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February 22, 2024

Ms. Rebecca Jones, P.G.  
American Electric Power  
502 North Allen Avenue  
Shreveport, LA 71101

Re: Alternate Source Demonstration for Barium, Fluoride and Lithium Exceedances – Bottom Ash Pond  
Public Service Company of Oklahoma - Northeastern Power Station, Rogers County  
Solid Waste Permit No. none

Dear Ms. Jones:

The Oklahoma Department of Environmental Quality received the Alternate Source Demonstration (ASD) dated January 2, 2024. The ASD was submitted by American Electric Power (AEP) Public Service Company of Oklahoma – Northeastern Power Station (PSO-NES) for the Bottom Ash Pond. During the June 20, 2023 sampling event, potential statistically significant levels (SSLs) were identified for lithium, barium, and fluoride in SP-10. The Lower Confidence Levels (LCL) for lithium, barium, and fluoride exceeded the Groundwater Protection Standards (GWPS). The detected concentrations for each constituent also exceeded their respective LCL.

On October 29, 2019, DEQ approved the revised ASD for lithium detected in monitoring well SP-10 for the BAP. The 2019 ASD proposed that naturally occurring lithium in the shale lenses was the source of the potential SSL. On June 4, 2021, DEQ approved an ASD for fluoride exceedances detected in SP-10 for the BAP. The 2021 ASD also proposed that naturally occurring fluoride in the shale lenses was the source of the potential SSL.

On September 20, 2022, DEQ approved the ASD for barium, lithium, and fluoride exceedances detected in SP-10. The 2022 ASD proposed that naturally occurring barium in the shale lenses was the source of the potential SSL. The 2022 ASD approval stated it is applicable for lithium, fluoride, and barium exceedances of the GWPS in SP-10 if conditions do not change.

The lithium and fluoride concentrations in SP-10 from the June 2023 sampling event are consistent with previous results and continue to show no statistically positive trends. However, the time-series plot and Mann-Kendall analysis of the reported barium concentration over time, indicate a statistically significant increasing trend.

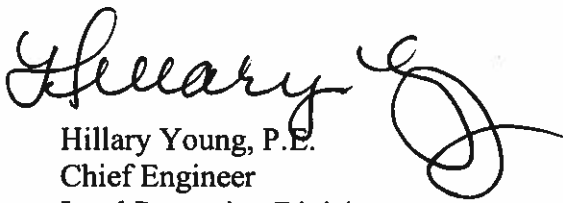
The Piper Diagram continues to show that the SP-10 samples are chemically distinct from the BAP surface water, pore water, and sediment samples. The geochemistry at SP-10 does not change over time in a manner indicative of a release from the BAP. The June 2023 SP-10 sample concentration of barium was detected at 5.18 mg/L, far greater than the August 25, 2022 sample concentration from the leachate of bottom ash, detected at 0.22 mg/L.

Ms. Rebecca Jones, P.G.  
American Electric Power  
February 22, 2024  
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AEP may refer to the ASD approval and continue assessment monitoring for the BAP in accordance with OAC 252:517-9-6(g)(3)(B). If exceedances of GWPSs are determined in other monitoring wells, AEP is required to submit a separate ASD for constituents in those monitoring wells if applicable.

The ASD for barium, fluoride, and lithium exceedances in SP-10 is accepted as submitted. If you have any questions, please contact Kaylee Daneshmand at (405) 702-5196 or at [Kaylee.daneshmand@deq.ok.gov](mailto:Kaylee.daneshmand@deq.ok.gov).

Sincerely,

A handwritten signature in black ink, appearing to read "Hillary Young", with a large, stylized flourish extending from the end of the signature.

Hillary Young, P.E.  
Chief Engineer  
Land Protection Division

HY/kd



American Electric Power  
502 North Allen Avenue  
Shreveport, LA 71101  
AEP.com

January 2, 2024

**Via electronic mail**

Ms. Kaylee Daneshmand  
Oklahoma Department of Environmental Quality (ODEQ)  
707 North Robinson, P.O. Box 1677  
Oklahoma City, OK 73101-1677

Re: Alternate Source Demonstration (ASD)  
Bottom Ash Pond (BAP)  
Public Service Company of Oklahoma (PSO) - Northeastern Power Station (NPS)  
Roger County  
Solid Waste Permit No. Pending

Dear Ms. Daneshmand,

AEP/PSO received ODEQ's correspondence dated July 12, 2023, in which ODEQ accepted the ASD for the lithium, fluoride, and barium detected in SP-10 during the May 24, 2023, sampling event. ODEQ indicated that if lithium, fluoride, and barium continue to exceed the groundwater protection standards (GWPS) in the future and conditions have not changed, NPS may refer to the October 24, 2019, ASD approval for lithium, June 4, 2021, ASD approval for fluoride, and to the March 9, 2023, ASD approval for barium and continue assessment monitoring for the BAP in accordance with OAC 252:517-9-6(g)(3)(B).

On October 4, 2023, the statistical evaluation of the first semi-annual 2023 assessment monitoring event (June 20, 2023) for the BAP was certified and in that statistical evaluation report, potential SSLs were identified for lithium, fluoride, and barium at SP-10.

The statistical findings are summarized as follows:

The Lower Confidence Level (LCL) for lithium (0.240 mg/L) exceeded the GWPS (a calculated Upper Tolerance Limit (UTL)) of 0.163 mg/L at SP-10. The actual detected lithium concentration in SP-10 was 0.206 mg/l.

The LCL for fluoride (5.36 mg/L) exceeded the GWPS (UTL of 4.39 mg/L) was exceeded as at SP-10. The actual detected fluoride concentration in SP-10 was 6.3 mg/L.

The LCL for barium (4.07 mg/L) exceeded the GWPS (UTL of 2.60 mg/L) was exceeded as at SP-10. The actual detected barium concentration in SP-10 was 5.18 mg/L.

Attached are the alternative source demonstrations for your review outlining the lines of evidence that these exceedances are the result of natural variations occurring in the groundwater at SP-10 and that the conditions at the BAP have not changed.

Please do not hesitate to contact me if you have any questions or would like to discuss. I can be reached by email at: [rdjones2@aep.com](mailto:rdjones2@aep.com) or by phone at: (737) 330-3725.

Sincerely,



Rebecca D. Jones, P.G.

AEP, Environmental Specialist

Attachments

## Memorandum

Date: December 28, 2023

To: Rebecca Jones, American Electric Power (AEP)

From: Beth Gross, PhD, PE (OK) and Allison Kreinberg, Geosyntec

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

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The Bottom Ash Pond (BAP) is a regulated coal combustion residual (CCR) management unit at the Northeastern Power Station (NPS) in Oologah, Oklahoma. A semiannual assessment monitoring event was completed at the BAP on June 20, 2023, in accordance with the assessment monitoring requirements of Oklahoma Administrative Code (OAC) 252:517-9-6. Analysis of the June 2023 data identified statistically significant levels (SSLs) above the groundwater protection standards (GWPSs) for lithium, fluoride, and barium at SP-10 (Attachment B). The following SSLs were identified at the Northeastern BAP:

- The lower confidence limit (LCL) for lithium exceeded the GWPS of 0.163 milligrams per liter (mg/L) at SP-10 (0.240 mg/L).
- The LCL for fluoride exceeded the GWPS of 4.39 mg/L at SP-10 (5.36 mg/L).
- The LCL for barium exceeded the GWPS of 2.60 mg/L at SP-10 (4.07 mg/L).

Key analytical results for samples collected from the BAP and from SP-10 are provided in **Table 1**. As described in previous alternative source demonstrations (ASDs) (Geosyntec 2019, Geosyntec 2021a, Geosyntec 2021b, Geosyntec 2021c, Geosyntec 2022, Geosyntec 2023a, Geosyntec 2023b), concentrations of lithium, fluoride, and barium in the BAP water (including pore water) and BAP sediments that are lower than concentrations observed at SP-10 suggest that the BAP is not the source of these exceedances. These previous ASDs demonstrate that the release of lithium from the clay minerals in the shale lens located at 46 feet 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 barium and fluoride are also associated with the shale lenses and are contributing to aqueous barium and fluoride concentrations at SP-10.

The Oklahoma Department of Environmental Quality (DEQ) previously noted in a letter to the NPS dated June 4, 2021, that “[i]f lithium and fluoride continue to exceed their relative GWPS in the future and conditions have not changed, NPS may refer to the October 29, 2019 ASD approval

for lithium and this [June 4, 2021] approval for fluoride and continue assessment monitoring for the BAP in accordance with OAC 252:517-6(g)(3)(B)” (DEQ 2021). DEQ provided a similar letter to the NPS dated September 20, 2022, that indicated that the July 14, 2022 ASD “is applicable for the barium exceedance in SP-10 of the GWPS if conditions do not change. AEP may refer to the ASD approval for barium and continue assessment monitoring for the BAP in accordance with OAC 252:517-9-6(g)(3)(B)” (DEQ 2022). This ASD update presents an evaluation of the BAP for changing conditions that may affect previously approved ASDs for lithium, fluoride, and barium exceedances at SP-10.

The sample collected from the June 2023 monitoring event at SP-10 contained a lithium concentration of 0.206 mg/L, fluoride concentration of 6.3 mg/L, and barium concentration of 5.18 mg/L. The lithium concentration (**Figure 1**) and fluoride concentration (**Figure 2**) are consistent with previous results collected during the assessment monitoring period and continue to show no statistically significant positive trends. This is an indication that conditions have not changed substantially since the preceding ASD was submitted (Geosyntec 2023b), and the arguments presented in the previous ASDs are still valid. Thus, the lithium and fluoride concentrations at SP-10 during the June 2023 assessment monitoring event are not attributed to a release from the BAP.

A time series plot of the barium concentrations at SP-10 and a Mann-Kendall statistical analysis of the reported barium results over time are shown in **Figure 3**. The analysis determined that barium concentrations at SP-10 display a statistically significant increasing trend. However, based on a Piper diagram showing select events where the full suite of major cations and anions were sampled (**Figure 4**), the geochemistry at monitoring well SP-10 does not change over time in a manner indicative of a release from the BAP. The June 2023 sample is displayed on the plot as the purple triangle. **Figure 4** demonstrates that the geochemistry of SP-10 has remained consistent over the past several years, indicating that groundwater condition at SP-10 is geochemically stable.

The information above, as well as the information presented in previous ASDs (Geosyntec 2019, Geosyntec 2021a, Geosyntec 2021b, Geosyntec 2021c, Geosyntec 2022, Geosyntec 2023a, Geosyntec 2023b), continues to support the position that barium, fluoride, and lithium concentrations are a result of natural variation in the underlying lithology, including the presence of shale lenses containing barium, fluoride, and lithium 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.

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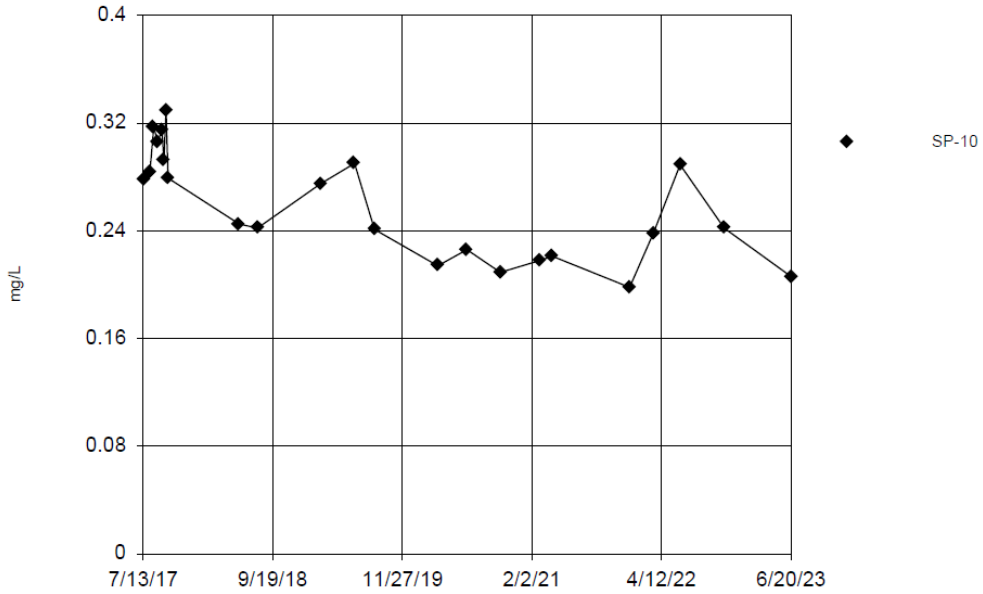
## REFERENCES

- DEQ. 2021. Alternate Source Demonstration for Fluoride and Lithium Exceedance – Bottom Ash Pond, Public Service Company of Oklahoma Northeastern Power Station, Rogers County. Oklahoma Department of Environmental Quality. June 4.
- DEQ. 2022. Alternative Source Demonstration for Barium, Fluoride, and Lithium Exceedances – Bottom Ash Pond, Public Service Company of Oklahoma - Northeastern Power Station, Rogers County. Oklahoma Department of Environmental Quality. September 20.
- Geosyntec. 2019. Alternative Source Demonstration. Bottom Ash Pond – Northeastern Power Station, Oologah, Oklahoma. Geosyntec Consultants. April.
- Geosyntec. 2021a. Alternative Source Demonstration. Bottom Ash Pond – Northeastern Power Station, Oologah, Oklahoma. Geosyntec Consultants. January.
- Geosyntec. 2021b. Alternative Source Demonstration. Bottom Ash Pond – Northeastern Power Station, Oologah, Oklahoma. Geosyntec Consultants. May.
- Geosyntec. 2021c. Alternative Source Demonstration. Bottom Ash Pond – Northeastern Power Station, Oologah, Oklahoma. Geosyntec Consultants. October.
- Geosyntec. 2022. Alternative Source Demonstration. Bottom Ash Pond – Northeastern Power Station, Oologah, Oklahoma. Geosyntec Consultants. July.
- Geosyntec. 2023a. Alternative Source Demonstration. Bottom Ash Pond – Northeastern Power Station, Oologah, Oklahoma. Geosyntec Consultants. January.
- Geosyntec. 2023b. Alternative Source Demonstration. Bottom Ash Pond – Northeastern Power Station, Oologah, Oklahoma. Geosyntec Consultants. May.

# FIGURES

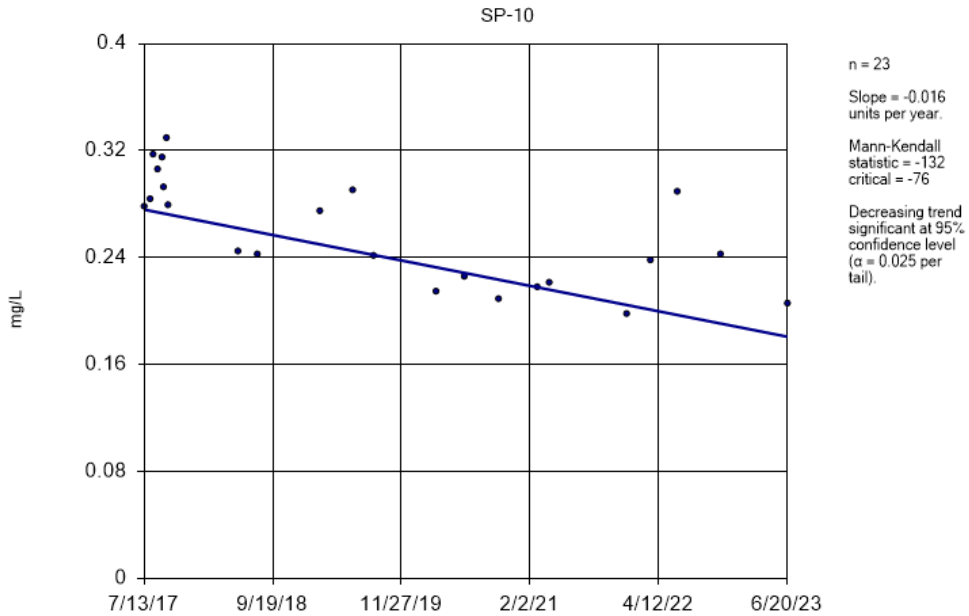


### Time Series



Constituent: Lithium Analysis Run 12/19/2023 2:29 PM  
Northeastern Plant Client: AEP Data: 20231219\_AEP\_NE\_BAP\_ASD

### Sen's Slope Estimator



Constituent: Lithium Analysis Run 12/19/2023 3:04 PM  
Northeastern Plant Client: AEP Data: 20231219\_AEP\_NE\_BAP\_ASD

Notes: Lithium results from monitoring well SP-10 are displayed on the plots.

