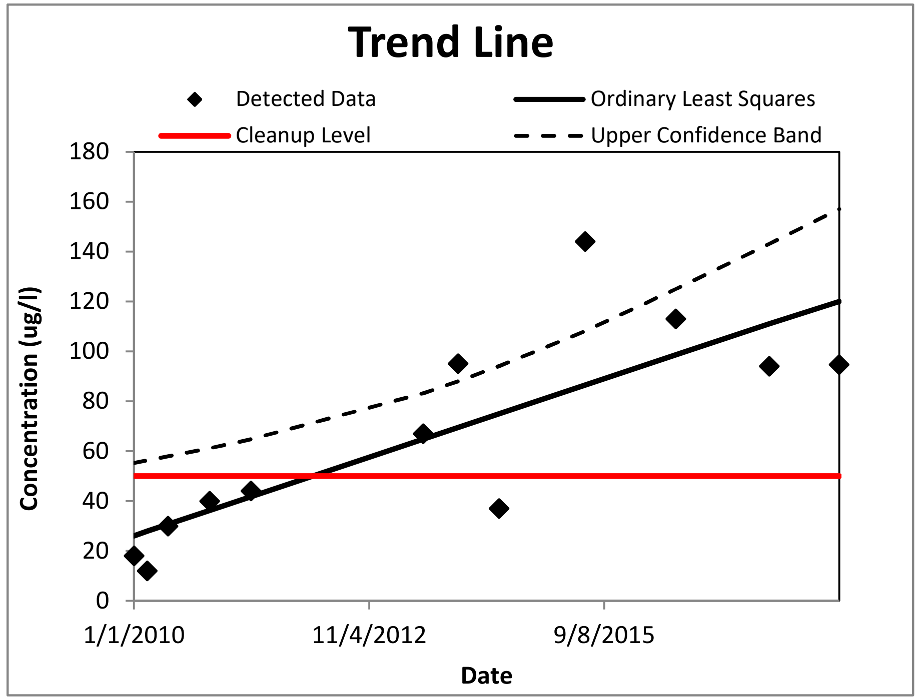
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	11/2/2018
Person performing analysis	VP

Chemical of Concern	Cr
Well Name/Number	RW05
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	12
Number < cleanup level	6
Are any potential outliers present?	No
Mean of concentration	65.7
Standard deviation of concentration	41.8
t-value for UCL calculation	1.796



95% Upper Confidence Limit (UCL)	87.4
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	157
Trend calculation method	Ordinary Least Squares
Cleanup level	50
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	**No**

When is the concentration predicted to exceed the MCL?	MCL is already exceeded
Message: None.	

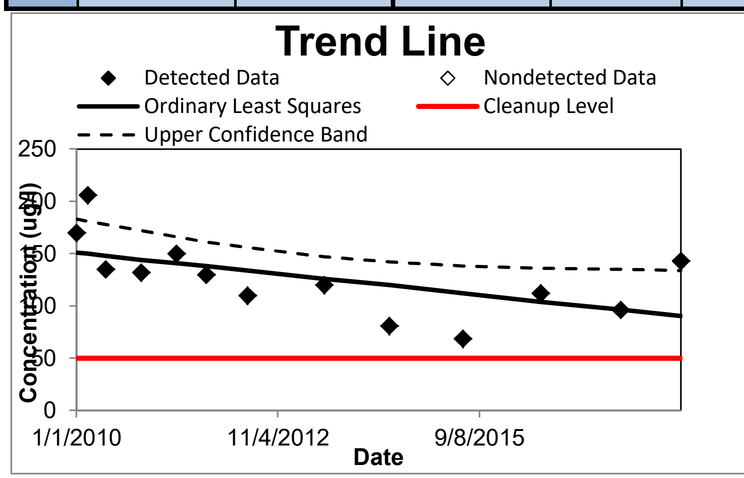
RW-05 Chromium

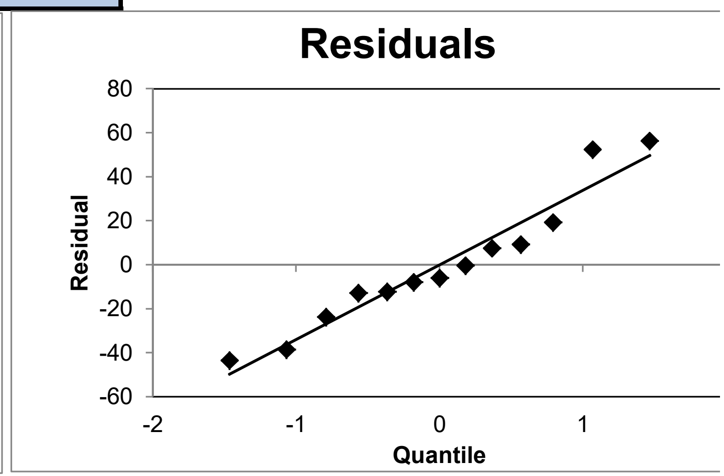
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	1/1/2010	170	151	19	183
2	3/1/2010	206	150	56	181
3	6/1/2010	135	148	-13	178
4	12/1/2010	132	144	-12	172
5	6/1/2011	150	141	9	166
6	11/1/2011	130	138	-8	161
7	6/1/2012	110	134	-24	156
8	7/1/2013	120	126	-6	147
9	6/1/2014	81	120	-39	142
10	6/15/2015	68.8	112	-43.2	138
11	7/20/2016	112	104	8	136
12	9/5/2017	96.2	96.5	-0.3	135
13	7/11/2018	143	90.5	52.5	134
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	-0.01933316
Intercept	927.5150225
Correlation, R^2	0.3249
Test Result	Decreasing
Test Statistic	-2.301
Critical Value	1.796
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





RW-06 Chromium

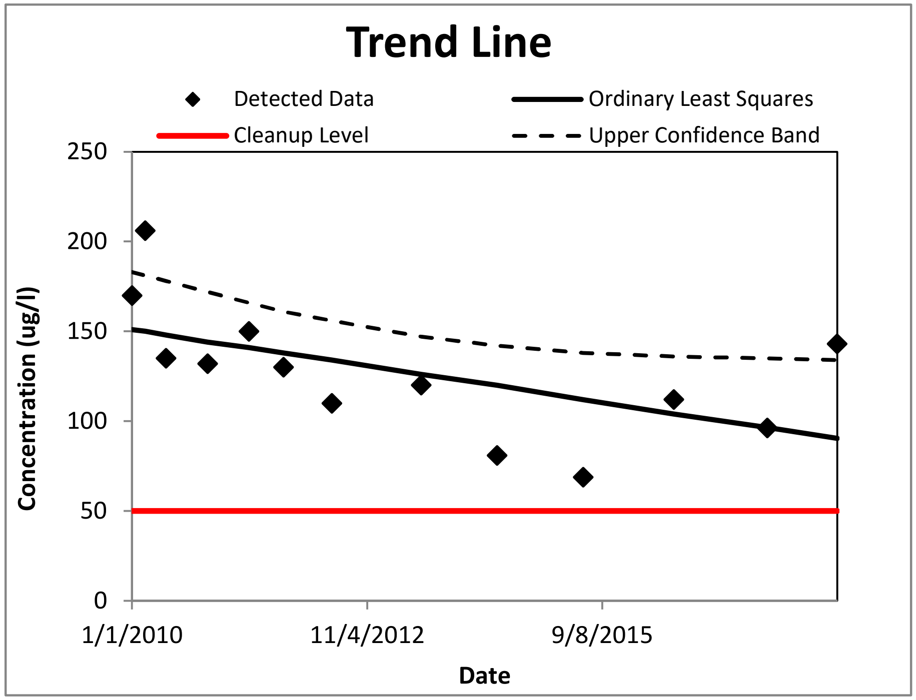
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	11/2/2018
Person performing analysis	VP

Chemical of Concern	Cr
Well Name/Number	RW06
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	13
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	127
Standard deviation of concentration	36.5
t-value for UCL calculation	1.782



95% Upper Confidence Limit (UCL)	145
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	134
Trend calculation method	Ordinary Least Squares
Cleanup level	50
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	Yes

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

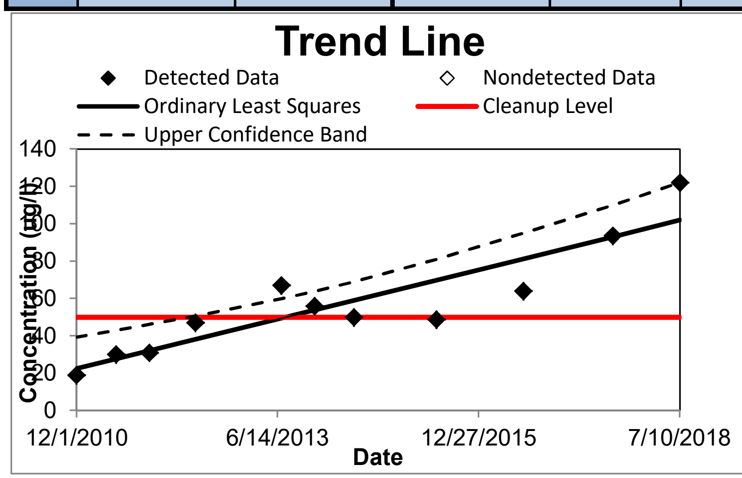
RW-06 Chromium

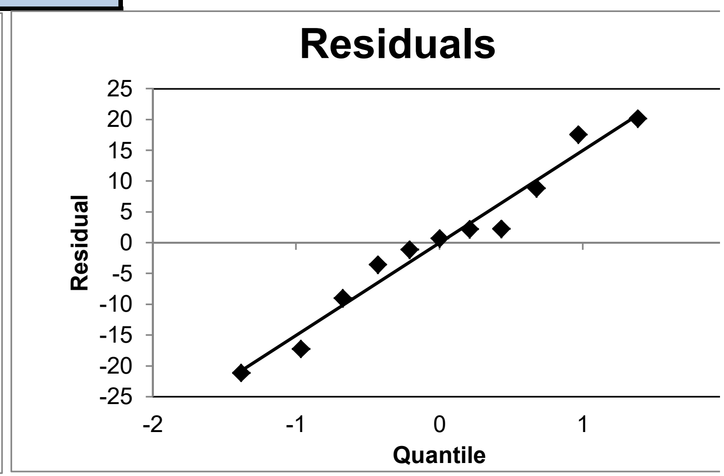
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	12/1/2010	19	22.5	-3.5	39.4
2	6/1/2011	30	27.7	2.3	43
3	11/1/2011	31	32.1	-1.1	46.1
4	6/1/2012	47	38.1	8.9	50.6
5	7/1/2013	67	49.4	17.6	59.8
6	12/1/2013	56	53.8	2.2	63.9
7	6/1/2014	50	59	-9	69
8	6/15/2015	48.7	69.8	-21.1	80.9
9	7/20/2016	64	81.2	-17.2	95
10	9/5/2017	93.7	93	0.7	110
11	7/11/2018	122	102	20	122
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.028527386
Intercept	-1133.214221
Correlation, R^2	0.8132
Test Result	Increasing
Test Statistic	6.259
Critical Value	1.833
When is the concentration predicted to exceed the cleanup level?	MCL is already exceeded





RW-07 Chromium

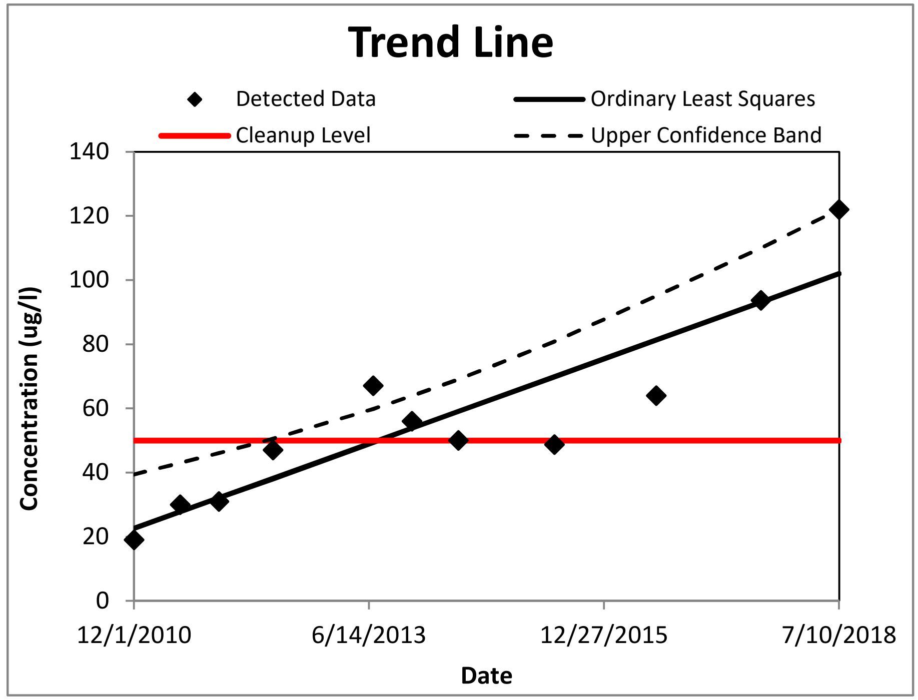
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	11/2/2018
Person performing analysis	VP

Chemical of Concern	Cr
Well Name/Number	RW07
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	11
Number < cleanup level	5
Are any potential outliers present?	No
Mean of concentration	57.1
Standard deviation of concentration	29.6
t-value for UCL calculation	1.812



95% Upper Confidence Limit (UCL)	73.3
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	122
Trend calculation method	Ordinary Least Squares
Cleanup level	50
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	**No**

When is the concentration predicted to exceed the MCL?	MCL is already exceeded
Message: None.	

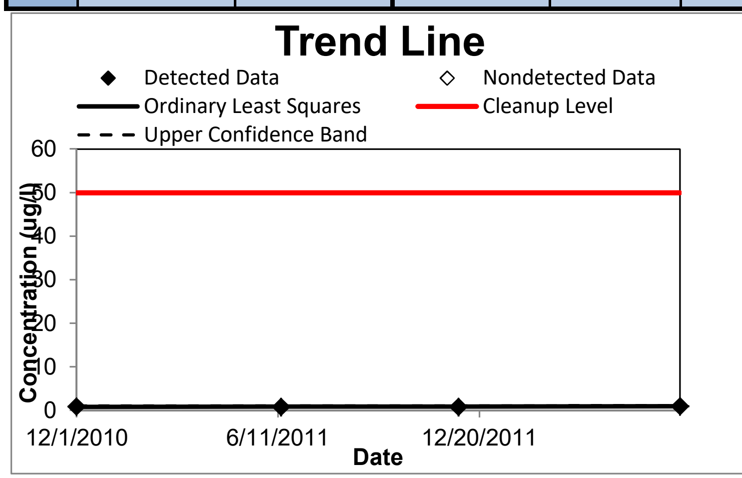
RW-07 Chromium

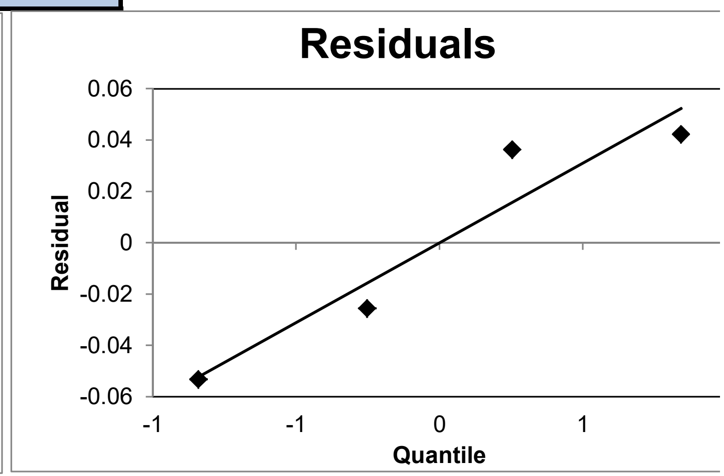
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	12/1/2010	0.9	0.864	0.036	1.07
2	6/14/2011	0.87	0.896	-0.026	1.03
3	11/30/2011	0.87	0.923	-0.053	1.05
4	6/28/2012	1	0.958	0.042	1.16
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.00016359
Intercept	-5.763879309
Correlation, R^2	0.4217
Test Result	No trend
Test Statistic	1.208
Critical Value	2.920
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





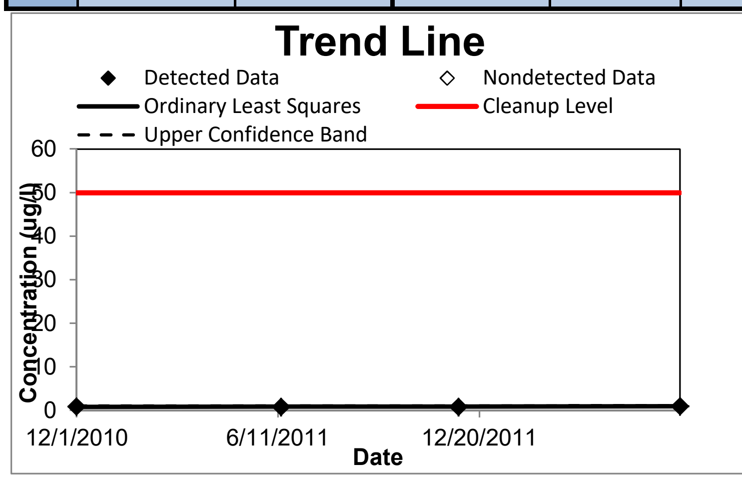
RW-09 Chromium

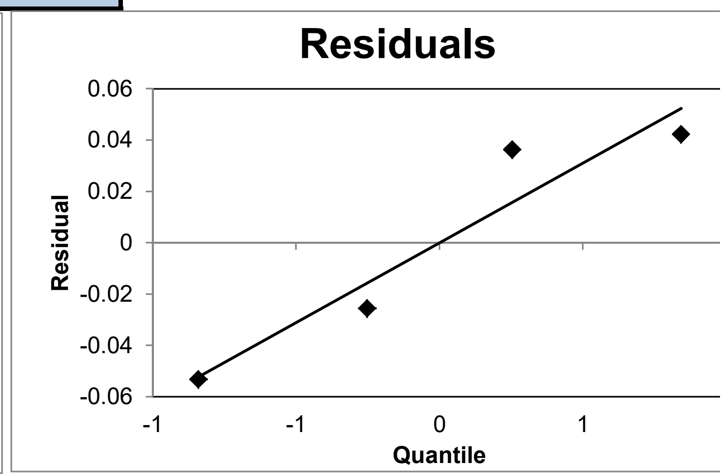
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (ug/l)	C Predicted	Fit residual	Upper Confidence Band
1	12/1/2010	0.9	0.864	0.036	1.07
2	6/14/2011	0.87	0.896	-0.026	1.03
3	11/30/2011	0.87	0.923	-0.053	1.05
4	6/28/2012	1	0.958	0.042	1.16
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.00016359
Intercept	-5.763879309
Correlation, R^2	0.4217
Test Result	No trend
Test Statistic	1.208
Critical Value	2.920
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





RW-10 Chromium

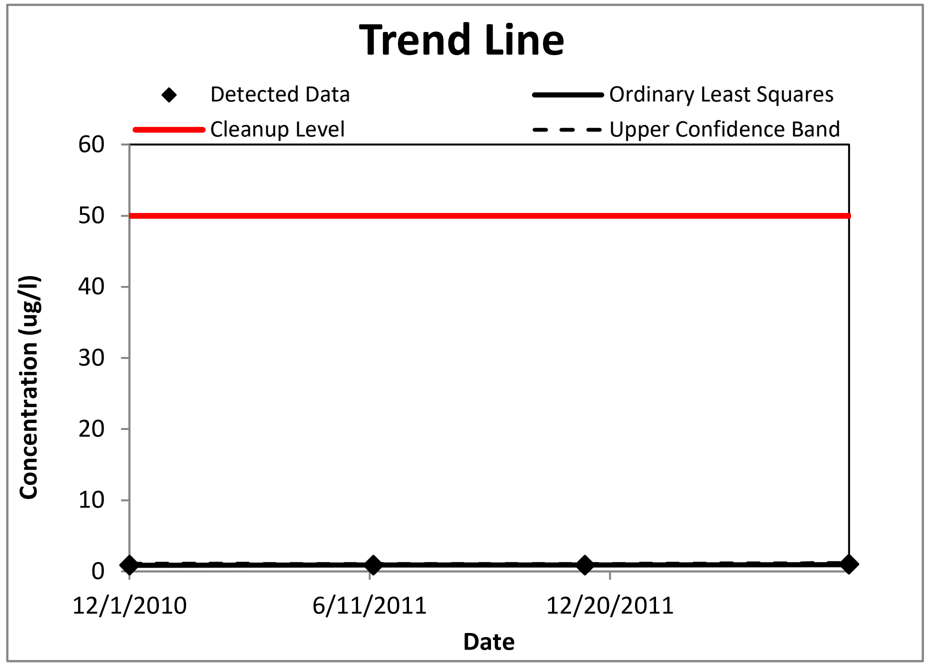
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	LIFS
Operating Unit (OU)	0
Type of Evaluation	Remediation
Date of Evaluation	11/2/2018
Person performing analysis	VP

Chemical of Concern	Cr
Well Name/Number	RW10
Date Units	Date
Concentration Units	ug/l

Confidence Level	95%
Number of results	4
Number < cleanup level	4
Are any potential outliers present?	No
Mean of concentration	0.91
Standard deviation of concentration	0.0616



95% Upper Confidence Limit (UCL)	1.04
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	1.16
Trend calculation method	Ordinary Least Squares
Cleanup level	50
Source of cleanup level	RBC
Is the trend decreasing or statistically insignificant?	Yes

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Random Seed Used	41639.55078
Message: None.	

RW-10 Chromium

APPENDIX D

GROUNDWATER REMEDIATION SYSTEM MASS REMOVAL GRAPHS

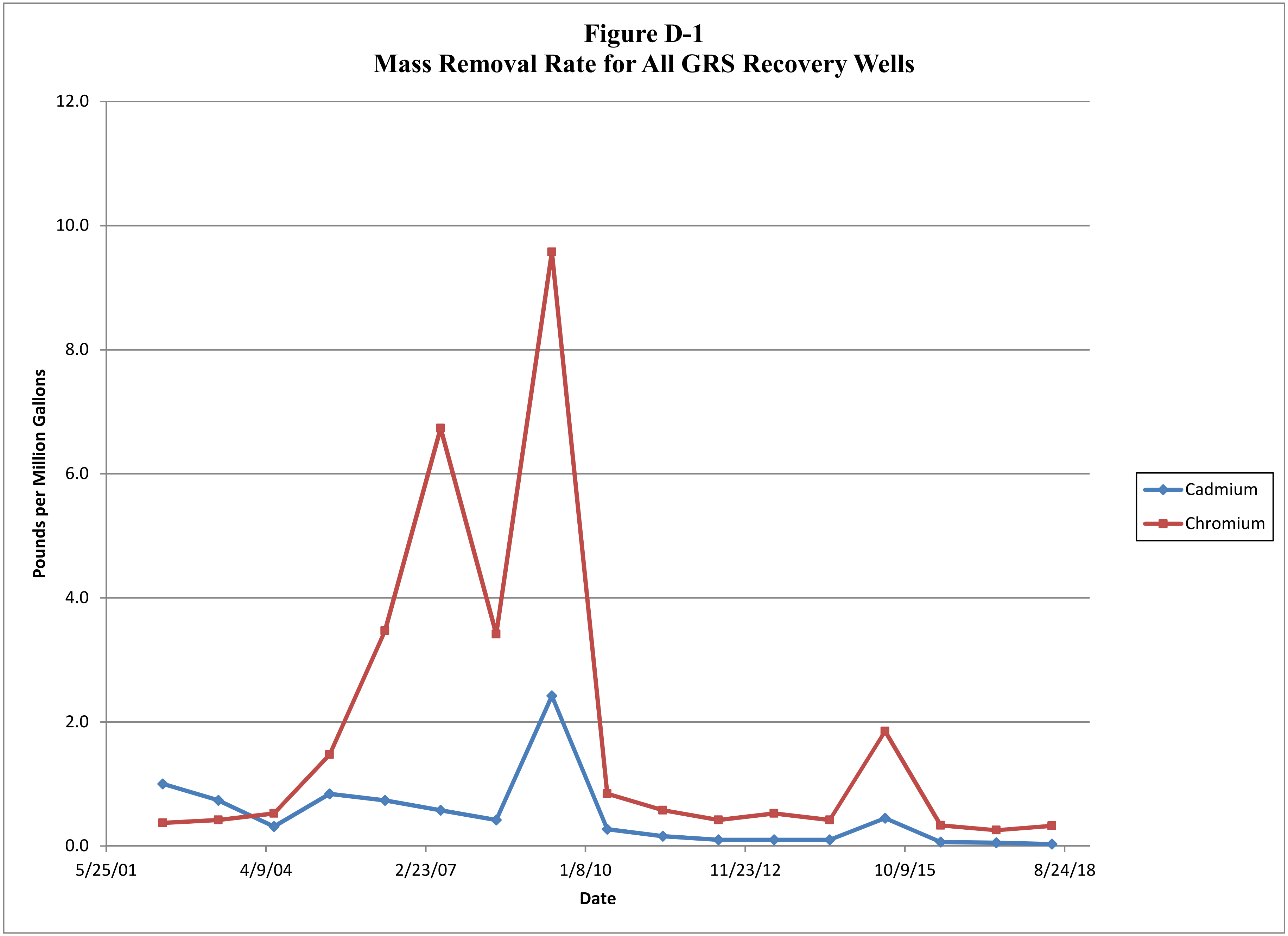


Figure D-1
Mass Removal Rate for All GRS Recovery Wells
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Pounds per Million Gallons
5/25/01
4/9/04
2/23/07
1/8/10
11/23/12
10/9/15
8/24/18
Date
Cadmium
Chromium

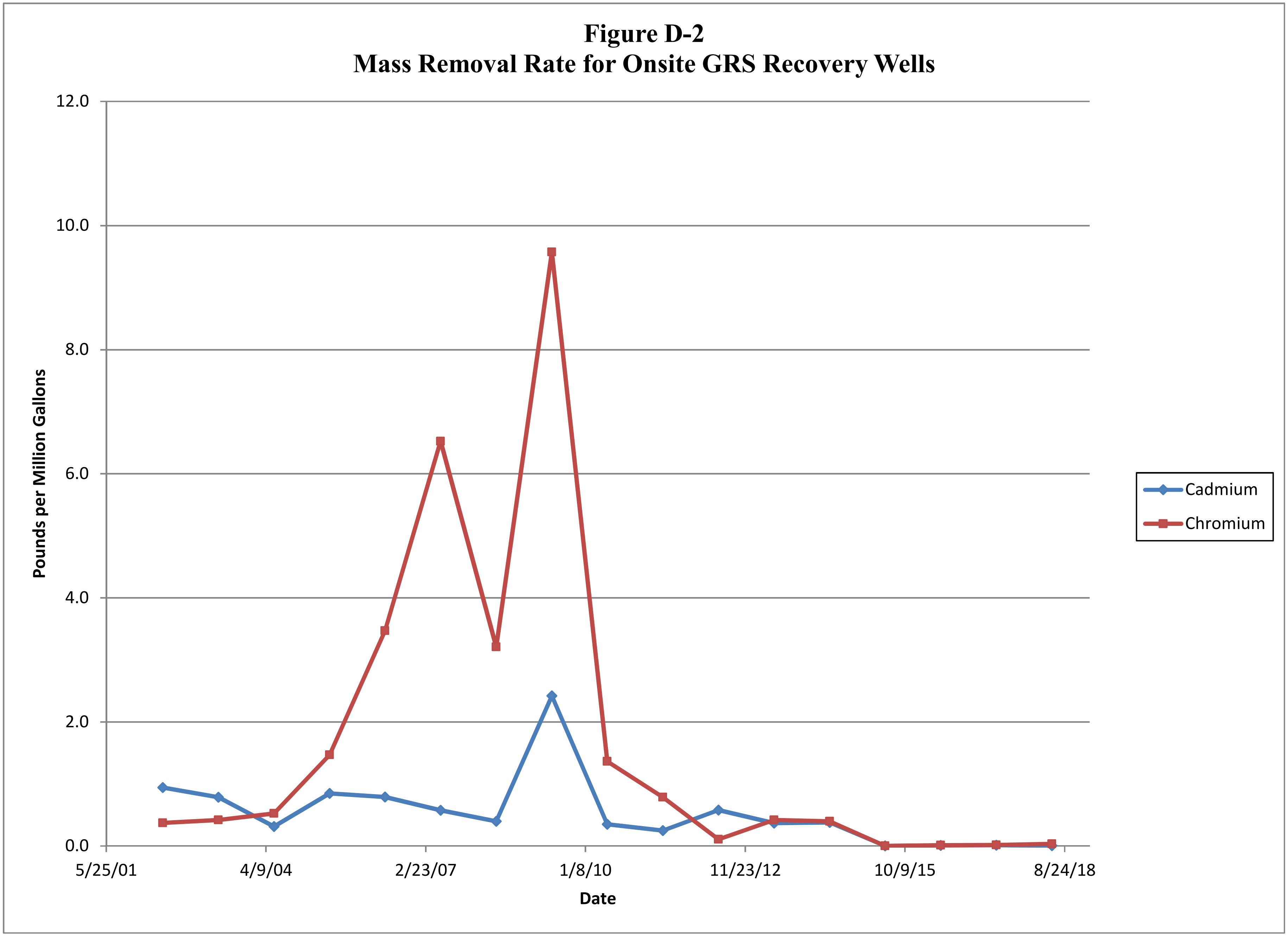


Figure D-2
Mass Removal Rate for Onsite GRS Recovery Wells
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Pounds per Million Gallons
5/25/01
4/9/04
2/23/07
1/8/10
11/23/12
10/9/15
8/24/18
Date
Cadmium
Chromium

Figure D-3
Cumulative Mass Removed by All GRS Recovery Wells

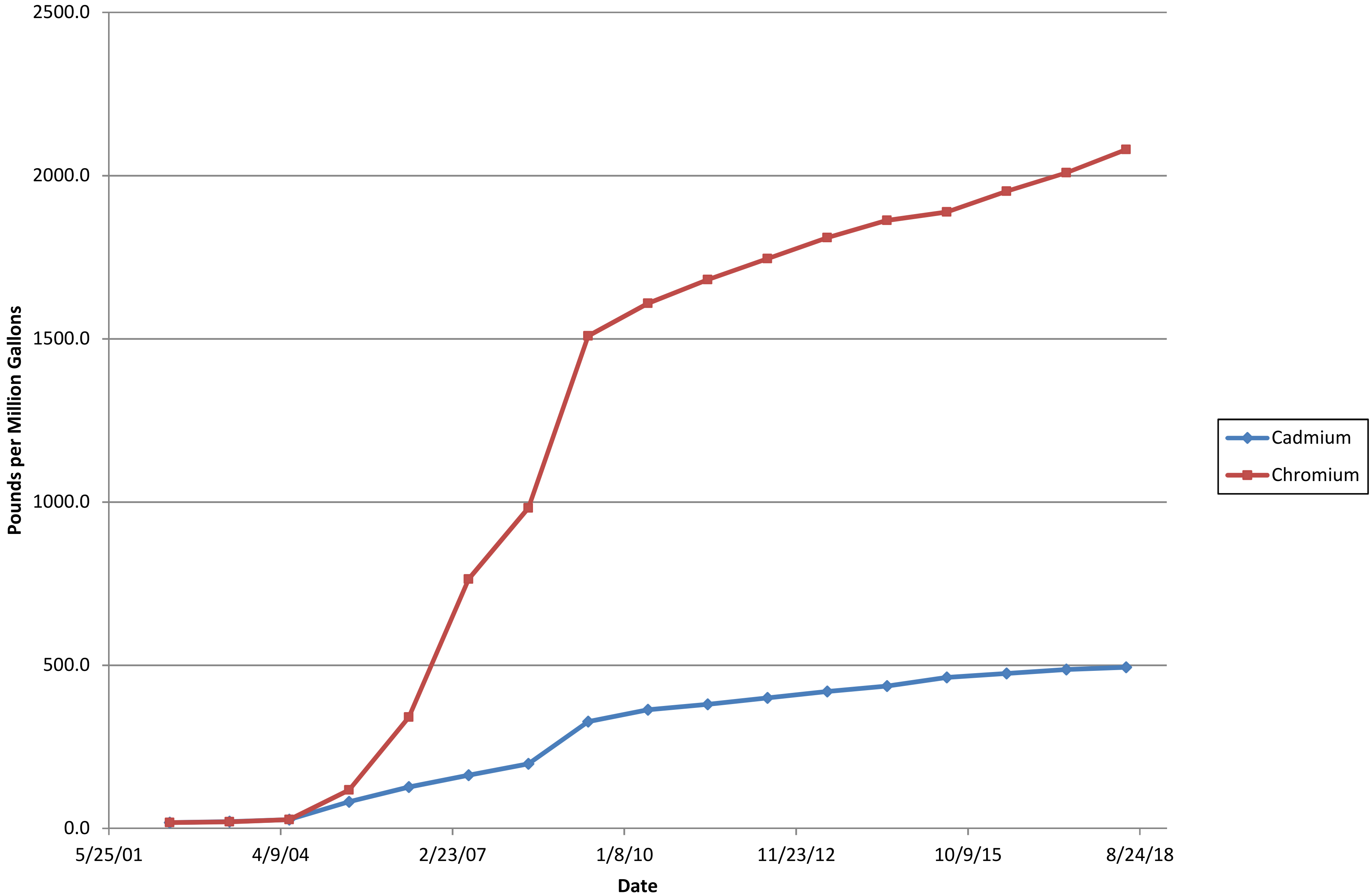
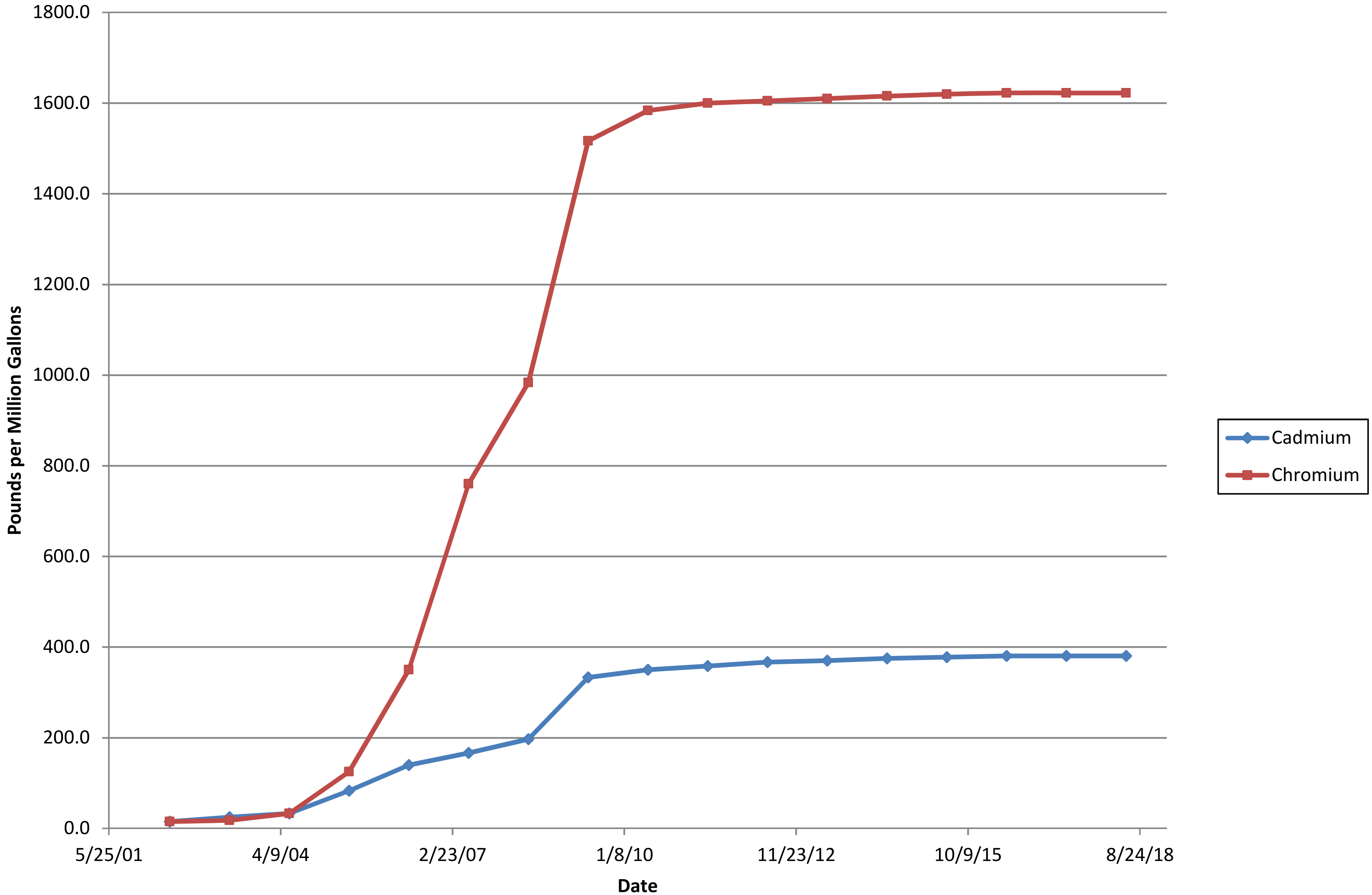
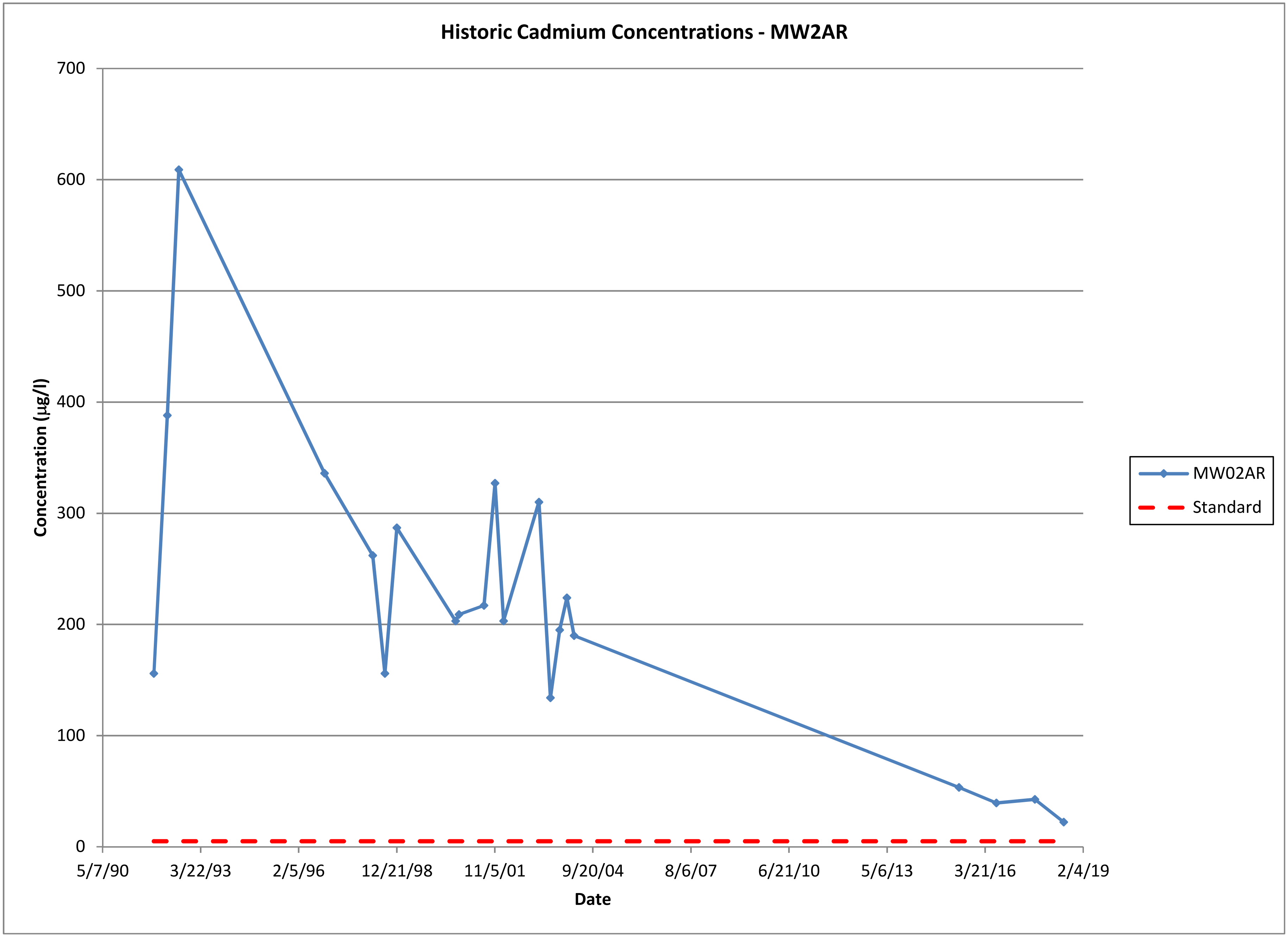


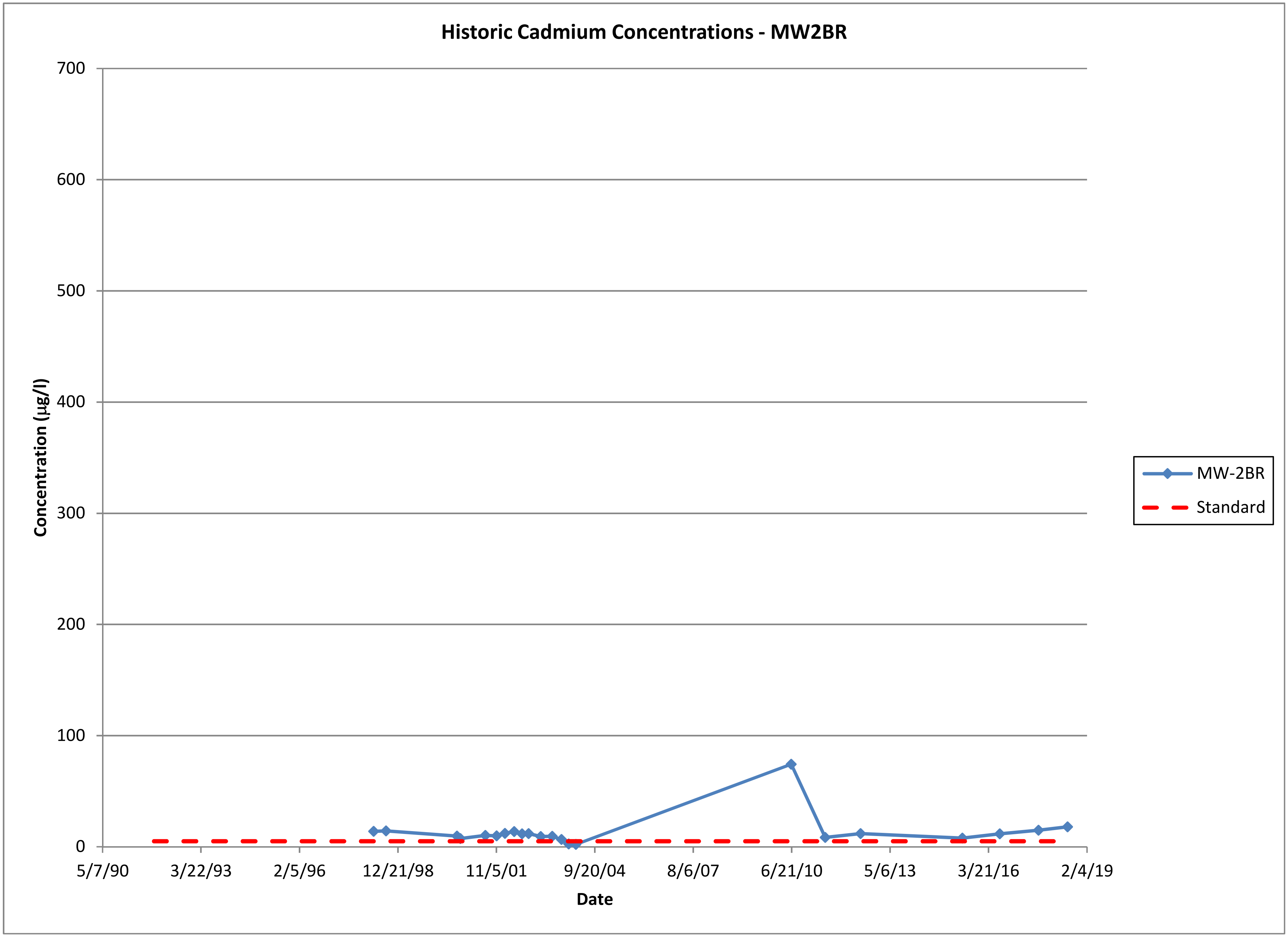
Figure D-4
Cumulative Mass Removed by Onsite GRS Recovery Wells

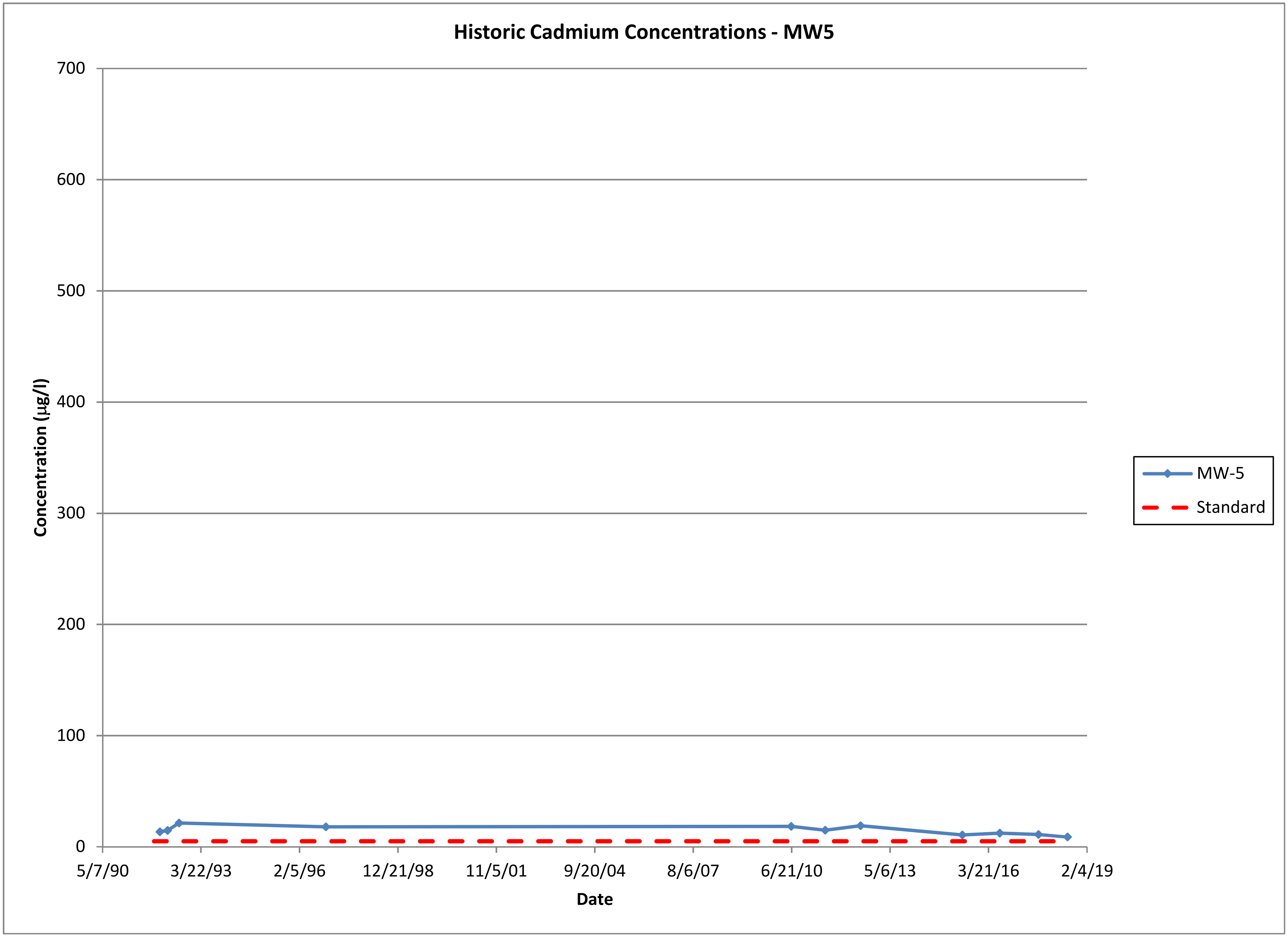


APPENDIX E

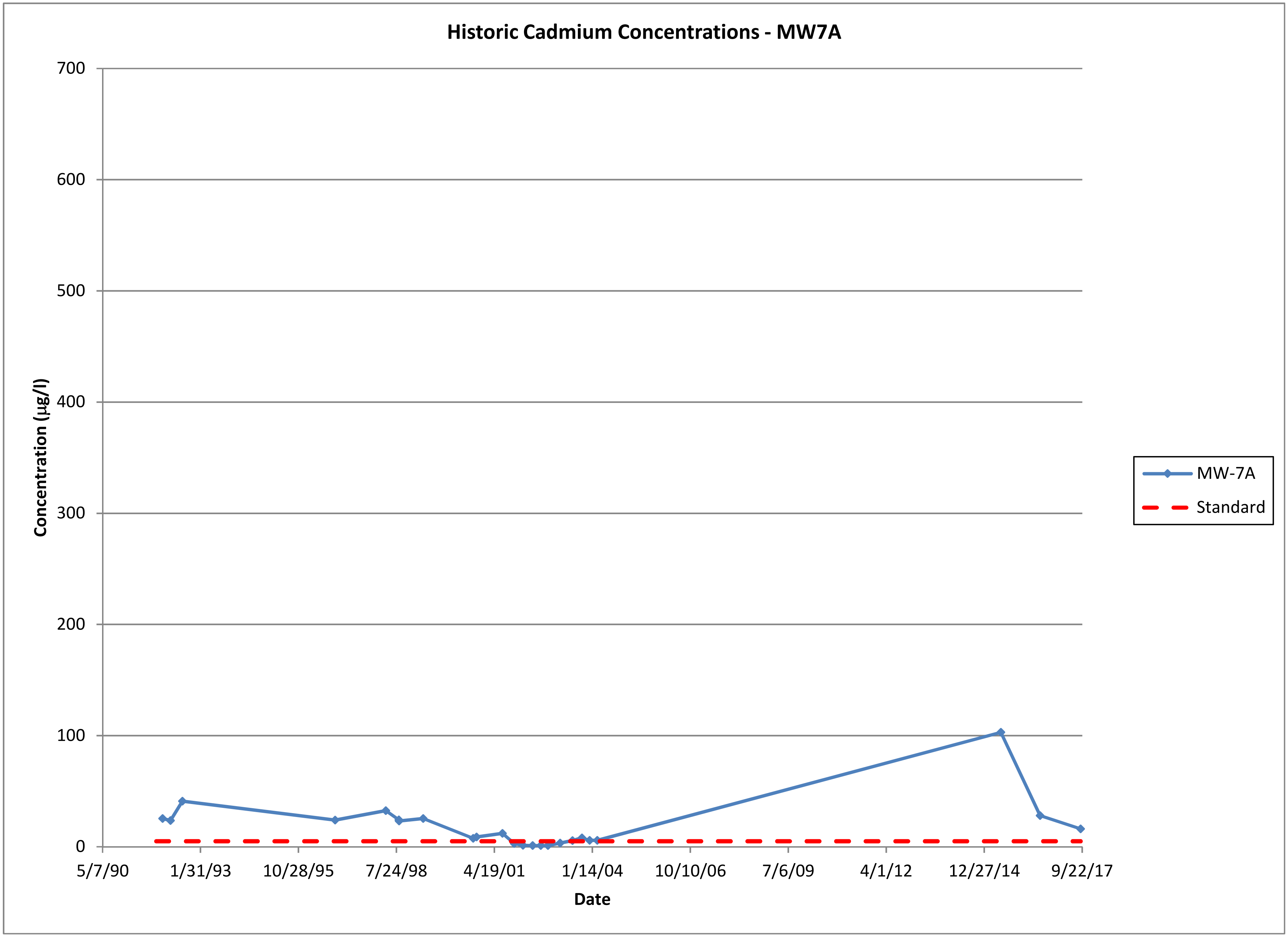
GRAPHS OF DETECTED CONCENTRATIONS – ROUTINELY MONITORED WELLS (FLASH DRIVE)


Historic Cadmium Concentrations - MW2AR
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW02AR
Standard

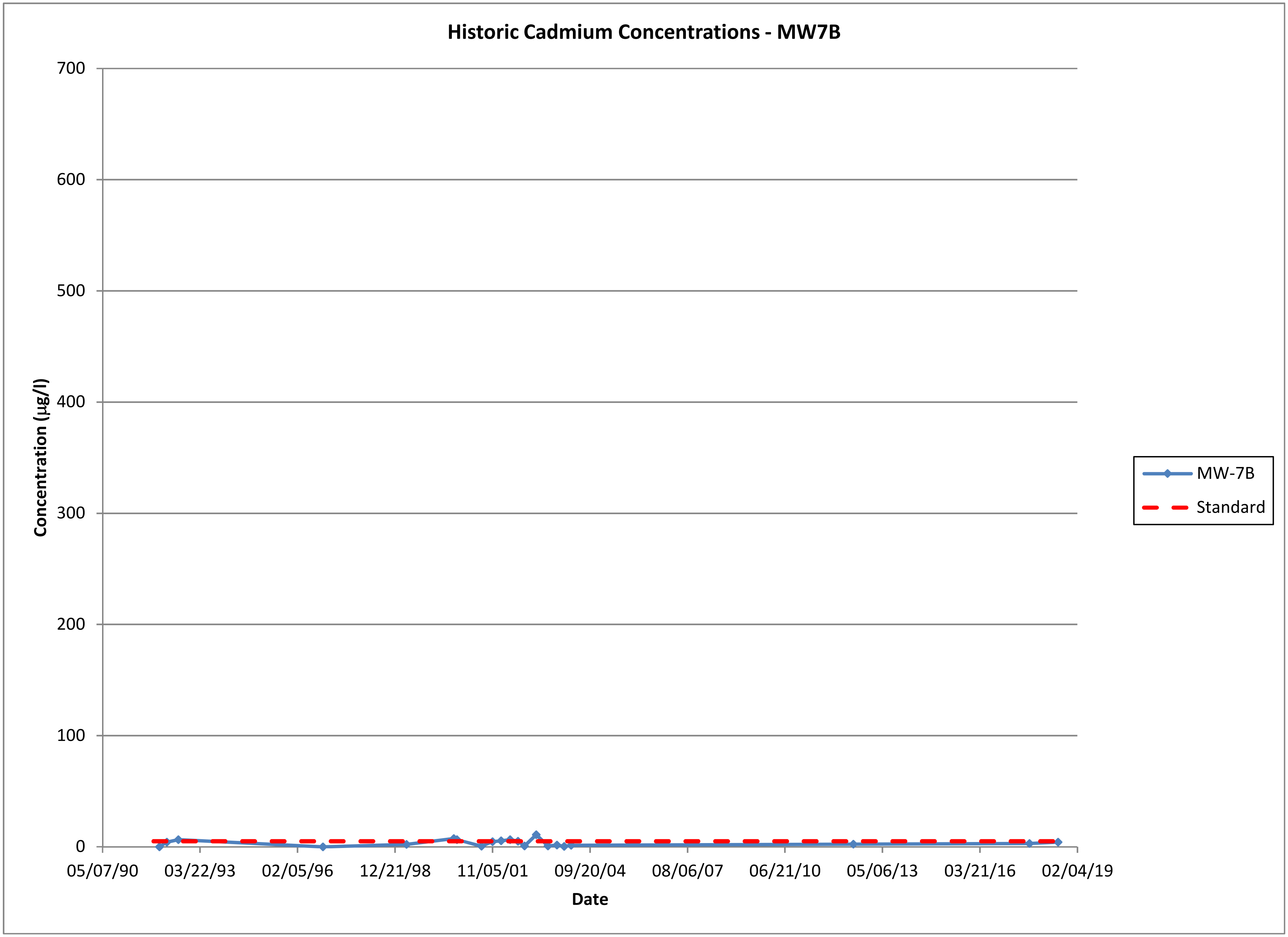

Historic Cadmium Concentrations - MW2BR
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-2BR
Standard



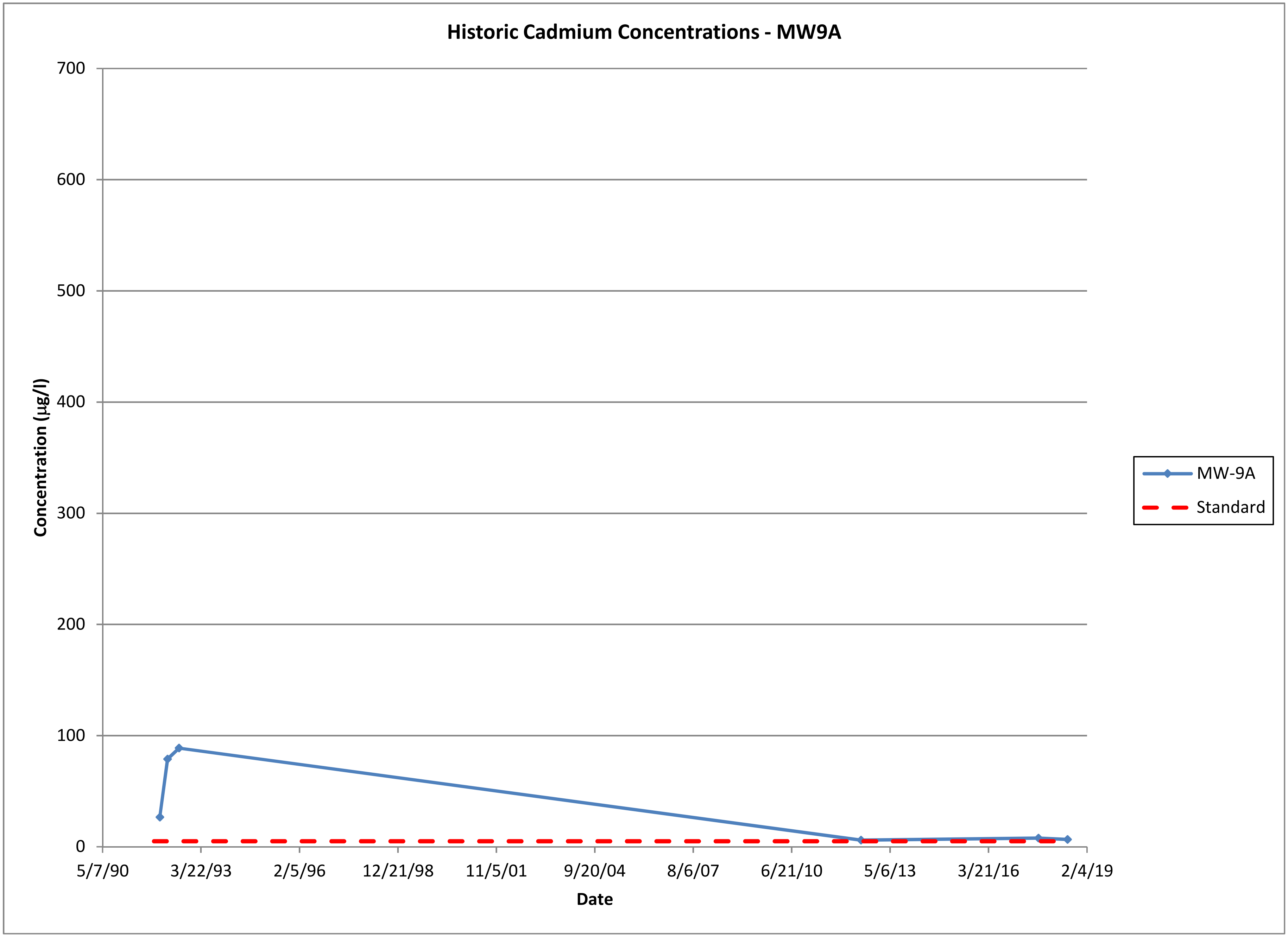
Historic Cadmium Concentrations - MW5
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-5
Standard



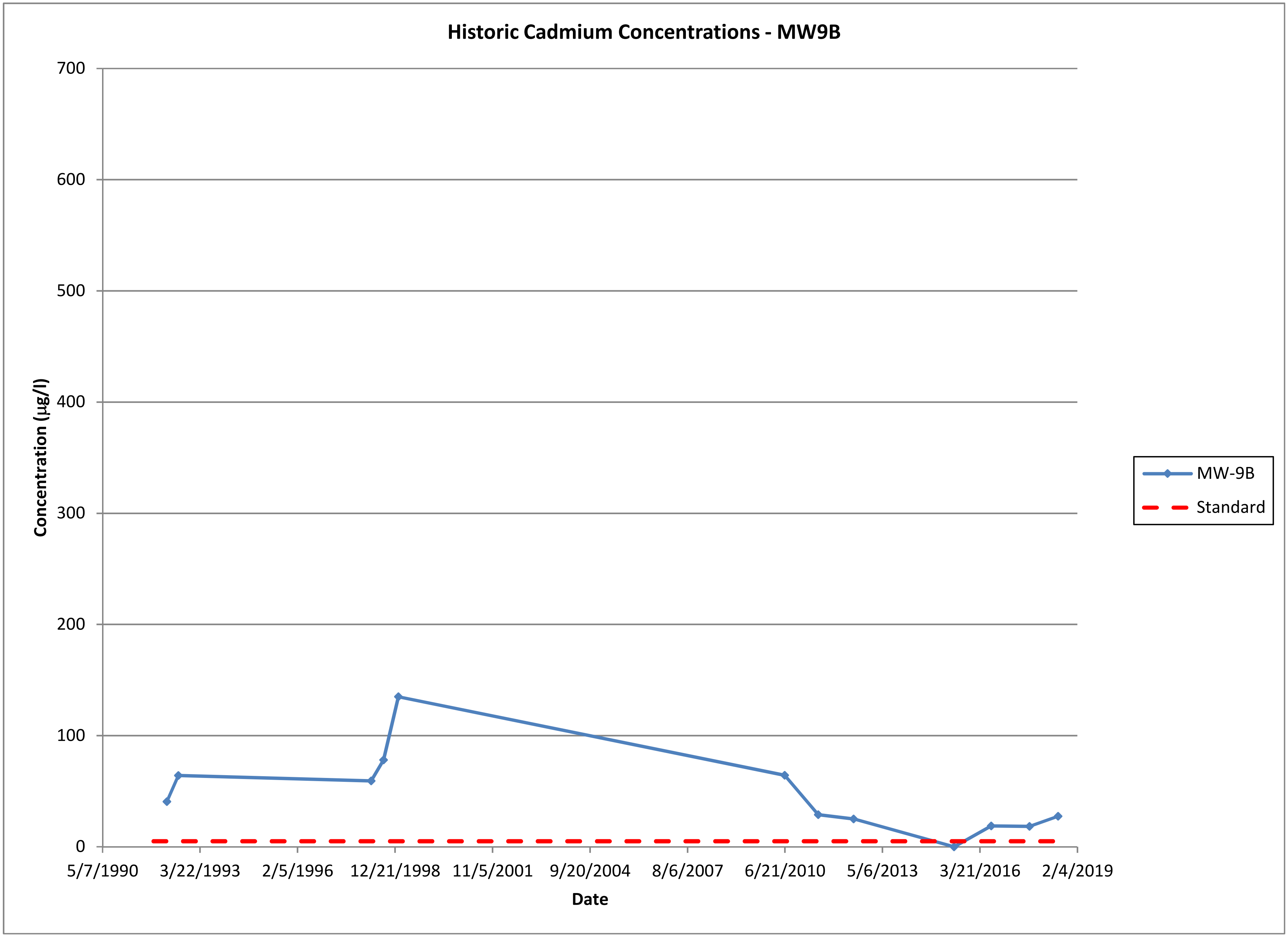
Historic Cadmium Concentrations - MW7A
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-7A
Standard



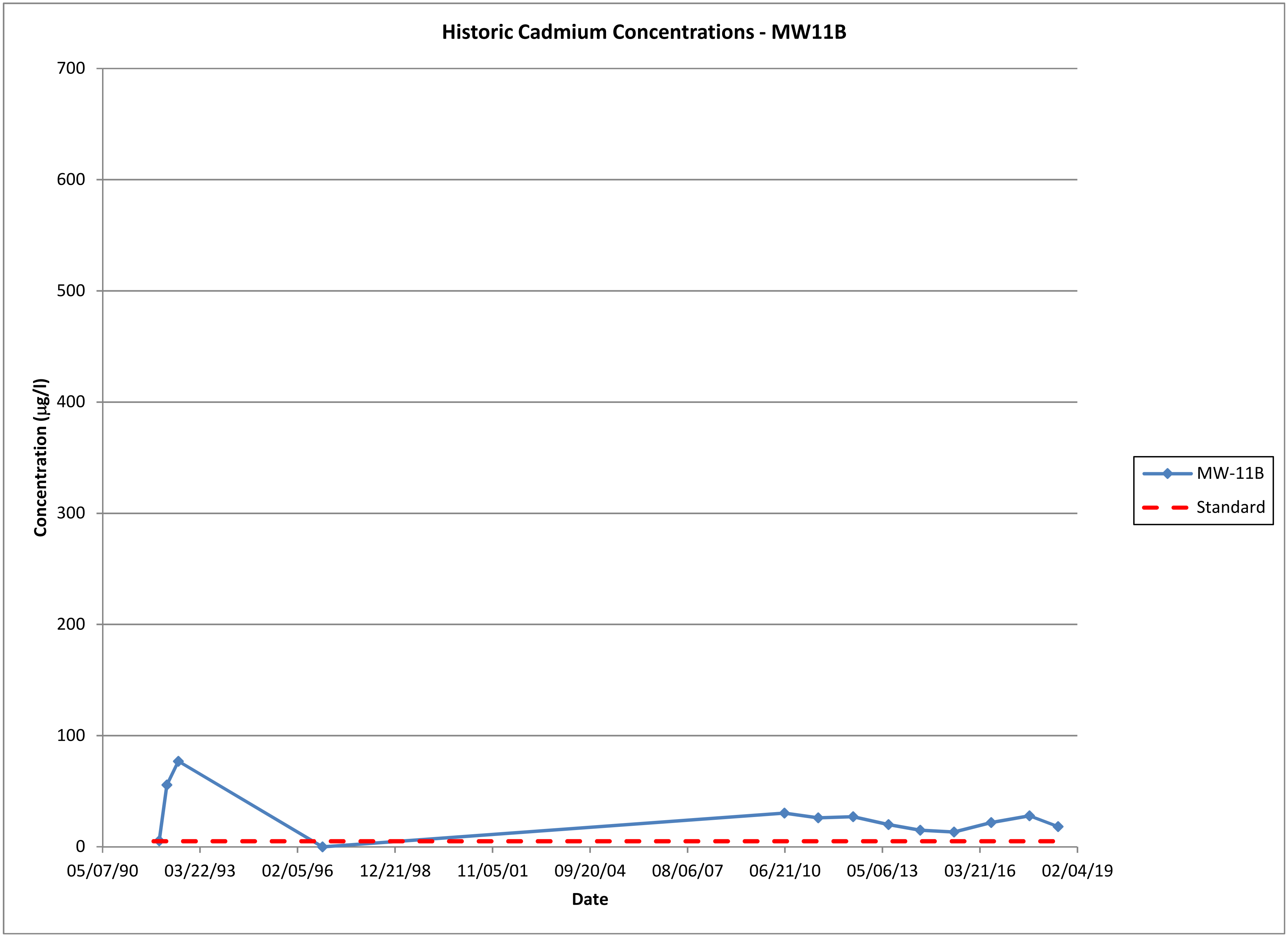
Historic Cadmium Concentrations - MW7B
700
600
500
400
300
200
100
0
Concentration (µg/l)
05/07/90
03/22/93
02/05/96
12/21/98
11/05/01
09/20/04
08/06/07
06/21/10
05/06/13
03/21/16
02/04/19
Date
MW-7B
Standard

