U.S. Army Corps of Engineers
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Phase I USEPA SOW – Demonstrate Plume Capture, Technical Memorandum Phase I Subtask 5.e, Validate the Extent of Capture by Evaluating Concentration Trends in NIA Monitoring Locations as Compared to Flow Paths Developed from the Updated Groundwater Flow Model

Area of Contamination 5 – Shepley's Hill Landfill
Former Fort Devens Army Installation
Devens, Massachusetts

Contract No. W912WJ-19-D-0014

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December 9, 2021

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Acronyms and Abbreviations

3PE	three-point estimation
µg/L	microgram per liter
ATP	arsenic treatment plant
CL	cleanup level
Geosyntec	Geosyntec Consultants, Inc.
gpm	gallon per minute
HSU	hydrostratigraphic unit
NIA	North Impact Area
S-A JV	SERES-Arcadis 8(a) Joint Venture 2, LLC
SHL	Shepley's Hill Landfill
site	Area of Contamination 5 – Shepley's Hill Landfill, located at the former Fort Devens Army Installation in Devens, Massachusetts
SOW	scope of work
Technical Memo 1	Phase I USEPA SOW – Demonstrate Plume Capture Technical Memorandum Phase I Subtask 1.g Delineate Capture Zone based on Hydraulic and Geochemical Data
Technical Memo 2	Phase I USEPA SOW – Demonstrate Plume Capture Technical Memorandum Phase I Subtask 2.d Delineate Lateral and Vertical Extent Upgradient
Technical Memo 4	Phase I USEPA SOW – Demonstrate Plume Capture, Technical Memorandum Phase I Subtask 4.e, Validate the Updated Groundwater Flow Model with Sufficient Field-Measured Hydraulic Data to Confirm Conclusions
Technical Memo 5	Phase I USEPA SOW – Demonstrate Plume Capture, Technical Memorandum Phase I Subtask 5.e, Validate the Extent of Capture by Evaluating Concentration Trends in NIA Monitoring Locations as Compared to Flow Paths Developed in the Updated Groundwater Flow Model
UCL	upper confidence limit
USEPA	United States Environmental Protection Agency

1 Introduction

SERES-Arcadis 8(a) Joint Venture 2, LLC (S-A JV) prepared this Phase I USEPA SOW – Demonstrate Plume Capture, Technical Memorandum Phase I Subtask 5.e, Validate the Extent of Capture by Evaluating Concentration Trends in NIA Monitoring Locations as Compared to Flow Paths Developed in the Updated Groundwater Flow Model (Technical Memo 5) in accordance with a scope of work (SOW; United States Environmental Protection Agency [USEPA] 2016) developed by the USEPA, Region 1, for the Area of Contamination 5 – Shepley's Hill Landfill (SHL), located at the former Fort Devens Army Installation in Devens, Massachusetts (site; Figure 1). Technical Memo 5, listed as Phase I Subtask 5.e in the SOW, is the fifth of five memoranda required by the USEPA in accordance with the SOW (USEPA 2016). The S-A JV prepared this Technical Memo 5 on behalf of the United States Army Corps of Engineers, New England District, under contract number W912WJ-19-D-0014.

The EPA SOW is based on a Conceptual Site Model (CSM) that assumes the SHL is the primary source of arsenic in the groundwater and that, by intercepting the "plume" emanating from that source, a groundwater extraction and treatment remedy would result in the restoration of groundwater downgradient of the remedial system. This EPA CSM also includes the assumption that advective transport is the primary mechanism of contaminant migration. The SOW goal of Technical Memo 5 is to evaluate whether "plume capture" is occurring based on arsenic concentration trends in groundwater. As presented to the EPA in numerous meetings and correspondence, the Army disagrees with this CSM, as there is substantial evidence that advective transport is not the only mechanism of contaminant migration, and that the naturally-occurring geochemical conditions associated with wetland and natural organic matter deposits, combined with geogenic arsenic sources, contribute to arsenic in groundwater in and downgradient from the area of current groundwater extraction. Further, the Army believes failure to account for these documented geochemical conditions and arsenic inputs provides misleading conclusions concerning the efficacy of a groundwater extraction and treatment remedy for restoration of downgradient groundwater.

The SOW-stated purpose of Technical Memo 5 is to evaluate capture zones estimated by the groundwater model developed for SHL using MODFLOW (Geosyntec Consultants, Inc. [Geosyntec] 2020). The following Technical Memos prepared by the S-A JV in 2021 included analyses of groundwater flow potential, recharge, and pumping influence using three-point estimation (3PE) analysis and the groundwater flow model to estimate the capture zone created by the two extraction wells (EW-01 and EW-04) used by the arsenic treatment plant (ATP) to recover arsenic impacted groundwater:

- Phase I USEPA SOW – Demonstrate Plume Capture Technical Memorandum Phase I Subtask 1.g Delineate Capture Zone based on Hydraulic and Geochemical Data (Technical Memo 1; S-A JV 2021a, submitted June 11, 2021)
- Phase I USEPA SOW – Demonstrate Plume Capture Technical Memorandum Phase I Subtask 2.d Delineate Lateral and Vertical Extent Upgradient (Technical Memo 2; S-A JV 2021b, draft submitted May 17, 2021)
- Phase I USEPA SOW – Demonstrate Plume Capture, Technical Memorandum Phase I Subtask 4.e, Validate the Updated Groundwater Flow Model with Sufficient Field-Measured Hydraulic Data to Confirm Conclusions (Technical Memo 4; S-A JV 2021c, draft submitted June 14, 2021).

The 3PE analysis was performed using monitoring wells and piezometers located within the Nearfield Area (the area encompassing the extraction wells and the wells/piezometers immediately downgradient of the extraction wells), located hydraulically upgradient of the Northern Impact Area (NIA). The location of the Nearfield Area and NIA is shown on Figure 2.

The findings of the three technical memoranda indicate that the migration of arsenic within the underlying aquifers and capture of arsenic by the ATP extraction wells is dependent on multiple factors that include hydraulic head, recharge, and geochemical conditions. The following lines of evidence have been used to assess the extent of capture by the ATP extraction wells:

- The 3PE analysis provided in Technical Memo 1 (S-A JV 2021a)
- An assessment of geochemical conditions within the aquifer that impact the dissolution and ionic state of arsenic provided in Technical Memo 1 (S-A JV 2021a)
- An assessment of groundwater flow from Shepley's Hill, Plow Shop Pond, and the bedrock aquifer evident on potentiometric maps provided in Technical Memos 1 and 4 (S-A JV 2021a, 2021c)
- Groundwater flow calculations along the toe of the landfill estimated by the groundwater flow model provided in Technical Memo 4 (S-A JV 2021c)
- Results of particle tracking simulations by the groundwater model for SHL provided in Technical Memo 4 (S-A JV 2021c)
- Trend analysis using statistical methods provided in Sections 3 and 4 of this Technical Memo 5

The results of the SHL model (Geosyntec 2020) constitute an additional line of evidence that supports characterization of the extent of capture created by the extraction wells. The complex nature of the groundwater flow and arsenic geochemistry at the site precludes a single method approach toward approximating the capture zone at the ATP. While the 3PE analysis provides a direct mathematical formula from which water level data can be used to calculate hydraulic gradients and groundwater flow directions within triangular areas, it is a simplistic method that does not take into account the complexities of groundwater flow under pumping conditions. Accordingly, the SHL groundwater flow model is better suited to evaluate hydraulic capture of a recovery well since the 3PE analysis treats each triangular area as an independent analysis, whereas the groundwater model simulates all aspects of the groundwater flow regime (including vertical components of flow) and honors a water mass balance across the area. Furthermore, the size of the 3PE triangles provide a much coarser assessment of flow direction and magnitude than the SHL groundwater flow model because the model is much more discretized within each 3PE triangle area. 3PE also represents the gradient and direction for a single time whereas the groundwater flow model results are for an average of three months. A 3PE analysis could vary significantly over a three month period. For these reasons, Army believes that the groundwater model is the preferred tool for estimating capture extent because it reasonably represents groundwater levels and flow.

This Technical Memo 5 presents the results of the required trend analysis (as prescribed in the SOW [USEPA 2016]). Additionally, an evaluation of arsenic mass flux is presented based on hydraulic parameters presented in the model to provide an estimate of arsenic flux through the aquifer and potential arsenic mass recovered by the system. Sections 1.1 and 1.2 provide additional detail regarding the goals and background of the scope of this Technical Memo 5. The evaluation of trend analyses and arsenic mass flux is presented in Sections 2, 3, and 4.

1.1 Goals of Technical Memorandum

The goal of Technical Memo 5 is to evaluate the degree of hydraulic and arsenic mass capture by evaluating concentration trends in NIA monitoring locations as compared to flow paths developed from the updated groundwater model. Trend analysis of several Nearfield Area wells has also been conducted and are included for comparison. Mann-Kendall statistical trend analysis is commonly used to evaluate if remedial measures are decreasing contaminant concentrations in groundwater at landfills and other cleanup sites, and indicate whether the concentration trend over time is increasing, decreasing, or if there is insufficient evidence of a statically significant trend for each dataset.

It is important to note that arsenic trends in the NIA are not necessarily a good indicator of "plume capture," and therefore the objective of understanding extent of capture based on these trends is unlikely to be met. More specifically, a lack of a decreasing arsenic trend in the NIA does not in itself imply that water emanating from the landfill has not been prevented from entering the NIA. The NIA comprises a naturally reducing zone with influence from wetland and natural organic matter deposits. This reducing condition is expected to prevent attenuation and/or contribute to release of arsenic derived from geogenic sources; this is in addition to the desorption of adsorbed arsenic in equilibrium with the aqueous phase, which also serves to replenish dissolved arsenic and extend the timeframe for washout of arsenic via advection. Accordingly, arsenic concentrations are likely to remain elevated as the reducing condition is sustained, even as the NIA receives groundwater inflow from areas other than the landfill.

Several EPA-authored guidance documents support thorough characterization and evaluation of the conceptual site model when assessing remedial performance with respect to inorganic constituents. EPA guidance indicates: "development of general knowledge of the redox status of the aquifer throughout the plume is important relative to understanding the processes of contaminant attenuation (or lack thereof) within the plume" (USEPA 2007), "hydrogeology and groundwater and aquifer geochemistry together form the framework for understanding contaminant fate and transport at a site", and "evaluation of aquifer mineralogy and solid-phase contaminant speciation is typically an important part of identification of the contaminant immobilization process […] for inorganic contaminants." (USEPA 2015). Technical Memo 1 (S-A JV 2021a) included a summary of geochemical conditions at SHL, including geogenic sources of arsenic that continue to contribute to the aquifer both upgradient and downgradient of the ATP extraction wells. These conditions result in groundwater at SHL and the NIA remaining at concentrations orders of magnitude greater than the CLs, regardless of the upgradient ATP capture zone.

The EPA's "A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems" document includes evaluation of concentration trends as Step 5 of the "Six Steps for Systematic Evaluation of Capture Zones" and includes a real-life example in Example B1 (Example Capture Zone Evaluation, ECCA Site) where concentrations trends are not considered to be an indicator of capture zone performance due to there being "continuing sources of ground-water impacts", noting that "this line of evidence would provide ambiguous interpretations (i.e., these wells might not clean up over time whether or not capture is sufficient)" (USEPA 2008). As discussed above, the Army posits that there are ongoing geogenic sources of arsenic to the system and that evaluation of arsenic contaminant trends at SHL provides similarly ambiguous results. Results of performing Steps 1 through 4 of the USEPA's recommended Six Steps for Systematic Evaluation of Capture Zones (USEPA 2008) indicate that the ATP is achieving capture as specified in the Remedial Design and Remedial Action Workplan (CH2MHill 2005).

Arsenic trends are compared to the estimated capture zones documented in Technical Memos 1 and 4 (S-A JV 2021a, 2021c) to evaluate if there is a correlation between the two (Section 4). Monitoring wells with arsenic that has been documented to exhibit an increasing or decreasing trend are compared to hydraulic gradients and particle tracking pathways presented in model simulations (included in Technical Memo 4) to evaluate the overall zone of influence of extraction wells EW-01 and EW-04.

In addition to the evaluation of trend analyses presented in Sections 3 and 4, a calculation of mass flux of arsenic passing through the northern boundary of the landfill was performed, using aquifer flow rates calculated by the model. A comparison of the arsenic mass flux upgradient of the ATP to the arsenic mass estimated through calculation to be recovered by the extraction wells provides additional insight into the arsenic mass capture performance of the ATP.

1.2 Background – Development of Scope of Work for Technical Memorandum

The SOW (USEPA 2016) lists 56 monitoring wells/piezometers within the NIA and Nearfield Area identified for trend analysis. The intent of the analysis was to compare arsenic trends to flow paths developed from the groundwater model (Geosyntec 2020). Initially, the SOW included arsenic trend analysis for 2010 through 2015, which represents the period prior to upgrading the ATP system. On the groundwater modeling call on June 15, 2020, the USEPA indicated that the available period of record should include 2010 to 2015 and post-upgrade 2016 to 2019. Data for 2020 were also included in trend analyses, as 2020 data were included in Technical Memos 1, 2, and 4 (S-A JV 2021a, 2021b, 2021c).

The USEPA's statistical software package ProUCL's Mann-Kendall statistical trend analysis was used to evaluate arsenic concentrations over time at the subject monitoring wells. A total of 68 wells were reviewed and prioritized for this effort (32 within the NIA and 36 in the Nearfield Area) and are presented in Table 1. Monitoring wells located in the NIA and Nearfield Area are shown on Figure 2. Well construction information for these wells is presented in Table 2. Arsenic concentrations used in the trend analysis were retrieved from the Former Fort Devens Environmental Restoration Program Database. Arsenic concentration data collected from 2010 to 2015 and 2016 to 2020 for monitoring wells at SHL were chosen based upon the SOW (USEPA 2016) and the availability of data for each well.

2 Groundwater Chemistry Data

Arsenic concentration data reported for long-term monitoring events and other sampling events at SHL are compiled and maintained in the Former Fort Devens Environmental Restoration Program Database. Tables 3 and 4 include the arsenic concentrations reported for 68 monitoring wells and piezometers at SHL in the NIA and Nearfield Areas (respectively) for 2010 through 2020. Locations are shown on Figure 2.

2.1 Pre-Arsenic Treatment Plant Upgrade Data (2010 to 2015)

System upgrades to the ATP made in January 2015 resulted in a moderate increase in the combined total average extraction rate of the two extraction wells by approximately 15 to 20 percent. This section summarizes the dissolved arsenic concentrations for monitoring wells and piezometers in the NIA and Nearfield Area during the period 2010 to 2015, as prescribed in the USEPA SOW.

2.1.1 Northern Impact Area

Arsenic concentrations ranged from 0.15 to 3,700 micrograms per liter (µg/L) at the 32 monitoring wells and piezometers in the NIA from 2010 to 2015. Eleven wells had arsenic concentrations less than the cleanup level (CL) of 10 µg/L, with concentrations ranging from 1.5 to 9.7 µg/L. Arsenic concentrations were less than the CL from 2010 to 2015 at SHM-10-03, SHM-10-08, SHM-10-10, SHM-13-01, SHM-13-02, SHM-13-08,SHM-13-15, and SHM-05-42A. Eight wells (SHM-10-02, SHM-10-05A, SHM-10-04, SHM-10-16, SHM-13-03, SHM-13-05, SHM-13-14D, and SHM-05-41A) had arsenic concentrations both less than and greater than the CL during the same time period. The remaining wells and piezometers had arsenic concentrations greater than the CL in the NIA from 2010 to 2015 (SHM-05-41B, SHM-05-41C, SHM-13-04, SHM-13-06, SHM-13-07, SHM-05-40X, SHM-99-31C, SHM-99-32X, SHM-05-42B, SHM-13-14S, SHM-07-03, SHM-05-39A, SHM-05-39B, SHM-07-05, SHM-99-31A, and SHM-99-31B). Monitoring well SHM-05-40X had the highest arsenic concentrations, ranging from 2,970 to 3,700 µg/L.

2.1.2 Nearfield Area

Arsenic concentrations ranged from 0.14 to 4,100 µg/L at the 36 monitoring wells and piezometers in the Nearfield Area from 2010 to 2015. Seven wells (EPA-PZ-2012-5B, SHL-23, EPA-PZ-2012-4A, SHM-96-5C, SHL-5, SHL-8D, and SHL-8S) had arsenic concentrations less than the CL of 10 µg/L, with concentrations ranging from 0.14 to 8.7 µg/L from 2010 to 2015. Three wells had arsenic concentrations less than and greater than the CL, including SHL-5, SHM-10-06A, and SHM-96-5C. The remaining wells and piezometers had arsenic concentrations greater than the CL in the Nearfield Area from 2010 to 2015. EPA-PZ-2012-3B had the highest arsenic concentration, ranging from 3,830 to 4,070 µg/L.

2.2 Post-Arsenic Treatment Plant Upgrade Data (2016 to 2020)

This section summarizes the dissolved arsenic concentrations for monitoring wells and piezometers in the NIA and Nearfield Area for the period 2016 to 2020.

2.2.1 Northern Impact Area

Arsenic data for the same 32 monitoring wells and piezometers in Section 2.1.1 were reviewed for 2016 to 2020. Arsenic concentrations ranged from 1.5 to 3,100 µg/L. Fifteen wells had arsenic concentrations less than the CL of 10 µg/L, with concentrations ranging from 1.5 to 9.1 µg/L. Arsenic concentrations were less than the CL from 2016 to 2020 at SHM-05-42A, SHM-07-03, SHM-10-02, SHM-10-03, SHM-10-04, SHM-10-05A, SHM-10-08, SHM-10-10, SHM-13-01, SHM-13-02, SHM-13-14D, SHM-13-15, SHM-99-32X, SHM-13-14S, and SHM-99-31B. SHM-13-05 and SHM-13-14D had arsenic concentrations both less than and greater than the CL. The remaining wells and piezometers were greater than the CL in the NIA from 2016 to 2020. SHM-05-40X had the highest arsenic concentration, ranging from 25 to 3,100 µg/L.

2.2.2 Nearfield Area

Arsenic data for the same 36 monitoring wells and piezometers in Section 2.1.2 were reviewed for 2016 to 2020. Arsenic concentrations ranged from 1.5 to 4,000 µg/L. Twelve wells had arsenic concentrations less than the CL of 10 µg/L, with concentrations ranging from 1.5 to 9.4 µg/L. Arsenic concentrations were less than the CL from 2016 to 2020 for EPA-PZ-2012-1A, EPA-PZ-2012-2A, EPA-PZ-2012-2B, EPA-PZ-2012-4A, EPA-PZ-2012-5A, EPA-PZ-2012-5B, EPA-PZ-2012-6A, EPA-PZ-2012-7A, SHL-22, SHL-5, SHL-8D, and SHL-8S. SHM-93-22C had arsenic concentrations both less than and greater than the CL from 2016 to 2020. The remaining wells and piezometers had arsenic concentrations greater than the CL in the Nearfield Area from 2016 to 2020. EPA-PZ-2012-3B had the highest arsenic concentrations, ranging from 2,700 to 4,000 µg/L.

3 Trend Analyses – Northern Impact Area

This section summarizes the Mann-Kendall trend analyses results for monitoring wells located in the NIA (Figure 2).

3.1 Methodology

The USEPA software package ProUCL (Version 5.1) was used to generate arsenic trend estimates for 32 monitoring wells in the NIA. The Mann-Kendall test was used to determine the presence and direction of a trend (i.e., decreasing, increasing, or unknown). Mann-Kendall analysis is a nonparametric test for linear trend that involves listing the concentrations in temporal order and computing all differences that may be formed between a given measurement and earlier measurements. The test statistic (sum of trend, S value) is the difference between the number of strictly positive differences and the number of strictly negative differences. If there is an underlying increasing trend, then these differences will tend to be positive, indicated by a sufficiently large positive S value. The p-value of the correlation provides a measure of the level of significance of the statistical test. Correlations were accepted as statistically significant for p-values less than or equal to 0.05 (95% confidence level). Trend analyses were performed for three time periods: before the ATP upgrades (2010 to 2015), after the ATP upgrades (2016 to 2020), and long-term trend after the ATP extraction wells were installed (March 2006 to 2020). The results of the trend analyses for each period are described in Sections 3.2, 3.3, and 3.4.

3.2 Pre-Arsenic Treatment Plant Upgrade Trends (2010 to 2015)

The Mann-Kendall test was used to evaluate trends at NIA monitoring wells before the ATP upgrades (2010 to 2015). Of the 32 wells where trend analyses were attempted, 31% (10 monitoring wells) could not have trend analyses performed either because there were less than two data points before 2015 or there were a large number of instances where arsenic was not detected, as noted in Table 5. Mann-Kendall trend analysis was performed on the remaining 22 monitoring wells. The evaluation identified that of the 22 monitoring wells statistically tested, four wells (18%) were found to have statistically significant increasing concentrations, seven wells (32%) were found to have statistically significant decreasing concentrations, and 11 wells (50%) showed no statistically significant trend at the selected 95% confidence level. The results are presented in Table 5. Figure 3 shows the arsenic concentration trend result for each location. The Mann-Kendall ProUCL output for each well is provided in Attachment 1.

3.3 Post ATP-Upgrade Trends (2016-2020)

The Mann-Kendall test was used to evaluate trends at NIA monitoring wells after the ATP upgrades (2016 to 2020). Of the 32 wells where trend analyses were attempted, 50% (16 monitoring wells) could not have trend analyses performed because there were a large number of instances where arsenic was not detected, as noted in Table 5. Mann-Kendall trend analysis was performed on the remaining 15 monitoring wells. The evaluation identified that of the 15 monitoring wells statistically tested, one well (6%) was found to have statistically significant increasing concentrations, one well (6%) were found to have statistically significant decreasing concentrations, and 14 wells (88%) showed no statistically significant trend at the selected 95% confidence level.

The highest arsenic concentration in groundwater between 2016 and 2020 was at SHM-13-06and was similar to the highest concentration detected at the same location between 2010 and 2015 (3,180 µg/L in June 2013 compared to 3,100 µg/L in April 2019). The results are presented in Table 5. Figure 4 shows the arsenic concentration trend result for each location. The Mann-Kendall ProUCL output for each well is provided in Attachment 1.

3.4 Long-Term Trends After ATP Extraction Well Installation (March 2006 - 2020)

To understand the long-term impacts of the ATP extraction well operation, the Mann-Kendall Trend analyses were performed for wells having data immediately after the installation of the ATP extraction wells (in March 2006) and were continuously sampled through November 2020. Seven wells in the NIA had sufficient data to perform this analysis after ATP operation began (SHM-05-40X, SHM-05-41A, SHM-05-41B, SHM-05-41C, SHM-05-42B, SHM-99-31C, and SHM-99-32X). The table below shows post ATP system Mann-Kendall trend analysis results.

Well ID	Post-ATP Trend (March 2006-2020)
SHM-05-40X	Statistically Significant **Decreasing** Concentrations
SHM-05-41A	Statistically Significant **Decreasing** Concentrations
SHM-05-41B	Statistically Significant **Decreasing** Concentrations
SHM-05-41C	**No statistically significant trend** at the selected 95% confidence level
SHM-05-42B	Statistically Significant **Decreasing** Concentrations
SHM-99-31C	Statistically Significant **Decreasing** Concentrations
SHM-99-32X	Statistically Significant **Decreasing** Concentrations

Six of the seven wells (86%) had statistically significant decreasing concentrations after the installation of the ATP extraction wells. One well (14%; SHM-05-41C) showed no statistically significant trend at the selected 95% confidence level. SHM-05-40X, approximately 450 ft hydraulically downgradient of the base boundary, was sampled first in 2006 when the ATP first began to operate and had a concentration of 3,610 µg/L. The concentration was 2,100 µg/L in 2020. The Mann-Kendall ProUCL output for each well is provided in Attachment 2.

4 Nearfield Area Wells and Model Flow Paths

This section summarizes the Mann-Kendall trend analyses and comparison of trend analyses to model-generated flow paths described in Technical Memo 4 (S-A JV 2021c).

4.1 Trend Analysis for Nearfield Area Wells (2010-2020)

Mann-Kendall trend analyses (described in Section 3.1) were performed for upgradient well clusters included in Technical Memo 2 (S-A JV 2021b) and all Nearfield area wells used in the 3PE analyses performed in Technical Memo 1 (S-A JV 2021a), for a total of 36 wells. These wells are in the Nearfield Area. The trend analyses were performed using all available data from 2010 through 2020. Trend analyses were performed for the aggregate 2010 through 2020 period rather than splitting into two periods as in the NIA since many wells in the Nearfield Area were recently installed (after 2013). Of the 36 wells where trend analyses were attempted, 33% (12 monitoring wells) could not have trend analyses performed because there were many instances when arsenic was not detected, as noted in Table 6. Mann-Kendall trend analysis was performed on the remaining 24 monitoring wells. The evaluation identified that of the 24 monitoring wells statistically tested, no wells (0%) were found to have statistically significant increasing concentrations, 8 wells (33%) were found to have statistically significant decreasing concentrations, and 16 wells (67%) showed no statistically significant trend at the selected 95% confidence level. The results are presented in Table 6. Figure 5 shows the arsenic concentration trend result for each location. The Mann-Kendall ProUCL output for each well is provided in Attachment 1.

4.2 Trend Analysis for Nearfield Wells Pre and Post ATP Extraction Well Installation (March 2006)

To understand the long-term impacts of the ATP extraction well operation, the Mann-Kendall Trend analyses were performed for wells that had sufficient data both before the installation of the ATP extraction wells (in March 2006) and after the installation of the ATP extraction wells. Six wells in the Nearfield Area had sufficient data to perform the analyses both before and after the installation of the ATP extraction wells (SHL-9, SHL-22, SHM-93-22B, SHM-93-22C, SHM-96-5B, and SHM-96-5C). The table below shows the pre and post ATP system Mann-Kendall trend analysis results.

Well ID	Pre-ATP Trend (through 2006)	Post-ATP Trend (March 2006-2020)
SHL-9	**No statistically significant trend** at the selected 95% confidence level	**No statistically significant trend** at the selected 95% confidence level
SHL-22	Statistically Significant **Increasing** Concentrations	Statistically Significant **Decreasing** Concentrations
SHM-93-22B	Statistically Significant **Increasing** Concentrations	Statistically Significant **Decreasing** Concentrations

SHM-93-22C	Statistically Significant **Decreasing** Concentrations	Statistically Significant **Decreasing** Concentrations
SHM-96-5B	**No statistically significant trend** at the selected 95% confidence level	Statistically Significant **Decreasing** Concentrations
SHM-96-5C	**No statistically significant trend** at the selected 95% confidence level	Statistically Significant **Decreasing** Concentrations

Two of the six wells (33%; SHL-22 and SHM-93-22B) went from statistically significant increasing concentrations before the installation of the ATP extraction wells to statistically significant decreasing concentrations after the installation of the ATP extraction wells. Two of the six wells (33%; SHM-96-5B and SHM-96-5C) went from no statistically significant trend at the selected 95% confidence level before the installation of the ATP extraction wells to statistically significant decreasing concentrations after the installation of the ATP extraction wells. One well (17%; SHL-9) showed no statistically significant trend at the selected 95% confidence level both before and after the installation of the ATP extraction wells. One well (17%; SHM-93-22C) showed statistically significant decreasing concentrations both before and after the installation of the ATP extraction wells. The historical arsenic trends and Mann-Kendall ProUCL output for each well is provided in Attachment 3.

4.3 Flow Paths and Trend Analysis Results

Reverse particle tracking was used to evaluate the model-predicted capture of ATP extraction wells EW-01 and EW-04, as described in Technical Memo 4 (S-A JV 2021c). As summarized in Technical Memo 4, in general, the model-predicted capture zones extend farther to the north, east, and west than the capture zones estimated from the 3PE analysis in Technical Memos 1 and 2 (S-A JV 2021a, 2021b). The limited extent of the capture zone demonstrated by the 3PE analysis included in Technical Memo 1 (S-A JV 2021a) is partially constrained in the eastern portion of the site, as the easternmost triangles are spatially limited by the existing well network. The model accounts for flow potential in the eastern portion of the site (east of the monitoring well SHM-10-06A) that the 3PE analysis cannot fully represent due to the lack of additional triangles in that area. Both the model-predicted capture zones and the capture zones estimated from the 3PE analysis fully encompass the northern edge of the SHL boundary.

A comparison of the 2010 to 2020 arsenic trend analyses described in Section 4.1 to the reverse particle pathlines from the extraction wells for November 2020 (from Technical Memo 4) is shown on Figure 5. There are 18 wells within both the model-predicted capture zone and the capture zone estimated from the 3PE analysis (Figure 5). No wells were found to have statistically significant increasing concentrations, four wells (22%) were found to have statistically significant decreasing concentrations, nine wells (50%) showed no statistically significant trend at the selected 95% confidence level, and five wells (28%) had a large number of instances where arsenic was not detected (therefore trend analyses were not performed). There are 5 wells outside both the model-predicted capture zone and the capture zone estimated from the 3PE analysis (Figure 5; SHM-05-42B, SHM-05-41C, SHM-10-16, SHL-8S, and SHL-8D). No wells were found to have statistically significant increasing concentrations, five wells (28%) were found to have statistically significant decreasing concentrations, six wells (33%) showed no statistically significant trend at the selected 95% confidence level, and seven wells (39%) had a large number of instances where arsenic was not detected (therefore trend analyses were not performed). Based on these results, there is no significant difference in arsenic trend results inside and outside the both the model-predicted capture zone and the capture zones estimated from the 3PE analysis.

To understand the vertical distribution of the particle pathlines along the location of the cross-section shown on Figure 5, forward particle pathlines from the cross-section location were evaluated. Thirty particles were initialized at the midpoint of each layer in model layers 2, 3, and 4. These particles were released transiently from 2012 through 2020. The vertical particle pathlines for the forward particle paths from the cross-section location is shown on Figure 6. Extraction wells EW-01 and EW-04 are projected onto the cross section. All particles terminate at the extraction wells, indicating that the model shows complete capture for particles originating from the cross-section location.

4.4 Arsenic Mass Flux

Since the capture zone delineated using the 3PE analyses indicate there could be areas between SHM-10-06 and SHL-21 where arsenic in groundwater exceeding the CL may not be captured at all times[1] (Figure 5 and 6), a calculation of arsenic mass flux was performed to evaluate the relative mass of arsenic that could migrate into the NIA if groundwater exceeding the CL were not always captured.

The groundwater flow model (Geosyntec 2020) presented in Technical Memo 4 (S-A JV 2021c) was used to evaluate two scenarios:

1. Non-pumping conditions (assuming the current upgradient dissolved arsenic concentrations are representative of the pre-pumping dissolved concentrations)
2. Average 2016 to 2020 pumping conditions representative of ATP operation since system upgrades were completed in 2015.

In addition, estimates of arsenic flux migrating from the landfill under pumping and non-pumping conditions were compared to the total arsenic removed from the system by the ATP extraction wells (EW-01 and EW-04).

4.4.1 Methodology

Mass flux, expressed as mass through time, represents the total mass of a solute conveyed by groundwater through a defined transect. Mass flux can be estimated as the product of groundwater (Darcy) flux across a transect and the solute concentration in groundwater. The east-west transect used is the transect presented in Technical Memos 1 and 2 (S-A JV 2021a, 2021b) located upgradient of the ATP extraction wells (extending from soil boring SB-2017-06 to monitoring well SHL-21) and extending from the water table to the top of the bedrock (Figure 6). The arsenic concentration data included the most recently collected monitoring well data when available, and vertical profile data collected from the 2017 transect borings.

[1] The key design criterion for the ATP extraction wells, as specified in the 100% Design (CH2MHill 2005) were to "provide containment of the groundwater plume in the vicinity of the base boundary," seek to reduce the design rate of 50 gpm as appropriate, and to focus groundwater extraction in the deeper part of the glacial aquifer. It should be noted the modeling results presented in the final design of the ATP extraction system did not include full capture east of the landfill boundary (between wells SHM-10-06 and SHM-21; Figures A-8 and A-9 of CH2MHill 2005).

The Darcy flux across this section was calculated using the SHL groundwater flow model (Geosyntec 2020). A cross section along model row 76, corresponding to the location of the transect, was superimposed on the hydrogeologic cross section on Figure 7. The cross section was subdivided into 16 discrete areas of solute mass flux based on model layers and hydraulic conductivity zone boundaries. In the model, these areas were defined in the overburden (Layers 1 through 4) as individual hydrostratigraphic units (HSUs). The Darcy flux for each HSU was calculated for average of each stress period from 2016 to 2020 under ATP pumping and non-pumping conditions. The groundwater flux values generated by the model for the two scenarios are presented in Table 7.

To assess the impact of groundwater on the eastern end of the transect where arsenic in groundwater exceeding the CL may not be captured at all times, a similar calculation was performed for the portion of the transect between wells SHM-10-06 and SHL-21. Groundwater flux through this area is presented separately in Table 7 and represents the sum of groundwater flux from HSUs 4, 5, 15, and 26.

4.4.2 Mass-Flux Calculation

For each HSU, a representative arsenic concentration was estimated using available data from sample locations within each HSU. For the HSUs specified in Layer 1 (HSUs 2 through 5) and Layer 4 (HSUs 31, 32, and 33), available arsenic data were limited to one datapoint. Consequently, the arsenic concentrations estimated for these HSUs were either the detected concentration or half the reporting limit for non-detects. For HSUs defined in Layers 2 and 3, arsenic data were available from multiple sampling depths and locations. The representative arsenic concentrations for these HSUs were calculated using multiple methods including the geometric mean, the arithmetic mean, and the 95% upper confidence limit (UCL) used to represent an upper bound determined using ProUCL. The arsenic concentrations for these HSUs, determined using each method, are presented in Table 7. The arsenic mass flux through each HSU was estimated by multiplying the model-generated groundwater flux by the representative arsenic concentration. The arsenic mass flux through the transect is the cumulative mass flux from individual HSUs. Table 7 presents the arsenic mass flux estimates across the transect during the pumping and non-pumping scenarios for each "representative" arsenic concentration estimate (average, geometric mean, and 95% UCL).

Mass flux during ATP operation.

Under pumping conditions, the model-estimated groundwater flux through the east-west transect is 39.3 gallons per minute (gpm). The estimated groundwater flux through the area where arsenic in groundwater exceeding the CL may not be captured at all times is 5.1 gpm and represents 13.1% of the total groundwater flux migrating northward from the landfill area; and the other 86.9% (34.2 gpm) of the groundwater flowing through the transect flows to the extraction wells. Compared to the 2016 to 2020 average ATP extraction rate of 50.1 gpm, the flow migrating from the landfill in the overburden represents 68% of the groundwater captured by the ATP extraction system. Based on these rates, 34.2 gpm extracted by the ATP system is from the landfill, and 15.9 gpm of the groundwater captured by the ATP originates from areas located downgradient (e.g., the NIA), cross-gradient (e.g., Shepley's Hill), or from bedrock beneath the system.

Under average 2016 to 2020 pumping conditions, the arsenic mass flux across the east-west section is estimated to be 222 to 280 pounds per year (based on average and geometric mean concentrations in each HSU), with an upper bound of 491 pounds per year based on 95% UCL concentrations. Across the area where arsenic in groundwater exceeding the CL may not be captured at all times, arsenic mass flux was 0.7 to 3.9 pounds per year with an upper bound of 16.9 pounds per year based on 95% UCL concentrations. Based on these estimates, the arsenic mass flux across the area where arsenic in groundwater exceeding the CL may not be captured at all times is 0.3 to 1.4% of the total mass flux from the area underneath the landfill cap, with an upper bound of 3.4% using 95% UCL concentrations.

Mass flux under non-pumping conditions.

To compare these estimates to the fluxes that occurred before the ATP extraction system was implemented, a similar calculation was performed with the following assumptions:

- No pumping took place, and therefore the groundwater flux was estimated using the model with no pumping at the ATP extraction wells. Under non-pumping conditions, 33.6 gpm flows across the entire east-west section.
- The same HSUs were used for the non-pumping scenario as for the pumping scenario (just less total flow).
- The same dissolved arsenic concentrations were assumed for each HSU as were assumed for the pumping scenario (arsenic trend analyses of upgradient wells within the landfill area were performed as part of the 2020 SHL Annual report and the majority of those wells showed insufficient evidence of a statistically significant trend at the 95% level).

Based on these assumptions, the arsenic flux across the entire section without pumping is estimated to be 181 to 230 pounds per year, with an upper bound of 410 pounds per year based on 95% UCL concentrations.

Arsenic mass captured by the ATP extraction wells.

The arsenic mass captured by the ATP was estimated using the average arsenic concentrations detected in the influent raw water sampled from each well from 2016 to 2020 and the average 2016 to 2020 pumping rates. The total arsenic mass captured by the ATP system pumping at a rate of 50.1 gpm is estimated to be 466 pounds per year. Table 7 also presents an estimate of the upper bound for arsenic captured by the ATP using maximum concentrations for the extraction wells during the 5-year periods. Compared to the arsenic removed by the extraction system, the estimated arsenic flux migrating from the landfill using average well and vertical profile concentrations in the transect accounts for 48 to 60% of the arsenic mass captured by the ATP. (Comparing the upper bound of the mass migrating through the transect [i.e., using 95% UCL values] with the upper bound of the ATP captured mass, the transect account for 85% of the captured mass.). The rest of the arsenic captured by the ATP extraction wells originates from areas located downgradient (e.g., the NIA), cross-gradient (e.g., Shepley’s Hill), or from bedrock beneath the system.

5 Summary and Conclusions

5.1 Summary

Mann-Kendall trend analyses were performed on NIA monitoring wells for both pre-ATP upgrades (2010 to 2015) and post-ATP upgrades (2016 to 2020). The analysis for the pre-ATP upgrades period identified 18% of wells tested with statistically significant increasing concentrations, 32% of wells with statistically significant decreasing concentrations, and 50% of wells with no statistically significant trend at the selected 95% confidence levels. The analysis for post-ATP upgrades period identified 6% of wells with statistically significant increasing concentrations, 6% of wells with statistically significant decreasing concentrations, and 88% of wells with no statistically significant trend at the selected 95% confidence levels.

Mann-Kendall trend analyses were also performed for Nearfield Area monitoring wells for 2010 to 2020. Of the 36 wells where trend analyses were attempted, 33% (12 monitoring wells) could not have trend analyses performed because there were a large number of non-detects. The Mann-Kendall test was performed on the remaining 24 monitoring wells. The evaluation identified that of the 24 monitoring wells statistically tested, no wells (0%) had statistically significant increasing concentrations, 8 wells (33%) had statistically significant decreasing concentrations, and 16 wells (67%) showed no statistically significant trend at the selected 95% confidence levels.

To understand the long-term impacts of the ATP extraction well operation, Mann-Kendall Trend analyses were performed for wells that had sufficient data both before the installation of the ATP extraction wells (in March 2006) and after the installation of the ATP extraction wells. Six wells in the Nearfield Area had sufficient data to perform the analyses both before and after the installation of the ATP extraction wells (SHL-9, SHL-22, SHM-93-22B, SHM-93-22C, SHM-96-5B, and SHM-96-5C). Thirty-three percent (33%) of the monitoring wells went from statistically significant increasing concentrations before the installation of the ATP extraction wells to statistically significant decreasing concentrations after the installation of the ATP extraction wells. Thirty-three percent (33%) of the wells went from no statistically significant trend at the selected 95% confidence level before the installation of the ATP extraction wells to statistically significant decreasing concentrations after the installation of the ATP extraction wells. Seventeen percent (17%) of the wells showed no statistically significant trend at the selected 95% confidence level both before and after the installation of the ATP extraction wells. Seventeen percent (17%) of the wells showed statistically significant decreasing concentrations both before and after the installation of the ATP extraction wells.

3PE analyses (presented and discussed in this Technical Memo 5 and Technical Memos 1, 2, and 4 [S-A JV 2021a, 2021b, 2021c]) indicate there could be areas between SHM-10-06 and SHL-21 where the arsenic may not be captured by the extraction wells at all times[2]. A mass flux analysis was performed to quantify the potential arsenic mass not captured by the ATP extraction wells. The ATP extracts approximately 50 gpm under average 2016 to 2020 operating conditions. Under these conditions, results of the mass flux calculation indicate about

[2] The key design criterion for the ATP extraction wells, as specified in the 100% Design (CH2MHill 2005) were to "provide containment of the groundwater plume in the vicinity of the base boundary," seek to reduce the design rate of 50 gpm as appropriate, and to focus groundwater extraction in the deeper part of the glacial aquifer. It should be noted the modeling results presented in the final design of the ATP extraction system did not include full capture east of the landfill boundary (between wells SHM-10-06 and SHM-21; Figures A-8 and A-9 of CH2MHill 2005).

13.1% (5.1 gpm) of the overburden groundwater migrating northward from the landfill migrates though the hypothetical bypass area between monitoring wells SHM-10-06 and SHL-21. The mass of arsenic present in the 5.1 gpm that may bypass the ATP is estimated to be 0.7 to 3.9 pounds per year using the geometric and arithmetic mean arsenic concentrations. This is approximately 0.3 to 1.4% of the approximately 220 to 280 pounds per year of arsenic that migrates through the overburden across the entire transect between SB-2017-06 and SHL-21 (under average 2016-2020 pumping conditions). Using 95% UCL arsenic concentrations, the upper-bound estimate of arsenic mass present in the 5.1 gpm that may bypass the ATP is estimated to be 16.9 pounds per year, approximately 3.4% of the total arsenic mass flux that migrates through the overburden across the entire transect. Of that volume, 39.3 gpm is estimated to be migrating in overburden northward from the landfill. If 5.1 gpm bypasses the ATP through the hypothetical bypass area, then only 34.2 gpm extracted by ATP system is from the landfill, and 15.9 gpm of the groundwater captured by the ATP originates from areas located downgradient (e.g., the NIA), cross-gradient (e.g., Shepley's Hill), or from bedrock beneath the system. These mass flux analyses indicate if the capture zone were extended to the east, the ATP would only achieve 0.7 to 16.9 more pounds per year more of arsenic removal.

5.2 Conclusions

The ATP was installed as a contingency remedy triggered by conditions of the ROD. ATP system performance, per the final May 2005 Remedial Design and Remedial Action Workplan by CH2M Hill, was "to be evaluated through hydraulic monitoring demonstrating appropriate capture zone dimensions for the containment system." The primary design criteria for the ATP was that it provide containment of the groundwater plume in the vicinity of the base boundary and meet POTW discharge requirements.

Results of analysis of pre-and post ATP system installation Mann-Kendall trend analyses at monitoring wells with available data and the calculated estimate of mass flux provide additional lines of evidence to validate the extent of capture of the ATP. These analyses showed that downgradient of the ATP extraction wells, all wells had either a neutral response (i.e., had no statistically significant trend at the selected 95% confidence level or had statistically significant decreasing concentrations both before and after the installation of the ATP extraction well) or a positive response (i.e., went from statistically significant increasing concentrations or no statistically significant trend at the selected 95% confidence level before the installation of the ATP extraction wells to statically significant decreasing concentrations after the installation of the ATP extraction wells). Comparing these two lines of evidence to other lines of evidence (e.g., 3PE analysis, particle tracking model simulations) presented in previous technical memorandums (Technical Memos 1, 2, and 4 [S-A JV 2021a, 2021b, 2021c]) indicate that the groundwater flow model presents a reasonable representation of the capture zone created by the two extraction wells and should be viewed as an additional line of evidence in combination with other methods.

While improvements in groundwater quality at several locations in the Nearfield and NIA over time are apparent, the data indicate that continued ATP operation will not result in the achievement of the current groundwater cleanup goals in these areas. As evidenced in the Technical Memoranda provided to date, the ATP is capturing approximately 87% of the overburden groundwater flow from the landfill, and approximately 97% of the associated arsenic mass flux – with an estimated capture zone that corresponds to the design capture zone presented in the Remedial Design and Remedial Action Workplan [CH2MHill 2005]. The discrepancy between system performance and remedy effectiveness is due to the fact that geogenic sources of arsenic are present, and will persist, downgradient of the ATP regardless of the ATP's operational status. Downgradient of the ATP in the NIA, discharge of groundwater from mineralized bedrock zones will continue to contribute dissolved arsenic to overburden, while arsenic in the overburden may exhibit limited attenuation and/or may continue to be mobilized due to naturally reducing conditions associated with the presence of wetlands in that area. These conditions are likely to result in extended or even unachievable cleanup timeframes for the NIA and Nearfield area and, therefore, cannot be ignored.

6 References

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Tables

SERES Engineering & Services, LLC
ARCADIS
a joint venture

Area	Well ID	Included in USEPA SOW	Rationale for Inclusion
Nearfield	SHM-93-22B	Yes	Part of USEPA SOW
	SHM-96-5B	Yes	
	SHL-23	Yes	
	SHL-5	Yes	
	SHL-8S	Yes	
	SHL-8D	Yes	
	SHL-9	Yes	
	SHL-22	Yes	
	SHM-93-22C	Yes	
	EPA-PZ-2012-1A	Yes	
	EPA-PZ-2012-1B	Yes	
	EPA-PZ-2012-2A	Yes	
	EPA-PZ-2012-2B	Yes	
	EPA-PZ-2012-3A	Yes	
	EPA-PZ-2012-3B	Yes	
	EPA-PZ-2012-4A	Yes	
	EPA-PZ-2012-4B	Yes	
	EPA-PZ-2012-5A	Yes	
	EPA-PZ-2012-5B	Yes	
	EPA-PZ-2012-6A	Yes	
	EPA-PZ-2012-6B	Yes	
	EPA-PZ-2012-7A	Yes	
	EPA-PZ-2012-7B	Yes	
	SHM-96-5C	Yes	
	SHM-10-06	No	Used to delineate capture zones as part of the 3PE analyses in Technical Memo 1 (SERES-Arcadis JV 2021)
	SHM-10-06A	No	
	SHP-2016-1B	No	
	SHP-2016-2B	No	
	SHP-2016-3B	No	
	SHP-2016-4B	No	
	SHP-2016-5B	No	
	SHP-2016-06B	No	
	SHP-2016-6A	No	
	SHP-2016-6C	No	
	SHP-05-45B	No	
	SHP-05-46B	No	
North Impact Area (NIA)	SHM-05-41B	Yes	Part of USEPA SOW
	SHM-05-41C	Yes	
	SHM-10-16	Yes	
	SHM-13-03	Yes	
	SHM-13-04	Yes	
	SHM-13-06	Yes	
	SHM-13-07	Yes	
	SHM-13-08	Yes	
	SHM-05-40X	Yes	
	SHM-99-31C	Yes	
	SHM-99-32X	Yes	
	SHM-05-41A	Yes	
	SHM-05-42A	Yes	
	SHM-05-42B	Yes	
	SHM-10-10	Yes	
	SHM-13-02	Yes	
	SHM-13-05	Yes	
	SHM-13-14S	Yes	
	SHM-13-14D	Yes	
	SHM-13-15	Yes	
	SHM-13-01	Yes	
	SHM-10-02	Yes	
	SHM-10-03	Yes	
	SHM-10-04	Yes	
	SHM-07-03	Yes	
	SHM-10-05A	Yes	
	SHM-10-08	Yes	
	SHM-05-39A	Yes	
	SHM-05-39B	Yes	
	SHM-07-05	Yes	
	SHM-99-31A	Yes	
	SHM-99-31B	Yes	

Notes/Abbreviations
USEPA = United States Environmental Protection Agency
SOW = Scope of Work
Technical Memo 1 = Phase I USEPA SOW – Demonstrate Plume Capture Technical

References:

USEPA. 2016. Letter from Lynn A. Jennings (USEPA) to William O'Donnell (Army) re: Former Fort Devens Installation – Dispute Resolution, 2015 Devens Five Year Review (FYR) Report. February 24.
S-A JV. 2021. Final Phase I EPA SOW – Demonstrate Plume Capture Technical Memorandum

Table 2 - Summary of Well Construction for Phase 1 Designated Wells

Location Definition							Well Completion Info	Well Construction Interval		
Site	Location	North Coordinate	East Coordinate	Horizontal Datum	Surface Elevation *	Elevation Units	Top of Casing Elevation*	Depth to Top of Screen (Feet BGS)	Depth to Bottom of Screen (Feet BGS)	Screen Diameter (Inches)
AOC 5, Shepley's Hill Landfill (5)	EPA-PZ-2012-1A	3028055.85	630191.11	NAD83	219.91	FT	223.79	23.7	28.7	1
AOC 5, Shepley's Hill Landfill (5)	EPA-PZ-2012-1B	3028057.05	630192.91	NAD83	219.81	FT	223.53	73.56	78.56	1
AOC 5, Shepley's Hill Landfill (5)	EPA-PZ-2012-2A	3028124.73	630287.28	NAD83	219.72	FT	223.38	18.14	23.14	1
AOC 5, Shepley's Hill Landfill (5)	EPA-PZ-2012-2B	3028124.72	630290.4	NAD83	219.76	FT	223.37	73.16	78.16	1
AOC 5, Shepley's Hill Landfill (5)	EPA-PZ-2012-3A	3028088.07	630062.52	NAD83	219.2	FT	222.65	19.09	24.09	1
AOC 5, Shepley's Hill Landfill (5)	EPA-PZ-2012-3B	3028086.13	630064.63	NAD83	219.25	FT	222.57	68.7	73.7	1
AOC 5, Shepley's Hill Landfill (5)	EPA-PZ-2012-4A	3028045.34	629992.07	NAD83	223.3	FT	226.6	19.56	24.56	1
AOC 5, Shepley's Hill Landfill (5)	EPA-PZ-2012-4B	3028043.8	629989.87	NAD83	223.51	FT	226.39	79.5	84.5	1
AOC 5, Shepley's Hill Landfill (5)	EPA-PZ-2012-5A	3028184.86	630151.89	NAD83	216.33	FT	220.01	17.95	22.95	1
AOC 5, Shepley's Hill Landfill (5)	EPA-PZ-2012-5B	3028186.12	630155.26	NAD83	216.2	FT	219.38	68.46	73.46	1
AOC 5, Shepley's Hill Landfill (5)	EPA-PZ-2012-6A	3028066.25	629894.69	NAD83	230.71	FT	234.25	24.19	29.19	1
AOC 5, Shepley's Hill Landfill (5)	EPA-PZ-2012-6B	3028069.24	629894.4	NAD83	230.85	FT	234.08	74.23	79.23	1
AOC 5, Shepley's Hill Landfill (5)	EPA-PZ-2012-7A	3028106.48	629801.05	NAD83	234.42	FT	234.16	23.87	28.87	1
AOC 5, Shepley's Hill Landfill (5)	EPA-PZ-2012-7B	3028109.22	629800.87	NAD83	234.28	FT	234.03	58.82	63.82	1
AOC 5, Shepley's Hill Landfill (5)	EW-01	3027960.2	629942.81	NAD83	226.97	FT	226.8	60	85	6
AOC 5, Shepley's Hill Landfill (5)	EW-04	3027991	629895.33	NAD83	227.36	FT	227.03	70	95	6
AOC 5, Shepley's Hill Landfill (5)	SHL-22	3028163.04	630056.4	NAD83	218.9	FT	219.58	105	115	4
AOC 5, Shepley's Hill Landfill (5)	SHL-23	3027915.85	629712.8	NAD83	239.44	FT	241.29	23	33	2
AOC 5, Shepley's Hill Landfill (5)	SHL-5	3028125.1	630192.21	NAD83	**216.81**	FT	**216.81**	3	13	2
AOC 5, Shepley's Hill Landfill (5)	SHL-8D	3028126.57	630407.1	NAD83	218.83	FT	220.78	68	70	2
AOC 5, Shepley's Hill Landfill (5)	SHL-8S	3028126.57	630407.1	NAD83	218.83	FT	220.97	52	54	2
AOC 5, Shepley's Hill Landfill (5)	SHL-9	3028146.84	630009.57	NAD83	**220.88**	FT	**220.88**	15	25	2
AOC 5, Shepley's Hill Landfill (5)	SHM-05-39A	3028544.28	629761.38	NAD83	221.79	FT	221.53	37	39	2
AOC 5, Shepley's Hill Landfill (5)	SHM-05-39B	3028543.68	629765.33	NAD83	221.77	FT	221.51	66	68	2
AOC 5, Shepley's Hill Landfill (5)	SHM-05-40X	3028514.16	629636.83	NAD83	223.48	FT	223.19	32	34	2
AOC 5, Shepley's Hill Landfill (5)	SHM-05-41A	3028290.82	629796.11	NAD83	**222.78**	FT	**222.78**	42	44	2
AOC 5, Shepley's Hill Landfill (5)	SHM-05-41B	3028299.22	629796.25	NAD83	222.5	FT	222.33	62	64	2
AOC 5, Shepley's Hill Landfill (5)	SHM-05-41C	3028285.47	629795.79	NAD83	222.91	FT	222.57	88	93	2
AOC 5, Shepley's Hill Landfill (5)	SHM-05-42A	3028376.14	630017.63	NAD83	213.65	FT	216.81	40	42	1
AOC 5, Shepley's Hill Landfill (5)	SHM-05-42B	3028376.14	630017.63	NAD83	213.65	FT	216.8	70	72	1
AOC 5, Shepley's Hill Landfill (5)	SHM-07-03	3028444.63	629411.08	NAD83	227.96	FT	227.9	25	35	2
AOC 5, Shepley's Hill Landfill (5)	SHM-07-05	3028513.33	629632.06	NAD83	NA	FT	223.62	56	65	2
AOC 5, Shepley's Hill Landfill (5)	SHM-10-02	3028700.13	628381.41	NAD83	220.19	FT	223.03	53	63	1.5
AOC 5, Shepley's Hill Landfill (5)	SHM-10-03	3029000.27	628436.33	NAD83	229.77	FT	232.05	58.5	68.5	1.5
AOC 5, Shepley's Hill Landfill (5)	SHM-10-04	3029485.34	628959.21	NAD83	210	FT	212.61	55	65	1.5
AOC 5, Shepley's Hill Landfill (5)	SHM-10-05A	3028943.39	630441.84	NAD83	235.41	FT	235.09	50	60	1.5
AOC 5, Shepley's Hill Landfill (5)	SHM-10-06	3027882.54	630215.62	NAD83	230.03	FT	232.91	69.5	79.5	1.5
AOC 5, Shepley's Hill Landfill (5)	SHM-10-06A	3027895.73	630300.71	NAD83	245.96	FT	248.54	77	87	1.5
AOC 5, Shepley's Hill Landfill (5)	SHM-10-08	3028526.47	628351.74	NAD83	211.86	FT	214.36	46	56	1.5
AOC 5, Shepley's Hill Landfill (5)	SHM-10-10	3028873.64	629105.25	NAD83	215.4	FT	217.11	56	66	1.5
AOC 5, Shepley's Hill Landfill (5)	SHM-10-16	3028355.25	629834.23	NAD83	216.72	FT	219.23	75	85	2
AOC 5, Shepley's Hill Landfill (5)	SHM-13-01	3028294.76	628556.66	NAD83	205.77	FT	208.08	39	49	2

Table 2 - Summary of Well Construction for Phase 1 Designated Wells

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Site	Location	North Coordinate	East Coordinate	Horizontal Datum	Surface Elevation *	Elevation Units	Top of Casing Elevation*	Depth to Top of Screen (Feet BGS)	Depth to Bottom of Screen (Feet BGS)	Screen Diameter (Inches)
AOC 5, Shepley's Hill Landfill (5)	SHM-13-02	3028713.88	628980.64	NAD83	216.92	FT	218.72	60	70	2
AOC 5, Shepley's Hill Landfill (5)	SHM-13-03	3028990.91	629173.39	NAD83	209.91	FT	212.05	42	52	2
AOC 5, Shepley's Hill Landfill (5)	SHM-13-04	3028606.18	629479.56	NAD83	227.34	FT	227.02	20	30	2
AOC 5, Shepley's Hill Landfill (5)	SHM-13-05	3028776.73	629829.47	NAD83	225.39	FT	225.14	75	85	2
AOC 5, Shepley's Hill Landfill (5)	SHM-13-06	3028694.87	629245.1	NAD83	224.23	FT	223.89	36	46	2
AOC 5, Shepley's Hill Landfill (5)	SHM-13-07	3028760.82	629331.42	NAD83	226.11	FT	225.64	27	37	2
AOC 5, Shepley's Hill Landfill (5)	SHM-13-08	3028837.54	629515.32	NAD83	228.19	FT	227.9	55	65	2
AOC 5, Shepley's Hill Landfill (5)	SHM-13-14D	3029016.63	629391.87	NAD83	207.48	FT	210.48	45	55	2
AOC 5, Shepley's Hill Landfill (5)	SHM-13-14S	3029020.58	629392.28	NAD83	207.67	FT	210.55	5	15	2
AOC 5, Shepley's Hill Landfill (5)	SHM-13-15	3029072.16	629273.49	NAD83	205.98	FT	210.58	50	60	2
AOC 5, Shepley's Hill Landfill (5)	SHM-93-22B	3028169.92	630071.91	NAD83	218.84	FT	219.39	82.3	92.3	2
AOC 5, Shepley's Hill Landfill (5)	SHM-93-22C	3028158.6	630045.7	NAD83	218.92	FT	220.69	124.3	134.3	4
AOC 5, Shepley's Hill Landfill (5)	SHM-96-5B	3028112.94	630158.14	NAD83	217.38	FT	218.92	80	90	4
AOC 5, Shepley's Hill Landfill (5)	SHM-96-5C	3028105.39	630172.72	NAD83	217.39	FT	218.39	50	60	4
AOC 5, Shepley's Hill Landfill (5)	SHM-99-31A	3028559.08	629895.03	NAD83	212.82	FT	214.34	4	14	2
AOC 5, Shepley's Hill Landfill (5)	SHM-99-31B	3028559.47	629901.16	NAD83	212.52	FT	214.39	50	60	2
AOC 5, Shepley's Hill Landfill (5)	SHM-99-31C	3028561.83	629908.75	NAD83	212.64	FT	214.6	68	78	2
AOC 5, Shepley's Hill Landfill (5)	SHM-99-32X	3028574.65	630168.76	NAD83	219.12	FT	221.28	72	82	2
AOC 5, Shepley's Hill Landfill (5)	SHP-05-45B	3027956.77	629995.45	NAD83	226.72	FT	229.11	65	75	2
AOC 5, Shepley's Hill Landfill (5)	SHP-05-46B	3027946.62	630041.84	NAD83	226.03	FT	227.6	65	75	2
AOC 5, Shepley's Hill Landfill (5)	SHP-2016-06A	3027906.15	629710.34	NAD83	240.05	FT	241.9	81	86	NA
AOC 5, Shepley's Hill Landfill (5)	SHP-2016-06B	3027906.15	629710.34	NAD83	240.05	FT	241.89	102	112	NA
AOC 5, Shepley's Hill Landfill (5)	SHP-2016-06C	3027906.15	629710.34	NAD83	240.05	FT	241.92	123	133	NA
AOC 5, Shepley's Hill Landfill (5)	SHP-2016-1B	3027979.56	629933.53	NAD83	224.69	FT	227.24	75	85	NA
AOC 5, Shepley's Hill Landfill (5)	SHP-2016-2B	3028200.3	629925.84	NAD83	223.73	FT	225.95	80	85	NA
AOC 5, Shepley's Hill Landfill (5)	SHP-2016-3B	3028174.29	630007.26	NAD83	221.13	FT	223.18	80	85	NA
AOC 5, Shepley's Hill Landfill (5)	SHP-2016-4B	3028146.65	629902.15	NAD83	227.57	FT	229.75	85	90	NA
AOC 5, Shepley's Hill Landfill (5)	SHP-2016-5B	3028113.45	629963.58	NAD83	224.88	FT	226.95	85	90	NA

Well Completion Information and Well Construction Interval is only applicable to the Location Type of Well

All Elevations are reported in feet relative to NAVD88 vertical datum

Bolded elevations are the most current values from the Well Maintenance Information table.

