

Memorandum

Date: May 17, 2021

To: Jill Parker-Witt, American Electric Power (AEP)

From: Beth Gross, Ph.D., P.E. (OK) and Allison Kreinberg, Geosyntec

Subject: Alternative Source Demonstration
Northeastern Power Station Bottom Ash Pond
Oologah, Rogers County, Oklahoma

The Bottom Ash Pond (BAP) is a regulated coal combustion residual (CCR) management unit at the Northeastern Power Station in Oologah, Oklahoma. A semi-annual assessment monitoring event was completed at the BAP on October 20, 2020 in accordance with the assessment monitoring requirements of Oklahoma Administrative Code OAC 252:517-9-6. Analysis of the October 2020 data identified statistically significant levels (SSLs) above the groundwater protection standards (GWPSs) for lithium and fluoride at SP-10 (Attachment B). The lower confidence level (LCL) for lithium at SP-10 of 0.247 milligrams per liter (mg/L) exceeded the GWPS of 0.15 mg/L. The LCL for fluoride at SP-10 of 4.80 mg/L exceeded the GWPS of 4.40 mg/L.

As described in previous ASDs (Geosyntec, 2019; Geosyntec, 2021), lower concentrations of lithium and fluoride in the BAP and BAP sediments, including pore water, than those observed at SP-10 suggest that the BAP is not the source of these exceedances. Instead, the release of lithium from the clay minerals in the shale lens located at 46 ft below ground surface in the screened interval of SP-10 is the likely source of lithium in groundwater at that location. Analytical results suggest that naturally occurring fluoride is also associated with the shale lenses and is contributing to aqueous fluoride at SP-10.

Data from the October 2020 monitoring event indicate a lithium concentration of 0.209 mg/L and a fluoride concentration of 6.55 mg/L at SP-10. These concentrations are consistent with previous results collected during the assessment monitoring period (**Figure 1** and **Figure 2**, respectively) and continue to show no statistically significant positive trends. This is an indication that conditions have not changed substantially since the previous ASD was submitted (Geosyntec, 2021) and the arguments presented in the previous ASDs (Geosyntec, 2019; Geosyntec, 2021) are

Jill Parker-Witt
May 17, 2021
Page 2

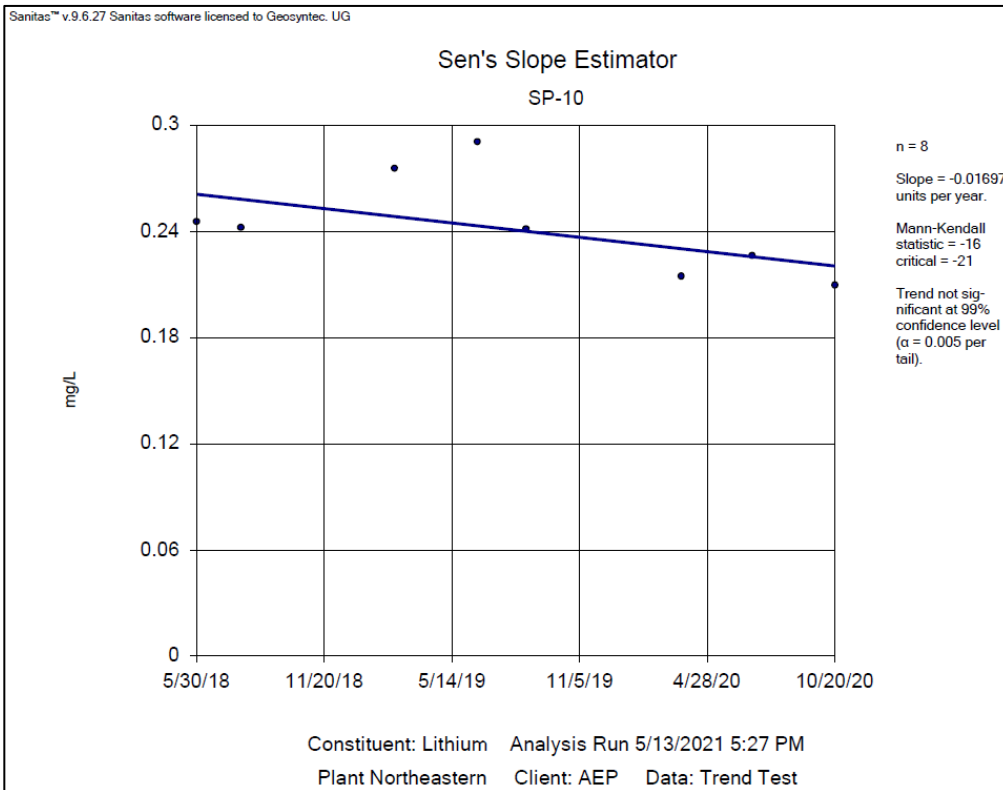
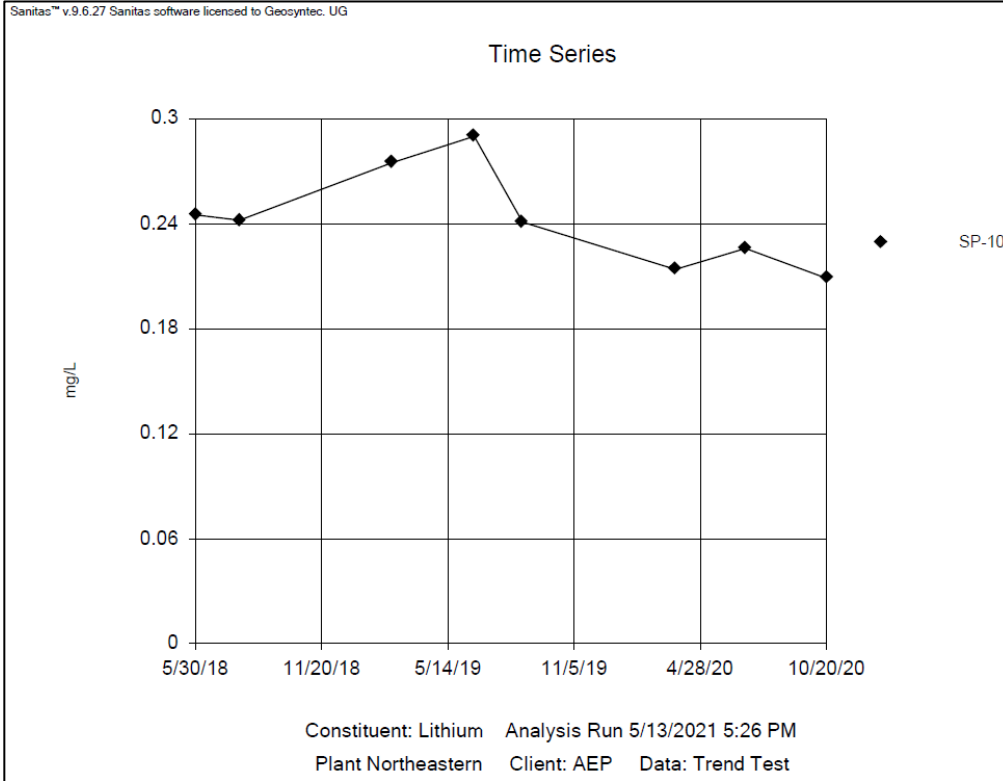
still valid. Thus, lithium and fluoride concentrations at SP-10 identified during the October 2020 assessment monitoring event are not attributed to a release from the BAP.

The information above, as well as the information presented in previous ASDs (Geosyntec, 2019; Geosyntec, 2021), continue to support the position that lithium and fluoride concentrations are a result of natural variation in the underlying lithology, including the presence of shale lenses containing lithium and fluoride within the screened interval at SP-10. Therefore, no further action is warranted, and the BAP will remain in the assessment monitoring program. Certification of this ASD memorandum by a qualified professional engineer is in Attachment A.

Geosyntec Consultants, 2019. Alternative Source Demonstration. Bottom Ash Pond – Northeastern Power Station, Oologah, Oklahoma. April.

Geosyntec Consultants, 2021. Alternative Source Demonstration. Bottom Ash Pond – Northeastern Power Station, Oologah, Oklahoma. January.

FIGURES



Lithium Time Series and Trend Test – SP-10

Northeastern Bottom Ash Pond

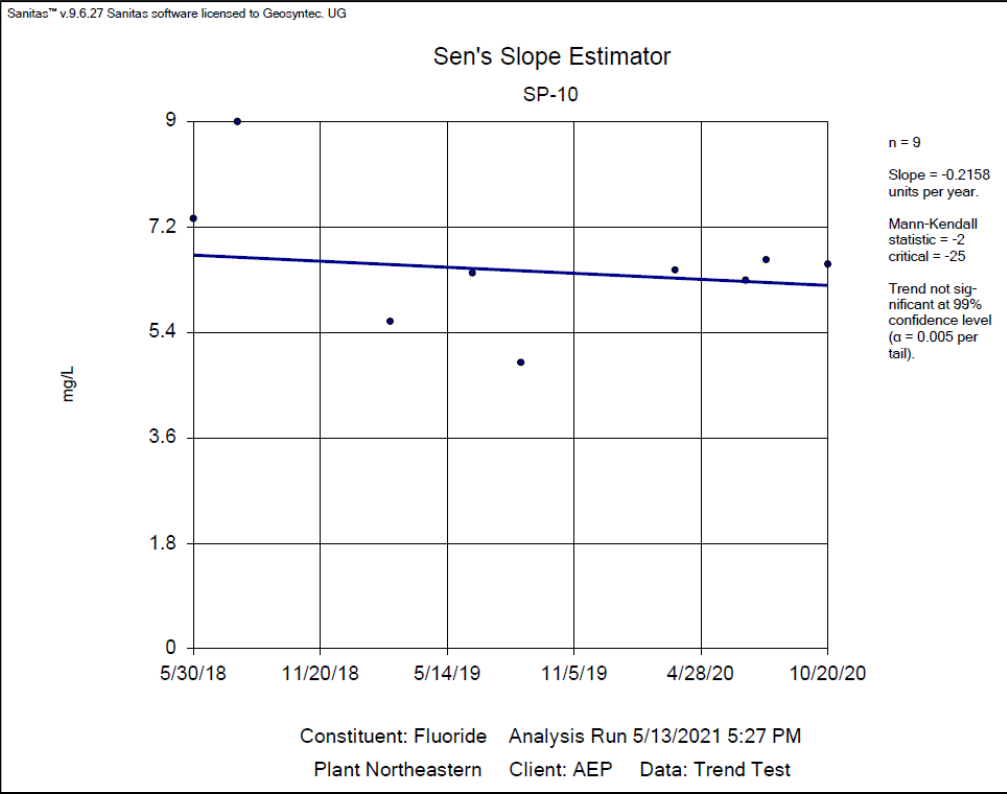
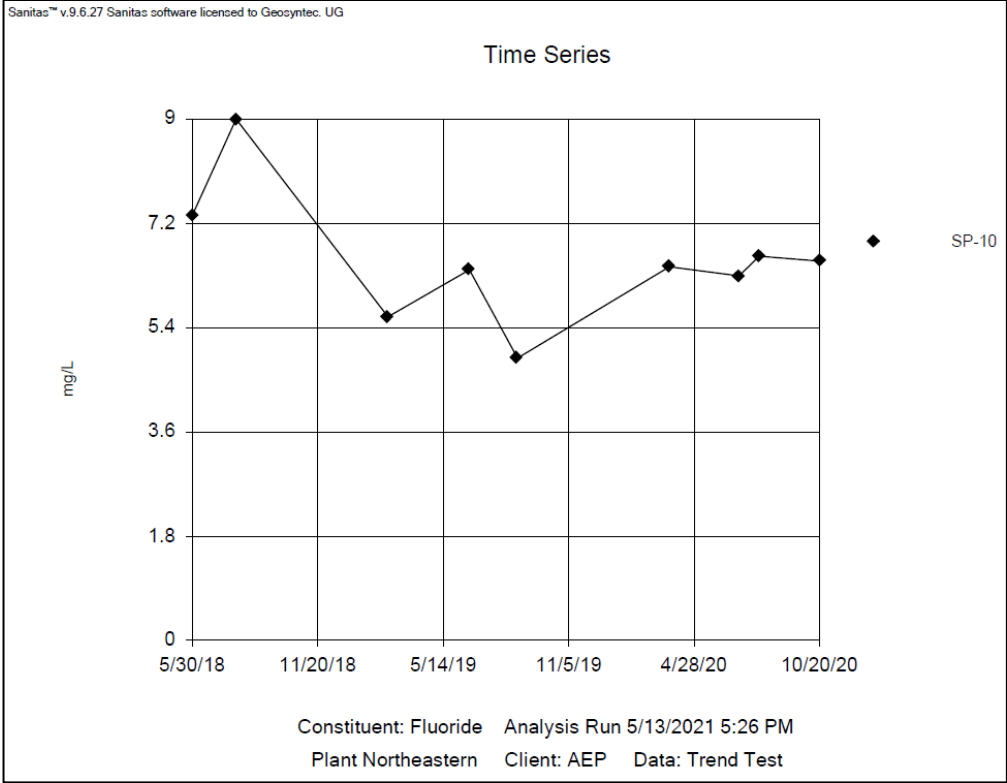
Geosyntec
consultants



Figure
1

Columbus, Ohio

May 7, 2021



Fluoride Time Series and Trend Test – SP-10
 Northeastern Bottom Ash Pond



Figure
2

Columbus, Ohio

May 7, 2021

Internal info; path, date revised, author

ATTACHMENT A

Certification by Qualified Professional Engineer

CERTIFICATION BY A QUALIFIED PROFESSIONAL ENGINEER

I certify that the selected and above described alternative source demonstration is appropriate for evaluating the groundwater monitoring data for the Bottom Ash Pond CCR management area at the Northeastern Power Station and that the requirements of OAC 252:517-9-6(g)(3)(B) have been met.

Beth Ann Gross
Printed Name of Licensed Professional Engineer

Beth Ann Gross
Signature



Geosyntec Consultants
2039 Centre Pointe Boulevard, Suite 103
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Oklahoma Firm Certificate of
Authorization No. 1996
Exp. 6/30/2022

18167
License Number

Oklahoma
Licensing State

May 17, 2021
Date

* * * * *

ATTACHMENT B
Assessment Statistics Report -
2020 Second Semiannual Event

STATISTICAL ANALYSIS SUMMARY
BOTTOM ASH POND
Northeastern Power Station
Oologah, Oklahoma

Submitted to



1 Riverside Plaza
Columbus, Ohio 43215-2372

Submitted by



engineers | scientists | innovators

941 Chatham Lane
Suite 103
Columbus, Ohio 43221

February 19, 2021
CHA8500

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LIST OF ACRONYMS AND ABBREVIATIONS

AEP	American Electric Power
ASD	Alternative Source Demonstration
BAP	Bottom Ash Pond
CCR	Coal Combustion Residuals
CCV	Continuing Calibration Verification
GWPS	Groundwater Protection Standard
LCL	Lower Confidence Limit
LFB	Laboratory Fortified Blanks
LRB	Laboratory Reagent Blanks
MCL	Maximum Contaminant Level
NELAP	National Environmental Laboratory Accreditation Program
ODEQ	Oklahoma Department of Environmental Quality
OAC	Oklahoma Administrative Code
QA	Quality Assurance
QC	Quality Control
RSL	Regional Screening Level
SSI	Statistically Significant Increase
SSL	Statistically Significant Level
TDS	Total Dissolved Solids
UPL	Upper Prediction Limit
UTL	Upper Tolerance Limit

SECTION 1

EXECUTIVE SUMMARY

In accordance with the Oklahoma Department of Environmental Quality (ODEQ) and Oklahoma administrative code (OAC) regarding the disposal of coal combustion residuals (CCR) in landfills and surface impoundments (OAC 252:517), groundwater monitoring has been conducted at the Bottom Ash Pond (BAP), an existing CCR unit at the Northeastern Power Station located in Oologah, Oklahoma.

Based on detection monitoring conducted in 2017 and 2018, statistically significant increases (SSIs) over background were concluded for boron, chloride, fluoride, total dissolved solids (TDS), and sulfate at the BAP. Also, pH values below the lower prediction limit (LPL) resulted in SSIs below background as well. Groundwater protection standards (GWPS) were set in accordance with OAC 252:517-9-6(h). One assessment monitoring event was conducted at the BAP in October 2020, in accordance with OAC 252:517-9-6(d), respectively. Results of the October 2020 event are documented in this report.

Groundwater data underwent several validation tests, including those for completeness, sample tracking accuracy, transcription errors, and consistent use of measurement units. No data quality issues were identified which would impact data usability.

The monitoring data were submitted to Groundwater Stats Consulting, LLC for statistical analysis. Groundwater protection standards (GWPSs) were established for the Appendix B parameters. Confidence intervals were calculated for Appendix B parameters at the compliance wells to assess whether Appendix B parameters were present at a statistically significant level (SSL) above the GWPS. SSLs were identified for fluoride and lithium. Thus, either the unit will move to an assessment of corrective measures or an alternative source demonstration (ASD) will be conducted to evaluate if the unit can remain in assessment monitoring. Certification of the selected statistical methods by a qualified professional engineer is documented in Attachment A. The statistical analysis and certification of the selected methods were completed within 90 days of obtaining the data.

SECTION 2

BOTTOM ASH POND EVALUATION

2.1 Data Validation & QA/QC

During the assessment monitoring program, one set of samples was collected for analysis from each upgradient and downgradient well to meet the requirements of OAC 252:517-9-6(d)(1) (October 2020). Samples from the sampling event were analyzed for the Appendix A and Appendix B parameters. A summary of data collected during this assessment monitoring event may be found in Table 1.

Chemical analysis was completed by an analytical laboratory certified by the National Environmental Laboratory Accreditation Program (NELAP). Quality assurance and quality control (QA/QC) samples completed by the analytical laboratory included the use of laboratory reagent blanks (LRBs), continuing calibration verification (CCV) samples, and laboratory fortified blanks (LFBs).

The analytical data were imported into a Microsoft Access database, where checks were completed to assess the accuracy of sample location identification and analyte identification. Where necessary, unit conversions were applied to standardize reported units across all sampling events. Exported data files were created for use with the Sanitas™ v.9.6.27b statistics software. The export file was checked against the analytical data for transcription errors and completeness. No QA/QC issues were noted which would impact data usability.

2.2 Statistical Analysis

Statistical analyses for the BAP were conducted in accordance with the June 2018 *Statistical Analysis Plan* (Geosyntec, 2018a), except where noted below. Time series plots and results for all completed statistical tests are provided in Attachment B.

The data obtained in October 2020 were screened for potential outliers. No outliers were identified for these events.

2.2.1 Establishment of GWPSs

A GWPS was established for each Appendix B parameter in accordance with OAC 252:517-9-6(h) and the *Statistical Analysis Plan* (Geosyntec, 2018a). The established GWPS was determined to be the greater value of the background concentration and the maximum contaminant level (MCL) or risk-based level specified in OAC 252:517-9-6(h) for each Appendix B parameter. To determine background concentrations, an upper tolerance limit (UTL) was calculated using pooled data from the background wells collected during the background monitoring and assessment monitoring events. Tolerance limits were calculated parametrically with 95% coverage and 95% confidence for arsenic, beryllium, combined radium, fluoride, and lithium. Non-parametric

tolerance limits were calculated for antimony, barium, chromium, cobalt, lead, and molybdenum due to apparent non-normal distributions and for cadmium, mercury, selenium, and thallium due to a high non-detect frequency. Tolerance limits and the final GWPSs are summarized in Table 2.

2.2.2 Evaluation of Potential Appendix B SSLs

A confidence interval was constructed for each Appendix B parameter at each compliance well. Confidence limits were generally calculated parametrically ($\alpha = 0.01$); however, non-parametric confidence limits were calculated in some cases (e.g., when the data did not appear to be normally distributed or when the non-detect frequency was too high). An SSL was concluded if the lower confidence limit (LCL) exceeded the GWPS (i.e., if the entire confidence interval exceeded the GWPS). Calculated confidence limits are shown in Attachment B.

The following SSLs were identified at the Northeastern BAP:

- The LCL for fluoride exceeded the GWPS of 4.4 mg/L at SP-10 (4.80 mg/L).
- The LCL for lithium exceeded the GWPS of 0.14 mg/L at SP-10 (0.247 mg/L).

As a result, the Northeastern BAP will either move to an assessment of corrective measures or an alternative source demonstration will be conducted to evaluate if the unit can remain in assessment monitoring.

2.2.3 Establishment of Appendix A Prediction Limits

Upper prediction limits (UPL) were previously established for all Appendix III parameters following the background monitoring period (Geosyntec, 2018b). Intrawell tests were used to evaluate potential SSIs for calcium, whereas interwell tests were used to evaluate potential SSIs for boron, chloride, fluoride, pH, sulfate, and TDS. While interwell prediction limits have been updated periodically during the assessment monitoring period as sufficient data became available, this represents the first update to the background dataset for calcium, which was parameters evaluated using intrawell tests.

Mann-Whitney (Wilcoxon rank-sum) tests were performed to determine whether the newer data are affected by a release from the BAP. Because the interwell Appendix A limits and the Appendix B GWPSs are based on data from upgradient wells which we would not expect to have been impacted by a release, these tests were used for intrawell Appendix A tests only. Mann-Whitney tests were used to compare the medians of historical data (January 2017 – October 2017) to the new compliance samples (July 2018 – June 2020) for calcium. Results were evaluated to determine if the medians of the two groups were similar at the 99% confidence level. Where no significant difference was found, the new compliance data were added to the background dataset. Where a statistically significant difference was found between the medians of the two groups, the data were reviewed to evaluate the cause of the difference and to determine if adding newer data to the background dataset, replacing the background dataset with the newer data, or continuing to

use the existing background dataset was most appropriate. If the differences appeared to have been caused by a release, then the previous background dataset continued to be used.

The complete Mann-Whitney test results and a summary of the significant findings can be found in Attachment B. Significant differences were found between the two groups for calcium in well SP-11, and as such, the prediction limits were not updated to include more recent data at SP-11.

After the revised background set was established, a parametric or non-parametric analysis was selected based on the distribution of the data and the frequency of non-detect data. Estimated results less than the practical quantitation limit (PQL) – i.e., “J-flagged” data – were considered detections and the estimated results were used in the statistical analyses. Non-parametric analyses were selected for datasets with at least 50% non-detect data or datasets that could not be normalized. Parametric analyses were selected for datasets (either transformed or untransformed) that passed the Shapiro-Wilk / Shapiro-Francia test for normality. The Kaplan-Meier non-detect adjustment was applied to datasets with between 15% and 50% non-detect data. For datasets with fewer than 15% non-detect data, non-detect data were replaced with one half of the PQL. The selected analysis (i.e., parametric or non-parametric) and transformation (where applicable) for each background dataset are shown in Attachment B.

Except for calcium at well SP-11, the intrawell UPLs were updated using all the historical data through June 2020 to represent background values. The intrawell UPLs were calculated for a one-of-two retesting procedure; i.e., if at least one sample in a series of two does not exceed the UPL, then it can be concluded that an SSI has not occurred. The retesting procedures allows achieving an acceptably high statistical power to detect changes at downgradient wells for constituents evaluated using intrawell prediction limits. Intrawell tests continued to be used to evaluate potential SSIs for calcium, whereas interwell tests continued to be used to evaluate potential SSIs for boron, chloride, fluoride, pH, sulfate and TDS. Interwell UPLS and the LPL for pH were updated using all data through October 2020. The updated prediction limits are summarized in Table 3.

2.2.4 Evaluation of Potential Appendix A SSIs

While SSLs were identified, a review of the Appendix A results was completed to assess whether concentrations of Appendix A parameters at the compliance wells exceeded background concentrations.

Data collected during the October 2020 assessment monitoring event from each compliance well were compared to the prediction limits to evaluate results above background values. The results from this event and the prediction limits are summarized in Table 3. The following exceedances of the upper prediction limits (UPLs) were noted:

- Boron concentrations exceeded the interwell UPL of 0.506 mg/L at SP-10 (0.955 mg/L).
- Chloride concentrations exceeded the interwell UPL of 806 mg/L at SP-2 (850 mg/L) and SP-10 (1,830 mg/L).

- Fluoride concentrations exceeded the interwell UPL of 4.22 mg/L at SP-10 (6.55 mg/L).
- pH concentrations exceeded the interwell UPL of 9.0 at SP-10 (9.1 mg/L) and at SP-11 (9.2 mg/L).
- TDS concentrations exceeded the interwell UPL of 1,580 mg/L at SP-2 (1,790 mg/L) and SP-10 (3,540 mg/L).

While the prediction limits were calculated for a one-of-two retesting procedure, SSIs were conservatively assumed if the initial (October 2020) sample was above the UPL or below the LPL. Based on these results, boron, chloride, fluoride, pH, and TDS concentrations appear to be above background concentrations and the unit will remain assessment monitoring.

2.3 Conclusions

A semi-annual assessment monitoring event was conducted in accordance with the CCR Rule. The laboratory and field data were reviewed prior to statistical analysis, with no QA/QC issues identified that impacted data usability. A review of outliers identified no potential outliers in the October 2020 data. GWPSs were re-established for the Appendix B parameters. A confidence interval was constructed at each compliance well for each Appendix B parameter; SSLs were concluded if the entire confidence interval exceeded the GWPS. SSLs were identified for fluoride and lithium. Appendix A parameters were compared to recalculated prediction limits, with exceedances identified for boron, chloride, fluoride, pH, and TDS.

Based on this evaluation, the Northeastern BAP CCR unit will either move to an assessment of corrective measures or an ASD will be conducted to evaluate if the unit can remain in assessment monitoring.

SECTION 3

REFERENCES

Geosyntec Consultants (Geosyntec). 2018a. Statistical Analysis Plan – Northeastern Power Station. Oologah, Oklahoma. June.

Geosyntec Consultants (Geosyntec). 2018b. Statistical Analysis Summary – Stations 3 and 4 Bottom Ash Pond, Northeastern Plant, Oologah, Oklahoma. January 15, 2018.

Geosyntec. 2020a. Statistical Analysis Summary – Bottom Ash Pond, Northeastern Plant, Oologah, Oklahoma. October 28, 2020.

TABLES

**Table 1 - Groundwater Data Summary
Northeastern Plant - Bottom Ash Pond**

Geosyntec Consultants, Inc.

Parameter	Unit	SP-1	SP-10	SP-11	SP-2	SP-4	SP-5R
		10/20/2020	10/20/2020	10/20/2020	10/20/2020	10/21/2020	10/21/2020
Antimony	µg/L	0.46	0.08 J	0.48	1.22	0.29	0.10
Arsenic	µg/L	0.57	0.42	1.49	1.08	1.03	10.9
Barium	µg/L	143	6,800	630	1,110	322	2,070
Beryllium	µg/L	0.05 J	0.03 J	0.03 J	0.07 J	0.06 J	0.05 J
Boron	mg/L	0.146	0.955	0.220	0.151	0.333	0.188
Cadmium	µg/L	0.08	0.01 J	0.15	0.04 J	0.07	0.05 U
Calcium	mg/L	103	39.9	43.8	75.3	63.9	50.4
Chloride	mg/L	12.9	1,830	98.1	850	441	584
Chromium	µg/L	0.215	0.2 J	2.20	0.398	0.523	0.320
Cobalt	µg/L	0.727	0.103	1.16	0.433	0.508	0.378
Combined Radium	pCi/L	2.82	13.9507	0.661	12.96	3.42	6.502
Fluoride	mg/L	0.81	6.55	3.05	2.98	3.24	3.03
Lead	µg/L	0.254	0.1 J	0.719	0.1 J	0.359	0.373
Lithium	mg/L	0.00336	0.209	0.0298	0.0517	0.0559	0.0792
Mercury	µg/L	0.005 U	0.005 U	0.004 J	0.005 U	0.005 U	0.005 U
Molybdenum	µg/L	11.5	0.6 J	2 J	20.1	3.24	0.8 J
Selenium	µg/L	3.8	0.09 J	0.5	4.4	0.7	0.2 J
Sulfate	mg/L	51.1	9.6	35.6	19.1	70.4	5.0
Thallium	µg/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Total Dissolved Solids	mg/L	427	3,540	764	1,790	1,150	1,320
pH	SU	8.5	9.1	9.2	8.7	8.9	8.8

Notes:

mg/L: milligrams per liter

µg/L: micrograms per liter

SU: standard unit

pCi/L: picocuries per liter

U: Parameter was not present in concentrations above method detection limit and is reported as the reporting limit

J: Estimated value. Parameter was detected in concentrations below the reporting limit

**Table 2: Groundwater Protection Standards
Northeastern Plant - Bottom Ash Pond**

Geosyntec Consultants, Inc.

Constituent Name	MCL	CCR Rule-Specified	Calculated UTL	GWPS
Antimony, Total (mg/L)	0.006		0.0051	0.006
Arsenic, Total (mg/L)	0.01		0.054	0.054
Barium, Total (mg/L)	2		2.60	2.60
Beryllium, Total (mg/L)	0.004		0.002	0.004
Cadmium, Total (mg/L)	0.005		0.0025	0.005
Chromium, Total (mg/L)	0.1		0.042	0.1
Cobalt, Total (mg/L)	n/a	0.006	0.018	0.018
Combined Radium, Total (pCi/L)	5		16.37	16.37
Fluoride, Total (mg/L)	4		4.4	4.4
Lead, Total (mg/L)	n/a	0.015	0.011	0.015
Lithium, Total (mg/L)	n/a	0.04	0.14	0.14
Mercury, Total (mg/L)	0.002		0.000030	0.002
Molybdenum, Total (mg/L)	n/a	0.1	0.010	0.1
Selenium, Total (mg/L)	0.05		0.005	0.05
Thallium, Total (mg/L)	0.002		0.0016	0.002

Notes:

MCL = Maximum Contaminant Level

CCR = Coal Combustion Residual

Calculated UTL (Upper Tolerance Limit) represents site-specific background values.

Grey cells indicate the GWPS is based on the calculated UTL, which is higher than the MCL or CCR Rule-specified value.

**Table 3 - Appendix III Data Summary
Northeastern Plant - Bottom Ash Pond**

Analyte	Unit	Description	SP-1	SP-2	SP-10	SP-11
			10/20/2020	10/20/2020	10/20/2020	10/20/2020
Boron	mg/L	Interwell Background Value (UPL)	0.506			
		Analytical Result	0.146	0.151	0.955	0.220
Calcium	mg/L	Intrawell Background Value (UPL)	144	176	227	1,460
		Analytical Result	103	75.3	39.9	43.8
Chloride	mg/L	Interwell Background Value (UPL)	806			
		Analytical Result	12.9	850	1,830	98.1
Fluoride	mg/L	Interwell Background Value (UPL)	4.22			
		Analytical Result	0.81	2.98	6.55	3.05
pH	SU	Interwell Background Value (UPL)	9.0			
		Interwell Background Value (LPL)	6.9			
		Analytical Result	8.5	8.7	9.1	9.2
Sulfate	mg/L	Interwell Background Value (UPL)	90.0			
		Analytical Result	51.1	19.1	9.6	35.6
Total Dissolved Solids	mg/L	Interwell Background Value (UPL)	1,580			
		Analytical Result	427	1,790	3,540	764

Notes:

UPL: Upper prediction limit

LPL: Lower prediction limit

Bold values exceed the background value.

Background values are shaded gray.

ATTACHMENT A

Certification by Qualified Professional Engineer

Certification by Qualified Professional Engineer

I certify that the selected and above described statistical method is appropriate for evaluating the groundwater monitoring data for the Northeastern Bottom Ash Pond CCR management area and that the requirements of OAC 252:517-9-4(g) have been met.

DAVID ANTHONY MILLER

Printed Name of Licensed Professional Engineer

David Anthony Miller

Signature



26057

License Number

OKLAHOMA

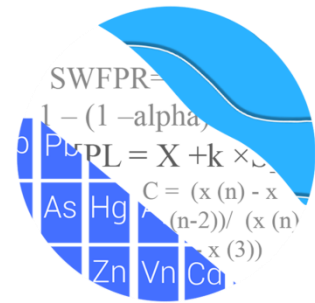
Licensing State

02-19-21

Date

ATTACHMENT B
Statistical Analysis Output

GROUNDWATER STATS CONSULTING



December 29, 2020

Geosyntec Consultants
Attn: Ms. Allison Kreinberg
941 Chatham Lane, #103
Columbus, OH 43221

Re: Northeastern BAP
Background Update & Assessment Monitoring Statistics – October 2020

Dear Ms. Kreinberg,

Groundwater Stats Consulting, formerly the statistical consulting division of Sanitas Technologies, is pleased to provide the background update of groundwater data and assessment monitoring analysis for American Electric Power Inc.'s Northeastern BAP. The analysis complies with the federal rule for the Disposal of Coal Combustion Residuals from Electric Utilities (CCR Rule, 2015) as well as with the USEPA Unified Guidance (2009).

Sampling began at the site for the CCR program in 2017. The monitoring well network, as provided by Geosyntec Consultants, consists of the following:

- **Upgradient wells:** SP-4 and SP-5R
- **Downgradient wells:** SP-1, SP2, SP-10, and SP-11

Data were sent electronically, and the statistical analysis was conducted according to the Statistical Analysis Plan and screening evaluation prepared by GSC and approved by Dr. Kirk Cameron, PhD Statistician with MacStat Consulting, primary author of the USEPA Unified Guidance, and Senior Advisor to GSC. The analysis was reviewed by Kristina Rayner, Groundwater Statistician and Founder of Groundwater Stats Consulting.

The CCR program consists of the following constituents listed below. The terms “constituent” and “parameter” are interchangeable.

- **Appendix III** (Detection Monitoring) - boron, calcium, chloride, fluoride, pH, sulfate, and TDS
- **Appendix IV** (Assessment Monitoring) – antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, combined radium 226 + 228, fluoride, lead, lithium, mercury, molybdenum, selenium, and thallium

For all constituents, a substitution of the most recent reporting limit is used for nondetect data. In the time series plots, a single reporting limit substitution is used across all wells for a given parameter since the wells are plotted as a group. For calculating intrawell prediction limits, the substitution is performed for individual wells and may differ across wells. This generally gives the most conservative limit in each case.

Time series and box plots for Appendix III and IV parameters are provided for all wells and constituents, and are used to evaluate concentrations over the entire record (Figures A & B, respectively). A summary of the values identified as outliers in this report and through previous screenings follows this letter. These values are deselected prior to the statistical analysis. All flagged values may also be seen in a lighter font and disconnected symbol on the time series graphs (Figure C).

For regulatory comparison of current observations against statistical limits for Appendix III constituents, the annual site-wide false positive rate is based on the USEPA Unified Guidance (2009) recommendation of 10% (5% for each semi-annual sample event or 2.5% for quarterly sample events). Power curves are included with this report to demonstrate that the selected statistical method provides sufficient power to detect a change at any of the downgradient wells which complies with the USEPA Unified Guidance recommendation. The EPA suggests the selected statistical method should provide at least 55% power at 3 standard deviations or at least 80% power at 4 standard deviations. Power curves were based on the following:

Semi-Annual Sampling

1-of-2 resample plan

Constituents: 7

Downgradient wells: 4

Summary of Statistical Methods – Appendix III Parameters

Based on the original background screening described below, the following statistical methods were selected for Appendix III parameters:

- Intrawell prediction limits, combined with a 1-of-2 resample plan for calcium
- Interwell prediction limits, combined with a 1-of-2 resample plan for boron, chloride, fluoride, pH, sulfate and TDS

Parametric prediction limits are utilized when the screened historical data follow a normal or transformed-normal distribution. When data cannot be normalized or the majority of data are nondetects, a nonparametric test is utilized. While the annual false positive rate associated with parametric limits is fixed at 10% as recommended by the EPA Unified Guidance (2009), the false positive rate associated with nonparametric limits is not fixed and depends upon the available background sample size, number of future comparisons, and verification resample plan. The distribution of data is tested using the Shapiro-Wilk/Shapiro-Francia test for normality. After testing for normality and performing any adjustments as discussed below (US EPA, 2009), data are analyzed using either parametric or non-parametric prediction limits as appropriate. Nondetects are handled as follows:

- No statistical analyses are required on wells and analytes containing 100% nondetects (USEPA Unified Guidance, 2009, Chapter 6).
- When data contain <15% nondetects in background, simple substitution of one-half the reporting limit is utilized in the statistical analysis. The reporting limit utilized for nondetects is the practical quantification limit (PQL) as reported by the laboratory.
- When data contain between 15-50% nondetects, the Kaplan-Meier nondetect adjustment is applied to the background data. This technique adjusts the mean and standard deviation of the historical concentrations to account for concentrations below the reporting limit.
- Nonparametric prediction limits are used on data containing greater than 50% nondetects.

Note that values shown on data pages reflect raw data and any non-detects that have been substituted with one-half of the reporting limit in the statistical analysis will be shown as the original reporting limit.

Natural systems continuously evolve due to physical changes made to the environment. Examples include capping a landfill, paving areas near a well, or lining a drainage

channel to prevent erosion. Periodic updating of background statistical limits is necessary to accommodate these types of changes. In the intrawell case, data for all wells and constituents may be re-evaluated when a minimum of 4 new data points are available to determine whether earlier concentrations are representative of present-day groundwater quality. In the interwell case, prediction limits are updated with upgradient well data following each sampling event after careful screening for any new outliers. In some cases, deselecting the earlier portion of data may be necessary prior to construction of limits so that resulting statistical limits are conservative (lower) from a regulatory perspective and capable of rapidly detecting changes in groundwater quality. Even though the data are excluded from the calculation, the values will continue to be reported and shown in tables and graphs.

Summary of Initial Background Screening Conducted in December 2017

Interwell prediction limits combined with a 1-of-2 verification strategy were recommended for boron, chloride, fluoride, pH, sulfate and TDS; and intrawell prediction limits combined with a 1-of-2 verification strategy were recommended for calcium. All proposed background data were screened for outliers and trends during the background screening. The findings of those reports were submitted with that analysis. Interwell prediction limits utilize all upgradient well data for construction of statistical limits. During each sample event, upgradient well data are screened for any newly suspected outliers or obvious trending patterns using time series plots. Intrawell prediction limits utilized the background data set that was originally screened in 2017. As recommended in the EPA Unified Guidance (2009), the background data sets are evaluated for the purpose of updating statistical limits, as described below, using the Mann-Whitney two-sample test when an additional four to eight measurements are available.

Appendix III Background Update – Conducted in December 2020

Prior to updating background data, Tukey's outlier test and visual screening were used to evaluate samples or outliers at all wells for calcium, which utilizes intrawell prediction limits, and at all upgradient wells for boron, chloride, fluoride, pH, sulfate and TDS, which utilize interwell prediction limits (Figure C). No outliers were noted by Tukey's test at any of the wells for calcium. Values were flagged as outliers as a result of not accurately representing the populations for the following constituents in well SP-1: chloride, fluoride, and TDS. These constituents are evaluated using interwell methods and, therefore, the values have no effect on the calculation of the prediction limits.

Tukey's outlier test on pooled upgradient well data identified a few outliers for Appendix III parameters which included chloride and TDS. These values were flagged accordingly in the database. As mentioned above, flagged data are displayed in a lighter font and as a disconnected symbol on the time series reports, as well as in a lighter font on the accompanying data pages. An updated summary of Tukey's test results and flagged outliers follow this report (Figure C).

For calcium which requires intrawell prediction limits, the Mann-Whitney (Wilcoxon Rank Sum) test was used to compare the medians of historical data through October 2017 to the new compliance samples at each well through June 2020 to evaluate whether the groups are statistically different at the 99% confidence level (Figure D). If no differences are noted, background data may be updated to include more recent data. Statistically significant differences were found between the two groups for calcium in well SP-11.

Typically, when the test concludes that the medians of the two groups are significantly different, particularly in the downgradient wells, the background data are not updated to include the newer data unless it can be reasonably justified that the change in concentrations reflects a naturally occurring shift unrelated to practices at the site. In studies such as the current one, in which one or both of the segments being compared are short, the comparison is complicated by the fact that normal short-term variation may be mistaken for long-term change in medians. In this analysis all of the cases with statistically significant Mann-Whitney results were updated. The individual case is discussed below.

For calcium in well SP-11, where the median was lower for more recent data compared to historical data, the background will consist of the 8 most recent samples. This will provide representation of more current groundwater quality, while providing statistical limits that are conservative from a regulatory perspective. The test results are included with the Mann Whitney test section at the end of this report. A list of any well/constituent pairs using a truncated portion of their record also follows this report.

Intrawell prediction limits using all historical data through June 2020, combined with a 1-of-2 resample plan, were constructed for calcium (Figure E).

For parameters tested using interwell analyses, the Sen's Slope/Mann-Kendall trend test was used to evaluate data in upgradient wells to determine whether concentrations are statistically increasing, decreasing or stable (Figure F). No statistically significant increasing or decreasing trends were noted except for decreasing trends for boron in upgradient well SP-4 and sulfate in upgradient well SP-5R. Concentrations for boron at SP-4 appear to be stabilizing, but the limited scope of the data could be indicative of

short term trends and, therefore, no adjustments were made at this time. Concentrations for sulfate at upgradient well SP-5R decreased for a period of time since sampling began, but the more recent values indicate a return to historical levels. No adjustments to these records were required at this time. However, as more data are collected, the records will be re-evaluated and earlier measurements will be flagged and deselected if they no longer represent present-day groundwater quality conditions.

Interwell prediction limits, combined with a 1-of-2 resample plan, were updated using all available data from upgradient wells through October 2020 for boron, chloride, fluoride, pH, sulfate, and TDS (Figure G). Interwell prediction limits pool upgradient well data to establish a background limit for an individual constituent. A summary table of the updated limits may be found following this letter in the Prediction Limit Summary Tables.