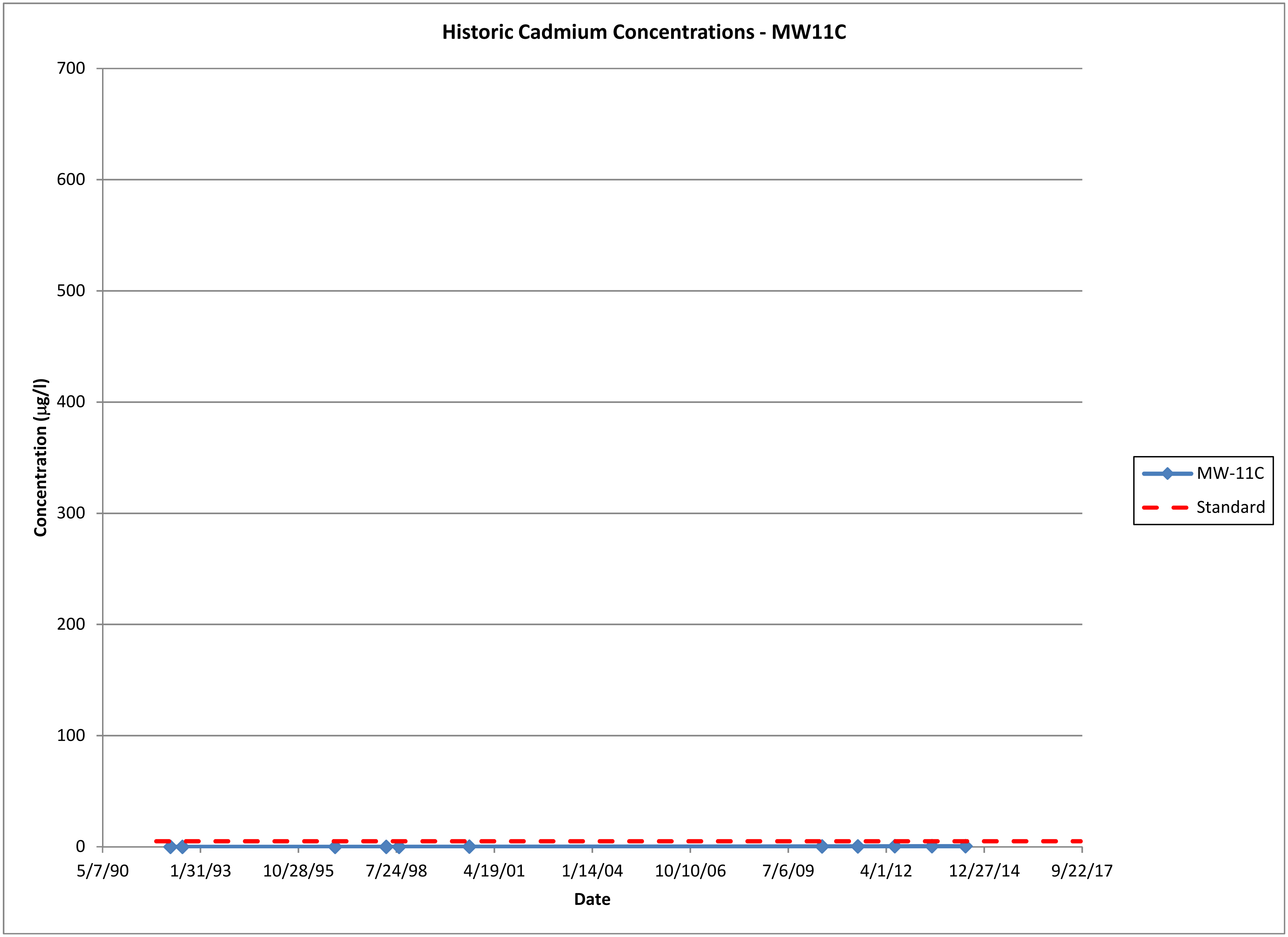


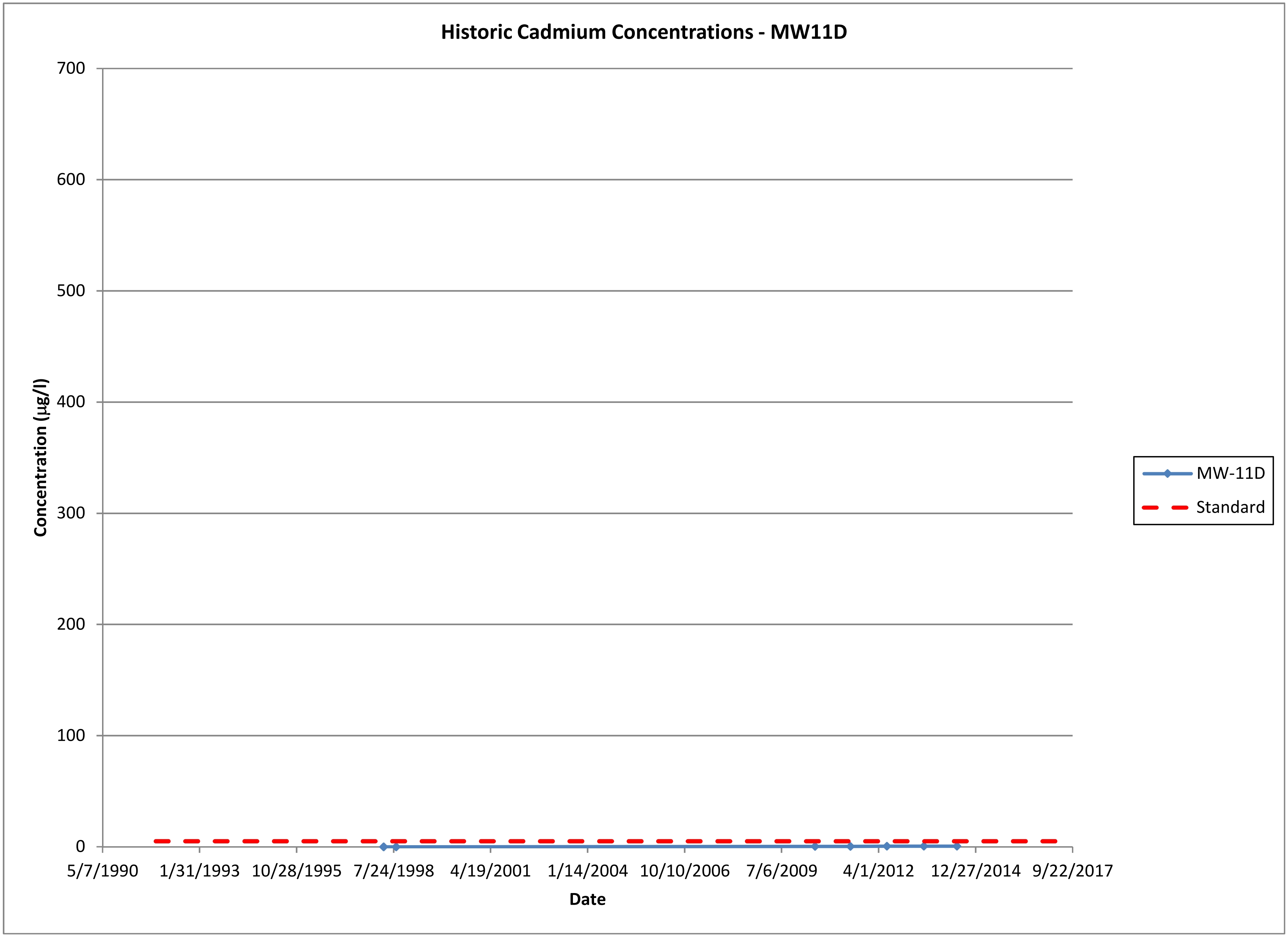
Historic Cadmium Concentrations - MW9A
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-9A
Standard



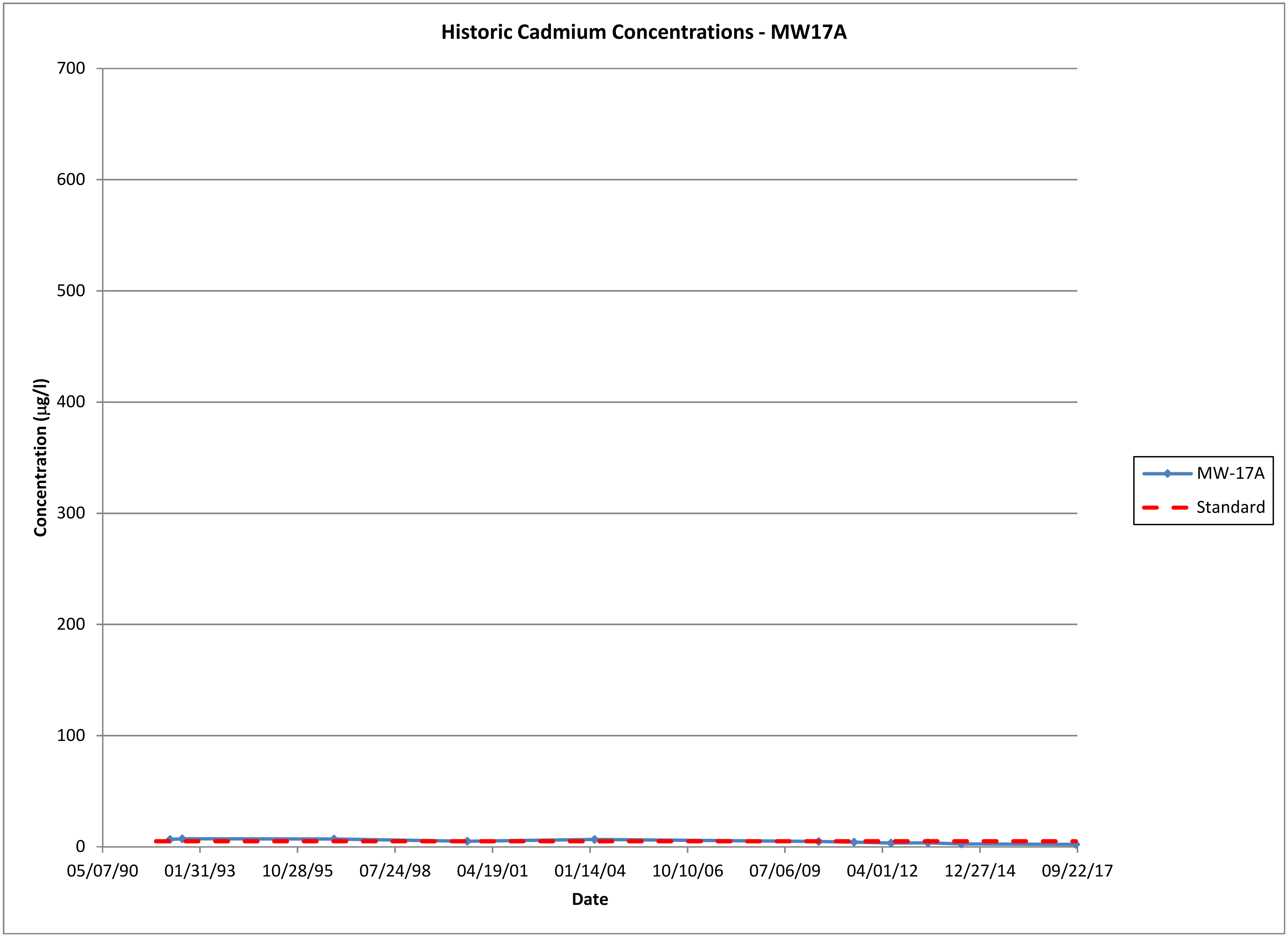
Historic Cadmium Concentrations - MW9B
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/1990
3/22/1993
2/5/1996
12/21/1998
11/5/2001
9/20/2004
8/6/2007
6/21/2010
5/6/2013
3/21/2016
2/4/2019
Date
MW-9B
Standard


Historic Cadmium Concentrations - MW11B
700
600
500
400
300
200
100
0
Concentration (µg/l)
05/07/90
03/22/93
02/05/96
12/21/98
11/05/01
09/20/04
08/06/07
06/21/10
05/06/13
03/21/16
02/04/19
Date
MW-11B
Standard

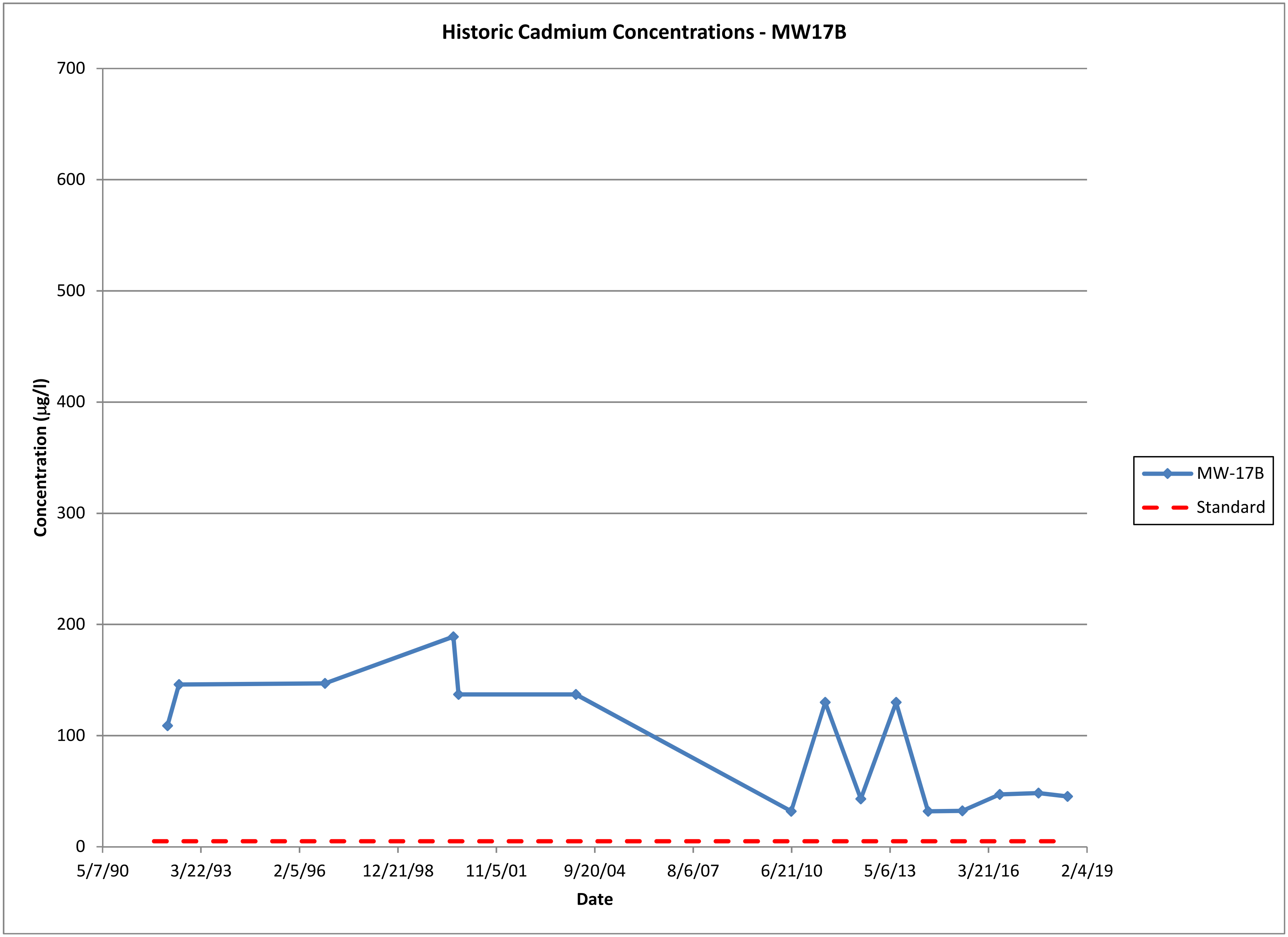

Historic Cadmium Concentrations - MW11C
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-11C
Standard

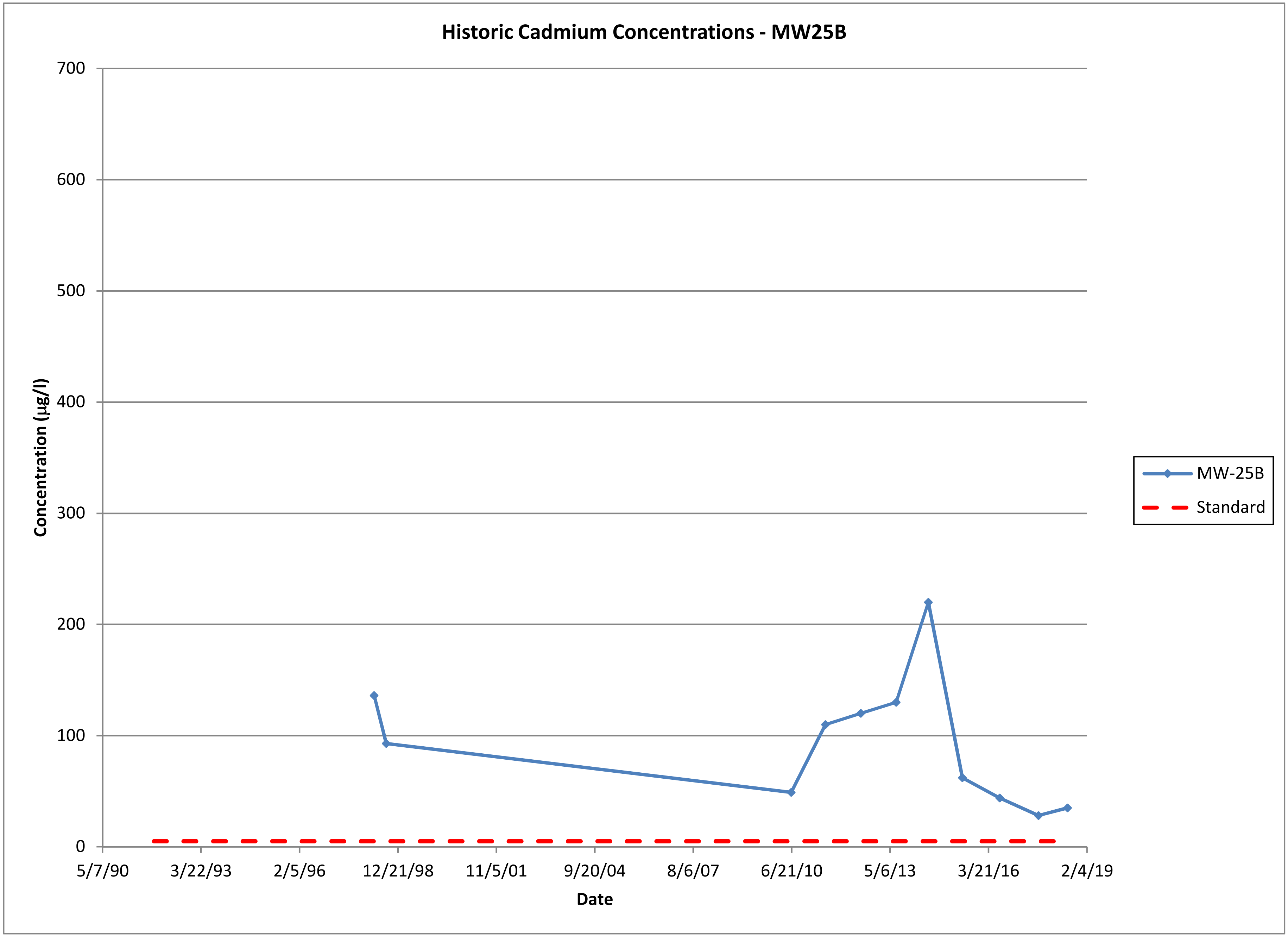


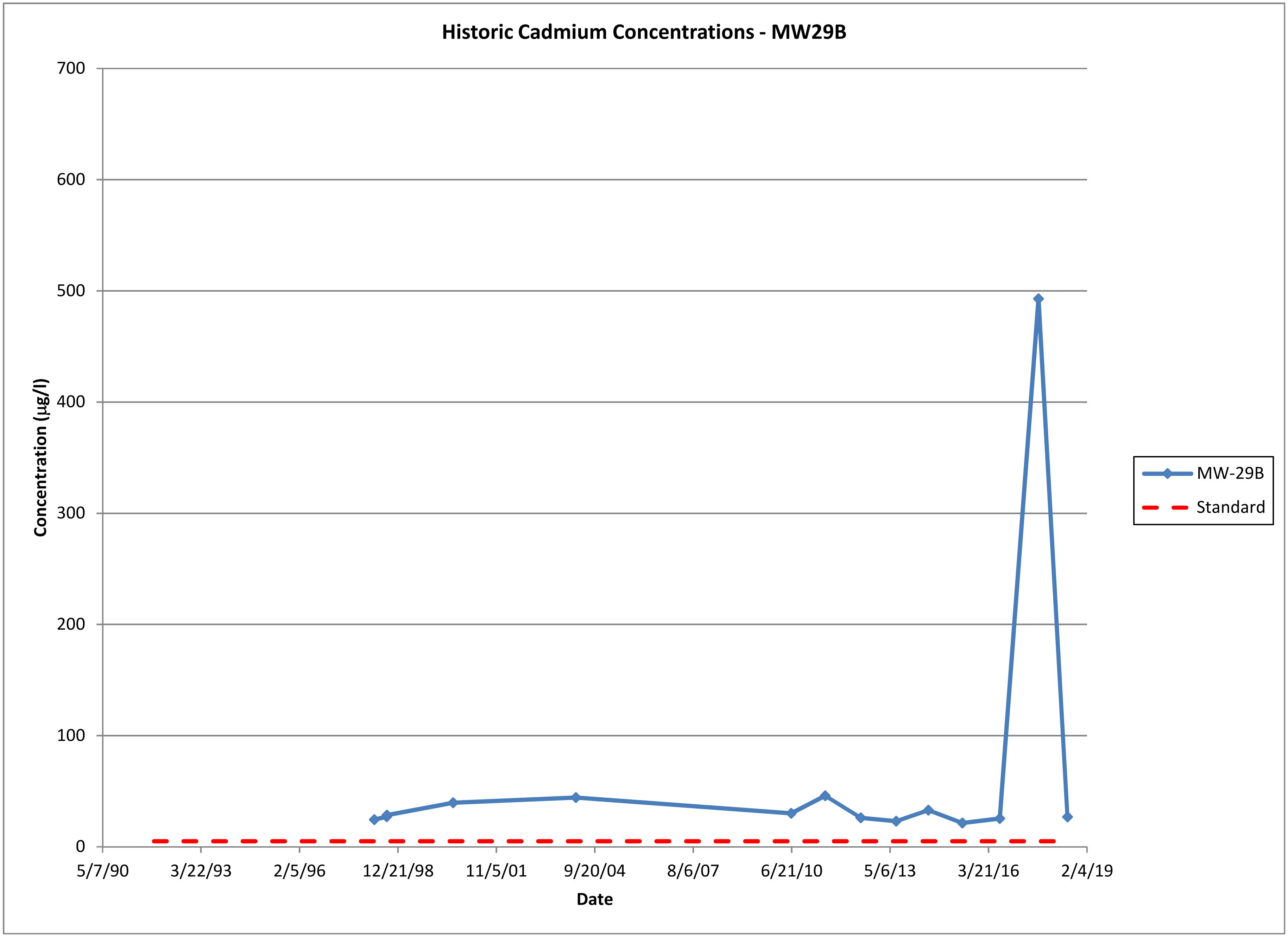
Historic Cadmium Concentrations - MW11D
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/1990
1/31/1993
10/28/1995
7/24/1998
4/19/2001
1/14/2004
10/10/2006
7/6/2009
4/1/2012
12/27/2014
9/22/2017
Date
MW-11D
Standard

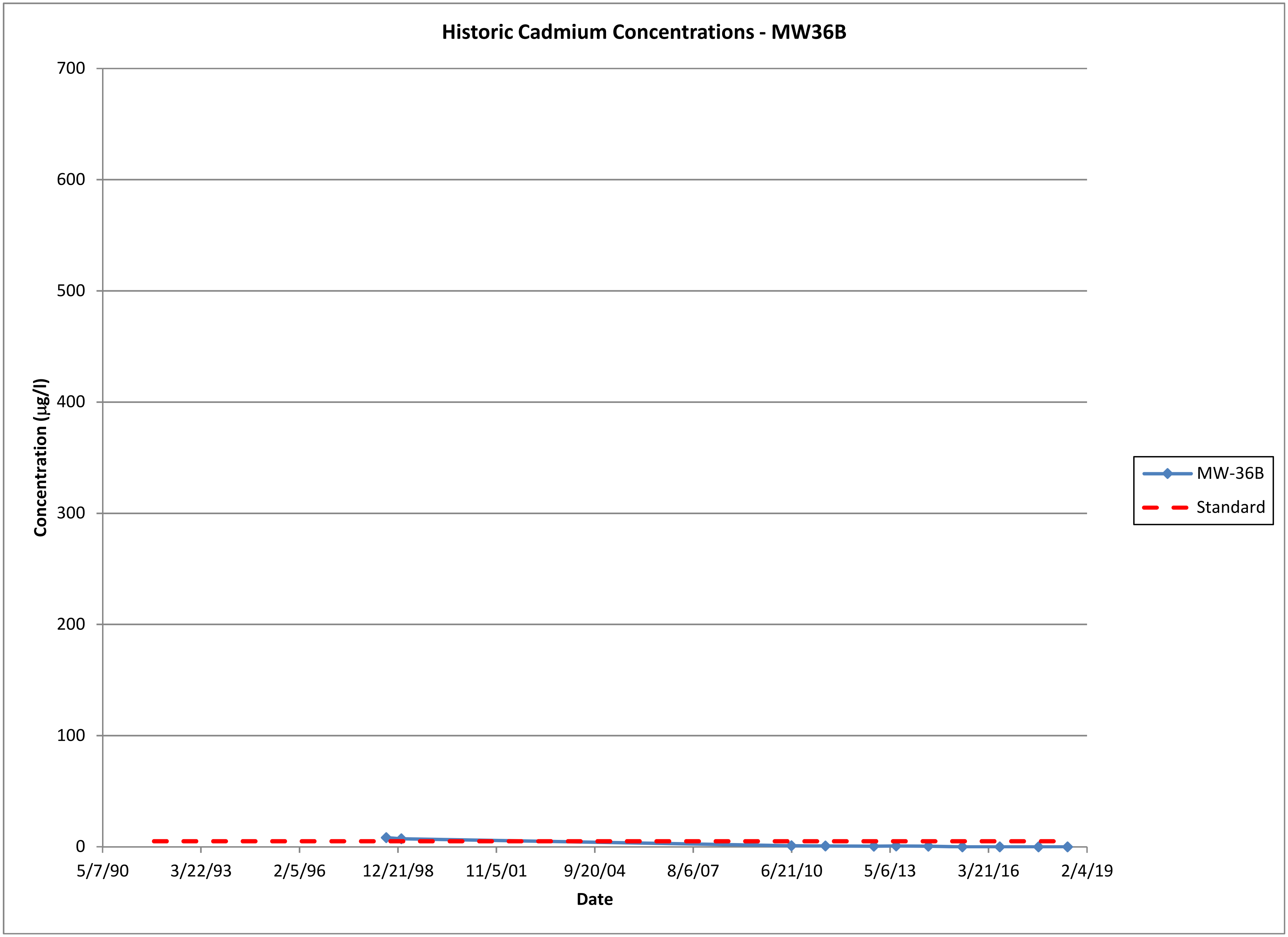


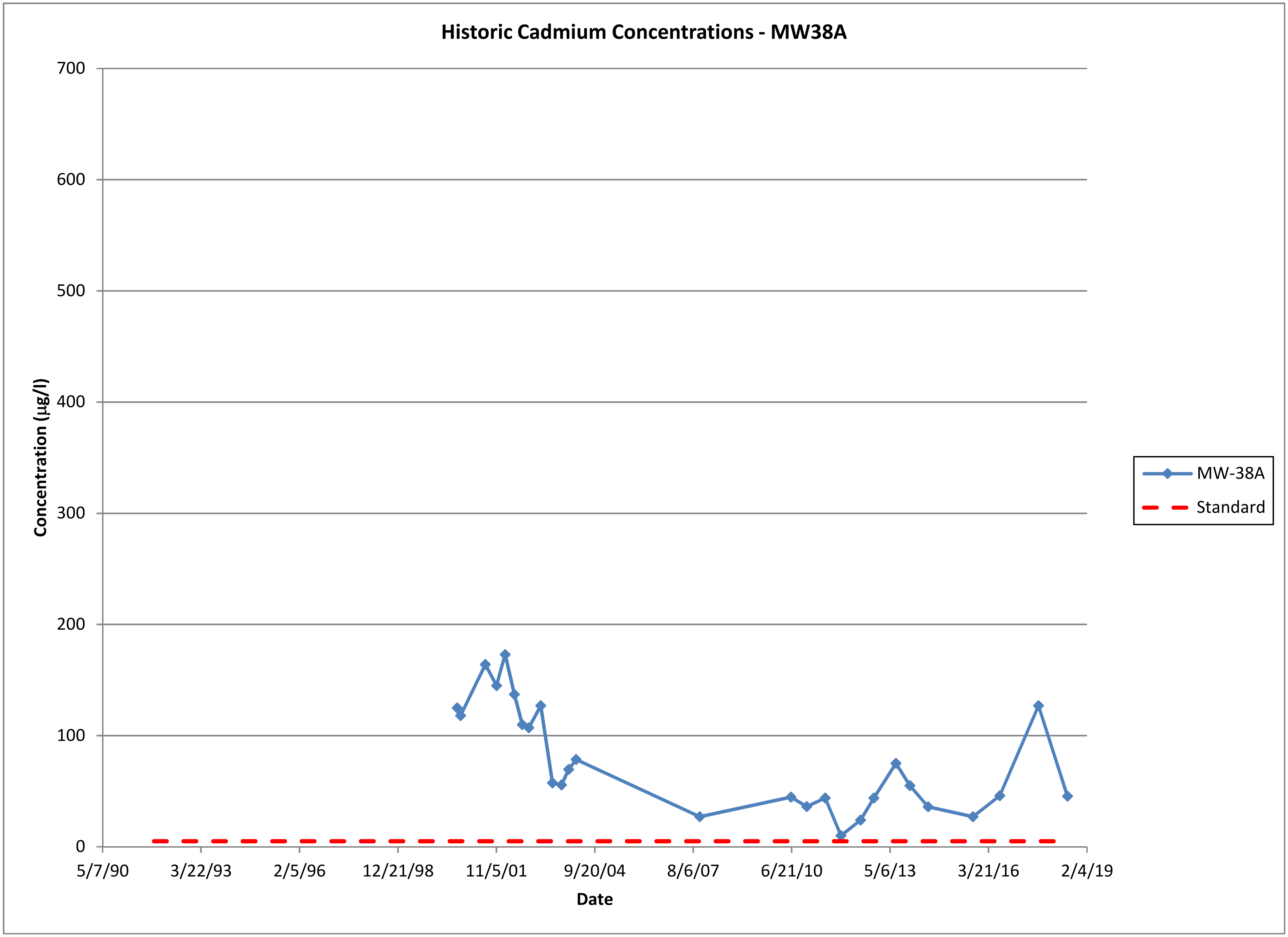
Historic Cadmium Concentrations - MW17A
700
600
500
400
300
200
100
0
Concentration (µg/l)
05/07/90
01/31/93
10/28/95
07/24/98
04/19/01
01/14/04
10/10/06
07/06/09
04/01/12
12/27/14
09/22/17
Date
MW-17A
Standard


Historic Cadmium Concentrations - MW17B
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-17B
Standard

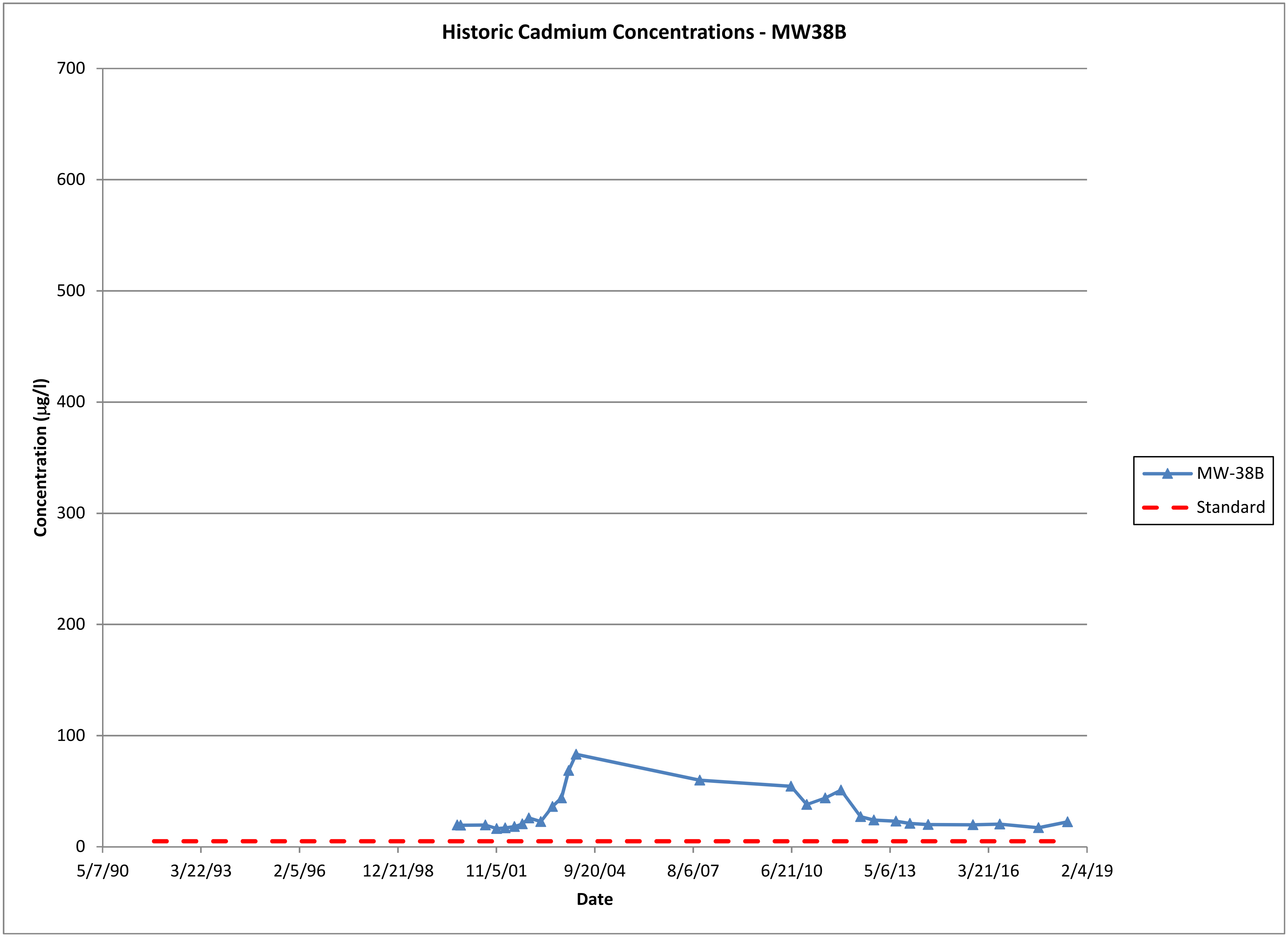

Historic Cadmium Concentrations - MW25B
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-25B
Standard

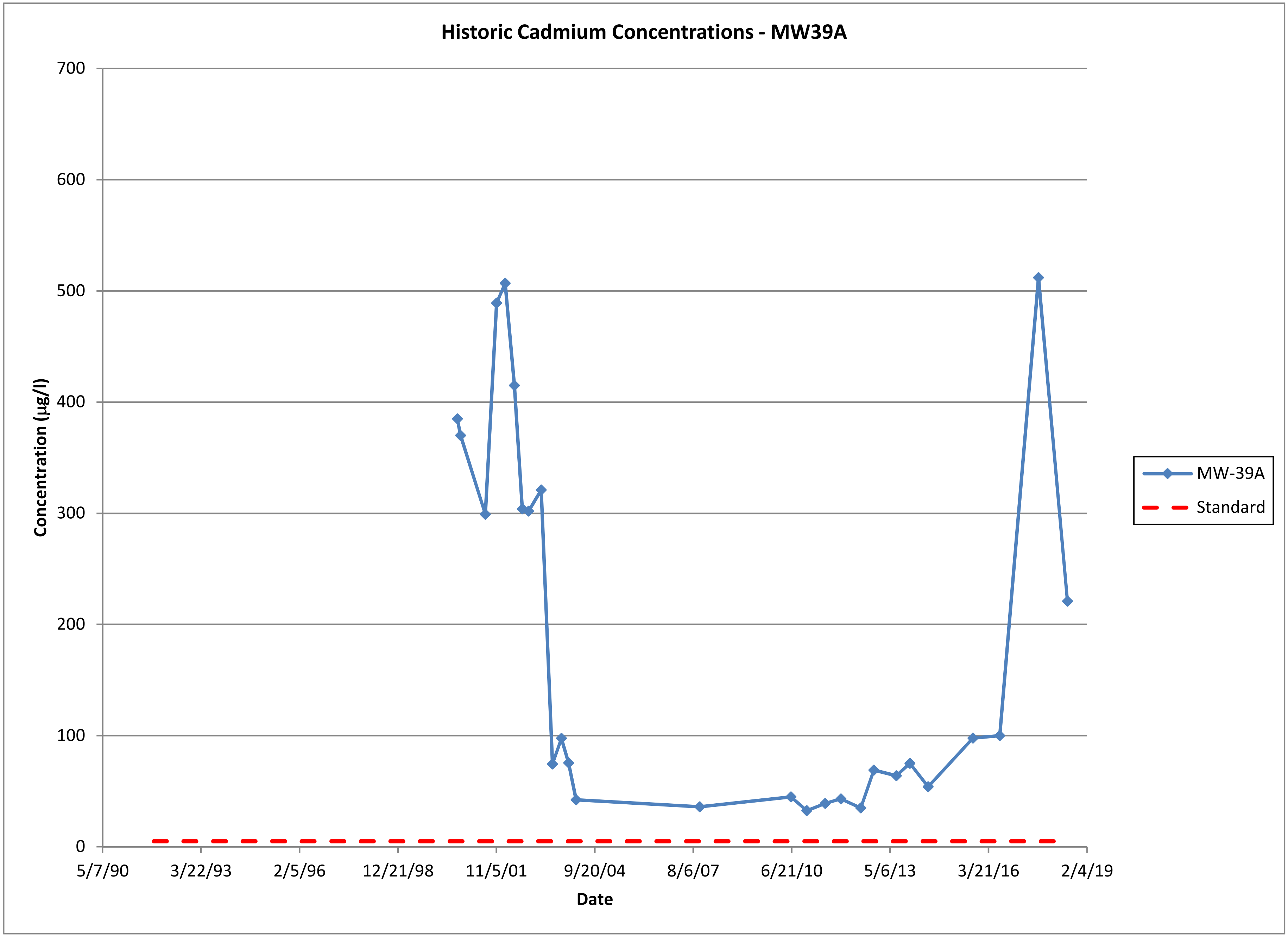

Historic Cadmium Concentrations - MW29B
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-29B
Standard

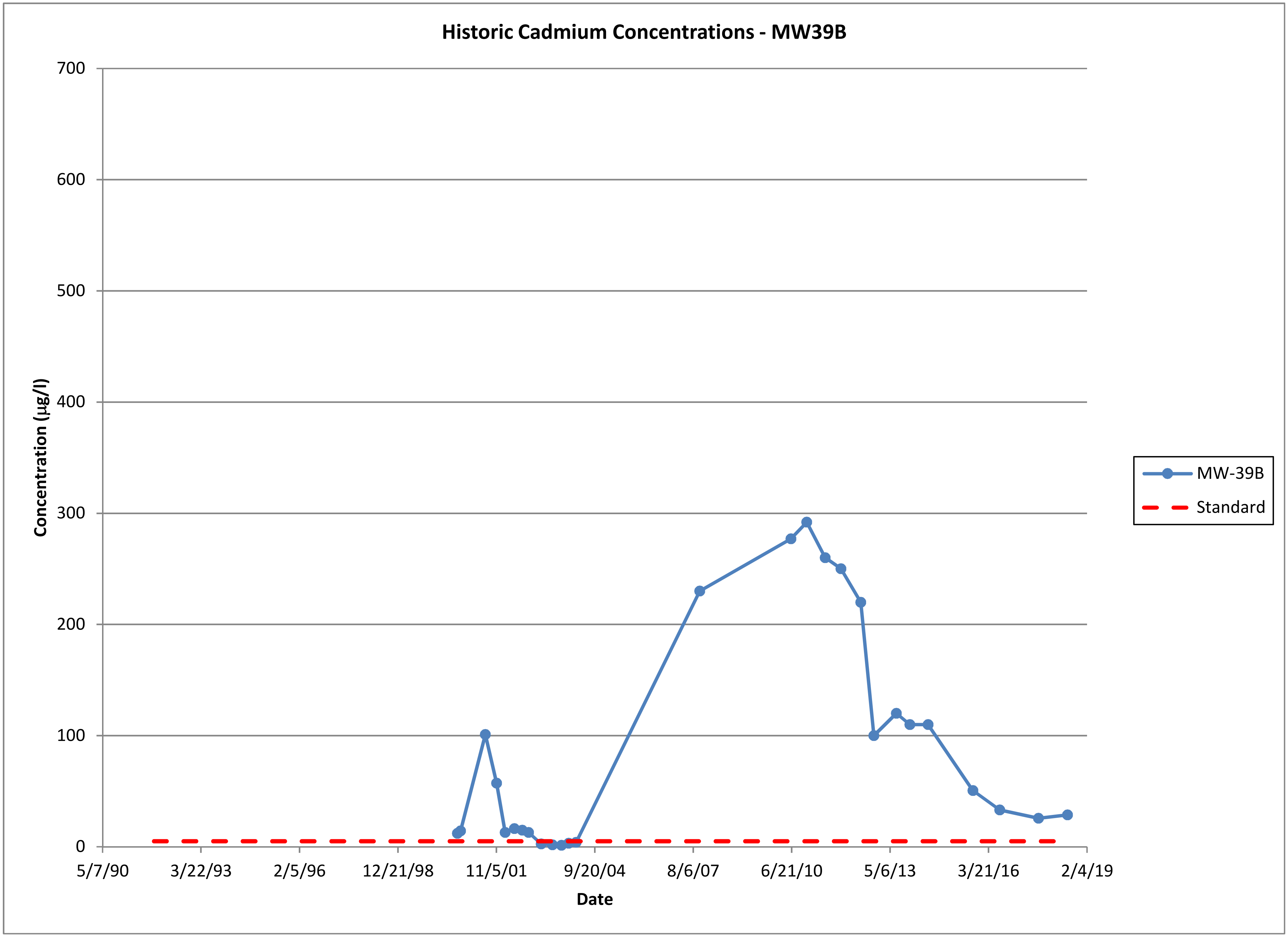

Historic Cadmium Concentrations - MW36B
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-36B
Standard

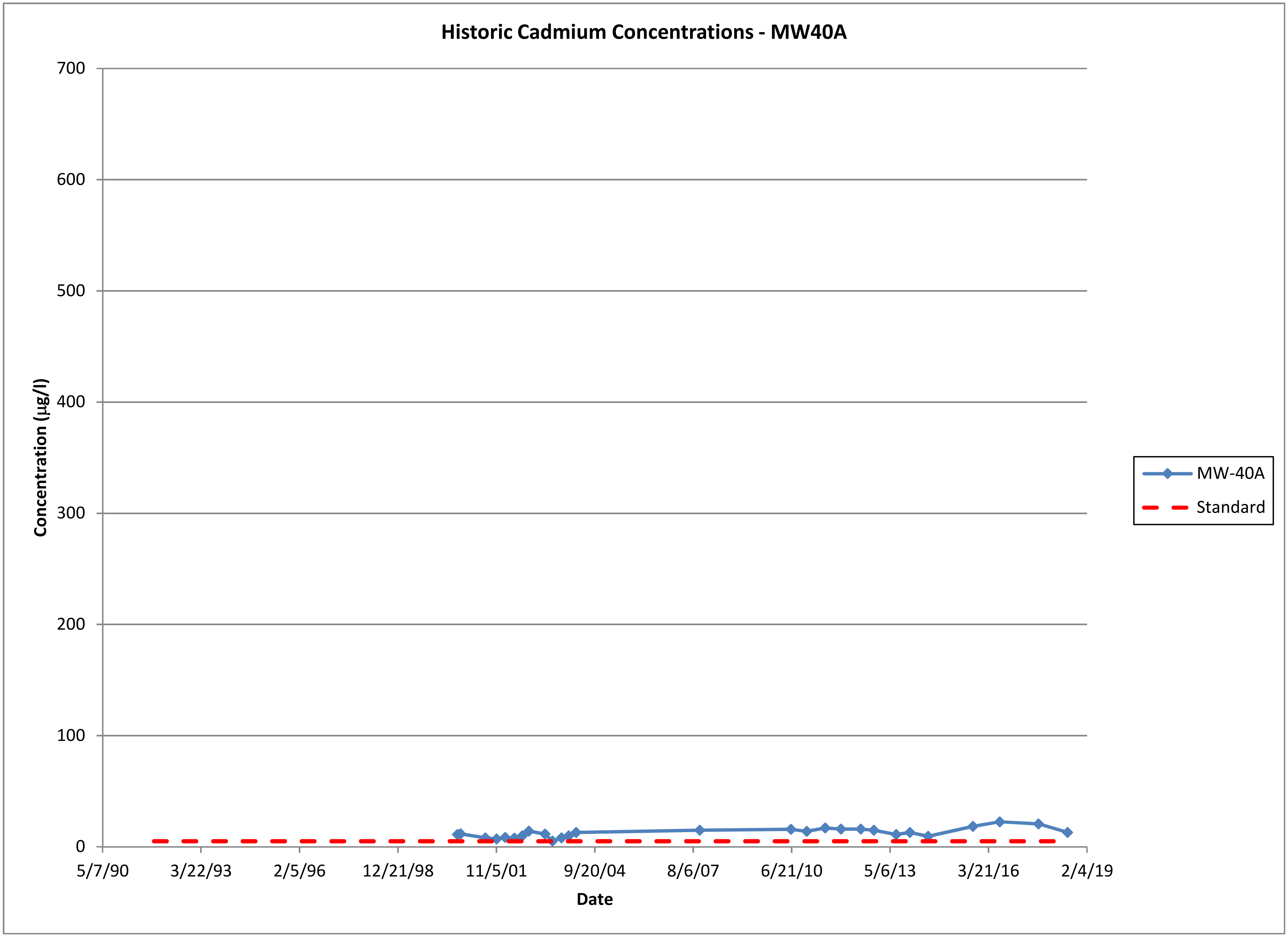


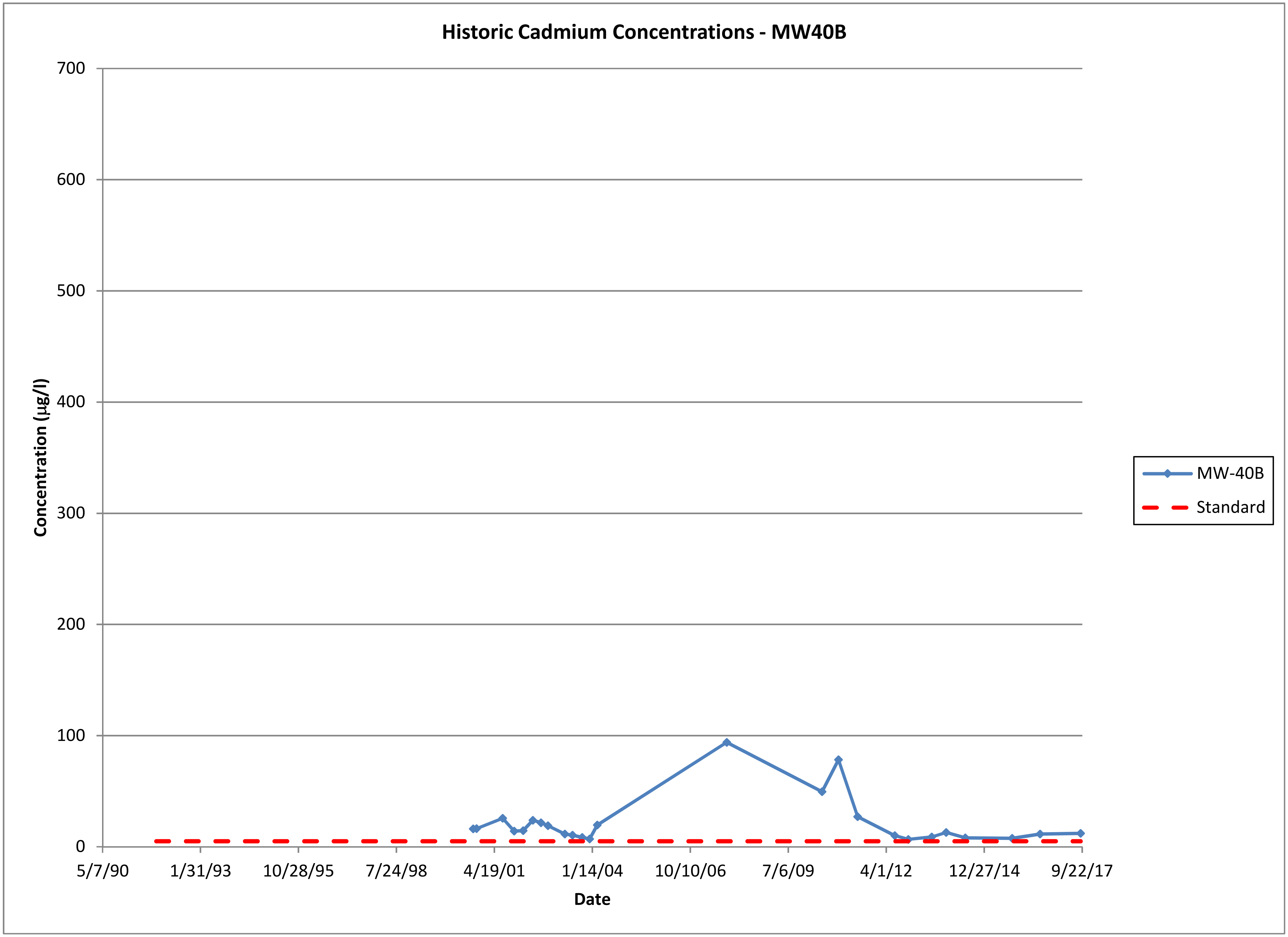
Historic Cadmium Concentrations - MW38A
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-38A
Standard

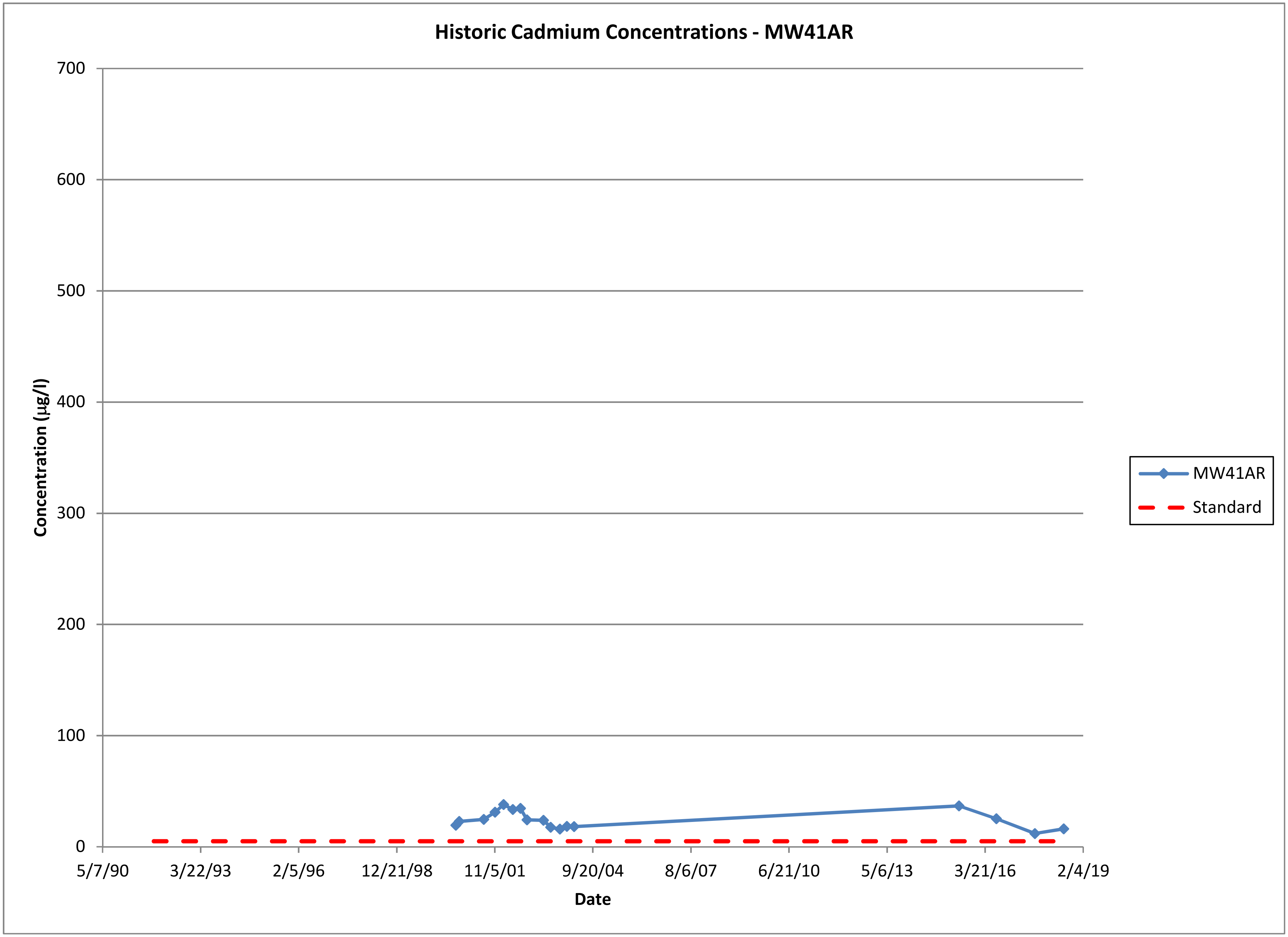

Historic Cadmium Concentrations - MW38B
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-38B
Standard


Historic Cadmium Concentrations - MW39A
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-39A
Standard

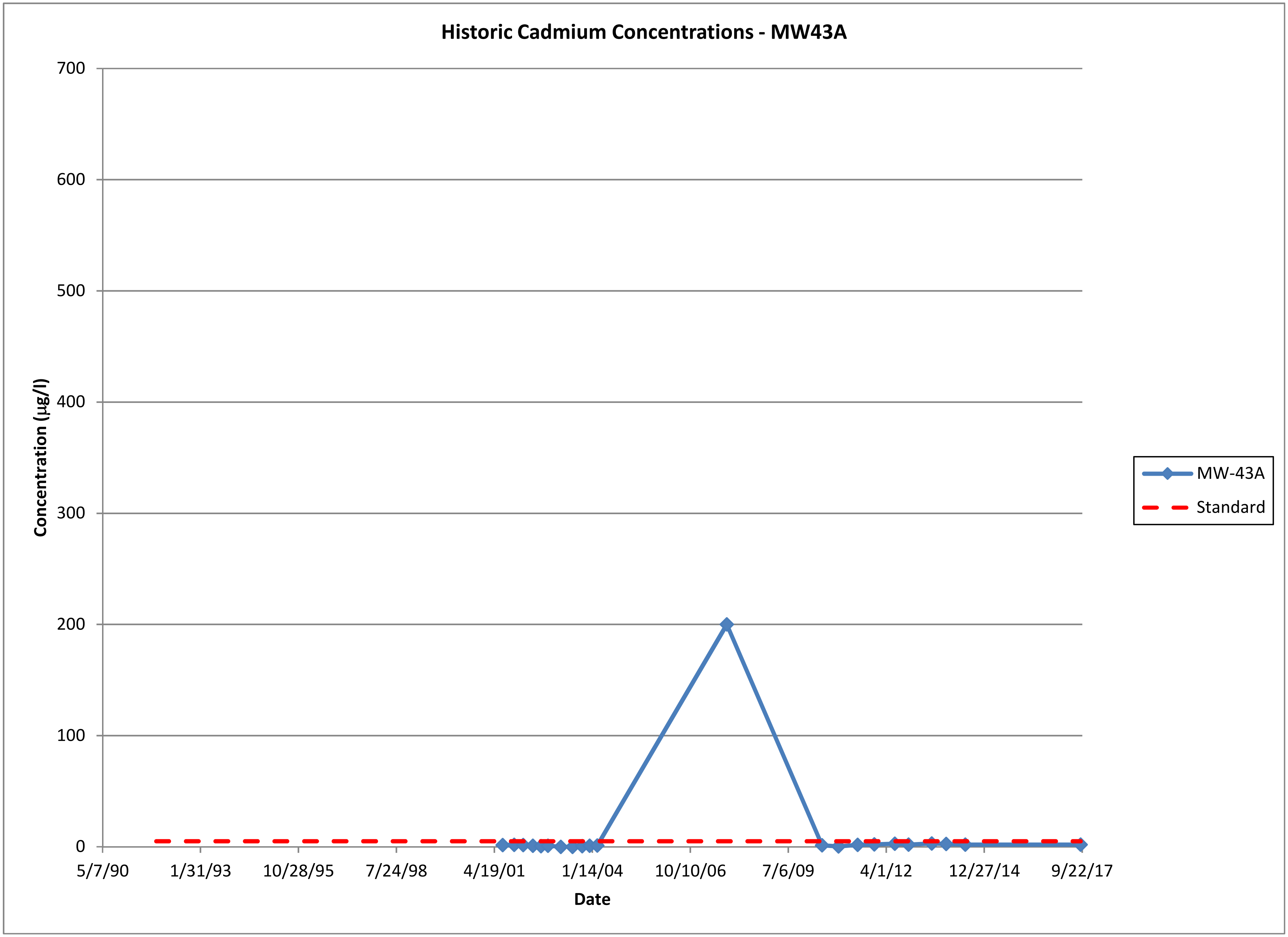

Historic Cadmium Concentrations - MW39B
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-39B
Standard


Historic Cadmium Concentrations - MW40A
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-40A
Standard

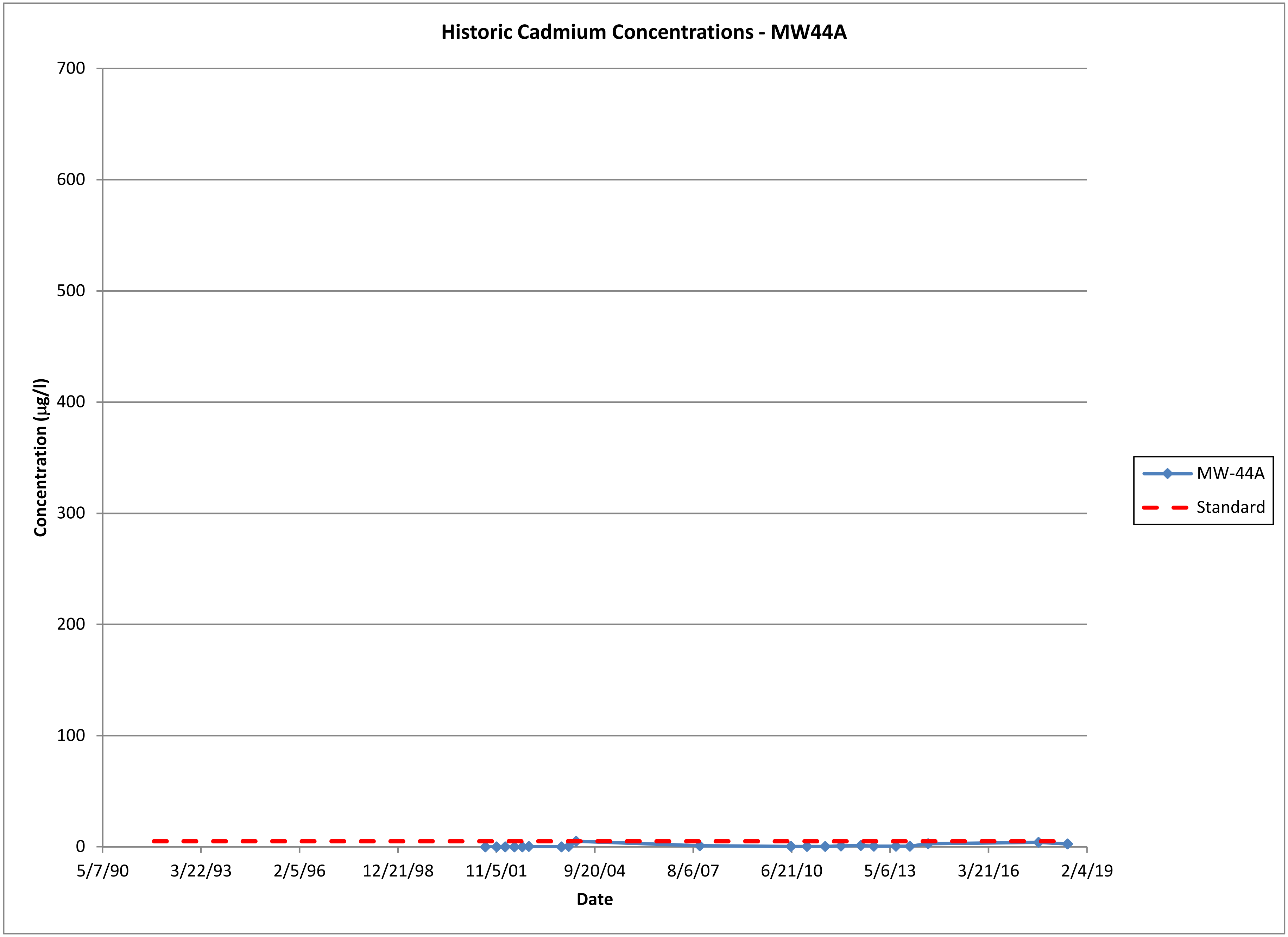

Historic Cadmium Concentrations - MW40B
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-40B
Standard

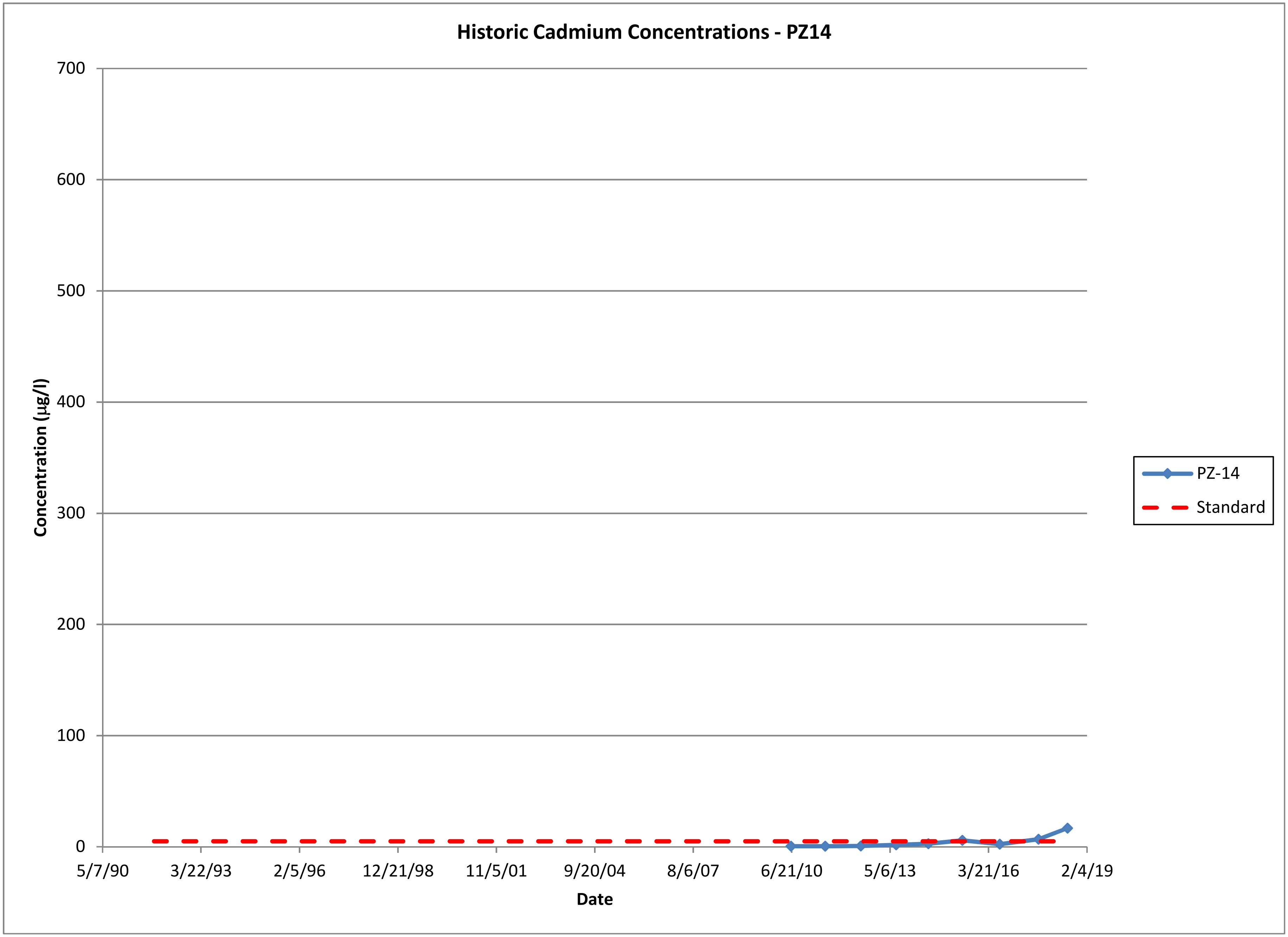


Historic Cadmium Concentrations - MW41AR
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW41AR
Standard

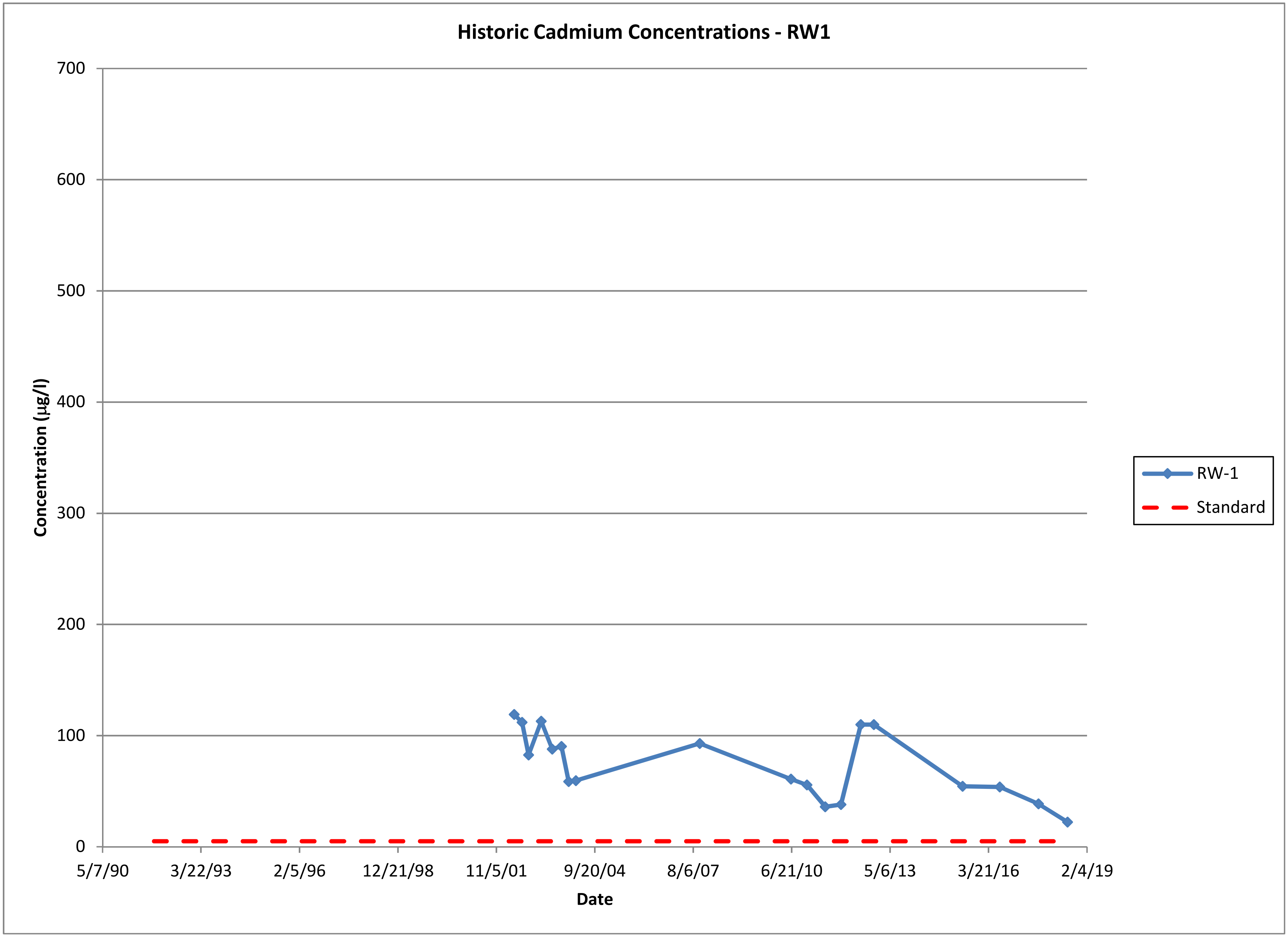


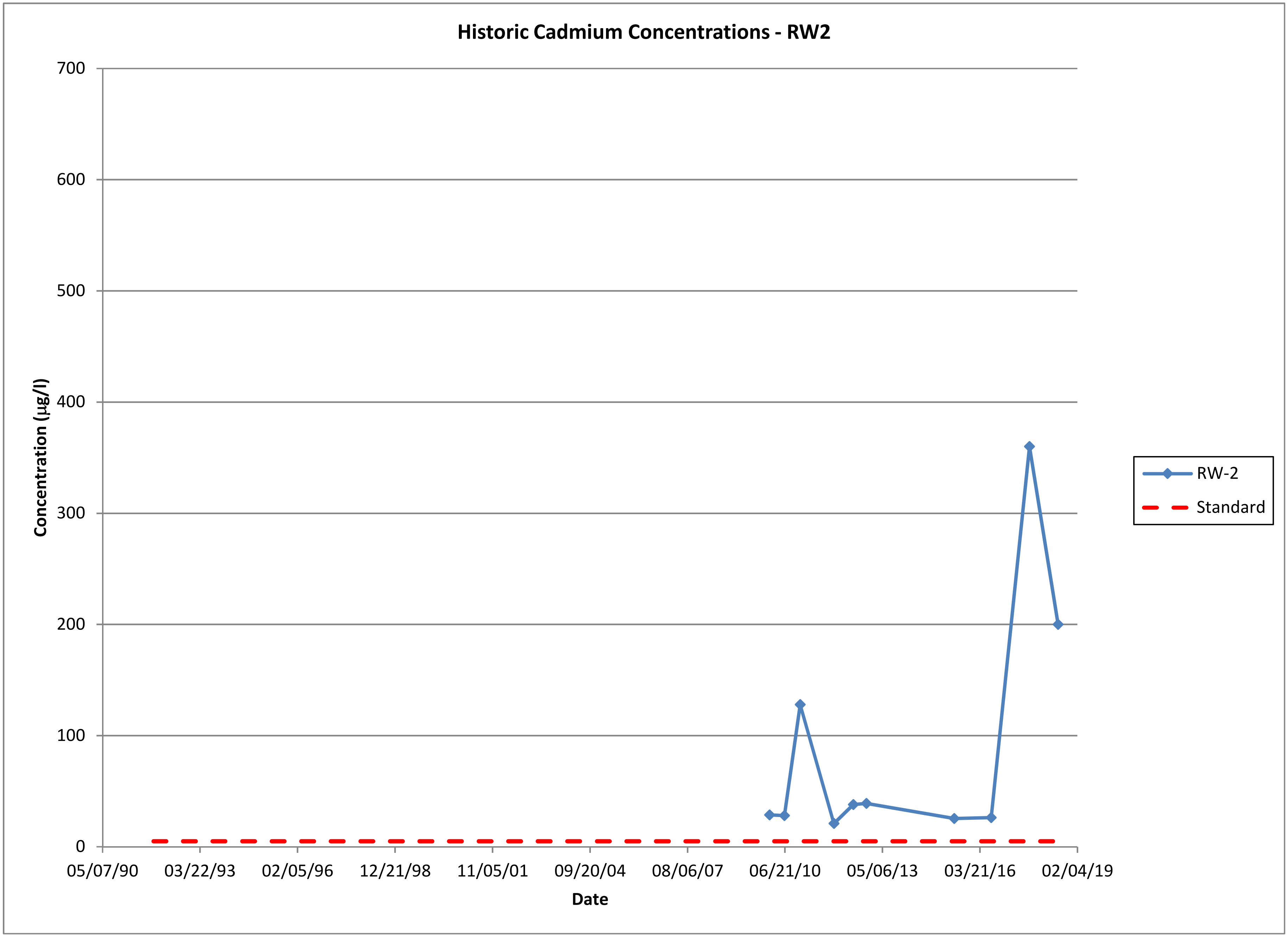
Historic Cadmium Concentrations - MW43A
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-43A
Standard


Historic Cadmium Concentrations - MW44A
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-44A
Standard

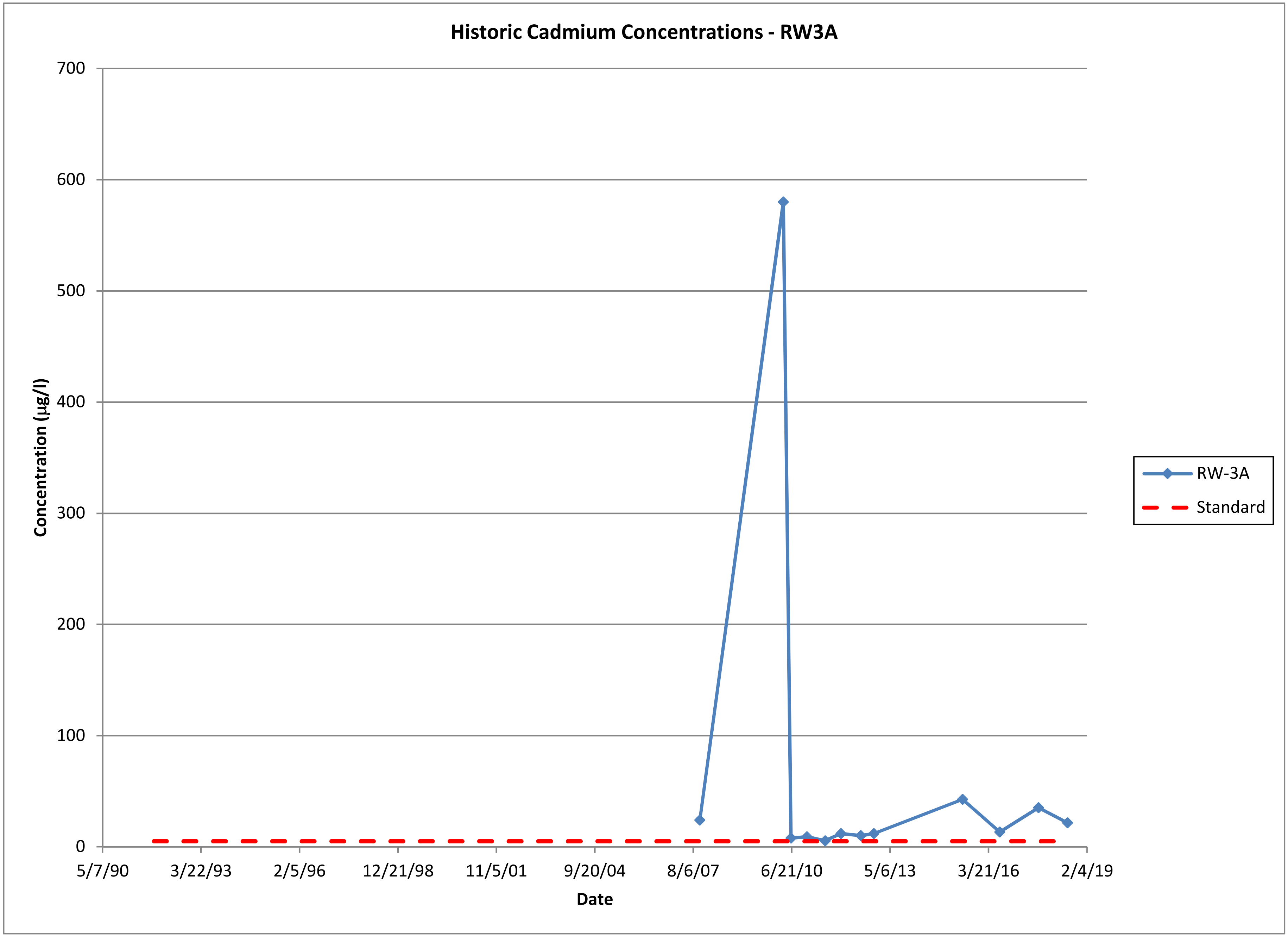


Historic Cadmium Concentrations - PZ14
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
PZ-14
Standard