NA = not available

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-05-39A	SHM-05-39A	SHM-05-39A	SHM-05-39A	SHM-05-39A	SHM-05-39A	SHM-05-39A	SHM-05-39A	SHM-05-39A
Sample Date:	8/12/2010	10/13/2010	10/13/2010	10/4/2011	10/4/2011	10/16/2012	10/16/2012	10/24/2013	10/24/2013
Historical (µg/L)									
Arsenic	*236*	*246*	NA	*227*	NA	*76.3*	NA	*146*	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	*246*	NA	*227*	NA	*76.3*	NA	*146*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-05-39A	SHM-05-39A	SHM-05-39A	SHM-05-39B	SHM-05-39B	SHM-05-39B	SHM-05-39B	SHM-05-39B	SHM-05-39B
Sample Date:	10/29/2015	10/29/2015	10/26/2020	10/13/2010	10/13/2010	10/5/2011	10/5/2011	10/16/2012	10/16/2012
Historical (µg/L)									
Arsenic	*4.00 U*	*4.00 U*	NA	*162*	NA	*308*	NA	*364*	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	NA	NA	*162*	NA	*308*	NA	*364*
Arsenic (Dissolved)	NA	NA	7.30	NA	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L	Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-05-39B	SHM-05-39B	SHM-05-39B	SHM-05-39B	SHM-05-39B	SHM-05-40X	SHM-05-40X	SHM-05-40X	SHM-05-40X
Sample Date:	10/24/2013	10/24/2013	10/29/2015	10/29/2015	10/26/2020	10/7/2010	10/7/2010	10/5/2011	10/5/2011
Historical (µg/L)									
Arsenic	*113*	NA	*293*	*293*	NA	*3640*	NA	*3700*	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	*113*	NA	NA	NA	NA	*3640*	NA	*3700*
Arsenic (Dissolved)	NA	NA	NA	NA	420	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-05-40X	SHM-05-40X	SHM-05-40X	SHM-05-40X	SHM-05-40X	SHM-05-40X	SHM-05-40X	SHM-05-40X	SHM-05-40X
Sample Date:	10/17/2012	10/24/2013	10/24/2013	10/13/2014	10/13/2014	10/29/2015	10/29/2015	6/30/2016	7/8/2016
Historical (µg/L)									
Arsenic	NA	*3100*	NA	*3070*	NA	*3060*	*2060*	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	*2970*	NA	*3100*	NA	*3070*	NA	NA	*2800*	*3100*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	*2800*

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units
µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-05-40X	SHM-05-40X	SHM-05-40X	SHM-05-40X	SHM-05-40X	SHM-05-40X	SHM-05-40X	SHM-05-40X	SHM-05-40X
Sample Date:	11/21/2016	12/15/2016	6/6/2017	11/17/2017	11/17/2017	4/17/2018	11/26/2018	11/26/2018	4/23/2019
Historical (µg/L)									
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	*2400*	*2300 J*	*270 J*	NA	NA	*1900*	NA	NA	NA
Arsenic (Dissolved)	NA	*2400 J*	*25.0 J*	*2200*	*2100*	NA	2400	2600	2100

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units
µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
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UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-05-40X	SHM-05-40X	SHM-05-40X	SHM-05-40X	SHM-05-40X	SHM-05-40X	SHM-05-41A	SHM-05-41A	SHM-05-41A
Sample Date:	11/8/2019	11/8/2019	5/19/2020	5/19/2020	11/11/2020	11/11/2020	4/21/2010	4/21/2010	10/7/2010
Historical (µg/L)									
Arsenic	NA	NA	NA	NA	NA	NA	NA	*26.9*	*66.7*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	NA	NA	NA	NA	*26.9*	NA	NA
Arsenic (Dissolved)	2200	2100	1900	1900	2300	2100	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-05-41A	SHM-05-41A	SHM-05-41A	SHM-05-41A	SHM-05-41A	SHM-05-41A	SHM-05-41A	SHM-05-41A	SHM-05-41A
Sample Date:	10/7/2010	4/4/2011	10/4/2011	10/4/2011	4/11/2012	4/11/2012	10/17/2012	10/17/2012	5/22/2013
Historical (µg/L)									
Arsenic	NA	NA	*18.4*	NA	NA	*15.5*	*10.3*	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	*66.7*	*20.9*	NA	*18.4*	*15.5*	NA	NA	*10.3*	*12.3*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-05-41A	SHM-05-41A	SHM-05-41A	SHM-05-41A	SHM-05-41A	SHM-05-41A	SHM-05-41A	SHM-05-41A	SHM-05-41A
Sample Date:	5/22/2013	10/23/2013	10/23/2013	4/23/2014	4/23/2014	10/9/2014	10/9/2014	10/26/2015	10/26/2015
Historical (µg/L)									
Arsenic	*12.3*	*12.5*	NA	NA	*9.70*	*14.2*	NA	*15.0*	*15.0*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	*12.5*	*9.70*	NA	NA	*14.2*	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-05-41A	SHM-05-41A	SHM-05-41A	SHM-05-41A	SHM-05-41A	SHM-05-41B	SHM-05-41B	SHM-05-41B	SHM-05-41B
Sample Date:	11/18/2016	11/20/2017	11/16/2018	11/8/2019	11/6/2020	4/21/2010	4/21/2010	8/9/2010	10/7/2010
Historical (µg/L)									
Arsenic	NA	NA	NA	NA	NA	NA	*1370*	*1440*	*1040*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	*1130*	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	*19.0*	NA	NA	NA	NA	*1370*	NA	NA	NA
Arsenic (Dissolved)	NA	*18.0*	16.0	31.0	18.0	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-05-41B	SHM-05-41B	SHM-05-41B	SHM-05-41B	SHM-05-41B	SHM-05-41B	SHM-05-41B	SHM-05-41B	SHM-05-41B
Sample Date:	10/7/2010	4/4/2011	10/4/2011	10/4/2011	4/11/2012	4/11/2012	10/17/2012	10/17/2012	5/22/2013
Historical (µg/L)									
Arsenic	NA	NA	*1370*	NA	NA	*771*	*860*	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	*1040*	*1050*	NA	*1370*	*771*	NA	NA	*860*	*812*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L	Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-05-41B	SHM-05-41B	SHM-05-41B	SHM-05-41B	SHM-05-41B	SHM-05-41B	SHM-05-41B	SHM-05-41B	SHM-05-41B
Sample Date:	5/22/2013	10/23/2013	10/23/2013	4/23/2014	4/23/2014	10/9/2014	10/9/2014	6/8/2015	6/8/2015
Historical (µg/L)									
Arsenic	*812*	*716*	NA	NA	*678*	*638*	NA	*626*	*626*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	*716*	*678*	NA	NA	*638*	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-05-41B	SHM-05-41B	SHM-05-41B	SHM-05-41B	SHM-05-41B	SHM-05-41B	SHM-05-41B	SHM-05-41B	SHM-05-41B
Sample Date:	10/26/2015	10/26/2015	6/27/2016	11/18/2016	6/6/2017	11/20/2017	4/20/2018	11/16/2018	4/18/2019
Historical (µg/L)									
Arsenic	*614*	*614*	NA	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	*670*	*730*	*630*	NA	*330*	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	*620*	NA	510	360

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-05-41B	SHM-05-41B	SHM-05-41B	SHM-05-41C	SHM-05-41C	SHM-05-41C	SHM-05-41C	SHM-05-41C	SHM-05-41C
Sample Date:	11/8/2019	5/21/2020	11/6/2020	4/21/2010	4/21/2010	10/7/2010	10/7/2010	4/4/2011	10/4/2011
Historical (µg/L)									
Arsenic	NA	NA	NA	NA	*896*	*787*	NA	NA	*917*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	NA	*896*	NA	NA	*787*	*750*	NA
Arsenic (Dissolved)	530	420	570	NA	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-05-41C	SHM-05-41C	SHM-05-41C	SHM-05-41C	SHM-05-41C	SHM-05-41C	SHM-05-41C	SHM-05-41C	SHM-05-41C
Sample Date:	10/4/2011	4/11/2012	4/11/2012	10/18/2012	10/18/2012	5/21/2013	5/21/2013	10/23/2013	10/23/2013
Historical (µg/L)									
Arsenic	NA	NA	*765*	*782*	NA	NA	*709*	*890*	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	*917*	*765*	NA	NA	*782*	*709*	NA	NA	*890*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-05-41C	SHM-05-41C	SHM-05-41C	SHM-05-41C	SHM-05-41C	SHM-05-41C	SHM-05-41C	SHM-05-41C	SHM-05-41C
Sample Date:	4/23/2014	4/23/2014	10/9/2014	10/9/2014	6/8/2015	6/8/2015	10/26/2015	10/26/2015	6/27/2016
Historical (µg/L)									
Arsenic	NA	*1490*	*946*	NA	*883*	*883*	*851*	*851*	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	*1490*	NA	NA	*946*	NA	NA	NA	NA	*810*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-05-41C	SHM-05-41C	SHM-05-41C	SHM-05-41C	SHM-05-41C	SHM-05-41C	SHM-05-41C	SHM-05-41C	SHM-05-42A
Sample Date:	11/18/2016	6/6/2017	11/20/2017	4/20/2018	4/15/2019	11/8/2019	5/21/2020	11/6/2020	4/22/2010
Historical (µg/L)									
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	*820 J*	*390*	NA	*800*	NA	NA	NA	NA	*2.50*
Arsenic (Dissolved)	NA	NA	*740*	NA	91.0	29.0	660	610	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-05-42A	SHM-05-42A	SHM-05-42A	SHM-05-42A	SHM-05-42A	SHM-05-42A	SHM-05-42A	SHM-05-42A	SHM-05-42A
Sample Date:	4/22/2010	8/12/2010	10/13/2010	10/13/2010	4/5/2011	4/5/2011	10/7/2011	10/7/2011	4/11/2012
Historical (µg/L)									
Arsenic	*2.50*	*1.25*	*1.20*	NA	*1.10*	NA	*0.800*	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	NA	*1.20*	NA	*1.10*	NA	*0.800*	*2.30*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-05-42A	SHM-05-42A	SHM-05-42A	SHM-05-42A	SHM-05-42A	SHM-05-42A	SHM-05-42A	SHM-05-42A	SHM-05-42A
Sample Date:	4/11/2012	10/18/2012	10/18/2012	5/22/2013	10/23/2013	10/23/2013	4/23/2014	4/23/2014	10/9/2014
Historical (µg/L)									
Arsenic	*2.30*	*0.700*	NA	NA	*2.00 U*	NA	NA	*2.00 U*	*2.00 U*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	*0.700*	*0.890 U*	NA	*2.00 U*	*2.00 U*	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-05-42A	SHM-05-42A	SHM-05-42A	SHM-05-42A	SHM-05-42A	SHM-05-42A	SHM-05-42A	SHM-05-42A	SHM-05-42B
Sample Date:	10/9/2014	10/28/2015	10/28/2015	11/18/2016	11/28/2017	11/15/2018	11/5/2019	11/9/2020	4/22/2010
Historical (µg/L)									
Arsenic	NA	*4.00 U*	*4.00 U*	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	*2.00 U*	NA	NA	*1.50 U*	NA	NA	NA	NA	*72.2*
Arsenic (Dissolved)	NA	NA	NA	NA	*3.00*	3.00 U	3.00 U	3.00 U	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-05-42B	SHM-05-42B	SHM-05-42B	SHM-05-42B	SHM-05-42B	SHM-05-42B	SHM-05-42B	SHM-05-42B	SHM-05-42B
Sample Date:	4/22/2010	10/13/2010	10/13/2010	4/1/2011	4/5/2011	10/7/2011	10/7/2011	4/11/2012	4/11/2012
Historical (µg/L)									
Arsenic	*72.2*	*197*	NA	*189*	NA	*230*	NA	NA	*239*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	*197*	NA	*189*	NA	*230*	*239*	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-05-42B	SHM-05-42B	SHM-05-42B	SHM-05-42B	SHM-05-42B	SHM-05-42B	SHM-05-42B	SHM-05-42B	SHM-05-42B
Sample Date:	10/18/2012	10/18/2012	5/22/2013	5/22/2013	10/23/2013	10/23/2013	4/23/2014	4/23/2014	10/9/2014
Historical (µg/L)									
Arsenic	*241*	NA	NA	*238*	*232*	NA	NA	*229*	*215*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	*241*	*238*	NA	NA	*232*	*229*	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units
µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-05-42B	SHM-05-42B	SHM-05-42B	SHM-05-42B	SHM-05-42B	SHM-05-42B	SHM-05-42B	SHM-05-42B	SHM-07-03
Sample Date:	10/9/2014	10/28/2015	10/28/2015	11/18/2016	11/28/2017	11/15/2018	11/5/2019	11/9/2020	8/12/2010
Historical (µg/L)									
Arsenic	NA	*206*	*206*	NA	NA	NA	NA	NA	*0.290 J*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	*215*	NA	NA	*180*	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	*160*	160	170	160	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-07-03	SHM-07-03	SHM-07-03	SHM-07-03	SHM-07-03	SHM-07-03	SHM-07-03	SHM-07-03	SHM-07-03
Sample Date:	5/28/2013	6/9/2015	6/9/2015	6/30/2016	6/1/2017	11/17/2017	4/17/2018	11/19/2018	4/18/2019
Historical (µg/L)									
Arsenic	NA	*2.00 U*	*2.00 U*	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	*1.00 U*	NA	NA	*3.20*	*1.50 U*	NA	*3.10*	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	*3.00*	NA	3.00 U	3.00 U

Notes:

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Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-07-03	SHM-07-03	SHM-07-03	SHM-07-05	SHM-07-05	SHM-07-05	SHM-07-05	SHM-10-02	SHM-10-02
Sample Date:	11/7/2019	5/15/2020	11/11/2020	8/12/2010	6/30/2016	6/1/2017	4/18/2018	6/7/2010	6/7/2010
Historical (µg/L)									
Arsenic	NA	NA	NA	*3180*	NA	NA	NA	*0.410 J*	*0.670*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	*0.370 J*	*0.330 J*
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	NA	NA	*11.0*	*54.0*	*430*	NA	NA
Arsenic (Dissolved)	3.00 U	3.00 U	3.00 U	NA	NA	NA	NA	NA	NA

Notes:

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Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-10-02	SHM-10-02	SHM-10-02	SHM-10-02	SHM-10-02	SHM-10-02	SHM-10-02	SHM-10-02	SHM-10-02
Sample Date:	6/7/2010	6/7/2010	6/7/2010	6/7/2010	6/7/2010	6/8/2010	6/8/2010	7/15/2010	9/7/2010
Historical (µg/L)									
Arsenic	*1.64*	*2.43*	*5.87*	*36.9*	*24.8*	*127*	*84.6*	*0.740*	*1.11*
Arsenic (Dissolved)	*0.740 J*	*0.410 J*	*0.410 J*	*0.870 J*	*4.64*	*0.610 J*	*8.68*	*0.430 J*	*1.07*
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-10-02	SHM-10-02	SHM-10-02	SHM-10-02	SHM-10-02	SHM-10-02	SHM-10-02	SHM-10-02	SHM-10-02
Sample Date:	10/22/2012	10/22/2012	5/29/2013	6/8/2015	6/8/2015	11/21/2017	11/28/2018	11/14/2019	11/10/2020
Historical (µg/L)									
Arsenic	*1.10*	NA	NA	*3.20 J*	*3.20 J*	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	*1.10*	*1.50 U*	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	*3.00*	3.00 U	3.00 U	3.00 U

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Units
µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
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NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-10-03	SHM-10-03	SHM-10-03	SHM-10-03	SHM-10-03	SHM-10-03	SHM-10-03	SHM-10-03	SHM-10-03
Sample Date:	6/10/2010	6/10/2010	6/10/2010	6/10/2010	6/10/2010	7/14/2010	9/7/2010	10/23/2012	10/23/2012
Historical (µg/L)									
Arsenic	*0.890*	*6.79*	*14.6*	*42.1*	*8.74*	*2.36*	*1.47 J*	*1.00 U*	NA
Arsenic (Dissolved)	*0.500*	*0.610 J*	*0.565 U*	*0.920 J*	*3.47*	*0.780 J*	*0.510 J*	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	*1.00 U*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

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Units

µg/L Micrograms per Liter

Qualifier

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J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
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NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-10-03	SHM-10-03	SHM-10-03	SHM-10-03	SHM-10-03	SHM-10-03	SHM-10-03	SHM-10-04	SHM-10-04
Sample Date:	5/24/2013	6/9/2015	6/9/2015	11/21/2017	11/28/2018	11/14/2019	11/10/2020	6/8/2010	6/8/2010
Historical (µg/L)									
Arsenic	NA	*4.20*	*4.20*	NA	NA	NA	NA	*2.26*	*2.19*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	*0.180 J*	*0.180 J*
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	*1.50 U*	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	*3.00*	3.00 U	8.50	1.90 J	NA	NA

Notes:

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Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-10-04	SHM-10-04	SHM-10-04	SHM-10-04	SHM-10-04	SHM-10-04	SHM-10-04	SHM-10-04	SHM-10-04
Sample Date:	6/8/2010	6/8/2010	6/8/2010	6/8/2010	6/8/2010	6/8/2010	6/8/2010	7/14/2010	9/7/2010
Historical (µg/L)									
Arsenic	*1.22*	*3.37*	*13.7*	*8.02*	*24.3*	*26.7*	*214*	*1.62*	*1.00 J*
Arsenic (Dissolved)	*0.180 J*	*0.150 J*	*0.260 J*	*0.330 J*	*0.330 J*	*1.27*	*15.1*	*0.640*	*0.790 J*
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
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NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-10-04	SHM-10-04	SHM-10-04	SHM-10-04	SHM-10-04	SHM-10-04	SHM-10-04	SHM-10-04	SHM-10-04
Sample Date:	10/22/2012	10/22/2012	5/29/2013	6/8/2015	6/8/2015	11/21/2017	11/26/2018	11/14/2019	11/12/2020
Historical (µg/L)									
Arsenic	*1.00 U*	NA	NA	*2.00 U*	*2.00 U*	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	*1.00 U*	*1.00 U*	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	*3.00*	3.00 U	3.00 U	3.00 U

Notes:

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Units

µg/L Micrograms per Liter

Qualifier

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J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-10-05A	SHM-10-05A	SHM-10-05A	SHM-10-05A	SHM-10-05A	SHM-10-05A	SHM-10-05A	SHM-10-05A	SHM-10-05A
Sample Date:	6/9/2010	6/9/2010	6/9/2010	6/9/2010	6/9/2010	6/9/2010	6/9/2010	6/9/2010	6/9/2010
Historical (µg/L)									
Arsenic	*0.930*	*13.0*	*4.86*	*3.48*	*29.8*	*65.0*	*24.5*	*364*	*911*
Arsenic (Dissolved)	*0.620 J*	*0.350 J*	*1.12*	*0.390 J*	*0.590*	*2.18*	*5.09*	*4.16*	*1.92*
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-10-05A	SHM-10-05A	SHM-10-05A	SHM-10-05A	SHM-10-05A	SHM-10-05A	SHM-10-05A	SHM-10-05A	SHM-10-05A
Sample Date:	7/15/2010	9/8/2010	10/23/2012	10/24/2012	10/24/2012	5/22/2013	5/22/2013	6/9/2015	6/9/2015
Historical (µg/L)									
Arsenic	*4.70*	*5.68*	*3.00*	*20.0 U*	NA	NA	*3.10*	*3.00 J*	*3.00 J*
Arsenic (Dissolved)	*4.60*	*5.21*	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	NA	NA	*3.00*	*3.10*	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

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Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
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NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-10-05A	SHM-10-05A	SHM-10-05A	SHM-10-05A	SHM-10-08	SHM-10-08	SHM-10-08	SHM-10-08	SHM-10-08
Sample Date:	11/16/2017	11/13/2018	11/12/2019	11/12/2020	6/3/2010	6/3/2010	6/3/2010	6/3/2010	6/3/2010
Historical (µg/L)									
Arsenic	NA	NA	NA	NA	*2.08*	*3.19*	*3.60*	*3.77*	*19.8*
Arsenic (Dissolved)	NA	NA	NA	NA	*0.640*	*0.760*	*0.310 J*	*0.850 J*	*1.06*
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	*2.10*	3.00 U	2.00 J	2.00 J	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-10-08	SHM-10-08	SHM-10-08	SHM-10-08	SHM-10-08	SHM-10-08	SHM-10-08	SHM-10-08	SHM-10-08
Sample Date:	6/3/2010	7/15/2010	9/7/2010	10/22/2012	10/22/2012	5/21/2013	6/8/2015	11/21/2017	11/26/2018
Historical (µg/L)									
Arsenic	*2.07*	*2.72*	*1.40*	*1.90*	NA	NA	*3.60 J*	NA	NA
Arsenic (Dissolved)	*0.730 J*	*0.730 J*	*1.55*	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	NA	NA	*1.90*	*1.90 U*	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	*3.00*	2.00 J

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-10-08	SHM-10-08	SHM-10-10	SHM-10-10	SHM-10-10	SHM-10-10	SHM-10-10	SHM-10-10	SHM-10-10
Sample Date:	11/14/2019	11/10/2020	6/2/2010	6/2/2010	6/2/2010	6/2/2010	6/2/2010	6/2/2010	6/3/2010
Historical (µg/L)									
Arsenic	NA	NA	*0.340 J*	*1.59*	*1.29 J*	*1.86 J*	*4.40 J*	*11.1*	*13.7*
Arsenic (Dissolved)	NA	NA	*0.270 J*	*0.270 J*	*0.565 U*	*1.13 J*	*2.47 J*	*2.82 U*	*1.13 U*
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	3.00 U	3.00 U	NA	NA	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L	Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-10-10	SHM-10-10	SHM-10-10	SHM-10-10	SHM-10-10	SHM-10-10	SHM-10-10	SHM-10-10	SHM-10-10
Sample Date:	7/13/2010	8/12/2010	9/8/2010	10/24/2012	10/24/2012	5/29/2013	11/20/2013	11/20/2013	10/10/2014
Historical (µg/L)									
Arsenic	*2.00 J*	*3.62 J*	*2.57 J*	*1.00*	NA	NA	*2.00 J*	NA	NA
Arsenic (Dissolved)	*1.25 J*	NA	*2.40 J*	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	NA	NA	*1.00*	*1.70 U*	NA	*2.00 J*	*2.60 J*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L	Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-10-10	SHM-10-10	SHM-10-10	SHM-10-10	SHM-10-10	SHM-10-10	SHM-10-10	SHM-10-16	SHM-10-16
Sample Date:	10/23/2015	10/23/2015	11/29/2016	11/27/2017	11/20/2018	11/11/2019	11/9/2020	8/17/2010	8/18/2010
Historical (µg/L)									
Arsenic	*2.90 J*	*2.90 J*	NA	NA	NA	NA	NA	*170*	*333 J*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	*4.81*	*1.97*
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	*3.50*	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	*3.00*	3.00 U	3.00 U	3.00 U	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L	Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-10-16	SHM-10-16	SHM-10-16	SHM-10-16	SHM-10-16	SHM-10-16	SHM-10-16	SHM-10-16	SHM-10-16
Sample Date:	8/18/2010	8/18/2010	8/19/2010	8/19/2010	8/19/2010	9/2/2010	10/20/2010	10/23/2012	10/24/2012
Historical (µg/L)									
Arsenic	*19.9*	*445*	*248 J*	*256*	*19.3*	*487*	*1180*	*1600*	*1500*
Arsenic (Dissolved)	*1.89*	NA	*216 J*	*248*	*3.44*	*495*	*1090*	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

Undefined Qualifier

J Estimated Value

U Undetected: The analyte was analyzed for, but not detected.

UJ The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

NA Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-10-16	SHM-10-16	SHM-10-16	SHM-10-16	SHM-10-16	SHM-10-16	SHM-10-16	SHM-10-16	SHM-10-16
Sample Date:	10/24/2012	5/28/2013	5/28/2013	11/20/2013	11/20/2013	10/28/2015	10/28/2015	6/27/2016	11/29/2016
Historical (µg/L)									
Arsenic	NA	NA	*1350*	*1530*	NA	*1760*	*1760*	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	*1600*	*1350*	NA	NA	*1530*	NA	NA	*1900*	*1600*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-10-16	SHM-10-16	SHM-10-16	SHM-10-16	SHM-10-16	SHM-10-16	SHM-10-16	SHM-10-16	SHM-10-16
Sample Date:	6/2/2017	11/17/2017	11/17/2017	11/15/2018	11/15/2018	11/13/2019	11/13/2019	11/21/2019	5/6/2020
Historical (µg/L)									
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	*1800*	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	*1200*	*1200*	1100	1100	1200	1100	1100	1100

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-10-16	SHM-13-01	SHM-13-01	SHM-13-01	SHM-13-01	SHM-13-01	SHM-13-01	SHM-13-01	SHM-13-01
Sample Date:	11/12/2020	5/7/2013	5/7/2013	5/7/2013	5/7/2013	5/7/2013	11/21/2013	11/21/2013	10/27/2015
Historical (µg/L)									
Arsenic	NA	*1.00 U*	*1.00 U*	*1.00 U*	*1.10 U*	*1.30 U*	*2.20 J*	NA	*2.10 J*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	NA	NA	NA	NA	NA	*2.20 J*	NA
Arsenic (Dissolved)	1100	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-13-01	SHM-13-01	SHM-13-01	SHM-13-01	SHM-13-01	SHM-13-02	SHM-13-02	SHM-13-02	SHM-13-02
Sample Date:	10/27/2015	11/28/2017	11/26/2018	11/14/2019	11/9/2020	4/15/2013	4/15/2013	4/15/2013	4/15/2013
Historical (µg/L)									
Arsenic	*2.10 J*	NA	NA	NA	NA	*0.930 J*	*0.820 J*	*0.930 J*	*0.950 J*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	*1.50*	1.50 J	1.90 J	3.00 UJ	NA	NA	NA	NA

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L	Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-13-02	SHM-13-02	SHM-13-02	SHM-13-02	SHM-13-02	SHM-13-02	SHM-13-02	SHM-13-02	SHM-13-02
Sample Date:	4/15/2013	4/15/2013	4/16/2013	5/29/2013	11/21/2013	11/21/2013	10/10/2014	10/23/2015	10/23/2015
Historical (µg/L)									
Arsenic	*0.890 J*	*0.950 J*	*1.20*	NA	*2.70 J*	NA	NA	*2.60 J*	*2.60 J*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	NA	*2.50 U*	NA	*2.70 J*	*2.60 J*	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units
µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-13-02	SHM-13-02	SHM-13-02	SHM-13-02	SHM-13-02	SHM-13-03	SHM-13-03	SHM-13-03	SHM-13-03
Sample Date:	11/29/2016	11/27/2017	11/15/2018	11/11/2019	11/5/2020	4/16/2013	4/16/2013	4/16/2013	4/17/2013
Historical (µg/L)									
Arsenic	NA	NA	NA	NA	NA	*0.600 J*	*1.70*	*17.6*	*22.6*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	*1.80 J*	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	*3.00*	3.00 U	3.00 U	3.00 U	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-13-03	SHM-13-03	SHM-13-03	SHM-13-03	SHM-13-03	SHM-13-03	SHM-13-03	SHM-13-03	SHM-13-03
Sample Date:	4/17/2013	5/29/2013	5/29/2013	11/20/2013	11/20/2013	4/23/2014	4/23/2014	10/10/2014	10/10/2014
Historical (µg/L)									
Arsenic	*357*	NA	*318*	*137*	NA	NA	*120*	NA	*80.8*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	*318*	NA	NA	*137*	*120*	NA	*80.8*	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-13-03	SHM-13-03	SHM-13-03	SHM-13-03	SHM-13-03	SHM-13-03	SHM-13-03	SHM-13-03	SHM-13-03
Sample Date:	6/8/2015	6/8/2015	10/23/2015	10/23/2015	6/28/2016	11/29/2016	6/6/2017	11/27/2017	4/25/2018
Historical (µg/L)									
Arsenic	*75.5*	*75.5*	*68.7*	*68.7*	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	NA	NA	*53.0*	*55.0*	*46.0*	NA	*26.0*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	*46.0*	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

Undefined Qualifier

J Estimated Value

U Undetected: The analyte was analyzed for, but not detected.

UJ The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

NA Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-13-03	SHM-13-03	SHM-13-03	SHM-13-03	SHM-13-03	SHM-13-04	SHM-13-04	SHM-13-04	SHM-13-04
Sample Date:	11/19/2018	4/16/2019	11/11/2019	5/21/2020	10/29/2020	5/28/2013	5/28/2013	4/24/2014	4/24/2014
Historical (µg/L)									
Arsenic	NA	NA	NA	NA	NA	NA	*2060*	NA	*61.1*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	NA	NA	NA	*2060*	NA	*61.1*	NA
Arsenic (Dissolved)	44.0	110	140	150	83.0	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-13-04	SHM-13-04	SHM-13-04	SHM-13-04	SHM-13-04	SHM-13-04	SHM-13-04	SHM-13-04	SHM-13-04
Sample Date:	10/13/2014	10/13/2014	6/9/2015	6/9/2015	10/28/2015	10/28/2015	6/28/2016	7/8/2016	11/28/2016
Historical (µg/L)									
Arsenic	*693*	NA	*620*	*620*	*212*	*212*	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	*693*	NA	NA	NA	NA	*20.0*	*320*	*140 J*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	*21.0*	NA

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L	Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-13-04	SHM-13-04	SHM-13-04	SHM-13-04	SHM-13-04	SHM-13-04	SHM-13-04	SHM-13-04	SHM-13-04
Sample Date:	12/15/2016	6/6/2017	11/14/2017	4/17/2018	11/13/2018	4/15/2019	11/12/2019	5/20/2020	11/6/2020
Historical (µg/L)									
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	*600*	*400*	NA	*340*	NA	NA	NA	NA	NA
Arsenic (Dissolved)	*320*	*350*	*160*	NA	190 J	430	600	200	260 J

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-13-05	SHM-13-05	SHM-13-05	SHM-13-05	SHM-13-05	SHM-13-05	SHM-13-05	SHM-13-05	SHM-13-05
Sample Date:	4/9/2013	4/10/2013	4/10/2013	4/10/2013	4/10/2013	4/10/2013	4/10/2013	4/10/2013	5/28/2013
Historical (µg/L)									
Arsenic	*0.600 J*	*0.550 J*	*0.670 J*	*33.5*	*69.4*	*2.40*	*56.8*	*96.5*	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	*8.90*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-13-05	SHM-13-05	SHM-13-05	SHM-13-05	SHM-13-05	SHM-13-05	SHM-13-05	SHM-13-05	SHM-13-05
Sample Date:	5/28/2013	11/21/2013	11/21/2013	10/13/2014	10/13/2014	10/28/2015	10/28/2015	11/28/2016	11/16/2017
Historical (µg/L)									
Arsenic	*8.90*	*6.80*	NA	*11.0*	NA	*12.3*	*12.3*	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	*6.80*	NA	*11.0*	NA	NA	*11.0*	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	*8.40*

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

Undefined Qualifier

J Estimated Value

U Undetected: The analyte was analyzed for, but not detected.

UJ The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

NA Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-13-05	SHM-13-05	SHM-13-05	SHM-13-06	SHM-13-06	SHM-13-06	SHM-13-06	SHM-13-06	SHM-13-06
Sample Date:	11/13/2018	11/12/2019	11/6/2020	4/18/2013	6/13/2013	11/21/2013	4/24/2014	4/24/2014	10/13/2014
Historical (µg/L)									
Arsenic	NA	NA	NA	NA	NA	NA	NA	*2850*	*2360*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	NA	*85.0*	*3180*	*2540*	*2850*	NA	NA
Arsenic (Dissolved)	12.0	16.0	6.40	NA	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-13-06	SHM-13-06	SHM-13-06	SHM-13-06	SHM-13-06	SHM-13-06	SHM-13-06	SHM-13-06	SHM-13-06
Sample Date:	10/13/2014	6/8/2015	6/8/2015	12/22/2015	6/28/2016	7/8/2016	11/28/2016	12/15/2016	6/9/2017
Historical (µg/L)									
Arsenic	NA	*2460*	*2460*	*2160*	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	*2360*	NA	NA	NA	*2500*	*2400*	*2700*	*3200*	*2400*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	*2500*	NA	*2800*	*2800*

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-13-06	SHM-13-06	SHM-13-06	SHM-13-06	SHM-13-06	SHM-13-06	SHM-13-06	SHM-13-06	SHM-13-07
Sample Date:	11/14/2017	4/17/2018	11/13/2018	4/16/2019	4/16/2019	11/12/2019	5/19/2020	11/9/2020	4/18/2013
Historical (µg/L)									
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	*1.80 U*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	*2700*	NA	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	*2700*	NA	2400	3100	2900	1900	2900	2200	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-13-07	SHM-13-07	SHM-13-07	SHM-13-07	SHM-13-07	SHM-13-07	SHM-13-07	SHM-13-07	SHM-13-07
Sample Date:	4/19/2013	4/19/2013	4/19/2013	11/21/2013	11/21/2013	4/24/2014	4/24/2014	10/10/2014	6/8/2015
Historical (µg/L)									
Arsenic	*3170*	*1650*	*135*	*1340*	NA	NA	*1280*	NA	*946*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	NA	NA	*1340*	*1280*	NA	*962*	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-13-07	SHM-13-07	SHM-13-07	SHM-13-07	SHM-13-07	SHM-13-07	SHM-13-07	SHM-13-07	SHM-13-07
Sample Date:	6/8/2015	10/23/2015	10/23/2015	6/28/2016	11/28/2016	6/7/2017	11/28/2017	4/17/2018	11/20/2018
Historical (µg/L)									
Arsenic	*946*	*531*	*531*	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	NA	*320*	*140*	*230*	NA	*470*	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	*620*	NA	490

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
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UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-13-07	SHM-13-07	SHM-13-07	SHM-13-07	SHM-13-08	SHM-13-08	SHM-13-08	SHM-13-08	SHM-13-08
Sample Date:	4/16/2019	11/11/2019	5/22/2020	11/5/2020	4/22/2013	4/22/2013	4/22/2013	4/22/2013	4/22/2013
Historical (µg/L)									
Arsenic	NA	NA	NA	NA	*1.70*	*1.50*	*1.90*	*288*	*1080*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	470	750	400	420	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-13-08	SHM-13-08	SHM-13-08	SHM-13-08	SHM-13-08	SHM-13-08	SHM-13-08	SHM-13-08	SHM-13-08
Sample Date:	4/22/2013	6/13/2013	6/13/2013	11/21/2013	11/21/2013	4/24/2014	4/24/2014	10/13/2014	6/8/2015
Historical (µg/L)									
Arsenic	*20.6*	NA	*928*	*994*	NA	NA	*1040*	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	*975*
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	*928*	NA	NA	*994*	*1040*	NA	*978*	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-13-08	SHM-13-08	SHM-13-08	SHM-13-08	SHM-13-08	SHM-13-08	SHM-13-08	SHM-13-08	SHM-13-08
Sample Date:	6/8/2015	10/28/2015	10/28/2015	6/28/2016	11/28/2016	6/6/2017	11/14/2017	4/17/2018	11/19/2018
Historical (µg/L)									
Arsenic	NA	*954*	*954*	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	*975*	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	NA	*770*	*870*	*900*	NA	*830*	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	*810*	NA	310

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L	Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-13-08	SHM-13-08	SHM-13-08	SHM-13-08	SHM-13-14D	SHM-13-14D	SHM-13-14D	SHM-13-14D	SHM-13-14D
Sample Date:	4/16/2019	11/11/2019	5/22/2020	11/10/2020	2/19/2014	2/19/2014	10/10/2014	10/10/2014	12/2/2016
Historical (µg/L)									
Arsenic	NA	NA	NA	NA	NA	*7.90*	NA	*9.60*	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	NA	NA	*7.90*	NA	*9.60*	NA	*9.10*
Arsenic (Dissolved)	800	930	630	1000	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-13-14D	SHM-13-14D	SHM-13-14D	SHM-13-14D	SHM-13-14S	SHM-13-14S	SHM-13-14S	SHM-13-14S	SHM-13-14S
Sample Date:	11/27/2017	11/15/2018	11/11/2019	10/29/2020	2/19/2014	2/19/2014	10/10/2014	10/10/2014	12/2/2016
Historical (µg/L)									
Arsenic	NA	NA	NA	NA	NA	*2.00 U*	NA	*2.00 U*	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	NA	NA	*2.00 U*	NA	*2.00 U*	NA	*4.00*
Arsenic (Dissolved)	*11.0*	6.10	12.0	3.00 U	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-13-14S	SHM-13-14S	SHM-13-14S	SHM-13-14S	SHM-13-15	SHM-13-15	SHM-13-15	SHM-13-15	SHM-13-15
Sample Date:	11/27/2017	11/15/2018	11/11/2019	10/29/2020	2/3/2014	2/3/2014	2/3/2014	2/4/2014	2/4/2014
Historical (µg/L)									
Arsenic	NA	NA	NA	NA	*2.00 U*	*2.00 U*	*2.00 U*	*2.00 U*	*2.00 U*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	*3.00*	3.00 U	1.90 J	1.50 J	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L	Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-13-15	SHM-13-15	SHM-13-15	SHM-13-15	SHM-13-15	SHM-13-15	SHM-13-15	SHM-13-15	SHM-13-15
Sample Date:	2/4/2014	2/4/2014	2/19/2014	2/19/2014	10/10/2014	10/10/2014	12/2/2016	11/27/2017	11/15/2018
Historical (µg/L)									
Arsenic	*35.5*	*34.0*	NA	*3.80 J*	NA	*8.10*	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	*3.80 J*	NA	*8.10*	NA	*5.50*	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	*5.70*	1.60 J

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L	Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-13-15	SHM-13-15	SHM-99-31A	SHM-99-31A	SHM-99-31A	SHM-99-31A	SHM-99-31A	SHM-99-31B	SHM-99-31B
Sample Date:	11/11/2019	10/29/2020	10/13/2010	10/5/2011	10/18/2012	10/23/2013	11/2/2020	8/12/2010	10/13/2010
Historical (µg/L)									
Arsenic	NA	NA	NA	NA	NA	NA	NA	*28.8*	*39.2*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	*17.4*	*18.4*	*17.7*	*14.2*	NA	NA	NA
Arsenic (Dissolved)	5.10	7.10	NA	NA	NA	NA	20.0	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-99-31B	SHM-99-31B	SHM-99-31B	SHM-99-31B	SHM-99-31B	SHM-99-31B	SHM-99-31B	SHM-99-31B	SHM-99-31C
Sample Date:	10/13/2010	10/5/2011	10/5/2011	10/18/2012	10/18/2012	10/23/2013	10/23/2013	10/30/2020	10/13/2010
Historical (µg/L)									
Arsenic	NA	*59.3*	NA	*60.1*	NA	*61.6*	NA	NA	*239*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	*39.2*	NA	*59.3*	NA	*60.1*	NA	*61.6*	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	1.90 J	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-99-31C	SHM-99-31C	SHM-99-31C	SHM-99-31C	SHM-99-31C	SHM-99-31C	SHM-99-31C	SHM-99-31C	SHM-99-31C
Sample Date:	10/13/2010	10/5/2011	10/5/2011	10/18/2012	10/18/2012	10/23/2013	10/23/2013	10/13/2014	10/13/2014
Historical (µg/L)									
Arsenic	NA	*244*	NA	*206*	NA	*205*	NA	*180*	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	*239*	NA	*244*	NA	*206*	NA	*205*	NA	*180*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

Undefined Qualifier

J Estimated Value

U Undetected: The analyte was analyzed for, but not detected.

UJ The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

NA Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-99-31C	SHM-99-31C	SHM-99-31C	SHM-99-31C	SHM-99-31C	SHM-99-32X	SHM-99-32X	SHM-99-32X	SHM-99-32X
Sample Date:	11/28/2017	11/29/2018	11/14/2019	5/19/2020	10/30/2020	10/13/2010	10/13/2010	10/4/2011	10/4/2011
Historical (µg/L)									
Arsenic	NA	NA	NA	NA	NA	*173*	NA	*173*	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	NA	NA	NA	NA	NA	*173*	NA	*173*
Arsenic (Dissolved)	*200*	160	140	180	140	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-99-32X	SHM-99-32X	SHM-99-32X	SHM-99-32X	SHM-99-32X	SHM-99-32X	SHM-99-32X	SHM-99-32X	SHM-99-32X
Sample Date:	10/17/2012	10/17/2012	10/23/2013	10/23/2013	10/13/2014	10/13/2014	10/28/2015	11/21/2016	11/28/2017
Historical (µg/L)									
Arsenic	*131*	NA	*107*	NA	*93.5*	NA	*76.4*	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	NA	*131*	NA	*107*	NA	*93.5*	NA	*59.0*	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	*60.0*

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L	Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 3.
Summary of Available Groundwater Chemistry Datasets for North Impact Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-99-32X	SHM-99-32X	SHM-99-32X	SHM-99-32X	SHM-99-32X
Sample Date:	11/15/2018	11/12/2019	11/13/2019	5/19/2020	10/30/2020
Historical (µg/L)					
Arsenic	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)					
Arsenic	NA	NA	NA	NA	NA
Arsenic (Dissolved)	6.30	47.0	55.0	22.0	26.0

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
NA	Not analyzed

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	EPA-PZ-2012-1A	EPA-PZ-2012-1A	EPA-PZ-2012-1A	EPA-PZ-2012-1A	EPA-PZ-2012-1A	EPA-PZ-2012-1A	EPA-PZ-2012-1A	EPA-PZ-2012-1A	EPA-PZ-2012-1A	EPA-PZ-2012-1A	EPA-PZ-2012-1A	EPA-PZ-2012-1A	EPA-PZ-2012-1A	EPA-PZ-2012-1A	EPA-PZ-2012-1B	EPA-PZ-2012-1B
Sample Date:	10/13/2014	10/13/2014	10/22/2015	10/22/2015	6/28/2016	11/17/2016	5/25/2017	11/14/2017	4/16/2018	11/13/2018	4/16/2019	11/7/2019	5/19/2020	10/30/2020	10/13/2014	10/13/2014
Historical (µg/L)																
Arsenic	*2.00 U*	NA	*4.00 U*	*4.00 U*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	*160*	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	NA	*2.00 U*	NA	NA	*1.50 U*	*1.50 U*	*1.50 U*	NA	*1.50 U*	NA	NA	NA	NA	NA	NA	*160*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	*3.00*	NA	3.00 U	3.00 U	3.00 U	1.50 U	3.00 U	NA	NA

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units
µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
NA	not analyzed
	October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	EPA-PZ-2012-1B	EPA-PZ-2012-1B	EPA-PZ-2012-1B	EPA-PZ-2012-1B	EPA-PZ-2012-1B	EPA-PZ-2012-1B	EPA-PZ-2012-1B	EPA-PZ-2012-1B	EPA-PZ-2012-1B	EPA-PZ-2012-1B	EPA-PZ-2012-1B	EPA-PZ-2012-1B	EPA-PZ-2012-2A	EPA-PZ-2012-2A	EPA-PZ-2012-2A	EPA-PZ-2012-2A
Sample Date:	10/22/2015	10/22/2015	6/28/2016	11/17/2016	5/25/2017	11/14/2017	4/16/2018	11/13/2018	4/16/2019	11/7/2019	5/19/2020	10/30/2020	10/14/2014	10/14/2014	10/22/2015	10/22/2015
Historical (µg/L)																
Arsenic	*288*	*288*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	*2.00 U*	NA	*4.00 U*	*4.00 U*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	NA	NA	*20.0*	*260*	*240*	NA	*170*	NA	NA	NA	NA	NA	NA	*2.00 U*	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	*200*	NA	170	160	220	150	210	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

Undefined Qualifier

J Estimated Value

U Undetected: The analyte was analyzed for, but not detected.

NA not analyzed

October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	EPA-PZ-2012-2A	EPA-PZ-2012-2A	EPA-PZ-2012-2A	EPA-PZ-2012-2A	EPA-PZ-2012-2A	EPA-PZ-2012-2A	EPA-PZ-2012-2A	EPA-PZ-2012-2A	EPA-PZ-2012-2A	EPA-PZ-2012-2A	EPA-PZ-2012-2B	EPA-PZ-2012-2B	EPA-PZ-2012-2B	EPA-PZ-2012-2B	EPA-PZ-2012-2B	EPA-PZ-2012-2B
Sample Date:	6/29/2016	11/17/2016	5/31/2017	11/8/2017	4/16/2018	11/13/2018	4/12/2019	10/24/2019	5/19/2020	11/5/2020	10/14/2014	10/14/2014	10/22/2015	10/22/2015	6/29/2016	11/17/2016
Historical (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	*2.00 U*	NA	*4.00 U*	*4.00 U*	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	*1.60 J*	*1.50 U*	*1.50 U*	NA	*1.50 U*	NA	NA	NA	NA	NA	NA	*2.00 U*	NA	NA	*1.50 U*	*1.50 U*
Arsenic (Dissolved)	NA	NA	NA	*3.00*	NA	1.90 J	3.00 U	3.00 U	1.50 U	3.00 U	NA	NA	NA	NA	NA	NA

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units
µg/L Micrograms per Liter

Qualifier
Undefined Qualifier
J Estimated Value
U Undetected: The analyte was analyzed for, but not detected.
NA not analyzed
October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	EPA-PZ-2012-2B	EPA-PZ-2012-2B	EPA-PZ-2012-2B	EPA-PZ-2012-2B	EPA-PZ-2012-2B	EPA-PZ-2012-2B	EPA-PZ-2012-2B	EPA-PZ-2012-2B	EPA-PZ-2012-3A	EPA-PZ-2012-3A	EPA-PZ-2012-3A	EPA-PZ-2012-3A	EPA-PZ-2012-3A	EPA-PZ-2012-3A	EPA-PZ-2012-3A	EPA-PZ-2012-3A
Sample Date:	5/31/2017	11/8/2017	4/16/2018	11/13/2018	4/12/2019	10/24/2019	5/20/2020	11/5/2020	10/8/2014	10/8/2014	10/26/2015	10/26/2015	6/29/2016	11/18/2016	5/25/2017	11/8/2017
Historical (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	*21.2*	NA	*16.4*	*16.4*	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	*3.30*	NA	*1.50 U*	NA	NA	NA	NA	NA	NA	*21.2*	NA	NA	*14.0*	*23.0*	*19.0*	NA
Arsenic (Dissolved)	NA	*3.00*	NA	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U	NA	NA	NA	NA	NA	NA	NA	*12.0*

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units
µg/L Micrograms per Liter

Qualifier
Undefined Qualifier
J Estimated Value
U Undetected: The analyte was analyzed for, but not detected.
NA not analyzed
October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	EPA-PZ-2012-3A	EPA-PZ-2012-3A	EPA-PZ-2012-3A	EPA-PZ-2012-3A	EPA-PZ-2012-3A	EPA-PZ-2012-3A	EPA-PZ-2012-3B	EPA-PZ-2012-3B	EPA-PZ-2012-3B	EPA-PZ-2012-3B	EPA-PZ-2012-3B	EPA-PZ-2012-3B	EPA-PZ-2012-3B	EPA-PZ-2012-3B	EPA-PZ-2012-3B	EPA-PZ-2012-3B
Sample Date:	4/24/2018	11/14/2018	4/16/2019	10/28/2019	5/21/2020	11/2/2020	10/9/2014	10/9/2014	10/26/2015	10/26/2015	6/29/2016	11/18/2016	5/25/2017	11/9/2017	4/24/2018	11/14/2018
Historical (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	*3830*	NA	*4070*	*4070*	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	*13.0*	NA	NA	NA	NA	NA	NA	*3830*	NA	NA	*3500*	*3600*	*4000*	NA	*2900*	NA
Arsenic (Dissolved)	NA	15.0	15.0	16.0	17.0	12.0	NA	NA	NA	NA	NA	NA	NA	*3400*	NA	3000

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units
µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
NA	not analyzed
(yellow)	October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	EPA-PZ-2012-3B	EPA-PZ-2012-3B	EPA-PZ-2012-3B	EPA-PZ-2012-3B	EPA-PZ-2012-3B	EPA-PZ-2012-4A	EPA-PZ-2012-4A	EPA-PZ-2012-4A	EPA-PZ-2012-4A	EPA-PZ-2012-4A	EPA-PZ-2012-4A	EPA-PZ-2012-4A	EPA-PZ-2012-4A	EPA-PZ-2012-4A	EPA-PZ-2012-4A	EPA-PZ-2012-4A
Sample Date:	4/16/2019	4/16/2019	10/28/2019	5/21/2020	11/2/2020	10/8/2014	10/8/2014	10/26/2015	10/26/2015	6/28/2016	11/17/2016	5/25/2017	11/8/2017	4/16/2018	11/13/2018	4/15/2019
Historical (µg/L)																
Arsenic	NA	NA	NA	NA	NA	*4.80*	NA	*5.60*	*5.60*	NA	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	*4.80*	NA	NA	*2.80 J*	*5.10*	*2.90 J*	NA	*2.50 J*	NA	NA
Arsenic (Dissolved)	2700	3000	3200	3200	2700	NA	NA	NA	NA	NA	NA	NA	*3.40*	NA	3.50	2.50 J

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
NA	not analyzed
	October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	EPA-PZ-2012-4A	EPA-PZ-2012-4A	EPA-PZ-2012-4A	EPA-PZ-2012-4B	EPA-PZ-2012-4B	EPA-PZ-2012-4B	EPA-PZ-2012-4B	EPA-PZ-2012-4B	EPA-PZ-2012-4B	EPA-PZ-2012-4B	EPA-PZ-2012-4B	EPA-PZ-2012-4B	EPA-PZ-2012-4B	EPA-PZ-2012-4B	EPA-PZ-2012-4B	EPA-PZ-2012-4B
Sample Date:	10/31/2019	5/19/2020	10/30/2020	10/6/2014	10/6/2014	10/26/2015	10/26/2015	6/29/2016	11/17/2016	5/25/2017	11/8/2017	11/8/2017	4/16/2018	11/13/2018	11/13/2018	4/15/2019
Historical (µg/L)																
Arsenic	NA	NA	NA	*2680*	NA	*3520*	*3520*	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	*2680*	NA	NA	*2700*	*2200*	*2300*	NA	NA	*1900*	NA	NA	NA
Arsenic (Dissolved)	4.50	2.70 J	3.6	NA	NA	NA	NA	NA	NA	NA	*2300*	*2500*	NA	2000	2100	2000

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units
µg/L Micrograms per Liter

Qualifier
Undefined Qualifier
J Estimated Value
U Undetected: The analyte was analyzed for, but not detected.
NA not analyzed
October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	EPA-PZ-2012-4B	EPA-PZ-2012-4B	EPA-PZ-2012-4B	EPA-PZ-2012-4B	EPA-PZ-2012-4B	EPA-PZ-2012-4B	EPA-PZ-2012-5A	EPA-PZ-2012-5A	EPA-PZ-2012-5A	EPA-PZ-2012-5A	EPA-PZ-2012-5A	EPA-PZ-2012-5A	EPA-PZ-2012-5A	EPA-PZ-2012-5A	EPA-PZ-2012-5A	EPA-PZ-2012-5A
Sample Date:	10/31/2019	10/31/2019	5/19/2020	5/19/2020	10/29/2020	10/29/2020	10/14/2014	10/14/2014	10/26/2015	10/26/2015	6/30/2016	11/17/2016	5/31/2017	11/10/2017	4/23/2018	11/15/2018
Historical (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	*2.00 U*	NA	*4.00 U*	*4.00 U*	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	*2.00 U*	NA	NA	*1.50 U*	*1.50 U*	*1.50 U*	NA	*1.50 J*	NA
Arsenic (Dissolved)	2100	2000	1800	2000	2000	1900	NA	NA	NA	NA	NA	NA	NA	*3.00*	NA	1.50 J

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units
µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
NA	not analyzed
(yellow)	October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	EPA-PZ-2012-5A	EPA-PZ-2012-5A	EPA-PZ-2012-5A	EPA-PZ-2012-5A	EPA-PZ-2012-5B	EPA-PZ-2012-5B	EPA-PZ-2012-5B	EPA-PZ-2012-5B	EPA-PZ-2012-5B	EPA-PZ-2012-5B	EPA-PZ-2012-5B	EPA-PZ-2012-5B	EPA-PZ-2012-5B	EPA-PZ-2012-5B	EPA-PZ-2012-5B	EPA-PZ-2012-5B
Sample Date:	4/12/2019	11/5/2019	5/22/2020	11/10/2020	10/14/2014	10/14/2014	10/26/2015	10/26/2015	6/30/2016	11/17/2016	5/31/2017	11/10/2017	4/23/2018	11/15/2018	4/12/2019	11/5/2019
Historical (µg/L)																
Arsenic	NA	NA	NA	NA	*3.20 J*	NA	*3.70 J*	*3.70 J*	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	*3.20 J*	NA	NA	*1.50 U*	*2.40 J*	*1.60 J*	NA	*1.50 U*	NA	NA	NA
Arsenic (Dissolved)	1.50 J	2.20 J	3.00 U	3.00 U	NA	NA	NA	NA	NA	NA	NA	*3.00*	NA	12.0	2.70 J	14.0

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

Undefined Qualifier

J Estimated Value

U Undetected: The analyte was analyzed for, but not detected.

NA not analyzed

October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	EPA-PZ-2012-5B	EPA-PZ-2012-5B	EPA-PZ-2012-6A	EPA-PZ-2012-6A	EPA-PZ-2012-6A	EPA-PZ-2012-6A	EPA-PZ-2012-6A	EPA-PZ-2012-6A	EPA-PZ-2012-6A	EPA-PZ-2012-6A	EPA-PZ-2012-6A	EPA-PZ-2012-6A	EPA-PZ-2012-6A	EPA-PZ-2012-6A	EPA-PZ-2012-6A	EPA-PZ-2012-6B
Sample Date:	5/22/2020	11/10/2020	10/9/2014	10/9/2014	10/26/2015	10/26/2015	11/17/2016	5/24/2017	11/9/2017	4/20/2018	11/9/2018	4/22/2019	10/25/2019	5/22/2020	11/11/2020	10/9/2014
Historical (µg/L)																
Arsenic	NA	NA	*2.00 U*	NA	*4.00 U*	*4.00 U*	NA	NA	NA	NA	NA	NA	NA	NA	NA	*515*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	NA	NA	NA	*2.00 U*	NA	NA	*1.60 J*	*1.50 U*	NA	*1.50 U*	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	2.40 J	2.50 J	NA	NA	NA	NA	NA	NA	*3.00*	NA	3.00 U	1.60 J	3.00 U	3.00 U	3.00 U	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
NA	not analyzed
	October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	EPA-PZ-2012-6B	EPA-PZ-2012-6B	EPA-PZ-2012-6B	EPA-PZ-2012-6B	EPA-PZ-2012-6B	EPA-PZ-2012-6B	EPA-PZ-2012-6B	EPA-PZ-2012-6B
Sample Date:	10/9/2014	10/26/2015	10/26/2015	6/30/2016	11/17/2016	5/24/2017	11/9/2017	4/20/2018
Historical (µg/L)								
Arsenic	NA	*386*	*386*	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)								
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)								
Arsenic	*515*	NA	NA	*440*	*370*	*430*	NA	*96.0*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	*350*	NA

Location ID:	EPA-PZ-2012-6B	EPA-PZ-2012-6B	EPA-PZ-2012-6B	EPA-PZ-2012-6B	EPA-PZ-2012-6B	EPA-PZ-2012-7A	EPA-PZ-2012-7A	EPA-PZ-2012-7A
Sample Date:	11/9/2018	4/22/2019	10/25/2019	5/22/2020	11/11/2020	10/14/2014	10/14/2014	10/27/2015
Historical (µg/L)								
Arsenic	NA	NA	NA	NA	NA	*2.00 U*	NA	*4.00 U*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)								
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)								
Arsenic	NA	NA	NA	NA	NA	NA	*2.00 U*	NA
Arsenic (Dissolved)	300	350	370	220	300	NA	NA	NA

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units
µg/L Micrograms per Liter

Qualifier
Undefined Qualifier
J Estimated Value
U Undetected: The analyte was analyzed for, but not detected.
NA not analyzed
October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	EPA-PZ-2012-7A	EPA-PZ-2012-7A	EPA-PZ-2012-7A	EPA-PZ-2012-7A	EPA-PZ-2012-7A	EPA-PZ-2012-7A	EPA-PZ-2012-7A	EPA-PZ-2012-7A	EPA-PZ-2012-7A	EPA-PZ-2012-7A	EPA-PZ-2012-7A	EPA-PZ-2012-7B	EPA-PZ-2012-7B	EPA-PZ-2012-7B	EPA-PZ-2012-7B	EPA-PZ-2012-7B
Sample Date:	10/27/2015	6/29/2016	11/21/2016	5/24/2017	11/17/2017	4/18/2018	11/16/2018	4/19/2019	10/31/2019	5/22/2020	11/6/2020	10/14/2014	10/14/2014	10/27/2015	10/27/2015	6/29/2016
Historical (µg/L)																
Arsenic	*4.00 U*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	*1250*	NA	*1330*	*1330*	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	NA	*1.80 J*	*1.50 U*	*1.50 U*	NA	*1.50 U*	NA	NA	NA	NA	NA	NA	*1250*	NA	NA	*1000*
Arsenic (Dissolved)	NA	NA	NA	NA	*3.00*	NA	3.00 U	3.00 U	2.30 J	3.00 U	3.00 U	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
NA	not analyzed
	October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	EPA-PZ-2012-7B	EPA-PZ-2012-7B	EPA-PZ-2012-7B	EPA-PZ-2012-7B	EPA-PZ-2012-7B	EPA-PZ-2012-7B	EPA-PZ-2012-7B	EPA-PZ-2012-7B	EPA-PZ-2012-7B	SHL-22	SHL-22	SHL-22	SHL-22	SHL-22	SHL-22	SHL-22
Sample Date:	11/21/2016	5/24/2017	11/17/2017	4/18/2018	11/16/2018	4/19/2019	11/5/2019	5/22/2020	11/6/2020	4/21/2010	4/21/2010	10/12/2010	10/12/2010	4/6/2011	4/6/2011	10/7/2011
Historical (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	*69.6*	*46.5*	NA	*57.9*	NA	*45.7*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	*1000*	*1500*	NA	*1300*	NA	NA	NA	NA	NA	*69.6*	NA	NA	*46.5*	NA	*57.9*	NA
Arsenic (Dissolved)	NA	NA	*1200*	NA	1100	1500	1300	1400	1300	NA	NA	NA	NA	NA	NA	NA

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units
µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
NA	not analyzed
	October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHL-22	SHL-22	SHL-22	SHL-22	SHL-22	SHL-22	SHL-22	SHL-22	SHL-22	SHL-22	SHL-22	SHL-22	SHL-22	SHL-22	SHL-22	SHL-22
Sample Date:	10/7/2011	4/10/2012	10/17/2012	10/17/2012	5/28/2013	5/28/2013	10/23/2013	10/23/2013	4/24/2014	4/24/2014	10/9/2014	10/9/2014	10/26/2015	10/26/2015	11/17/2016	11/13/2017
Historical (µg/L)																
Arsenic	NA	NA	*16.5*	NA	NA	*34.1*	*53.1*	NA	NA	*49.2*	*44.5*	NA	*15.9*	*15.9*	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	*45.7*	*41.9 J*	NA	*16.5*	*34.1*	NA	NA	*53.1*	*49.2*	NA	NA	*44.5*	NA	NA	*9.40*	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	*6.10*

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

Undefined Qualifier

J Estimated Value

U Undetected: The analyte was analyzed for, but not detected.

NA not analyzed

October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHL-22	SHL-22	SHL-22	SHL-22	SHL-23	SHL-23	SHL-23	SHL-23	SHL-23	SHL-23	SHL-23	SHL-23	SHL-23	SHL-23	SHL-23	SHL-23
Sample Date:	11/12/2018	11/4/2019	11/3/2020	11/3/2020	8/12/2010	10/13/2010	10/13/2010	10/15/2012	10/15/2012	6/9/2015	6/10/2015	10/21/2015	10/26/2015	7/8/2016	11/22/2016	12/22/2016
Historical (µg/L)																
Arsenic	NA	NA	NA	NA	*0.140 J*	*0.500 U*	NA	*0.500 U*	NA	*2.00 U*	*2.00 U*	*4.00 U*	*4.00 U*	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	*0.500 U*	NA	*0.500 U*	NA	NA	NA	NA	*1.50 U*	*1.50 U*	*1.50 U*
Arsenic (Dissolved)	5.00	6.20	2.40 J	2.20 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	*1.50 U*	NA	*1.50 U*

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units
µg/L Micrograms per Liter

Qualifier
Undefined Qualifier
J Estimated Value
U Undetected: The analyte was analyzed for, but not detected.
NA not analyzed
October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHL-23	SHL-23	SHL-23	SHL-23	SHL-23	SHL-5	SHL-5	SHL-5	SHL-5	SHL-5	SHL-5	SHL-5	SHL-5	SHL-5	SHL-5	SHL-5
Sample Date:	5/24/2017	11/27/2017	11/8/2018	11/13/2019	11/12/2020	4/22/2010	4/22/2010	10/11/2010	10/11/2010	4/10/2012	10/15/2012	10/15/2012	5/21/2013	5/21/2013	10/22/2013	10/22/2013
Historical (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	*3.40*	*4.80*	NA	NA	*4.50*	NA	NA	*3.70*	*15.1*	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	*1.50 U*	NA	NA	NA	NA	*3.40*	NA	NA	*4.80*	*3.70 J*	NA	*4.50*	*3.70*	NA	NA	*15.1*
Arsenic (Dissolved)	*1.50 U*	*3.00*	3.00 U	3.00 U	3.00 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

Undefined Qualifier

J Estimated Value

U Undetected: The analyte was analyzed for, but not detected.

NA not analyzed

October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHL-5	SHL-5	SHL-5	SHL-5	SHL-5	SHL-5	SHL-5	SHL-5	SHL-5	SHL-5	SHL-8D	SHL-8D	SHL-8D	SHL-8D	SHL-8D	SHL-8D
Sample Date:	4/22/2014	4/22/2014	10/13/2014	10/13/2014	10/21/2015	10/21/2015	11/17/2016	11/10/2017	11/8/2019	11/9/2020	4/22/2010	4/22/2010	10/11/2010	10/11/2010	4/5/2011	4/5/2011
Historical (µg/L)																
Arsenic	NA	*2.00 U*	*13.3*	NA	*12.6*	*12.6*	NA	NA	NA	NA	NA	*0.600*	*0.500 U*	NA	*0.500 U*	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	*2.00 U*	NA	NA	*13.3*	NA	NA	*1.50 U*	NA	NA	NA	*0.600*	NA	NA	*0.500 U*	NA	*0.500 U*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	*3.70*	5.10	4.60	NA	NA	NA	NA	NA	NA

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units
µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
NA	not analyzed
	October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHL-8D	SHL-8D	SHL-8D	SHL-8D	SHL-8D	SHL-8D	SHL-8D	SHL-8D	SHL-8D	SHL-8D	SHL-8D	SHL-8D	SHL-8D	SHL-8D	SHL-8D	SHL-8D
Sample Date:	10/6/2011	10/6/2011	4/11/2012	4/11/2012	10/15/2012	10/15/2012	5/21/2013	10/22/2013	10/22/2013	4/22/2014	4/22/2014	10/9/2014	10/9/2014	10/27/2015	10/27/2015	11/17/2016
Historical (µg/L)																
Arsenic	*0.500 U*	NA	NA	*0.500 U*	*0.500 U*	NA	NA	*2.00 U*	NA	NA	*2.00 U*	*2.00 U*	NA	*4.00 U*	*4.00 U*	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	NA	*0.500 U*	*0.500 U*	NA	NA	*0.500 U*	*0.720 U*	NA	*2.00 U*	*2.00 U*	NA	NA	*2.00 U*	NA	NA	*1.50 U*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units
µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
NA	not analyzed
	October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHL-8D	SHL-8D	SHL-8D	SHL-8D	SHL-8S	SHL-8S	SHL-8S	SHL-8S	SHL-8S	SHL-8S	SHL-8S	SHL-8S	SHL-8S	SHL-8S	SHL-8S	SHL-8S
Sample Date:	11/8/2017	11/13/2018	10/24/2019	11/10/2020	4/22/2010	4/22/2010	10/11/2010	10/11/2010	4/5/2011	4/5/2011	10/6/2011	10/6/2011	4/10/2012	10/15/2012	10/15/2012	5/28/2013
Historical (µg/L)																
Arsenic	NA	NA	NA	NA	NA	*0.600*	*0.500 U*	NA	*0.500 U*	NA	*0.500 U*	NA	NA	*0.500 U*	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	*0.600*	NA	NA	*0.500 U*	NA	*0.500 U*	NA	*0.500 U*	*0.600 J*	NA	*0.500 U*	*0.930 U*
Arsenic (Dissolved)	*3.00*	3.00 U	3.00 U	3.00 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

Undefined Qualifier

J Estimated Value

U Undetected: The analyte was analyzed for, but not detected.