Evaluation of Appendix IV Parameters – October 2020

Prior to evaluating Appendix IV parameters, background data are screened through visual screening and Tukey's outlier test for potential outliers and extreme trending patterns that would lead to artificially elevated statistical limits. Due to no variation in the data, Tukey's outlier test was not performed for cadmium in well SP-5R, mercury in all wells, selenium in well SP-5R, and thallium in all wells. Any flagged values may be seen on the Outlier Summary following this letter as mentioned above.

Tukey's outlier test for Appendix IV parameters in downgradient wells only identified a high value for combined radium 226 + 228 in well SP-1, which was flagged as an outlier. The following additional values were flagged as outliers as they did not adequately represent the populations at their respective wells: chromium in well SP-10; combined radium 226 + 228 in well SP-11; lithium in well SP-1; and molybdenum in well SP-10.

Among upgradient wells, high values for cadmium, lead, and selenium were identified by Tukey's outlier test. Substantially high values were identified for upgradient well SP-4 on 8/4/17 through visual screening. Only the highest values for cadmium and lead were flagged as outliers to maintain statistical limits that are conservative from a regulatory perspective. This step will result in upper tolerance limits that are conservative (lower) from a regulatory perspective. A summary of flagged outliers follows this report (Figure C).

Parametric tolerance limits were used to calculate background limits from pooled upgradient well data through October 2020 for Appendix IV parameters with a target of 95% confidence and 95% coverage to determine background limits (Figure H). The

confidence and coverage levels for nonparametric tolerance limits are dependent upon the number of background samples. These limits were compared to the Maximum Contaminant Levels (MCLs), CCR Rule-Specified levels, and background limits in the Groundwater Protection Standard (GWPS) table following this letter to determine the highest limit for use as the GWPS in the Confidence Interval comparisons (Figure I).

Confidence intervals were then constructed on downgradient wells with data through October 2020 for each of the Appendix IV parameters using the highest limit of the MCL, CCR Rule-Specified level, or background limit as discussed above for the GWPS (Figure J). Only when the entire confidence interval is above a GWPS is the well/constituent pair considered to exceed its respective standard. A summary of the confidence interval results follows this letter. Exceedances were found for the following well/constituent pairs:

- Fluoride: SP-10
- Lithium: SP-10

Thank you for the opportunity to assist you in the statistical analysis of groundwater quality for the Northeastern BAP. If you have any questions or comments, please feel free to contact us.

For Groundwater Stats Consulting,



Andrew T. Collins
Project Manager



Kristina L. Rayner
Groundwater Statistician

Date Ranges

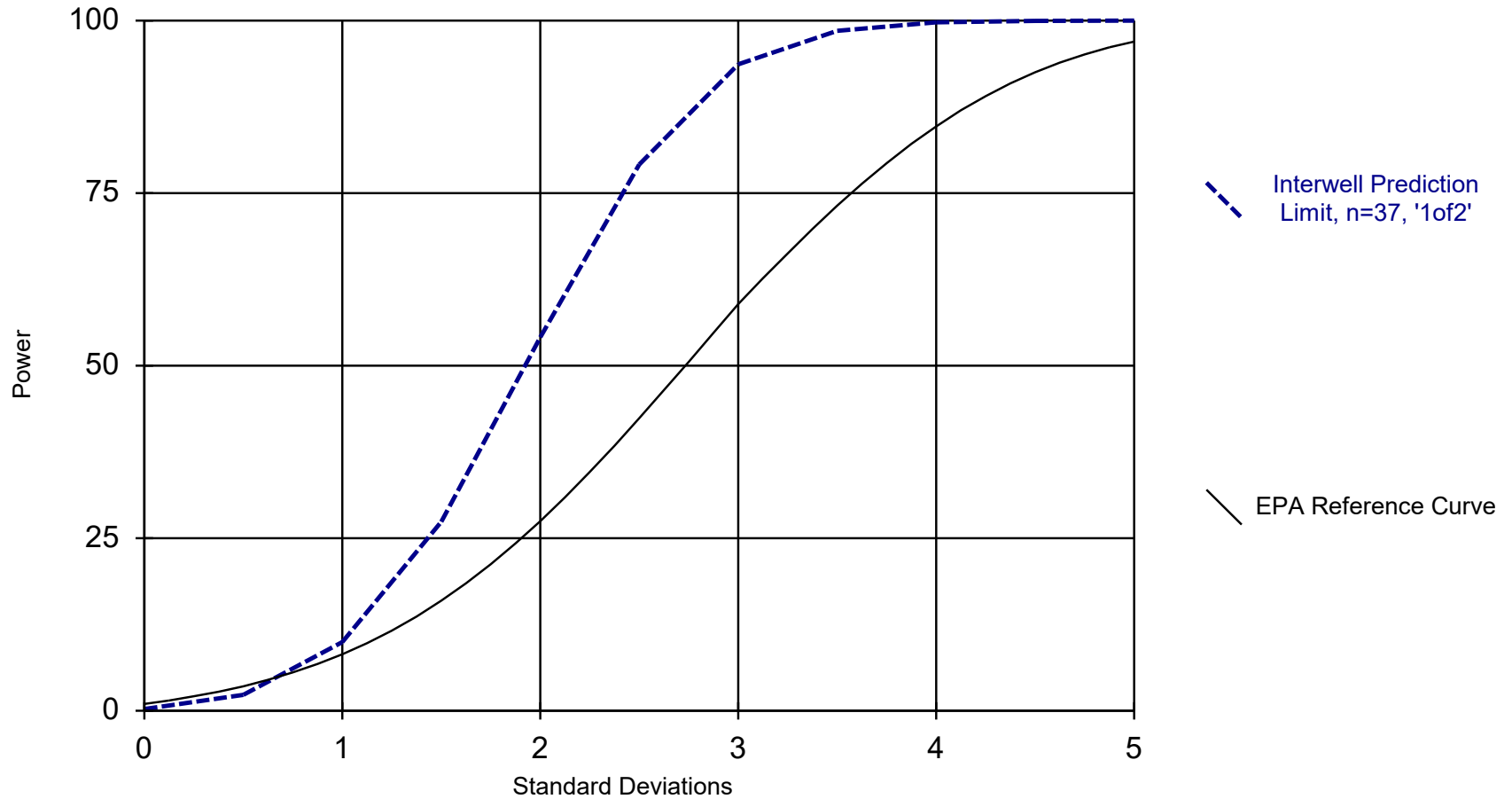
Date: 12/28/2020 3:29 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Calcium (mg/L)

SP-11 background:10/4/2017-6/30/2020

Interwell Power Curve

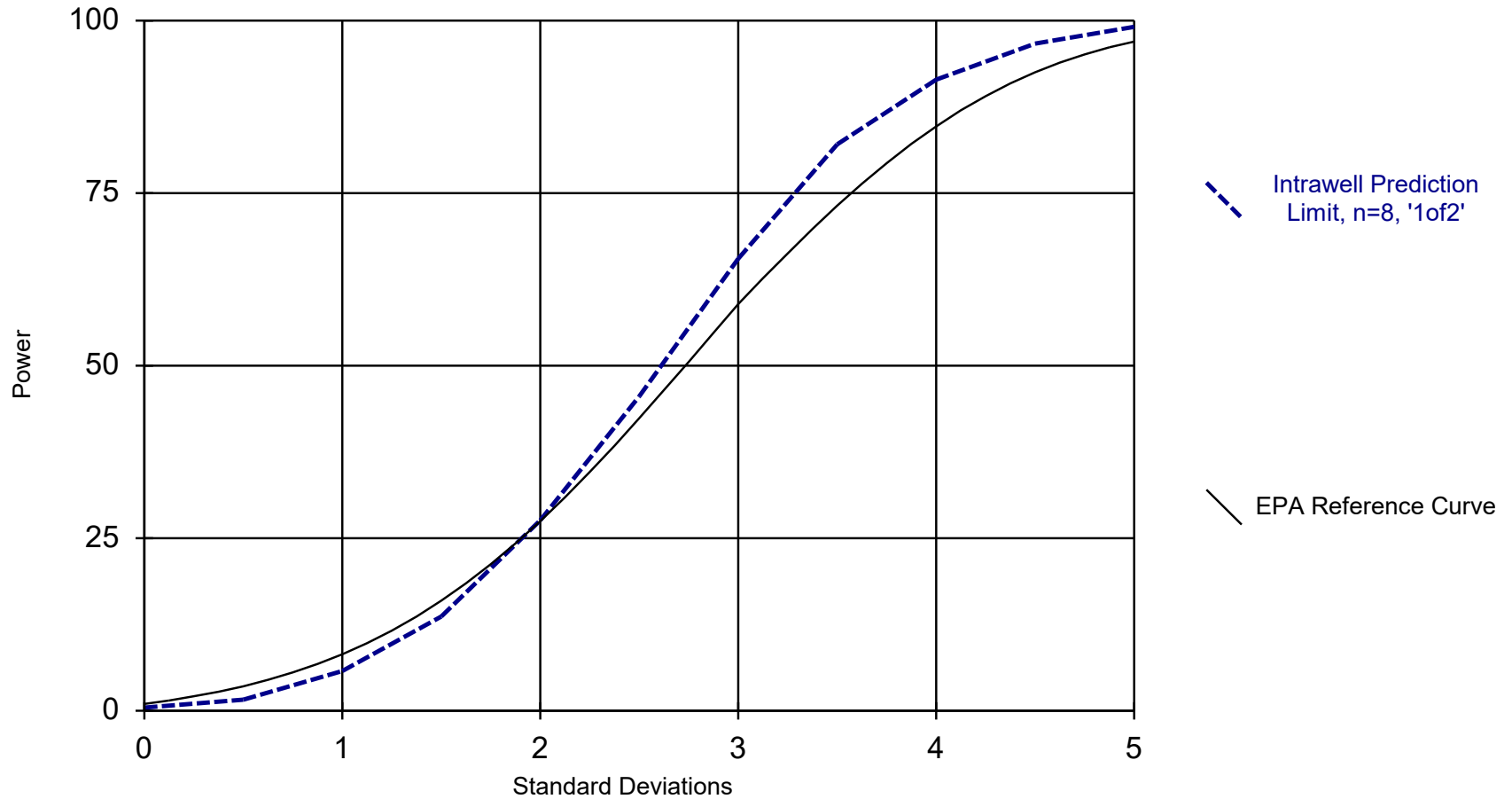


Kappa = 1.84, based on 4 compliance wells and 7 constituents, evaluated semi-annually (this report reflects annual total).

Analysis Run 12/29/2020 11:33 AM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Intrawell Power Curve



Kappa = 2.616, based on 4 compliance wells and 7 constituents, evaluated semi-annually (this report reflects annual total).

Analysis Run 12/28/2020 3:28 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Tukey's Outlier Analysis - Downgradient Wells - Significant Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/28/2020, 3:00 PM

<u>Constituent</u>	<u>Well</u>	<u>Outlier</u>	<u>Value(s)</u>	<u>Method</u>	<u>Alpha</u>	<u>N</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>Distribution</u>	<u>Normality Test</u>
Combined Radium 226 + 228 (pCi/L)	SP-1	Yes	14.29	NP	NaN	19	4.088	2.682	ln(x)	ShapiroWilk

Tukey's Outlier Analysis - Downgradient Wells - All Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/28/2020, 3:00 PM

Constituent	Well	Outlier Value(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Antimony (mg/L)	SP-1	No n/a	NP	NaN	19	0.00281	0.00223	ln(x)	ShapiroWilk
Antimony (mg/L)	SP-10	No n/a	NP	NaN	16	0.002199	0.002011	ln(x)	ShapiroWilk
Antimony (mg/L)	SP-11	No n/a	NP	NaN	16	0.002792	0.003066	ln(x)	ShapiroWilk
Antimony (mg/L)	SP-2	No n/a	NP	NaN	19	0.003362	0.002798	ln(x)	ShapiroWilk
Arsenic (mg/L)	SP-1	No n/a	NP	NaN	19	0.00298	0.002061	ln(x)	ShapiroWilk
Arsenic (mg/L)	SP-10	No n/a	NP	NaN	16	0.005632	0.004396	x^(1/3)	ShapiroWilk
Arsenic (mg/L)	SP-11	No n/a	NP	NaN	16	0.004986	0.003012	x^(1/3)	ShapiroWilk
Arsenic (mg/L)	SP-2	No n/a	NP	NaN	19	0.003152	0.002797	ln(x)	ShapiroWilk
Barium (mg/L)	SP-1	No n/a	NP	NaN	19	0.1932	0.03921	ln(x)	ShapiroWilk
Barium (mg/L)	SP-10	No n/a	NP	NaN	16	2.507	2.329	x^(1/3)	ShapiroWilk
Barium (mg/L)	SP-11	No n/a	NP	NaN	16	0.2846	0.1825	ln(x)	ShapiroWilk
Barium (mg/L)	SP-2	No n/a	NP	NaN	19	1.228	0.5399	ln(x)	ShapiroWilk
Beryllium (mg/L)	SP-1	No n/a	NP	NaN	19	0.0003368	0.0004106	ln(x)	ShapiroWilk
Beryllium (mg/L)	SP-10	No n/a	NP	NaN	16	0.00006519	0.00003147	x^(1/3)	ShapiroWilk
Beryllium (mg/L)	SP-11	No n/a	NP	NaN	16	0.0001368	0.0001279	ln(x)	ShapiroWilk
Beryllium (mg/L)	SP-2	No n/a	NP	NaN	19	0.0002947	0.0003781	ln(x)	ShapiroWilk
Cadmium (mg/L)	SP-1	No n/a	NP	NaN	19	0.0003111	0.0002069	ln(x)	ShapiroWilk
Cadmium (mg/L)	SP-10	No n/a	NP	NaN	16	0.0001437	0.00008632	ln(x)	ShapiroWilk
Cadmium (mg/L)	SP-11	No n/a	NP	NaN	16	0.0007756	0.001033	ln(x)	ShapiroWilk
Cadmium (mg/L)	SP-2	No n/a	NP	NaN	19	0.0003042	0.0002141	ln(x)	ShapiroWilk
Calcium (mg/L)	SP-1	No n/a	NP	NaN	20	118.9	12.43	ln(x)	ShapiroWilk
Calcium (mg/L)	SP-10	No n/a	NP	NaN	16	84.33	56.02	ln(x)	ShapiroWilk
Calcium (mg/L)	SP-11	No n/a	NP	NaN	16	377.2	432.6	ln(x)	ShapiroWilk
Calcium (mg/L)	SP-2	No n/a	NP	NaN	19	101.8	35.29	ln(x)	ShapiroWilk
Chromium (mg/L)	SP-1	No n/a	NP	NaN	19	0.001056	0.0006702	ln(x)	ShapiroWilk
Chromium (mg/L)	SP-10	No n/a	NP	NaN	16	0.00821	0.02722	ln(x)	ShapiroWilk
Chromium (mg/L)	SP-11	No n/a	NP	NaN	16	0.008519	0.0121	ln(x)	ShapiroWilk
Chromium (mg/L)	SP-2	No n/a	NP	NaN	19	0.001383	0.001183	x^(1/3)	ShapiroWilk
Cobalt (mg/L)	SP-1	No n/a	NP	NaN	19	0.001192	0.001255	ln(x)	ShapiroWilk
Cobalt (mg/L)	SP-10	No n/a	NP	NaN	16	0.002153	0.001843	x^(1/3)	ShapiroWilk
Cobalt (mg/L)	SP-11	No n/a	NP	NaN	16	0.005027	0.004958	ln(x)	ShapiroWilk
Cobalt (mg/L)	SP-2	No n/a	NP	NaN	19	0.0009857	0.0008224	ln(x)	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	SP-1	Yes 14.29	NP	NaN	19	4.088	2.682	ln(x)	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	SP-10	No n/a	NP	NaN	16	8.741	8.843	x^(1/3)	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	SP-11	No n/a	NP	NaN	16	3.235	6.004	ln(x)	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	SP-2	No n/a	NP	NaN	16	11.91	5.762	ln(x)	ShapiroWilk
Fluoride (mg/L)	SP-1	No n/a	NP	NaN	20	0.9509	0.7726	ln(x)	ShapiroWilk
Fluoride (mg/L)	SP-10	No n/a	NP	NaN	18	5.611	2.704	x^2	ShapiroWilk
Fluoride (mg/L)	SP-11	No n/a	NP	NaN	18	3.07	0.8538	normal	ShapiroWilk
Fluoride (mg/L)	SP-2	No n/a	NP	NaN	20	2.858	0.6539	x^2	ShapiroWilk
Lead (mg/L)	SP-1	No n/a	NP	NaN	19	0.002541	0.00218	ln(x)	ShapiroWilk
Lead (mg/L)	SP-10	No n/a	NP	NaN	16	0.001248	0.0009001	ln(x)	ShapiroWilk
Lead (mg/L)	SP-11	No n/a	NP	NaN	16	0.003157	0.003051	ln(x)	ShapiroWilk
Lead (mg/L)	SP-2	No n/a	NP	NaN	19	0.00272	0.002265	ln(x)	ShapiroWilk
Lithium (mg/L)	SP-1	No n/a	NP	NaN	19	0.006729	0.005882	ln(x)	ShapiroWilk
Lithium (mg/L)	SP-10	No n/a	NP	NaN	16	0.2714	0.03766	x^2	ShapiroWilk
Lithium (mg/L)	SP-11	No n/a	NP	NaN	16	0.07165	0.0395	ln(x)	ShapiroWilk
Lithium (mg/L)	SP-2	No n/a	NP	NaN	19	0.07202	0.02613	normal	ShapiroWilk
Mercury (mg/L)	SP-1	n/a n/a	NP	NaN	19	0.000006632	0.000004284	unknown	ShapiroWilk
Mercury (mg/L)	SP-10	No n/a	NP	NaN	16	0.0000115	0.000007983	ln(x)	ShapiroWilk
Mercury (mg/L)	SP-11	No n/a	NP	NaN	16	0.00001769	0.00001444	ln(x)	ShapiroWilk
Mercury (mg/L)	SP-2	n/a n/a	NP	NaN	19	0.000005579	0.000002063	unknown	ShapiroWilk
Molybdenum (mg/L)	SP-1	No n/a	NP	NaN	19	0.01261	0.004628	normal	ShapiroWilk
Molybdenum (mg/L)	SP-10	No n/a	NP	NaN	16	0.08158	0.2294	ln(x)	ShapiroWilk
Molybdenum (mg/L)	SP-11	No n/a	NP	NaN	16	0.02708	0.02435	ln(x)	ShapiroWilk

Tukey's Outlier Analysis - Downgradient Wells - All Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/28/2020, 3:00 PM

Constituent	Well	Outlier	Value(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Molybdenum (mg/L)	SP-2	No	n/a	NP	NaN	19	0.02668	0.007507	sqrt(x)	ShapiroWilk
Selenium (mg/L)	SP-1	No	n/a	NP	NaN	19	0.005332	0.002475	ln(x)	ShapiroWilk
Selenium (mg/L)	SP-10	No	n/a	NP	NaN	16	0.002088	0.002397	x^(1/3)	ShapiroWilk
Selenium (mg/L)	SP-11	No	n/a	NP	NaN	16	0.002543	0.002418	ln(x)	ShapiroWilk
Selenium (mg/L)	SP-2	No	n/a	NP	NaN	19	0.009736	0.009881	ln(x)	ShapiroWilk
Thallium (mg/L)	SP-1	n/a	n/a	NP	NaN	19	0.0005568	0.0003851	unknown	ShapiroWilk
Thallium (mg/L)	SP-10	n/a	n/a	NP	NaN	16	0.0004713	0.000115	unknown	ShapiroWilk
Thallium (mg/L)	SP-11	n/a	n/a	NP	NaN	16	0.0004706	0.0001175	unknown	ShapiroWilk
Thallium (mg/L)	SP-2	n/a	n/a	NP	NaN	19	0.0004558	0.0001326	unknown	ShapiroWilk

Tukey's Outlier Analysis - Upgradient Wells - Significant Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/28/2020, 2:57 PM

Constituent	Well	Outlier	Value(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Cadmium (mg/L)	SP-4,SP-5R	Yes	0.00057,0.00137,0.00655,0.00205,0.00166,0.00247,0	NP	NaN	40	0.000458	0.001171	ln(x)	ShapiroWilk
Chloride (mg/L)	SP-4,SP-5R	Yes	52,62,1834	NP	NaN	40	569.4	265.6	sqrt(x)	ShapiroWilk
Lead (mg/L)	SP-4,SP-5R	Yes	0.03663	NP	NaN	40	0.00287	0.006132	ln(x)	ShapiroWilk
Selenium (mg/L)	SP-4,SP-5R	Yes	0.00499,0.0001,0.0001,0.0001	NP	NaN	40	0.0009938	0.0007495	x^(1/3)	ShapiroWilk
Total Dissolved Solids [TDS] (mg/L)	SP-4,SP-5R	Yes	3008	NP	NaN	40	1326	315.6	ln(x)	ShapiroWilk

Tukey's Outlier Analysis - Upgradient Wells - All Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/28/2020, 2:57 PM

Constituent	Well	Outlier	Value(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Antimony (mg/L)	SP-4,SP-5R	No	n/a	NP	NaN	40	0.0009355	0.001097	ln(x)	ShapiroWilk
Arsenic (mg/L)	SP-4,SP-5R	No	n/a	NP	NaN	40	0.01588	0.01477	sqrt(x)	ShapiroWilk
Barium (mg/L)	SP-4,SP-5R	No	n/a	NP	NaN	40	1.494	0.9334	normal	ShapiroWilk
Beryllium (mg/L)	SP-4,SP-5R	No	n/a	NP	NaN	40	0.0005218	0.000888	ln(x)	ShapiroWilk
Boron (mg/L)	SP-4,SP-5R	No	n/a	NP	NaN	40	0.327	0.09795	ln(x)	ShapiroWilk
Cadmium (mg/L)	SP-4,SP-5R	Yes	0.00057,0.00137,0.00655,0.00205,0.00166,0.00247,0	NP	NaN	40	0.000458	0.001171	ln(x)	ShapiroWilk
Chloride (mg/L)	SP-4,SP-5R	Yes	52,62,1834	NP	NaN	40	569.4	265.6	sqrt(x)	ShapiroWilk
Chromium (mg/L)	SP-4,SP-5R	No	n/a	NP	NaN	40	0.007279	0.0162	ln(x)	ShapiroWilk
Cobalt (mg/L)	SP-4,SP-5R	No	n/a	NP	NaN	40	0.003845	0.007722	ln(x)	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	SP-4,SP-5R	No	n/a	NP	NaN	39	8.085	3.885	sqrt(x)	ShapiroWilk
Fluoride (mg/L)	SP-4,SP-5R	No	n/a	NP	NaN	42	3.167	0.7226	x^2	ShapiroWilk
Lead (mg/L)	SP-4,SP-5R	Yes	0.03663	NP	NaN	40	0.00287	0.006132	ln(x)	ShapiroWilk
Lithium (mg/L)	SP-4,SP-5R	No	n/a	NP	NaN	40	0.09259	0.02422	sqrt(x)	ShapiroWilk
Mercury (mg/L)	SP-4,SP-5R	No	n/a	NP	NaN	40	0.0000096	0.00001012	ln(x)	ShapiroWilk
Molybdenum (mg/L)	SP-4,SP-5R	No	n/a	NP	NaN	40	0.005758	0.003963	ln(x)	ShapiroWilk
pH, field (SU)	SP-4,SP-5R	No	n/a	NP	NaN	38	7.973	0.5842	ln(x)	ShapiroWilk
Selenium (mg/L)	SP-4,SP-5R	Yes	0.00499,0.0001,0.0001,0.0001	NP	NaN	40	0.0009938	0.0007495	x^(1/3)	ShapiroWilk
Sulfate (mg/L)	SP-4,SP-5R	No	n/a	NP	NaN	40	32.68	29.94	ln(x)	ShapiroWilk
Thallium (mg/L)	SP-4,SP-5R	n/a	n/a	NP	NaN	40	0.0005225	0.0002359	unknown	ShapiroWilk
Total Dissolved Solids [TDS] (mg/L)	SP-4,SP-5R	Yes	3008	NP	NaN	40	1326	315.6	ln(x)	ShapiroWilk

Welch's t-test/Mann-Whitney - Significant Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/28/2020, 2:51 PM

<u>Constituent</u>	<u>Well</u>	<u>Calc.</u>	<u>0.01</u>	<u>Method</u>
Calcium (mg/L)	SP-11	-3.241	Yes	Mann-W

Welch's t-test/Mann-Whitney - All Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/28/2020, 2:51 PM

<u>Constituent</u>	<u>Well</u>	<u>Calc.</u>	<u>0.01</u>	<u>Method</u>
Calcium (mg/L)	SP-1	-0.3385	No	Mann-W
Calcium (mg/L)	SP-10	-0.05893	No	Mann-W
Calcium (mg/L)	SP-11	-3.241	Yes	Mann-W
Calcium (mg/L)	SP-2	-0.75	No	Mann-W
Calcium (mg/L)	SP-4 (bg)	-1.733	No	Mann-W
Calcium (mg/L)	SP-5R (bg)	0.8336	No	Mann-W

Appendix III - Intrawell Prediction Limits - All Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/29/2020, 11:21 AM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Calcium (mg/L)	SP-1	144.2	n/a	n/a	1 future	n/a	19	119.7	12.18	0	None	No	0.00188	Param Intra 1 of 2
Calcium (mg/L)	SP-10	227	n/a	n/a	1 future	n/a	15	n/a	n/a	0	n/a	n/a	0.007533	NP Intra (normality) 1 of 2
Calcium (mg/L)	SP-11	1458	n/a	n/a	1 future	n/a	8	13.4	9.475	0	None	sqrt(x)	0.00188	Param Intra 1 of 2
Calcium (mg/L)	SP-2	175.8	n/a	n/a	1 future	n/a	18	103.2	35.71	0	None	No	0.00188	Param Intra 1 of 2
Calcium (mg/L)	SP-4	1333	n/a	n/a	1 future	n/a	18	5.155	1.004	0	None	ln(x)	0.00188	Param Intra 1 of 2
Calcium (mg/L)	SP-5R	131	n/a	n/a	1 future	n/a	19	n/a	n/a	0	n/a	n/a	0.004832	NP Intra (normality) 1 of 2

Trend Tests - Interwell Upgradient Well - Significant Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/28/2020, 3:36 PM

<u>Constituent</u>	<u>Well</u>	<u>Slope</u>	<u>Calc.</u>	<u>Critical</u>	<u>Sig.</u>	<u>N</u>	<u>%NDs</u>	<u>Normality</u>	<u>Xform</u>	<u>Alpha</u>	<u>Method</u>
Boron (mg/L)	SP-4 (bg)	-0.02259	-89	-81	Yes	20	0	n/a	n/a	0.01	NP
Sulfate (mg/L)	SP-5R (bg)	-2.968	-145	-81	Yes	20	0	n/a	n/a	0.01	NP

Trend Tests - Interwell Upgradient Well - All Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/28/2020, 3:36 PM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Boron (mg/L)	SP-4 (bg)	-0.02259	-89	-81	Yes	20	0	n/a	n/a	0.01	NP
Boron (mg/L)	SP-5R (bg)	-0.01237	-65	-81	No	20	0	n/a	n/a	0.01	NP
Chloride (mg/L)	SP-4 (bg)	5.207	18	74	No	19	0	n/a	n/a	0.01	NP
Chloride (mg/L)	SP-5R (bg)	54.75	67	68	No	18	0	n/a	n/a	0.01	NP
Fluoride (mg/L)	SP-4 (bg)	-0.004185	-7	-87	No	21	4.762	n/a	n/a	0.01	NP
Fluoride (mg/L)	SP-5R (bg)	-0.02165	-15	-87	No	21	0	n/a	n/a	0.01	NP
pH, field (SU)	SP-4 (bg)	0.139	7	74	No	19	0	n/a	n/a	0.01	NP
pH, field (SU)	SP-5R (bg)	0.1777	30	74	No	19	0	n/a	n/a	0.01	NP
Sulfate (mg/L)	SP-4 (bg)	9.878	75	81	No	20	0	n/a	n/a	0.01	NP
Sulfate (mg/L)	SP-5R (bg)	-2.968	-145	-81	Yes	20	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	SP-4 (bg)	5.88	25	81	No	20	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	SP-5R (bg)	42.48	60	74	No	19	0	n/a	n/a	0.01	NP

Appendix III - Interwell Prediction Limits - All Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/29/2020, 11:23 AM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Boron (mg/L)	n/a	0.5059	n/a	n/a	4 future	n/a	40	0.327	0.09795	0	None	No	0.00188	Param Inter 1 of 2
Chloride (mg/L)	n/a	805.5	n/a	n/a	4 future	n/a	37	562.9	131.8	0	None	No	0.00188	Param Inter 1 of 2
Fluoride (mg/L)	n/a	4.223	n/a	n/a	4 future	n/a	42	10.54	4.005	2.381	None	x^2	0.00188	Param Inter 1 of 2
pH, field (SU)	n/a	9.045	6.9	n/a	4 future	n/a	38	7.973	0.5842	0	None	No	0.0009398	Param Inter 1 of 2
Sulfate (mg/L)	n/a	90	n/a	n/a	4 future	n/a	40	n/a	n/a	0	n/a	n/a	0.001141	NP Inter (normality) 1 of 2
Total Dissolved Solids [TDS] (mg/L)	n/a	1578	n/a	n/a	4 future	n/a	39	1283	160.9	0	None	No	0.00188	Param Inter 1 of 2

Upper Tolerance Limit Summary Table

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/18/2020, 4:52 PM

Constituent	Upper Lim.	Lower Lim.	Sig.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Antimony (mg/L)	0.00514	n/a	n/a	40	n/a	n/a	42.5	n/a	n/a	0.1285	NP Inter(normality)
Arsenic (mg/L)	0.05439	n/a	n/a	39	0.1087	0.05835	7.692	None	sqrt(x)	0.05	Inter
Barium (mg/L)	2.6	n/a	n/a	39	n/a	n/a	0	n/a	n/a	0.1353	NP Inter(normality)
Beryllium (mg/L)	0.001899	n/a	n/a	39	-9.221	1.384	25.64	Kaplan-Meier	ln(x)	0.05	Inter
Cadmium (mg/L)	0.00247	n/a	n/a	39	n/a	n/a	53.85	n/a	n/a	0.1353	NP Inter(NDs)
Chromium (mg/L)	0.04182	n/a	n/a	39	n/a	n/a	17.95	n/a	n/a	0.1353	NP Inter(normality)
Cobalt (mg/L)	0.01786	n/a	n/a	39	n/a	n/a	12.82	n/a	n/a	0.1353	NP Inter(normality)
Combined Radium 226 + 228 (pCi/L)	16.37	n/a	n/a	39	8.085	3.885	0	None	No	0.05	Inter
Fluoride (mg/L)	4.359	n/a	n/a	42	10.54	4.005	2.381	None	x^2	0.05	Inter
Lead (mg/L)	0.0107	n/a	n/a	39	n/a	n/a	33.33	n/a	n/a	0.1353	NP Inter(normality)
Lithium (mg/L)	0.1441	n/a	n/a	40	0.09259	0.02422	0	None	No	0.05	Inter
Mercury (mg/L)	0.00003	n/a	n/a	39	n/a	n/a	66.67	n/a	n/a	0.1353	NP Inter(NDs)
Molybdenum (mg/L)	0.01	n/a	n/a	40	n/a	n/a	42.5	n/a	n/a	0.1285	NP Inter(normality)
Selenium (mg/L)	0.00499	n/a	n/a	40	n/a	n/a	55	n/a	n/a	0.1285	NP Inter(NDs)
Thallium (mg/L)	0.00162	n/a	n/a	39	n/a	n/a	89.74	n/a	n/a	0.1353	NP Inter(NDs)

Confidence Intervals Summary - Significant Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/29/2020, 11:40 AM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig. N	Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Fluoride (mg/L)	SP-10	7.349	4.798	4.4	Yes 18	5.611	2.704	16.67	Kaplan-Meier	x^2	0.01	Param.
Lithium (mg/L)	SP-10	0.2959	0.2469	0.14	Yes 16	0.2714	0.03766	0	None	No	0.01	Param.

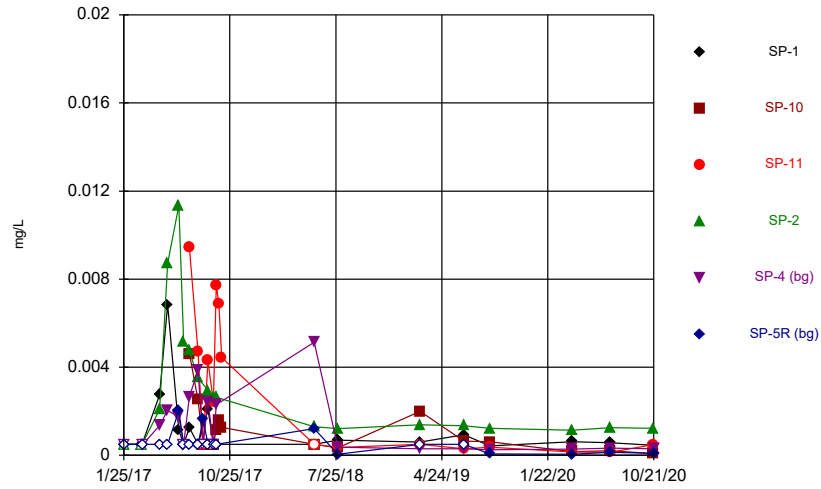
Confidence Intervals Summary - All Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/29/2020, 11:40 AM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Antimony (mg/L)	SP-1	0.00125	0.0006	0.006	No	19	0.001336	0.001445	36.84	None	No	0.01	NP (normality)
Antimony (mg/L)	SP-10	0.001787	0.0004241	0.006	No	16	0.001199	0.001127	25	Kaplan-Meier	sqrt(x)	0.01	Param.
Antimony (mg/L)	SP-11	0.003708	0.0005235	0.006	No	16	0.002792	0.003066	18.75	Kaplan-Meier	x^(1/3)	0.01	Param.
Antimony (mg/L)	SP-2	0.00474	0.00121	0.006	No	19	0.002941	0.002822	10.53	None	No	0.01	NP (normality)
Arsenic (mg/L)	SP-1	0.005	0.00072	0.054	No	19	0.00298	0.002061	42.11	None	No	0.01	NP (normality)
Arsenic (mg/L)	SP-10	0.008493	0.002772	0.054	No	16	0.005632	0.004396	12.5	None	No	0.01	Param.
Arsenic (mg/L)	SP-11	0.006945	0.003026	0.054	No	16	0.004986	0.003012	6.25	None	No	0.01	Param.
Arsenic (mg/L)	SP-2	0.005	0.00129	0.054	No	19	0.003152	0.002797	5.263	None	No	0.01	NP (normality)
Barium (mg/L)	SP-1	0.2161	0.1702	2.6	No	19	0.1932	0.03921	0	None	No	0.01	Param.
Barium (mg/L)	SP-10	3.6	0.8082	2.6	No	16	2.507	2.329	0	None	sqrt(x)	0.01	Param.
Barium (mg/L)	SP-11	0.4034	0.1659	2.6	No	16	0.2846	0.1825	0	None	No	0.01	Param.
Barium (mg/L)	SP-2	1.41	0.9374	2.6	No	19	1.228	0.5399	0	None	ln(x)	0.01	Param.
Beryllium (mg/L)	SP-1	0.0001075	0.0000549	0.004	No	19	0.0001	0.0000526	26.32	Kaplan-Meier	ln(x)	0.01	Param.
Beryllium (mg/L)	SP-10	0.0001	0.00003	0.004	No	16	0.00006519	0.00003147	37.5	None	No	0.01	NP (normality)
Beryllium (mg/L)	SP-11	0.000129	0.0000341	0.004	No	16	0.0001368	0.0001279	31.25	Kaplan-Meier	ln(x)	0.01	Param.
Beryllium (mg/L)	SP-2	0.0001298	0.00006451	0.004	No	19	0.0001052	0.0000545	21.05	Kaplan-Meier	sqrt(x)	0.01	Param.
Cadmium (mg/L)	SP-1	0.0002	0.00008	0.005	No	19	0.0001532	0.00005935	52.63	None	No	0.01	NP (NDs)
Cadmium (mg/L)	SP-10	0.0002	0.00002	0.005	No	16	0.0001437	0.00008632	68.75	None	No	0.01	NP (NDs)
Cadmium (mg/L)	SP-11	0.0006042	0.00006558	0.005	No	16	0.0007194	0.001056	18.75	Kaplan-Meier	ln(x)	0.01	Param.
Cadmium (mg/L)	SP-2	0.0002	0.00007	0.005	No	19	0.0001463	0.00006525	52.63	Kaplan-Meier	No	0.01	NP (NDs)
Chromium (mg/L)	SP-1	0.00121	0.0005169	0.1	No	19	0.001056	0.0006702	31.58	Kaplan-Meier	sqrt(x)	0.01	Param.
Chromium (mg/L)	SP-10	0.001922	0.000339	0.1	No	15	0.001424	0.002145	13.33	None	x^(1/3)	0.01	Param.
Chromium (mg/L)	SP-11	0.007945	0.0008812	0.1	No	16	0.008519	0.0121	6.25	None	ln(x)	0.01	Param.
Chromium (mg/L)	SP-2	0.001757	0.0005543	0.1	No	19	0.001383	0.001183	15.79	Kaplan-Meier	sqrt(x)	0.01	Param.
Cobalt (mg/L)	SP-1	0.001589	0.0006223	0.018	No	19	0.001192	0.001255	15.79	Kaplan-Meier	x^(1/3)	0.01	Param.
Cobalt (mg/L)	SP-10	0.003031	0.000741	0.018	No	16	0.002121	0.001875	12.5	None	sqrt(x)	0.01	Param.
Cobalt (mg/L)	SP-11	0.007055	0.001401	0.018	No	16	0.004886	0.005065	6.25	None	sqrt(x)	0.01	Param.
Cobalt (mg/L)	SP-2	0.001331	0.0005661	0.018	No	19	0.0009857	0.0008224	15.79	Kaplan-Meier	x^(1/3)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	SP-1	4.085	2.873	16.37	No	18	3.521	1.075	0	None	sqrt(x)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	SP-10	12.62	2.51	16.37	No	16	8.741	8.843	0	None	sqrt(x)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	SP-11	2.532	0.9861	16.37	No	15	1.759	1.141	0	None	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	SP-2	14.97	8.247	16.37	No	16	11.91	5.762	0	None	sqrt(x)	0.01	Param.
Fluoride (mg/L)	SP-1	0.9625	0.6183	4.4	No	19	0.7904	0.2939	10.53	None	No	0.01	Param.
Fluoride (mg/L)	SP-10	7.349	4.798	4.4	Yes	18	5.611	2.704	16.67	Kaplan-Meier	x^2	0.01	Param.
Fluoride (mg/L)	SP-11	3.587	2.553	4.4	No	18	3.07	0.8538	0	None	No	0.01	Param.
Fluoride (mg/L)	SP-2	3.23	2.487	4.4	No	20	2.858	0.6539	0	None	No	0.01	Param.
Lead (mg/L)	SP-1	0.002	0.000354	0.015	No	19	0.001278	0.0007146	42.11	None	No	0.01	NP (normality)
Lead (mg/L)	SP-10	0.002	0.0001	0.015	No	16	0.001248	0.0009001	56.25	None	No	0.01	NP (NDs)
Lead (mg/L)	SP-11	0.002953	0.0004158	0.015	No	16	0.002594	0.002926	18.75	Kaplan-Meier	x^(1/3)	0.01	Param.
Lead (mg/L)	SP-2	0.002	0.0003	0.015	No	19	0.001299	0.0008107	47.37	None	No	0.01	NP (normality)
Lithium (mg/L)	SP-1	0.006486	0.004386	0.14	No	18	0.005436	0.001736	0	None	No	0.01	Param.
Lithium (mg/L)	SP-10	0.2959	0.2469	0.14	Yes	16	0.2714	0.03766	0	None	No	0.01	Param.
Lithium (mg/L)	SP-11	0.09334	0.04455	0.14	No	16	0.07165	0.0395	0	None	sqrt(x)	0.01	Param.
Lithium (mg/L)	SP-2	0.0961	0.0404	0.14	No	19	0.07202	0.02613	0	None	No	0.01	NP (normality)
Mercury (mg/L)	SP-1	0.000009	0.000005	0.002	No	19	0.000006632	0.000004284	78.95	None	No	0.01	NP (NDs)
Mercury (mg/L)	SP-10	0.000019	0.000005	0.002	No	16	0.0000115	0.000007983	37.5	None	No	0.01	NP (normality)
Mercury (mg/L)	SP-11	0.000027	0.000005	0.002	No	16	0.00001394	0.00001467	18.75	None	No	0.01	NP (normality)
Mercury (mg/L)	SP-2	0.000005	0.000005	0.002	No	19	0.000005579	0.000002063	78.95	None	No	0.01	NP (NDs)
Molybdenum (mg/L)	SP-1	0.01532	0.009903	0.1	No	19	0.01261	0.004628	0	None	No	0.01	Param.
Molybdenum (mg/L)	SP-10	0.03527	0.005751	0.1	No	15	0.02375	0.03203	6.667	None	sqrt(x)	0.01	Param.
Molybdenum (mg/L)	SP-11	0.0515	0.00301	0.1	No	16	0.02708	0.02435	6.25	None	No	0.01	NP (normality)
Molybdenum (mg/L)	SP-2	0.03107	0.02228	0.1	No	19	0.02668	0.007507	0	None	No	0.01	Param.
Selenium (mg/L)	SP-1	0.006576	0.003633	0.05	No	19	0.004701	0.002969	15.79	Kaplan-Meier	No	0.01	Param.
Selenium (mg/L)	SP-10	0.002985	0.0003831	0.05	No	16	0.002088	0.002397	25	Kaplan-Meier	sqrt(x)	0.01	Param.
Selenium (mg/L)	SP-11	0.00348	0.0007427	0.05	No	16	0.002418	0.002472	12.5	None	sqrt(x)	0.01	Param.
Selenium (mg/L)	SP-2	0.01181	0.003185	0.05	No	19	0.009315	0.01017	10.53	None	x^(1/3)	0.01	Param.
Thallium (mg/L)	SP-1	0.00089	0.0001	0.002	No	19	0.0005568	0.0003851	78.95	None	No	0.01	NP (NDs)
Thallium (mg/L)	SP-10	0.0005	0.00004	0.002	No	16	0.0004713	0.000115	93.75	None	No	0.01	NP (NDs)
Thallium (mg/L)	SP-11	0.0005	0.00003	0.002	No	16	0.0004706	0.0001175	93.75	None	No	0.01	NP (NDs)
Thallium (mg/L)	SP-2	0.0005	0.0001	0.002	No	19	0.0004558	0.0001326	89.47	None	No	0.01	NP (NDs)

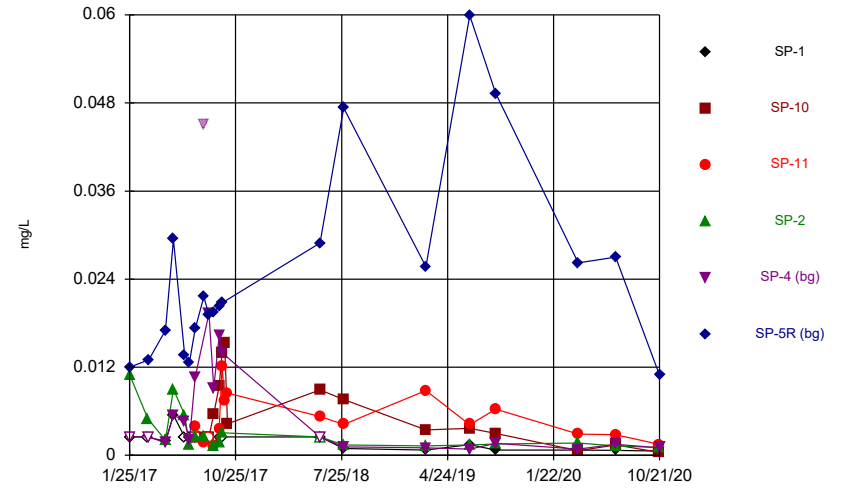
FIGURE A.