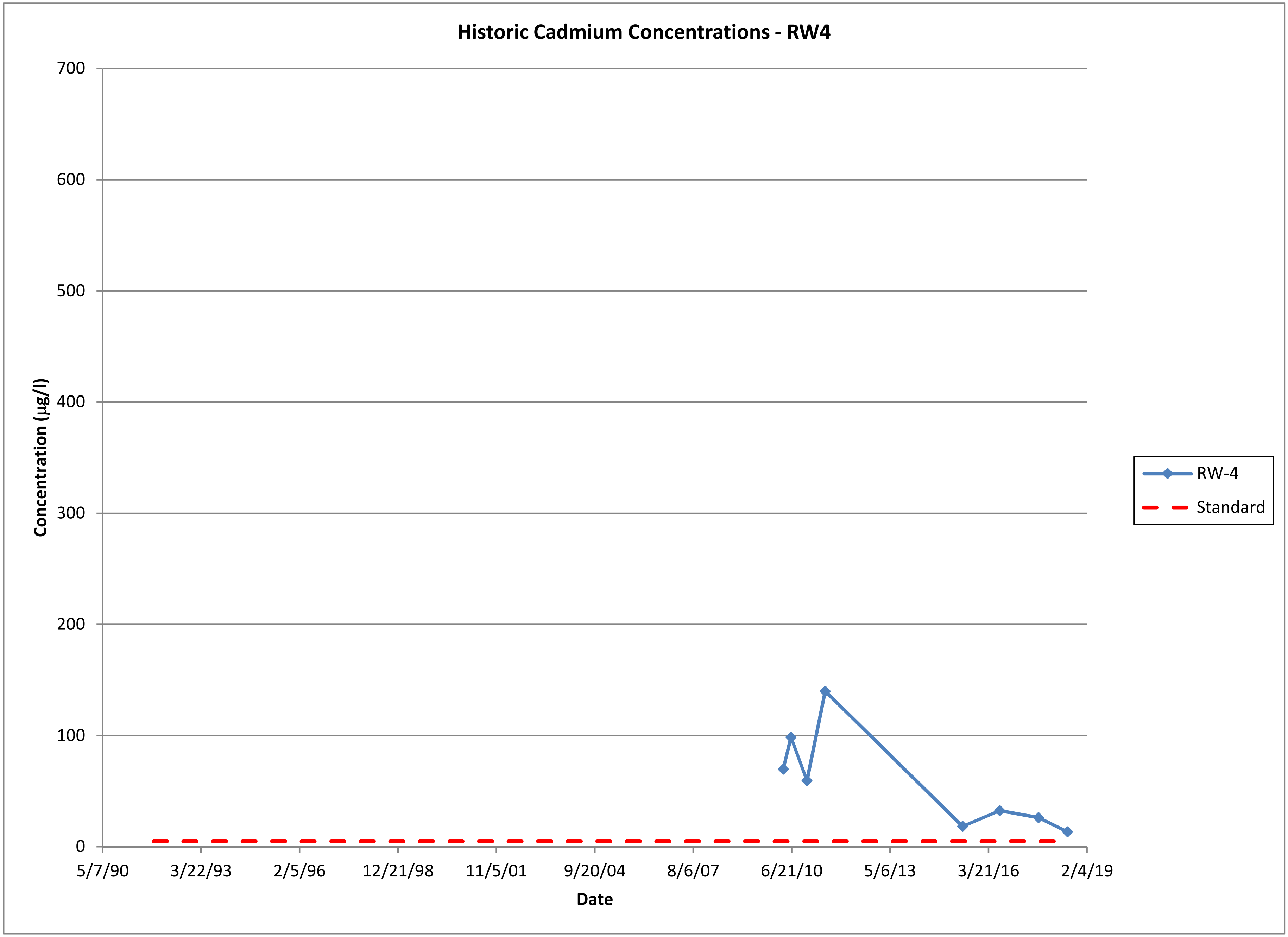

Historic Cadmium Concentrations - RW1
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-1
Standard

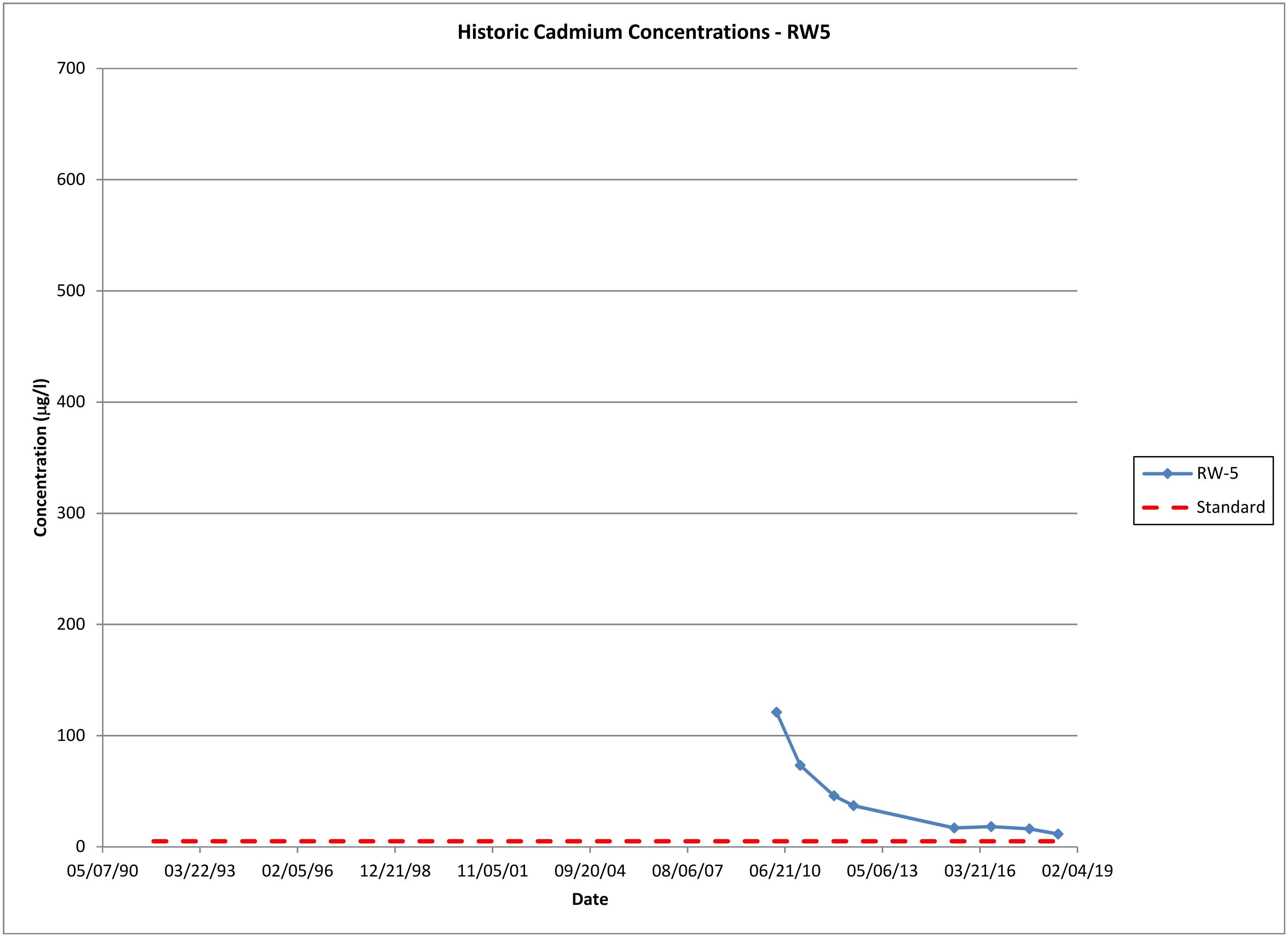


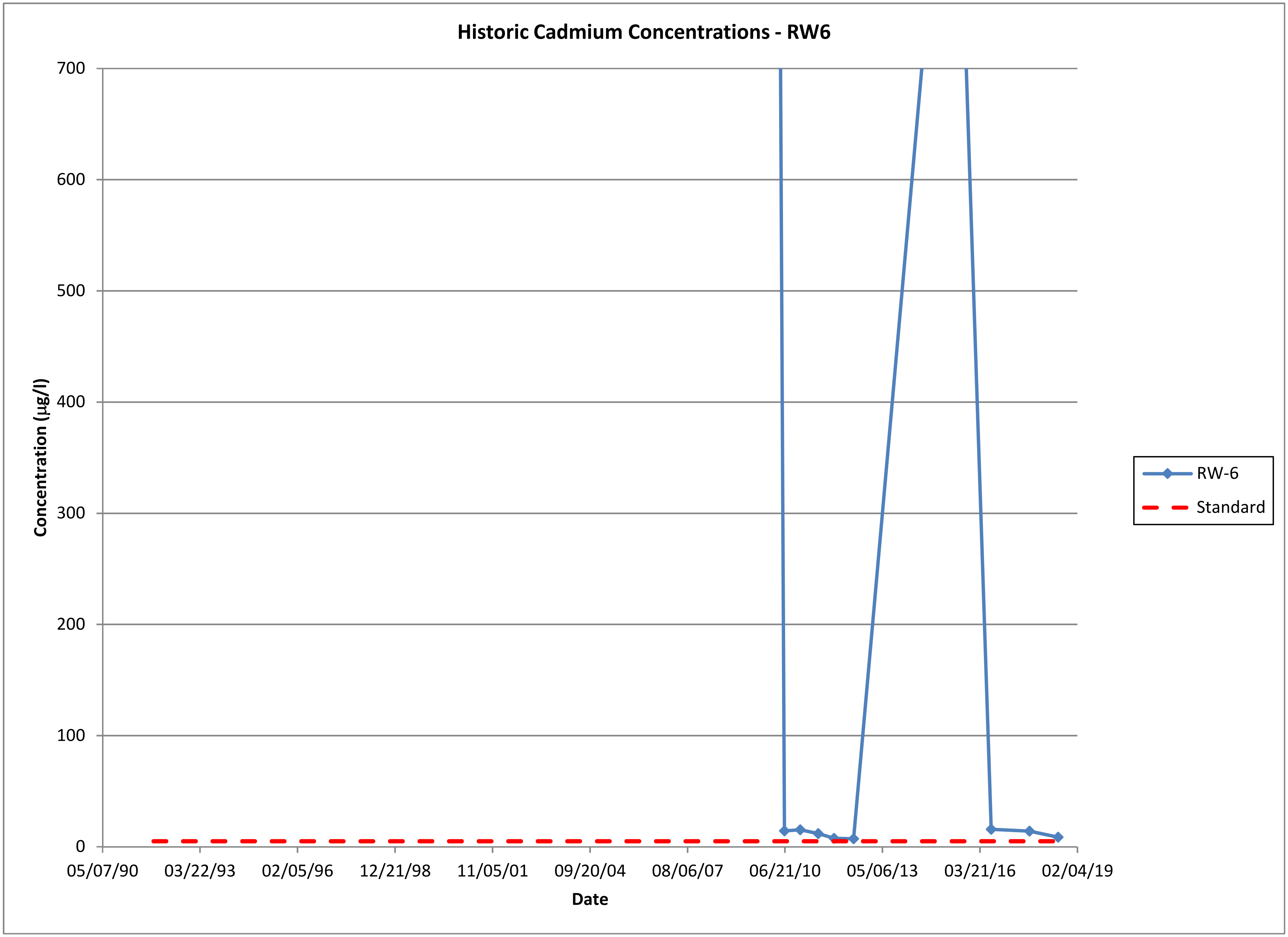
Historic Cadmium Concentrations - RW2
Concentration (µg/l)
700
600
500
400
300
200
100
0
05/07/90
03/22/93
02/05/96
12/21/98
11/05/01
09/20/04
08/06/07
06/21/10
05/06/13
03/21/16
02/04/19
Date
RW-2
Standard



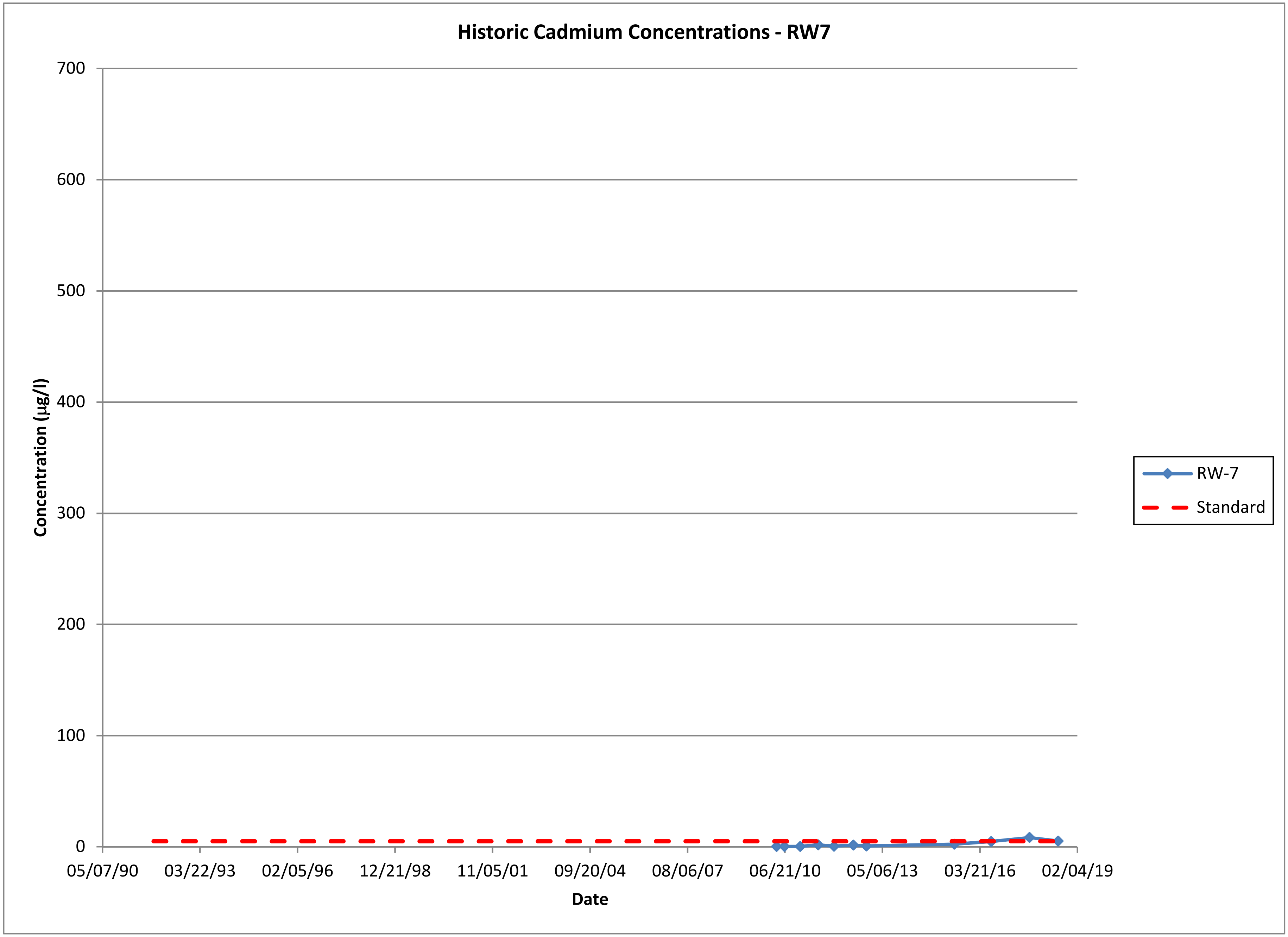
Historic Cadmium Concentrations - RW3A
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-3A
Standard

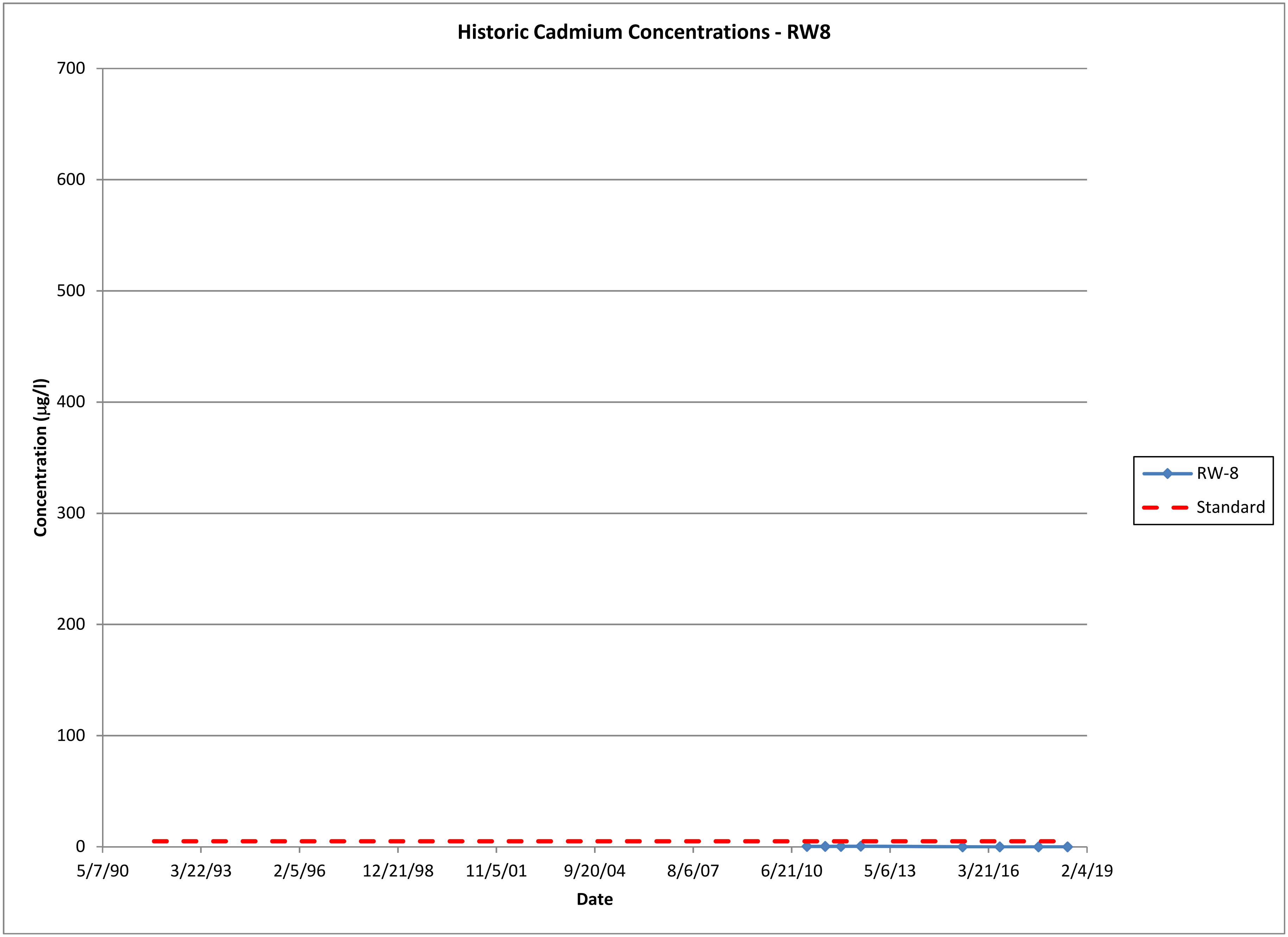

Historic Cadmium Concentrations - RW4
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-4
Standard


Historic Cadmium Concentrations - RW5
Concentration (µg/l)
700
600
500
400
300
200
100
0
05/07/90
03/22/93
02/05/96
12/21/98
11/05/01
09/20/04
08/06/07
06/21/10
05/06/13
03/21/16
02/04/19
Date
RW-5
Standard

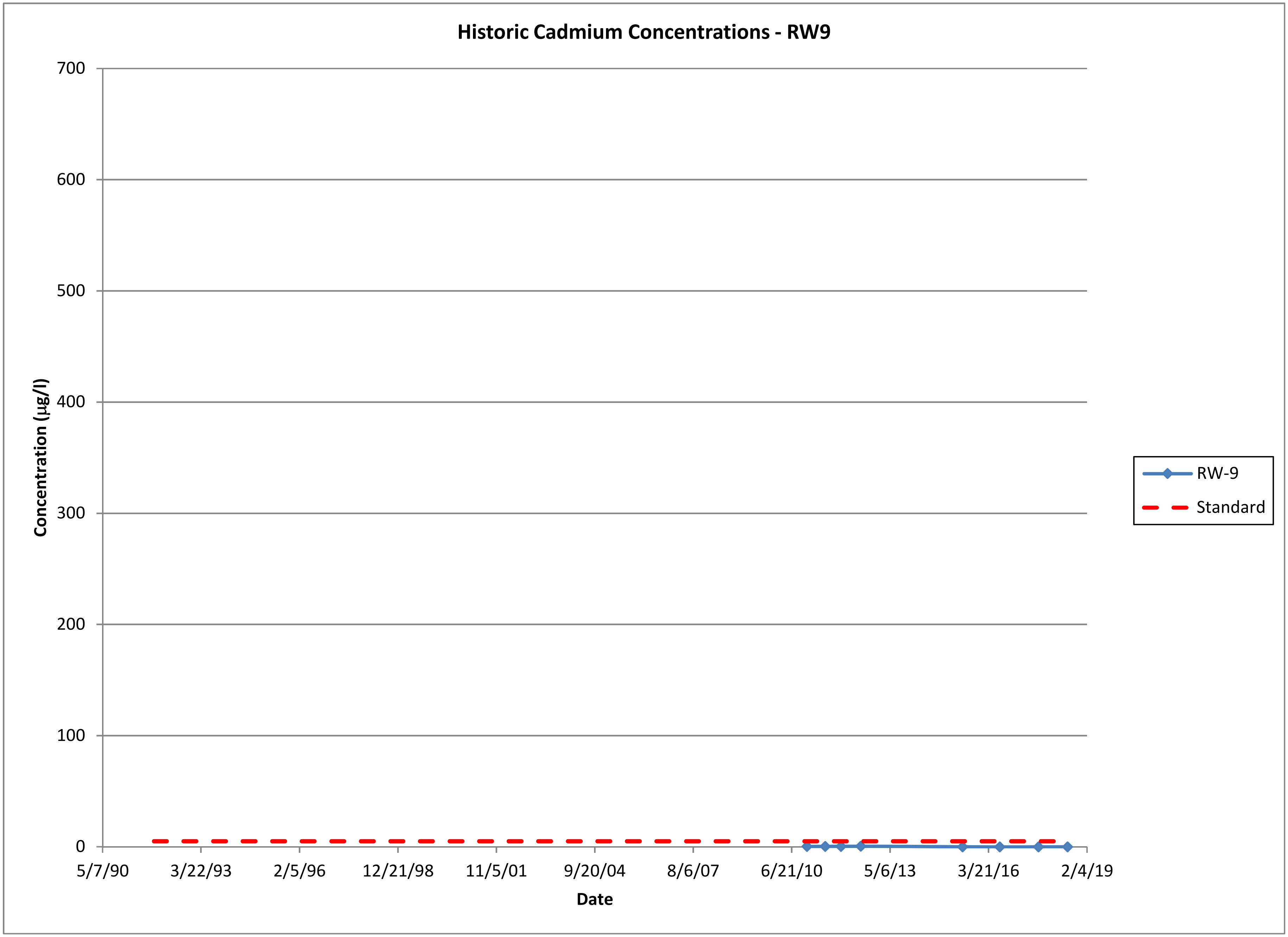


Historic Cadmium Concentrations - RW6
700
600
500
400
300
200
100
0
Concentration (µg/l)
05/07/90
03/22/93
02/05/96
12/21/98
11/05/01
09/20/04
08/06/07
06/21/10
05/06/13
03/21/16
02/04/19
Date
RW-6
Standard

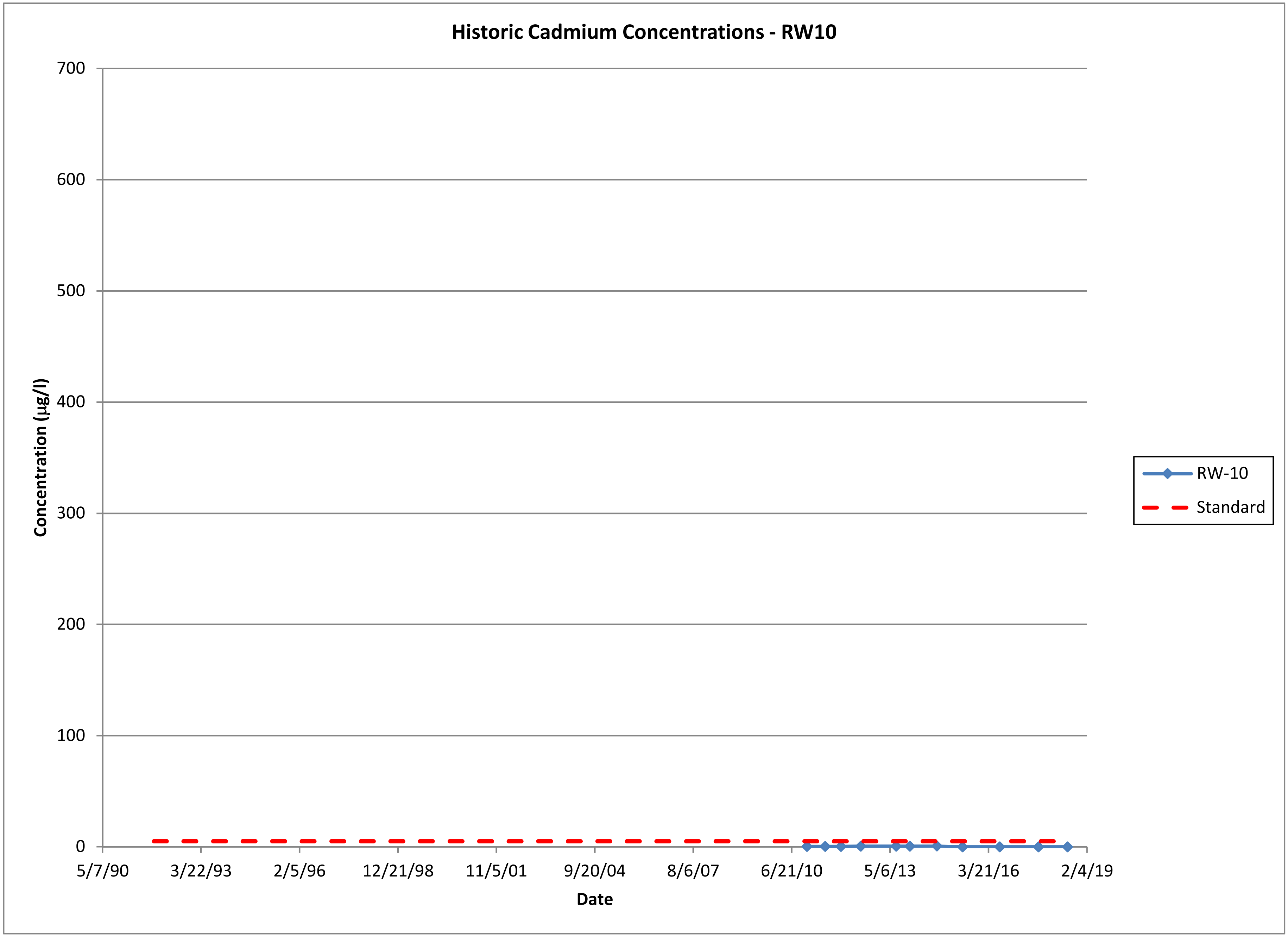

Historic Cadmium Concentrations - RW7
Concentration (µg/l)
700
600
500
400
300
200
100
0
05/07/90
03/22/93
02/05/96
12/21/98
11/05/01
09/20/04
08/06/07
06/21/10
05/06/13
03/21/16
02/04/19
Date
RW-7
Standard

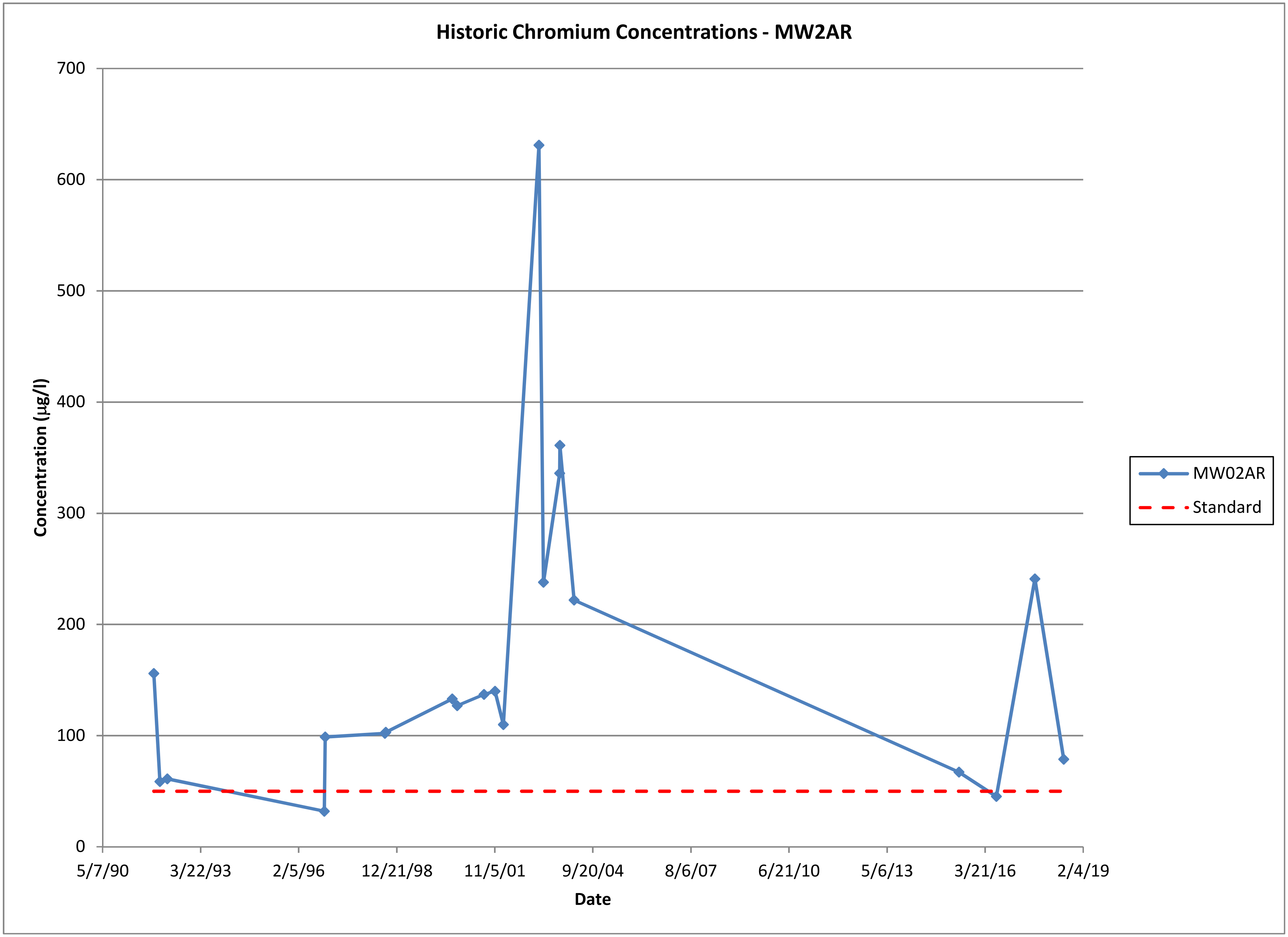


Historic Cadmium Concentrations - RW8
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-8
Standard

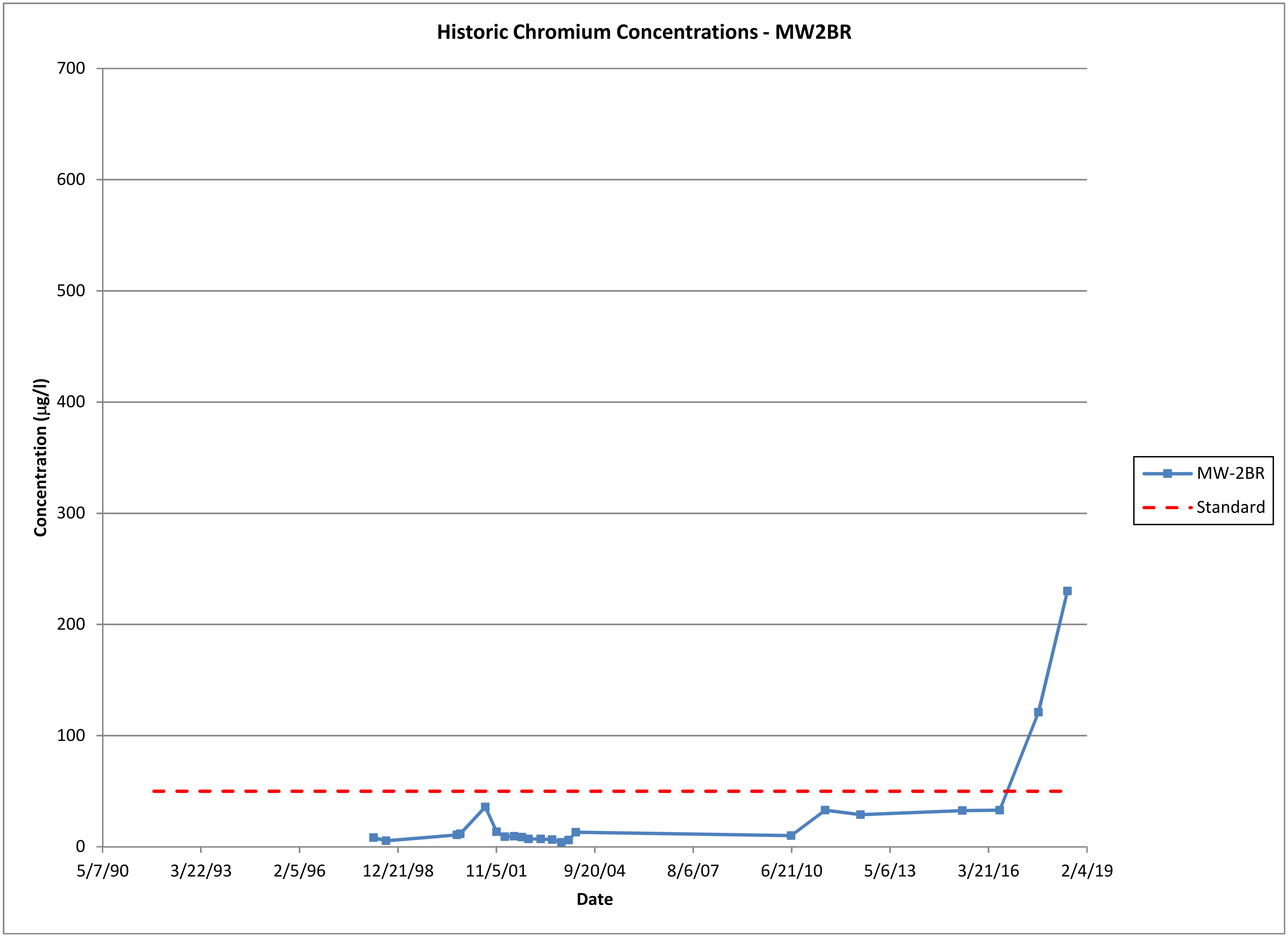


Historic Cadmium Concentrations - RW9
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-9
Standard

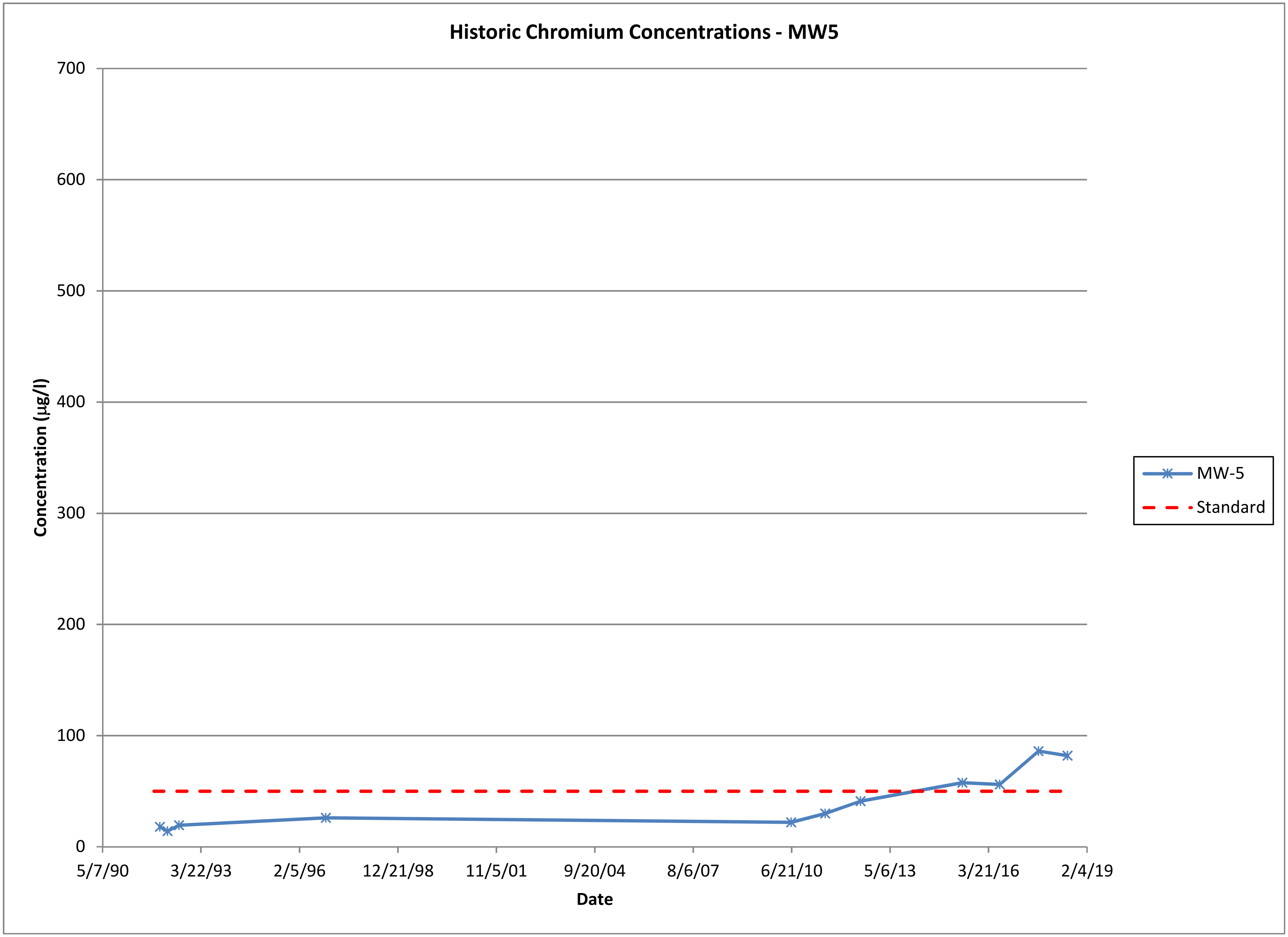

Historic Cadmium Concentrations - RW10
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-10
Standard



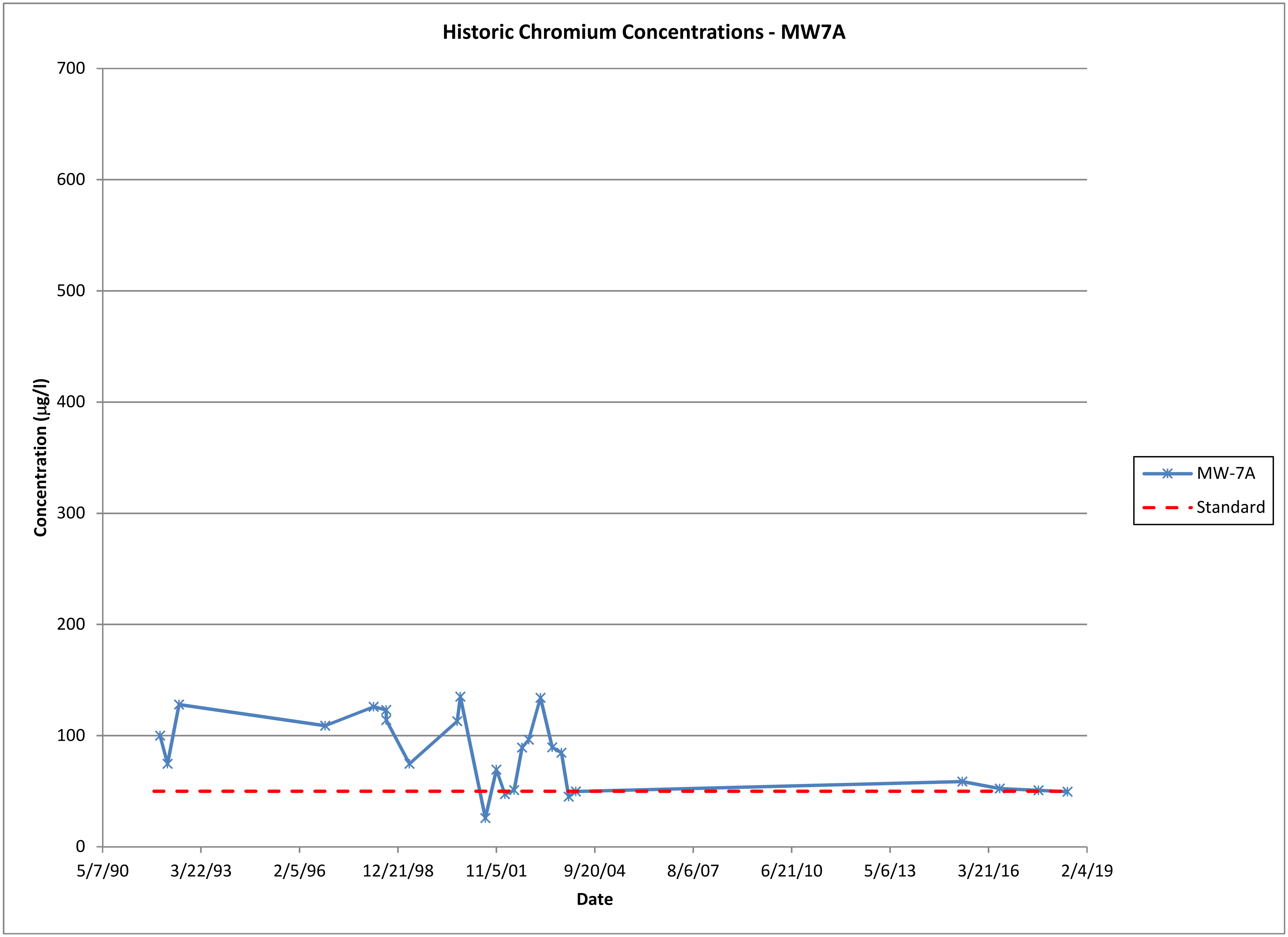
Historic Chromium Concentrations - MW2AR
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW02AR
Standard

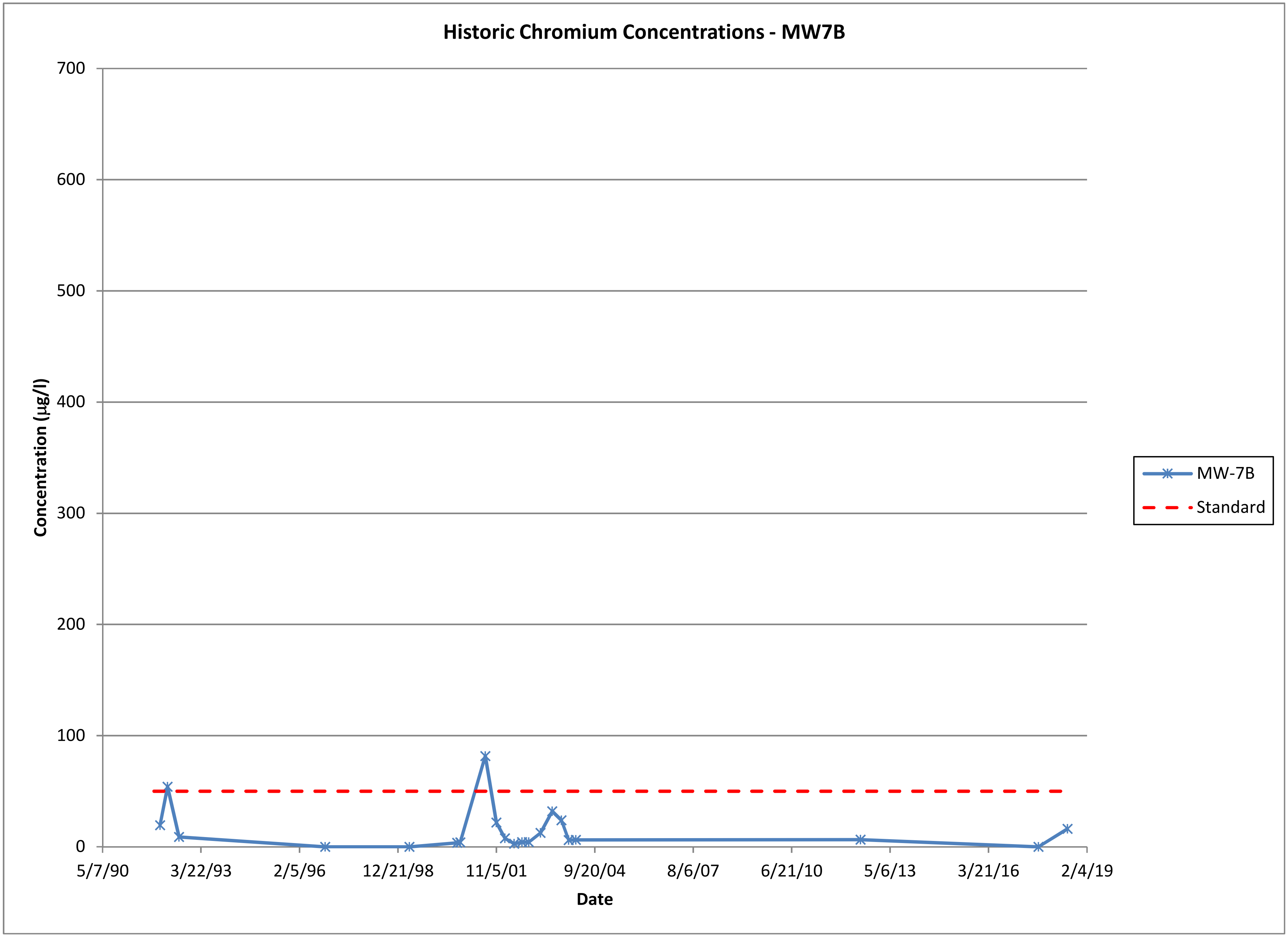


Historic Chromium Concentrations - MW2BR
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-2BR
Standard

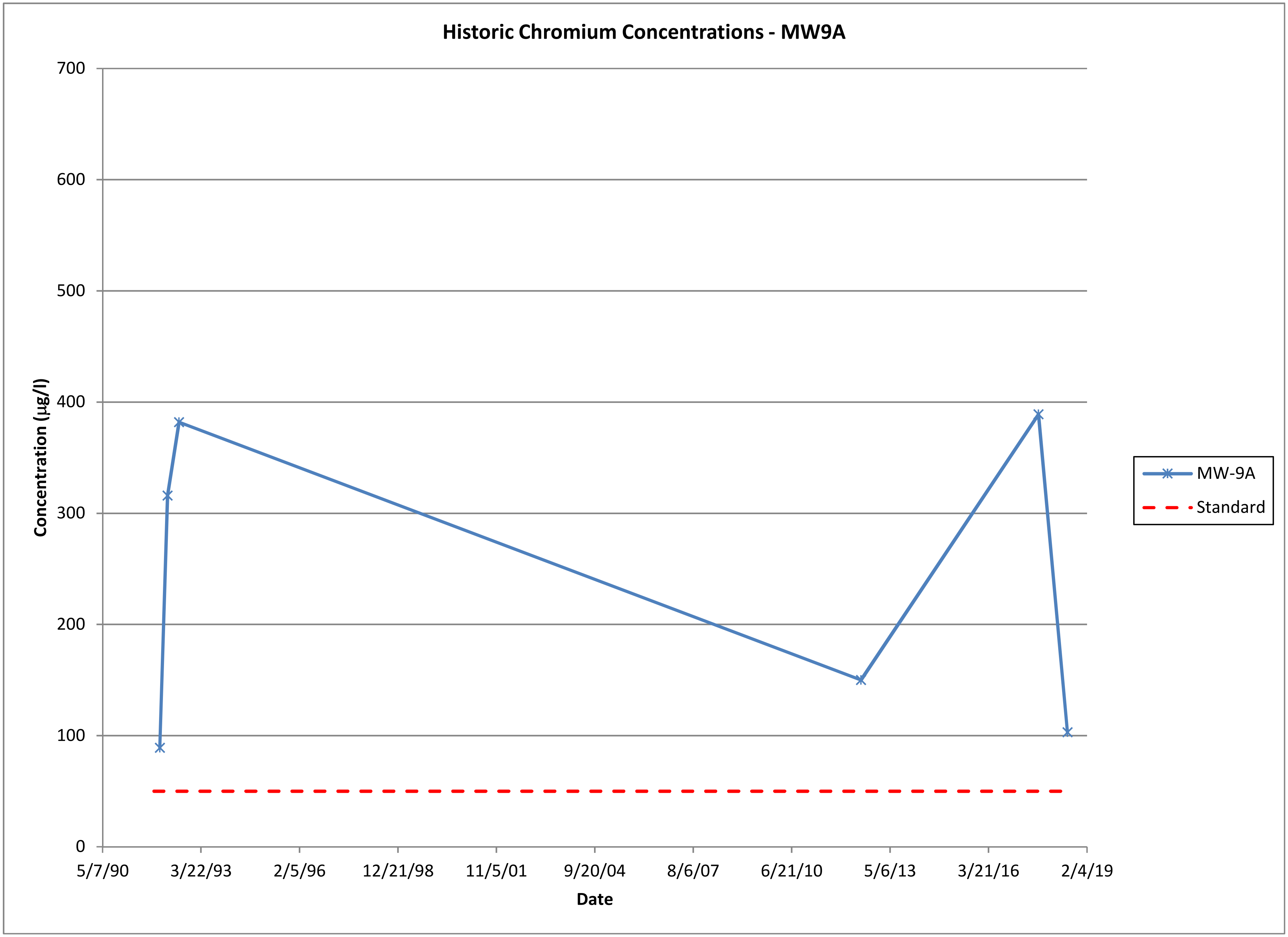


Historic Chromium Concentrations - MW5
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-5
Standard

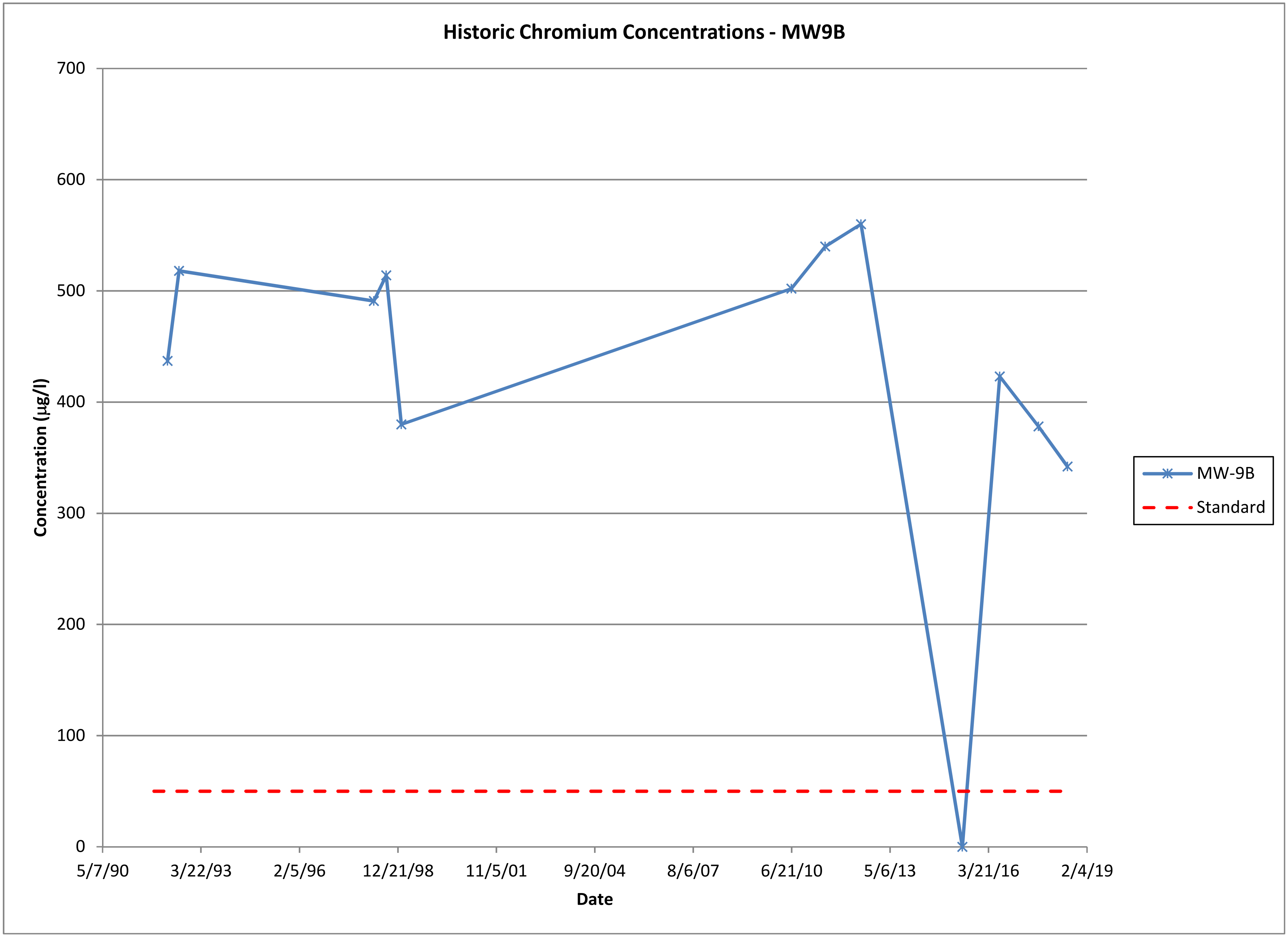

Historic Chromium Concentrations - MW7A
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-7A
Standard

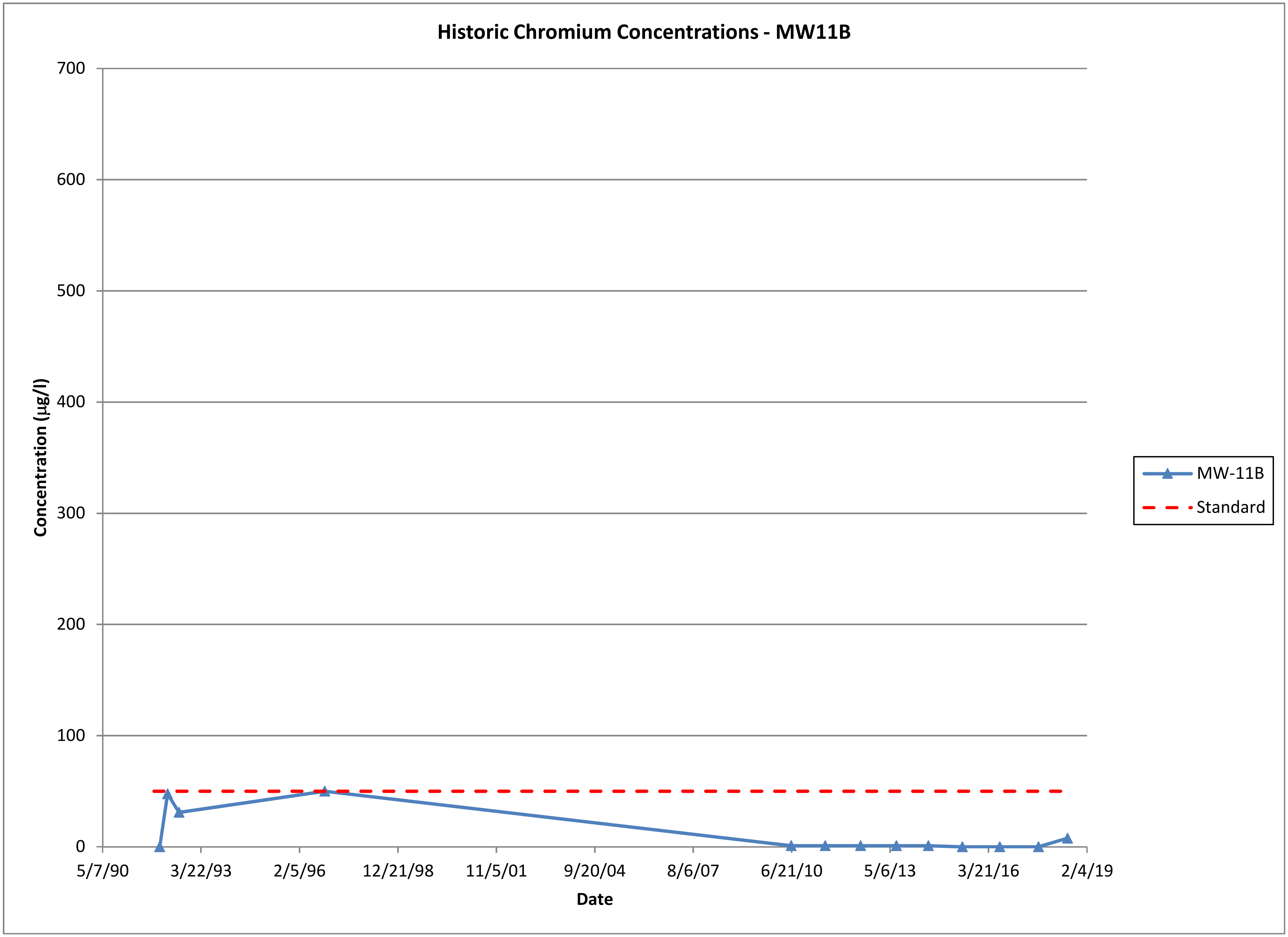


Historic Chromium Concentrations - MW7B
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-7B
Standard

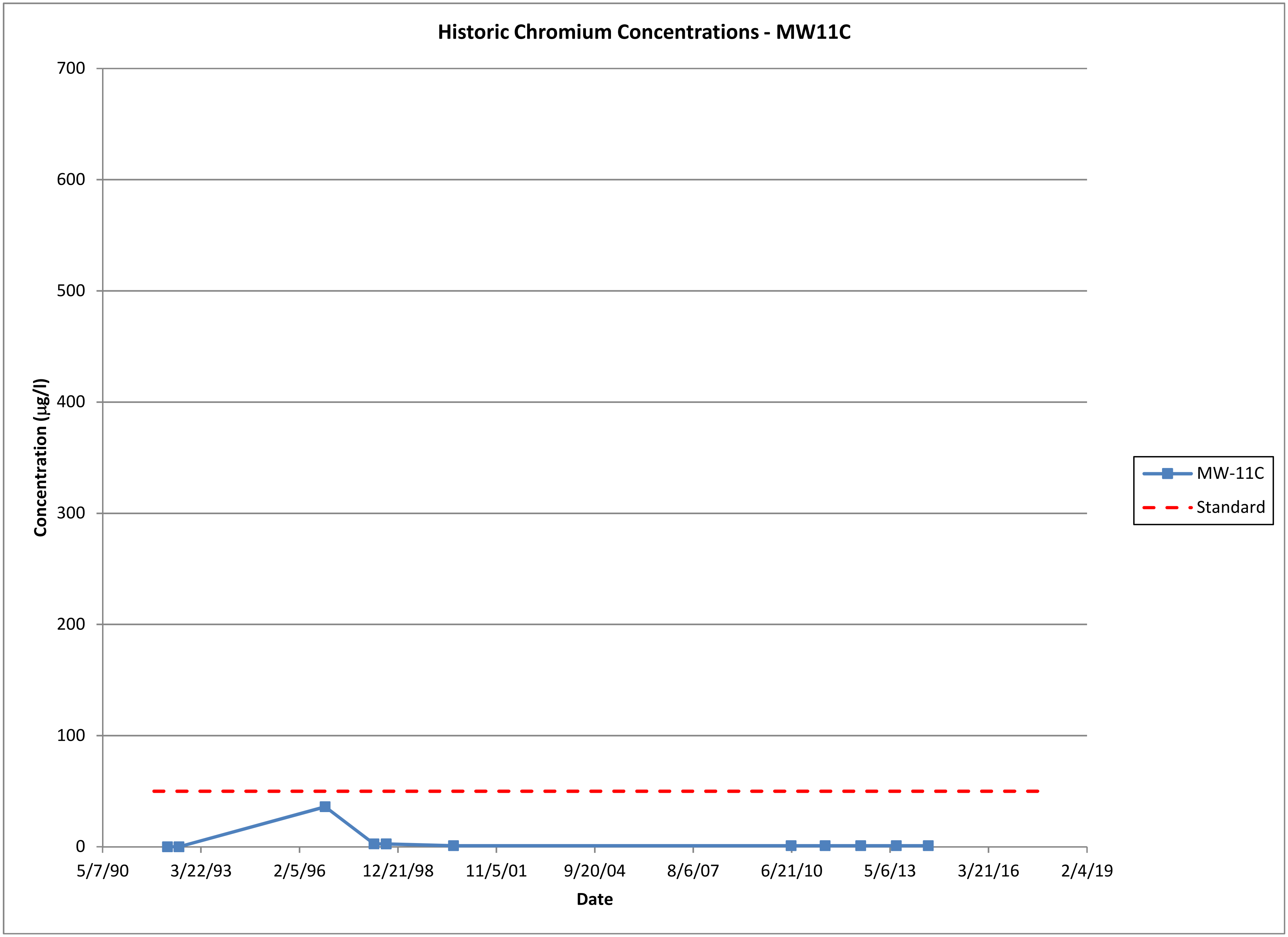


Historic Chromium Concentrations - MW9A
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-9A
Standard

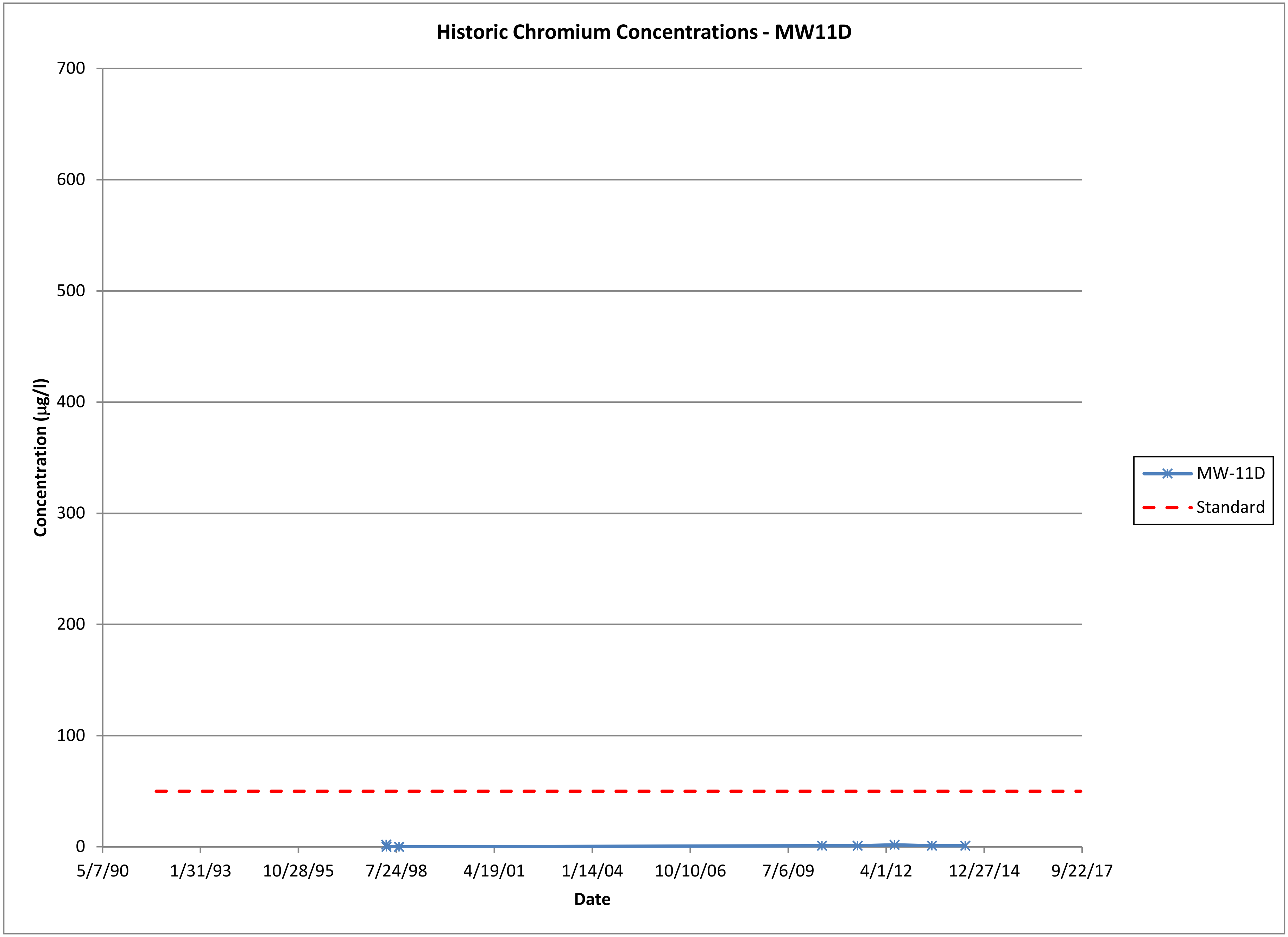

Historic Chromium Concentrations - MW9B
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-9B
Standard



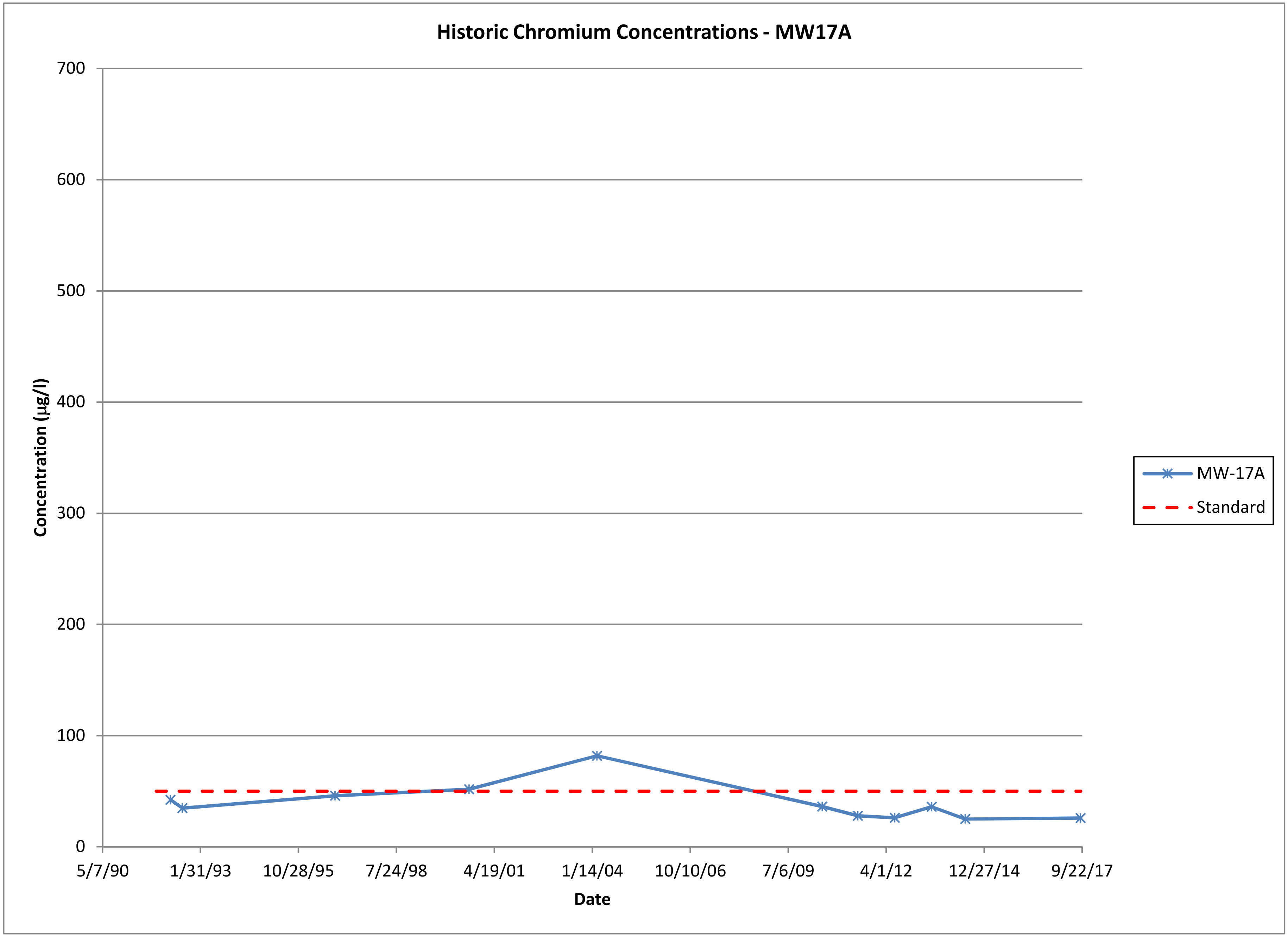
Historic Chromium Concentrations - MW11B
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-11B
Standard