NA not analyzed

October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHL-8S	SHL-8S	SHL-8S	SHL-8S	SHL-8S	SHL-8S	SHL-8S	SHL-8S	SHL-8S	SHL-8S	SHL-8S	SHL-8S	SHL-8S	SHL-9	SHL-9	SHL-9
Sample Date:	10/22/2013	10/22/2013	4/22/2014	4/22/2014	10/9/2014	10/9/2014	10/27/2015	10/27/2015	11/17/2016	11/8/2017	11/13/2018	10/24/2019	11/10/2020	4/21/2010	4/21/2010	10/12/2010
Historical (µg/L)																
Arsenic	*2.00 U*	NA	NA	*2.00 U*	*2.00 U*	NA	*4.00 U*	*4.00 U*	NA	NA	NA	NA	NA	NA	*25.2*	*38.4*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	NA	*2.00 U*	*2.00 U*	NA	NA	*2.00 U*	NA	NA	*1.50 U*	NA	NA	NA	NA	*25.2*	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	*3.00*	3.00 U	3.00 U	3.00 U	NA	NA	NA

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units
µg/L Micrograms per Liter

Qualifier
Undefined Qualifier
J Estimated Value
U Undetected: The analyte was analyzed for, but not detected.
NA not analyzed
October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHL-9	SHL-9	SHL-9	SHL-9	SHL-9	SHL-9	SHL-9	SHL-9	SHL-9	SHL-9	SHL-9	SHL-9	SHL-9	SHL-9	SHL-9	SHL-9
Sample Date:	10/12/2010	4/6/2011	4/6/2011	10/7/2011	10/7/2011	4/10/2012	10/17/2012	10/17/2012	5/28/2013	10/23/2013	10/23/2013	4/23/2014	4/23/2014	10/9/2014	10/9/2014	10/28/2015
Historical (µg/L)																
Arsenic	NA	*25.7*	NA	*39.8*	NA	NA	*36.4*	NA	NA	*33.1*	NA	NA	*22.2*	*28.5*	NA	*18.5*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	*38.4*	NA	*25.7*	NA	*39.8*	*29.5 J*	NA	*36.4*	*30.0*	NA	*33.1*	*22.2*	NA	NA	*28.5*	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
NA	not analyzed
	October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHL-9	SHL-9	SHL-9	SHL-9	SHL-9	SHL-9	SHL-9	SHL-9	SHM-10-06	SHM-10-06	SHM-10-06	SHM-10-06	SHM-10-06	SHM-10-06	SHM-10-06	SHM-10-06
Sample Date:	10/28/2015	11/17/2016	11/15/2017	11/15/2017	11/12/2018	10/30/2019	10/30/2019	11/3/2020	5/24/2010	5/24/2010	5/24/2010	5/26/2010	5/26/2010	5/26/2010	5/26/2010	7/8/2010
Historical (µg/L)																
Arsenic	*18.5*	NA	NA	NA	NA	NA	NA	NA	*17.2*	*120*	*155*	*67.5*	*683*	*2390*	*2540*	*2210 J*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	*10.0*	*121*	*129*	*42.9*	*750*	*2070*	NA	*1680 J*
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	*2660*	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	NA	*38.0*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	*22.0*	*25.0*	28.0	33.0	30.0	35.0	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units
µg/L Micrograms per Liter

Qualifier
Undefined Qualifier
J Estimated Value
U Undetected: The analyte was analyzed for, but not detected.
NA not analyzed
October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-10-06	SHM-10-06	SHM-10-06	SHM-10-06	SHM-10-06	SHM-10-06	SHM-10-06	SHM-10-06	SHM-10-06	SHM-10-06	SHM-10-06	SHM-10-06	SHM-10-06	SHM-10-06	SHM-10-06	SHM-10-06A
Sample Date:	9/8/2010	10/23/2012	10/23/2012	10/23/2012	5/23/2013	5/23/2013	10/8/2014	10/8/2014	10/22/2015	10/22/2015	11/21/2016	11/16/2017	11/12/2018	11/1/2019	10/30/2020	5/24/2010
Historical (µg/L)																
Arsenic	*2580*	*2300*	*1900*	NA	NA	*1980*	*1900*	NA	*2150*	*2150*	NA	NA	NA	NA	NA	*0.590*
Arsenic (Dissolved)	*2710*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	*0.370 J*
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	NA	NA	NA	*2300*	*1980*	NA	NA	*1900*	NA	NA	*1700*	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	*1600*	1200	1300	1000	NA

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units
µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
NA	not analyzed
	October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-10-06A	SHM-10-06A	SHM-10-06A	SHM-10-06A	SHM-10-06A	SHM-10-06A	SHM-10-06A	SHM-10-06A	SHM-10-06A	SHM-10-06A	SHM-10-06A	SHM-10-06A	SHM-10-06A	SHM-10-06A	SHM-10-06A	SHM-10-06A
Sample Date:	5/24/2010	5/24/2010	5/25/2010	5/25/2010	5/25/2010	5/25/2010	5/25/2010	5/25/2010	7/7/2010	9/9/2010	10/24/2012	10/24/2012	10/24/2012	5/22/2013	11/20/2013	11/20/2013
Historical (µg/L)																
Arsenic	*595*	*1090*	*170*	*134*	*186*	*382*	*405*	*333*	*64.8*	*102*	*72.0*	*80.0*	NA	*72.8*	*22.9*	NA
Arsenic (Dissolved)	*55.1*	*18.0*	*36.7*	*58.6*	*106*	*1.13 U*	*1.13 U*	*1.17 J*	*61.0*	*94.2*	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	*72.0*	NA	NA	*22.9*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units
µg/L Micrograms per Liter

Qualifier
Undefined Qualifier
J Estimated Value
U Undetected: The analyte was analyzed for, but not detected.
NA not analyzed
October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-10-06A	SHM-10-06A	SHM-10-06A	SHM-10-06A	SHM-10-06A	SHM-10-06A	SHM-10-06A	SHM-10-06A	SHM-10-06A	SHM-93-22B	SHM-93-22B	SHM-93-22B	SHM-93-22B	SHM-93-22B	SHM-93-22B	SHM-93-22B
Sample Date:	10/7/2014	10/7/2014	10/21/2015	10/21/2015	12/2/2016	11/30/2017	11/7/2018	11/7/2019	11/13/2020	4/21/2010	4/21/2010	10/11/2010	10/12/2010	4/6/2011	4/6/2011	10/11/2011
Historical (µg/L)																
Arsenic	*95.6*	NA	*4.00 U*	*4.00 U*	NA	NA	NA	NA	NA	NA	*948*	*828*	NA	NA	NA	*1070*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	*1040*	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	NA	*95.6*	NA	NA	*76.0*	NA	NA	NA	NA	*948*	NA	NA	*828*	*1040*	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	*74.0*	64.0	63.0	71.0	NA	NA	NA	NA	NA	NA	NA

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units
µg/L Micrograms per Liter

Qualifier
Undefined Qualifier
J Estimated Value
U Undetected: The analyte was analyzed for, but not detected.
NA not analyzed
October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-93-22B	SHM-93-22B	SHM-93-22B	SHM-93-22B	SHM-93-22B	SHM-93-22B	SHM-93-22B	SHM-93-22B	SHM-93-22B	SHM-93-22B	SHM-93-22B	SHM-93-22B	SHM-93-22B	SHM-93-22B	SHM-93-22B	SHM-93-22B
Sample Date:	10/11/2011	4/10/2012	4/10/2012	10/17/2012	10/17/2012	5/28/2013	5/28/2013	10/23/2013	10/23/2013	4/24/2014	4/24/2014	10/8/2014	10/8/2014	6/8/2015	6/8/2015	10/23/2015
Historical (µg/L)																
Arsenic	NA	NA	*1270*	*879*	NA	NA	*1150*	*1150*	NA	NA	*997*	*690*	NA	*1050*	*1050*	*670*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	*1070*	*1270 J*	NA	NA	*879*	*1150*	NA	NA	*1150*	*997*	NA	NA	*690*	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units
µg/L Micrograms per Liter

Qualifier
Undefined Qualifier
J Estimated Value
U Undetected: The analyte was analyzed for, but not detected.
NA not analyzed
October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-93-22B	SHM-93-22B	SHM-93-22B	SHM-93-22B	SHM-93-22B	SHM-93-22B	SHM-93-22B	SHM-93-22B	SHM-93-22B	SHM-93-22B	SHM-93-22B	SHM-93-22C	SHM-93-22C	SHM-93-22C	SHM-93-22C	SHM-93-22C
Sample Date:	10/23/2015	6/27/2016	11/17/2016	5/23/2017	11/13/2017	4/24/2018	11/14/2018	4/12/2019	11/4/2019	5/21/2020	11/3/2020	4/21/2010	4/21/2010	10/12/2010	10/12/2010	4/6/2011
Historical (µg/L)																
Arsenic	*670*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	*14.6*	*15.8*	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	NA	*630*	*480*	*310*	NA	*270*	NA	NA	NA	NA	NA	*14.6*	NA	NA	*15.8*	*13.9*
Arsenic (Dissolved)	NA	NA	NA	NA	*360*	NA	170	83.0	370	170	300	NA	NA	NA	NA	NA

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units
µg/L Micrograms per Liter

Qualifier
Undefined Qualifier
J Estimated Value
U Undetected: The analyte was analyzed for, but not detected.
NA not analyzed
October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-93-22C	SHM-93-22C	SHM-93-22C	SHM-93-22C	SHM-93-22C	SHM-93-22C	SHM-93-22C	SHM-93-22C	SHM-93-22C	SHM-93-22C	SHM-93-22C	SHM-93-22C	SHM-93-22C	SHM-93-22C	SHM-93-22C	SHM-93-22C
Sample Date:	4/6/2011	10/5/2011	10/5/2011	4/11/2012	4/11/2012	10/17/2012	10/17/2012	5/28/2013	5/28/2013	10/23/2013	10/23/2013	4/24/2014	4/24/2014	10/8/2014	10/8/2014	10/23/2015
Historical (µg/L)																
Arsenic	NA	*13.9*	NA	NA	*25.4*	*21.7*	NA	NA	*19.7*	*25.1*	NA	NA	*31.9*	*45.6*	NA	*137*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	*13.9*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	NA	NA	*13.9*	*25.4*	NA	NA	*21.7*	*19.7*	NA	NA	*25.1*	*31.9*	NA	NA	*45.6*	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units
µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
NA	not analyzed
	October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-93-22C	SHM-93-22C	SHM-93-22C	SHM-93-22C	SHM-93-22C	SHM-93-22C	SHM-93-22C	SHM-93-22C	SHM-96-5B	SHM-96-5B	SHM-96-5B	SHM-96-5B	SHM-96-5B	SHM-96-5B	SHM-96-5B	SHM-96-5B
Sample Date:	10/23/2015	11/29/2016	11/13/2017	11/14/2018	11/4/2019	11/11/2019	5/6/2020	11/3/2020	4/22/2010	4/22/2010	10/11/2010	10/11/2010	4/5/2011	4/5/2011	10/6/2011	10/6/2011
Historical (µg/L)																
Arsenic	*137*	NA	NA	NA	NA	NA	NA	NA	NA	*1500 J*	*846*	NA	*2030*	NA	*1900*	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	NA	*120*	NA	NA	NA	NA	NA	NA	*1500 J*	NA	NA	*846*	NA	*2030*	NA	*1900*
Arsenic (Dissolved)	NA	NA	*3.80*	3.80	4.30	4.20	4.50	4.40	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units
µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
NA	not analyzed
(yellow)	October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-96-5B	SHM-96-5B	SHM-96-5B	SHM-96-5B	SHM-96-5B	SHM-96-5B	SHM-96-5B	SHM-96-5B	SHM-96-5B	SHM-96-5B	SHM-96-5B	SHM-96-5B	SHM-96-5B	SHM-96-5B	SHM-96-5B	SHM-96-5B
Sample Date:	4/10/2012	10/15/2012	10/15/2012	5/21/2013	5/21/2013	10/22/2013	10/22/2013	4/22/2014	4/22/2014	10/9/2014	10/9/2014	6/5/2015	6/5/2015	10/21/2015	10/21/2015	6/27/2016
Historical (µg/L)																
Arsenic	NA	*1380*	NA	NA	*1400*	*1660*	NA	NA	*1340*	*991*	NA	*1210*	*1210*	*799*	*799*	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	*1680 J*	NA	*1380*	*1400*	NA	NA	*1660*	*1340*	NA	NA	*991*	NA	NA	NA	NA	*1100*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units
µg/L Micrograms per Liter

Qualifier
Undefined Qualifier
J Estimated Value
U Undetected: The analyte was analyzed for, but not detected.
NA not analyzed
October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-96-5B	SHM-96-5B	SHM-96-5B	SHM-96-5B	SHM-96-5B	SHM-96-5B	SHM-96-5B	SHM-96-5B	SHM-96-5B	SHM-96-5B	SHM-96-5C	SHM-96-5C	SHM-96-5C	SHM-96-5C	SHM-96-5C	SHM-96-5C
Sample Date:	11/17/2016	5/31/2017	11/10/2017	4/23/2018	11/26/2018	4/23/2019	11/7/2019	5/19/2020	11/10/2020	11/10/2020	4/22/2010	4/22/2010	10/11/2010	10/11/2010	4/5/2011	4/5/2011
Historical (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	*31.2*	*26.4*	NA	*35.0*	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	*990*	*1200*	NA	*980*	NA	NA	NA	NA	NA	NA	*31.2*	NA	NA	*26.4*	NA	*35.0*
Arsenic (Dissolved)	NA	NA	*990*	NA	100	1100	41.0	1100	720	640	NA	NA	NA	NA	NA	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

Undefined Qualifier

J Estimated Value

U Undetected: The analyte was analyzed for, but not detected.

NA not analyzed

October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-96-5C	SHM-96-5C	SHM-96-5C	SHM-96-5C	SHM-96-5C	SHM-96-5C	SHM-96-5C	SHM-96-5C	SHM-96-5C	SHM-96-5C	SHM-96-5C	SHM-96-5C	SHM-96-5C	SHM-96-5C	SHM-96-5C	SHM-96-5C
Sample Date:	10/6/2011	10/6/2011	4/10/2012	10/17/2012	10/17/2012	5/28/2013	5/28/2013	10/22/2013	10/22/2013	4/22/2014	4/22/2014	10/9/2014	10/9/2014	10/21/2015	10/21/2015	11/17/2016
Historical (µg/L)																
Arsenic	*24.5*	NA	NA	*7.70*	NA	NA	*10.4*	*5.50*	NA	NA	*10.9*	*17.7*	NA	*39.6*	*39.6*	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	NA	*24.5*	*8.70 J*	NA	*7.70*	*10.4*	NA	NA	*5.50*	*10.9*	NA	NA	*17.7*	NA	NA	*42.0*
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units
µg/L Micrograms per Liter

Qualifier
Undefined Qualifier
J Estimated Value
U Undetected: The analyte was analyzed for, but not detected.
NA not analyzed
October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHM-96-5C	SHM-96-5C	SHM-96-5C	SHM-96-5C	SHP-05-45B	SHP-05-46B	SHP-05-46B	SHP-05-46B	SHP-2016-06A	SHP-2016-06A	SHP-2016-06A	SHP-2016-06A	SHP-2016-06A	SHP-2016-06A	SHP-2016-06A	SHP-2016-06A
Sample Date:	11/10/2017	11/20/2018	11/7/2019	11/10/2020	10/28/2015	8/9/2010	10/28/2015	10/28/2015	6/15/2017	11/28/2017	4/18/2018	11/9/2018	4/17/2019	11/5/2019	5/21/2020	11/12/2020
Historical (µg/L)																
Arsenic	NA	NA	NA	NA	*24.5*	*50.6*	*7.70*	*7.70*	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	*81.4*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	*670*	NA	*280*	NA	NA	NA	NA	NA
Arsenic (Dissolved)	*34.0*	31.0	13.0	29.0	NA	NA	NA	NA	*520*	*600*	NA	480	2800	860	760	640

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

Undefined Qualifier

J Estimated Value

U Undetected: The analyte was analyzed for, but not detected.

NA not analyzed

October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHP-2016-06B	SHP-2016-06B	SHP-2016-06B	SHP-2016-06B	SHP-2016-06B	SHP-2016-06B	SHP-2016-06B	SHP-2016-06B	SHP-2016-06C	SHP-2016-06C	SHP-2016-06C	SHP-2016-06C	SHP-2016-06C	SHP-2016-06C	SHP-2016-06C	SHP-2016-1B
Sample Date:	6/15/2017	11/28/2017	4/18/2018	11/7/2018	4/17/2019	11/5/2019	5/21/2020	11/12/2020	11/28/2017	4/18/2018	11/7/2018	4/17/2019	11/5/2019	5/21/2020	11/12/2020	5/23/2017
Historical (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	*850*	NA	*1300*	NA	NA	NA	NA	NA	NA	*210*	NA	NA	NA	NA	NA	*120*
Arsenic (Dissolved)	*830 J*	*1300*	NA	1300	1300	1200	1100	1100	*280*	NA	300	250	270	310	350	NA

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units
µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
NA	not analyzed
	October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHP-2016-1B	SHP-2016-1B	SHP-2016-1B	SHP-2016-1B	SHP-2016-1B	SHP-2016-1B	SHP-2016-2B	SHP-2016-2B	SHP-2016-2B	SHP-2016-2B	SHP-2016-2B	SHP-2016-2B	SHP-2016-2B	SHP-2016-2B	SHP-2016-2B	SHP-2016-3B
Sample Date:	11/14/2017	11/13/2018	4/22/2019	11/8/2019	5/19/2020	11/5/2020	5/24/2017	11/20/2017	4/23/2018	11/15/2018	4/19/2019	4/19/2019	10/24/2019	5/20/2020	11/6/2020	5/23/2017
Historical (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	*350*	NA	*420*	NA	NA	NA	NA	NA	NA	*240*
Arsenic (Dissolved)	*170*	130	120	180	110	140	NA	*550*	NA	430	450	410	560	260	520	NA

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
NA	not analyzed
(yellow)	October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHP-2016-3B	SHP-2016-3B	SHP-2016-3B	SHP-2016-3B	SHP-2016-3B	SHP-2016-3B	SHP-2016-4B	SHP-2016-4B	SHP-2016-4B	SHP-2016-4B	SHP-2016-4B	SHP-2016-4B	SHP-2016-4B	SHP-2016-4B	SHP-2016-4B	SHP-2016-4B
Sample Date:	11/15/2017	4/24/2018	11/12/2018	4/18/2019	5/20/2020	11/3/2020	5/24/2017	11/16/2017	11/16/2017	4/23/2018	11/12/2018	11/12/2018	4/19/2019	11/5/2019	5/21/2020	11/6/2020
Historical (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)																
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)																
Arsenic	NA	*240*	NA	NA	NA	NA	*1100*	NA	NA	*1300*	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	*270*	NA	240	230	160	180	NA	*1800*	*2200*	NA	1400	1500	1400	1500	650	3.00 U

Notes:
Data loaded as 'Historical' is included in this report and is shown in italics.

Units
µg/L Micrograms per Liter

Qualifier

	Undefined Qualifier
J	Estimated Value
U	Undetected: The analyte was analyzed for, but not detected.
NA	not analyzed
	October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 4.
Summary of Available Groundwater Chemistry Datasets for Nearfield Area
Former Fort Devens, Long Term Monitoring
Former Fort Devens, Massachusetts

Location ID:	SHP-2016-5B	SHP-2016-5B	SHP-2016-5B	SHP-2016-5B	SHP-2016-5B	SHP-2016-5B	SHP-2016-5B	SHP-2016-5B	SHP-2016-5B
Sample Date:	5/24/2017	11/20/2017	4/24/2018	11/14/2018	4/23/2019	4/23/2019	11/5/2019	5/21/2020	11/9/2020
Historical (µg/L)									
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry (µg/L)									
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trace Metals by Inductively Coupled Plasma/Mass Spectrometry (µg/L)									
Arsenic	*620*	NA	*620*	NA	NA	NA	NA	NA	NA
Arsenic (Dissolved)	NA	*700*	NA	520	610	620	720	470	730

Notes:

Data loaded as 'Historical' is included in this report and is shown in italics.

Units

µg/L Micrograms per Liter

Qualifier

Undefined Qualifier

J Estimated Value

U Undetected: The analyte was analyzed for, but not detected.

NA not analyzed

October 2020 data for EPA-PZ-2012-1B and EPZ-PZ-2012-4A were switched.

Table 5
Summary of Dissolved Arsenic Trends for North Impact Area

Well ID	2010-2015 As Trend	2016-2020 As Trend
SHM-05-39A	No Trend	NA
SHM-05-39B	No Trend	NA
SHM-05-40X	No Trend	No trend
SHM-05-41A	Decreasing	No Trend
SHM-05-41B	Decreasing	No Trend
SHM-05-41C	No Trend	No Trend
SHM-05-42A	NA	NA
SHM-05-42B	No Trend	No Trend
SHM-07-03	NA	NA
SHM-07-05	NA	NA
SHM-10-02	No Trend	NA
SHM-10-03	NA	NA
SHM-10-04	NA	NA
SHM-10-05A	Increasing	NA
SHM-10-08	Increasing	NA
SHM-10-10	No Trend	NA
SHM-10-16	Increasing	Decreasing
SHM-13-01	NA	NA
SHM-13-02	No Trend	NA
SHM-13-03	Decreasing	No Trend
SHM-13-04	No trend	Increasing
SHM-13-05	No Trend	No Trend
SHM-13-06	Decreasing	No trend
SHM-13-07	Decreasing	No Trend
SHM-13-08	No Trend	No Trend
SHM-13-14D	NA	No Trend
SHM-13-14S	NA	NA
SHM-13-15	NA	No trend
SHM-99-31A	NA	NA
SHM-99-31B	Increasing	NA
SHM-99-31C	Decreasing	No Trend
SHM-99-32X	Decreasing	No Trend

Notes:

NA	There were not enough data points to run the Mann Kendall test.
No Trend	Insufficient statistical evidence of a significant trend.
Increasing	Statistically significant evidence of an increasing trend.
Decreasing	Statistically significant evidence of a decreasing trend.

Table 6
Summary of Dissolve Arsenic Trends for Nearfield Area

Well ID	2010-2020 As Trend
EPA-PZ-2012-1A	NA
EPA-PZ-2012-1B	No Trend
EPA-PZ-2012-2A	NA
EPA-PZ-2012-2B	NA
EPA-PZ-2012-3A	No Trend
EPA-PZ-2012-3B	Decreasing
EPA-PZ-2012-4A	No Trend
EPA-PZ-2012-4B	Decreasing
EPA-PZ-2012-5A	NA
EPA-PZ-2012-5B	NA
EPA-PZ-2012-6A	NA
EPA-PZ-2012-6B	Decreasing
EPA-PZ-2012-7A	NA
EPA-PZ-2012-7B	No Trend
SHL-22	Decreasing
SHL-23	NA
SHL-5	No Trend
SHL-8D	NA
SHL-8S	NA
SHL-9	No Trend
SHM-10-06	Decreasing
SHM-10-06A	No Trend
SHM-93-22B	Decreasing
SHM-93-22C	No Trend
SHM-96-5B	Decreasing
SHM-96-5C	No Trend
SHP-05-45B	NA
SHP-05-46B	NA
SHP-2016-06B	No Trend
SHP-2016-1B	No Trend
SHP-2016-2B	No Trend
SHP-2016-3B	Decreasing
SHP-2016-4B	No Trend
SHP-2016-5B	No Trend
SHP-2016-6A	No Trend
SHP-2016-6C	No Trend

Notes

NA	There were not enough data points to run the Mann Kendall test.
No Trend	Insufficient statistical evidence of a significant trend.
Increasing	Statistically significant evidence of an increasing trend.
Decreasing	Statistically significant evidence of a decreasing trend.

Table 7. **Arsenic Flux in the Overburden Across East to West Section from SHL-23 to SHL-21**

HSU Number	Model Hydraulic Conductivity (ft/d)	Geometric Mean Arsenic Conc. (µg/L)	Mean Arsenic Conc. (µg/L)	Sensitivity (95% UCL) Arsenic Conc. (µg/L)	Darcy Flux Under Pumping Conditions (gpm)	Darcy Flux Under Ambient Conditions (gpm)	Mass Flux Under Pumping Conditions			Mass Flux Under Ambient (Non-Pumping) Conditions		
							Based on Geometric Mean (lb/yr)	Based on Mean (lb/yr)	Based on 95% UCL (lb/yr)	Based on Geometric Mean (lb/yr)	Based on Mean (lb/yr)	Based on 95% UCL (lb/yr)
2[5]	1.3	1.5	1.5	1.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	21	62	62	62	0.80	0.69	0.22	0.22	0.22	0.19	0.19	0.19
4	21	5.3	5.3	5.3	0.37	0.33	0.01	0.01	0.01	0.01	0.01	0.01
5	48.8	2	2	2	0.28	0.25	0.00	0.00	0.00	0.00	0.00	0.00
11	19	51	106	270	3.15	2.73	0.71	1.46	3.73	0.61	1.27	3.24
12	6	165	936	5,200	2.98	2.57	2.16	12.2	68.0	1.86	10.6	58.7
14	6	57	84.2	137	0.55	0.51	0.14	0.20	0.33	0.13	0.19	0.31
15	6	50	72.7	110	0.73	0.70	0.16	0.23	0.35	0.15	0.22	0.34
21	24	163	1,135	3,000	3.98	3.51	2.85	19.8	52.5	2.51	17.5	46.2
22	24	4,441	4,675	6,500	9.14	7.38	178	188	261	144	151	211
23	24	561	813	1,400	9.66	7.76	23.8	34.5	59.4	19.1	27.7	47.7
25	30	419	834	1,473	3.54	3.28	6.51	13.0	22.9	6.04	12.0	21.2
26	30	32	220	1,000	3.76	3.59	0.53	3.64	16.5	0.51	3.48	15.8
31	5	18	18	18	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00
32	5	7,000	7,000	7,000	0.17	0.14	5.22	5.22	5.22	4.21	4.21	4.21
33	5	2,500	2,500	2,500	0.14	0.12	1.51	1.51	1.51	1.34	1.34	1.34
Total Across East-West Cross Section					*39.3*	*33.6*	*222*	*280*	*491*	*181*	*230*	*410*
Total Across Area Where Arsenic in Groundwater Exceeding the CL May Not be Captured at All Times					*5.1*	*4.9*	*0.7*	*3.9*	*16.9*	*0.7*	*3.7*	*16.1*
Total Across Hypothetical Area Where Arsenic in Groundwater Exceeding the CL May Not be Captured at All Times as a % of Total Across East-West Cross Section					**13.1%**	**14.5%**	**0.3%**	**1.4%**	**3.4%**	**0.4%**	**1.6%**	**3.9%**
Total Across East-West Cross Section as a % of Total ATP Pumping Rate or Mass Removal					**78%**	--	**48%**	**60%**	**85%**	**--**	**--**	**--**
Total Flow Rate Across East-West Cross Section Less the Total Across Hypothetical Area Where Arsenic in Groundwater Exceeding the CL May Not be Captured at All Times as a % of Total ATP Pumping Rate					**68%**	--	**--**	**--**	**--**	**--**	**--**	**--**

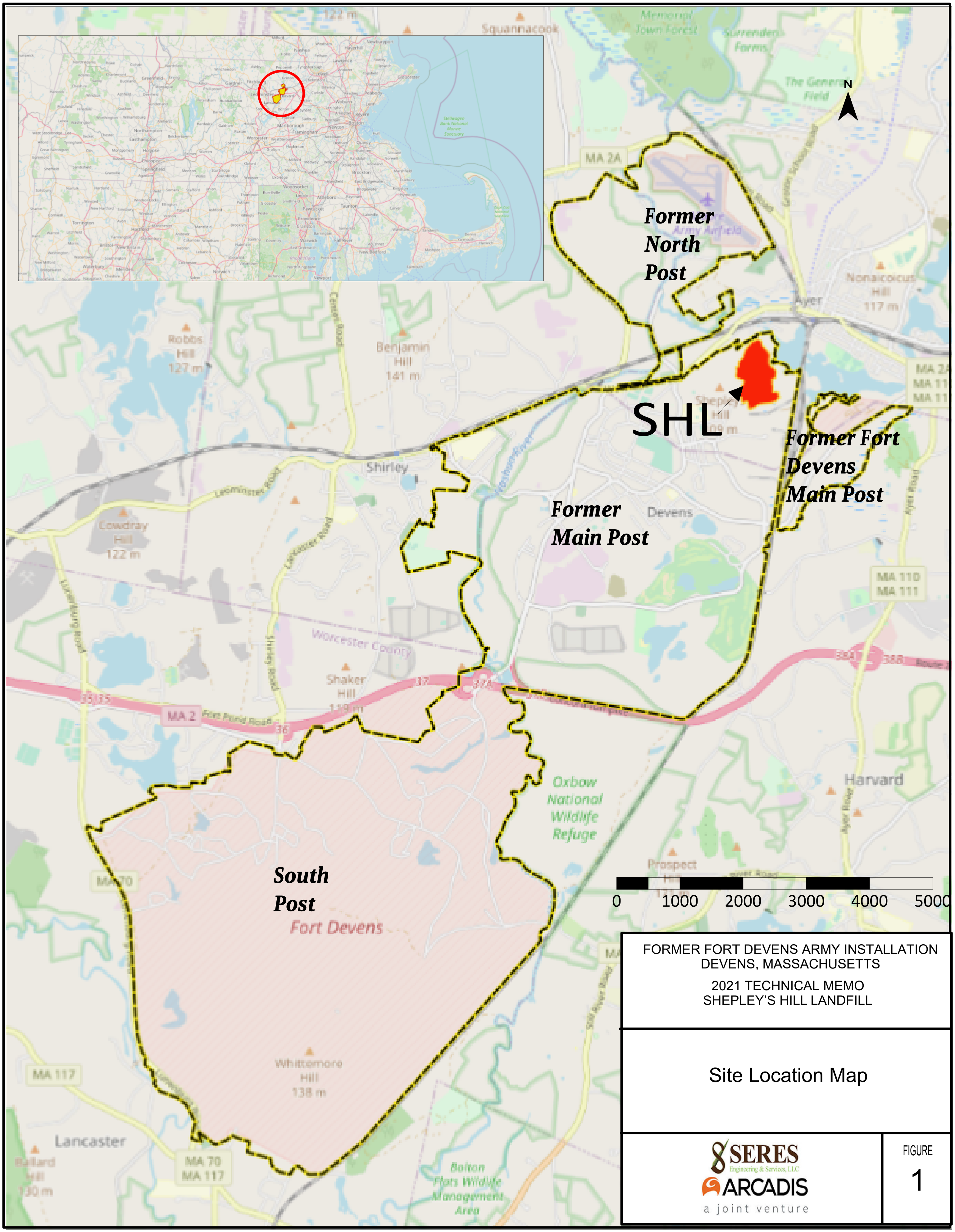
ATP Data

ATP Extraction Well	Average 2016-2020 Pumping Rate (gpm)	Average 2016-2020 Dissolved Arsenic Conc. (µg/L)	Average 2016-2020 Arsenic Removed (lb/yr)	Maximum 2016-2020 Dissolved Arsenic Conc. (µg/L)	Maximum 2016-2020 Arsenic Removed (lb/yr)
EW-01	32.5	1,610	229.9	1,900	271.4
EW-04	17.5	3,066	235.8	4,000	307.6
Total	**50.1**	**--**	**466**	**--**	**579**

Notes:

1. The East-West Cross Section spans from monitoring well SHL-23 to SHL-21.
2. The hypothetical bypass area spans from monitoring well SHM-10-06 to SHL-21.
3. The hydrostratigraphic units (HSUs) were assigned to row 76 in the calibrated model.
4. Darcy flux is calculated in model Stress Period 18 which simulates long term average conditions.
5. Arsenic concentrations assigned to each hydrostratigraphic unit were calculated using dissolved arsenic concentrations in groundwater samples collected from profile borings in 2017 and the most recent time (Fall 2020) for monitoring wells. The HSU5 arsenic concentration for SHL-21 is from the most recent sample collected on 21 October 2015.
6. Pumping flux represents darcy flux with the Arsenic Treatment Plant (ATP) wells EW-01 and EW-04 operating at an average extraction rate of 50.1 gpm for 2016-2020. The same extraction rates are used to evaluate the ATP arsenic output.
7. Non-pumping flux represents groundwater flux calculated with extraction wells EW-01 and EW-04 not pumping.
8. Gray shaded cells include data for HSUs in the hypothetical bypass area between wells SHM-10-06 and SHL-21, which include HSUs 4, 5, 15, and 26.

Figures



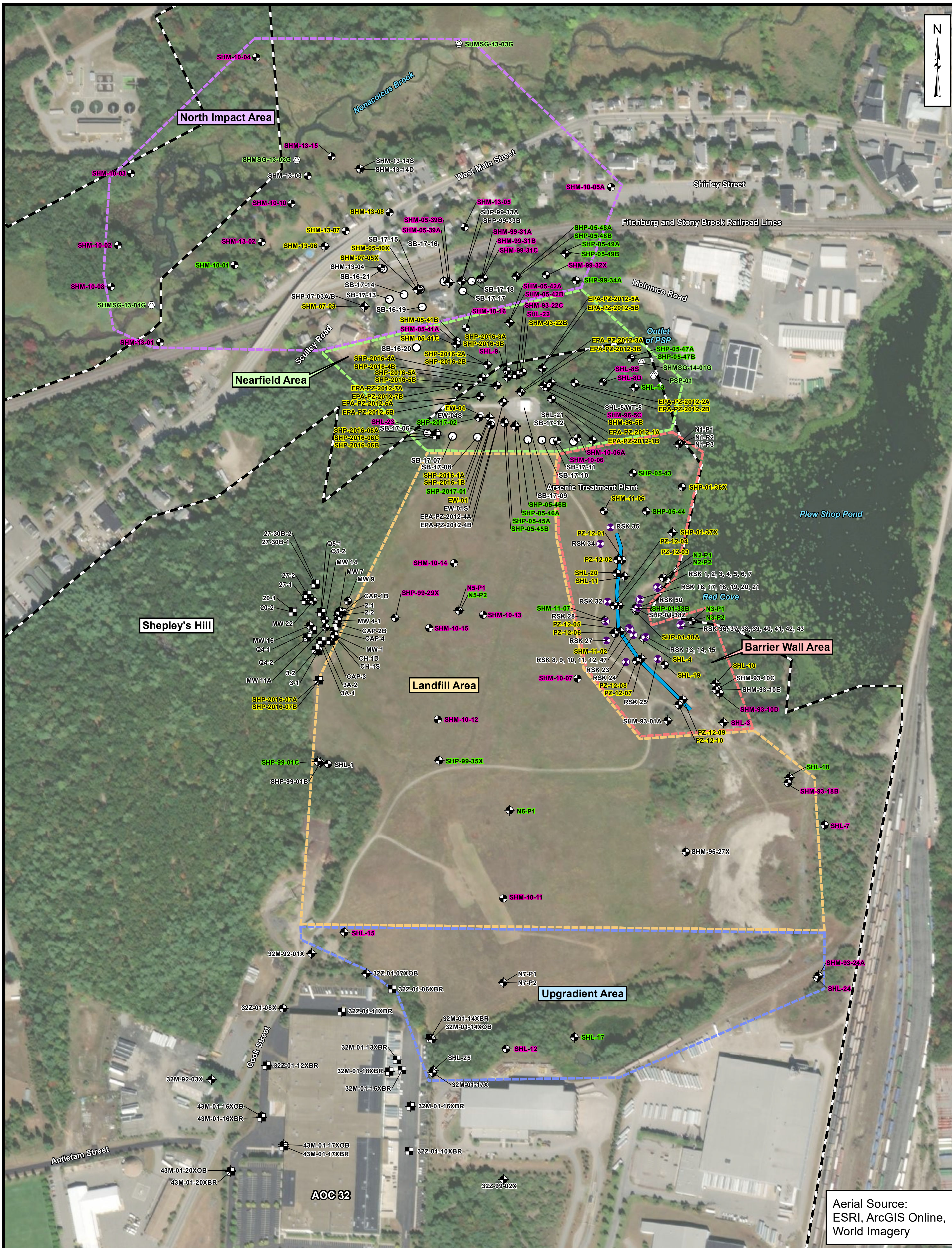
FORMER FORT DEVENS ARMY INSTALLATION
DEVENS, MASSACHUSETTS

2021 TECHNICAL MEMO
SHEPLEY'S HILL LANDFILL

Site Location Map

SERES Engineering & Services, LLC
ARCADIS
a joint venture

FIGURE
1



Legend

	Former Fort Devens Boundary
	Overburden Monitoring Well/Piezometer
	Groundwater Profiling Location/Monitoring Well
	Monitoring Well
	Bedrock Monitoring Well
	Bedrock Study Core
	Extraction Well
	Stream Gauge
	Soil Boring
	Barrier Wall

PZ-12-07	Well/Boring/Gauge Identification
SHM-13-01	LTM Well/Piezometer Annual Sampling (Fall)
SHL-10	LTM Well/Piezometer Semiannual Sampling (Spring/Fall)
SHP-99-01B	LTM Well/Piezometer Hydraulic Monitoring Only

LTM = long-term monitoring
LTMMP = Long-Term Monitoring and Maintenance Plan

Notes:
1. LTM well network established from LTMMP Update (Sovereign 2015) and LTMMP Addendum (KGS 2018).

0 200 400
Feet

2021 Technical Memorandum
Shepley's Hill Landfill
Former Fort Devens Army Installation
Devens, Massachusetts

Long-Term Monitoring Well Network

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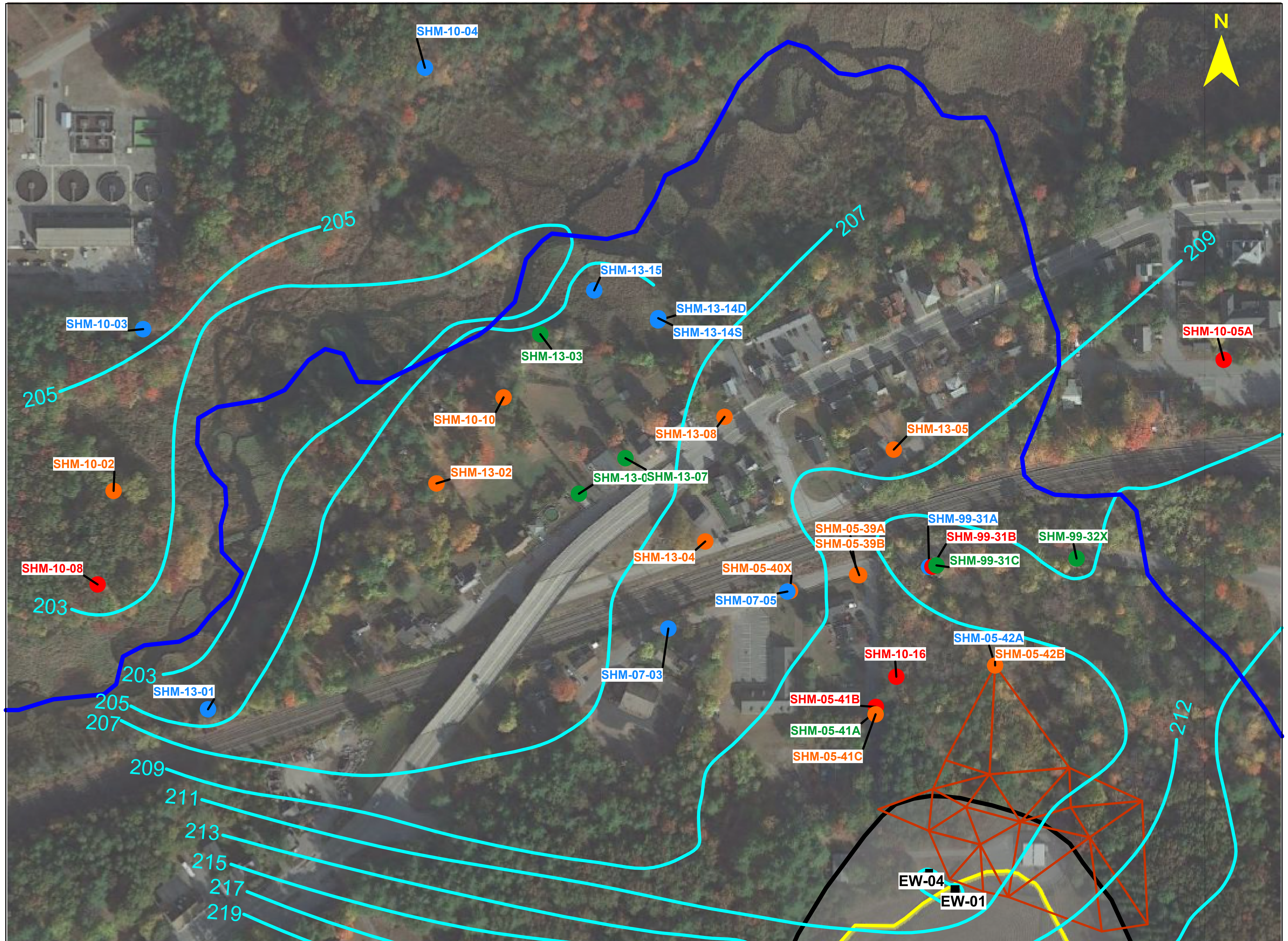
Figure
2



Legend

- Extraction Wells
- Triangle for Vector Analysis
- Groundwater Capture Zone from Technical Memo 1 (S-A JV, 2021)
- Shepley's Hill Landfill Boundary
- Fall 2020 Groundwater Contours

2010-2015 Mann-Kendall Trend Analysis

- Arsenic Concentration had a large number of non-detects; therefore a trend analysis could not be performed
- Insufficient Evidence of a Statistically Significant Trend
- Statistically Significant Evidence of a Decreasing Trend
- Statistically Significant Evidence of an Increasing Trend

Scale in feet

0 200 400

Notes:

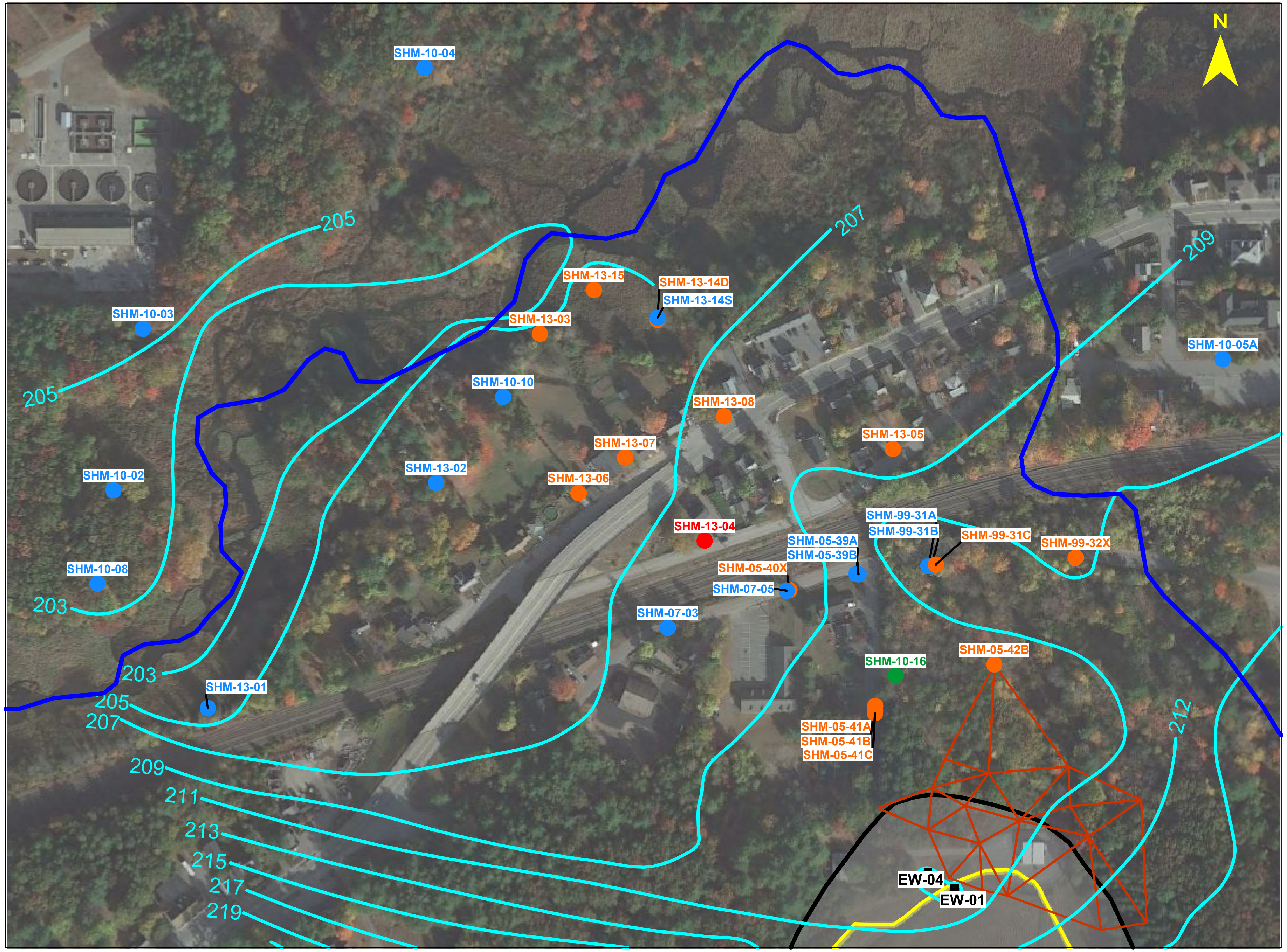
1. Arsenic concentration trends evaluated using ProUCL Mann-Kendall statistical software
2. S-A JV = SERES-Arcadis 8(a) Joint Venture 2, LLC
3. S-A JV. 2021. Draft Phase I EPA SOW Demonstrate Plume Capture Technical Memorandum Phase I Subtask 1.g Delineate Capture Zone based on Hydraulic and Geochemical Data. Shepley's Hill Landfill, Former Fort Devens Army Installation, Devens, Massachusetts. Prepared for U.S. Army Corps of Engineers New England District. March 28.

FORMER FORT DEVENS ARMY INSTALLATION
DEVENS, MASSACHUSETTS
2021 TECHNICAL MEMO
SHEPLEY'S HILL LANDFILL

2010-2015 North Impact Area Arsenic Concentration Trends

SERES ARCADIS a joint venture

FIGURE 3



Legend

- Extraction Wells
- Triangle for Vector Analysis
- Groundwater Capture Zone from Technical Memo 1 (S-A JV, 2021)
- Shepley's Hill Landfill Boundary
- Fall 2020 Groundwater Contours

2016-2020 Mann-Kendall Trend Analysis

- Arsenic Concentration had a large number of non-detects; therefore a trend analysis could not be performed
- Insufficient Evidence of a Statistically Significant Trend
- Statistically Significant Evidence of a Decreasing Trend
- Statistically Significant Evidence of an Increasing Trend

Scale in feet
0 200 400

Notes:

1. Arsenic concentration trends evaluated using ProUCL Mann-Kendall statistical software
2. S-A JV = SERES-Arcadis 8(a) Joint Venture 2, LLC
3. S-A JV. 2021. Draft Phase I EPA SOW Demonstrate Plume Capture Technical Memorandum Phase I Subtask 1.g Delineate Capture Zone based on Hydraulic and Geochemical Data. Shepley's Hill Landfill, Former Fort Devens Army Installation, Devens, Massachusetts. Prepared for U.S. Army Corps of Engineers New England District. March 28.

FORMER FORT DEVENS ARMY INSTALLATION
DEVENS, MASSACHUSETTS
2021 TECHNICAL MEMO
SHEPLEY'S HILL LANDFILL

2016-2020 North Impact Area Arsenic Concentration Trends

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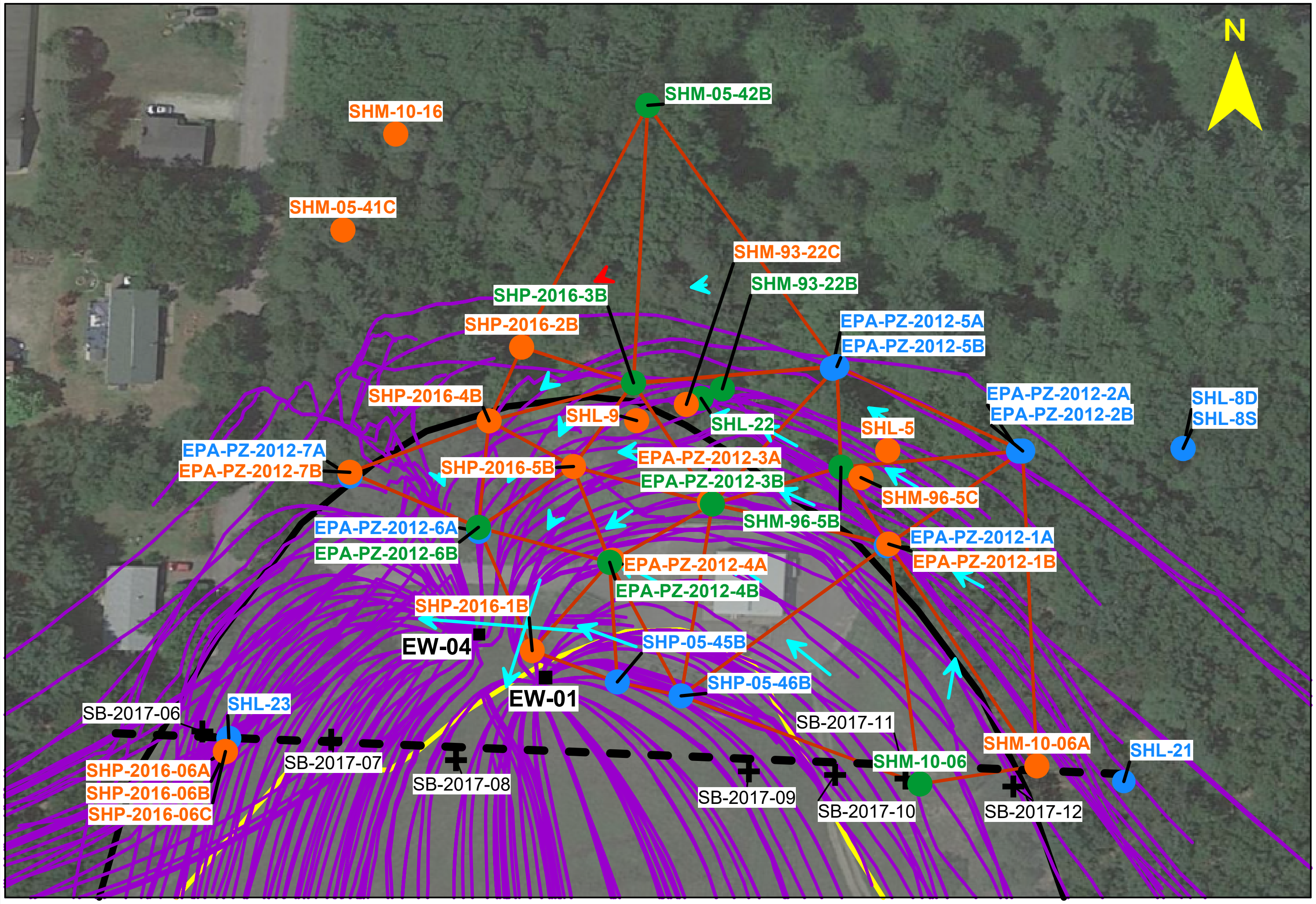
FIGURE 4



2010-2020 Mann-Kendall Trend Analysis

- Arsenic Concentration had a large number of non-detects; therefore a trend analysis could not be performed
- Insufficient Evidence of a Statistically Significant Trend
- Statistically Significant Evidence of a Decreasing Trend
- Statistically Significant Evidence of an Increasing Trend

Legend

- Extraction Wells
- Monitoring Wells
- Triangle for Vector Analysis
- Hydraulic Gradient Arrow from Technical Memo 1 (S-A JV, 2021)
  (Scale Factor = 5,000)
- Groundwater Capture Zone from Technical Memo 1 (S-A JV, 2021)
- Reverse Groundwater Pathlines from Extraction Wells
- Shepley's Hill Landfill Boundary
- Cross-Section Location
- Soil Boring Location

Scale in feet

0 120 240

Notes:

1. NM = not measured
2. Red arrows indicate gradients less than 0.001 foot per foot.
3. S-A JV = SERES-Arcadis 8(a) Joint Venture 2, LLC
4. S-A JV. 2021. Draft Phase I EPA SOW Demonstrate Plume Capture Technical Memorandum Phase I Subtask 1.g Delineate Capture Zone based on Hydraulic and Geochemical Data. Shepley's Hill Landfill, Former Fort Devens Army Installation, Devens, Massachusetts. Prepared for U.S. Army Corps of Engineers New England District. March 28.

FORMER FORT DEVENS ARMY INSTALLATION
DEVENS, MASSACHUSETTS
2021 TECHNICAL MEMO
SHEPLEY'S HILL LANDFILL

November 4, 2020
Groundwater Capture Zone, Model-Generated Particle Tracks, and Arsenic Trends

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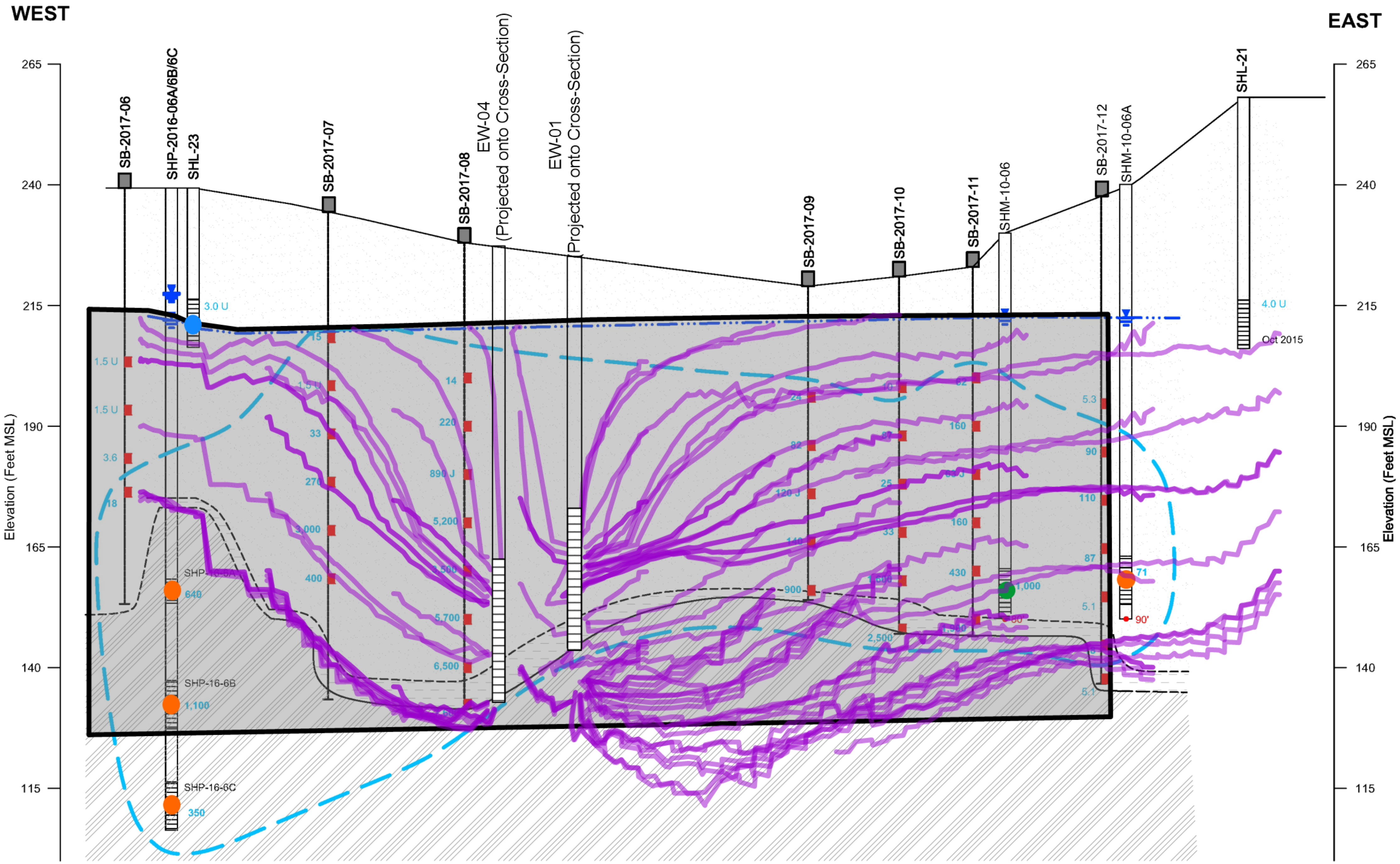
FIGURE
5



Legend

Forward Groundwater Pathlines from Cross-Section Location
(Location of Pathlines mid-way between extraction wells)

SHL-21 — Monitoring Well

4.0 U — Arsenic Concentration (µg/L) (Results shown for monitoring wells are from October/November 2020 or most recent sampling event for that well as specified.)

Well Casing

Screened Interval

90' — Depth to Refusal

SB-16-09 — 2017 Soil Boring

25 — Arsenic Concentration (µg/L)

Sample Interval (1 Foot)

Boring to Refusal

Interpreted Area of Arsenic > CL of 10 µg/L

Water Table Elevations for Monitoring Wells are from November 2020 Well Hydraulic Gauging Event

Sand

Bedrock

Till

Estimated Average Fall 2016-2020 Groundwater Capture Zone

Notes:
1. MSL = Mean Seal Level
2. µg/L = Micrograms per Liter
3. J = Estimated Result
4. U = Non-Detect
5. **Bold** values indicate an exceedance of the Cleanup Levels (CLs)
6. Depth to bottom of boring not available for SHL-21 and SHL-23.
7. Strata data shown on Figure 5-8 of the September 2020 Area 2 Preliminary Site Characterization Summary Per- and Polyfluoroalkyl Substances (PFAS) Remedial Investigation by KOMAN Government Solutions, LLC were used to develop this figure.

2010-2020 Mann-Kendall Trend Analysis

- Arsenic Concentration had a large number of non-detects; therefore a trend analysis could not be performed
- Insufficient Evidence of a Statistically Significant Trend
- Statistically Significant Evidence of a Decreasing Trend
- Statistically Significant Evidence of an Increasing Trend

VERTICAL SCALE (IN FEET) 25

HORIZONTAL SCALE (IN FEET) 75

2021 TECHNICAL MEMO
SHEPLEY'S HILL LANDFILL
FORMER FORT DEVENS ARMY INSTALLATION
DEVENS, MASSACHUSETTS

November 4, 2020
Vertical Groundwater Capture Zone, Model-Generated Particle Tracks, and Arsenic Trends

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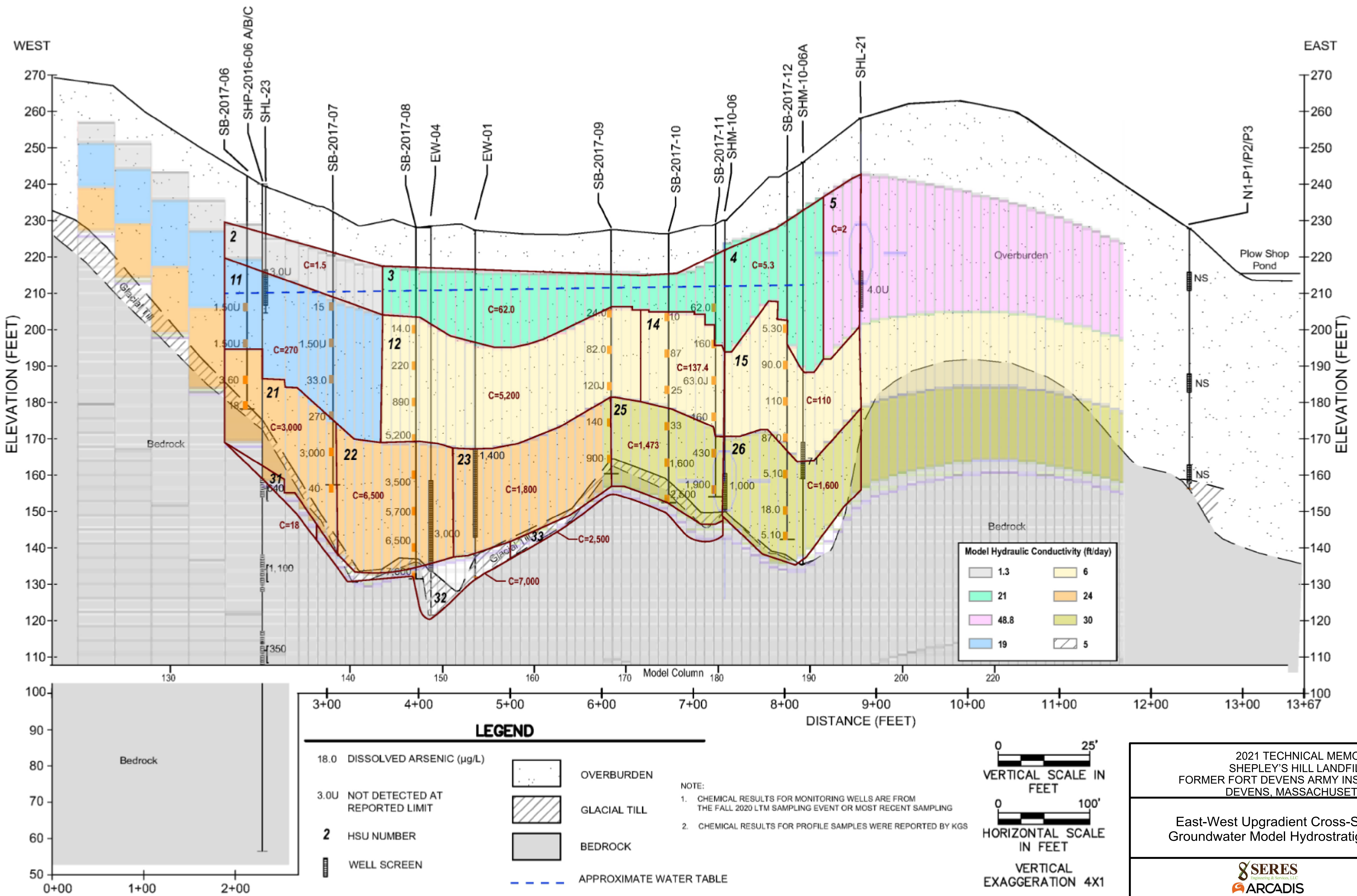
FIGURE 6



2021 TECHNICAL MEMO
SHEPLEY'S HILL LANDFILL
FORMER FORT DEVENS ARMY INSTALLATION
DEVENS, MASSACHUSETTS

East-West Upgradient Cross-Section With Groundwater Model Hydrostratigraphic Units

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FIGURE 7

Attachment 1

Mann Kendall Statistical Analysis Plots

5 Year Trends 2010 to 2015

Mann-Kendall Trend Test SHM-13-07 2010 to 2015

Mann-Kendall Trend Analysis

n	5
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	4.0825
Standardized Value of S	-2.2045
M-K Test Value (S)	-10
Tabulated p-value	0.0080
Approximate p-value	0.0137

OLS Regression Line (Blue)

OLS Regression Slope	-378.9247
OLS Regression Intercept	764,490.4582

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test SHM-05-39A

Mann-Kendall Trend Analysis

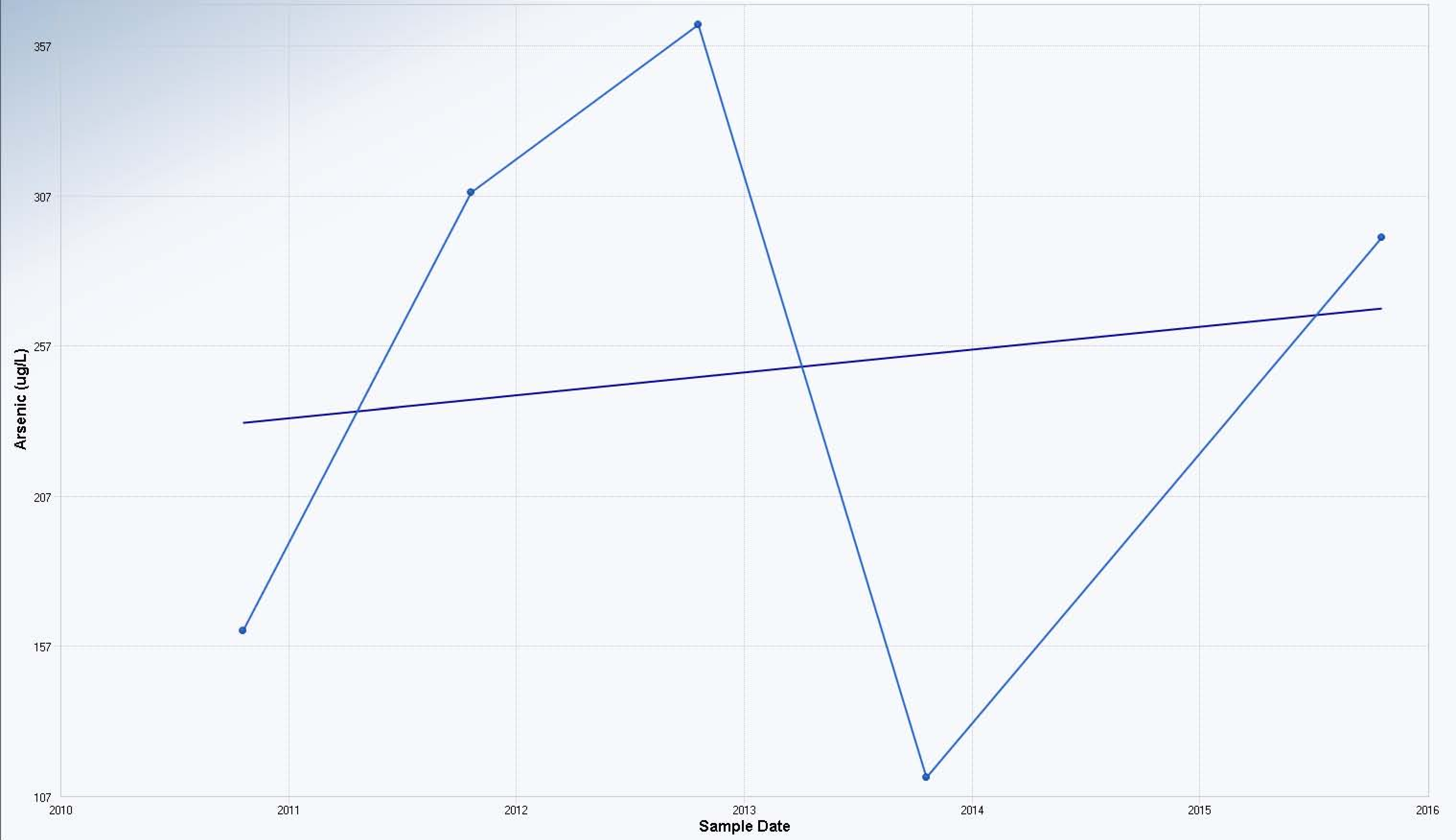
n	5
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	4.0825
Standardized Value of S	-1.2247
M-K Test Value (S)	-6
Tabulated p-value	0.1170
Approximate p-value	0.1103

OLS Regression Line (Blue)

OLS Regression Slope	-42.7399
OLS Regression Intercept	86,177.4720

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test SHM-05-39B 2010 to 2015



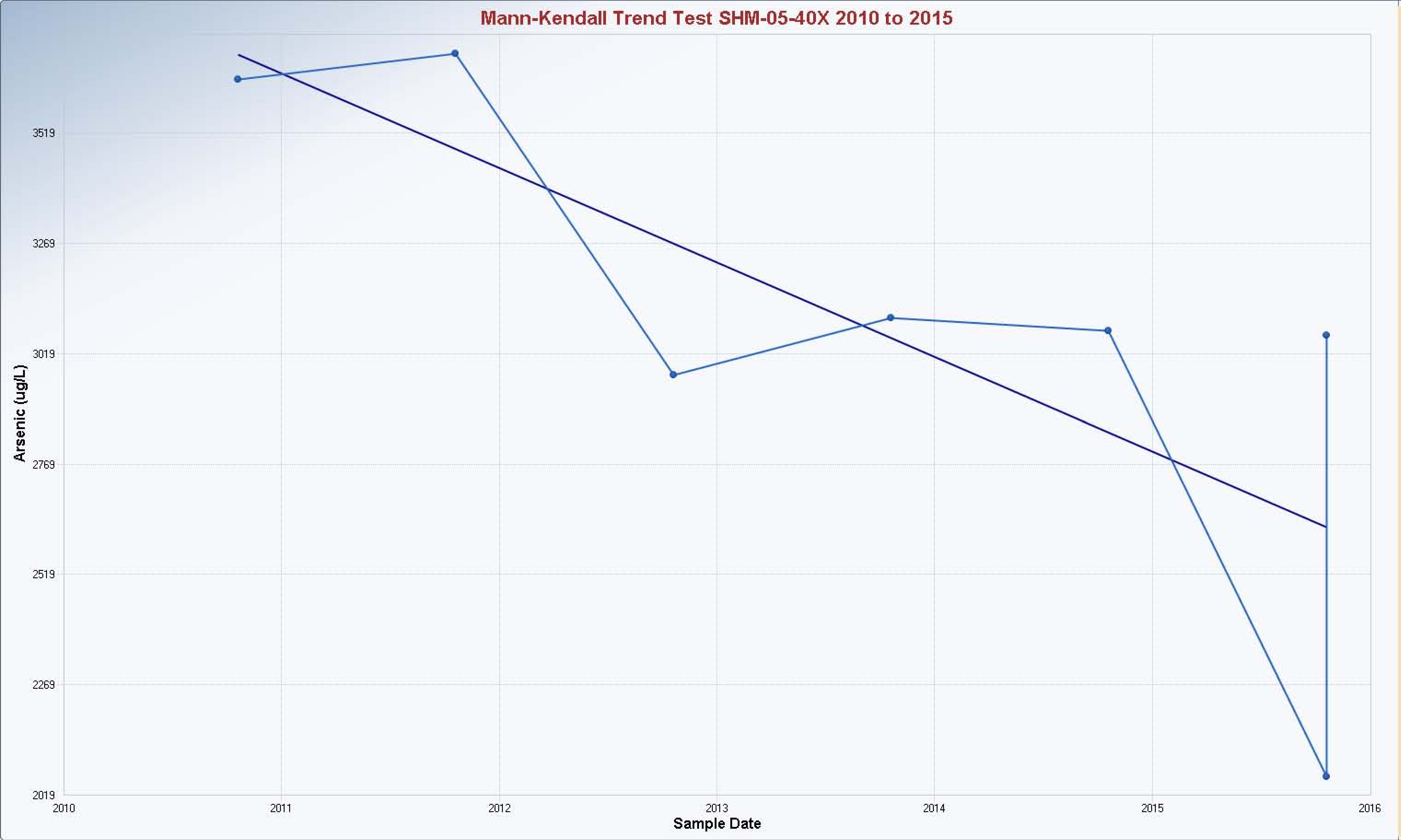
Mann-Kendall Trend Analysis

n	5
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	4.0825
Standardized Value of S	
M-K Test Value (S)	0
Tabulated p-value	0.5920
Approximate p-value	

OLS Regression Line (Blue)

OLS Regression Slope	7.5676
OLS Regression Intercept	-14,985.5135

Insufficient statistical evidence of a significant trend at the specified level of significance.