AEP: American Electric Power  
mg/L: milligrams per liter

### Lithium Time Series and Trend Test: SP-10

Northeastern Bottom Ash Pond

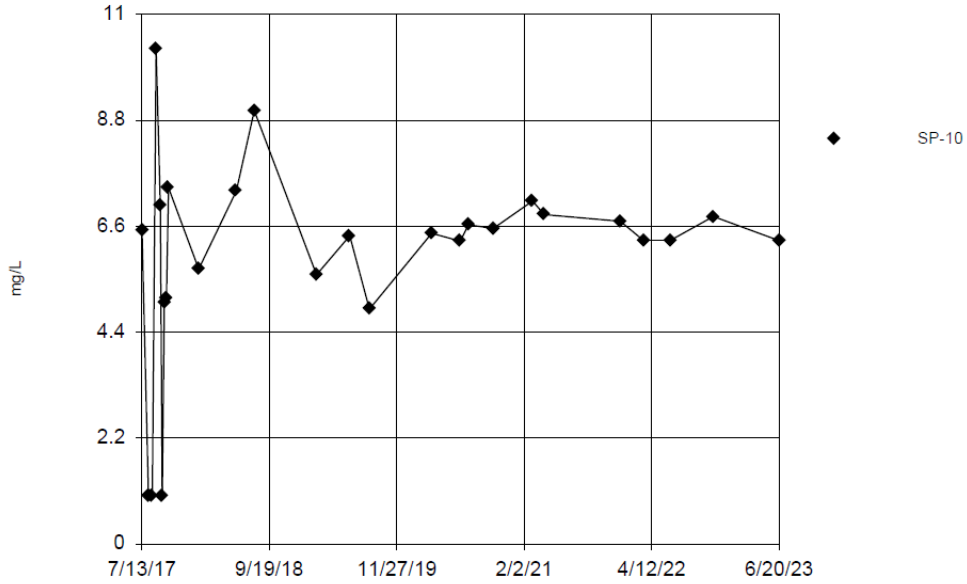


Figure 1

Columbus, Ohio

December 28, 2023

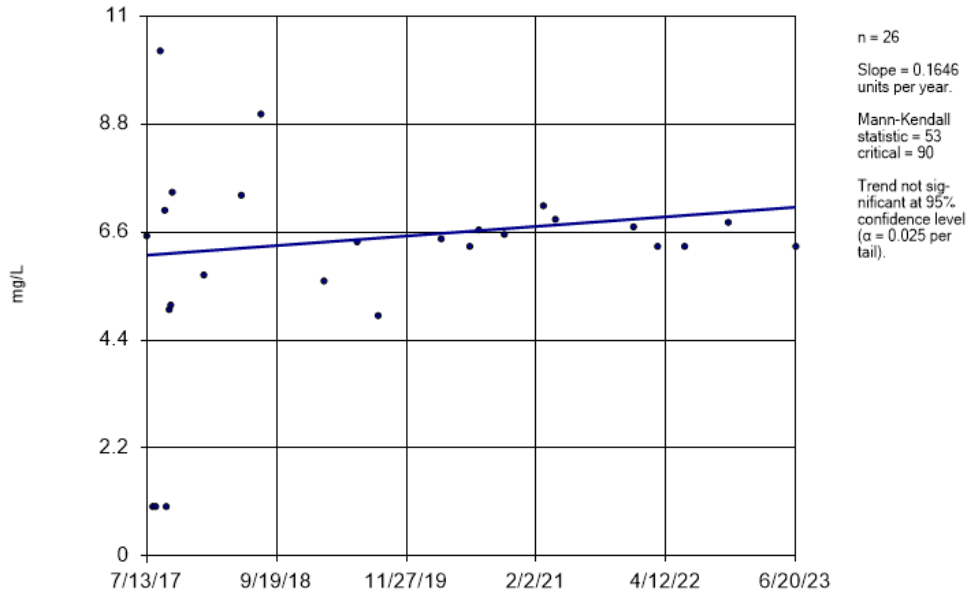
### Time Series



Constituent: Fluoride Analysis Run 12/18/2023 11:30 AM  
 Northeastern Plant Client: AEP Data: 20231218\_AEP\_NE\_BAP\_ASD

### Sen's Slope Estimator

SP-10



Constituent: Fluoride Analysis Run 12/19/2023 3:04 PM  
 Northeastern Plant Client: AEP Data: 20231219\_AEP\_NE\_BAP\_ASD

Notes: Fluoride results from monitoring well SP-10 are displayed on the plots.

AEP: American Electric Power  
 mg/L: milligrams per liter

### Fluoride Time Series and Trend Test: SP-10

Northeastern Bottom Ash Pond

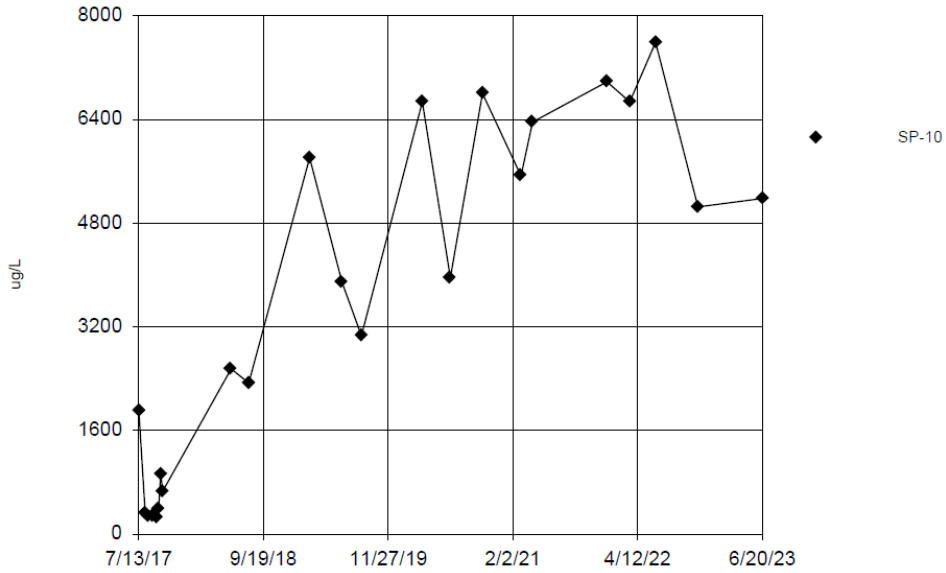


Figure  
**2**

Columbus, Ohio

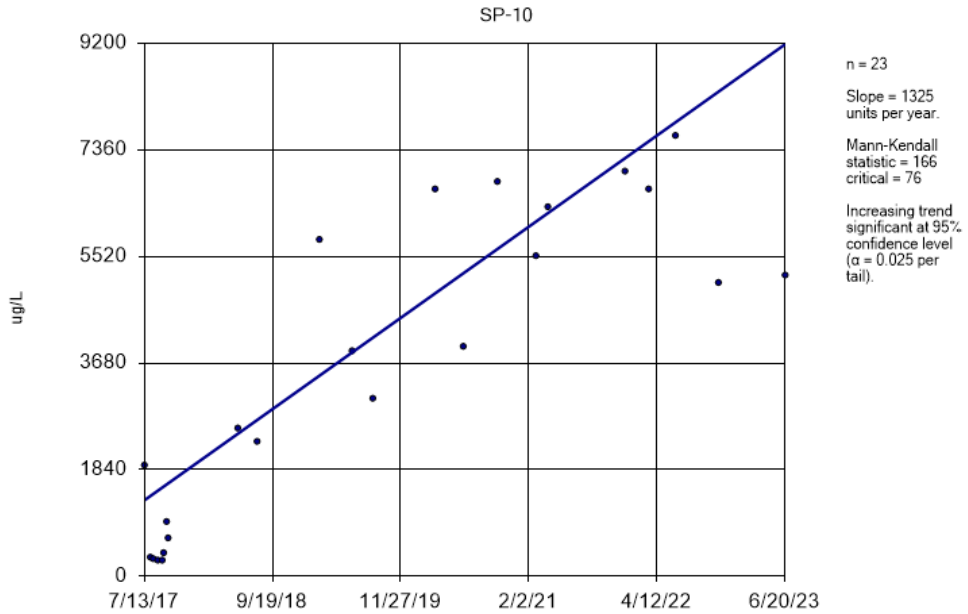
December 28, 2023

### Time Series



Constituent: Barium Analysis Run 12/19/2023 2:29 PM  
 Northeastern Plant Client: AEP Data: 20231219\_AEP\_NE\_BAP\_ASD

### Sen's Slope Estimator



Constituent: Barium Analysis Run 12/19/2023 3:04 PM  
 Northeastern Plant Client: AEP Data: 20231219\_AEP\_NE\_BAP\_ASD

Notes: Barium results from monitoring well SP-10 are displayed on the plots.

AEP: American Electric Power  
 ug/L: micrograms per liter

### Barium Time Series and Trend Test: SP-10

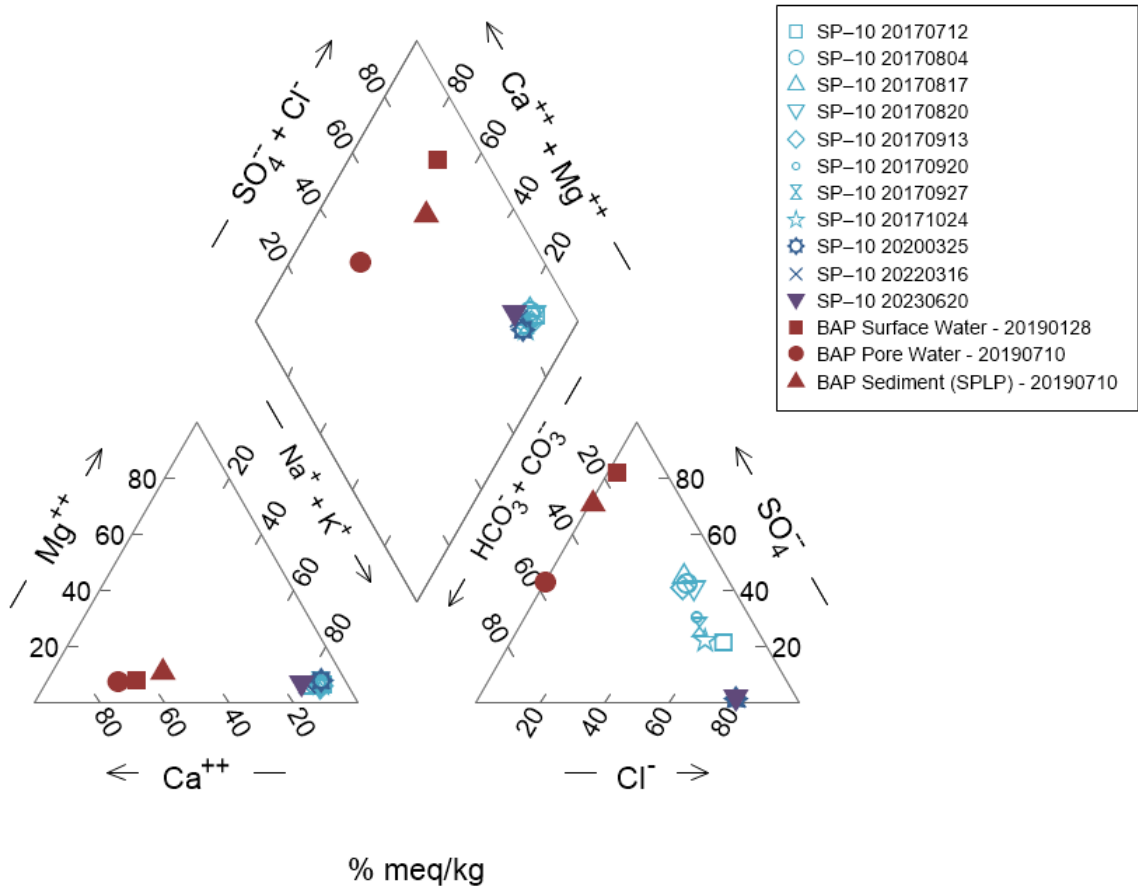
Northeastern Bottom Ash Pond



Figure  
**3**

Columbus, Ohio

December 28, 2023



Notes:  
 AEP: American Electric Power  
 SPLP – synthetic precipitation leaching procedure  
 % meq/kg – percent milliequivalents per kilogram

**Piper Diagram – SP-10 and BAP Samples**  
 Northeastern Bottom Ash Pond

Geosyntec  
 consultants



Figure  
 4

Columbus, Ohio

December 28, 2023

# TABLES

**Table 1. Summary of Key Analytical Data**  
**Alternative Source Demonstration Update Memorandum**  
**Northeastern Power Station Bottom Ash Pond, Oologah, Oklahoma**

<b>Sample</b>	<b>Sample Date</b>	<b>Lithium Concentration (mg/L)</b>	<b>Fluoride Concentration (mg/L)</b>	<b>Barium Concentration (mg/L)</b>
SPLP Leachate of Bottom Ash	7/10/2019	0.001	0.458	0.352
	8/25/2022	< 0.5	NA	0.22
BAP Surface Water	2/5/2019	0.00874	0.37	0.315
BAP Pore Water	7/10/2019	0.003	< 0.83	0.083
SP-10 June 2023 Result	6/20/2023	0.206	6.3	5.18

## Notes:

1. Nondetect results are shown as less than the reporting limit.

BAP: Bottom Ash Pond

mg/L: milligram per liter

NA: not analyzed

SPLP: synthetic precipitation leaching procedure

# ATTACHMENT A

Certification by Qualified Professional Engineer

**CERTIFICATION BY A QUALIFIED PROFESSIONAL ENGINEER**

I certify that the 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  
Tallahassee, Florida 32308

Oklahoma Firm Certificate of  
Authorization No. 1996  
Exp. 6/30/2024

18167  
License Number

Oklahoma  
Licensing State

12/29/2023  
Date

\* \* \* \* \*



ATTACHMENT B  
Assessment Statistics Report  
2023 First Semiannual Event

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# STATISTICAL ANALYSIS SUMMARY, BOTTOM ASH POND

## Northeastern Power Station Oologah, Oklahoma

*Prepared for*

**American Electric Power**

1 Riverside Plaza

Columbus, Ohio 43215-2372

*Prepared by*

Geosyntec Consultants, Inc.

500 West Wilson Bridge Road, Suite 250

Worthington, Ohio 43085

Project Number: CHA8500B

October 3, 2023

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Table 3:	Appendix B Groundwater Protection Standards
Table 4:	Appendix A Data Summary

## LIST OF ATTACHMENTS

Attachment A:	Certification by Qualified Professional Engineer
Attachment B:	Statistical Analysis Output

## ACRONYMS AND ABBREVIATIONS

ASD	alternative source demonstration
BAP	Bottom Ash Pond
CCR	coal combustion residuals
GWPS	groundwater protection standard
LCL	lower confidence limit
LPL	lower prediction limit
mg/L	milligrams per liter
NPS	Northeastern Power Station
OAC	Oklahoma Administrative Code
ODEQ	Oklahoma Department of Environmental Quality
QA/QC	quality assurance and quality control
SSI	statistically significant increase
SSL	statistically significant level
TDS	total dissolved solids
UPL	upper prediction limit

## 1. INTRODUCTION

In accordance with Oklahoma Department of Environmental Quality (ODEQ) requirements regarding the disposal of coal combustion residuals (CCR) in landfills and surface impoundments (Oklahoma Administrative Code [OAC] 252:517), groundwater monitoring has been conducted at the Bottom Ash Pond (BAP), an existing CCR unit at the Northeastern Power Station (NPS) in Oologah, Oklahoma. Recent groundwater monitoring results were used to identify concentrations of Appendix B constituents that are above the groundwater protection standards (GWPSs).

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. In addition, pH values below the lower prediction limit (LPL) resulted in SSIs below background as well. GWPSs were set in accordance with OAC 252:517-9-6(h) and a statistical evaluation of the assessment monitoring data was conducted.

An assessment monitoring event was conducted at the BAP in November 2022 in accordance with OAC 252:517-9-6(d). During the November 2022 assessment monitoring event, statistically significant levels (SSLs) were observed for barium, fluoride, and lithium (Geosyntec 2023a). An alternative source demonstration (ASD) was successfully completed (Geosyntec 2023b), and the unit therefore remained in assessment monitoring. One assessment monitoring event was conducted at the BAP in June 2023, in accordance with OAC 252:517-9-6(d). Results of this event are documented in this report.

Before the statistical analyses were conducted, the 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 that would impact the usability of the data were identified.

The monitoring data were submitted to Groundwater Stats Consulting, LLC for statistical analysis. Confidence intervals were calculated for Appendix B parameters at the compliance wells to assess whether SSLs were present above previously established GWPSs. SSLs were identified for barium, fluoride, and lithium. Therefore, either the unit will move to an assessment of corrective measures or an ASD will be conducted to evaluate whether 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.

## 2. BOTTOM ASH POND EVALUATION

### 2.1 Data Validation and QA/QC

During the assessment monitoring program, one set of samples was collected in June 2023 for analysis from each upgradient and downgradient well to meet the requirements of OAC 252:517-9-6(d)(1). Samples from this sampling event were analyzed for both the Appendix A and Appendix B parameters. A summary of data collected during this assessment monitoring event may be found in Table 1. An additional sample was collected from SP-10 for dissolved Appendix B parameters based on a request from ODEQ (2023). The results for both the total and dissolved samples collected from SP-10 on June 20, 2023 are provided in Table 2.

Chemical analysis was completed by a National Environmental Laboratory Accreditation Program certified analytical laboratory. The laboratory completed analysis of quality assurance and quality control (QA/QC) samples such as laboratory reagent blanks, continuing calibration verification samples, and laboratory fortified blanks.

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.9.6.33 statistics software. The export file was checked against the analytical data for transcription errors and completeness. No QA/QC issues that would impact data usability were noted.

### 2.2 Statistical Analysis

Statistical analyses for the BAP were conducted in accordance with the November 2021 *Statistical Analysis Plan* (Geosyntec 2021) for the samples collected in June 2023. Time series plots and results for all completed statistical tests are provided in Attachment B.

The data obtained in June 2023 were screened for potential outliers. No outliers were identified for this event.

#### 2.2.1 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, nonparametric confidence limits were calculated in some cases (e.g., when the data did not appear to be normally distributed or when the nondetect frequency was too high). Select datasets were truncated if significant serial correlation was observed among the background samples that were collected on an approximately monthly basis in 2017. Additionally, the dataset for barium at SP-10 was truncated because earlier values were noted to be significantly lower than more recent results. A list of the truncated well/constituent pairs used for calculation of the confidence limits is provided in Attachment B.

An SSL was concluded if the lower confidence limit (LCL) was above the GWPS (i.e., if the entire confidence interval was above the GWPS). The calculated confidence limits (Attachment B) were compared to the GWPSs provided in Table 3. The GWPSs were established during a previous statistical analysis as either (a) the background concentration or (b) the maximum contaminant

level and risk-based levels specified in OAC 252:517-9-6(h), whichever was greater (Geosyntec 2023a).