Time Series



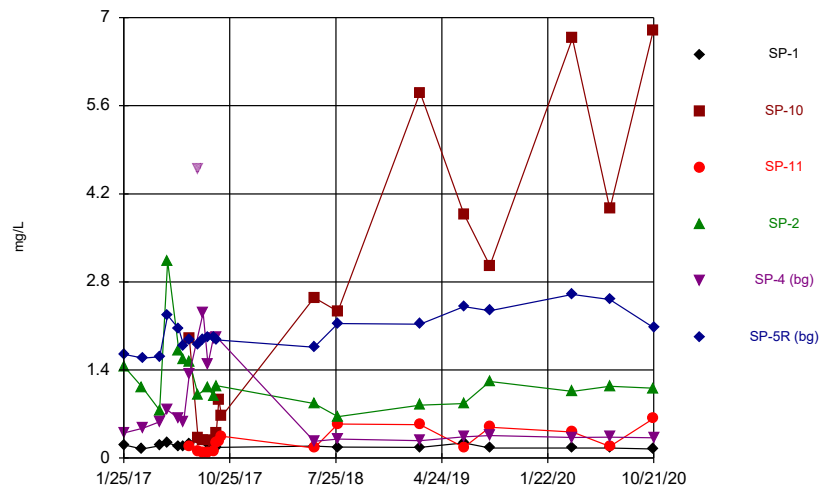
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Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Time Series



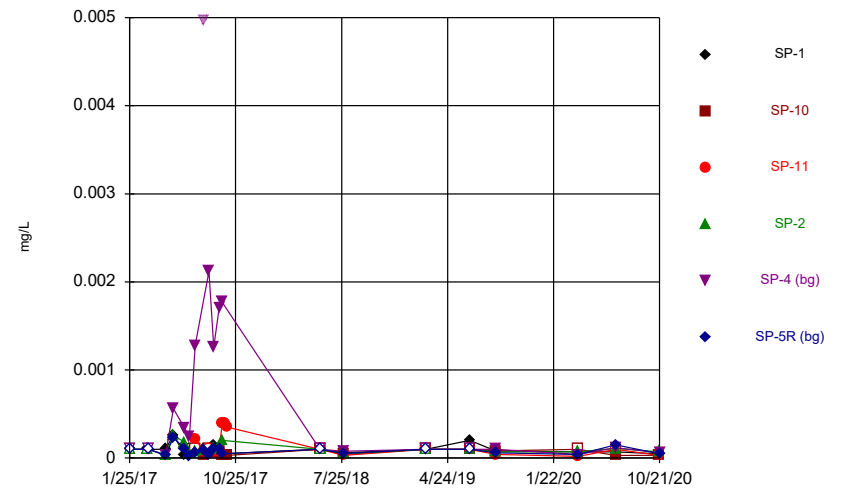
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Time Series



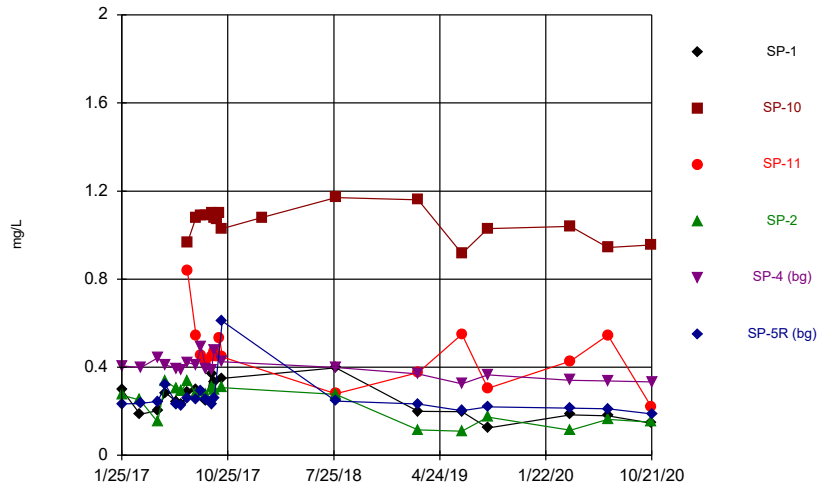
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Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Time Series



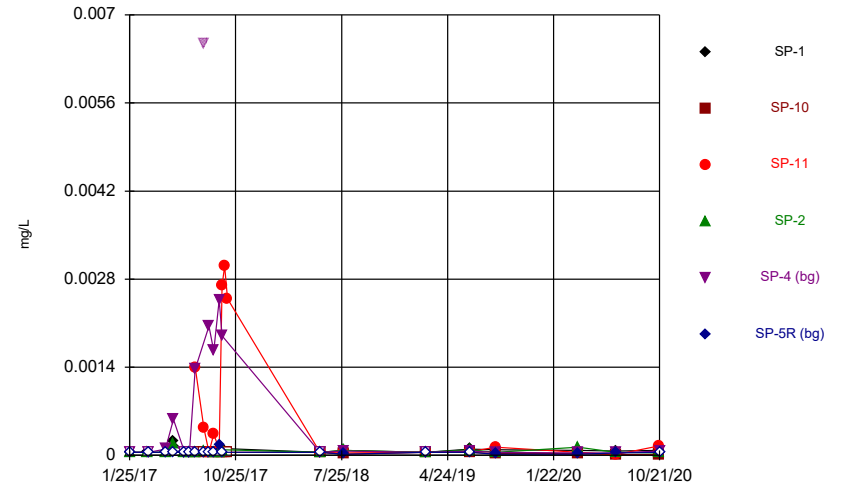
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Time Series



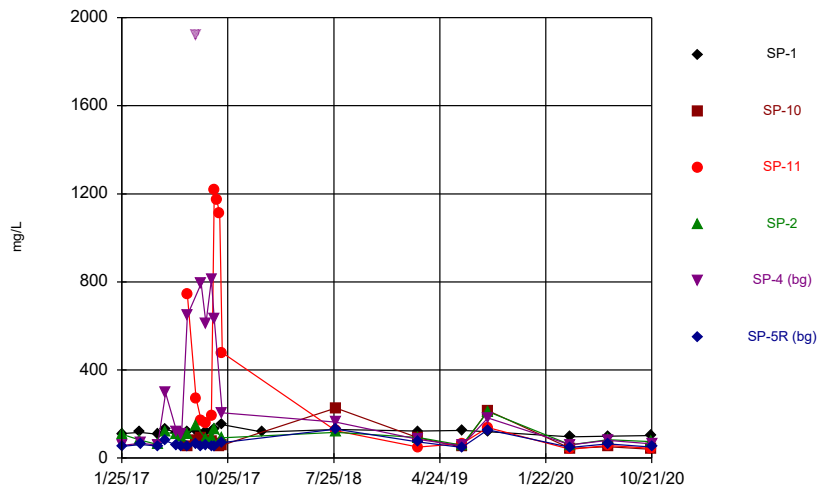
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Time Series



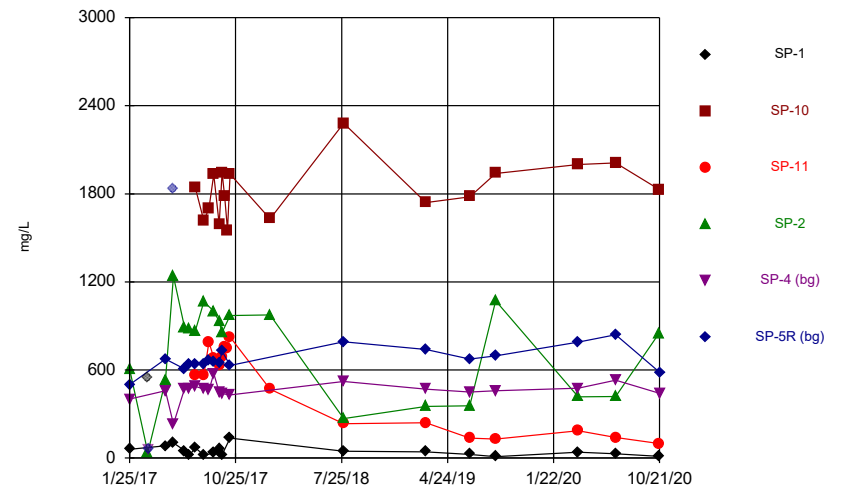
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Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Time Series



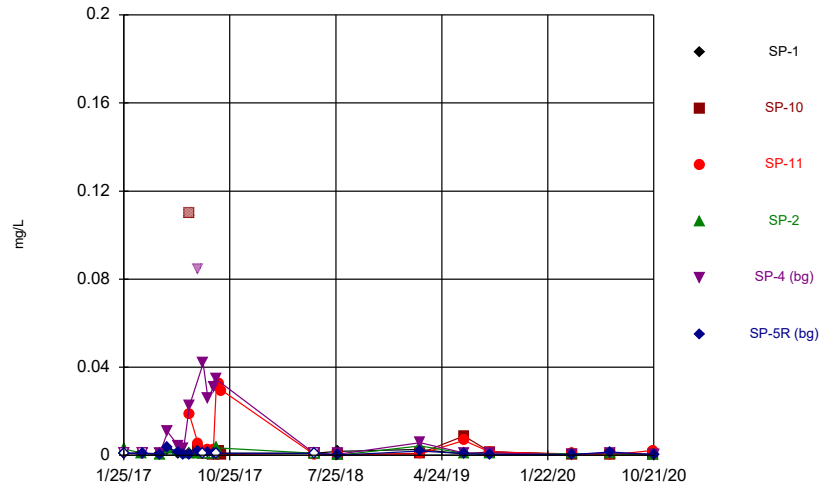
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Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Time Series



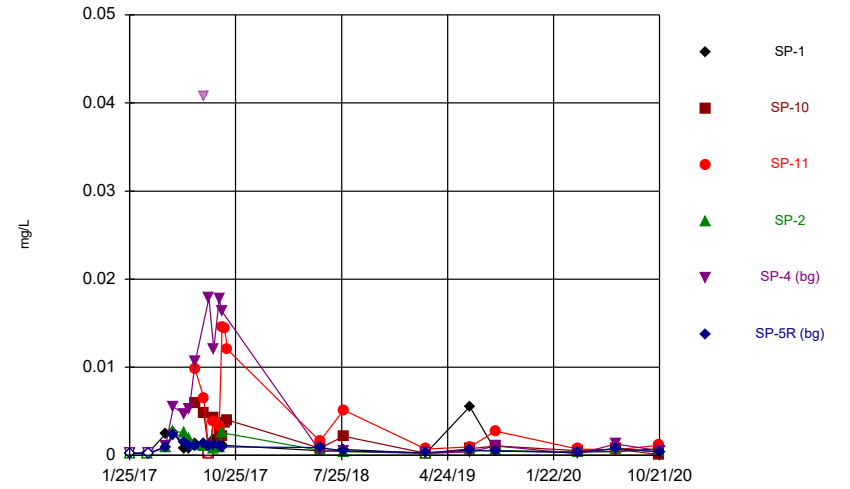
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Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Time Series



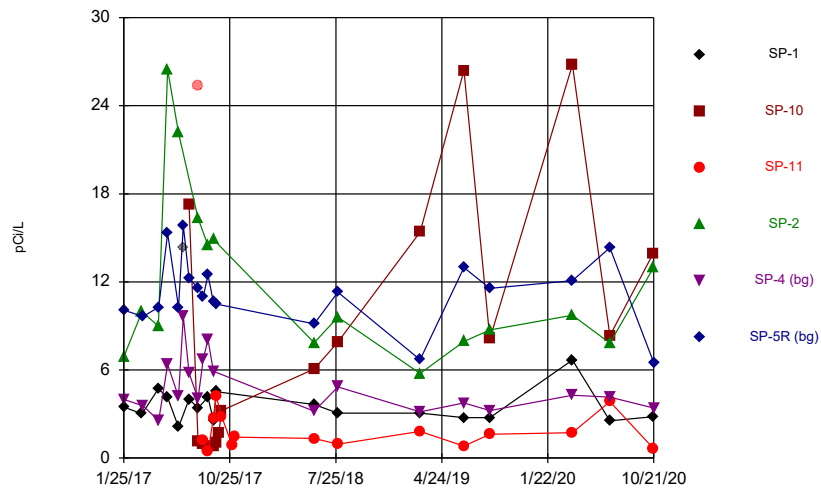
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Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Time Series



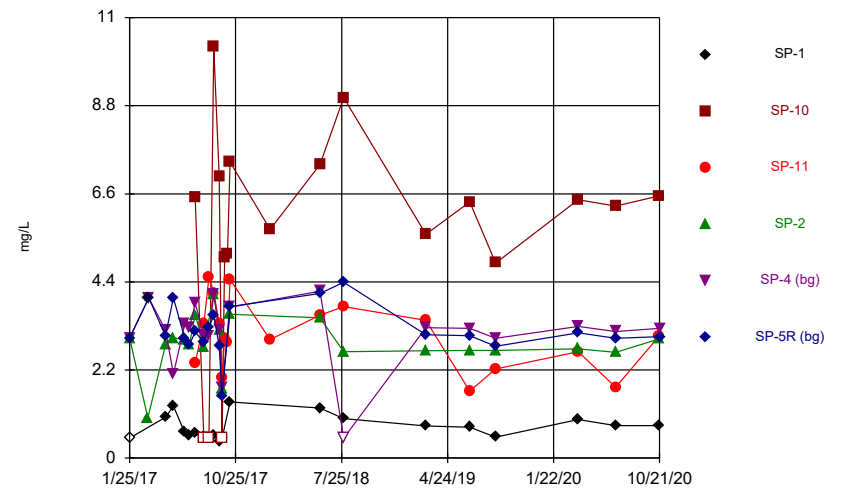
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Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Time Series



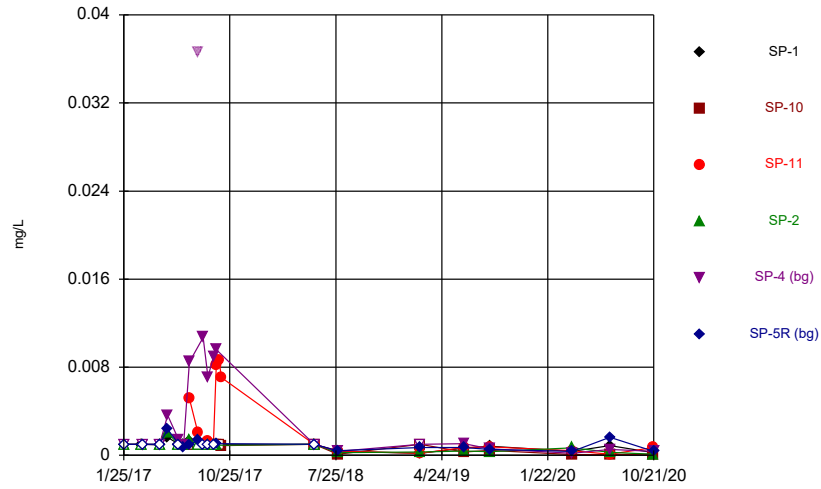
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Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Time Series



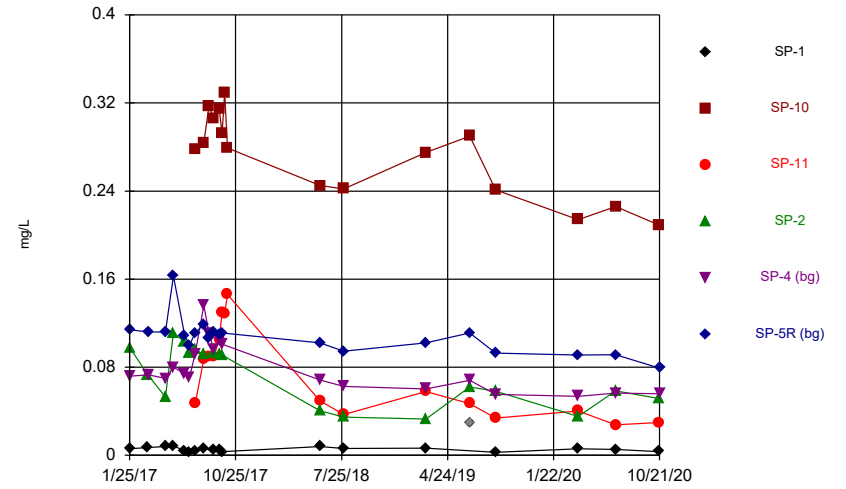
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Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Time Series



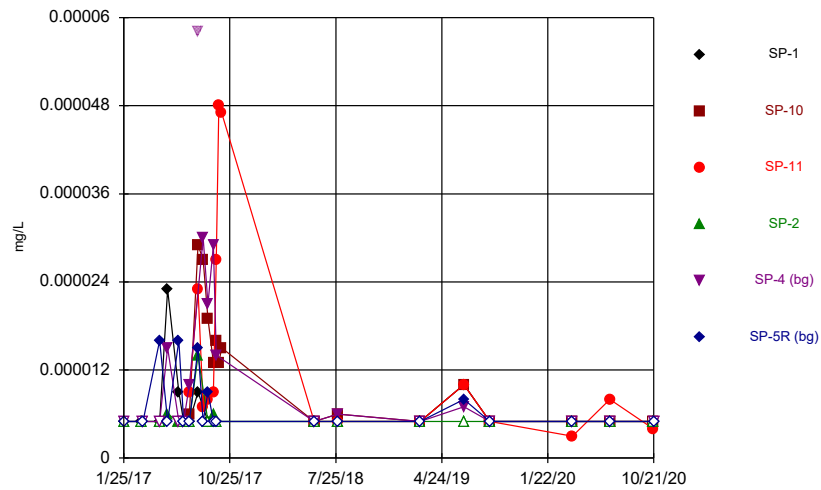
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Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Time Series



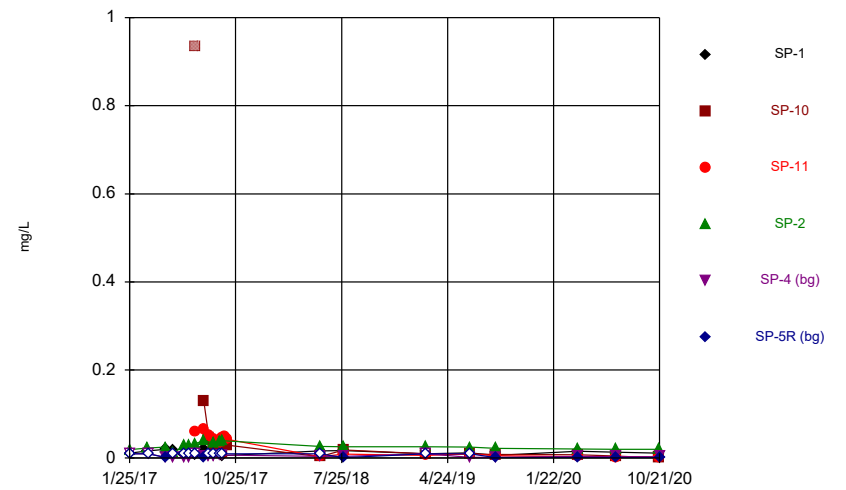
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Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Time Series



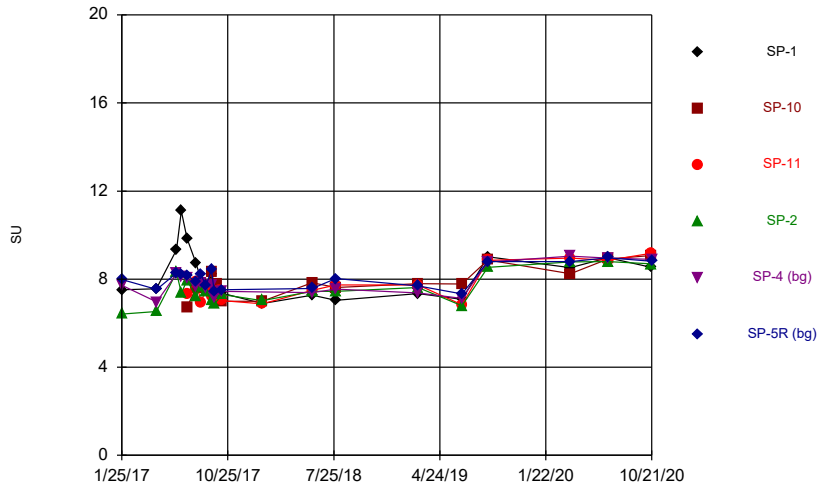
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Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Time Series



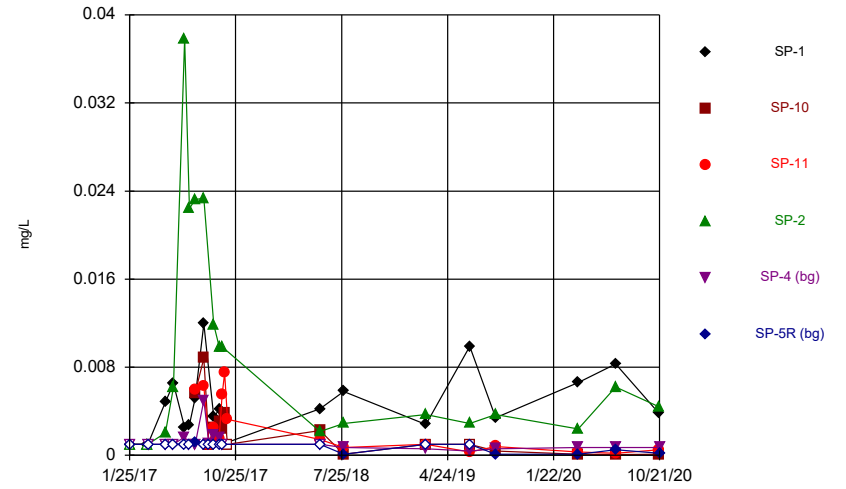
Constituent: Molybdenum Analysis Run 12/18/2020 4:41 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Time Series



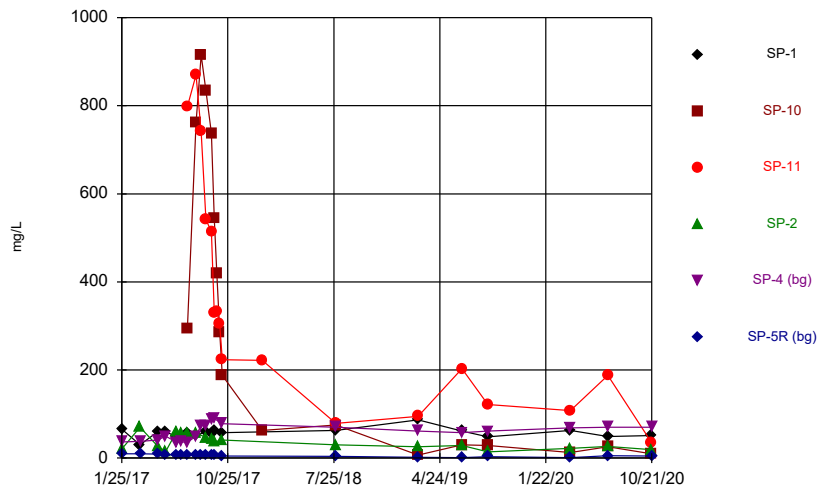
Constituent: pH, field Analysis Run 12/18/2020 4:41 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Time Series



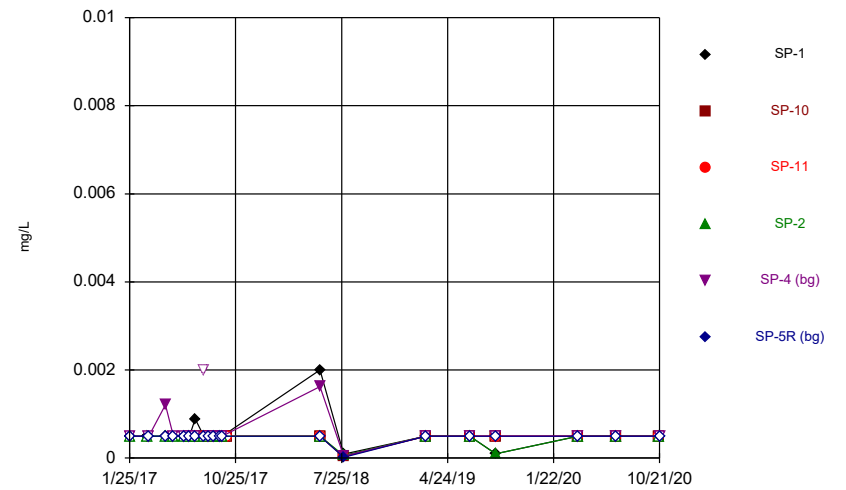
Constituent: Selenium Analysis Run 12/18/2020 4:41 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Time Series



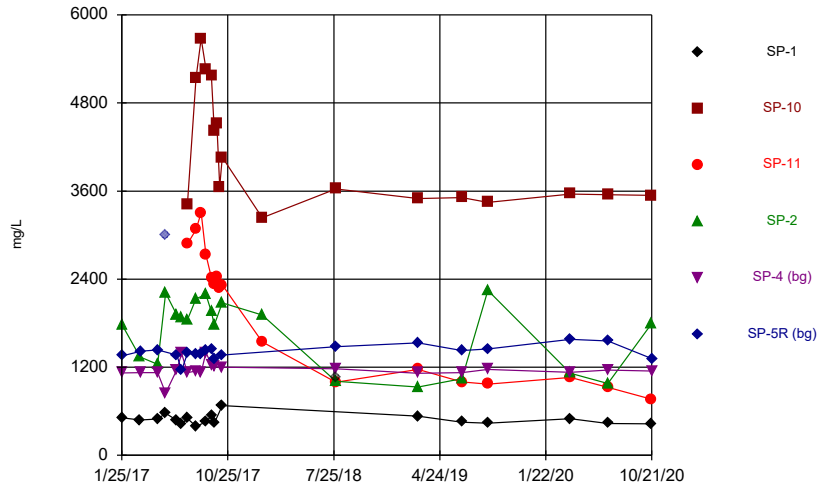
Constituent: Sulfate Analysis Run 12/18/2020 4:41 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Time Series



Constituent: Thallium Analysis Run 12/18/2020 4:41 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

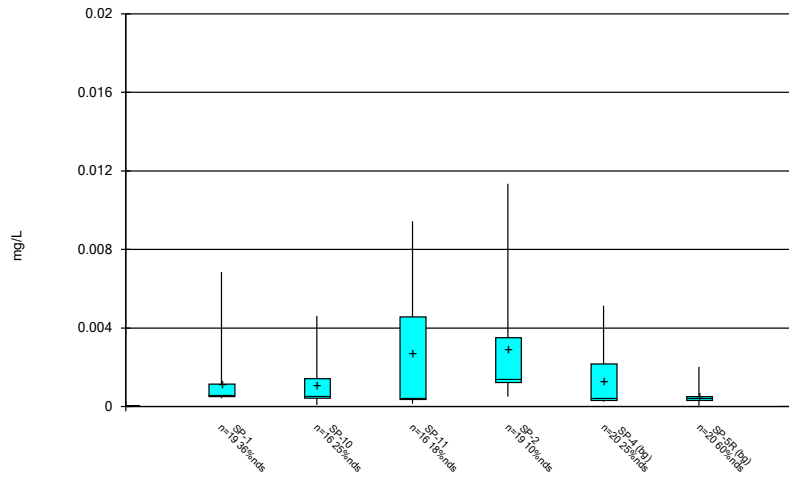
Time Series



Constituent: Total Dissolved Solids [TDS] Analysis Run 12/18/2020 4:41 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

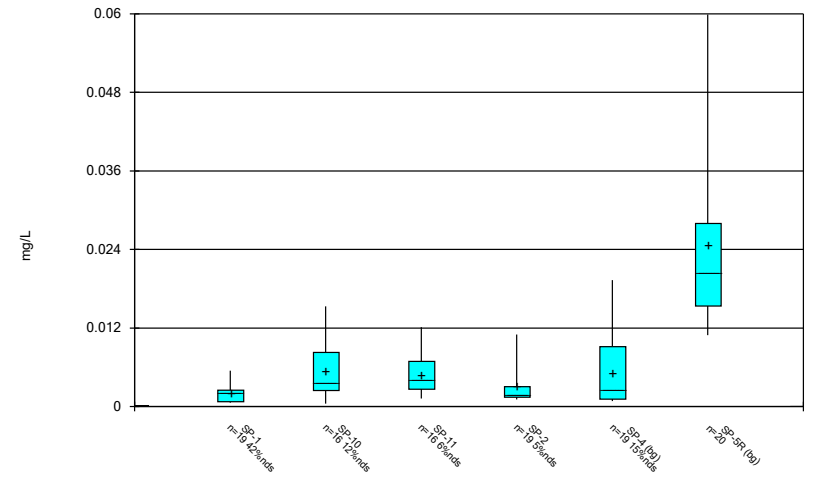
FIGURE B.

Box & Whiskers Plot



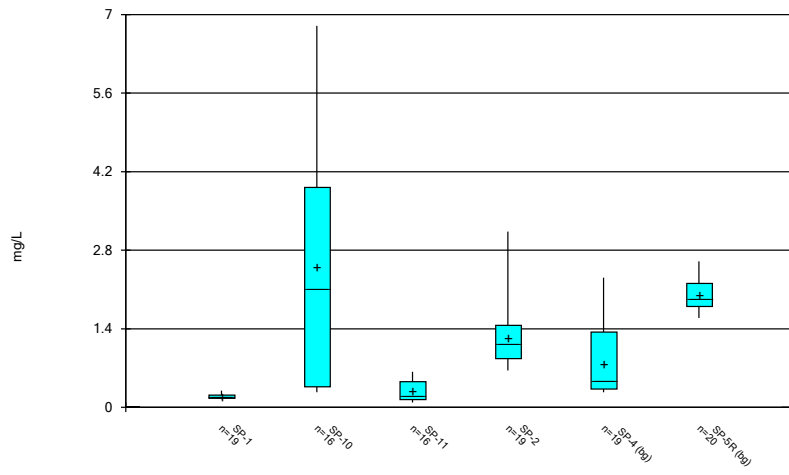
Constituent: Antimony Analysis Run 12/18/2020 4:42 PM
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



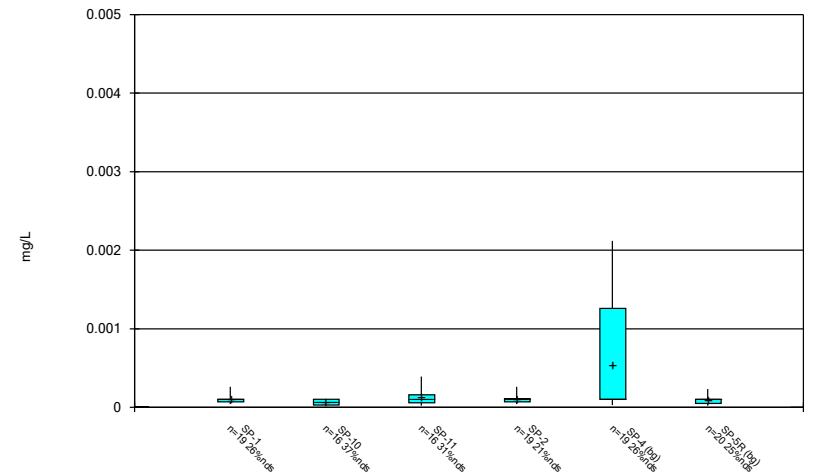
Constituent: Arsenic Analysis Run 12/18/2020 4:42 PM
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



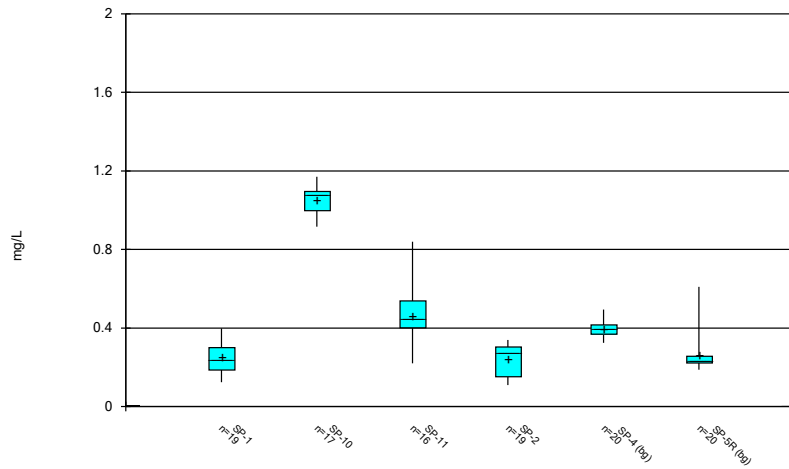
Constituent: Barium Analysis Run 12/18/2020 4:42 PM
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



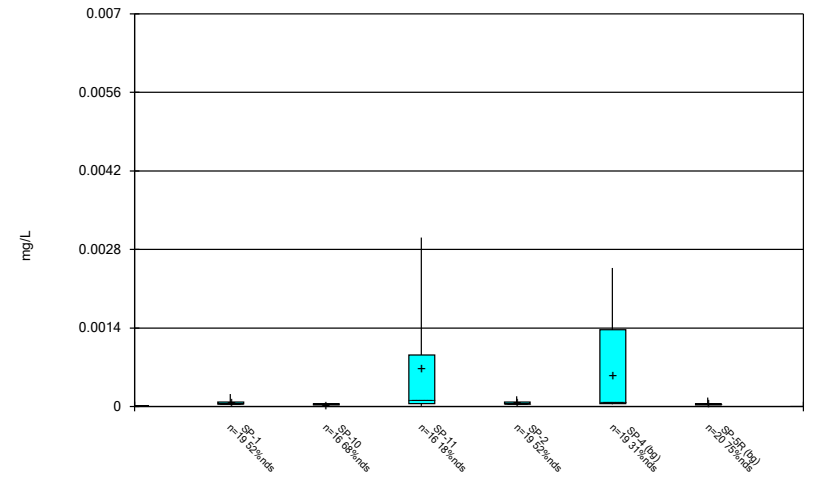
Constituent: Beryllium Analysis Run 12/18/2020 4:42 PM
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



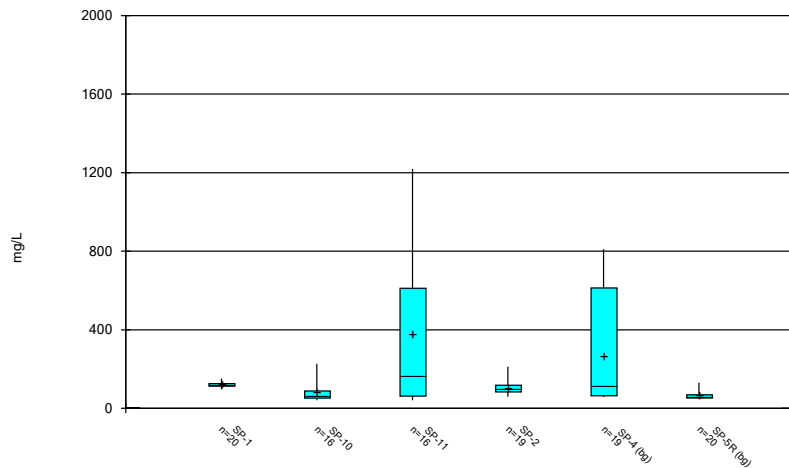
Constituent: Boron Analysis Run 12/18/2020 4:42 PM
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



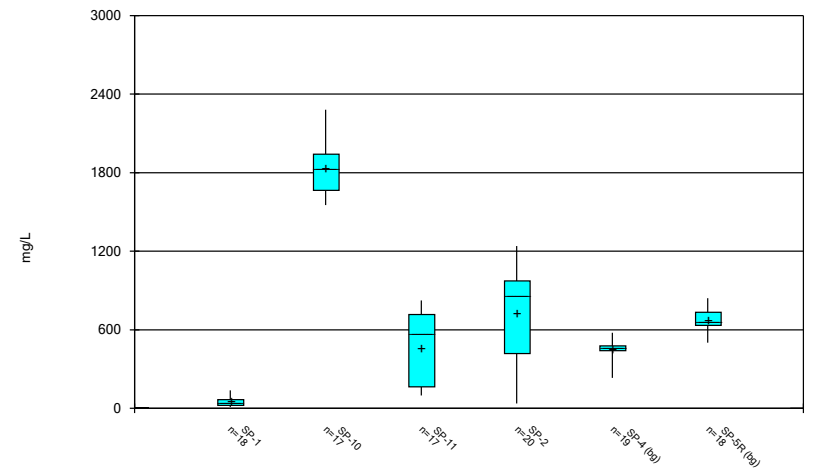
Constituent: Cadmium Analysis Run 12/18/2020 4:42 PM
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



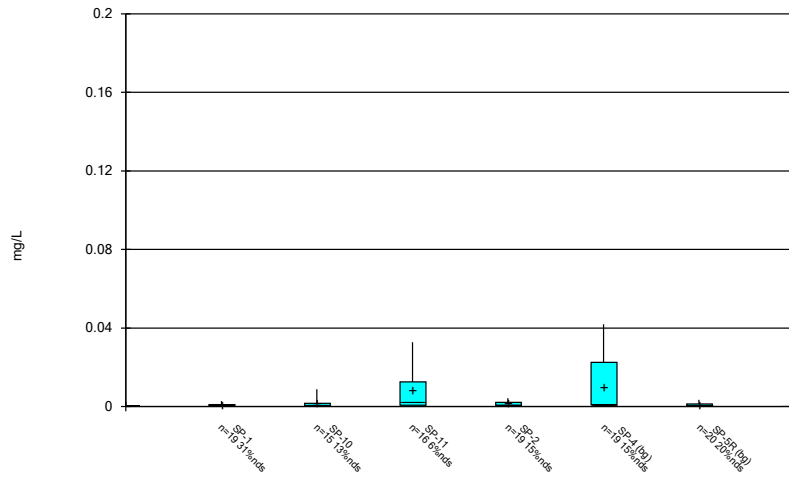
Constituent: Calcium Analysis Run 12/18/2020 4:42 PM
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



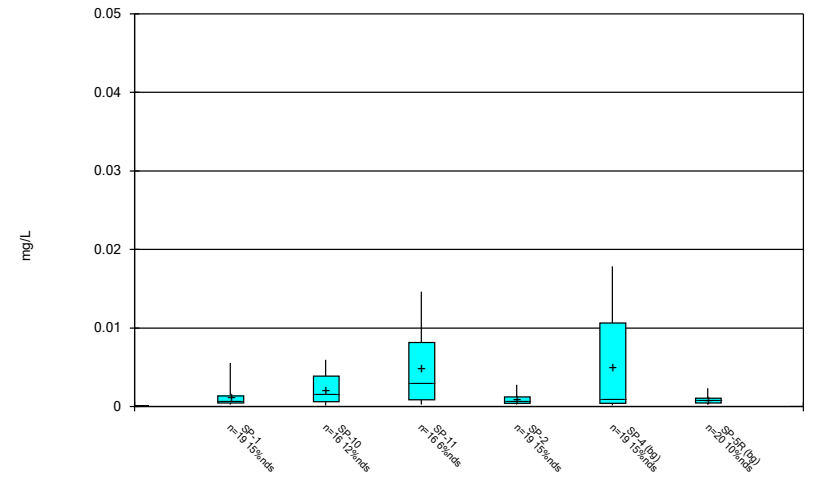
Constituent: Chloride Analysis Run 12/18/2020 4:42 PM
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