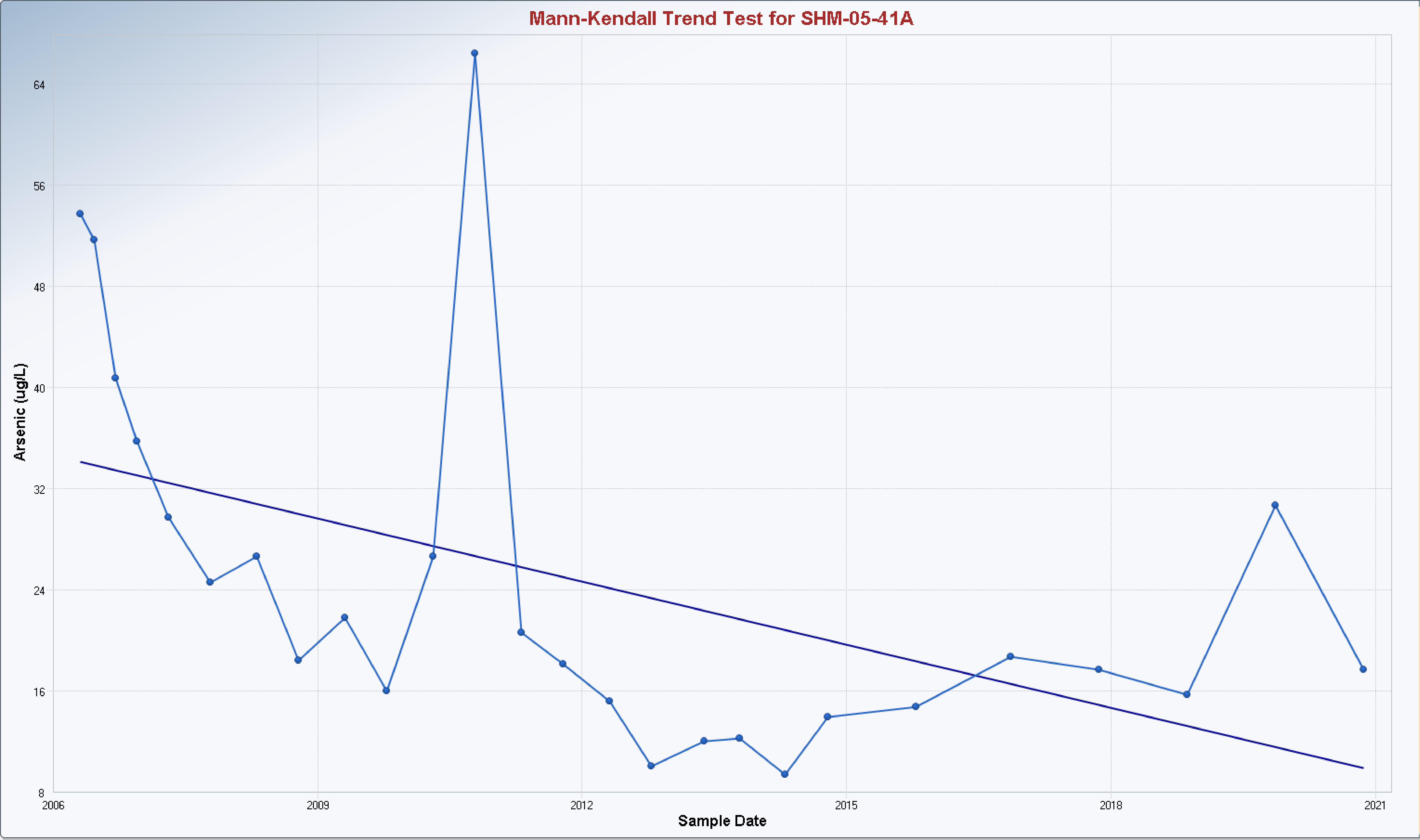
Mann-Kendall Trend Analysis

n	7
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	6.6583
Standardized Value of S	-1.5019
M-K Test Value (S)	-11
Tabulated p-value	0.0680
Approximate p-value	0.0666

OLS Regression Line (Blue)

OLS Regression Slope	-214.1250
OLS Regression Intercept	434,260.0498

Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis

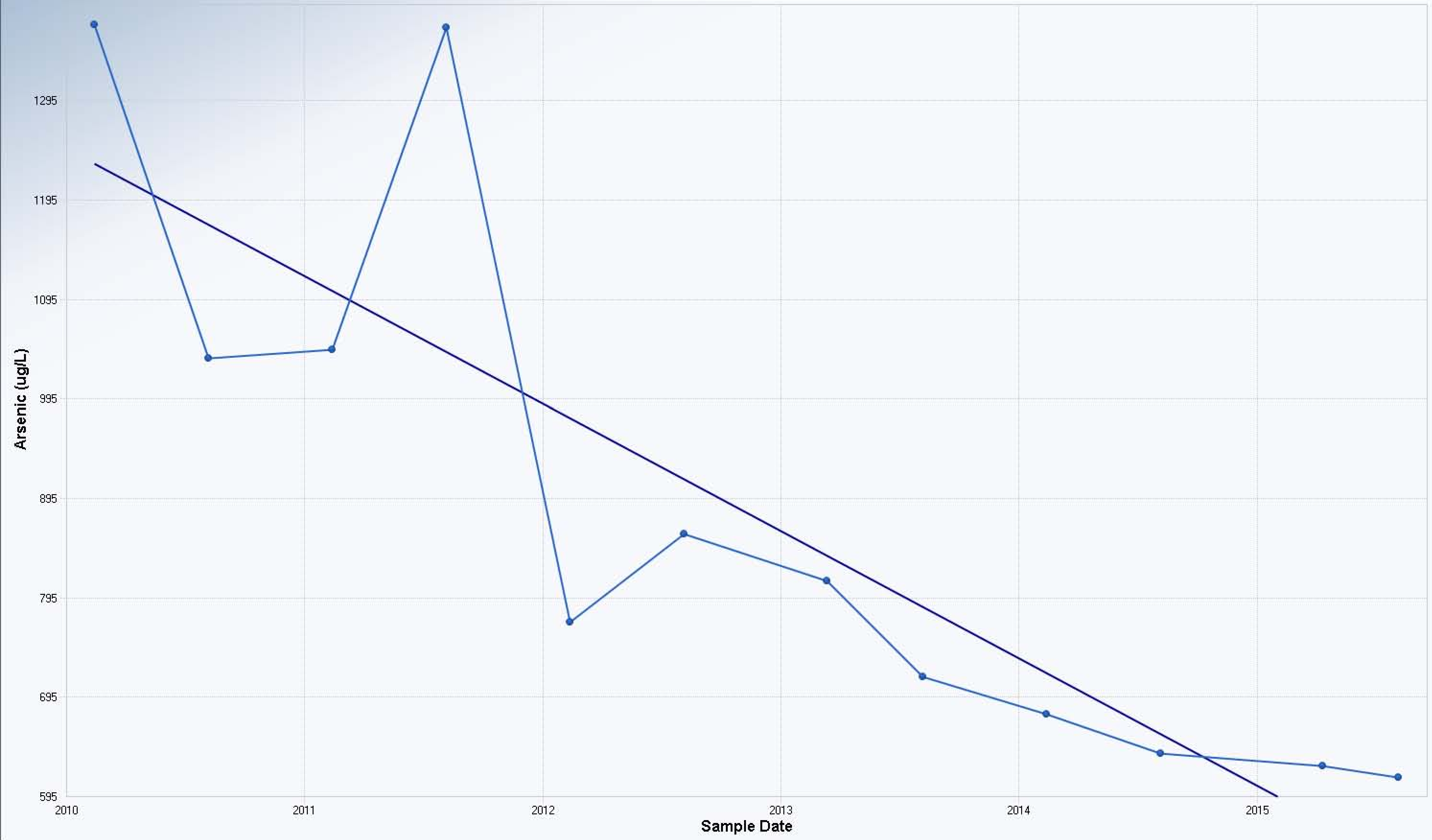
n	26
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	45.3468
Standardized Value of S	-3.3519
M-K Test Value (S)	-153
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0004

OLS Regression Line (Blue)

OLS Regression Slope	-1.6618
OLS Regression Intercept	3,368.5943

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test SHM-05-41B 2010 to 2015



Mann-Kendall Trend Analysis

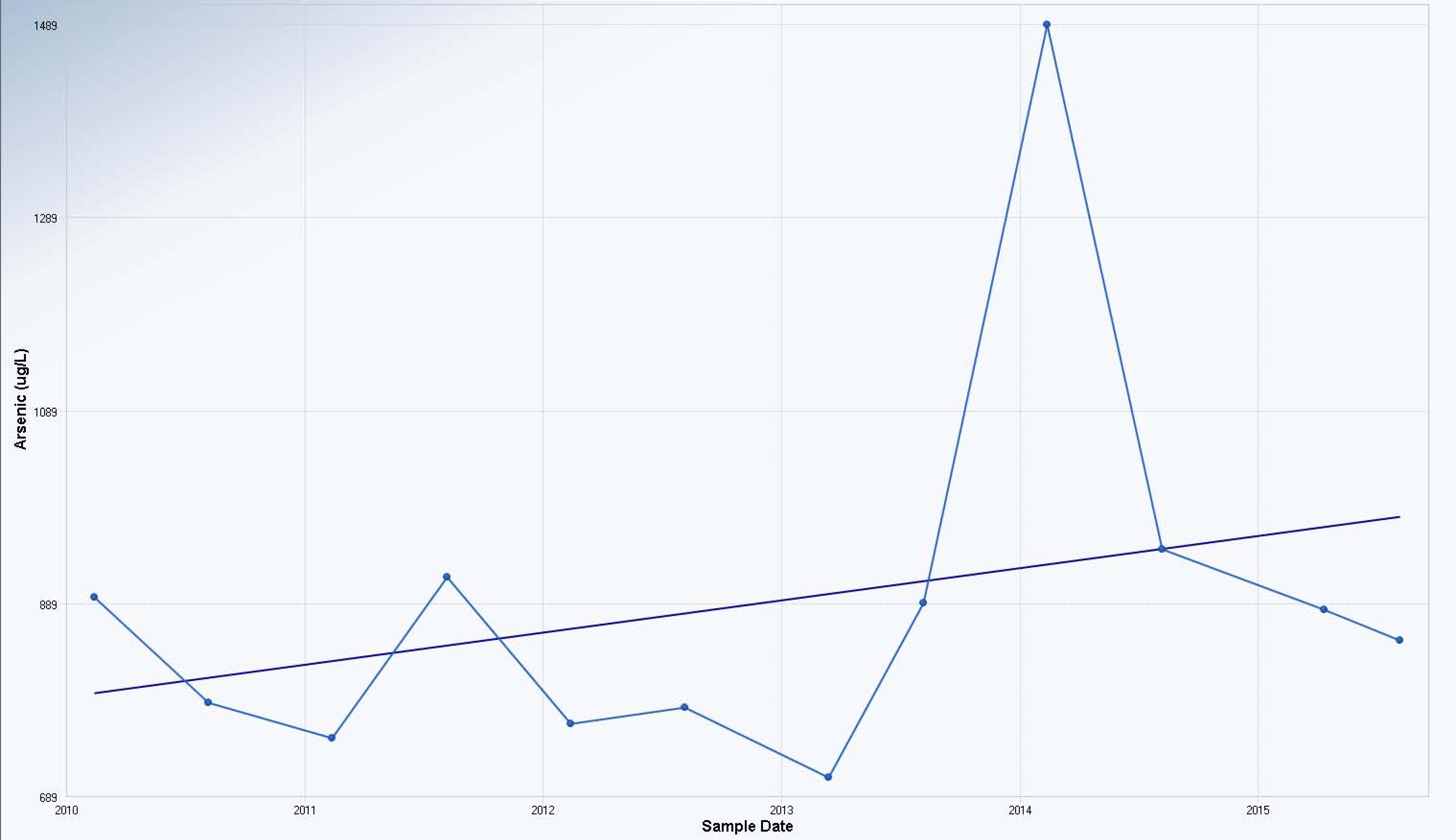
n	12
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	14.5831
Standardized Value of S	-3.7715
M-K Test Value (S)	-56
Tabulated p-value	0.0000
Approximate p-value	0.0001

OLS Regression Line (Blue)

OLS Regression Slope	-128.3020
OLS Regression Intercept	259,160.2411

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test SHM-05-41C 2010 to 2015



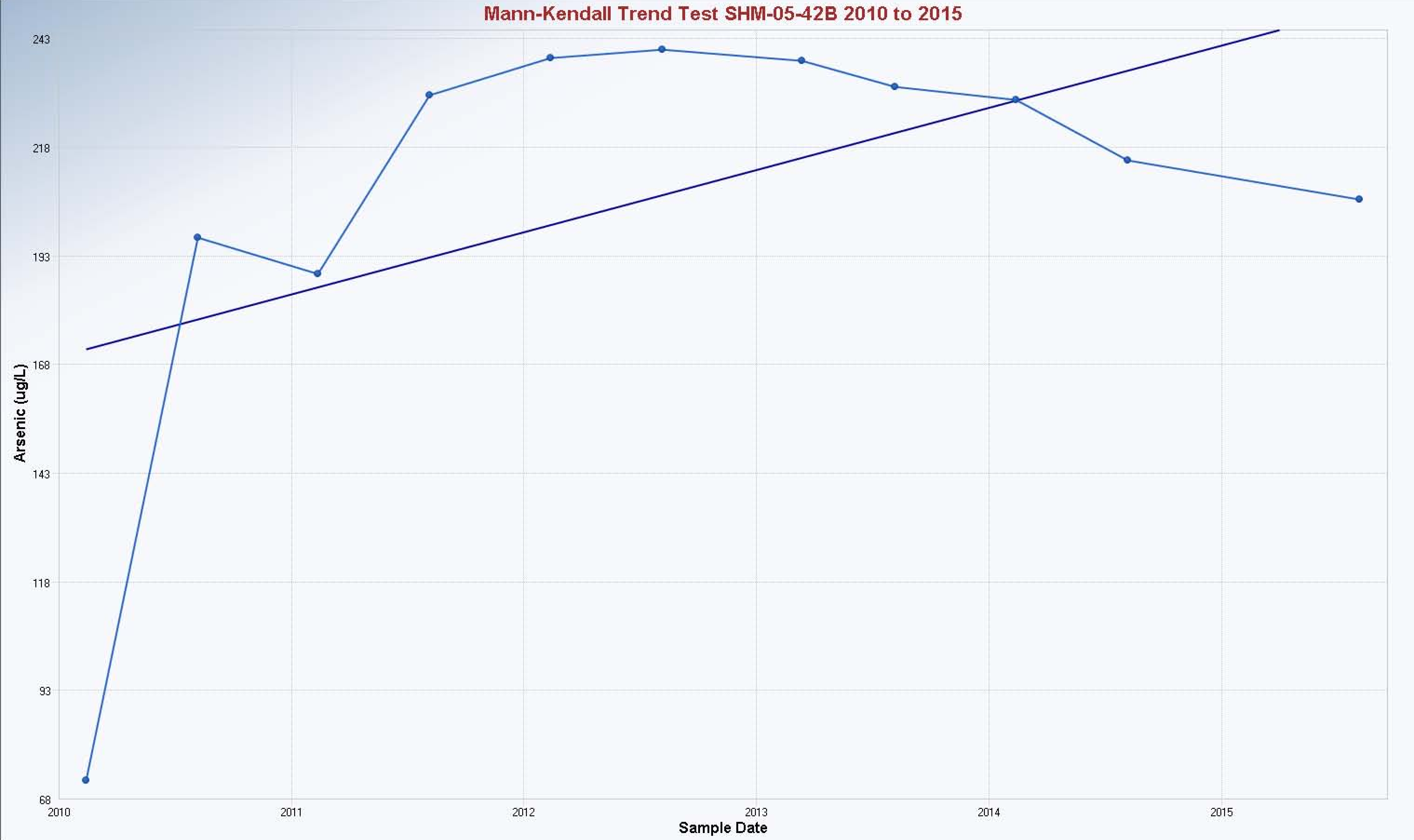
Mann-Kendall Trend Analysis

n	12
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	14.5831
Standardized Value of S	0.4800
M-K Test Value (S)	8
Tabulated p-value	0.3190
Approximate p-value	0.3156

OLS Regression Line (Blue)

OLS Regression Slope	33.3120
OLS Regression Intercept	-66,170.8845

Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis

n	11
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	12.8452
Standardized Value of S	0.4671
M-K Test Value (S)	7
Tabulated p-value	0.3240
Approximate p-value	0.3202

OLS Regression Line (Blue)

OLS Regression Slope	14.3002
OLS Regression Intercept	-28,576.4247

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test SHM-10-02 2010 to 2015

Mann-Kendall Trend Analysis

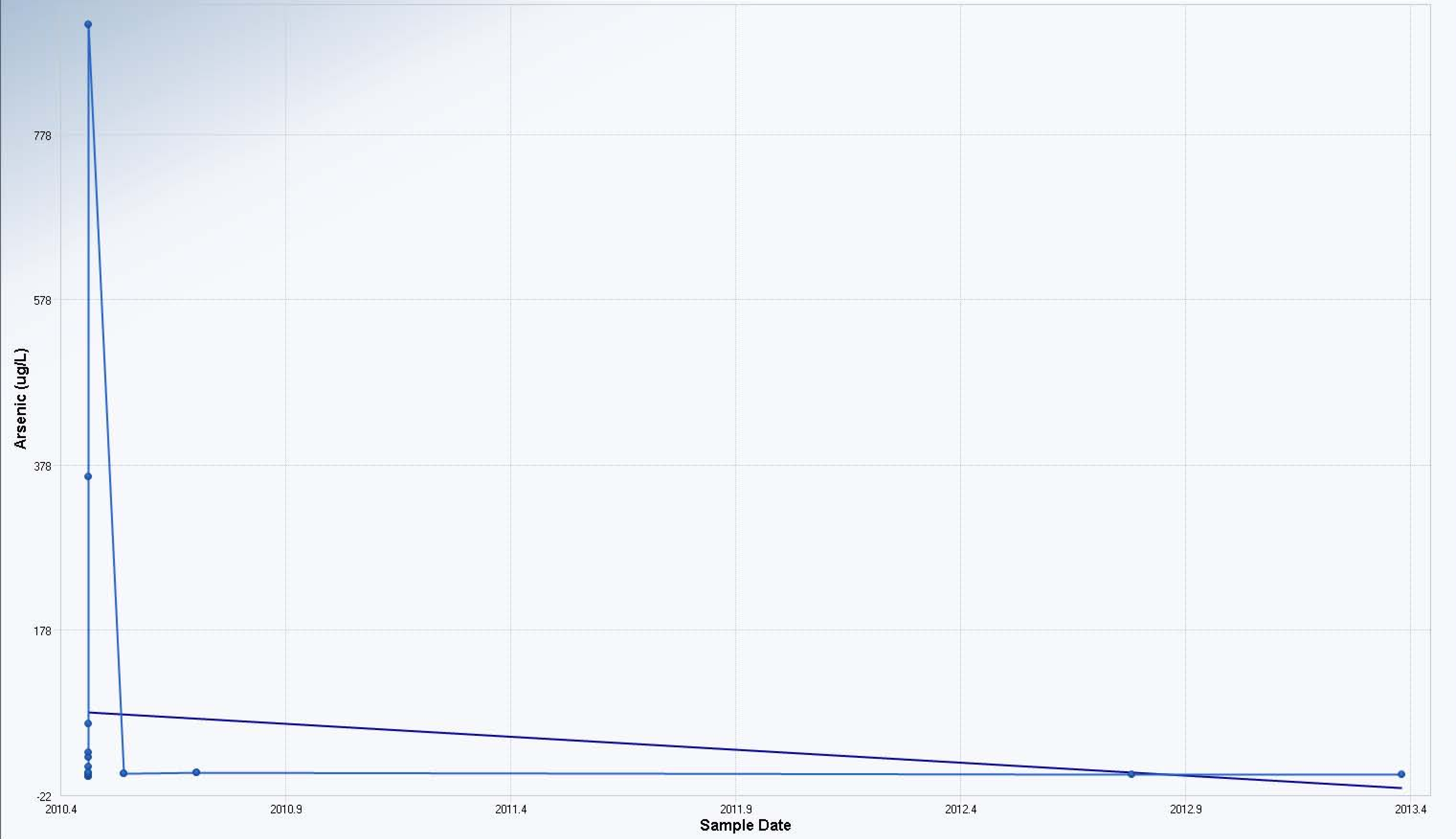
n	3
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	1.9149
Standardized Value of S	0.0000
M-K Test Value (S)	1
Tabulated p-value	
Approximate p-value	0.5000

OLS Regression Line (Blue)

OLS Regression Slope	0.0048
OLS Regression Intercept	-8.5769

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test SHM-10-05A



Mann-Kendall Trend Analysis

n	21
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	33.1160
Standardized Value of S	2.9291
M-K Test Value (S)	98
Tabulated p-value	0.0010
Approximate p-value	0.0017

OLS Regression Line (Blue)

OLS Regression Slope	-31.3830
OLS Regression Intercept	63,173.1184

Statistically significant evidence of an increasing trend at the specified level of significance.

Mann-Kendall Trend Test SHM-10-08

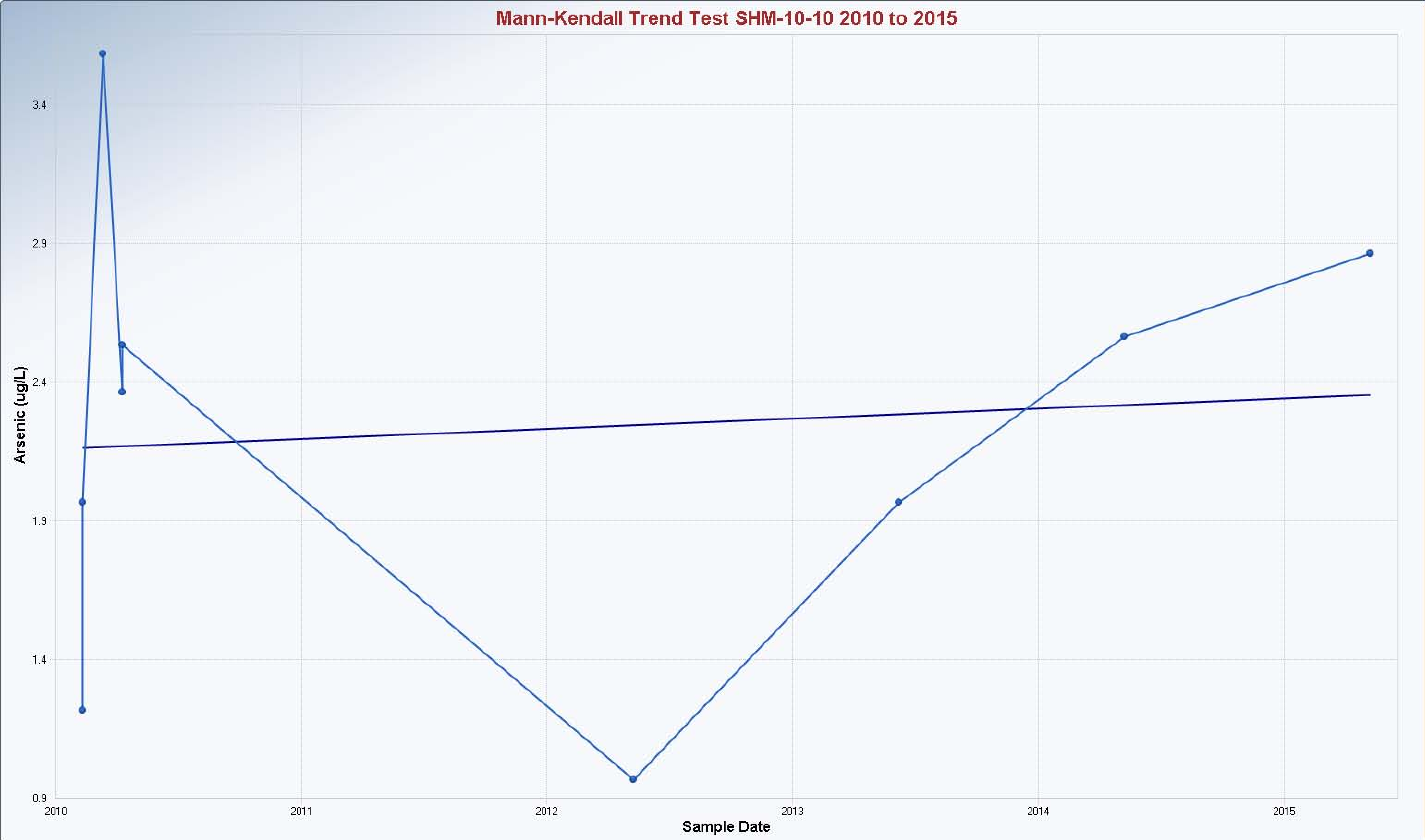
Mann-Kendall Trend Analysis

n	13
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	16.3911
Standardized Value of S	1.6472
M-K Test Value (S)	28
Tabulated p-value	0.0500
Approximate p-value	0.0498

OLS Regression Line (Blue)

OLS Regression Slope	-0.9317
OLS Regression Intercept	1,876.8379

Statistically significant evidence of an increasing trend at the specified level of significance.



Mann-Kendall Trend Analysis

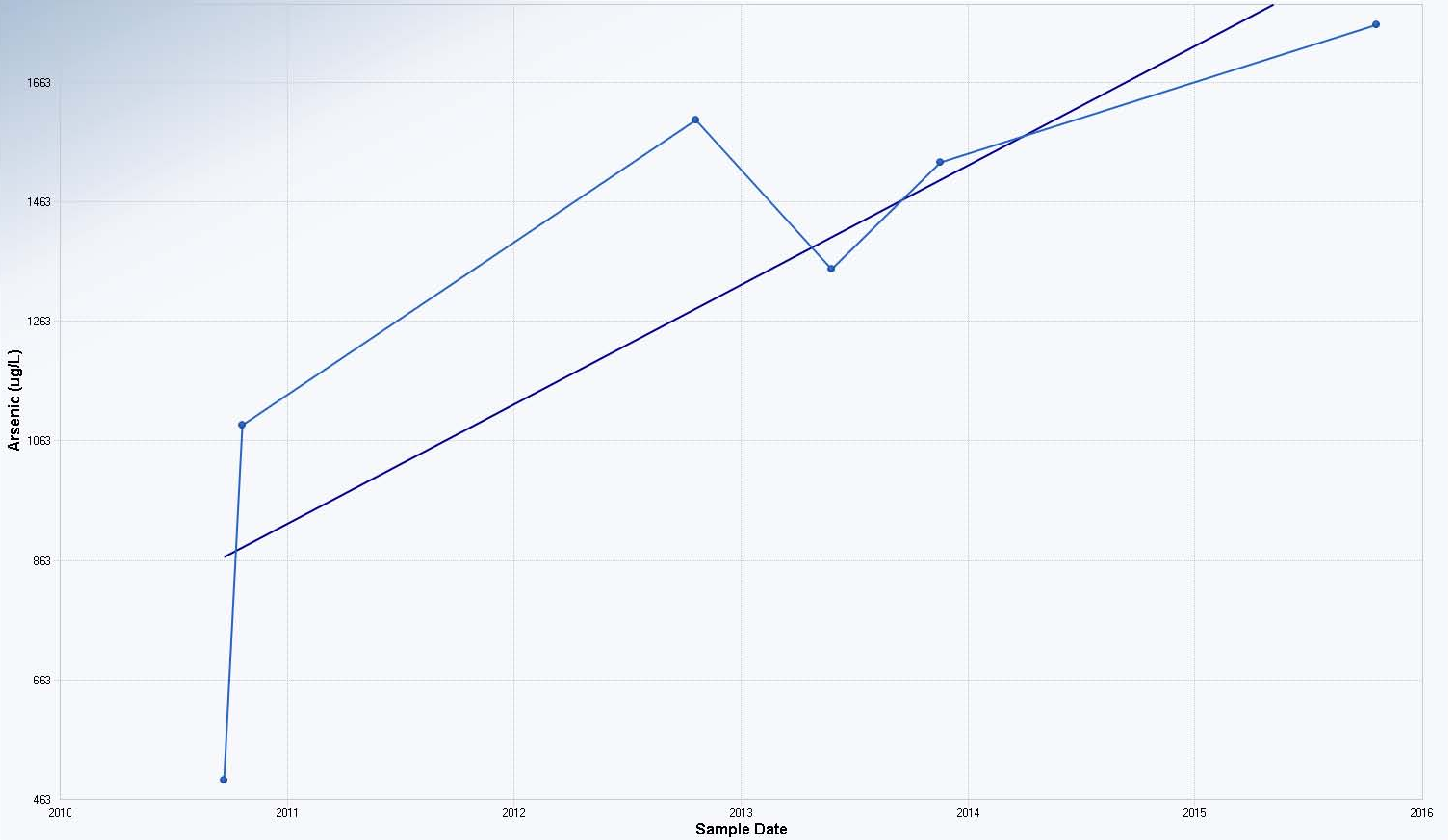
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5394
Standardized Value of S	1.0483
M-K Test Value (S)	11
Tabulated p-value	0.1790
Approximate p-value	0.1473

OLS Regression Line (Blue)

OLS Regression Slope	0.0368
OLS Regression Intercept	-71.8353

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test SHM-10-16 2010 to 2015



Mann-Kendall Trend Analysis

n	6
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	5.3229
Standardized Value of S	1.8787
M-K Test Value (S)	11
Tabulated p-value	0.0280
Approximate p-value	0.0301

OLS Regression Line (Blue)

OLS Regression Slope	199.5605
OLS Regression Intercept	-400,391.1031

Statistically significant evidence of an increasing trend at the specified level of significance.

Mann-Kendall Trend Test SHM-13-02 2010 to 2015

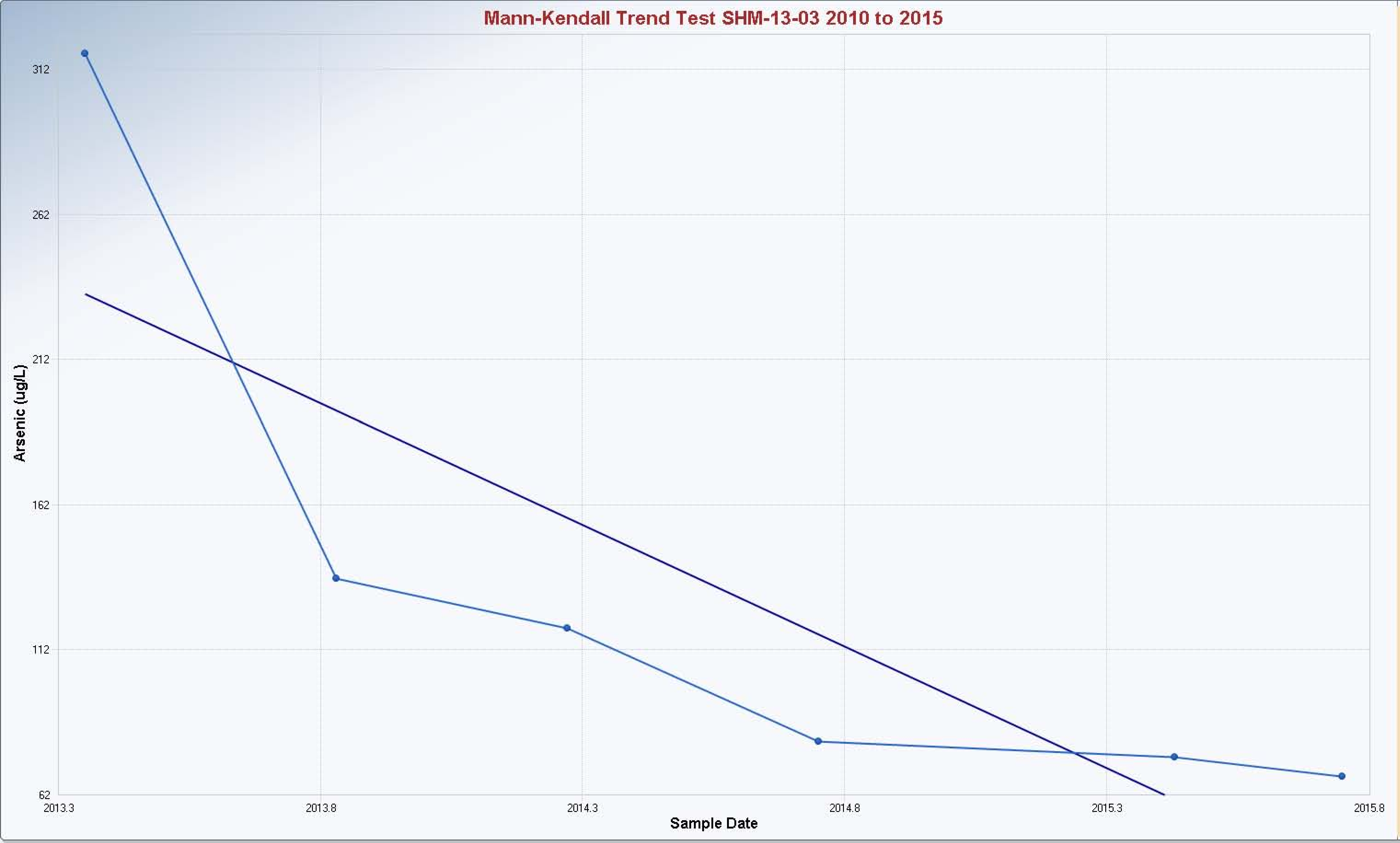
Mann-Kendall Trend Analysis

n	4
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	2.7689
Standardized Value of S	0.0000
M-K Test Value (S)	1
Tabulated p-value	0.6250
Approximate p-value	0.5000

OLS Regression Line (Blue)

OLS Regression Slope	0.4300
OLS Regression Intercept	-863.8681

Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis

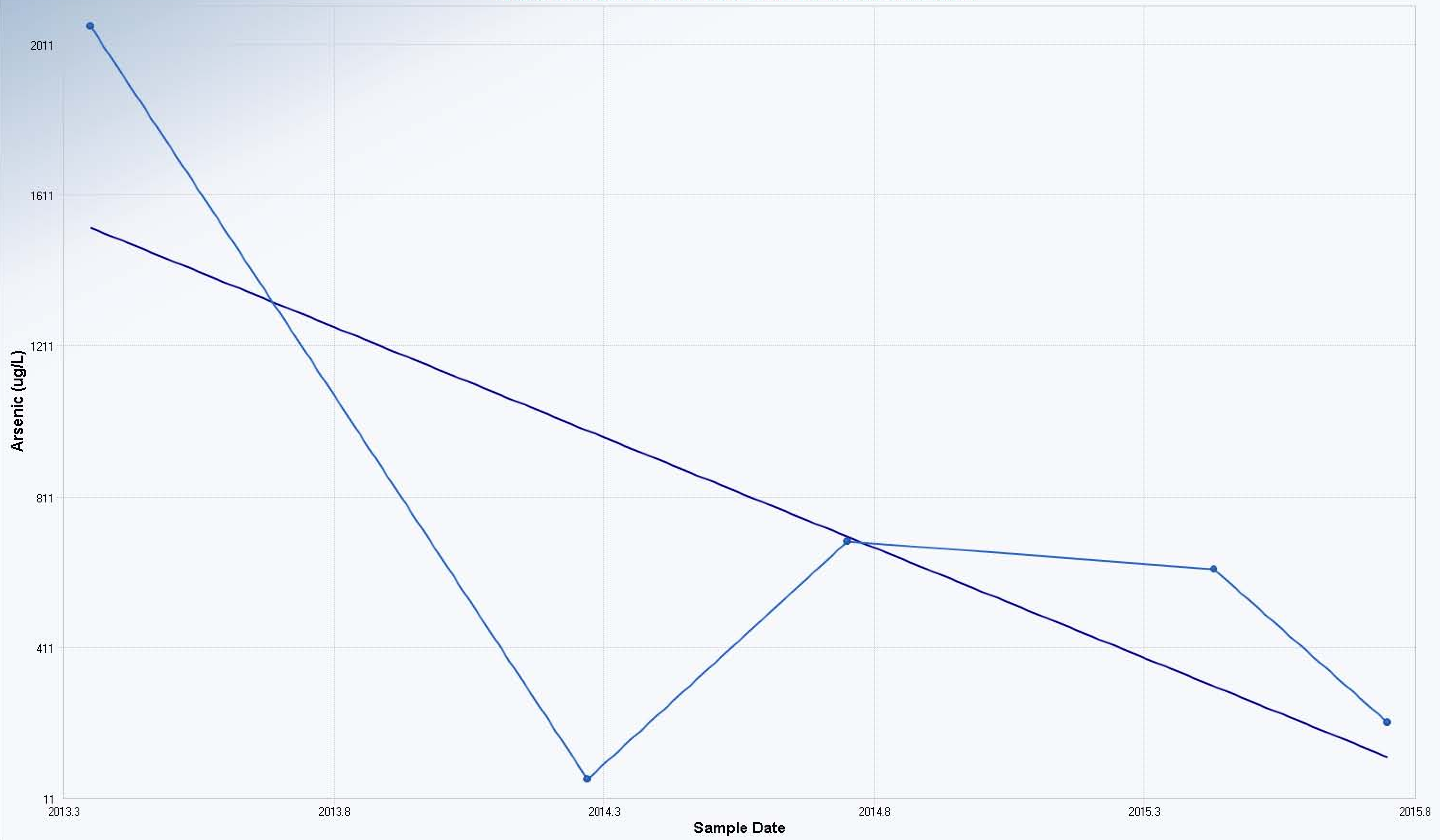
n	6
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	5.3229
Standardized Value of S	-2.6301
M-K Test Value (S)	-15
Tabulated p-value	0.0010
Approximate p-value	0.0043

OLS Regression Line (Blue)

OLS Regression Slope	-83.7892
OLS Regression Intercept	168,936.0916

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test SHM-13-04 2010 to 2015



Mann-Kendall Trend Analysis

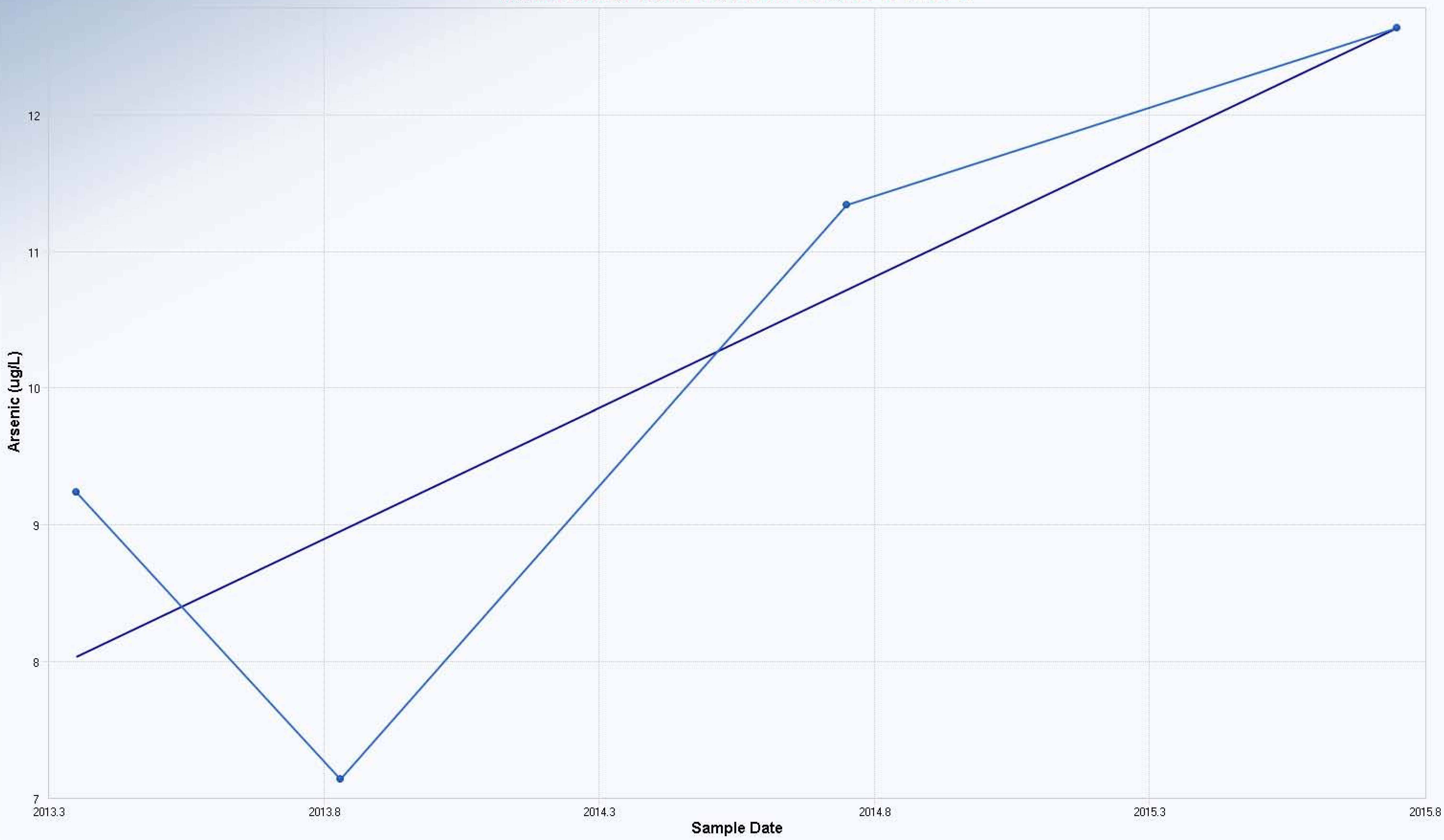
n	5
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	4.0825
Standardized Value of S	-0.7348
M-K Test Value (S)	-4
Tabulated p-value	0.2420
Approximate p-value	0.2312

OLS Regression Line (Blue)

OLS Regression Slope	-585.4598
OLS Regression Intercept	1,180,290.2723

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test SHM-13-05 2010 to 2015



Mann-Kendall Trend Analysis

n	4
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	2.9439
Standardized Value of S	1.0190
M-K Test Value (S)	4
Tabulated p-value	0.1670
Approximate p-value	0.1541

OLS Regression Line (Blue)

OLS Regression Slope	1.9147
OLS Regression Intercept	-3,847.3134

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test SHM-13-06 2010 to 2015

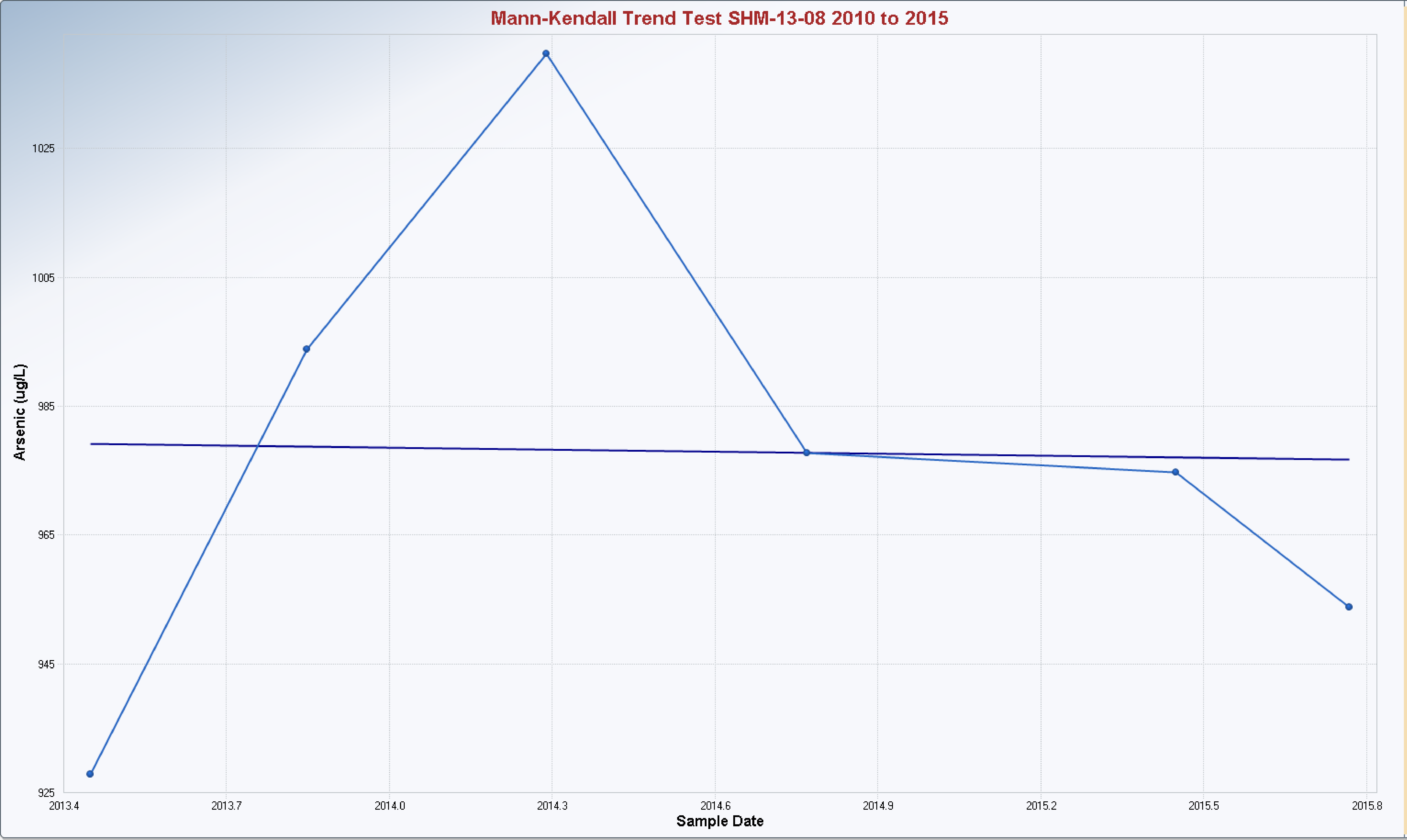
Mann-Kendall Trend Analysis

n	6
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	5.3229
Standardized Value of S	-1.8787
M-K Test Value (S)	-11
Tabulated p-value	0.0280
Approximate p-value	0.0301

OLS Regression Line (Blue)

OLS Regression Slope	-320.8738
OLS Regression Intercept	649,041.2273

Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis

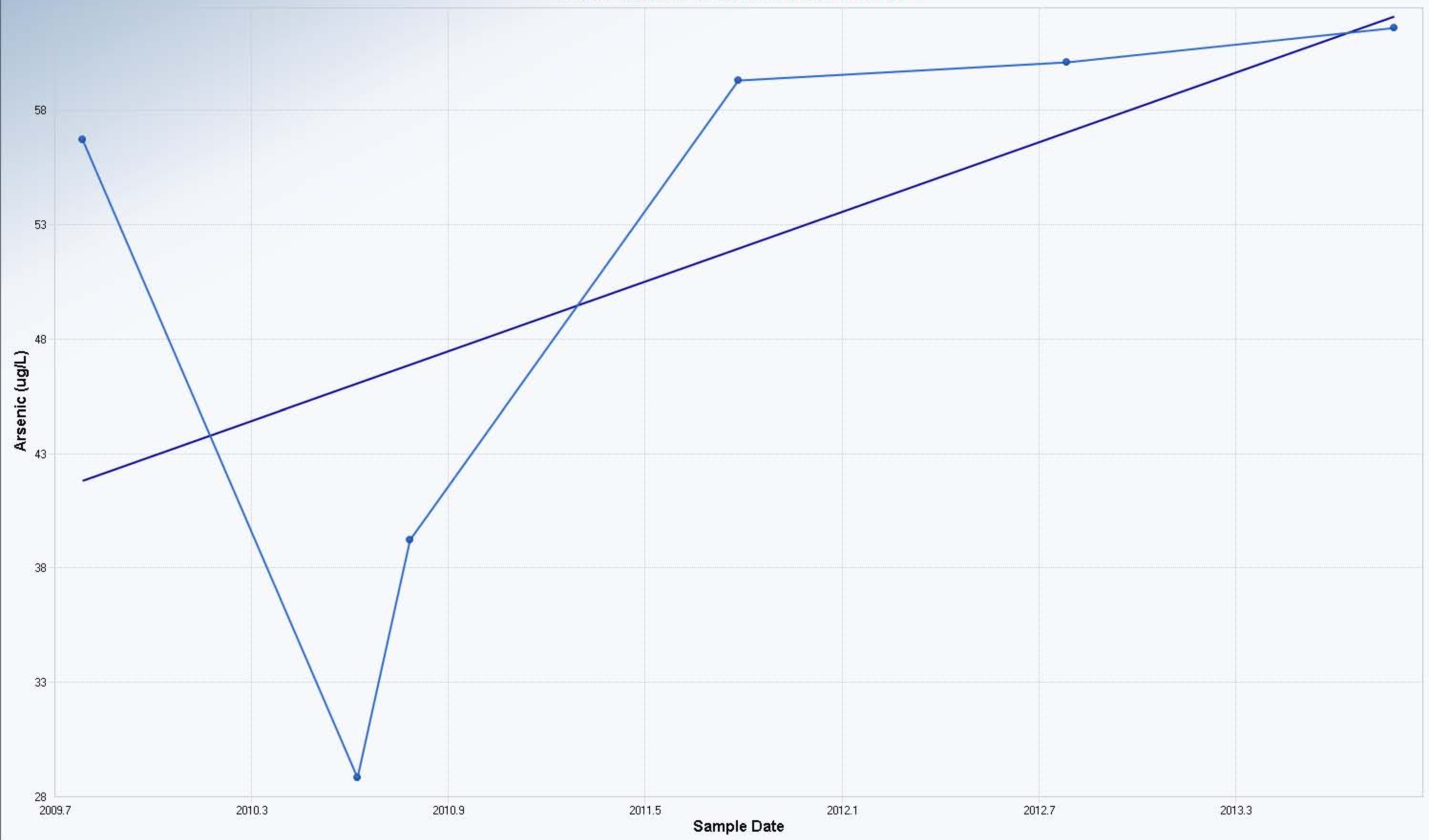
n	6
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	5.3229
Standardized Value of S	-0.3757
M-K Test Value (S)	-3
Tabulated p-value	0.3600
Approximate p-value	0.3536

OLS Regression Line (Blue)

OLS Regression Slope	-1.0598
OLS Regression Intercept	3,113.3042

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test SHM-99-31B



Mann-Kendall Trend Analysis

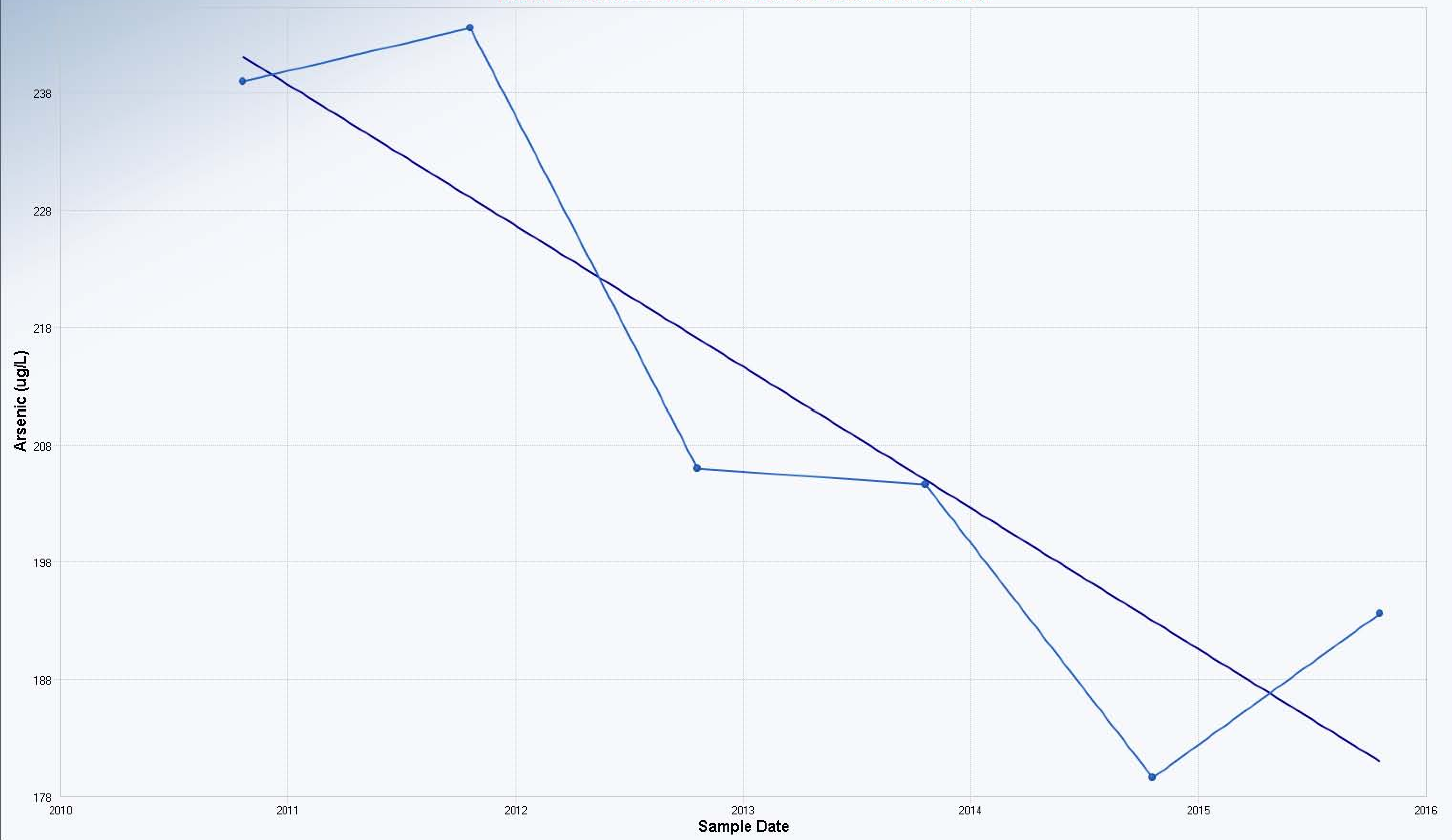
n	6
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	5.3229
Standardized Value of S	1.8787
M-K Test Value (S)	11
Tabulated p-value	0.0280
Approximate p-value	0.0301

OLS Regression Line (Blue)

OLS Regression Slope	5.0708
OLS Regression Intercept	-10,149.4948

Statistically significant evidence of an increasing trend at the specified level of significance.

Mann-Kendall Trend Test SHM-99-31C 2010 to 2015



Mann-Kendall Trend Analysis

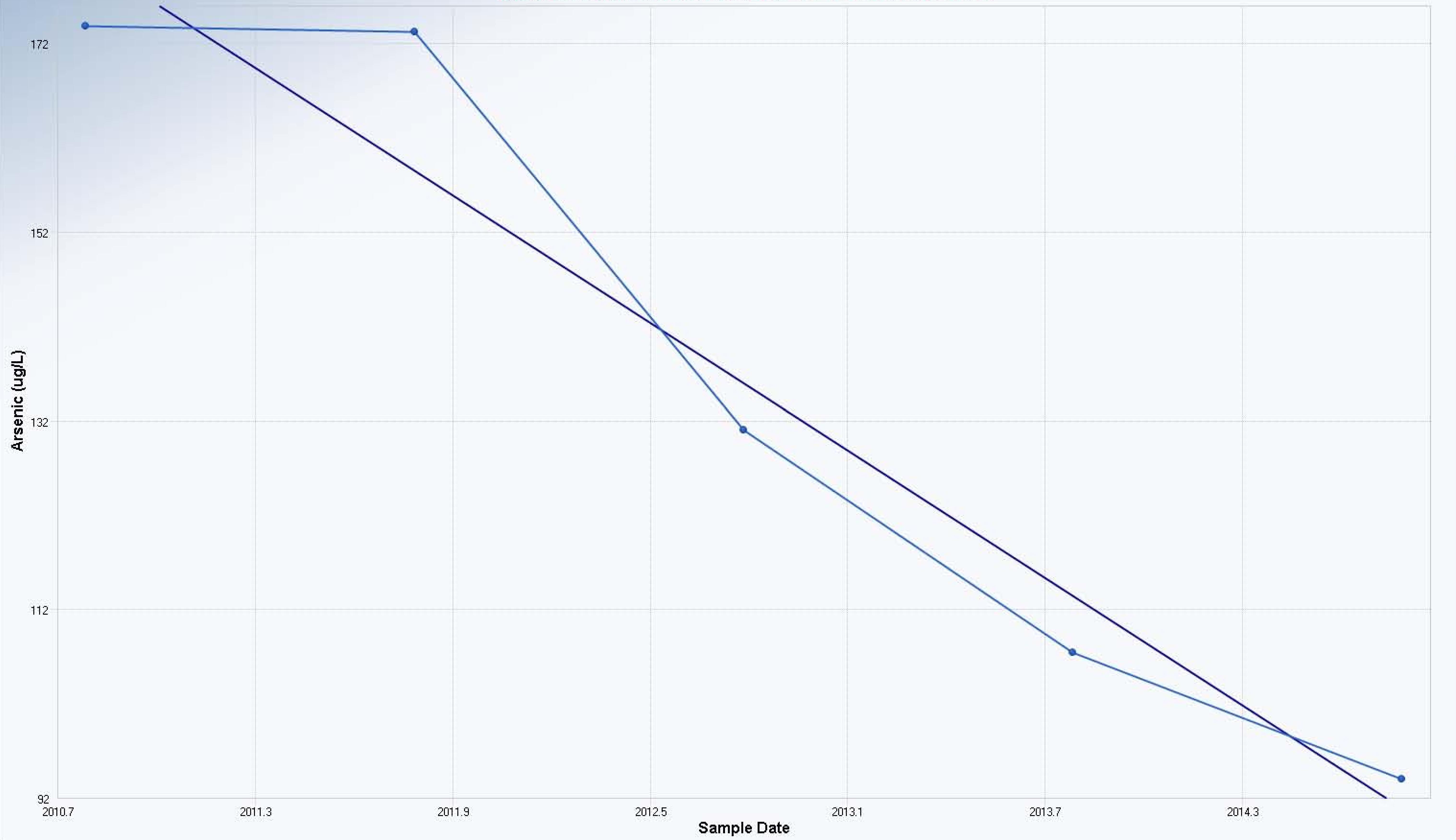
n	6
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	5.3229
Standardized Value of S	-1.8787
M-K Test Value (S)	-11
Tabulated p-value	0.0280
Approximate p-value	0.0301

OLS Regression Line (Blue)

OLS Regression Slope	-12.0114
OLS Regression Intercept	24,394.0758

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test SHM-99-32X 2010 to 2015



Mann-Kendall Trend Analysis

n	5
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	4.0825
Standardized Value of S	-2.2045
M-K Test Value (S)	-10
Tabulated p-value	0.0080
Approximate p-value	0.0137

OLS Regression Line (Blue)

OLS Regression Slope	-22.5600
OLS Regression Intercept	45,544.2280

Statistically significant evidence of a decreasing trend at the specified level of significance.

5 Year Trends 2016 to 2020

Mann-Kendall Trend Test SHM-13-07 2016 to 2020

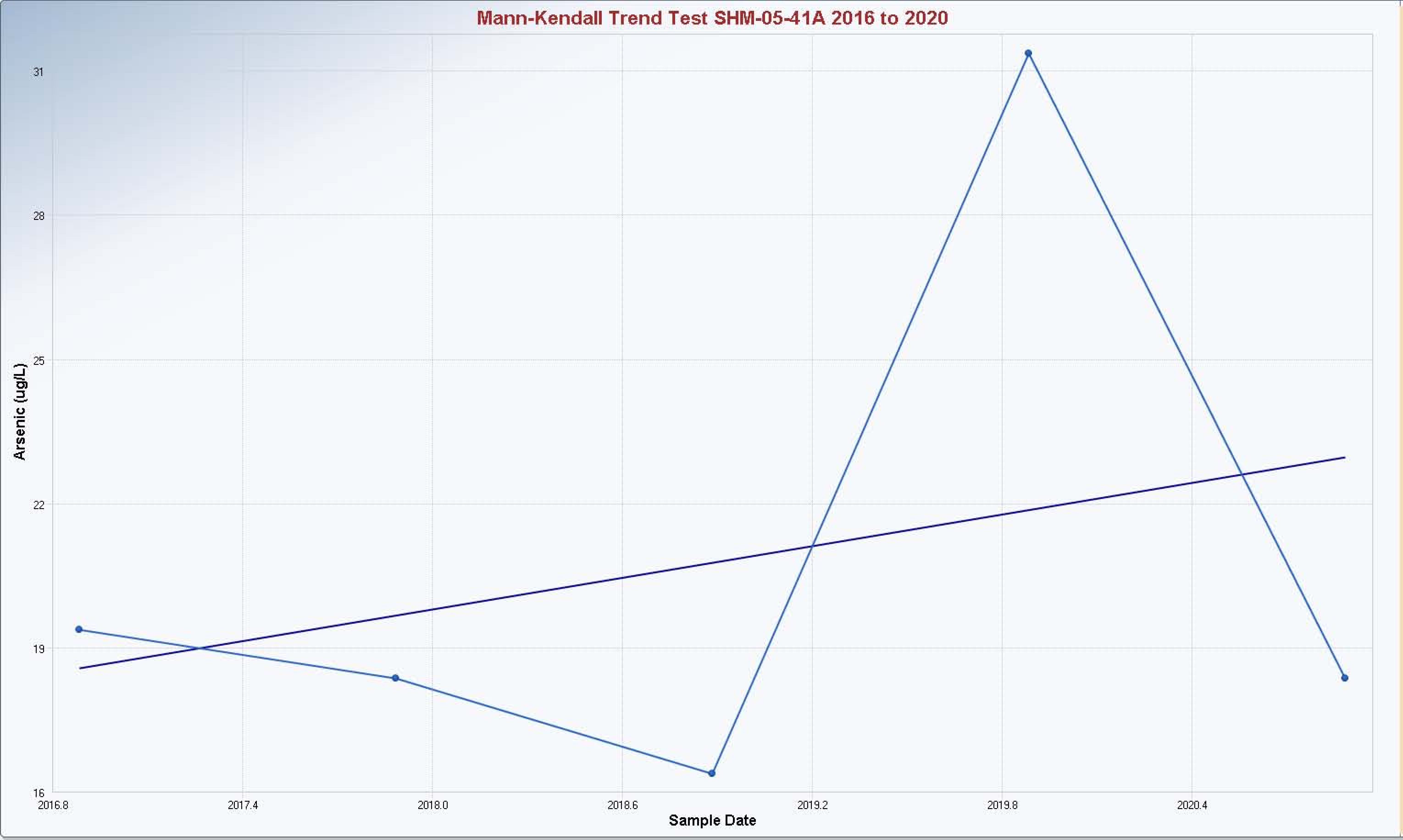
Mann-Kendall Trend Analysis

n	10
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	11.1355
Standardized Value of S	0.9878
M-K Test Value (S)	12
Tabulated p-value	0.1460
Approximate p-value	0.1616

OLS Regression Line (Blue)

OLS Regression Slope	59.4141
OLS Regression Intercept	-119,504.6286

Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis

n	5
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	3.9581
Standardized Value of S	0.0000
M-K Test Value (S)	-1
Tabulated p-value	0.5920
Approximate p-value	0.5000

OLS Regression Line (Blue)

OLS Regression Slope	1.1000
OLS Regression Intercept	-2,200.3680

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Analysis

n	10
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	11.1803
Standardized Value of S	-1.6100
M-K Test Value (S)	-19
Tabulated p-value	0.0540
Approximate p-value	0.0537

OLS Regression Line (Blue)

OLS Regression Slope	-50.0561
OLS Regression Intercept	101,582.2614

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test SHM-05-41C 2016 to 2020

Mann-Kendall Trend Analysis

n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	-1.5639
M-K Test Value (S)	-16
Tabulated p-value	0.0600
Approximate p-value	0.0589

OLS Regression Line (Blue)

OLS Regression Slope	-85.7269
OLS Regression Intercept	173,599.5074

Insufficient statistical evidence of a significant trend at the specified level of significance.

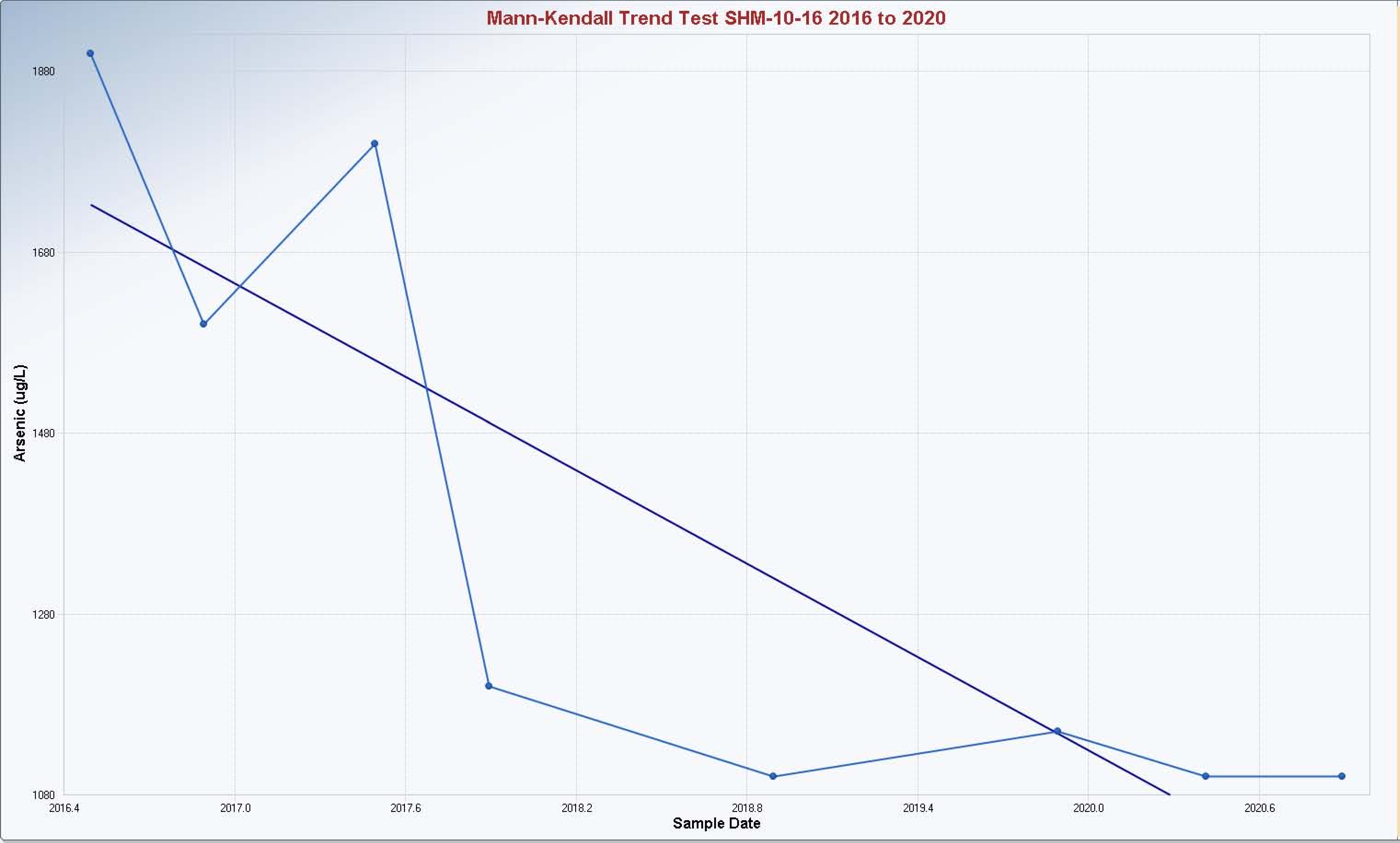
Mann-Kendall Trend Analysis

n	5
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	3.6056
Standardized Value of S	-0.5547
M-K Test Value (S)	-3
Tabulated p-value	0.4080
Approximate p-value	0.2895

OLS Regression Line (Blue)

OLS Regression Slope	-3.0000
OLS Regression Intercept	6,222.6400

Insufficient statistical evidence of a significant trend at the specified level of significance.