The following SSLs were identified at the Northeastern BAP:

- The LCL for barium was above the GWPS of 2.60 milligrams per liter (mg/L) at SP-10 (4.07 mg/L).
- The LCL for fluoride was above the GWPS of 4.39 mg/L at SP-10 (5.36 mg/L).
- The LCL for lithium was above the GWPS of 0.163 mg/L at SP-10 (0.240 mg/L).

ODEQ previously noted in a letter provided to the NPS that “[i]f lithium and fluoride continue to exceed their relative GWPS in the future and conditions have not changed, NPS may refer to the October 29, 2019 ASD approval for lithium and June 4, 2021 approval for fluoride and continue assessment monitoring for the BAP in accordance with OAC 252:517-6(g)(3)(B)” (ODEQ 2021). ODEQ provided a similar letter dated September 20, 2022 documenting ASD approval for a barium SSL at SP-10 which is applicable in the future if conditions do not change (ODEQ 2022). Therefore, an ASD will be submitted to ODEQ demonstrating that conditions at the BAP remain unchanged so that the unit will continue assessment monitoring.

### 2.2.2 Evaluation of Potential Appendix A SSIs

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

Data collected during the June 2023 assessment monitoring event from each compliance well were compared to previously calculated prediction limits to evaluate results above background values (Table 4). The following SSIs above the upper prediction limits (UPLs) were noted:

- Boron concentrations were above the interwell UPL of 0.503 mg/L at SP-10 (0.916 mg/L) and SP-11 (0.543 mg/L).
- Chloride concentrations were above the interwell UPL of 834 mg/L at SP-10 (1,960 mg/L).
- Fluoride concentrations were above the interwell UPL of 4.39 mg/L at SP-10 (6.3 mg/L).
- Sulfate concentrations were above the interwell UPL of 81.9 mg/L at SP-11 (358 mg/L).
- TDS concentrations were above the interwell UPL of 1,640 mg/L at SP-2 (1,780 mg/L) and SP-10 (3,500 mg/L).

While the prediction limits were calculated for a one-of-two retesting procedure, SSIs were conservatively assumed if the June 2023 sample was above the UPL or below the lower prediction limit. Based on these results, boron, chloride, fluoride, sulfate, and TDS concentrations were above background levels at compliance wells at the Northeastern BAP during assessment monitoring.

## 2.3 Conclusions

A semiannual assessment monitoring event was conducted in June 2023 in accordance with the CCR Rule. The laboratory and field data were reviewed prior to statistical analysis, and no QA/QC issues that impacted data usability were identified. A review of outliers identified no potential outliers in the June 2023 data. A confidence interval was constructed at each compliance well for each Appendix B parameter; SSLs were concluded if the entire confidence interval was above the GWPSs. SSLs were identified for barium, fluoride, and lithium. Appendix A parameters were compared to prediction limits, with concentrations of boron, chloride, fluoride, sulfate, and TDS above background levels.

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



### 3. REFERENCES

- Geosyntec. 2021. *Statistical Analysis Plan – Northeastern Power Station, Oologah, Oklahoma*. Geosyntec Consultants, Inc. November.
- Geosyntec. 2023a. *Statistical Analysis Summary – Bottom Ash Pond, Northeastern Power Station, Oologah, Oklahoma*. Geosyntec Consultants, Inc. February.
- Geosyntec. 2023b. *Alternative Source Demonstration Report – State CCR Rule, Northeastern Power Station – Bottom Ash Pond, Oologah, Oklahoma*. Geosyntec Consultants, Inc. May.
- ODEQ. 2021. Letter Transmittal – Alternate Source Demonstration for Fluoride and Lithium Exceedance – Bottom Ash Pond. Public Service Company of Oklahoma – Northeastern Power Station. Oklahoma Department of Environmental Quality. June.
- ODEQ. 2022. Letter Transmittal – Alternate Source Demonstration for Barium, Fluoride, and Lithium Exceedance – Bottom Ash Pond. Public Service Company of Oklahoma – Northeastern Power Station. Oklahoma Department of Environmental Quality. September.
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# TABLES

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

Parameter	Unit	SP-1	SP-2	SP-4	SP-5R	SP-10	SP-11
		6/20/2023	6/20/2023	6/20/2023	6/20/2023	6/20/2023	6/20/2023
Antimony	µg/L	0.491	0.957	0.192	0.230	0.083 J1	0.038 J1
Arsenic	µg/L	0.45	1.11	1.26	9.09	0.29	1.51
Barium	µg/L	145	989	204	2,120	5,180	102
Beryllium	µg/L	0.091	0.077	0.074	0.276	0.027 J1	0.025 J1
Boron	mg/L	0.158	0.105	0.323	0.191	0.916	0.543
Cadmium	µg/L	0.047	0.076	0.044	0.074	0.009 J1	0.020 U1
Calcium	mg/L	100	87.2	82.1	94.5	83.0	86.7
Chloride	mg/L	84.3	604	468	782	1,960	99.3
Chromium	µg/L	0.41	0.51	0.61	2.73	0.45	0.34
Cobalt	µg/L	0.174	0.326	0.470	1.18	0.146	0.717
Combined Radium	pCi/L	6.92	12.46	7.96	16.19	18.07	1.21
Fluoride	mg/L	0.82	3.02	3.29	3.09	6.3	1.43
Lead	µg/L	0.24	0.17 J1	0.21	2.11	0.09 J1	0.08 J1
Lithium	mg/L	0.0073	0.0326	0.0507	0.0822	0.206	0.0179
Mercury	µg/L	0.005 U1	0.005 U1	0.005 U1	0.005 U1	0.005 U1	0.005 U1
Molybdenum	µg/L	17.2	14.8	2.8	0.8	0.7	0.8
Selenium	µg/L	7.58	2.28	0.41 J1	0.91	0.5 U1	0.10 J1
Sulfate	mg/L	65.0	18.1	83.0	3.8	19.7	358
Thallium	µg/L	0.07 J1	0.03 J1	0.02 J1	0.05 J1	0.20 U1	0.20 U1
Total Dissolved Solids	mg/L	460	1,780	1,170	1,580	3,500	1,070
pH	SU	7.24	7.3	7.53	7.52	7.46	7.2

## Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

U: Nondetect value. For statistical analysis, parameters that were not detected were replaced with the reporting limit.

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

**Table 2. SP-10 Total v. Dissolved Data  
Statistical Analysis Summary  
Northeastern Plant - Bottom Ash Pond**

*Geosyntec Consultants, Inc.*

Parameter	Unit	SP-10	
		Total	Dissolved
Antimony	µg/L	0.083 J1	0.089 J1
Arsenic	µg/L	0.29	0.40
Barium	µg/L	5,180	5,280
Beryllium	µg/L	0.027 J1	0.022 J1
Boron	mg/L	0.916	0.916
Cadmium	µg/L	0.009 J1	0.02 U1
Calcium	mg/L	83.0	128
Chromium	µg/L	0.45	0.18 J1
Cobalt	µg/L	0.146	0.065
Combined Radium	pCi/L	18.07	20.00
Fluoride	mg/L	6.3	6.3
Lead	µg/L	0.09 J1	0.20 U1
Lithium	mg/L	0.206	0.214
Mercury	µg/L	0.005 U1	0.005 U1
Molybdenum	µg/L	0.7	0.9
Selenium	µg/L	0.5 U1	0.05 J1
Thallium	µg/L	0.20 U1	0.20 U1

Notes:

1. Both samples were collected on 6/20/2023.

µg/L: micrograms per liter

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

U: Nondetect value. For statistical analysis, parameters that were not detected were replaced with the reporting limit.

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

-: Not analyzed

**Table 3. Appendix B Groundwater Protection Standards  
Statistical Analysis Summary  
Northeastern Plant - Bottom Ash Pond**

Constituent Name	MCL	CCR Rule-Specified	Calculated UTL	GWPS
Antimony, Total (mg/L)	0.00600		0.00570	0.00600
Arsenic, Total (mg/L)	0.0100		0.0599	0.0599
Barium, Total (mg/L)	2.00		2.60	2.60
Beryllium, Total (mg/L)	0.00400		0.00212	0.00400
Cadmium, Total (mg/L)	0.00500		0.00207	0.00500
Chromium, Total (mg/L)	0.100		0.00342	0.100
Cobalt, Total (mg/L)	n/a	0.00600	0.0179	0.0179
Combined Radium, Total (pCi/L)	5.00		15.8	15.8
Fluoride, Total (mg/L)	4.00		4.39	4.39
Lead, Total (mg/L)	n/a	0.0150	0.0107	0.0150
Lithium, Total (mg/L)	n/a	0.0400	0.163	0.163
Mercury, Total (mg/L)	0.00200		0.0000300	0.00200
Molybdenum, Total (mg/L)	n/a	0.100	0.0100	0.100
Selenium, Total (mg/L)	0.0500		0.00499	0.0500
Thallium, Total (mg/L)	0.00200		0.00162	0.00200

Notes:

1. Calculated UTL (Upper Tolerance Limit) represents site-specific background values.
2. Grey cells indicate the GWPS is based on the calculated UTL, which is higher than the MCL or CCR Rule-specified value.

CCR: Coal Combustion Residuals

GWPS: Groundwater Protection Standard

MCL: Maximum Contaminant Level

mg/L: milligrams per liter

pCi/L: picocuries per liter

**Table 4. Appendix A Data Summary  
Statistical Analysis Summary  
Northeastern Plant - Bottom Ash Pond**

Analyte	Unit	Description	SP-1	SP-2	SP-10	SP-11
			6/20/2023	6/20/2023	6/20/2023	6/20/2023
Boron	mg/L	Interwell Background Value (UPL)	0.503			
		Analytical Result	0.158	0.105	<b>0.916</b>	<b>0.543</b>
Calcium	mg/L	Intrawell Background Value (UPL)	141			
		Analytical Result	100	87.2	83.0	86.7
Chloride	mg/L	Interwell Background Value (UPL)	834			
		Analytical Result	84.3	604	<b>1,960</b>	99.3
Fluoride	mg/L	Interwell Background Value (UPL)	4.39			
		Analytical Result	0.82	3.02	<b>6.3</b>	1.43
pH	SU	Interwell Background Value (UPL)	9.1			
		Interwell Background Value (LPL)	7.0			
		Analytical Result	7.2	7.3	7.5	7.2
Sulfate	mg/L	Interwell Background Value (UPL)	81.9			
		Analytical Result	65.0	18.1	19.7	<b>358</b>
Total Dissolved Solids	mg/L	Interwell Background Value (UPL)	1,640			
		Analytical Result	460	<b>1,780</b>	<b>3,500</b>	1,070

Notes:

**1. Bold values exceed the background value.**

2. Background values are shaded gray.

LPL: lower prediction limit

mg/L: milligrams per liter

SU: standard units

UPL: upper prediction limit

# ATTACHMENT A

## Certification by Qualified Professional Engineer

**Certification by Qualified Professional Engineer**

I certify that 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

10.04.2023

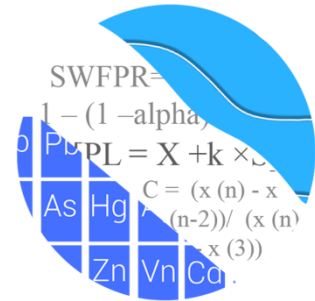
Date



# **ATTACHMENT B**

## Statistical Analysis Output

# GROUNDWATER STATS CONSULTING



August 7, 2023

Geosyntec Consultants  
Attn: Ms. Allison Kreinberg  
500 W. Wilson Bridge Road, Suite 250  
Worthington, OH 43085

Re: Northeastern BAP (Bottom Ash Pond)  
Assessment Monitoring Statistics – June 2023

Dear Ms. Kreinberg,

Groundwater Stats Consulting (GSC), formerly the statistical consulting division of Sanitas Technologies, is pleased to provide the June 2023 assessment monitoring analysis of groundwater data for American Electric Power Inc.'s Northeastern BAP. The analysis complies with the Oklahoma Administrative Code (OAC) as well as with the United States Environmental Protection Agency (USEPA) Unified Guidance (2009).

Sampling began at the site for the OAC 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 Andrew Collins, Project Manager of GSC.

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

- **Appendix B** (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 non-detect data. For several constituents, varying detection limits were present. Time series and box plots are provided for all wells for the parameters listed above (Figures A & B). The time series plots display concentrations over time for each well while the box plots provide visual representation of variation within a given well and across all wells.

## **Summary of Background Screening**

### **Evaluation of Appendix B Parameters – November 2022**

Prior to evaluating Appendix B 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.

#### Outlier Analysis

For the current analysis, Tukey’s outlier test on pooled upgradient well data identified outliers for fluoride, lead, mercury, and selenium and confirmed previously flagged values. Several of the values identified by Tukey’s test were either similar to concentrations upgradient of the facility or were lower than the respective Maximum Contaminant Level (MCL); therefore, the values were not flagged as outliers. A summary of previously flagged outliers follows this report (Figure C).

During previous screenings, 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. Among upgradient wells, high values for cadmium, lead, and selenium were identified by Tukey’s outlier test. Only the highest values for cadmium and lead were flagged as outliers to maintain statistical limits that are conservative from a regulatory perspective. Substantially high values were identified for upgradient well SP-4 on 8/4/17 through visual screening and the highest values for arsenic, beryllium, cobalt, and mercury were flagged. This step will result in upper tolerance limits that are conservative (lower) from a regulatory perspective. More recent concentrations for barium in downgradient well SP-10 were noted to be significantly higher than historical concentrations. Therefore,

earlier concentrations were previously deselected prior to constructing confidence intervals in order to evaluate present-day groundwater concentrations of barium at this well. As mentioned above, list of well/constituent pairs using a truncated portion of their records follows this report (Date Ranges Table).

Additionally, downgradient well data through November 2022 were screened through visual screening using time series graphs. Since the downgradient well data are used to construct confidence intervals, a regulatory conservative approach is taken in that values that are marginally high relative to the rest of the data are retained unless there is particular justification for excluding them. No additional outliers among downgradient wells were flagged during this analysis. Previously a high value for combined radium 226 + 228 in well SP-1 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.

### Rank Von Neumann

As mentioned above, background samples were collected approximately on a monthly basis during 2017 at all wells for Appendix B constituents. Since the EPA Unified Guidance recommends collection of independent groundwater samples, the Rank Von Neumann test for serial correlation was used to determine whether serial correlation was present among these earlier samples. Significant serial correlation was identified for the following Appendix B well/constituent pairs:

- Barium: SP-4 (upgradient) and SP-11
- Cadmium: SP-4 and SP-5R (both upgradient), SP-1, and SP-10
- Chromium: SP-4 (upgradient)
- Lead: SP-10
- Lithium: SP-4 (upgradient) and SP-11
- Molybdenum: SP-2
- Selenium: SP-5R (upgradient) and SP-2
- Thallium: SP-4 and SP-5R (both upgradient), SP-1, SP-2, SP-10, and SP-11

As a result, the records for these well/constituent pairs were truncated to remove earlier measurements for construction of statistical limits using only more recent data that represent independent samples. Results of the Rank Von Neumann test were included with the previous update.

## Tolerance Limits

Parametric tolerance limits were used to calculate background limits from pooled upgradient well data through November 2022 for Appendix B parameters with a target of 95% confidence and 95% coverage to determine background limits. These limits will be updated on an annual basis at the end of each year and will be updated again at the end of 2023. The confidence and coverage levels for nonparametric tolerance limits are dependent upon the number of background samples. These limits were compared to the MCLs 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 D).

## Groundwater Protection Standards

The upper tolerance limits were compared to the Maximum Contaminant Levels (MCLs) 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 E).

## **Evaluation of Appendix B Parameters – June 2023**

For Appendix B parameters, confidence intervals for each downgradient well/constituent were compared against corresponding Groundwater Protection Standards (GWPS). GWPS were developed as described below. Downgradient well/constituent pairs that have 100% non-detects do not require analysis; however, no downgradient wells had 100% non-detects, and all well/constituent pairs were eligible for confidence intervals.

## Confidence Intervals

Confidence intervals were then constructed on downgradient wells with data through June 2023 for each of the Appendix B parameters using the highest limit of the MCL or background limit as discussed above for the GWPS (Figure F). As mentioned above, the most recent reporting limit is substituted for historical non-detects within a given well, and the reporting limits vary among individual wells. These intervals were constructed as either parametric or nonparametric confidence intervals depending on the data distribution and percentage of non-detects.

When data followed a normal or transformed-normal distribution, parametric confidence intervals were used for Appendix B parameters. Nonparametric confidence intervals, which use the largest and smallest order statistics depending on the sample size as

interval limits, were constructed when data did not follow a normal or transformed-normal distribution or when there were greater than 50% non-detects. The lower confidence limit, which is constructed with 99% confidence for parametric confidence intervals, is compared to the GWPS prepared as described above. The confidence level associated with nonparametric confidence intervals is dependent upon the number samples available.