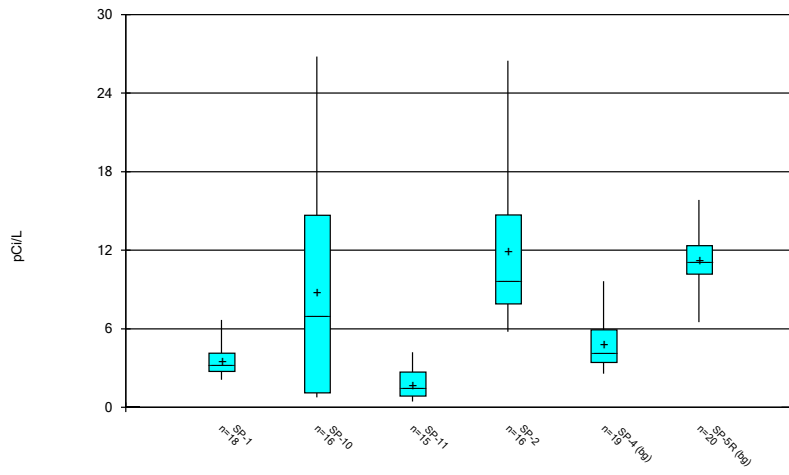
Constituent: Chromium Analysis Run 12/18/2020 4:42 PM
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



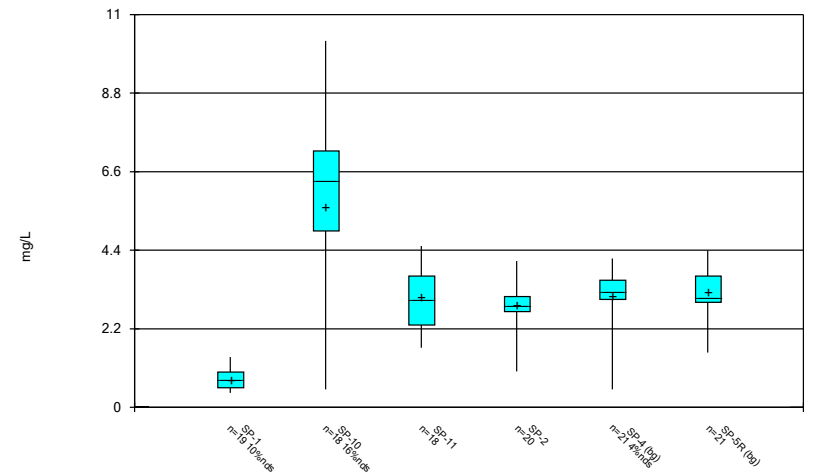
Constituent: Cobalt Analysis Run 12/18/2020 4:42 PM
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



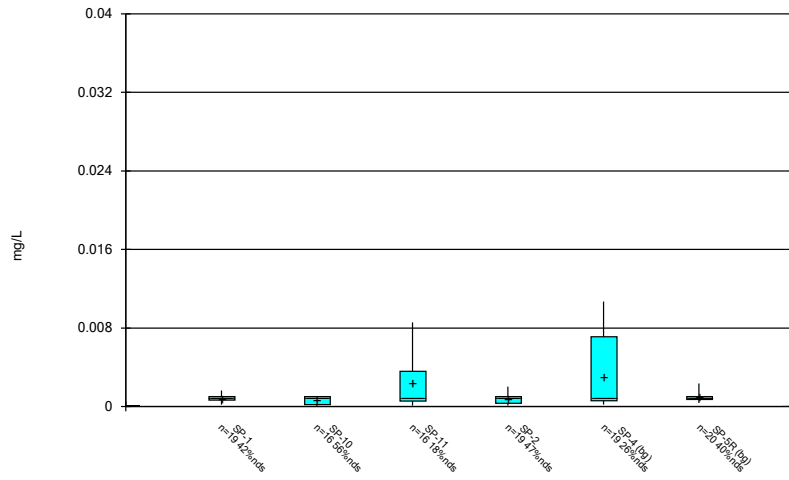
Constituent: Combined Radium 226 + 228 Analysis Run 12/18/2020 4:42 PM
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



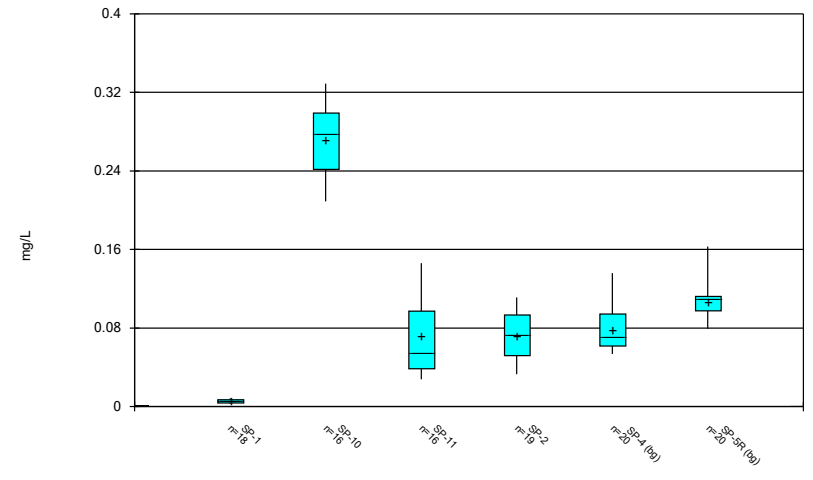
Constituent: Fluoride Analysis Run 12/18/2020 4:42 PM
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



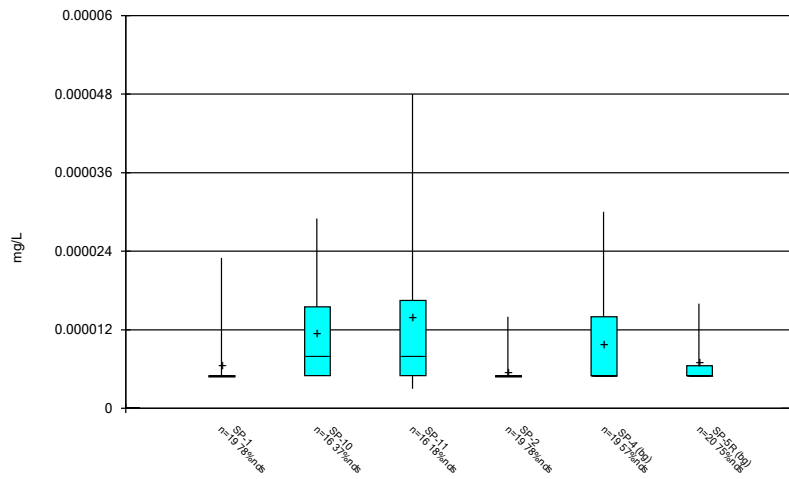
Constituent: Lead Analysis Run 12/18/2020 4:42 PM
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



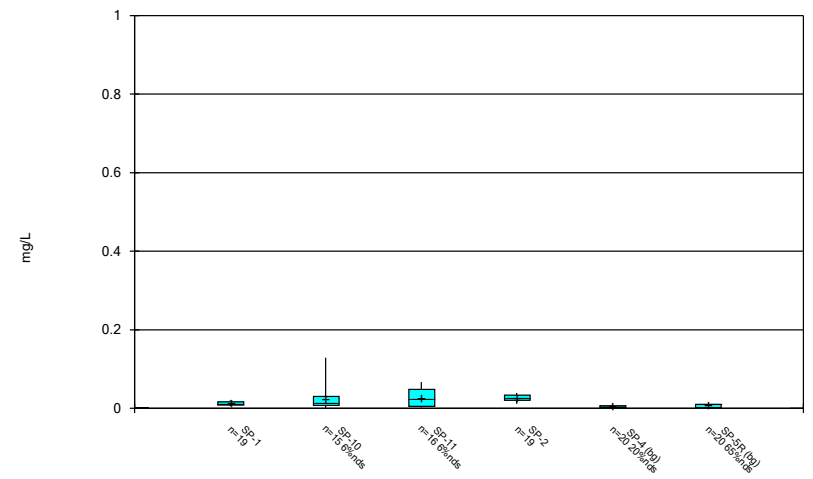
Constituent: Lithium Analysis Run 12/18/2020 4:42 PM
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



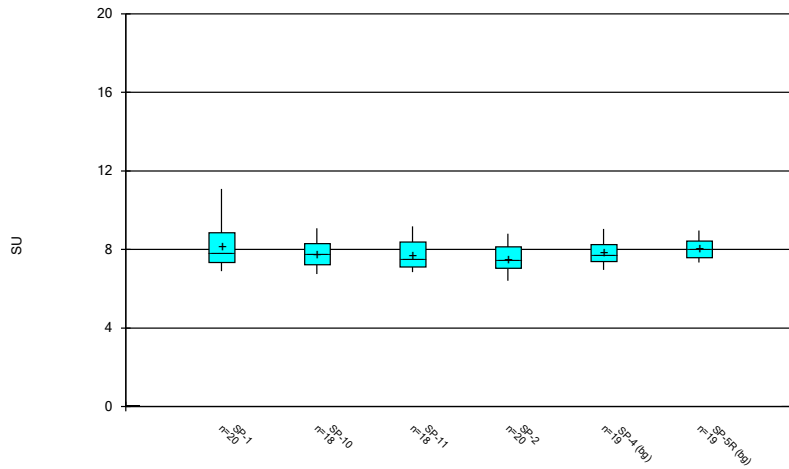
Constituent: Mercury Analysis Run 12/18/2020 4:42 PM
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



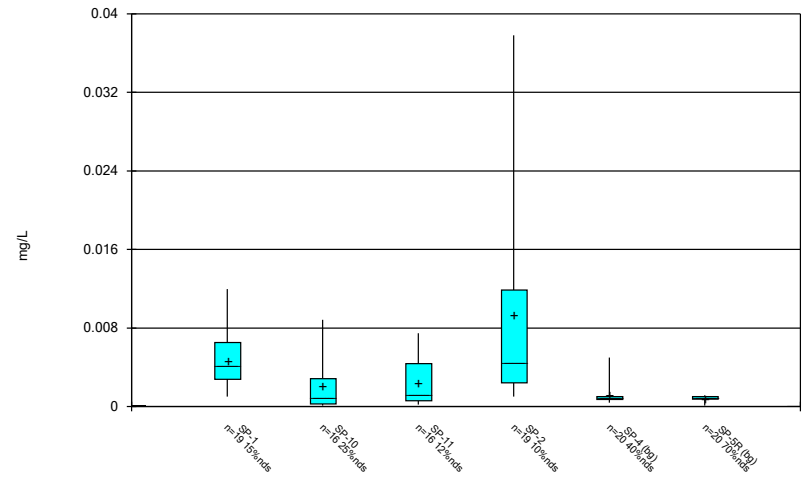
Constituent: Molybdenum Analysis Run 12/18/2020 4:42 PM
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



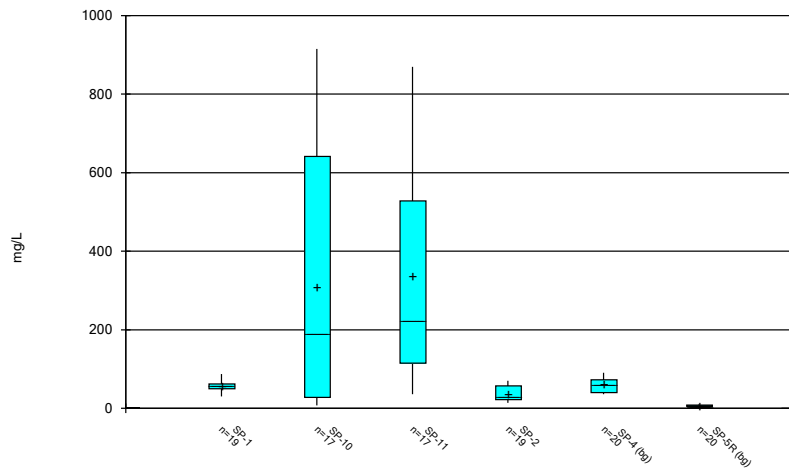
Constituent: pH, field Analysis Run 12/18/2020 4:42 PM
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



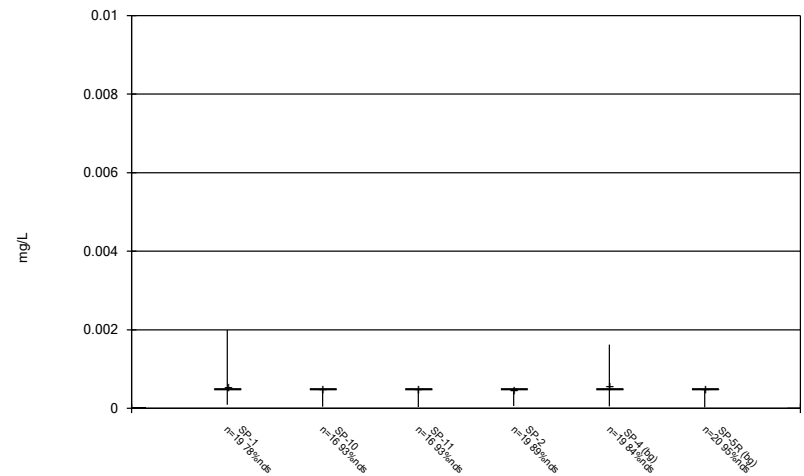
Constituent: Selenium Analysis Run 12/18/2020 4:42 PM
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



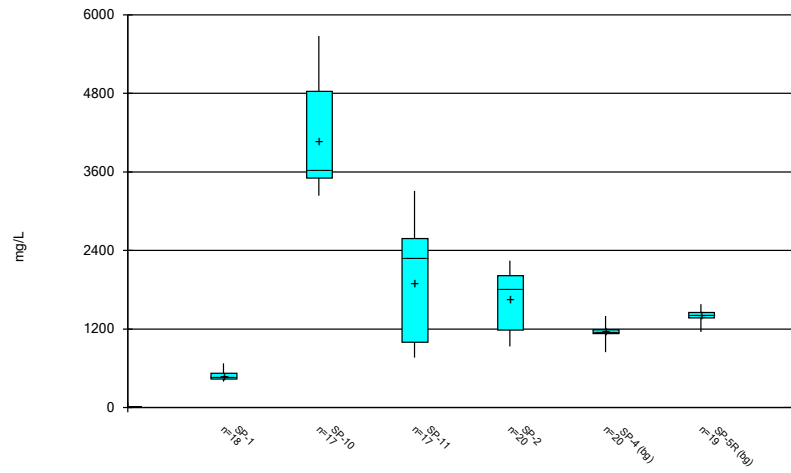
Constituent: Sulfate Analysis Run 12/18/2020 4:42 PM
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



Constituent: Thallium Analysis Run 12/18/2020 4:42 PM
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



Constituent: Total Dissolved Solids [TDS] Analysis Run 12/18/2020 4:42 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

FIGURE C.

Outlier Summary

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/29/2020, 11:30 AM

Date	SP-4 Arsenic (mg/L)	SP-4 Barium (mg/L)	SP-4 Beryllium (mg/L)	SP-4 Cadmium (mg/L)	SP-4 Calcium (mg/L)	SP-1 Chloride (mg/L)	SP-4 Chloride (mg/L)	SP-5R Chloride (mg/L)	SP-10 Chromium (mg/L)	SP-4 Chromium (mg/L)
3/13/2017						548 (o)				
3/15/2017							52 (o)	62 (o)		
5/18/2017								1834 (o)		
6/27/2017										
7/13/2017									0.11 (o)	
8/4/2017	0.04498 (o)	4.59 (o)	0.00497 (o)	0.00655 (o)	1920 (o)					0.08415 (o)
7/30/2018										
6/20/2019										

Date	SP-4 Cobalt (mg/L)	SP-1 Combined Radium 226 + 228 (pCi/L)	SP-11 Combined Radium 226 + 228 (pCi/L)	SP-1 Fluoride (mg/L)	SP-4 Lead (mg/L)	SP-1 Lithium (mg/L)	SP-4 Mercury (mg/L)	SP-10 Molybdenum (mg/L)	SP-4 Thallium (mg/L)	SP-1 Total Dissolved Solids [TDS] (mg/L)
3/13/2017				4 (o)						
3/15/2017										
5/18/2017										
6/27/2017										14.29 (o)
7/13/2017								0.934 (o)		
8/4/2017	0.04069 (o)		25.367 (o)		0.03663 (o)		5.8E-05 (o)		<0.002 (o)	
7/30/2018										1060 (o)
6/20/2019						0.03 (J,o)				

Date	SP-5R Total Dissolved Solids [TDS] (mg/L)
3/13/2017	
3/15/2017	
5/18/2017	3008 (o)
6/27/2017	
7/13/2017	
8/4/2017	
7/30/2018	
6/20/2019	

Tukey's Outlier Analysis - Downgradient Wells - Significant Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/28/2020, 3:00 PM

<u>Constituent</u>	<u>Well</u>	<u>Outlier</u>	<u>Value(s)</u>	<u>Method</u>	<u>Alpha</u>	<u>N</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>Distribution</u>	<u>Normality Test</u>
Combined Radium 226 + 228 (pCi/L)	SP-1	Yes	14.29	NP	NaN	19	4.088	2.682	In(x)	ShapiroWilk

Tukey's Outlier Analysis - Downgradient Wells - All Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/28/2020, 3:00 PM

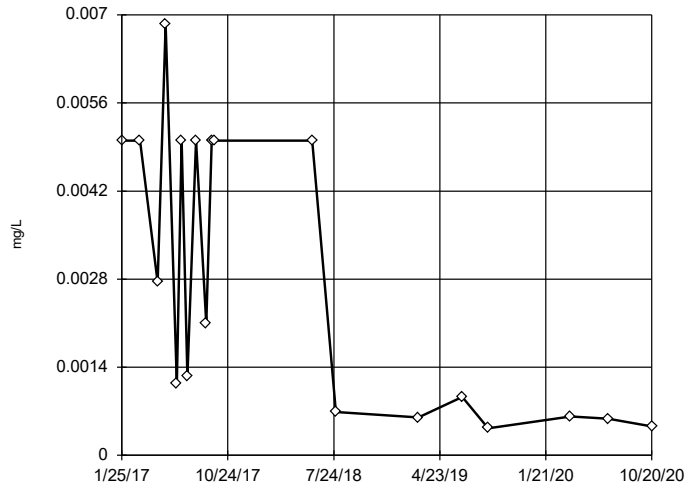
Constituent	Well	Outlier Value(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Antimony (mg/L)	SP-1	No n/a	NP	NaN	19	0.00281	0.00223	ln(x)	ShapiroWilk
Antimony (mg/L)	SP-10	No n/a	NP	NaN	16	0.002199	0.002011	ln(x)	ShapiroWilk
Antimony (mg/L)	SP-11	No n/a	NP	NaN	16	0.002792	0.003066	ln(x)	ShapiroWilk
Antimony (mg/L)	SP-2	No n/a	NP	NaN	19	0.003362	0.002798	ln(x)	ShapiroWilk
Arsenic (mg/L)	SP-1	No n/a	NP	NaN	19	0.00298	0.002061	ln(x)	ShapiroWilk
Arsenic (mg/L)	SP-10	No n/a	NP	NaN	16	0.005632	0.004396	x^(1/3)	ShapiroWilk
Arsenic (mg/L)	SP-11	No n/a	NP	NaN	16	0.004986	0.003012	x^(1/3)	ShapiroWilk
Arsenic (mg/L)	SP-2	No n/a	NP	NaN	19	0.003152	0.002797	ln(x)	ShapiroWilk
Barium (mg/L)	SP-1	No n/a	NP	NaN	19	0.1932	0.03921	ln(x)	ShapiroWilk
Barium (mg/L)	SP-10	No n/a	NP	NaN	16	2.507	2.329	x^(1/3)	ShapiroWilk
Barium (mg/L)	SP-11	No n/a	NP	NaN	16	0.2846	0.1825	ln(x)	ShapiroWilk
Barium (mg/L)	SP-2	No n/a	NP	NaN	19	1.228	0.5399	ln(x)	ShapiroWilk
Beryllium (mg/L)	SP-1	No n/a	NP	NaN	19	0.0003368	0.0004106	ln(x)	ShapiroWilk
Beryllium (mg/L)	SP-10	No n/a	NP	NaN	16	0.00006519	0.00003147	x^(1/3)	ShapiroWilk
Beryllium (mg/L)	SP-11	No n/a	NP	NaN	16	0.0001368	0.0001279	ln(x)	ShapiroWilk
Beryllium (mg/L)	SP-2	No n/a	NP	NaN	19	0.0002947	0.0003781	ln(x)	ShapiroWilk
Cadmium (mg/L)	SP-1	No n/a	NP	NaN	19	0.0003111	0.0002069	ln(x)	ShapiroWilk
Cadmium (mg/L)	SP-10	No n/a	NP	NaN	16	0.0001437	0.00008632	ln(x)	ShapiroWilk
Cadmium (mg/L)	SP-11	No n/a	NP	NaN	16	0.0007756	0.001033	ln(x)	ShapiroWilk
Cadmium (mg/L)	SP-2	No n/a	NP	NaN	19	0.0003042	0.0002141	ln(x)	ShapiroWilk
Calcium (mg/L)	SP-1	No n/a	NP	NaN	20	118.9	12.43	ln(x)	ShapiroWilk
Calcium (mg/L)	SP-10	No n/a	NP	NaN	16	84.33	56.02	ln(x)	ShapiroWilk
Calcium (mg/L)	SP-11	No n/a	NP	NaN	16	377.2	432.6	ln(x)	ShapiroWilk
Calcium (mg/L)	SP-2	No n/a	NP	NaN	19	101.8	35.29	ln(x)	ShapiroWilk
Chromium (mg/L)	SP-1	No n/a	NP	NaN	19	0.001056	0.0006702	ln(x)	ShapiroWilk
Chromium (mg/L)	SP-10	No n/a	NP	NaN	16	0.00821	0.02722	ln(x)	ShapiroWilk
Chromium (mg/L)	SP-11	No n/a	NP	NaN	16	0.008519	0.0121	ln(x)	ShapiroWilk
Chromium (mg/L)	SP-2	No n/a	NP	NaN	19	0.001383	0.001183	x^(1/3)	ShapiroWilk
Cobalt (mg/L)	SP-1	No n/a	NP	NaN	19	0.001192	0.001255	ln(x)	ShapiroWilk
Cobalt (mg/L)	SP-10	No n/a	NP	NaN	16	0.002153	0.001843	x^(1/3)	ShapiroWilk
Cobalt (mg/L)	SP-11	No n/a	NP	NaN	16	0.005027	0.004958	ln(x)	ShapiroWilk
Cobalt (mg/L)	SP-2	No n/a	NP	NaN	19	0.0009857	0.0008224	ln(x)	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	SP-1	Yes 14.29	NP	NaN	19	4.088	2.682	ln(x)	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	SP-10	No n/a	NP	NaN	16	8.741	8.843	x^(1/3)	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	SP-11	No n/a	NP	NaN	16	3.235	6.004	ln(x)	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	SP-2	No n/a	NP	NaN	16	11.91	5.762	ln(x)	ShapiroWilk
Fluoride (mg/L)	SP-1	No n/a	NP	NaN	20	0.9509	0.7726	ln(x)	ShapiroWilk
Fluoride (mg/L)	SP-10	No n/a	NP	NaN	18	5.611	2.704	x^2	ShapiroWilk
Fluoride (mg/L)	SP-11	No n/a	NP	NaN	18	3.07	0.8538	normal	ShapiroWilk
Fluoride (mg/L)	SP-2	No n/a	NP	NaN	20	2.858	0.6539	x^2	ShapiroWilk
Lead (mg/L)	SP-1	No n/a	NP	NaN	19	0.002541	0.00218	ln(x)	ShapiroWilk
Lead (mg/L)	SP-10	No n/a	NP	NaN	16	0.001248	0.0009001	ln(x)	ShapiroWilk
Lead (mg/L)	SP-11	No n/a	NP	NaN	16	0.003157	0.003051	ln(x)	ShapiroWilk
Lead (mg/L)	SP-2	No n/a	NP	NaN	19	0.00272	0.002265	ln(x)	ShapiroWilk
Lithium (mg/L)	SP-1	No n/a	NP	NaN	19	0.006729	0.005882	ln(x)	ShapiroWilk
Lithium (mg/L)	SP-10	No n/a	NP	NaN	16	0.2714	0.03766	x^2	ShapiroWilk
Lithium (mg/L)	SP-11	No n/a	NP	NaN	16	0.07165	0.0395	ln(x)	ShapiroWilk
Lithium (mg/L)	SP-2	No n/a	NP	NaN	19	0.07202	0.02613	normal	ShapiroWilk
Mercury (mg/L)	SP-1	n/a n/a	NP	NaN	19	0.000006632	0.000004284	unknown	ShapiroWilk
Mercury (mg/L)	SP-10	No n/a	NP	NaN	16	0.0000115	0.000007983	ln(x)	ShapiroWilk
Mercury (mg/L)	SP-11	No n/a	NP	NaN	16	0.00001769	0.00001444	ln(x)	ShapiroWilk
Mercury (mg/L)	SP-2	n/a n/a	NP	NaN	19	0.000005579	0.000002063	unknown	ShapiroWilk
Molybdenum (mg/L)	SP-1	No n/a	NP	NaN	19	0.01261	0.004628	normal	ShapiroWilk
Molybdenum (mg/L)	SP-10	No n/a	NP	NaN	16	0.08158	0.2294	ln(x)	ShapiroWilk
Molybdenum (mg/L)	SP-11	No n/a	NP	NaN	16	0.02708	0.02435	ln(x)	ShapiroWilk

Tukey's Outlier Analysis - Downgradient Wells - All Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/28/2020, 3:00 PM

Constituent	Well	Outlier	Value(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Molybdenum (mg/L)	SP-2	No	n/a	NP	NaN	19	0.02668	0.007507	sqrt(x)	ShapiroWilk
Selenium (mg/L)	SP-1	No	n/a	NP	NaN	19	0.005332	0.002475	ln(x)	ShapiroWilk
Selenium (mg/L)	SP-10	No	n/a	NP	NaN	16	0.002088	0.002397	x^(1/3)	ShapiroWilk
Selenium (mg/L)	SP-11	No	n/a	NP	NaN	16	0.002543	0.002418	ln(x)	ShapiroWilk
Selenium (mg/L)	SP-2	No	n/a	NP	NaN	19	0.009736	0.009881	ln(x)	ShapiroWilk
Thallium (mg/L)	SP-1	n/a	n/a	NP	NaN	19	0.0005568	0.0003851	unknown	ShapiroWilk
Thallium (mg/L)	SP-10	n/a	n/a	NP	NaN	16	0.0004713	0.000115	unknown	ShapiroWilk
Thallium (mg/L)	SP-11	n/a	n/a	NP	NaN	16	0.0004706	0.0001175	unknown	ShapiroWilk
Thallium (mg/L)	SP-2	n/a	n/a	NP	NaN	19	0.0004558	0.0001326	unknown	ShapiroWilk

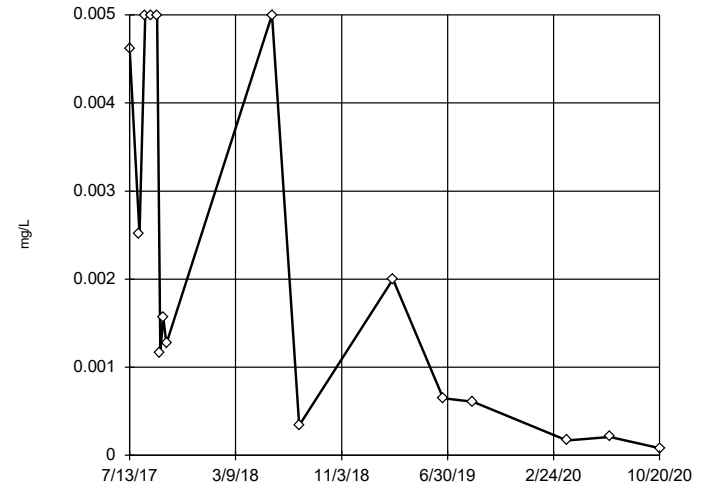
Tukey's Outlier Screening
SP-1



n = 19
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 2.622, low cutoff = 0.000001182, based on IQR multiplier of 3.

Constituent: Antimony Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

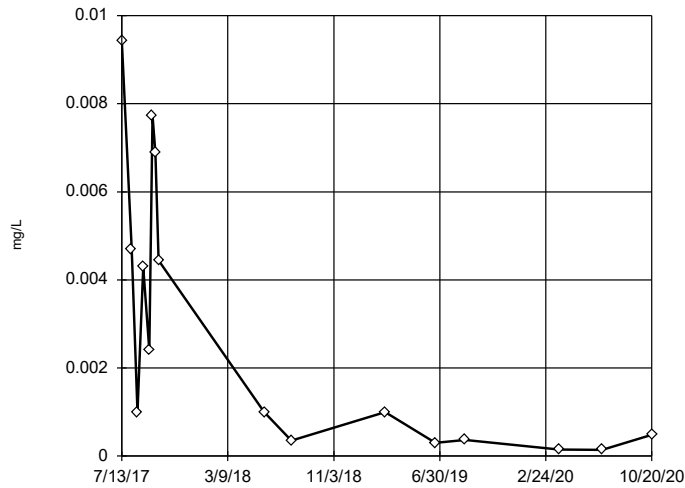
Tukey's Outlier Screening
SP-10



n = 16
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 5.65, low cutoff = 3.9e-7, based on IQR multiplier of 3.

Constituent: Antimony Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

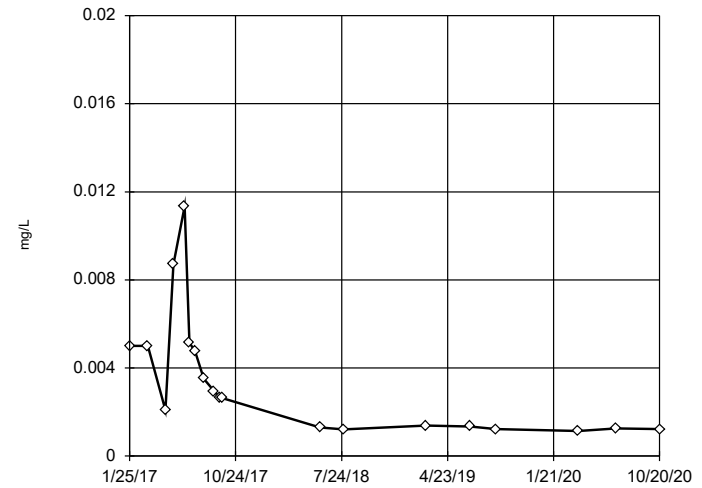
Tukey's Outlier Screening
SP-11



n = 16
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 9.345, low cutoff = 1.8e-7, based on IQR multiplier of 3.

Constituent: Antimony Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

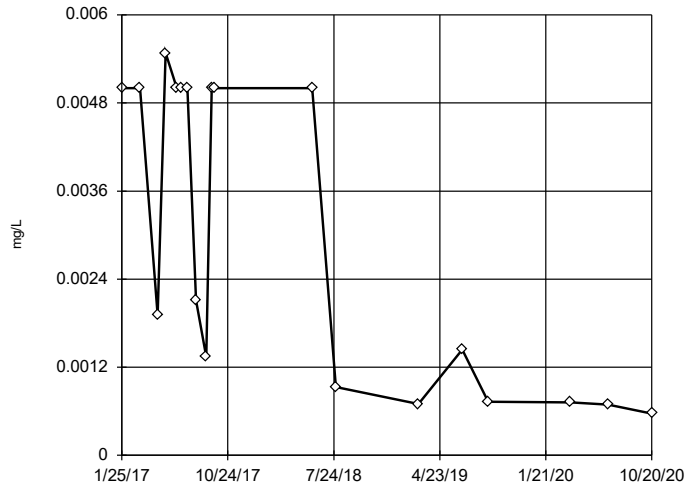
Tukey's Outlier Screening
SP-2



n = 19
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.3124, low cutoff = 0.00002016, based on IQR multiplier of 3.

Constituent: Antimony Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

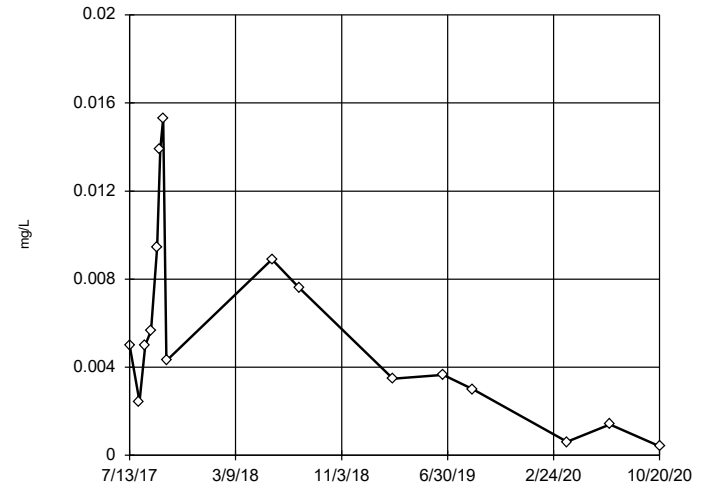
Tukey's Outlier Screening
SP-1



n = 19
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 1.607, low cutoff = 0.00002272, based on IQR multiplier of 3.

Constituent: Arsenic Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

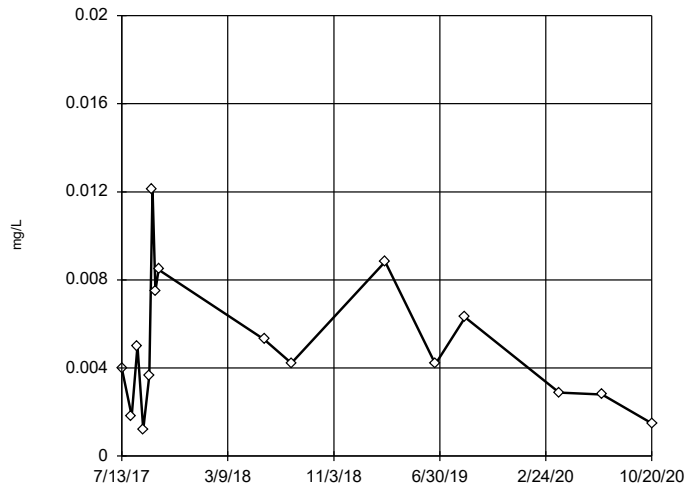
Tukey's Outlier Screening
SP-10



n = 16
No outliers found. Tukey's method selected by user.
Data were cube root transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.05926, low cutoff = -0.0001145, based on IQR multiplier of 3.

Constituent: Arsenic Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

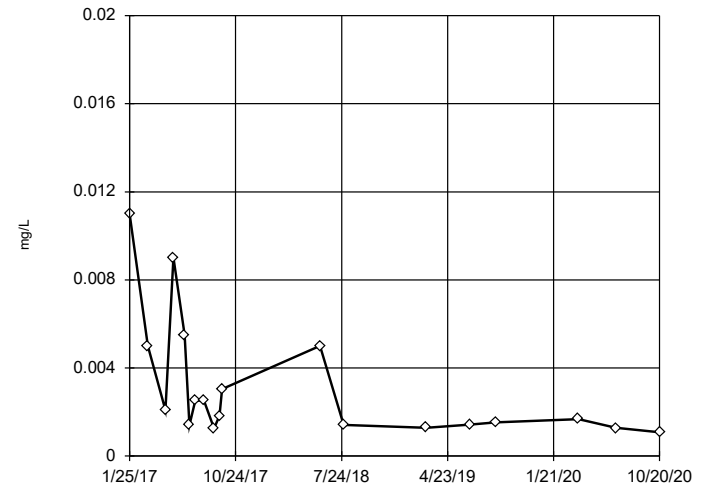
Tukey's Outlier Screening
SP-11



n = 16
No outliers found. Tukey's method selected by user.
Data were cube root transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.03803, low cutoff = -9.4e-8, based on IQR multiplier of 3.

Constituent: Arsenic Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Tukey's Outlier Screening
SP-2

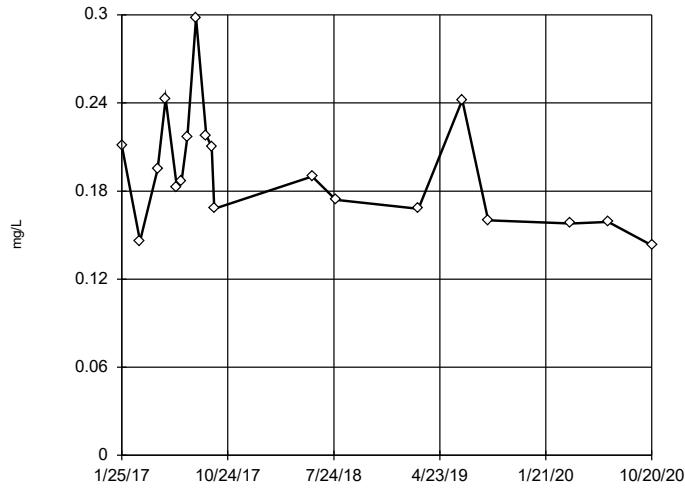


n = 19
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.2278, low cutoff = 0.00003073, based on IQR multiplier of 3.

Constituent: Arsenic Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Tukey's Outlier Screening

SP-1



n = 19

No outliers found. Tukey's method selected by user.

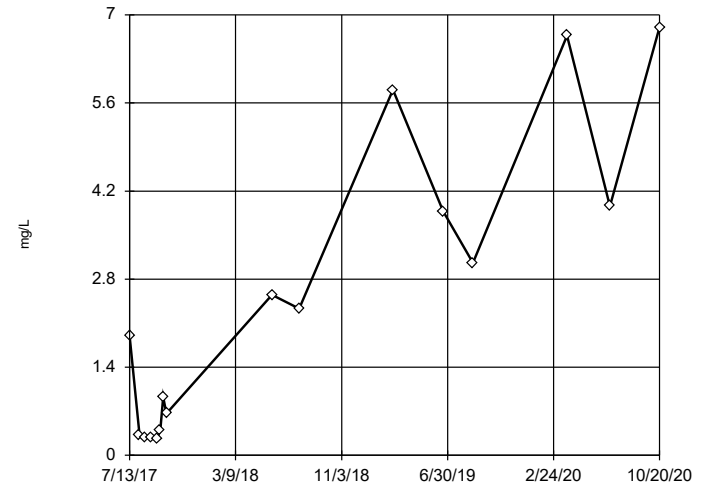
Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 0.5414, low cutoff = 0.06414, based on IQR multiplier of 3.

Constituent: Barium Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Tukey's Outlier Screening

SP-10



n = 16

No outliers found. Tukey's method selected by user.

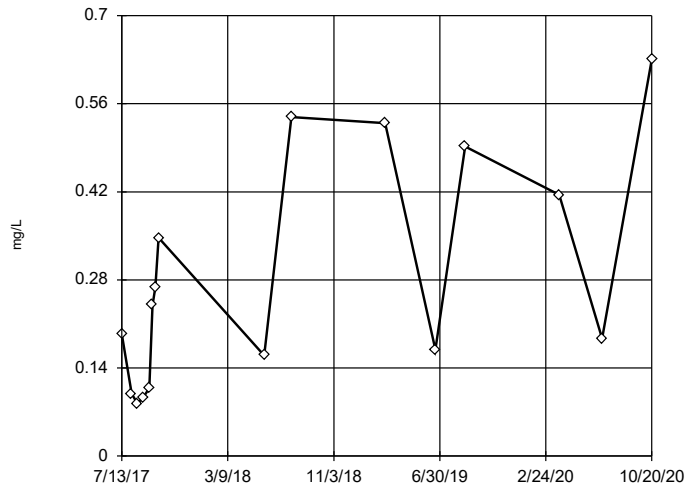
Data were cube root transformed to achieve best W statistic (graph shown in original units).

High cutoff = 72.31, low cutoff = -6.599, based on IQR multiplier of 3.

Constituent: Barium Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Tukey's Outlier Screening

SP-11



n = 16

No outliers found. Tukey's method selected by user.

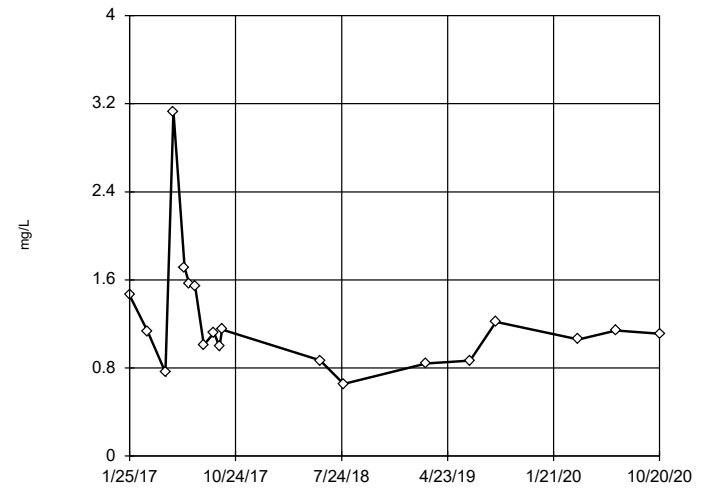
Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 18.35, low cutoff = 0.003236, based on IQR multiplier of 3.