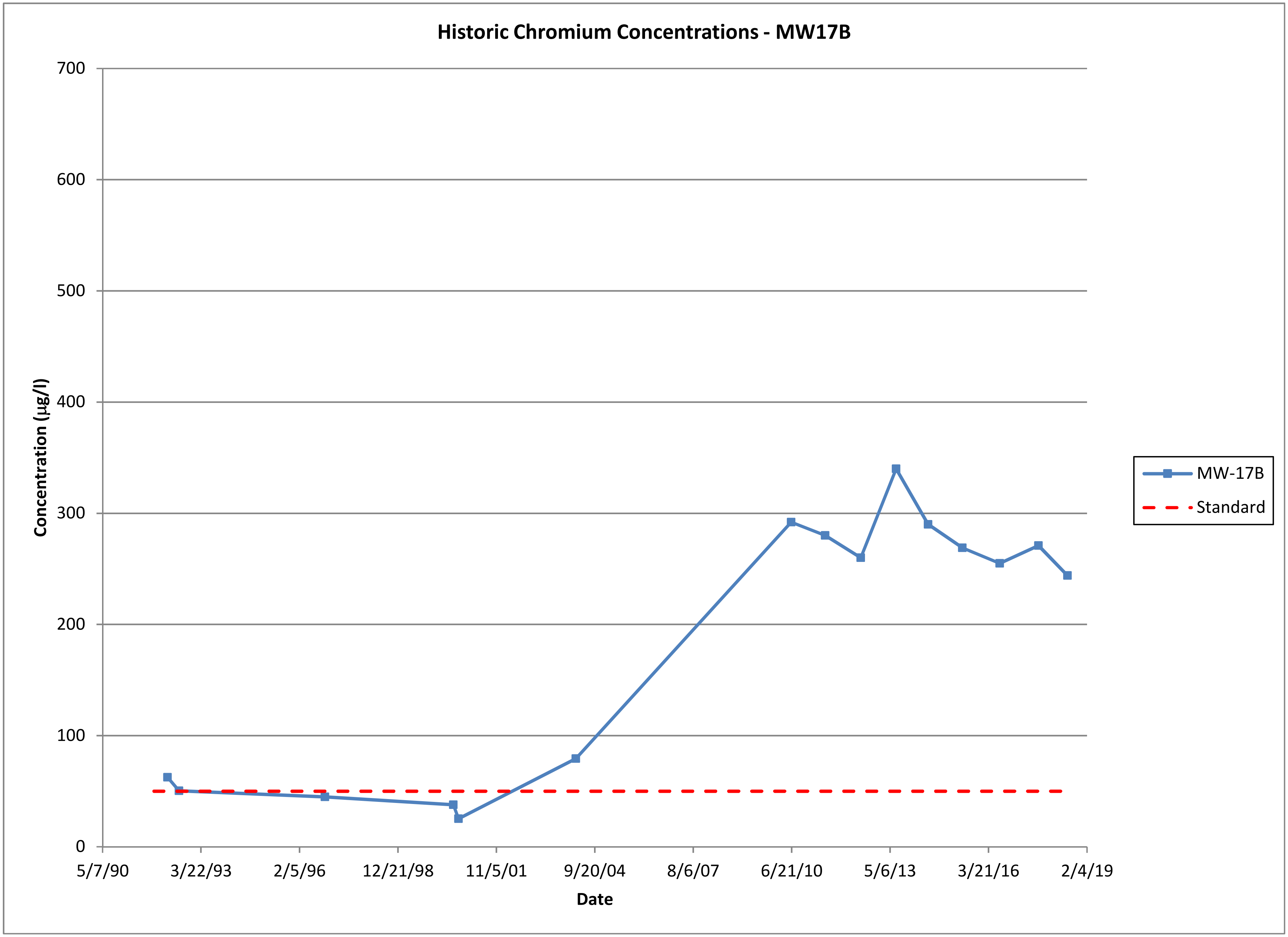


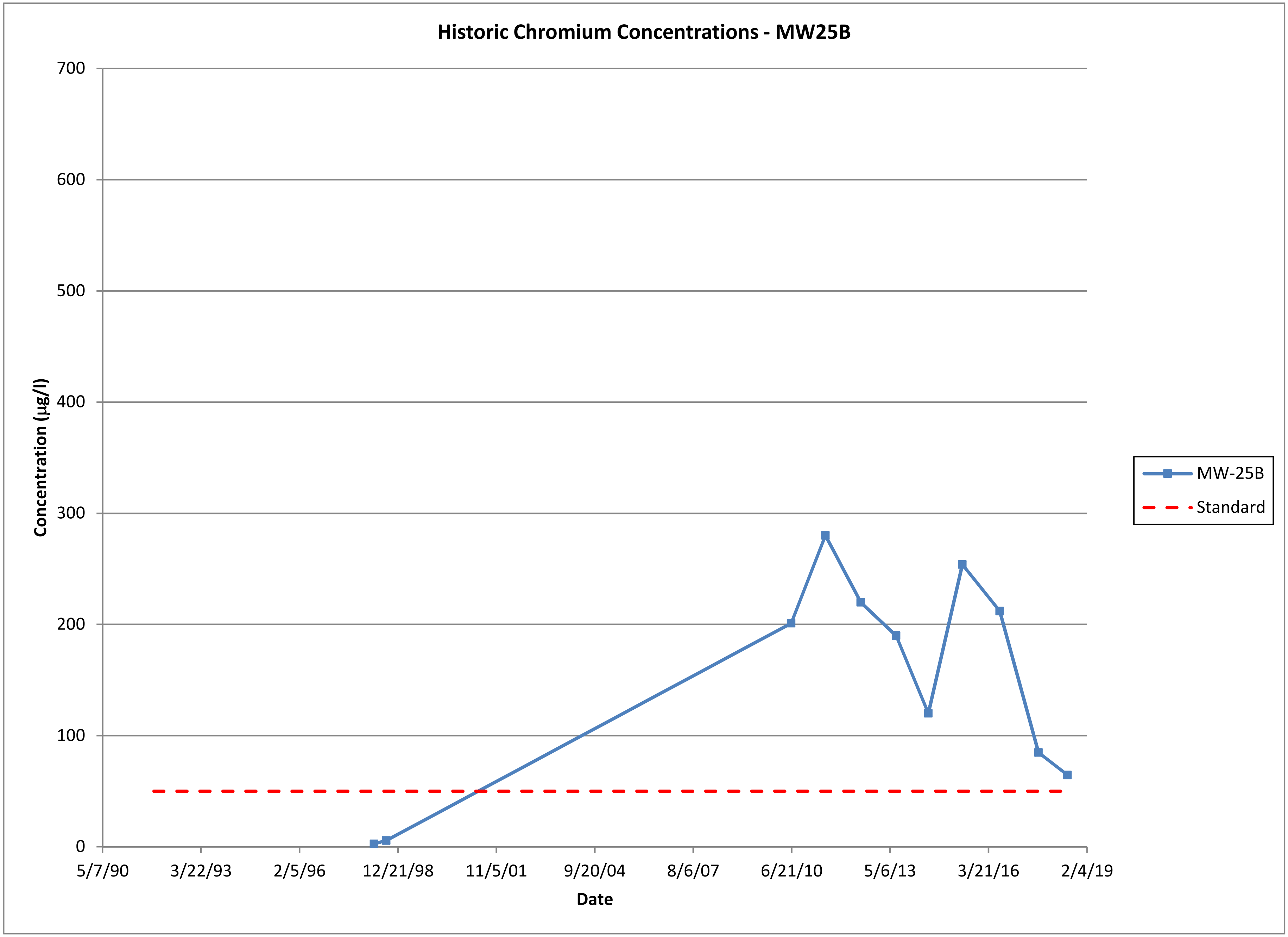
Historic Chromium Concentrations - MW11C
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-11C
Standard



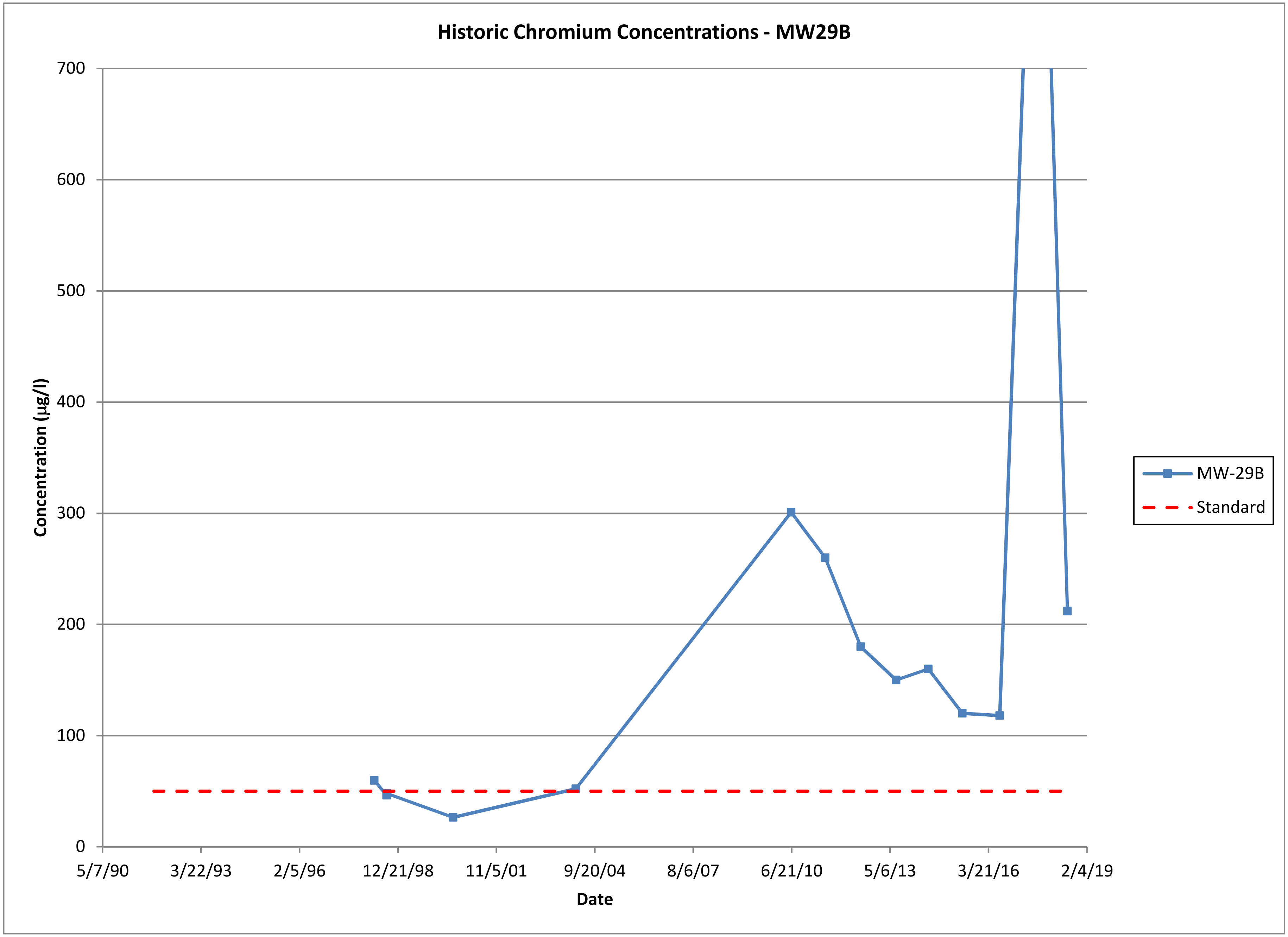
Historic Chromium Concentrations - MW11D
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-11D
Standard


Historic Chromium Concentrations - MW17A
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-17A
Standard

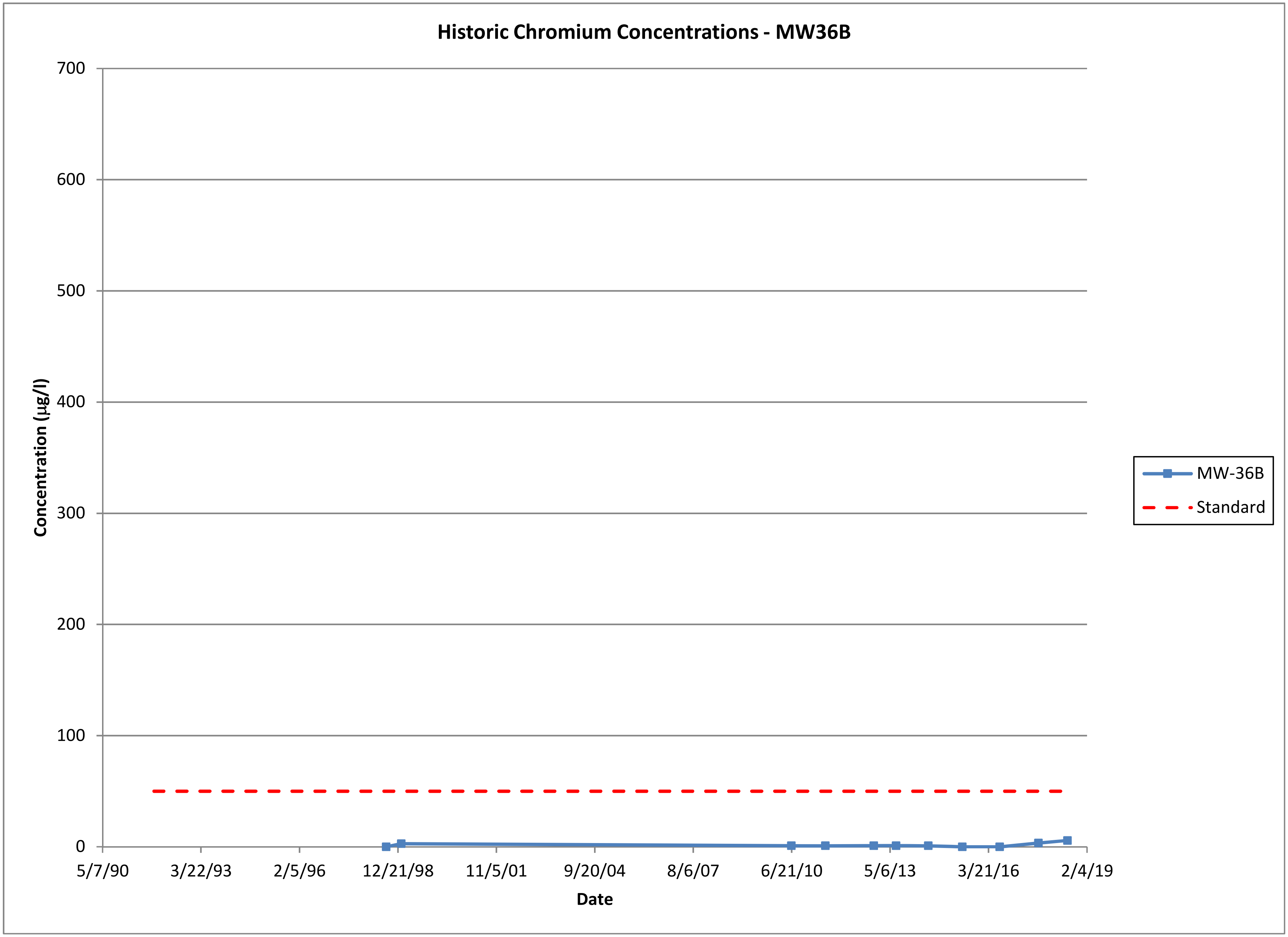

Historic Chromium Concentrations - MW17B
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-17B
Standard

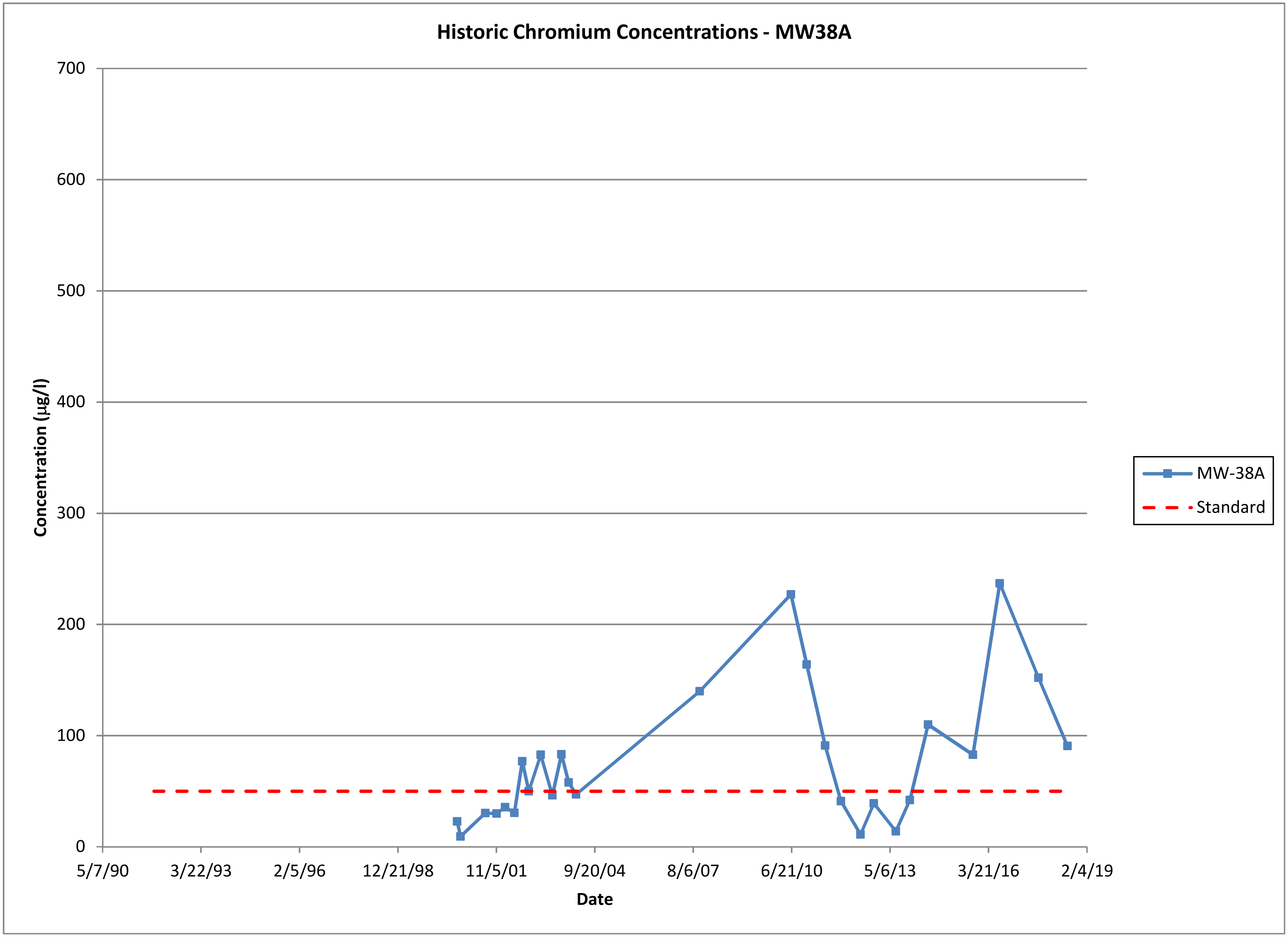


Historic Chromium Concentrations - MW25B
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-25B
Standard

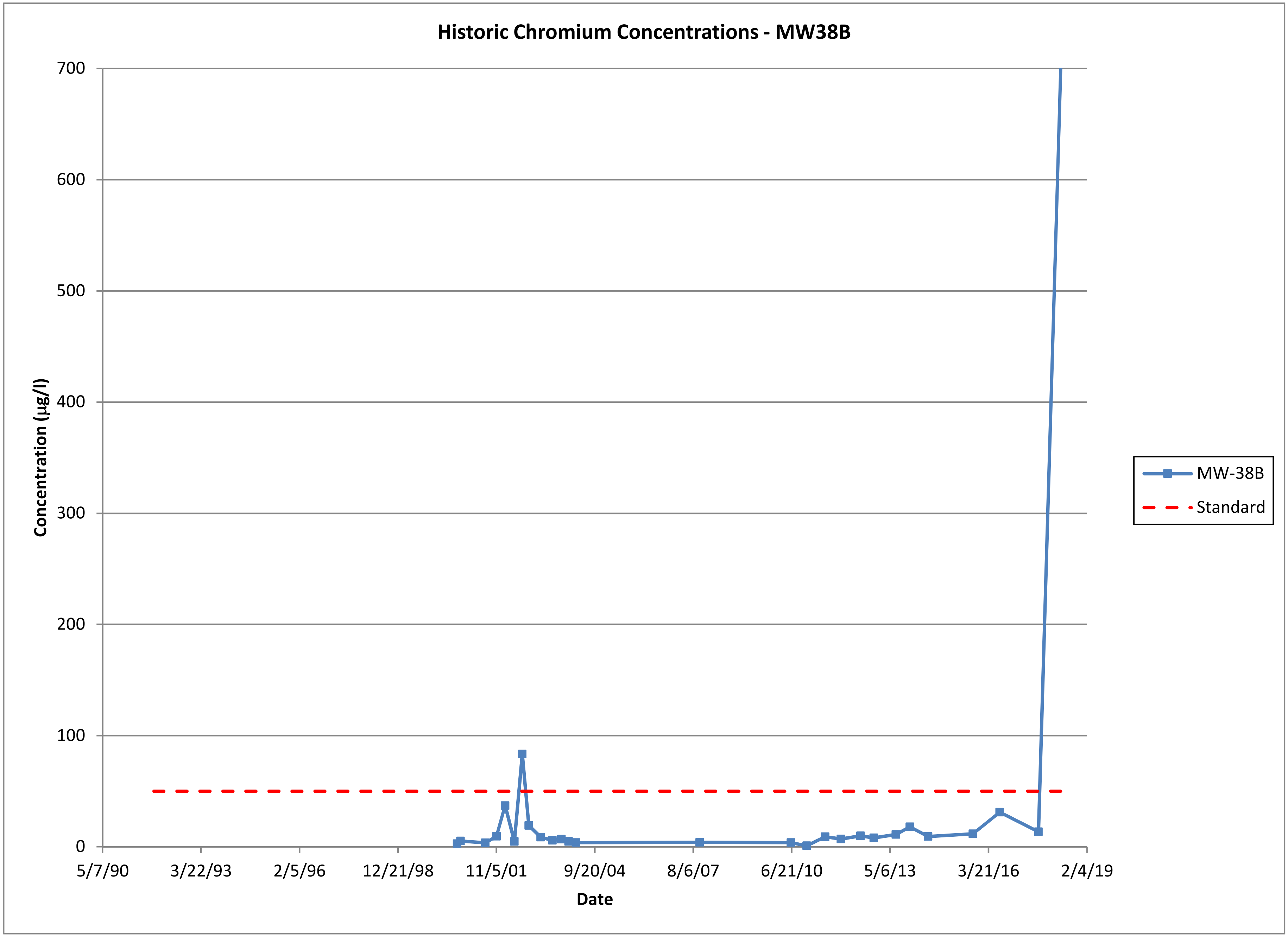


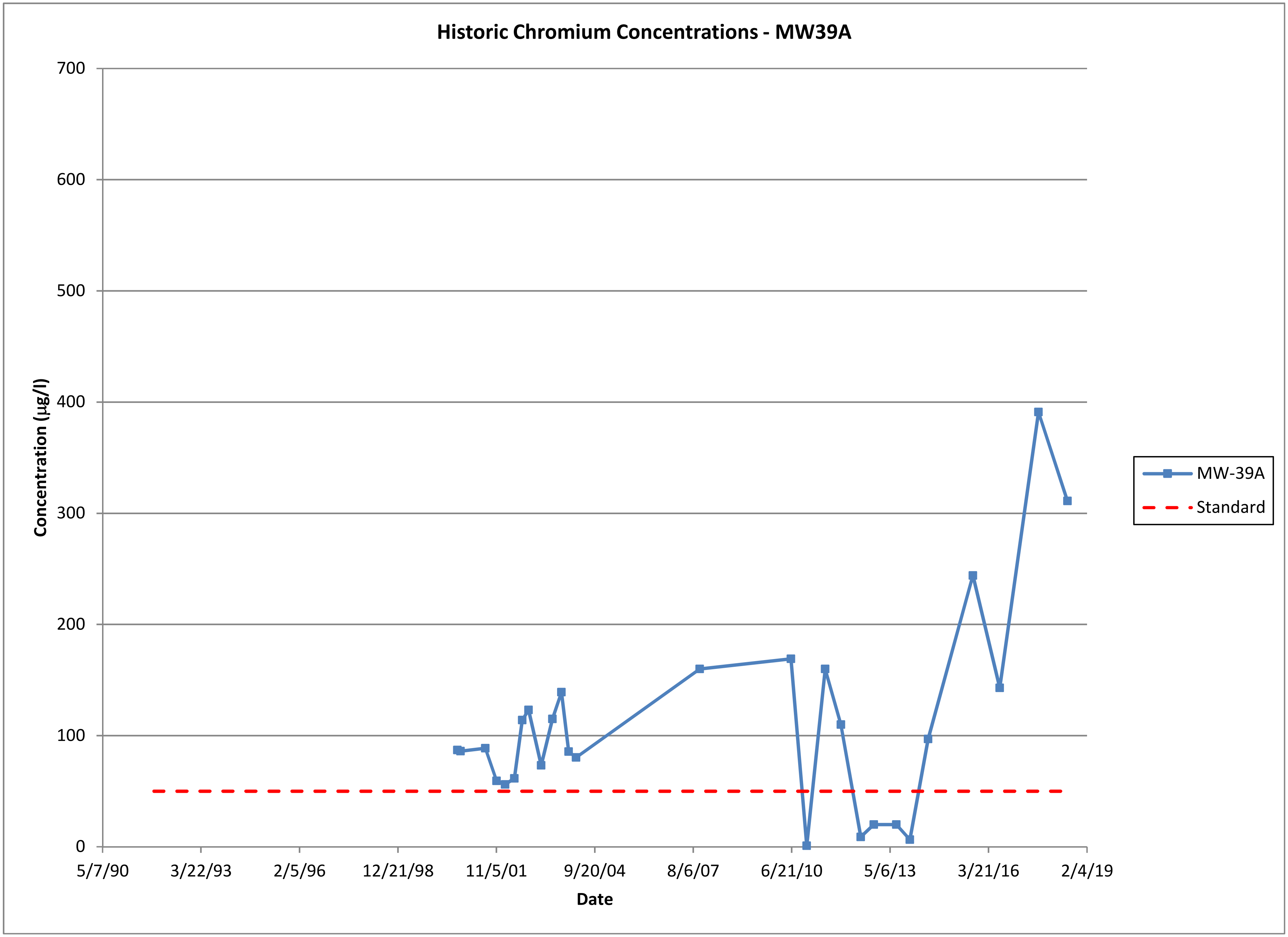
Historic Chromium Concentrations - MW29B
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-29B
Standard


Historic Chromium Concentrations - MW36B
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-36B
Standard

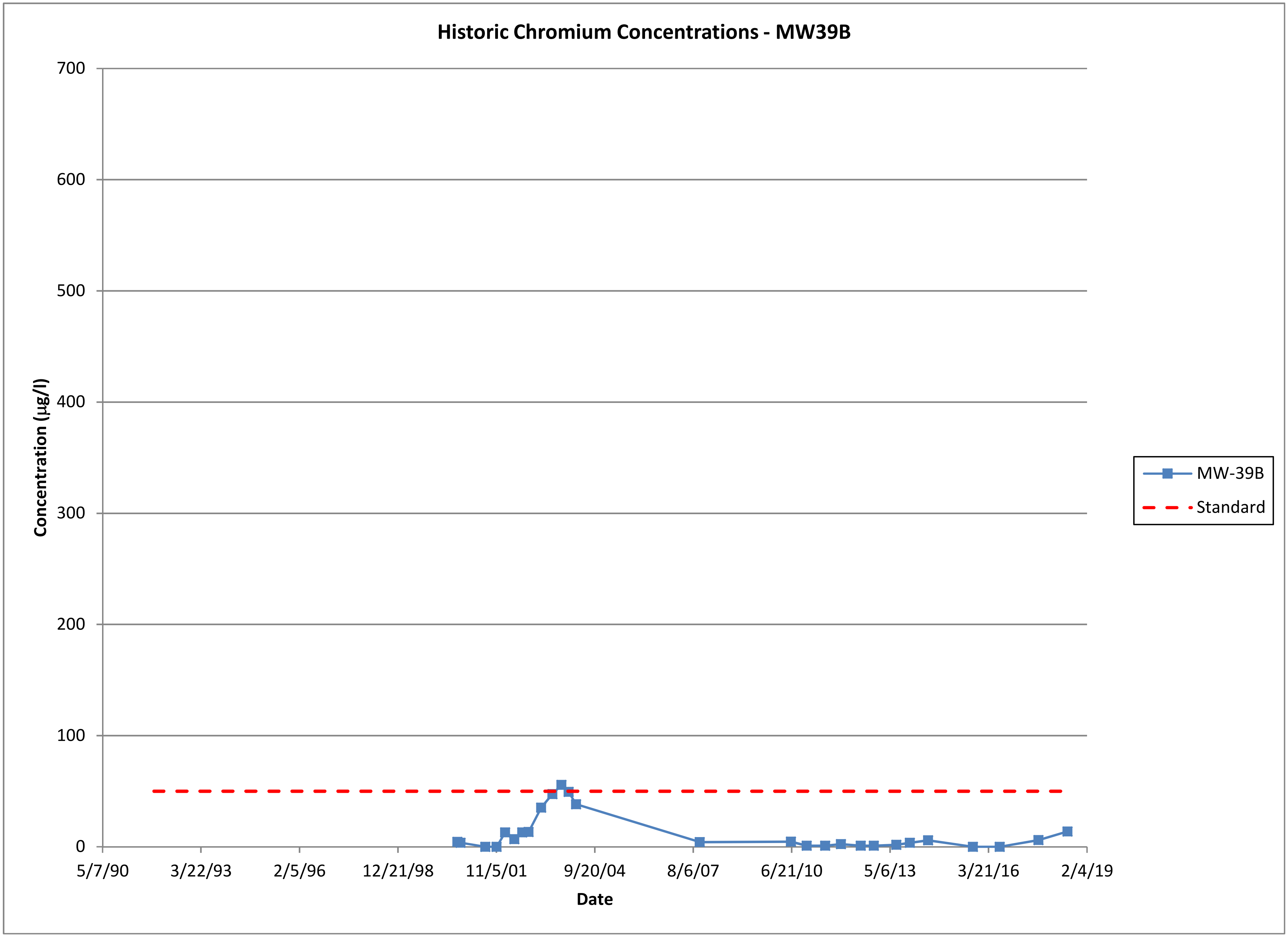


Historic Chromium Concentrations - MW38A
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-38A
Standard

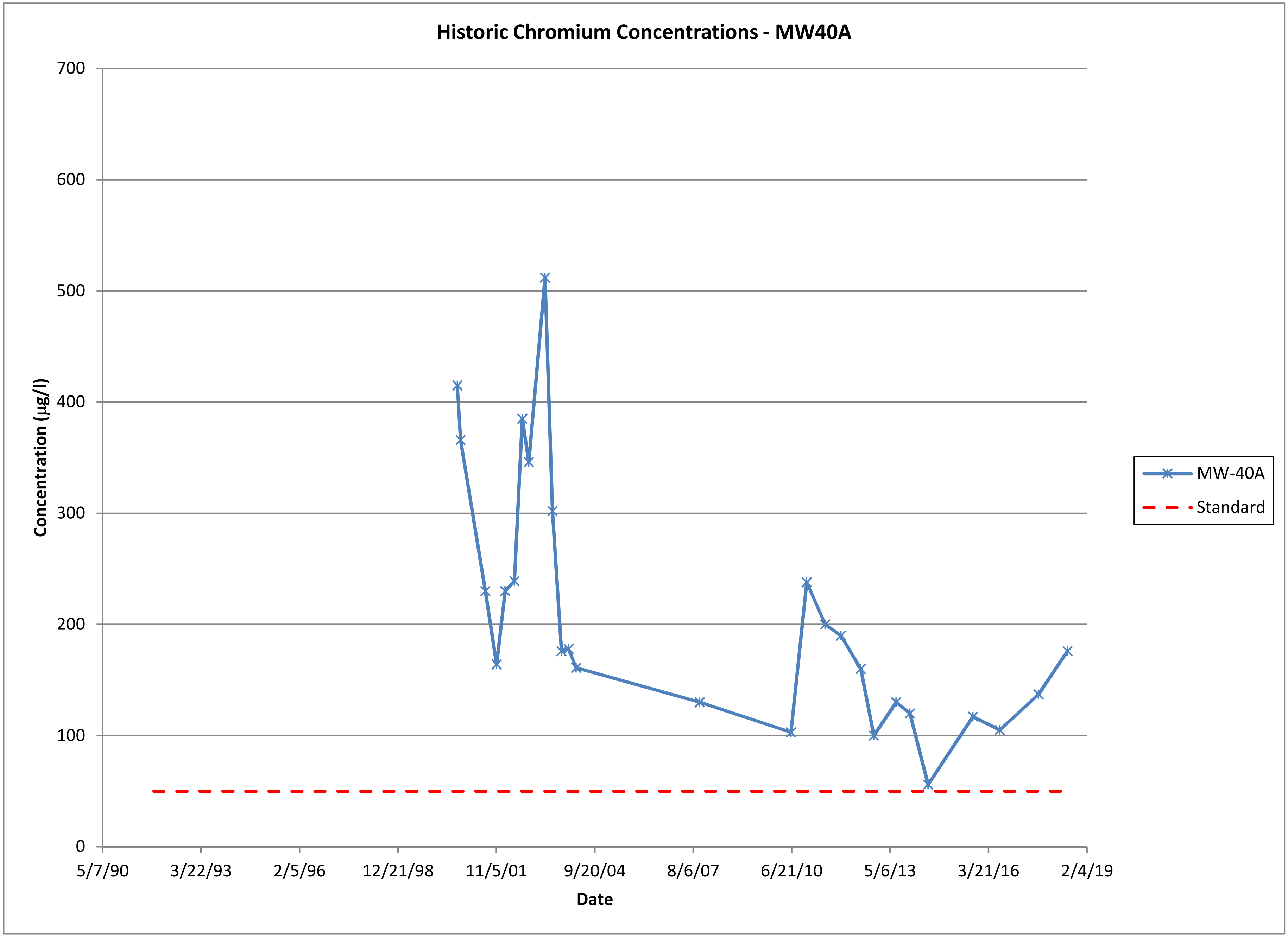

Historic Chromium Concentrations - MW38B
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-38B
Standard



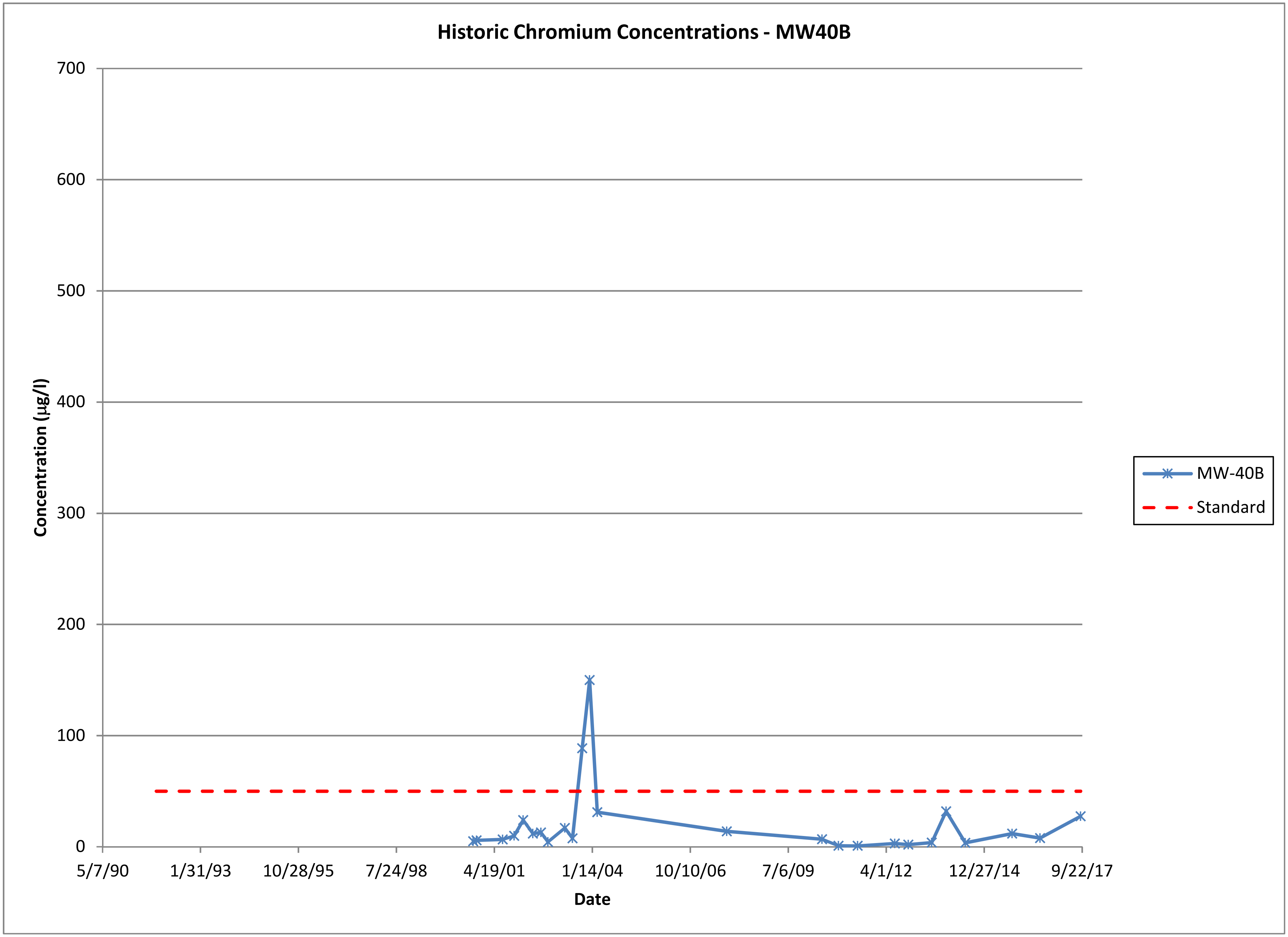
Historic Chromium Concentrations - MW39A
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-39A
Standard



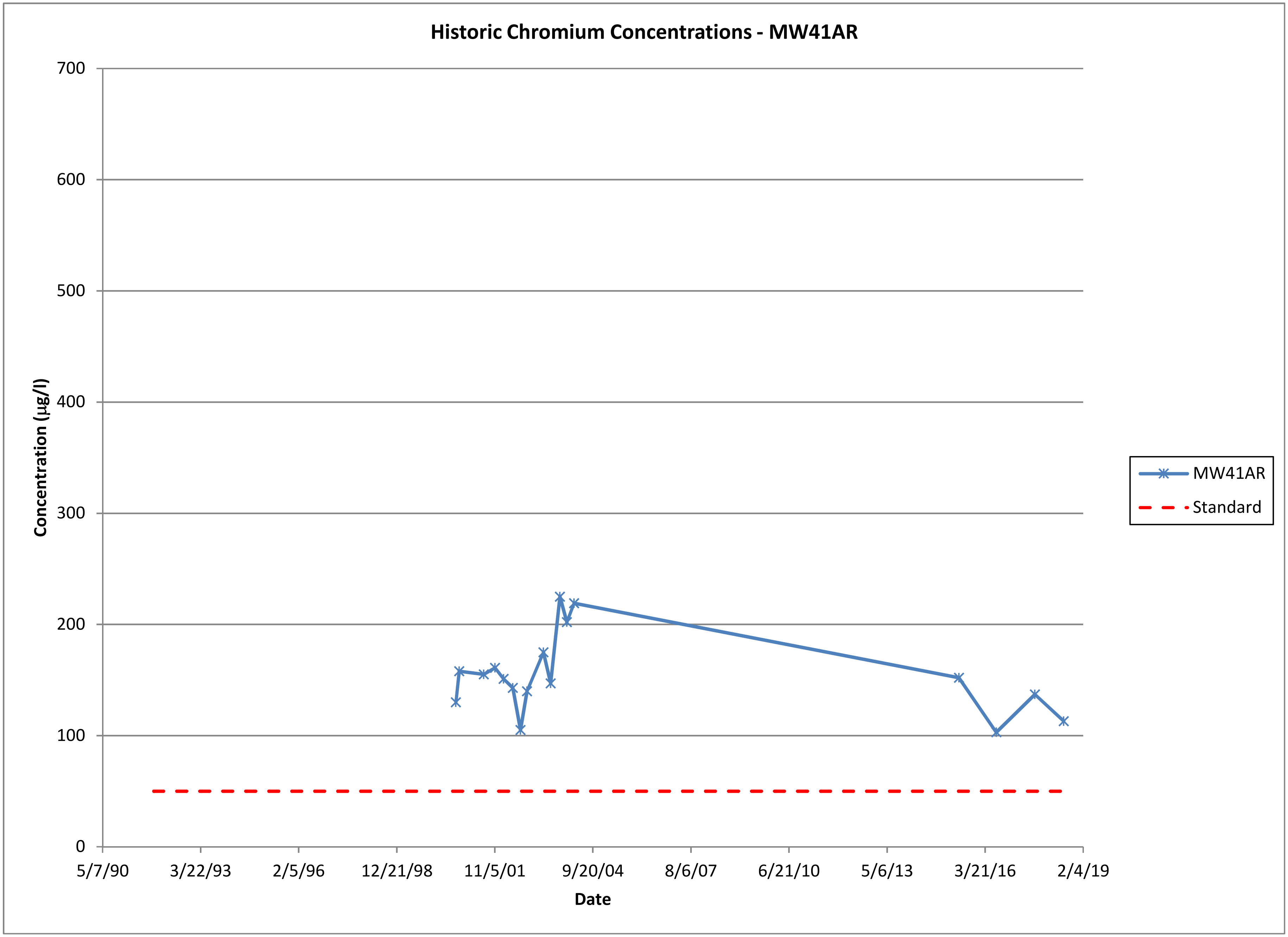
Historic Chromium Concentrations - MW39B
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-39B
Standard



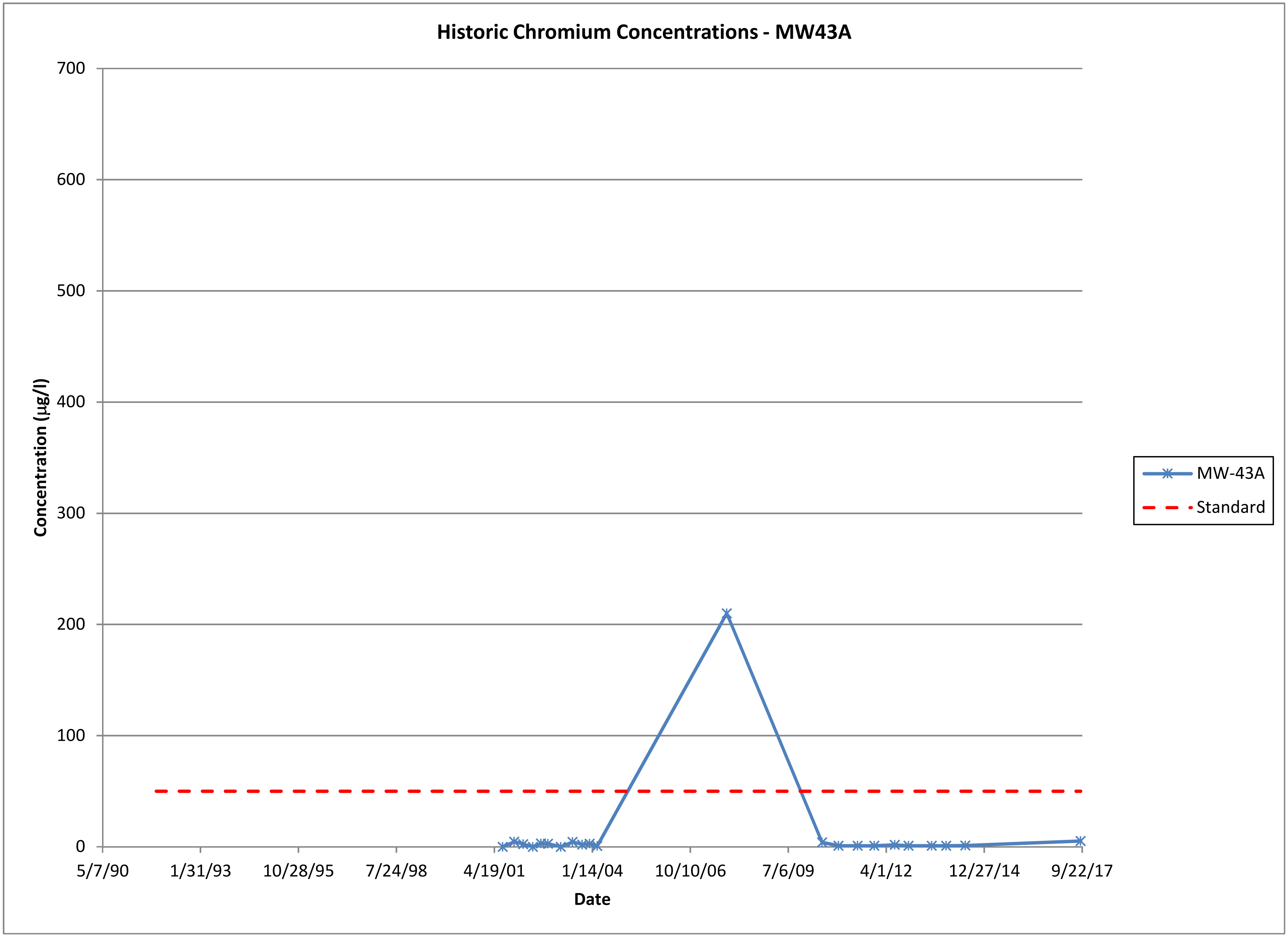
Historic Chromium Concentrations - MW40A
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-40A
Standard



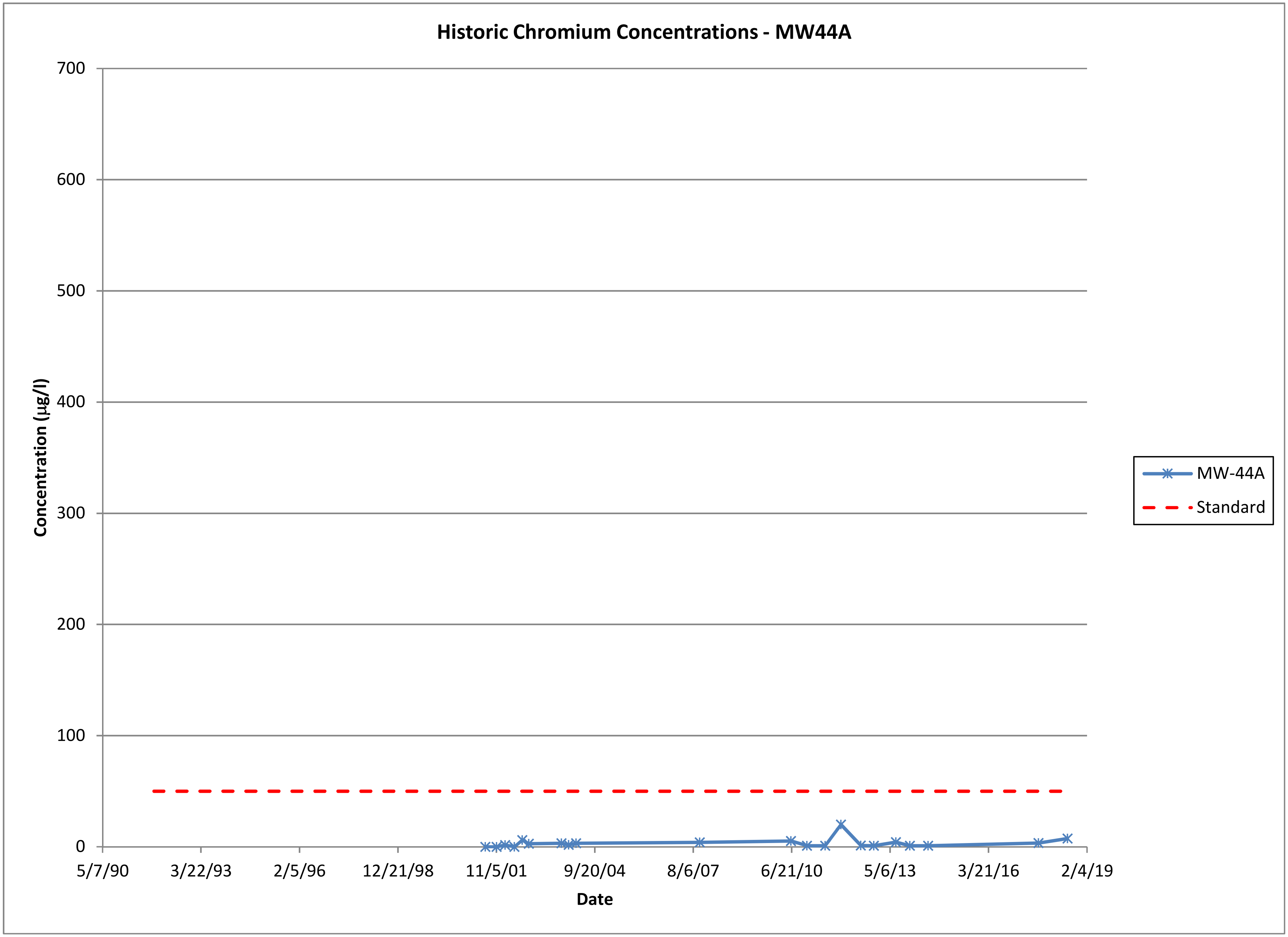
Historic Chromium Concentrations - MW40B
Concentration (µg/l)
0
100
200
300
400
500
600
700
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-40B
Standard



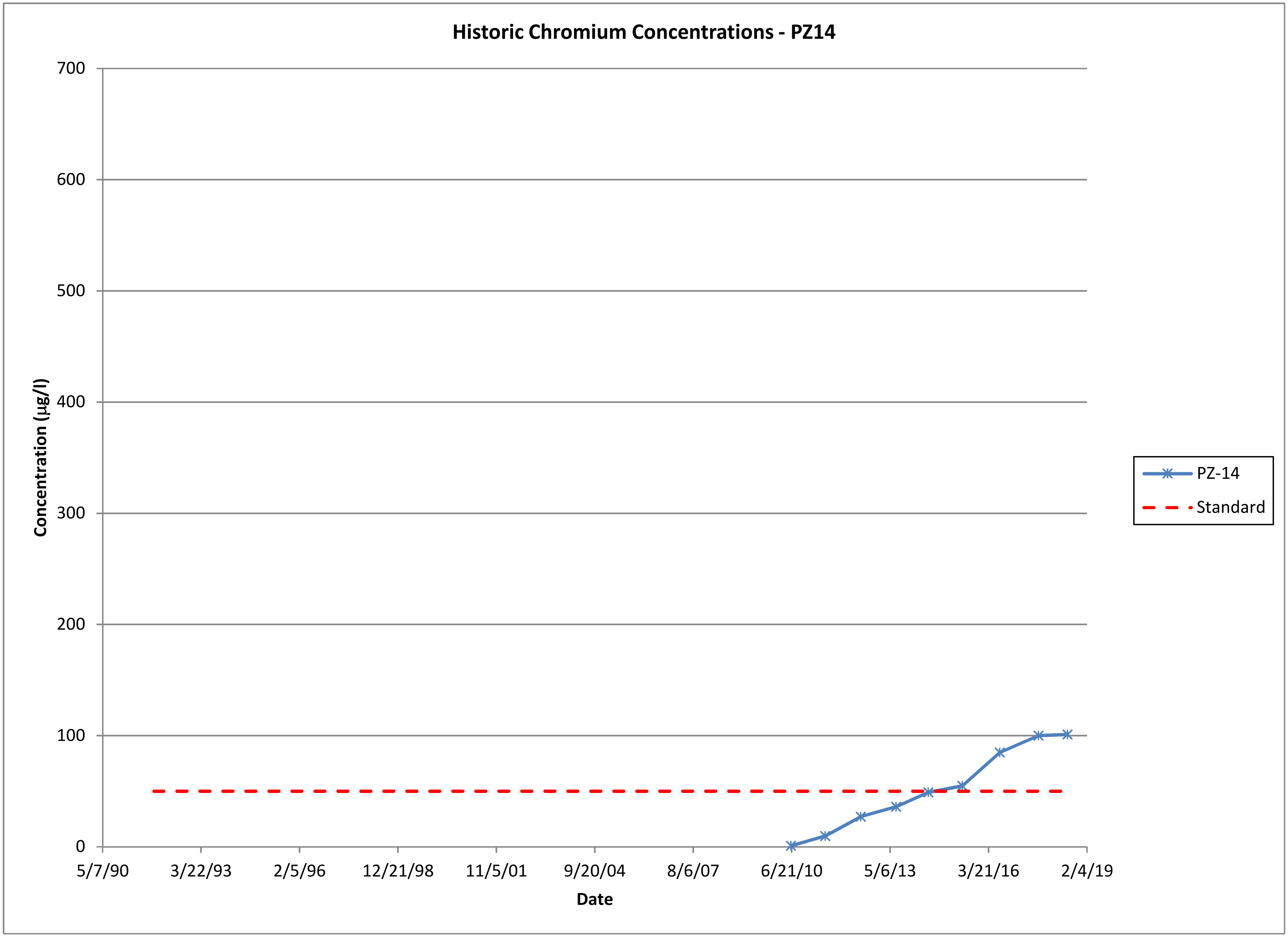
Historic Chromium Concentrations - MW41AR
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW41AR
Standard

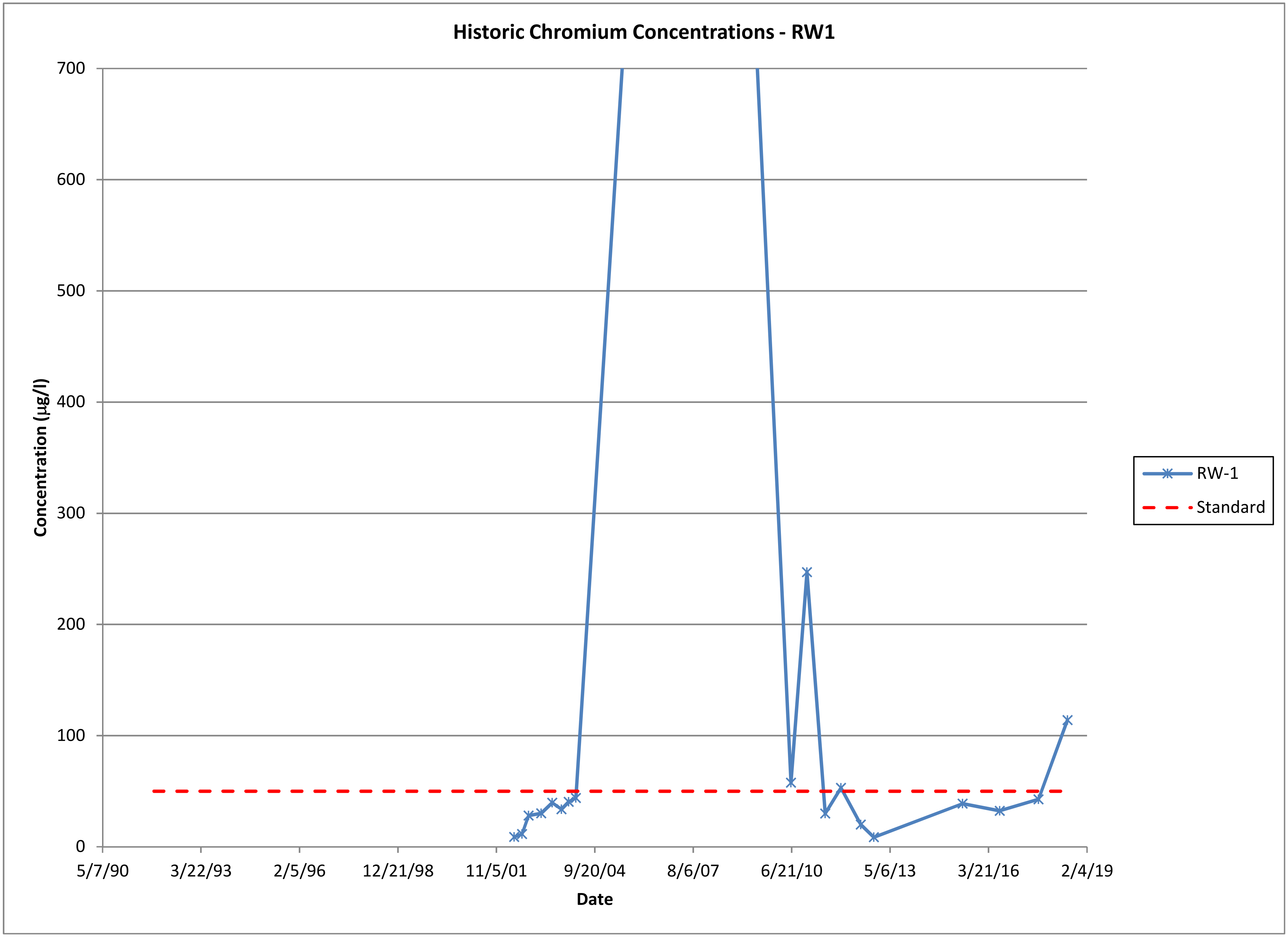


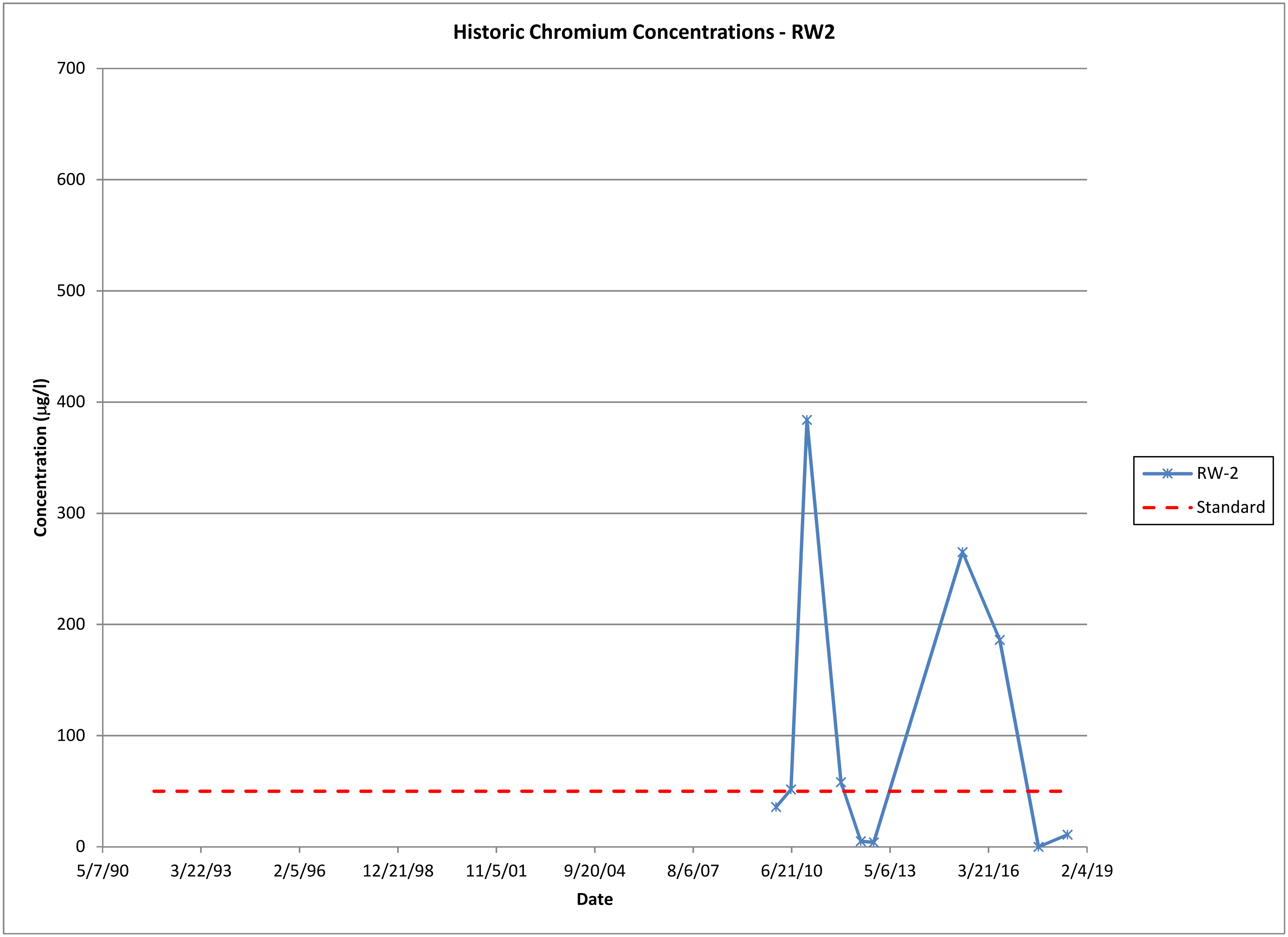
Historic Chromium Concentrations - MW43A
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-43A
Standard



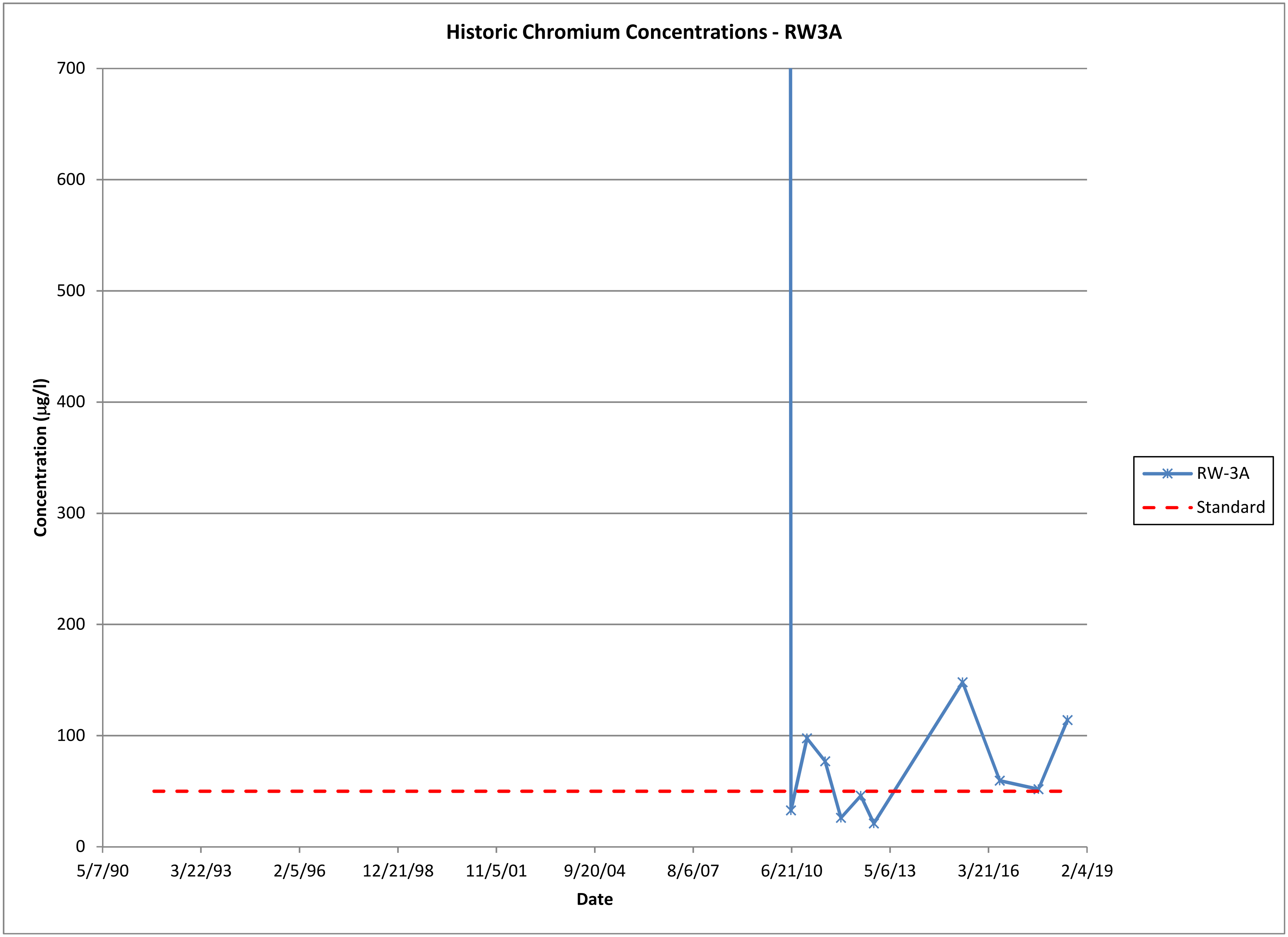
Historic Chromium Concentrations - MW44A
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-44A
Standard


Historic Chromium Concentrations - PZ14
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
PZ-14
Standard

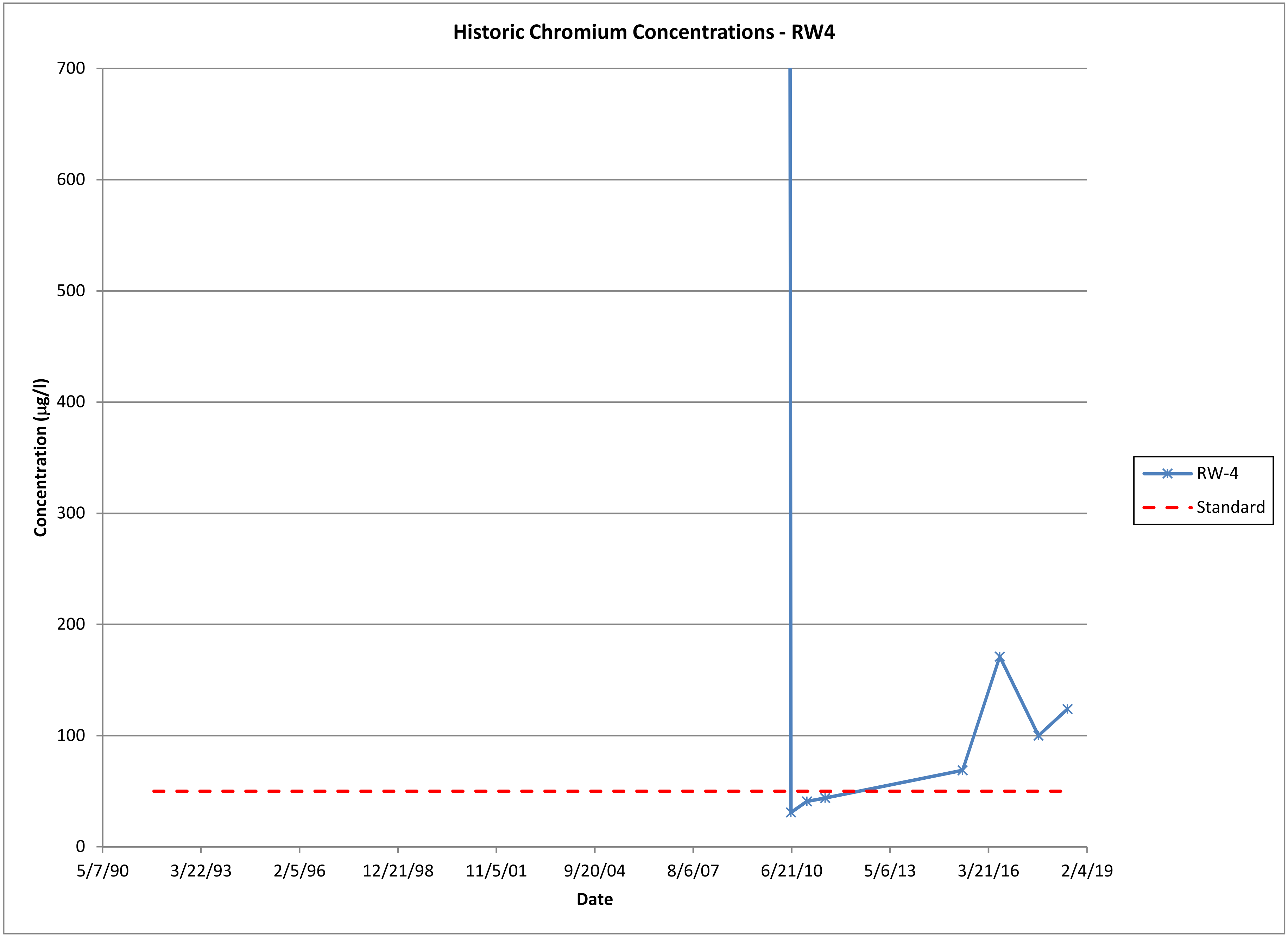

Historic Chromium Concentrations - RW1
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-1
Standard