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:

- Barium: SP-10
- 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,



Tristan Clark  
Groundwater Analyst



Andrew Collins  
Project Manager

# Date Ranges

Date: 8/5/2023 4:44 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

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Barium (mg/L)

SP-10 overall:5/30/2018-6/20/2023  
SP-11 overall:5/30/2018-6/20/2023  
SP-4 overall:5/30/2018-6/20/2023

Cadmium (mg/L)

SP-1 overall:5/30/2018-6/20/2023  
SP-10 overall:5/30/2018-6/20/2023  
SP-4 overall:5/30/2018-6/20/2023  
SP-5R overall:5/30/2018-6/20/2023

Calcium (mg/L)

SP-11 background:7/30/2018-6/20/2023  
SP-4 overall:1/22/2018-6/20/2023

Chromium (mg/L)

SP-4 overall:5/30/2018-6/20/2023

Lead (mg/L)

SP-10 overall:5/30/2018-6/20/2023

Lithium (mg/L)

SP-11 overall:5/30/2018-6/20/2023  
SP-4 overall:5/30/2018-6/20/2023

Molybdenum (mg/L)

SP-2 overall:5/30/2018-6/20/2023

Selenium (mg/L)

SP-2 overall:5/30/2018-6/20/2023  
SP-5R overall:5/30/2018-6/20/2023

Sulfate (mg/L)

SP-4 overall:5/30/2018-6/20/2023  
SP-5R overall:5/30/2018-6/20/2023

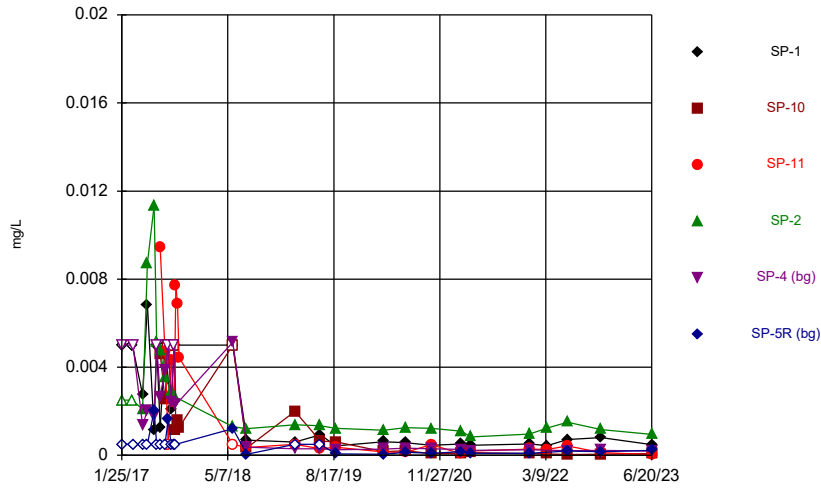
Thallium (mg/L)

overall:5/30/2018-6/20/2023

FIGURE A  
Time Series

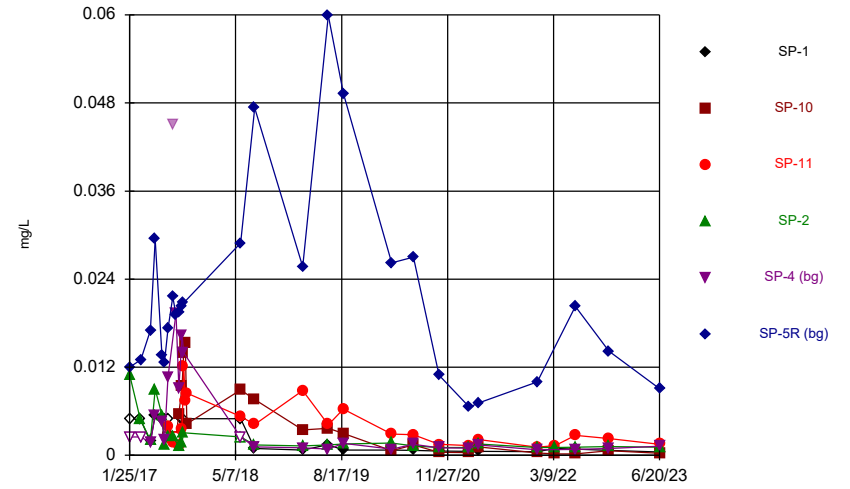


Time Series



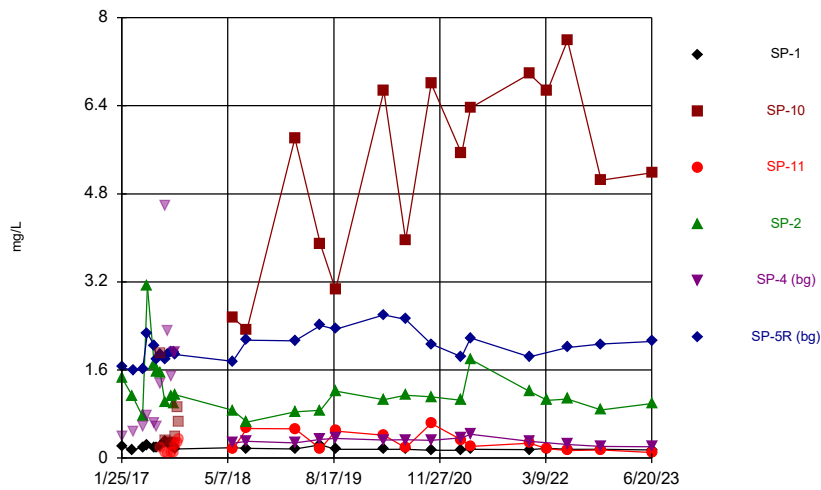
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Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Time Series



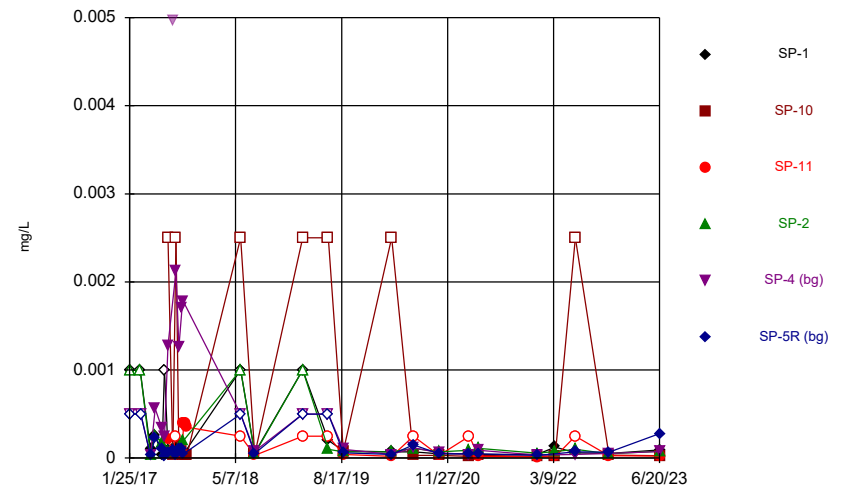
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Time Series



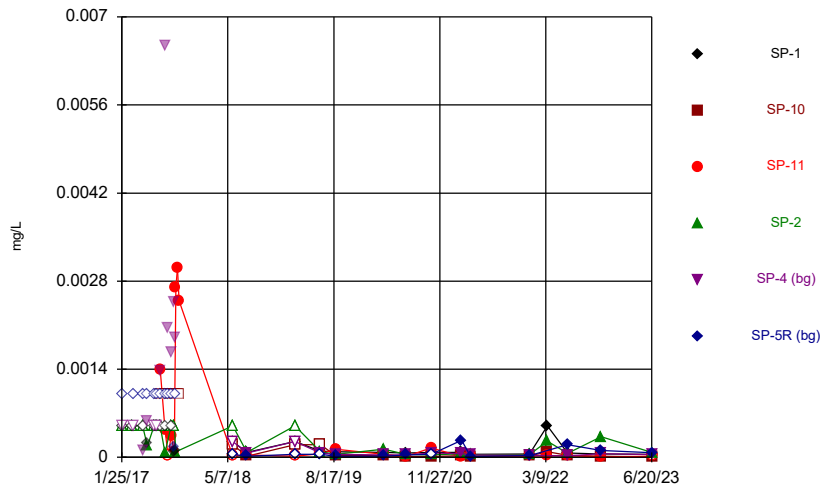
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Time Series



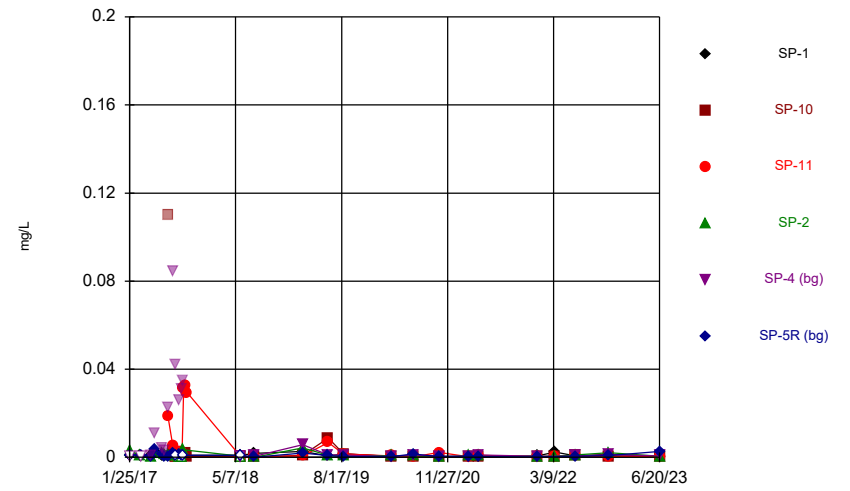
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### Time Series



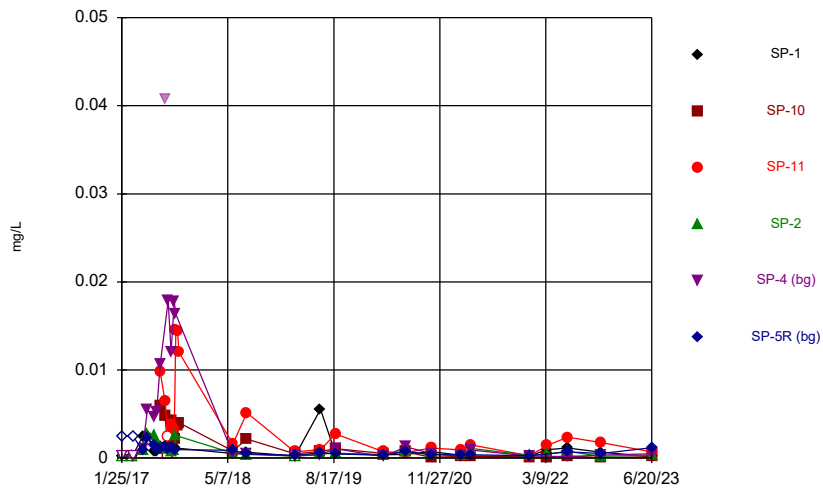
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### Time Series



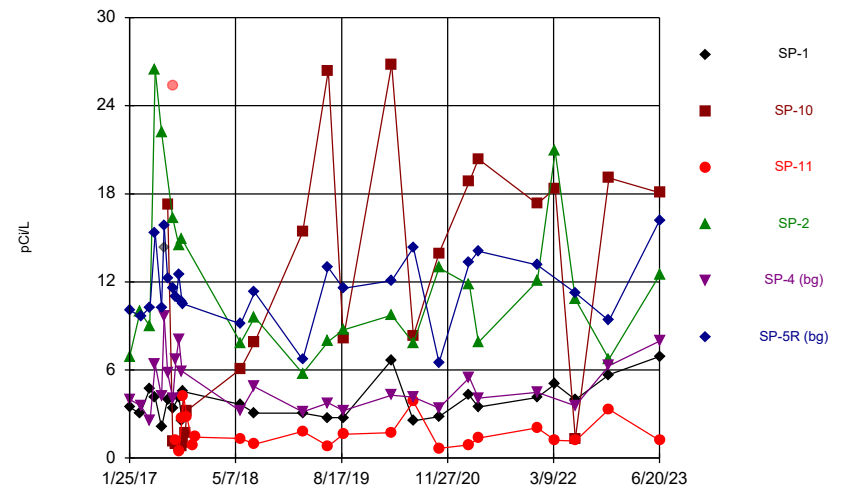
Constituent: Chromium Analysis Run 8/3/2023 4:42 PM View: Appendix B  
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### Time Series



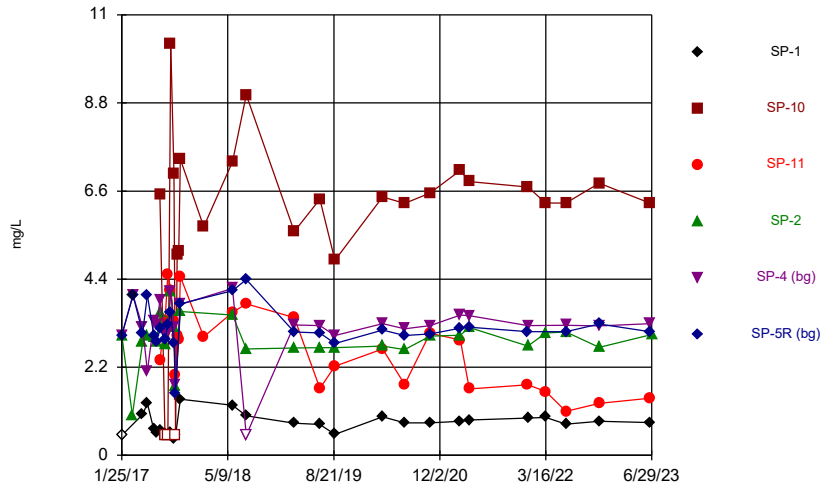
Constituent: Cobalt Analysis Run 8/3/2023 4:42 PM View: Appendix B  
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### Time Series



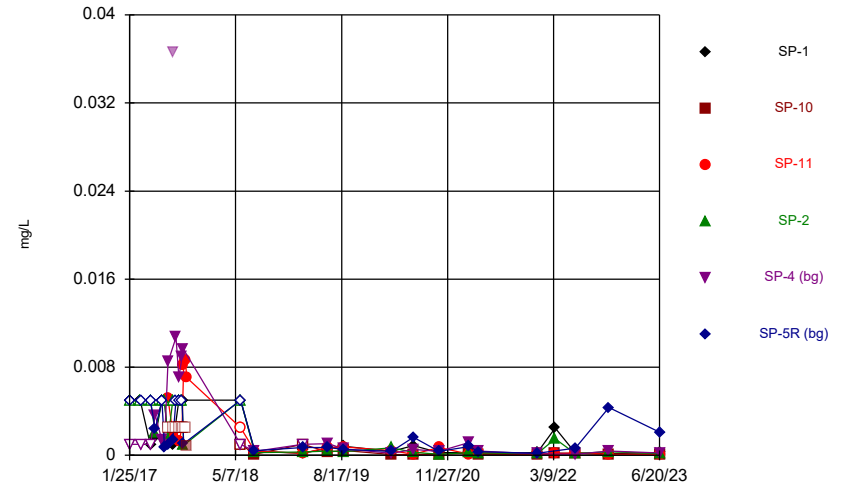
Constituent: Combined Radium 226 + 228 Analysis Run 8/3/2023 4:42 PM View: Appendix B  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Time Series



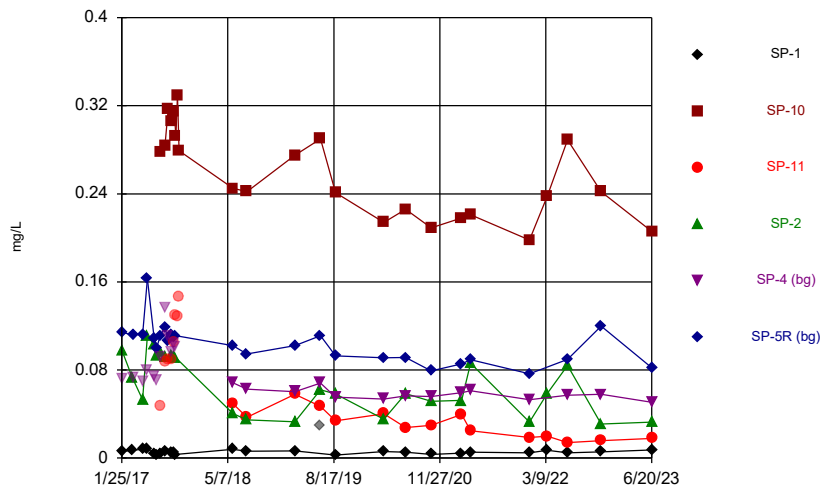
Constituent: Fluoride Analysis Run 8/3/2023 4:42 PM View: Appendix B  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Time Series



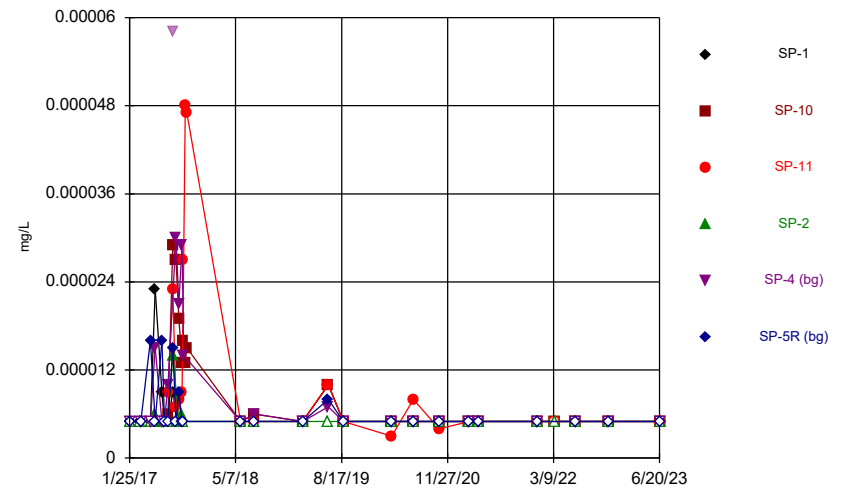
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Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Time Series