Constituent: Barium Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Tukey's Outlier Screening

SP-2



n = 19

No outliers found. Tukey's method selected by user.

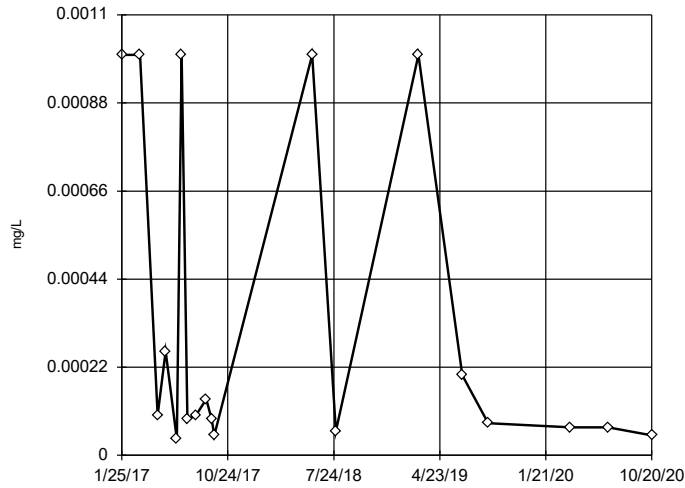
Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 6.924, low cutoff = 0.1832, based on IQR multiplier of 3.

Constituent: Barium Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Tukey's Outlier Screening

SP-1



n = 19

No outliers found. Tukey's method selected by user.

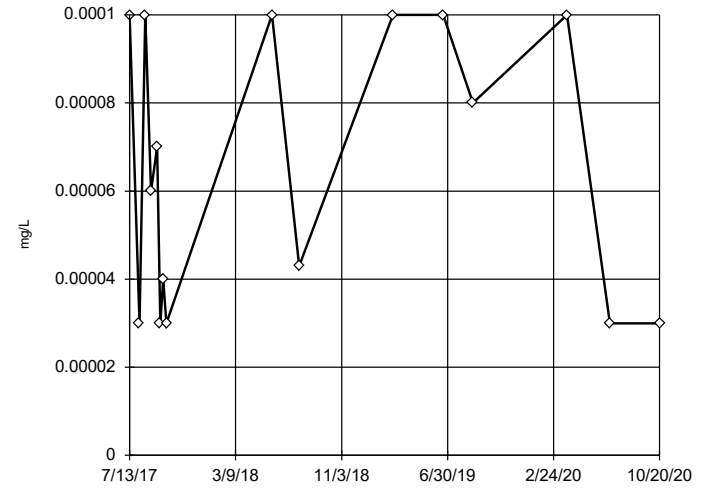
Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 2.915, low cutoff = 2.4e-8, based on IQR multiplier of 3.

Constituent: Beryllium Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Tukey's Outlier Screening

SP-10



n = 16

No outliers found. Tukey's method selected by user.

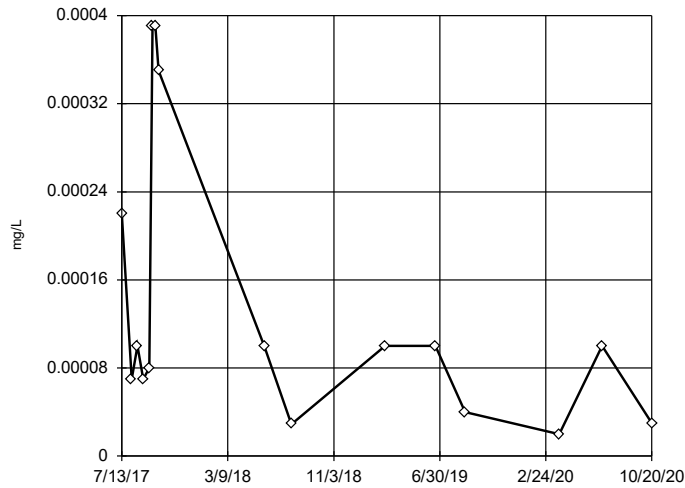
Data were cube root transformed to achieve best W statistic (graph shown in original units).

High cutoff = 0.0007901, low cutoff = -0.00003347, based on IQR multiplier of 3.

Constituent: Beryllium Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Tukey's Outlier Screening

SP-11



n = 16

No outliers found. Tukey's method selected by user.

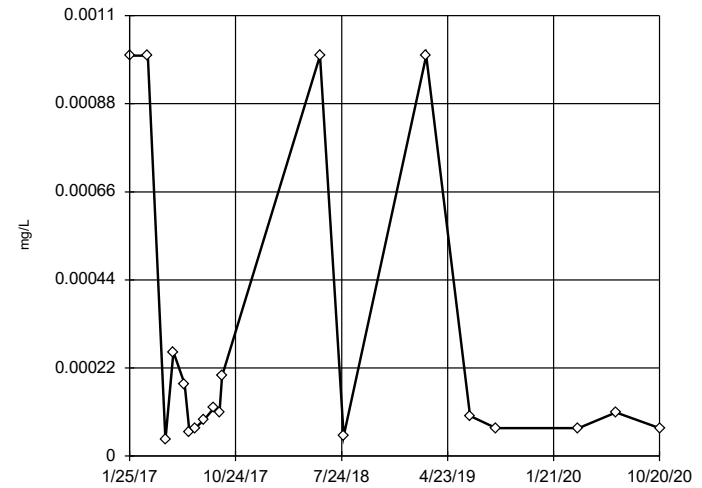
Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 0.003267, low cutoff = 0.000002403, based on IQR multiplier of 3.

Constituent: Beryllium Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Tukey's Outlier Screening

SP-2



n = 19

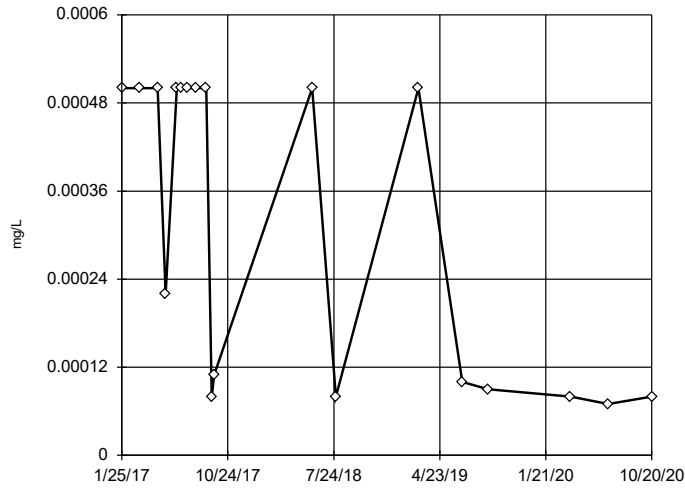
No outliers found. Tukey's method selected by user.

Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 0.01332, low cutoff = 0.000001366, based on IQR multiplier of 3.

Constituent: Beryllium Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

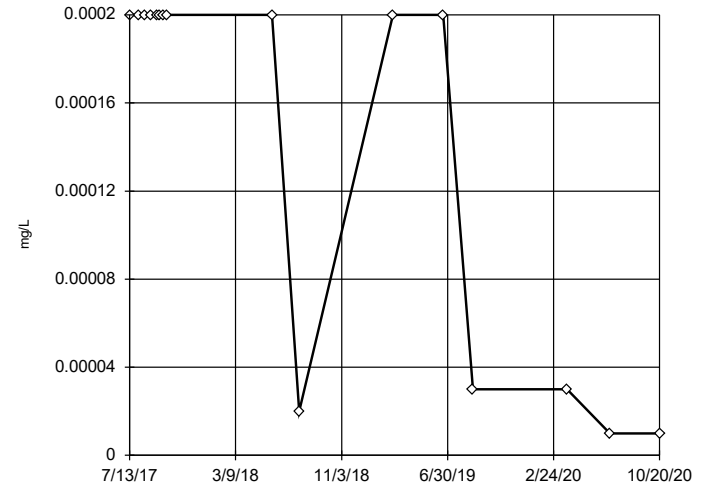
Tukey's Outlier Screening
SP-1



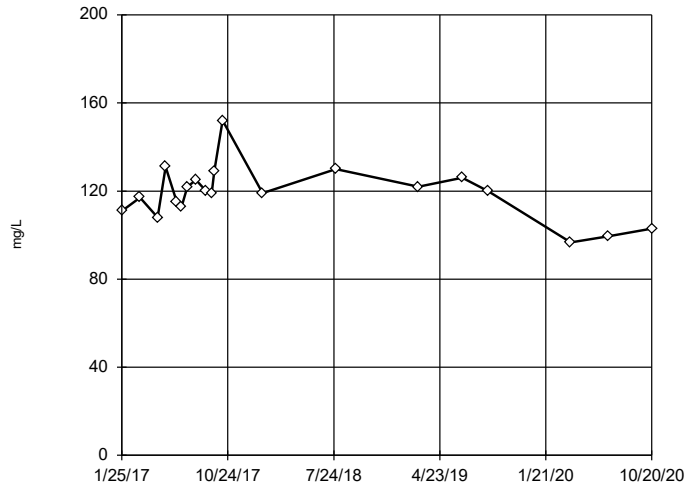
n = 19
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.1221, low cutoff = 3.3e-7, based on IQR multiplier of 3.

Constituent: Cadmium Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Tukey's Outlier Screening
SP-10



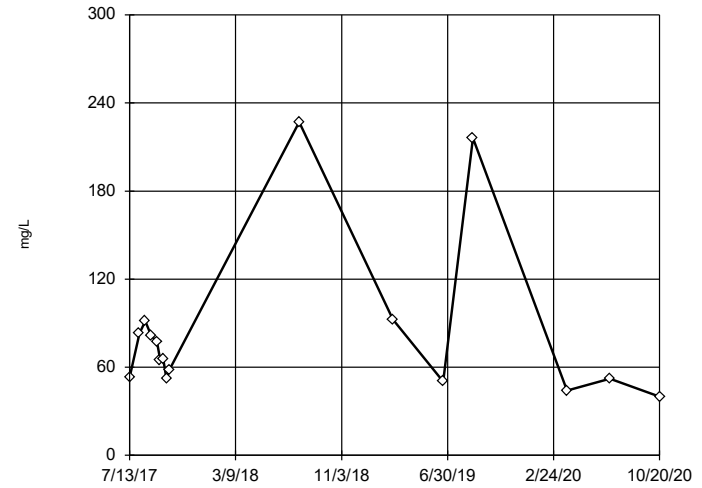
Tukey's Outlier Screening
SP-1



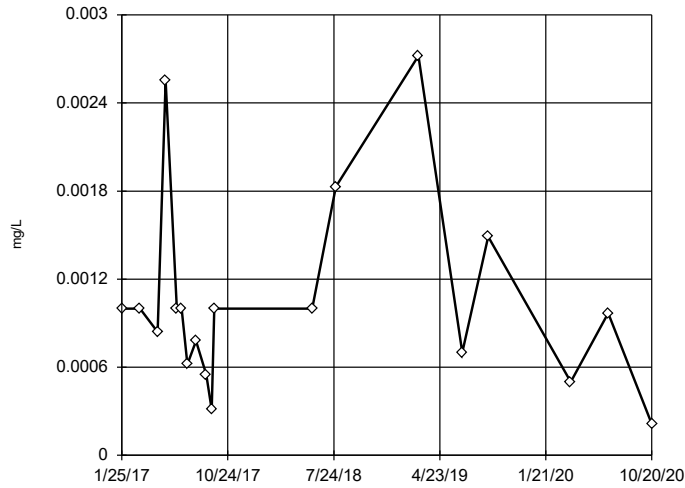
n = 20
No outliers found.
Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 176.6, low cutoff = 79.59, based on IQR multiplier of 3.

Constituent: Calcium Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Tukey's Outlier Screening
SP-10



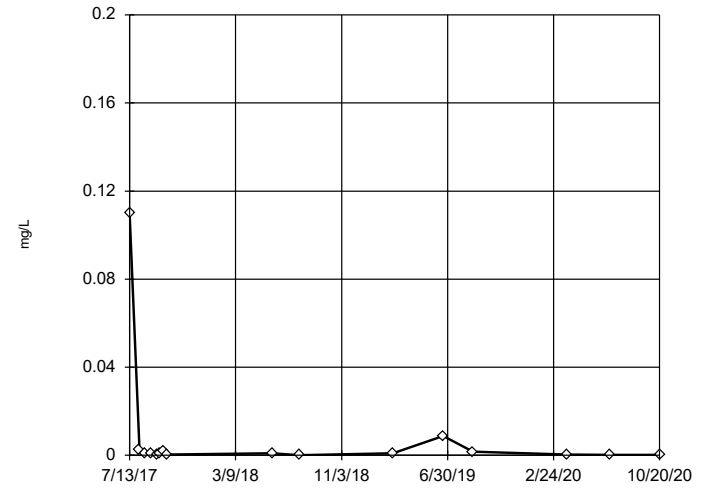
Tukey's Outlier Screening
SP-1



n = 19
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.004196, low cutoff = 0.0001478, based on IQR multiplier of 3.

Constituent: Chromium Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

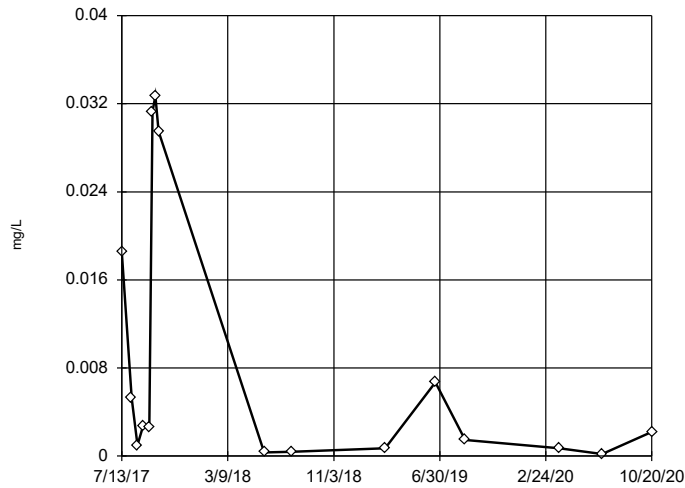
Tukey's Outlier Screening
SP-10



n = 16
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.2169, low cutoff = 0.000003125, based on IQR multiplier of 3.

Constituent: Chromium Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

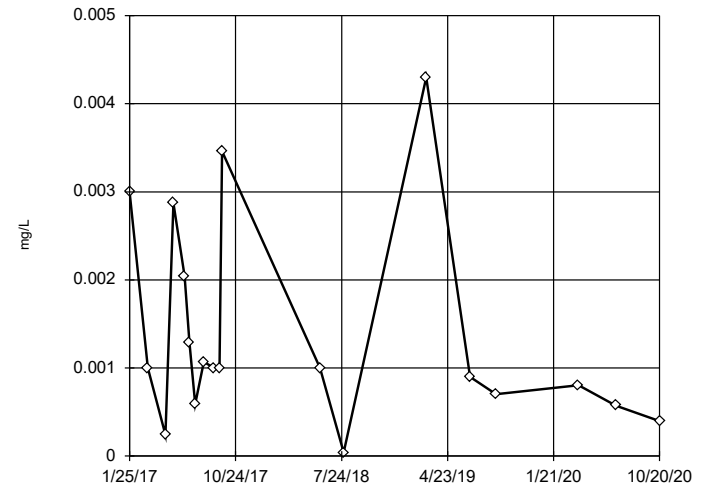
Tukey's Outlier Screening
SP-11



n = 16
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 44.54, low cutoff = 1.8e-7, based on IQR multiplier of 3.

Constituent: Chromium Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

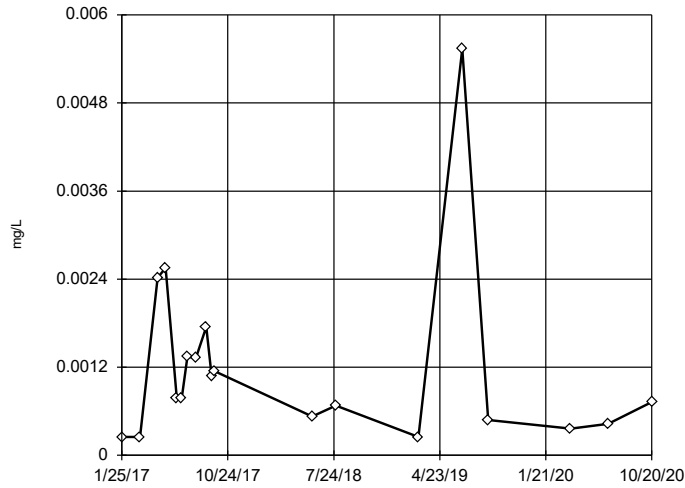
Tukey's Outlier Screening
SP-2



n = 19
No outliers found. Tukey's method selected by user.
Data were cube root transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.01672, low cutoff = -0.00009107, based on IQR multiplier of 3.

Constituent: Chromium Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

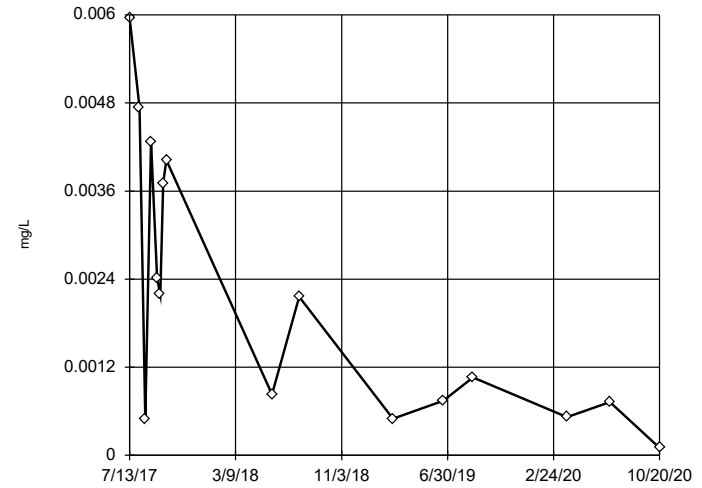
Tukey's Outlier Screening
SP-1



n = 19
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.04027, low cutoff = 0.00001434, based on IQR multiplier of 3.

Constituent: Cobalt Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

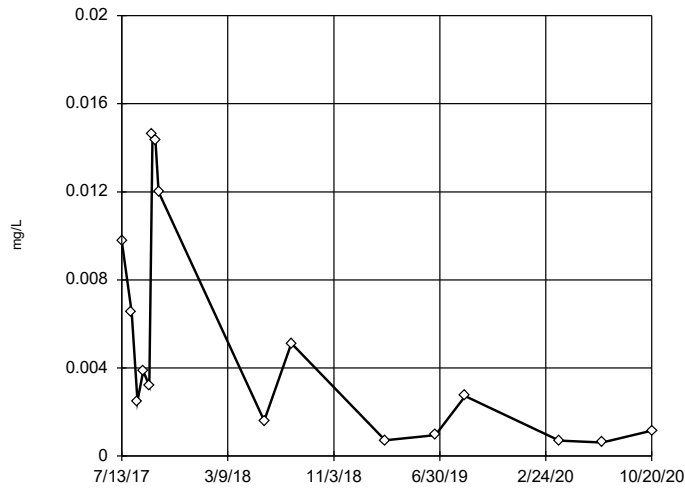
Tukey's Outlier Screening
SP-10



n = 16
No outliers found. Tukey's method selected by user.
Data were cube root transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.05154, low cutoff = -0.002202, based on IQR multiplier of 3.

Constituent: Cobalt Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

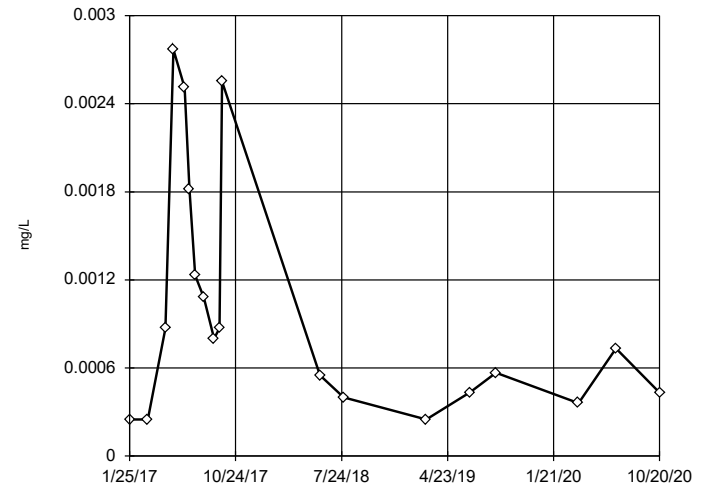
Tukey's Outlier Screening
SP-11



n = 16
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 3.512, low cutoff = 0.000002382, based on IQR multiplier of 3.

Constituent: Cobalt Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

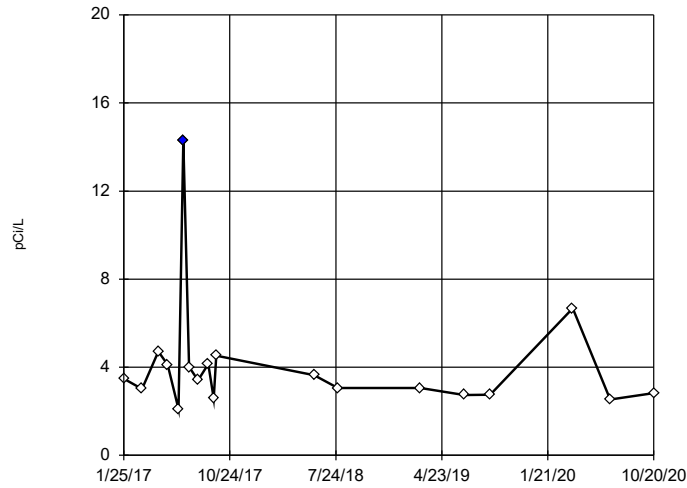
Tukey's Outlier Screening
SP-2



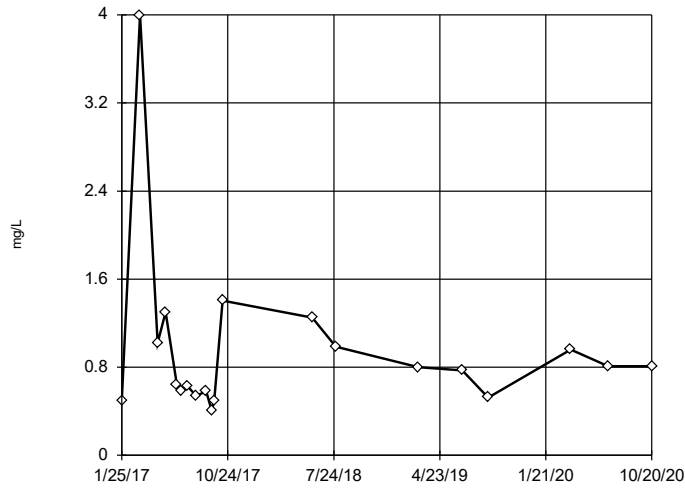
n = 19
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.03576, low cutoff = 0.00001376, based on IQR multiplier of 3.

Constituent: Cobalt Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Tukey's Outlier Screening
SP-1



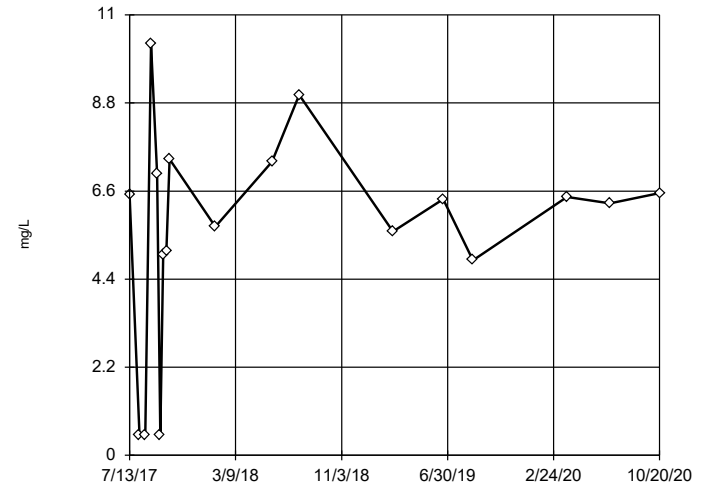
Tukey's Outlier Screening
SP-1



n = 20
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 5.724, low cutoff = 0.09832, based on IQR multiplier of 3.

Constituent: Fluoride Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

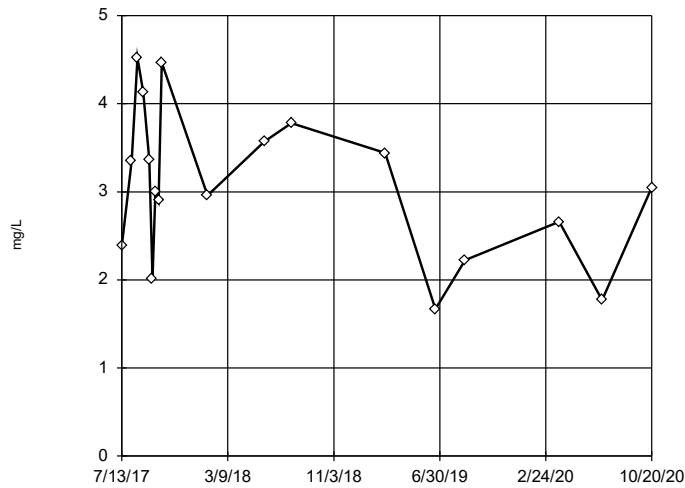
Tukey's Outlier Screening
SP-10



n = 18
No outliers found. Tukey's method selected by user.
Data were square transformed to achieve best W statistic (graph shown in original units).
High cutoff = 11.54, low cutoff = -7.561, based on IQR multiplier of 3.

Constituent: Fluoride Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

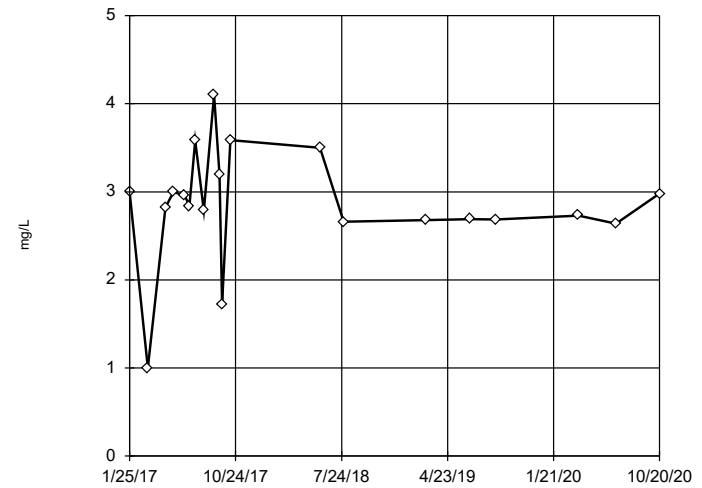
Tukey's Outlier Screening
SP-11



n = 18
No outliers found. Tukey's method selected by user.
Ladder of Powers transformations did not improve normality; analysis run on raw data.
High cutoff = 7.784, low cutoff = -1.803, based on IQR multiplier of 3.

Constituent: Fluoride Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Tukey's Outlier Screening
SP-2

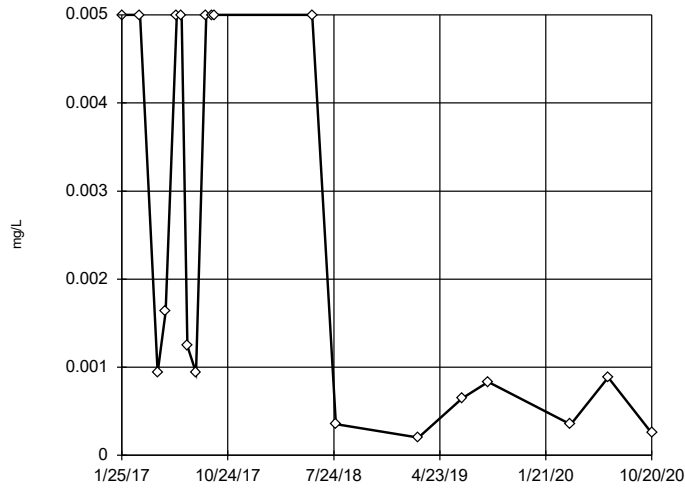


n = 20
No outliers found. Tukey's method selected by user.
Data were square transformed to achieve best W statistic (graph shown in original units).
High cutoff = 4.104, low cutoff = -0.1959, based on IQR multiplier of 3.

Constituent: Fluoride Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Tukey's Outlier Screening

SP-1

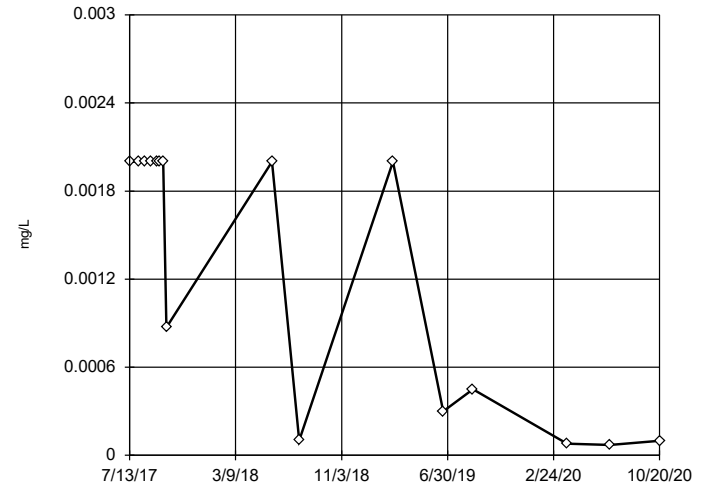


n = 19
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 2.276, low cutoff = 0.000001428, based on IQR multiplier of 3.

Constituent: Lead Analysis Run 12/28/2020 2:58 PM View: Outlier
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Tukey's Outlier Screening

SP-10

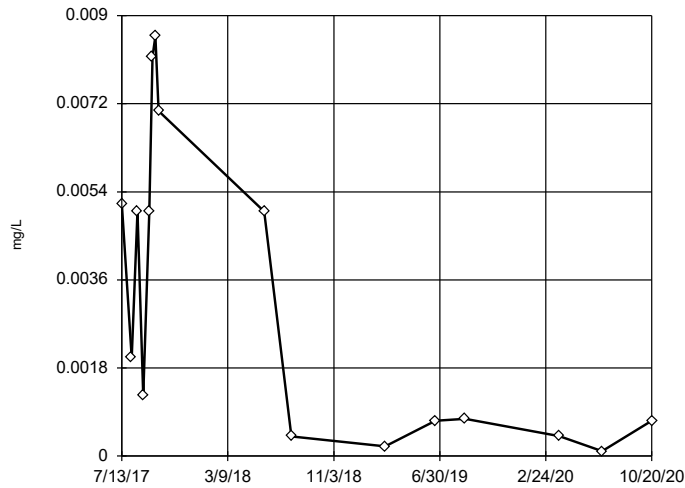


n = 16
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 2.989, low cutoff = 1.2e-7, based on IQR multiplier of 3.

Constituent: Lead Analysis Run 12/28/2020 2:59 PM View: Outlier
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Tukey's Outlier Screening

SP-11

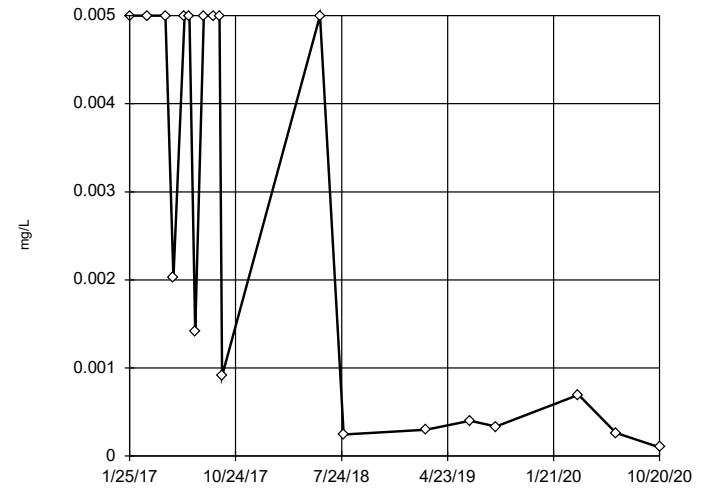


n = 16
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 4.174, low cutoff = 6.6e-7, based on IQR multiplier of 3.

Constituent: Lead Analysis Run 12/28/2020 2:59 PM View: Outlier
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Tukey's Outlier Screening

SP-2

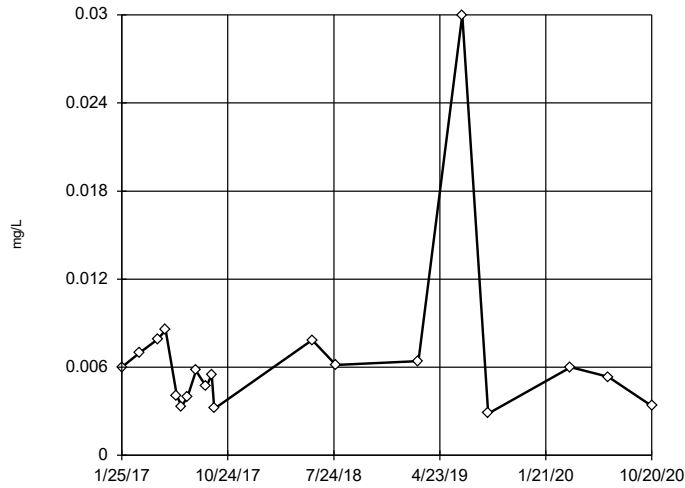


n = 19
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 16.77, low cutoff = 1.0e-7, based on IQR multiplier of 3.

Constituent: Lead Analysis Run 12/28/2020 2:59 PM View: Outlier
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Tukey's Outlier Screening

SP-1

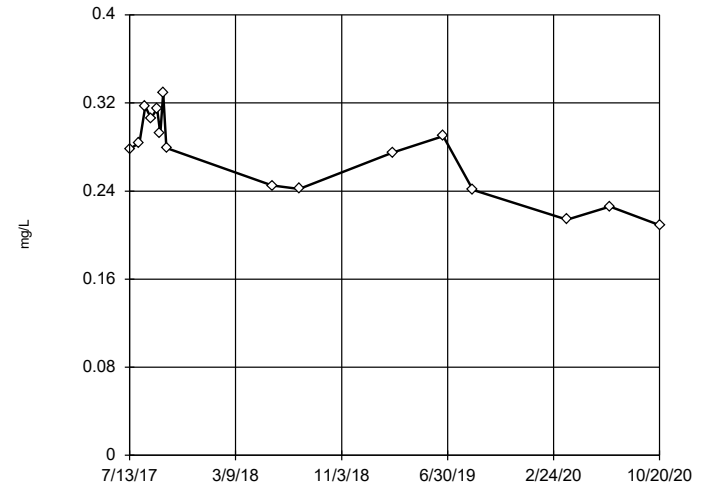


n = 19
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.03896, low cutoff = 0.0007097, based on IQR multiplier of 3.

Constituent: Lithium Analysis Run 12/28/2020 2:59 PM View: Outlier
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Tukey's Outlier Screening

SP-10

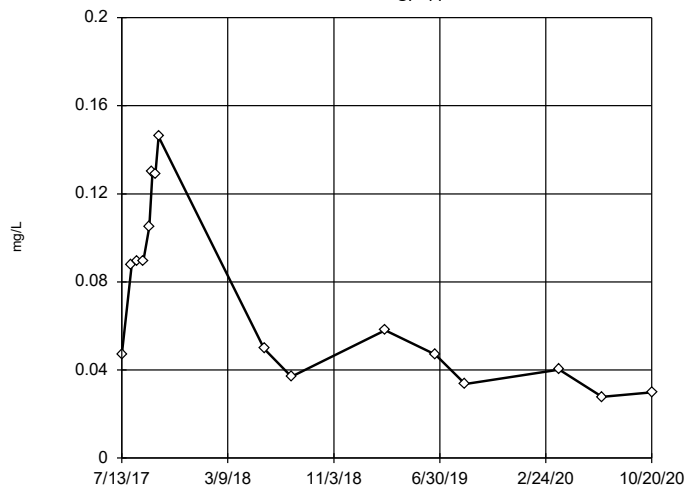


n = 16
 No outliers found.
 Tukey's method selected by user.
 Data were square transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.4276, low cutoff = -0.1872, based on IQR multiplier of 3.

Constituent: Lithium Analysis Run 12/28/2020 2:59 PM View: Outlier
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Tukey's Outlier Screening

SP-11



n = 16
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 1.534, low cutoff = 0.002435, based on IQR multiplier of 3.

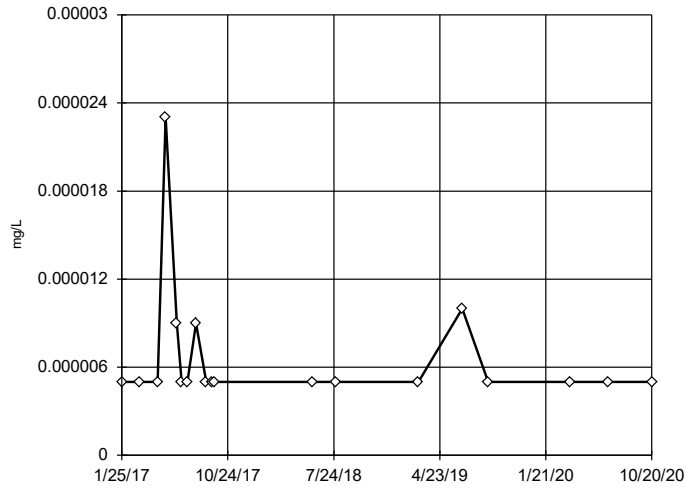
Constituent: Lithium Analysis Run 12/28/2020 2:59 PM View: Outlier
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Tukey's Outlier Screening

SP-2



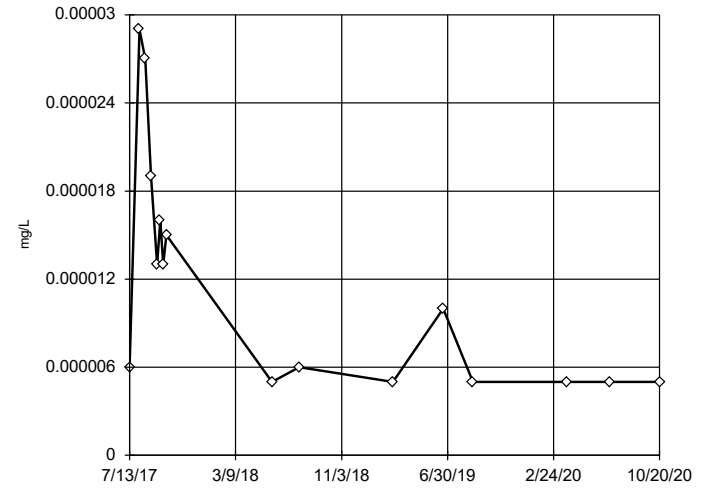
Tukey's Outlier Screening
SP-1



n = 19
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Mercury Analysis Run 12/28/2020 2:59 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

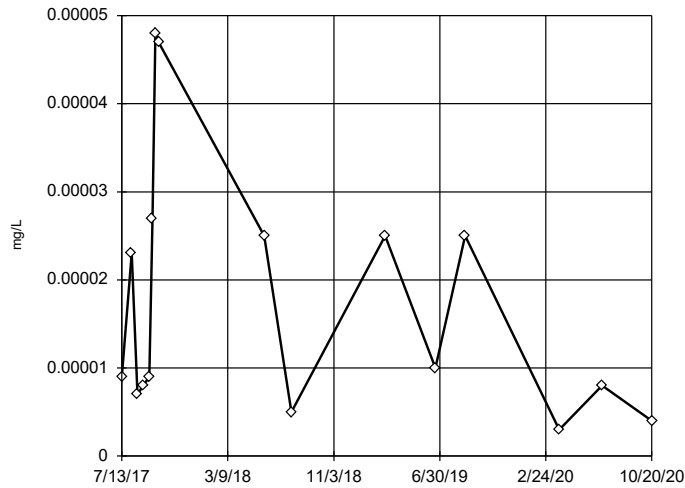
Tukey's Outlier Screening
SP-10



n = 16
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.0004608, low cutoff = 1.7e-7, based on IQR multiplier of 3.

Constituent: Mercury Analysis Run 12/28/2020 2:59 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

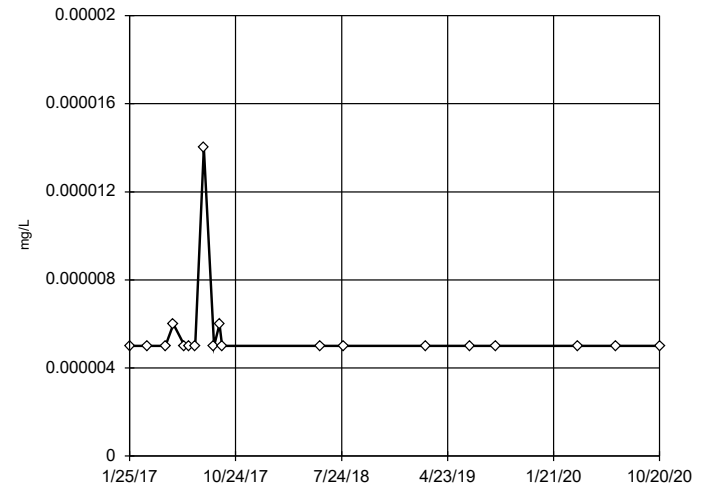
Tukey's Outlier Screening
SP-11



n = 16
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.0009321, low cutoff = 2.0e-7, based on IQR multiplier of 3.