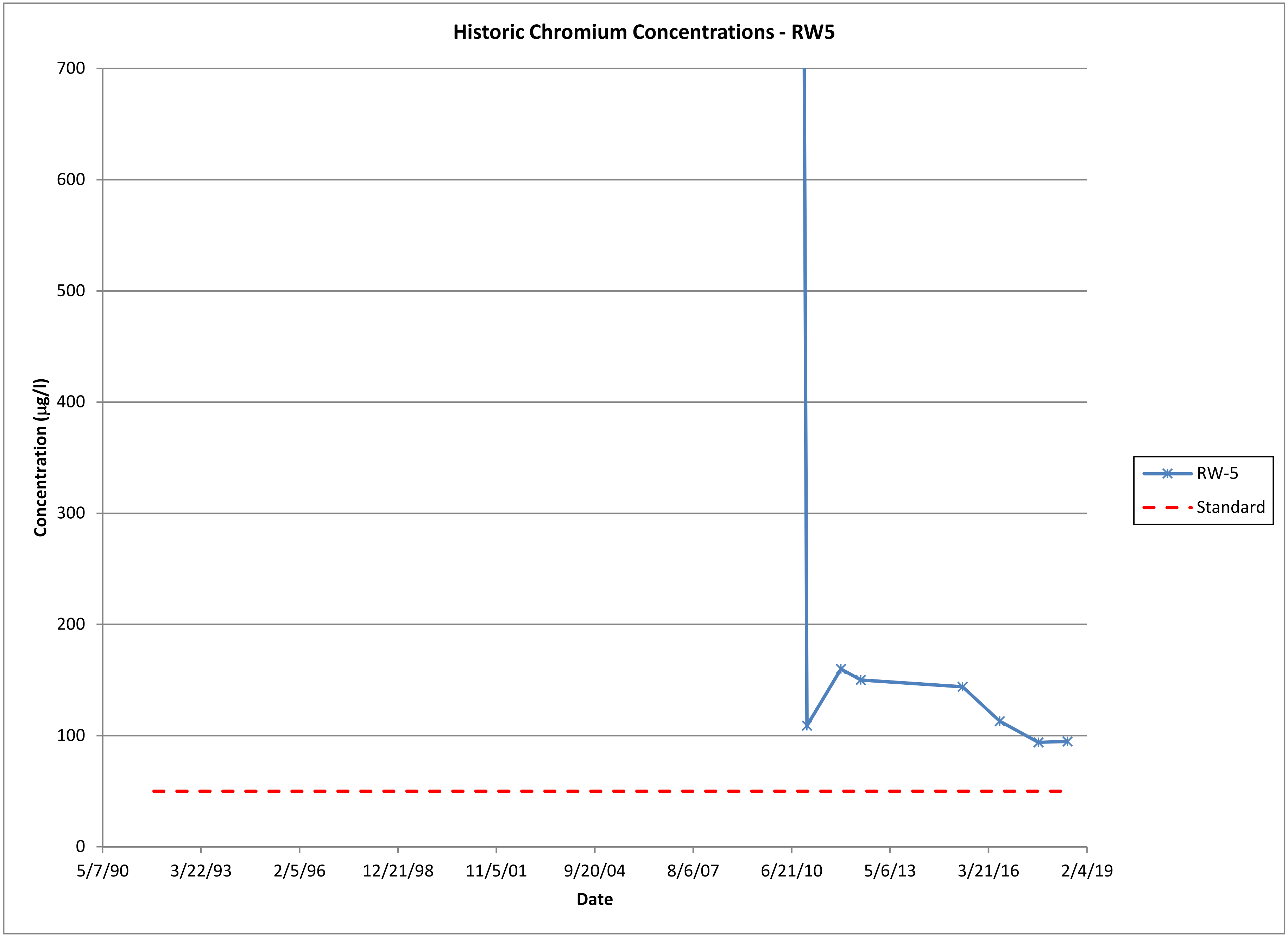


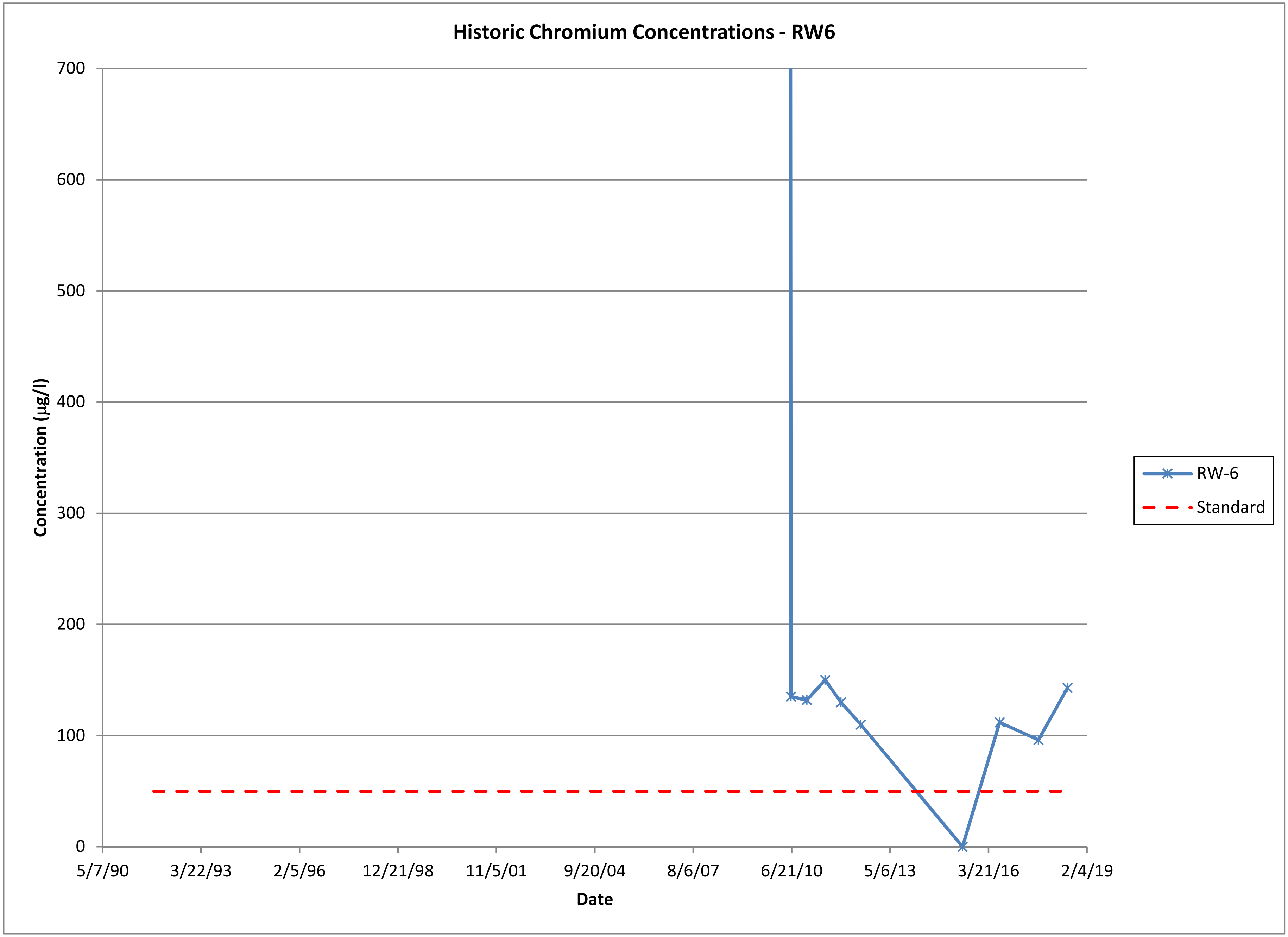
Historic Chromium Concentrations - RW2
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-2
Standard



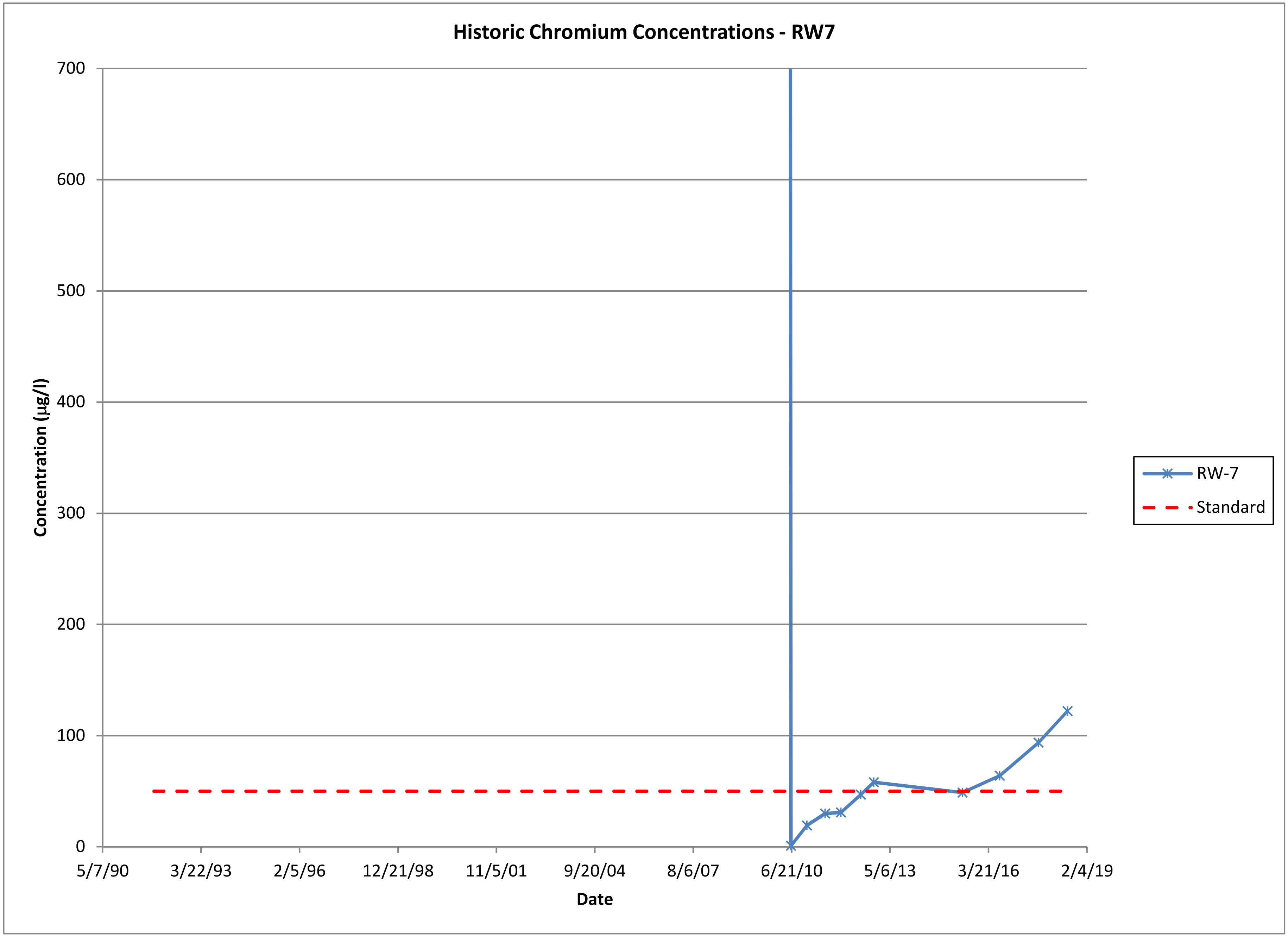
Historic Chromium Concentrations - RW3A
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-3A
Standard

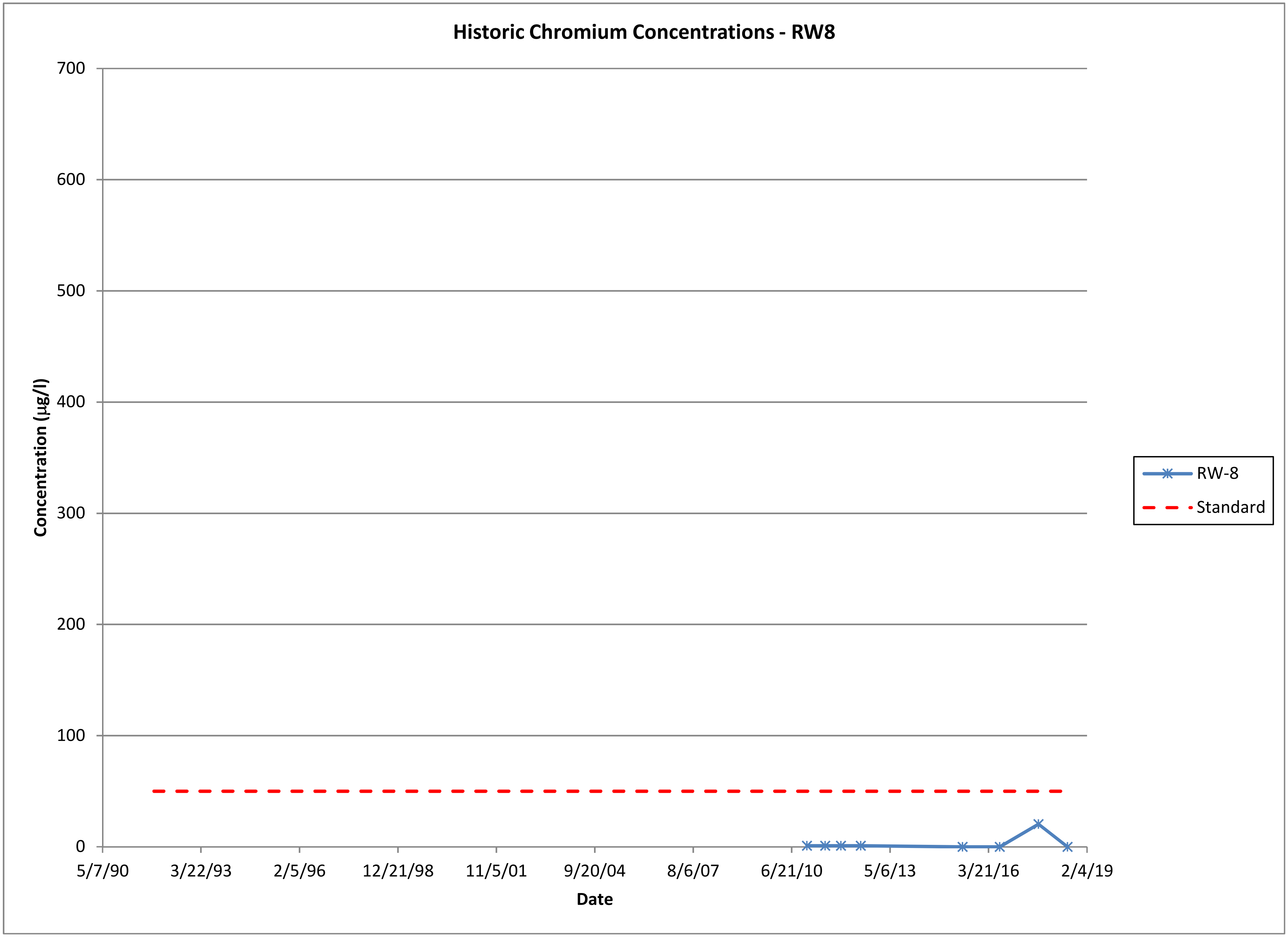

Historic Chromium Concentrations - RW4
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-4
Standard


Historic Chromium Concentrations - RW5
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-5
Standard

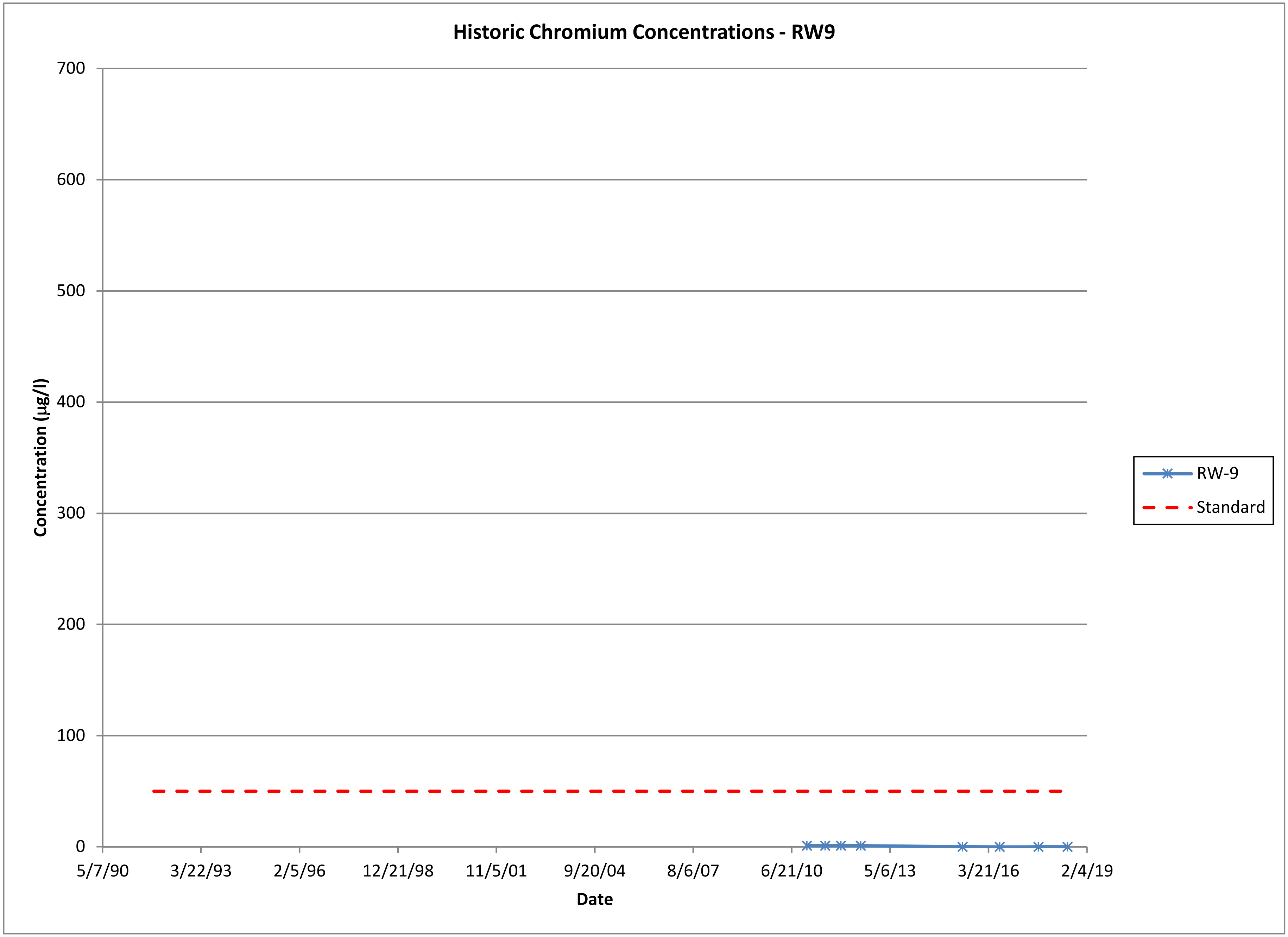


Historic Chromium Concentrations - RW6
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-6
Standard

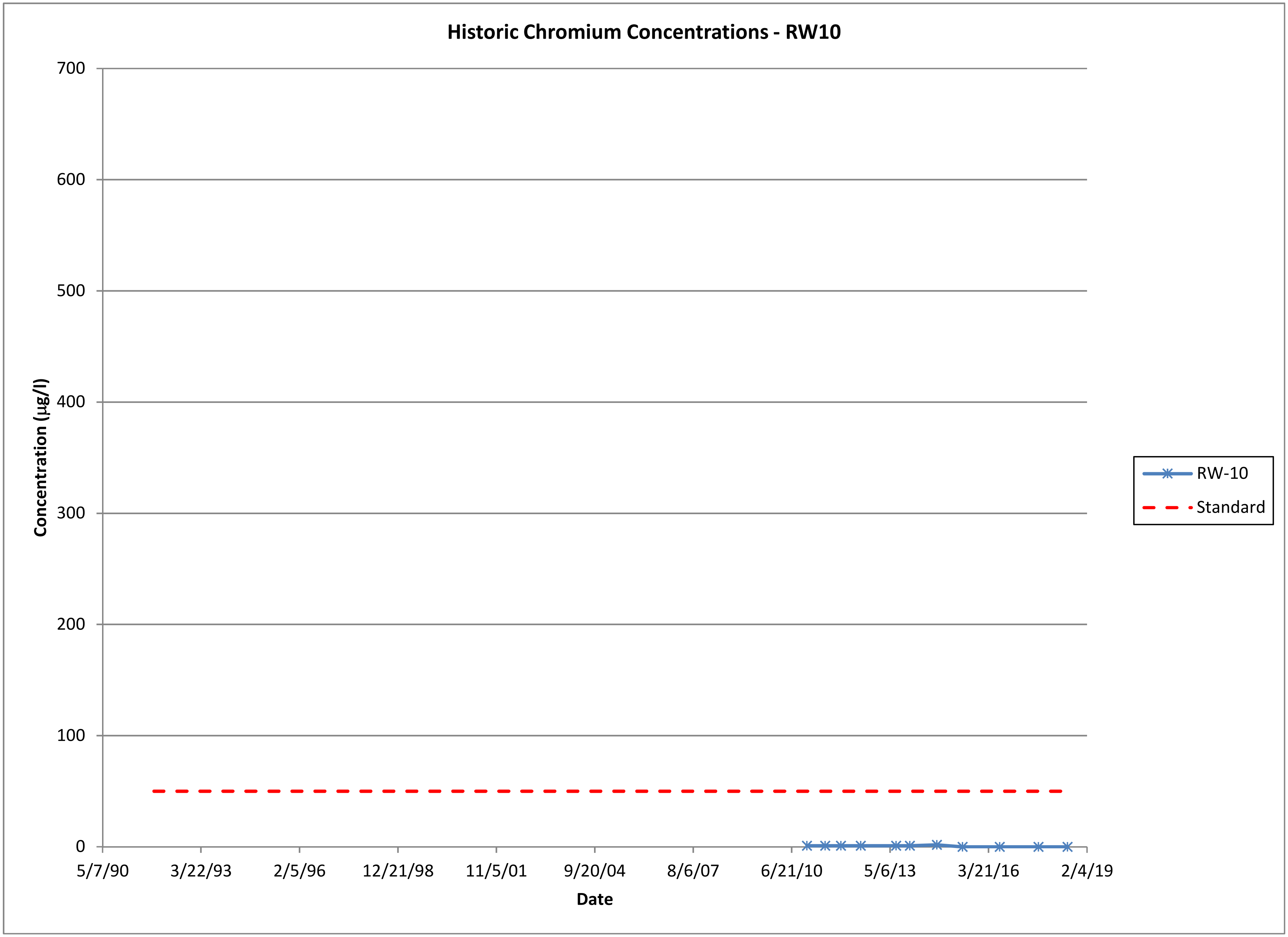

Historic Chromium Concentrations - RW7
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-7
Standard

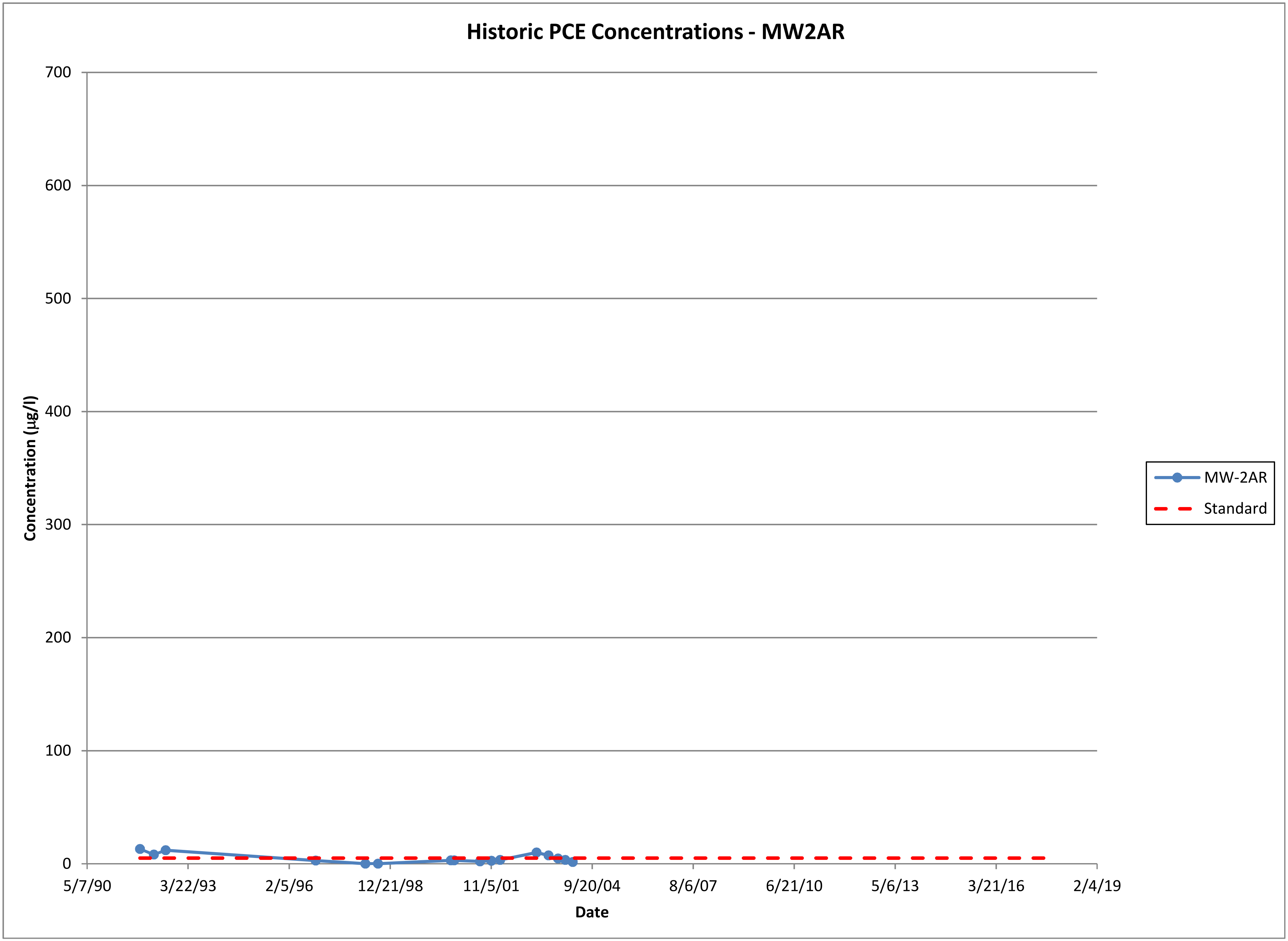


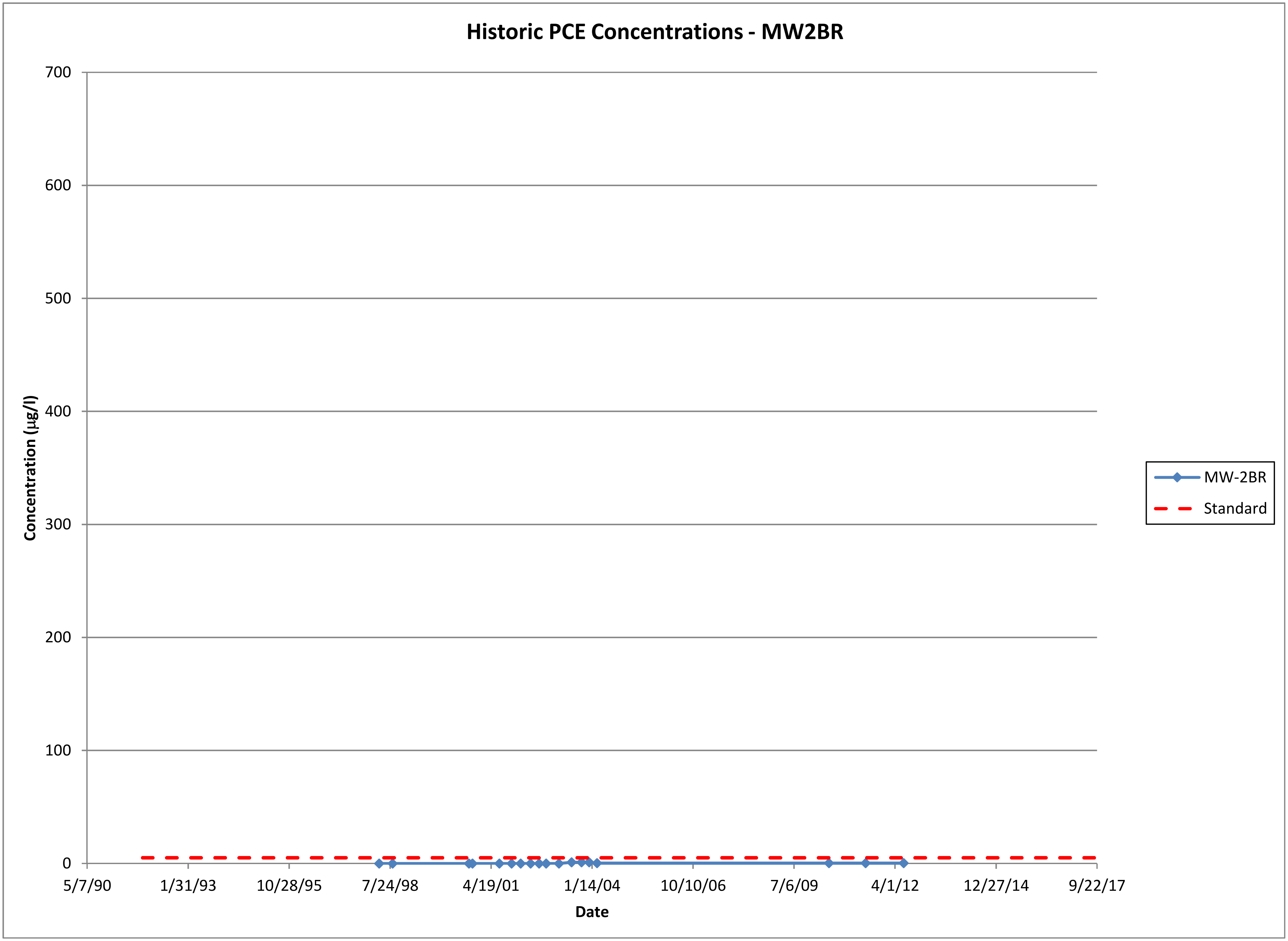
Historic Chromium Concentrations - RW8
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-8
Standard

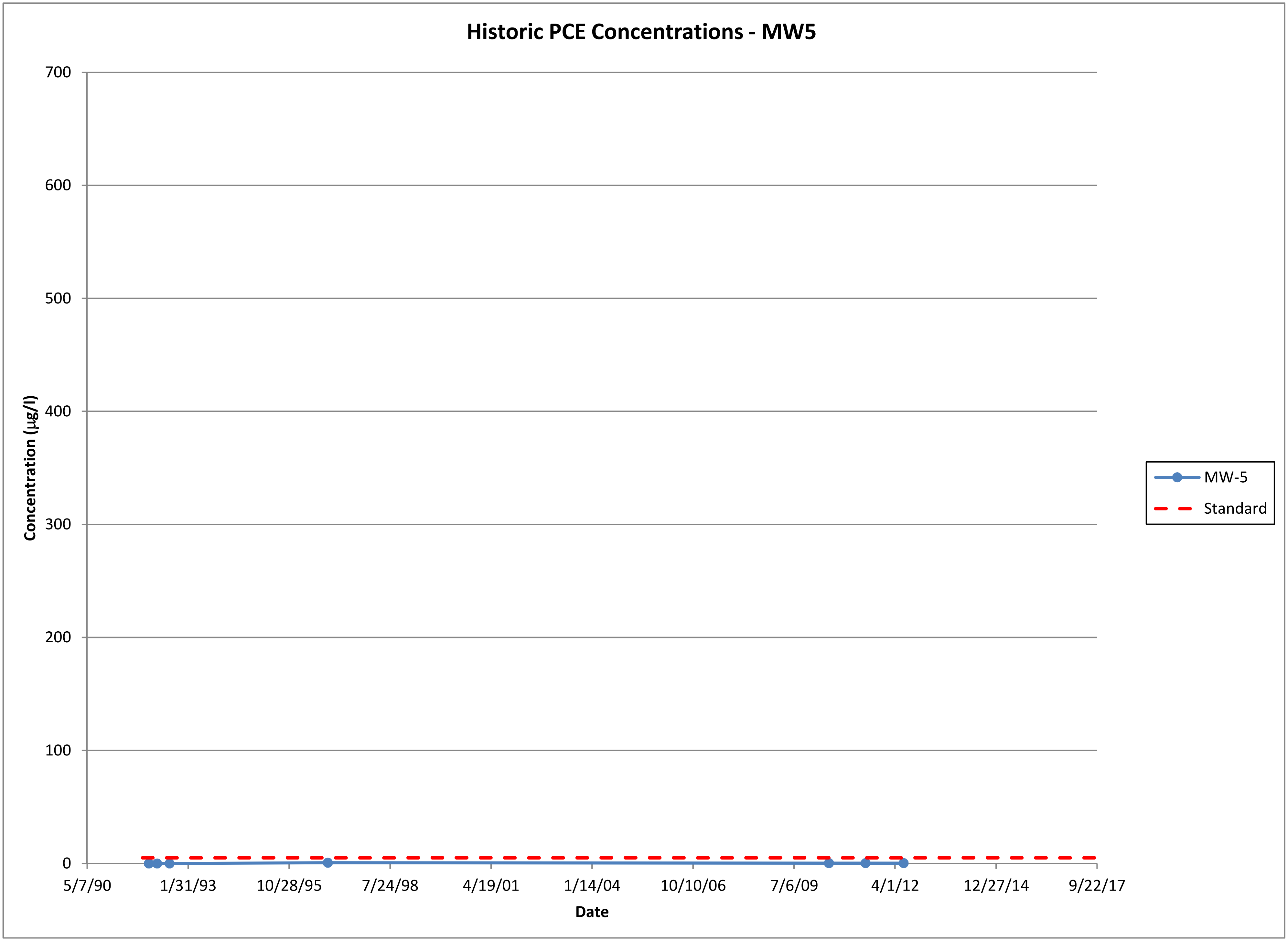


Historic Chromium Concentrations - RW9
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-9
Standard

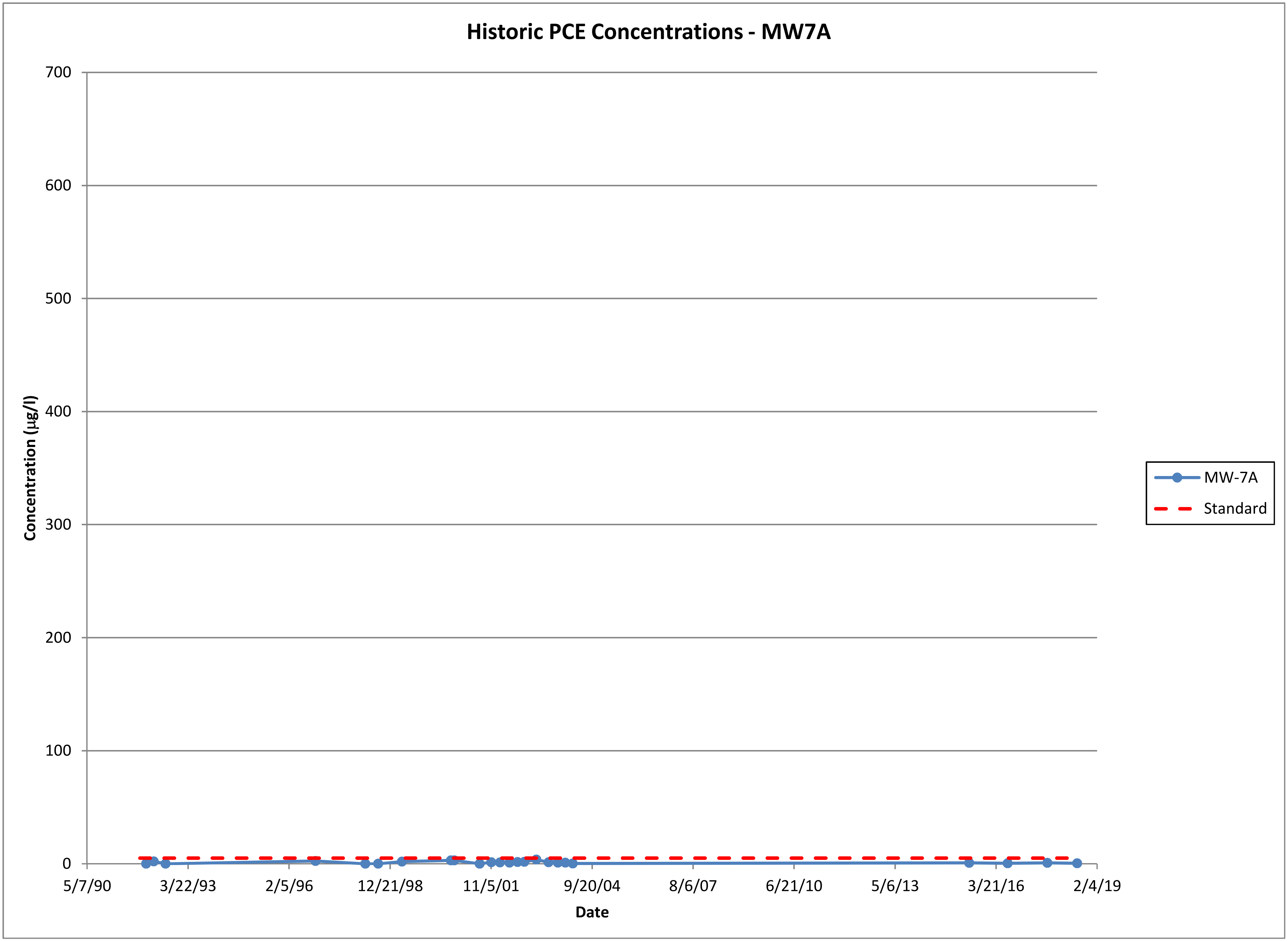

Historic Chromium Concentrations - RW10
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-10
Standard

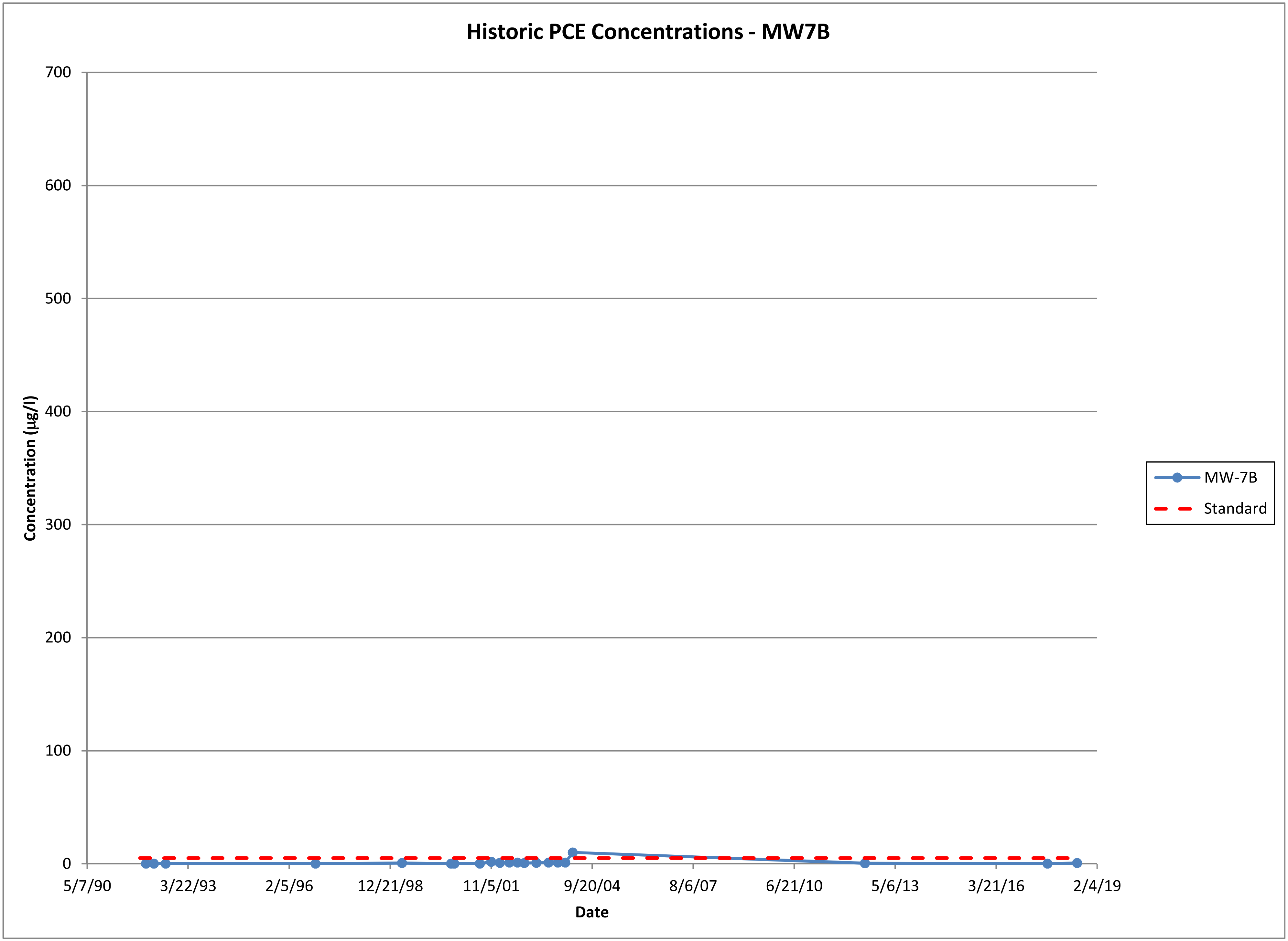

Historic PCE Concentrations - MW2AR
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-2AR
Standard


Historic PCE Concentrations - MW2BR
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-2BR
Standard

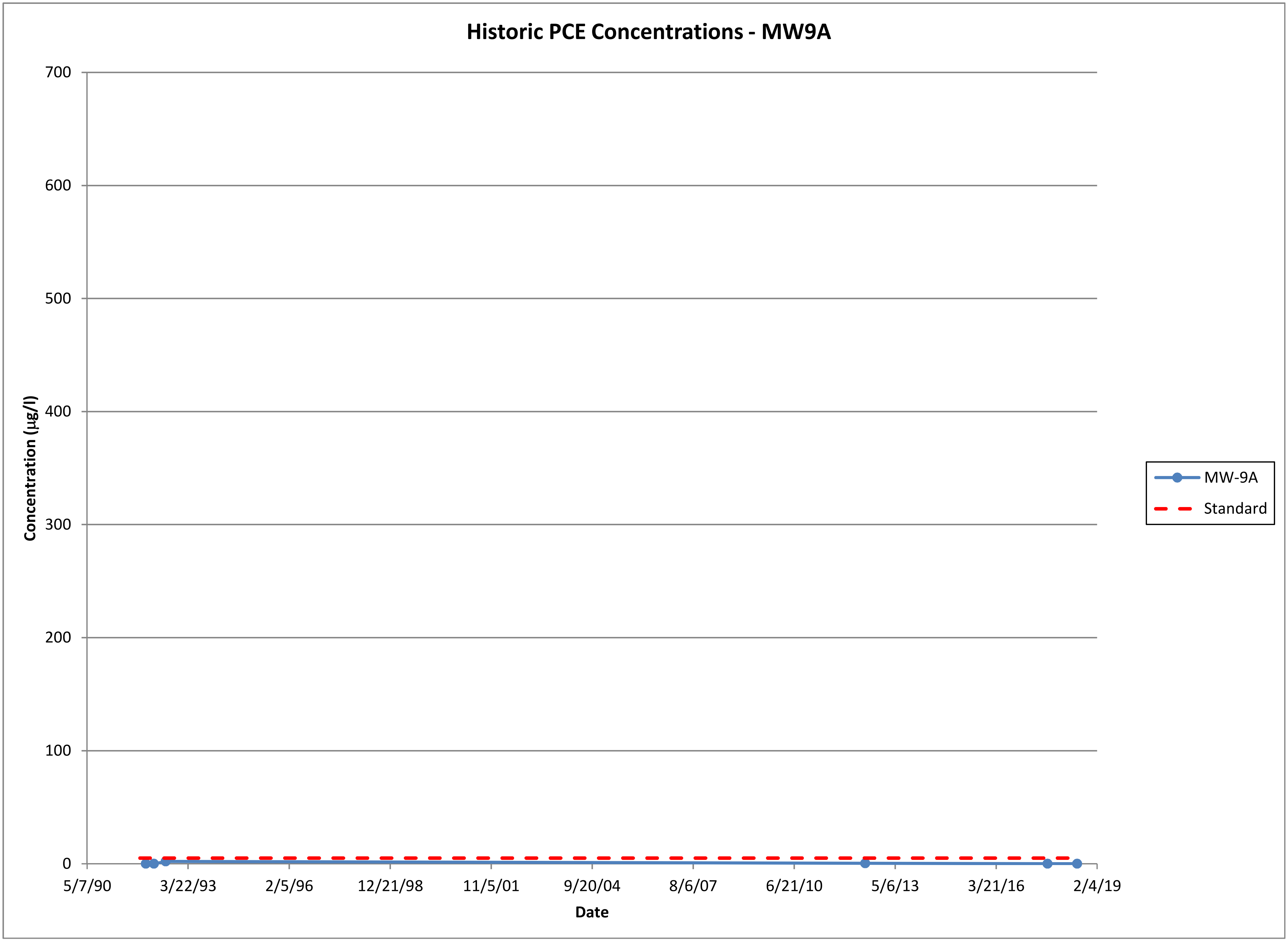


Historic PCE Concentrations - MW5
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-5
Standard

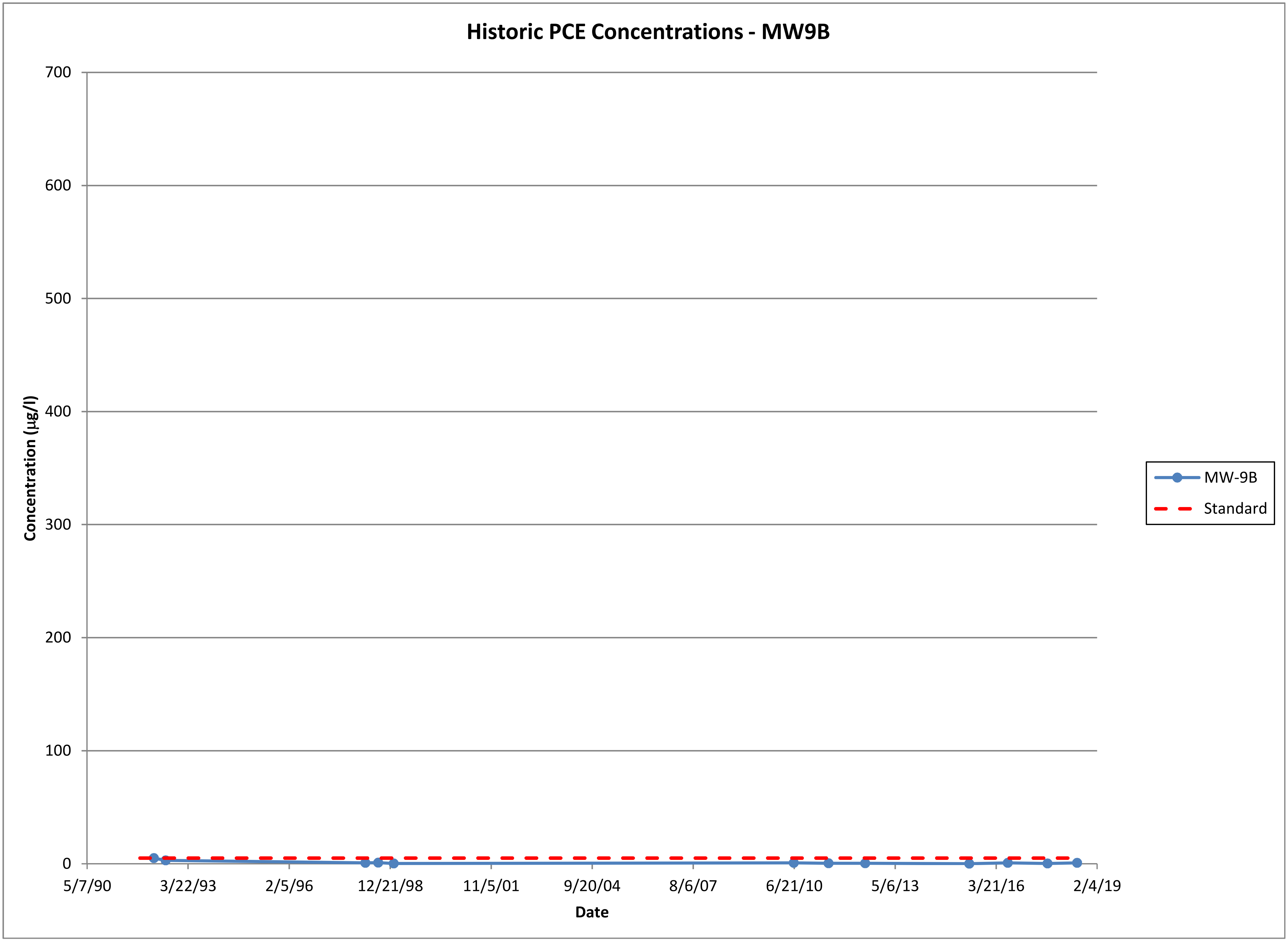

Historic PCE Concentrations - MW7A
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-7A
Standard



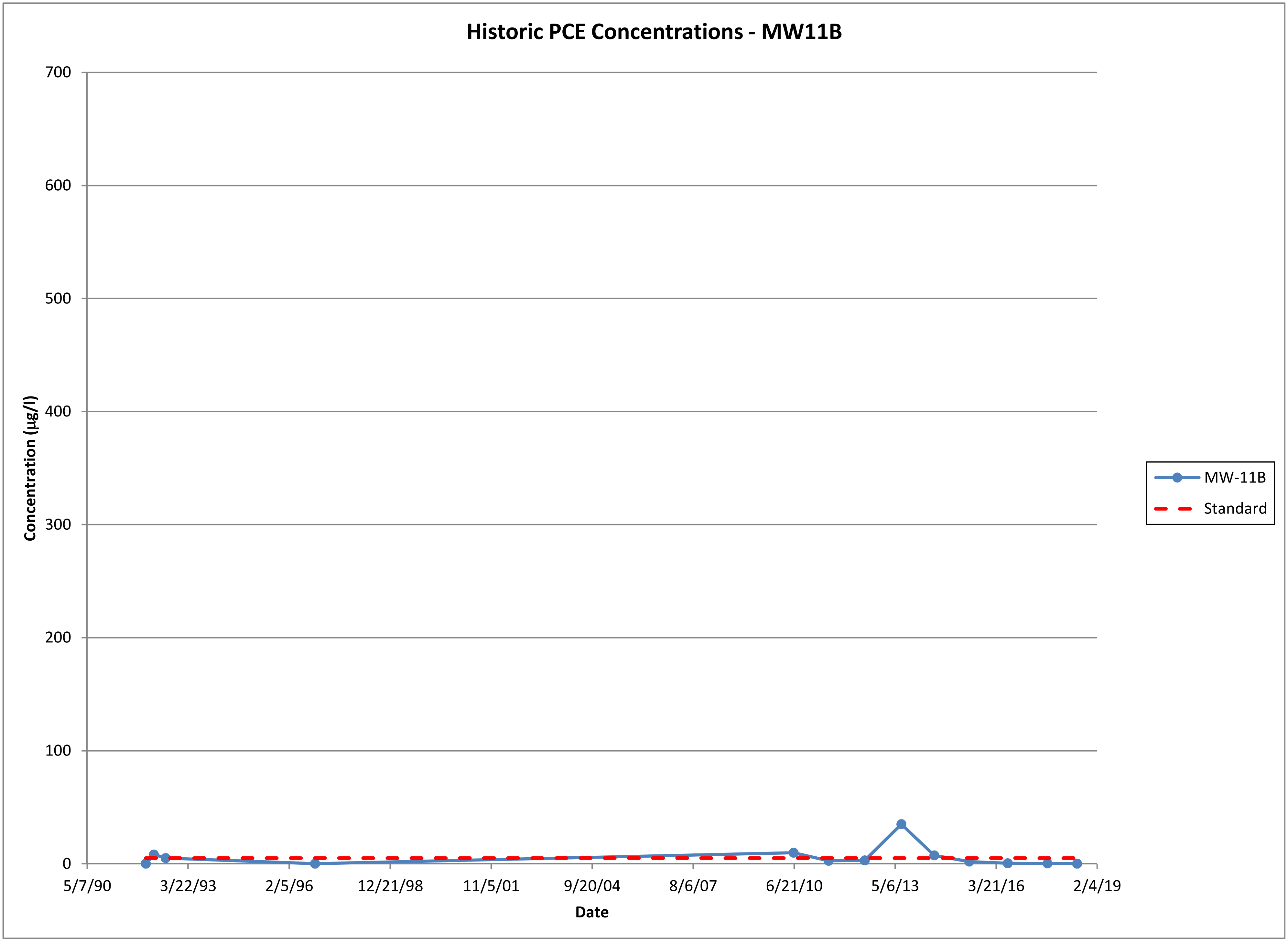
Historic PCE Concentrations - MW7B
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-7B
Standard



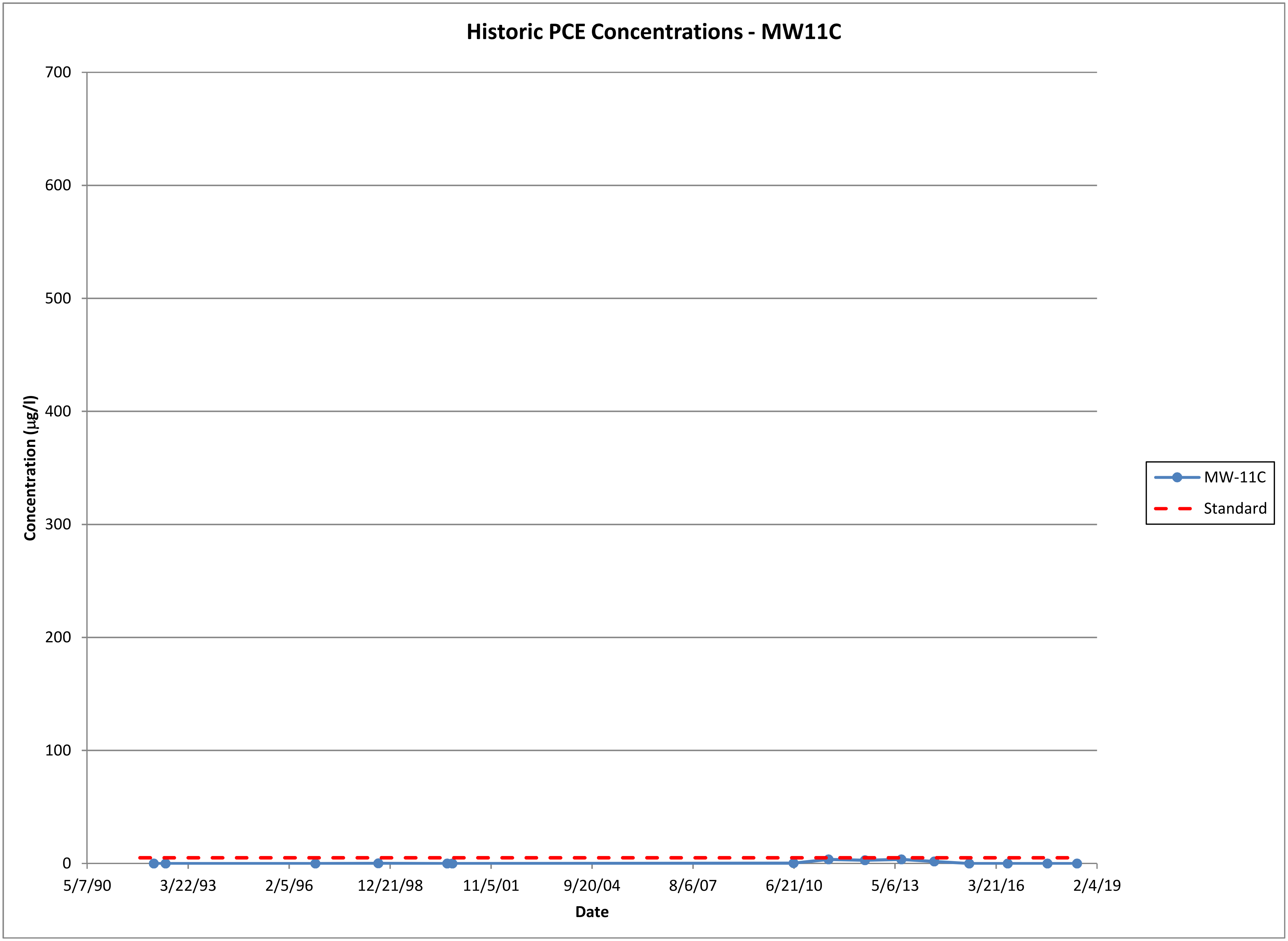
Historic PCE Concentrations - MW9A
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-9A
Standard



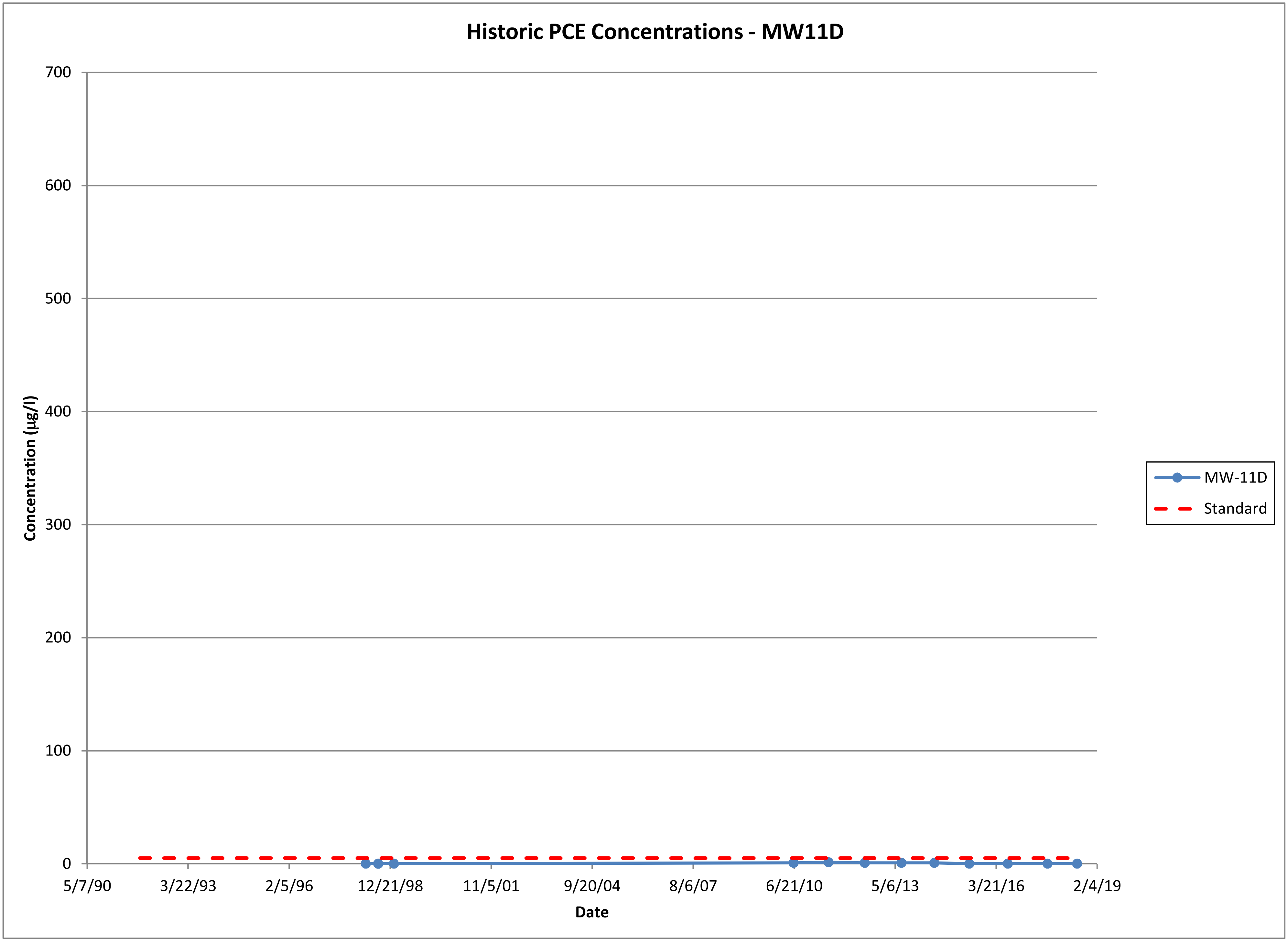
Historic PCE Concentrations - MW9B
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-9B
Standard

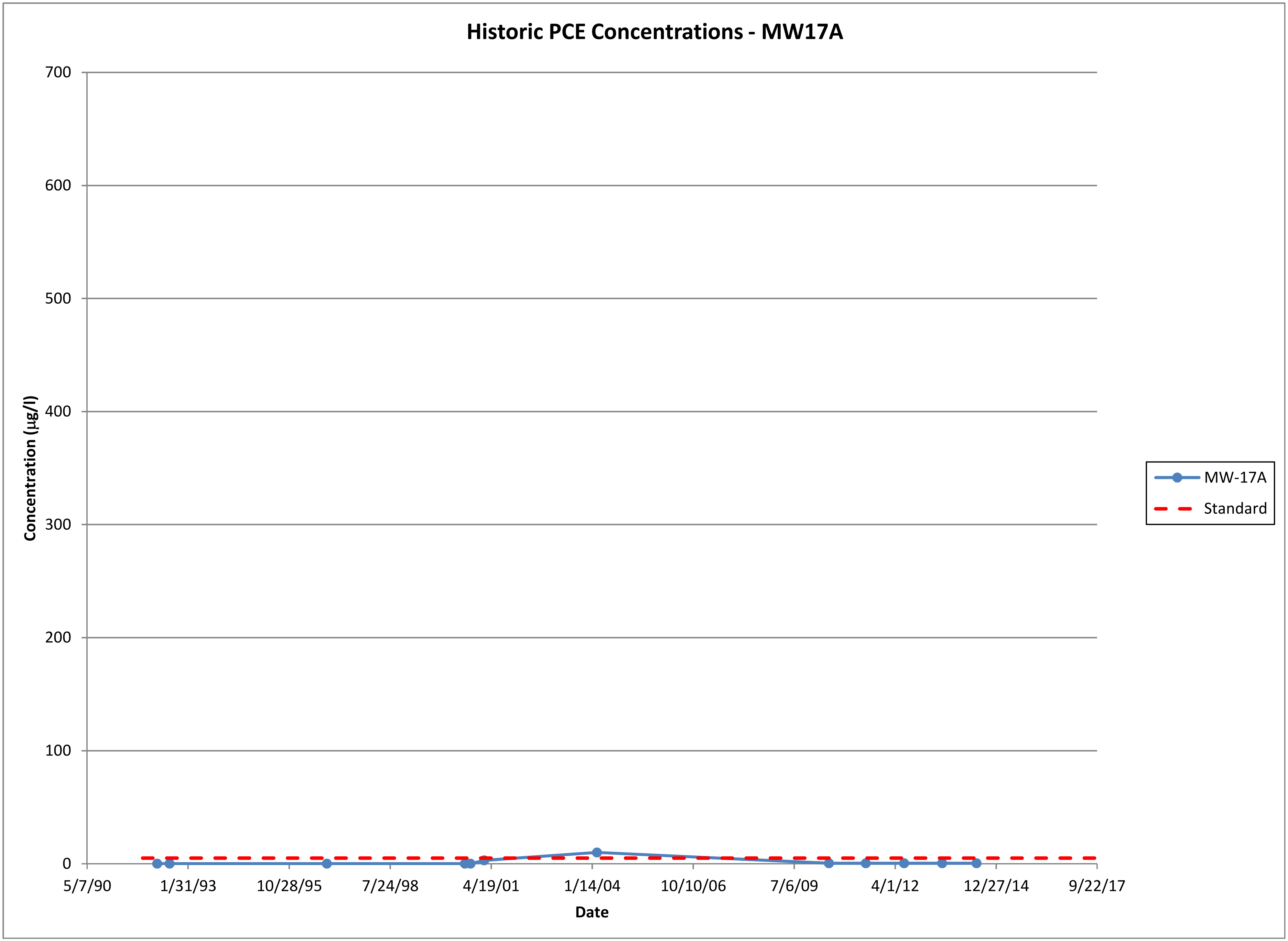


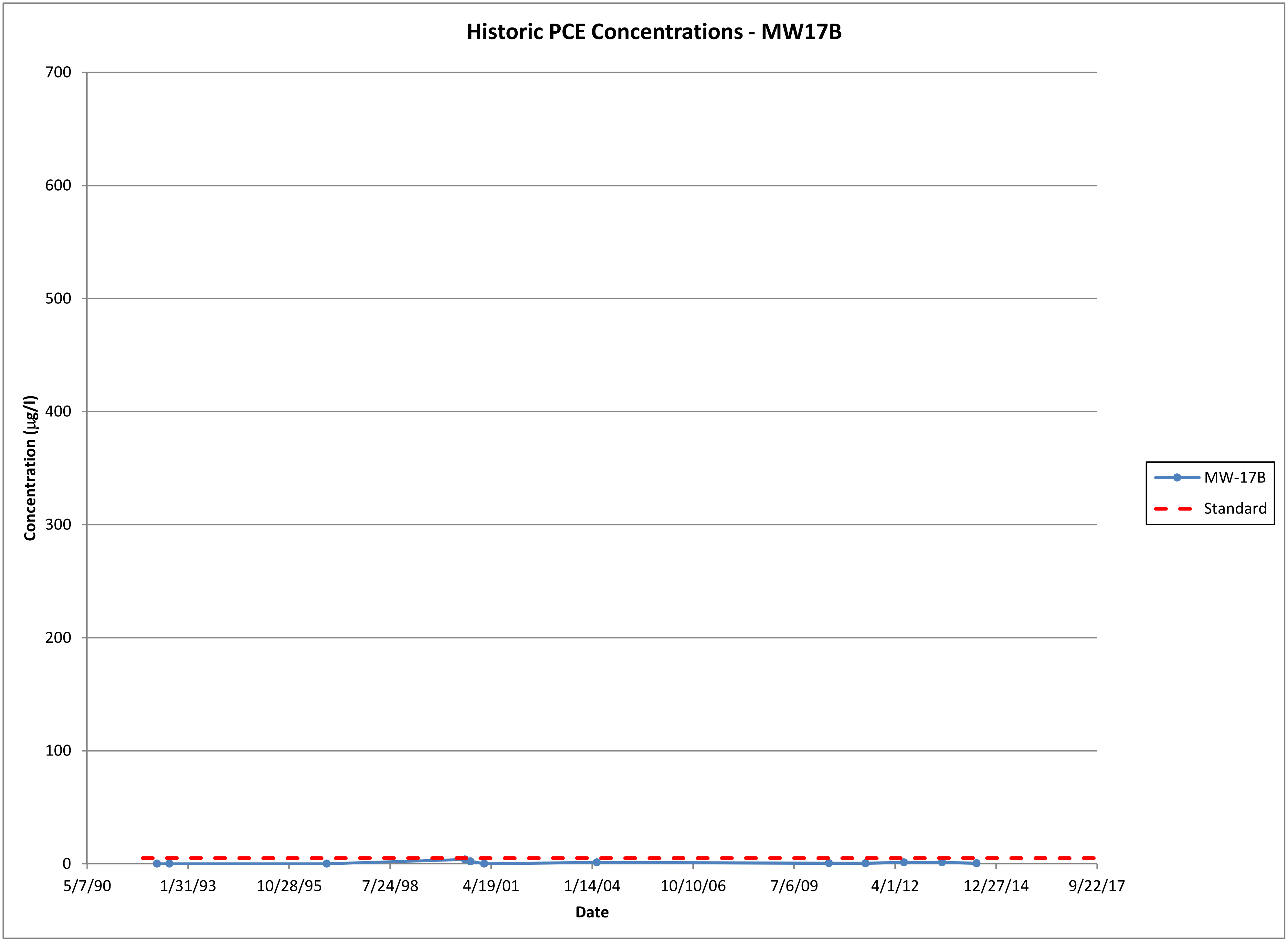
Historic PCE Concentrations - MW11B
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-11B
Standard

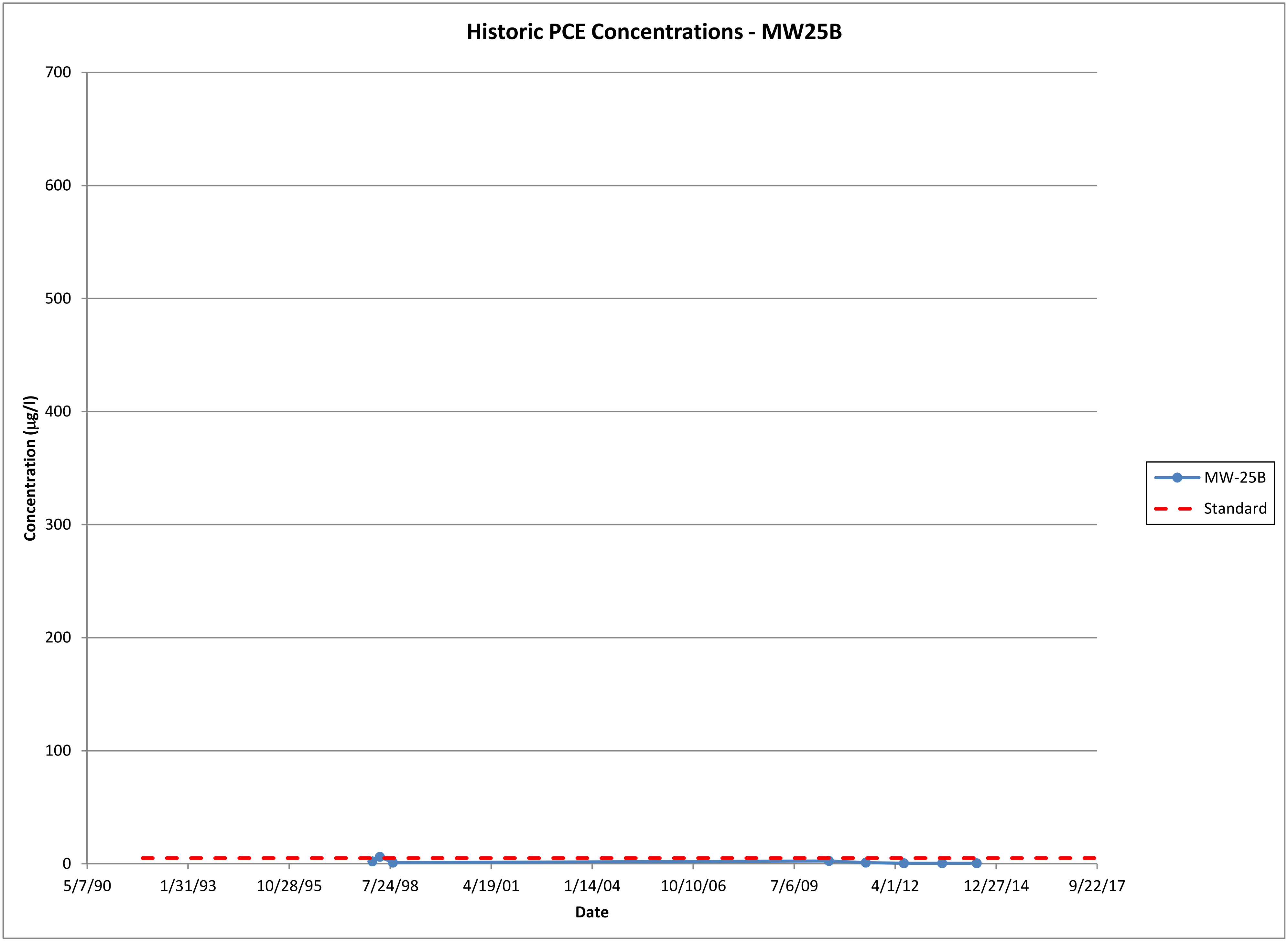


Historic PCE Concentrations - MW11C
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-11C
Standard

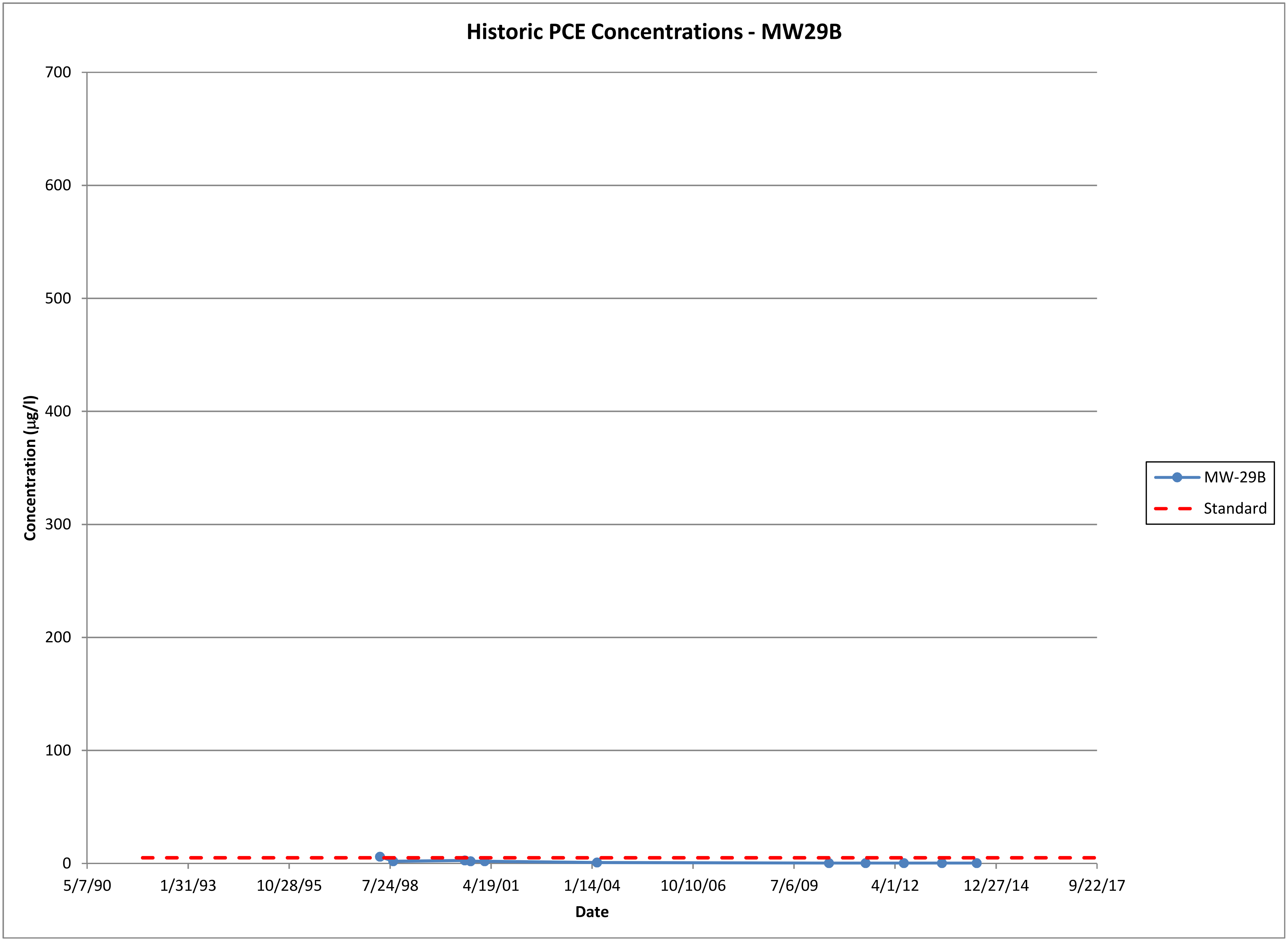

Historic PCE Concentrations - MW11D
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-11D
Standard