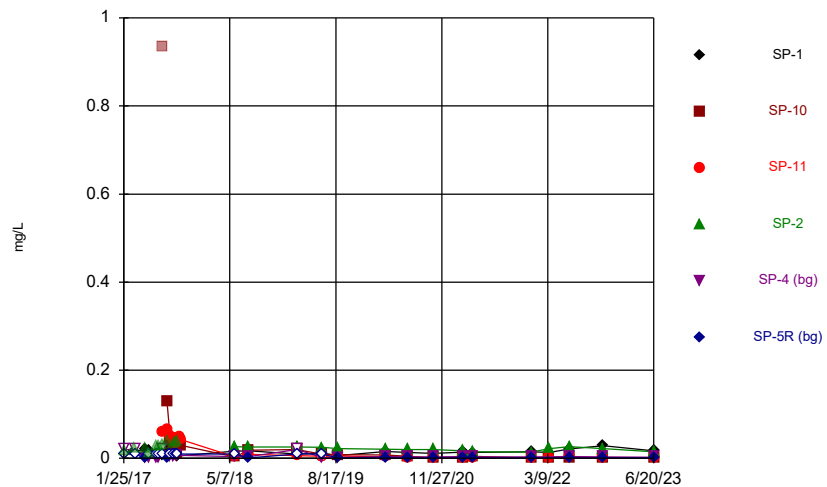
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Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Time Series



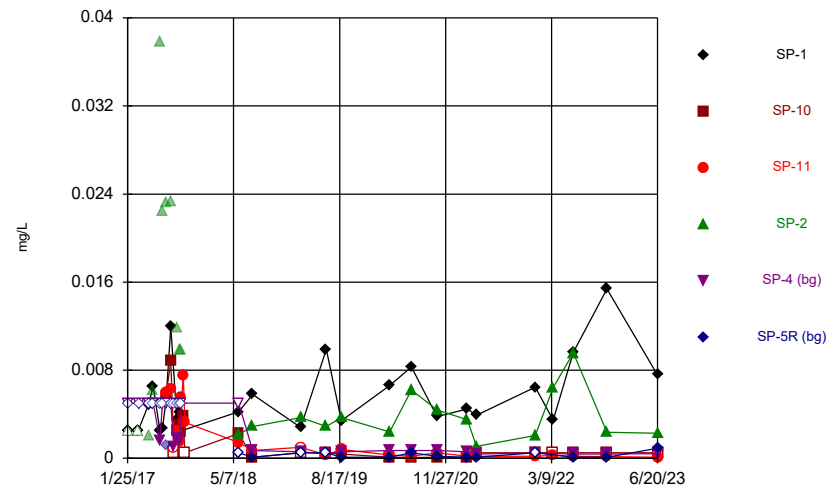
Constituent: Mercury Analysis Run 8/3/2023 4:42 PM View: Appendix B  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Time Series



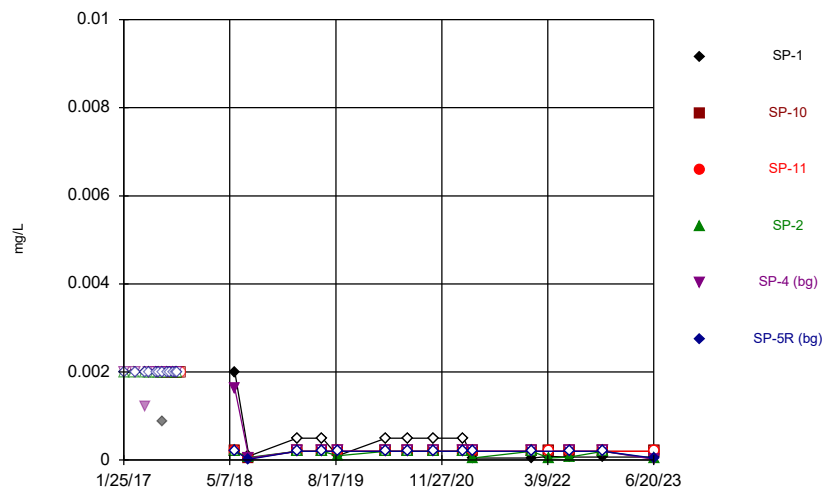
Constituent: Molybdenum Analysis Run 8/3/2023 4:42 PM View: Appendix B  
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Time Series



Constituent: Selenium Analysis Run 8/3/2023 4:42 PM View: Appendix B  
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

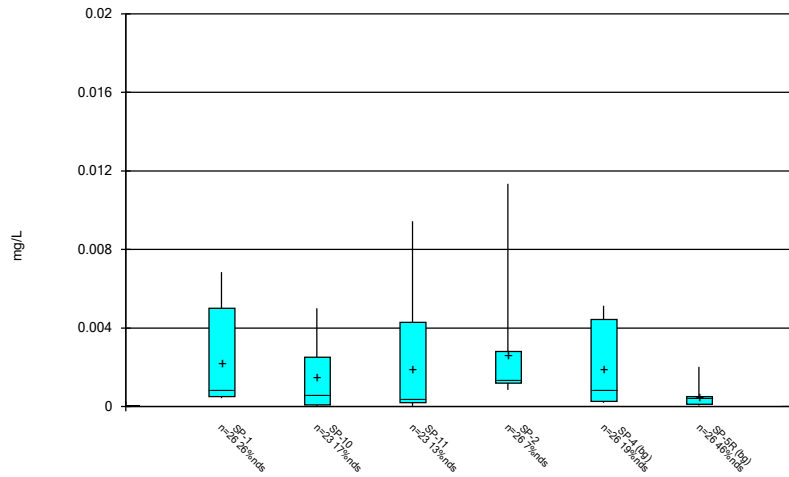
Time Series



Constituent: Thallium Analysis Run 8/3/2023 4:42 PM View: Appendix B  
 Northeastern BAP Client: Geosyntec Data: Northeastern BAP

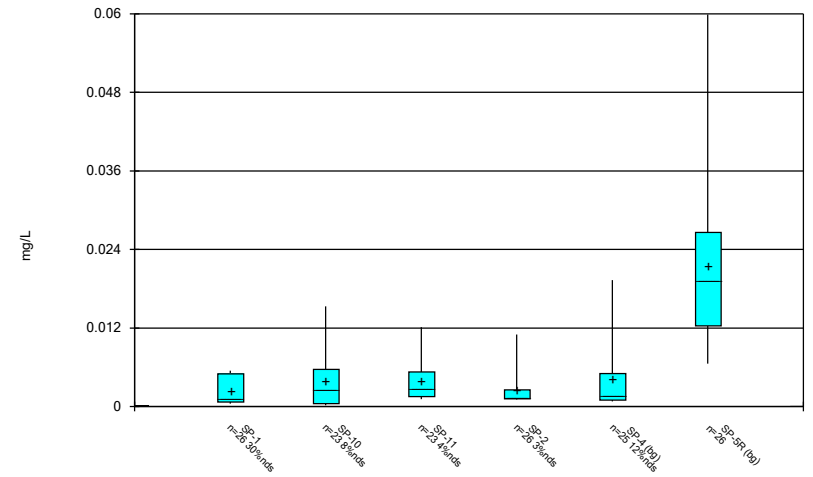
**FIGURE B**  
**Box Plots**

### Box & Whiskers Plot



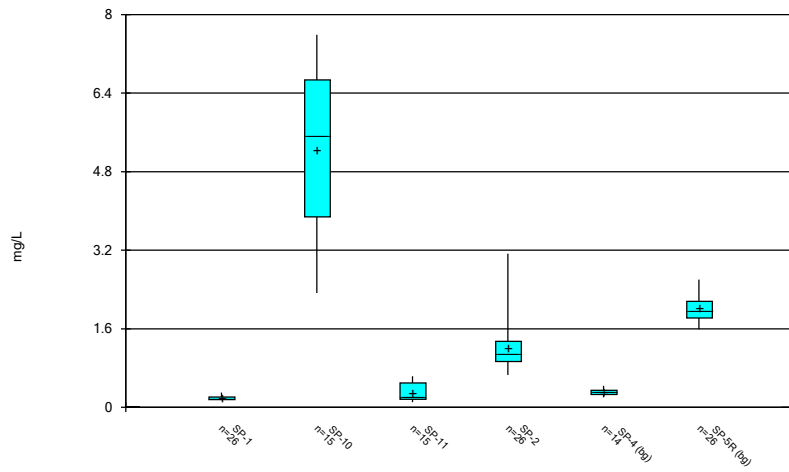
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### Box & Whiskers Plot



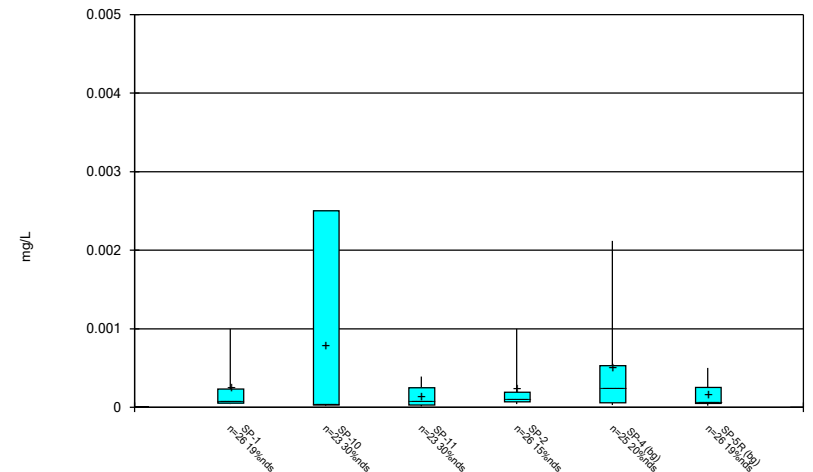
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### Box & Whiskers Plot



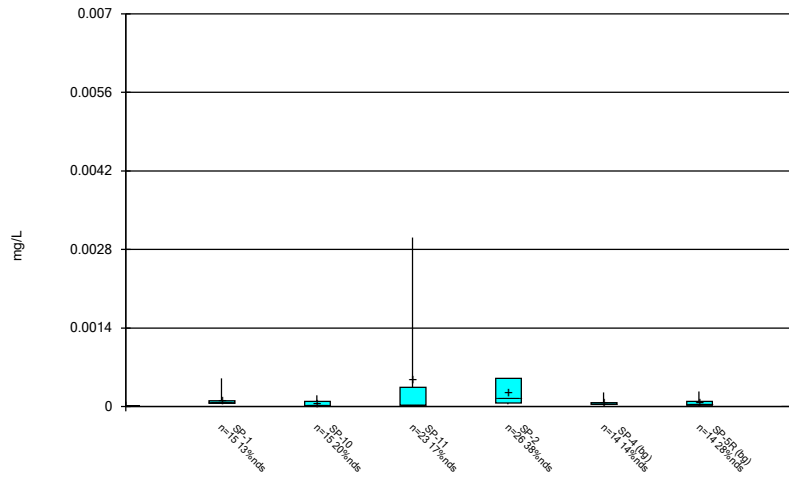
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### Box & Whiskers Plot



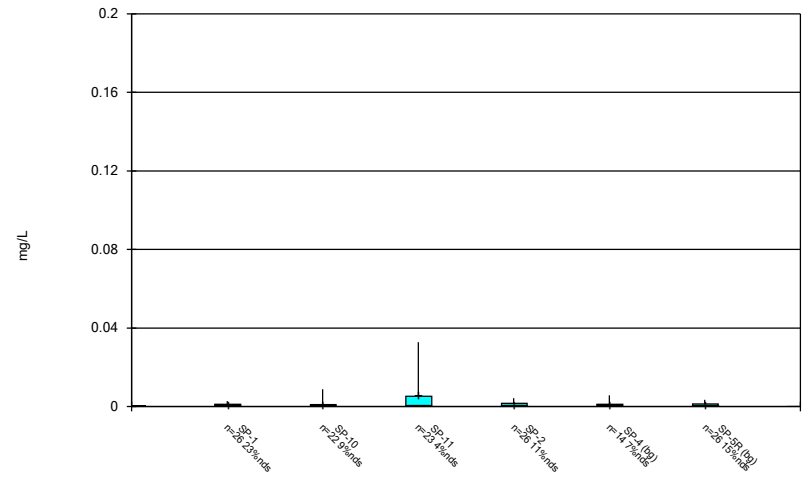
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Box & Whiskers Plot



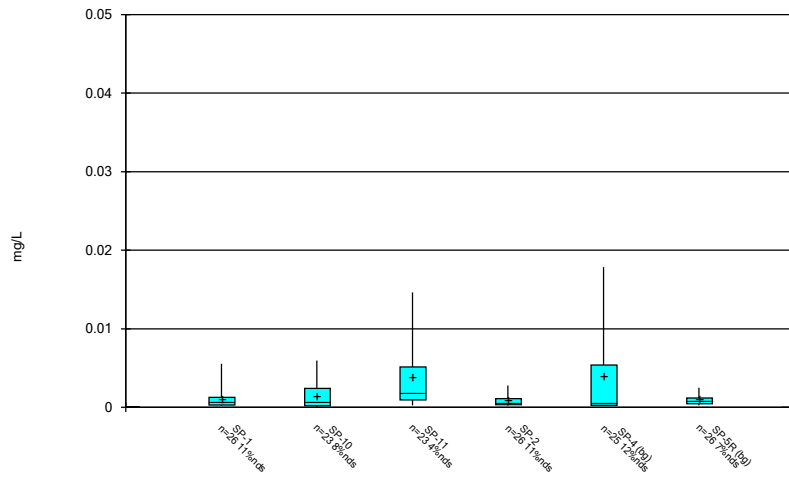
Constituent: Cadmium Analysis Run 8/3/2023 4:42 PM View: Appendix B  
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Box & Whiskers Plot



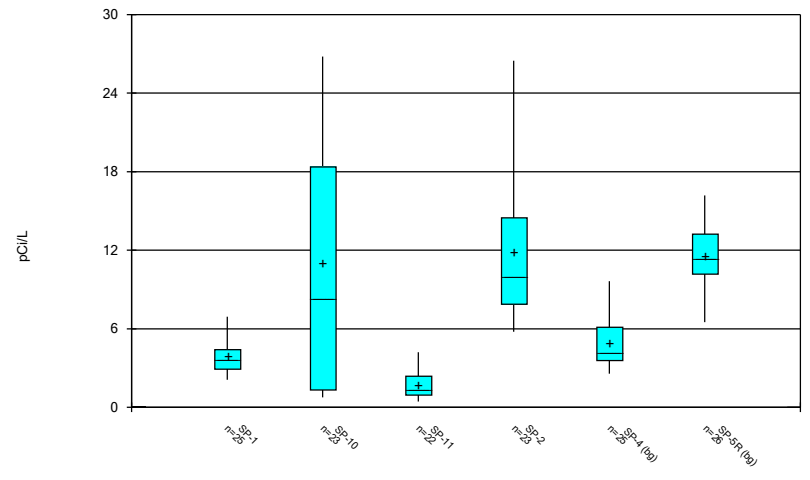
Constituent: Chromium Analysis Run 8/3/2023 4:42 PM View: Appendix B  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



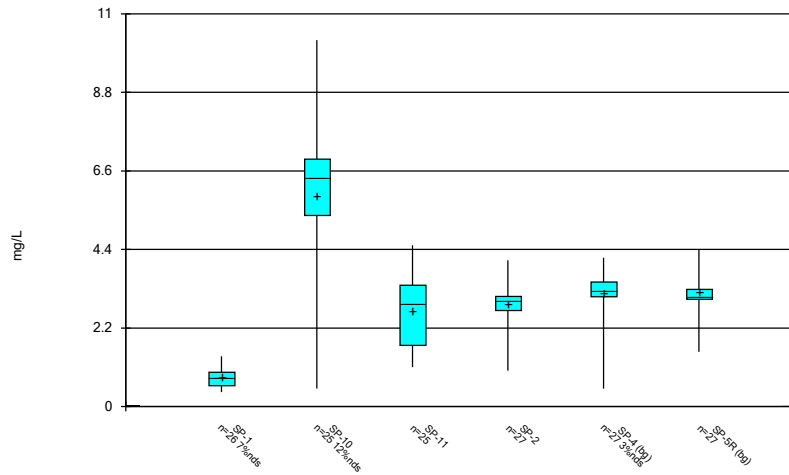
Constituent: Cobalt Analysis Run 8/3/2023 4:42 PM View: Appendix B  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



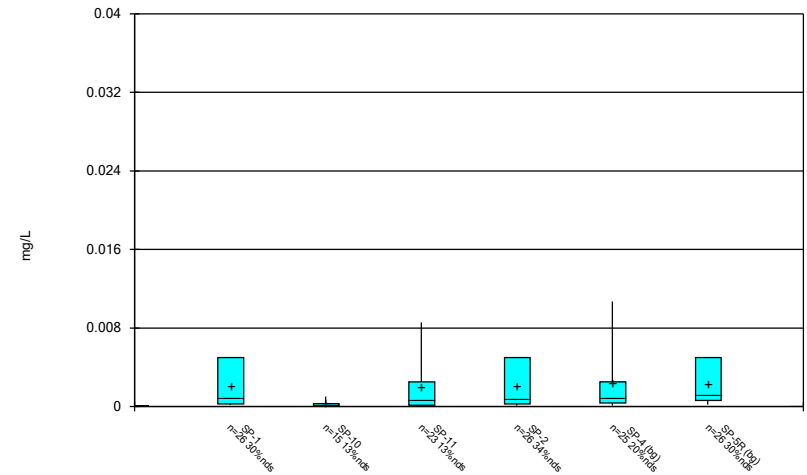
Constituent: Combined Radium 226 + 228 Analysis Run 8/3/2023 4:42 PM View: Appendix B  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