Constituent: Mercury Analysis Run 12/28/2020 2:59 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

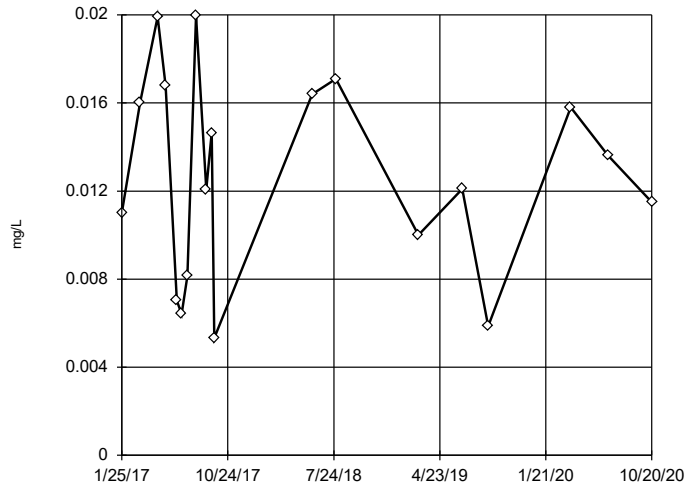
Tukey's Outlier Screening
SP-2



n = 19
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Mercury Analysis Run 12/28/2020 2:59 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

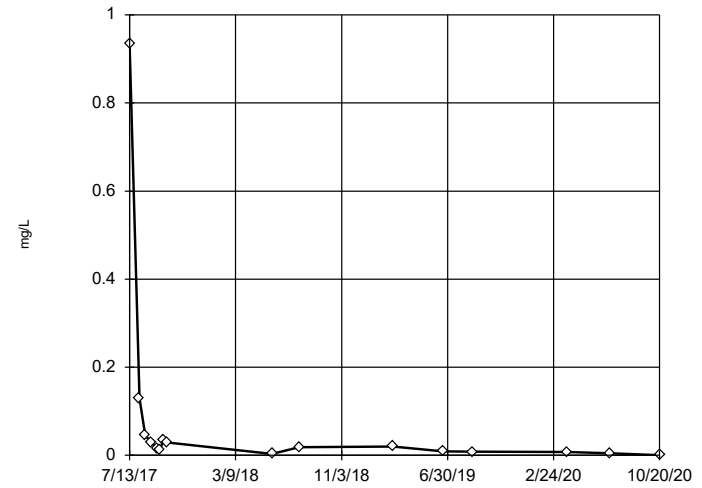
Tukey's Outlier Screening
SP-1



n = 19
No outliers found. Tukey's method selected by user.
Ladder of Powers transformations did not improve normality; analysis run on raw data.
High cutoff = 0.04118, low cutoff = -0.01664, based on IQR multiplier of 3.

Constituent: Molybdenum Analysis Run 12/28/2020 2:59 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

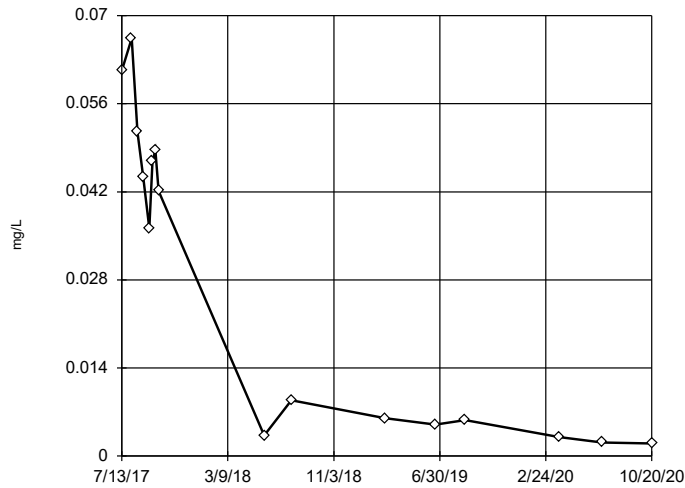
Tukey's Outlier Screening
SP-10



n = 16
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 2.512, low cutoff = 0.0001025, based on IQR multiplier of 3.

Constituent: Molybdenum Analysis Run 12/28/2020 2:59 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

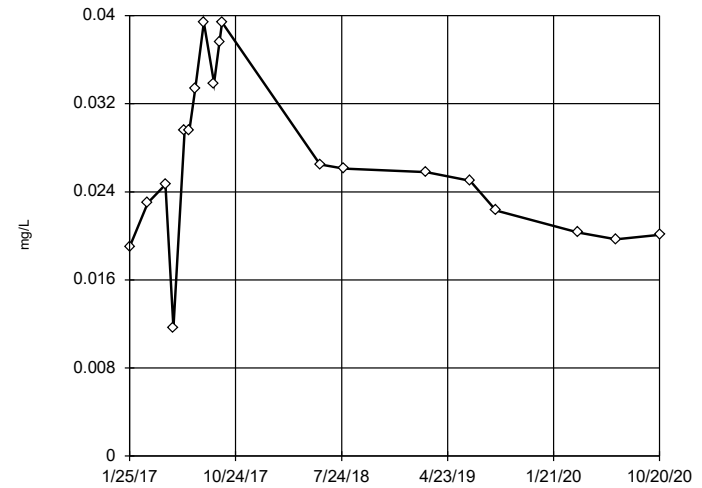
Tukey's Outlier Screening
SP-11



n = 16
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 78.62, low cutoff = 0.000002456, based on IQR multiplier of 3.

Constituent: Molybdenum Analysis Run 12/28/2020 2:59 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

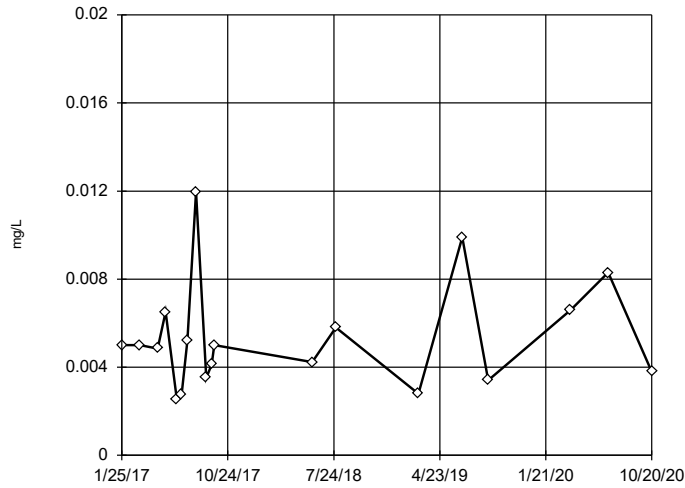
Tukey's Outlier Screening
SP-2



n = 19
No outliers found. Tukey's method selected by user.
Data were square root transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.09164, low cutoff = 0.0004973, based on IQR multiplier of 3.

Constituent: Molybdenum Analysis Run 12/28/2020 2:59 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

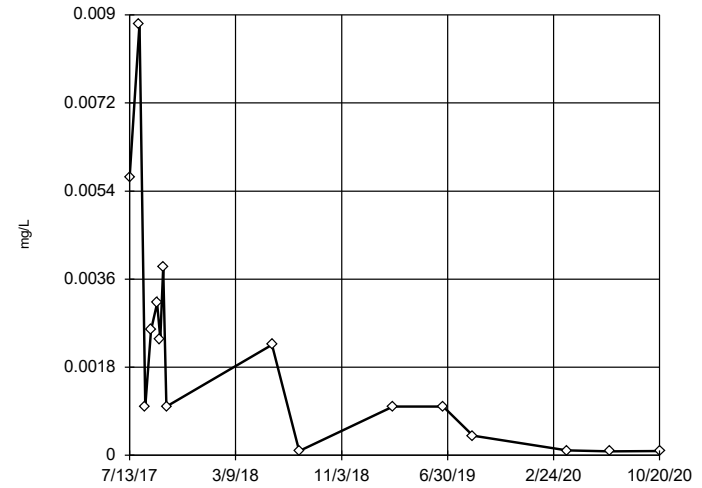
Tukey's Outlier Screening
SP-1



n = 19
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.04153, low cutoff = 0.0005502, based on IQR multiplier of 3.

Constituent: Selenium Analysis Run 12/28/2020 2:59 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

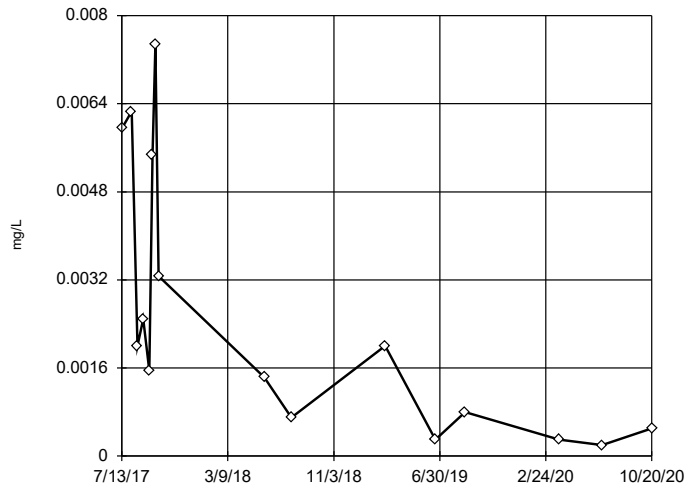
Tukey's Outlier Screening
SP-10



n = 16
No outliers found. Tukey's method selected by user.
Data were cube root transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.05724, low cutoff = -0.006225, based on IQR multiplier of 3.

Constituent: Selenium Analysis Run 12/28/2020 2:59 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

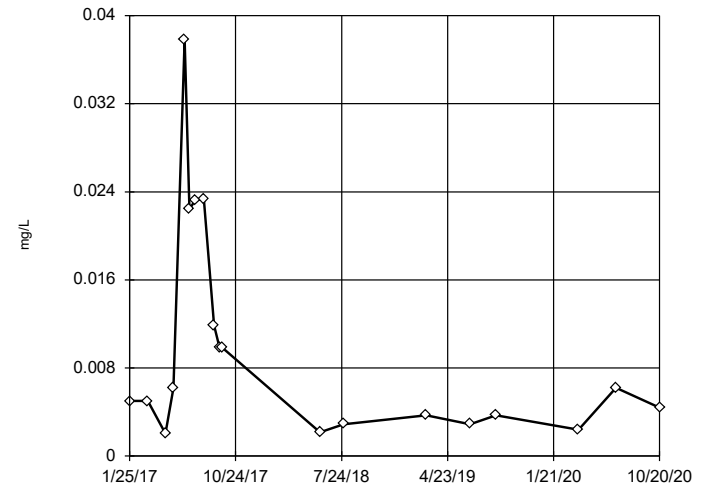
Tukey's Outlier Screening
SP-11



n = 16
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 1.539, low cutoff = 0.000001624, based on IQR multiplier of 3.

Constituent: Selenium Analysis Run 12/28/2020 2:59 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

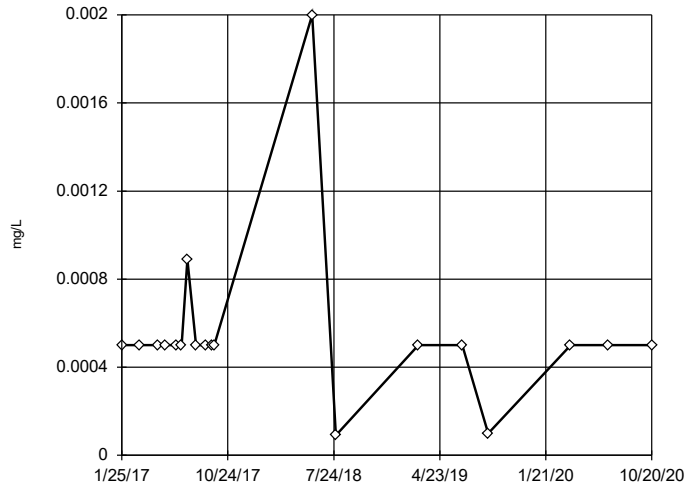
Tukey's Outlier Screening
SP-2



n = 19
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.8112, low cutoff = 0.0000424, based on IQR multiplier of 3.

Constituent: Selenium Analysis Run 12/28/2020 2:59 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

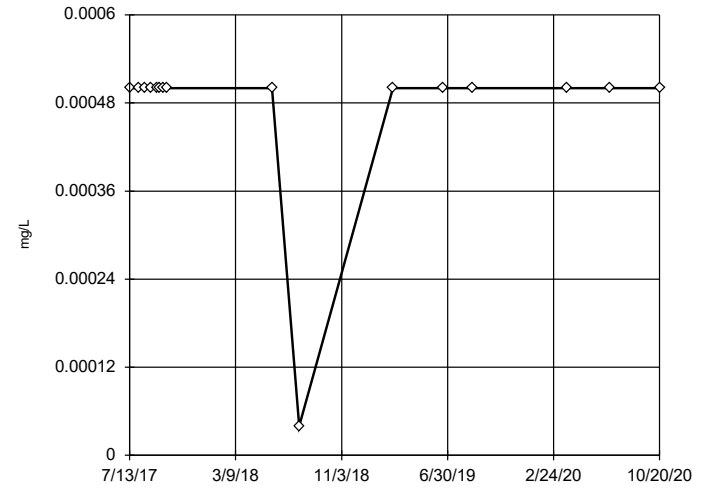
Tukey's Outlier Screening
SP-1



n = 19
No outliers found. Tukey's method selected by user.
Data were cube root transformed to achieve best W statistic (graph shown in original units).
The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Thallium Analysis Run 12/28/2020 2:59 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

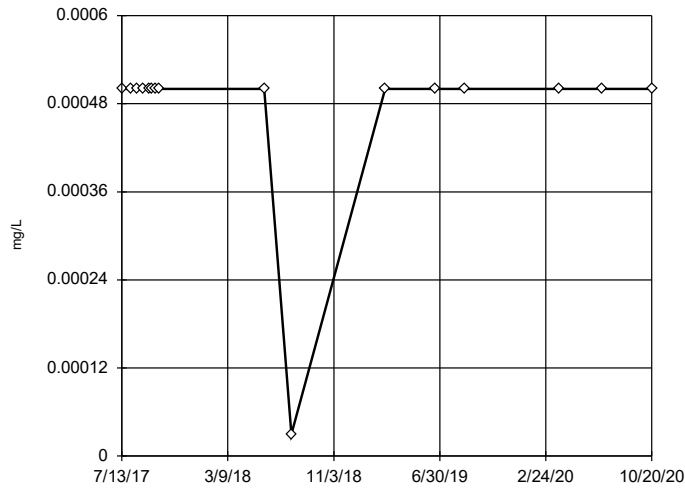
Tukey's Outlier Screening
SP-10



n = 16
No outliers found. Tukey's method selected by user.
Ladder of Powers transformations did not improve normality; analysis run on raw data.
The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Thallium Analysis Run 12/28/2020 2:59 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

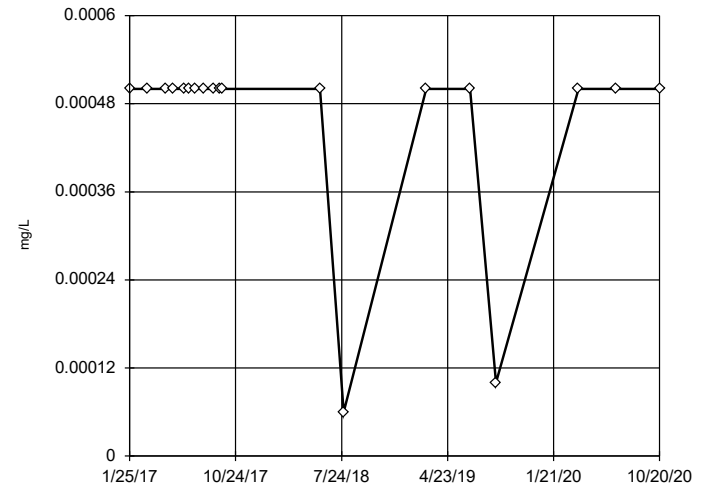
Tukey's Outlier Screening
SP-11



n = 16
No outliers found. Tukey's method selected by user.
Data were x^4 transformed to achieve best W statistic (graph shown in original units).
The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Thallium Analysis Run 12/28/2020 2:59 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Tukey's Outlier Screening
SP-2



n = 19
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Thallium Analysis Run 12/28/2020 2:59 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Tukey's Outlier Analysis - Upgradient Wells - Significant Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/28/2020, 2:57 PM

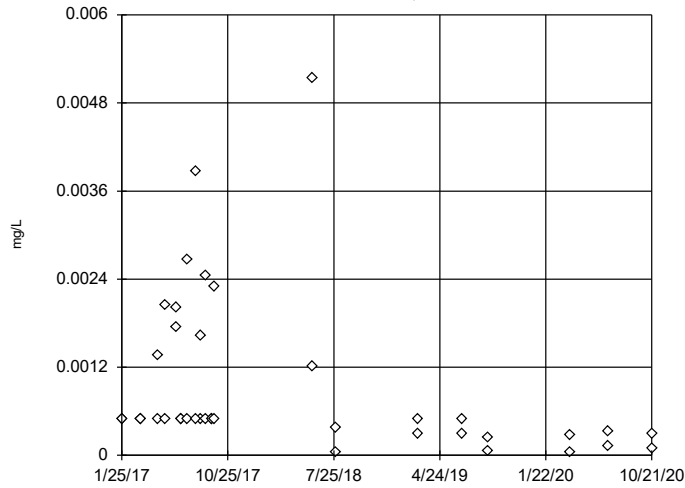
Constituent	Well	Outlier	Value(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Cadmium (mg/L)	SP-4,SP-5R	Yes	0.00057,0.00137,0.00655,0.00205,0.00166,0.00247,0	NP	NaN	40	0.000458	0.001171	ln(x)	ShapiroWilk
Chloride (mg/L)	SP-4,SP-5R	Yes	52,62,1834	NP	NaN	40	569.4	265.6	sqrt(x)	ShapiroWilk
Lead (mg/L)	SP-4,SP-5R	Yes	0.03663	NP	NaN	40	0.00287	0.006132	ln(x)	ShapiroWilk
Selenium (mg/L)	SP-4,SP-5R	Yes	0.00499,0.0001,0.0001,0.0001	NP	NaN	40	0.0009938	0.0007495	x^(1/3)	ShapiroWilk
Total Dissolved Solids [TDS] (mg/L)	SP-4,SP-5R	Yes	3008	NP	NaN	40	1326	315.6	ln(x)	ShapiroWilk

Tukey's Outlier Analysis - Upgradient Wells - All Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/28/2020, 2:57 PM

Constituent	Well	Outlier	Value(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Antimony (mg/L)	SP-4,SP-5R	No	n/a	NP	NaN	40	0.0009355	0.001097	ln(x)	ShapiroWilk
Arsenic (mg/L)	SP-4,SP-5R	No	n/a	NP	NaN	40	0.01588	0.01477	sqrt(x)	ShapiroWilk
Barium (mg/L)	SP-4,SP-5R	No	n/a	NP	NaN	40	1.494	0.9334	normal	ShapiroWilk
Beryllium (mg/L)	SP-4,SP-5R	No	n/a	NP	NaN	40	0.0005218	0.000888	ln(x)	ShapiroWilk
Boron (mg/L)	SP-4,SP-5R	No	n/a	NP	NaN	40	0.327	0.09795	ln(x)	ShapiroWilk
Cadmium (mg/L)	SP-4,SP-5R	Yes	0.00057,0.00137,0.00655,0.00205,0.00166,0.00247,0	NP	NaN	40	0.000458	0.001171	ln(x)	ShapiroWilk
Chloride (mg/L)	SP-4,SP-5R	Yes	52,62,1834	NP	NaN	40	569.4	265.6	sqrt(x)	ShapiroWilk
Chromium (mg/L)	SP-4,SP-5R	No	n/a	NP	NaN	40	0.007279	0.0162	ln(x)	ShapiroWilk
Cobalt (mg/L)	SP-4,SP-5R	No	n/a	NP	NaN	40	0.003845	0.007722	ln(x)	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	SP-4,SP-5R	No	n/a	NP	NaN	39	8.085	3.885	sqrt(x)	ShapiroWilk
Fluoride (mg/L)	SP-4,SP-5R	No	n/a	NP	NaN	42	3.167	0.7226	x^2	ShapiroWilk
Lead (mg/L)	SP-4,SP-5R	Yes	0.03663	NP	NaN	40	0.00287	0.006132	ln(x)	ShapiroWilk
Lithium (mg/L)	SP-4,SP-5R	No	n/a	NP	NaN	40	0.09259	0.02422	sqrt(x)	ShapiroWilk
Mercury (mg/L)	SP-4,SP-5R	No	n/a	NP	NaN	40	0.0000096	0.00001012	ln(x)	ShapiroWilk
Molybdenum (mg/L)	SP-4,SP-5R	No	n/a	NP	NaN	40	0.005758	0.003963	ln(x)	ShapiroWilk
pH, field (SU)	SP-4,SP-5R	No	n/a	NP	NaN	38	7.973	0.5842	ln(x)	ShapiroWilk
Selenium (mg/L)	SP-4,SP-5R	Yes	0.00499,0.0001,0.0001,0.0001	NP	NaN	40	0.0009938	0.0007495	x^(1/3)	ShapiroWilk
Sulfate (mg/L)	SP-4,SP-5R	No	n/a	NP	NaN	40	32.68	29.94	ln(x)	ShapiroWilk
Thallium (mg/L)	SP-4,SP-5R	n/a	n/a	NP	NaN	40	0.0005225	0.0002359	unknown	ShapiroWilk
Total Dissolved Solids [TDS] (mg/L)	SP-4,SP-5R	Yes	3008	NP	NaN	40	1326	315.6	ln(x)	ShapiroWilk

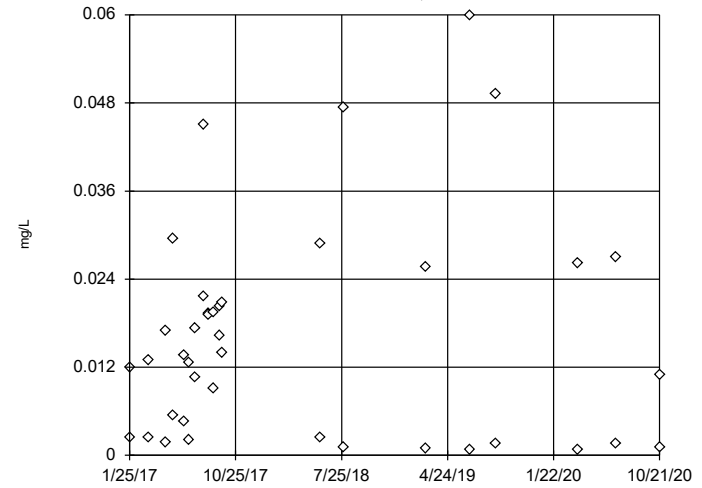
Tukey's Outlier Screening, Pooled Background
SP-4,SP-5R



n = 40
No outliers found.
Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.09104,
low cutoff = 0.000004366,
based on IQR multiplier of 3.

Constituent: Antimony Analysis Run 12/28/2020 2:56 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

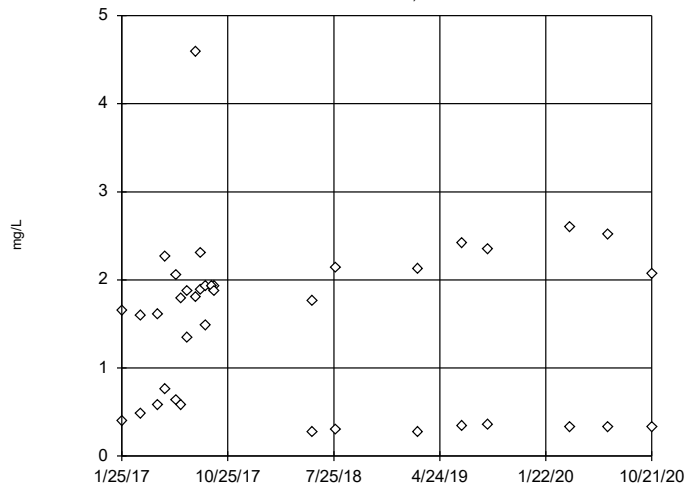
Tukey's Outlier Screening, Pooled Background
SP-4,SP-5R



n = 40
No outliers found.
Tukey's method selected by user.
Data were square root transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.1868,
low cutoff = -0.05599,
based on IQR multiplier of 3.

Constituent: Arsenic Analysis Run 12/28/2020 2:56 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

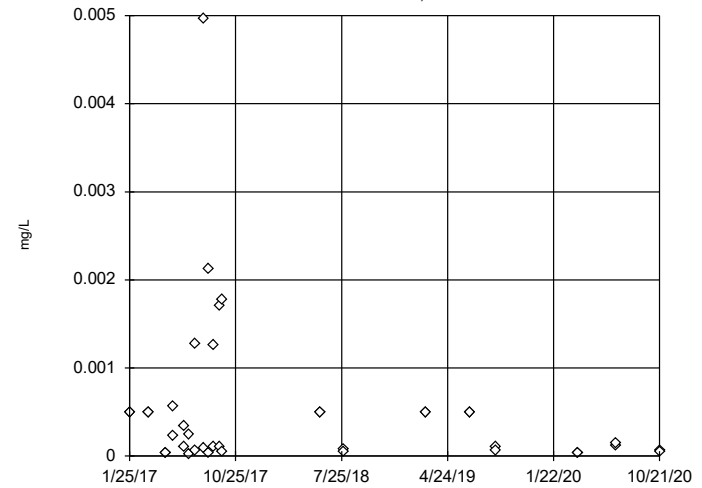
Tukey's Outlier Screening, Pooled Background
SP-4,SP-5R



n = 40
No outliers found.
Tukey's method selected by user.
Ladder of Powers transformations did not improve normality; analysis run on raw data.
High cutoff = 6.661, low cutoff = -4.074, based on IQR multiplier of 3.

Constituent: Barium Analysis Run 12/28/2020 2:56 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

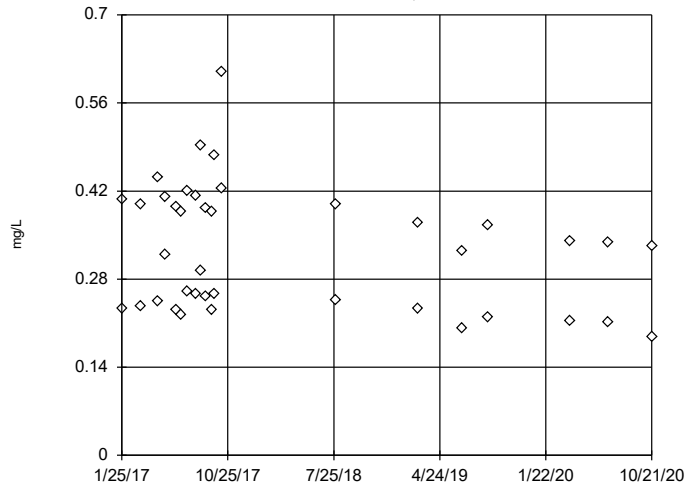
Tukey's Outlier Screening, Pooled Background
SP-4,SP-5R



n = 40
No outliers found.
Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.2894,
low cutoff = 1.0e-7, based on IQR multiplier of 3.

Constituent: Beryllium Analysis Run 12/28/2020 2:56 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

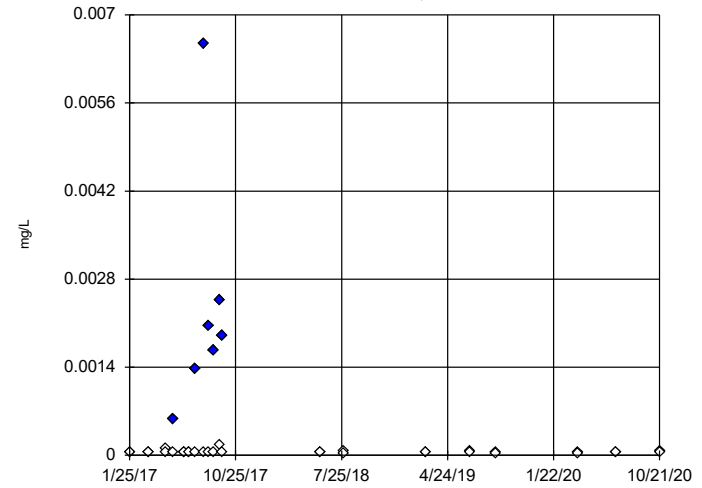
Tukey's Outlier Screening, Pooled Background
SP-4,SP-5R



n = 40
No outliers found.
Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 1.966, low cutoff = 0.0476, based on IQR multiplier of 3.

Constituent: Boron Analysis Run 12/28/2020 2:56 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

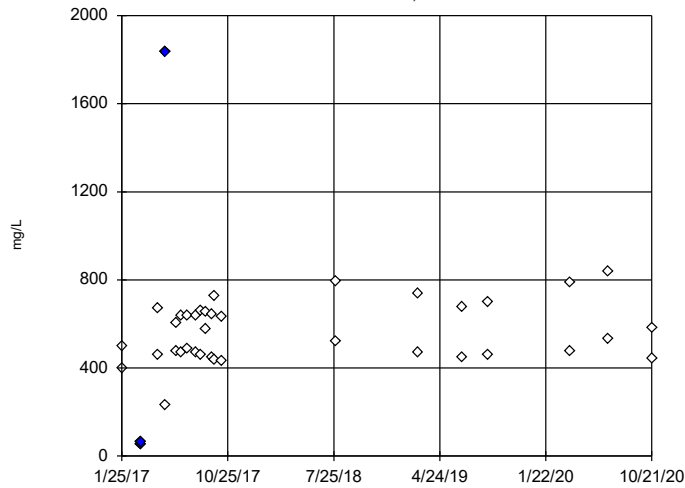
Tukey's Outlier Screening, Pooled Background
SP-4,SP-5R



n = 40
Outliers are drawn as solid.
Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.0001921, low cutoff = 0.00001822, based on IQR multiplier of 3.

Constituent: Cadmium Analysis Run 12/28/2020 2:56 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

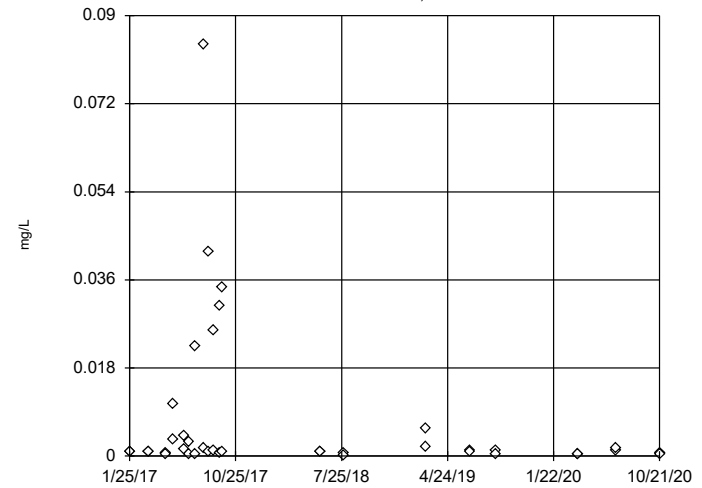
Tukey's Outlier Screening, Pooled Background
SP-4,SP-5R



n = 40
Outliers are drawn as solid.
Tukey's method selected by user.
Data were square root transformed to achieve best W statistic (graph shown in original units).
High cutoff = 1463, low cutoff = 77.16, based on IQR multiplier of 3.

Constituent: Chloride Analysis Run 12/28/2020 2:56 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

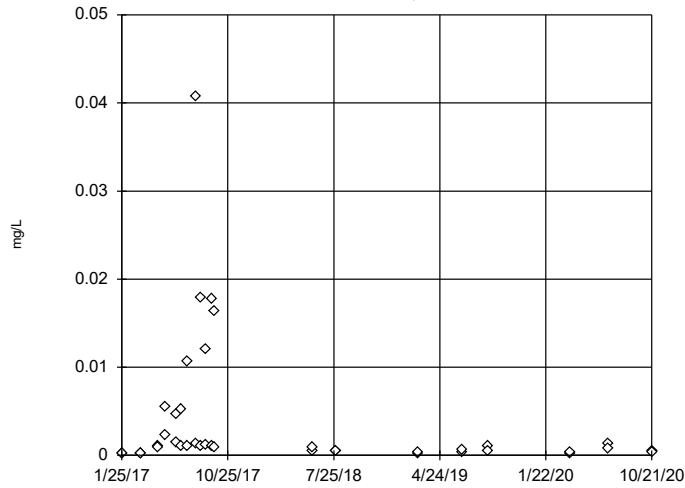
Tukey's Outlier Screening, Pooled Background
SP-4,SP-5R



n = 40
No outliers found.
Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.5021, low cutoff = 0.000003748, based on IQR multiplier of 3.

Constituent: Chromium Analysis Run 12/28/2020 2:56 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

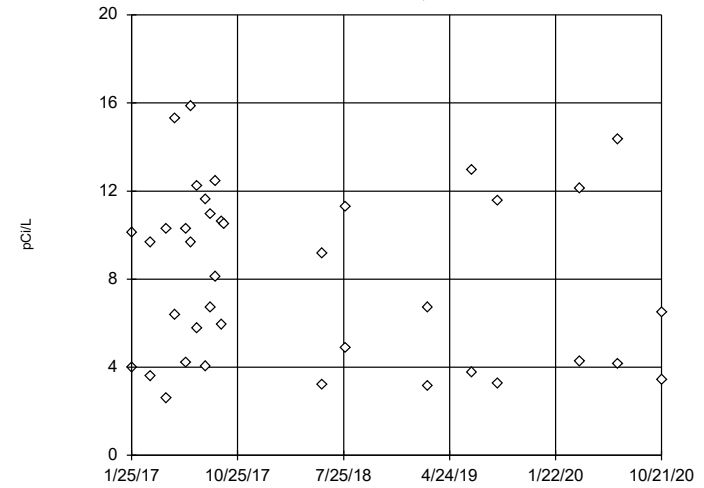
Tukey's Outlier Screening, Pooled Background
SP-4,SP-5R



n = 40
No outliers found.
Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.138, low cutoff = 0.000005728, based on IQR multiplier of 3.

Constituent: Cobalt Analysis Run 12/28/2020 2:56 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

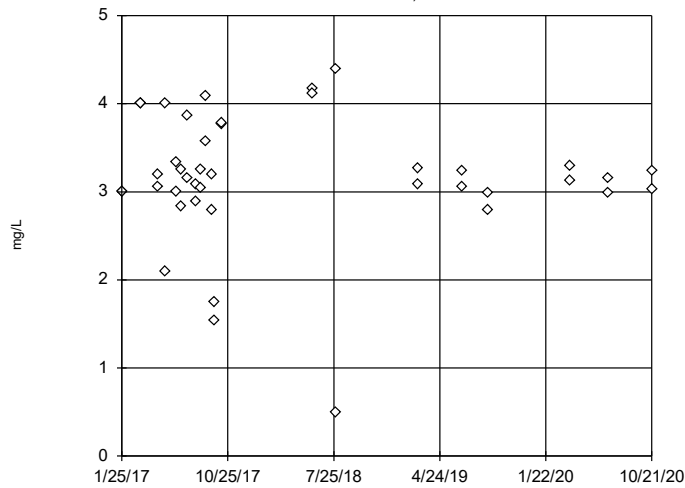
Tukey's Outlier Screening, Pooled Background
SP-4,SP-5R



n = 39
No outliers found.
Tukey's method selected by user.
Data were square root transformed to achieve best W statistic (graph shown in original units).
High cutoff = 53.69, low cutoff = -3.71, based on IQR multiplier of 3.

Constituent: Combined Radium 226 + 228 Analysis Run 12/28/2020 2:56 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

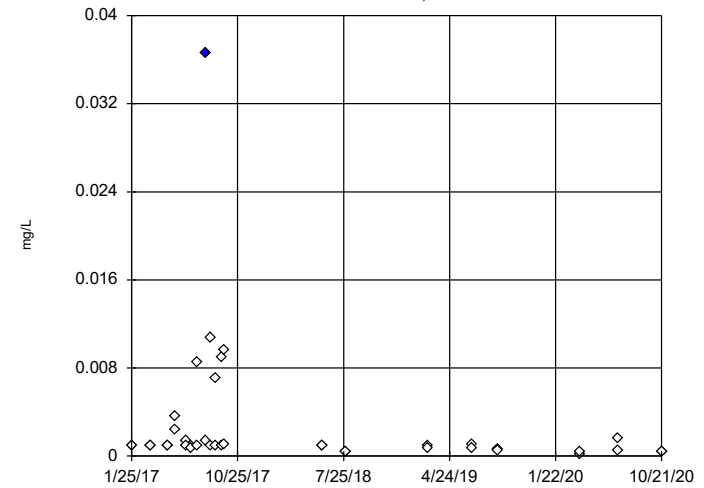
Tukey's Outlier Screening, Pooled Background
SP-4,SP-5R



n = 42
No outliers found.
Tukey's method selected by user.
Data were square transformed to achieve best W statistic (graph shown in original units).
High cutoff = 5.197, low cutoff = -2.135, based on IQR multiplier of 3.

Constituent: Fluoride Analysis Run 12/28/2020 2:56 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

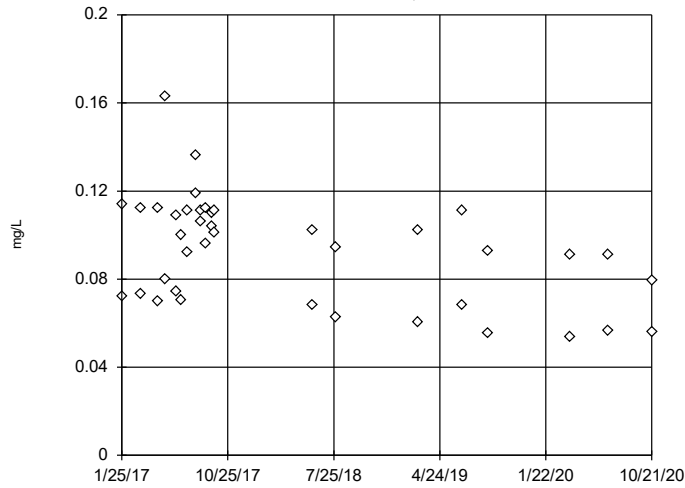
Tukey's Outlier Screening, Pooled Background
SP-4,SP-5R



n = 40
Outlier is drawn as solid.
Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.01166, low cutoff = 0.00008503, based on IQR multiplier of 3.

Constituent: Lead Analysis Run 12/28/2020 2:56 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

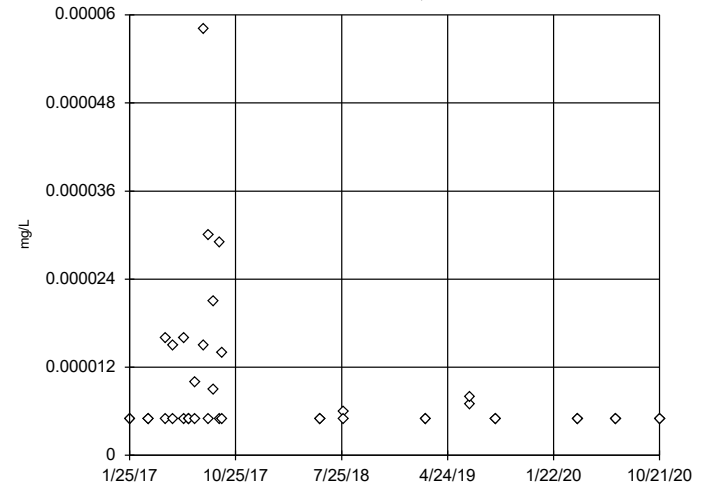
Tukey's Outlier Screening, Pooled Background
SP-4,SP-5R



n = 40
No outliers found.
Tukey's method selected by user.
Data were square root transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.2832, low cutoff = 0.004604, based on IQR multiplier of 3.

Constituent: Lithium Analysis Run 12/28/2020 2:56 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

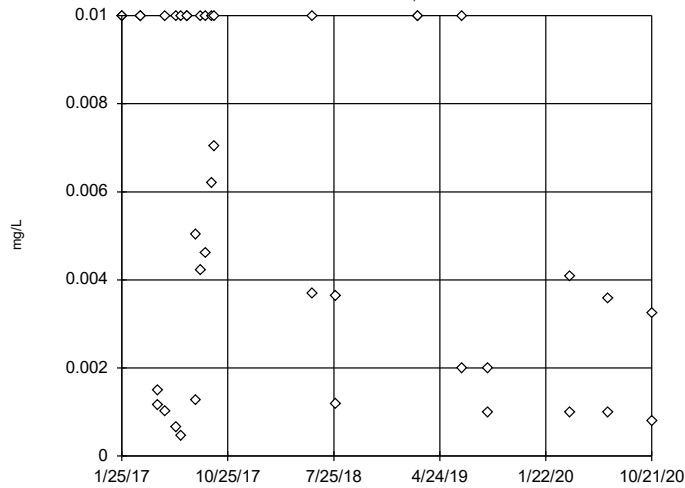
Tukey's Outlier Screening, Pooled Background
SP-4,SP-5R



n = 40
No outliers found.
Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.0000648, low cutoff = 7.3e-7, based on IQR multiplier of 3.