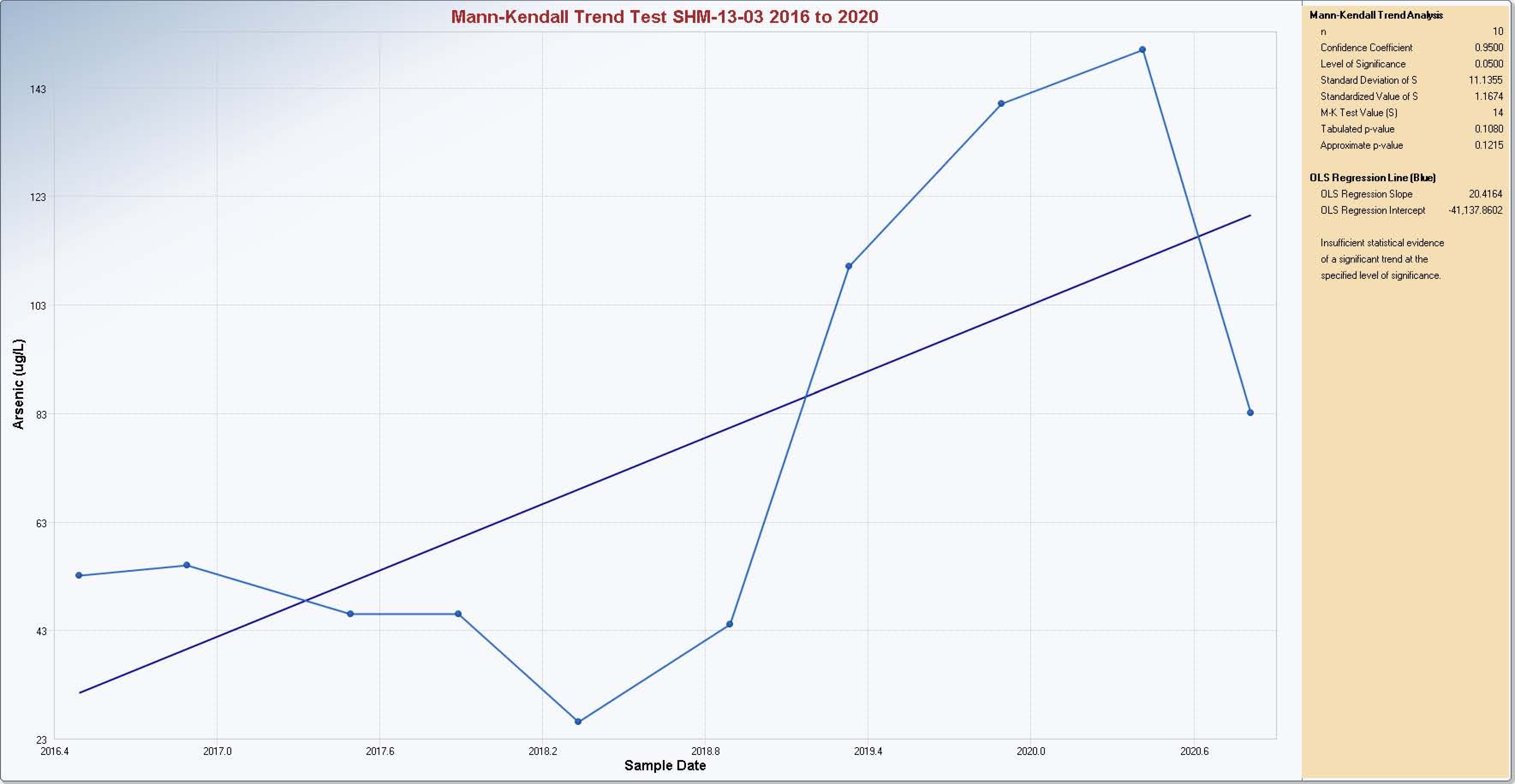
Mann-Kendall Trend Analysis

n	8
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	7.8528
Standardized Value of S	-2.5469
M-K Test Value (S)	-21
Tabulated p-value	0.0070
Approximate p-value	0.0054

OLS Regression Line (Blue)

OLS Regression Slope	-172.1954
OLS Regression Intercept	348,961.5057

Statistically significant evidence of a decreasing trend at the specified level of significance.


Mann-Kendall Trend Test SHM-13-03 2016 to 2020
Arsenic (ug/L)
143
123
103
83
63
43
23
2016.4
2017.0
2017.6
2018.2
2018.8
2019.4
2020.0
2020.6
Sample Date
Mann-Kendall Trend Analysis
n 10
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 11.1355
Standardized Value of S 1.1674
M-K Test Value (S) 14
Tabulated p-value 0.1080
Approximate p-value 0.1215
OLS Regression Line (Blue)
OLS Regression Slope 20.4164
OLS Regression Intercept -41,137.8602
Insufficient statistical evidence
of a significant trend at the
specified level of significance.

Mann-Kendall Trend Test SHM-13-04 2016 to 2020

Mann-Kendall Trend Analysis

n	10
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	11.1803
Standardized Value of S	1.7889
M-K Test Value (S)	21
Tabulated p-value	0.0360
Approximate p-value	0.0368

OLS Regression Line (Blue)

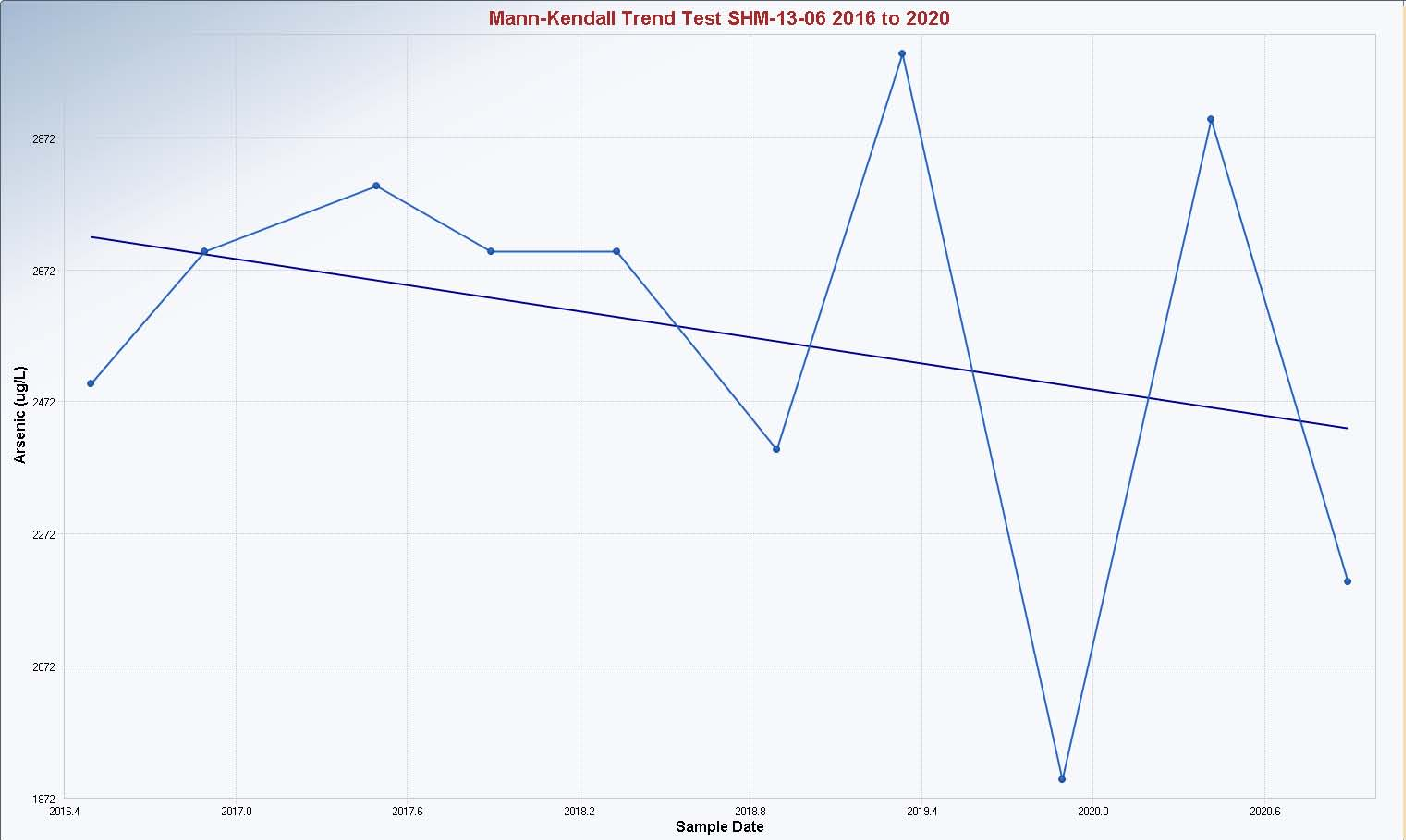
OLS Regression Slope	54.6249
OLS Regression Intercept	-109,998.9674

Statistically significant evidence of an increasing trend at the specified level of significance.

Mann-Kendall Trend Test SHM-13-05 2016 to 2020

Mann-Kendall Trend Analysis	
n	5
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	4.0825
Standardized Value of S	
M-K Test Value (S)	0
Tabulated p-value	0.5920
Approximate p-value	
OLS Regression Line (Blue)	
OLS Regression Slope	-0.1600
OLS Regression Intercept	333.7808

Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis

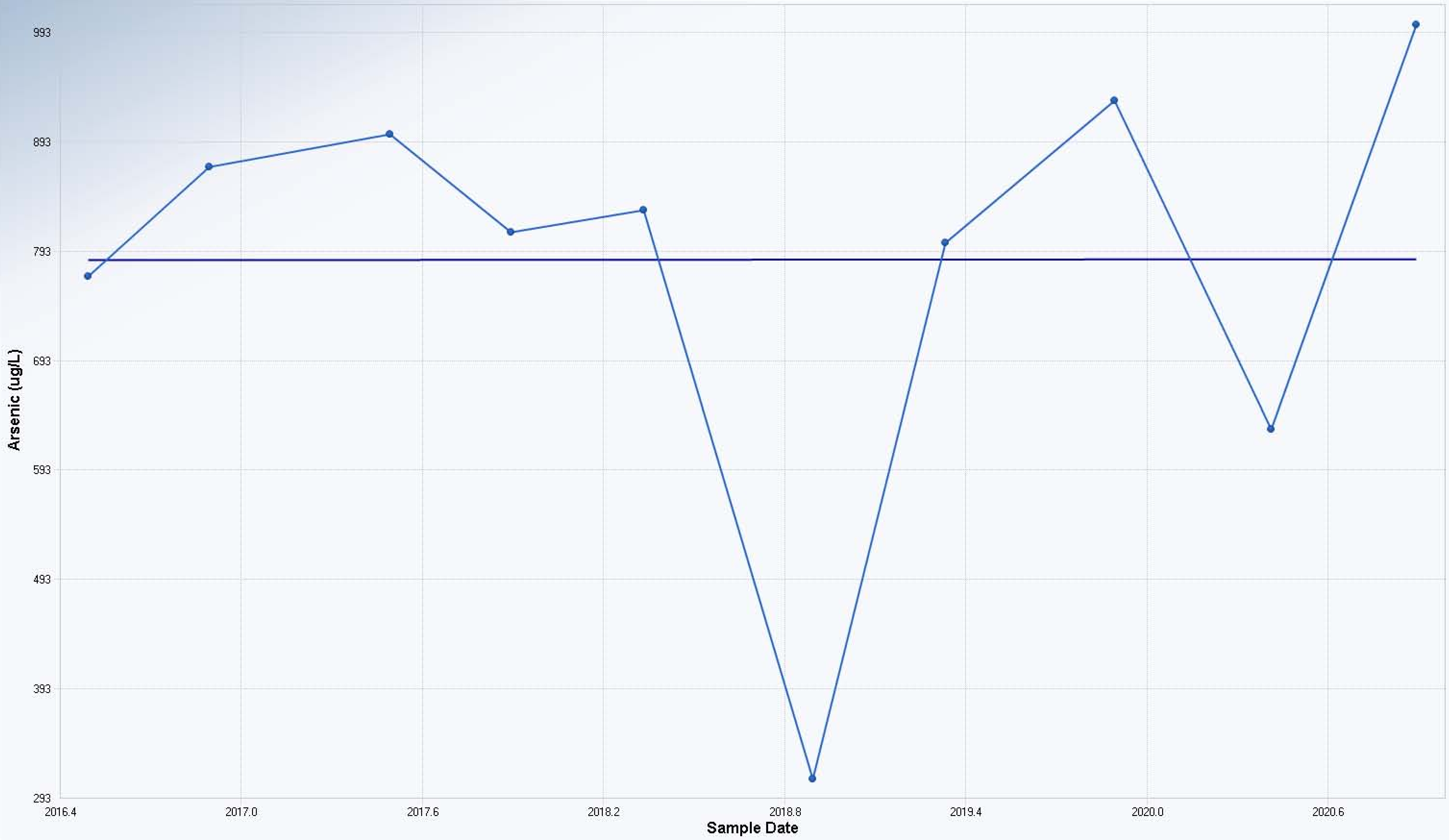
n	10
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	11.0151
Standardized Value of S	-0.2724
M-K Test Value (S)	-4
Tabulated p-value	0.3640
Approximate p-value	0.3927

OLS Regression Line (Blue)

OLS Regression Slope	-65.7262
OLS Regression Intercept	135,257.5250

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test SHM-13-08 2016 to 2020



Mann-Kendall Trend Analysis

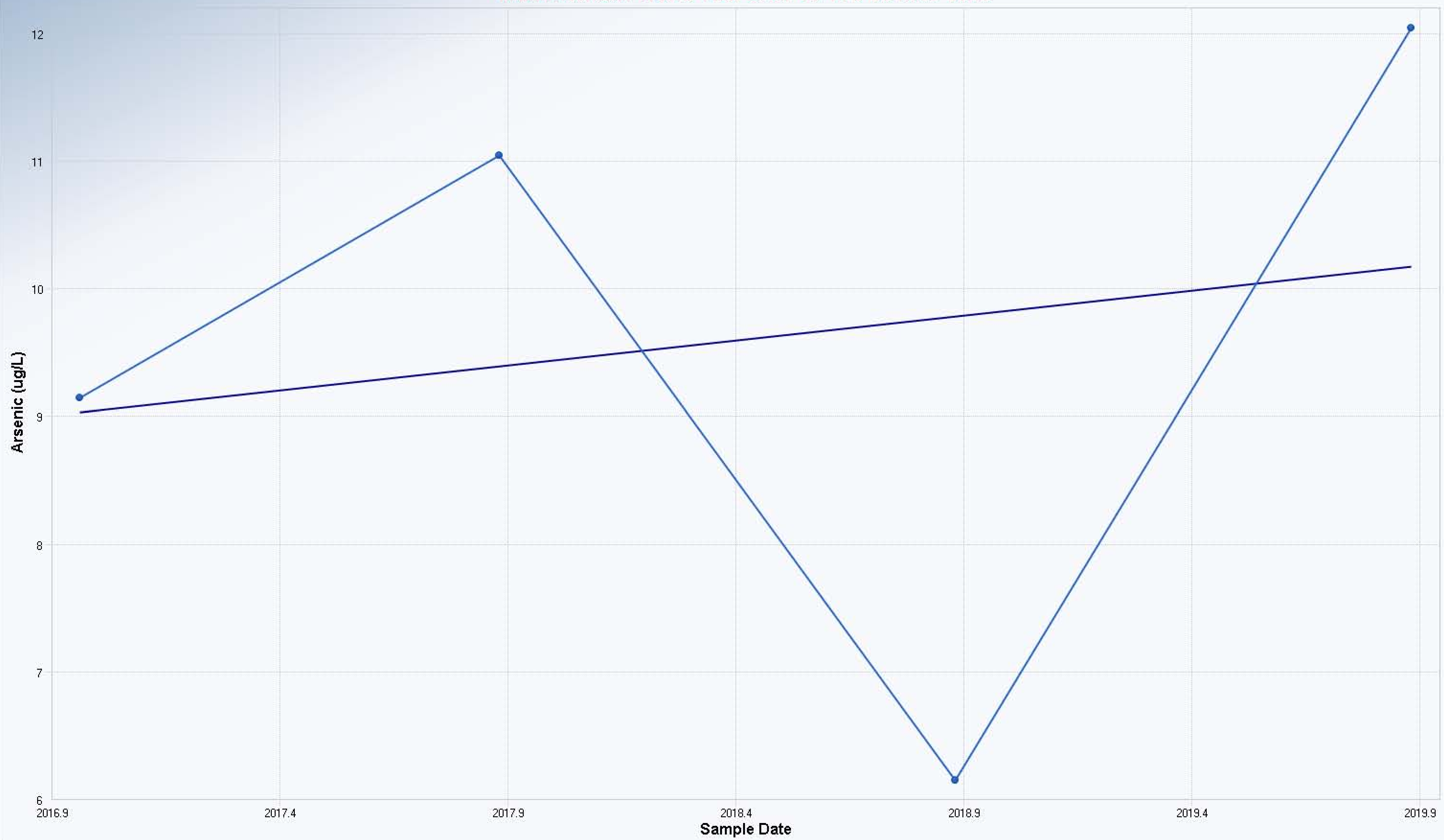
n	10
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	11.1803
Standardized Value of S	0.3578
M-K Test Value (S)	5
Tabulated p-value	0.3640
Approximate p-value	0.3603

OLS Regression Line (Blue)

OLS Regression Slope	0.0401
OLS Regression Intercept	704.0991

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test SHM-13-14D 2016 to 2020



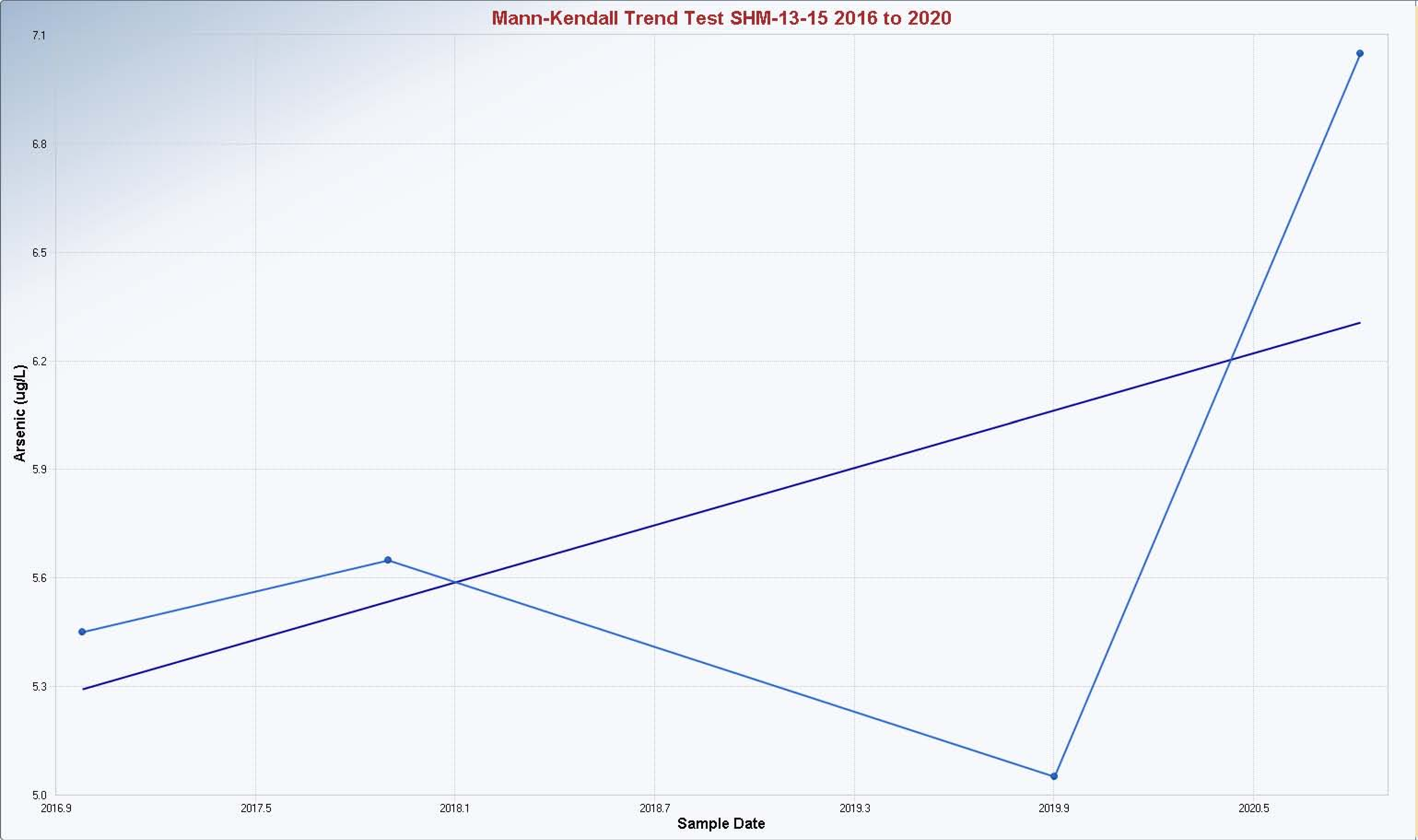
Mann-Kendall Trend Analysis

n	4
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	2.9439
Standardized Value of S	0.3397
M-K Test Value (S)	2
Tabulated p-value	0.3750
Approximate p-value	0.3670

OLS Regression Line (Blue)

OLS Regression Slope	0.3912
OLS Regression Intercept	-780.0524

Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis

n	4
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	2.9439
Standardized Value of S	0.3397
M-K Test Value (S)	2
Tabulated p-value	0.3750
Approximate p-value	0.3670

OLS Regression Line (Blue)

OLS Regression Slope	0.2637
OLS Regression Intercept	-526.6132

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Analysis

n	6
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	5.1316
Standardized Value of S	-1.5590
M-K Test Value (S)	-9
Tabulated p-value	0.0680
Approximate p-value	0.0595

OLS Regression Line (Blue)

OLS Regression Slope	-13.9385
OLS Regression Intercept	28,313.4606

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Analysis

n	6
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	5.3229
Standardized Value of S	-0.7515
M-K Test Value (S)	-5
Tabulated p-value	0.2350
Approximate p-value	0.2262

OLS Regression Line (Blue)

OLS Regression Slope	-8.6268
OLS Regression Intercept	17,455.1619

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test SHM-05-40X 2016 to 2020

Mann-Kendall Trend Analysis

n	8
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	7.9582
Standardized Value of S	-0.6283
M-K Test Value (S)	-6
Tabulated p-value	0.2740
Approximate p-value	0.2649

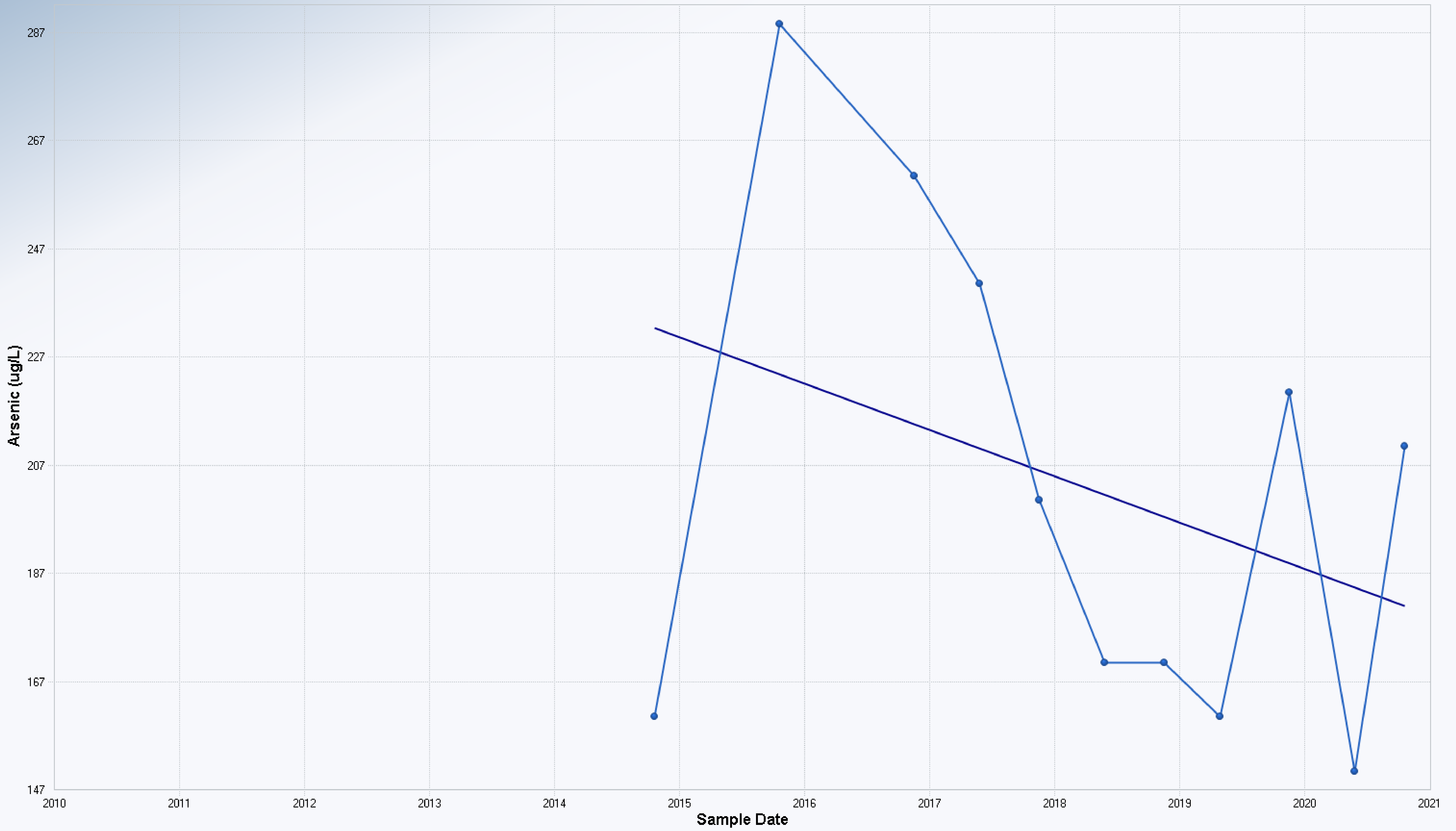
OLS Regression Line (Blue)

OLS Regression Slope	-57.3270
OLS Regression Intercept	117,902.7058

Insufficient statistical evidence of a significant trend at the specified level of significance.

2010 to 2020 Trends

Mann-Kendall Trend Test for EPA-PZ-2012-1B



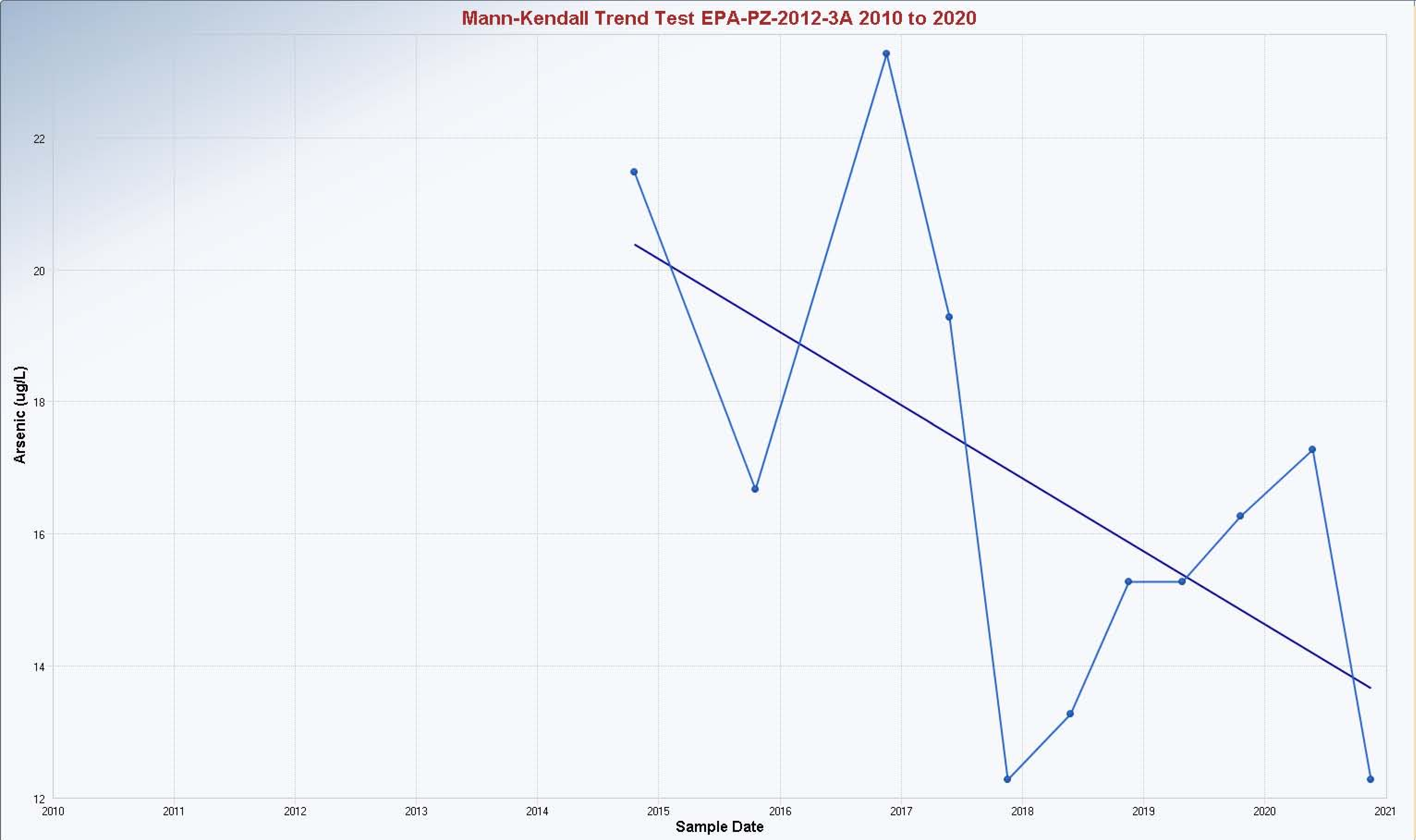
Mann-Kendall Trend Analysis

n	11
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	12.7671
Standardized Value of S	-1.4099
M-K Test Value (S)	-19
Tabulated p-value	0.0820
Approximate p-value	0.0793

OLS Regression Line (Blue)

OLS Regression Slope	-8.5776
OLS Regression Intercept	17,514.0150

Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis

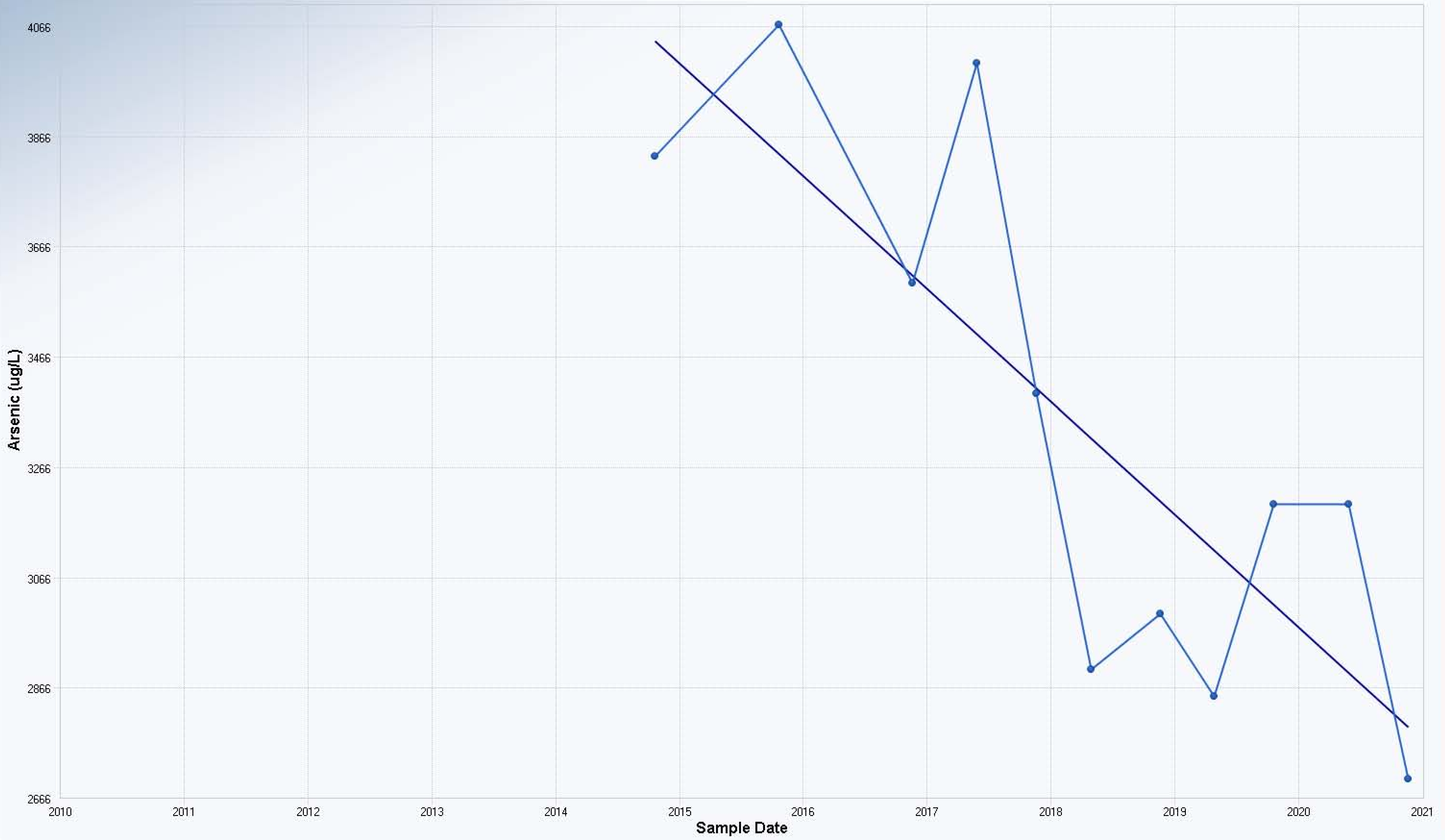
n	11
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	12.7671
Standardized Value of S	-1.2532
M-K Test Value (S)	-17
Tabulated p-value	0.1090
Approximate p-value	0.1051

OLS Regression Line (Blue)

OLS Regression Slope	-1.1068
OLS Regression Intercept	2,250.1042

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test EPA-PZ-2012-3B 2010 to 2020



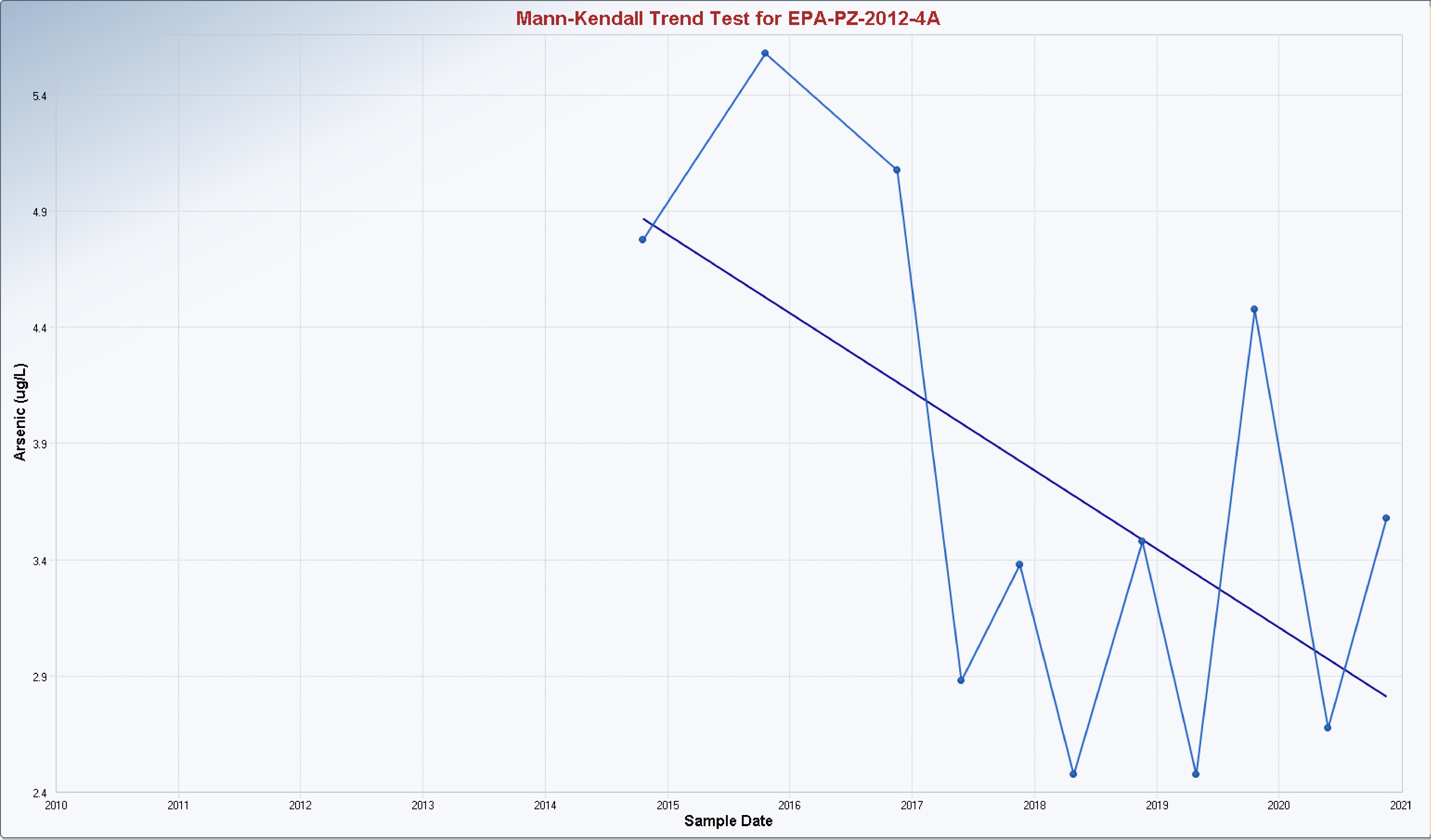
Mann-Kendall Trend Analysis

n	11
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	12.8062
Standardized Value of S	-2.5769
M-K Test Value (S)	-34
Tabulated p-value	0.0030
Approximate p-value	0.0050

OLS Regression Line (Blue)

OLS Regression Slope	-204.5778
OLS Regression Intercept	416,222.7311

Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis

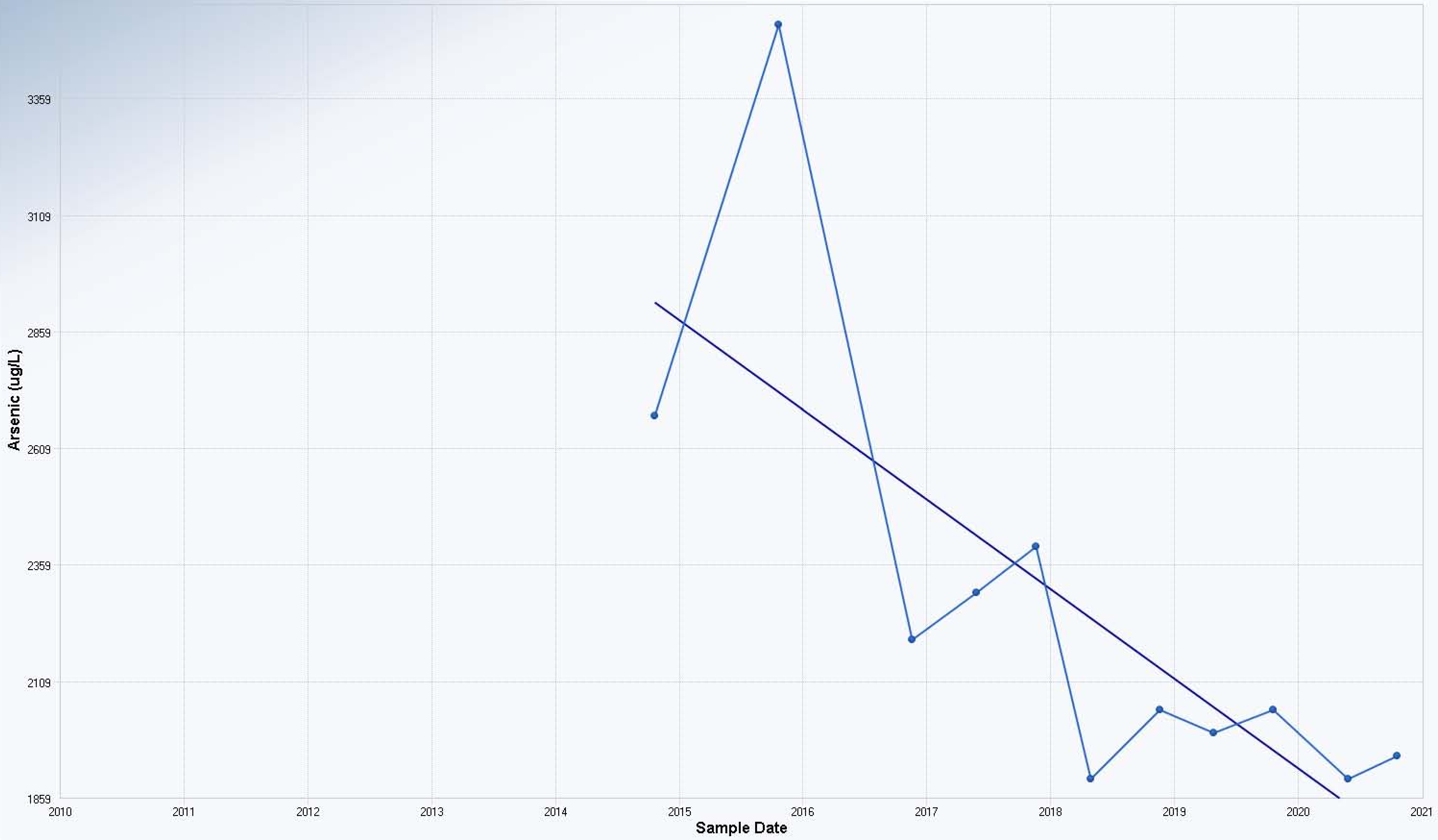
n	11
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	12.8062
Standardized Value of S	-1.1713
M-K Test Value (S)	-16
Tabulated p-value	0.1090
Approximate p-value	0.1207

OLS Regression Line (Blue)

OLS Regression Slope	-0.3386
OLS Regression Intercept	687.1550

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test EPA-PZ-2012-4B 2010 to 2020



Mann-Kendall Trend Analysis

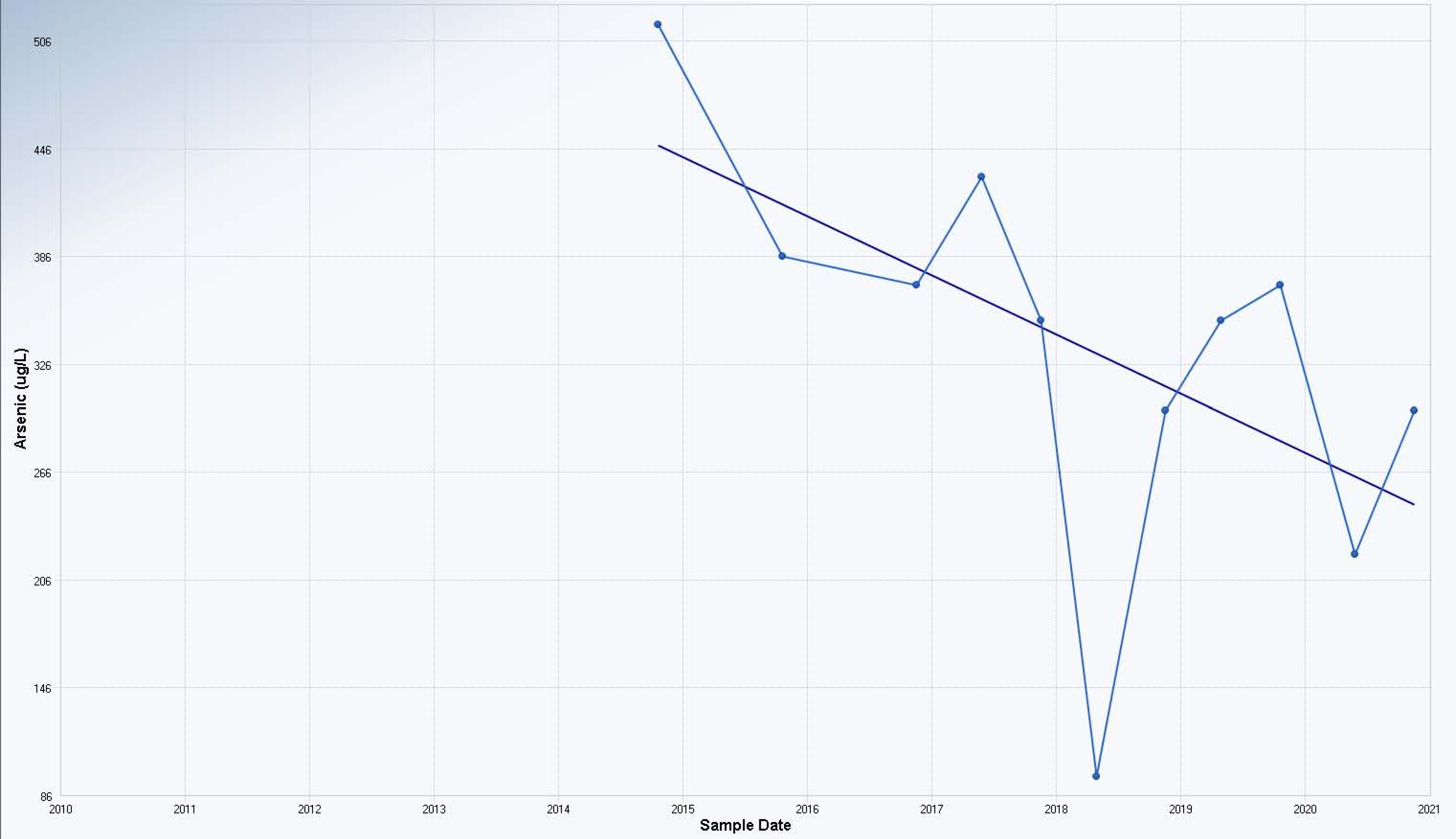
n	11
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	12.7671
Standardized Value of S	-2.5064
M-K Test Value (S)	-33
Tabulated p-value	0.0050
Approximate p-value	0.0061

OLS Regression Line (Blue)

OLS Regression Slope	-192.2223
OLS Regression Intercept	390,212.5784

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test EPA-PZ-2012-6B 2010 to 2020



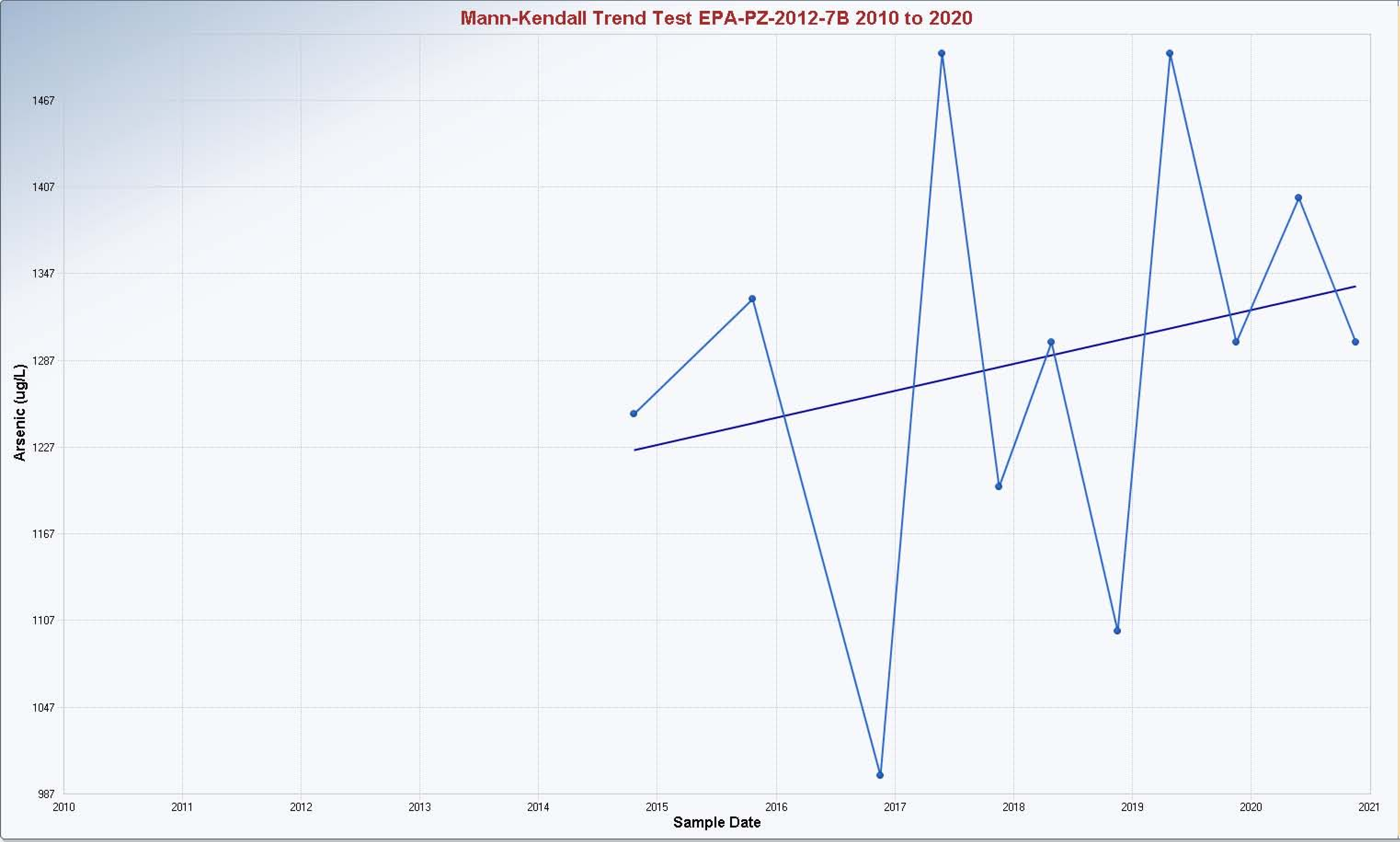
Mann-Kendall Trend Analysis

n	11
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	12.7279
Standardized Value of S	-2.1213
M-K Test Value (S)	-28
Tabulated p-value	0.0130
Approximate p-value	0.0169

OLS Regression Line (Blue)

OLS Regression Slope	-32.8914
OLS Regression Intercept	66,717.1338

Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis

n	11
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	12.6623
Standardized Value of S	0.6318
M-K Test Value (S)	9
Tabulated p-value	0.2710
Approximate p-value	0.2638

OLS Regression Line (Blue)

OLS Regression Slope	18.6009
OLS Regression Intercept	-36,251.6491

Insufficient statistical evidence of a significant trend at the specified level of significance.

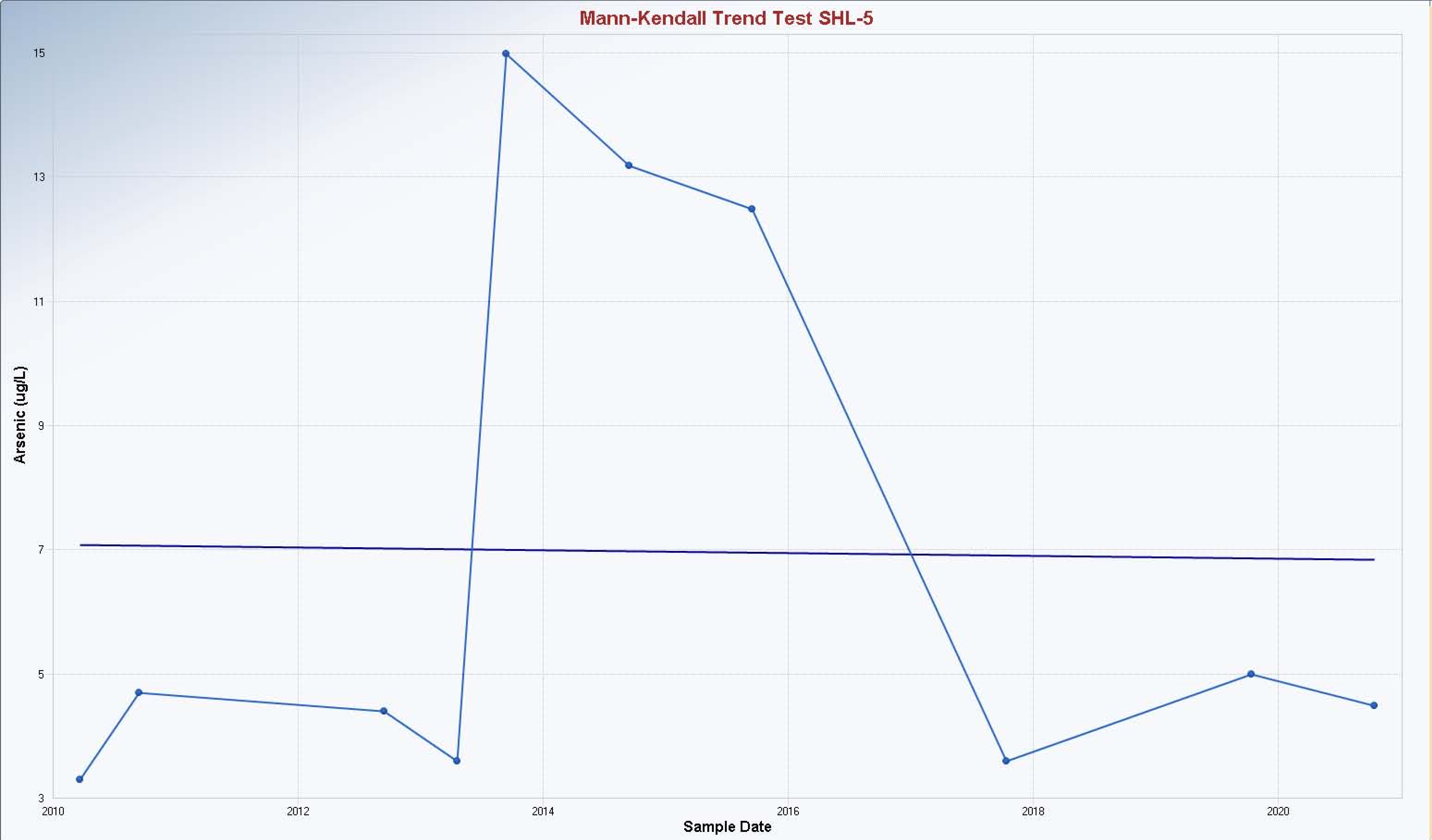
Mann-Kendall Trend Analysis

n	14
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	18.2665
Standardized Value of S	-3.3942
M-K Test Value (S)	-63
Tabulated p-value	0.0000
Approximate p-value	0.0003

OLS Regression Line (Blue)

OLS Regression Slope	-6.1518
OLS Regression Intercept	12,425.4076

Statistically significant evidence of a decreasing trend at the specified level of significance.