### Box & Whiskers Plot



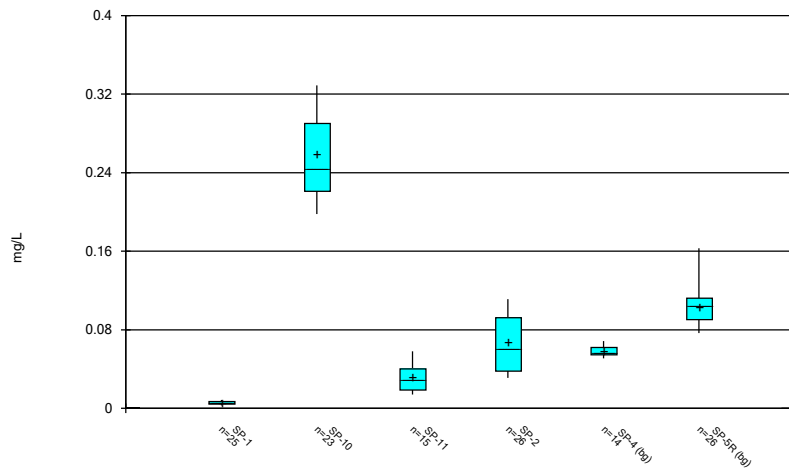
Constituent: Fluoride Analysis Run 8/3/2023 4:43 PM View: Appendix B  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

### Box & Whiskers Plot



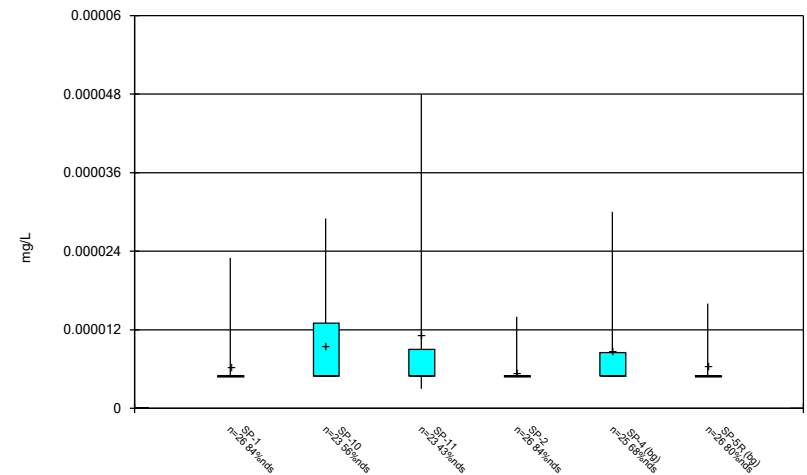
Constituent: Lead Analysis Run 8/3/2023 4:43 PM View: Appendix B  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

### Box & Whiskers Plot



Constituent: Lithium Analysis Run 8/3/2023 4:43 PM View: Appendix B  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

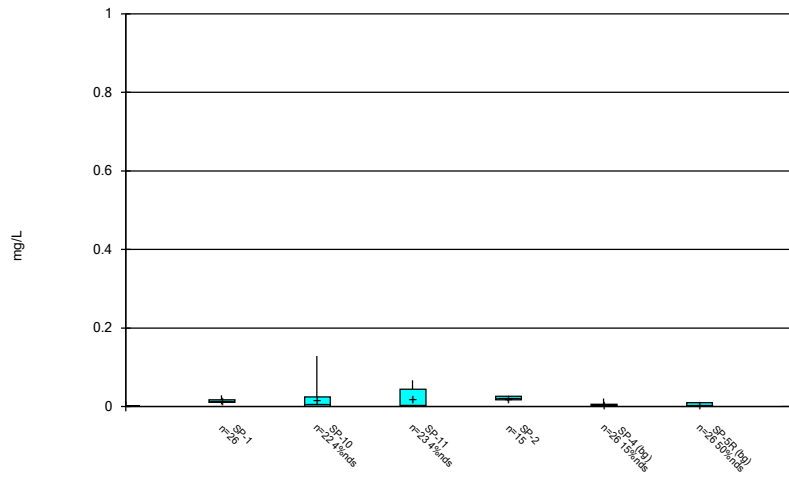
### Box & Whiskers Plot



Constituent: Mercury Analysis Run 8/3/2023 4:43 PM View: Appendix B  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

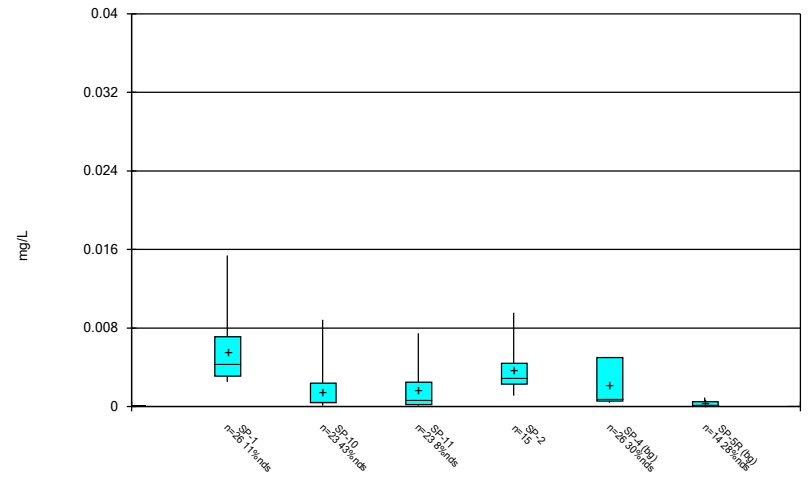


Box & Whiskers Plot



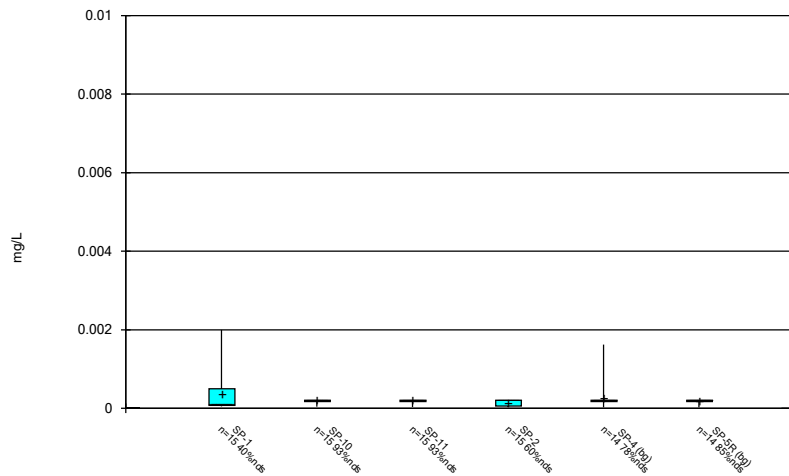
Constituent: Molybdenum Analysis Run 8/3/2023 4:43 PM View: Appendix B  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



Constituent: Selenium Analysis Run 8/3/2023 4:43 PM View: Appendix B  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



Constituent: Thallium Analysis Run 8/3/2023 4:43 PM View: Appendix B  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

FIGURE C  
Outlier Summary

# Outlier Summary

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 8/3/2023, 3:18 PM

	SP-4 Arsenic (mg/L)	SP-4 Beryllium (mg/L)	SP-10 Chromium (mg/L)	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)
3/13/2017					4 (o)					
6/27/2017				14.29 (o)						
7/13/2017			0.11 (o)							
8/4/2017	0.04498 (o)	0.00497 (o)		0.04069 (o)	25.367 (o)		0.03663 (o)			5.8E-05 (o)
6/20/2019									0.03 (Jo)	

	SP-10 Molybdenum (mg/L)
3/13/2017	
6/27/2017	
7/13/2017	0.934 (o)
8/4/2017	
6/20/2019	

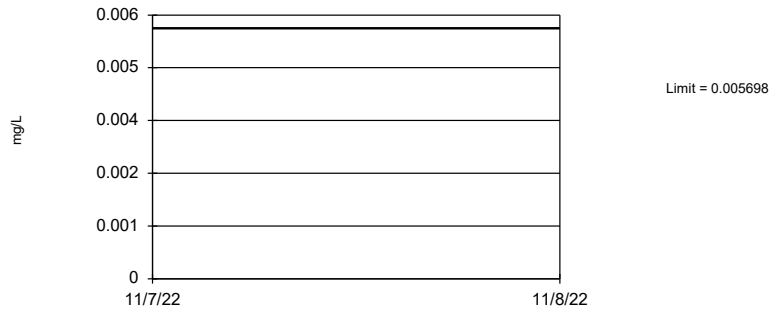
FIGURE D  
UTLs

# Upper Tolerance Limits Summary Table

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 2/13/2023, 11:12 AM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Antimony (mg/L)	n/a	0.005698	n/a	n/a	n/a	n/a 50	-7.963	1.354	34	Kaplan-Meier	ln(x)	0.05	Inter
Arsenic (mg/L)	n/a	0.0599	n/a	n/a	n/a	n/a 49	n/a	n/a	6.122	n/a	n/a	0.08099	NP Inter(normality)
Barium (mg/L)	n/a	2.6	n/a	n/a	n/a	n/a 38	n/a	n/a	0	n/a	n/a	0.1424	NP Inter(normality)
Beryllium (mg/L)	n/a	0.00212	n/a	n/a	n/a	n/a 49	n/a	n/a	20.41	n/a	n/a	0.08099	NP Inter(normality)
Cadmium (mg/L)	n/a	0.0002066	n/a	n/a	n/a	n/a 26	-10.48	0.8742	23.08	Kaplan-Meier	ln(x)	0.05	Inter
Chromium (mg/L)	n/a	0.003419	n/a	n/a	n/a	n/a 38	-7.327	0.7698	13.16	None	ln(x)	0.05	Inter
Cobalt (mg/L)	n/a	0.01786	n/a	n/a	n/a	n/a 49	n/a	n/a	10.2	n/a	n/a	0.08099	NP Inter(normality)
Combined Radium 226 + 228 (pCi/L)	n/a	15.84	n/a	n/a	n/a	n/a 49	n/a	n/a	0	n/a	n/a	0.08099	NP Inter(normality)
Fluoride (mg/L)	n/a	4.39	n/a	n/a	n/a	n/a 52	n/a	n/a	1.923	n/a	n/a	0.06944	NP Inter(normality)
Lead (mg/L)	n/a	0.0107	n/a	n/a	n/a	n/a 49	n/a	n/a	26.53	n/a	n/a	0.08099	NP Inter(normality)
Lithium (mg/L)	n/a	0.163	n/a	n/a	n/a	n/a 38	n/a	n/a	0	n/a	n/a	0.1424	NP Inter(normality)
Mercury (mg/L)	n/a	0.00003	n/a	n/a	n/a	n/a 49	n/a	n/a	73.47	n/a	n/a	0.08099	NP Inter(NDs)
Molybdenum (mg/L)	n/a	0.01	n/a	n/a	n/a	n/a 50	n/a	n/a	34	n/a	n/a	0.07694	NP Inter(normality)
Selenium (mg/L)	n/a	0.00499	n/a	n/a	n/a	n/a 38	n/a	n/a	31.58	n/a	n/a	0.1424	NP Inter(normality)
Thallium (mg/L)	n/a	0.00162	n/a	n/a	n/a	n/a 26	n/a	n/a	88.46	n/a	n/a	0.2635	NP Inter(NDs)

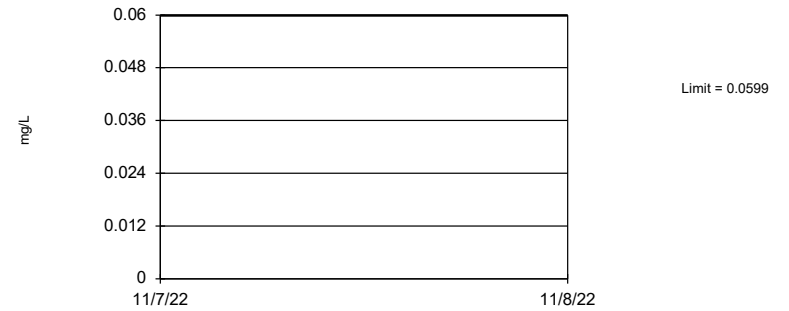
Tolerance Limit  
Interwell Parametric



95% coverage. Background Data Summary (based on natural log transformation) (after Kaplan-Meier Adjustment): Mean=7.963, Std. Dev.=1.354, n=50, 34% NDs. Normality test: Shapiro Francia @alpha = 0.01, calculated = 0.9543, critical = 0.935. Report alpha = 0.05.

Constituent: Antimony Analysis Run 2/13/2023 11:11 AM View: Upper Tolerance Limits  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

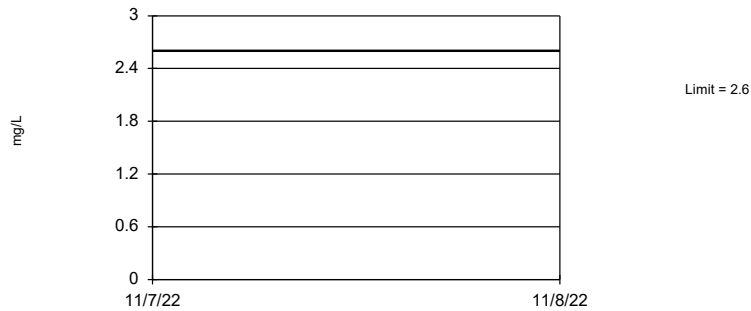
Tolerance Limit  
Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 49 background values. 6.122% NDs. 91.21% coverage at alpha=0.01; 93.95% coverage at alpha=0.05; 98.63% coverage at alpha=0.5. Report alpha = 0.08099.

Constituent: Arsenic Analysis Run 2/13/2023 11:11 AM View: Upper Tolerance Limits  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

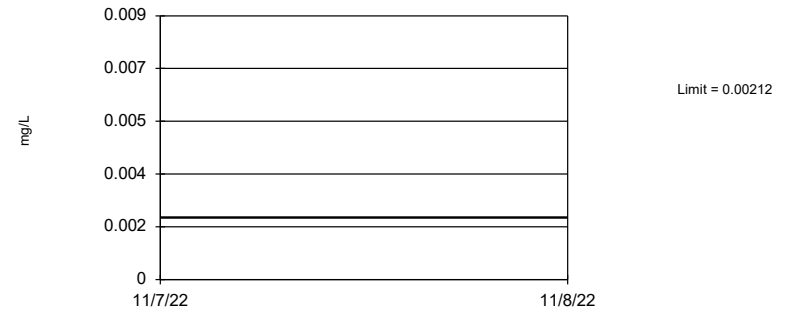
Tolerance Limit  
Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 38 background values. 88.48% coverage at alpha=0.01; 92.38% coverage at alpha=0.05; 98.24% coverage at alpha=0.5. Report alpha = 0.1424.

Constituent: Barium Analysis Run 2/13/2023 11:11 AM View: Upper Tolerance Limits  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

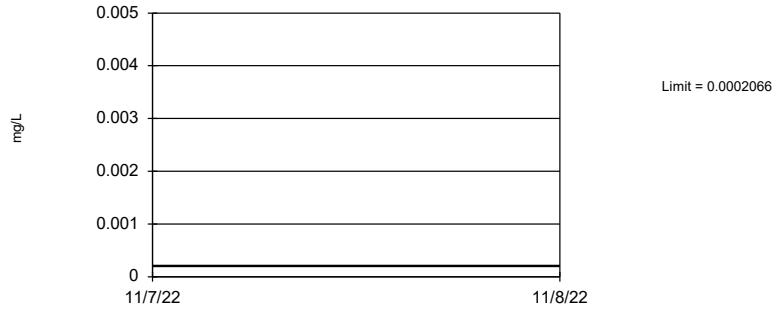
Tolerance Limit  
Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 49 background values. 20.41% NDs. 91.21% coverage at alpha=0.01; 93.95% coverage at alpha=0.05; 98.63% coverage at alpha=0.5. Report alpha = 0.08099.

Constituent: Beryllium Analysis Run 2/13/2023 11:11 AM View: Upper Tolerance Limits  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

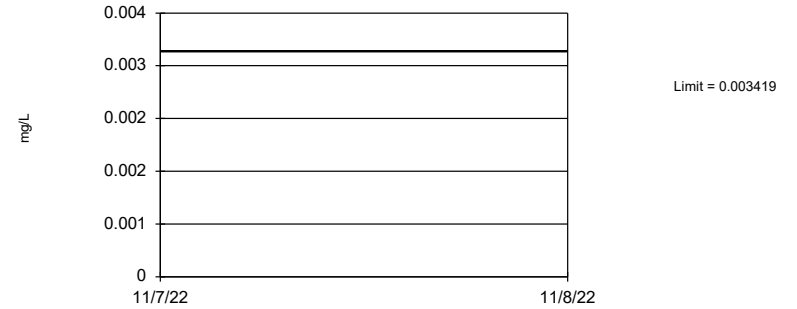
Tolerance Limit  
Interwell Parametric



95% coverage. Background Data Summary (based on natural log transformation) (after Kaplan-Meier Adjustment): Mean=-10.48, Std. Dev.=0.8742, n=26, 23.08% NDs. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9372, critical = 0.891. Report alpha = 0.05.

Constituent: Cadmium Analysis Run 2/13/2023 11:11 AM View: Upper Tolerance Limits  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

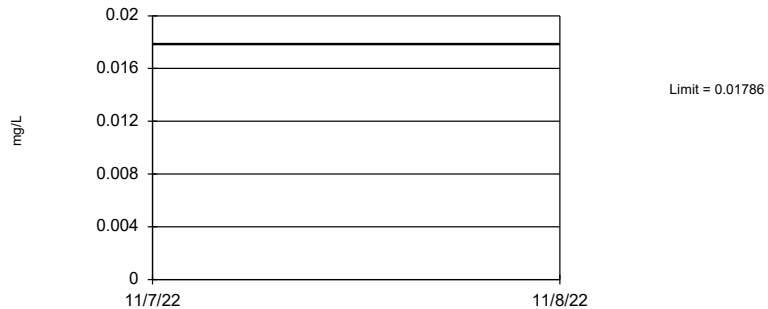
Tolerance Limit  
Interwell Parametric



95% coverage. Background Data Summary (based on natural log transformation): Mean=-7.327, Std. Dev.=0.7698, n=38, 13.16% NDs. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9508, critical = 0.916. Report alpha = 0.05.

Constituent: Chromium Analysis Run 2/13/2023 11:11 AM View: Upper Tolerance Limits  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Tolerance Limit  
Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 49 background values. 10.2% NDs. 91.21% coverage at alpha=0.01; 93.95% coverage at alpha=0.05; 98.63% coverage at alpha=0.5. Report alpha = 0.08099.

Constituent: Cobalt Analysis Run 2/13/2023 11:11 AM View: Upper Tolerance Limits  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

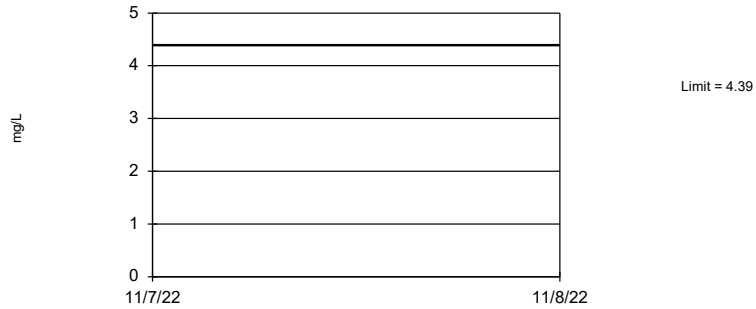
Tolerance Limit  
Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 49 background values. 91.21% coverage at alpha=0.01; 93.95% coverage at alpha=0.05; 98.63% coverage at alpha=0.5. Report alpha = 0.08099.

Constituent: Combined Radium 226 + 228 Analysis Run 2/13/2023 11:11 AM View: Upper Tolerance Limit  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

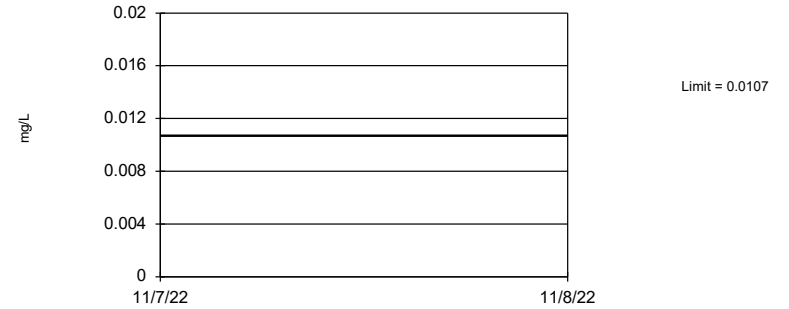
### Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Francia normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 52 background values. 1.923% NDs. 91.6% coverage at alpha=0.01; 94.34% coverage at alpha=0.05; 98.63% coverage at alpha=0.5. Report alpha = 0.06944.

Constituent: Fluoride Analysis Run 2/13/2023 11:11 AM View: Upper Tolerance Limits  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

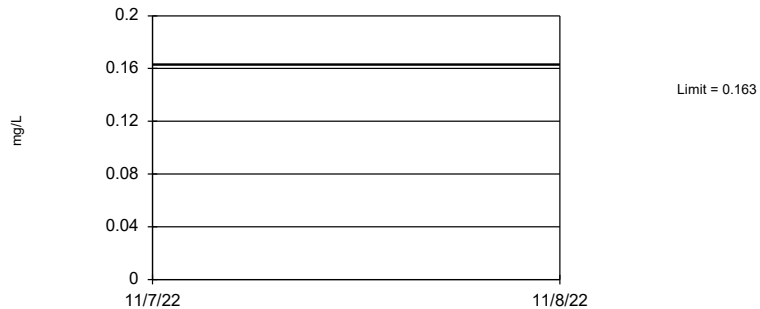
### Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 49 background values. 26.53% NDs. 91.21% coverage at alpha=0.01; 93.95% coverage at alpha=0.05; 98.63% coverage at alpha=0.5. Report alpha = 0.08099.

Constituent: Lead Analysis Run 2/13/2023 11:11 AM View: Upper Tolerance Limits  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

### Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 38 background values. 88.48% coverage at alpha=0.01; 92.38% coverage at alpha=0.05; 98.24% coverage at alpha=0.5. Report alpha = 0.1424.

Constituent: Lithium Analysis Run 2/13/2023 11:11 AM View: Upper Tolerance Limits  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

### Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 49 background values. 73.47% NDs. 91.21% coverage at alpha=0.01; 93.95% coverage at alpha=0.05; 98.63% coverage at alpha=0.5. Report alpha = 0.08099.

Constituent: Mercury Analysis Run 2/13/2023 11:11 AM View: Upper Tolerance Limits  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP



### Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Francia normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 50 background values. 34% NDs. 91.21% coverage at alpha=0.01; 94.34% coverage at alpha=0.05; 98.63% coverage at alpha=0.5. Report alpha = 0.07694.

Constituent: Molybdenum Analysis Run 2/13/2023 11:11 AM View: Upper Tolerance Limits  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

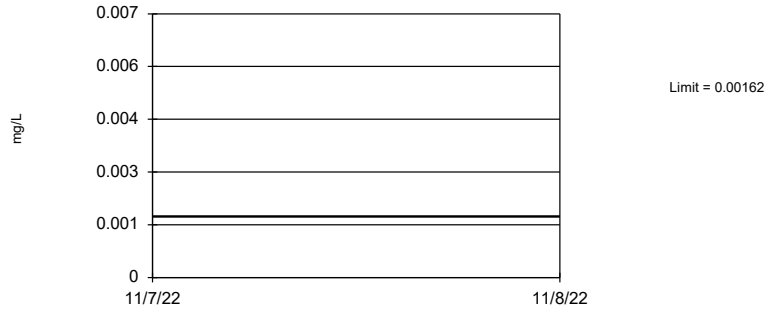
### Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 38 background values. 31.58% NDs. 88.48% coverage at alpha=0.01; 92.38% coverage at alpha=0.05; 98.24% coverage at alpha=0.5. Report alpha = 0.1424.

Constituent: Selenium Analysis Run 2/13/2023 11:11 AM View: Upper Tolerance Limits  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

### Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 26 background values. 88.46% NDs. 83.79% coverage at alpha=0.01; 89.26% coverage at alpha=0.05; 97.46% coverage at alpha=0.5. Report alpha = 0.2635.

Constituent: Thallium Analysis Run 2/13/2023 11:11 AM View: Upper Tolerance Limits  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

FIGURE E  
GWPS

<b>NORTHEASTERN BAP GWPS</b>				
<b>Constituent Name</b>	<b>MCL</b>	<b>CCR- Rule Specified Level</b>	<b>Background Limit</b>	<b>GWPS</b>
Antimony, Total (mg/L)	0.006		0.0057	0.006
Arsenic, Total (mg/L)	0.01		0.06	0.06
Barium, Total (mg/L)	2		2.6	2.6
Beryllium, Total (mg/L)	0.004		0.0021	0.004
Cadmium, Total (mg/L)	0.005		0.00021	0.005
Chromium, Total (mg/L)	0.1		0.034	0.1
Cobalt, Total (mg/L)	n/a	0.006	0.018	0.018
Combined Radium, Total (pCi/L)	5		15.84	15.84
Fluoride, Total (mg/L)	4		4.39	4.39
Lead, Total (mg/L)	n/a	0.015	0.011	0.015
Lithium, Total (mg/L)	n/a	0.04	0.16	0.16
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*

*\*GWPS = Groundwater Protection Standard*

*\*MCL = Maximum Contaminant Level*

*\*CCR = Coal Combustion Residuals*

FIGURE F  
Confidence Interval

# Confidence Intervals - Significant Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 8/8/2023, 2:19 PM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Lower Compl.	Sig.	N	Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Barium (mg/L)	SP-10	6.384	4.072	2.6	n/a	Yes	15	5.228	1.705	0	None	No	0.01	Param.
Fluoride (mg/L)	SP-10	7.156	5.356	4.39	n/a	Yes	25	5.894	2.328	12	None	x^2	0.01	Param.
Lithium (mg/L)	SP-10	0.2797	0.238	0.16	n/a	Yes	23	0.2589	0.03989	0	None	No	0.01	Param.

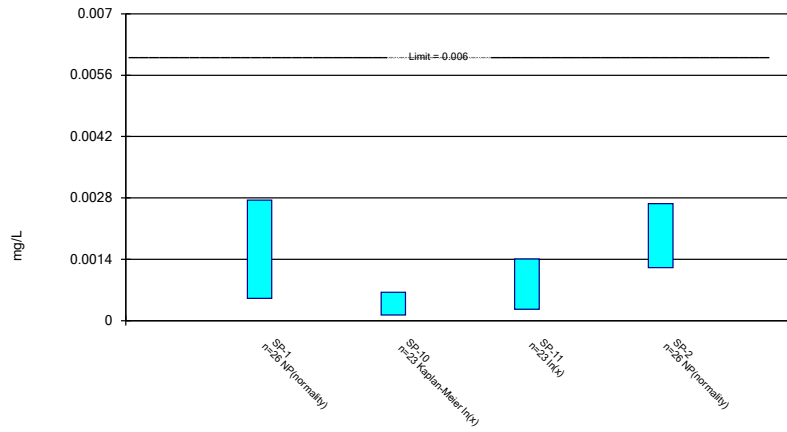
# Confidence Intervals - All Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 8/8/2023, 2:19 PM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Lower Compl.	Sig.	N	Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Antimony (mg/L)	SP-1	0.00275	0.00051	0.006	n/a	No	26	0.002205	0.002149	26.92	None	No	0.01	NP (normality)
Antimony (mg/L)	SP-10	0.0006446	0.0001272	0.006	n/a	No	23	0.001552	0.001939	17.39	Kaplan-Meier	ln(x)	0.01	Param.
Antimony (mg/L)	SP-11	0.001405	0.000259	0.006	n/a	No	23	0.001937	0.002841	13.04	None	ln(x)	0.01	Param.
Antimony (mg/L)	SP-2	0.00267	0.00121	0.006	n/a	No	26	0.002564	0.0025	7.692	None	No	0.01	NP (normality)
Arsenic (mg/L)	SP-1	0.005	0.00069	0.06	n/a	No	26	0.00235	0.002046	30.77	None	No	0.01	NP (normality)
Arsenic (mg/L)	SP-10	0.004912	0.001223	0.06	n/a	No	23	0.003837	0.004387	8.696	None	sqrt(x)	0.01	Param.
Arsenic (mg/L)	SP-11	0.004908	0.002257	0.06	n/a	No	23	0.0039	0.002935	4.348	None	sqrt(x)	0.01	Param.
Arsenic (mg/L)	SP-2	0.00251	0.00121	0.06	n/a	No	26	0.002521	0.002492	3.846	None	No	0.01	NP (normality)
Barium (mg/L)	SP-1	0.1994	0.1647	2.6	n/a	No	26	0.1833	0.03753	0	None	sqrt(x)	0.01	Param.
<b>Barium (mg/L)</b>	<b>SP-10</b>	<b>6.384</b>	<b>4.072</b>	<b>2.6</b>	<b>n/a</b>	<b>Yes</b>	<b>15</b>	<b>5.228</b>	<b>1.705</b>	<b>0</b>	<b>None</b>	<b>No</b>	<b>0.01</b>	<b>Param.</b>
Barium (mg/L)	SP-11	0.3995	0.1761	2.6	n/a	No	15	0.2995	0.1758	0	None	sqrt(x)	0.01	Param.
Barium (mg/L)	SP-2	1.332	0.9783	2.6	n/a	No	26	1.206	0.4826	0	None	ln(x)	0.01	Param.
Beryllium (mg/L)	SP-1	0.0002	0.000054	0.004	n/a	No	26	0.0002639	0.0003696	19.23	None	No	0.01	NP (normality)
Beryllium (mg/L)	SP-10	0.0025	0.00003	0.004	n/a	No	23	0.000787	0.001159	30.43	None	No	0.01	NP (normality)
Beryllium (mg/L)	SP-11	0.00025	0.000027	0.004	n/a	No	23	0.0001539	0.0001331	30.43	None	No	0.01	NP (normality)
Beryllium (mg/L)	SP-2	0.00018	0.00007	0.004	n/a	No	26	0.0002368	0.0003355	15.38	None	No	0.01	NP (normality)
Cadmium (mg/L)	SP-1	0.00025	0.000051	0.005	n/a	No	15	0.0001234	0.000123	13.33	None	No	0.01	NP (normality)
Cadmium (mg/L)	SP-10	0.0002	0.00001	0.005	n/a	No	15	0.0000606	0.00007471	20	None	No	0.01	NP (normality)
Cadmium (mg/L)	SP-11	0.00034	0.00002	0.005	n/a	No	23	0.0004828	0.0009419	17.39	None	No	0.01	NP (normality)
Cadmium (mg/L)	SP-2	0.0005	0.000063	0.005	n/a	No	26	0.0002557	0.0002073	38.46	None	No	0.01	NP (normality)
Chromium (mg/L)	SP-1	0.001097	0.0005286	0.1	n/a	No	26	0.001008	0.0006751	23.08	Kaplan-Meier	sqrt(x)	0.01	Param.
Chromium (mg/L)	SP-10	0.000981	0.0003212	0.1	n/a	No	22	0.001057	0.001827	9.091	None	ln(x)	0.01	Param.
Chromium (mg/L)	SP-11	0.00525	0.000379	0.1	n/a	No	23	0.006047	0.0107	4.348	None	No	0.01	NP (normality)
Chromium (mg/L)	SP-2	0.001474	0.0005998	0.1	n/a	No	26	0.001184	0.001096	11.54	None	sqrt(x)	0.01	Param.
Cobalt (mg/L)	SP-1	0.001182	0.0004726	0.018	n/a	No	26	0.001013	0.001123	11.54	None	x^(1/3)	0.01	Param.
Cobalt (mg/L)	SP-10	0.001962	0.0004423	0.018	n/a	No	23	0.00154	0.001793	8.696	None	sqrt(x)	0.01	Param.
Cobalt (mg/L)	SP-11	0.004598	0.001359	0.018	n/a	No	23	0.003888	0.004472	4.348	None	x^(1/3)	0.01	Param.
Cobalt (mg/L)	SP-2	0.001011	0.0004548	0.018	n/a	No	26	0.0008552	0.0007488	11.54	None	x^(1/3)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	SP-1	4.487	3.263	15.84	n/a	No	25	3.875	1.228	0	None	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	SP-10	15.62	6.401	15.84	n/a	No	23	11.01	8.809	0	None	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	SP-11	2.118	1.116	15.84	n/a	No	22	1.709	1.036	0	None	sqrt(x)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	SP-2	14.05	9.011	15.84	n/a	No	23	11.88	5.323	0	None	sqrt(x)	0.01	Param.
Fluoride (mg/L)	SP-1	0.9342	0.6872	4.39	n/a	No	26	0.8107	0.2534	7.692	None	No	0.01	Param.
<b>Fluoride (mg/L)</b>	<b>SP-10</b>	<b>7.156</b>	<b>5.356</b>	<b>4.39</b>	<b>n/a</b>	<b>Yes</b>	<b>25</b>	<b>5.894</b>	<b>2.328</b>	<b>12</b>	<b>None</b>	<b>x^2</b>	<b>0.01</b>	<b>Param.</b>
Fluoride (mg/L)	SP-11	3.18	2.179	4.39	n/a	No	25	2.679	1.004	0	None	No	0.01	Param.
Fluoride (mg/L)	SP-2	3.172	2.688	4.39	n/a	No	27	2.887	0.568	0	None	x^2	0.01	Param.
Lead (mg/L)	SP-1	0.00247	0.000254	0.015	n/a	No	26	0.002002	0.002101	30.77	None	No	0.01	NP (normality)
Lead (mg/L)	SP-10	0.0003167	0.00008644	0.015	n/a	No	15	0.0002687	0.0003159	13.33	None	ln(x)	0.01	Param.
Lead (mg/L)	SP-11	0.001519	0.000295	0.015	n/a	No	23	0.001913	0.002687	13.04	None	ln(x)	0.01	Param.
Lead (mg/L)	SP-2	0.005	0.000253	0.015	n/a	No	26	0.002095	0.002203	34.62	None	No	0.01	NP (normality)
Lithium (mg/L)	SP-1	0.006273	0.004705	0.16	n/a	No	25	0.005489	0.001573	0	None	No	0.01	Param.
<b>Lithium (mg/L)</b>	<b>SP-10</b>	<b>0.2797</b>	<b>0.238</b>	<b>0.16</b>	<b>n/a</b>	<b>Yes</b>	<b>23</b>	<b>0.2589</b>	<b>0.03989</b>	<b>0</b>	<b>None</b>	<b>No</b>	<b>0.01</b>	<b>Param.</b>
Lithium (mg/L)	SP-11	0.04072	0.02244	0.16	n/a	No	15	0.03158	0.01349	0	None	No	0.01	Param.
Lithium (mg/L)	SP-2	0.07999	0.05429	0.16	n/a	No	26	0.06714	0.02637	0	None	No	0.01	Param.
Mercury (mg/L)	SP-1	0.000009	0.000005	0.002	n/a	No	26	0.000006192	0.00000371	84.62	None	No	0.01	NP (NDs)
Mercury (mg/L)	SP-10	0.000013	0.000005	0.002	n/a	No	23	0.000009522	0.000007267	56.52	None	No	0.01	NP (NDs)
Mercury (mg/L)	SP-11	0.000009	0.000005	0.002	n/a	No	23	0.00001122	0.00001282	43.48	None	No	0.01	NP (normality)
Mercury (mg/L)	SP-2	0.000005	0.000005	0.002	n/a	No	26	0.000005423	0.00000177	84.62	None	No	0.01	NP (NDs)
Molybdenum (mg/L)	SP-1	0.01656	0.01139	0.1	n/a	No	26	0.01397	0.005312	0	None	No	0.01	Param.
Molybdenum (mg/L)	SP-10	0.01887	0.00297	0.1	n/a	No	22	0.01726	0.02817	4.545	None	x^(1/3)	0.01	Param.
Molybdenum (mg/L)	SP-11	0.04433	0.002	0.1	n/a	No	23	0.01941	0.02334	4.348	None	No	0.01	NP (normality)
Molybdenum (mg/L)	SP-2	0.02417	0.01811	0.1	n/a	No	15	0.02114	0.004469	0	None	No	0.01	Param.
Selenium (mg/L)	SP-1	0.006678	0.003883	0.05	n/a	No	26	0.005567	0.003255	11.54	None	sqrt(x)	0.01	Param.
Selenium (mg/L)	SP-10	0.0008877	0.0001458	0.05	n/a	No	23	0.001499	0.002161	43.48	Kaplan-Meier	ln(x)	0.01	Param.
Selenium (mg/L)	SP-11	0.001502	0.0003588	0.05	n/a	No	23	0.001738	0.002295	8.696	None	ln(x)	0.01	Param.
Selenium (mg/L)	SP-2	0.004896	0.002271	0.05	n/a	No	15	0.003712	0.00219	0	None	sqrt(x)	0.01	Param.
Thallium (mg/L)	SP-1	0.0005	0.00007	0.002	n/a	No	15	0.000372	0.0004977	40	None	No	0.01	NP (normality)
Thallium (mg/L)	SP-10	0.0002	0.00004	0.002	n/a	No	15	0.0001893	0.00004131	93.33	None	No	0.01	NP (NDs)
Thallium (mg/L)	SP-11	0.0002	0.00003	0.002	n/a	No	15	0.0001887	0.00004389	93.33	None	No	0.01	NP (NDs)
Thallium (mg/L)	SP-2	0.0002	0.00005	0.002	n/a	No	15	0.000144	0.00007239	60	None	No	0.01	NP (NDs)

### Parametric and Non-Parametric (NP) Confidence Interval

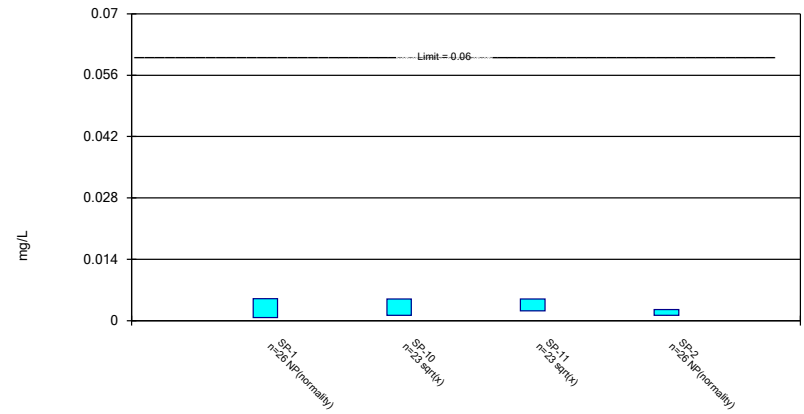
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Antimony Analysis Run 8/8/2023 2:18 PM View: Confidence Intervals  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

### Parametric and Non-Parametric (NP) Confidence Interval

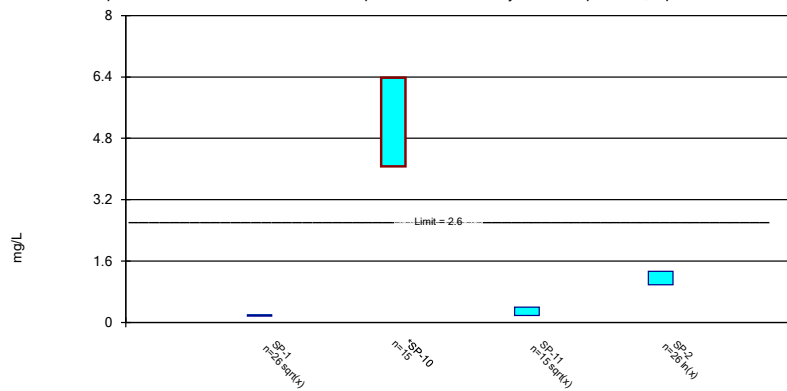
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Arsenic Analysis Run 8/8/2023 2:18 PM View: Confidence Intervals  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

### Parametric Confidence Interval

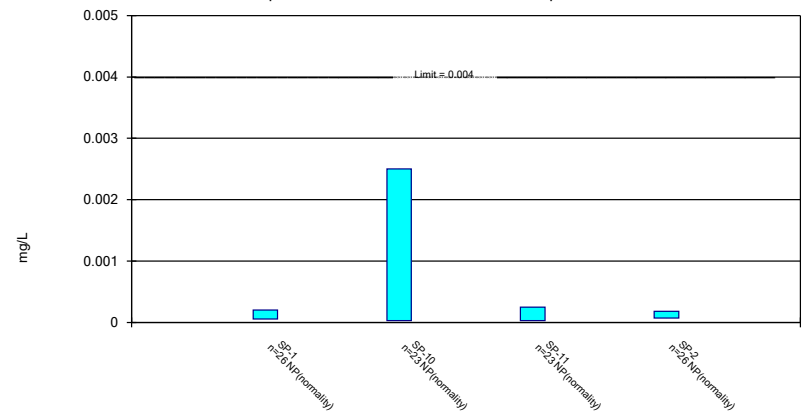
Compliance limit is exceeded.\* Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Barium Analysis Run 8/8/2023 2:18 PM View: Confidence Intervals  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

### Non-Parametric Confidence Interval

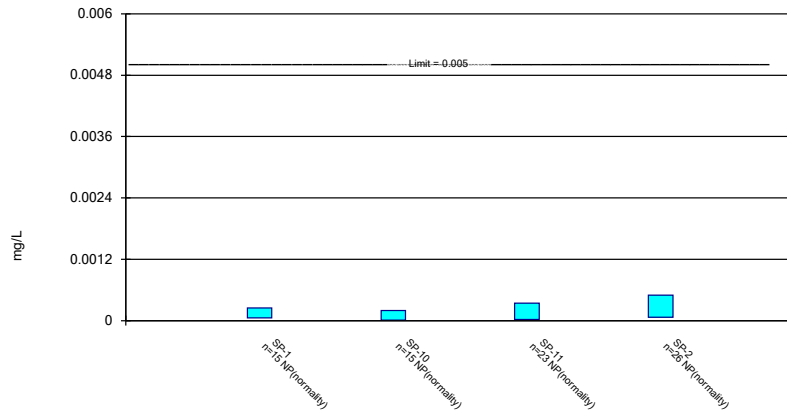
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Beryllium Analysis Run 8/8/2023 2:18 PM View: Confidence Intervals  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

### Non-Parametric Confidence Interval

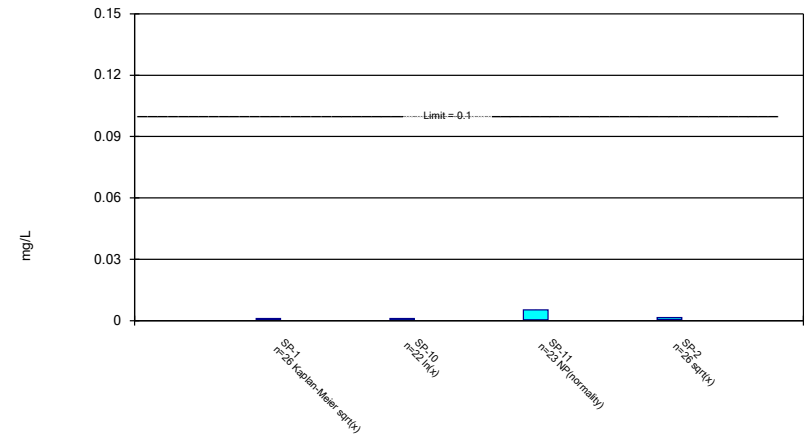
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Cadmium Analysis Run 8/8/2023 2:18 PM View: Confidence Intervals  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

### Parametric and Non-Parametric (NP) Confidence Interval

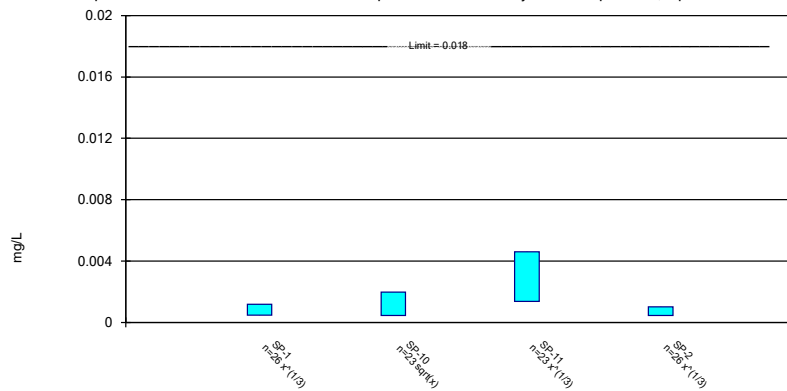
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Chromium Analysis Run 8/8/2023 2:18 PM View: Confidence Intervals  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

### Parametric Confidence Interval

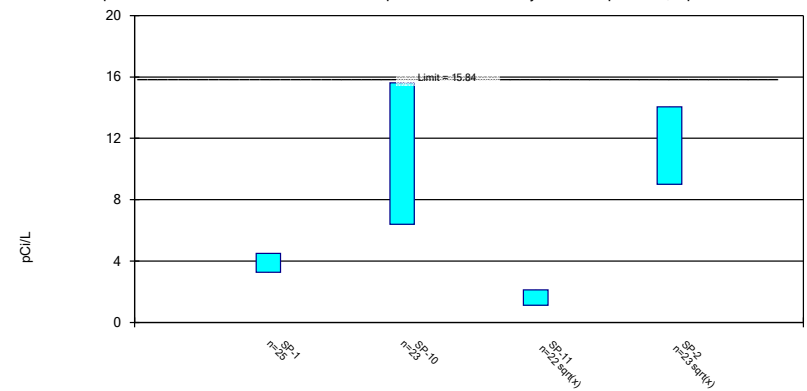
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Cobalt Analysis Run 8/8/2023 2:18 PM View: Confidence Intervals  
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.

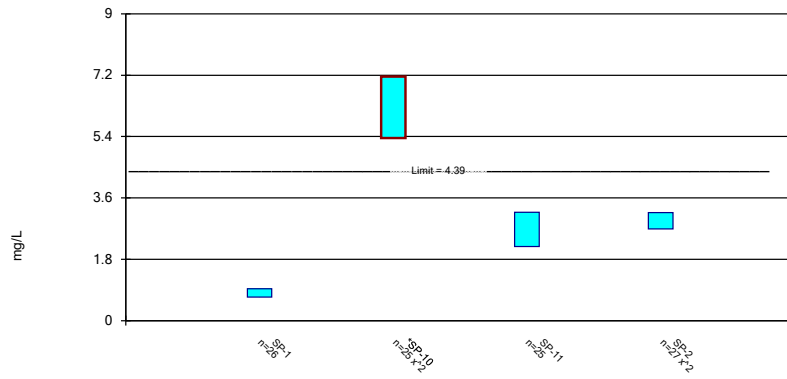


Constituent: Combined Radium 226 + 228 Analysis Run 8/8/2023 2:18 PM View: Confidence Intervals  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP



### Parametric Confidence Interval

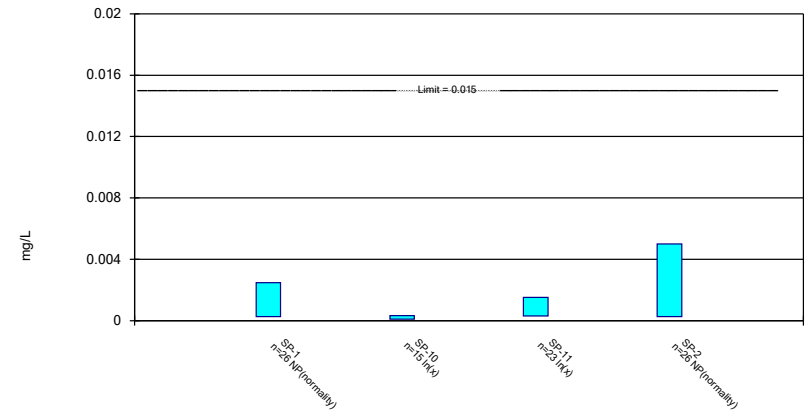
Compliance limit is exceeded.\* Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Fluoride Analysis Run 8/8/2023 2:18 PM View: Confidence Intervals  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

### Parametric and Non-Parametric (NP) Confidence Interval

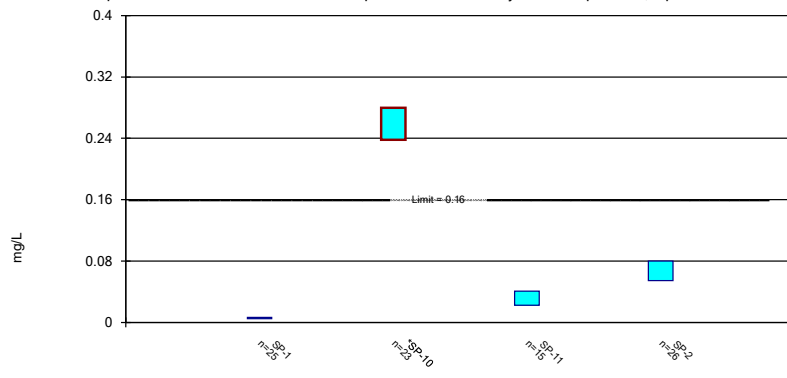
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Lead Analysis Run 8/8/2023 2:18 PM View: Confidence Intervals  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

### Parametric Confidence Interval

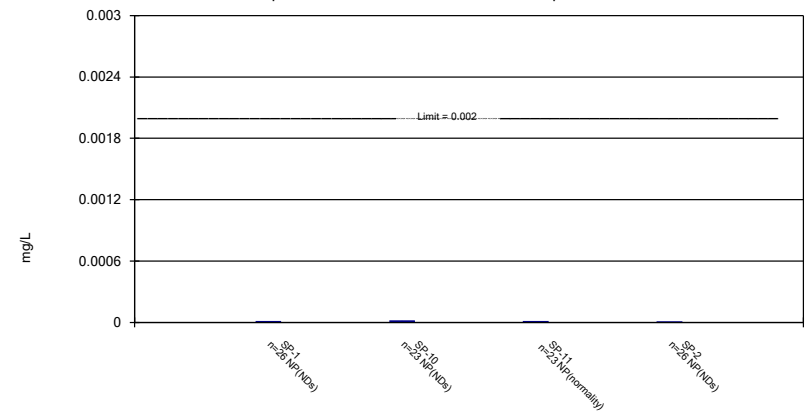
Compliance limit is exceeded.\* Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Lithium Analysis Run 8/8/2023 2:18 PM View: Confidence Intervals  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

### Non-Parametric Confidence Interval

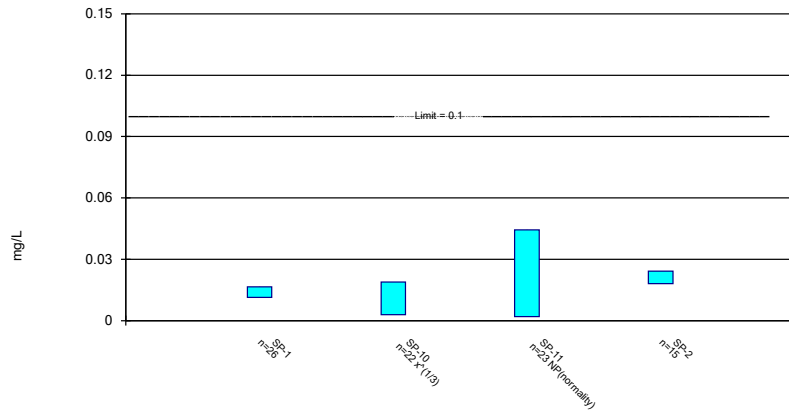
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Mercury Analysis Run 8/8/2023 2:18 PM View: Confidence Intervals  
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 8/8/2023 2:18 PM View: Confidence Intervals  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

### Parametric Confidence Interval

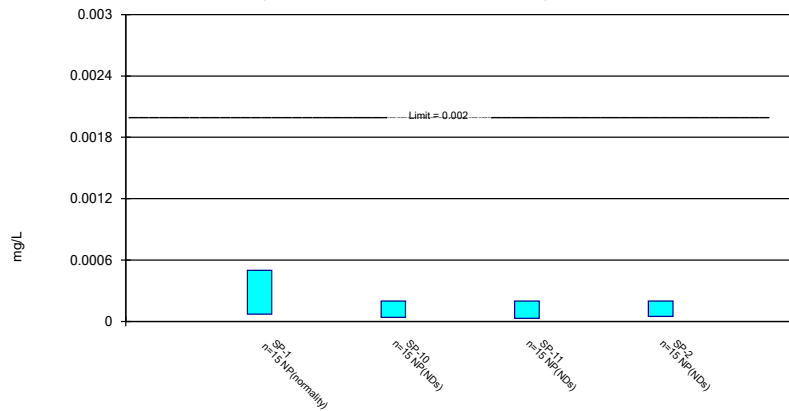
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Selenium Analysis Run 8/8/2023 2:18 PM View: Confidence Intervals  
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 8/8/2023 2:18 PM View: Confidence Intervals  
Northeastern BAP Client: Geosyntec Data: Northeastern BAP