Constituent: Mercury Analysis Run 12/28/2020 2:56 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

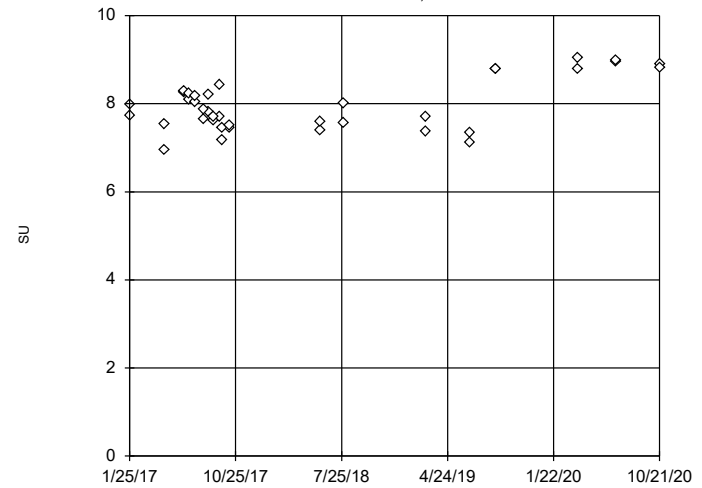
Tukey's Outlier Screening, Pooled Background
SP-4,SP-5R



n = 40
No outliers found.
Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 3.803, low cutoff = 0.000003629, based on IQR multiplier of 3.

Constituent: Molybdenum Analysis Run 12/28/2020 2:56 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

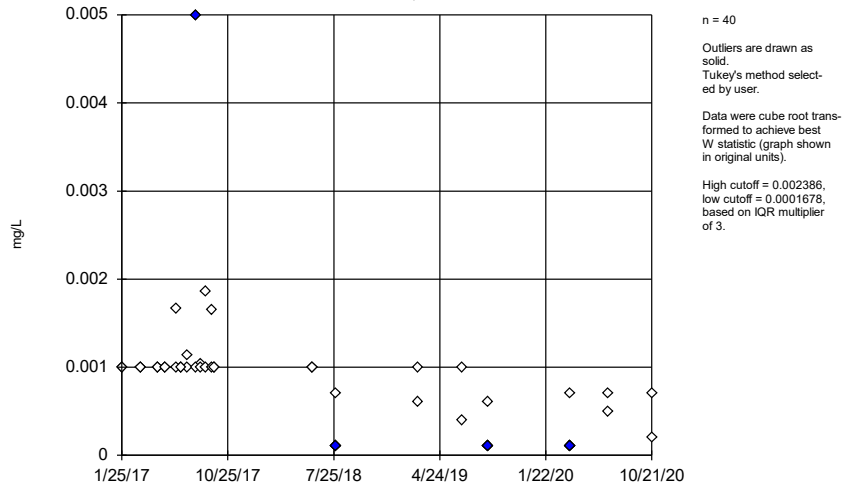
Tukey's Outlier Screening, Pooled Background
SP-4,SP-5R



n = 38
No outliers found.
Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 11.41, low cutoff = 5.513, based on IQR multiplier of 3.

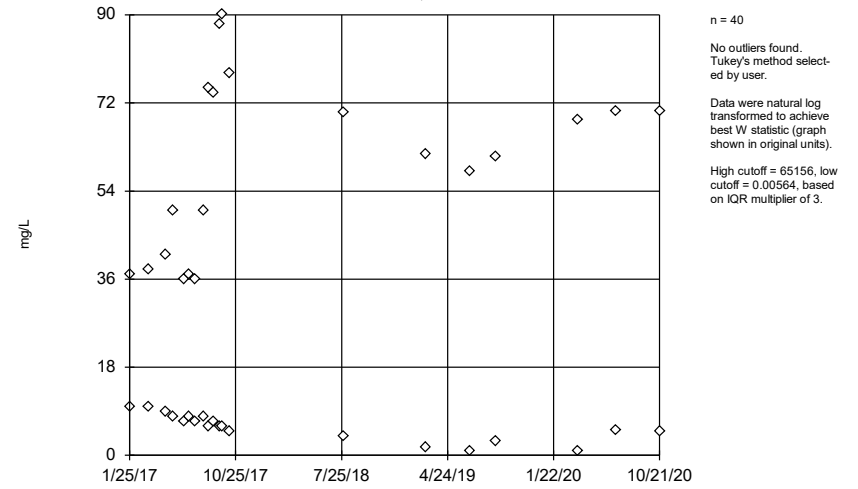
Constituent: pH, field Analysis Run 12/28/2020 2:56 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Tukey's Outlier Screening, Pooled Background
SP-4,SP-5R



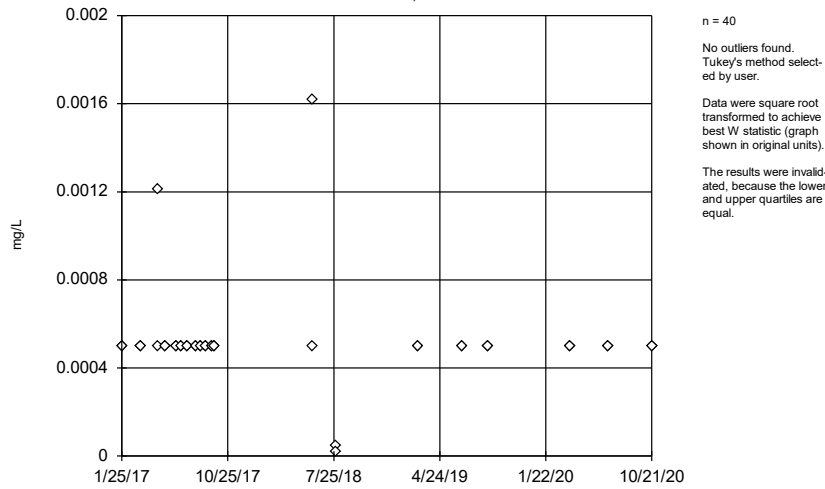
Constituent: Selenium Analysis Run 12/28/2020 2:56 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Tukey's Outlier Screening, Pooled Background
SP-4,SP-5R



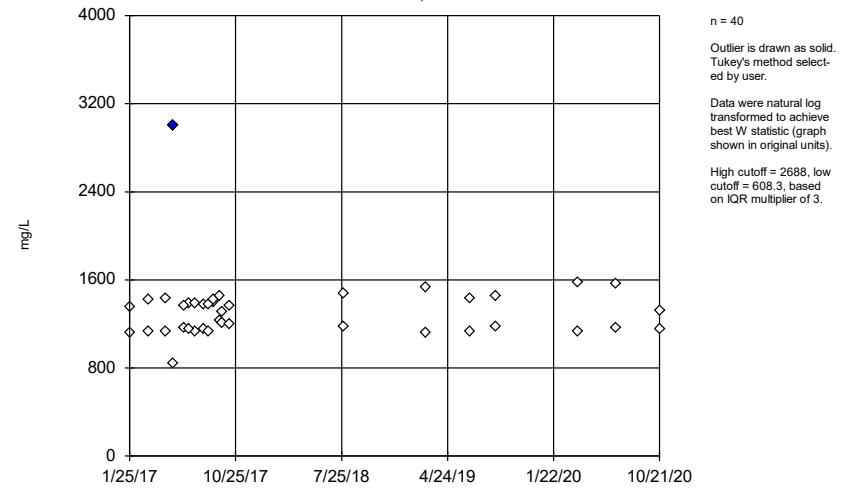
Constituent: Sulfate Analysis Run 12/28/2020 2:56 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Tukey's Outlier Screening, Pooled Background
SP-4,SP-5R



Constituent: Thallium Analysis Run 12/28/2020 2:56 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Tukey's Outlier Screening, Pooled Background
SP-4,SP-5R



Constituent: Total Dissolved Solids [TDS] Analysis Run 12/28/2020 2:56 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

FIGURE D.

Welch's t-test/Mann-Whitney - Significant Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/28/2020, 2:51 PM

<u>Constituent</u>	<u>Well</u>	<u>Calc.</u>	<u>0.01</u>	<u>Method</u>
Calcium (mg/L)	SP-11	-3.241	Yes	Mann-W

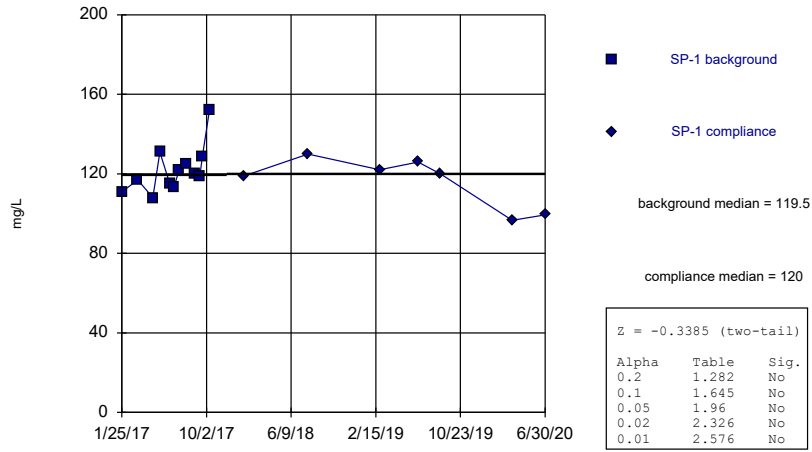
Welch's t-test/Mann-Whitney - All Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/28/2020, 2:51 PM

<u>Constituent</u>	<u>Well</u>	<u>Calc.</u>	<u>0.01</u>	<u>Method</u>
Calcium (mg/L)	SP-1	-0.3385	No	Mann-W
Calcium (mg/L)	SP-10	-0.05893	No	Mann-W
Calcium (mg/L)	SP-11	-3.241	Yes	Mann-W
Calcium (mg/L)	SP-2	-0.75	No	Mann-W
Calcium (mg/L)	SP-4 (bg)	-1.733	No	Mann-W
Calcium (mg/L)	SP-5R (bg)	0.8336	No	Mann-W

Mann-Whitney (Wilcoxon Rank Sum)

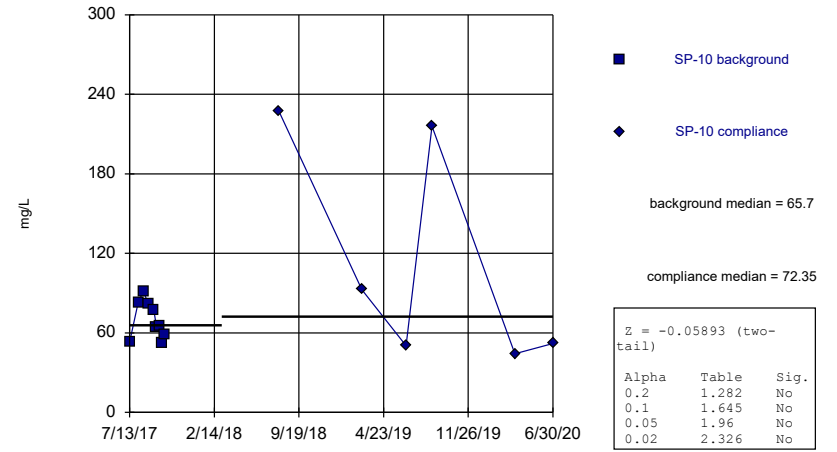
SP-1



Constituent: Calcium Analysis Run 12/28/2020 2:50 PM View: Mann-Whitney
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Mann-Whitney (Wilcoxon Rank Sum)

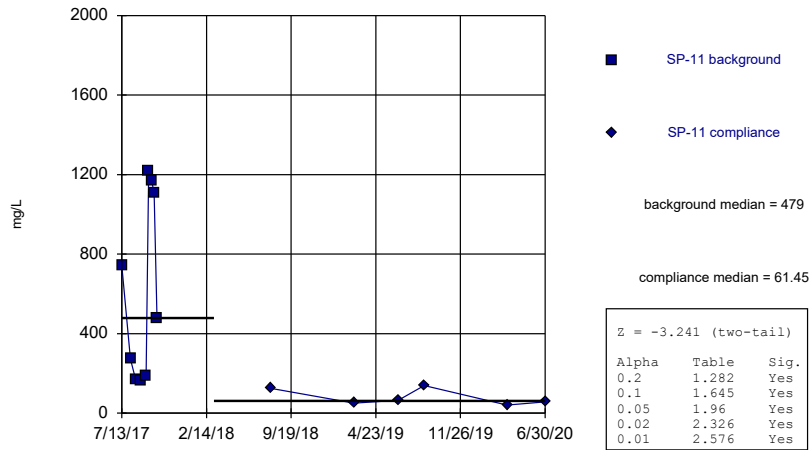
SP-10



Constituent: Calcium Analysis Run 12/28/2020 2:50 PM View: Mann-Whitney
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Mann-Whitney (Wilcoxon Rank Sum)

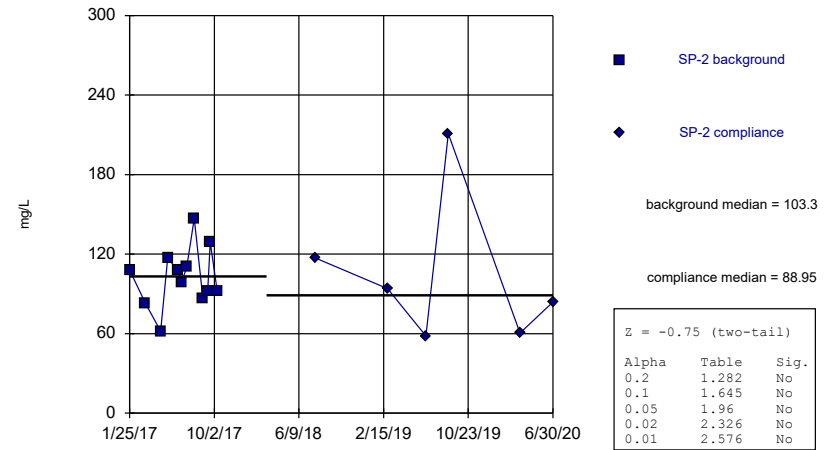
SP-11



Constituent: Calcium Analysis Run 12/28/2020 2:50 PM View: Mann-Whitney
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Mann-Whitney (Wilcoxon Rank Sum)

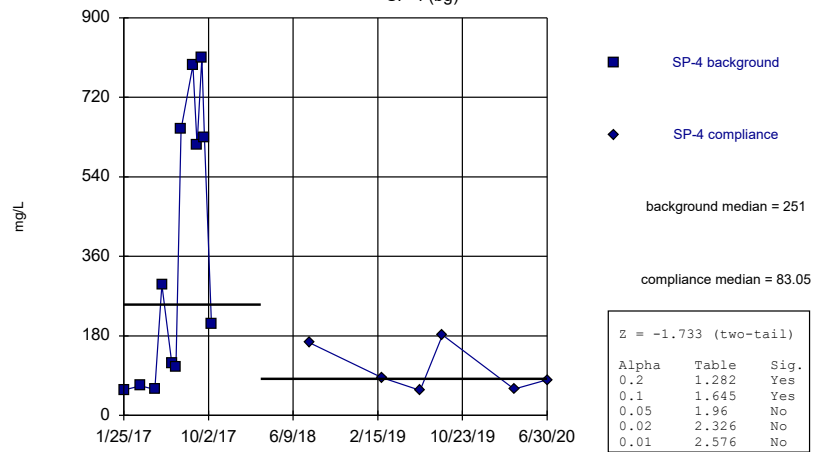
SP-2



Constituent: Calcium Analysis Run 12/28/2020 2:50 PM View: Mann-Whitney
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Mann-Whitney (Wilcoxon Rank Sum)

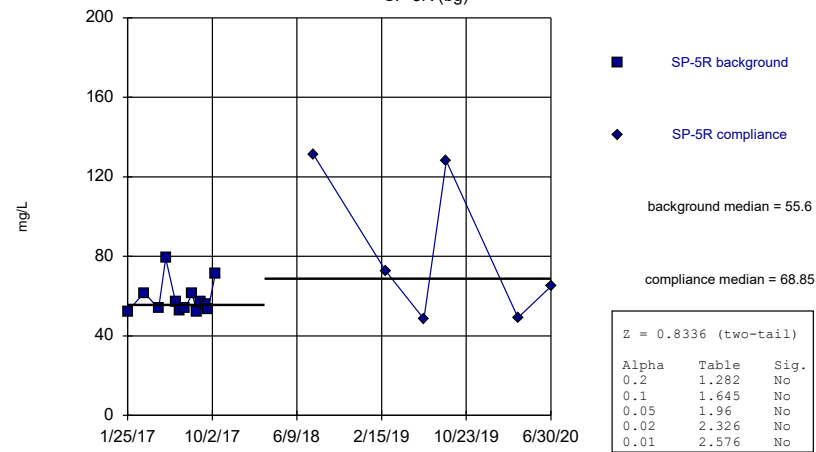
SP-4 (bg)



Constituent: Calcium Analysis Run 12/28/2020 2:50 PM View: Mann-Whitney
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Mann-Whitney (Wilcoxon Rank Sum)

SP-5R (bg)



Constituent: Calcium Analysis Run 12/28/2020 2:50 PM View: Mann-Whitney
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

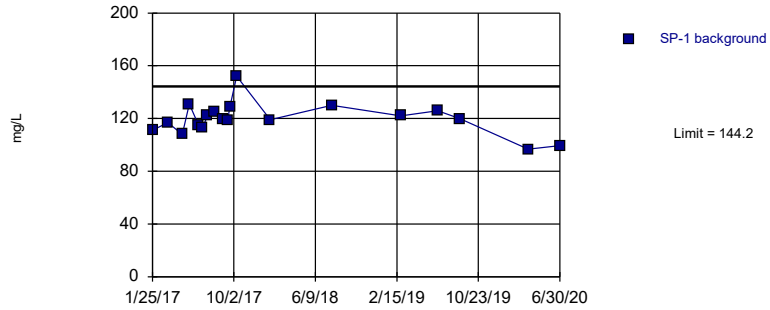
FIGURE E.

Appendix III - Intrawell Prediction Limits - All Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/29/2020, 11:21 AM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bq	N	Bq Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Calcium (mg/L)	SP-1	144.2	n/a	n/a	1 future	n/a	19	119.7	12.18	0	None		No	0.00188	Param Intra 1 of 2
Calcium (mg/L)	SP-10	227	n/a	n/a	1 future	n/a	15	n/a	n/a	0	n/a		n/a	0.007533	NP Intra (normality) 1 of 2
Calcium (mg/L)	SP-11	1458	n/a	n/a	1 future	n/a	8	13.4	9.475	0	None		sqrt(x)	0.00188	Param Intra 1 of 2
Calcium (mg/L)	SP-2	175.8	n/a	n/a	1 future	n/a	18	103.2	35.71	0	None		No	0.00188	Param Intra 1 of 2
Calcium (mg/L)	SP-4	1333	n/a	n/a	1 future	n/a	18	5.155	1.004	0	None		ln(x)	0.00188	Param Intra 1 of 2
Calcium (mg/L)	SP-5R	131	n/a	n/a	1 future	n/a	19	n/a	n/a	0	n/a		n/a	0.004832	NP Intra (normality) 1 of 2

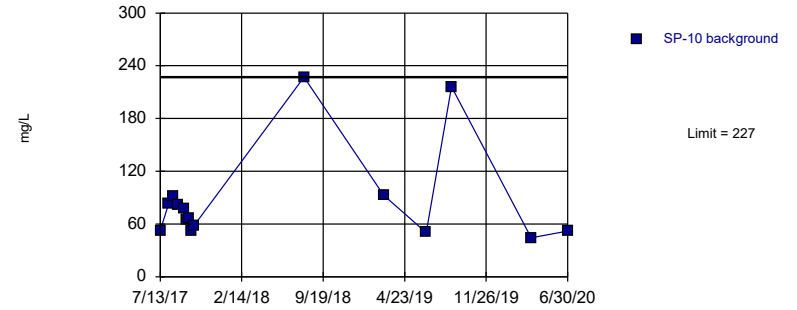
Prediction Limit
Intrawell Parametric, SP-1



Background Data Summary: Mean=119.7, Std. Dev.=12.18, n=19. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9445, critical = 0.863. Kappa = 2.01 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.00188. Assumes 1 future value.

Constituent: Calcium Analysis Run 12/29/2020 11:20 AM View: Intrawell
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

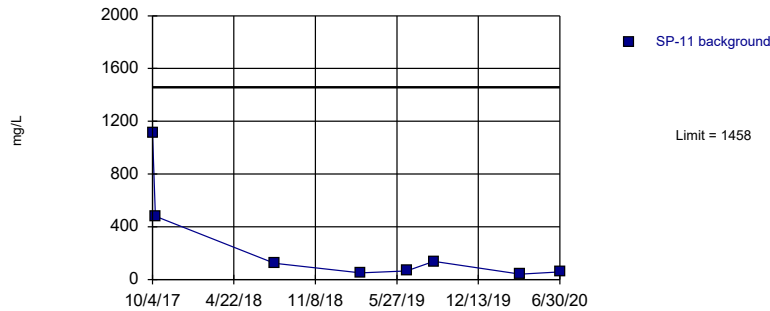
Prediction Limit
Intrawell Non-parametric, SP-10



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 15 background values. Well-constituent pair annual alpha = 0.01501. Individual comparison alpha = 0.007533 (1 of 2). Assumes 1 future value.

Constituent: Calcium Analysis Run 12/29/2020 11:20 AM View: Intrawell
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

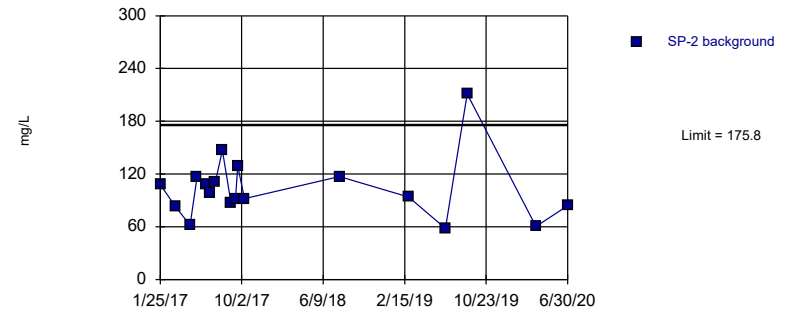
Prediction Limit
Intrawell Parametric, SP-11



Background Data Summary (based on square root transformation): Mean=13.4, Std. Dev.=9.475, n=8. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.7642, critical = 0.749. Kappa = 2.616 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.00188. Assumes 1 future value.

Constituent: Calcium Analysis Run 12/29/2020 11:20 AM View: Intrawell
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

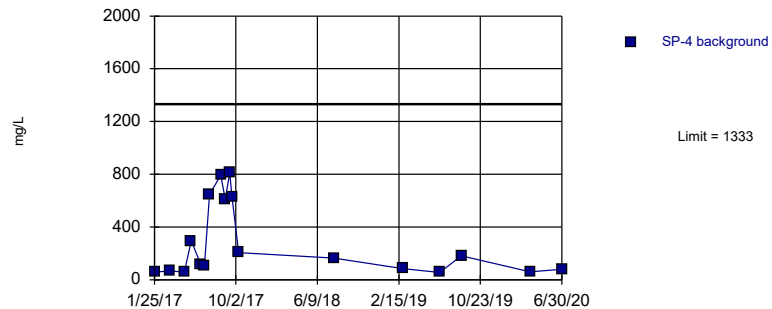
Prediction Limit
Intrawell Parametric, SP-2



Background Data Summary: Mean=103.2, Std. Dev.=35.71, n=18. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8694, critical = 0.858. Kappa = 2.032 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.00188. Assumes 1 future value.

Constituent: Calcium Analysis Run 12/29/2020 11:20 AM View: Intrawell
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

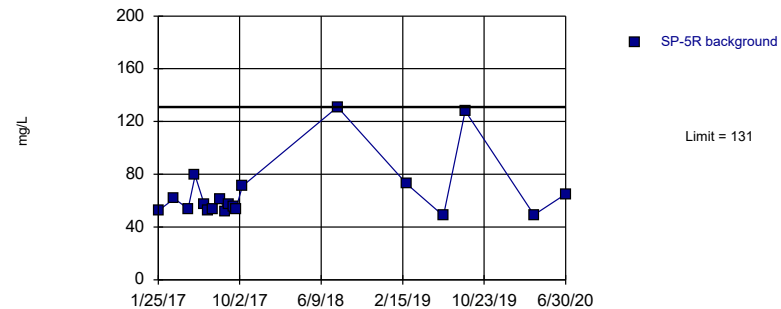
Prediction Limit
Intrawell Parametric, SP-4 (bg)



Background Data Summary (based on natural log transformation): Mean=5.155, Std. Dev.=1.004, n=18. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8679, critical = 0.858. Kappa = 2.032 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.00188. Assumes 1 future value.

Constituent: Calcium Analysis Run 12/29/2020 11:20 AM View: Intrawell
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Prediction Limit
Intrawell Non-parametric, SP-5R (bg)



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 19 background values. Well-constituent pair annual alpha = 0.009641. Individual comparison alpha = 0.004832 (1 of 2). Assumes 1 future value.

Constituent: Calcium Analysis Run 12/29/2020 11:20 AM View: Intrawell
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

FIGURE F.

Trend Tests - Interwell Upgradient Well - Significant Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/28/2020, 3:36 PM

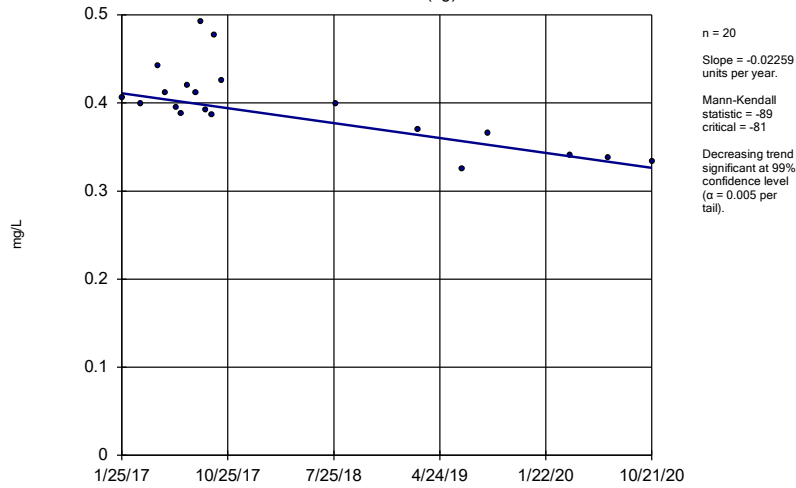
<u>Constituent</u>	<u>Well</u>	<u>Slope</u>	<u>Calc.</u>	<u>Critical</u>	<u>Sig.</u>	<u>N</u>	<u>%NDs</u>	<u>Normality</u>	<u>Xform</u>	<u>Alpha</u>	<u>Method</u>
Boron (mg/L)	SP-4 (bg)	-0.02259	-89	-81	Yes	20	0	n/a	n/a	0.01	NP
Sulfate (mg/L)	SP-5R (bg)	-2.968	-145	-81	Yes	20	0	n/a	n/a	0.01	NP

Trend Tests - Interwell Upgradient Well - All Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/28/2020, 3:36 PM

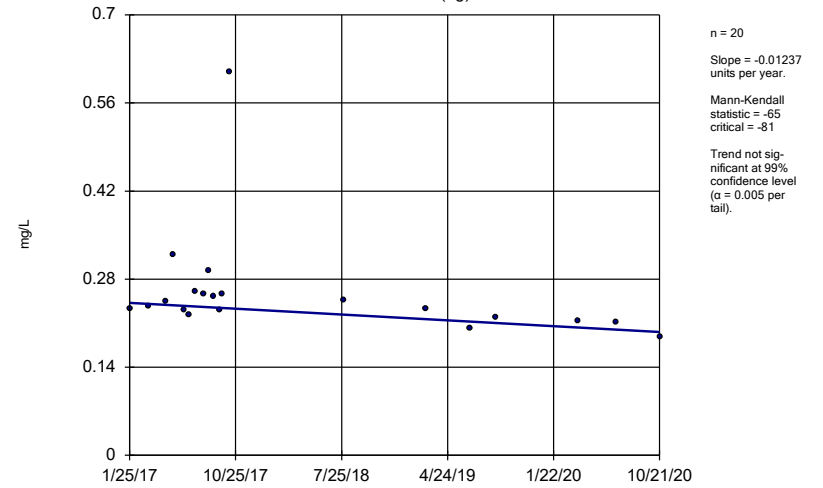
Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Boron (mg/L)	SP-4 (bg)	-0.02259	-89	-81	Yes	20	0	n/a	n/a	0.01	NP
Boron (mg/L)	SP-5R (bg)	-0.01237	-65	-81	No	20	0	n/a	n/a	0.01	NP
Chloride (mg/L)	SP-4 (bg)	5.207	18	74	No	19	0	n/a	n/a	0.01	NP
Chloride (mg/L)	SP-5R (bg)	54.75	67	68	No	18	0	n/a	n/a	0.01	NP
Fluoride (mg/L)	SP-4 (bg)	-0.004185	-7	-87	No	21	4.762	n/a	n/a	0.01	NP
Fluoride (mg/L)	SP-5R (bg)	-0.02165	-15	-87	No	21	0	n/a	n/a	0.01	NP
pH, field (SU)	SP-4 (bg)	0.139	7	74	No	19	0	n/a	n/a	0.01	NP
pH, field (SU)	SP-5R (bg)	0.1777	30	74	No	19	0	n/a	n/a	0.01	NP
Sulfate (mg/L)	SP-4 (bg)	9.878	75	81	No	20	0	n/a	n/a	0.01	NP
Sulfate (mg/L)	SP-5R (bg)	-2.968	-145	-81	Yes	20	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	SP-4 (bg)	5.88	25	81	No	20	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	SP-5R (bg)	42.48	60	74	No	19	0	n/a	n/a	0.01	NP

Sen's Slope Estimator
SP-4 (bg)



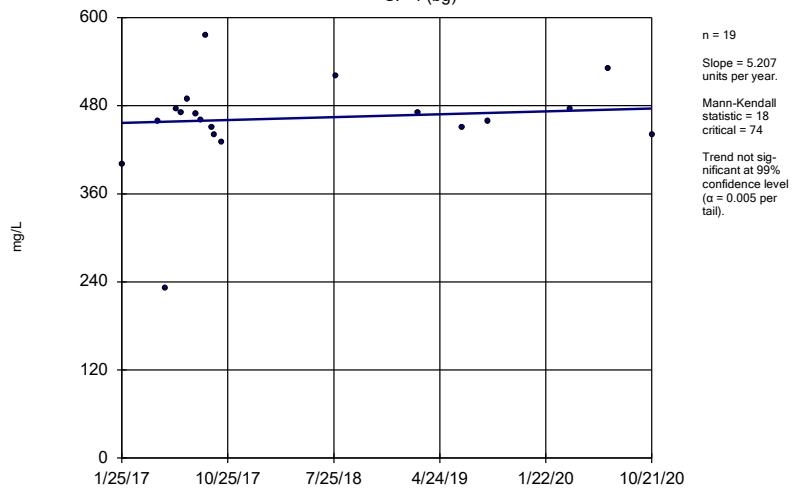
Constituent: Boron Analysis Run 12/28/2020 3:35 PM View: Interwell
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sen's Slope Estimator
SP-5R (bg)



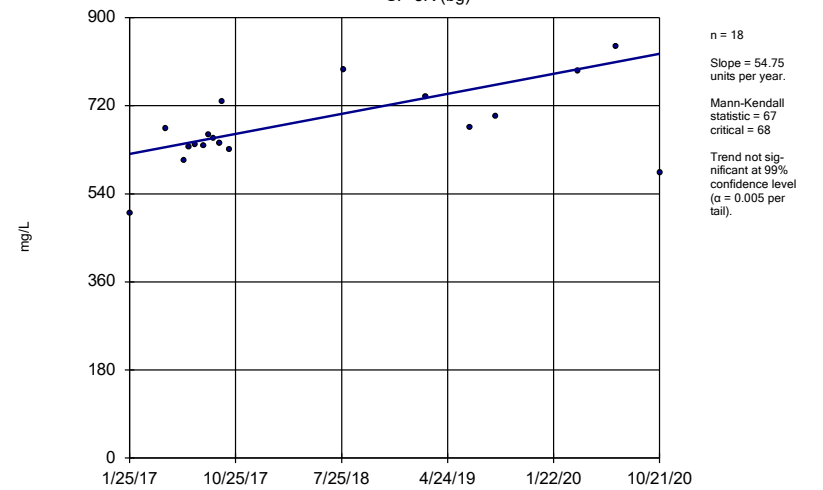
Constituent: Boron Analysis Run 12/28/2020 3:35 PM View: Interwell
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sen's Slope Estimator
SP-4 (bg)



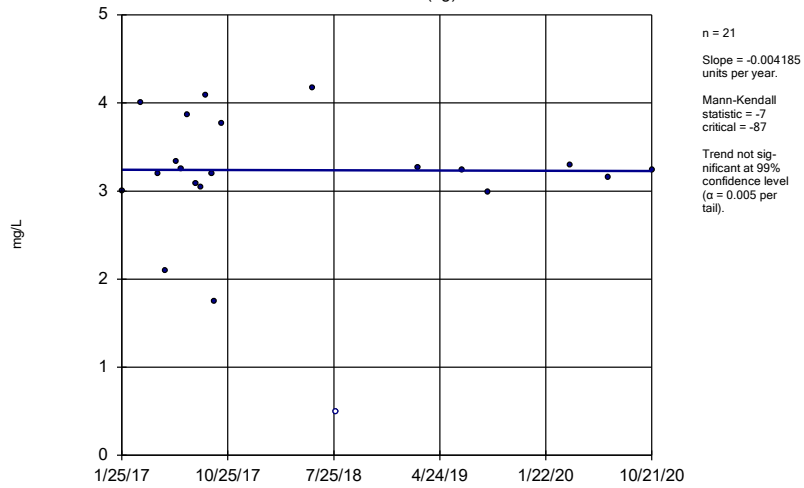
Constituent: Chloride Analysis Run 12/28/2020 3:35 PM View: Interwell
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sen's Slope Estimator
SP-5R (bg)



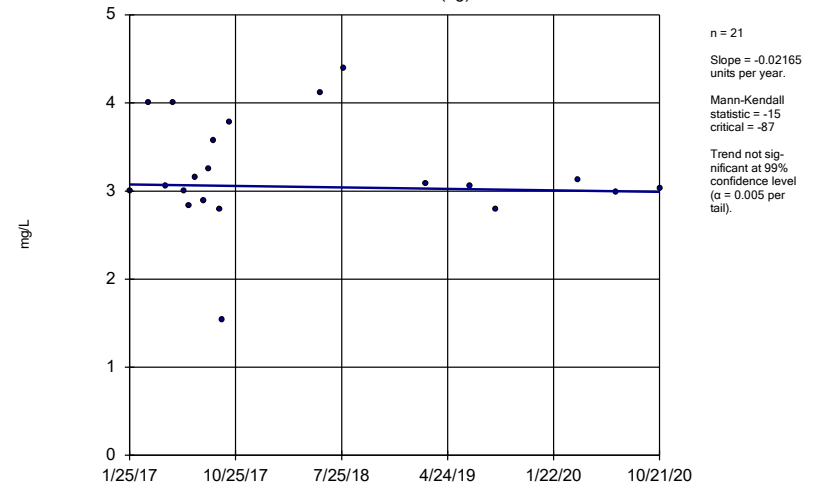
Constituent: Chloride Analysis Run 12/28/2020 3:35 PM View: Interwell
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sen's Slope Estimator
 SP-4 (bg)



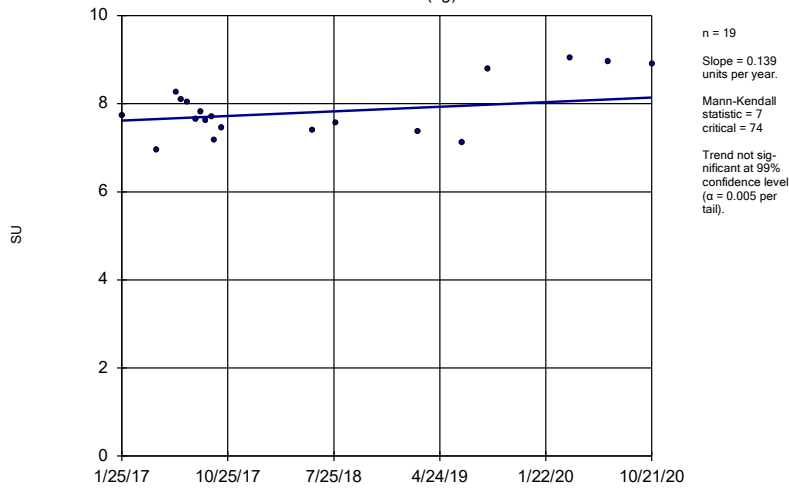
Constituent: Fluoride Analysis Run 12/28/2020 3:35 PM View: Interwell
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sen's Slope Estimator
 SP-5R (bg)



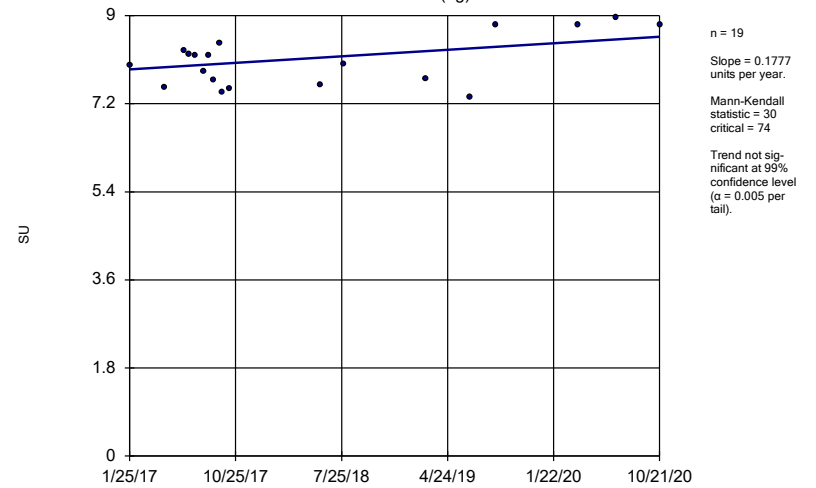
Constituent: Fluoride Analysis Run 12/28/2020 3:35 PM View: Interwell
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sen's Slope Estimator
 SP-4 (bg)



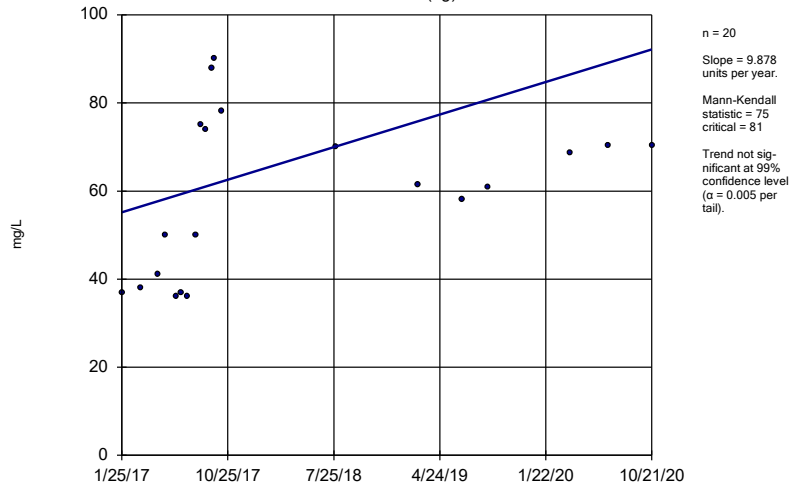
Constituent: pH, field Analysis Run 12/28/2020 3:35 PM View: Interwell
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sen's Slope Estimator
 SP-5R (bg)



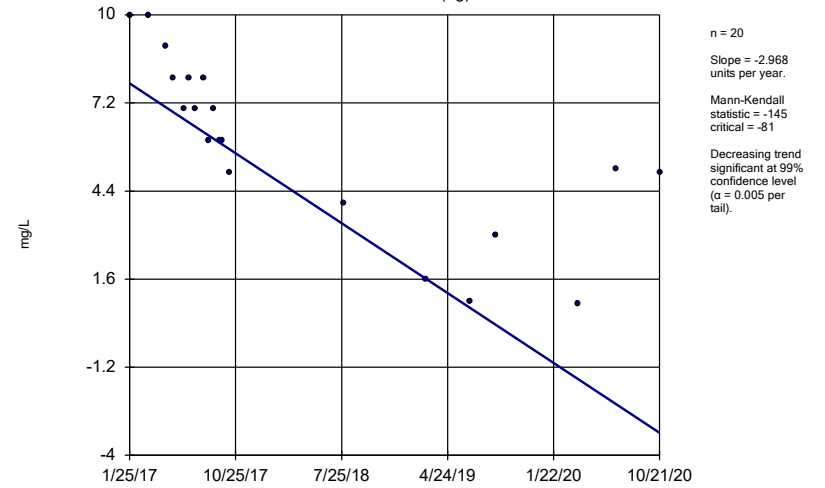
Constituent: pH, field Analysis Run 12/28/2020 3:35 PM View: Interwell
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sen's Slope Estimator
SP-4 (bg)



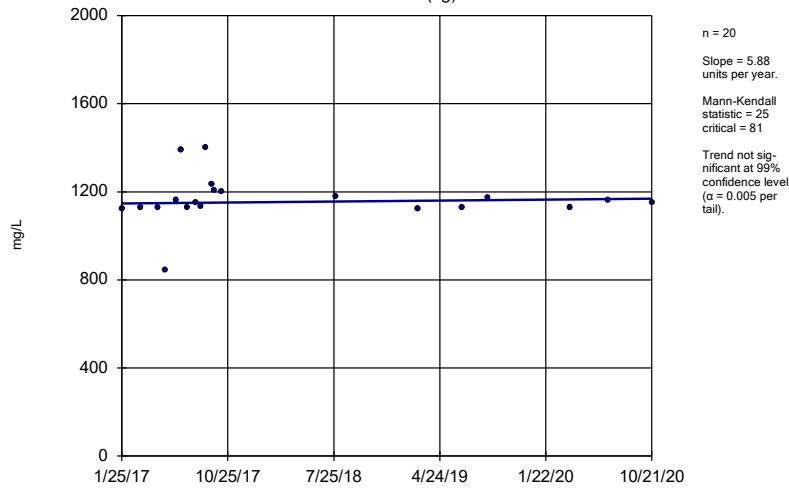
Constituent: Sulfate Analysis Run 12/28/2020 3:35 PM View: Interwell
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sen's Slope Estimator
SP-5R (bg)



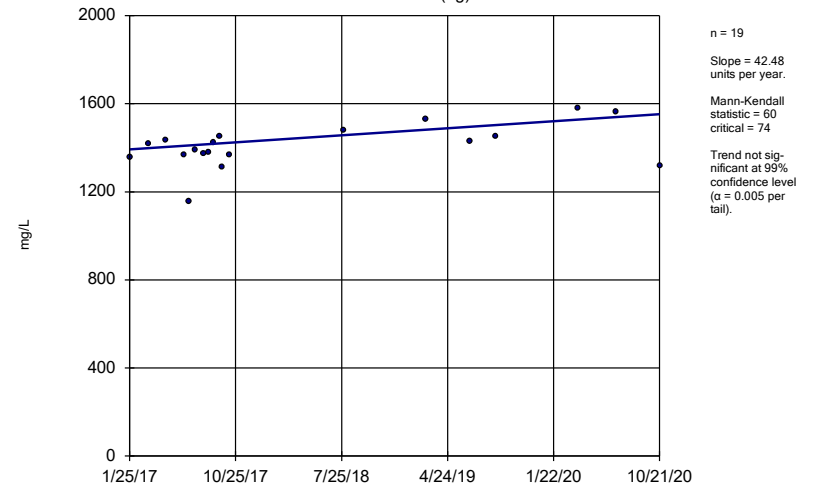
Constituent: Sulfate Analysis Run 12/28/2020 3:35 PM View: Interwell
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sen's Slope Estimator
SP-4 (bg)



Constituent: Total Dissolved Solids [TDS] Analysis Run 12/28/2020 3:35 PM View: Interwell
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sen's Slope Estimator
SP-5R (bg)



Constituent: Total Dissolved Solids [TDS] Analysis Run 12/28/2020 3:35 PM View: Interwell
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

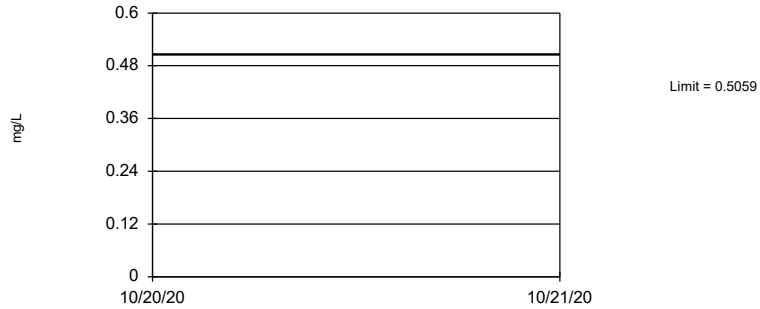
FIGURE G.