Historic PCE Concentrations - MW17A
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-17A
Standard

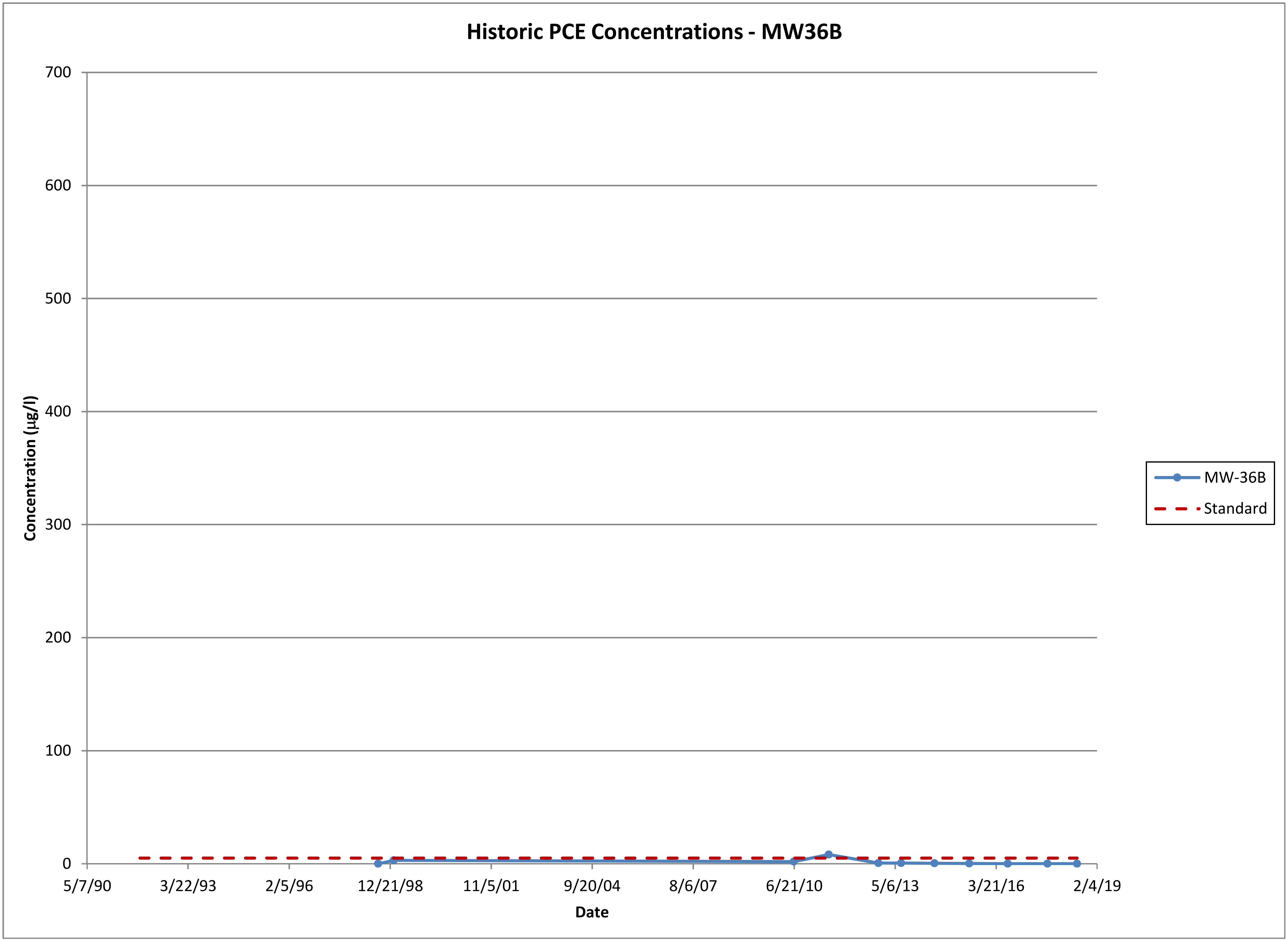

Historic PCE Concentrations - MW17B
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-17B
Standard

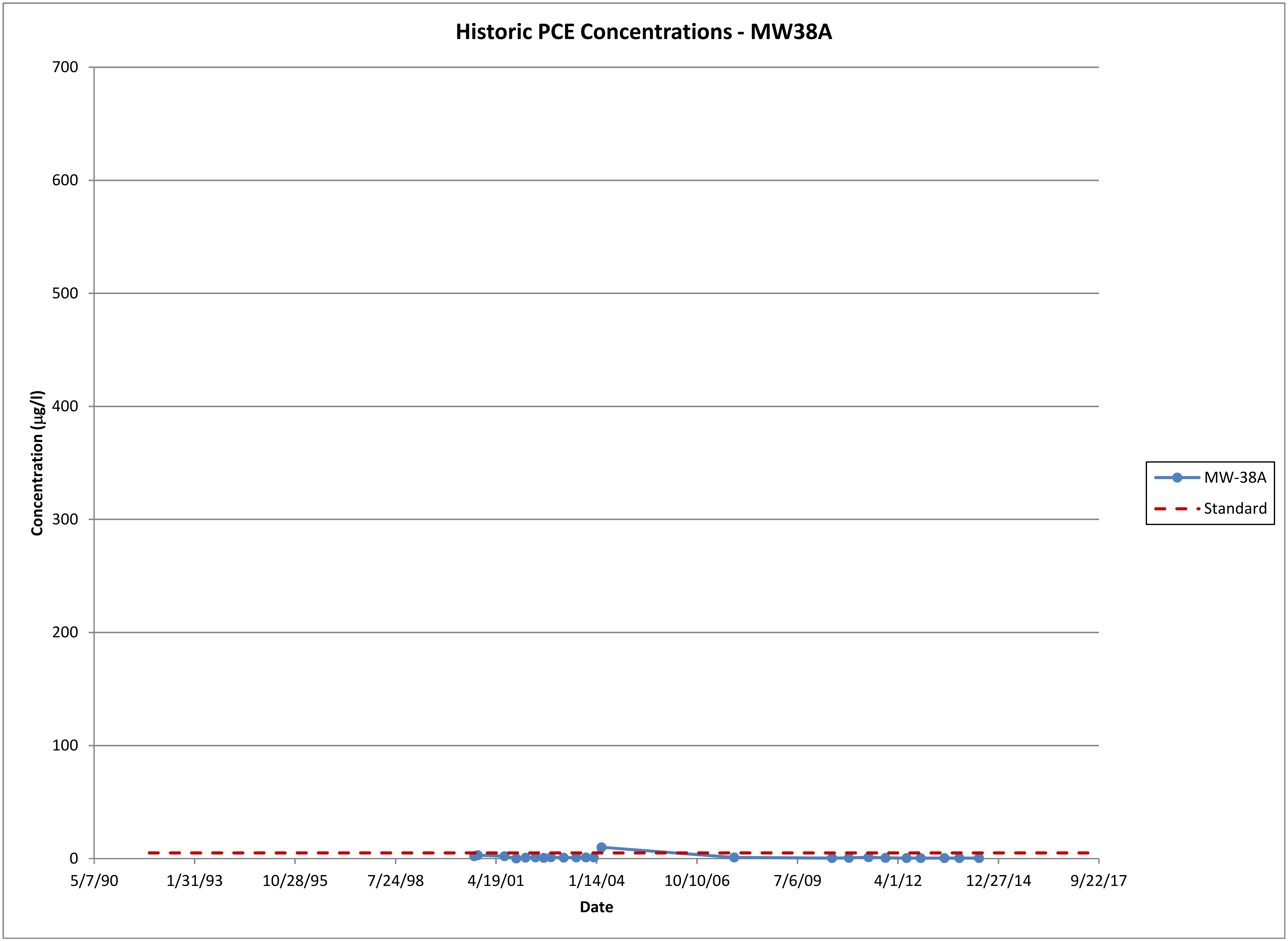


Historic PCE Concentrations - MW25B
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-25B
Standard

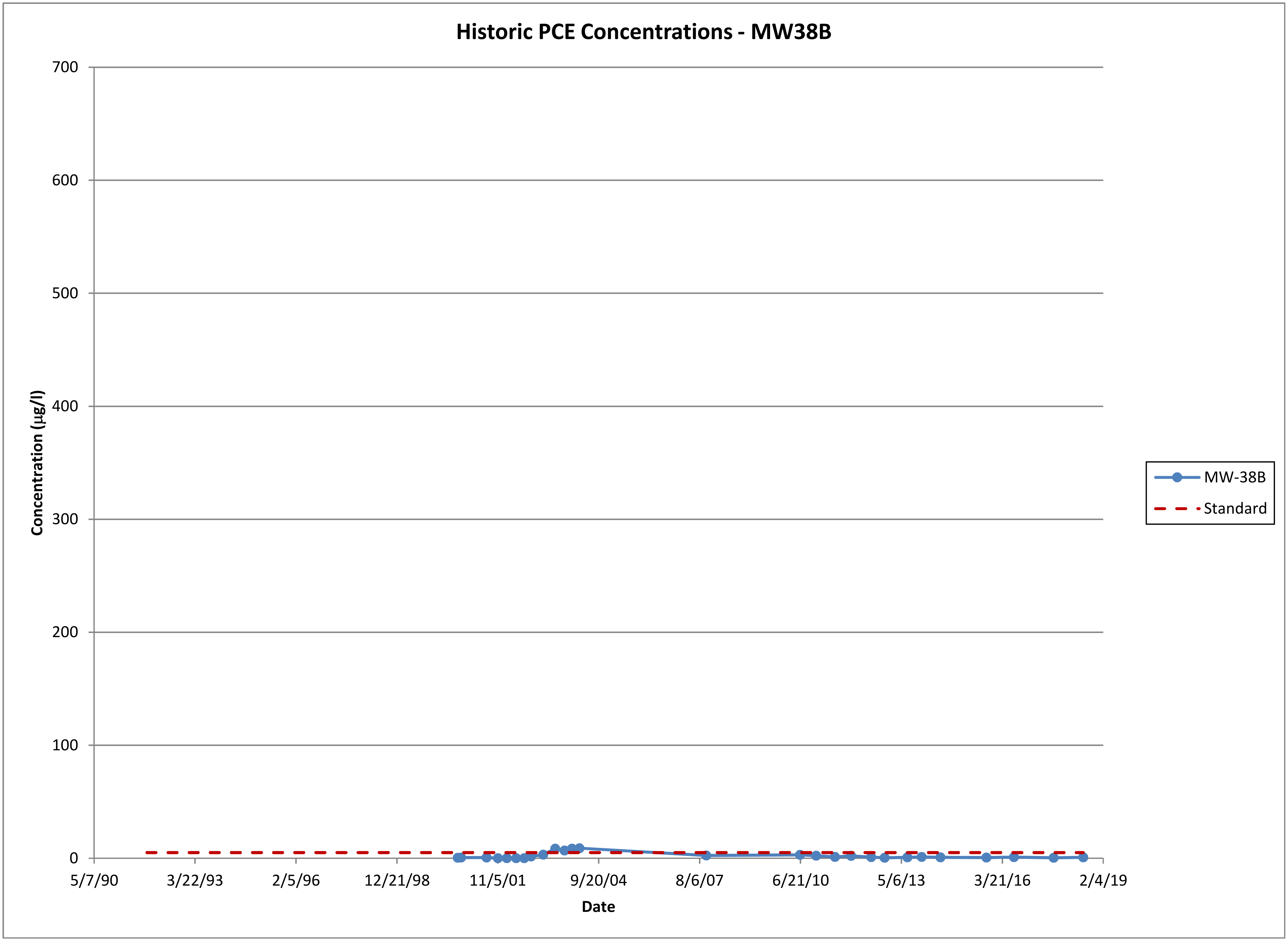


Historic PCE Concentrations - MW29B
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-29B
Standard

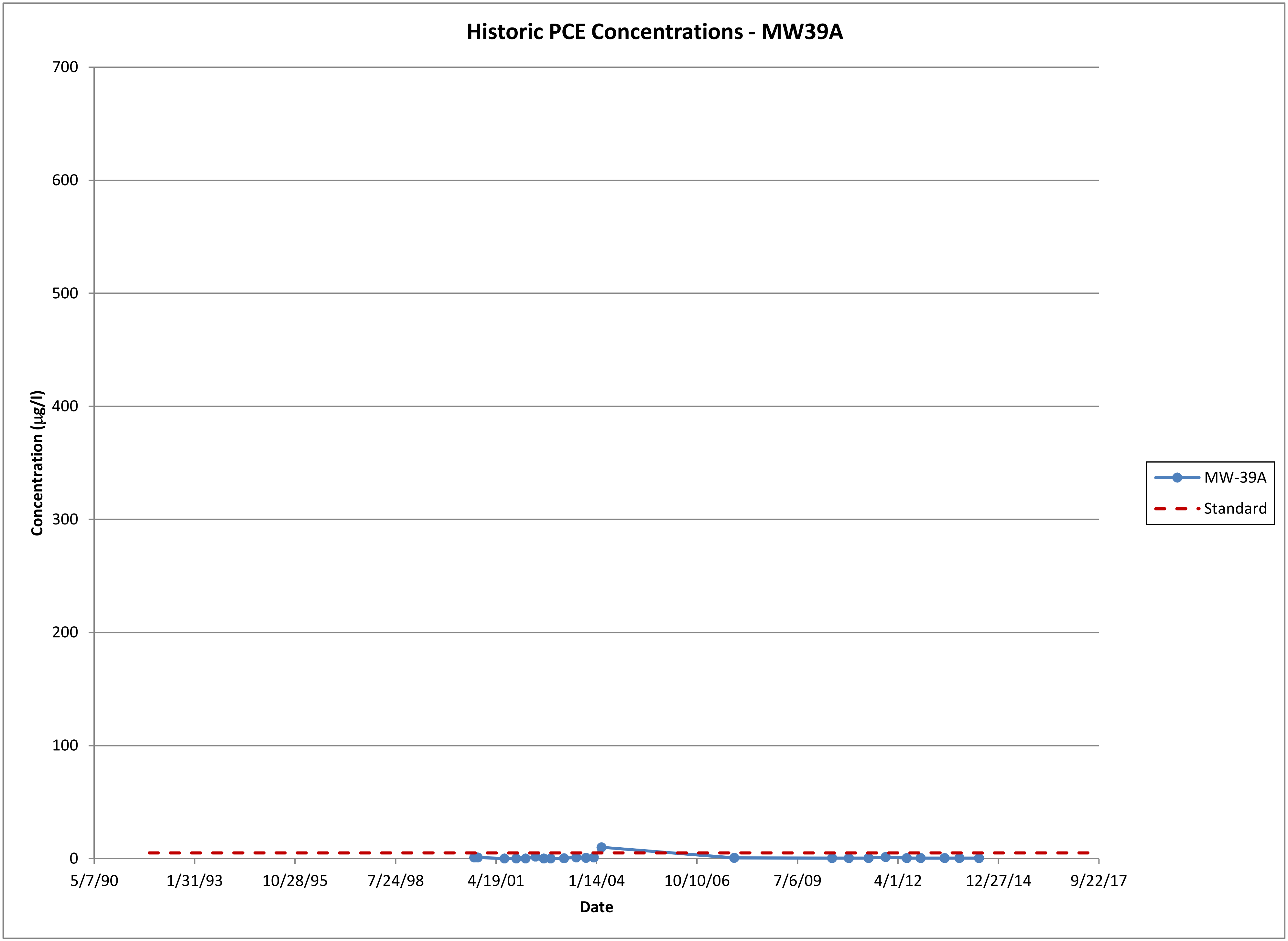

Historic PCE Concentrations - MW36B
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-36B
Standard

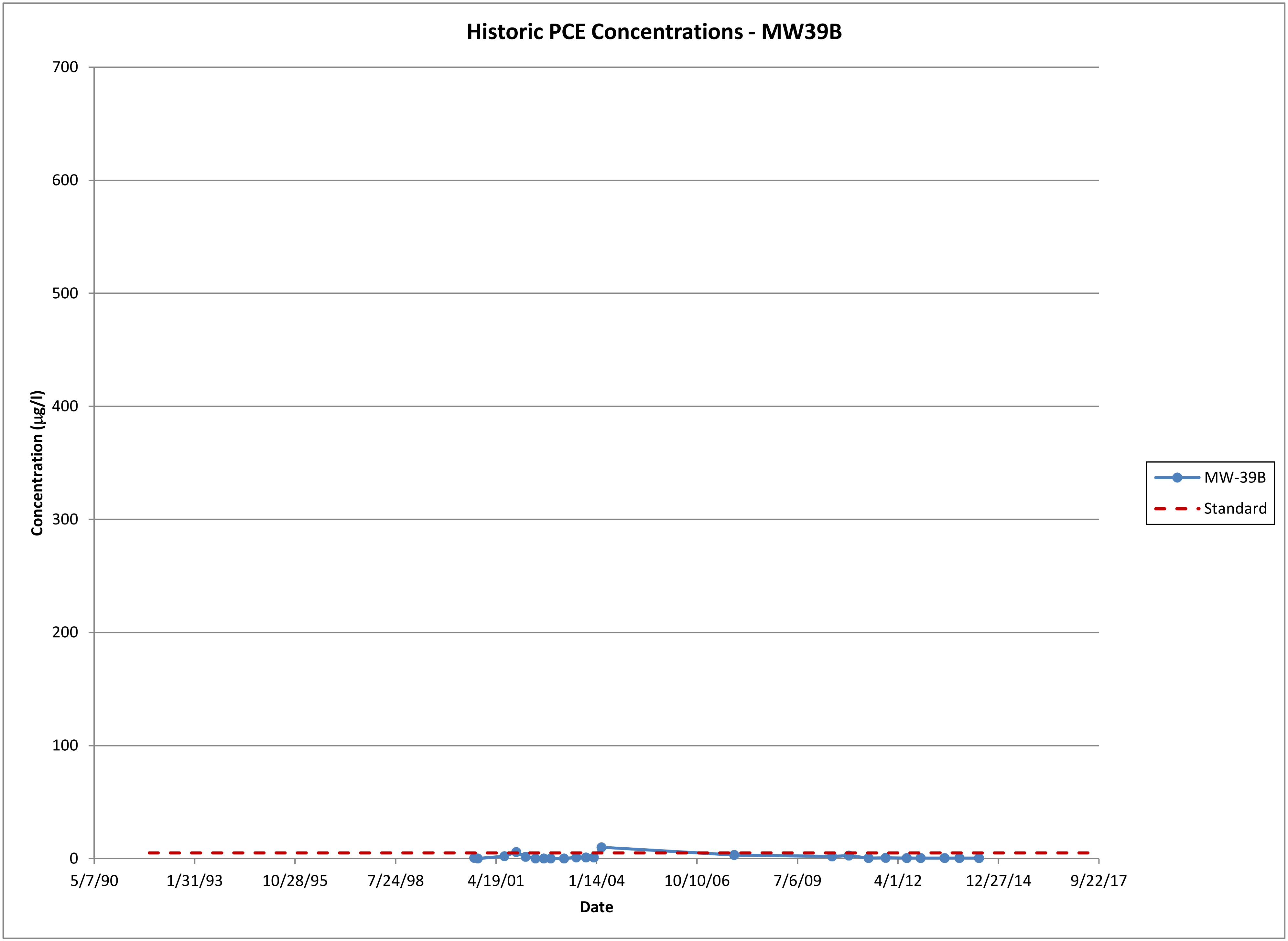


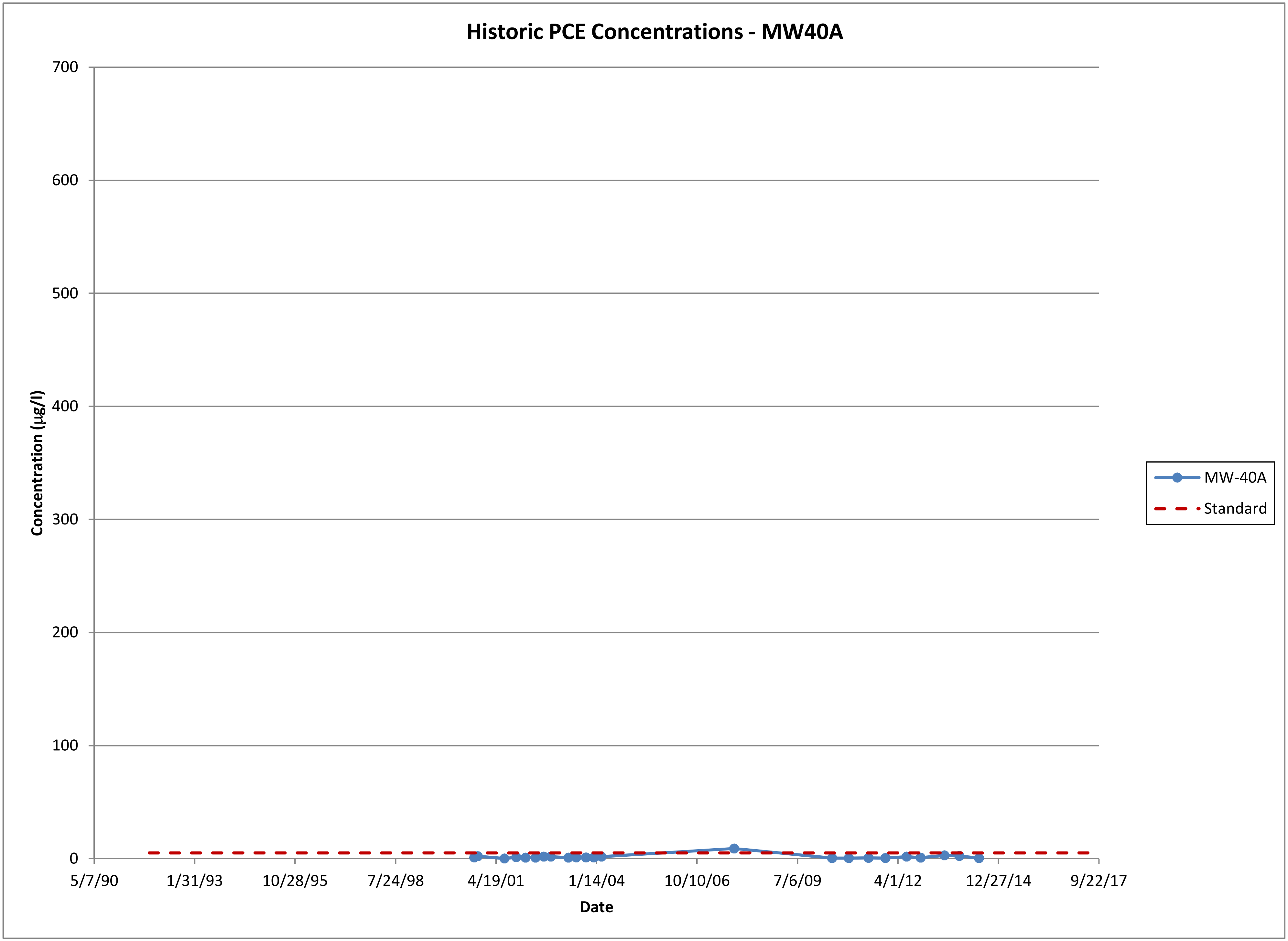
Historic PCE Concentrations - MW38A
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-38A
Standard



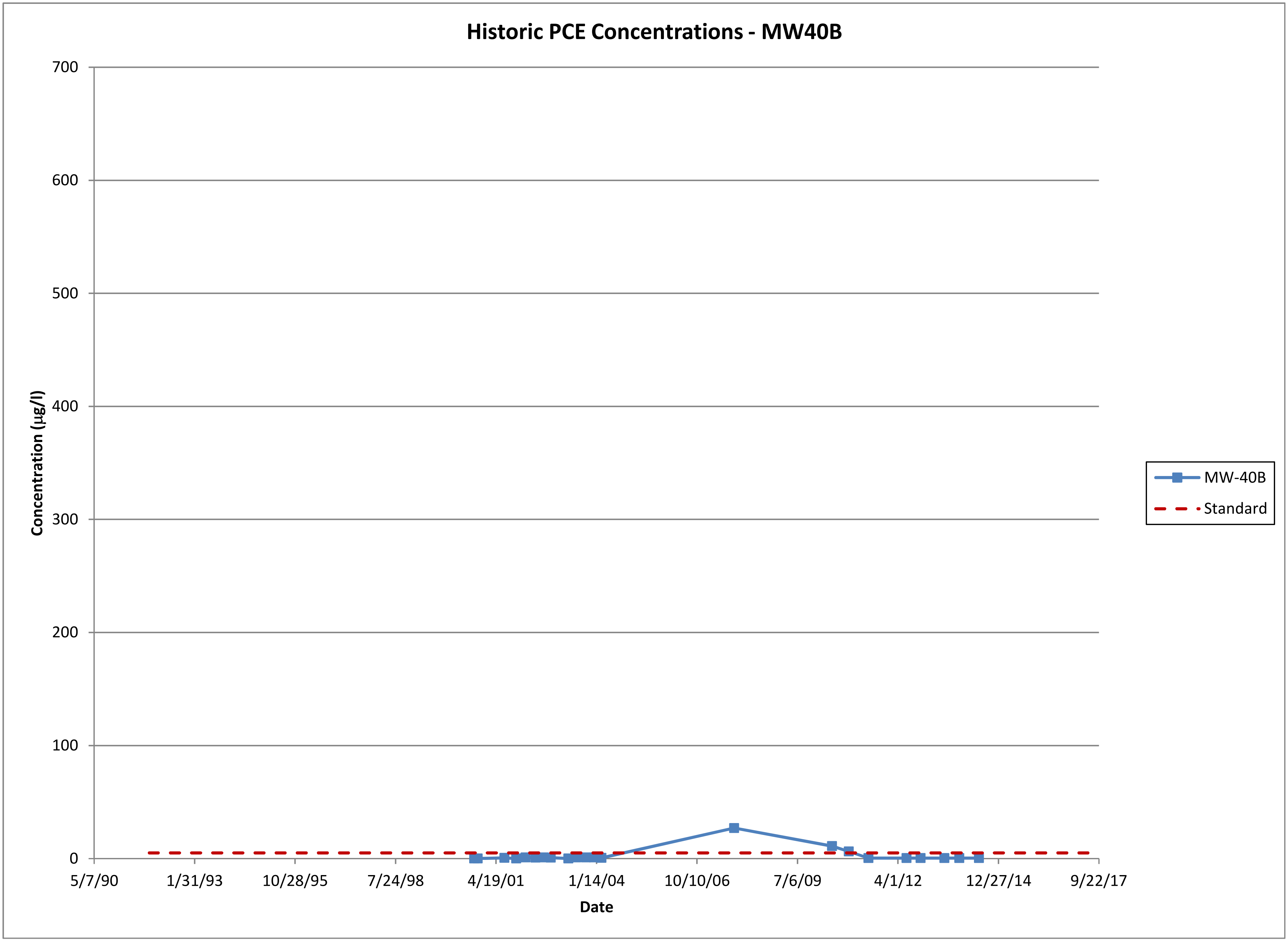
Historic PCE Concentrations - MW38B
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-38B
Standard


Historic PCE Concentrations - MW39A
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-39A
Standard

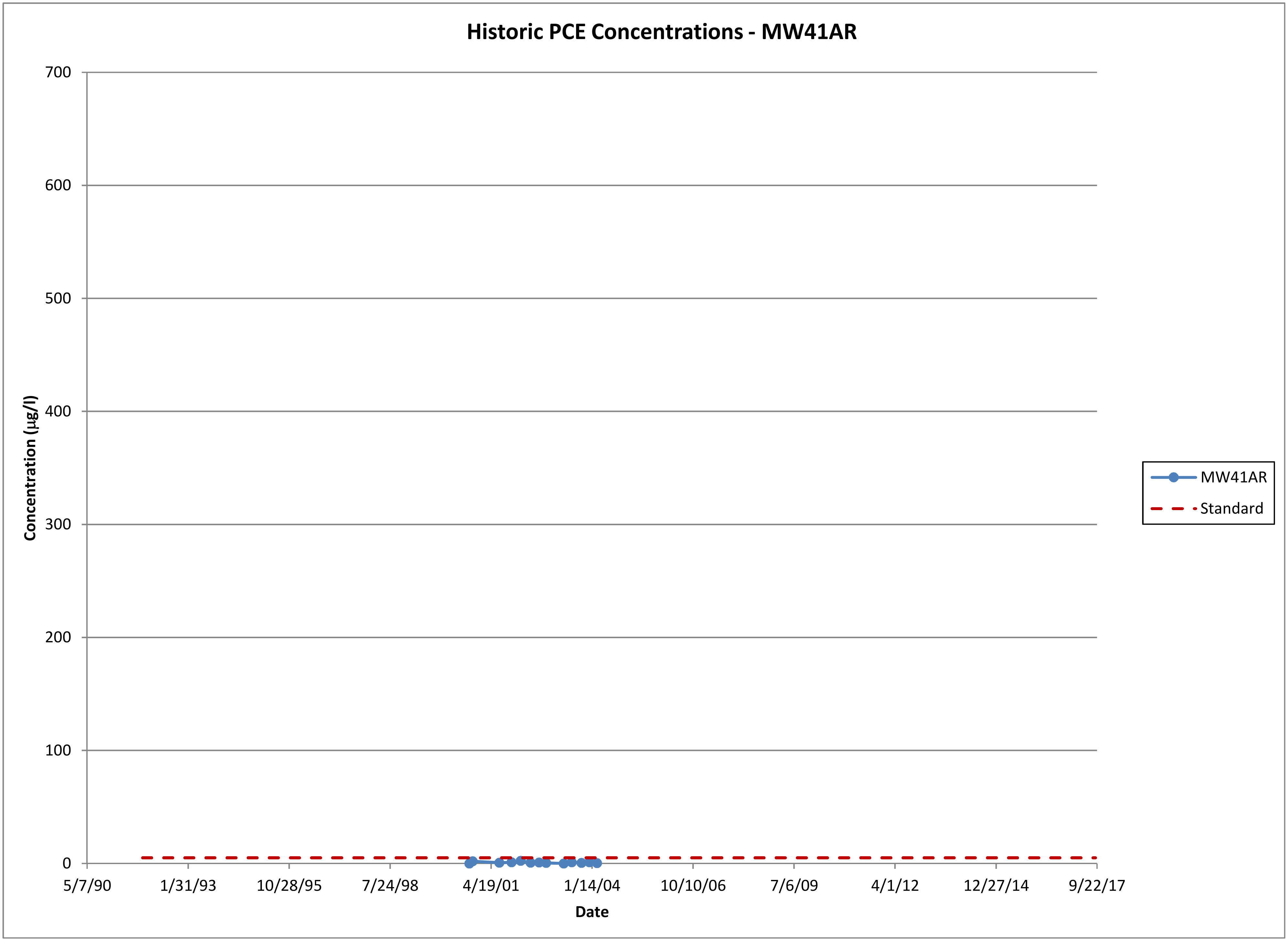

Historic PCE Concentrations - MW39B
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-39B
Standard

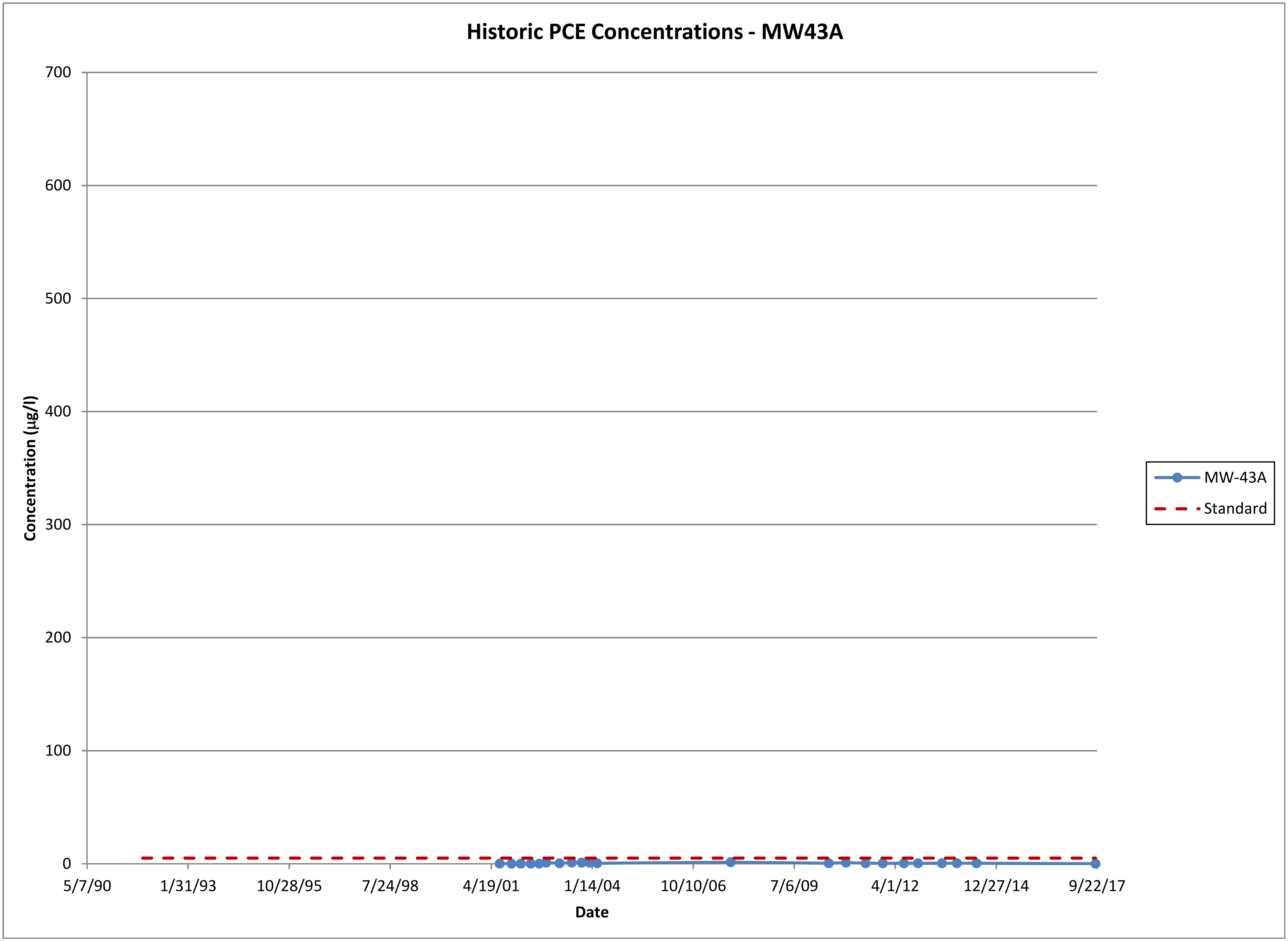


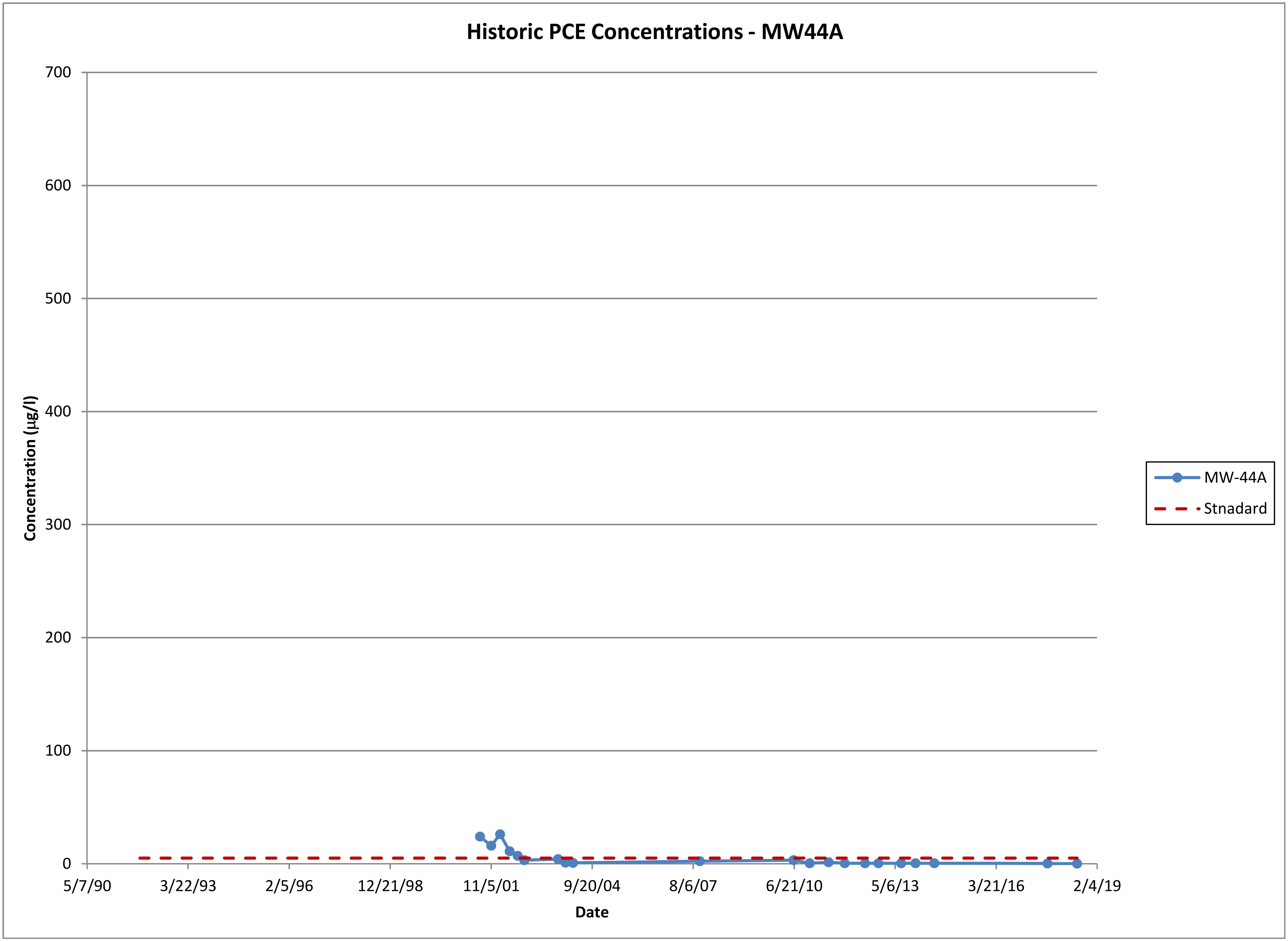
Historic PCE Concentrations - MW40A
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-40A
Standard



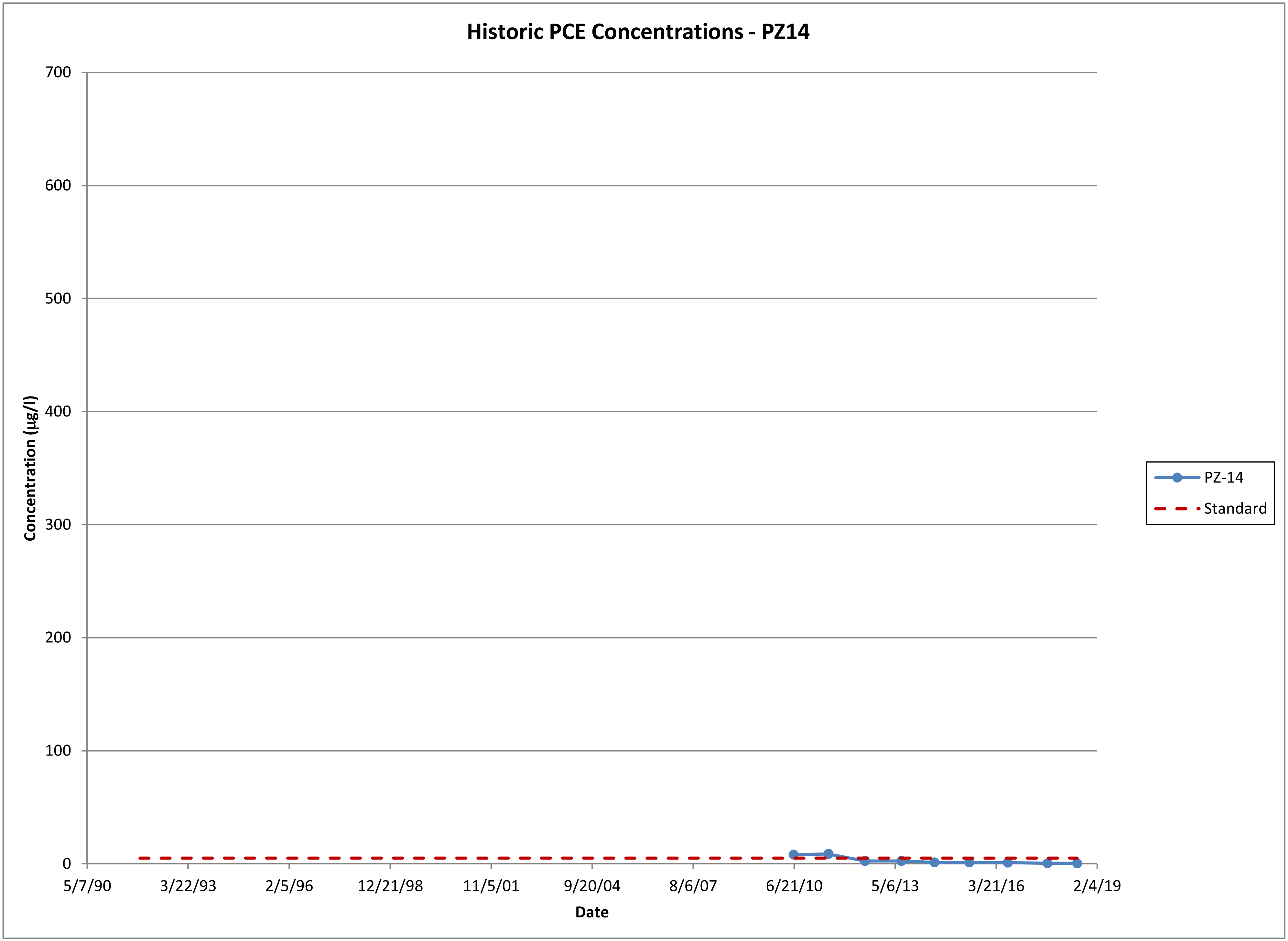
Historic PCE Concentrations - MW40B
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-40B
Standard

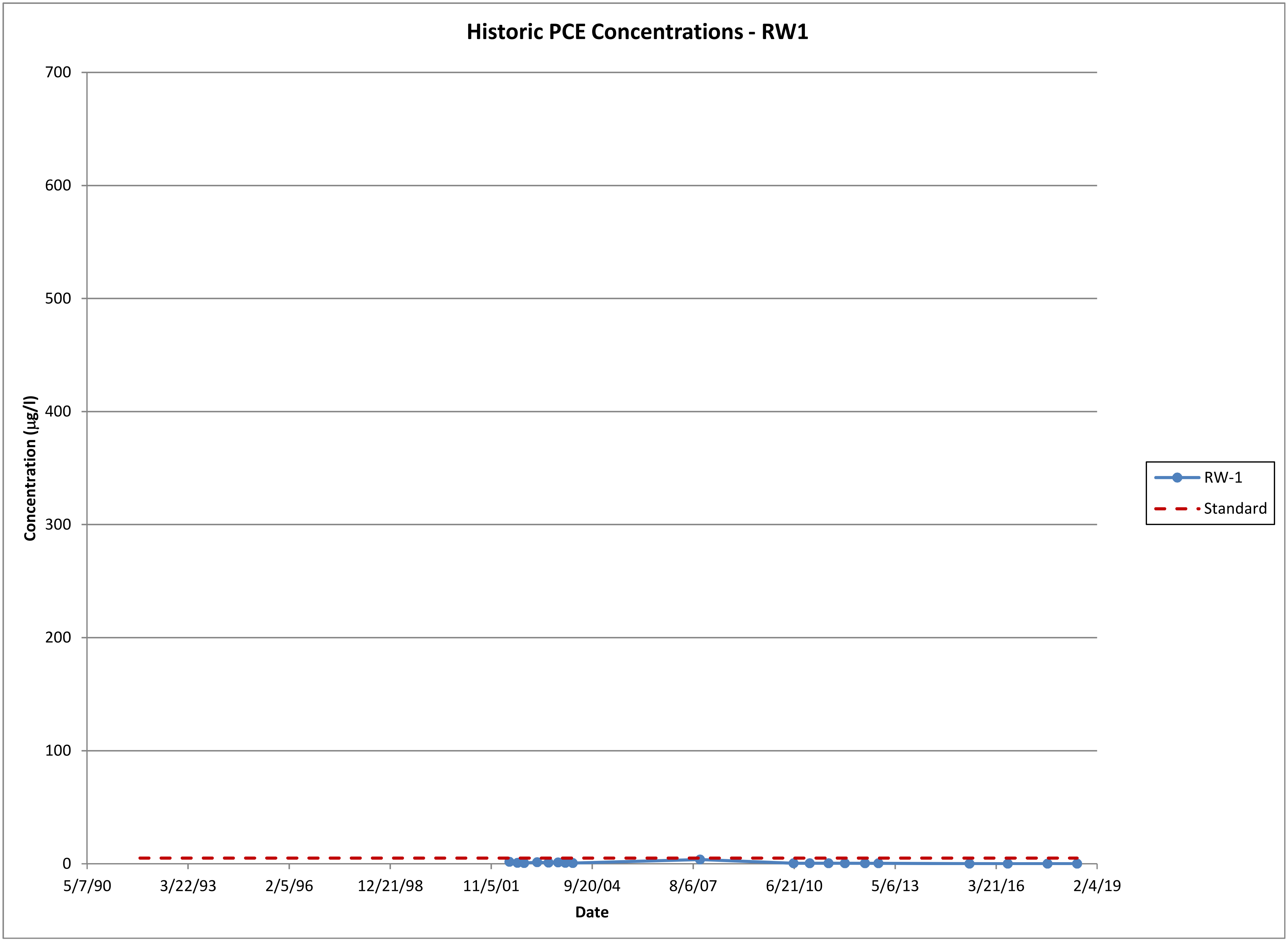

Historic PCE Concentrations - MW41AR
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW41AR
Standard

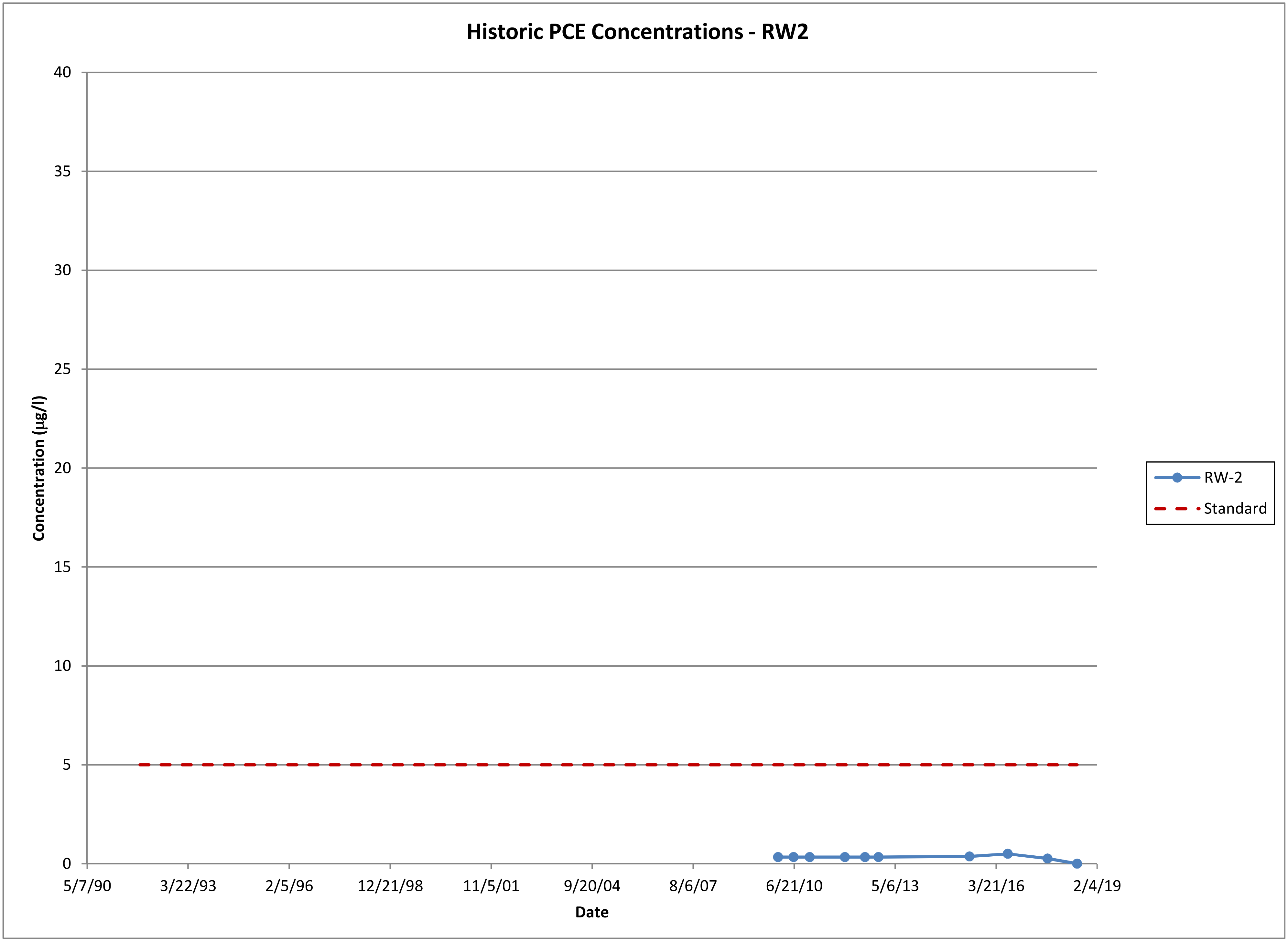

Historic PCE Concentrations - MW43A
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-43A
Standard

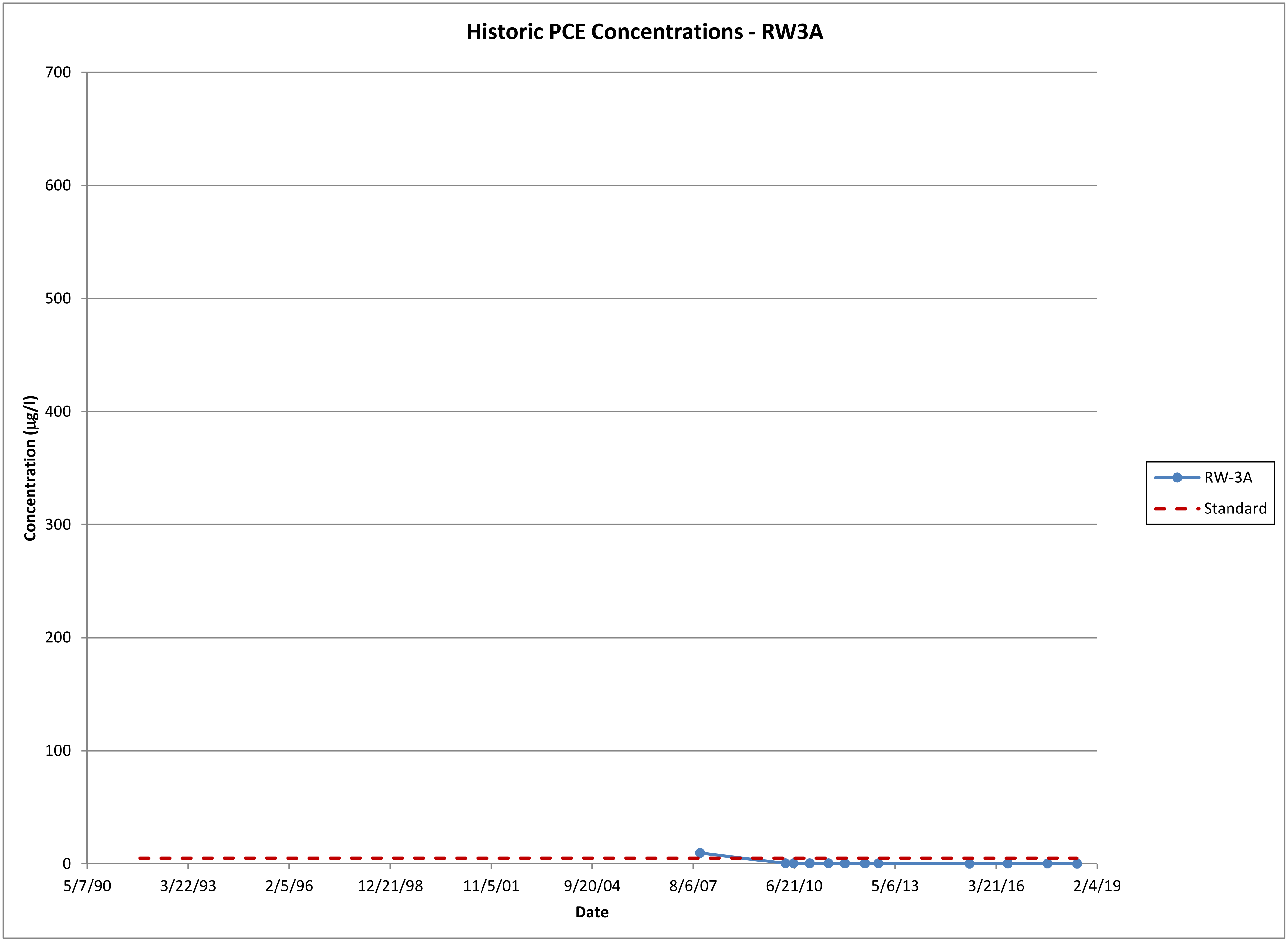


Historic PCE Concentrations - MW44A
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-44A
Stnadard

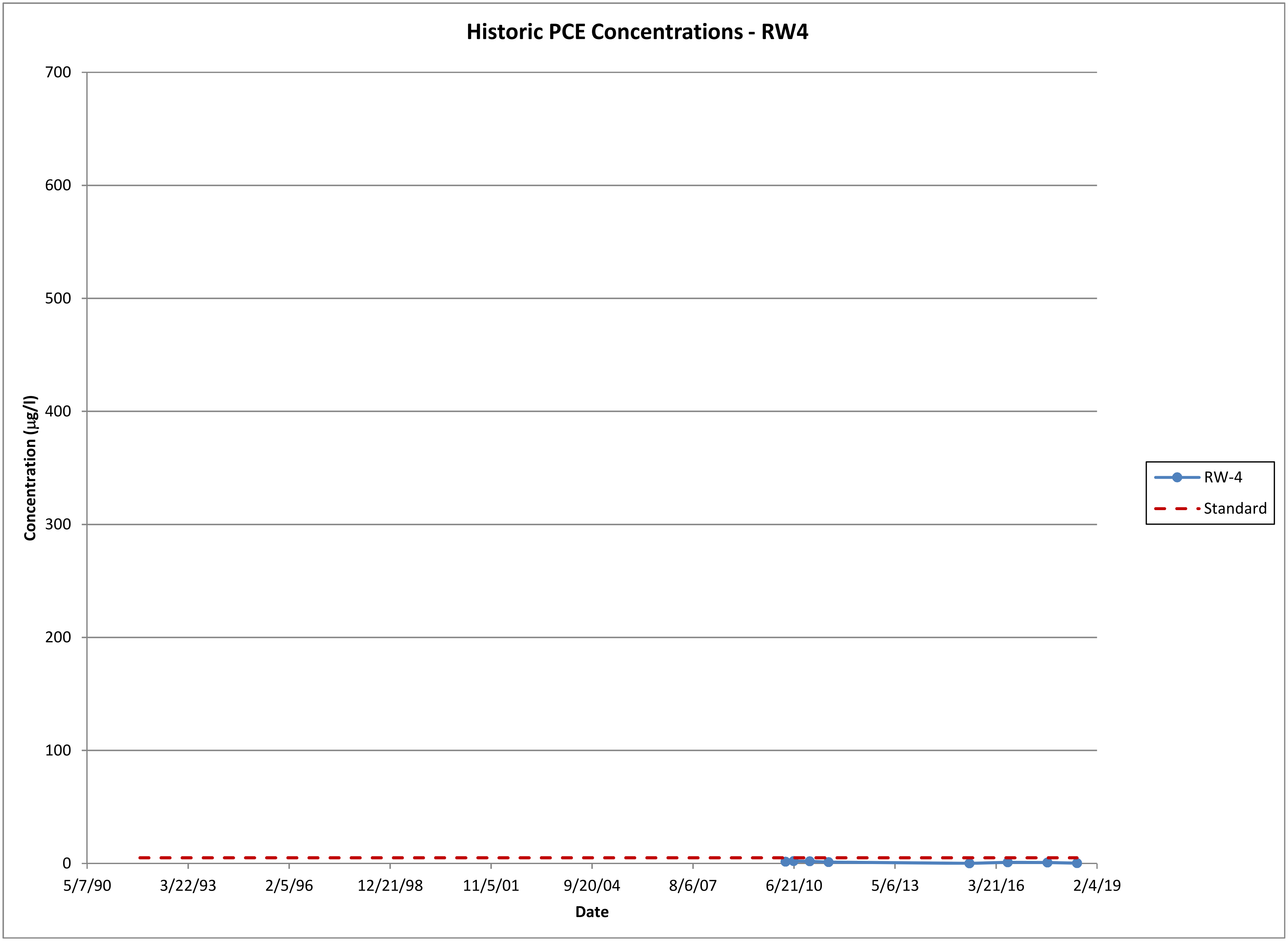

Historic PCE Concentrations - PZ14
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
PZ-14
Standard


Historic PCE Concentrations - RW1
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-1
Standard

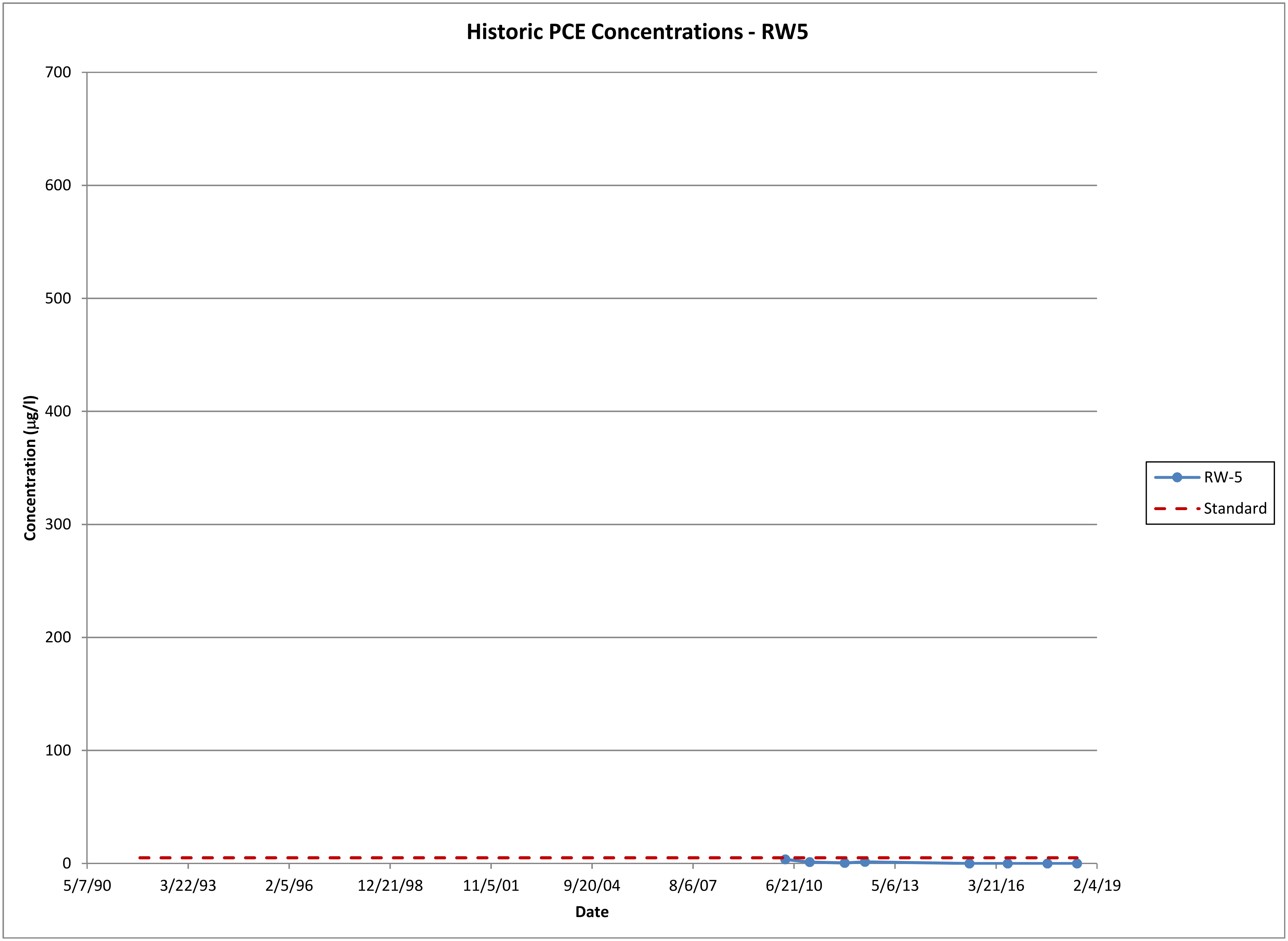

Historic PCE Concentrations - RW2
Concentration (µg/l)
40
35
30
25
20
15
10
5
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-2
Standard



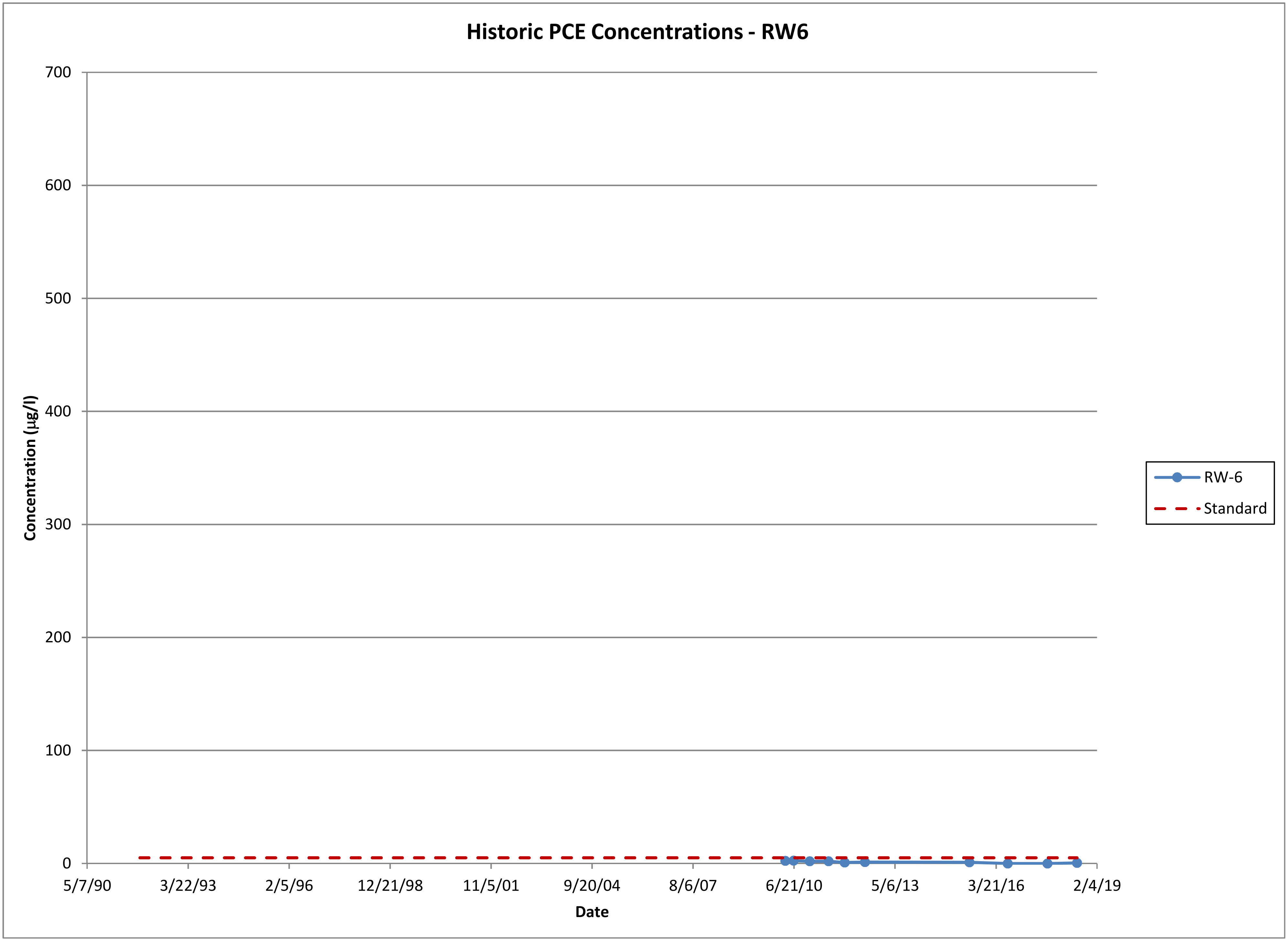
Historic PCE Concentrations - RW3A
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-3A
Standard



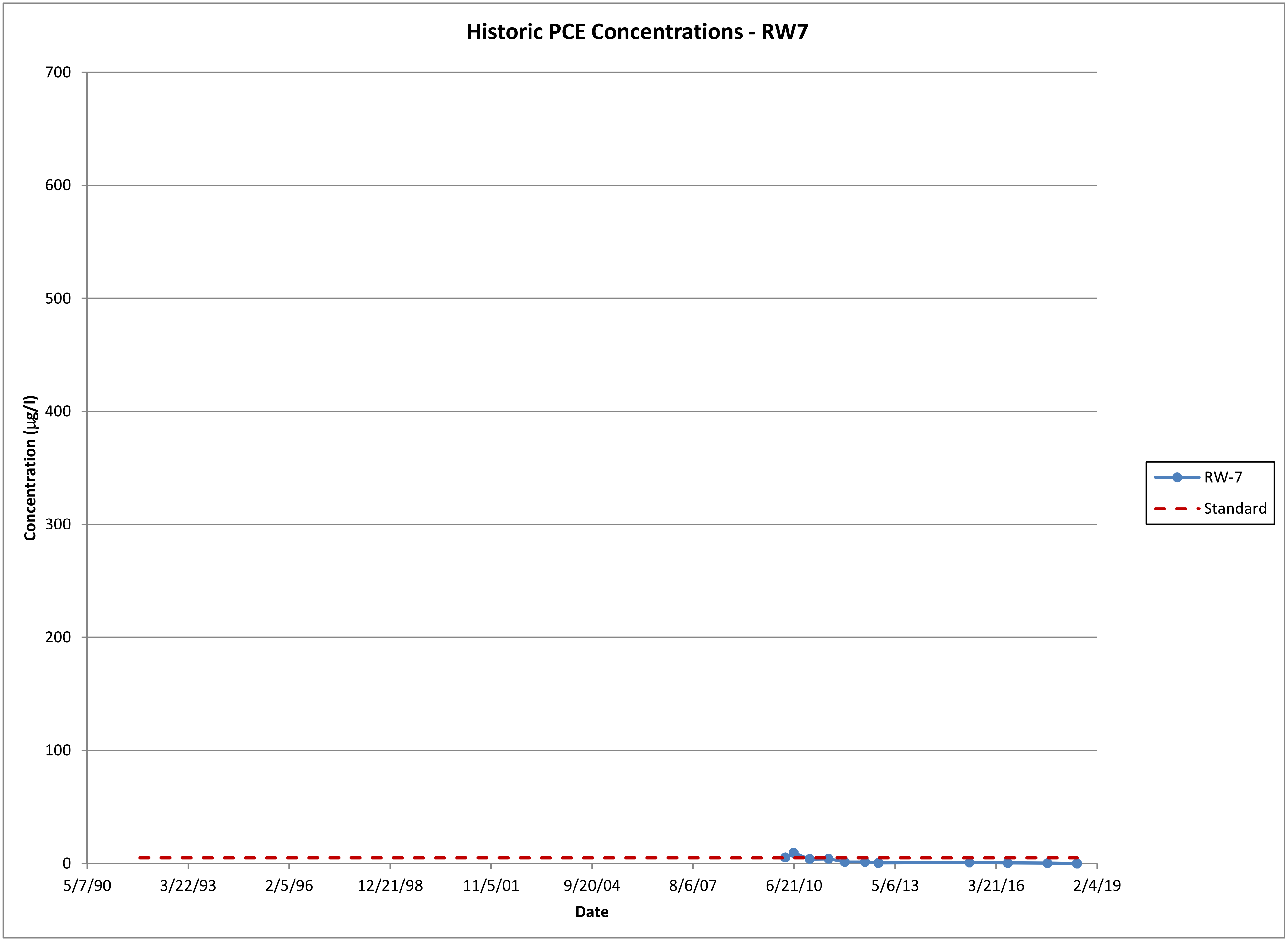
Historic PCE Concentrations - RW4
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-4
Standard



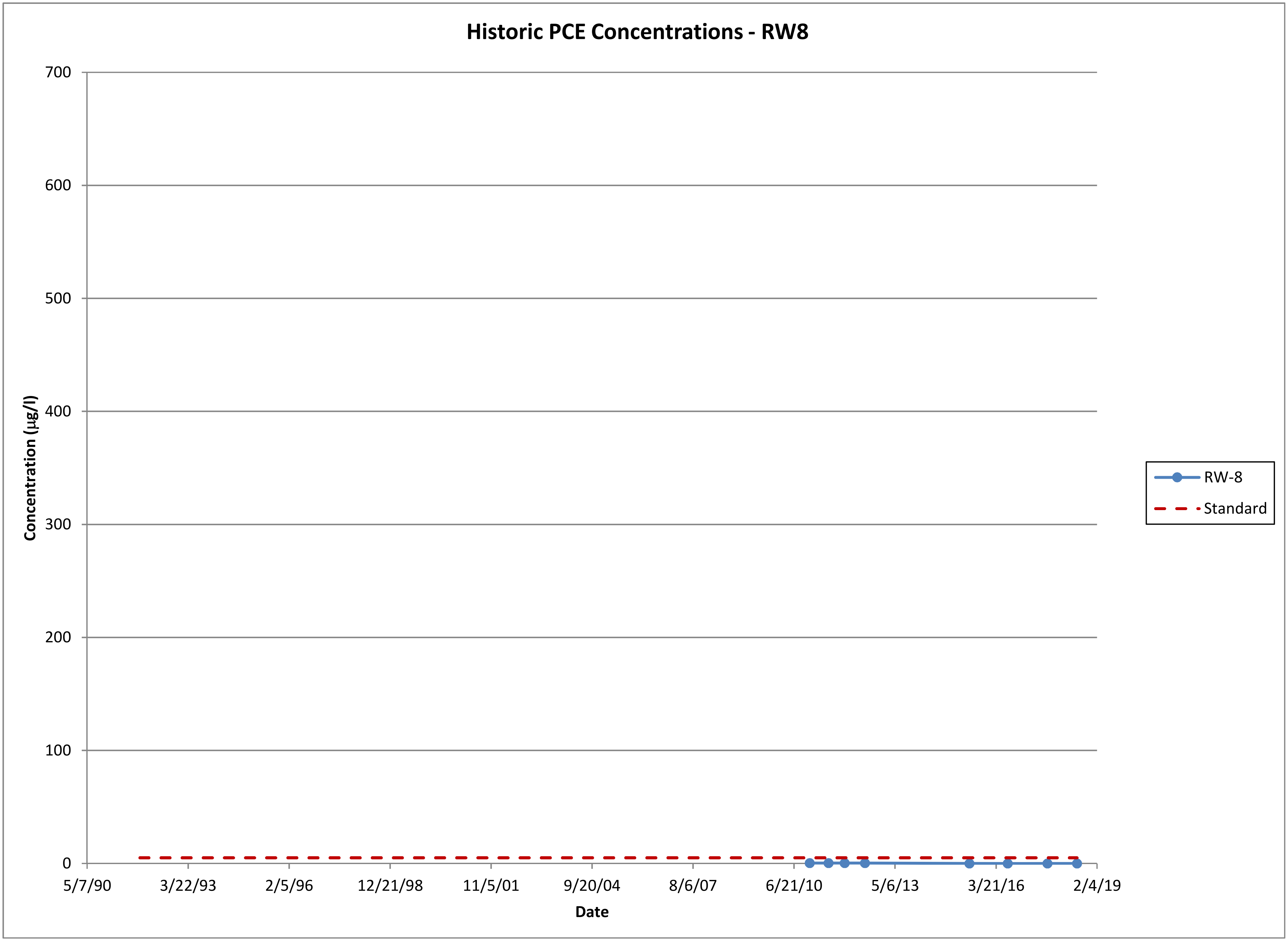
Historic PCE Concentrations - RW5
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-5
Standard



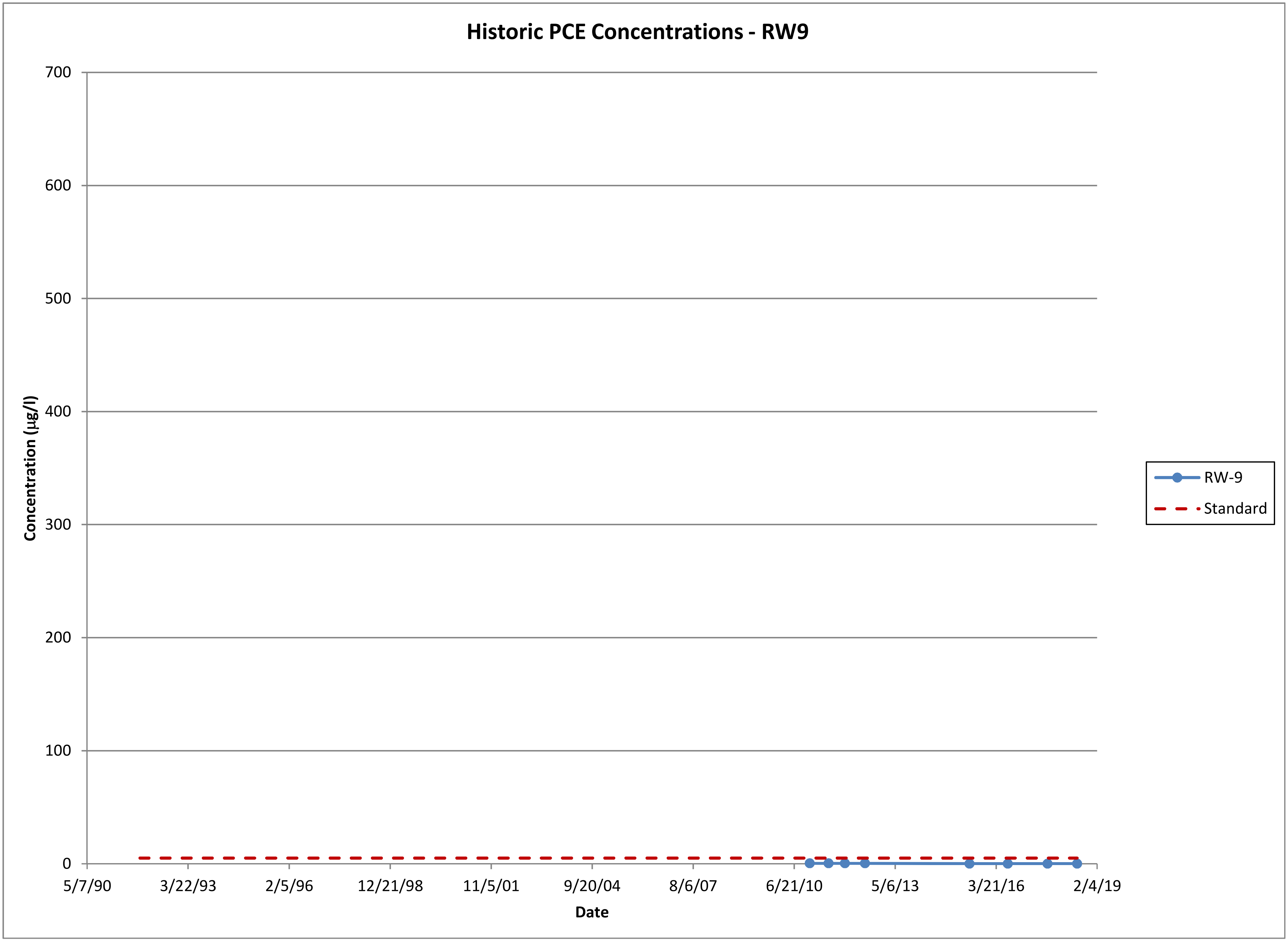
Historic PCE Concentrations - RW6
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-6
Standard



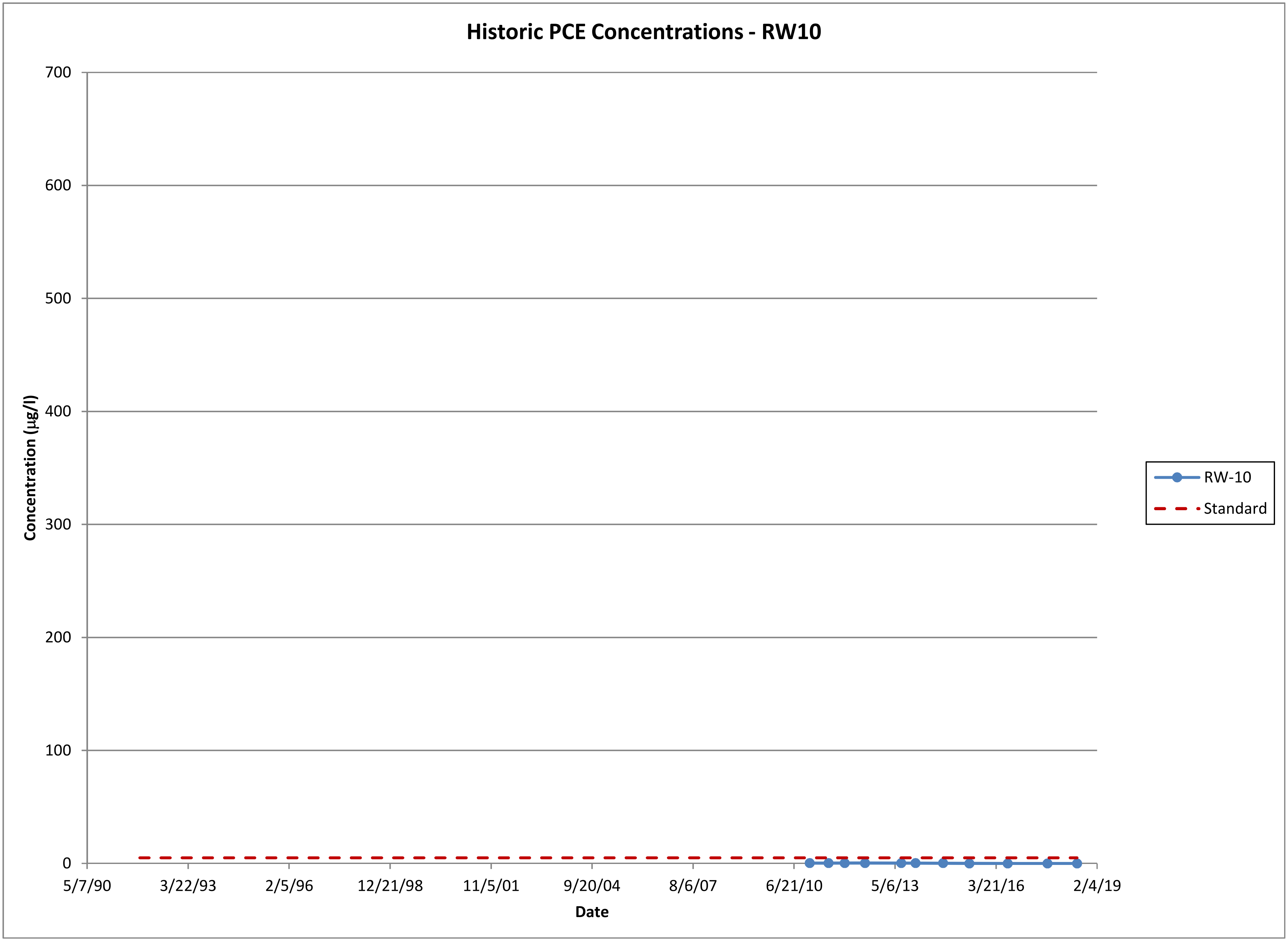
Historic PCE Concentrations - RW7
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-7
Standard



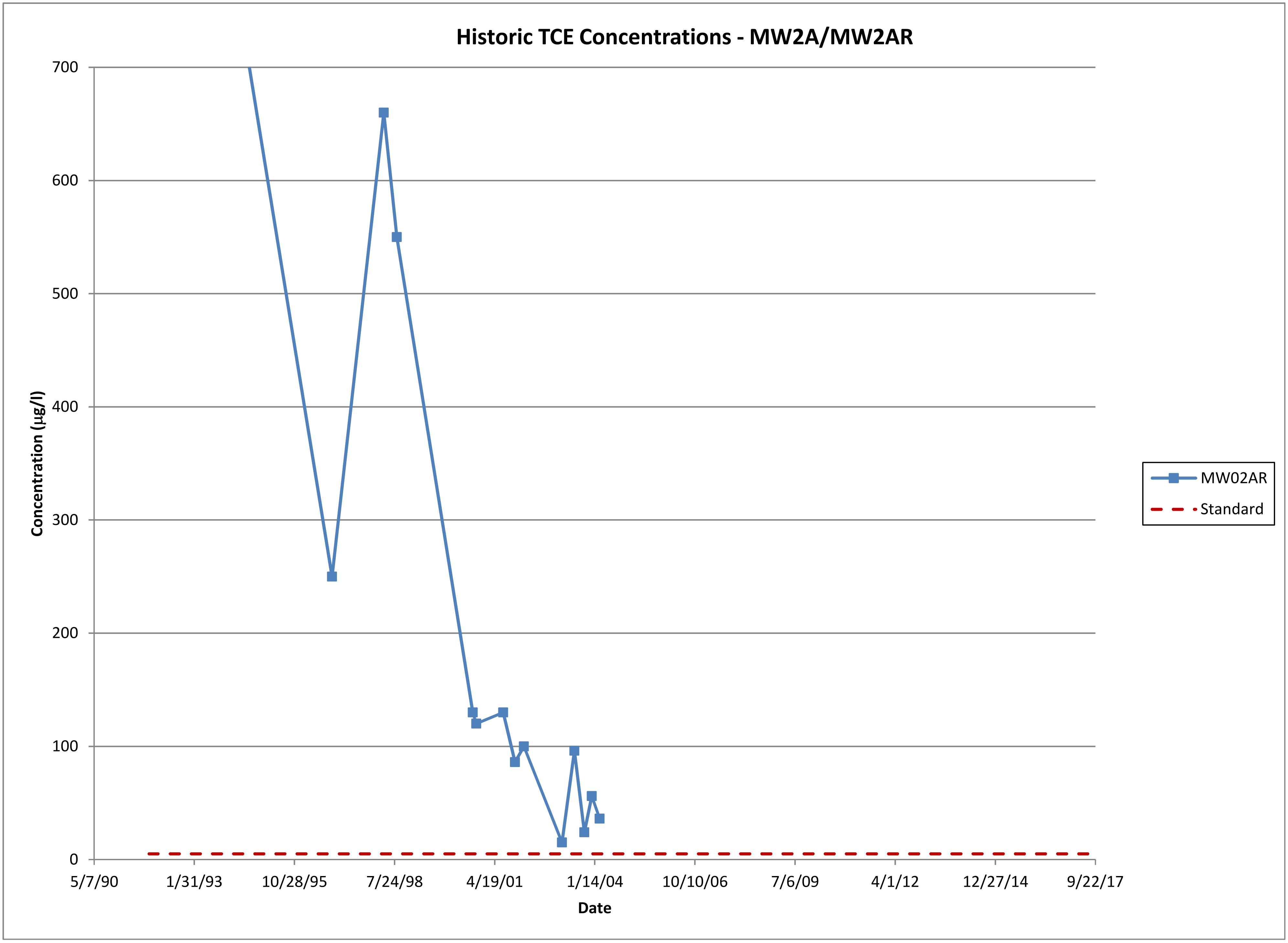
Historic PCE Concentrations - RW8
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-8
Standard



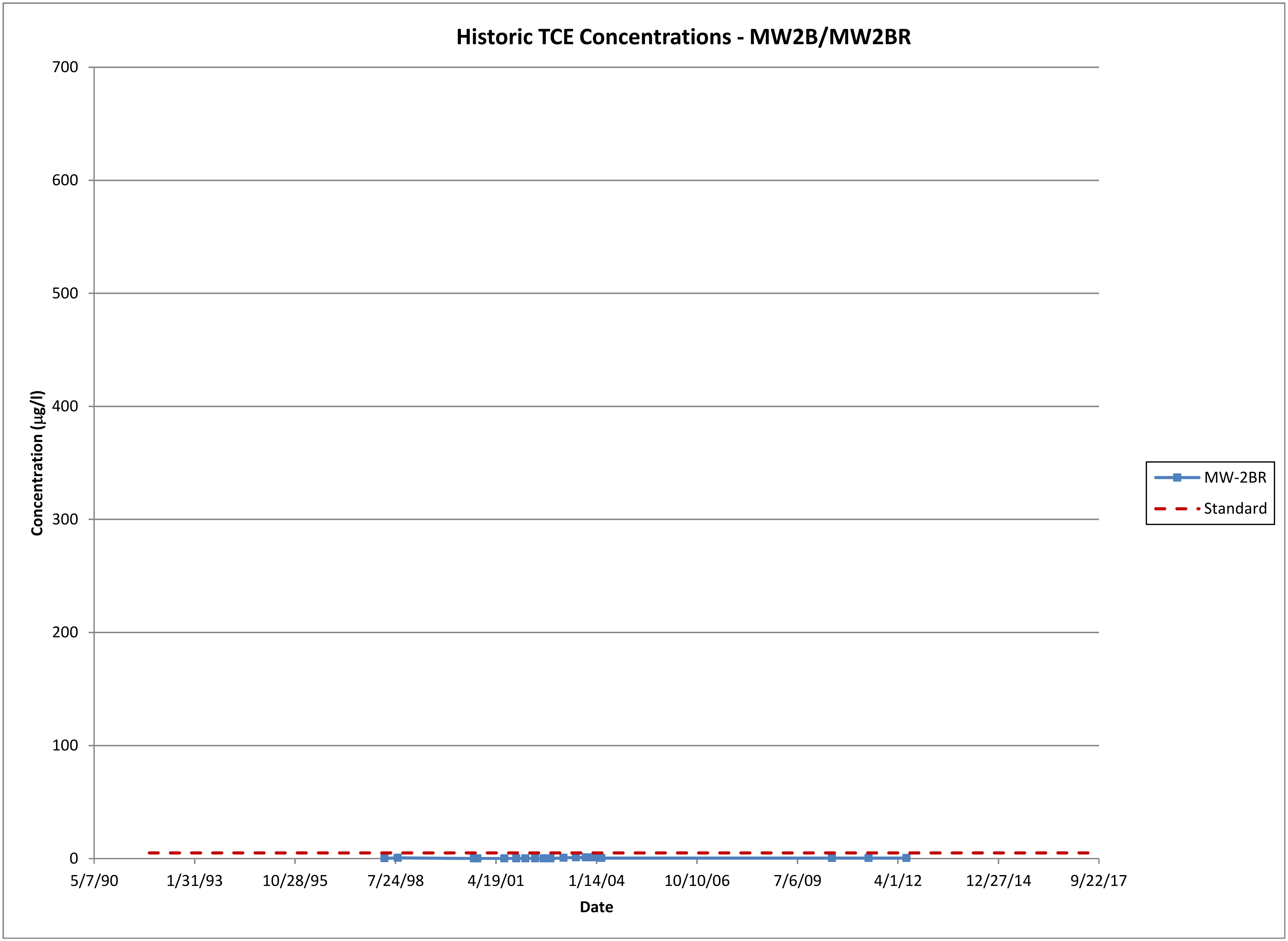
Historic PCE Concentrations - RW9
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-9
Standard

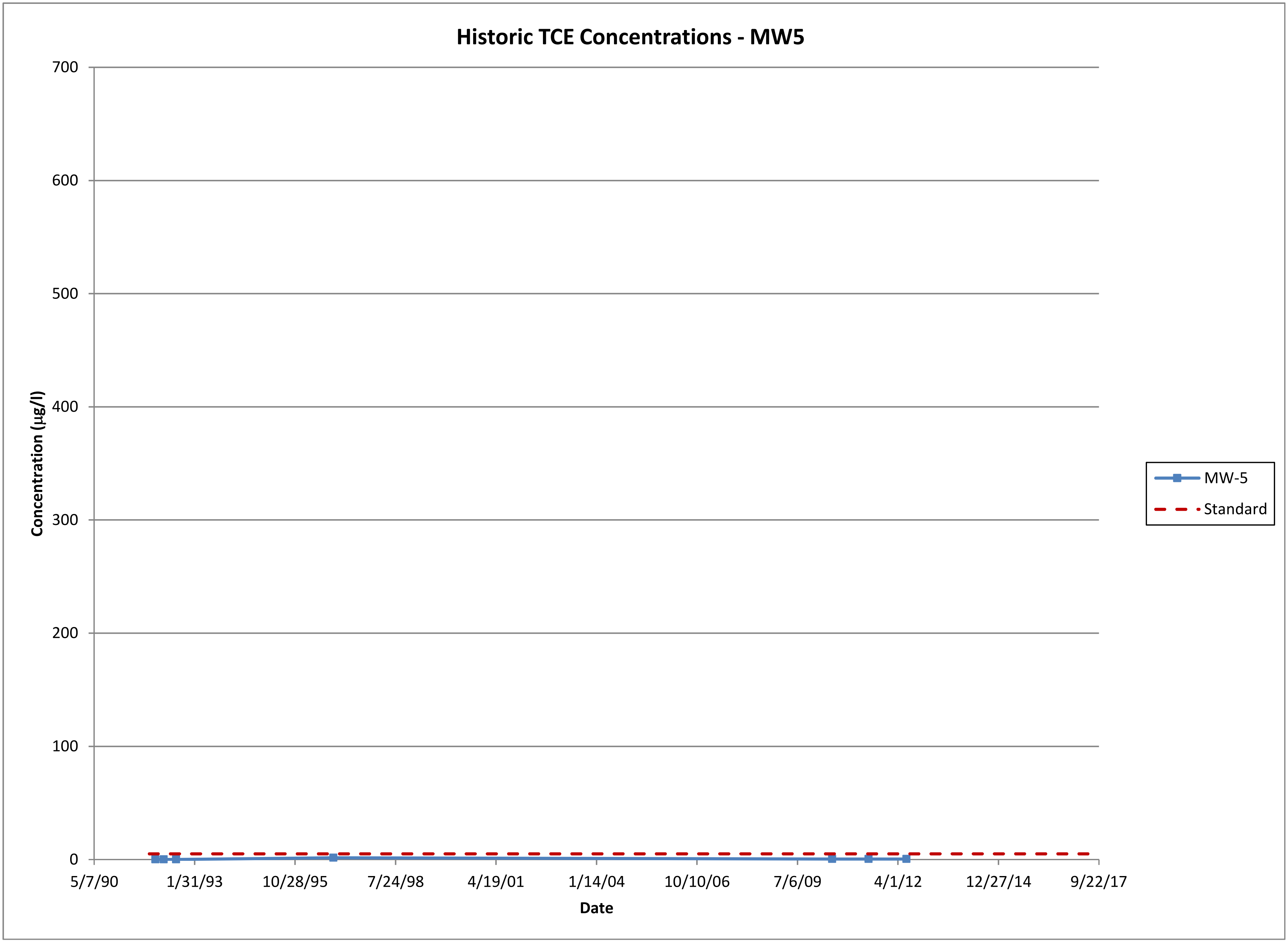


Historic PCE Concentrations - RW10
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-10
Standard

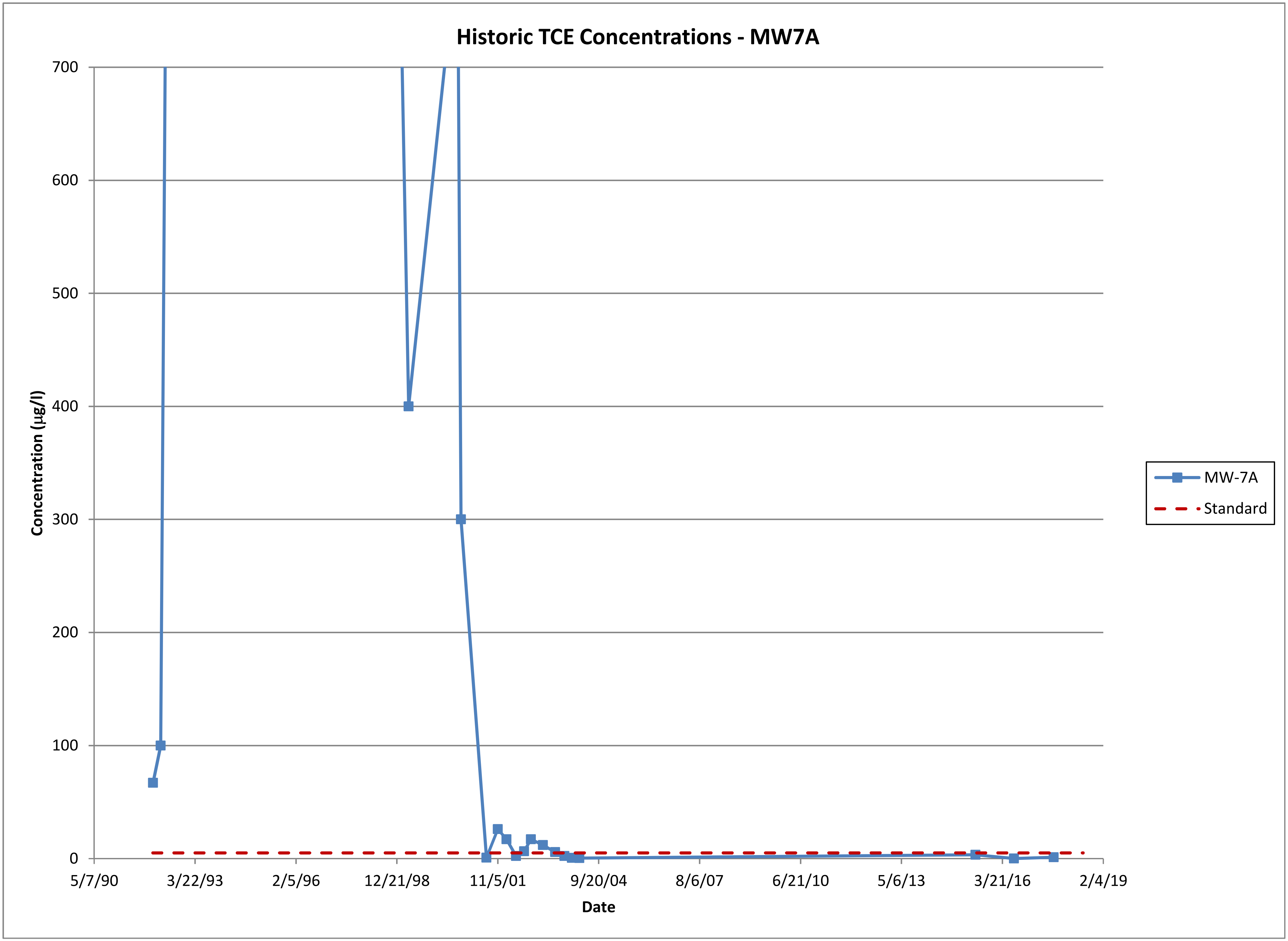


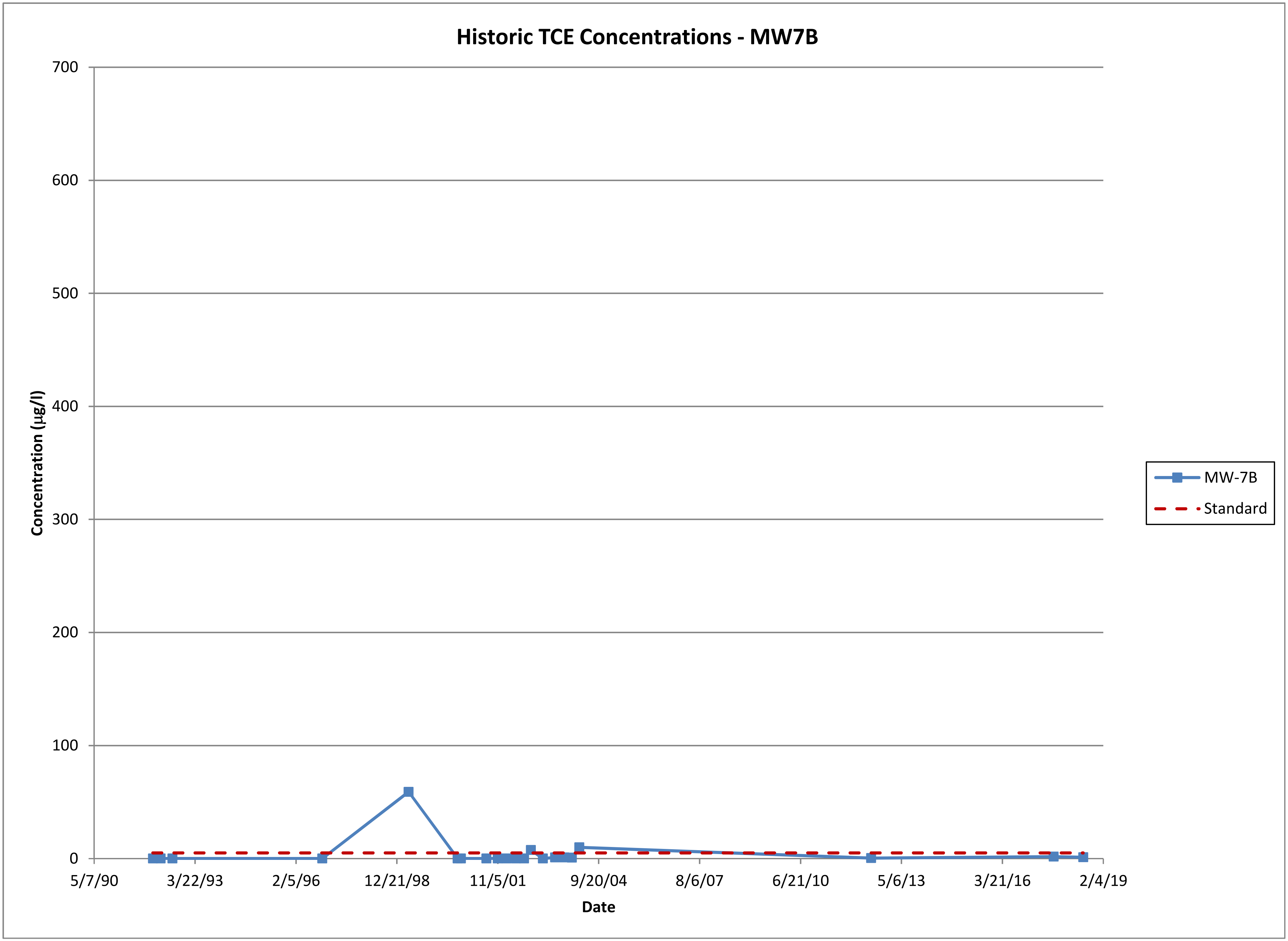
Historic TCE Concentrations - MW2A/MW2AR
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW02AR
Standard


Historic TCE Concentrations - MW2B/MW2BR
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-2BR
Standard

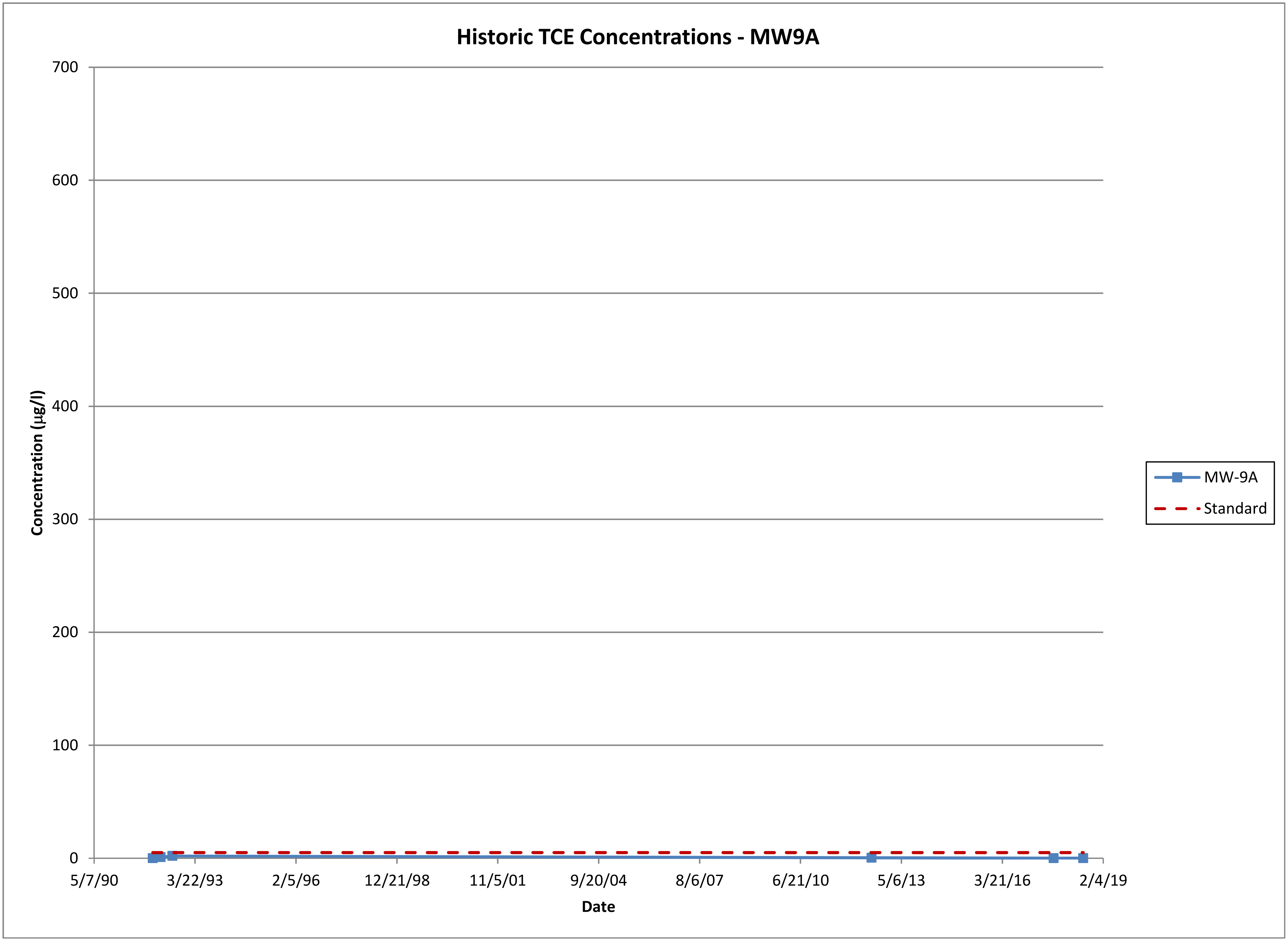


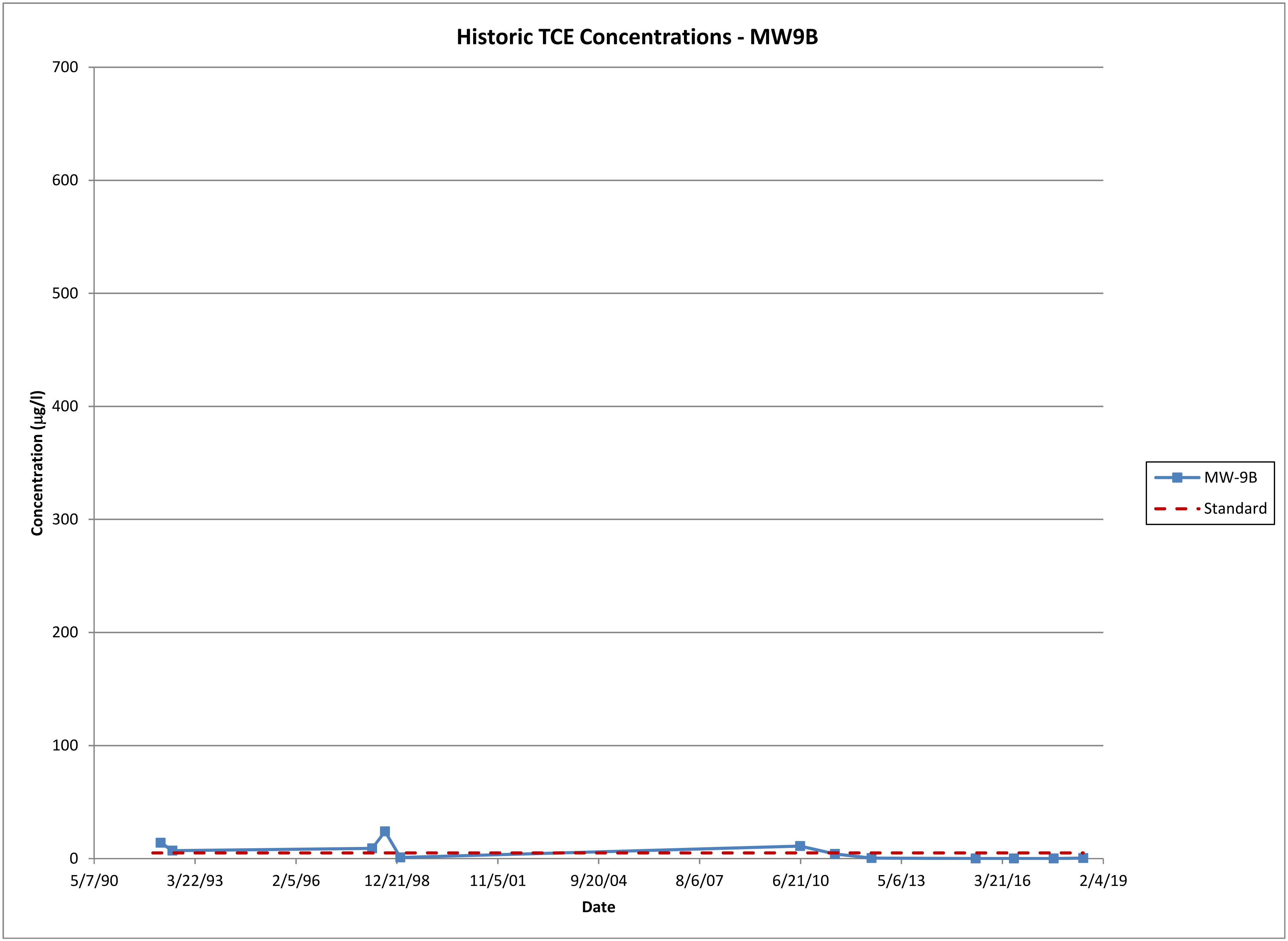
Historic TCE Concentrations - MW5
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-5
Standard


Historic TCE Concentrations - MW7A
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-7A
Standard

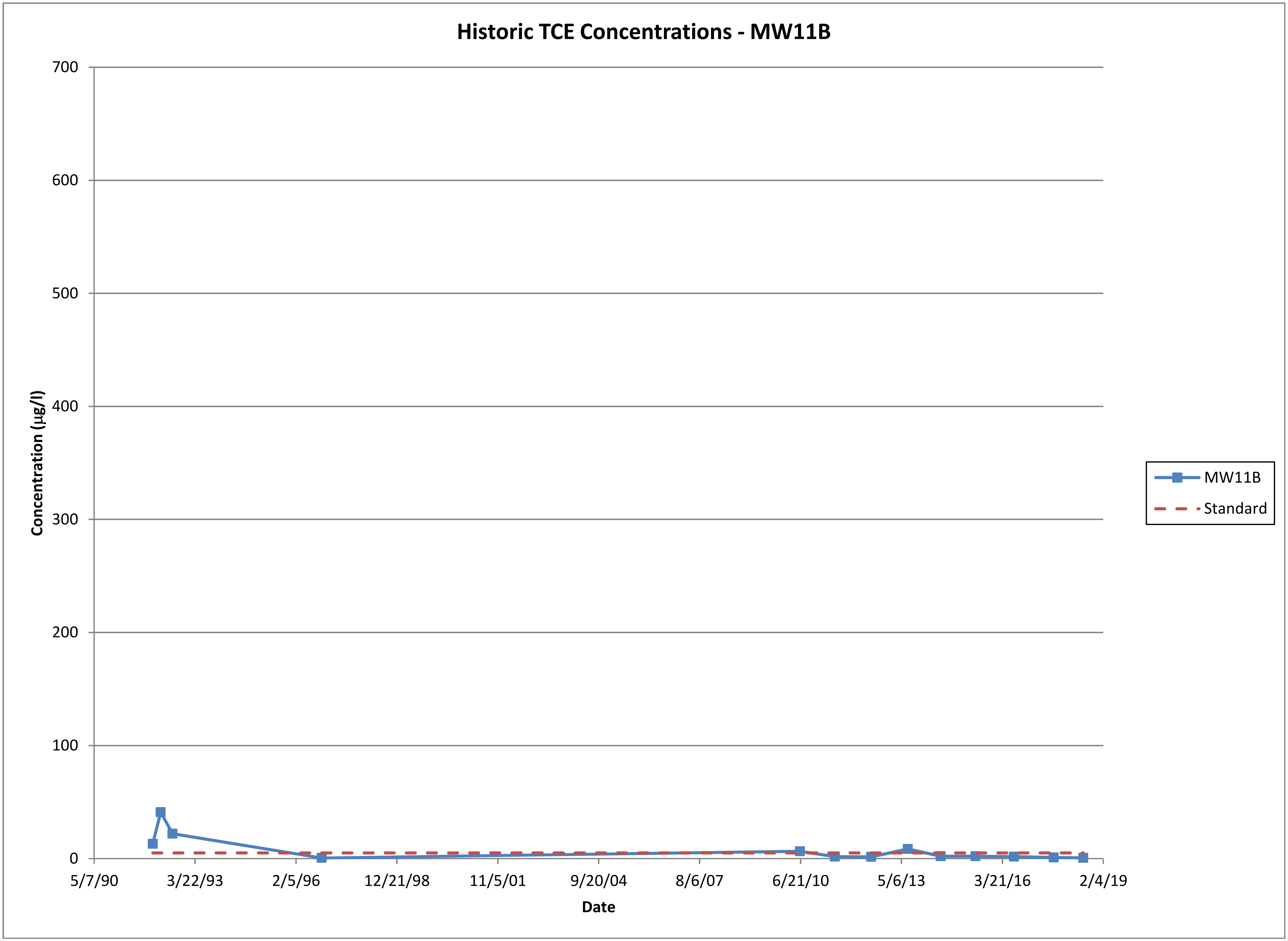


Historic TCE Concentrations - MW7B
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-7B
Standard

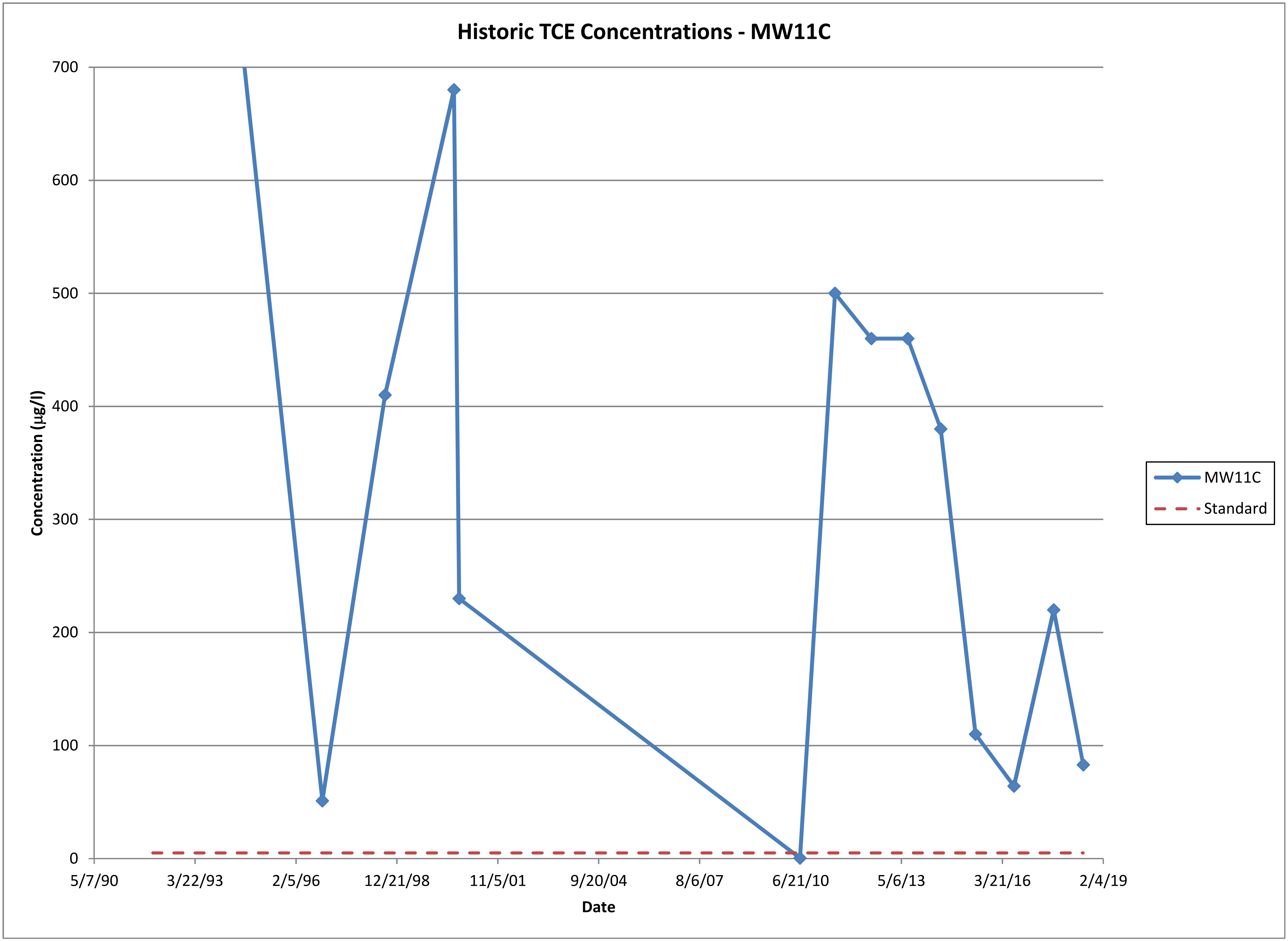

Historic TCE Concentrations - MW9A
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-9A
Standard



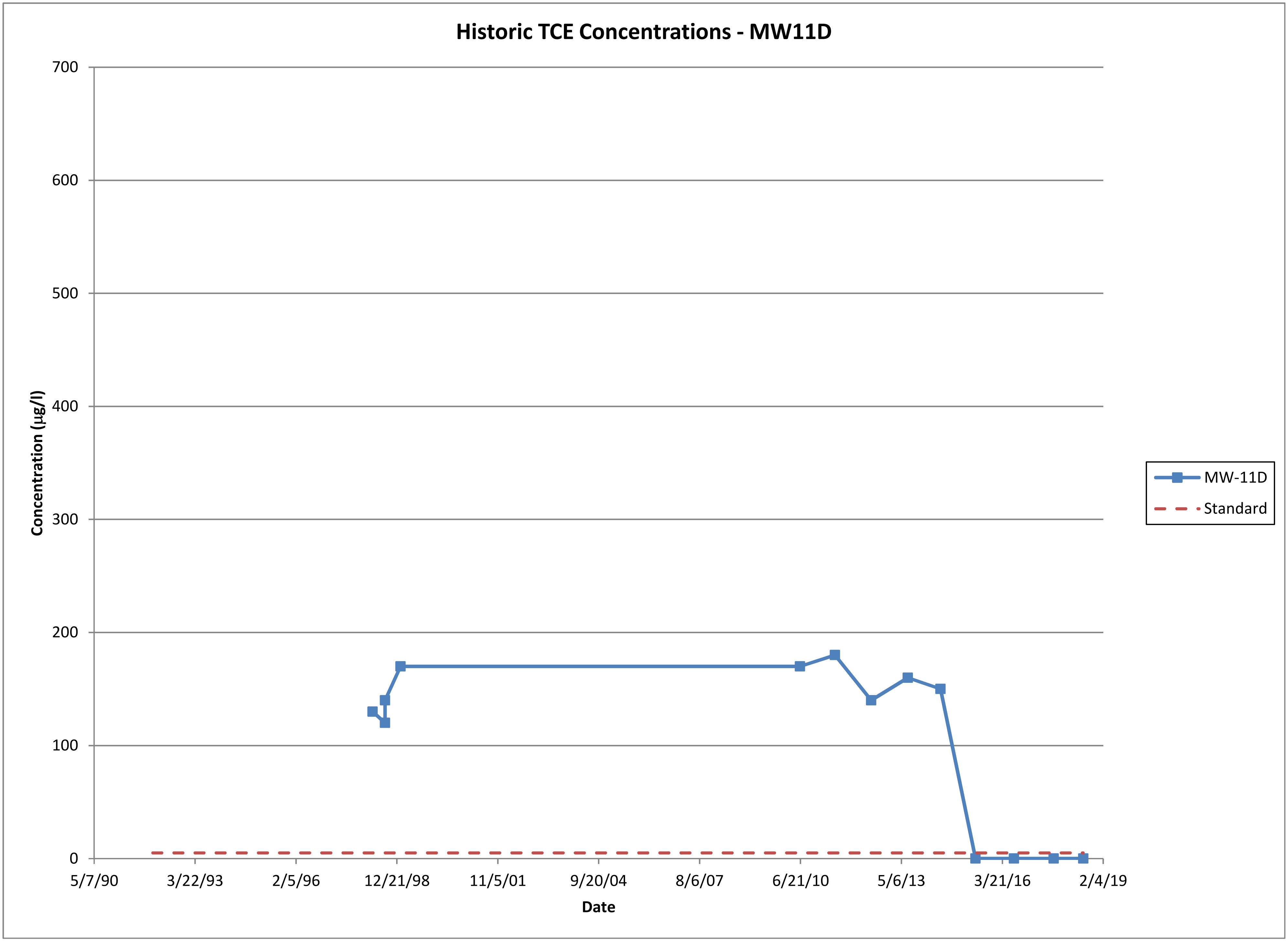
Historic TCE Concentrations - MW9B
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-9B
Standard

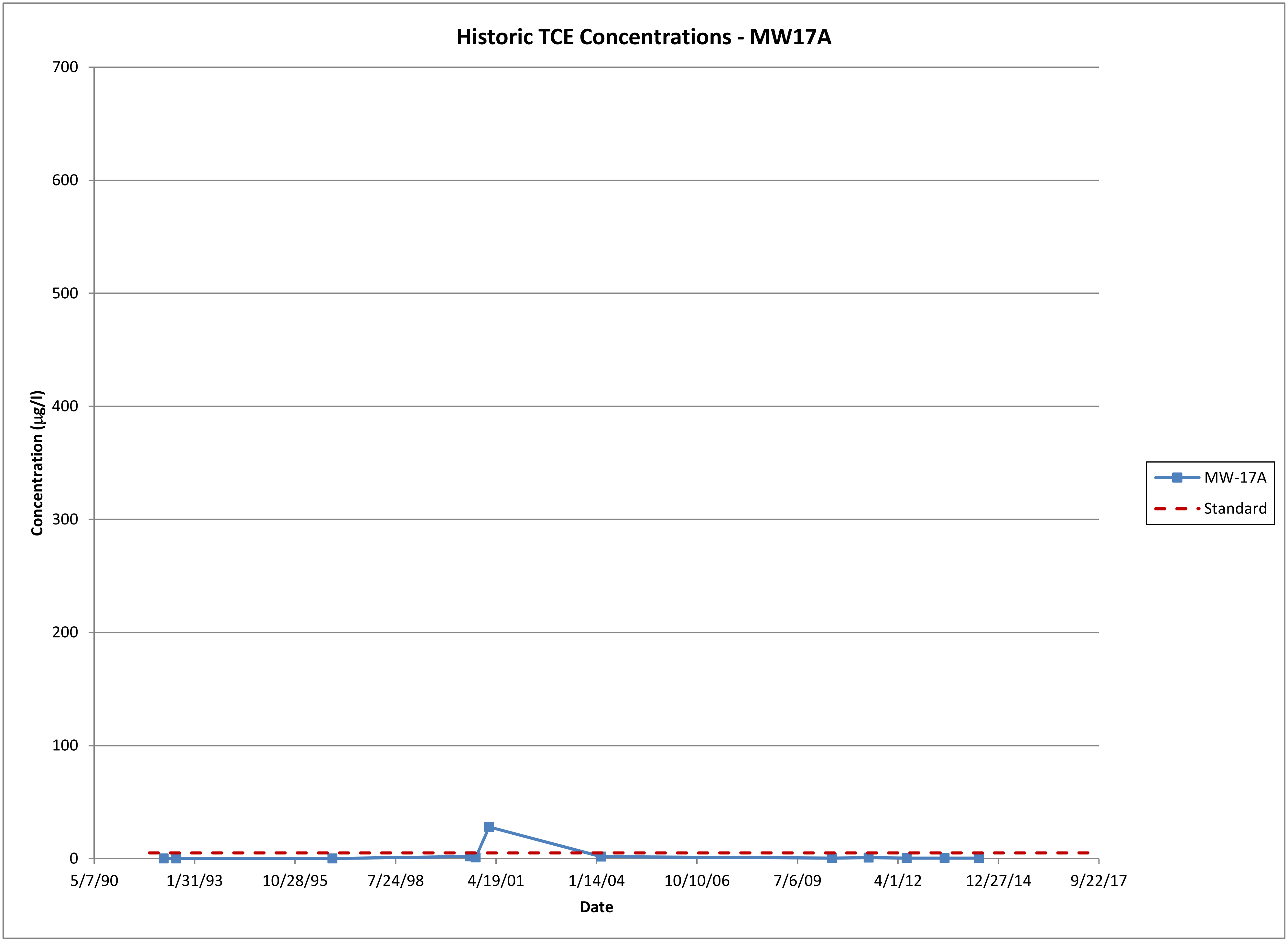


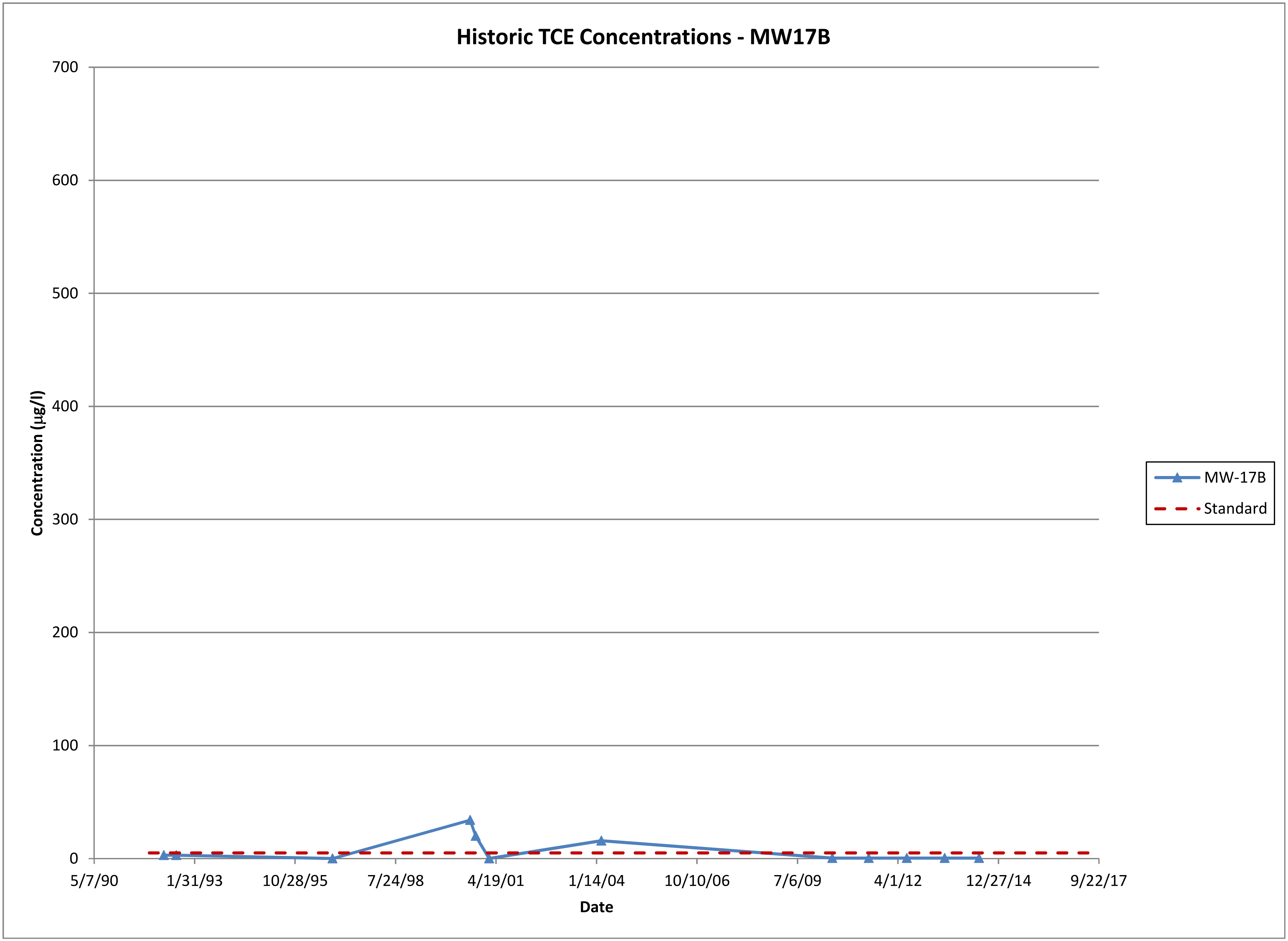
Historic TCE Concentrations - MW11B
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW11B
Standard



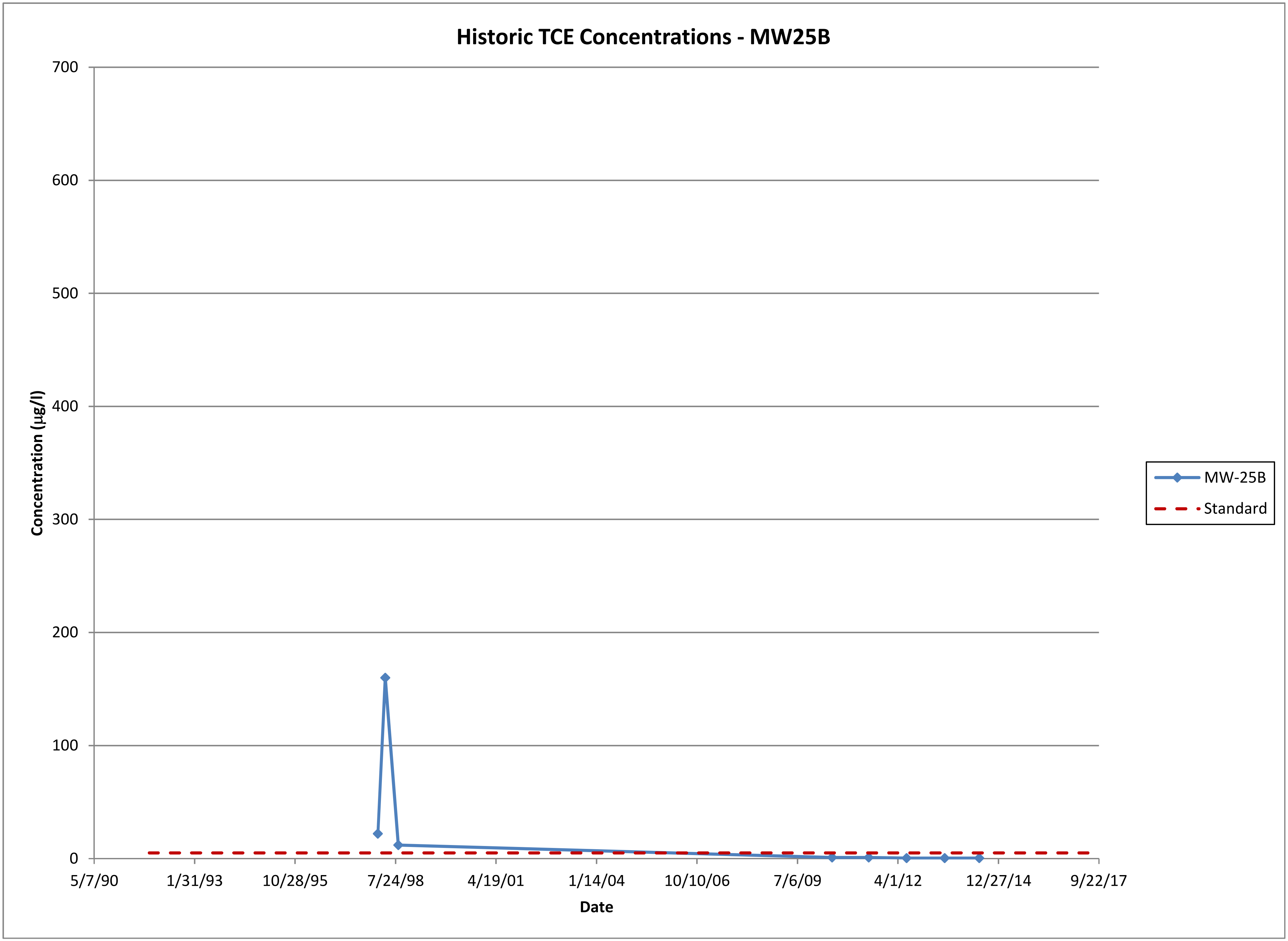
Historic TCE Concentrations - MW11C
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW11C
Standard

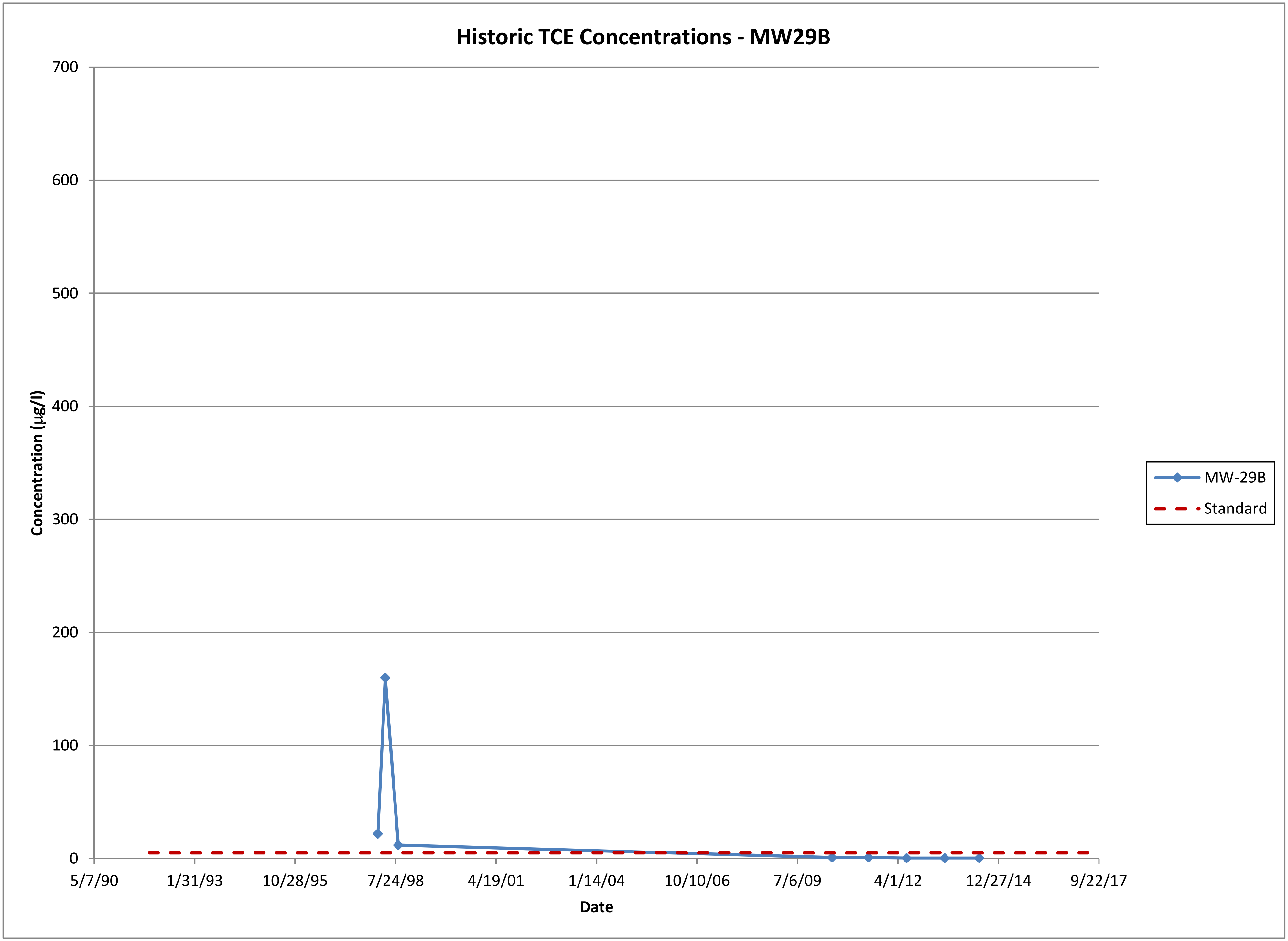

Historic TCE Concentrations - MW11D
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-11D
Standard

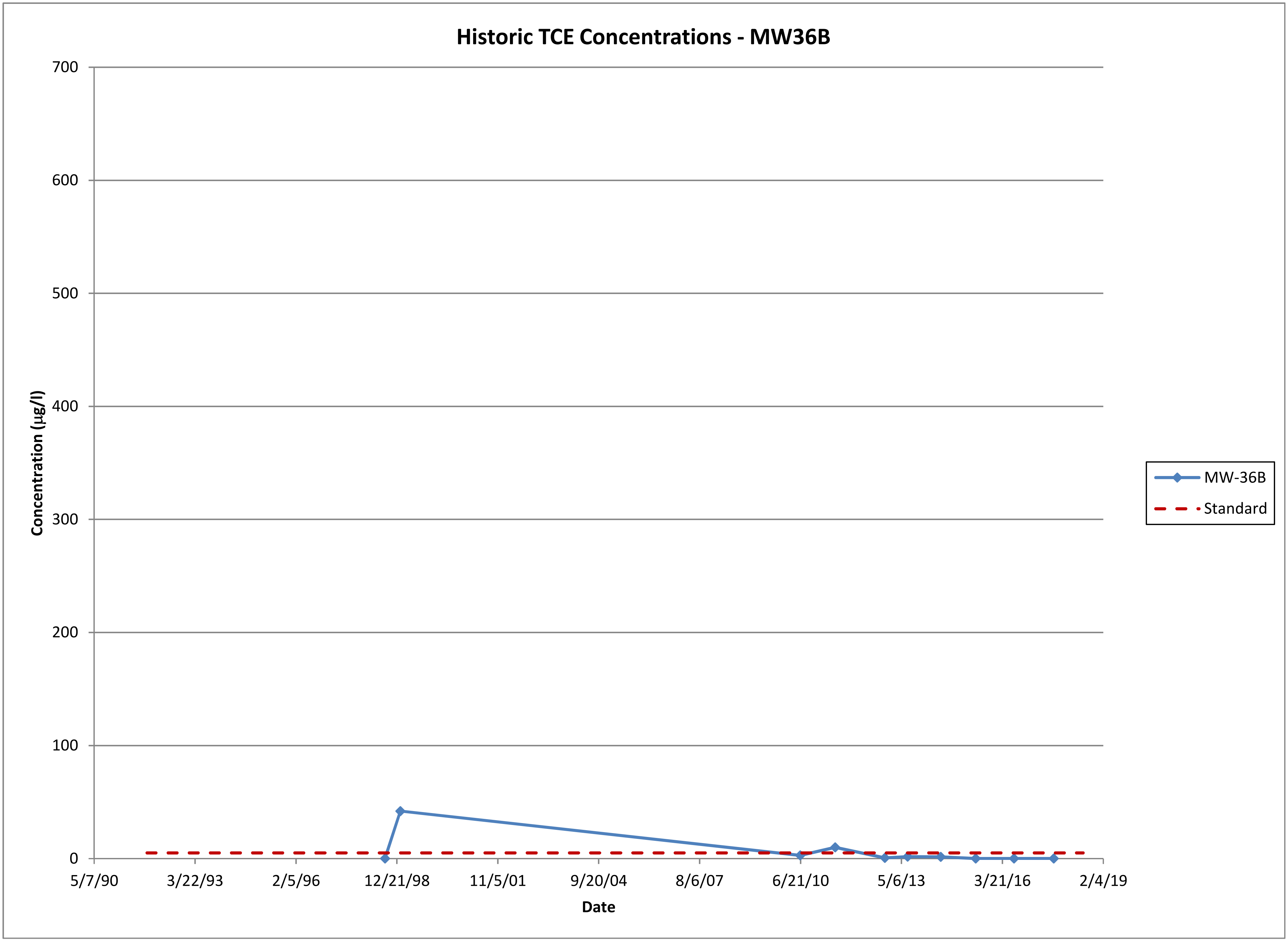

Historic TCE Concentrations - MW17A
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-17A
Standard

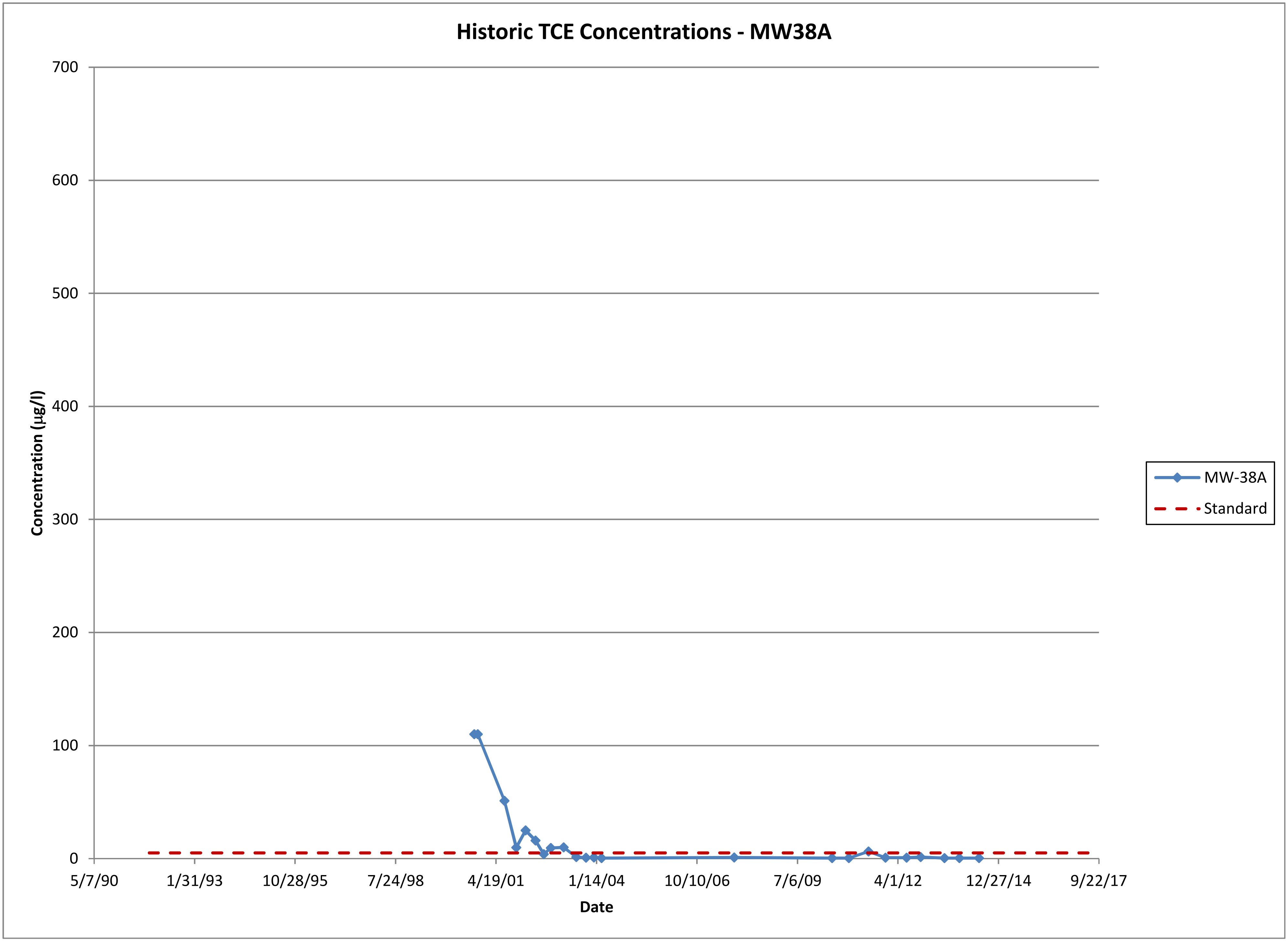


Historic TCE Concentrations - MW17B
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-17B
Standard

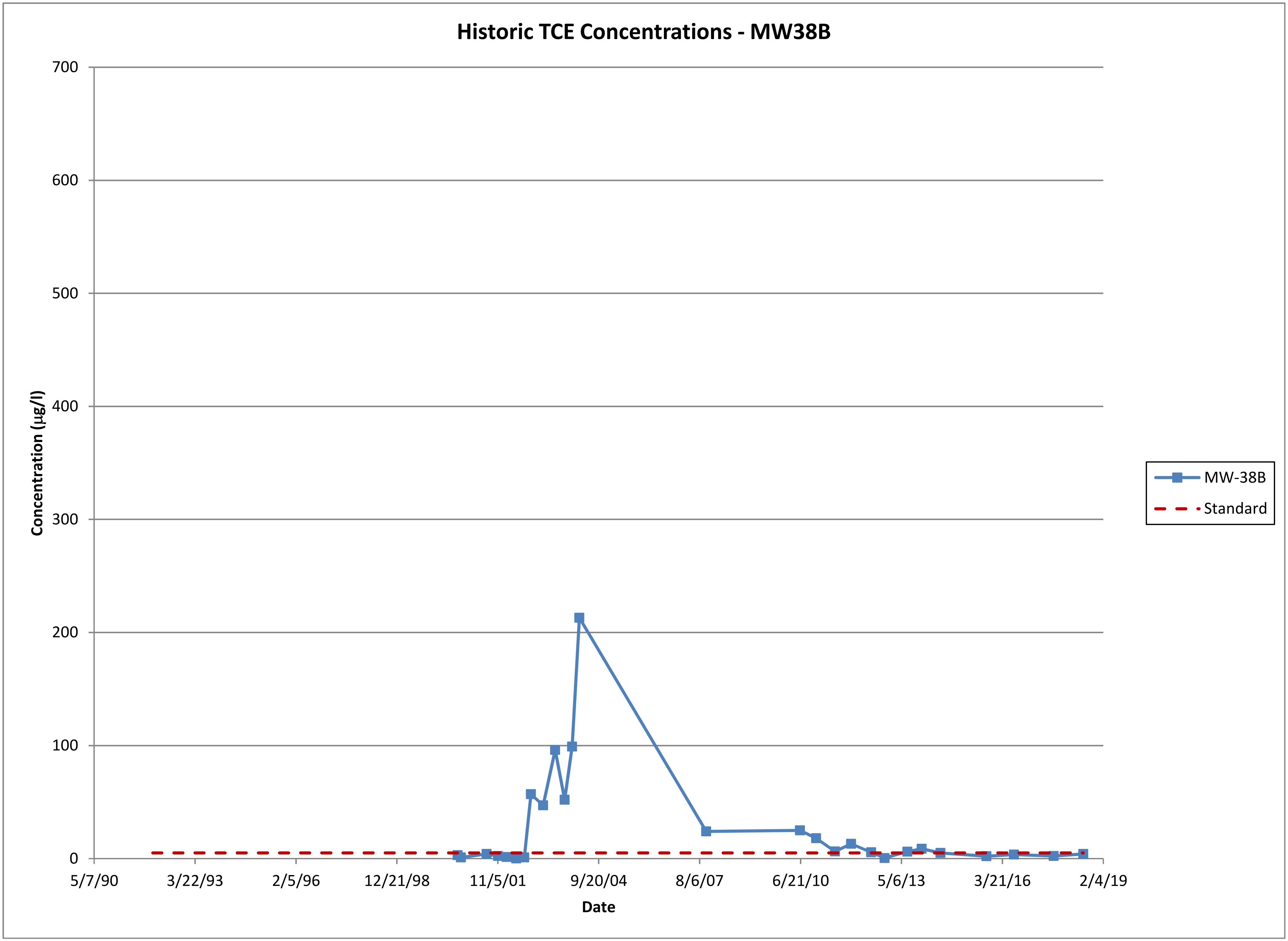

Historic TCE Concentrations - MW25B
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-25B
Standard


Historic TCE Concentrations - MW29B
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-29B
Standard

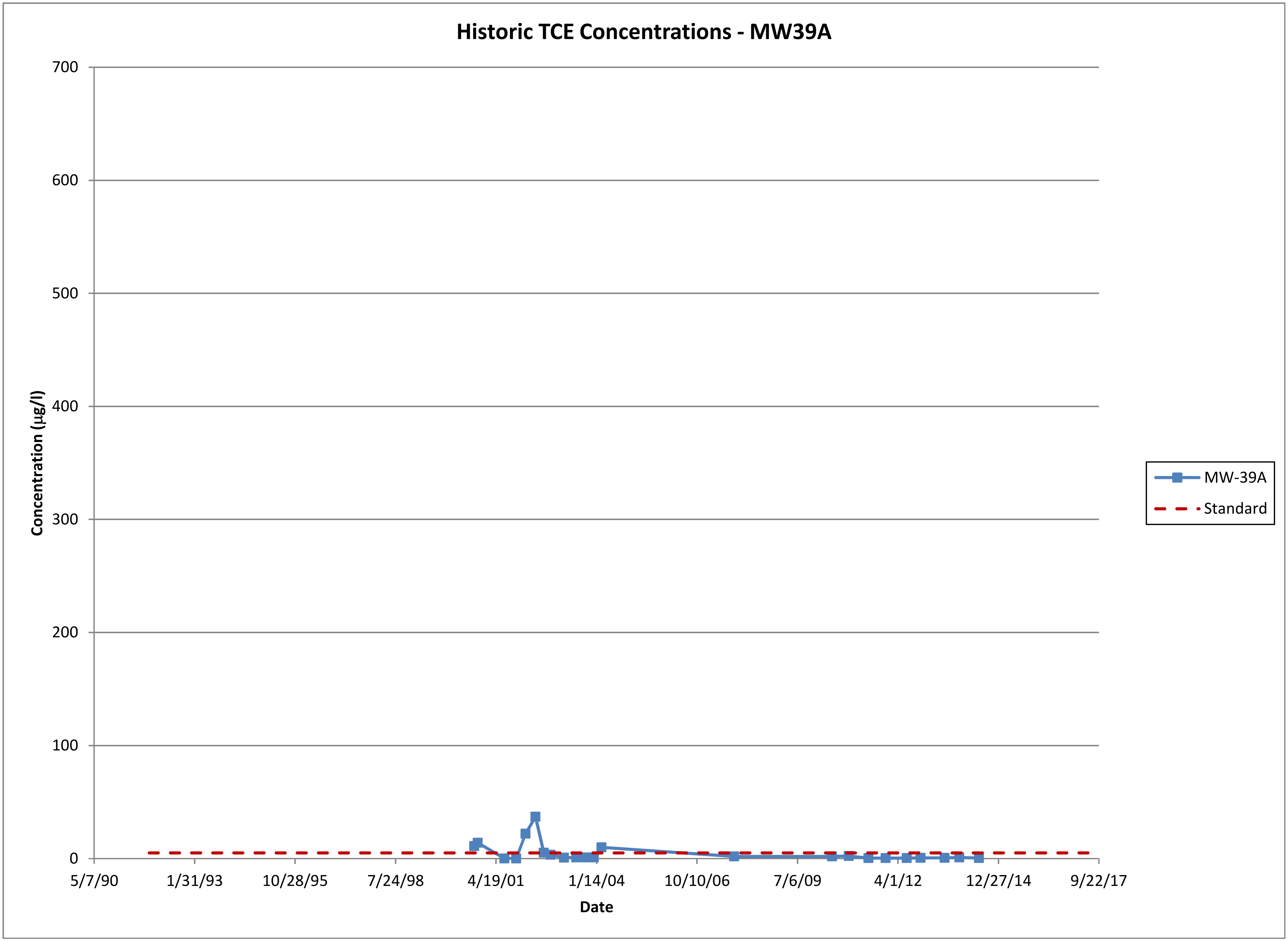

Historic TCE Concentrations - MW36B
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-36B
Standard

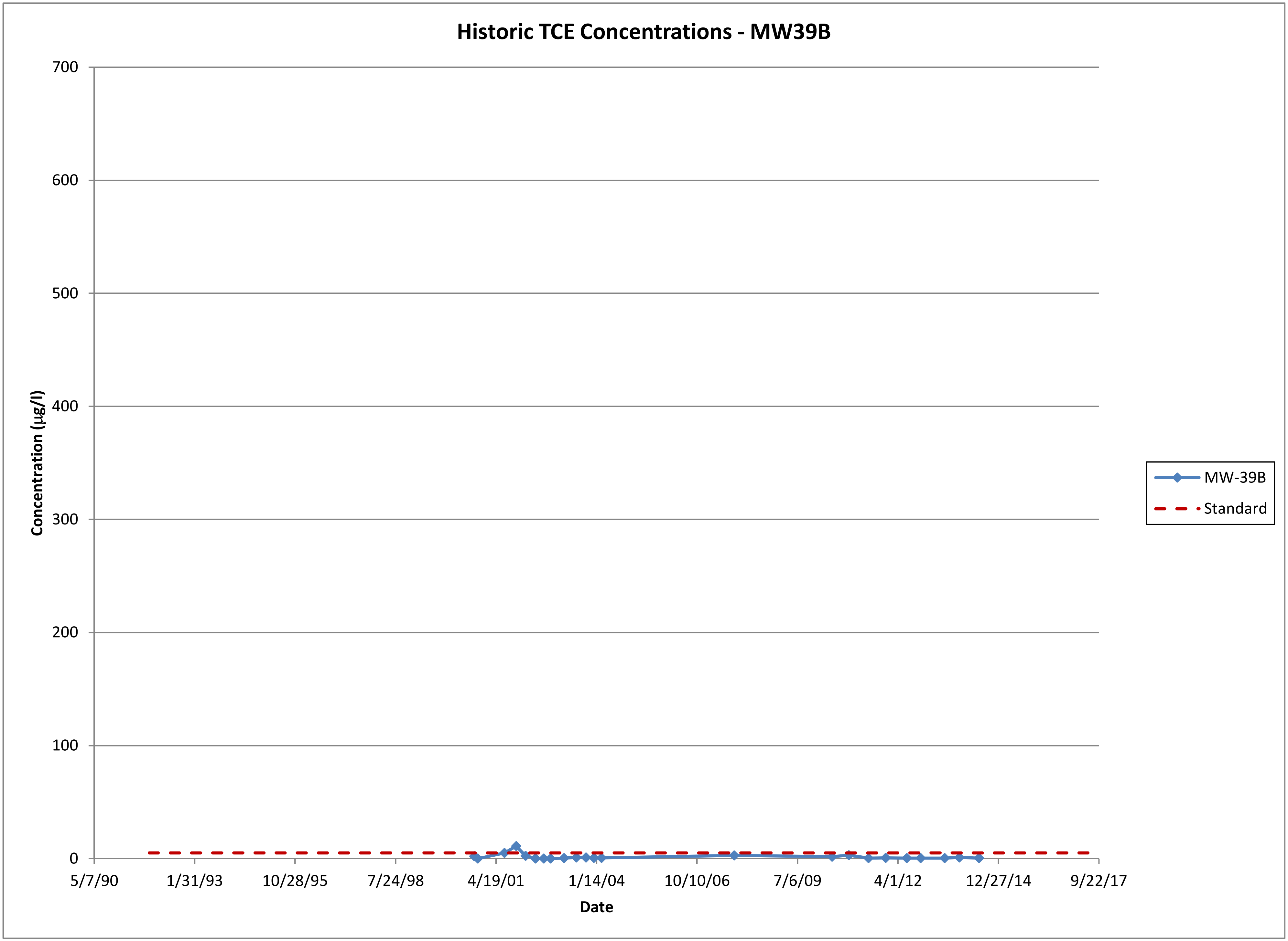


Historic TCE Concentrations - MW38A
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-38A
Standard

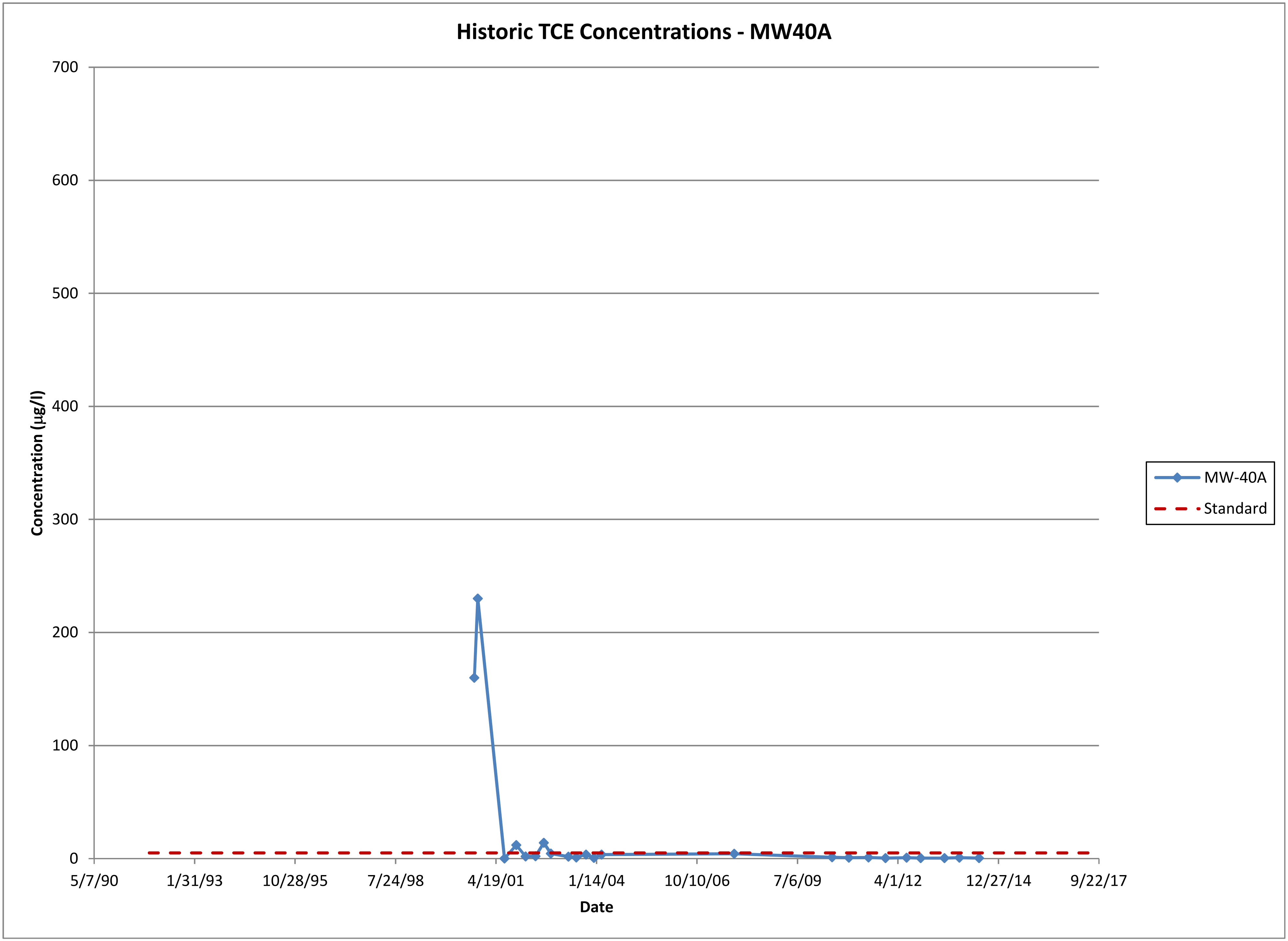


Historic TCE Concentrations - MW38B
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-38B
Standard

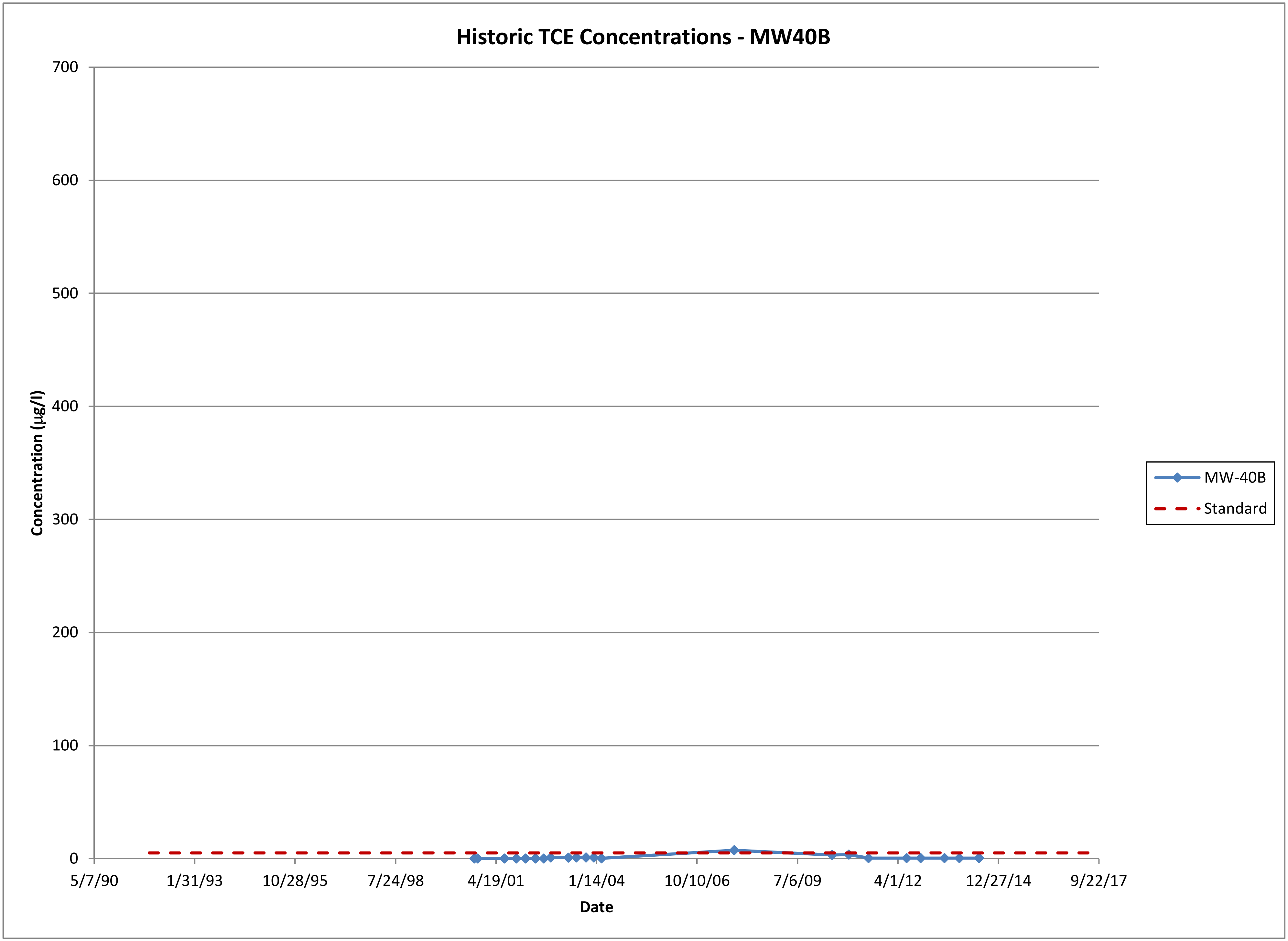

Historic TCE Concentrations - MW39A
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-39A
Standard



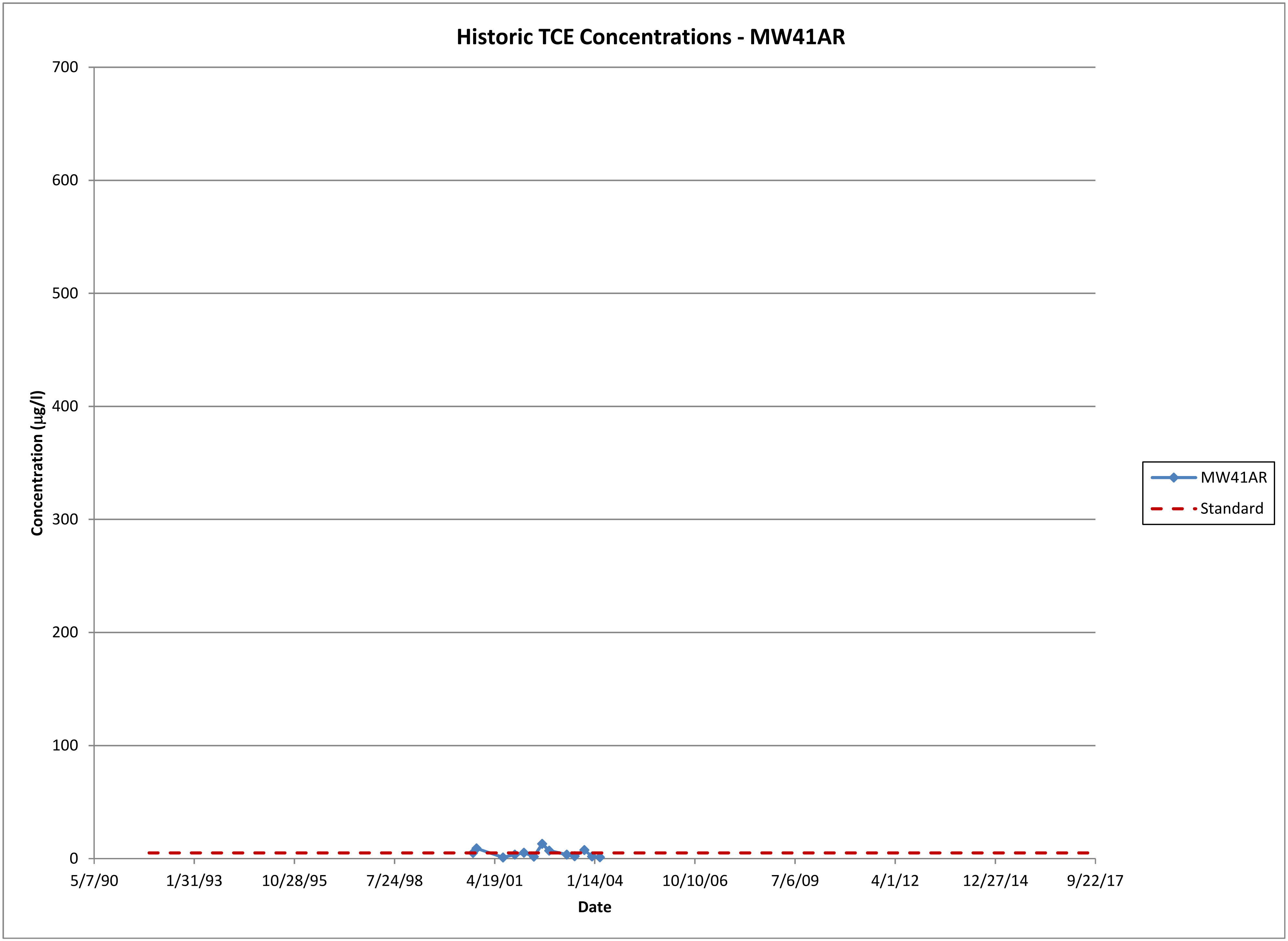
Historic TCE Concentrations - MW39B
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-39B
Standard



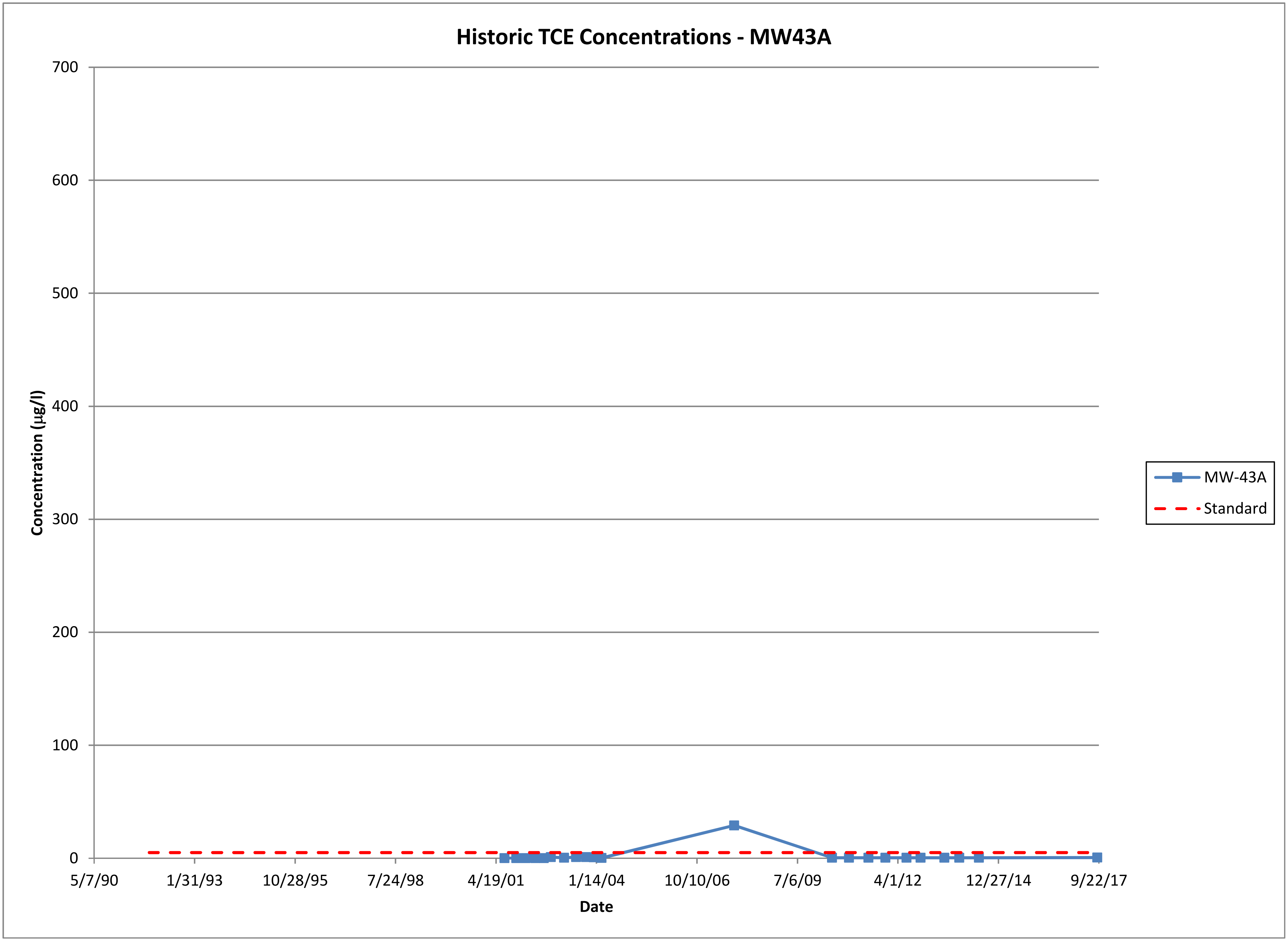
Historic TCE Concentrations - MW40A
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-40A
Standard



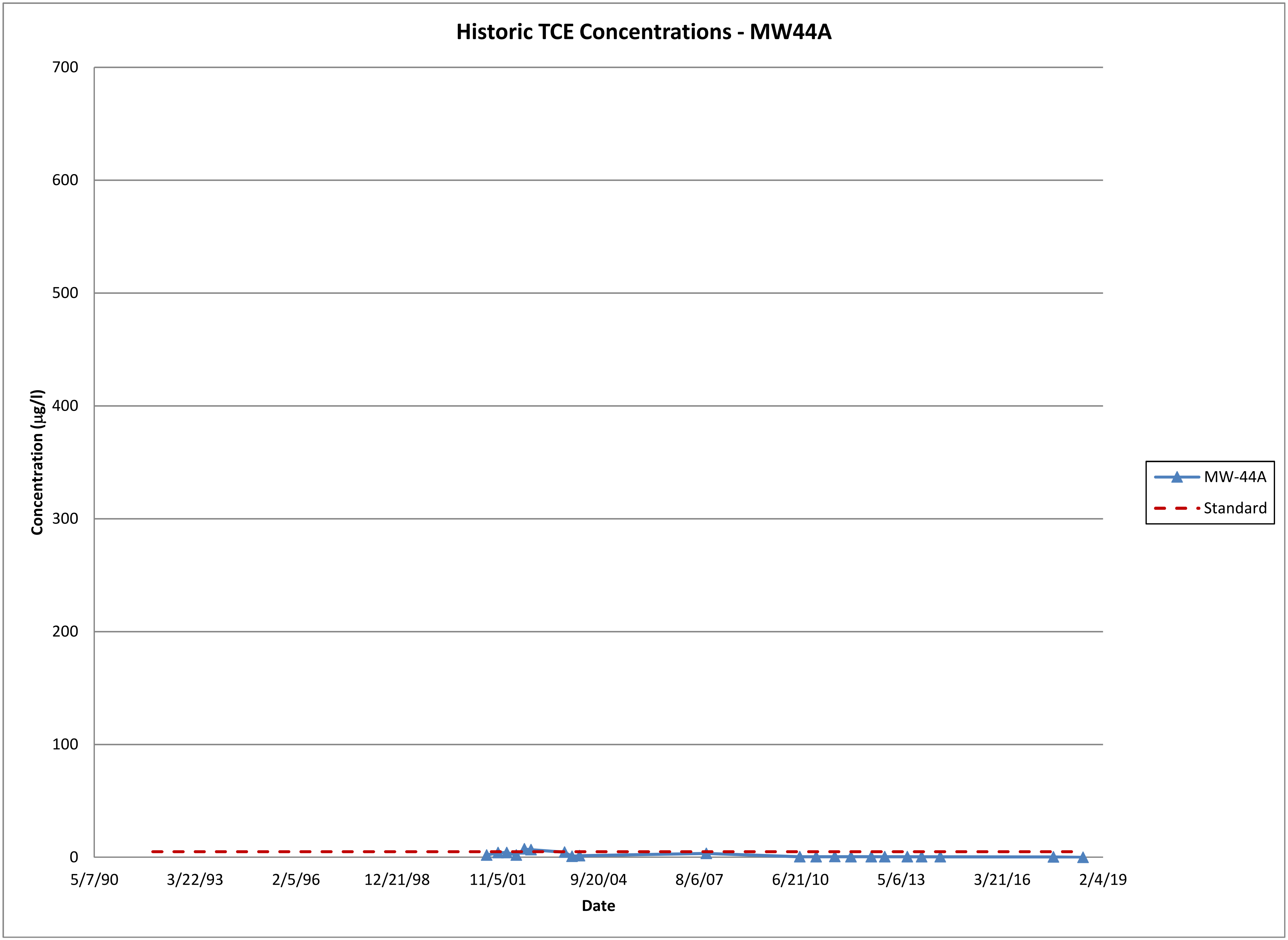
Historic TCE Concentrations - MW40B
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-40B
Standard



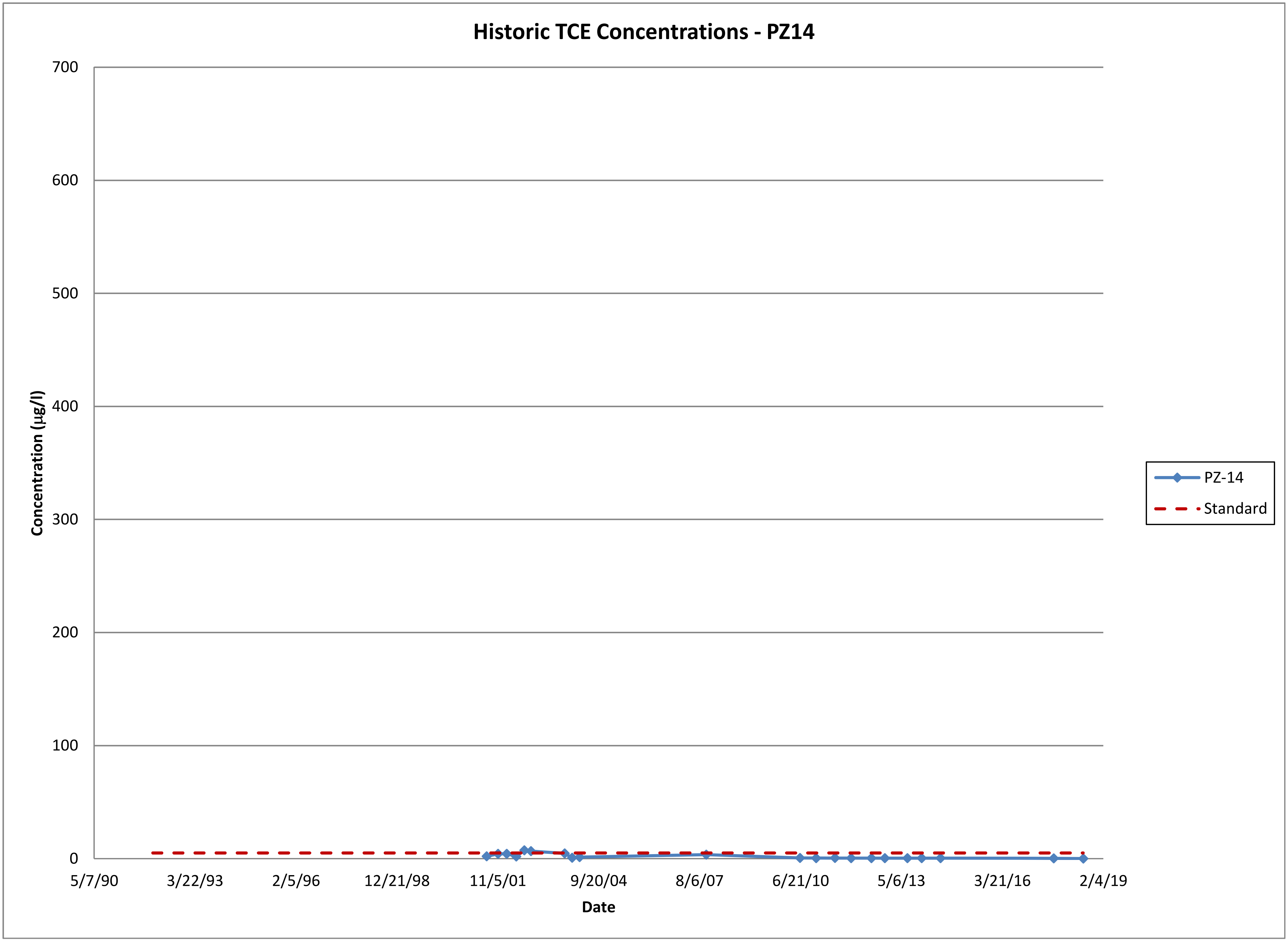
Historic TCE Concentrations - MW41AR
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW41AR
Standard

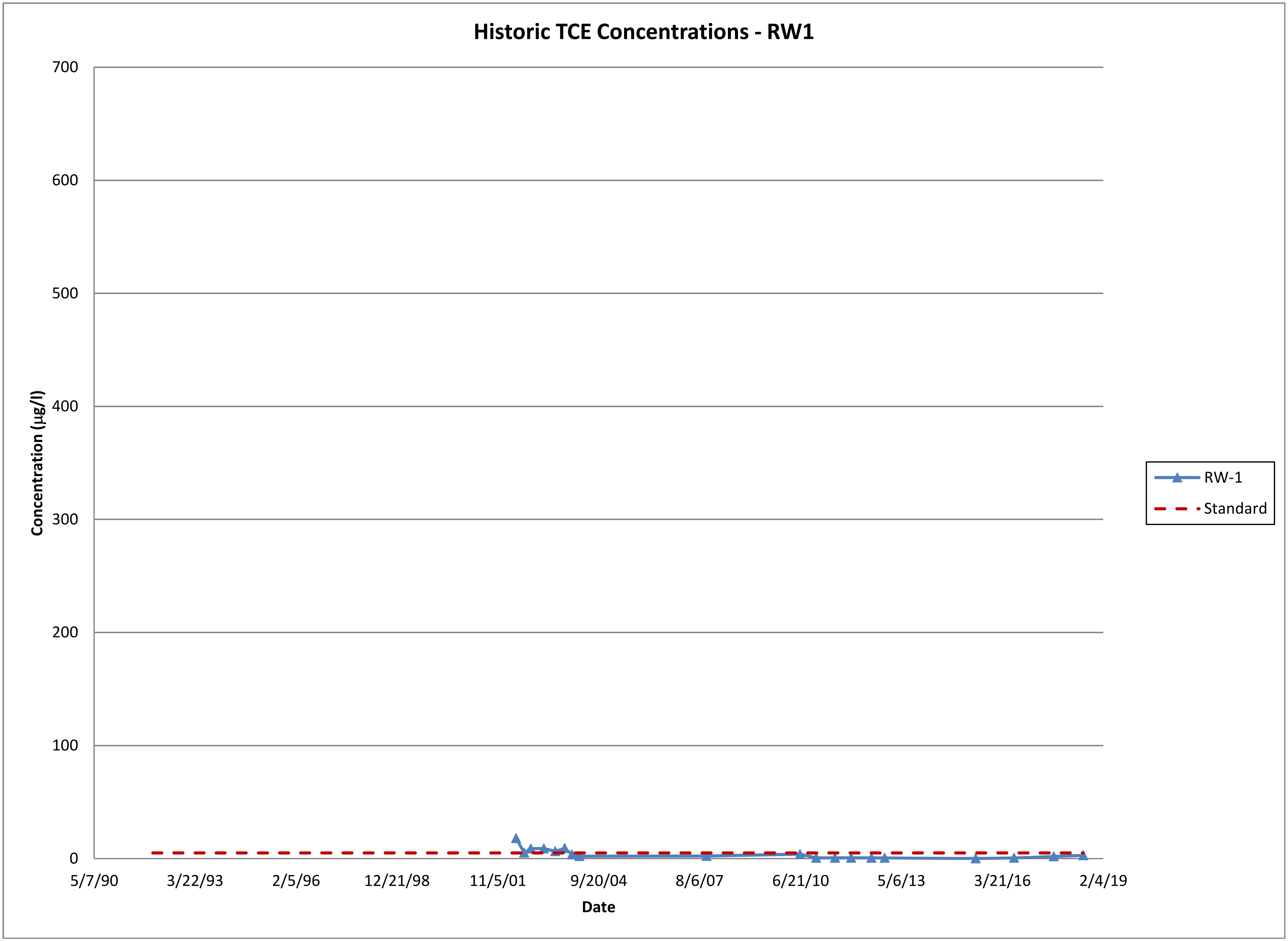


Historic TCE Concentrations - MW43A
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
Date
MW-43A
Standard

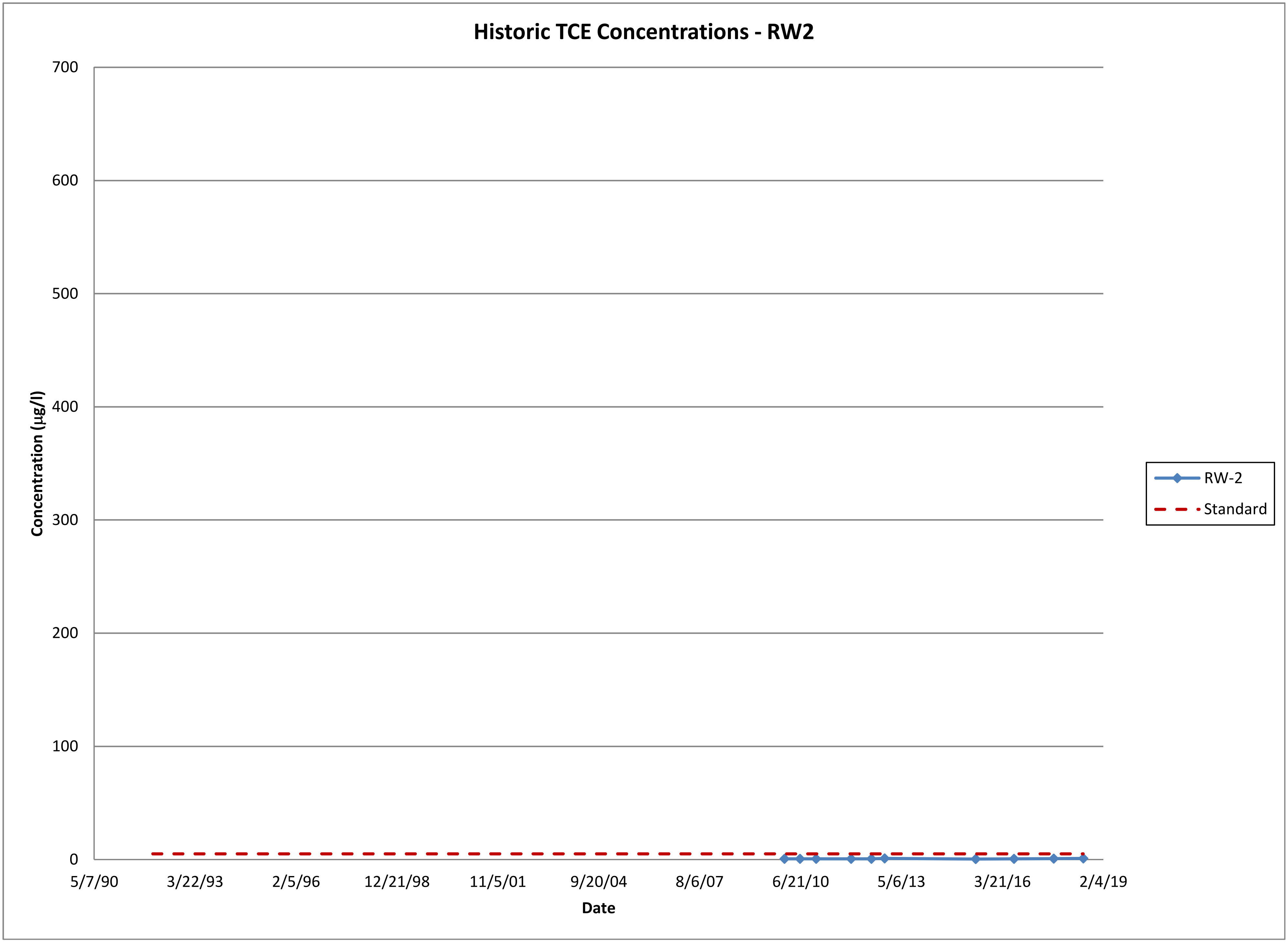


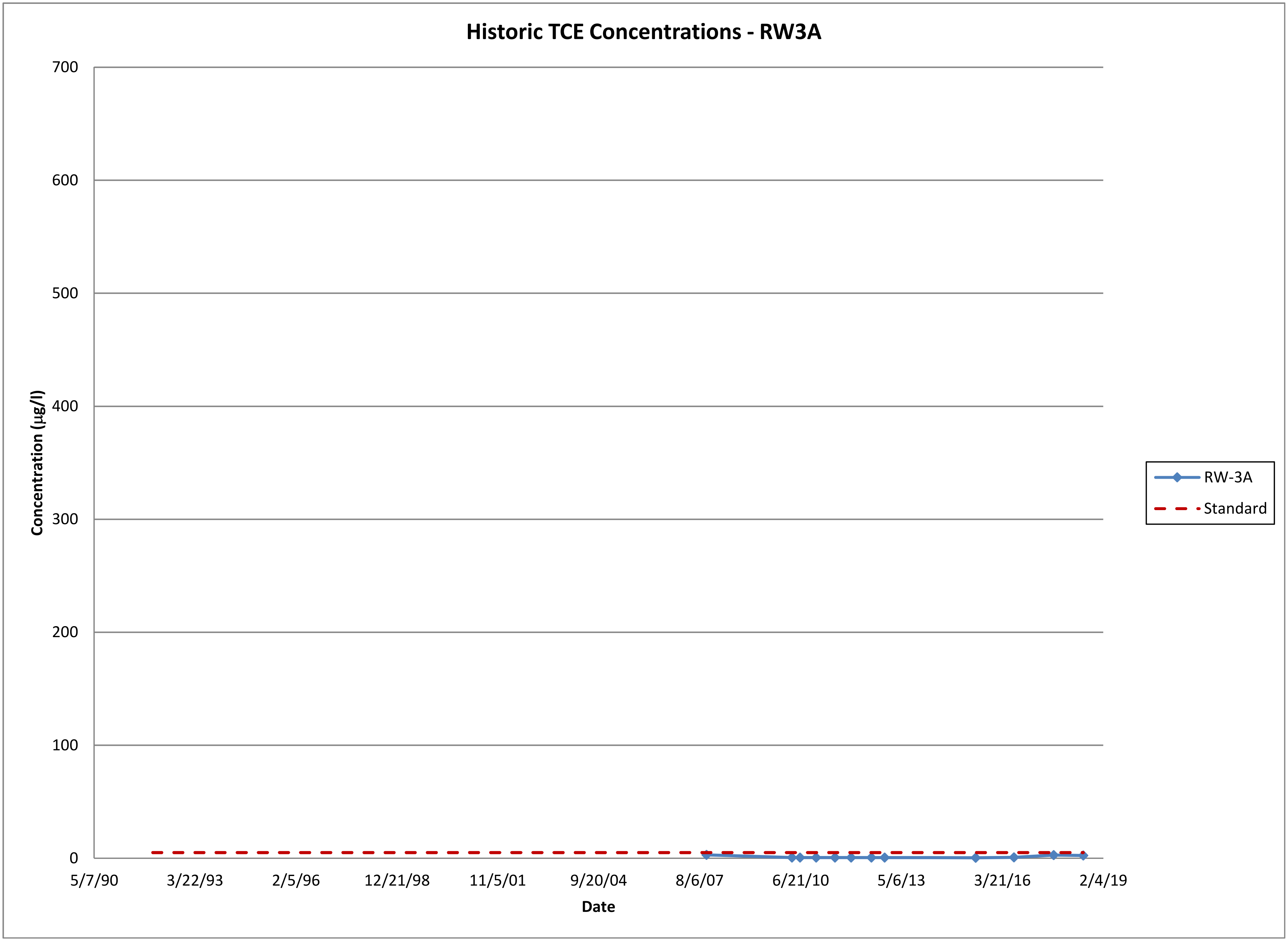
Historic TCE Concentrations - MW44A
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
MW-44A
Standard

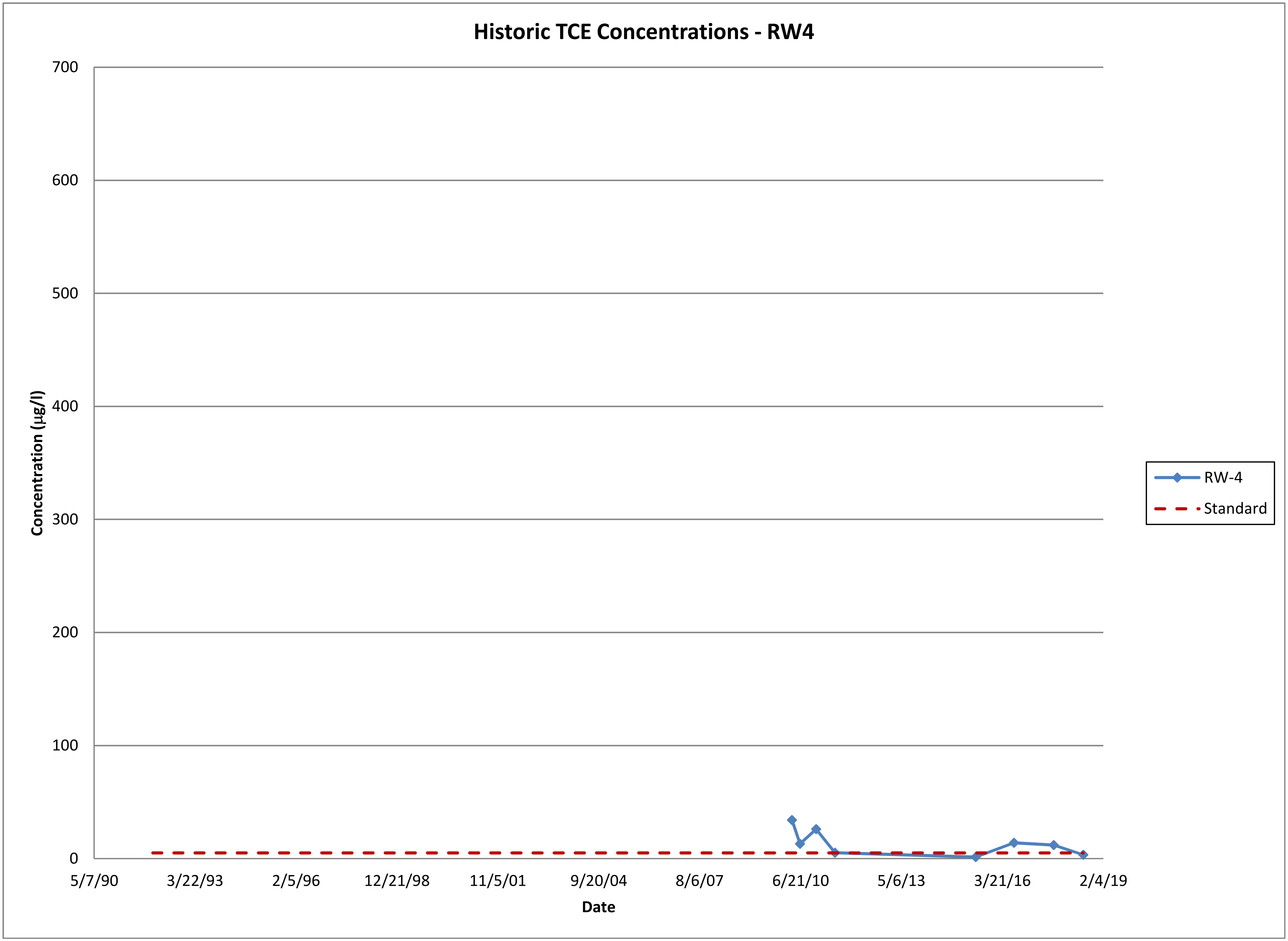

Historic TCE Concentrations - PZ14
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
PZ-14
Standard



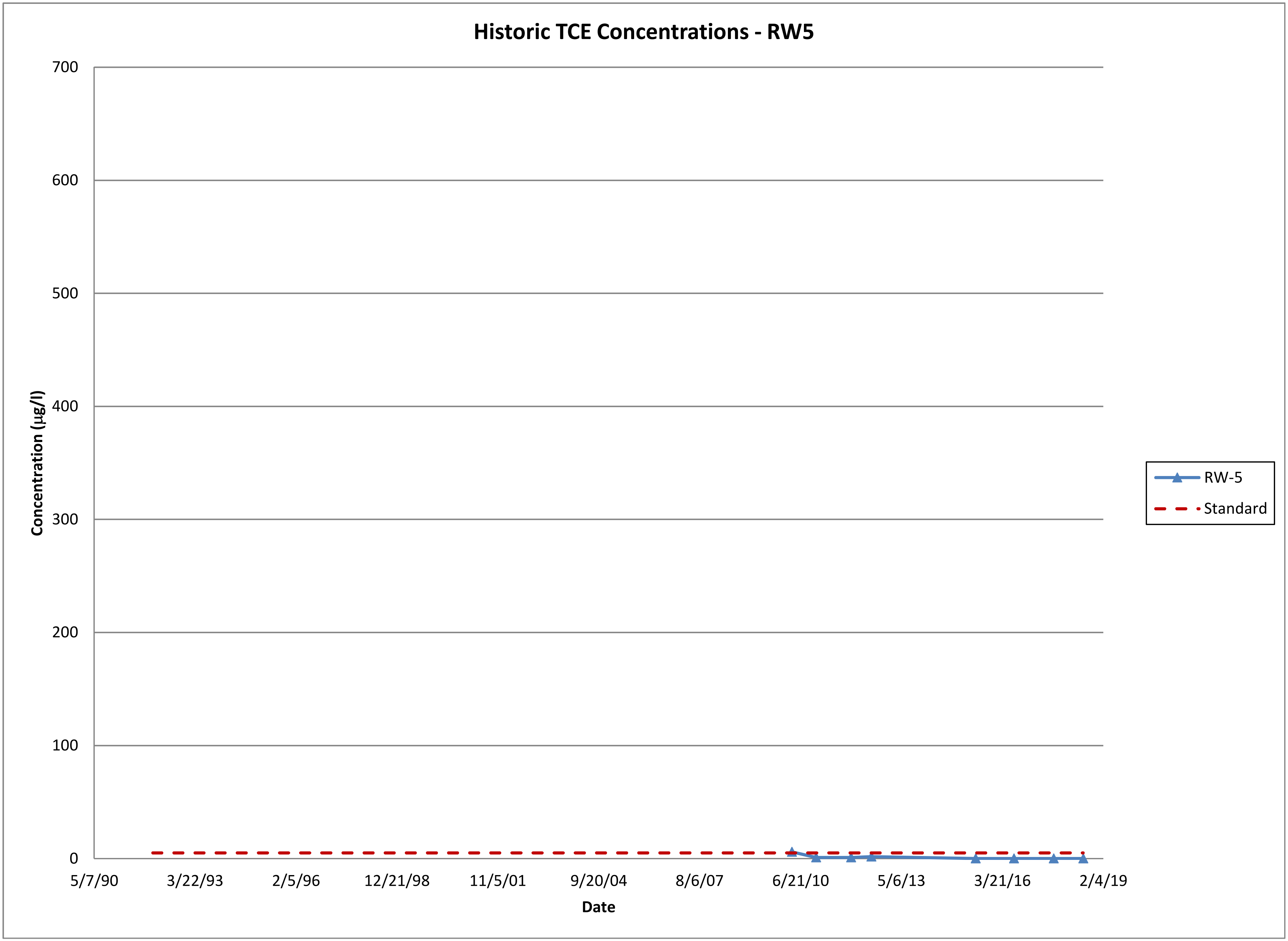
Historic TCE Concentrations - RW1
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-1
Standard

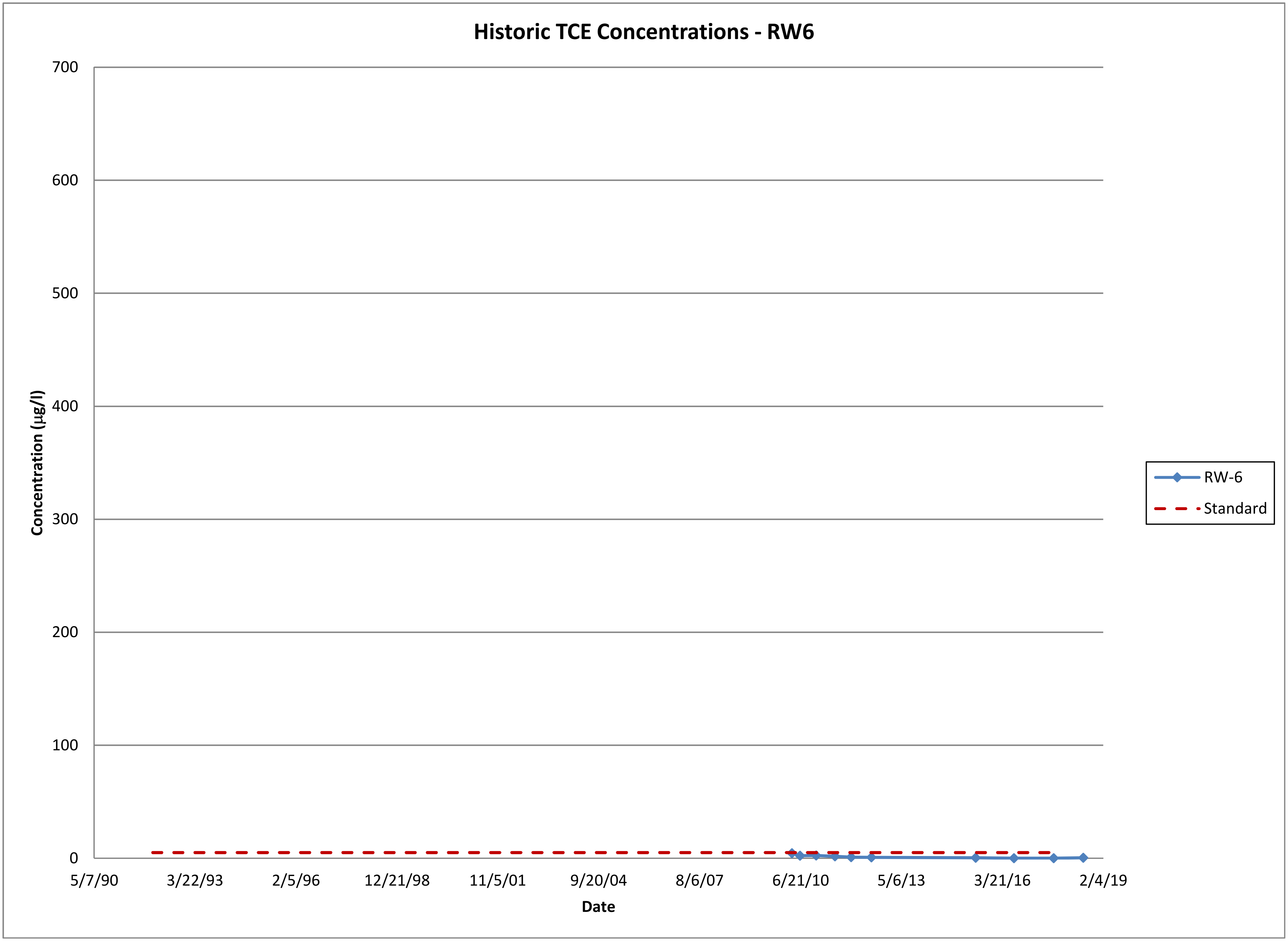

Historic TCE Concentrations - RW2
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-2
Standard

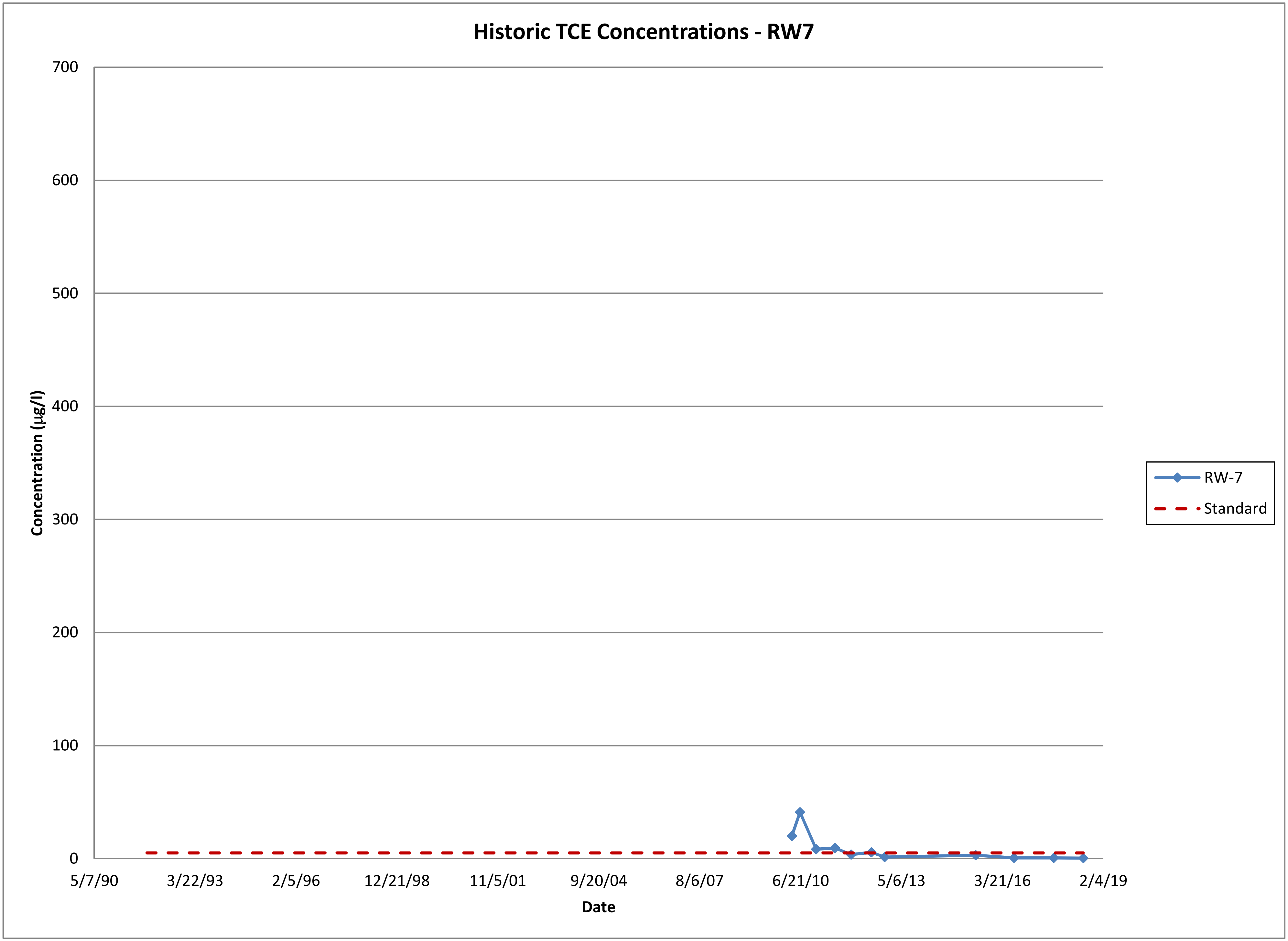

Historic TCE Concentrations - RW3A
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-3A
Standard

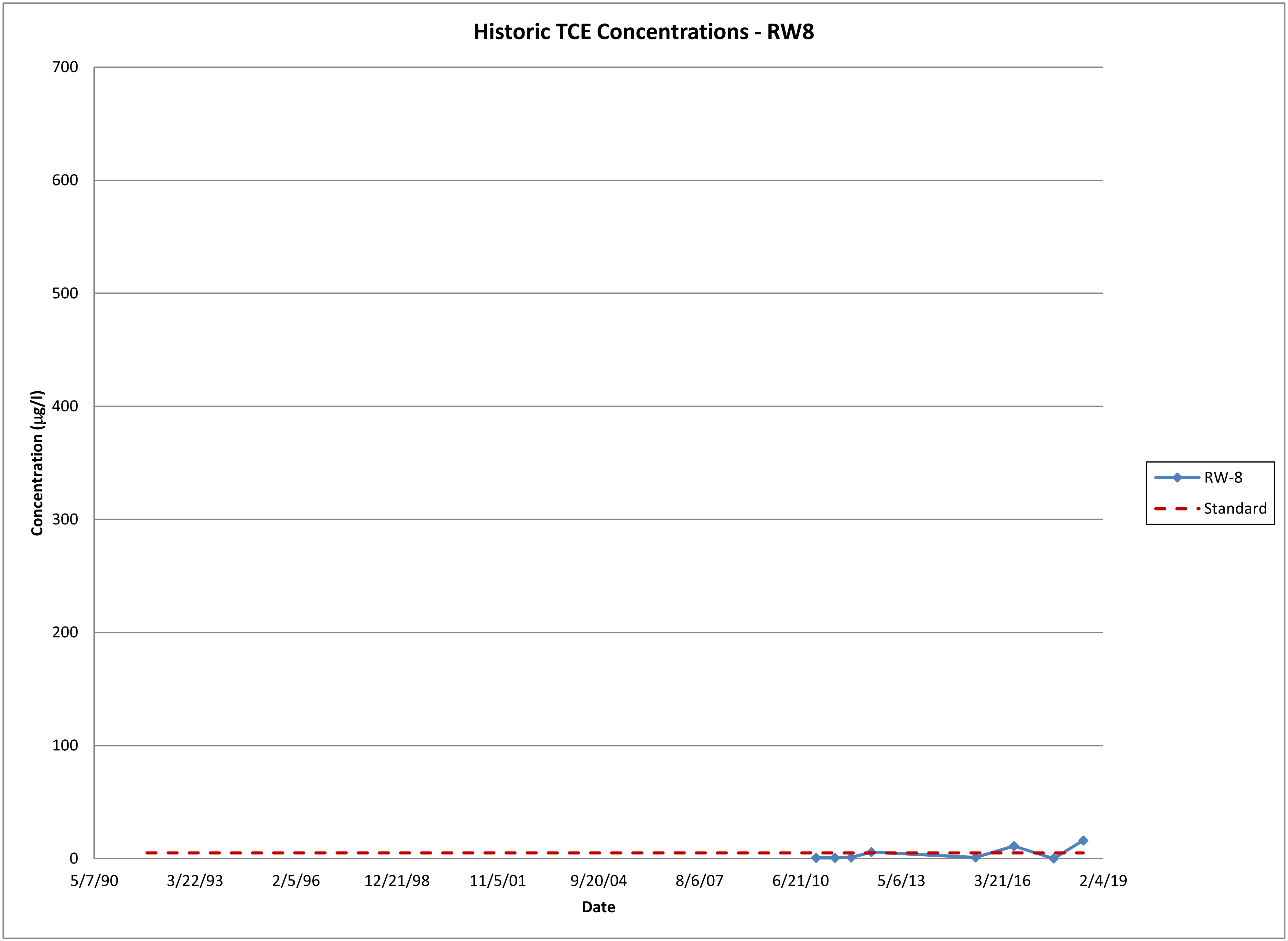


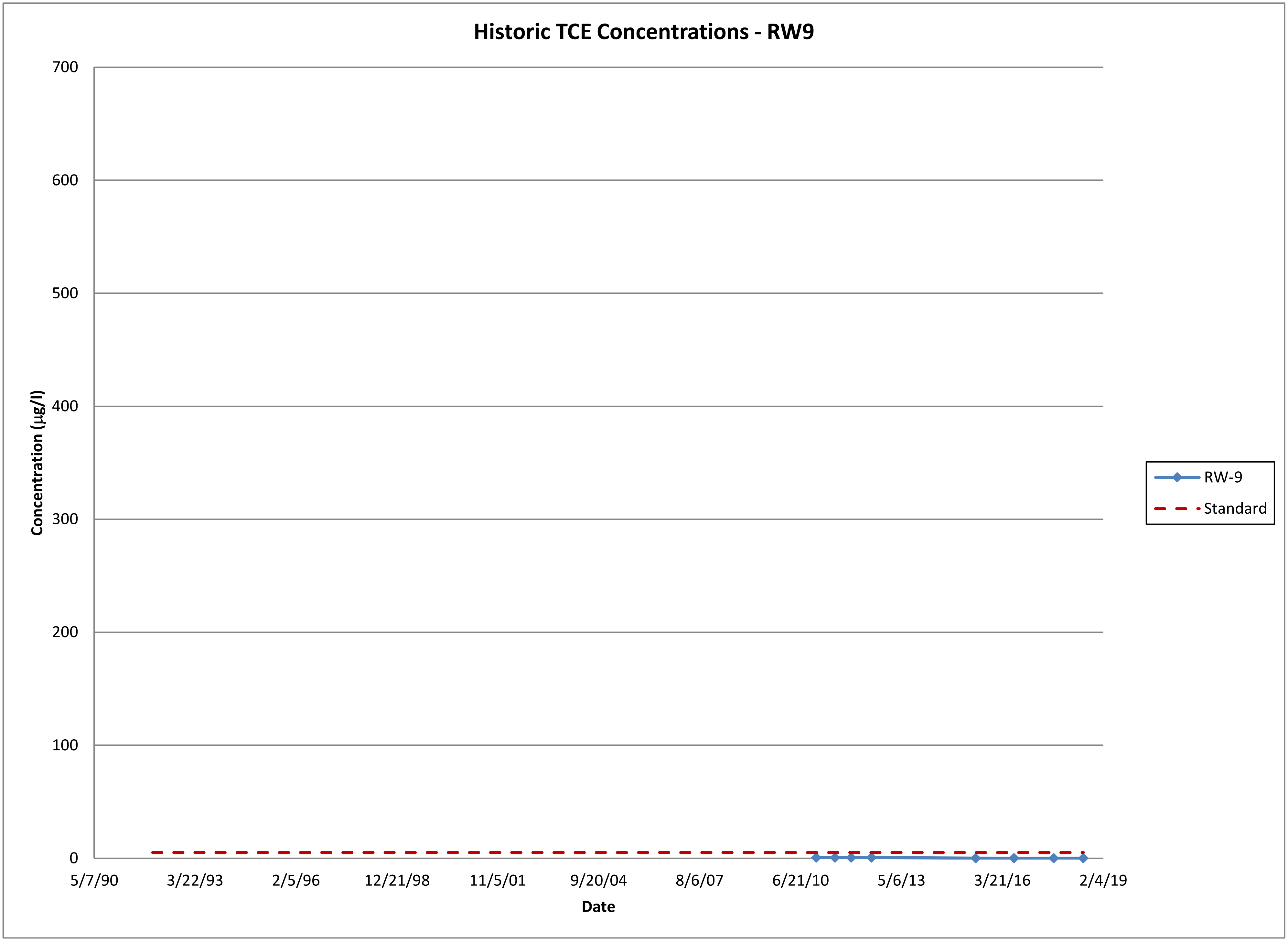
Historic TCE Concentrations - RW4
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-4
Standard

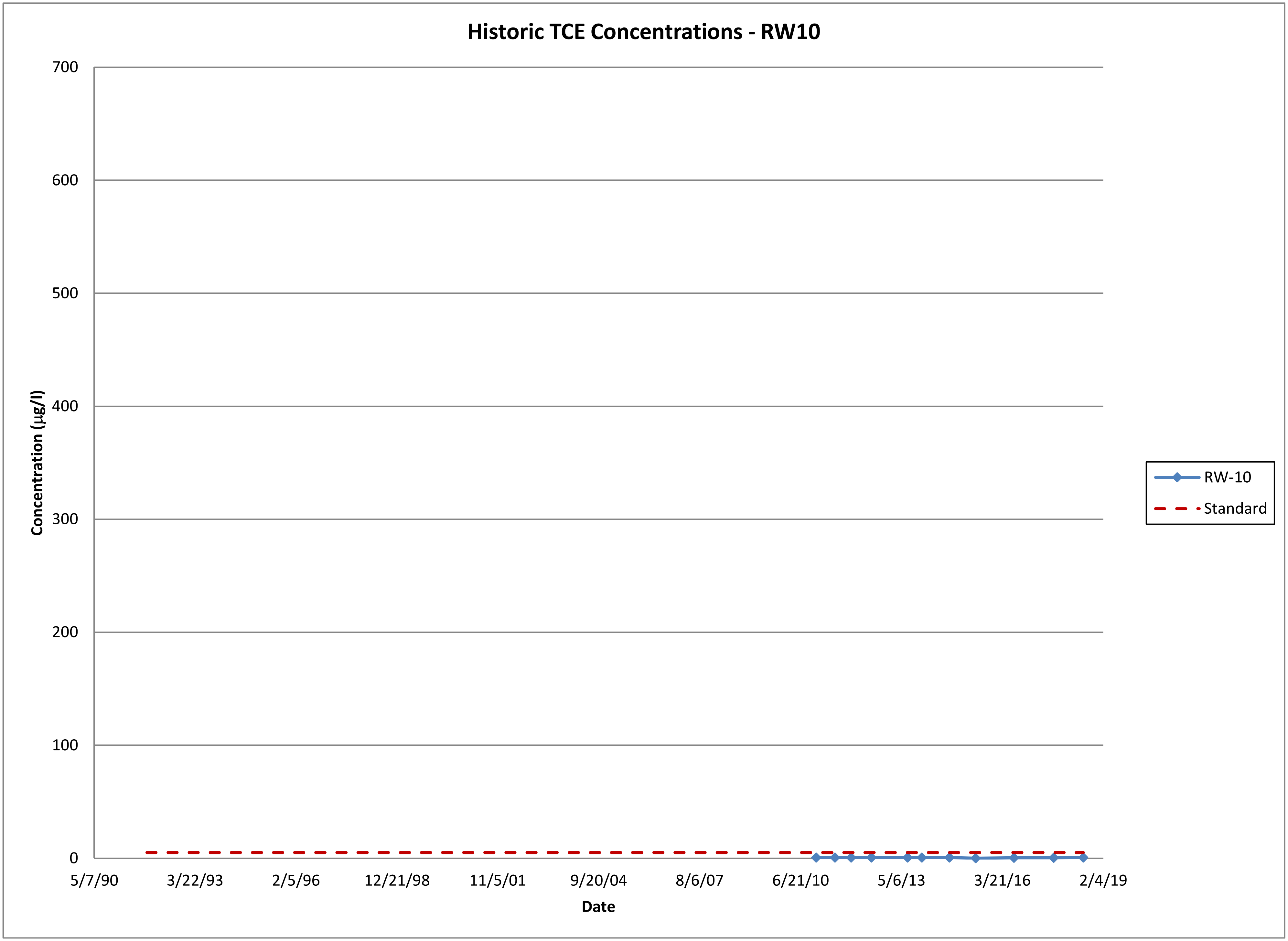

Historic TCE Concentrations - RW5
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-5
Standard


Historic TCE Concentrations - RW6
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-6
Standard


Historic TCE Concentrations - RW7
Concentration (µg/l)
700
600
500
400
300
200
100
0
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-7
Standard


Historic TCE Concentrations - RW8
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-8
Standard


Historic TCE Concentrations - RW9
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-9
Standard


Historic TCE Concentrations - RW10
700
600
500
400
300
200
100
0
Concentration (µg/l)
5/7/90
3/22/93
2/5/96
12/21/98
11/5/01
9/20/04
8/6/07
6/21/10
5/6/13
3/21/16
2/4/19
Date
RW-10
Standard