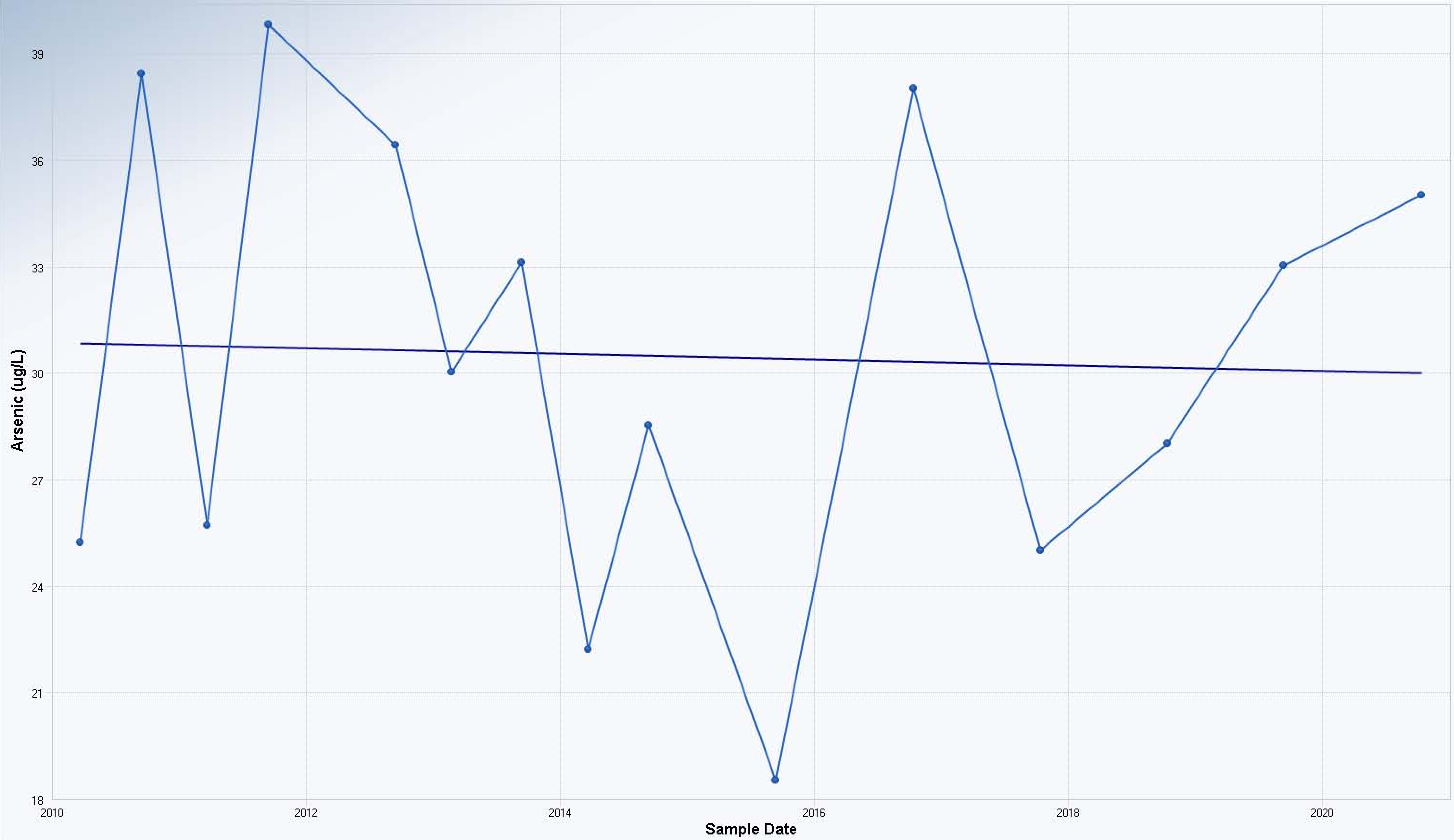


Mann-Kendall Trend Analysis	
n	10
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	11.1355
Standardized Value of S	0.4490
M-K Test Value (S)	6
Tabulated p-value	0.3000
Approximate p-value	0.3267

OLS Regression Line (Blue)	
OLS Regression Slope	-0.0220
OLS Regression Intercept	51.4575

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test SHL-9 2010 to 2020



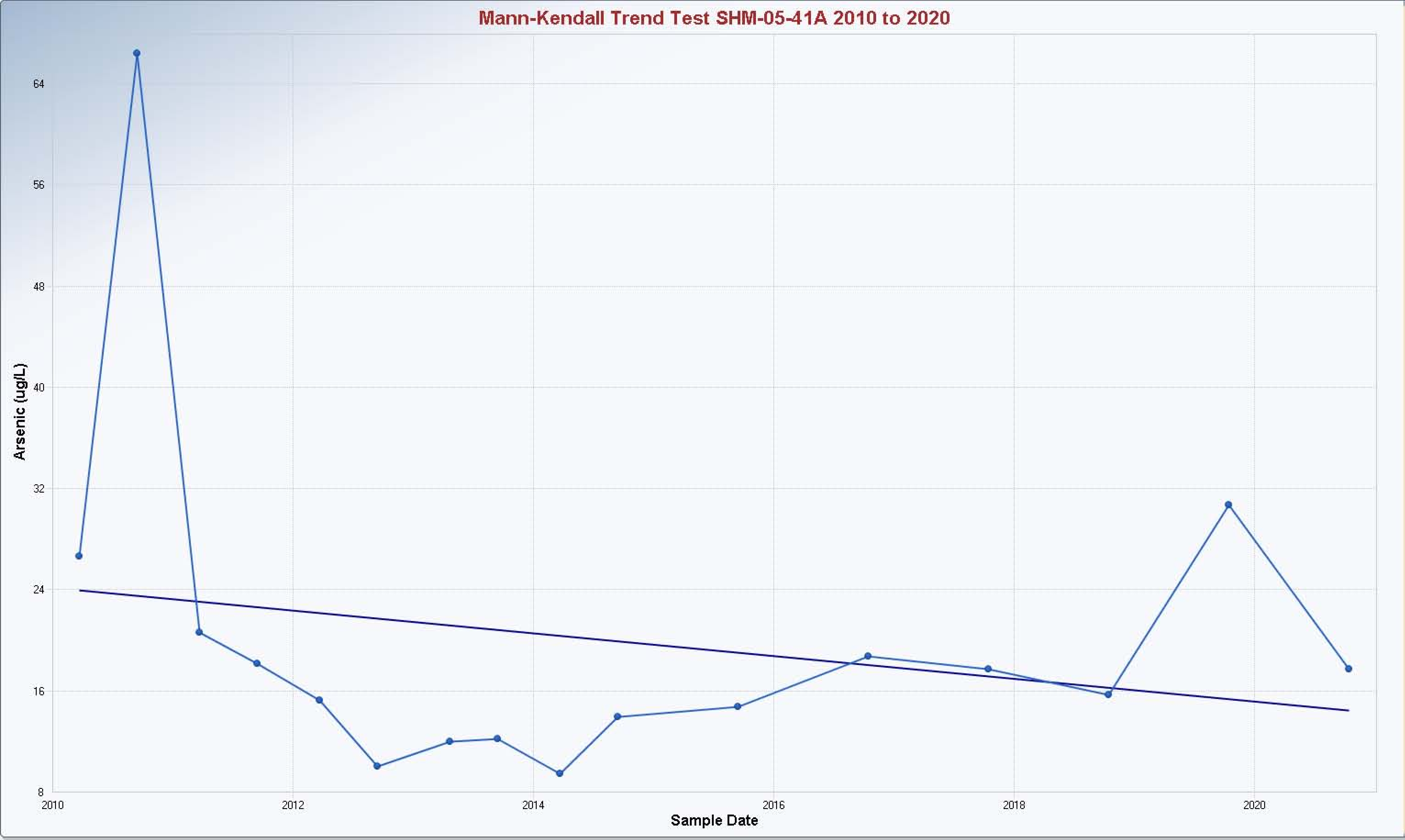
Mann-Kendall Trend Analysis

n	15
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	20.2073
Standardized Value of S	-0.3959
M-K Test Value (S)	-9
Tabulated p-value	0.3490
Approximate p-value	0.3461

OLS Regression Line (Blue)

OLS Regression Slope	-0.0778
OLS Regression Intercept	187.2371

Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis

n	16
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	22.1886
Standardized Value of S	-0.2704
M-K Test Value (S)	-7
Tabulated p-value	0.4120
Approximate p-value	0.3934

OLS Regression Line (Blue)

OLS Regression Slope	-0.8977
OLS Regression Intercept	1,828.8504

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test for SHM-10-06

Mann-Kendall Trend Analysis

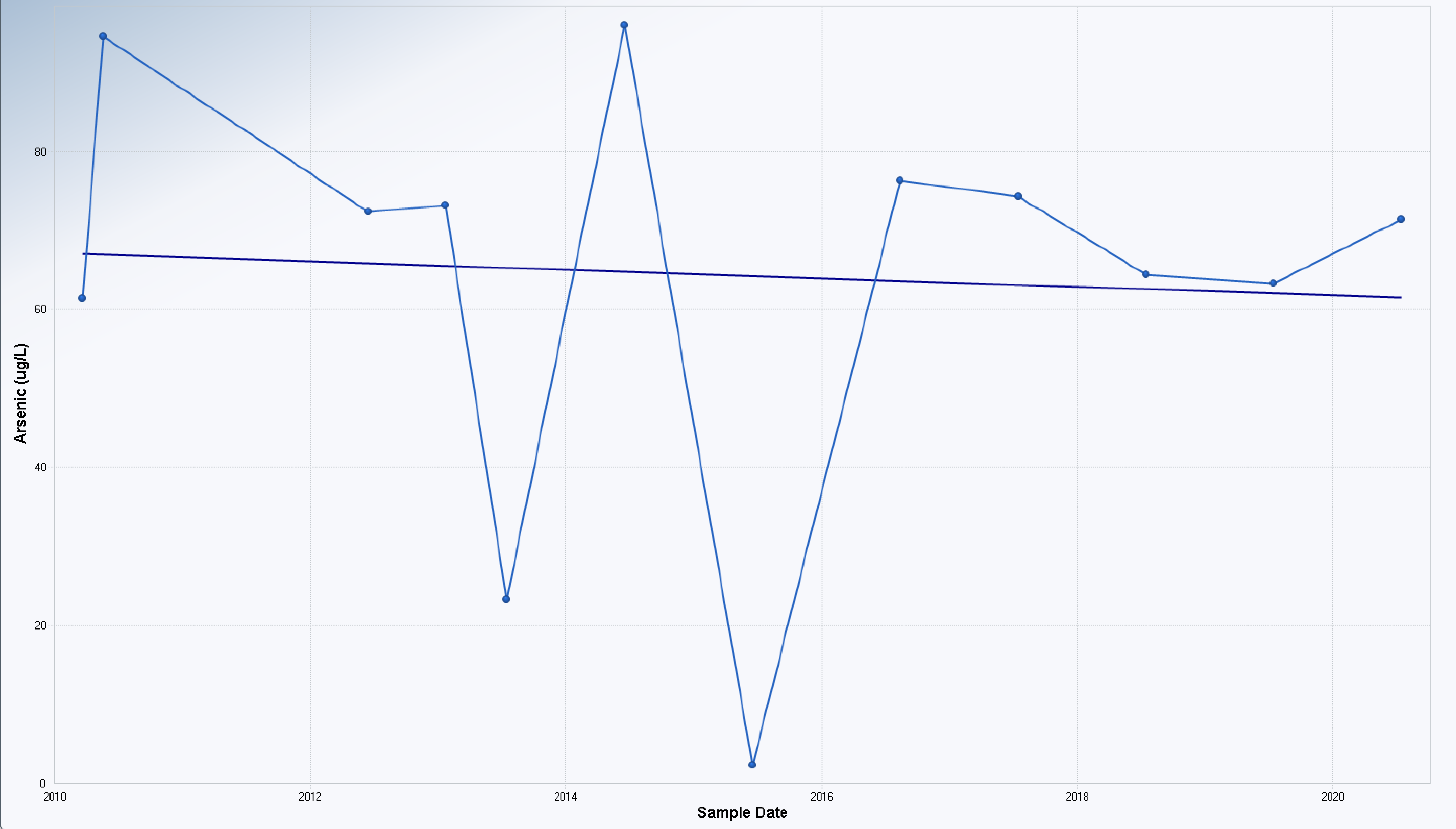
n	11
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	12.8452
Standardized Value of S	-2.8026
M-K Test Value (S)	-37
Tabulated p-value	0.0020
Approximate p-value	0.0025

OLS Regression Line (Blue)

OLS Regression Slope	-115.3541
OLS Regression Intercept	234,290.5599

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test for SHM-10-06A



Mann-Kendall Trend Analysis

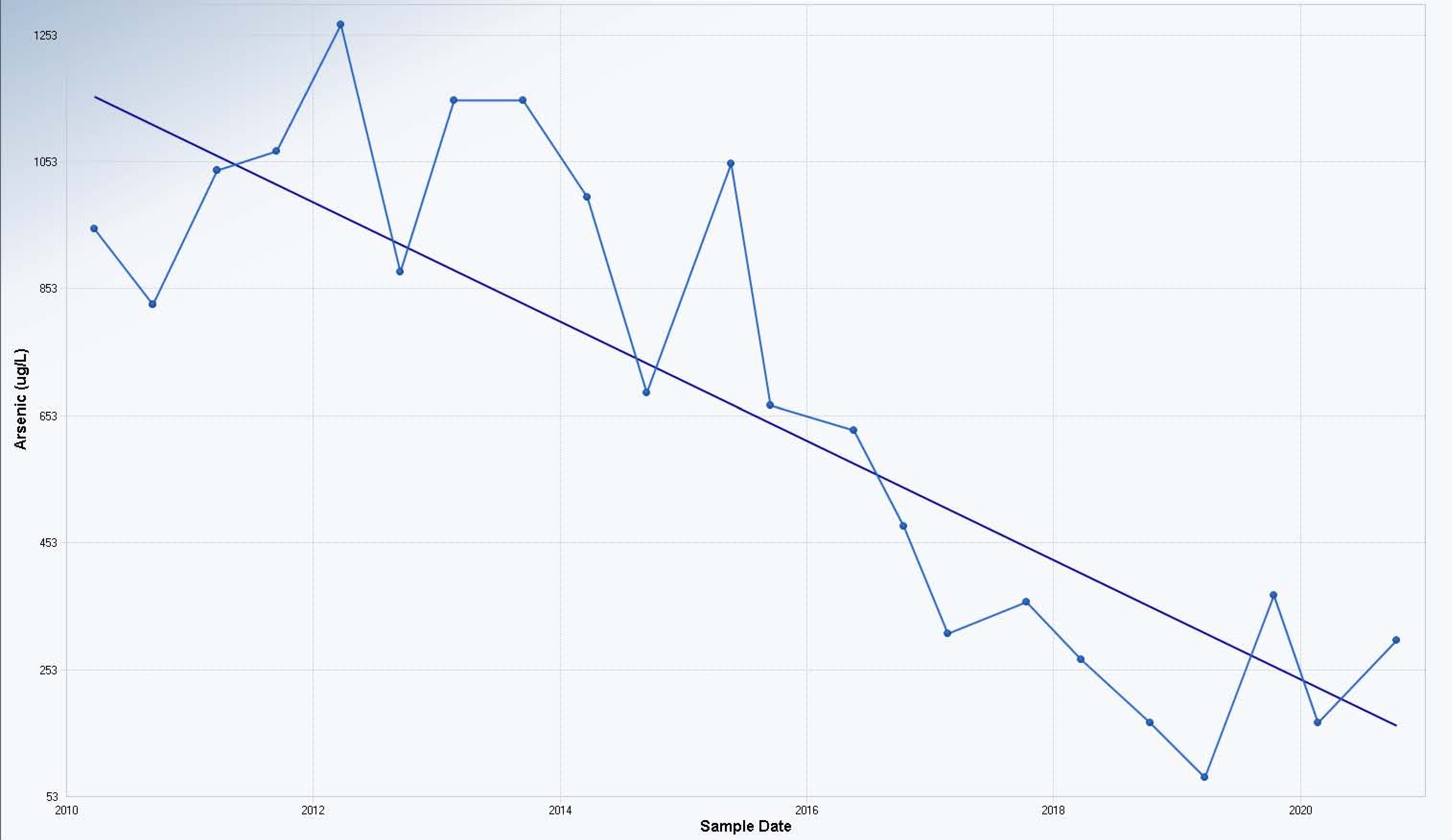
n	12
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	14.5831
Standardized Value of S	-0.3429
M-K Test Value (S)	-6
Tabulated p-value	0.3690
Approximate p-value	0.3659

OLS Regression Line (Blue)

OLS Regression Slope	-0.5342
OLS Regression Intercept	1,140.7267

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test SHM-93-22B 2010 to 2020



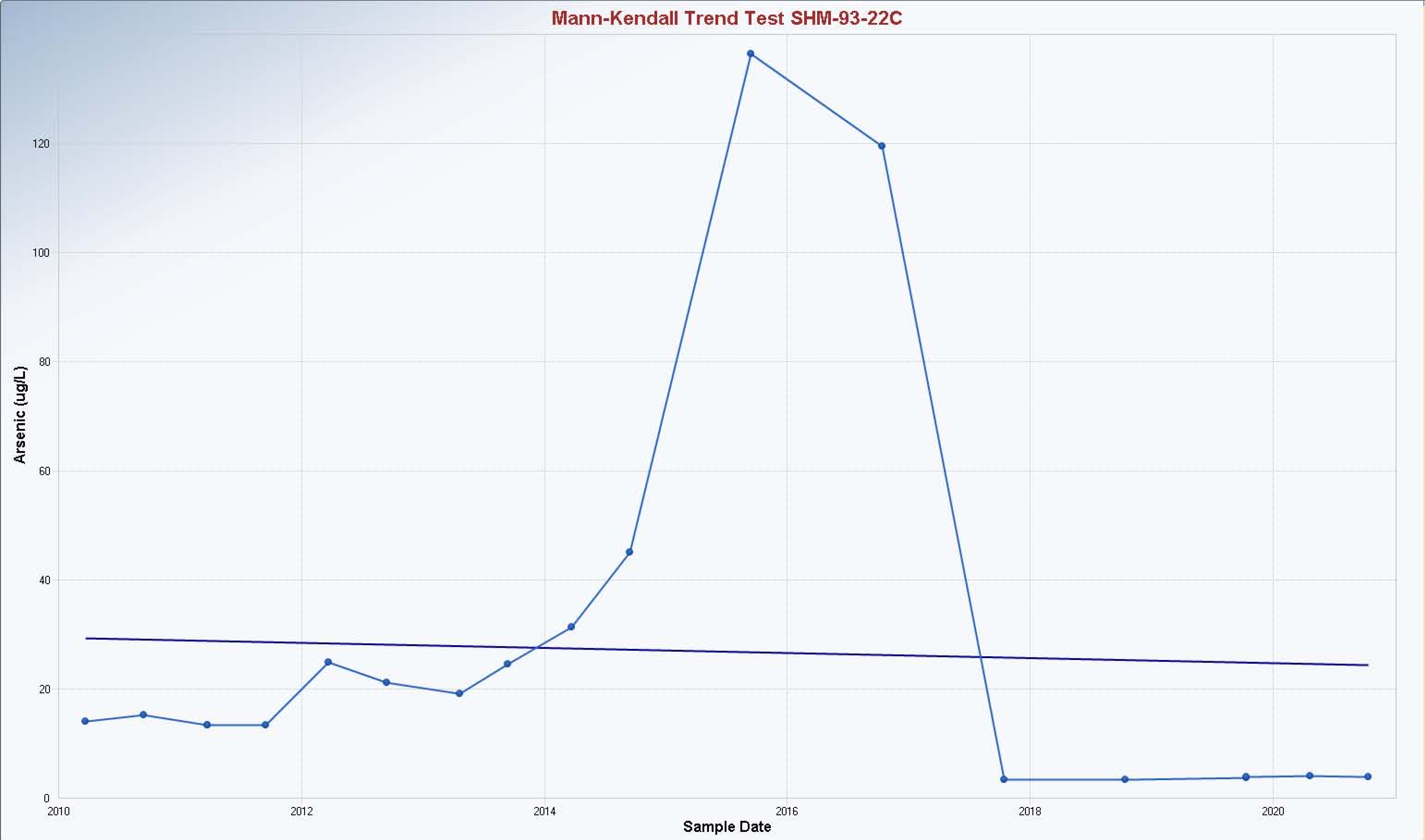
Mann-Kendall Trend Analysis

n	24
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	40.2658
Standardized Value of S	-3.9488
M-K Test Value (S)	-160
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	-93.7776
OLS Regression Intercept	189,679.1776

Statistically significant evidence of a decreasing trend at the specified level of significance.



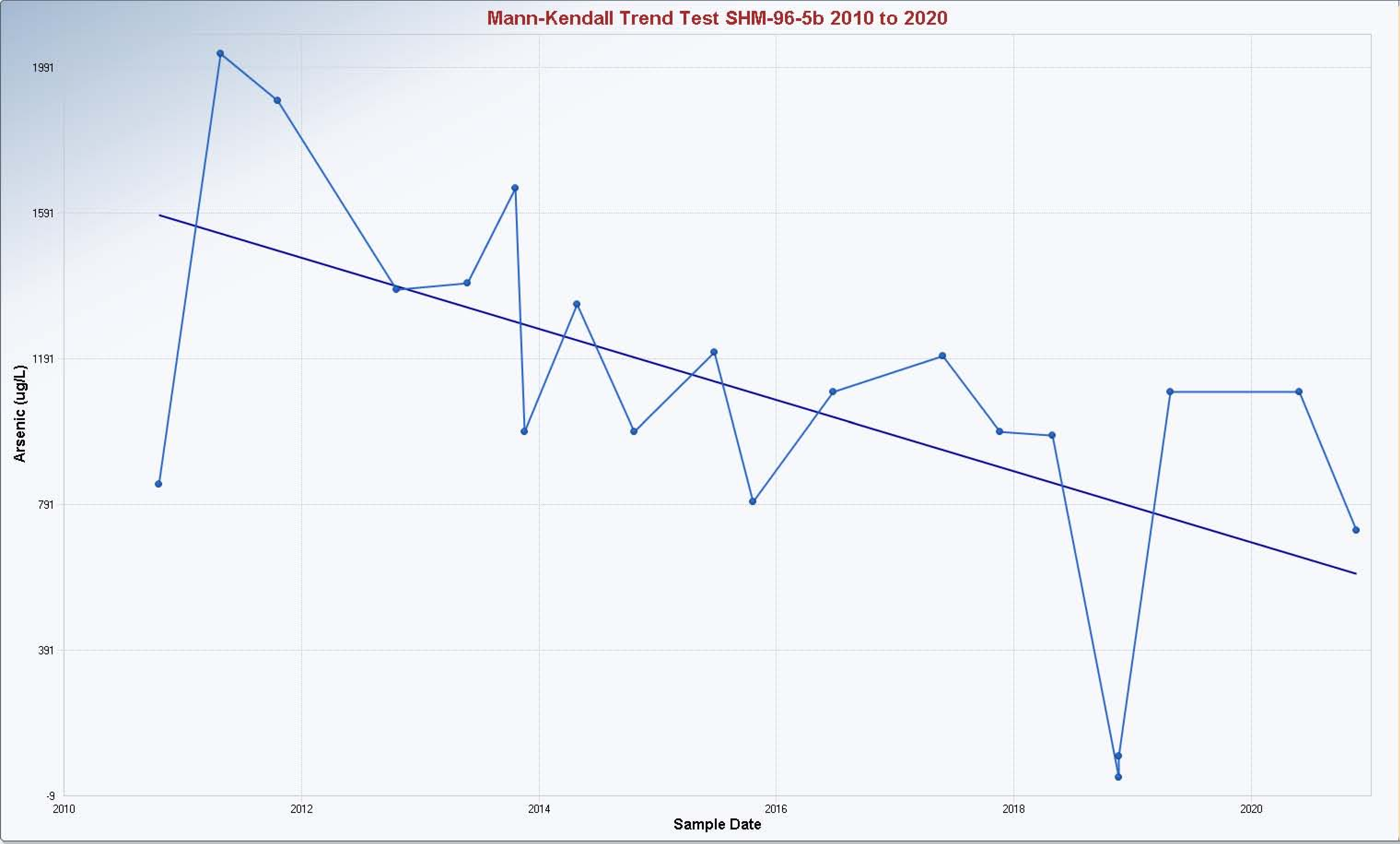
Mann-Kendall Trend Analysis

n	19
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	28.5015
Standardized Value of S	-0.4210
M-K Test Value (S)	-13
Tabulated p-value	0.3390
Approximate p-value	0.3369

OLS Regression Line (Blue)

OLS Regression Slope	-0.4549
OLS Regression Intercept	944.3253

Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis

n	20
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	30.7463
Standardized Value of S	-2.8947
M-K Test Value (S)	-90
Tabulated p-value	0.0020
Approximate p-value	0.0019

OLS Regression Line (Blue)

OLS Regression Slope	-97.7865
OLS Regression Intercept	198,215.0675

Statistically significant evidence of a decreasing trend at the specified level of significance.

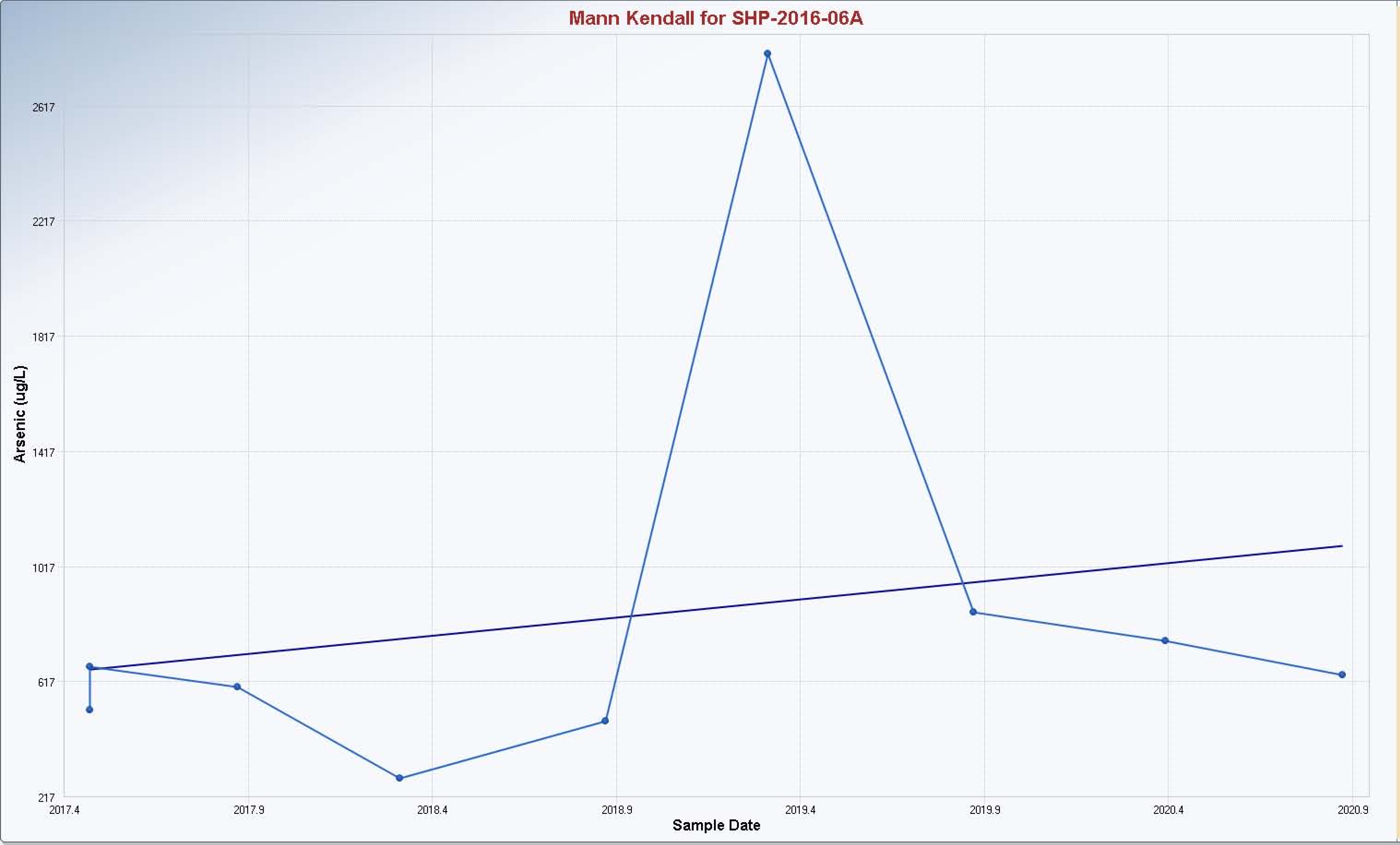
Mann-Kendall Trend Analysis

n	15
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	20.2073
Standardized Value of S	0.2969
M-K Test Value (S)	7
Tabulated p-value	0.3850
Approximate p-value	0.3833

OLS Regression Line (Blue)

OLS Regression Slope	0.5171
OLS Regression Intercept	-1,018.0542

Insufficient statistical evidence of a significant trend at the specified level of significance.



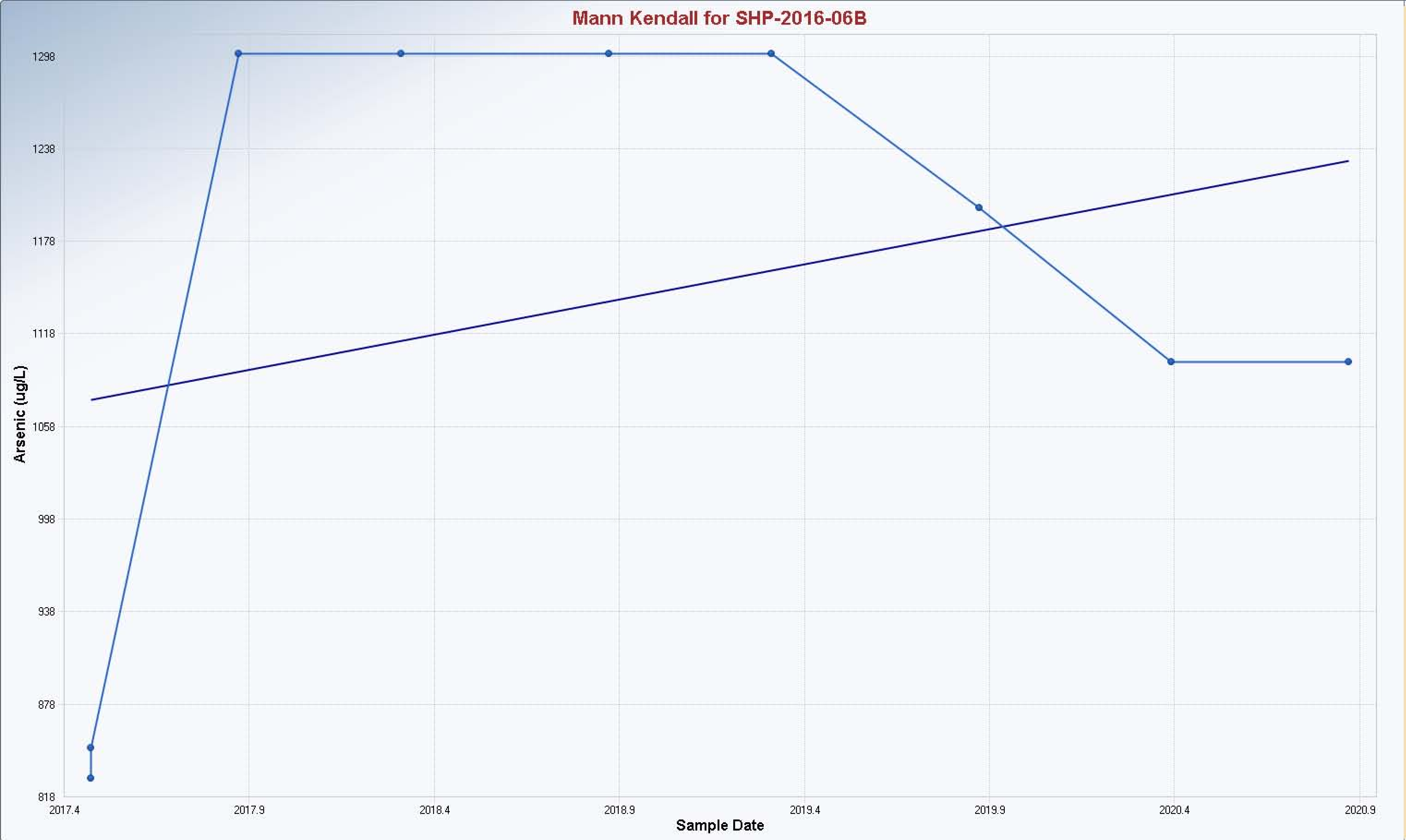
Mann-Kendall Trend Analysis

n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	0.7298
M-K Test Value (S)	8
Tabulated p-value	0.2380
Approximate p-value	0.2328

OLS Regression Line (Blue)

OLS Regression Slope	125.7770
OLS Regression Intercept	-253,091.5996

Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis

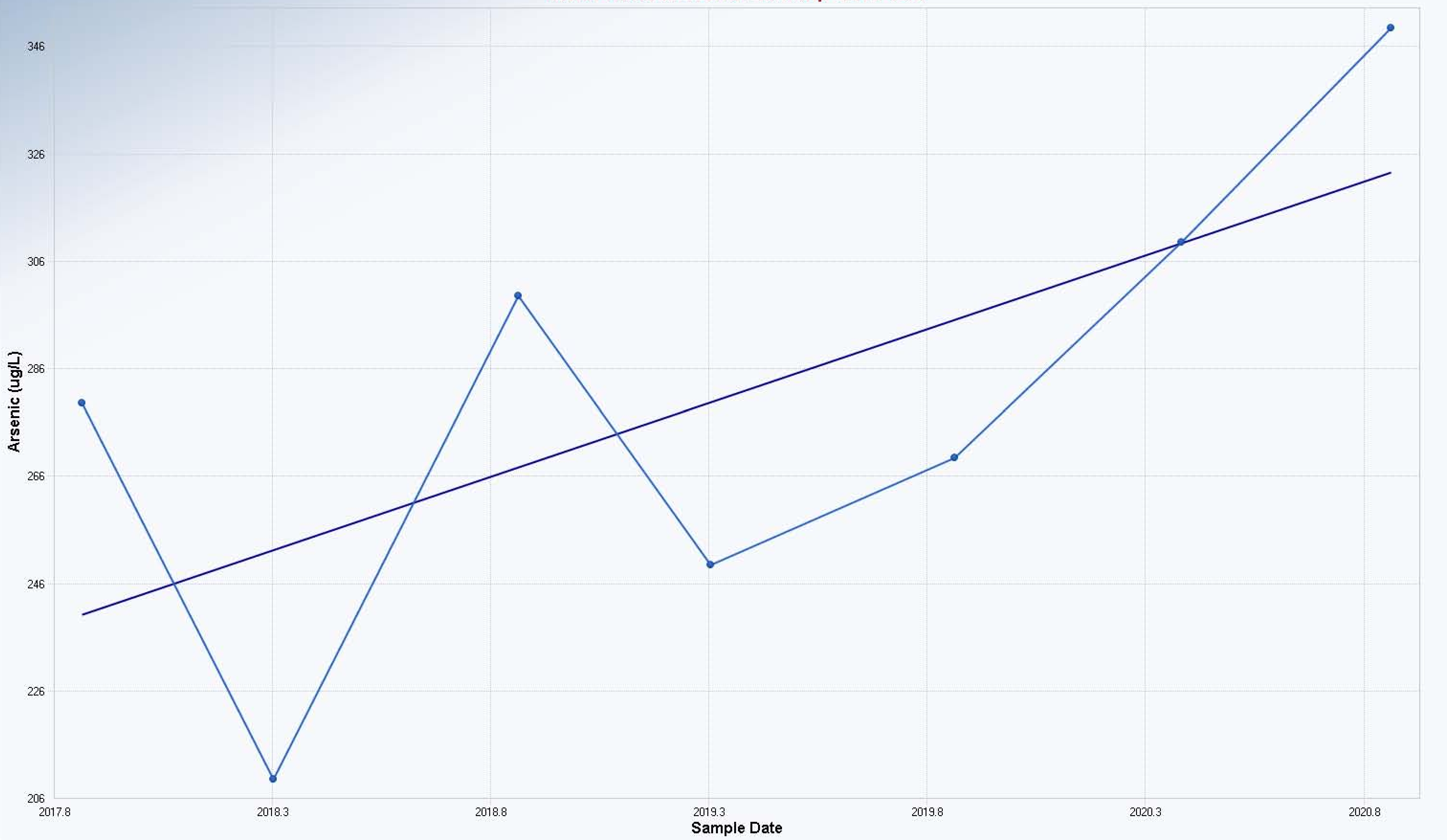
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.0738
Standardized Value of S	0.0000
M-K Test Value (S)	1
Tabulated p-value	0.5400
Approximate p-value	0.5000

OLS Regression Line (Blue)

OLS Regression Slope	45.5729
OLS Regression Intercept	-90,867.0659

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test shp-2016-06C



Mann-Kendall Trend Analysis	
n	7
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	6.6583
Standardized Value of S	1.5019
M-K Test Value (S)	11
Tabulated p-value	0.0680
Approximate p-value	0.0666

OLS Regression Line (Blue)	
OLS Regression Slope	27.4544
OLS Regression Intercept	-55,159.0230

Insufficient statistical evidence of a significant trend at the specified level of significance.

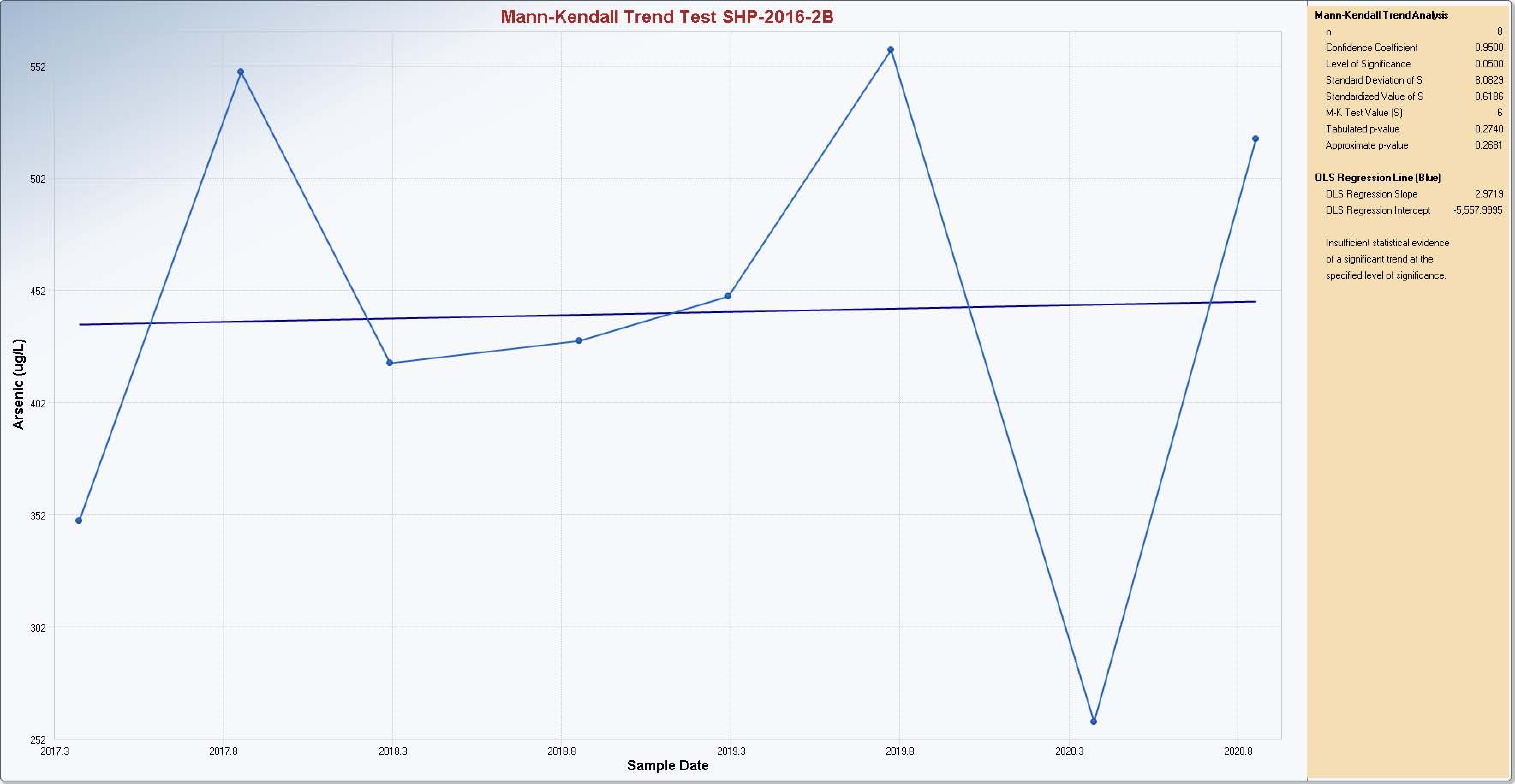
Mann-Kendall Trend Analysis

n	7
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	6.5828
Standardized Value of S	
M-K Test Value (S)	0
Tabulated p-value	0.5000
Approximate p-value	

OLS Regression Line (Blue)

OLS Regression Slope	-1.1468
OLS Regression Intercept	2,454.3149

Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Test SHP-2016-2B
Arsenic (ug/L)
552
502
452
402
352
302
252
2017.3
2017.8
2018.3
2018.8
2019.3
2019.8
2020.3
2020.8
Sample Date
Mann-Kendall Trend Analysis
n 8
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 8.0829
Standardized Value of S 0.6186
M-K Test Value (S) 6
Tabulated p-value 0.2740
Approximate p-value 0.2681
OLS Regression Line (Blue)
OLS Regression Slope 2.9719
OLS Regression Intercept -5,557.9995
Insufficient statistical evidence
of a significant trend at the
specified level of significance.

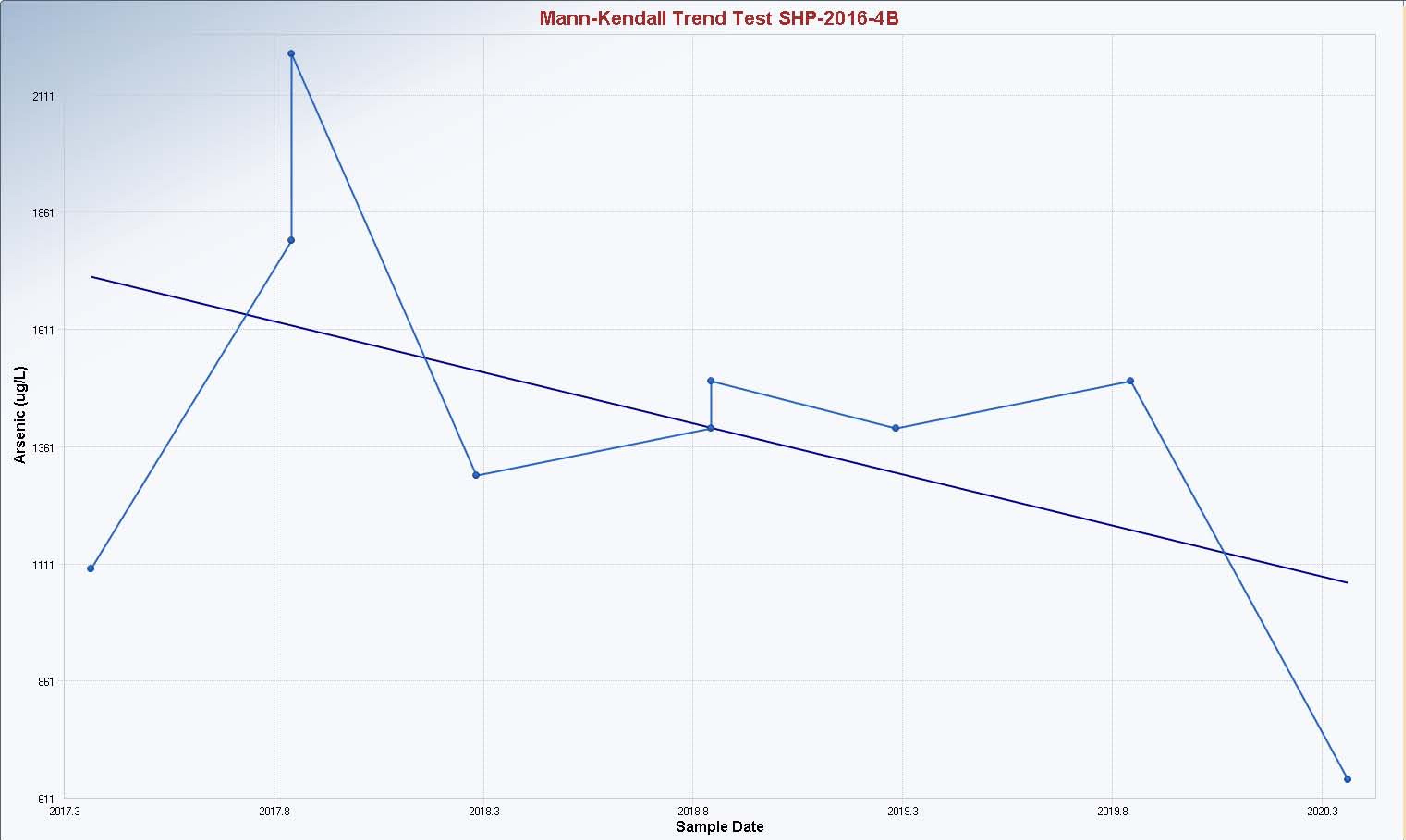
Mann-Kendall Trend Analysis

n	7
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	6.3770
Standardized Value of S	-2.0386
M-K Test Value (S)	-14
Tabulated p-value	0.0150
Approximate p-value	0.0207

OLS Regression Line (Blue)

OLS Regression Slope	-26.3200
OLS Regression Intercept	53,363.3351

Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis

n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.4868
Standardized Value of S	-0.3162
M-K Test Value (S)	-4
Tabulated p-value	0.3810
Approximate p-value	0.3759

OLS Regression Line (Blue)

OLS Regression Slope	-217.0491
OLS Regression Intercept	439,597.9148

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Analysis

n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.3986
Standardized Value of S	0.2128
M-K Test Value (S)	3
Tabulated p-value	0.4600
Approximate p-value	0.4157

OLS Regression Line (Blue)

OLS Regression Slope	-0.0252
OLS Regression Intercept	674.2121

Insufficient statistical evidence of a significant trend at the specified level of significance.

Attachment 2

Mann-Kendall Statistical Analysis Plots for NIA Wells Post ATP Extraction Well Installation (March 2006-2020)

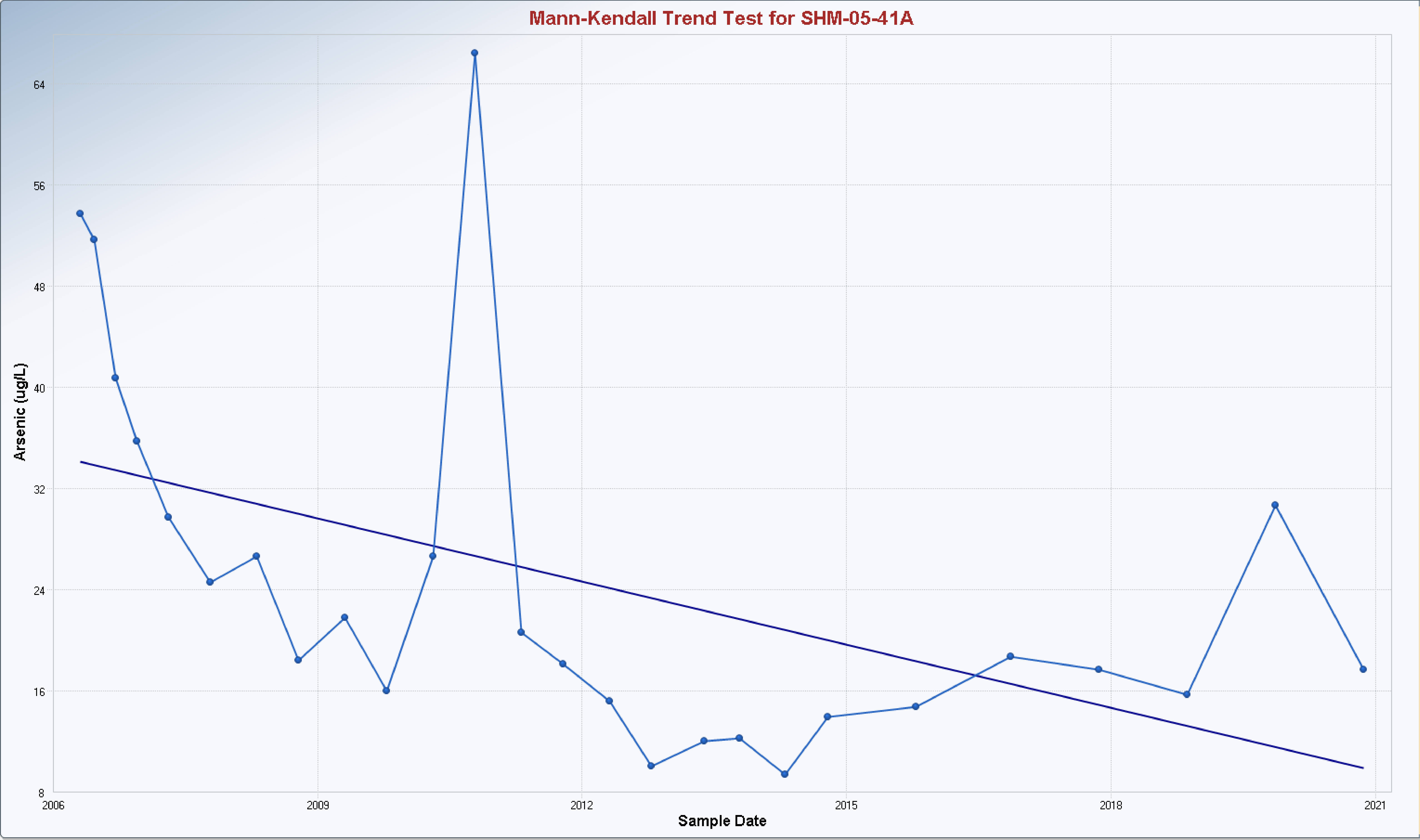
Mann-Kendall Trend Analysis

n	22
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	35.4354
Standardized Value of S	-4.2895
M-K Test Value (S)	-153
Tabulated p-value	0.0000
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	-146.1817
OLS Regression Intercept	297,409.5924

Statistically significant evidence of a decreasing trend at the specified level of significance.



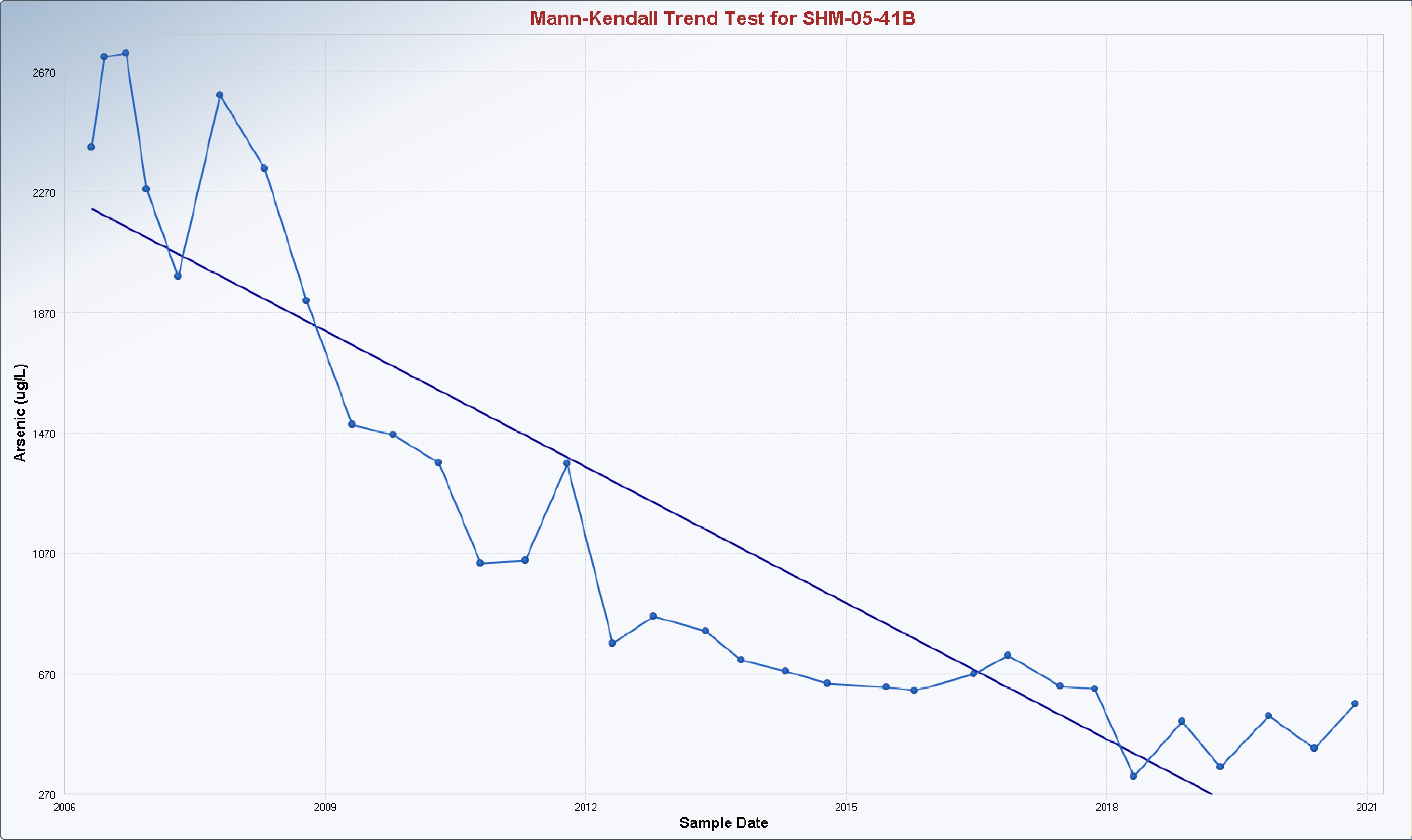
Mann-Kendall Trend Analysis

n	26
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	45.3468
Standardized Value of S	-3.3519
M-K Test Value (S)	-153
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0004

OLS Regression Line (Blue)

OLS Regression Slope	-1.6618
OLS Regression Intercept	3,368.5943

Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis

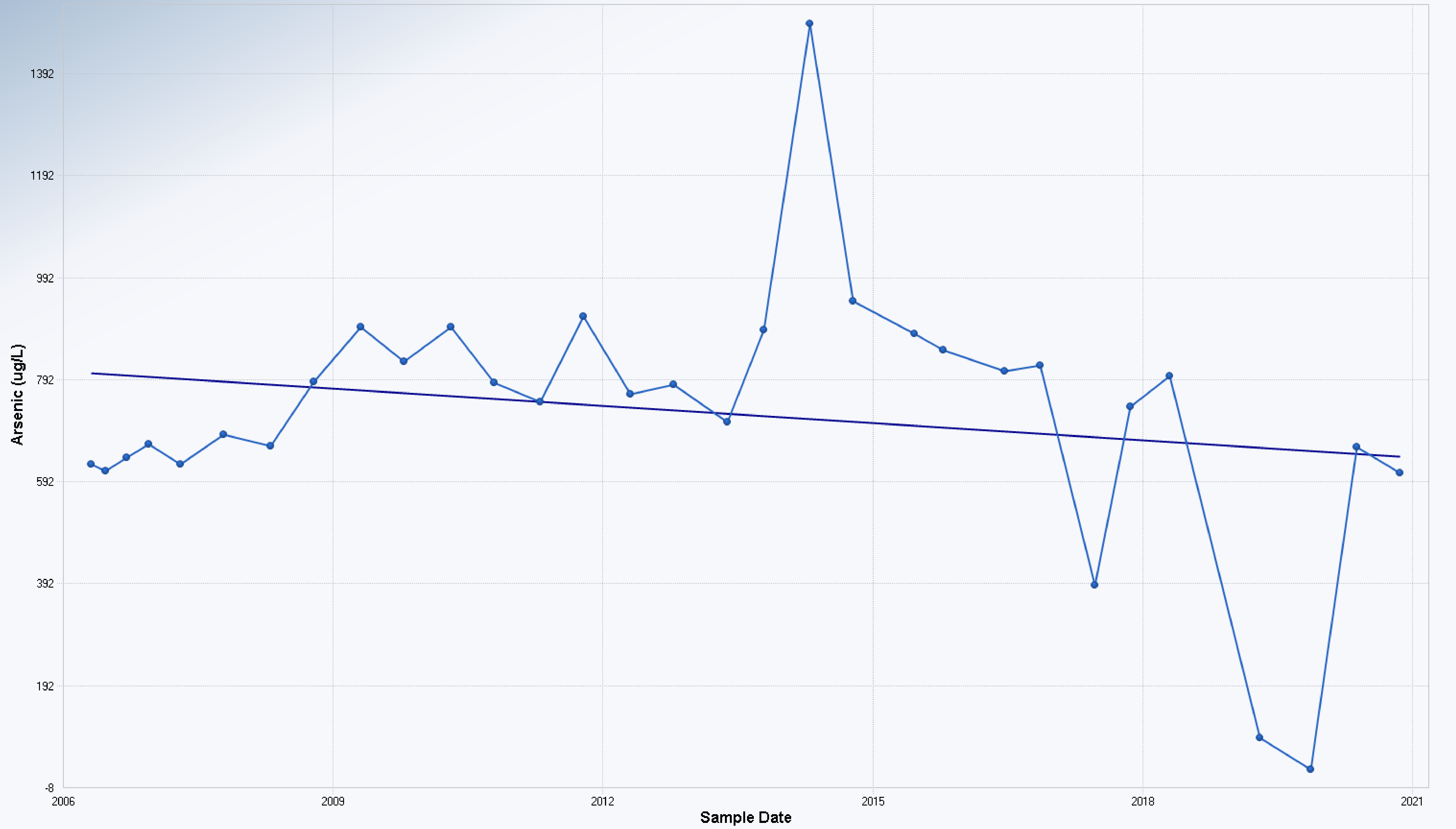
n	32
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	61.6658
Standardized Value of S	-6.8271
M-K Test Value (S)	-422
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	-150.8877
OLS Regression Intercept	304,944.4059

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test for SHM-05-41C



Mann-Kendall Trend Analysis

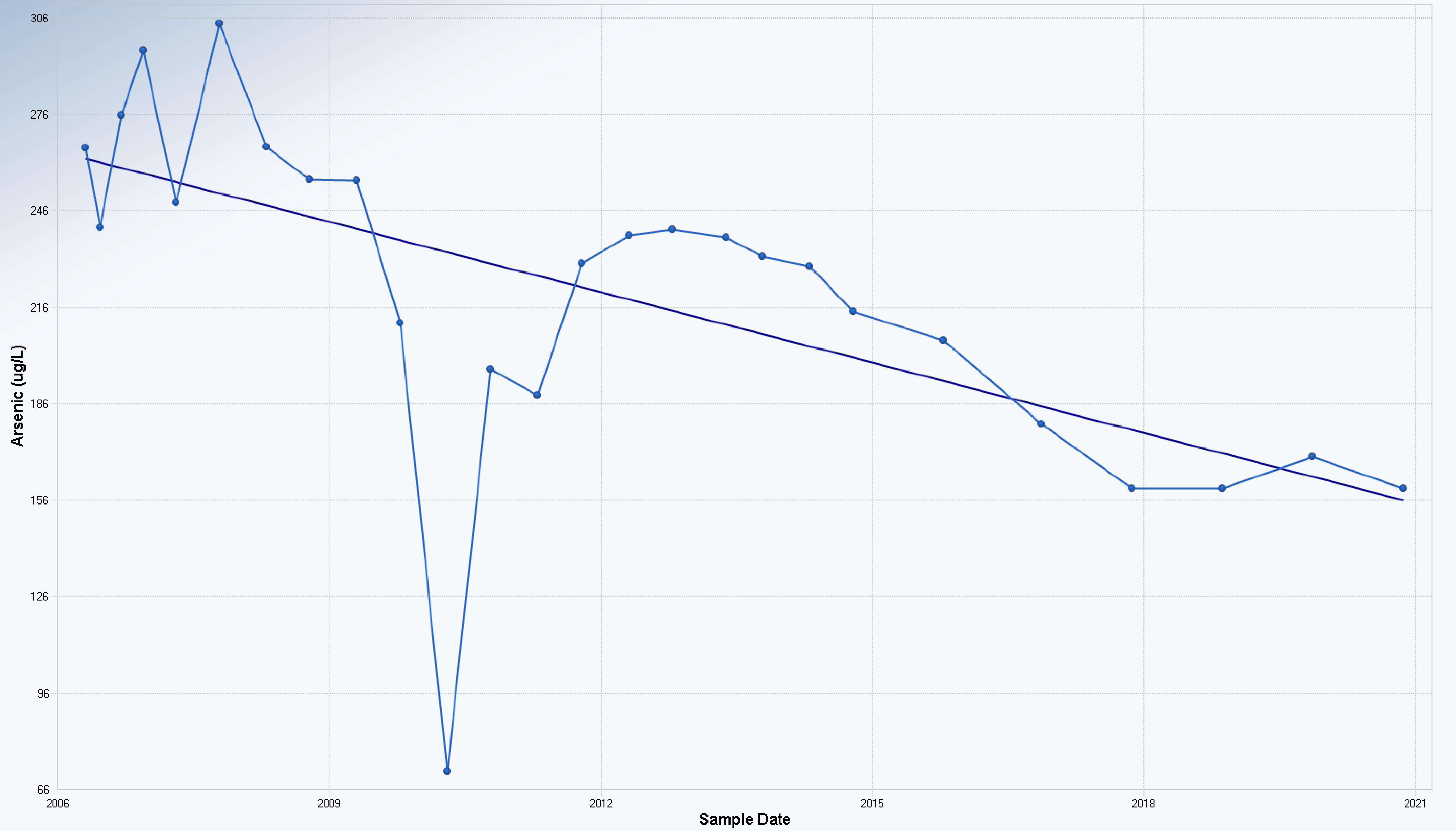
n	31
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	58.8359
Standardized Value of S	0.2040
M-K Test Value (S)	13
Appx. Critical Value (0.05)	1.6449
Approximate p-value	0.4192

OLS Regression Line (Blue)

OLS Regression Slope	-11.2874
OLS Regression Intercept	23,451.8820

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test for SHM-05-42B



Mann-Kendall Trend Analysis

n	26
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	45.3284
Standardized Value of S	-4.3019
M-K Test Value (S)	-196
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	-7.3049
OLS Regression Intercept	14,918.5910

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test for SHM-99-31C

Mann-Kendall Trend Analysis

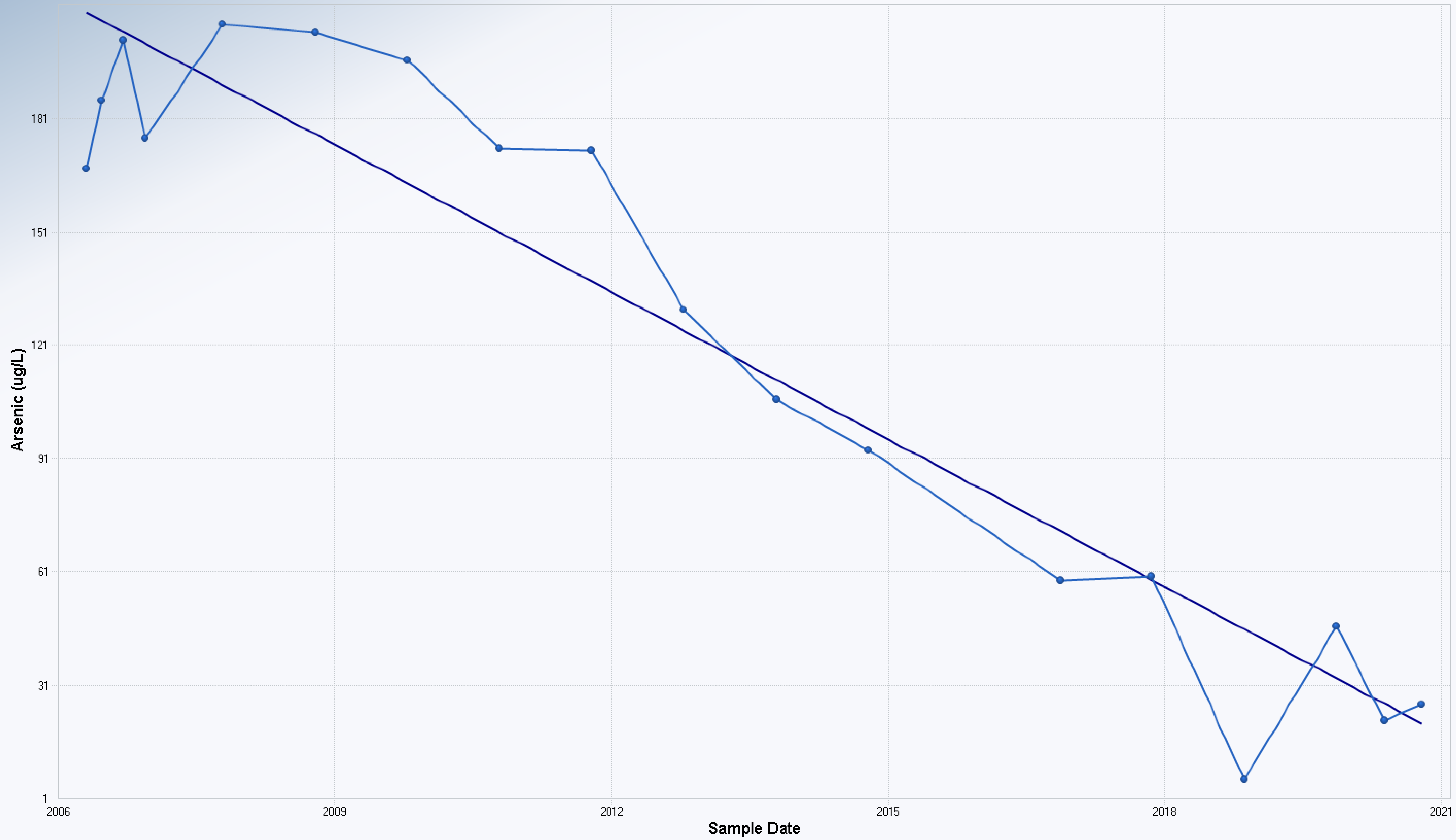
n	19
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	28.5307
Standardized Value of S	-4.6616
M-K Test Value (S)	-134
Tabulated p-value	0.0000
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	-9.4895
OLS Regression Intercept	19,324.2547

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test for SHM-99-32X



Mann-Kendall Trend Analysis

n	18
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	26.4008
Standardized Value of S	-4.0908
M-K Test Value (S)	-109
Tabulated p-value	0.0000
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	-13.0109
OLS Regression Intercept	26,313.5466

Statistically significant evidence of a decreasing trend at the specified level of significance.

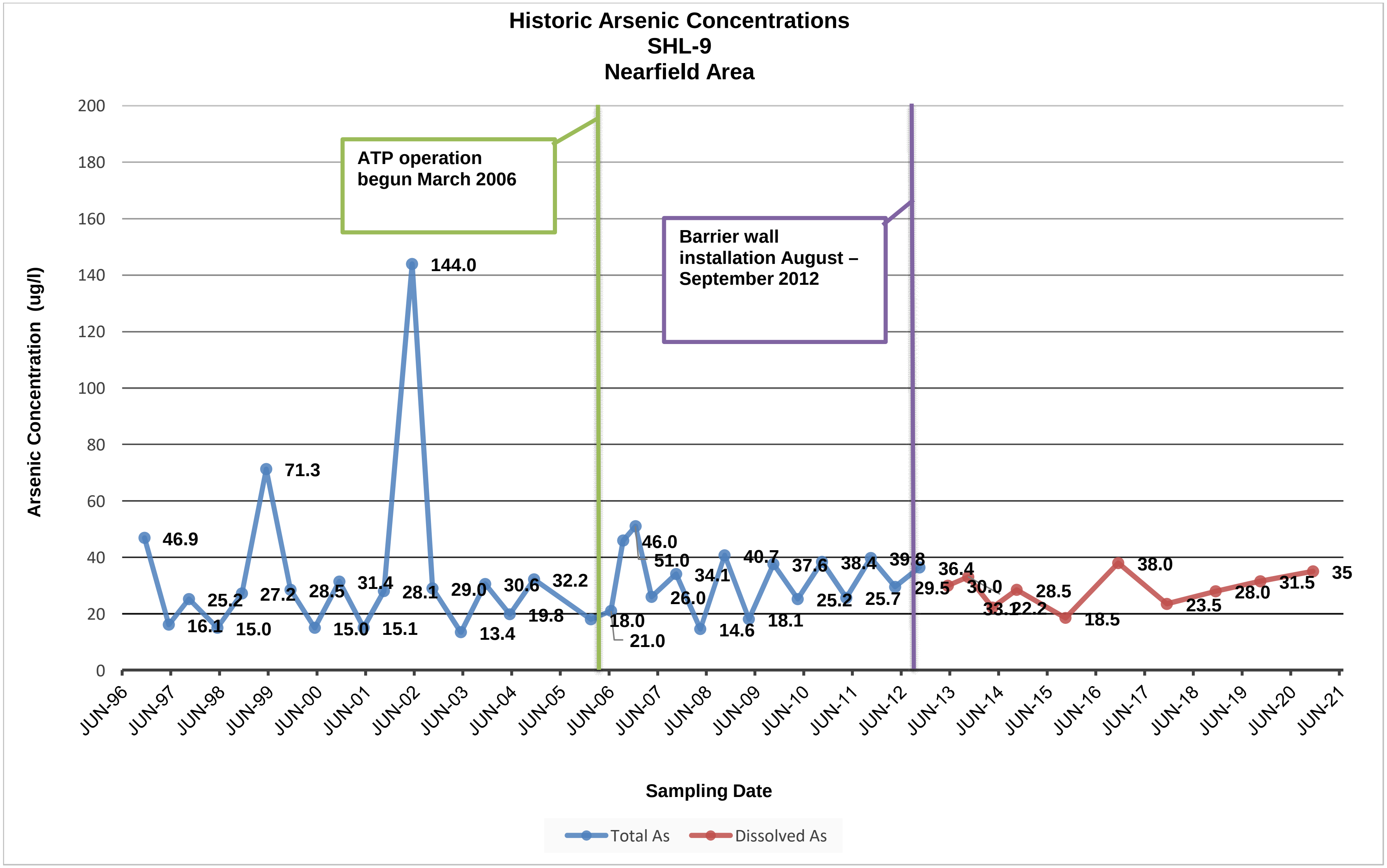
Attachment 3

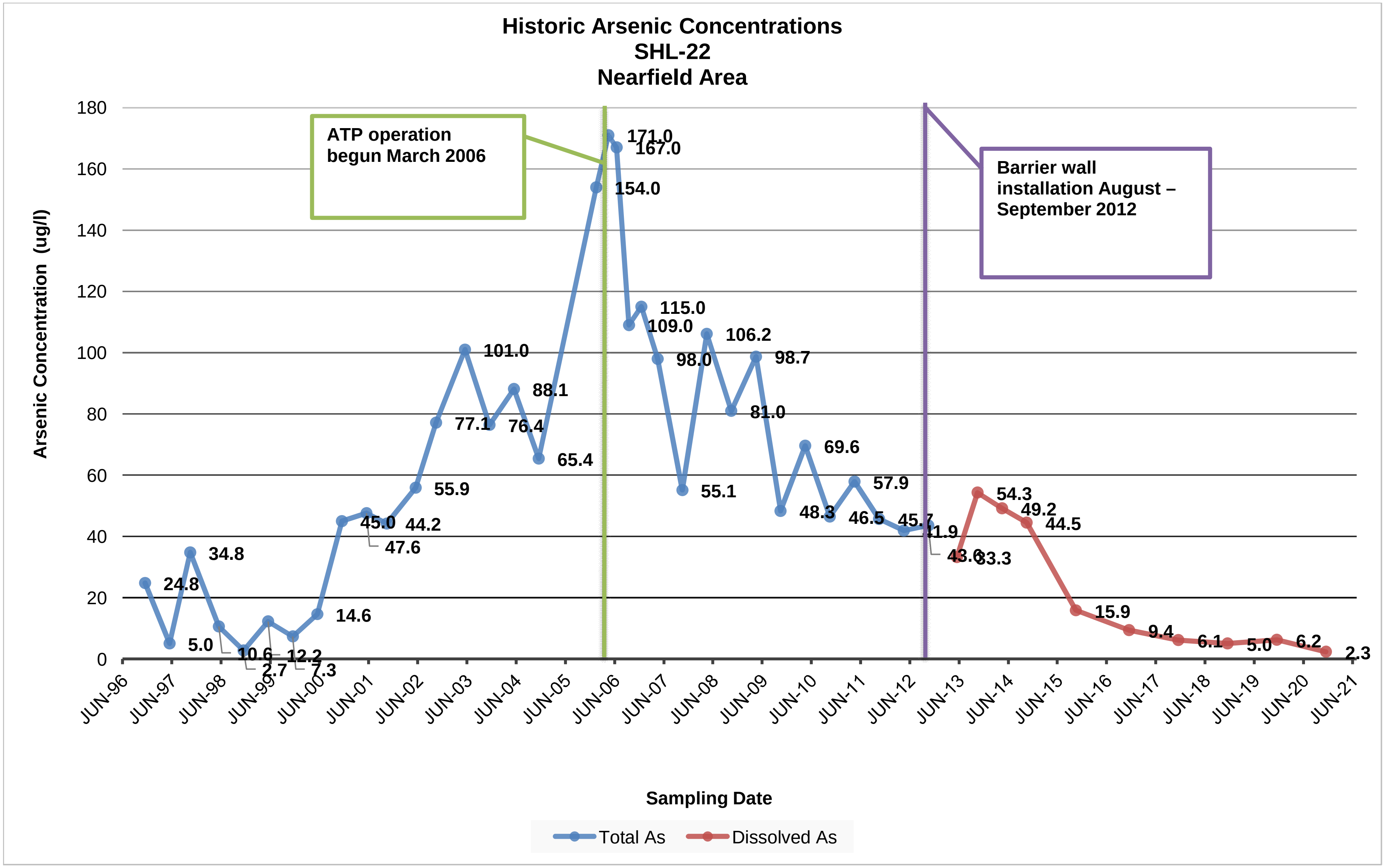
Arsenic Trend Plots and Mann-Kendall Statistical Analysis Plots for Nearfield Area Wells Pre and Post ATP Extraction Well Installation

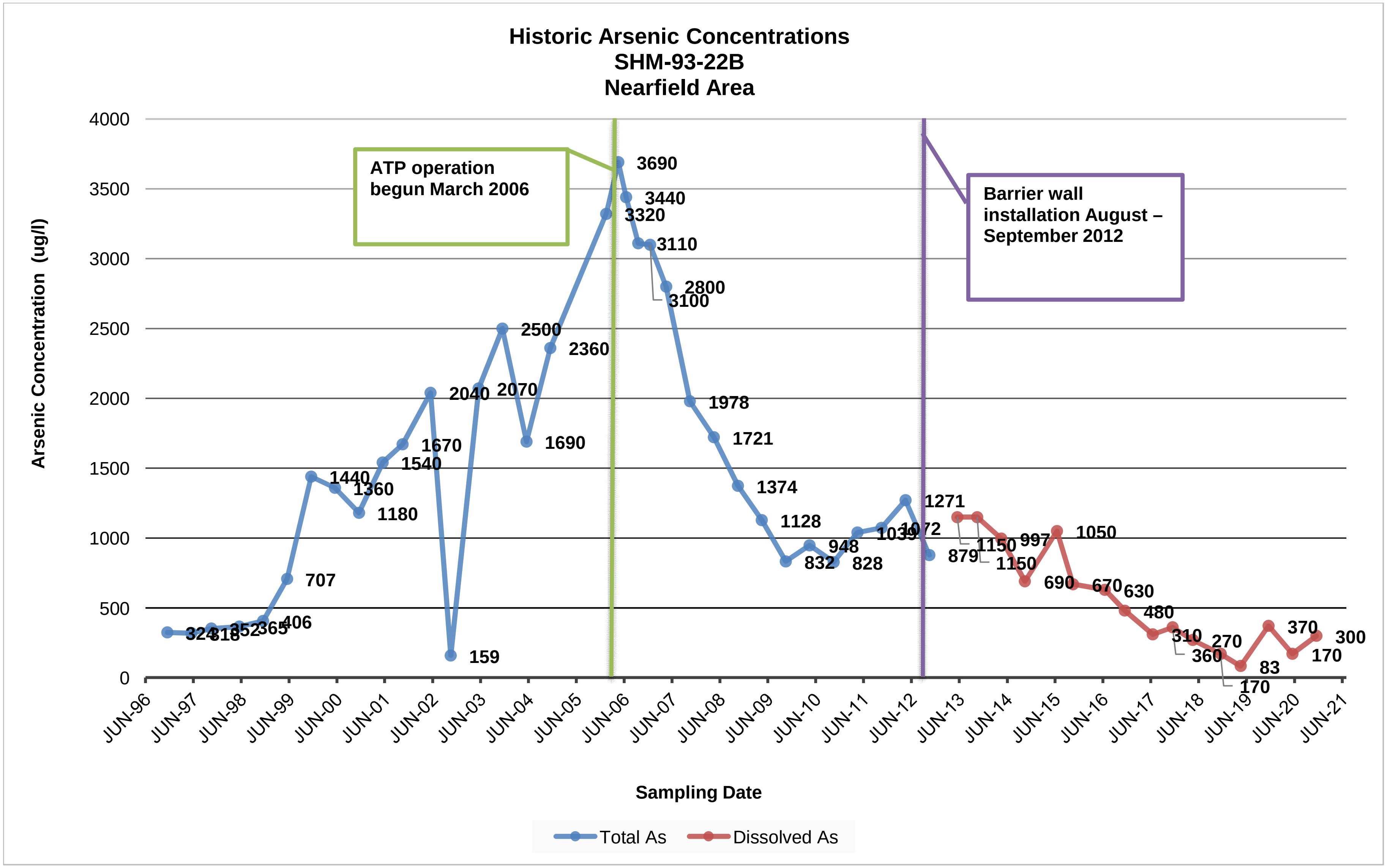
Arsenic Trend Plots

Attachment 3
Arsenic Trend Graphs
Shepley's Hill Landfill, Former Fort Devens Army Installation, Massachusetts

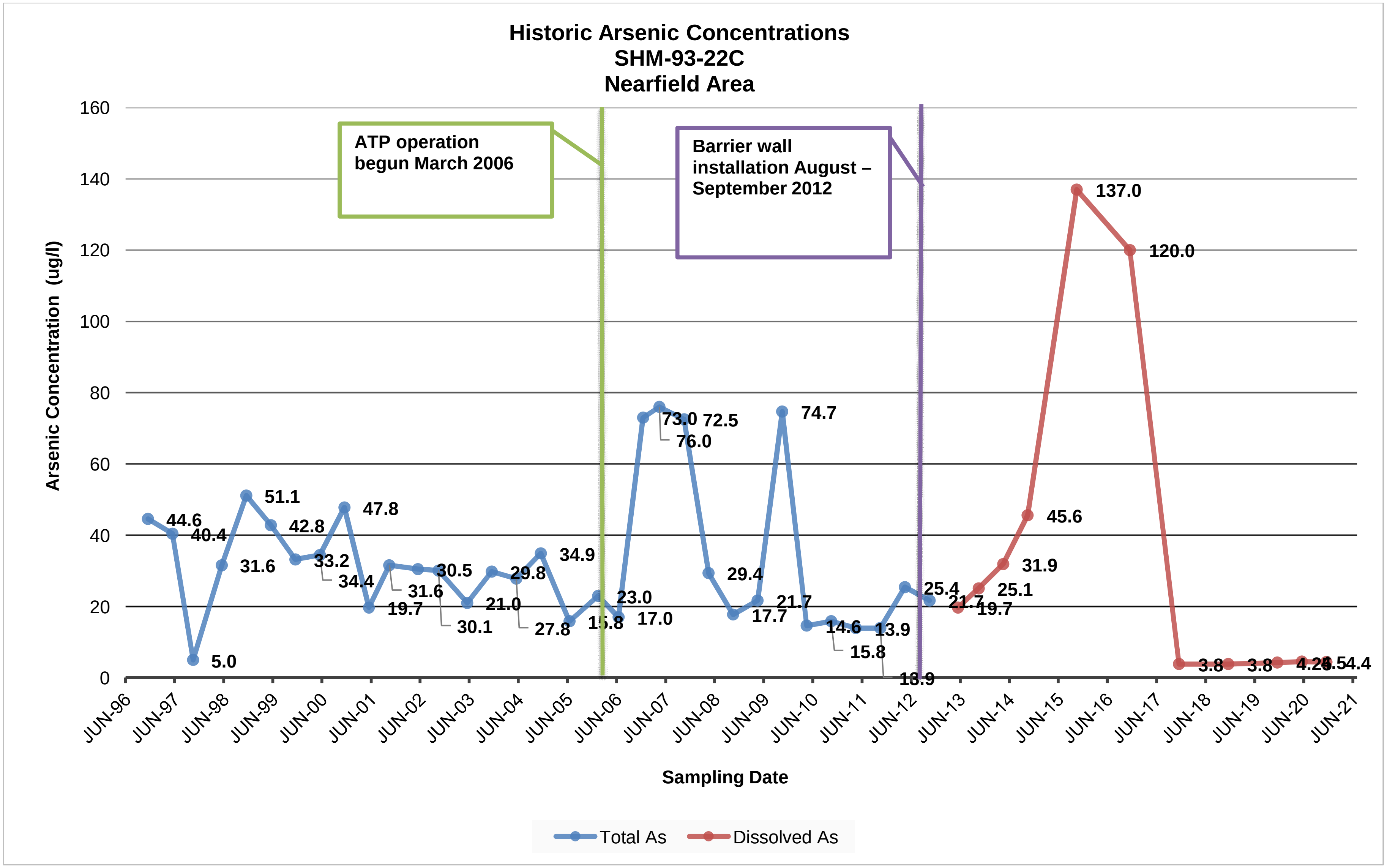
SERES Engineering & Services, LLC
ARCADIS
a joint venture

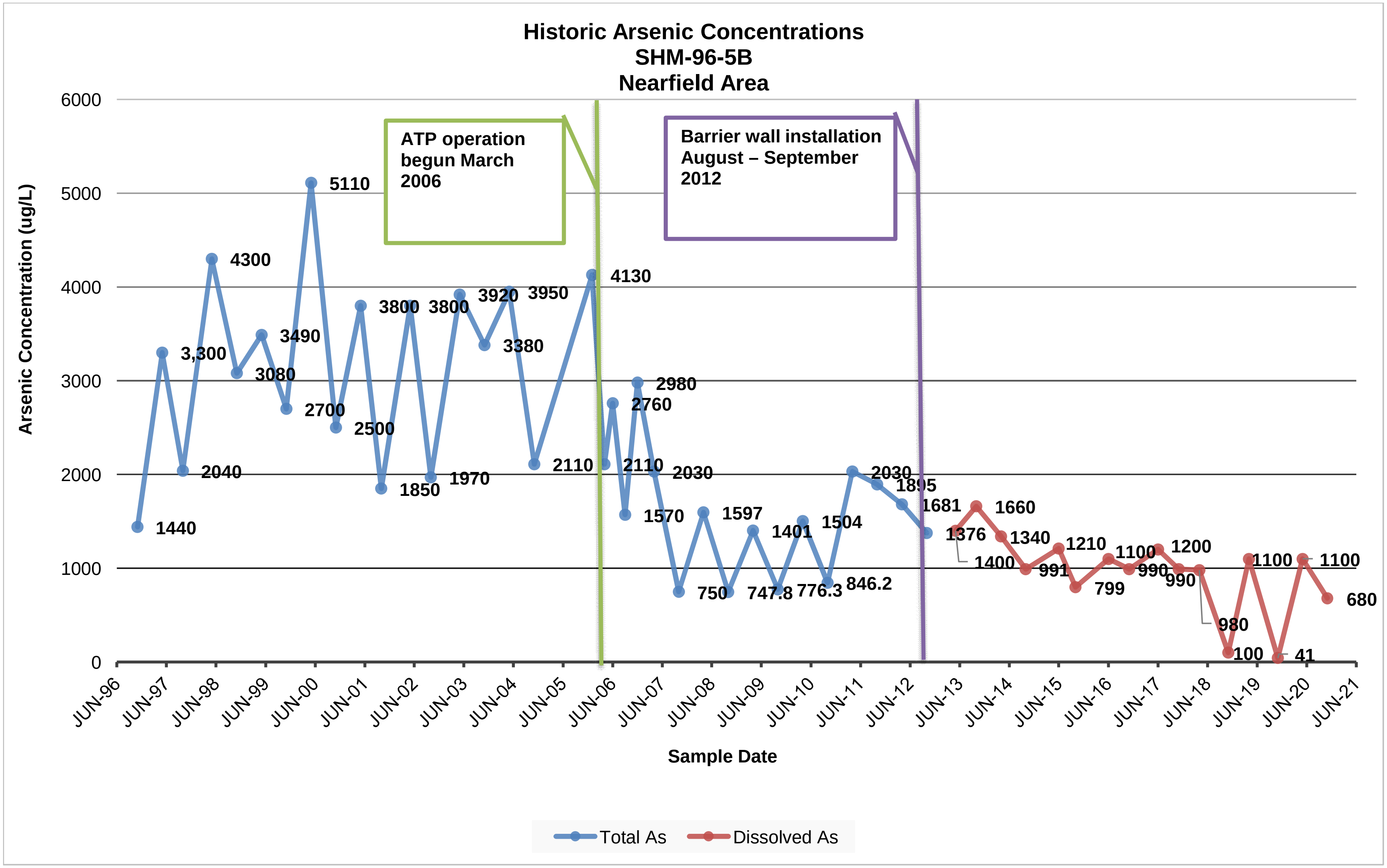


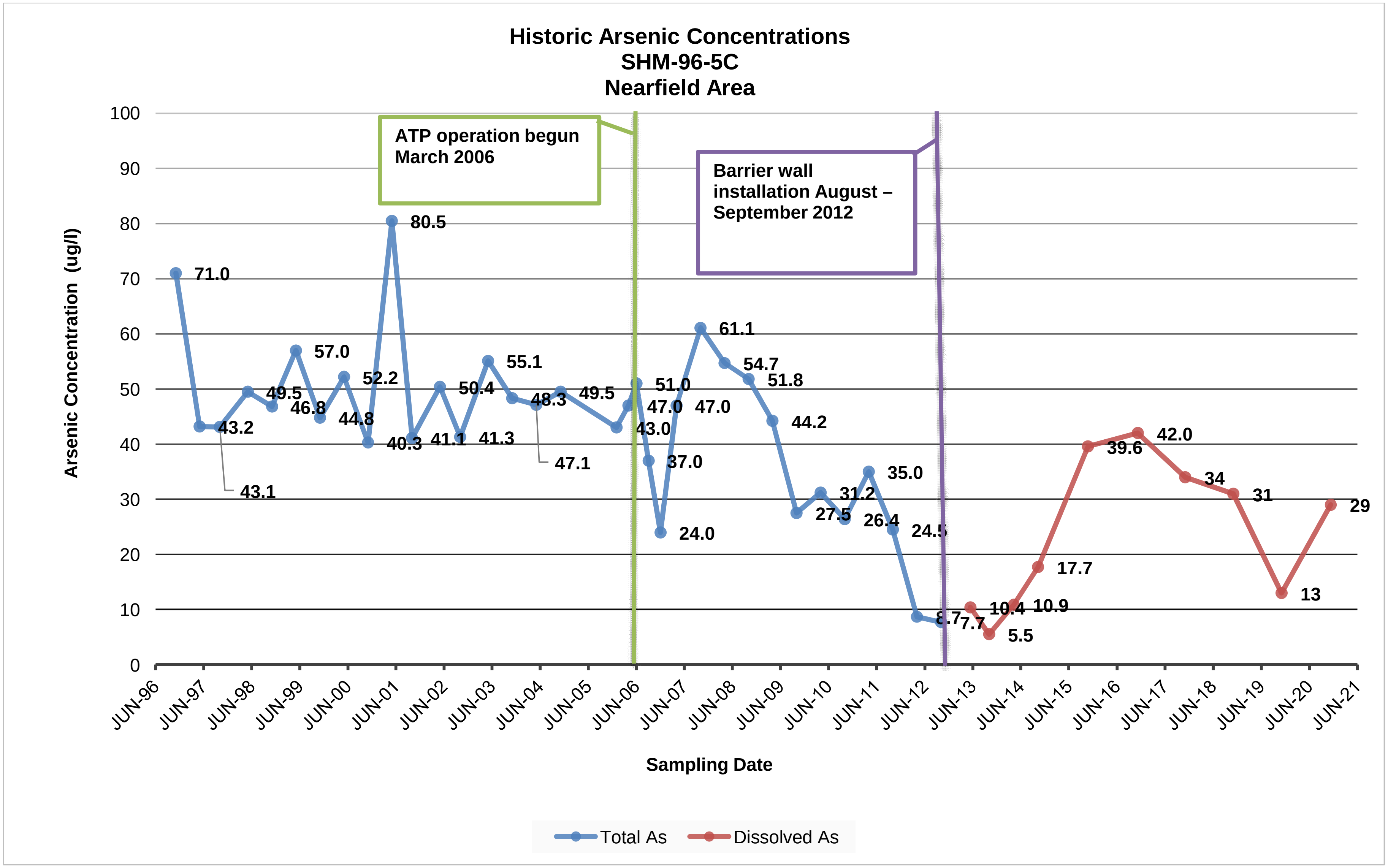

Historic Arsenic Concentrations
SHL-22
Nearfield Area
ATP operation begun March 2006
Barrier wall installation August – September 2012
Arsenic Concentration (ug/l)
Sampling Date
Total As
Dissolved As


Historic Arsenic Concentrations
SHM-93-22B
Nearfield Area
ATP operation begun March 2006
Barrier wall installation August – September 2012
Arsenic Concentration (ug/l)
Sampling Date
Total As
Dissolved As

SERES Engineering & Services, LLC
ARCADIS
a joint venture




Historic Arsenic Concentrations
SHM-96-5B
Nearfield Area
ATP operation begun March 2006
Barrier wall installation August – September 2012
Arsenic Concentration (ug/L)
Sample Date
Total As
Dissolved As


Historic Arsenic Concentrations
SHM-96-5C
Nearfield Area
ATP operation begun March 2006
Barrier wall installation August – September 2012
Arsenic Concentration (ug/l)
100
90
80
70
60
50
40
30
20
10
0
71.0
43.2
43.1
49.5
46.8
57.0
44.8
52.2
40.3
80.5
41.1
50.4
41.3
55.1
48.3
47.1
49.5
43.0
47.0
51.0
37.0
24.0
47.0
61.1
54.7
51.8
44.2
27.5
31.2
35.0
26.4
24.5
8.7
7.7
10.4
5.5
10.9
17.7
39.6
42.0
34
31
13
29
JUN-96
JUN-97
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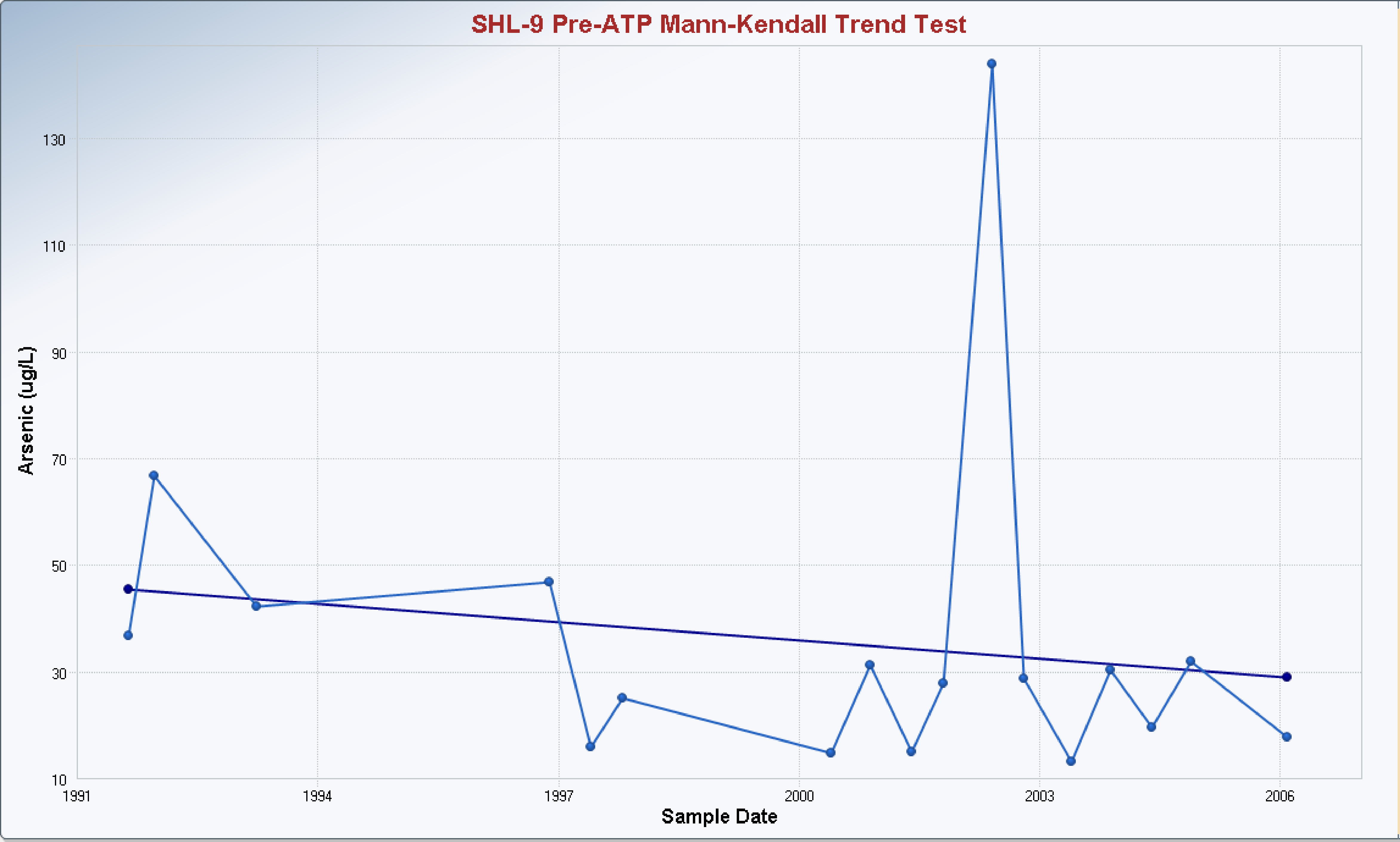
JUN-15
JUN-16
JUN-17
JUN-18
JUN-19
JUN-20
JUN-21
Sampling Date
Total As
Dissolved As

Mann-Kendall Statistical Analysis Plots for Nearfield Area Wells Pre and Post ATP Extraction Well Installation



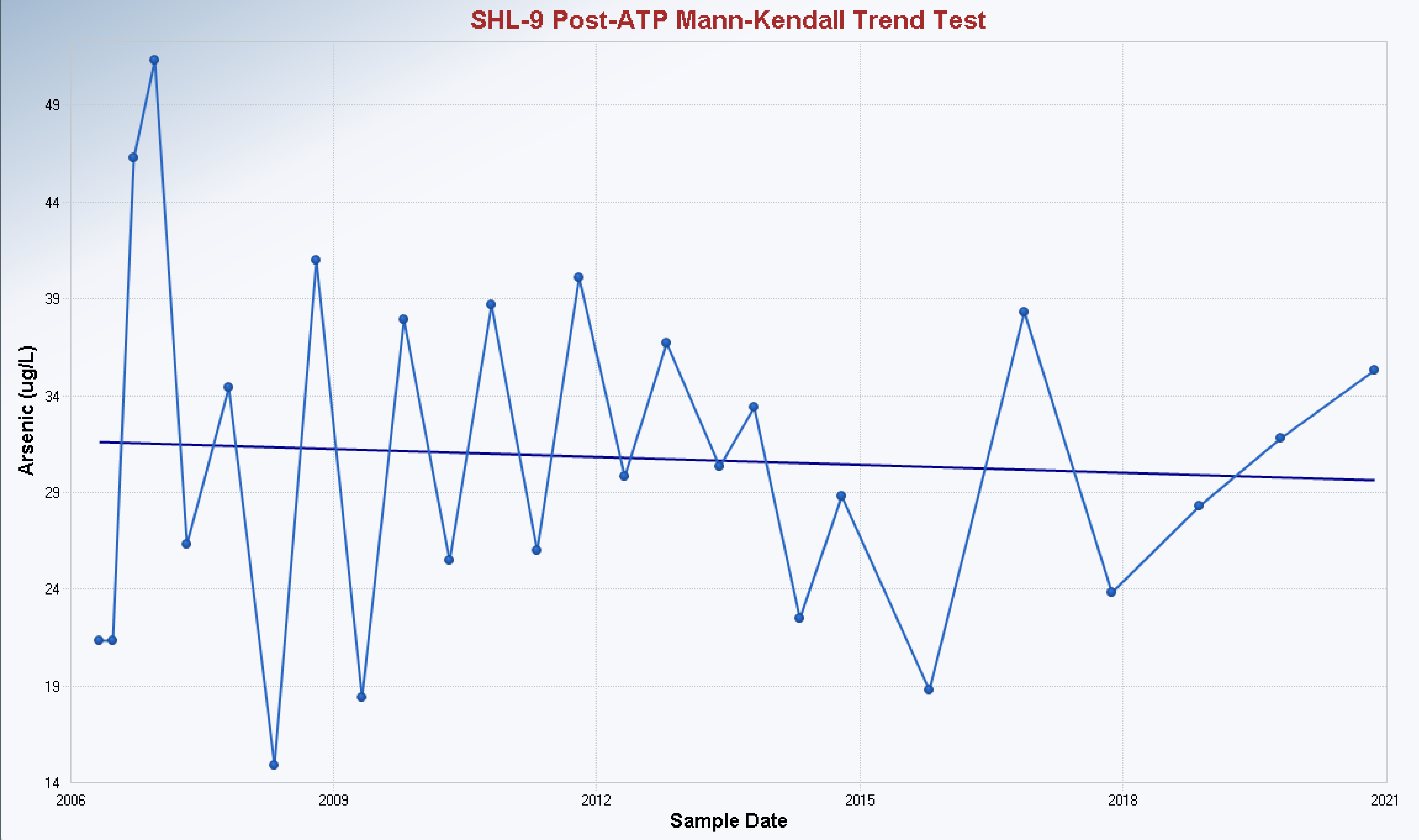
Mann-Kendall Trend Analysis

n	17
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	24.2762
Standardized Value of S	-1.1946
M-K Test Value (S)	-30
Tabulated p-value	0.1180
Approximate p-value	0.1161

OLS Regression Line (Blue)

OLS Regression Slope	-1.1364
OLS Regression Intercept	2,308.8433

Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis

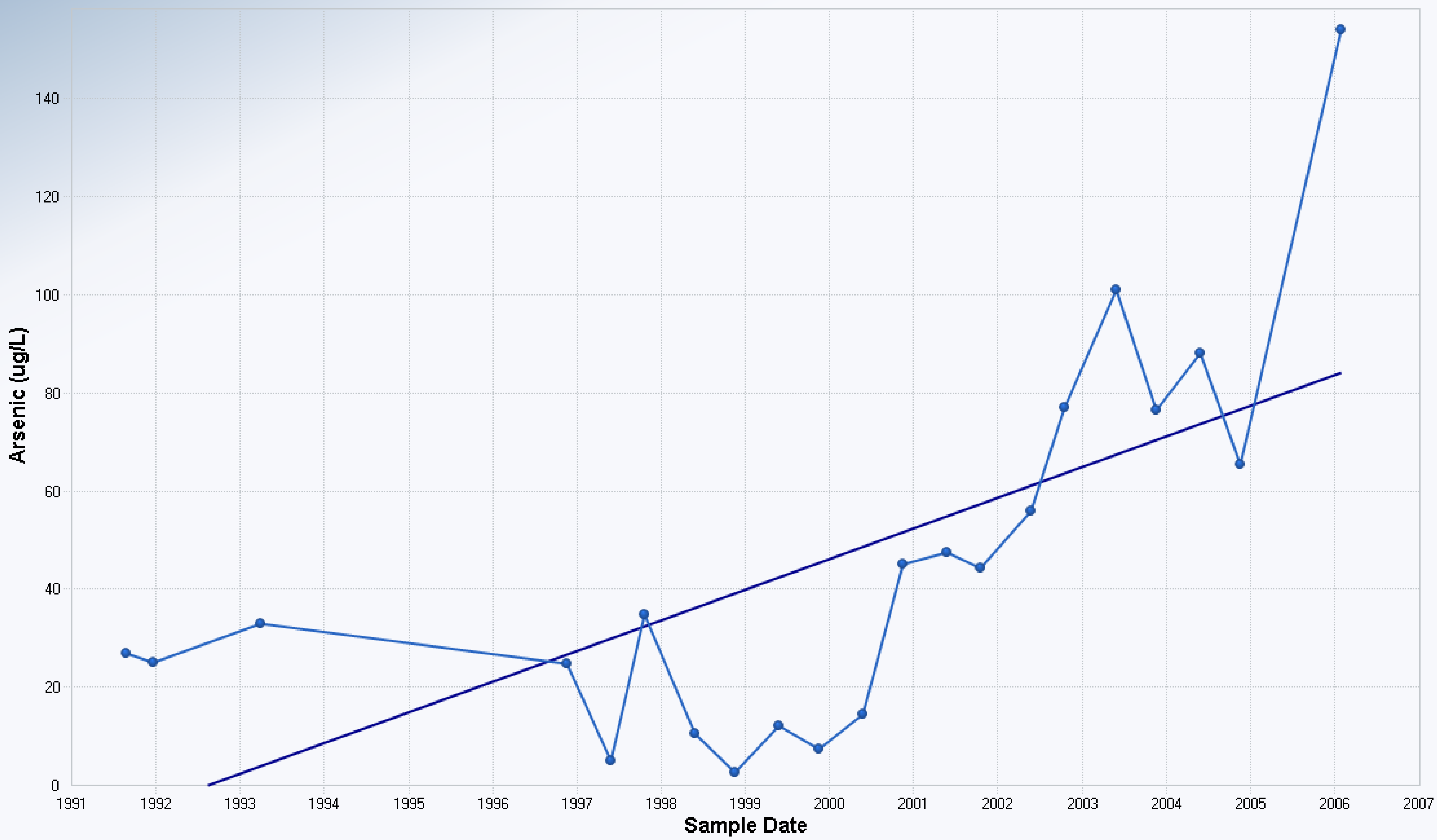
n	26
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	45.3578
Standardized Value of S	-0.1102
M-K Test Value (S)	-6
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.4561

OLS Regression Line (Blue)

OLS Regression Slope	-0.1360
OLS Regression Intercept	304.1699

Insufficient statistical evidence of a significant trend at the specified level of significance.

SHL-22 Pre-ATP Mann-Kendall Trend Test



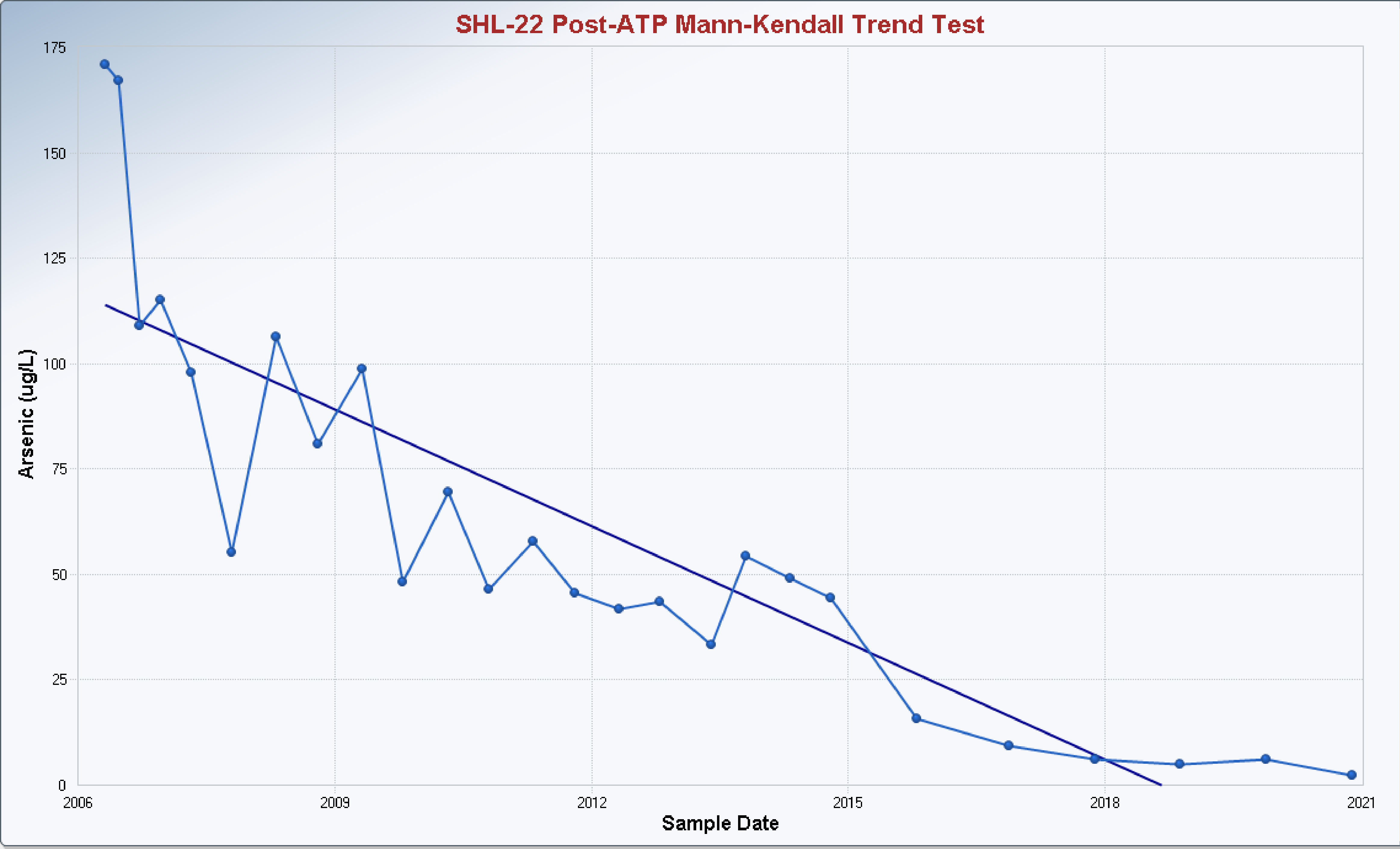
Mann-Kendall Trend Analysis

n	21
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	33.1160
Standardized Value of S	3.5330
M-K Test Value (S)	118
Tabulated p-value	0.0000
Approximate p-value	0.0002

OLS Regression Line (Blue)

OLS Regression Slope	6.2651
OLS Regression Intercept	-12,484.1844

Statistically significant evidence of an increasing trend at the specified level of significance.



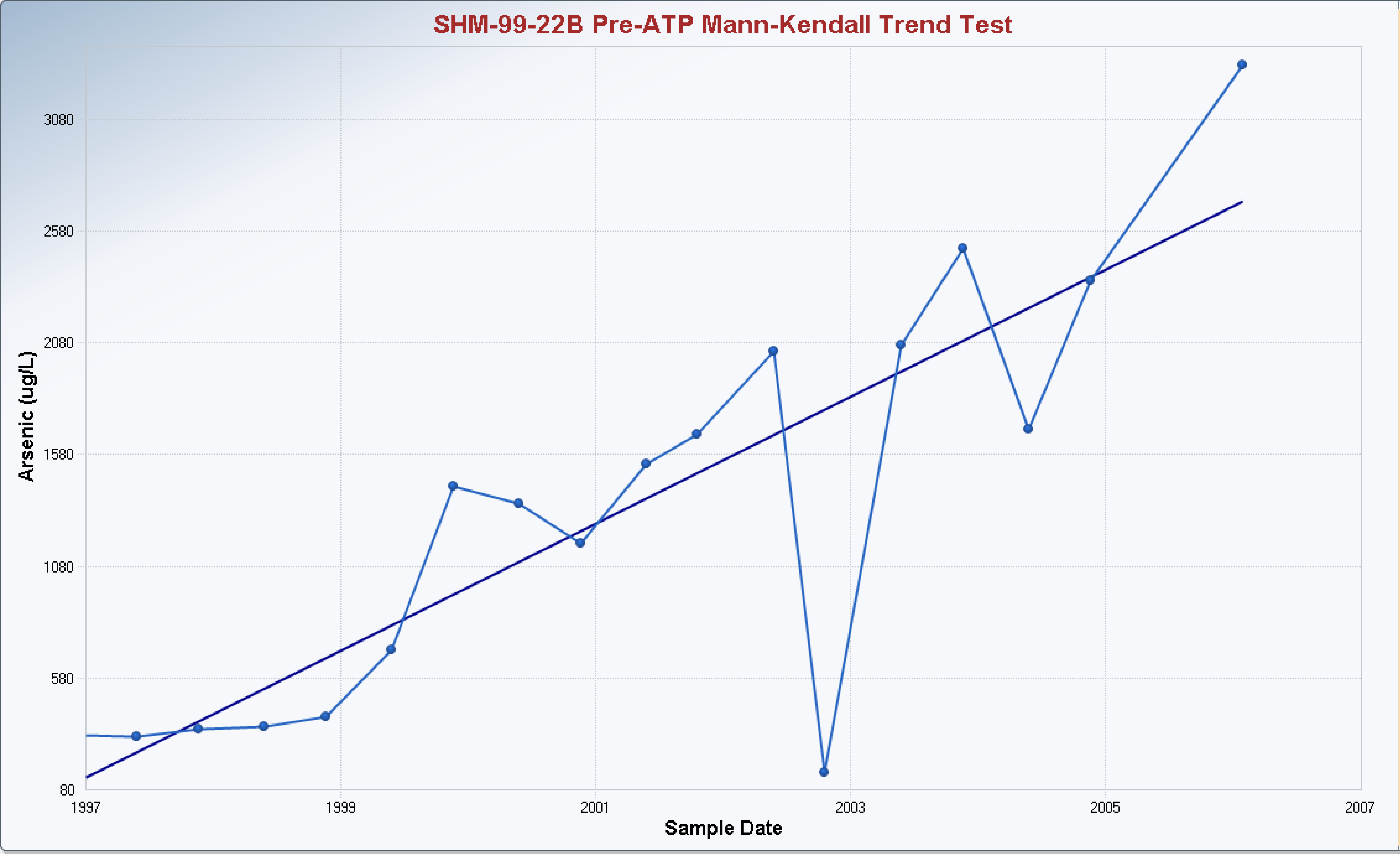
Mann-Kendall Trend Analysis

n	26
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	45.3689
Standardized Value of S	-5.8190
M-K Test Value (S)	-265
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	-9.2542
OLS Regression Intercept	18,680.8870

Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis

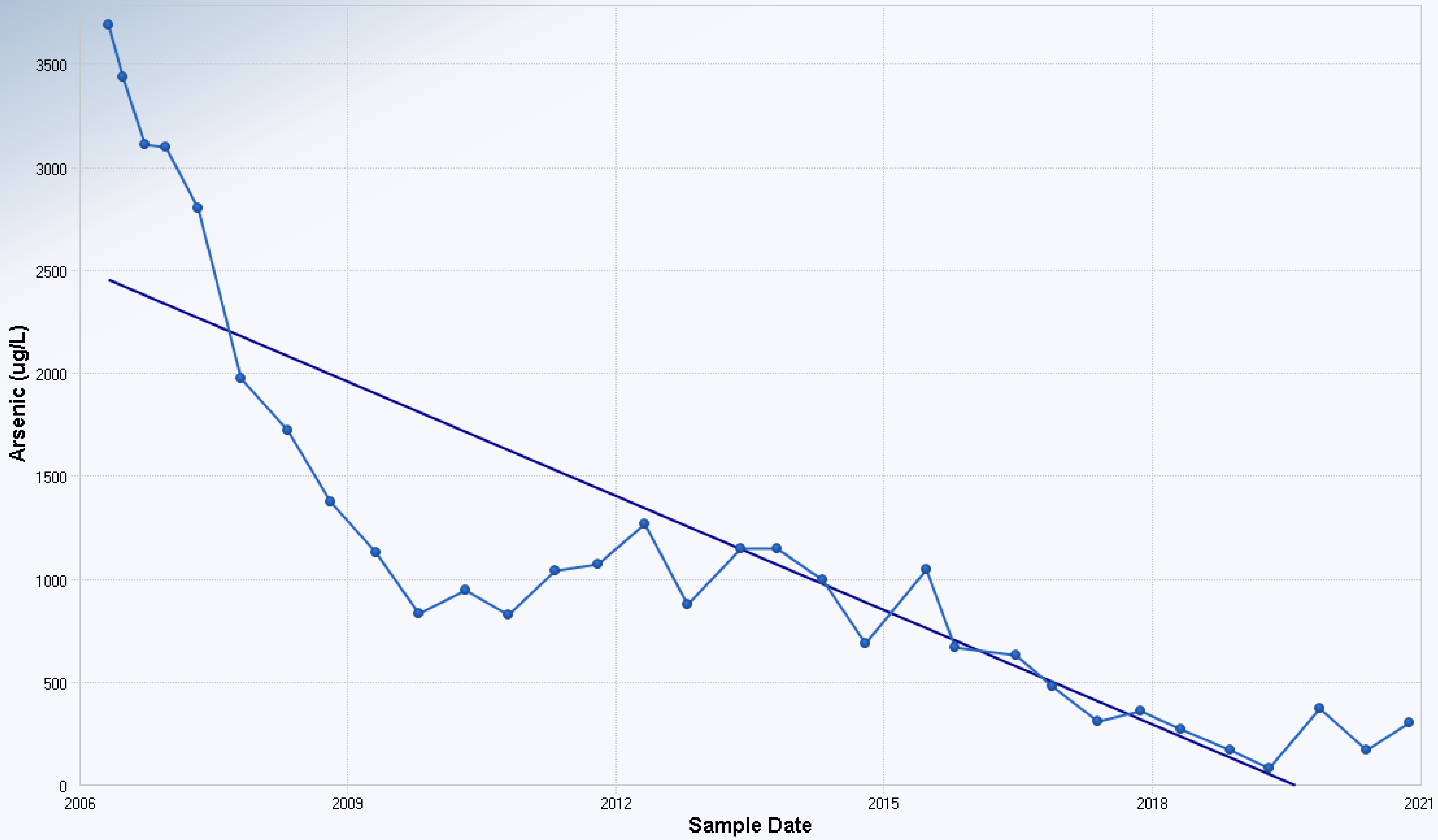
n	18
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	26.4008
Standardized Value of S	4.2423
M-K Test Value (S)	113
Tabulated p-value	0.0000
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	282.6833
OLS Regression Intercept	-564,374.7588

Statistically significant evidence of an increasing trend at the specified level of significance.

SHM-93-22B Post-ATP Mann-Kendall Trend Test



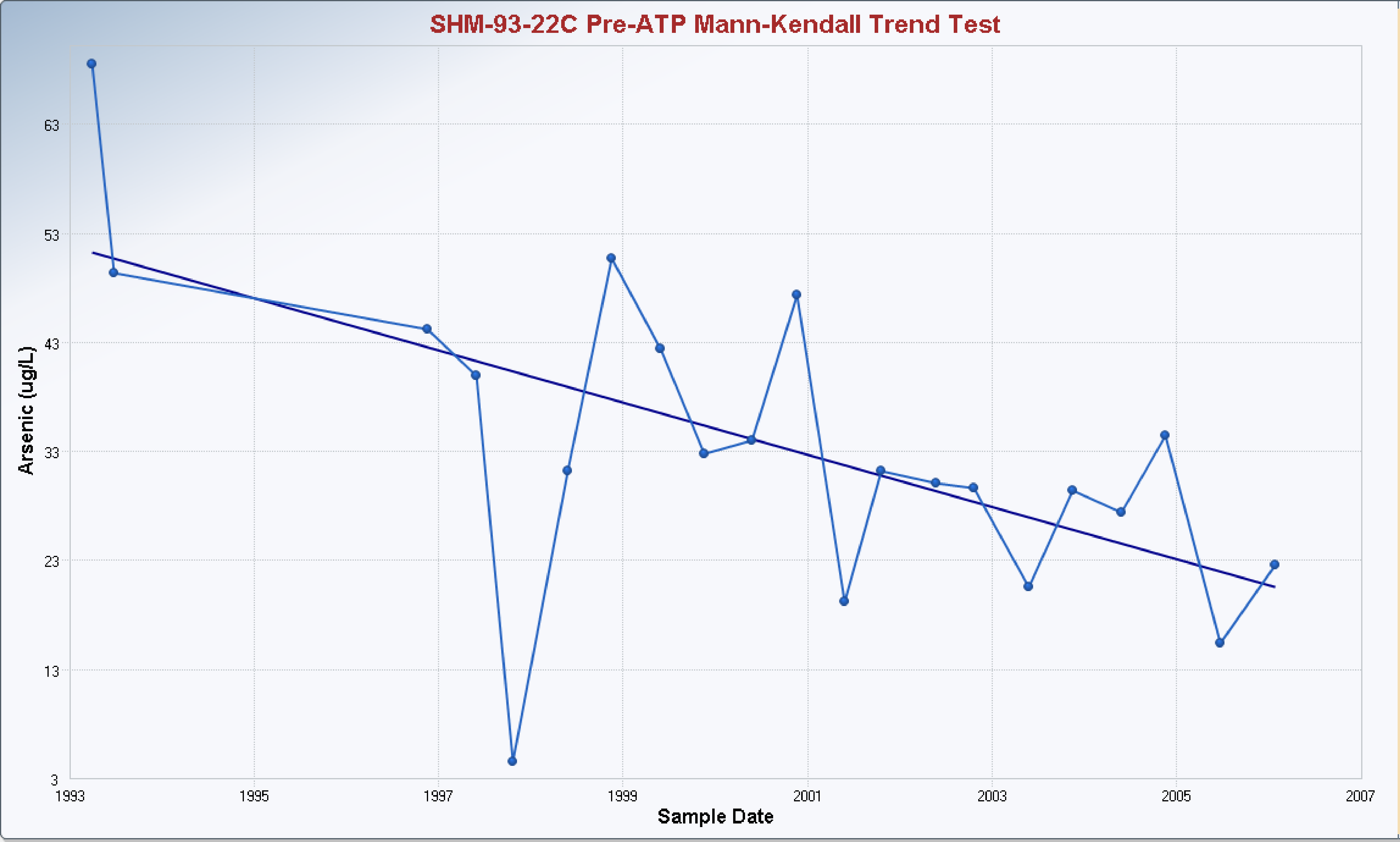
Mann-Kendall Trend Analysis

n	32
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	61.6495
Standardized Value of S	-6.3099
M-K Test Value (S)	-390
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	-185.1359
OLS Regression Intercept	373,897.5368

Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis

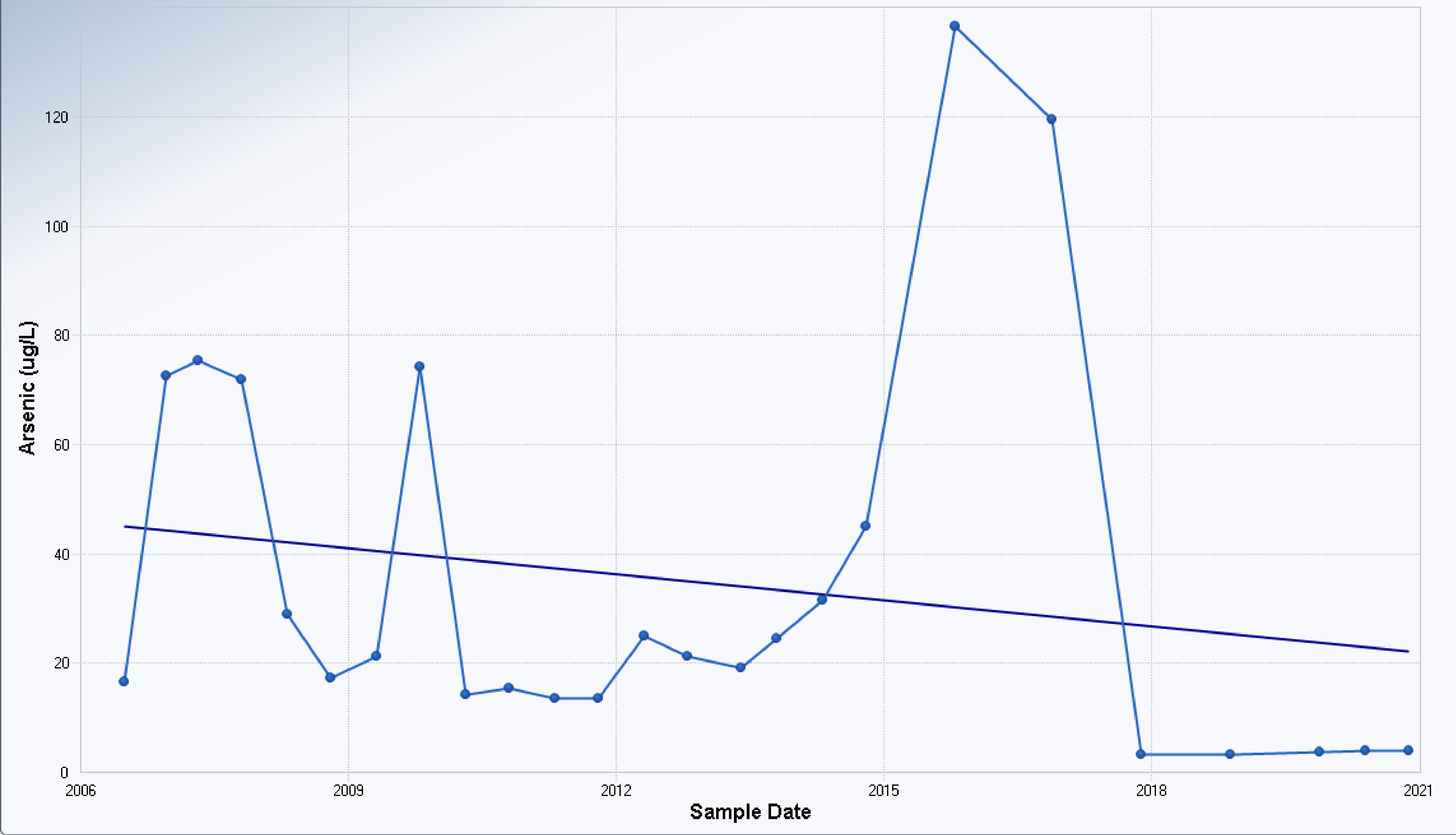
n	21
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	33.1009
Standardized Value of S	-3.1419
M-K Test Value (S)	-105
Tabulated p-value	0.0010
Approximate p-value	0.0008

OLS Regression Line (Blue)

OLS Regression Slope	-2.3915
OLS Regression Intercept	4,818.4545

Statistically significant evidence of a decreasing trend at the specified level of significance.

SHM-93-22C Post-ATP Mann-Kendall Trend Test



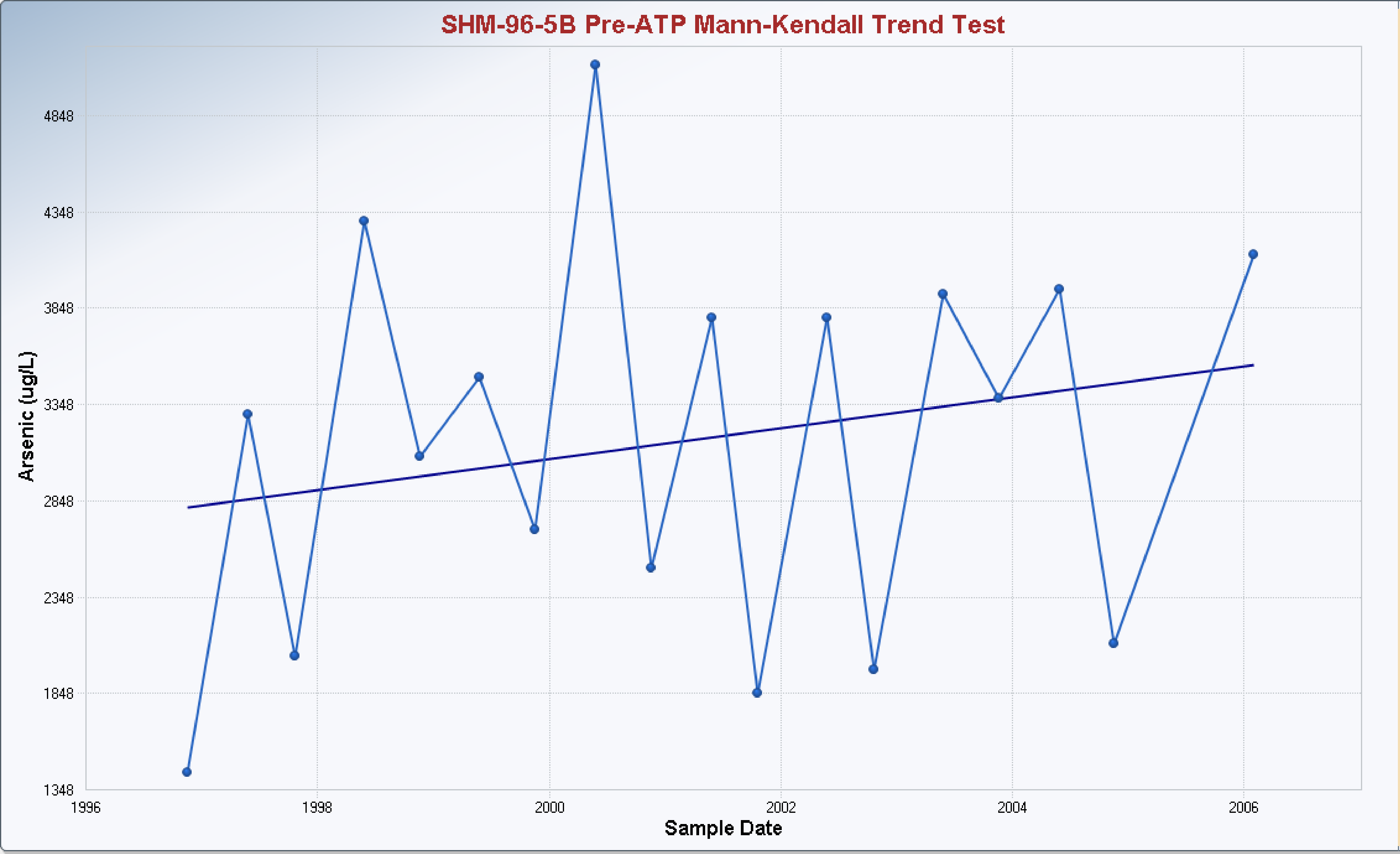
Mann-Kendall Trend Analysis

n	25
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	42.7824
Standardized Value of S	-1.6829
M-K Test Value (S)	-73
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0462

OLS Regression Line (Blue)

OLS Regression Slope	-1.5952
OLS Regression Intercept	3,246.3519

Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis

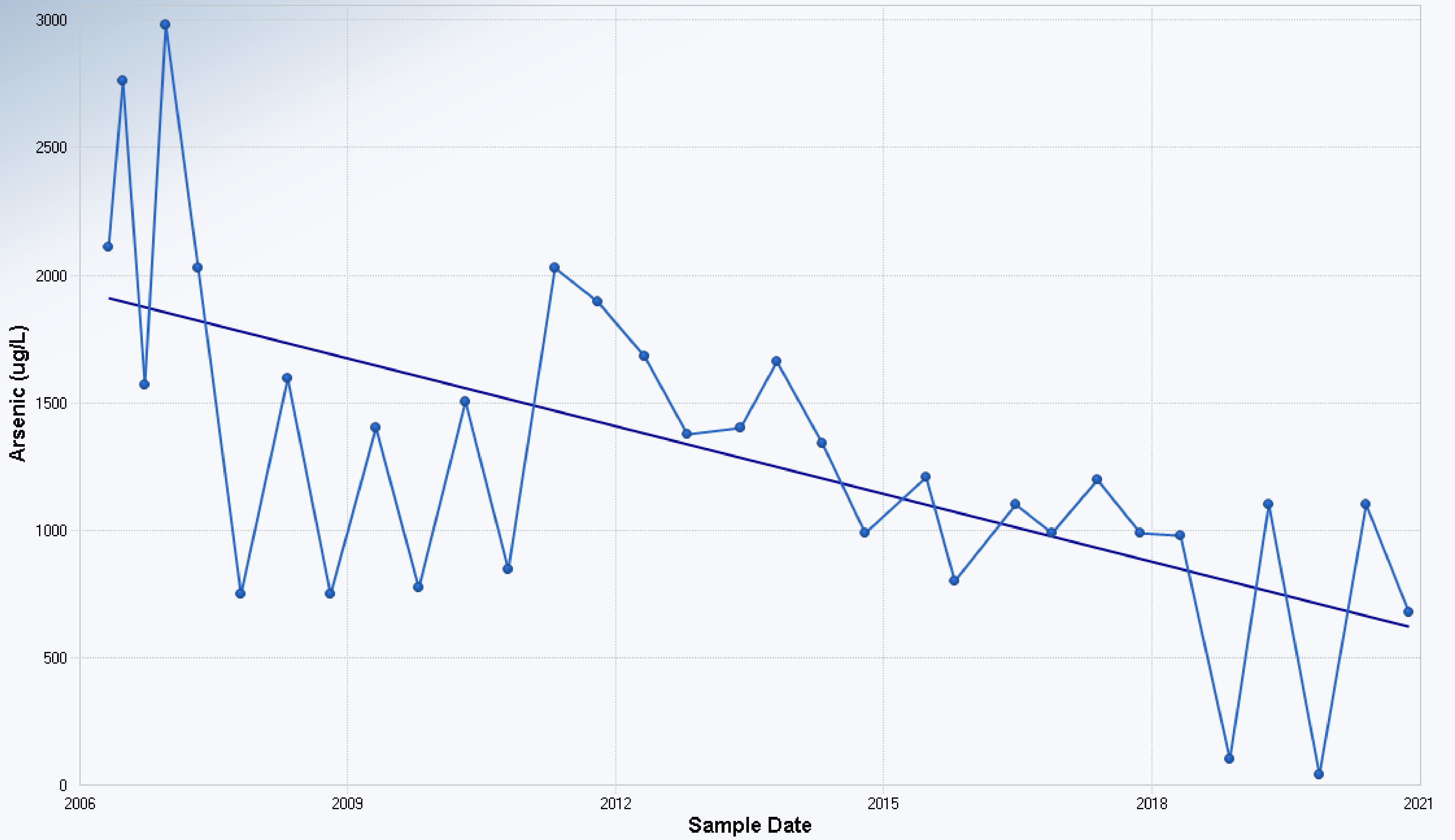
n	18
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	26.3818
Standardized Value of S	1.0992
M-K Test Value (S)	30
Tabulated p-value	0.1300
Approximate p-value	0.1358

OLS Regression Line (Blue)

OLS Regression Slope	80.1627
OLS Regression Intercept	-157,259.2910

Insufficient statistical evidence of a significant trend at the specified level of significance.

SHM-96-5B Post-ATP Mann-Kendall Trend Test



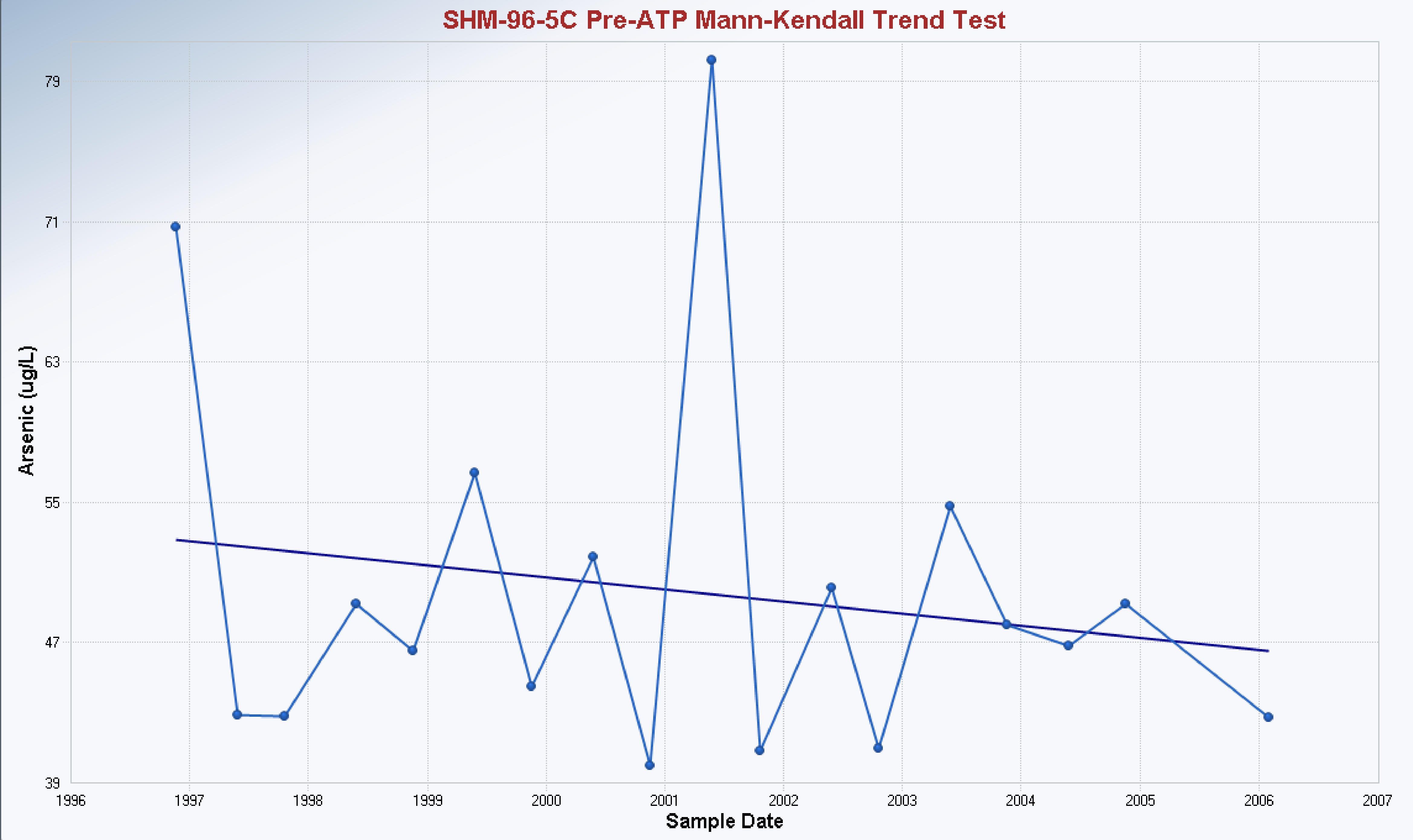
Mann-Kendall Trend Analysis

n	32
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	61.6198
Standardized Value of S	-3.7650
M-K Test Value (S)	-233
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0001

OLS Regression Line (Blue)

OLS Regression Slope	-88.5188
OLS Regression Intercept	179,506.7819

Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis

n	18
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	26.3818
Standardized Value of S	-0.4170
M-K Test Value (S)	-12
Tabulated p-value	0.3270
Approximate p-value	0.3384

OLS Regression Line (Blue)

OLS Regression Slope	-0.6907
OLS Regression Intercept	1,432.3933

Insufficient statistical evidence of a significant trend at the specified level of significance.

SHM-96-5C Post-ATP Mann-Kendall Trend Test

Mann-Kendall Trend Analysis

n	26
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	45.3578
Standardized Value of S	-2.5354
M-K Test Value (S)	-116
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0056

OLS Regression Line (Blue)

OLS Regression Slope	-1.7154
OLS Regression Intercept	3,482.8189

Statistically significant evidence of a decreasing trend at the specified level of significance.

Attachment 4

Response to Comments

US Army Corps of Engineers ®

New England District
696 Virginia Road
Concord, Massachusetts
01742-2751

Project Name:	Former Fort Devens Army Installation Shepley's Hill Landfill	Date:	9 December 2021
Location:	Devens, Massachusetts	Reviewer:	Multiple
Document Name:	Technical Memo		
Prepared By:	Seres Arcadis 8(a) JV		

No.	Ref. Page / Para.	COMMENTS	RESPONSE	Disposition
		Carol Keating (EPA)		
1.		In several instances, the memorandum postulates that naturally-occurring geochemical conditions and geogenic arsenic sources are significant contributors to observed arsenic in groundwater downgradient of the capture zone of the extraction system. However, no definitive evidence was provided in support. Given the geologic setting, it is possible that groundwater in some areas at the site may support arsenic concentrations unrelated to the landfill that are somewhat above the cleanup level of 10 ug/l. However, it is noted that assessment of arsenic concentrations in groundwater unrelated to the landfill (i.e., an assessment of background conditions) has been contemplated but not been completed to date. Completion of this study is necessary to provide data to determine the final remedy for the site.	The Army has provided support for naturally-occurring geochemical conditions and geogenic arsenic sources that are known contributors to observed arsenic in groundwater downgradient of the ATP on several occasions, most recently in Technical Memo 1, Section 4 (final document submitted on June 11, 2021). Gannett Fleming's 2012 Final Shepley's Hill Bedrock Investigation also contained support for geogenic sources of arsenic. The Army agrees that an assessment of background conditions (i.e., groundwater conditions unrelated to the landfill) is necessary to support an updated Conceptual Site Model (CSM) that will set the stage for the evaluation and selection of an effective remedy in accordance with CERCLA guidelines. Accordingly, the Army proposes to move forward with a Background Conditions Assessment that will be in accordance with the evaluation listed in the Phase 2, Task 2 of the SOW for the Informal Dispute for Shepley's Hill Landfill (SHL).	

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2.		In addition, it should be noted that detection of arsenic at concentrations significantly above the cleanup level in wells screened in bedrock does not necessarily mean there will be sufficient groundwater flux from bedrock to the overlying alluvial aquifer to impact remedial options. For example, wells SHP-2016-6A/B/C are screened in bedrock adjacent to well SHL-23 which is screened in the alluvial aquifer. Arsenic concentrations in groundwater in the bedrock well cluster routinely exceed 500 ug/l. However, arsenic concentrations in the alluvial aquifer well are consistently below the cleanup level (10 ug/l). Also, arsenic concentrations observed in the vertical profile SB-2017-06 of the alluvial aquifer adjacent to this area ranged from undetected at 1.5 ug/l to a maximum of 18 ug/l which are orders of magnitude less than concentrations in the bedrock near this location. This indicates that impact to the alluvial aquifer from bedrock in this area may be quite limited in terms of the effect on the existing remedy.	It is acknowledged that higher concentrations in the bedrock do not necessarily mean there is sufficient groundwater flux from bedrock to the alluvial aquifer to correspond to high arsenic concentrations in certain portions of the Nearfield Area. However, as noted in previous responses to comments, there are times during the year that groundwater flow is upward from the bedrock to the overburden, as noted below: "*Continuous water level monitoring data from 2007 to 2010 in bedrock and overburden wells N5-P1 and N5-P2 located within the landfill footprint (Figure 1.2) indicate seasonal changes in the direction of the vertical gradient at that location (Gannett Fleming 2012). In periods of high recharge and low evapotranspiration (generally winter/spring), the direction of groundwater flow, primarily derived from precipitation recharge on Shepley's Hill, is reported to be upward from the bedrock to the overburden beneath the landfill. In periods of low recharge and high evapotranspiration (generally summer/fall), the direction of groundwater flow is reported to be downward from the overburden sands to the underlying bedrock but with a shallower gradient than is associated with the upward flows observed in the winter/spring. The long-*	

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			term average head difference indicates a net upward discharge of bedrock groundwater to overburden (Gannett Fleming 2012)."	
3.		The memorandum repeatedly attempts to dismiss the results of previous hydraulic gradient analyses performed by both USEPA and the Army using the 3PE spreadsheet tool (Beljin and others, 2014) in favor of the predictions of the flow model, which has not been validated, for the purpose of providing a detailed definition of the capture envelope surrounding the extraction wells. The hydraulic gradient analyses using observed hydraulic head data obtained at multiple locations and times indicated that the groundwater flow model appears to overestimate the influence of extraction on hydraulic gradients and overestimate the extent of the capture zone. This conclusion has been reported in previous documents (e.g., S-A JV, 2021a, 2021b) and in the original report describing the updated model (Geosyntec Consultants, 2020). The memorandum provides no analyses or other data to support its contention. It should be noted that the overestimation of the influence of the extraction wells is also evidenced by potentiometric surface maps created using observed hydraulic head data in addition to the 3PE results. The results of hydraulic gradient analyses using observed field data should not be dismissed as proposed in the memorandum.	It is noted that the Army worked extensively with the EPA over a period of four years to develop and calibrate the groundwater model used in this analysis, and that the associated model report was approved by EPA verbally on June 15, 2020 and in a letter dated December 3, 2020. The groundwater model and field data are generally in agreement when estimating the capture zone areas presented in this memorandum and in previous memoranda. The Army concurs that, as noted in the Technical Memo 4 text, the inferred capture zone generated by the groundwater model is slightly larger than that inferred from the 3PE analyses presented in Technical Memos 1 and 2. Figures 2 through 11 of Technical Memo 4 (attached) show a comparison between the model-generated and 3PE generated groundwater flow vectors. These vectors are very similar for most of the 3PE triangles for all 10 time periods that were evaluated from 2016 through 2020. As noted previously, 3PE analysis is a method limited spatially to large triangular areas that uses data for a single point in	

No.	Ref. Page / Para.	COMMENTS	RESPONSE	Disposition
			time and does not take into account the complexities of groundwater flow under pumping conditions. It is Army's opinion that the SHL groundwater flow model is the preferred tool for estimating capture extent because it simulates all aspects of the groundwater flow regime (including vertical components of flow adjacent to the extraction wells where the water table is sloped) and honors a water mass balance across the area.	
4.		The memorandum provided several series of plots of the temporal trends of arsenic in wells within both the Nearfield Area and in the North Impact Area as required by the scope of work. For each plot, Mann-Kendall trend analysis was used to determine whether a statistically significant trend was present. The trends relative to operation of the extraction system were discussed in general terms. No attempt was made to interpret trends relative to specific flow paths projected by the model. However, such an analysis would have been irrelevant since the model appears to overestimate the capture envelope and projects complete capture of the contaminant plume migrating north from the area of the landfill. The discussion of the contaminant trend analyses correctly indicates that many of the wells displayed significant downward trends in arsenic concentrations indicating the major influence of the extraction system on the contaminant plume. In addition, it appears that the system upgrade in 2015 may have had a significant impact as indicated by the arsenic trends observed at well SHM-10-16 which is located immediately downgradient of the capture zone. Prior to the 2015 system upgrade, arsenic concentrations in this well were increasing. The trend reversed and concentrations began to decrease in approximately 2016 following the increase in extraction rate associated with the	The ATP extraction system does have an impact on arsenic concentrations at many monitoring wells; however, many of the trends were not statistically significant. The permanence of the effects in the absence of continuous pumping is not known. As previously noted in Technical Memo 1, the mobilization, fate, and transport of arsenic in site groundwater is primarily dependent on redox conditions. As groundwater flows north from the ATP toward Nonacoicus Brook, redox conditions become more laterally and vertically variable. Based on arsenic, DO, and iron results, conditions within shallow overburden downgradient of the ATP and into the NIA were observed to be relatively oxidizing, with relatively low arsenic and iron concentrations. However, at greater depths, conditions were reducing, and arsenic and iron concentrations were elevated. The geochemical profiles of iron and arsenic were attributed to the reductive dissolution	

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		system upgrade. However, concentrations have been relatively stable for the past two to three years. Other wells, such as SHM-05-41B, exhibited similar but less dramatic behavior. Although not definitive, this behavior would be consistent with an increased degree of plume capture associated with the increase in pumping rate in 2015 but still not total containment of the plume. It is also noted that many of the wells that displayed no trend in the data also had arsenic concentrations that were below or close to the cleanup level. Results of the background study would be needed before the behavior of arsenic in these wells could be properly interpreted.	of iron oxides and concurrent release of both arsenic and iron into groundwater upgradient of the NIA. The vertical redox gradient, which changes from more oxic at shallow depths to more reducing at greater depths, potentially reflects the influence of oxic meteoric recharge. The Army intends to conduct a cleanup timeframe evaluation to support an updated CSM that will become part of the FFS for SHL. The cleanup timeframe evaluation will provide the anticipated timeframe to cleanup for arsenic in both Nearfield and NIA monitoring wells under groundwater extraction and other similar hydraulic control and barrier remedy scenarios. Like the previously mentioned Background Conditions Assessment, this evaluation will support the CSM and set the stage for effective evaluation and selection of a remedy, in accordance with CERCLA guidelines.	
5.		Figure 5 presents the model-generated capture zone surrounding the extraction wells using reverse particle tracks. Although it is difficult to follow individual particle tracks given the scale and label placement in this figure, it appears that the projected particle tracks may not align with observed chemistry is some areas. For example, particle tracks from the area between wells SHM-10-06 and SHM-10-06A appear to pass through well EPA-PZ-2012-3B. This would appear to be unlikely since arsenic concentrations observed at EPA-PZ-2012-3B are approximately twice the concentrations observed at SHM-10-06 and over an order of magnitude higher than the	Arsenic concentrations at EPA-PZ-2012-3B (screened from 68.7 to 73.7 ft bgs) have declined from concentrations of nearly 4,000 ppb to below 3,000 ppb from 2012 to 2020. The Mann-Kendall analysis performed on this well found statistically significant evidence of a decreasing trend, indicating this well is likely within the groundwater capture zone, however no data exists at EPA-PZ-2012-3B before the	

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		highest arsenic concentration measured in the vertical groundwater profile obtained from boring SB-2017-12 located between SHM-10-06 and SHM-10-06A. A complete review of groundwater chemistry in wells located along forward particle tracks generated by the model may provide another line of evidence that the model overestimates the size of the capture zone.	installation of the ATP extraction wells in 2006. Similarly, arsenic concentrations at SHM-10-06 (69.5 to 79.5 ft bgs) have declined from approximately 2,000 ppb to less than 1,000 ppb from 2010 to 2020. The Mann-Kendall analysis performed on this well found statistically significant evidence of a decreasing trend, indicating this well is likely within the groundwater capture zone, however no data exists at SHM-10-06 before the installation of the ATP extraction wells in 2006. It should be noted as demonstrated by both the groundwater flow model and the 3PE analyses, there is not a direct flow path from SHM-10-06 to EPA-PZ-2012-3B.	
6.		The memorandum included an estimate of arsenic mass flux across the east-west transect located upgradient of the extraction wells and extending from soil boring SB-2017-06 to well SHL-21. It appears that this may be a useful tool for conceptualizing possible groundwater and arsenic transport in this area. However, uncertainties in the hydraulic conductivity of aquifer materials and, particularly, the detailed distribution of arsenic in groundwater will result in significant uncertainty in the conclusions of this analysis. In particular, the calculated contaminant fluxes through various parts of the aquifer are subject to significant uncertainty due to the high degree of spatial heterogeneity in the subsurface arsenic distribution and the relatively low number of samples available to characterize the contaminant flux. It is recommended that this analysis not	It is acknowledged that the mass-flux calculations as presented in this technical memo have a degree of uncertainty associated with them due to heterogeneity of arsenic and hydraulic conductivity distributions. However, it should be noted the EPA/MassDEP were involved in the development of the SHL groundwater flow model and agreed to the hydraulic conductivity values used in that model (and subsequently used for this analysis). Furthermore, the hydraulic conductivity distribution was based on empirical data (such as slug and pumping tests).	

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		be accepted as a definitive line of evidence for the existence of major sources of arsenic not associated with the landfill as the discussions in this section of the document imply. The analysis also provided an estimate of the arsenic flux in the area of well SHM-10-06 that may not be captured by the extraction wells. Although the estimated flux through the assumed area is relatively small in comparison with the estimated flux through the rest of the cross section, it is noted that flux is still several pounds per year which can result in significant exceedance of the cleanup level depending on how it is distributed in groundwater.	However, in an effort to quantify the effect of these uncertainties, the mass flux was calculated using three different arsenic concentrations: the geometric mean, the arithmetic mean, and the 95% UCL. This analysis was not intended to be a definitive line of evidence for the existence of major non-landfill associated arsenic sources, but rather to provide an additional line of evidence for evaluation of the efficacy of the current remediation system in conjunction with the other hydrogeologic and geochemical factors presented in the memorandum. Use of mass flux in this manner is a commonly accepted practice in the evaluation of remedy effectiveness at EPA-regulated sites nationwide. As documented in previous comments and submissions, most of the arsenic mass from the landfill is being captured by the ATP extraction wells. Although a small amount of arsenic mass is bypassing the ATP extraction wells, this mass contribution is not sufficient to sustain the elevated arsenic concentrations observed in the NIA. Therefore, there must be other factors that contribute to those concentrations.	
7.		All data presented to date indicate that the extraction system exerts a major influence on the contaminant plume. In this document, this conclusion is evidenced by the decreasing	As stated in previous comments, there is a geogenic component to elevated arsenic	

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		contaminant trends observed since extraction began and since the system upgrade in 2015. However, all lines of evidence based on field data presented to date are consistent with the conservative interpretation that some of the landfill-impacted groundwater may not always be captured by the extraction wells, especially during times of increased precipitation. Given the available data, it is recommended that additional enhancement to the extraction system, such as increasing the overall extraction rate using a new well(s) located east of EW-1/EW-4 and/or incorporation of alternative remedial approaches be considered.	concentrations, particularly in the NIA where redox conditions are reducing. Applicable alternative remedial options, including enhancements to the existing groundwater extraction and treatment system, will be evaluated in accordance with CERCLA guidance as part of the upcoming Focused Feasibility Study.	
8.	Page 8, Section 3.3	Discussion in this section states that the highest arsenic concentration in the North Impact Area between 2016 and 2020 was at well SHM-13-04. This appears to be in error since the data provided in Table 3 indicates that arsenic concentrations during this time period were greater at wells SHM-13-06, SHM-13-07, and SMH-13-08 than at SHM-13-04. It is recommended that this discussion be corrected for clarity.	The discussion in the text was updated to indicate that arsenic concentrations between 2016 and 2020 was the highest at SHM-13-06.	
9.	Table 5	Several of the entries in Table 5 do not appear to be supported by the trend analysis plots in Attachment 1. For example, the arsenic trend from 2010 to 2015 at well SHM-05-41B is listed as “Increasing” in the table. However, examination of the Mann-Kendall analysis plot for this well indicates it was decreasing in concentration. Discrepancies were also noted for wells SHM-05-40X and SHM-13-06. In addition, the plot for well SHM-13-06 during the period from 2010 to 2015 in Attachment 1 is misidentified. It is recommended that the tables and figures in the finalized document, including the attachments, be checked for errors.	Table 5 had a transcription error and was updated to reflect the trend analyses in Attachment 1. The plot for well SHM-13-06 during the period from 2010 to 2015 in Attachment 1 was updated. Since Figures 3 and 4 used the trend information noted in Table 5 as the basis for the posting, Figures 3 and 4 were also updated.	
10.	Table 6, Figure 5	Some of the entries in Table 6 do not appear to be supported by the trend analysis plots in Attachment 1 and the data in Table 4. For example, an arsenic concentration trend from 2010 to 2020 at well SHL-23 was calculated to be increasing using measurements that were non-detect according to the	Table 6 had a transcription error and was updated to reflect the trend analyses in Attachment 1.	

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		data presented in Table 4. It appears this well should have been labeled NA in Table 6 and no trend analyzed. The lack of data is correctly labeled for this well in Figure 5. Well SHM-96-5C is labeled as having a decreasing trend in Table 6 and Figure 5. However, the plot provided for this well in the attachment indicates no statistically significant trend was found. Again, it is recommended that the tables and figures in the finalized document be checked for errors.		
		David Chaffin (DEP)		
1.	Section 1.0, Second Paragraph, and Section 1.1, Third, Fourth, and Fifth Paragraphs	Substantial evidence would be required to demonstrate the Army's alternative conceptual site model is more than an argument intended to cast doubt on the potential for groundwater extraction to control and contain arsenic at the site. More specifically, substantial evidence would be required to show that sources other than the landfill – wetlands, natural organic matter deposits, geogenic sources, etc. – contribute significantly to the plume, which otherwise appears to be a typical case of a disposal site mobilizing metals as observed elsewhere at Devens (e.g., AOCs 43G, 57, and 69W) and at landfills across the Commonwealth.	As discussed in the previous responses to comments, groundwater from the bedrock does at times discharge into the overburden and there are naturally reducing conditions (in addition to landfill conditions) which: 1) limit the natural attenuation of arsenic and 2) stabilize naturally occurring arsenic (coming from bedrock and released from overburden sediments) in solution. As has been mentioned in previous documents, there are wetlands/peat areas within the landfill boundary.	
2.	Section 1.0, Sixth Paragraph	MassDEP does not agree with the Army's conclusion that the groundwater model is "better suited" or the "preferred tool" for evaluating capture. On the contrary, the 3PE analyses, which were derived from field measurements, should be used to represent actual site conditions, and the model, which is a mathematical simulation, should be judged by making comparisons to the 3PE analyses. As explained in MassDEP comments on preceding tech memos (e.g., MassDEP Comments 3 and 4 on Tech Memo 4.e), such comparisons indicate that the model is not accurate enough for capture zone analysis.	As noted in the response to EPA Comment 3, the groundwater model and field data are generally in agreement when estimating the capture zone areas presented in this memorandum and in previous memoranda. As noted in the Technical Memo 4 text, the groundwater model inferred capture zone width along the transect between SHL-23 and SHL-21 is approximately 16% larger than that inferred from the 3PE analyses presented	

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			in Technical Memos 1 and 2. 3PE analysis is a method limited spatially to large triangular areas that uses data for a single point in time and does not take into account the complexities of groundwater flow under pumping conditions. It is Army's opinion that the SHL groundwater flow model is the preferred tool for estimating capture extent because it simulates all aspects of the groundwater flow regime (including vertical components of flow adjacent to the extraction wells where the water table is sloped) and honors a water mass balance across the area.	
3.	Section 5.2	MassDEP does not agree with the conclusions presented here: • The trend analyses and flux calculations do not support the conclusion that the groundwater model can be viewed as a line of evidence indicating that the capture zone of the extraction wells during 2015 through 2020 was large enough to achieve the stated design objective: "…containment of the groundwater plume in the vicinity of the base boundary..." On the contrary, as acknowledged here, the trend analyses show that groundwater extraction has significantly reduced arsenic concentrations in downgradient wells screened across the core of the plume. Smaller reductions were observed in wells located horizontally and vertically away from the plume core, and reductions were not observed in more distant wells, and these trends were enhanced after extraction rates were increased in 2015 (Figures 3 and 4, Attachments 1, 2, and 3), but not sufficient to fully capture the plume. Thus, changes in the spatial distribution of arsenic revealed by the trend analyses support the	• As discussed in the Technical Memo 4 responses to comments, the key design criterion for the ATP extraction wells, as specified in the 100% Design (CH2MHill 2005) were to "provide containment of the groundwater plume in the vicinity of the base boundary," seek to reduce the design rate of 50 gpm as appropriate, and to focus groundwater extraction in the deeper part of the glacial aquifer". It should be noted the modeling results presented in the final design of the ATP extraction system did not include full capture east of the landfill boundary (between wells SHM-10-06 and SHM-21; Figures A-8 and A-9 of CH2MHill 2005).	

No.	Ref. Page / Para.	COMMENTS	RESPONSE	Disposition
		conclusion that the actual extent of capture during 2015 through 2020 was substantially smaller than predicted by the model. This result is consistent with comparisons of field data-to-model predictions presented in preceding tech memos and reinforces the conclusion that the model overpredicted the extent of capture and is not accurate enough to be used for capture zone analysis (e.g., MassDEP Comments 3 and 4 on Tech Memo 4.e). Regarding the flux estimates, the memo does not include a comparison to field-data-based flux estimates to confirm the flux estimates, and the flux estimates likely overestimate the quantity of arsenic captured because they were derived from the over-estimated capture zones predicted by the groundwater model. Consequently, the predicted fluxes might be viewed as high-end estimates but cannot be viewed as a line of evidence indicating that the actual capture zones during 2015 through 2020 were large enough to contain the groundwater plume. • The statement indicating that continued ATP operation will not result in the achievement of the remedial goals is misleading because of the implication that the groundwater plume in the vicinity of the base boundary cannot be contained by groundwater extraction. While the pump and treat system as operated during 2015 through 2020 did not achieve the remedial goals, this does not mean that the system cannot be modified, expanded, or supplemented to improve capture and achieve the remedial goals. These possibilities, along with alternative technologies, should be considered during the up-coming feasibility study. • The statement indicating that the system cannot achieve remedial goals due to downgradient geogenic sources is	• The mass flux estimates were derived using a combination of the calibrated groundwater flow model generated parameters (such as the hydraulic conductivity distribution and Darcy flow rates), but the arsenic concentrations were derived from field data. The hydraulic conductivity distribution in the calibrated groundwater flow model was also based on field-derived data. • The current ATP operation will not result in decreases of arsenic concentrations in the aquifer to MCLs within a reasonable timeframe. As stated above, the Army intends to move forward with a cleanup timeframe evaluation as part of the FFS and Background Conditions Assessment in accordance with Phase II, Task 2 of the SOW for the Informal Dispute for Shepley's Hill Landfill (SHL). Alternative remedial options, including enhancements to the existing pump and treat system, will be evaluated as part of the upcoming Focused Feasibility Study. • It is speculative to state that concentrations at SHM-93-22B may have been significantly lower prior to capping. We are not aware of data that would support that statement. Concentrations could have also been higher prior to capping, but we also do	

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		speculative and the suggested contribution of nearby wetlands is misleading. As explained in comments on preceding tech memos (e.g., MassDEP Comments 4 through 7 on Tech Memo 1.g), site data clearly indicate that the arsenic plume is almost entirely attributable to reducing conditions induced by the landfill. For example, arsenic concentrations at well SHM-93-22B increased from less than 500 ug/L during the late 1990s to more than 3,000 ug/L before groundwater extraction commenced in 2006 (Attachment 3), and the early samples collected from well SHM-93-22B were obtained several years after the site was capped (1986–1992), indicating that concentrations prior to capping may have been significantly lower. In addition, while geogenic sources might contribute to the plume, the magnitude of these contributions is not known; prior studies have not attempted to quantify them. The suggested contribution of nearby wetlands is misleading because the wetlands are not hydraulically connected to the arsenic plume; minor impacts to shallow groundwater might be attributable to the wetlands, but these impacts do not extend into the deep overburden aquifer where the arsenic plume is located. • As the upcoming feasibility study approaches, MassDEP looks forward to refocusing work at this site from arguments that cast doubt on the potential for groundwater extraction to contain arsenic at the site to actions that directly address the primary problem at the site: landfill-impacted groundwater migrating from the landfill.	not have the data to support that statement. • The conclusions in Section 5.2 did not imply that the wetlands were a source of arsenic, but that the wetlands have naturally reducing conditions which may contribute to increasing arsenic mobilization within the groundwater. • We look forward to working with MassDEP on alternative remedial options, including but not limited to groundwater extraction, that will address landfill-impacted groundwater.	
4.	Figure 7	The elevation of the top of bedrock surface east of well SHL-21 appears to be different than the surface used in the groundwater model. Was the surface used to calculate fluxes	The mass flux was calculated using the bedrock surface in the groundwater model. The bedrock surface in the groundwater	

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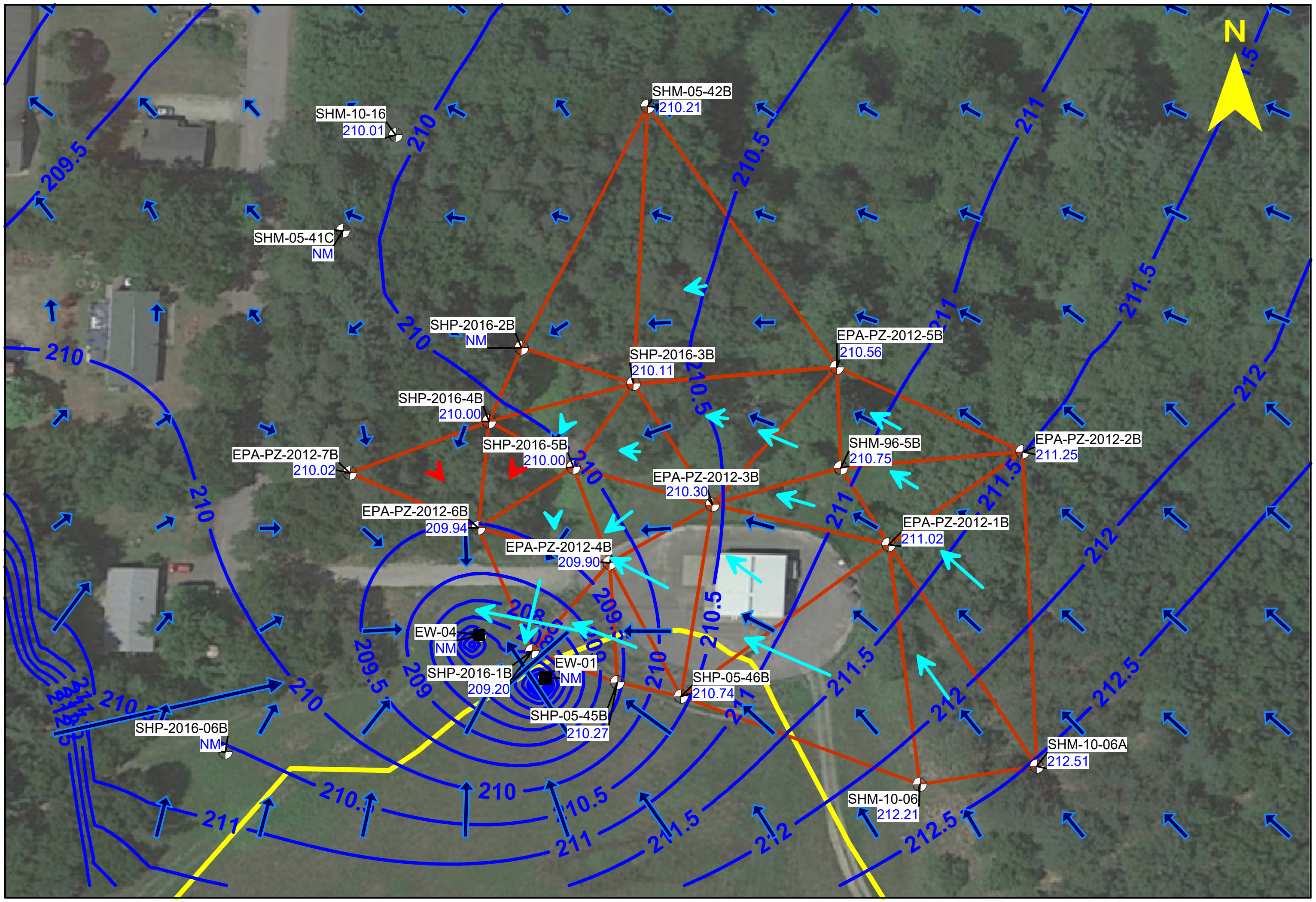
		altered from that used in the groundwater model? Could a bedrock high be located between SHL-21 and Plow Shop Pond, and if so, how would this affect the flow paths predicted by the groundwater model? Could adjustments to the bedrock surface here improve the match between the capture zones predicted by the model and capture zones indicated by 3PE flow vectors?	model was developed by Geosyntec (see Figure 5.2 of the Geosyntec Groundwater Model Report). The mass flux was calculated along row 76 of the groundwater flow model, where the overburden thickness varied from approximately 60 to 100 ft. The bedrock high on Figure 7 between SHL-21 and Plow Shop Pond is projected onto the cross-section and actually occurs south of the cross-section location at approximately row 85.	
		END OF COMMENTS		



Legend

- Extraction Wells
- Shepley's Hill Landfill Boundary
- Monitoring Wells
- Triangle for Vector Analysis
- Hydraulic Gradient Arrow from Technical Memo 1 (S-A JV, 2021)
  (Scale Factor = 5,000)
- Hydraulic Gradient Arrow from Groundwater Model
- Groundwater Elevation Contour from Groundwater Model (0.5 foot interval)

Scale in feet

0 120 240

Notes:

1. NM = not measured
2. Red arrows indicate gradients less than 0.001 foot per foot.
3. S-A JV = SERES-Arcadis 8(a) Joint Venture 2, LLC
4. S-A JV. 2021. Draft Phase I EPA SOW Demonstrate Plume Capture Technical Memorandum Phase I Subtask 1.g Delineate Capture Zone based on Hydraulic and Geochemical Data. Shepley's Hill Landfill, Former Fort Devens Army Installation, Devens, Massachusetts. Prepared for U.S. Army Corps of Engineers New England District. March 28.

FORMER FORT DEVENS ARMY INSTALLATION
DEVENS, MASSACHUSETTS
2021 TECHNICAL MEMO
SHEPLEY'S HILL LANDFILL

August 16, 2016 (Stress Period 16)
3PE and Model-Generated Hydraulic Vectors
and Groundwater Elevation Contours

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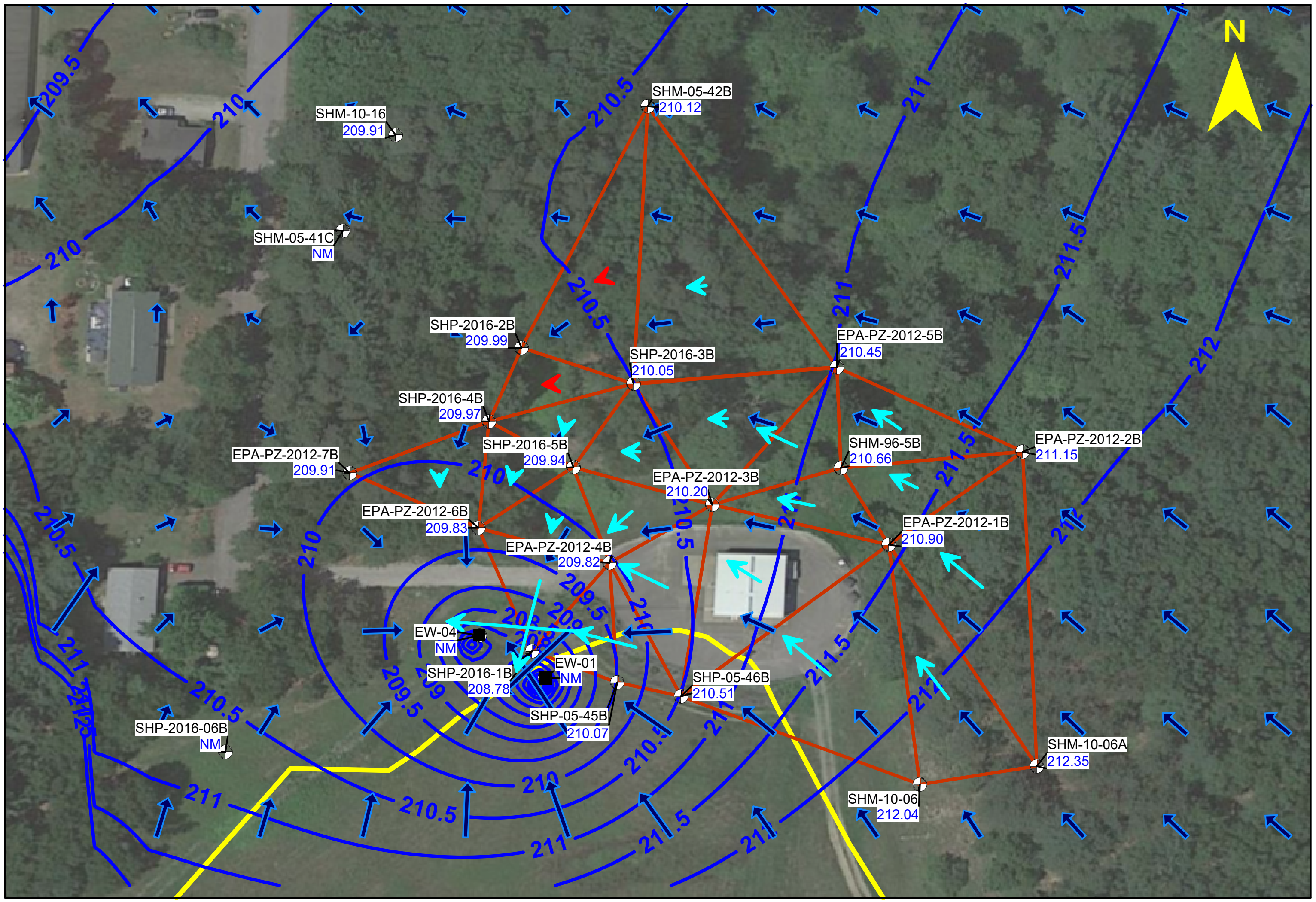
FIGURE
2



Legend

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FORMER FORT DEVENS ARMY INSTALLATION
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2021 TECHNICAL MEMO
SHEPLEY'S HILL LANDFILL

October 20, 2016 (Stress Period 17)
3PE and Model-Generated Hydraulic Vectors and Groundwater Elevation Contours

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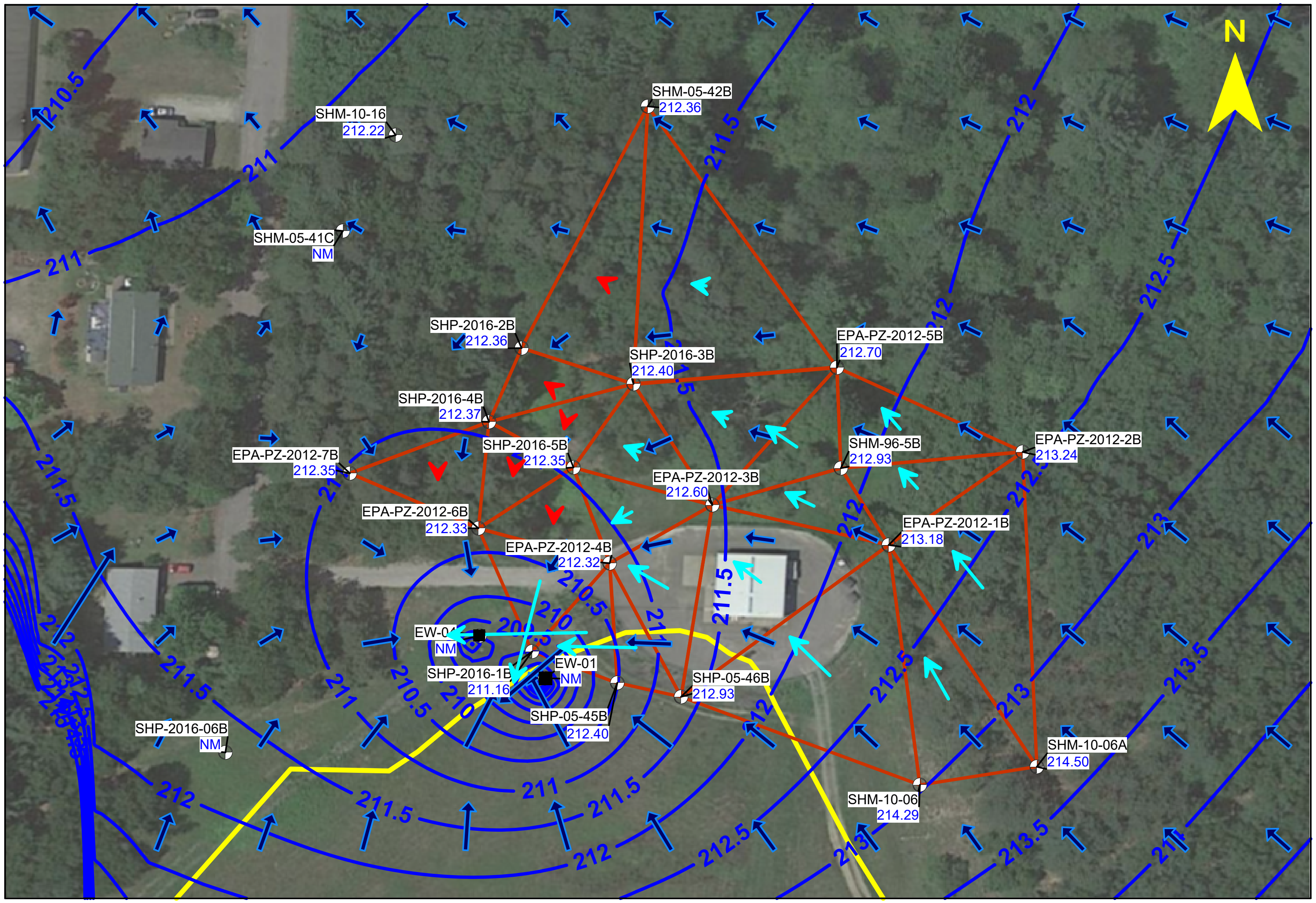
FIGURE

3



Legend

- Extraction Wells
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Scale in feet
0 120 240

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FORMER FORT DEVENS ARMY INSTALLATION
DEVENS, MASSACHUSETTS
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SHEPLEY'S HILL LANDFILL

March 2, 2017 (Stress Period 18)
3PE and Model-Generated Hydraulic Vectors and Groundwater Elevation Contours

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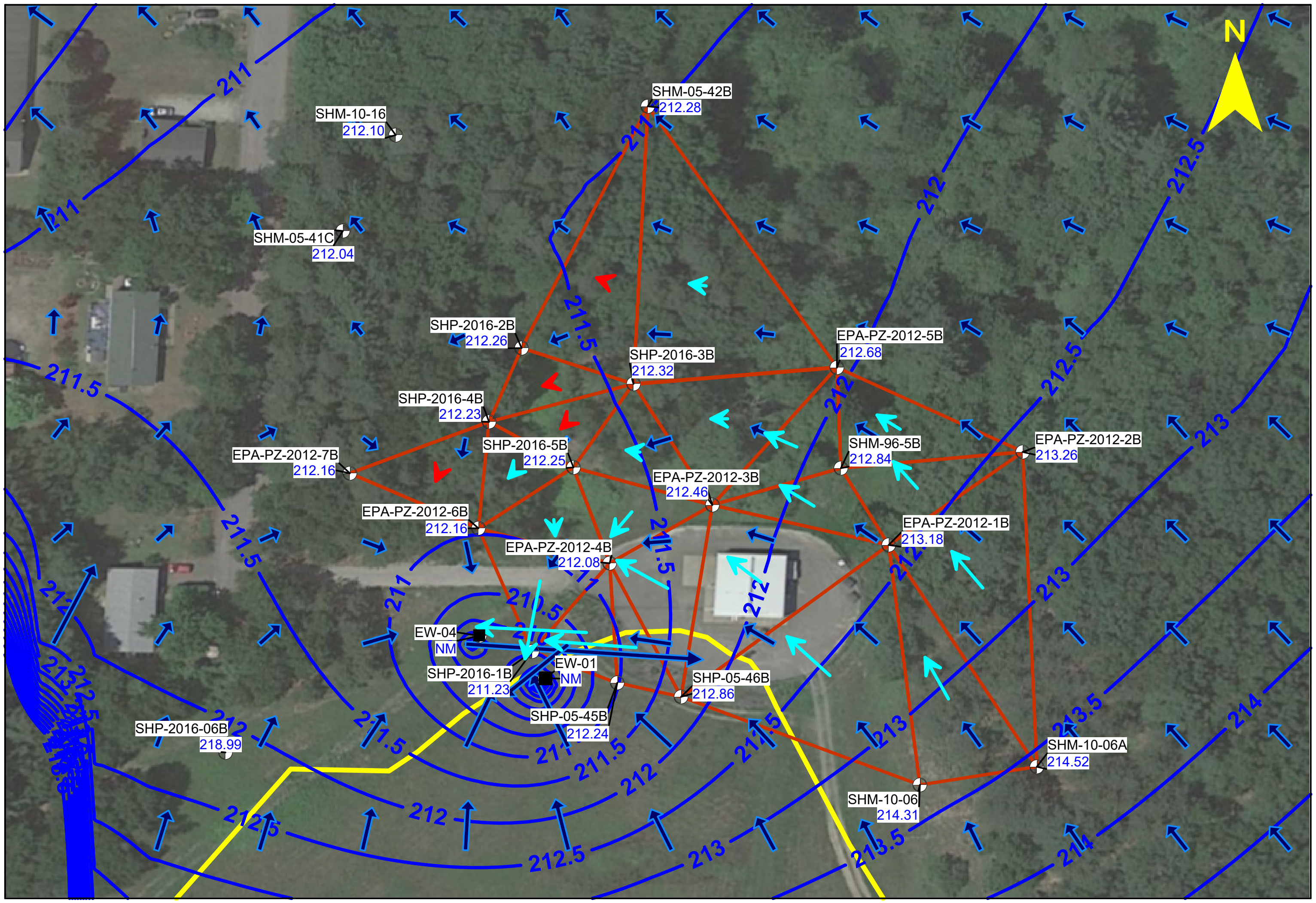
FIGURE
4



Scale in feet

0 120 240

Legend

- Extraction Wells
- Shepley's Hill Landfill Boundary
- Monitoring Wells
- Triangle for Vector Analysis
- Hydraulic Gradient Arrow from Technical Memo 1 (S-A JV, 2021) (Scale Factor = 5,000)
- Hydraulic Gradient Arrow from Groundwater Model
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FORMER FORT DEVENS ARMY INSTALLATION
DEVENS, MASSACHUSETTS
2021 TECHNICAL MEMO
SHEPLEY'S HILL LANDFILL

November 2, 2017 (Stress Period 21)
3PE and Model-Generated Hydraulic Vectors and Groundwater Elevation Contours

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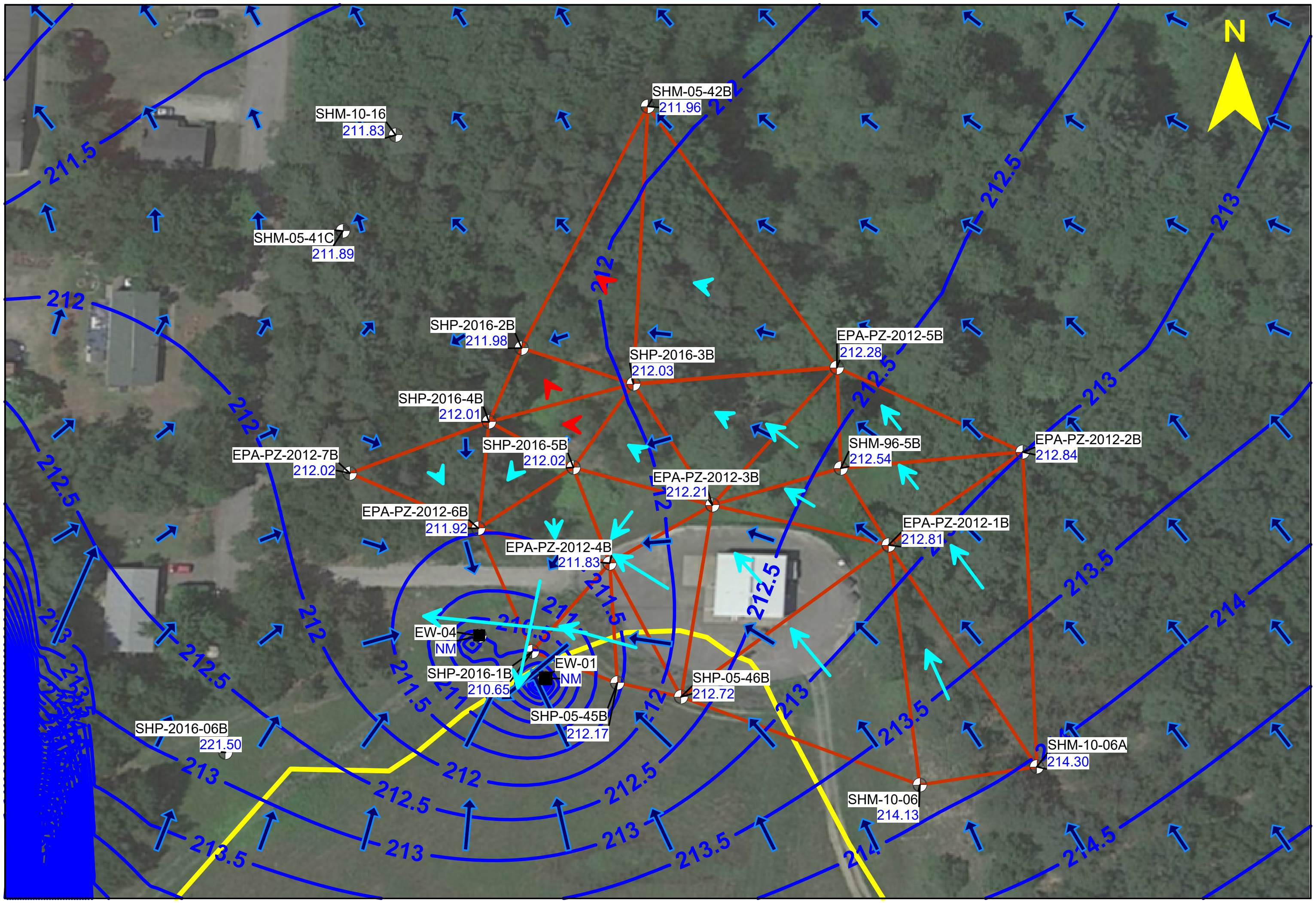
FIGURE

5



Legend

- ■ Extraction Wells
- Monitoring Wells
- △ Triangle for Vector Analysis
- Hydraulic Gradient Arrow from Technical Memo 1 (S-A JV, 2021) (Scale Factor = 5,000)
- Hydraulic Gradient Arrow from Groundwater Model
- Groundwater Elevation Contour from Groundwater Model (0.5 foot interval)
- Shepley's Hill Landfill Boundary

Scale in feet

0 120 240

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FORMER FORT DEVENS ARMY INSTALLATION
DEVENS, MASSACHUSETTS
2021 TECHNICAL MEMO
SHEPLEY'S HILL LANDFILL

May 22, 2018 (Stress Period 23)
3PE and Model-Generated Hydraulic Vectors
and Groundwater Elevation Contours

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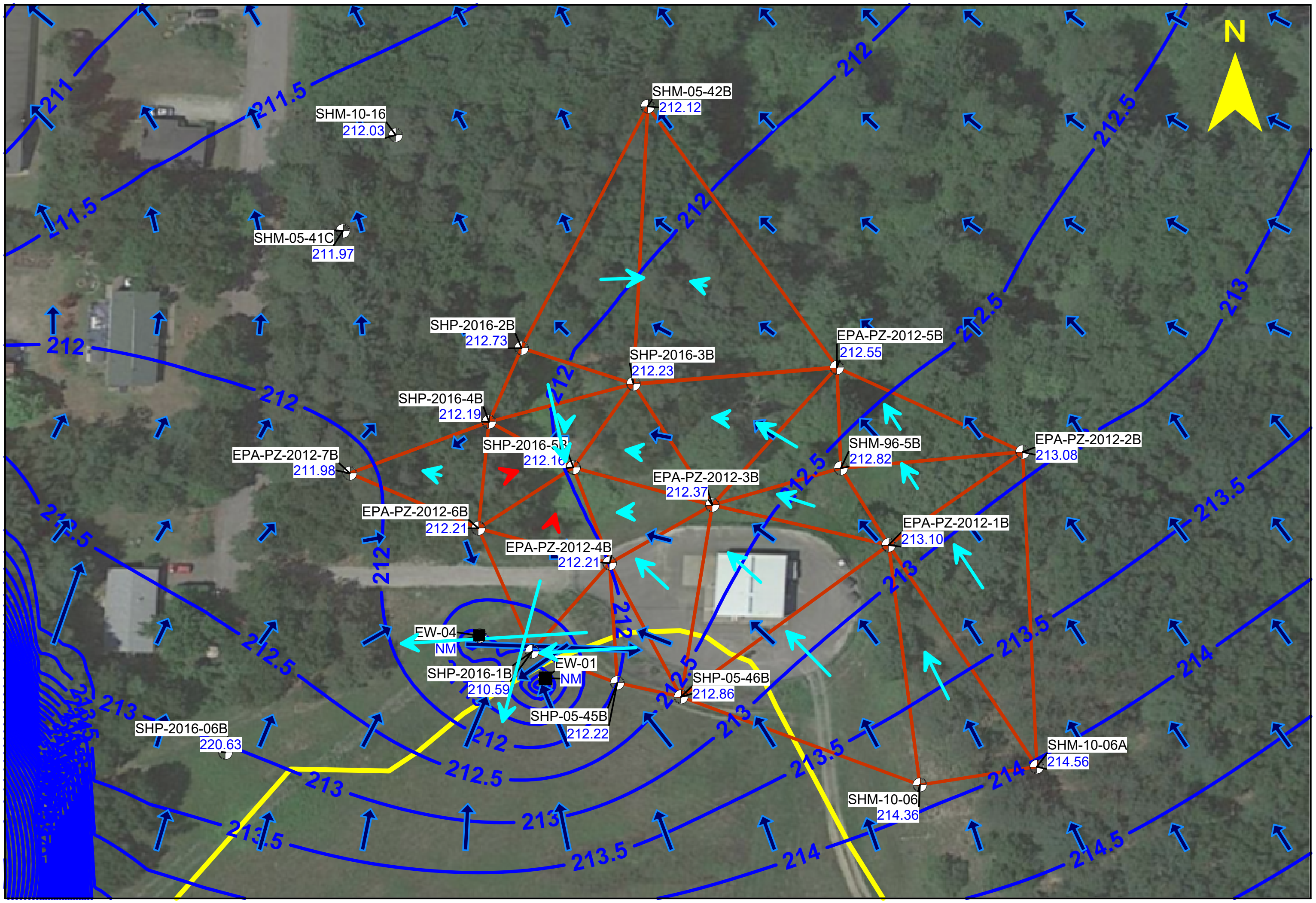
FIGURE

6



Legend

- Extraction Wells
- Monitoring Wells
- Triangle for Vector Analysis
- Hydraulic Gradient Arrow from Technical Memo 1 (S-A JV, 2021) (Scale Factor = 5,000)
- Hydraulic Gradient Arrow from Groundwater Model
- Groundwater Elevation Contour from Groundwater Model (0.5 foot interval)
- Shepley's Hill Landfill Boundary

Scale in feet

0 120 240

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FORMER FORT DEVENS ARMY INSTALLATION
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SHEPLEY'S HILL LANDFILL

November 1, 2018 (Stress Period 25)
3PE and Model-Generated Hydraulic Vectors and Groundwater Elevation Contours

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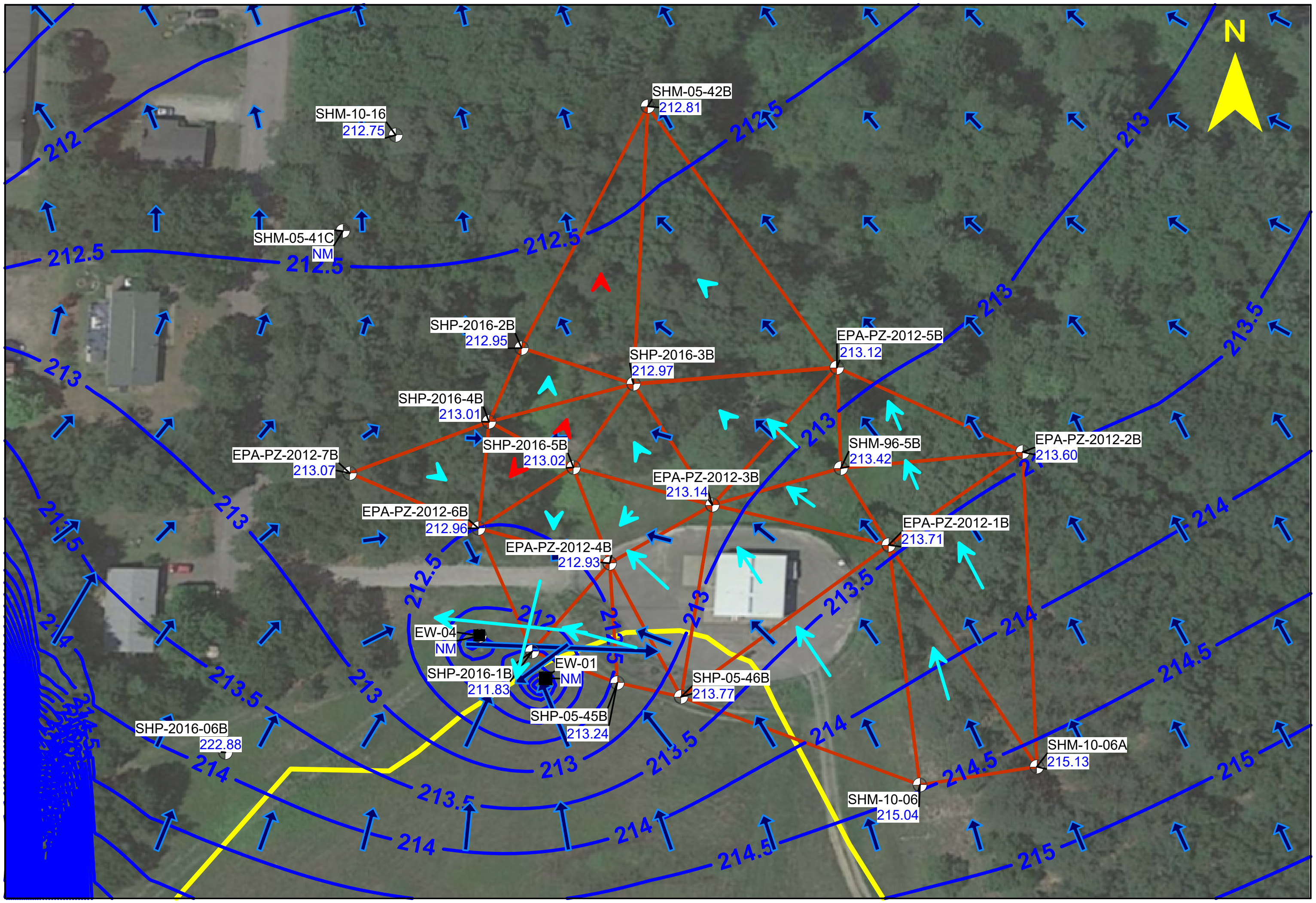
FIGURE

7



Legend

- Extraction Wells
- Shepley's Hill Landfill Boundary
- Monitoring Wells
- Triangle for Vector Analysis
- Hydraulic Gradient Arrow from Technical Memo 1 (S-A JV, 2021) (Scale Factor = 5,000)
- Hydraulic Gradient Arrow from Groundwater Model
- Groundwater Elevation Contour from Groundwater Model (0.5 foot interval)

Scale in feet

0 120 240

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FORMER FORT DEVENS ARMY INSTALLATION
DEVENS, MASSACHUSETTS
2021 TECHNICAL MEMO
SHEPLEY'S HILL LANDFILL

May 13, 2019 (Stress Period 27)
3PE and Model-Generated Hydraulic Vectors and Groundwater Elevation Contours

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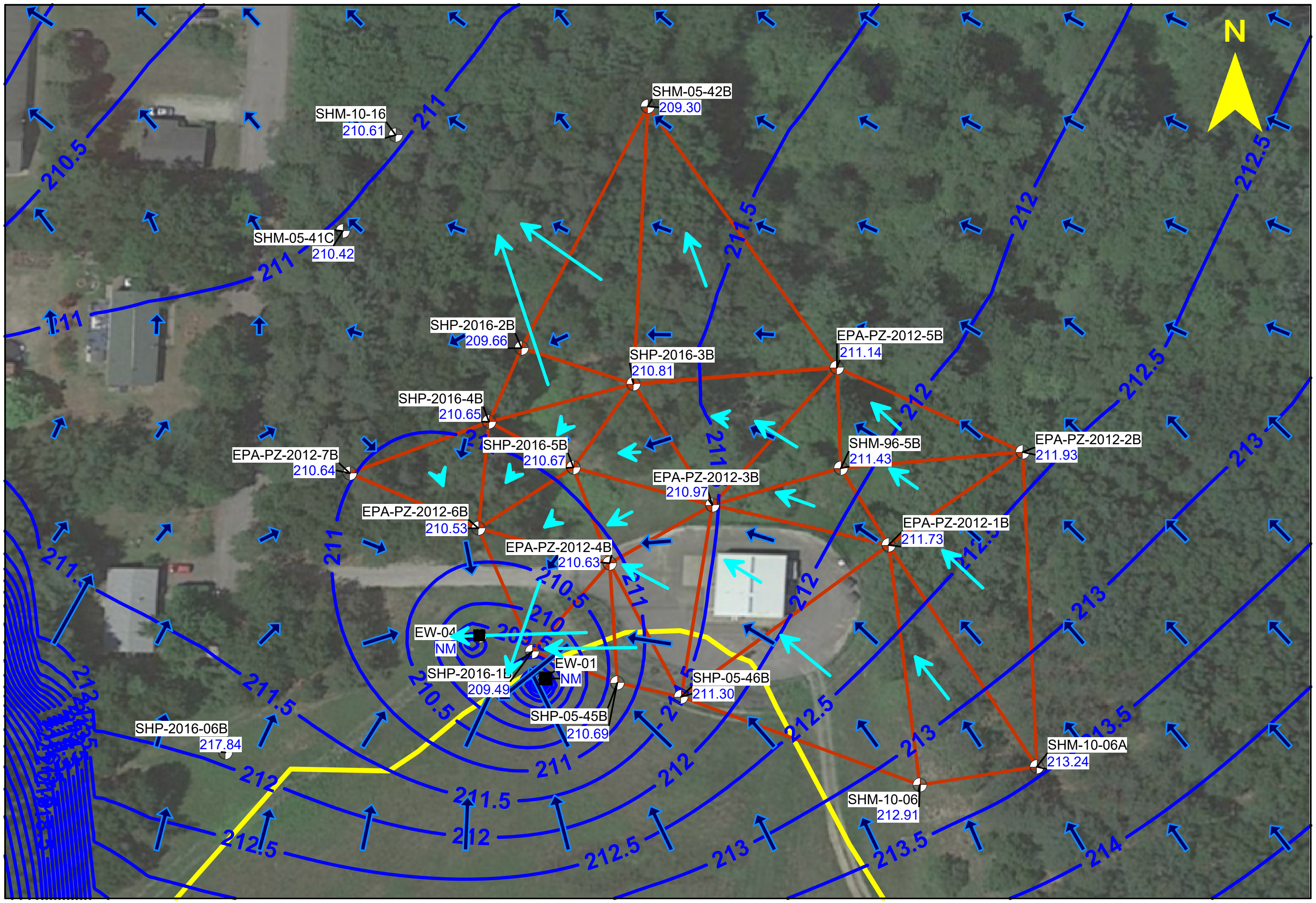
FIGURE
8



Legend

- Extraction Wells
- Monitoring Wells
- Triangle for Vector Analysis
- Hydraulic Gradient Arrow from Technical Memo 1 (S-A JV, 2021) (Scale Factor = 5,000)
- Hydraulic Gradient Arrow from Groundwater Model
- Groundwater Elevation Contour from Groundwater Model (0.5 foot interval)
- Shepley's Hill Landfill Boundary

Scale in feet

0 120 240

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FORMER FORT DEVENS ARMY INSTALLATION
DEVENS, MASSACHUSETTS
2021 TECHNICAL MEMO
SHEPLEY'S HILL LANDFILL

October 22, 2019 (Stress Period 29)
3PE and Model-Generated Hydraulic Vectors and Groundwater Elevation Contours

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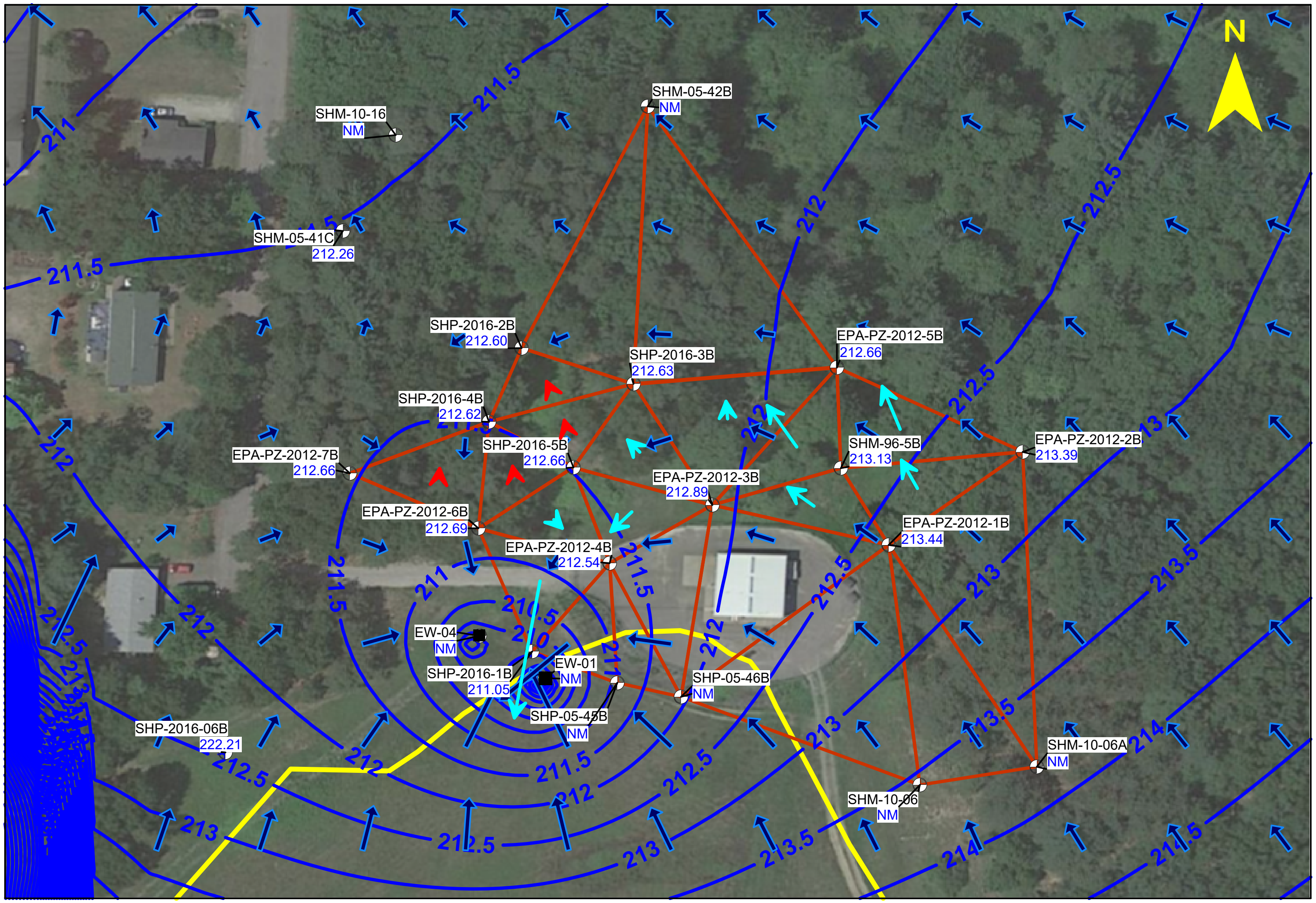
FIGURE 9



Legend

- Extraction Wells
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- Triangle for Vector Analysis
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(Scale Factor = 5,000)
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0 120 240

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FORMER FORT DEVENS ARMY INSTALLATION
DEVENS, MASSACHUSETTS
2021 TECHNICAL MEMO
SHEPLEY'S HILL LANDFILL

May 18, 2020 (Stress Period 31)
3PE and Model-Generated Hydraulic Vectors and Groundwater Elevation Contours

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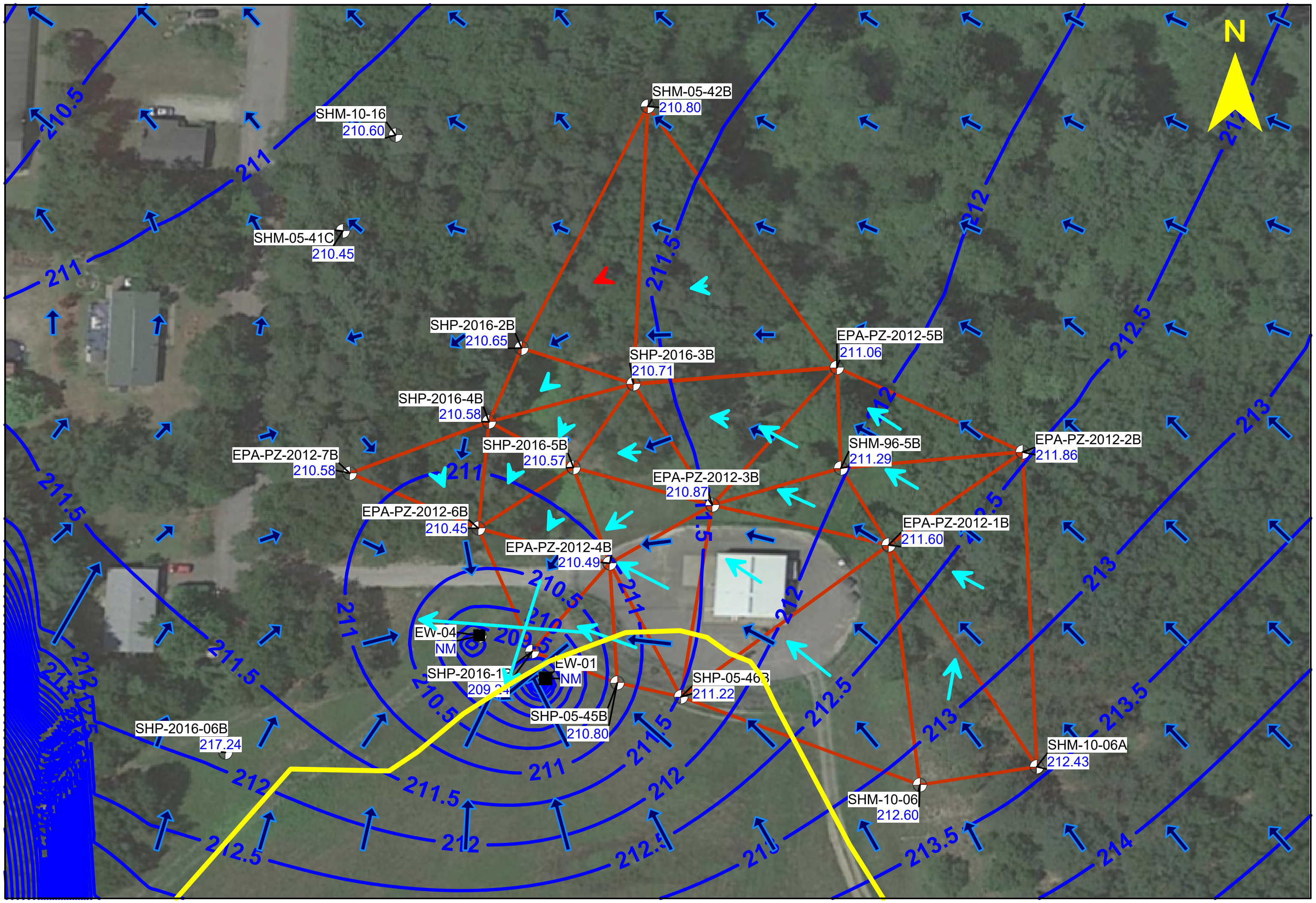
FIGURE
10



Legend

- ■ Extraction Wells
- Monitoring Wells
- Triangle for Vector Analysis
- Hydraulic Gradient Arrow from Technical Memo 1 (S-A JV, 2021) (Scale Factor = 5,000)
- Hydraulic Gradient Arrow from Groundwater Model
- Groundwater Elevation Contour from Groundwater Model (0.5 foot interval)
- Shepley's Hill Landfill Boundary

Scale in feet

0 120 240

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FORMER FORT DEVENS ARMY INSTALLATION
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2021 TECHNICAL MEMO
SHEPLEY'S HILL LANDFILL

November 4, 2020 (Stress Period 33)
3PE and Model-Generated Hydraulic Vectors and Groundwater Elevation Contours

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FIGURE
11