Appendix III - Interwell Prediction Limits - All Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/29/2020, 11:23 AM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Boron (mg/L)	n/a	0.5059	n/a	n/a	4 future	n/a	40	0.327	0.09795	0	None	No	0.00188	Param Inter 1 of 2
Chloride (mg/L)	n/a	805.5	n/a	n/a	4 future	n/a	37	562.9	131.8	0	None	No	0.00188	Param Inter 1 of 2
Fluoride (mg/L)	n/a	4.223	n/a	n/a	4 future	n/a	42	10.54	4.005	2.381	None	x^2	0.00188	Param Inter 1 of 2
pH, field (SU)	n/a	9.045	6.9	n/a	4 future	n/a	38	7.973	0.5842	0	None	No	0.0009398	Param Inter 1 of 2
Sulfate (mg/L)	n/a	90	n/a	n/a	4 future	n/a	40	n/a	n/a	0	n/a	n/a	0.001141	NP Inter (normality) 1 of 2
Total Dissolved Solids [TDS] (mg/L)	n/a	1578	n/a	n/a	4 future	n/a	39	1283	160.9	0	None	No	0.00188	Param Inter 1 of 2

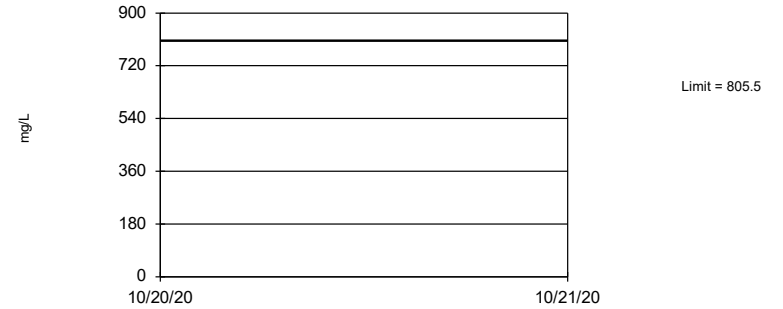
Prediction Limit
Interwell Parametric



Background Data Summary: Mean=0.327, Std. Dev.=0.09795, n=40. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9231, critical = 0.919. Kappa = 1.826 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.00188. Assumes 4 future values.

Constituent: Boron Analysis Run 12/29/2020 11:22 AM View: Interwell
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

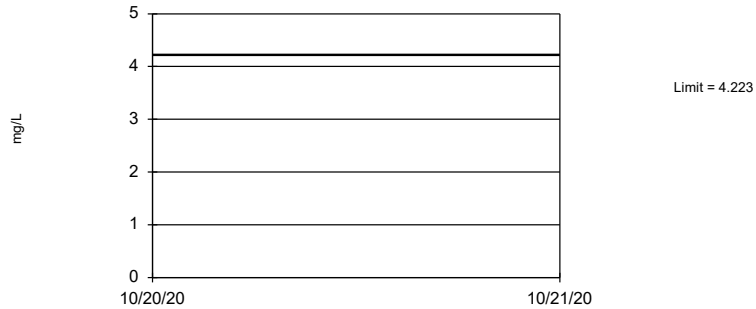
Prediction Limit
Interwell Parametric



Background Data Summary: Mean=562.9, Std. Dev.=131.8, n=37. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9509, critical = 0.914. Kappa = 1.84 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.00188. Assumes 4 future values.

Constituent: Chloride Analysis Run 12/29/2020 11:22 AM View: Interwell
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

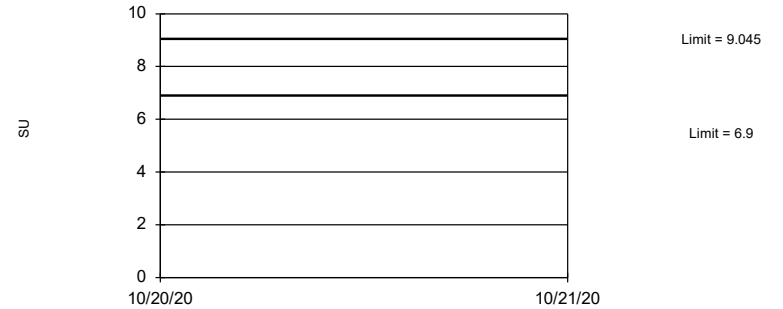
Prediction Limit
Interwell Parametric



Background Data Summary (based on square transformation): Mean=10.54, Std. Dev.=4.005, n=42, 2.381% NDs. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9295, critical = 0.922. Kappa = 1.822 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.00188. Assumes 4 future values.

Constituent: Fluoride Analysis Run 12/29/2020 11:22 AM View: Interwell
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

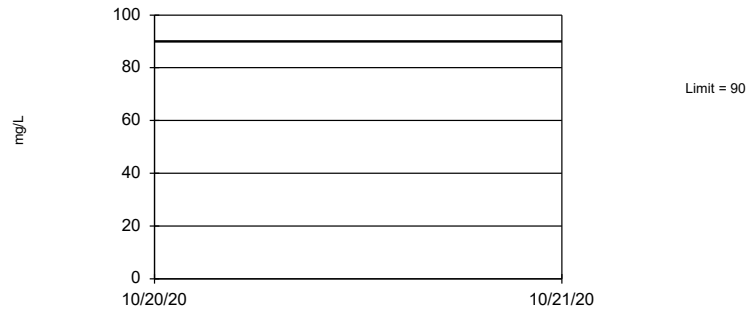
Prediction Limit
Interwell Parametric



Background Data Summary: Mean=7.973, Std. Dev.=0.5842, n=38. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9337, critical = 0.916. Kappa = 1.836 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.0009398. Assumes 4 future values.

Constituent: pH, field Analysis Run 12/29/2020 11:22 AM View: Interwell
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Prediction Limit
Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 40 background values. Annual per-constituent alpha = 0.009091. Individual comparison alpha = 0.001141 (1 of 2). Assumes 4 future values.

Constituent: Sulfate Analysis Run 12/29/2020 11:22 AM View: Interwell
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Prediction Limit
Interwell Parametric



Background Data Summary: Mean=1283, Std. Dev.=160.9, n=39. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9258, critical = 0.917. Kappa = 1.831 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.00188. Assumes 4 future values.

Constituent: Total Dissolved Solids [TDS] Analysis Run 12/29/2020 11:22 AM View: Interwell
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

FIGURE H.

Upper Tolerance Limit Summary Table

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/18/2020, 4:52 PM

Constituent	Upper Lim.	Lower Lim.	Sig.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Antimony (mg/L)	0.00514	n/a	n/a	40	n/a	n/a	42.5	n/a	n/a	0.1285	NP Inter(normality)
Arsenic (mg/L)	0.05439	n/a	n/a	39	0.1087	0.05835	7.692	None	sqrt(x)	0.05	Inter
Barium (mg/L)	2.6	n/a	n/a	39	n/a	n/a	0	n/a	n/a	0.1353	NP Inter(normality)
Beryllium (mg/L)	0.001899	n/a	n/a	39	-9.221	1.384	25.64	Kaplan-Meier	ln(x)	0.05	Inter
Cadmium (mg/L)	0.00247	n/a	n/a	39	n/a	n/a	53.85	n/a	n/a	0.1353	NP Inter(NDs)
Chromium (mg/L)	0.04182	n/a	n/a	39	n/a	n/a	17.95	n/a	n/a	0.1353	NP Inter(normality)
Cobalt (mg/L)	0.01786	n/a	n/a	39	n/a	n/a	12.82	n/a	n/a	0.1353	NP Inter(normality)
Combined Radium 226 + 228 (pCi/L)	16.37	n/a	n/a	39	8.085	3.885	0	None	No	0.05	Inter
Fluoride (mg/L)	4.359	n/a	n/a	42	10.54	4.005	2.381	None	x^2	0.05	Inter
Lead (mg/L)	0.0107	n/a	n/a	39	n/a	n/a	33.33	n/a	n/a	0.1353	NP Inter(normality)
Lithium (mg/L)	0.1441	n/a	n/a	40	0.09259	0.02422	0	None	No	0.05	Inter
Mercury (mg/L)	0.00003	n/a	n/a	39	n/a	n/a	66.67	n/a	n/a	0.1353	NP Inter(NDs)
Molybdenum (mg/L)	0.01	n/a	n/a	40	n/a	n/a	42.5	n/a	n/a	0.1285	NP Inter(normality)
Selenium (mg/L)	0.00499	n/a	n/a	40	n/a	n/a	55	n/a	n/a	0.1285	NP Inter(NDs)
Thallium (mg/L)	0.00162	n/a	n/a	39	n/a	n/a	89.74	n/a	n/a	0.1353	NP Inter(NDs)

FIGURE I.

NORTHEASTERN BAP GWPS				
Constituent Name	MCL	CCR Rule-Specified	Background Limit	GWPS
Antimony, Total (mg/L)	0.006		0.0051	0.006
Arsenic, Total (mg/L)	0.01		0.054	0.054
Barium, Total (mg/L)	2		2.6	2.6
Beryllium, Total (mg/L)	0.004		0.0019	0.004
Cadmium, Total (mg/L)	0.005		0.0025	0.005
Chromium, Total (mg/L)	0.1		0.042	0.1
Cobalt, Total (mg/L)	n/a	0.006	0.018	0.018
Combined Radium, Total (pCi/L)	5		16.37	16.37
Fluoride, Total (mg/L)	4		4.4	4.4
Lead, Total (mg/L)	0.015		0.011	0.015
Lithium, Total (mg/L)	n/a	0.04	0.14	0.14
Mercury, Total (mg/L)	0.002		0.00003	0.002
Molybdenum, Total (mg/L)	n/a	0.1	0.01	0.1
Selenium, Total (mg/L)	0.05		0.005	0.05
Thallium, Total (mg/L)	0.002		0.0016	0.002

**Grey cell indicates Background Limit is higher than MCL or CCR Rule-Specified Level*

**GWPS = Groundwater Protection Standard*

**MCL = Maximum Contaminant Level*

**CCR = Coal Combustion Residual*

FIGURE J.

Confidence Intervals Summary - Significant Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/29/2020, 11:40 AM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig. N	Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Fluoride (mg/L)	SP-10	7.349	4.798	4.4	Yes 18	5.611	2.704	16.67	Kaplan-Meier	x^2	0.01	Param.
Lithium (mg/L)	SP-10	0.2959	0.2469	0.14	Yes 16	0.2714	0.03766	0	None	No	0.01	Param.

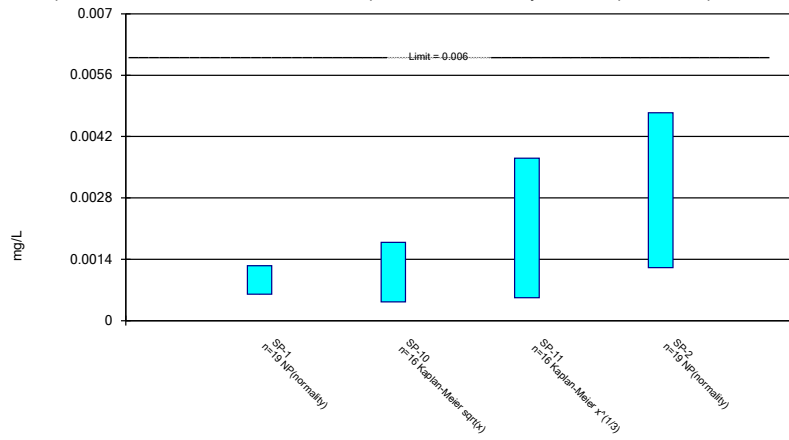
Confidence Intervals Summary - All Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/29/2020, 11:40 AM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Antimony (mg/L)	SP-1	0.00125	0.0006	0.006	No	19	0.001336	0.001445	36.84	None	No	0.01	NP (normality)
Antimony (mg/L)	SP-10	0.001787	0.0004241	0.006	No	16	0.001199	0.001127	25	Kaplan-Meier	sqrt(x)	0.01	Param.
Antimony (mg/L)	SP-11	0.003708	0.0005235	0.006	No	16	0.002792	0.003066	18.75	Kaplan-Meier	x^(1/3)	0.01	Param.
Antimony (mg/L)	SP-2	0.00474	0.00121	0.006	No	19	0.002941	0.002822	10.53	None	No	0.01	NP (normality)
Arsenic (mg/L)	SP-1	0.005	0.00072	0.054	No	19	0.00298	0.002061	42.11	None	No	0.01	NP (normality)
Arsenic (mg/L)	SP-10	0.008493	0.002772	0.054	No	16	0.005632	0.004396	12.5	None	No	0.01	Param.
Arsenic (mg/L)	SP-11	0.006945	0.003026	0.054	No	16	0.004986	0.003012	6.25	None	No	0.01	Param.
Arsenic (mg/L)	SP-2	0.005	0.00129	0.054	No	19	0.003152	0.002797	5.263	None	No	0.01	NP (normality)
Barium (mg/L)	SP-1	0.2161	0.1702	2.6	No	19	0.1932	0.03921	0	None	No	0.01	Param.
Barium (mg/L)	SP-10	3.6	0.8082	2.6	No	16	2.507	2.329	0	None	sqrt(x)	0.01	Param.
Barium (mg/L)	SP-11	0.4034	0.1659	2.6	No	16	0.2846	0.1825	0	None	No	0.01	Param.
Barium (mg/L)	SP-2	1.41	0.9374	2.6	No	19	1.228	0.5399	0	None	ln(x)	0.01	Param.
Beryllium (mg/L)	SP-1	0.0001075	0.0000549	0.004	No	19	0.0001	0.0000526	26.32	Kaplan-Meier	ln(x)	0.01	Param.
Beryllium (mg/L)	SP-10	0.0001	0.00003	0.004	No	16	0.00006519	0.00003147	37.5	None	No	0.01	NP (normality)
Beryllium (mg/L)	SP-11	0.000129	0.0000341	0.004	No	16	0.0001368	0.0001279	31.25	Kaplan-Meier	ln(x)	0.01	Param.
Beryllium (mg/L)	SP-2	0.0001298	0.00006451	0.004	No	19	0.0001052	0.0000545	21.05	Kaplan-Meier	sqrt(x)	0.01	Param.
Cadmium (mg/L)	SP-1	0.0002	0.00008	0.005	No	19	0.0001532	0.00005935	52.63	None	No	0.01	NP (NDs)
Cadmium (mg/L)	SP-10	0.0002	0.00002	0.005	No	16	0.0001437	0.00008632	68.75	None	No	0.01	NP (NDs)
Cadmium (mg/L)	SP-11	0.0006042	0.00006558	0.005	No	16	0.0007194	0.001056	18.75	Kaplan-Meier	ln(x)	0.01	Param.
Cadmium (mg/L)	SP-2	0.0002	0.00007	0.005	No	19	0.0001463	0.00006525	52.63	Kaplan-Meier	No	0.01	NP (NDs)
Chromium (mg/L)	SP-1	0.00121	0.0005169	0.1	No	19	0.001056	0.0006702	31.58	Kaplan-Meier	sqrt(x)	0.01	Param.
Chromium (mg/L)	SP-10	0.001922	0.000339	0.1	No	15	0.001424	0.002145	13.33	None	x^(1/3)	0.01	Param.
Chromium (mg/L)	SP-11	0.007945	0.0008812	0.1	No	16	0.008519	0.0121	6.25	None	ln(x)	0.01	Param.
Chromium (mg/L)	SP-2	0.001757	0.0005543	0.1	No	19	0.001383	0.001183	15.79	Kaplan-Meier	sqrt(x)	0.01	Param.
Cobalt (mg/L)	SP-1	0.001589	0.0006223	0.018	No	19	0.001192	0.001255	15.79	Kaplan-Meier	x^(1/3)	0.01	Param.
Cobalt (mg/L)	SP-10	0.003031	0.000741	0.018	No	16	0.002121	0.001875	12.5	None	sqrt(x)	0.01	Param.
Cobalt (mg/L)	SP-11	0.007055	0.001401	0.018	No	16	0.004886	0.005065	6.25	None	sqrt(x)	0.01	Param.
Cobalt (mg/L)	SP-2	0.001331	0.0005661	0.018	No	19	0.0009857	0.0008224	15.79	Kaplan-Meier	x^(1/3)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	SP-1	4.085	2.873	16.37	No	18	3.521	1.075	0	None	sqrt(x)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	SP-10	12.62	2.51	16.37	No	16	8.741	8.843	0	None	sqrt(x)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	SP-11	2.532	0.9861	16.37	No	15	1.759	1.141	0	None	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	SP-2	14.97	8.247	16.37	No	16	11.91	5.762	0	None	sqrt(x)	0.01	Param.
Fluoride (mg/L)	SP-1	0.9625	0.6183	4.4	No	19	0.7904	0.2939	10.53	None	No	0.01	Param.
Fluoride (mg/L)	SP-10	7.349	4.798	4.4	Yes	18	5.611	2.704	16.67	Kaplan-Meier	x^2	0.01	Param.
Fluoride (mg/L)	SP-11	3.587	2.553	4.4	No	18	3.07	0.8538	0	None	No	0.01	Param.
Fluoride (mg/L)	SP-2	3.23	2.487	4.4	No	20	2.858	0.6539	0	None	No	0.01	Param.
Lead (mg/L)	SP-1	0.002	0.000354	0.015	No	19	0.001278	0.0007146	42.11	None	No	0.01	NP (normality)
Lead (mg/L)	SP-10	0.002	0.0001	0.015	No	16	0.001248	0.0009001	56.25	None	No	0.01	NP (NDs)
Lead (mg/L)	SP-11	0.002953	0.0004158	0.015	No	16	0.002594	0.002926	18.75	Kaplan-Meier	x^(1/3)	0.01	Param.
Lead (mg/L)	SP-2	0.002	0.0003	0.015	No	19	0.001299	0.0008107	47.37	None	No	0.01	NP (normality)
Lithium (mg/L)	SP-1	0.006486	0.004386	0.14	No	18	0.005436	0.001736	0	None	No	0.01	Param.
Lithium (mg/L)	SP-10	0.2959	0.2469	0.14	Yes	16	0.2714	0.03766	0	None	No	0.01	Param.
Lithium (mg/L)	SP-11	0.09334	0.04455	0.14	No	16	0.07165	0.0395	0	None	sqrt(x)	0.01	Param.
Lithium (mg/L)	SP-2	0.0961	0.0404	0.14	No	19	0.07202	0.02613	0	None	No	0.01	NP (normality)
Mercury (mg/L)	SP-1	0.000009	0.000005	0.002	No	19	0.000006632	0.000004284	78.95	None	No	0.01	NP (NDs)
Mercury (mg/L)	SP-10	0.000019	0.000005	0.002	No	16	0.0000115	0.000007983	37.5	None	No	0.01	NP (normality)
Mercury (mg/L)	SP-11	0.000027	0.000005	0.002	No	16	0.00001394	0.00001467	18.75	None	No	0.01	NP (normality)
Mercury (mg/L)	SP-2	0.000005	0.000005	0.002	No	19	0.000005579	0.000002063	78.95	None	No	0.01	NP (NDs)
Molybdenum (mg/L)	SP-1	0.01532	0.009903	0.1	No	19	0.01261	0.004628	0	None	No	0.01	Param.
Molybdenum (mg/L)	SP-10	0.03527	0.005751	0.1	No	15	0.02375	0.03203	6.667	None	sqrt(x)	0.01	Param.
Molybdenum (mg/L)	SP-11	0.0515	0.00301	0.1	No	16	0.02708	0.02435	6.25	None	No	0.01	NP (normality)
Molybdenum (mg/L)	SP-2	0.03107	0.02228	0.1	No	19	0.02668	0.007507	0	None	No	0.01	Param.
Selenium (mg/L)	SP-1	0.006576	0.003633	0.05	No	19	0.004701	0.002969	15.79	Kaplan-Meier	No	0.01	Param.
Selenium (mg/L)	SP-10	0.002985	0.0003831	0.05	No	16	0.002088	0.002397	25	Kaplan-Meier	sqrt(x)	0.01	Param.
Selenium (mg/L)	SP-11	0.00348	0.0007427	0.05	No	16	0.002418	0.002472	12.5	None	sqrt(x)	0.01	Param.
Selenium (mg/L)	SP-2	0.01181	0.003185	0.05	No	19	0.009315	0.01017	10.53	None	x^(1/3)	0.01	Param.
Thallium (mg/L)	SP-1	0.00089	0.0001	0.002	No	19	0.0005568	0.0003851	78.95	None	No	0.01	NP (NDs)
Thallium (mg/L)	SP-10	0.0005	0.00004	0.002	No	16	0.0004713	0.000115	93.75	None	No	0.01	NP (NDs)
Thallium (mg/L)	SP-11	0.0005	0.00003	0.002	No	16	0.0004706	0.0001175	93.75	None	No	0.01	NP (NDs)
Thallium (mg/L)	SP-2	0.0005	0.0001	0.002	No	19	0.0004558	0.0001326	89.47	None	No	0.01	NP (NDs)

Parametric and Non-Parametric (NP) Confidence Interval

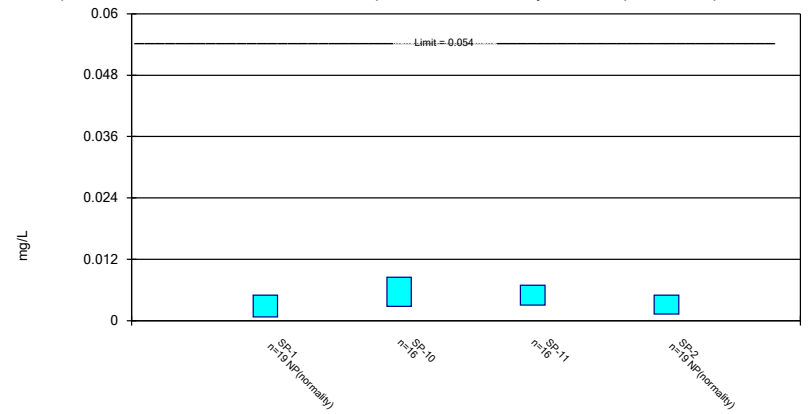
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Antimony Analysis Run 12/29/2020 11:39 AM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Parametric and Non-Parametric (NP) Confidence Interval

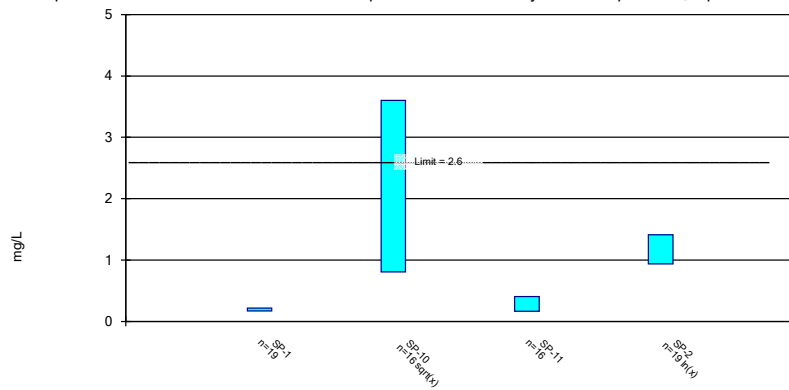
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Constituent: Arsenic Analysis Run 12/29/2020 11:39 AM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Parametric Confidence Interval

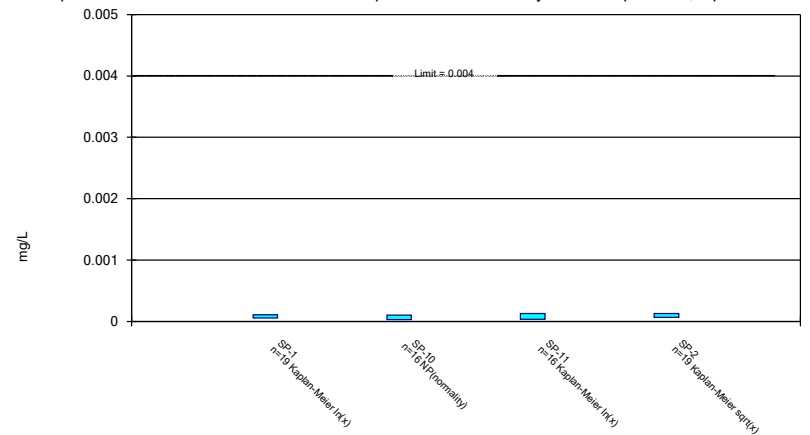
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Constituent: Barium Analysis Run 12/29/2020 11:39 AM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Parametric and Non-Parametric (NP) Confidence Interval

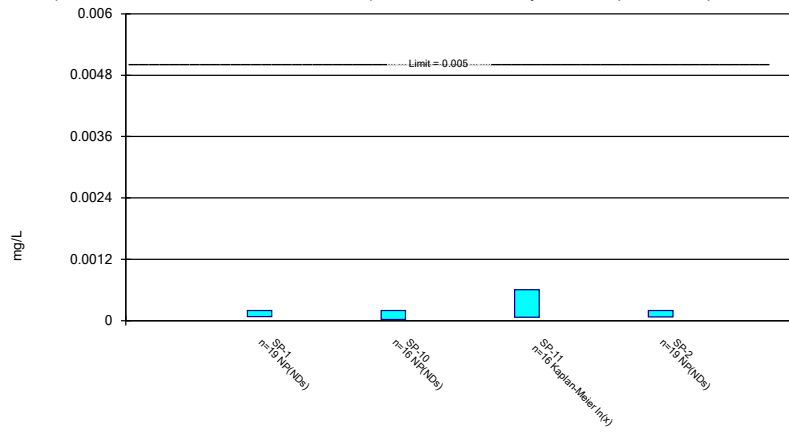
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Beryllium Analysis Run 12/29/2020 11:39 AM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Parametric and Non-Parametric (NP) Confidence Interval

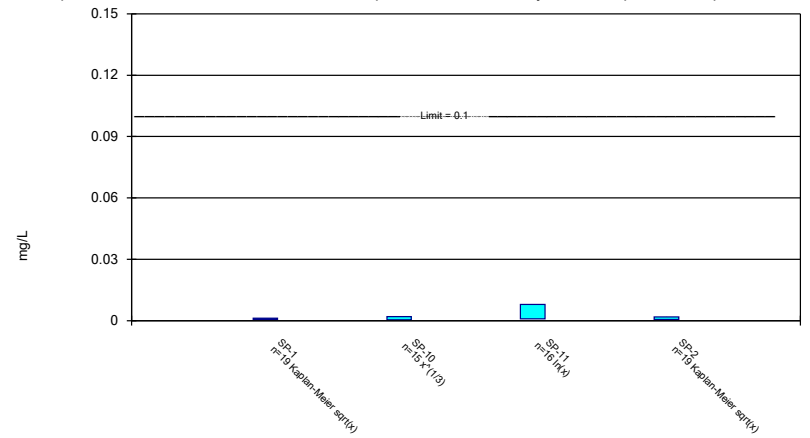
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Cadmium Analysis Run 12/29/2020 11:39 AM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Parametric Confidence Interval

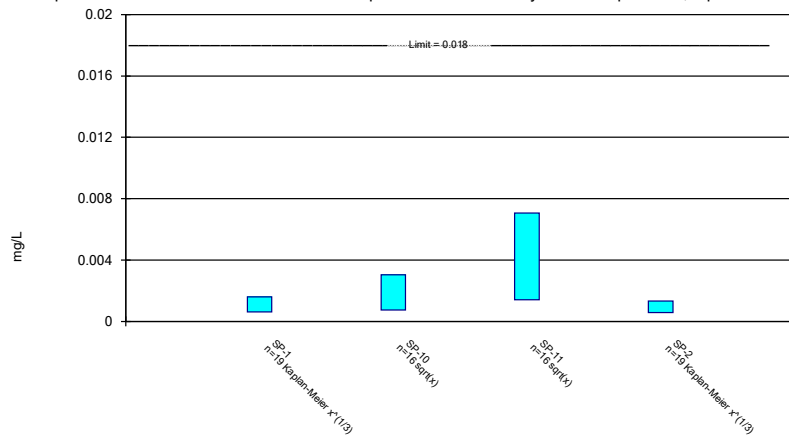
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Chromium Analysis Run 12/29/2020 11:39 AM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Parametric Confidence Interval

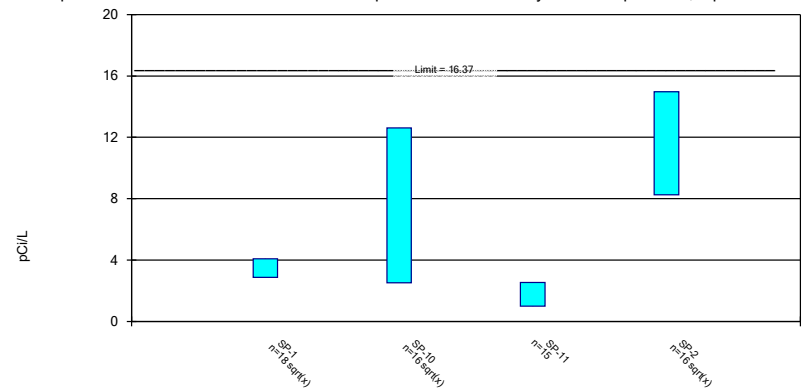
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Cobalt Analysis Run 12/29/2020 11:39 AM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Parametric Confidence Interval

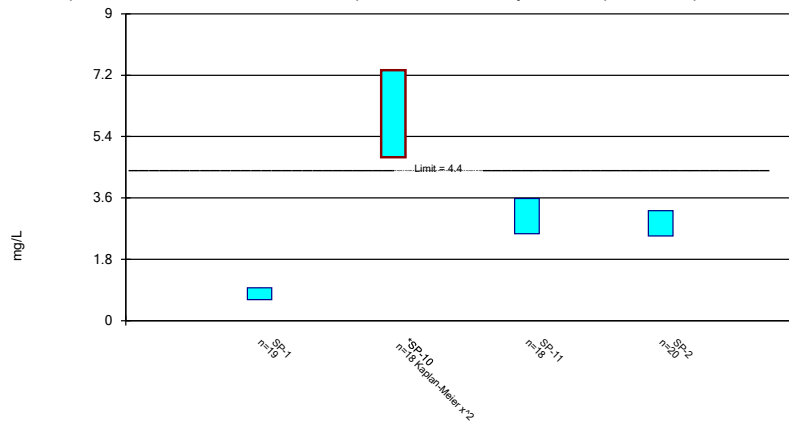
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Combined Radium 226 + 228 Analysis Run 12/29/2020 11:39 AM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Parametric Confidence Interval

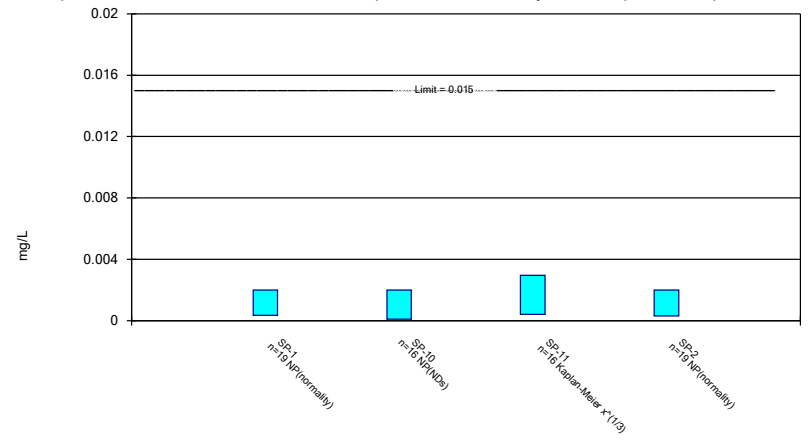
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Constituent: Fluoride Analysis Run 12/29/2020 11:39 AM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Parametric and Non-Parametric (NP) Confidence Interval

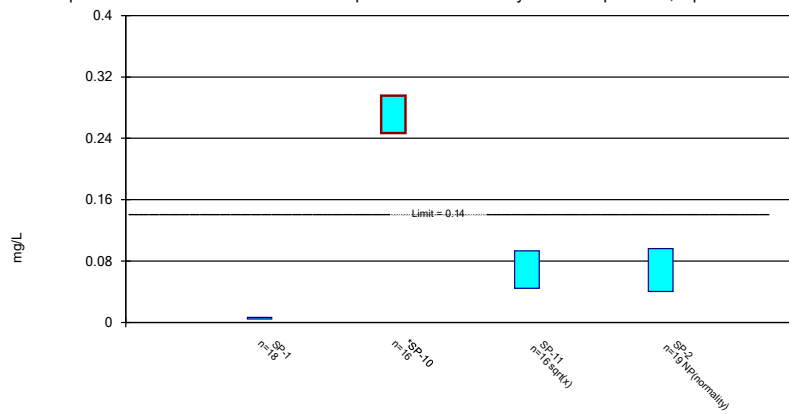
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Constituent: Lead Analysis Run 12/29/2020 11:39 AM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Parametric and Non-Parametric (NP) Confidence Interval

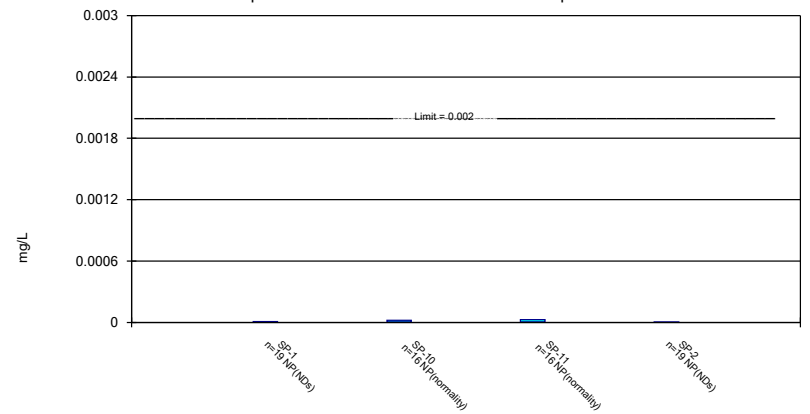
Compliance limit is exceeded.* Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Lithium Analysis Run 12/29/2020 11:39 AM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Non-Parametric Confidence Interval

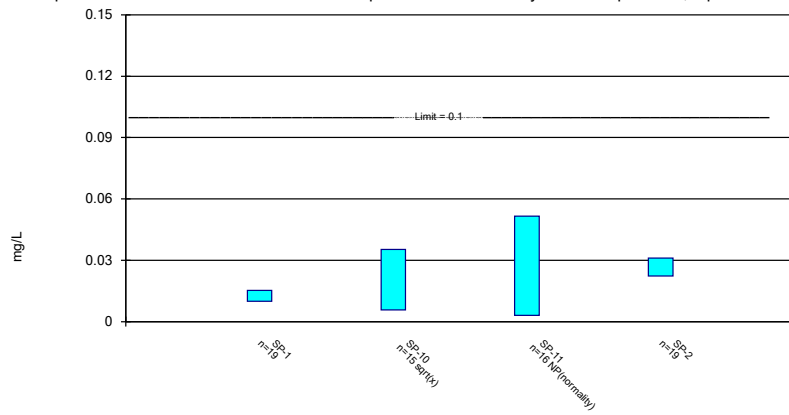
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Mercury Analysis Run 12/29/2020 11:39 AM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Parametric and Non-Parametric (NP) Confidence Interval

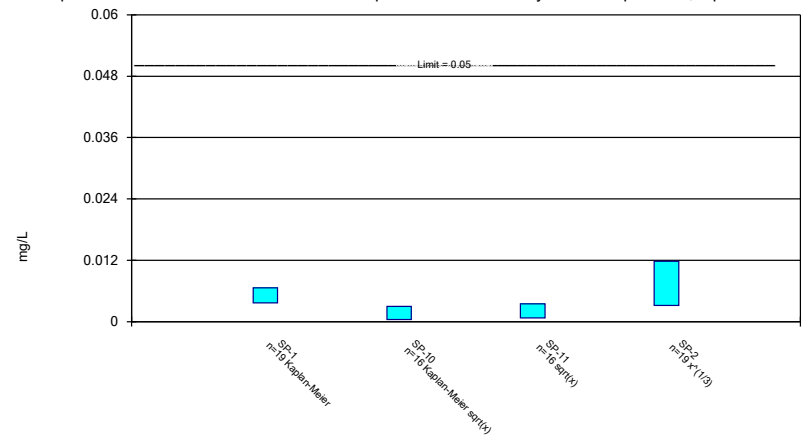
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Molybdenum Analysis Run 12/29/2020 11:39 AM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Parametric Confidence Interval

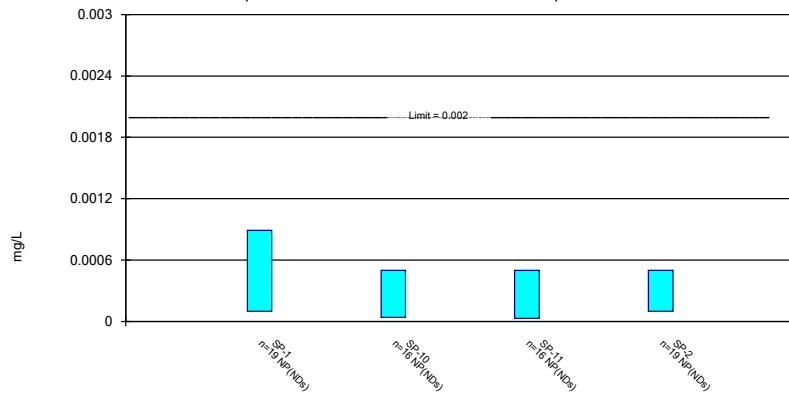
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Selenium Analysis Run 12/29/2020 11:39 AM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Non-Parametric Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Thallium Analysis Run 12/29/2020 11:39 AM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP