Annual Groundwater Monitoring Report

Public Service Company of Oklahoma

Northeastern Power Station

Bottom Ash Pond CCR Management Unit

Permit No. Pending

7300 E HWY 88

Oologah, Oklahoma

Rev. 0 January 31, 2022
Rev. 1 April 14, 2022

Prepared by:
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PUBLIC SERVICE COMPANY OF OKLAHOMA℠

An AEP Company

BOUNDLESS ENERGY℠

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Abbreviations:
ASD - Alternate Source Demonstration
BAP – Bottom Ash Pond
CCR – Coal Combustion Residual
GWPS - Groundwater protection standards
NPS – Northeastern Power Station
SSI - Statistically Significant Increase
SSL - Statistically Significant Level

I. Overview

This *Annual Groundwater Monitoring Report* (Report) has been prepared to report the status of activities for the preceding year for an existing Coal Combustion Residual (CCR) unit at Public Service Company of Oklahoma's (PSO's), a wholly-owned subsidiary of American Electric Power Company (AEP), Northeastern 3&4 Power Station (NPS). The Oklahoma Department of Environmental Quality (ODEQ) CCR rules require that the Annual Groundwater Monitoring Report be posted to the operating record for the preceding year no later than January 31, 2022.
In general, the following activities were completed:

- At the start of the current annual reporting period, the BAP was operating under the Assessment monitoring program.
- At the end of the current annual reporting period, the BAP was operating under the Assessment monitoring program.
- The BAP initiated an assessment monitoring program on April 13, 2018.
- Annual and Semi-Annual groundwater samples were collected and analyzed for Appendix A and Appendix B constituents, as specified in OAC 255:517-9-6 Assessment Monitoring program and AEP's *Groundwater Sampling and Analysis Plan* (2018).
- Data and statistical analysis not available for the previous reporting period indicated that during the 2nd semi-annual 2020 sampling event (October, 2020):
    - Potential SSIs were identified for:
        - Boron at SP-10
        - Chloride at SP-2 and SP-10
        - Fluoride at SP-10
        - pH at SP-10 and SP-11
        - TDS at SP-2 and SP-10
    - Potential SSLs were identified for:
        - Lithium and Fluoride in SP-10
- During the 1st semi-annual 2021 sampling event (April, 2021):
    - Potential SSIs were identified for:
        - Boron at SP-10 and SP-11
        - Chloride at SP-2 and SP-10
        - Fluoride at SP-10
        - Sulfate at SP-11
        - TDS at SP-2 and SP-10

    - Potential SSLs were identified for:
        - Lithium and Fluoride in SP-10

- Statistical evaluation of the 2nd semi-annual 2021 groundwater sampling event in December 2021 is underway.
- ASD for the 1st semi-annual 2020 potential Lithium and Fluoride SSLs was certified January 26, 2021 and approved by ODEQ June 4, 2021.
- ASD for the 2nd semi-annual 2020 potential Lithium and Fluoride SSLs was certified May 17, 2021 and approved by ODEQ June 4, 2021.
- ASD for the 1st semi-annual 2021 potential Lithium and Fluoride SSLs was certified October 18, 2021 and approval by ODEQ November 23, 2021.

The major components of this annual report, to the extent applicable at this time, are presented in sections that follow:

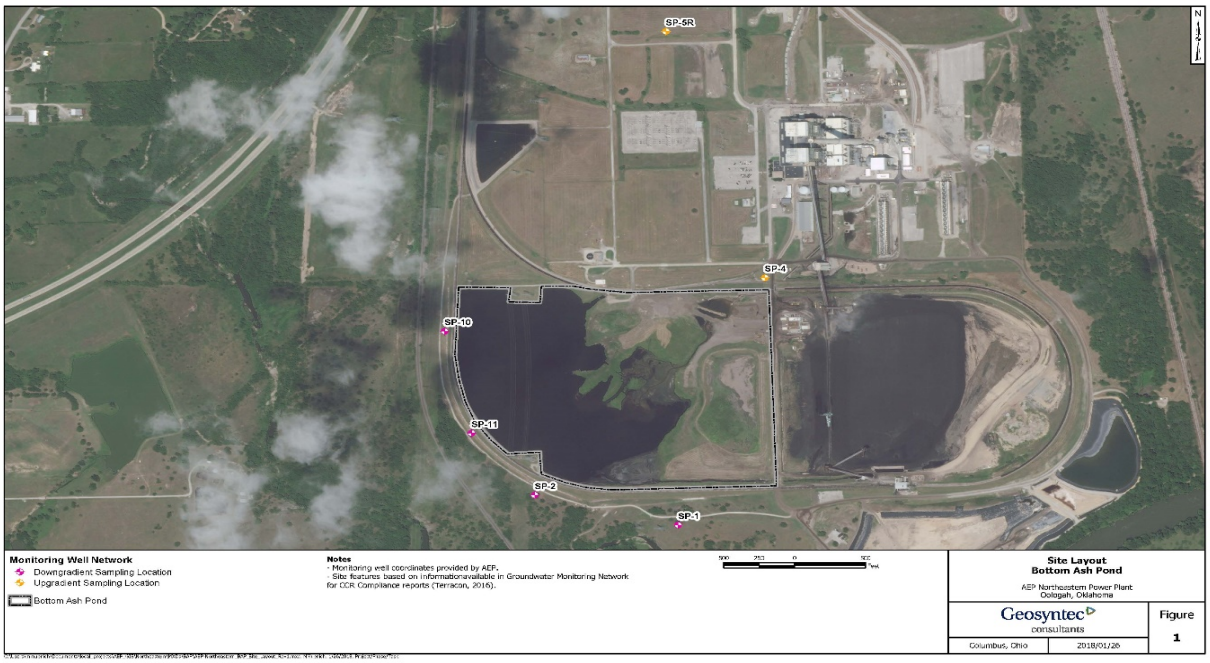
- A map, aerial photograph or a drawing showing the BAP CCR management unit, all groundwater monitoring wells and monitoring well identification numbers;
- Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a statement as to why that happened;
- All of the monitoring data collected, including the rate and direction of groundwater flow, plus a summary showing the number of samples collected per monitoring well, the dates the samples were collected and whether the sample was collected as part of detection monitoring or assessment monitoring programs is included in Appendix 1;
- Statistical comparison of monitoring data to determine if there have been SSI(s) or SSL(s) (Attached as Appendix 2, where applicable);
- A discussion of whether any alternate source demonstrations (ASDs) were performed, and the conclusions (Attached as Appendix 3, where applicable);
- A summary of any transition between monitoring programs or an alternate monitoring frequency, for example the date and circumstances for transitioning from detection monitoring to assessment monitoring, in addition to identifying the constituents detected at a statistically significant increase over background concentrations (Appendix 4).
- Identification of any monitoring wells that were installed, or decommissioned during the preceding year, along with a statement as to why that happened (Attached as Appendix 5, where applicable); and
- Other information required to be included in the annual report such as field sheets and analytical reports, if applicable.

In addition, this report summarizes key actions completed, and where applicable, describes any problems encountered and actions taken to resolve those problems. The report includes a projection of key activities for the upcoming year.

II. Groundwater Monitoring Well Locations and Identification Numbers

The figure that follows depicts the PE-certified groundwater monitoring network, the monitoring well locations and their corresponding identification numbers.

Bottom Ash Pond Monitoring Wells	
Up Gradient	Down Gradient
SP-4	SP-1
SP-5R	SP-2
	SP-10
	SP-11



III. Monitoring Wells Installed or Decommissioned

There were no groundwater monitoring wells installed or decommissioned during this reporting period. The network design, as summarized in the *Groundwater Monitoring Network Design Report* (September 2017) and as posted at the CCR website for NPS's Bottom Ash Pond (BAP), did not change. That network design report discusses the facility location, the hydrogeological setting, the hydrostratigraphic units, the uppermost aquifer, downgradient monitoring well locations and the upgradient monitoring well locations.

IV. Groundwater Quality Data and Static Water Elevation Data, With Flow Rate and Direction and Discussion

Appendix 1 contains tables showing the applicable groundwater quality data obtained under OAC 252:517-9-4 through 252:517-9-6 relevant to this reporting period. Static water elevation data from each monitoring event also are shown in Appendix 1, along with the groundwater velocity calculations groundwater flow directions and potentiometric maps developed after each sampling event.

Annual and Semi-Annual groundwater samples were collected and analyzed for Appendix A and Appendix B constituents, as specified in OAC 255:517-9-6 Assessment Monitoring program and AEP's *Groundwater Sampling and Analysis Plan* (2018), which was approved by ODEQ September 2018.

The site-wide groundwater flow velocity varies from the velocity computed in residence time calculations because assumptions used in these calculations vary based on the scale of the application of groundwater flow. The site-wide groundwater flow velocity is determined as a representative average over the entire CCR unit, which is a large area (multiple acres) consisting of different rock formations. The residence time calculation is a localized estimate use to establish the residence time of groundwater within a single well (<100 sq ft). The site-wide groundwater flow velocity utilizes the maximum and minimum hydraulic gradient based on groundwater elevation differences between two widely-spaced site monitoring wells. For a localized hydraulic gradient, the residence time calculations use the elevation difference between the target monitoring well and the nearest groundwater elevation contour line. Additionally, the hydraulic conductivity and effective porosity used in the site-wide groundwater flow velocity are represented by average parameters based on field tests conducted at the Unit. The residence time calculation uses an estimated hydraulic conductivity and effective porosity from a reference work representative of the formation in contact with the well.

A summary of the varying methods is shown below

	Site-Wide Flow Calculation	Residence Time Calculation
Purpose	Determine representative average groundwater flow velocity across the entire Unit (multiple acres)	Determine residence time of groundwater within a 2-inch diameter groundwater monitoring well (<100 square feet)
Hydraulic Gradient	Greatest groundwater elevation difference between two wells monitoring the Unit, and smallest groundwater elevation difference between two wells monitoring the Unit	Elevation difference between target groundwater monitoring well, and nearest groundwater elevation contour line
Hydraulic Conductivity	Average hydraulic conductivity determined from slug tests conducted at the Unit	Estimated hydraulic conductivity from referenced work representative of the formation in contact with the individual well
Effective Porosity	Average effective porosity determined from field tests	Estimated effective porosity from referenced work representative of the formation in contact with the well

The annual screening event for Appendix B constituents conducted in March, 2021 satisfies the requirement of 252:517-9-6(b).

The semi-annual groundwater sampling events for Appendix A and Appendix B constituents were conducted April 13, 2021 and December 27, 2021. When the data becomes available, it is placed into NPS's Operating Record, satisfying the requirement of 252:517-9-6(d).

Appendix 6 contains the available Field sheets and laboratory reports for this reporting period.

V. Groundwater Quality Data Statistical Analysis

Appendix 2 contains the available statistical analysis reports for this reporting period.

Data not available for the previous reporting period indicated that during the 2nd semi-annual sampling event conducted October 20-21, 2020:

- the following Appendix A parameters exceeded background concentrations for:
    - Boron at SP-10

- Chloride at SP-2 and SP-10
- Fluoride at SP-10
- pH at SP-10 and SP-11
- TDS at SP-2 and SP-10

- the following confidence intervals that exceeded Appendix B parameters GWPSs were:
  - Lithium and Fluoride in SP-10

During the 1st Semi-Annual sampling event April 13, 2021:

- the following Appendix A parameters exceeded background concentrations for:
  - Boron at SP-10 and SP-11
  - Chloride at SP-2 and SP-10
  - Fluoride at SP-10
  - Sulfate at SP-11
  - TDS at SP-2 and SP-10
- the following confidence intervals that exceeded Appendix B parameters GWPSs were:
  - Lithium and Fluoride at SP-10

Statistical evaluation of 2nd semi-annual groundwater monitoring event is underway for the groundwater samples collected on December 27, 2021.

VI. Alternate Source Demonstrations Completed

An alternate source demonstration (ASD) investigation relative to past SSIs was completed in April 2018. That demonstration concluded that alternate sources could not be identified. Additionally, an ASD investigation was not undertaken for the current SSI(s).

- ASD for the 1st semi-annual 2020 potential Lithium and Fluoride SSLs was certified January 26, 2021 and approved by ODEQ June 4, 2021.
- ASD for the 2nd semi-annual 2020 potential Lithium and Fluoride SSLs was certified May 17, 2021 and approved by ODEQ June 4, 2021.
- ASD for the 1st semi-annual 2021 potential Lithium and Fluoride SSLs was certified October 18, 2021 and approval by ODEQ November 23, 2021.

Because successful ASDs for the potential SSL(s) were identified, but no alternate sources for the SSI(s) were identified, the BAP remained in Assessment Monitoring.

VII. Discussion About Transition Between Monitoring Requirements or Alternate Monitoring Frequency

Because an ASD for the SSIs could not be identified, an assessment monitoring program was established at NE's BAP in April 2018. Assessment monitoring continued throughout the 2021 calendar year.

VIII. Other Information Required

NPS continues to work with ODEQ towards completing the permit for this CCR Unit.

IX. Description of Any Problems Encountered and Actions Taken

No significant problems were encountered. The low flow sampling effort continue and the schedule was met to support the annual groundwater report preparation covering this reporting period's groundwater monitoring activities.

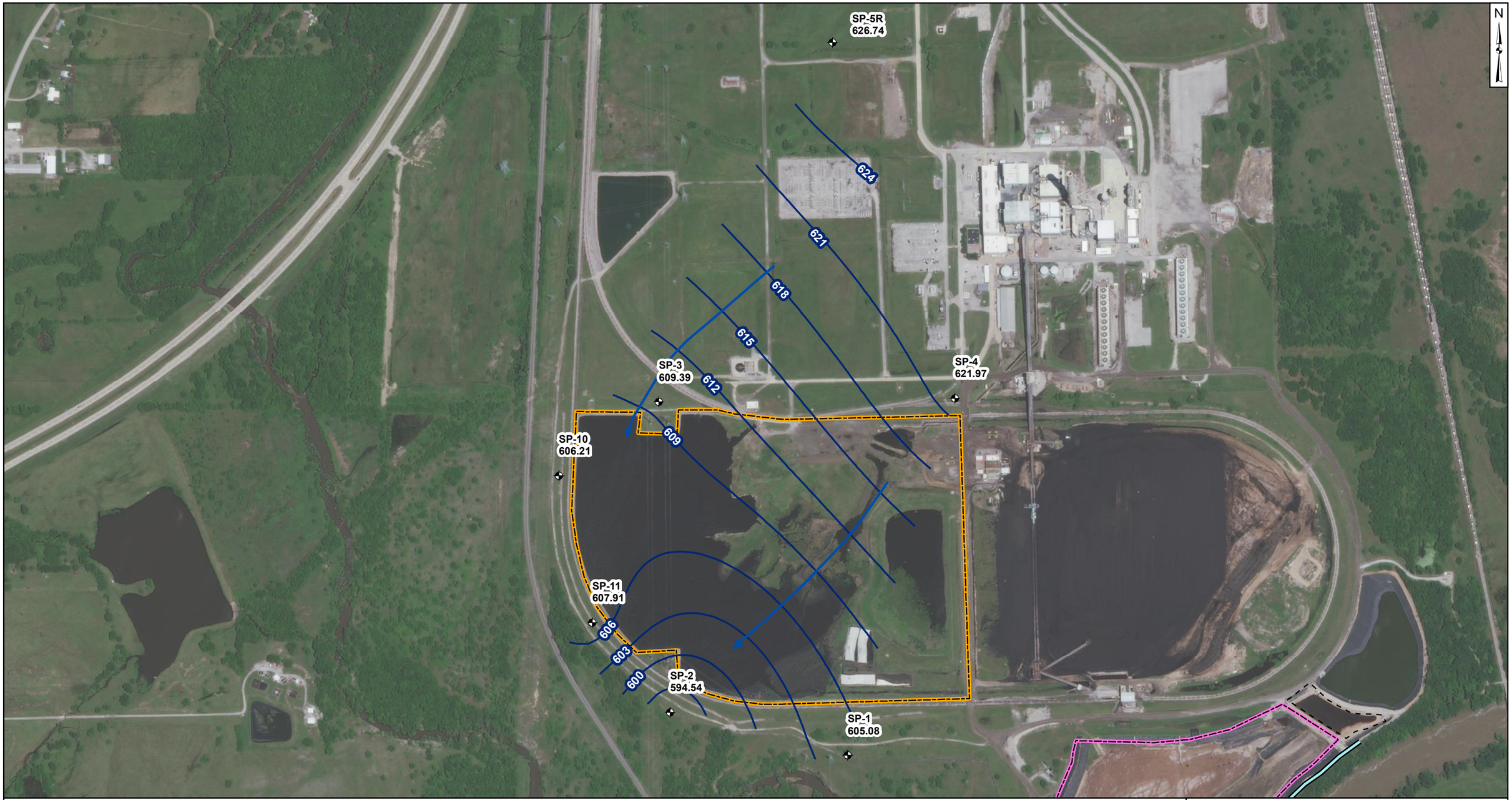
X. A Projection of Key Activities for the Upcoming Year

Key activities for the next reporting period include:

- As required by OAC 252:517-9-6, conduct assessment monitoring of the groundwater for the BAP CCR unit;
- Evaluation of the assessment monitoring results from a statistical analysis viewpoint, looking for SSLs above GWPS;
- Complete ASDs for potential SSLs and submit to ODEQ for approval;
- Continue to work towards obtaining a permit;
- Preparation of the next annual groundwater report.

APPENDIX 1

Potentiometric Maps and Tables follow, showing the groundwater monitoring data collected, the rate and direction of groundwater flow, and a summary showing the number of samples collected per monitoring well. The dates that the samples were collected also is shown.



Legend

- Groundwater Monitoring Well
- Approximate Groundwater Flow Direction
- Groundwater Elevation Contour
- Bottom Ash Pond
- Impoundment
- Landfill
- Slurry Wall

Notes

- Monitoring well coordinates and water level data (collected on 03/03/2021) provided by AEP.
- Data was collected during the annual Appendix B constituents screening event (OAC 252:517-9-6(b)).
- Groundwater elevation units are feet above mean sea level (ft. msl).
- Only wells screened in the Altamont Limestone were used for contouring.

570 285 0 570
Feet

Potentiometric Contours - Uppermost Aquifer
March 2021

AEP Northeastern Power Plant - Bottom Ash Pond
Oologah, Oklahoma

Geosyntec consultants

Columbus, Ohio | 2021/06/25

Figure
1

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Legend

- Groundwater Monitoring Well
- Approximate Groundwater Flow Direction
- Groundwater Elevation Contour
- Groundwater Contour Elevation (Inferred)
- Bottom Ash Pond
- Impoundment
- Landfill
- Slurry Wall

Notes

- Monitoring well coordinates and water level data (collected on 4/12/2021) provided by AEP.
- Groundwater elevation units are feet above mean sea level (ft. msl).
- Only wells screened in the Altamont Limestone were used for contouring.

600 300 0 600 Feet

Potentiometric Contours - Uppermost Aquifer
April 2021

AEP Northeastern Power Plant - Bottom Ash Pond
Oologah, Oklahoma

Geosyntec consultants

Columbus, Ohio | 2021/08/30

Figure **2**

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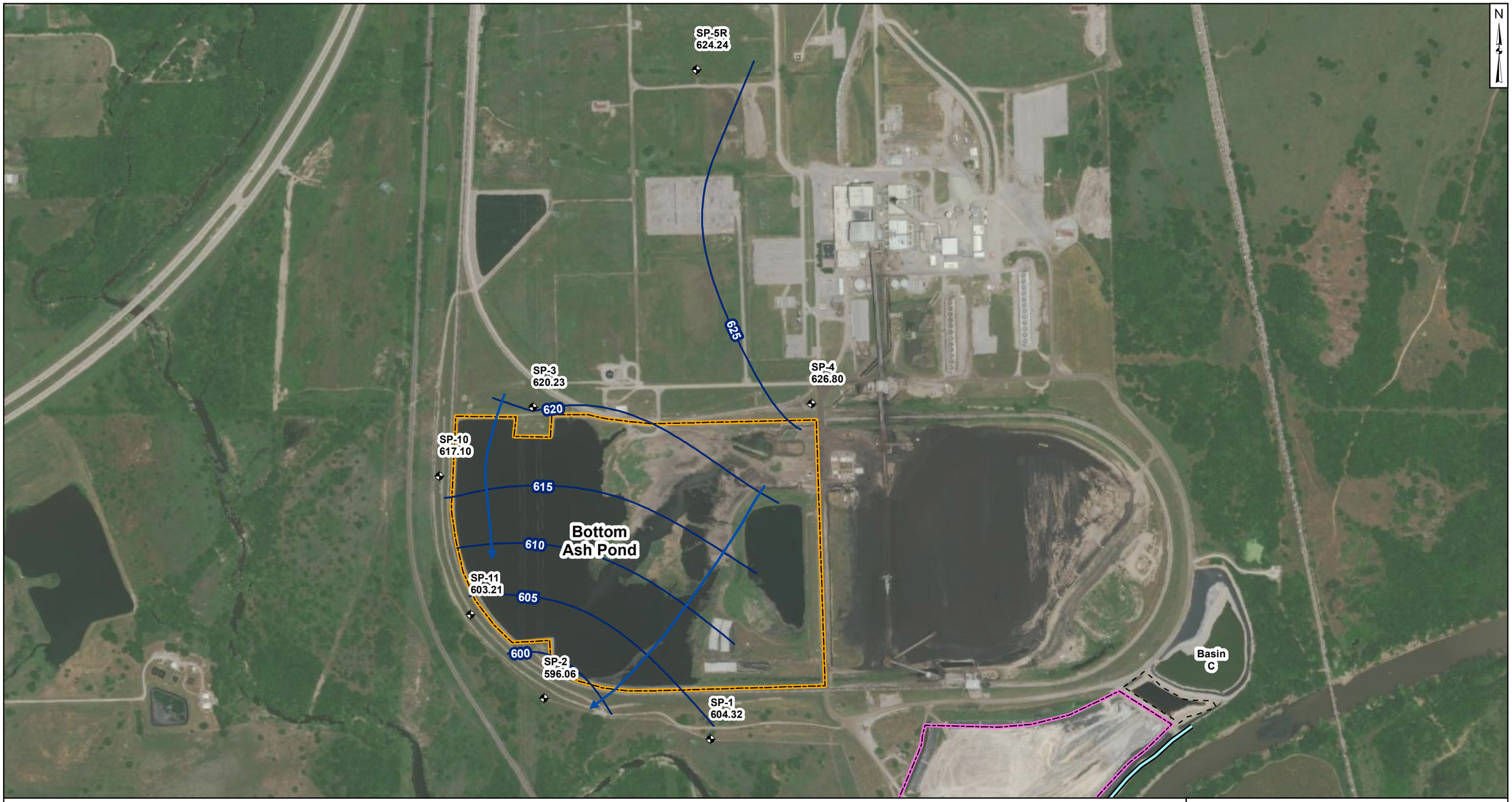

Legend

- Groundwater Monitoring Well
- Approximate Groundwater Flow Direction
- Groundwater Elevation Contour
- Groundwater Contour Elevation (Inferred)
- Bottom Ash Pond
- Impoundment
- Landfill
- Slurry Wall

Notes

- Monitoring well coordinates and water level data (collected on 12/27/2021) provided by AEP.
- Groundwater elevation units are feet above mean sea level (ft. msl).
- Only wells screened in the Altamont Limestone were used for contouring.

600 300 0 600 Feet

Potentiometric Contours - Uppermost Aquifer December 2021

AEP Northeastern Power Plant - Bottom Ash Pond
Oologah, Oklahoma

Geosyntec consultants

Columbus, Ohio | 2022/01/18

Figure 3

P:\Projects\AEP\Groundwater Statistical Evaluation - CHA8423\Groundwater Mapping\GIS Files\MXD\Northeastern\2021\AEP-Northeastern_BAP_2021-12Dec.mxd. ASoltero. 1/18/2022. Project/Phase/Task.

Site-Wide Groundwater Flow Velocity

NE CCR Units
NE BAP

$$v = 0.00463 \frac{cm}{sec} * \frac{head(ft)}{dist(ft)} * \frac{1}{0.045} * \frac{ft}{30.48cm} * \frac{31536000\ sec}{yr}$$

Distance between wells.

	SP1	SP2	SP3	SP4	SP5R	SP10	SP11
SP1	-	1000.0		2250.0	3750.0	2333.0	1677.0
SP2		-		2444.0	3972	1500.0	666.7
SP3							
SP4				-	2167.0	2333.0	2444.0
SP5R					-	2944.0	3611.0
SP10						-	861.1
SP11							-

NE BAP

Hydraulic gradient. Use row **80** 12/27/2021

	SP1	SP2	SP3	SP4	SP5R	SP10	SP11
SP1	-	0.008		0.0100	0.005	0.00548	0.001
SP2		-		0.013	0.007	0.014	0.011
SP3			-				
SP4				-	0.001	0.00416	0.010
SP5R					-	0.002	0.006
SP10						-	0.0161
SP11							-

effective porosity(n) = 0.045
Hydraulic conductivity of aquifer (k) = 4759 ft/yr
Max gradient (dh/dl)
0.016
min gradient
0.001

$$v = k \frac{(dh / dl)}{n}$$

Groundwater elevations, sea level

Well	SP-1	SP-2	SP-3	SP-4	SP-5R	SP-10	SP-11
total depth*	37.99	38.19	37.90	38.30	78.00	54.10	34.51
TOC	621.26	617.49	621.02	639.16	631.17	617.52	615.17

* includes riser

-----Depth to water-----

date							
10/4/2017	17.57	36.46	11.60	35.84	7.09	34.79	31.97
10/11/2017	16.53	35.79	9.28	35.04	5.76	34.66	32.21
5/1/2018	16.69	22.15	18.38	15.29	5.8	15.13	12.64
5/29/2018	17.43	21.71	19.12	14.45	6.99	14.89	14.31
7/30/2018	18.04	27.02		20.41	8.53	8.13	16.41
2/27/2019	16.58	20.86		13.09	4.81	20.12	11.15
6/20/2019	16.88	23.31		22.53	4.82	12.32	4.72
8/26/2019	17.51	28.43	16.28	25	6.39	3.85	14.6
3/25/2020	15.34	19.07	14.88	13.28	3.43	13.13	7.16
6/29/2020	17.87	26.71	17.14	24.83	7.41	12.06	11.52
7/28/2020	17.36	32.6	14.29	30.78	7.25	11.76	18.16
10/20/2020	17.68	28.9	1.55	19.29	8.55	0	14.19
3/3/2021	16.18	22.95	11.63	17.19	4.43	11.31	7.26
4/12/2021	16.87	29.25	16.93	29.73	5.55	18.14	7.84
12/27/2021	16.94	21.43	0.79	12.36	6.93	0.42	11.96

-----Calculated groundwater elevation-----

Well	SP-1	SP-2	SP-3	SP-4	SP-5R	SP-10	SP-11 Max	MIN	(dh/dl)		
TOC	621.26	617.49	621.02	639.16	631.17	617.52	615.17				
Date									**gradient**	**max v(ft/yr)**	**min v(ft/yr)**
10/4/2017	603.69	581.03	609.42	603.32	624.08	582.73	583.20	624.08	581.03	0.037	**3912.96**	
10/11/2017	604.73	581.7	611.74	604.12	625.41	582.86	582.96	625.41	581.70	0.023	**2432.38**	**12.27**
5/1/2018	604.57	595.34	602.64	623.87	625.37	602.39	602.53	625.37	595.34	0.012	**1269.07**	**17.24**
5/29/2018	603.83	595.78	601.90	624.71	624.18	602.63	600.86	624.71	595.78	0.012	**1269.07**	**25.91**
7/30/2018	603.22	590.47		618.75	622.64	609.39	598.76	622.64	590.47	0.013	**1374.82**	**18.93**
2/27/2019	604.68	596.63		626.07	626.36	597.4	604.02	626.36	596.63	0.012	**1269.07**	**12.69** 1H2019
6/20/2019	604.38	594.18		616.63	626.35	605.2	610.45	626.35	594.18	0.024	**2538.13**	**37.12** annual screening
8/26/2019	603.75	589.06	604.74	614.16	624.78	613.67	600.57	624.78	589.06	0.017	**1797.84**	**22.21** 2H2019
3/25/2020	605.92	598.42	606.14	625.88	627.74	604.39	608.01	627.74	598.42	0.014	**1480.58**	**69.38** annual screening
6/29/2020	603.39	590.78	603.88	614.33	623.76	605.46	603.65	623.76	590.78	0.019	**2009.36**	**16.39** 1H2020
7/28/2020	603.90	584.89	606.73	608.38	623.92	605.76	597.01	623.92	584.89	0.019	**2009.36**	**16.39** 1H2020 SSI confirmatory
10/20/2020	603.58	588.59	619.47	619.87	622.62	617.52	600.98	622.62	588.6	0.019	**2009.36**	**10.65** 2H2020
3/3/2021	605.08	594.54	609.39	621.97	626.74	606.21	607.91	626.74	594.54	0.02	**2115.11**	**51.19** annual screening
4/12/2021	604.39	588.24	604.09	609.43	625.62	599.38	607.33	625.62	588.24	0.029	**3066.91**	**0.001** 1H2021
12/27/2021	604.32	596.06	620.23	626.8	624.24	617.1	603.21	626.8	596.06	0.016	**1692.09**	**0.001** 2H2021

Residence Time Calculation Summary
Northeastern Bottom Ash Pond

Geosyntec Consultants, Inc.

			2021-03		2021-04		2021-12	
CCR Management Unit	Monitoring Well	Well Diameter (inches)	Groundwater Velocity (ft/year)	Groundwater Residence Time (days)	Groundwater Velocity (ft/year)	Groundwater Residence Time (days)	Groundwater Velocity (ft/year)	Groundwater Residence Time (days)
Bottom Ash Pond	SP-1 [2]	2.0	4.1	14.9	5.7	10.7	3.8	15.8
	SP-2 [2]	2.0	7.0	8.7	8.6	7.1	5.3	11.5
	SP-4 [2]	2.0	3.5	17.2	2.0	30.4	3.7	16.6
	SP-5R [1]	2.0	2.4	25.2	3.6	17.0	2.0	30.6
	SP-10 [1]	2.0	2.0	30.5	2.5	24.2	5.4	11.3
	SP-11 [1]	2.0	7.1	8.6	7.2	8.4	6.3	9.6

Notes:
[1] - Background Well
[2] - Downgradient Well

Table 1 - Groundwater Data Summary: SP-1
Northeastern - BAP
Appendix A Constituents

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
1/25/2017	Background	0.298	111	60	< 1 U1	7.5	66	514
3/13/2017	Background	0.186	117	548	4	--	30	480
4/24/2017	Background	0.202	108	83	1.02	7.6	60	496
5/18/2017	Background	0.284	131	104	1.3	--	60	574
6/15/2017	Background	0.242	115	50	0.6437 J1	9.3	48	478
6/27/2017	Background	0.232	113	19	0.582 J1	11.1	48	424
7/12/2017	Background	0.287	122	70	0.6283 J1	9.8	56	504
8/4/2017	Background	0.299	125	20	0.542 J1	8.7	52	394
8/17/2017	Background	--	--	--	--	7.9	--	--
8/30/2017	Background	0.25	120	34	0.581 J1	7.7	59	456
9/13/2017	Background	0.369	119	62	0.4042 J1	8.2	54	536
9/20/2017	Background	0.331	129	22	< 0.083 U1	7.3	62	440
10/11/2017	Detection	0.35	152	136	1.4051	7.4	58	676
1/22/2018	Detection	--	119	--	--	6.9	--	--
5/30/2018	Assessment	--	--	--	1.2525	7.3	--	--
7/30/2018	Assessment	0.397	130	46	0.9863 J1	7.0	63	1,060
2/4/2019	Assessment	0.354	150	--	--	--	--	--
2/27/2019	Assessment	0.200	122	42.7	0.80	7.3	87.1	532
6/20/2019	Assessment	0.198	126	25.2	0.77	7.1	61.4	452
8/26/2019	Assessment	0.124	120	9	0.525 J1	9.0	48	438
3/25/2020	Assessment	0.184	96.7	40.8	0.96	8.5	62.9	500
6/30/2020	Assessment	0.180	99.4	29.6	0.81	9.0	49.3	435
7/28/2020	Assessment	--	--	--	--	8.4	--	--
10/20/2020	Assessment	0.146	103	12.9	0.81	8.5	51.1	427
3/3/2021	Assessment	0.169	105	--	0.85	7.4	--	--
4/12/2021	Assessment	0.186	104	37.2	0.88	7.6	50.0	438

Notes:
mg/L: milligrams per liter
SU: standard unit
<: Non-detect value. Analytes which were not detected are shown as less than the method detection limit (MDL) followed by a 'U1' flag.
In analytical data prior to 5/18/2021, U1 flags were reported as U in the analytical report.
- -: Not analyzed
J1: Concentration estimated. Analyte was detected between the method detection limit and the reporting limit.
In analytical data prior to 5/18/2021, J1 flags were reported as J in the analytical report.

Table 1 - Groundwater Data Summary: SP-1
Northeastern - BAP
Appendix B Constituents

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
1/25/2017	Background	< 5 U1	< 5 U1	211	< 1 U1	< 1 U1	< 1 U1	< 5 U1	3.48	< 1 U1	< 5 U1	0.006	< 0.025 U1	11	< 5 U1	< 2 U1
3/13/2017	Background	< 5 U1	< 5 U1	146	< 1 U1	< 1 U1	< 1 U1	< 5 U1	3.014	4	< 5 U1	0.007	< 0.025 U1	16	< 5 U1	< 2 U1
4/24/2017	Background	2.75 J1	1.91 J1	195	0.1 J1	< 0.07 U1	0.84 J1	2.42 J1	4.71	1.02	0.94 J1	0.00789	< 0.005 U1	19.92	4.85 J1	< 0.86 U1
5/18/2017	Background	6.85	5.48	243	0.26 J1	0.22 J1	2.55	2.55 J1	4.12	1.3	1.63 J1	0.00853	0.023 J1	16.77	6.51	< 0.86 U1
6/15/2017	Background	1.14 J1	< 1.05 U1	183	0.04 J1	< 0.07 U1	< 0.23 U1	0.77 J1	2.096	0.6437 J1	< 0.68 U1	0.00407	0.009 J1	7.02	2.54 J1	< 0.86 U1
6/27/2017	Background	< 0.93 U1	< 1.05 U1	187	< 0.02 U1	< 0.07 U1	< 0.23 U1	0.77 J1	14.29	0.582 J1	< 0.68 U1	0.00334	< 0.005 U1	6.42	2.77 J1	< 0.86 U1
7/12/2017	Background	1.25 J1	< 1.05 U1	217	0.09 J1	< 0.07 U1	0.62 J1	1.34 J1	4.01	0.6283 J1	1.24 J1	0.00395	< 0.005 U1	8.14	5.21	0.89 J1
8/4/2017	Background	< 0.93 U1	2.11 J1	298	0.1 J1	< 0.07 U1	0.78 J1	1.33 J1	3.41	0.542 J1	0.94 J1	0.00577	0.009 J1	19.96	11.96	< 0.86 U1
8/30/2017	Background	2.09 J1	1.34 J1	218	0.14 J1	< 0.07 U1	0.55 J1	1.75 J1	4.15	0.581 J1	< 0.68 U1	0.00468	< 0.005 U1	12.08	3.51 J1	< 0.86 U1
9/13/2017	Background	< 0.93 U1	< 1.05 U1	210	0.09 J1	0.08 J1	0.31 J1	1.07 J1	2.584	0.4042 J1	< 0.68 U1	0.00548	< 0.005 U1	14.65	4.13 J1	< 0.86 U1
9/20/2017	Background	< 0.93 U1	< 1.05 U1	168	0.05 J1	0.11 J1	< 0.23 U1	1.15 J1	4.53	< 0.083 U1	< 0.68 U1	0.00318	< 0.005 U1	5.32	< 0.99 U1	< 0.86 U1
5/30/2018	Assessment	< 0.93 U1	< 1.05 U1	190	< 0.02 U1	< 0.07 U1	< 0.23 U1	0.53 J1	3.64	1.2525	< 0.68 U1	0.00785	< 0.005 U1	16.39	4.23 J1	2
7/30/2018	Assessment	0.69	0.93	174	0.06 J1	0.08 J1	1.83	0.676	3.056	0.9863 J1	0.354	0.00615	< 0.005 U1	17.1	5.8	0.09 J1
2/27/2019	Assessment	0.6 J1	0.7 J1	168	< 0.2 U1	< 0.1 U1	2.72	< 0.2 U1	3.056	0.80	0.2 J1	0.00641	< 0.005 U1	10 J1	2.8	< 1 U1
6/20/2019	Assessment	0.93	1.44	242	0.2 J1	0.1 J1	0.7 J1	5.54	2.745	0.77	0.650	0.03 J1	0.01 J1	12.1	9.9	< 0.5 U1
8/26/2019	Assessment	0.43	0.73	160	0.08 J1	0.09	1.49	0.481	2.75	0.525 J1	0.835	0.00285	< 0.005 U1	5.86	3.4	0.1 J1
3/25/2020	Assessment	0.62	0.72	158	0.07 J1	0.08	0.499	0.362	6.67	0.96	0.351	0.00600	< 0.002 U1	15.8	6.6	< 0.1 U1
6/30/2020	Assessment	0.58	0.69	159	0.07 J1	0.07	0.969	0.431	2.531	0.81	0.886	0.00534	< 0.002 U1	13.6	8.3	< 0.1 U1
10/20/2020	Assessment	0.46	0.57	143	0.05 J1	0.08	0.215	0.727	2.82	0.81	0.254	0.00336	< 0.002 U1	11.5	3.8	< 0.1 U1
3/3/2021	Assessment	0.51	0.53	144	0.05 J1	0.08	0.426	0.307	4.27	0.85	0.259	0.00443	< 0.002 U1	14.3	4.5	< 0.1 U1
4/12/2021	Assessment	0.46	0.54	158	0.04 J1	0.05	0.359	0.202	3.47	0.88	0.2 J1	0.00549	< 0.002 U1	13.7	3.9	0.05 J1

Notes:
µg/L: micrograms per liter
mg/L: milligrams per liter
pCi/L: picocuries per liter
<: Non-detect value. Analytes which were not detected are shown as less than the method detection limit (MDL) followed by a 'U1' flag. In analytical data prior to 5/18/2021, U1 flags were reported as U in the analytical report.
- -: Not analyzed
J1: Concentration estimated. Analyte was detected between the method detection limit and the reporting limit. In analytical data prior to 5/18/2021, J1 flags were reported as J in the analytical report.

Table 1 - Groundwater Data Summary: SP-2
Northeastern - BAP
Appendix A Constituents

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
1/25/2017	Background	0.274	108	607	3	6.4	21	1,786
3/13/2017	Background	0.251	82.6	37	1	--	70	1,340
4/24/2017	Background	0.152	62	527	2.82	6.5	27	1,242
5/18/2017	Background	0.336	117	1,240	3	--	15	2,214
6/15/2017	Background	0.303	108	888	2.96	8.3	61	1,912
6/27/2017	Background	0.292	98.5	883	2.8408	7.4	58	1,872
7/12/2017	Background	0.339	111	863	3.581	7.9	58	1,846
8/4/2017	Background	0.28	147	1,064	2.788	7.2	57	2,132
8/17/2017	Background	--	--	--	--	7.6	--	--
8/30/2017	Background	0.275	86.8	1,001	4.0998	7.5	47	2,192
9/13/2017	Background	0.311	91.8	930	3.196	7.0	43	1,956
9/20/2017	Background	0.3	129	856	1.726	6.9	37	1,778
10/11/2017	Detection	0.307	91.9	970	3.5881	7.3	41	2,076
1/22/2018	Detection	--	--	975	--	7.0	--	1,910
5/30/2018	Assessment	--	--	--	3.4972	7.5	--	--
7/30/2018	Assessment	0.276	117	268	2.6556	7.5	30	1,006
2/27/2019	Assessment	0.116	94.0	351	2.68	7.6	26.1	932
6/20/2019	Assessment	0.109	58.2	357	2.69	6.8	28.5	1,044
8/26/2019	Assessment	0.173	211	1,072	2.685	8.5	14	2,246
3/25/2020	Assessment	0.114	60.4	418	2.73	8.8	22.0	1,120
6/30/2020	Assessment	0.163	83.9	420	2.64	8.8	26.3	977
7/28/2020	Assessment	--	--	--	--	8.4	--	--
10/20/2020	Assessment	0.151	75.3	850	2.98	8.7	19.1	1,790
3/3/2021	Assessment	0.140	72.0	--	3.00	7.5	--	--
4/12/2021	Assessment	0.255	91.5	1,130	3.19	7.6	12.4	2,000

Notes:
mg/L: milligrams per liter
SU: standard unit
<: Non-detect value. Analytes which were not detected are shown as less than the method detection limit (MDL) followed by a 'U1' flag.
In analytical data prior to 5/18/2021, U1 flags were reported as U in the analytical report.
- -: Not analyzed
J1: Concentration estimated. Analyte was detected between the method detection limit and the reporting limit.
In analytical data prior to 5/18/2021, J1 flags were reported as J in the analytical report.

Table 1 - Groundwater Data Summary: SP-2
Northeastern - BAP
Appendix B Constituents

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
1/25/2017	Background	< 5 U1	11	1,460	< 1 U1	< 1 U1	3	< 5 U1	6.89	3	< 5 U1	0.098	< 0.025 U1	19	< 5 U1	< 2 U1
3/13/2017	Background	< 5 U1	5	1,130	< 1 U1	< 1 U1	1	< 5 U1	9.96	1	< 5 U1	0.073	< 0.025 U1	23	< 5 U1	< 2 U1
4/24/2017	Background	2.09 J1	2.08 J1	760	0.04 J1	< 0.07 U1	0.24 J1	0.87 J1	8.98	2.82	< 0.68 U1	0.05305	< 0.005 U1	24.67	2.04 J1	< 0.86 U1
5/18/2017	Background	8.71	9.02	3,130	0.26 J1	0.18 J1	2.87	2.77 J1	26.48	3	2.02 J1	0.111	0.006 J1	11.63	6.16	< 0.86 U1
6/15/2017	Background	11.34	5.5	1,710	0.18 J1	< 0.07 U1	2.04	2.51 J1	22.16	2.96	< 0.68 U1	0.103	0.005 J1	29.57	37.83	< 0.86 U1
6/27/2017	Background	5.15	1.4 J1	1,560	0.06 J1	< 0.07 U1	1.29	1.82 J1	--	2.8408	< 0.68 U1	0.09272	< 0.005 U1	29.62	22.41	< 0.86 U1
7/12/2017	Background	4.74 J1	2.51 J1	1,540	0.07 J1	< 0.07 U1	0.59 J1	1.23 J1	--	3.581	1.41 J1	0.0961	< 0.005 U1	33.32	23.23	< 0.86 U1
8/4/2017	Background	3.51 J1	2.54 J1	1,010	0.09 J1	0.07 J1	1.07	1.08 J1	16.34	2.788	< 0.68 U1	0.09164	0.014 J1	39.4	23.36	< 0.86 U1
8/30/2017	Background	2.95 J1	1.25 J1	1,120	0.12 J1	< 0.07 U1	< 0.23 U1	0.8 J1	14.48	4.0998	< 0.68 U1	0.0931	< 0.005 U1	33.86	11.86	< 0.86 U1
9/13/2017	Background	2.67 J1	1.83 J1	992	0.11 J1	< 0.07 U1	< 0.23 U1	0.87 J1	14.89	3.196	< 0.68 U1	0.09207	0.006 J1	37.61	9.87	< 0.86 U1
9/20/2017	Background	2.64 J1	3.05 J1	1,150	0.2 J1	0.09 J1	3.46	2.55 J1	--	1.726	0.91 J1	0.09111	< 0.005 U1	39.39	9.87	< 0.86 U1
5/30/2018	Assessment	1.3 J1	< 1.05 U1	869	< 0.02 U1	< 0.07 U1	< 0.23 U1	0.55 J1	7.85	3.4972	< 0.68 U1	0.04039	< 0.005 U1	26.46	2.16 J1	< 0.86 U1
7/30/2018	Assessment	1.21	1.42	656	0.05 J1	0.08 J1	< 40 U1	0.400	9.61	2.6556	0.245	0.0346	< 0.005 U1	26.1	2.9	0.06 J1
2/27/2019	Assessment	1.39	1.29	841	< 0.2 U1	< 0.1 U1	4.30	< 0.2 U1	5.76	2.68	0.3 J1	0.0329	< 0.005 U1	25.8	3.7	< 1 U1
6/20/2019	Assessment	1.34	1.43	868	0.1 J1	0.09 J1	0.9 J1	0.434	7.94	2.69	0.4 J1	0.062	< 0.005 U1	25.0	2.9	< 0.5 U1
8/26/2019	Assessment	1.22	1.53	1,220	0.07 J1	0.05	0.701	0.568	8.72	2.685	0.334	0.0582	< 0.005 U1	22.3	3.7	0.1 J1
3/25/2020	Assessment	1.14	1.68	1,060	0.07 J1	0.13	0.806	0.361	9.73	2.73	0.694	0.0352	< 0.002 U1	20.3	2.4	< 0.1 U1
6/30/2020	Assessment	1.26	1.28	1,140	0.109	0.05	0.573	0.733	7.84	2.64	0.263	0.0585	< 0.002 U1	19.7	6.2	< 0.1 U1
10/20/2020	Assessment	1.22	1.08	1,110	0.07 J1	0.04 J1	0.398	0.433	12.96	2.98	0.1 J1	0.0517	< 0.002 U1	20.1	4.4	< 0.1 U1
3/3/2021	Assessment	1.09	1.07	1,050	0.09 J1	0.06	0.700	0.323	11.81	3.00	0.253	0.0523	< 0.002 U1	17.1	3.5	< 0.1 U1
4/12/2021	Assessment	0.84	1.53	1,790	0.112	0.04 J1	0.559	1.10	7.87	3.19	0.211	0.0862	< 0.002 U1	14.6	1.1	0.05 J1

Notes:
µg/L: micrograms per liter
mg/L: milligrams per liter
pCi/L: picocuries per liter
<: Non-detect value. Analytes which were not detected are shown as less than the method detection limit (MDL) followed by a 'U1' flag. In analytical data prior to 5/18/2021, U1 flags were reported as U in the analytical report.
- -: Not analyzed
J1: Concentration estimated. Analyte was detected between the method detection limit and the reporting limit. In analytical data prior to 5/18/2021, J1 flags were reported as J in the analytical report.

Table 1 - Groundwater Data Summary: SP-4
Northeastern - BAP
Appendix A Constituents

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
1/25/2017	Background	0.406	57.7	401	3	7.7	37	1,122
3/15/2017	Background	0.399	67	52	4	--	38	1,128
4/25/2017	Background	0.442	58.8	459	3.2	7.0	41	1,128
5/18/2017	Background	0.411	296	232	2.1	--	50	846
6/15/2017	Background	0.395	118	475	3.34	8.3	36	1,164
6/27/2017	Background	0.388	110	471	3.2489	8.1	37	1,388
7/12/2017	Background	0.42	648	489	3.863	8.1	36	1,128
8/4/2017	Background	0.412	1,920	469	3.078	7.7	50	1,150
8/17/2017	Background	0.493	793	460	3.049	7.8	75	1,132
8/30/2017	Background	0.392	612	576	4.086	7.6	74	1,400
9/13/2017	Background	0.387	810	450	3.199	7.7	88	1,236
9/20/2017	Background	0.477	630	440	1.747	7.2	90	1,208
10/11/2017	Detection	0.425	206	431	3.7702	7.4	78	1,200
5/30/2018	Assessment	--	--	--	4.169	7.4	--	--
7/30/2018	Assessment	0.399	164	521	< 0.083 U1	7.6	70	1,180
2/27/2019	Assessment	0.370	85.6	470	3.26	7.4	61.5	1,122
6/20/2019	Assessment	0.325	56.4	450	3.24	7.1	58.0	1,128
8/26/2019	Assessment	0.365	182	458	2.99	8.8	61	1,170
3/25/2020	Assessment	0.340	59.6	476	3.29	9.1	68.6	1,130
6/30/2020	Assessment	0.338	80.5	531	3.16	9.0	70.2	1,160
10/21/2020	Assessment	0.333	63.9	441	3.24	8.9	70.4	1,150
3/3/2021	Assessment	0.347	58.7	--	3.50	7.8	--	--
4/12/2021	Assessment	0.393	70.8	495	3.49	7.7	68.1	1,160

Notes:
mg/L: milligrams per liter
SU: standard unit
<: Non-detect value. Analytes which were not detected are shown as less than the method detection limit (MDL) followed by a 'U1' flag.
In analytical data prior to 5/18/2021, U1 flags were reported as U in the analytical report.
- -: Not analyzed
J1: Concentration estimated. Analyte was detected between the method detection limit and the reporting limit.
In analytical data prior to 5/18/2021, J1 flags were reported as J in the analytical report.

Table 1 - Groundwater Data Summary: SP-4
Northeastern - BAP
Appendix B Constituents

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
1/25/2017	Background	< 5 U1	< 5 U1	398	< 1 U1	< 1 U1	< 1 U1	< 5 U1	4	3	< 5 U1	0.072	< 0.025 U1	< 5 U1	< 5 U1	< 2 U1
3/15/2017	Background	< 5 U1	< 5 U1	477	< 1 U1	< 1 U1	< 1 U1	< 5 U1	3.57	4	< 5 U1	0.073	< 0.025 U1	< 5 U1	< 5 U1	< 2 U1
4/25/2017	Background	1.36 J1	1.72 J1	578	0.03 J1	0.1 J1	0.64 J1	1.01 J1	2.566	3.2	< 0.68 U1	0.06973	< 0.005 U1	1.5 J1	< 0.99 U1	1.21 J1
5/18/2017	Background	2.04 J1	5.5	762	0.56 J1	0.57 J1	10.73	5.49	6.37	2.1	3.65 J1	0.07998	0.015 J1	1.02 J1	< 0.99 U1	< 0.86 U1
6/15/2017	Background	1.74 J1	4.59 J1	633	0.34 J1	< 0.07 U1	4.04	4.63 J1	4.18	3.34	1.39 J1	0.07422	< 0.005 U1	0.65 J1	1.67 J1	< 0.86 U1
6/27/2017	Background	< 0.93 U1	2.01 J1	576	0.24 J1	< 0.07 U1	2.98	5.29	9.64	3.2489	0.96 J1	0.07041	< 0.005 U1	0.46 J1	< 0.99 U1	< 0.86 U1
7/12/2017	Background	2.66 J1	10.65	1,340	1.28	1.37	22.48	10.64	5.79	3.863	8.47	0.09243	0.01 J1	< 0.29 U1	< 0.99 U1	< 0.86 U1
8/4/2017	Background	3.87 J1	44.98	4,590	4.97	6.55	84.15	40.69	4.04	3.078	36.63	0.136	0.058	5.03	4.99 J1	< 0.86 U1
8/17/2017	Background	< 0.93 U1	19.31	2,310	2.12	2.05	41.82	17.86	6.71	3.049	10.7	0.111	0.03	4.23 J1	1.04 J1	< 0.86 U1
8/30/2017	Background	2.45 J1	9.13	1,490	1.26	1.66	25.81	12.06	8.09	4.086	7.11	0.0962	0.021 J1	4.61 J1	1.86 J1	< 0.86 U1
9/13/2017	Background	< 0.93 U1	16.34	1,910	1.71	2.47	30.83	17.71	5.92	3.199	8.92	0.104	0.029	6.21	1.65 J1	< 0.86 U1
9/20/2017	Background	2.3 J1	13.95	1,930	1.77	1.9	34.55	16.32	--	1.747	9.6	0.101	0.014 J1	7.02	< 0.99 U1	< 0.86 U1
5/30/2018	Assessment	5.14	< 1.05 U1	268	< 0.02 U1	< 0.07 U1	< 0.23 U1	0.49 J1	3.186	4.169	< 0.68 U1	0.06851	< 0.005 U1	3.7 J1	< 0.99 U1	1.62 J1
7/30/2018	Assessment	0.37	1.14	303	0.078	0.07	0.562	0.497	4.85	< 0.083 U1	0.356	0.0627	0.006 J1	3.63	0.7	0.05 J1
2/27/2019	Assessment	0.3 J1	1 J1	276	< 0.2 U1	< 0.1 U1	5.71	< 0.2 U1	3.144	3.26	< 0.2 U1	0.0602	< 0.005 U1	< 4 U1	0.6 J1	< 1 U1
6/20/2019	Assessment	0.3 J1	0.83	337	< 0.1 U1	0.07 J1	1.06	0.388	3.751	3.24	1.07	0.068	0.007 J1	2 J1	0.4 J1	< 0.5 U1
8/26/2019	Assessment	0.25	1.64	359	0.101	0.05	1.01	1.07	3.24	2.99	0.596	0.0554	< 0.005 U1	2 J1	0.6	< 0.1 U1
3/25/2020	Assessment	0.28	0.83	327	0.04 J1	0.04 J1	0.332	0.166	4.28	3.29	0.2 J1	0.0535	< 0.002 U1	4.07	0.7	< 0.1 U1
6/30/2020	Assessment	0.32	1.52	334	0.118	0.04 J1	1.09	1.28	4.16	3.16	0.527	0.0564	< 0.002 U1	3.57	0.7	< 0.1 U1
10/21/2020	Assessment	0.29	1.03	322	0.06 J1	0.07	0.523	0.508	3.42	3.24	0.359	0.0559	< 0.002 U1	3.24	0.7	< 0.1 U1
3/3/2021	Assessment	0.27	0.99	367	0.04 J1	0.06	0.449	0.207	5.49	3.50	1.17	0.0594	< 0.002 U1	3.60	0.6	< 0.1 U1
4/12/2021	Assessment	0.22	1.41	435	0.09 J1	0.04 J1	1.03	0.921	4.09	3.49	0.392	0.0613	< 0.002 U1	2.94	0.4 J1	< 0.04 U1

Notes:
µg/L: micrograms per liter
mg/L: milligrams per liter
pCi/L: picocuries per liter
<: Non-detect value. Analytes which were not detected are shown as less than the method detection limit (MDL) followed by a 'U1' flag. In analytical data prior to 5/18/2021, U1 flags were reported as U in the analytical report.
- -: Not analyzed
J1: Concentration estimated. Analyte was detected between the method detection limit and the reporting limit. In analytical data prior to 5/18/2021, J1 flags were reported as J in the analytical report.

Table 1 - Groundwater Data Summary: SP-5R
Northeastern - BAP
Appendix A Constituents

Geosyntec Consultants, Inc.

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
1/25/2017	Background	0.233	52.4	500	3	8.0	10	1,354
3/15/2017	Background	0.236	61.7	62	4	--	10	1,420
4/25/2017	Background	0.245	53.8	674	3.06	7.5	9	1,436
5/18/2017	Background	0.319	79.1	1,834	4	--	8	3,008
6/15/2017	Background	0.231	57.1	607	3	8.3	7	1,368
6/27/2017	Background	0.224	53	636	2.835	8.2	8	1,156
7/12/2017	Background	0.261	53.8	640	3.156	8.2	7	1,388
8/4/2017	Background	0.256	61.3	638	2.889	7.9	8	1,372
8/17/2017	Background	0.293	52	661	3.258	8.2	6	1,378
8/30/2017	Background	0.252	57.3	652	3.5698	7.7	7	1,424
9/13/2017	Background	0.232	55.6	644	2.797	8.4	6	1,452
9/20/2017	Background	0.257	53.7	729	1.535	7.4	6	1,312
10/11/2017	Detection	0.61	71	630	3.7844	7.5	5	1,368
5/30/2018	Assessment	--	--	--	4.1115	7.6	--	--
7/30/2018	Assessment	0.246	131	793	4.3905	8.0	4	1,480
2/27/2019	Assessment	0.233	72.8	739	3.08	7.7	1.6	1,530
6/20/2019	Assessment	0.202	48.5	675	3.06	7.3	0.9 J1	1,428
8/26/2019	Assessment	0.220	128	697	2.789	8.8	3	1,450
3/25/2020	Assessment	0.214	49.2	790	3.13	8.8	0.8 J1	1,580
6/30/2020	Assessment	0.211	64.9	840	2.99	9.0	5.1	1,560
10/21/2020	Assessment	0.188	50.4	584	3.03	8.8	5.0	1,320
3/3/2021	Assessment	0.188	52.4	--	3.18	7.6	--	--
4/12/2021	Assessment	0.215	54.6	725	3.20	7.9	7.0	1,420

Notes:
mg/L: milligrams per liter
SU: standard unit
<: Non-detect value. Analytes which were not detected are shown as less than the method detection limit (MDL) followed by a 'U1' flag.
In analytical data prior to 5/18/2021, U1 flags were reported as U in the analytical report.
- -: Not analyzed
J1: Concentration estimated. Analyte was detected between the method detection limit and the reporting limit.
In analytical data prior to 5/18/2021, J1 flags were reported as J in the analytical report.

Table 1 - Groundwater Data Summary: SP-5R
Northeastern - BAP
Appendix B Constituents

Geosyntec Consultants, Inc.

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
1/25/2017	Background	< 5 U1	12	1,650	< 1 U1	< 1 U1	< 1 U1	< 5 U1	10.09	3	< 5 U1	0.114	< 0.025 U1	< 5 U1	< 5 U1	< 2 U1
3/15/2017	Background	< 5 U1	13	1,590	< 1 U1	< 1 U1	1	< 5 U1	9.65	4	< 5 U1	0.112	< 0.025 U1	< 5 U1	< 5 U1	< 2 U1
4/25/2017	Background	< 0.93 U1	17.03	1,610	0.03 J1	< 0.07 U1	0.33 J1	0.88 J1	10.27	3.06	< 0.68 U1	0.112	0.016 J1	1.16 J1	< 0.99 U1	< 0.86 U1
5/18/2017	Background	< 0.93 U1	29.42	2,270	0.23 J1	< 0.07 U1	3.41	2.32 J1	15.3	4	2.36 J1	0.163	< 0.005 U1	< 0.29 U1	< 0.99 U1	< 0.86 U1
6/15/2017	Background	2.02 J1	13.7	2,050	0.11 J1	< 0.07 U1	1.42	1.44 J1	10.27	3	< 0.68 U1	0.109	0.016 J1	< 0.29 U1	< 0.99 U1	< 0.86 U1
6/27/2017	Background	< 0.93 U1	12.65	1,790	0.02 J1	< 0.07 U1	0.3 J1	1.01 J1	15.84	2.835	0.76 J1	0.1	< 0.005 U1	< 0.29 U1	< 0.99 U1	< 0.86 U1
7/12/2017	Background	< 0.93 U1	17.24	1,880	0.06 J1	< 0.07 U1	0.5 J1	1.1 J1	12.21	3.156	0.9 J1	0.111	< 0.005 U1	< 0.29 U1	1.14 J1	< 0.86 U1
8/4/2017	Background	< 0.93 U1	21.6	1,800	0.09 J1	< 0.07 U1	1.69	1.32 J1	11.6	2.889	1.44 J1	0.119	0.015 J1	1.27 J1	< 0.99 U1	< 0.86 U1
8/17/2017	Background	1.63 J1	19.11	1,890	0.04 J1	< 0.07 U1	< 0.23 U1	1 J1	10.95	3.258	< 0.68 U1	0.106	< 0.005 U1	< 0.29 U1	< 0.99 U1	< 0.86 U1
8/30/2017	Background	< 0.93 U1	19.47	1,930	0.11 J1	< 0.07 U1	1.16	1.2 J1	12.47	3.5698	< 0.68 U1	0.112	0.009 J1	< 0.29 U1	< 0.99 U1	< 0.86 U1
9/13/2017	Background	< 0.93 U1	20.36	1,930	0.1 J1	0.16 J1	0.62 J1	1 J1	10.62	2.797	< 0.68 U1	0.11	< 0.005 U1	< 0.29 U1	< 0.99 U1	< 0.86 U1
9/20/2017	Background	< 0.93 U1	20.77	1,880	0.05 J1	< 0.07 U1	< 0.23 U1	0.97 J1	10.5	1.535	1.06 J1	0.111	< 0.005 U1	< 0.29 U1	< 0.99 U1	< 0.86 U1
5/30/2018	Assessment	1.21 J1	28.86	1,760	< 0.02 U1	< 0.07 U1	< 0.23 U1	0.88 J1	9.15	4.1115	< 0.68 U1	0.102	< 0.005 U1	< 0.29 U1	< 0.99 U1	< 0.86 U1
7/30/2018	Assessment	0.05 J1	47.3	2,140	0.052	0.02 J1	0.082	0.482	11.28	4.3905	0.415	0.0946	< 0.005 U1	1.17	0.1	0.02 J1
2/27/2019	Assessment	< 0.2 U1	25.7	2,130	< 0.2 U1	< 0.1 U1	2 J1	0.3 J1	6.702	3.08	0.7 J1	0.102	< 0.005 U1	< 4 U1	< 0.3 U1	< 1 U1
6/20/2019	Assessment	< 0.1 U1	59.9	2,410	< 0.1 U1	< 0.05 U1	0.8 J1	0.598	12.977	3.06	0.701	0.111	0.008 J1	< 2 U1	< 0.2 U1	< 0.5 U1
8/26/2019	Assessment	0.06 J1	49.3	2,340	0.06 J1	0.02 J1	0.335	0.485	11.56	2.789	0.545	0.0928	< 0.005 U1	1 J1	0.1 J1	< 0.1 U1
3/25/2020	Assessment	0.05 J1	26.2	2,600	0.04 J1	0.02 J1	0.346	0.296	12.09	3.13	0.371	0.0911	< 0.002 U1	1 J1	0.1 J1	< 0.1 U1
6/30/2020	Assessment	0.13	27.0	2,520	0.151	0.04 J1	1.51	0.774	14.34	2.99	1.65	0.0913	< 0.002 U1	1 J1	0.5	< 0.1 U1
10/21/2020	Assessment	0.10	10.9	2,070	0.05 J1	< 0.01 U1	0.320	0.378	6.502	3.03	0.373	0.0792	< 0.002 U1	0.8 J1	0.2 J1	< 0.1 U1
3/3/2021	Assessment	0.16	6.56	1,840	0.05 J1	0.27	0.496	0.391	13.31	3.18	0.793	0.0856	< 0.002 U1	0.7 J1	0.1 J1	< 0.1 U1
4/12/2021	Assessment	0.09 J1	7.12	2,180	0.05 J1	0.01 J1	0.415	0.378	14.1	3.20	0.325	0.0894	< 0.002 U1	1 J1	0.1 J1	< 0.04 U1

Notes:
µg/L: micrograms per liter
mg/L: milligrams per liter
pCi/L: picocuries per liter
<: Non-detect value. Analytes which were not detected are shown as less than the method detection limit (MDL) followed by a 'U1' flag. In analytical data prior to 5/18/2021, U1 flags were reported as U in the analytical report.
- -: Not analyzed
J1: Concentration estimated. Analyte was detected between the method detection limit and the reporting limit. In analytical data prior to 5/18/2021, J1 flags were reported as J in the analytical report.

Table 1 - Groundwater Data Summary: SP-10
Northeastern - BAP
Appendix A Constituents

Geosyntec Consultants, Inc.

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
7/12/2017	Background	0.965	53	1,844	6.502	6.7	294	3,416
8/4/2017	Background	1.08	83.1	1,616	< 0.083 U1	7.6	761	5,142
8/17/2017	Background	1.09	91.4	1,700	< 0.083 U1	7.8	915	5,678
8/30/2017	Background	1.09	81.8	1,932	10.2663	7.6	834	5,264
9/13/2017	Background	1.1	76.9	1,592	7.028	8.3	738	5,168
9/20/2017	Background	1.08	64.6	1,946	< 0.083 U1	7.1	544	4,424
9/27/2017	Background	1.07	65.7	1,784	5	7.8	419	4,516
10/4/2017	Background	1.1	52.3	1,553	5.11	7.4	286	3,660
10/11/2017	Detection	1.03	58.4	1,934	7.3938	7.0	188	4,060
1/22/2018	Detection	1.08	--	1,630	5.71	7.0	63.1	3,236
5/30/2018	Assessment	--	--	--	7.333	7.8	--	--
7/30/2018	Assessment	1.17	227	2,283	8.9991	7.6	75	3,632
2/4/2019	Assessment	1.17	144	--	--	--	--	--
2/27/2019	Assessment	1.16	92.6	1,740	5.59	7.8	6.9	3,504
6/20/2019	Assessment	0.916	50.3	1,780	6.40	7.8	30.3	3,512
8/26/2019	Assessment	1.03	216	1,939	4.874	8.9	29	3,446
3/25/2020	Assessment	1.04	44.2	2,000	6.45	8.2	12.6	3,560
6/30/2020	Assessment	0.944	52.1	2,010	6.29	8.9	25.5	3,550
7/28/2020	Assessment	0.914	--	1,960	6.63	8.3	--	3,440
10/20/2020	Assessment	0.955	39.9	1,830	6.55	9.1	9.6	3,540
3/3/2021	Assessment	0.853	40.4	--	7.12	7.7	--	--
4/12/2021	Assessment	1.03	43.8	2,000	6.84	8.1	15.4	3,540

Notes:
mg/L: milligrams per liter
SU: standard unit
<: Non-detect value. Analytes which were not detected are shown as less than the method detection limit (MDL) followed by a 'U1' flag.
In analytical data prior to 5/18/2021, U1 flags were reported as U in the analytical report.
- -: Not analyzed
J1: Concentration estimated. Analyte was detected between the method detection limit and the reporting limit.
In analytical data prior to 5/18/2021, J1 flags were reported as J in the analytical report.

Table 1 - Groundwater Data Summary: SP-10
Northeastern - BAP
Appendix B Constituents

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
7/12/2017	Background	4.62 J1	< 1.05 U1	1,900	< 0.02 U1	< 0.07 U1	110	5.96	17.23	6.502	< 0.68 U1	0.278	0.006 J1	934	5.67	< 0.86 U1
8/4/2017	Background	2.51 J1	2.43 J1	330	0.03 J1	< 0.07 U1	2.44	4.74 J1	1.153	< 0.083 U1	< 0.68 U1	0.284	0.029	129	8.82	< 0.86 U1
8/17/2017	Background	< 0.93 U1	< 1.05 U1	282	< 0.02 U1	< 0.07 U1	< 0.23 U1	< 0.14 U1	0.995	< 0.083 U1	< 0.68 U1	0.317	0.027	45.43	< 0.99 U1	< 0.86 U1
8/30/2017	Background	< 0.93 U1	5.66	279	0.06 J1	< 0.07 U1	1.09	4.27 J1	0.763	10.2663	< 0.68 U1	0.306	0.019 J1	30.35	2.56 J1	< 0.86 U1
9/13/2017	Background	< 0.93 U1	9.42	266	0.07 J1	< 0.07 U1	0.46 J1	2.41 J1	0.774	7.028	< 0.68 U1	0.315	0.013 J1	16.28	3.11 J1	< 0.86 U1
9/20/2017	Background	1.16 J1	13.92	399	0.03 J1	< 0.07 U1	0.72 J1	2.19 J1	1.062	< 0.083 U1	< 0.68 U1	0.292	0.016 J1	13.58	2.38 J1	< 0.86 U1
9/27/2017	Background	1.57 J1	15.31	928	0.04 J1	< 0.07 U1	2.07	3.71 J1	1.723	5	< 0.68 U1	0.329	0.013 J1	35.93	3.84 J1	< 0.86 U1
10/4/2017	Background	1.27 J1	4.3 J1	664	0.03 J1	< 0.07 U1	0.36 J1	4.02 J1	3.226	5.11	0.87 J1	0.279	0.015 J1	29.19	< 0.99 U1	< 0.86 U1
5/30/2018	Assessment	< 0.93 U1	8.9	2,550	< 0.02 U1	< 0.07 U1	< 0.23 U1	0.83 J1	6.06	7.333	< 0.68 U1	0.245	< 0.005 U1	2.94 J1	2.26 J1	< 0.86 U1
7/30/2018	Assessment	0.34	7.61	2,330	0.043	0.02 J1	0.06 J1	2.16	7.89	8.9991	0.102	0.242	0.006 J1	18.5	0.09 J1	0.04 J1
2/27/2019	Assessment	2 J1	3.48	5,810	< 0.4 U1	< 0.2 U1	1 J1	< 0.4 U1	15.35	5.59	< 0.4 U1	0.275	< 0.005 U1	< 8 U1	< 0.6 U1	< 2 U1
6/20/2019	Assessment	0.65	3.66	3,880	< 0.1 U1	< 0.05 U1	8.76	0.743	26.4	6.40	0.3 J1	0.290	0.01 J1	9 J1	< 0.2 U1	< 0.5 U1
8/26/2019	Assessment	0.61	3.00	3,060	0.08 J1	0.03 J1	1.61	1.06	8.11	4.874	0.449	0.241	< 0.005 U1	8.22	0.4	< 0.1 U1
3/25/2020	Assessment	0.17	0.61	6,670	< 0.02 U1	0.03 J1	0.383	0.522	26.79	6.45	0.08 J1	0.214	< 0.002 U1	7.39	0.1 J1	< 0.1 U1
6/30/2020	Assessment	0.21	1.40	3,960	0.03 J1	0.01 J1	0.204	0.724	8.33	6.29	0.07 J1	0.226	< 0.002 U1	4.81	0.08 J1	< 0.1 U1
10/20/2020	Assessment	0.08 J1	0.42	6,800	0.03 J1	0.01 J1	0.2 J1	0.103	13.9507	6.55	0.1 J1	0.209	< 0.002 U1	0.6 J1	0.09 J1	< 0.1 U1
3/3/2021	Assessment	0.08 J1	0.36	5,530	0.02 J1	0.03 J1	0.409	0.199	18.84	7.12	0.230	0.218	< 0.002 U1	1 J1	0.08 J1	< 0.1 U1
4/12/2021	Assessment	0.12	1.14	6,360	0.03 J1	0.01 J1	0.277	0.218	20.36	6.84	0.1 J1	0.221	< 0.002 U1	5.01	< 0.09 U1	< 0.04 U1

Notes:
µg/L: micrograms per liter
mg/L: milligrams per liter
pCi/L: picocuries per liter
<: Non-detect value. Analytes which were not detected are shown as less than the method detection limit (MDL) followed by a 'U1' flag. In analytical data prior to 5/18/2021, U1 flags were reported as U in the analytical report.
- -: Not analyzed
J1: Concentration estimated. Analyte was detected between the method detection limit and the reporting limit. In analytical data prior to 5/18/2021, J1 flags were reported as J in the analytical report.

Table 1 - Groundwater Data Summary: SP-11
Northeastern - BAP
Appendix A Constituents

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
7/12/2017	Background	0.839	742	568	2.386	7.4	798	2,880
8/4/2017	Background	0.543	272	567	3.355	7.9	870	3,076
8/17/2017	Background	0.453	171	789	4.52	6.9	741	3,308
8/30/2017	Background	0.428	161	683	4.1325	7.6	541	2,732
9/13/2017	Background	0.447	190	628	3.359	7.2	515	2,420
9/20/2017	Background	0.469	1,220	690	2.016	7.2	329	2,336
9/27/2017	Background	0.447	1,170	759	3	7.2	332	2,428
10/4/2017	Background	0.531	1,110	744	2.9	7.5	305	2,288
10/11/2017	Detection	0.446	479	824	4.4661	7.0	223	2,322
1/22/2018	Detection	--	--	470	2.96	6.9	222	1,544
5/30/2018	Assessment	--	--	--	3.574	7.5	--	--
7/30/2018	Assessment	0.280	124	234	3.7832	7.7	79	996
2/27/2019	Assessment	0.375	49.6	241	3.44	7.7	95.1	1,168
6/20/2019	Assessment	0.550	65.6	137	1.67	6.8	203	1,000
8/26/2019	Assessment	0.304	139	129	2.225	8.9	122	970
3/25/2020	Assessment	0.428	40.5	187	2.66	9.0	108	1,060
6/30/2020	Assessment	0.545	57.3	140	1.77	8.9	188	927
7/28/2020	Assessment	0.301	--	--	--	8.6	158	--
10/20/2020	Assessment	0.220	43.8	98.1	3.05	9.2	35.6	764
3/3/2021	Assessment	0.371	39.0	--	2.88	7.7	--	--
4/12/2021	Assessment	0.562	79.6	130	1.66	7.8	232	918

Notes:
mg/L: milligrams per liter
SU: standard unit
<: Non-detect value. Analytes which were not detected are shown as less than the method detection limit (MDL) followed by a 'U1' flag.
In analytical data prior to 5/18/2021, U1 flags were reported as U in the analytical report.
- -: Not analyzed
J1: Concentration estimated. Analyte was detected between the method detection limit and the reporting limit.
In analytical data prior to 5/18/2021, J1 flags were reported as J in the analytical report.

Table 1 - Groundwater Data Summary: SP-11
Northeastern - BAP
Appendix B Constituents

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
7/13/2017	Background	9.43	3.99 J1	194	0.22 J1	1.4	18.52	9.76	--	2.386	5.16	0.04698	0.009 J1	61.27	5.95	< 0.86 U1
8/4/2017	Background	4.7 J1	1.82 J1	98.74	0.07 J1	0.44 J1	5.25	6.52	25.367	3.355	2.01 J1	0.0877	0.023 J1	66.41	6.26	< 0.86 U1
8/17/2017	Background	< 0.93 U1	< 1.05 U1	83.42	< 0.02 U1	< 0.07 U1	< 0.23 U1	< 0.14 U1	0.947	4.52	< 0.68 U1	0.08931	0.007 J1	51.5	< 0.99 U1	< 0.86 U1
8/30/2017	Background	4.29 J1	1.2 J1	93.07	0.07 J1	0.34 J1	2.76	3.85 J1	0.438	4.1325	1.23 J1	0.08933	0.008 J1	44.33	2.49 J1	< 0.86 U1
9/13/2017	Background	2.4 J1	3.66 J1	108	0.08 J1	0.09 J1	2.57	3.21 J1	2.685	3.359	< 0.68 U1	0.105	0.009 J1	36.16	1.55 J1	< 0.86 U1
9/20/2017	Background	7.73	12.14	240	0.39 J1	2.7	31.3	14.62	4.2	2.016	8.16	0.13	0.027	46.9	5.46	< 0.86 U1
9/27/2017	Background	6.89	7.5	269	0.39 J1	3.01	32.71	14.37	--	3	8.58	0.129	0.048	48.61	7.47	< 0.86 U1
10/4/2017	Background	4.44 J1	8.47	347	0.35 J1	2.49	29.49	11.99	2.817	2.9	7.05	0.146	0.047	42.14	3.27 J1	< 0.86 U1
5/30/2018	Assessment	< 0.93 U1	5.3	160	< 0.02 U1	< 0.07 U1	0.34 J1	1.61 J1	1.334	3.574	< 0.68 U1	0.04956	< 0.005 U1	3.27 J1	1.43 J1	< 0.86 U1
7/30/2018	Assessment	0.35	4.22	539	0.029	0.04	0.379	5.12	0.95	3.7832	0.404	0.0370	0.005 J1	8.85	0.7	0.03 J1
2/27/2019	Assessment	< 0.2 U1	8.83	529	< 0.2 U1	< 0.1 U1	0.7 J1	0.720	1.81	3.44	0.2 J1	0.0580	< 0.005 U1	6 J1	< 0.3 U1	< 1 U1
6/20/2019	Assessment	0.3 J1	4.18	169	< 0.1 U1	0.06 J1	6.71	0.948	0.81	1.67	0.719	0.047	0.01 J1	< 2 U1	0.3 J1	< 0.5 U1
8/26/2019	Assessment	0.37	6.30	492	0.04 J1	0.13	1.47	2.73	1.623	2.225	0.764	0.0337	< 0.005 U1	5.70	0.8	< 0.1 U1
3/25/2020	Assessment	0.15	2.88	415	0.02 J1	0.05 J1	0.705	0.702	1.73	2.66	0.409	0.0402	0.003 J1	3.01	0.3	< 0.1 U1
6/30/2020	Assessment	0.14	2.79	187	< 0.02 U1	0.01 J1	0.201	0.620	3.845	1.77	0.1 J1	0.0278	0.008	2.15	0.2 J1	< 0.1 U1
10/20/2020	Assessment	0.48	1.49	630	0.03 J1	0.15	2.20	1.16	0.661	3.05	0.719	0.0298	0.004 J1	2 J1	0.5	< 0.1 U1
3/3/2021	Assessment	0.06 J1	1.33	330	< 0.02 U1	0.01 J1	0.243	0.939	0.901	2.88	0.1 J1	0.0396	< 0.002 U1	2 J1	0.2 J1	< 0.1 U1
4/12/2021	Assessment	0.19	2.14	212	0.02 J1	0.02 J1	0.944	1.52	1.354	1.66	0.224	0.0248	< 0.002 U1	2 J1	0.2 J1	< 0.04 U1

Notes:
µg/L: micrograms per liter
mg/L: milligrams per liter
pCi/L: picocuries per liter
<: Non-detect value. Analytes which were not detected are shown as less than the method detection limit (MDL) followed by a 'U1' flag. In analytical data prior to 5/18/2021, U1 flags were reported as U in the analytical report.
- -: Not analyzed
J1: Concentration estimated. Analyte was detected between the method detection limit and the reporting limit. In analytical data prior to 5/18/2021, J1 flags were reported as J in the analytical report.

APPENDIX 2

Where applicable, shown in this appendix are the results from statistical analyses, and a description of the statistical analysis method chosen.

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

Submitted to

1 Riverside Plaza
Columbus, Ohio 43215-2372

Submitted by

Geosyntec consultants
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-Francía 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

Geosyntec Consultants, Inc.

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

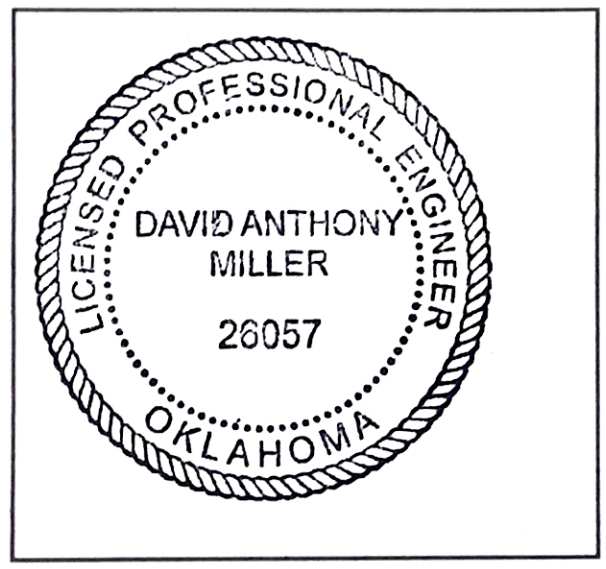
Notes:
UPL: Upper prediction limit
LPL: Lower prediction limit
Bold values exceed the background value.
Background values are shaded gray.

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	OKLAHOMA	02.19.21
License Number	Licensing State	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

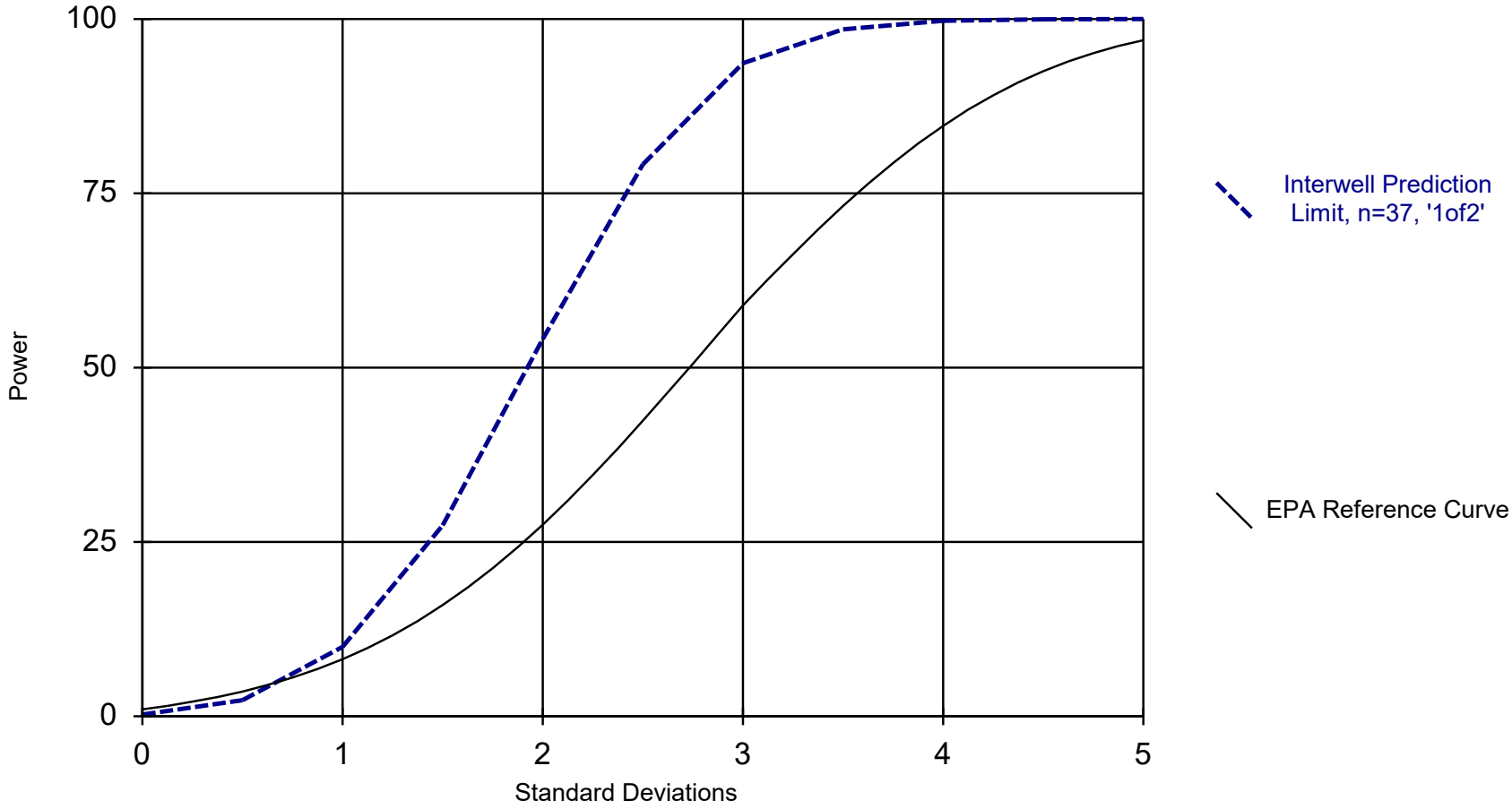
Date: 12/28/2020 3:29 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Calcium (mg/L)

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

Interwell Power Curve

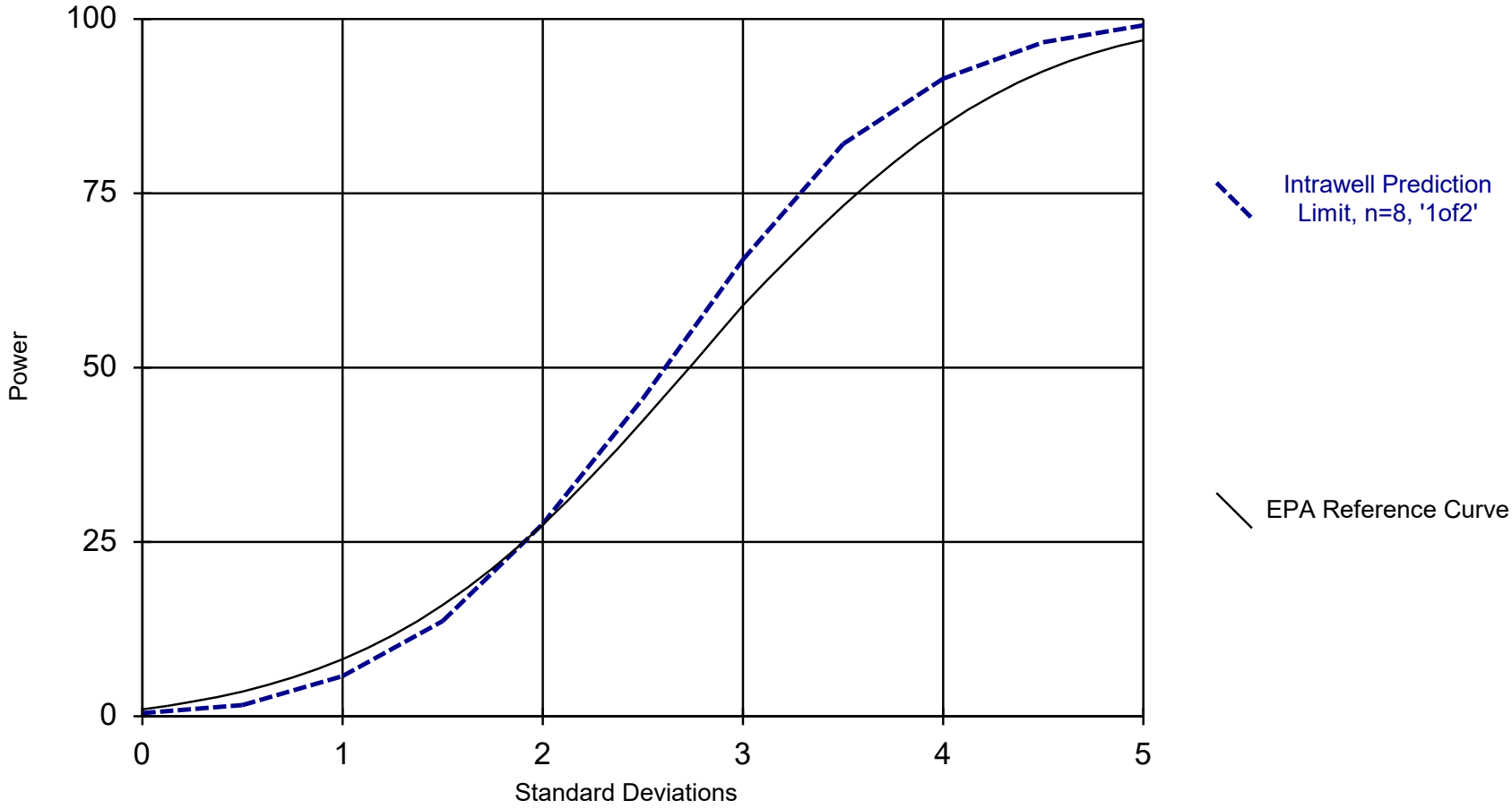


Kappa = 1.84, based on 4 compliance wells and 7 constituents, evaluated semi-annually (this report reflects annual total).

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

Constituent	Well	Outlier	Value(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
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

Constituent	Well	Calc.	0.01	Method
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

Constituent	Well	Calc.	0.01	Method
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

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**
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

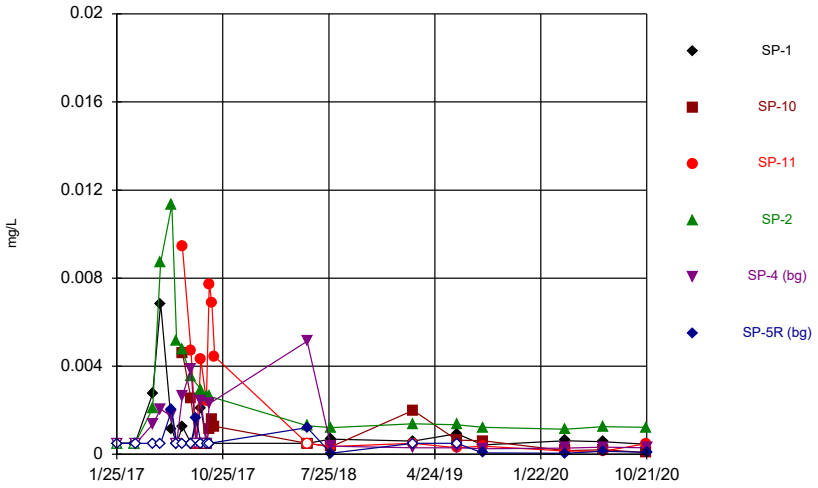
Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/29/2020, 11:40 AM

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	0.00000428	78.95	None	No	0.01	NP (NDs)
Mercury (mg/L)	SP-10	0.000019	0.000005	0.002	No	16	0.0000115	0.00000798	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	0.00000206	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.

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

Time Series



Constituent: Antimony Analysis Run 12/18/2020 4:40 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG
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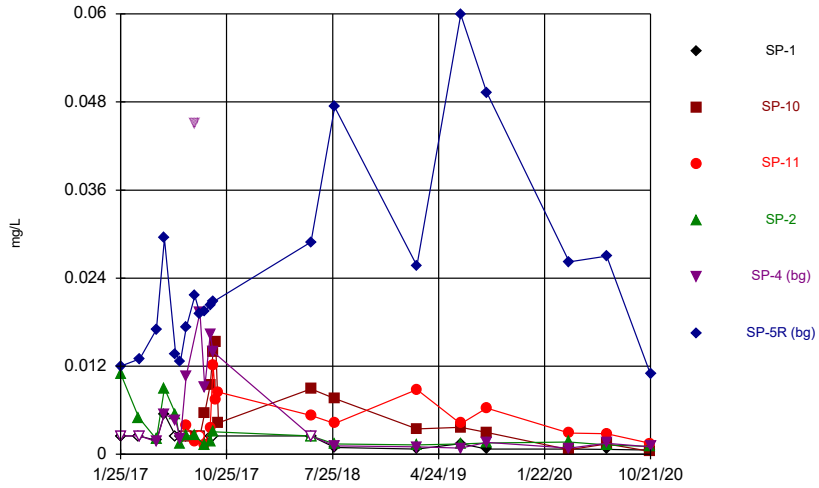

Constituent: Arsenic Analysis Run 12/18/2020 4:40 PM
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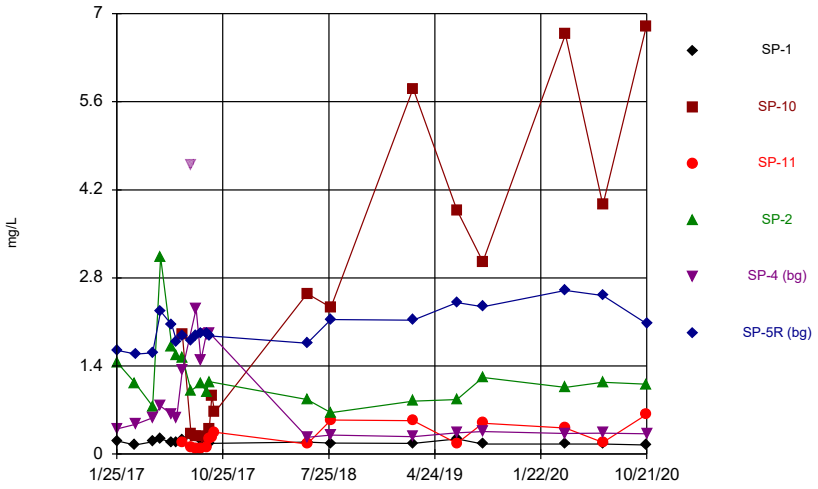
Time Series



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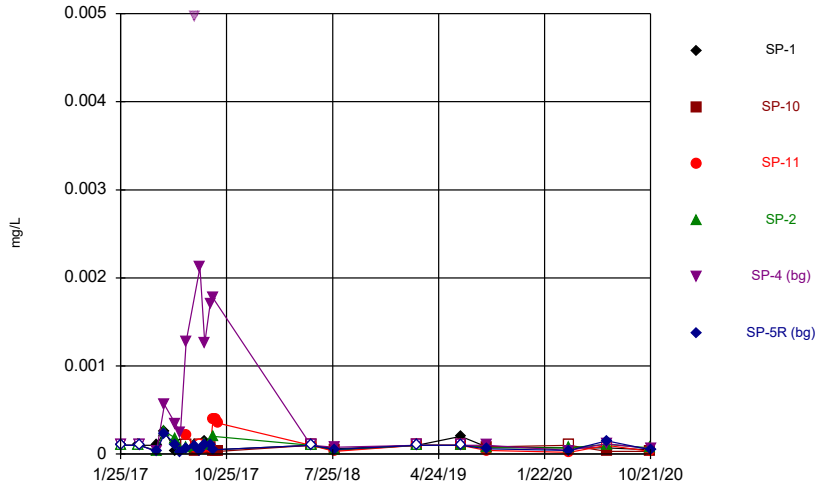
Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

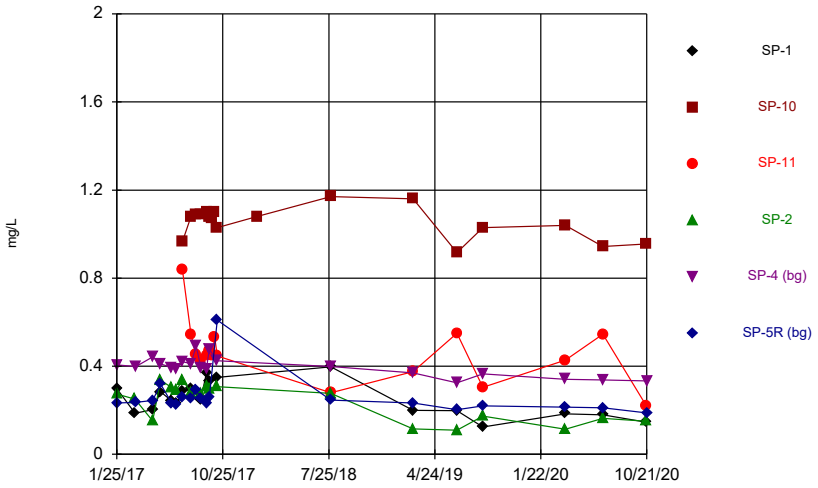
Time Series



Constituent: Beryllium Analysis Run 12/18/2020 4:40 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Time Series



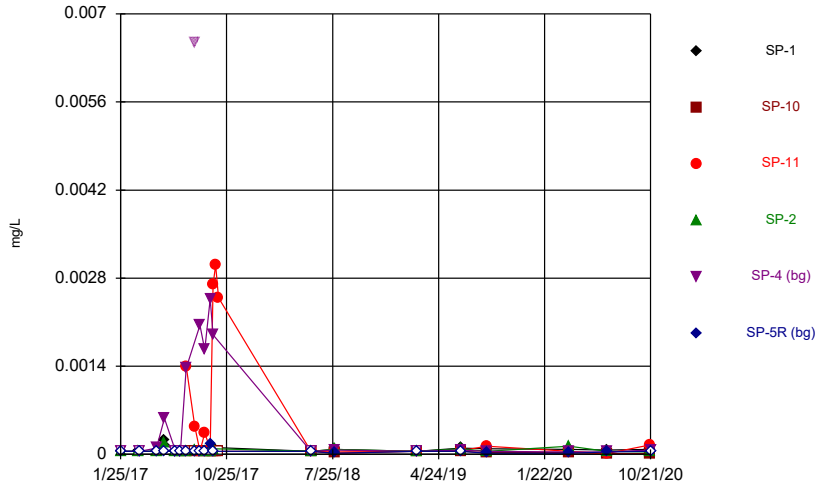
Constituent: Boron Analysis Run 12/18/2020 4:40 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Hollow symbols indicate censored values.

Time Series

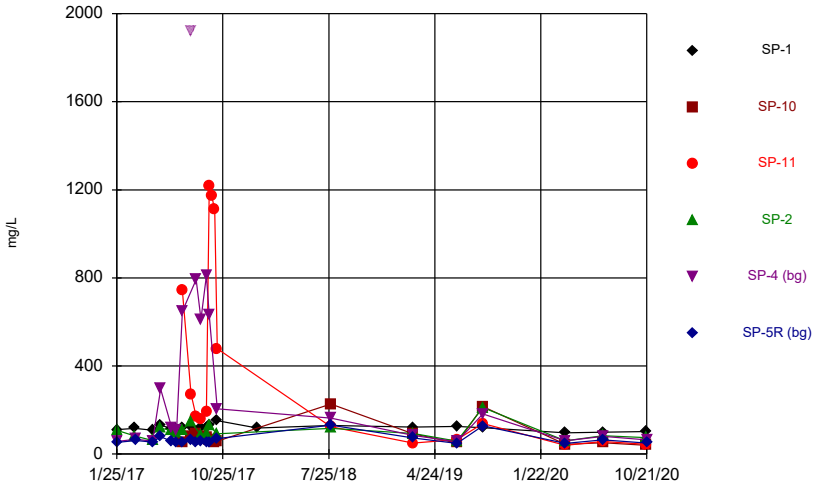


Constituent: Cadmium Analysis Run 12/18/2020 4:40 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Time Series

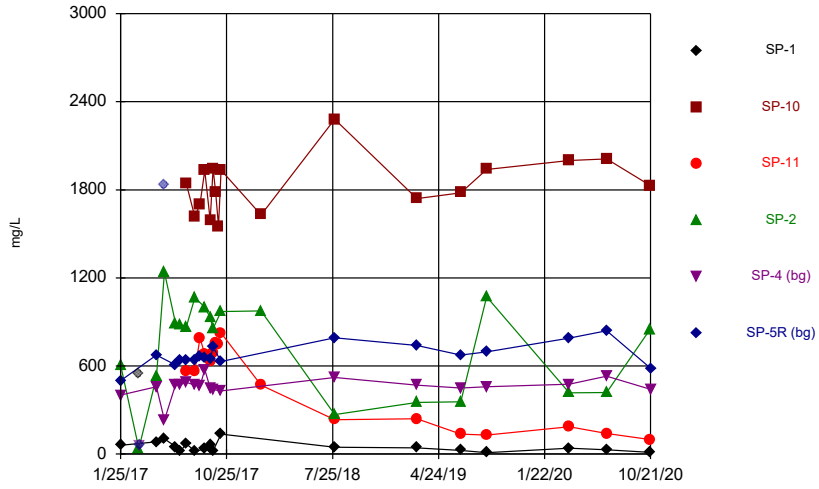


Constituent: Calcium Analysis Run 12/18/2020 4:40 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Time Series



Constituent: Chloride Analysis Run 12/18/2020 4:40 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG
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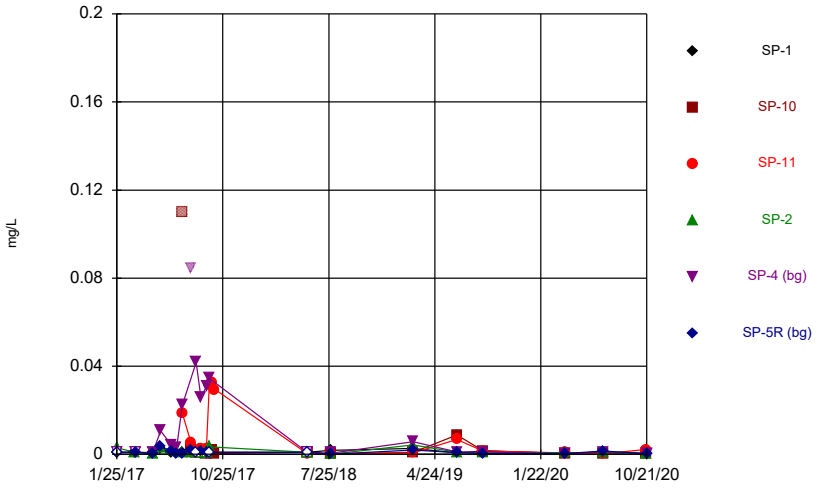
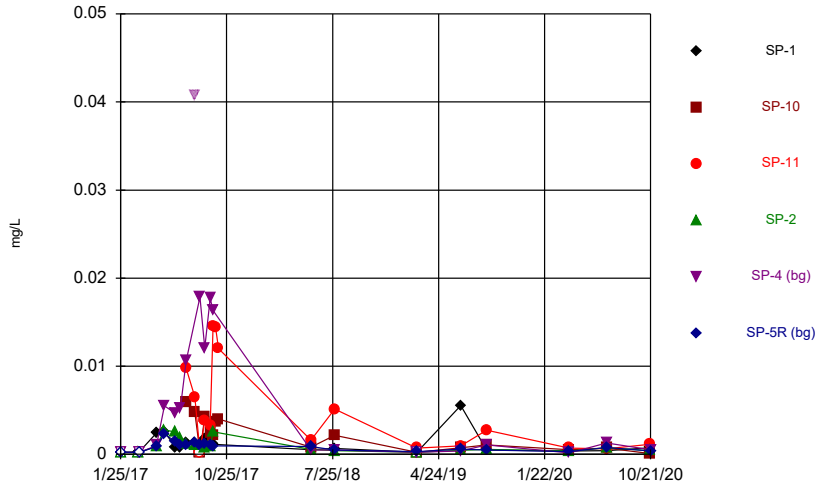
Time Series



Constituent: Chromium Analysis Run 12/18/2020 4:40 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

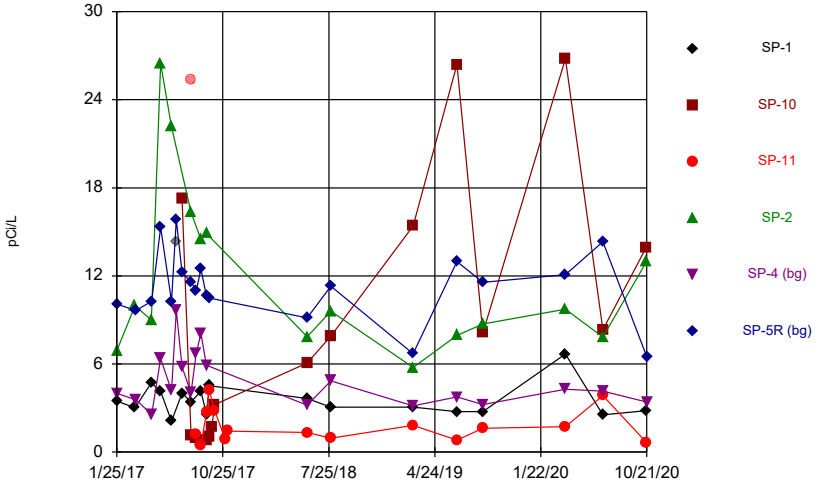
Time Series



Constituent: Cobalt Analysis Run 12/18/2020 4:40 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

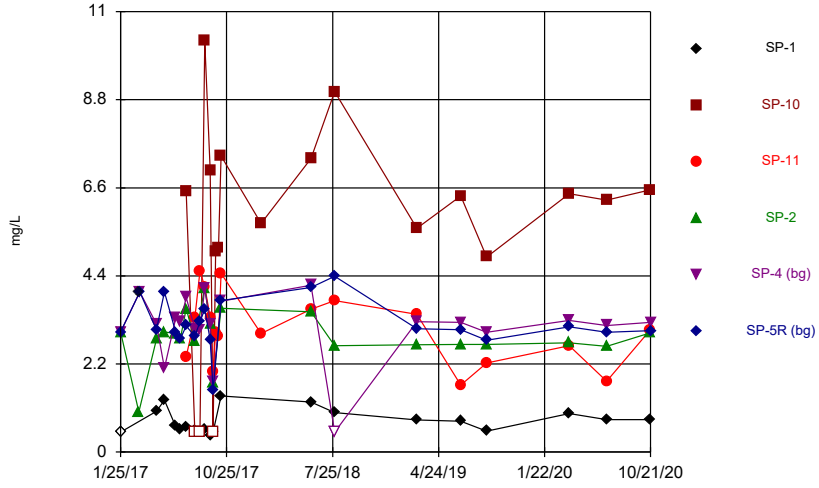
Time Series



Constituent: Combined Radium 226 + 228 Analysis Run 12/18/2020 4:40 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

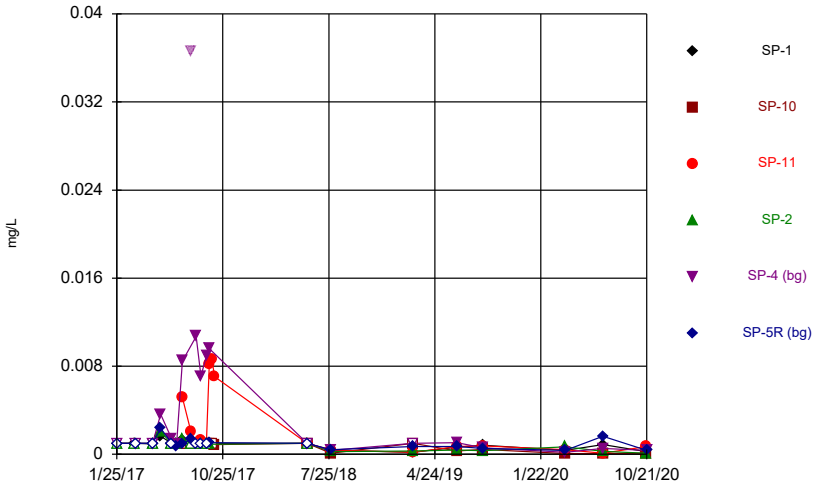
Time Series



Constituent: Fluoride Analysis Run 12/18/2020 4:40 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

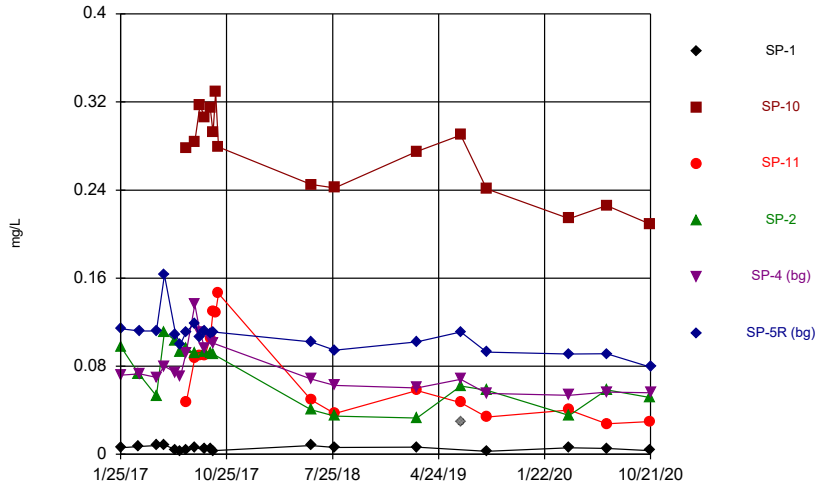
Time Series



Constituent: Lead Analysis Run 12/18/2020 4:40 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

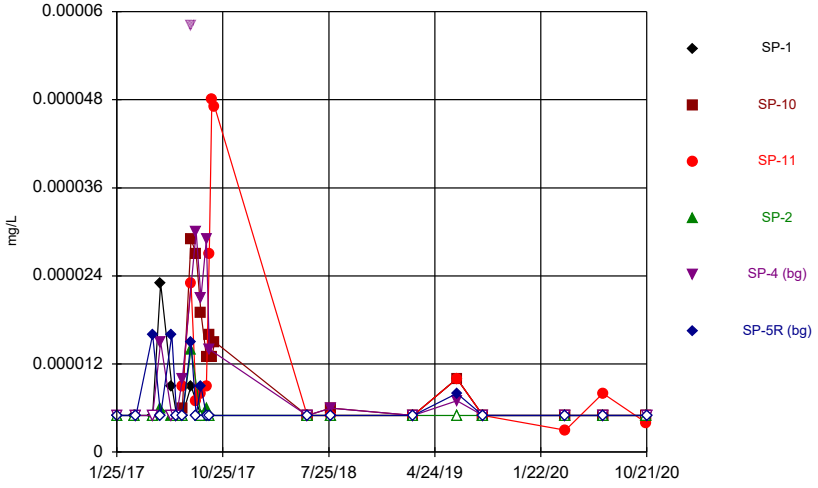
Time Series



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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

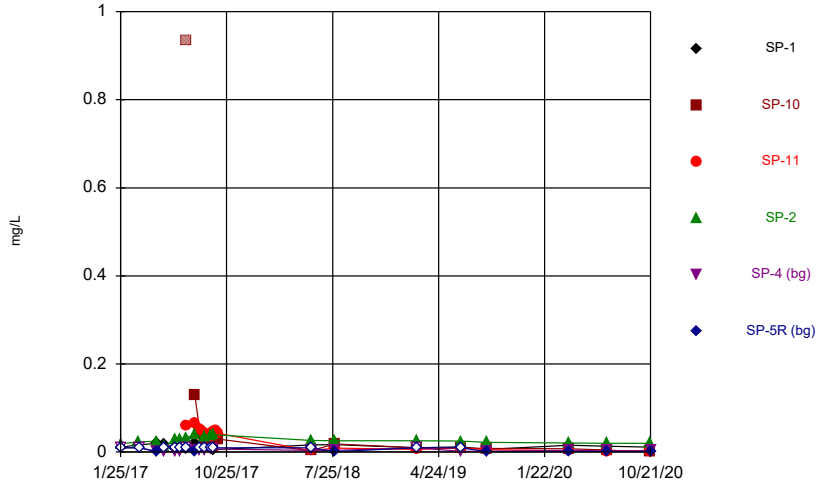
Time Series



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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

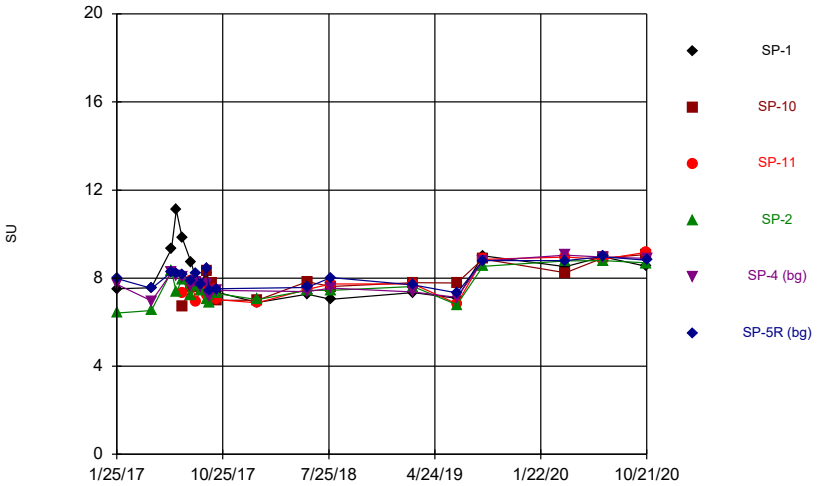
Time Series



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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Time Series

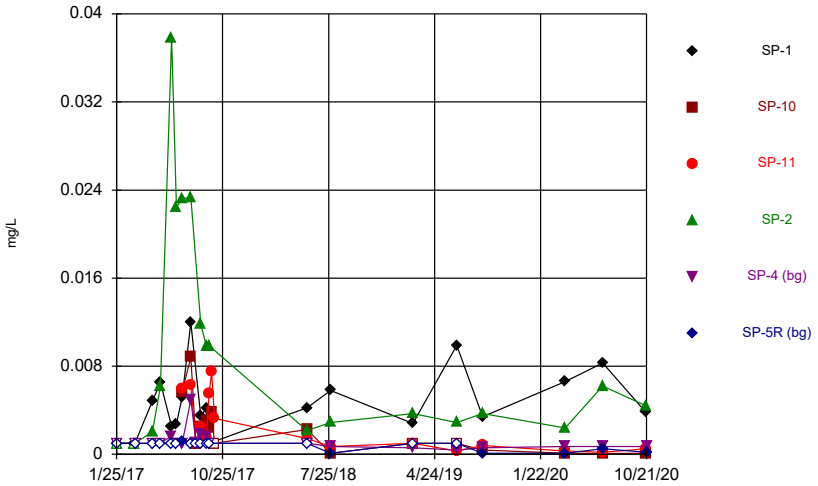


Constituent: pH, field Analysis Run 12/18/2020 4:41 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

Time Series

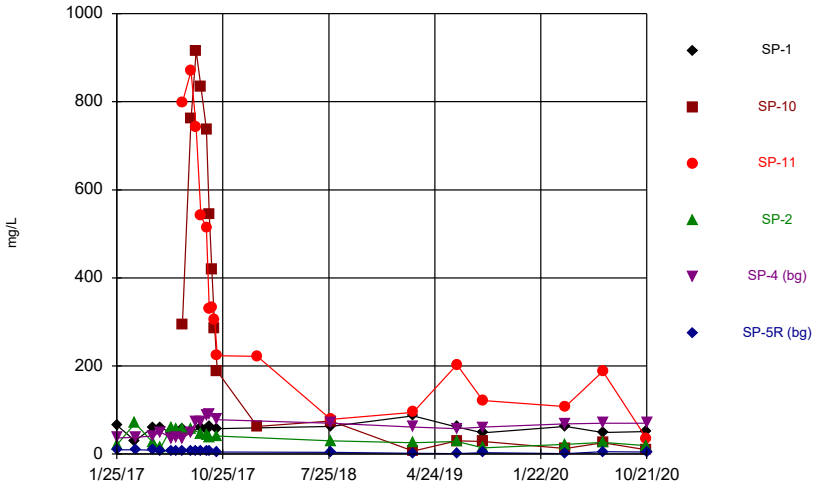


Constituent: Selenium Analysis Run 12/18/2020 4:41 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Time Series

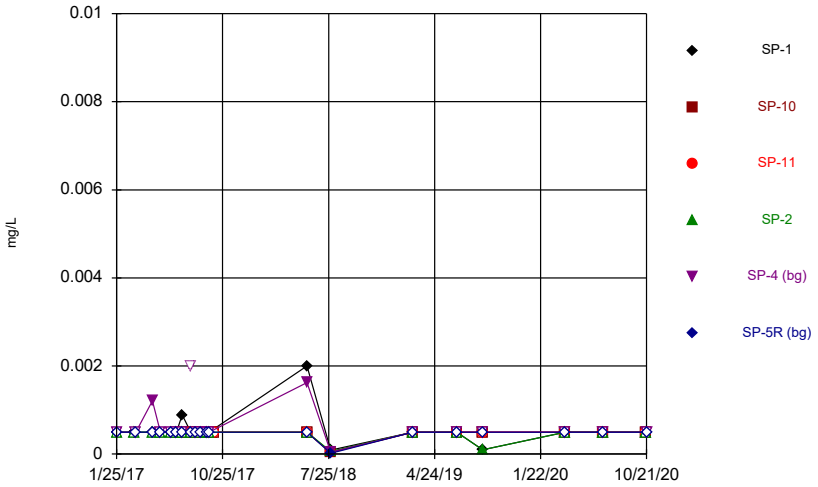


Constituent: Sulfate Analysis Run 12/18/2020 4:41 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

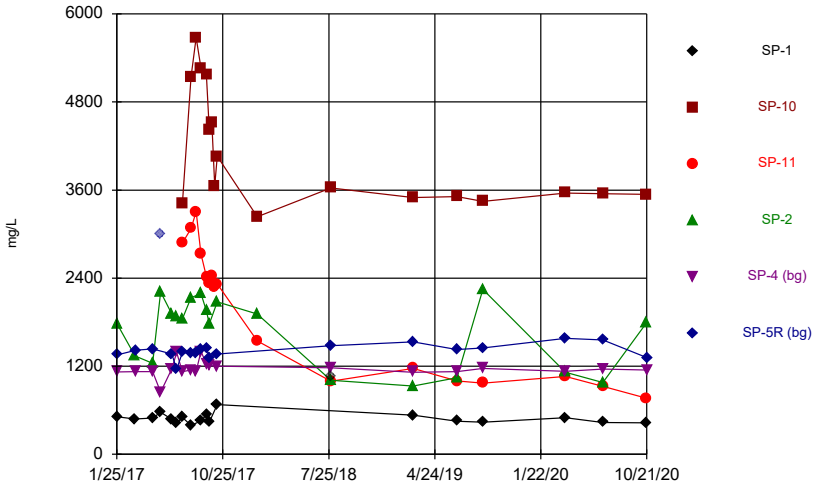
Time Series



Constituent: Thallium Analysis Run 12/18/2020 4:41 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Time Series

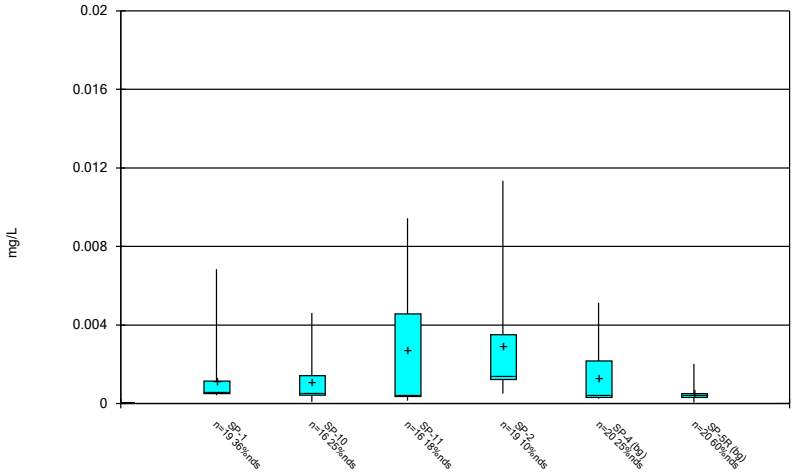


Constituent: Total Dissolved Solids [TDS] Analysis Run 12/18/2020 4:41 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

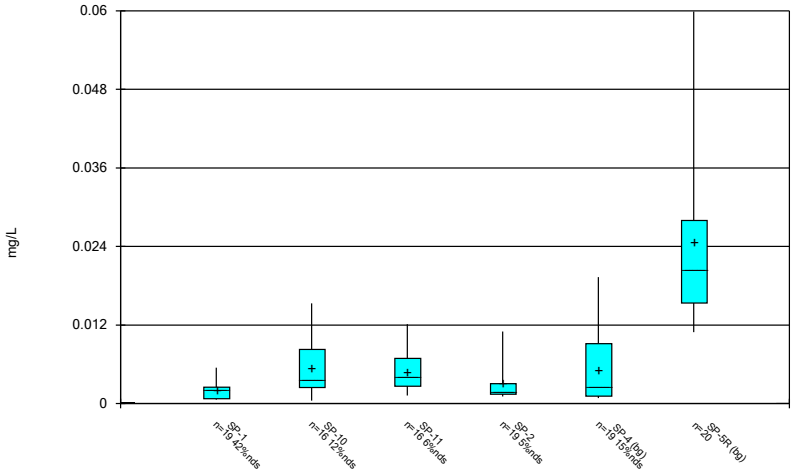
FIGURE B.

Box & Whiskers Plot



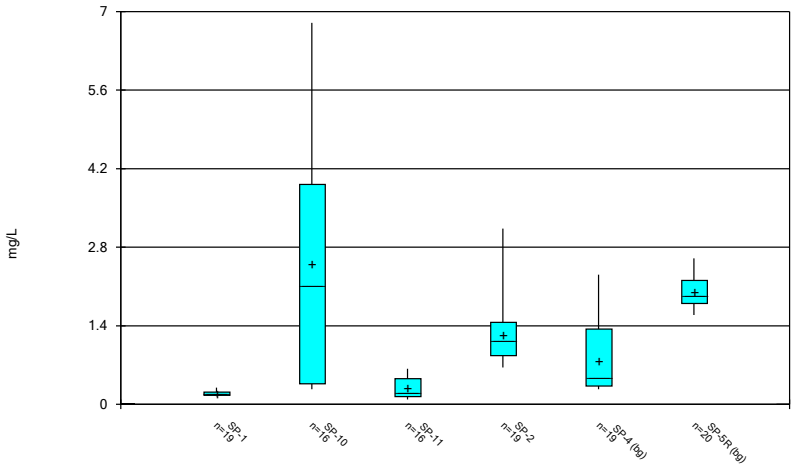
Constituent: Antimony Analysis Run 12/18/2020 4:42 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



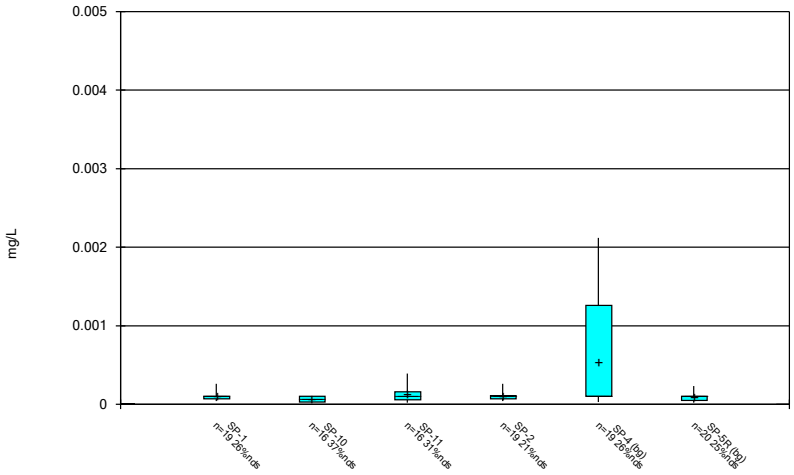
Constituent: Arsenic Analysis Run 12/18/2020 4:42 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



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

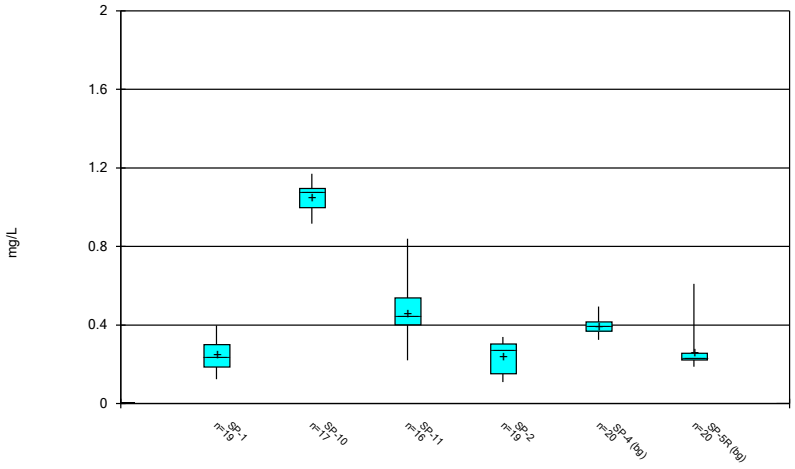
Box & Whiskers Plot



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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Box & Whiskers Plot

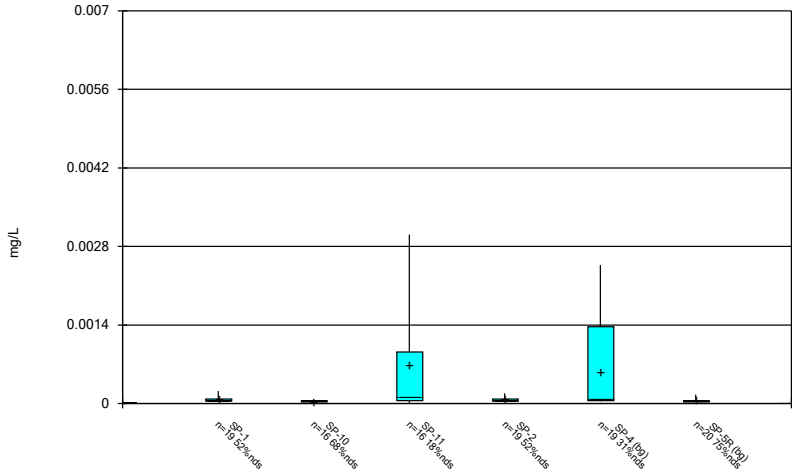


Constituent: Boron Analysis Run 12/18/2020 4:42 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Box & Whiskers Plot

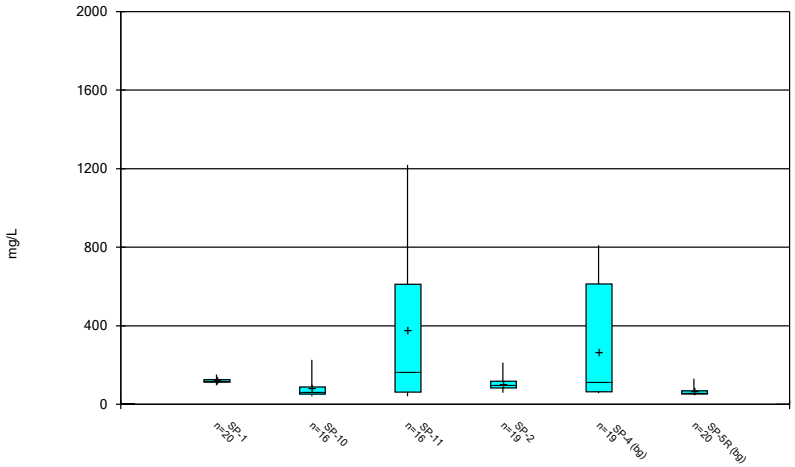


Constituent: Cadmium Analysis Run 12/18/2020 4:42 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Box & Whiskers Plot

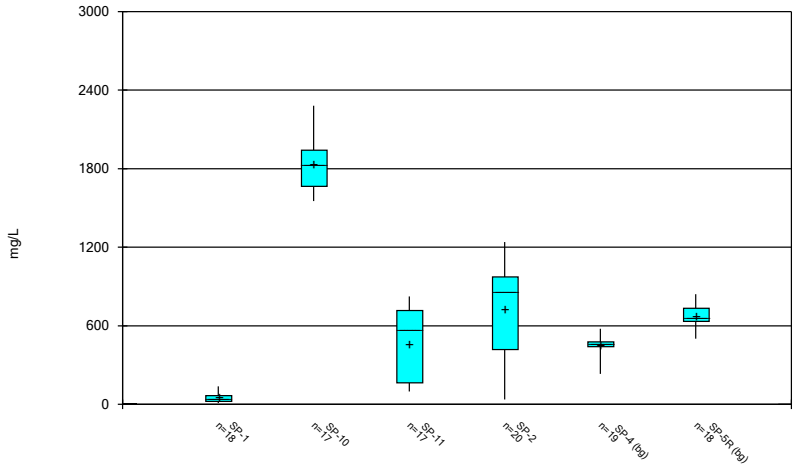


Constituent: Calcium Analysis Run 12/18/2020 4:42 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

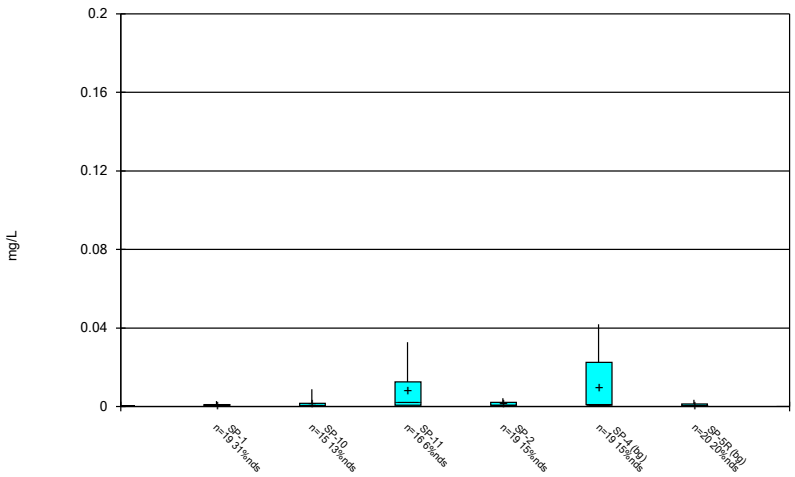
Box & Whiskers Plot



Constituent: Chloride Analysis Run 12/18/2020 4:42 PM

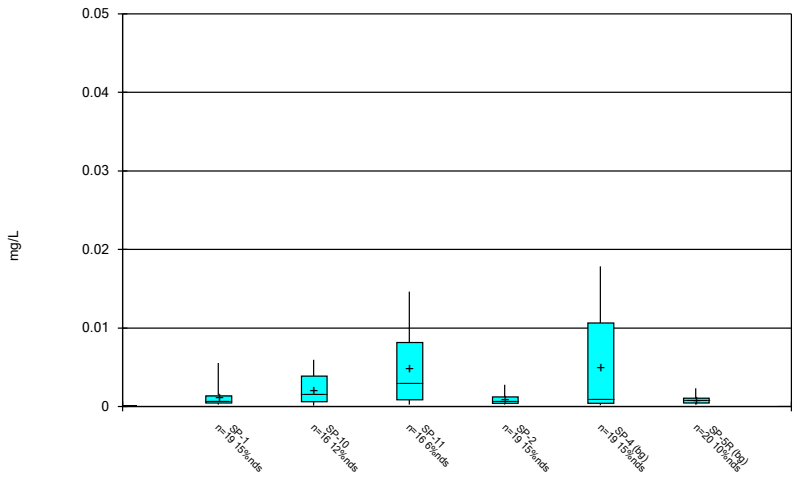
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



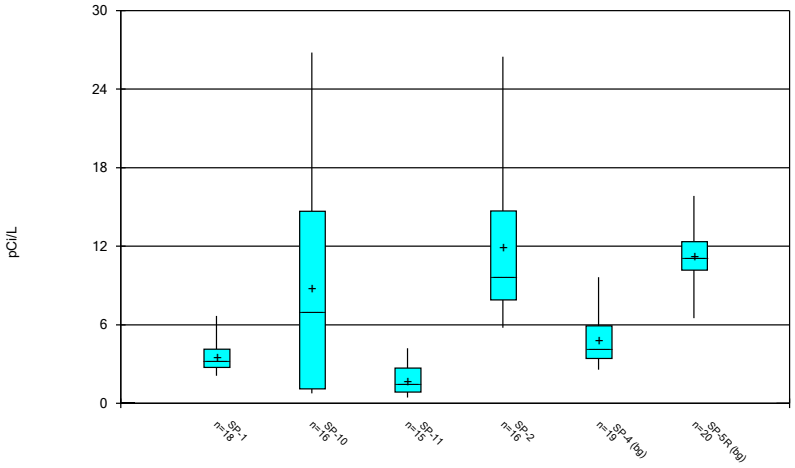
Constituent: Chromium Analysis Run 12/18/2020 4:42 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



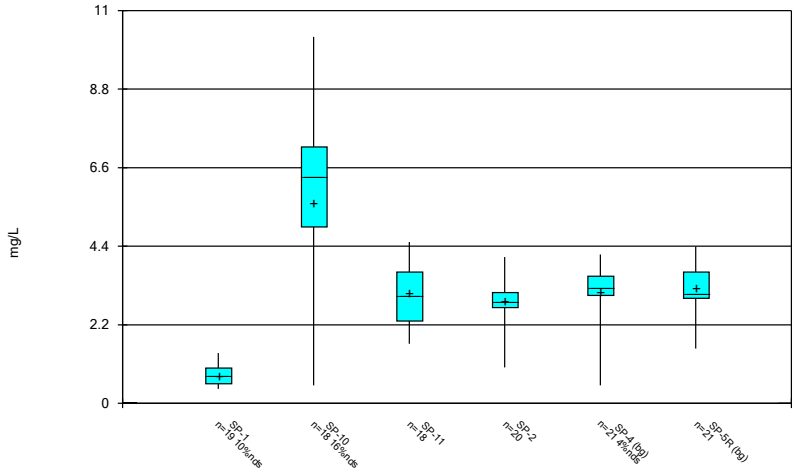
Constituent: Cobalt Analysis Run 12/18/2020 4:42 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



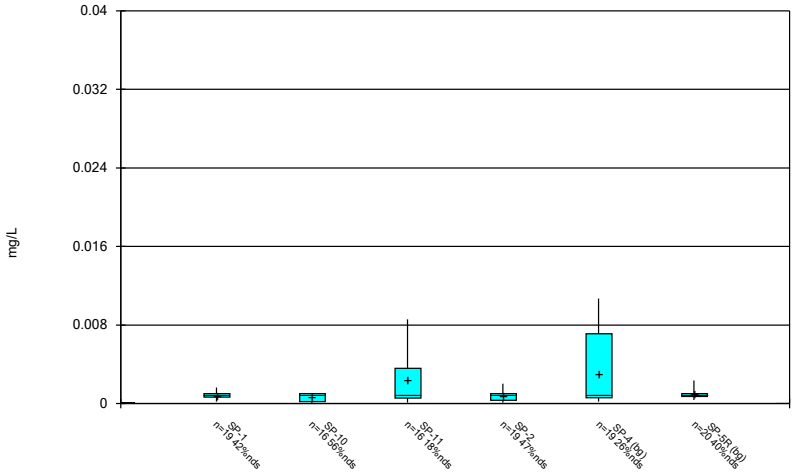
Constituent: Combined Radium 226 + 228 Analysis Run 12/18/2020 4:42 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



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

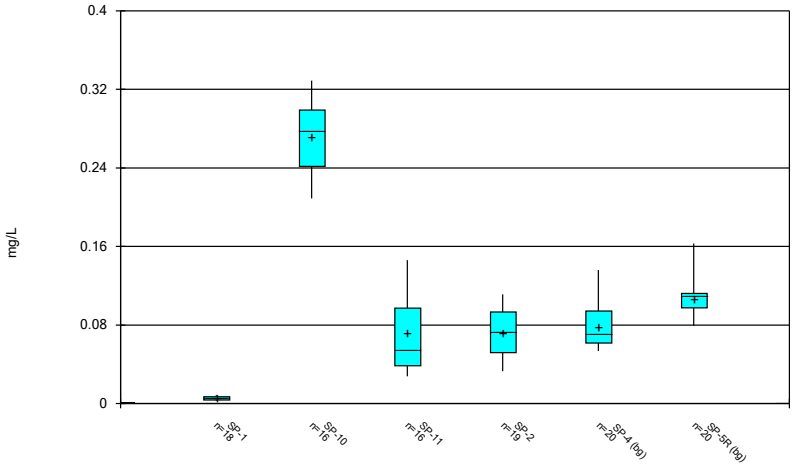
Box & Whiskers Plot



Constituent: Lead Analysis Run 12/18/2020 4:42 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

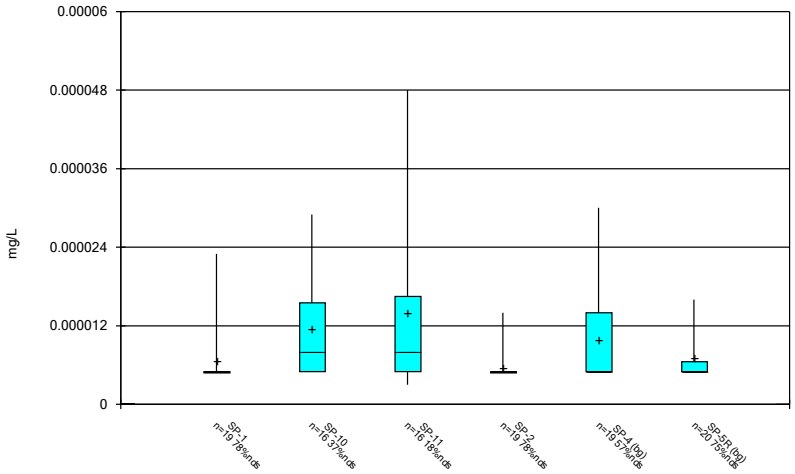
Box & Whiskers Plot



Constituent: Lithium Analysis Run 12/18/2020 4:42 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

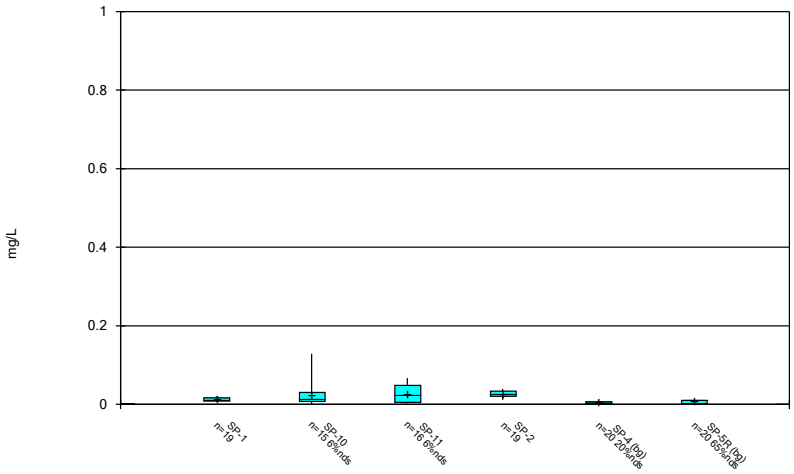
Box & Whiskers Plot



Constituent: Mercury Analysis Run 12/18/2020 4:42 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot

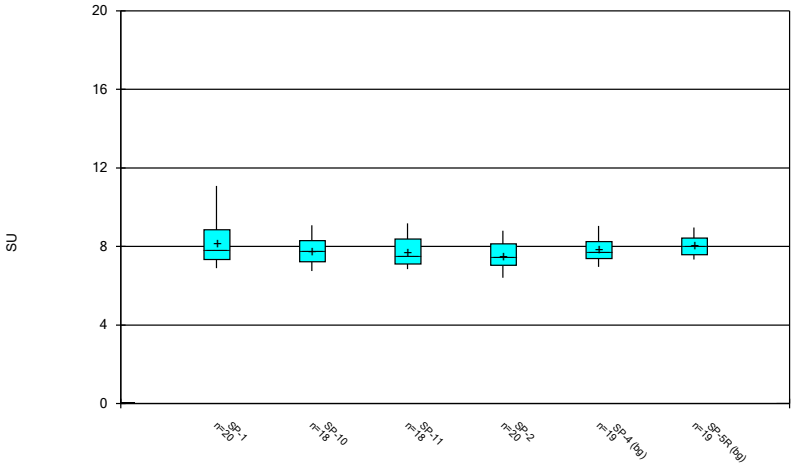


Constituent: Molybdenum Analysis Run 12/18/2020 4:42 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Box & Whiskers Plot

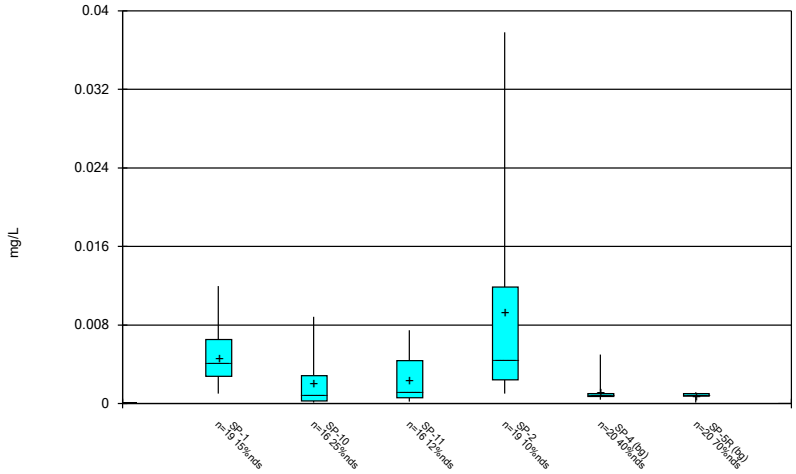


Constituent: pH, field Analysis Run 12/18/2020 4:42 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Box & Whiskers Plot

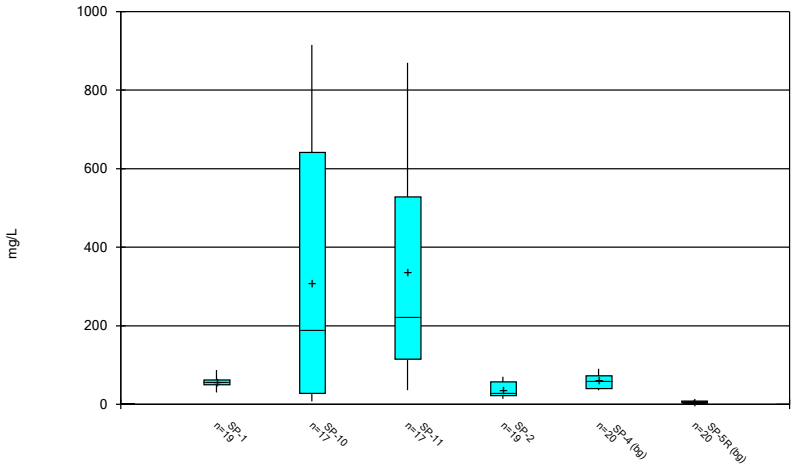


Constituent: Selenium Analysis Run 12/18/2020 4:42 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Box & Whiskers Plot

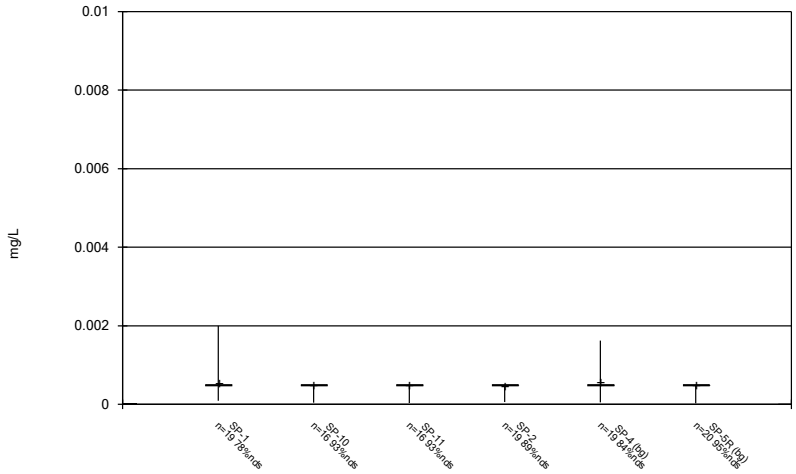


Constituent: Sulfate Analysis Run 12/18/2020 4:42 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

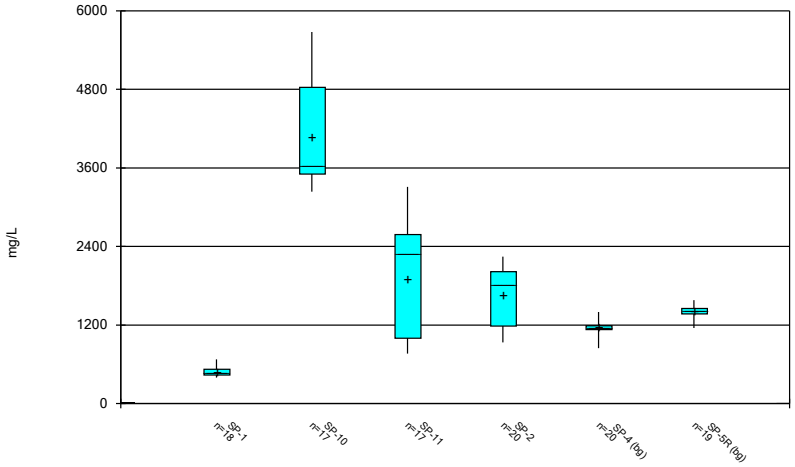
Box & Whiskers Plot



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

	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										

	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)				

	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

Constituent	Well	Outlier	Value(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
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

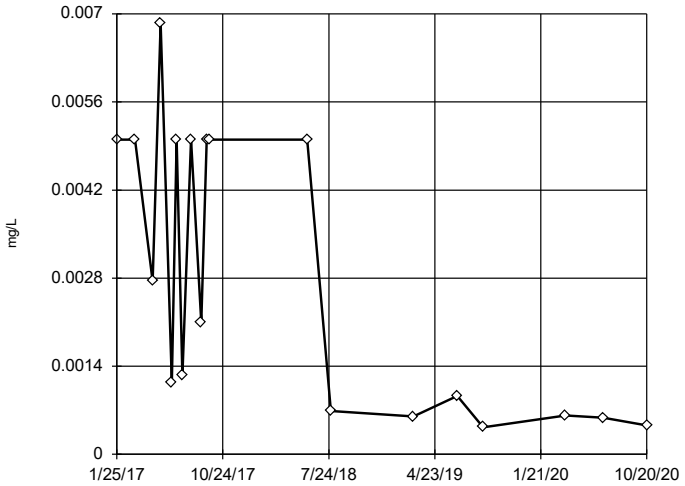
Tukey's Outlier Analysis - Downgradient Wells - All Results

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 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).

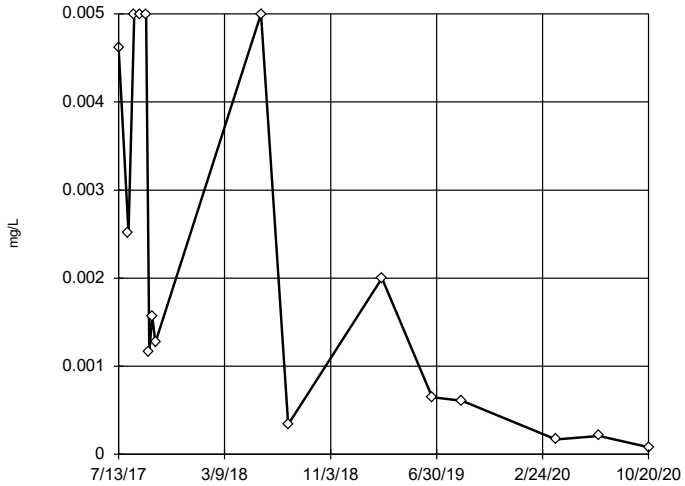
High cutoff = 2.622, low cutoff = 0.000001182, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

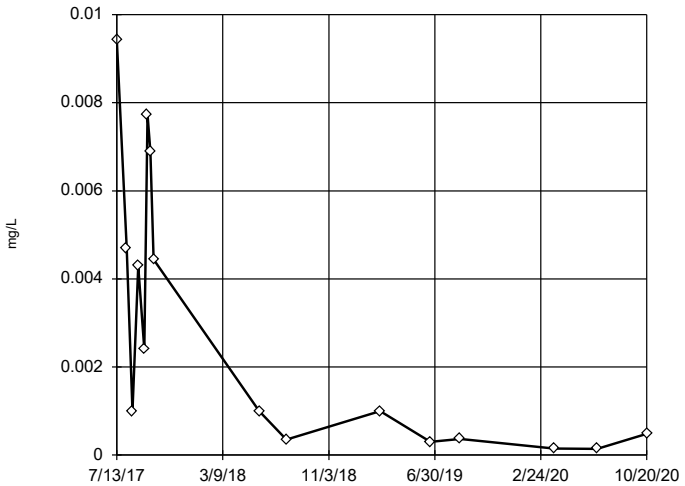
High cutoff = 5.65, low cutoff = 3.9e-7, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

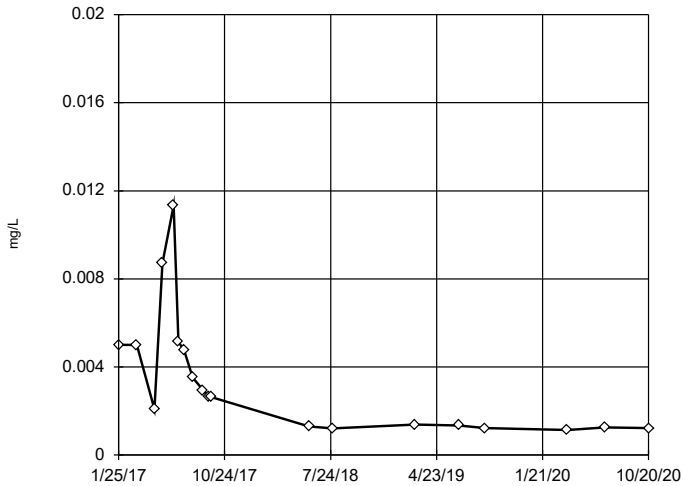
High cutoff = 9.345, low cutoff = 1.8e-7, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening

SP-2



n = 19

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

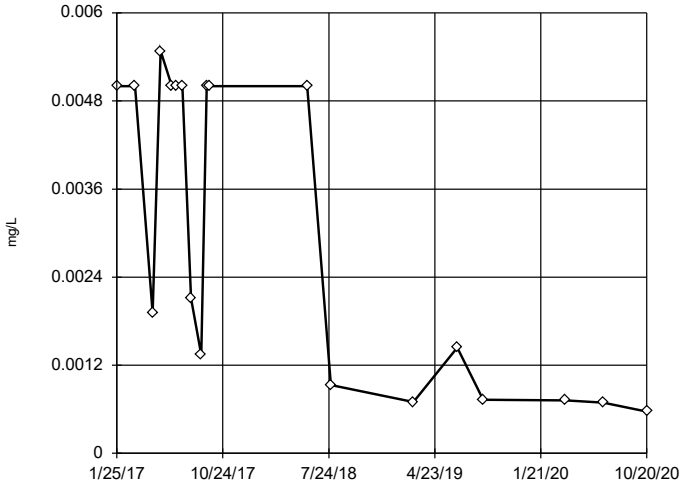
Data were natural log transformed to achieve best W statistic (graph shown in original units).

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).

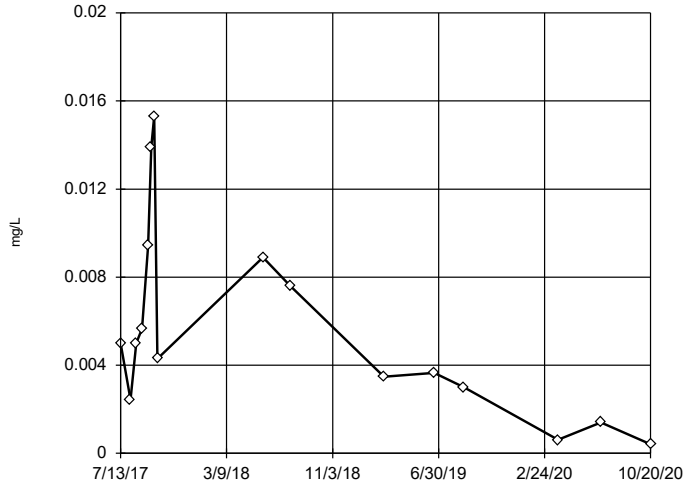
High cutoff = 1.607, low cutoff = 0.000002272, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

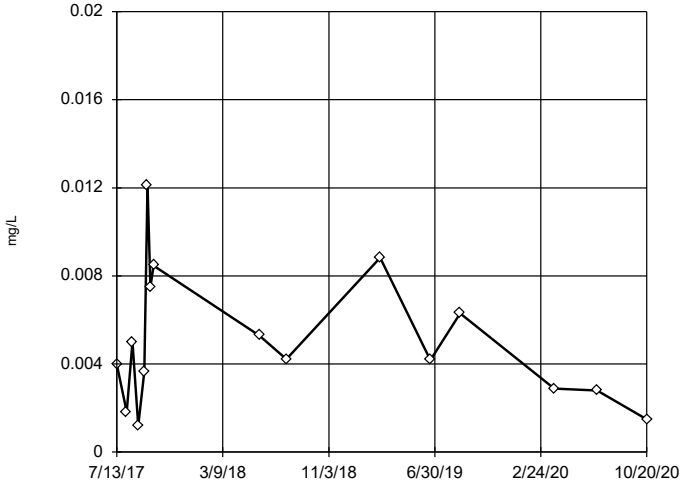
High cutoff = 0.05926, low cutoff = -0.0001145, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

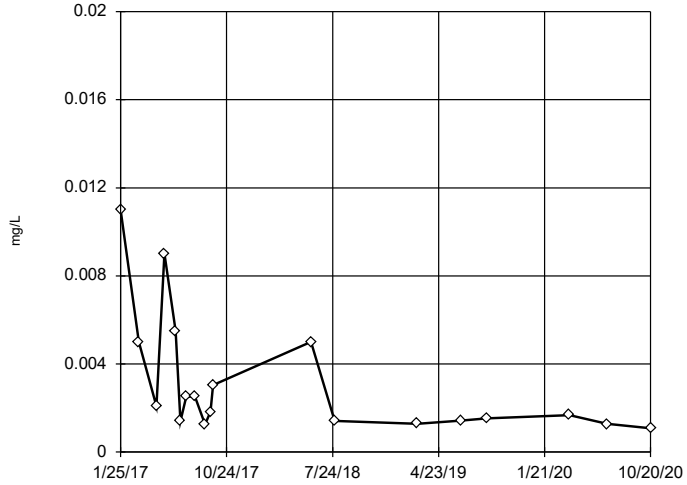
High cutoff = 0.03803, low cutoff = -9.4e-8, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening

SP-2



n = 19

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

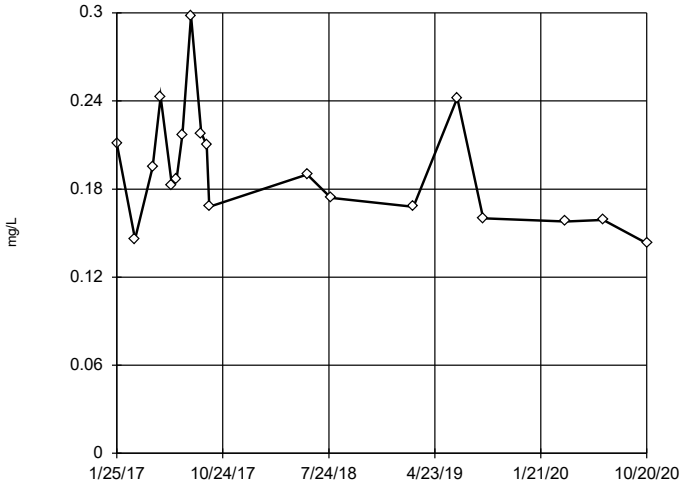
Data were natural log transformed to achieve best W statistic (graph shown in original units).

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).

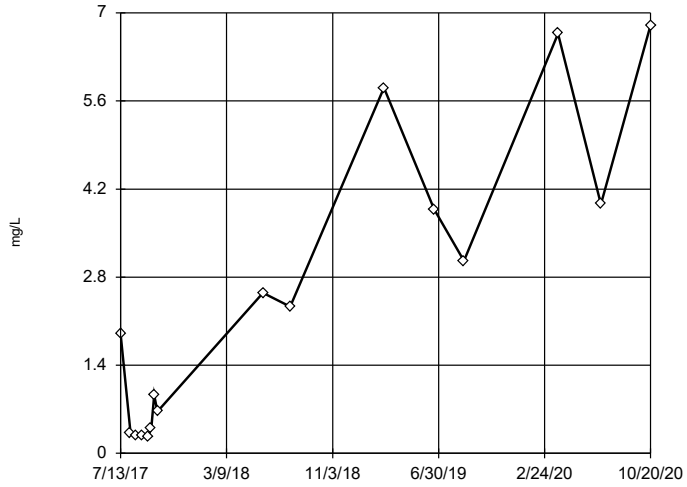
High cutoff = 0.5414, low cutoff = 0.06414, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

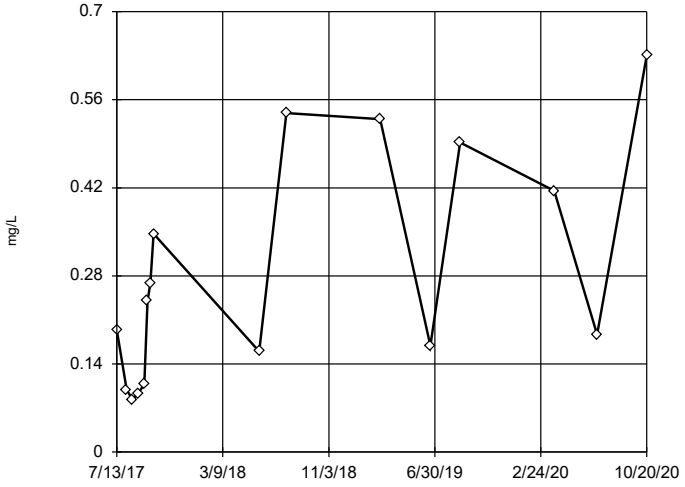
High cutoff = 72.31, low cutoff = -6.599, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

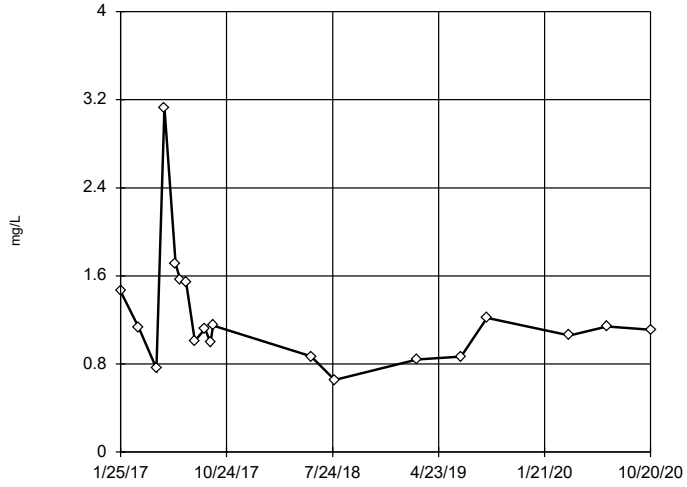
High cutoff = 18.35, low cutoff = 0.003236, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening

SP-2



n = 19

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

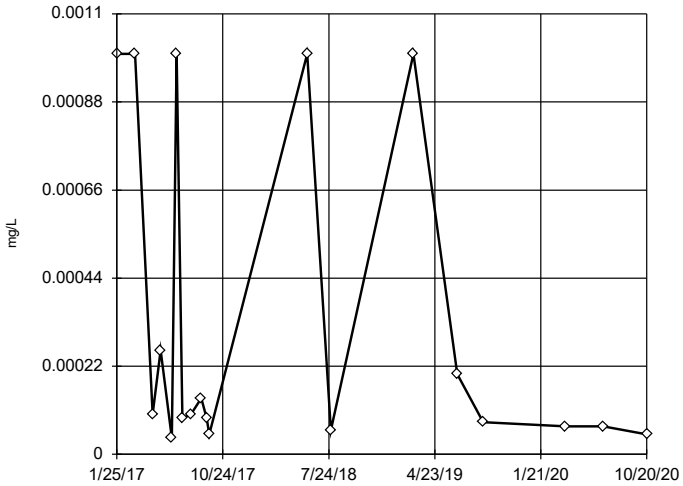
Data were natural log transformed to achieve best W statistic (graph shown in original units).

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).

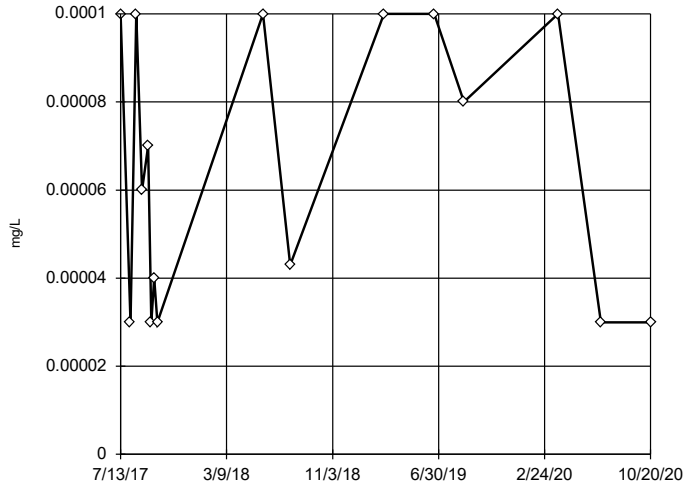
High cutoff = 2.915, low cutoff = 2.4e-8, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

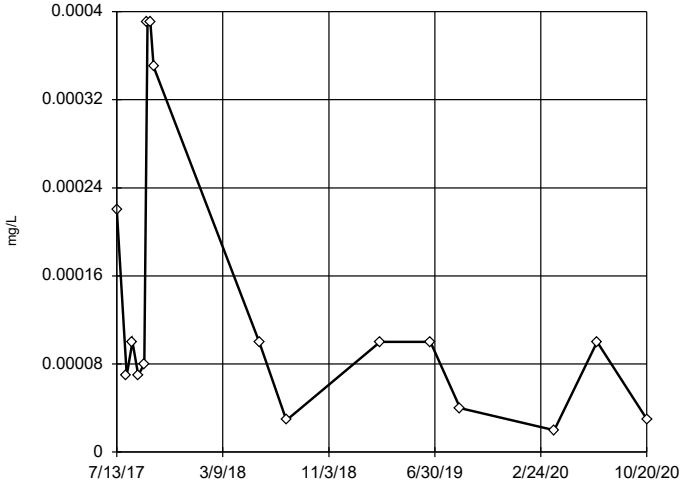
High cutoff = 0.0007901, low cutoff = -0.000003347, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

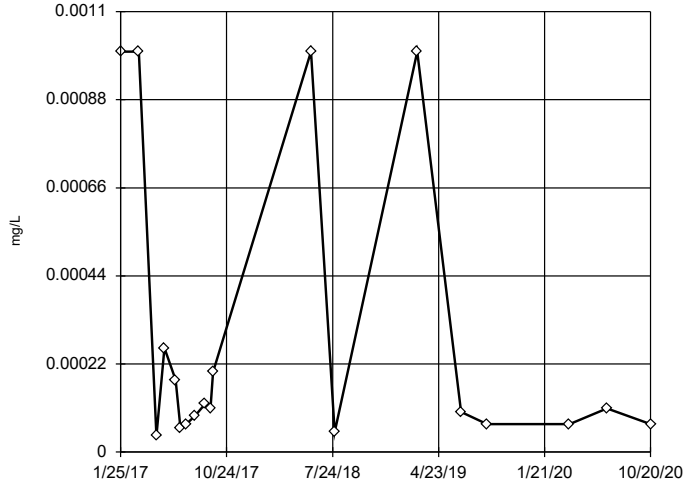
High cutoff = 0.003267, low cutoff = 0.000002403, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening

SP-2



n = 19

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

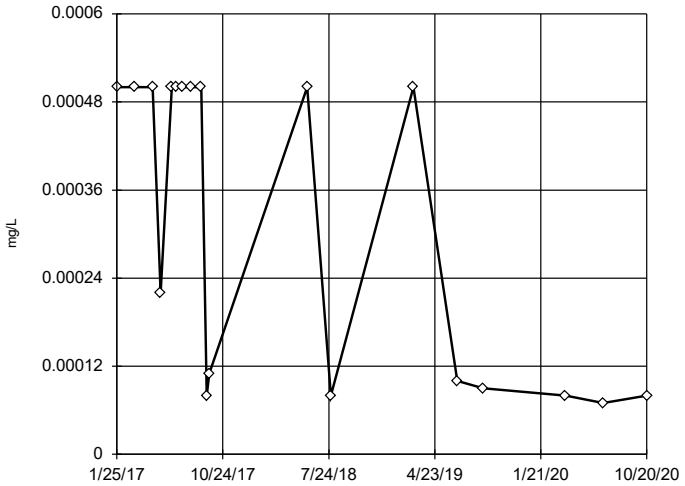
Data were natural log transformed to achieve best W statistic (graph shown in original units).

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).

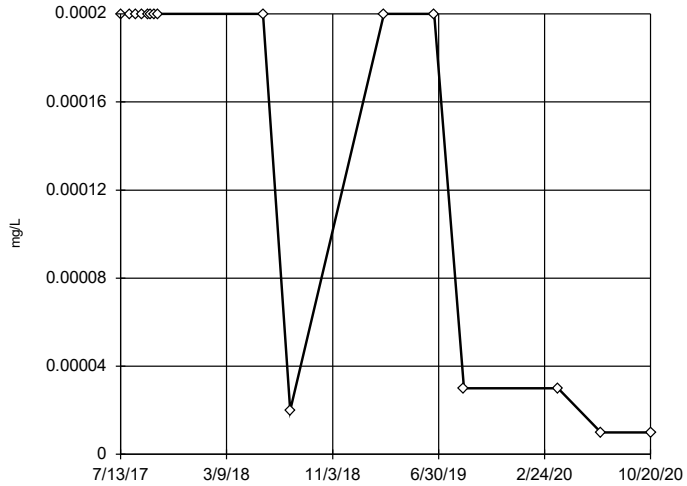
High cutoff = 0.1221, low cutoff = 3.3e-7, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

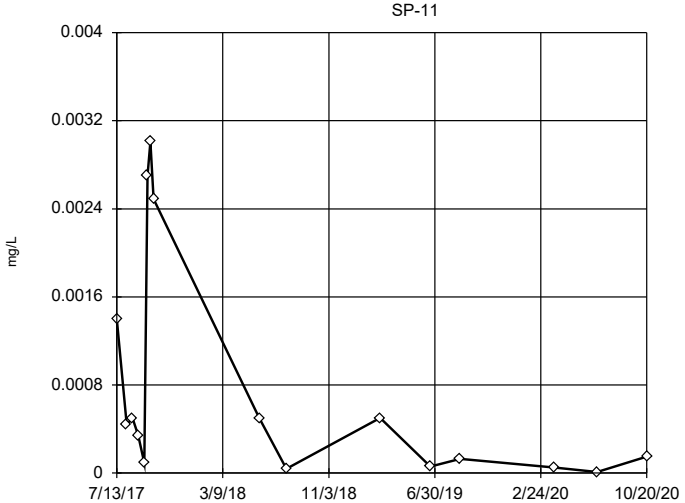
High cutoff = 0.05926, low cutoff = 1.0e-7, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

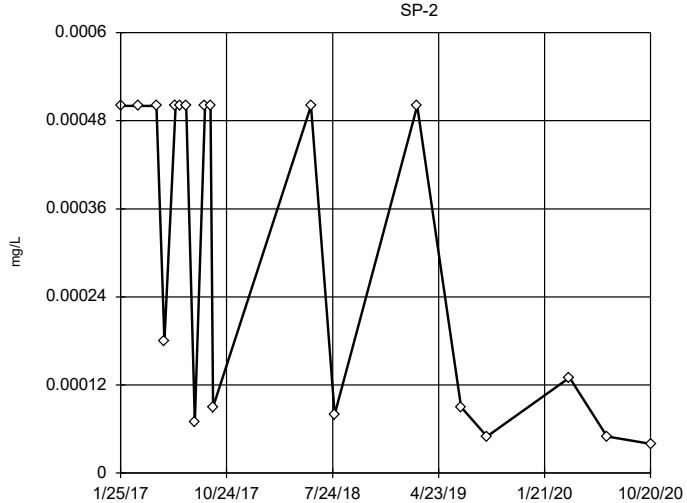
High cutoff = 1.235, low cutoff = 5.0e-8, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening

SP-2



n = 19

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

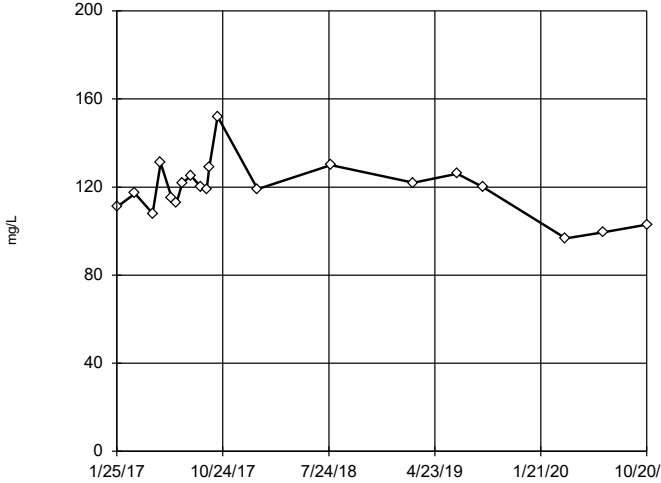
Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 0.1221, 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-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).

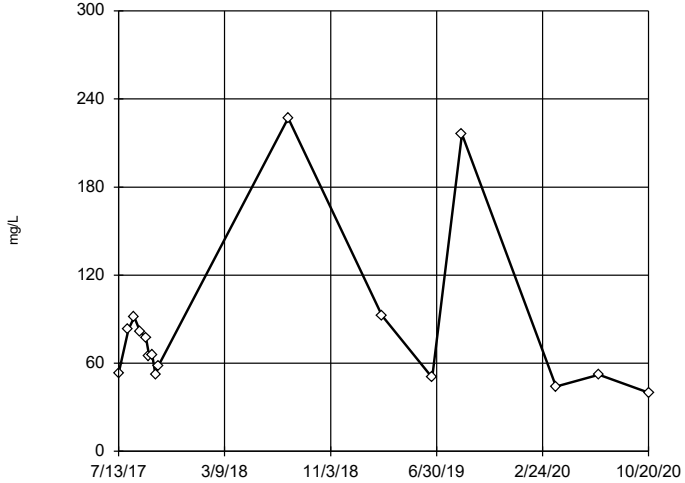
High cutoff = 176.6, low cutoff = 79.59, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

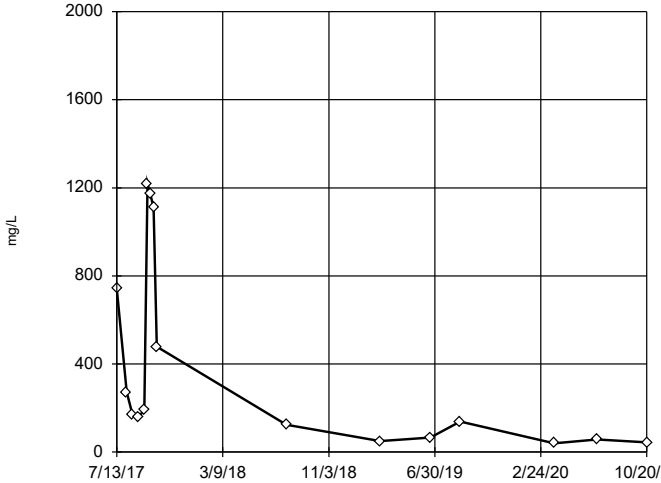
High cutoff = 405.6, low cutoff = 11.22, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

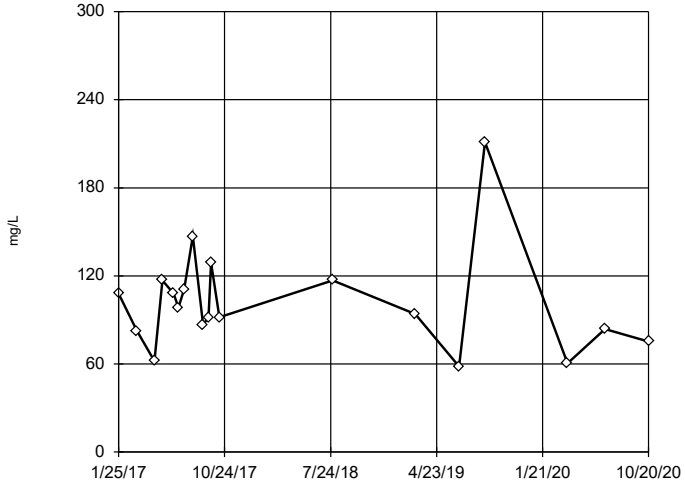
High cutoff = 548140, low cutoff = 0.06668, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening

SP-2



n = 19

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

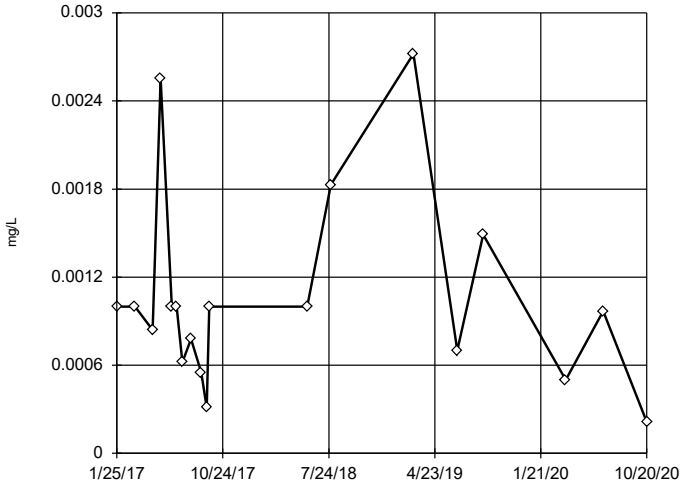
Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 332.5, low cutoff = 29.06, 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-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).

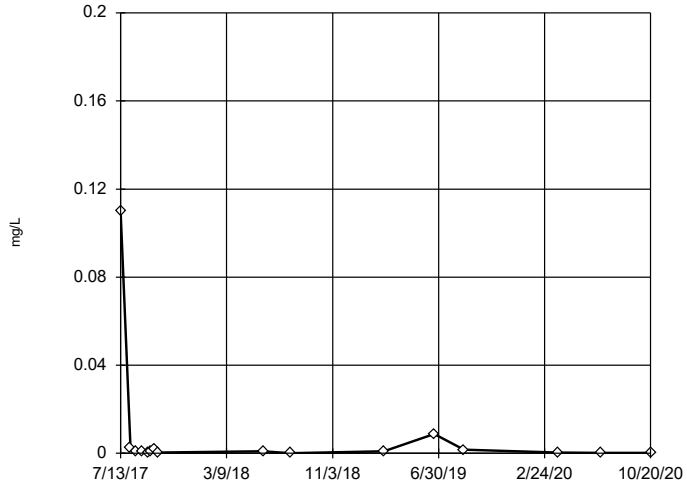
High cutoff = 0.004196, low cutoff = 0.0001478, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

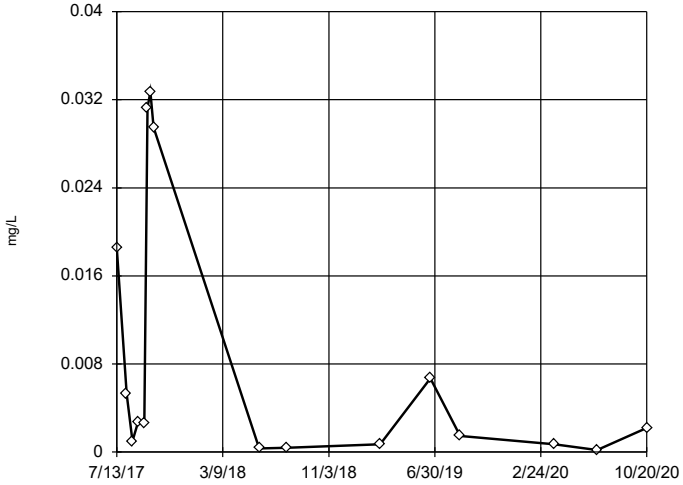
High cutoff = 0.2169, low cutoff = 0.000003125, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

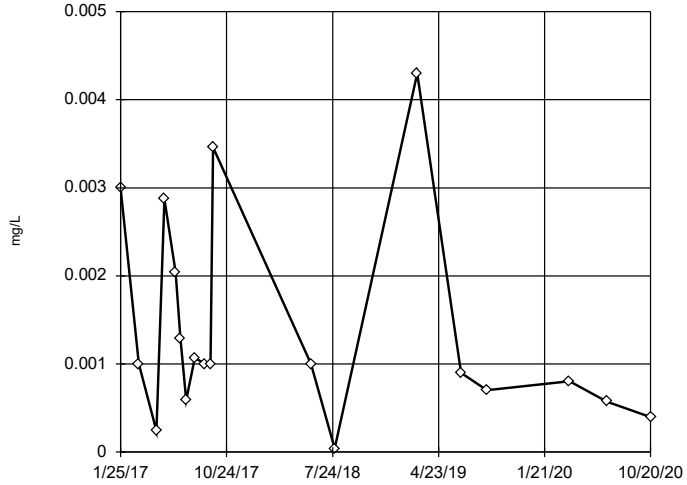
High cutoff = 44.54, low cutoff = 1.8e-7, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening

SP-2



n = 19

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

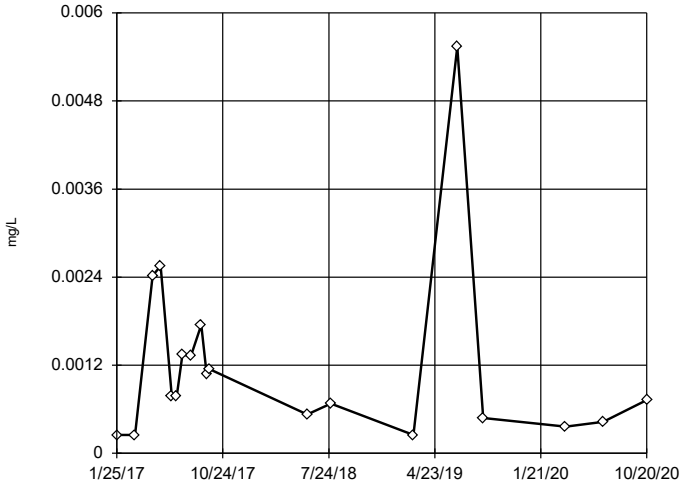
Data were cube root transformed to achieve best W statistic (graph shown in original units).

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).

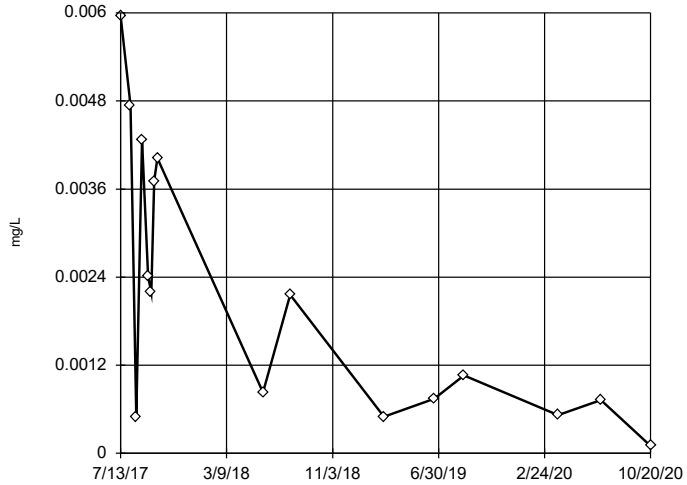
High cutoff = 0.04027, low cutoff = 0.00001434, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

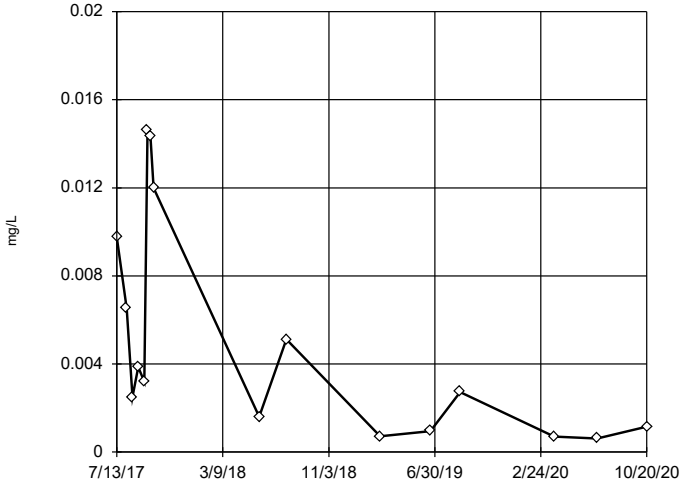
High cutoff = 0.05154, low cutoff = -0.002202, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

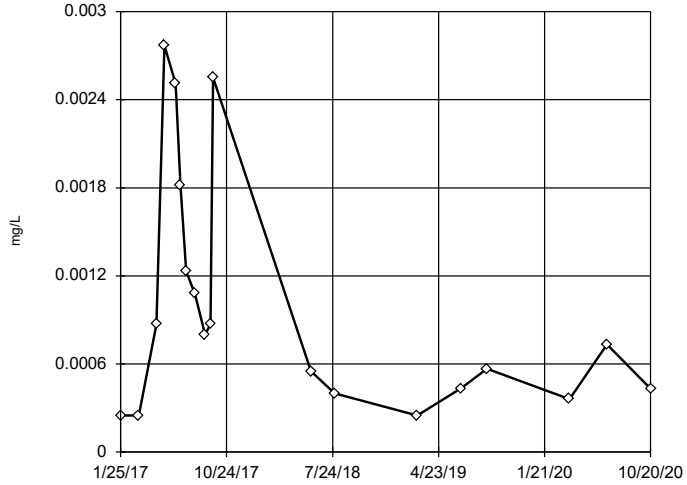
High cutoff = 3.512, low cutoff = 0.000002382, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening

SP-2



n = 19

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

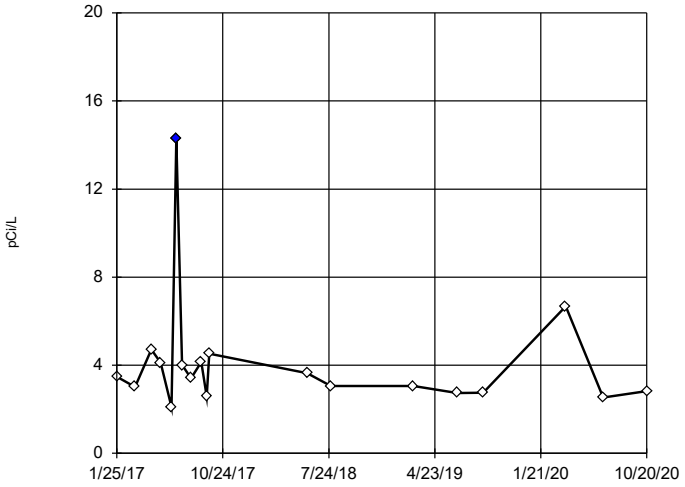
Data were natural log transformed to achieve best W statistic (graph shown in original units).

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



n = 19

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).

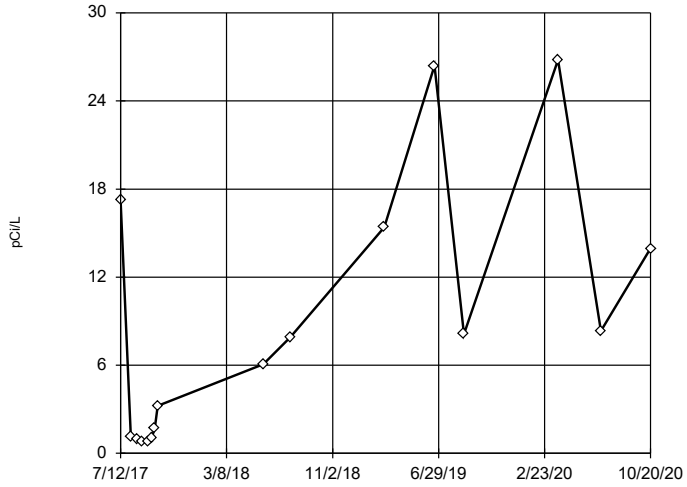
High cutoff = 14.26, low cutoff = 0.8002, based on IQR multiplier of 3.

Constituent: Combined Radium 226 + 228 Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

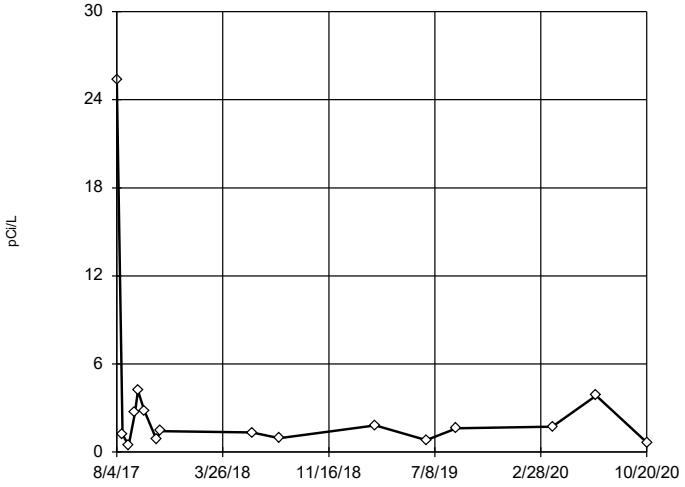
High cutoff = 299, low cutoff = -32.93, based on IQR multiplier of 3.

Constituent: Combined Radium 226 + 228 Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

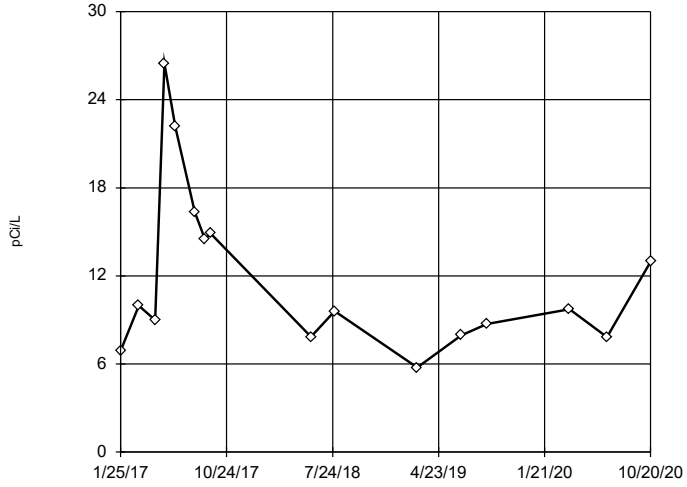
High cutoff = 77.88, low cutoff = 0.03186, based on IQR multiplier of 3.

Constituent: Combined Radium 226 + 228 Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening

SP-2



n = 16

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

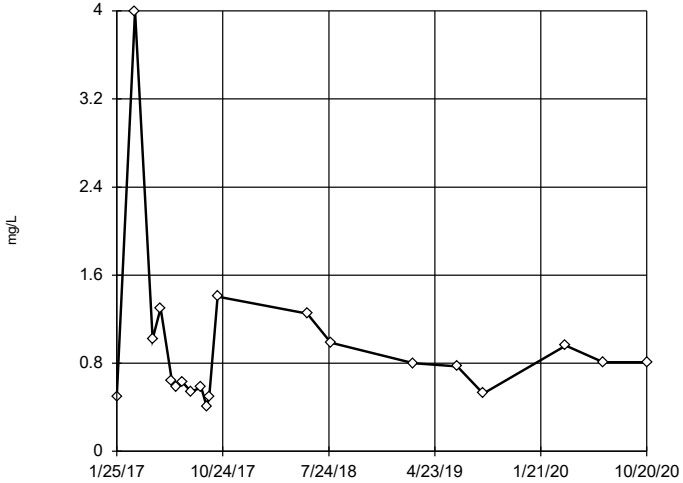
Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 94.47, low cutoff = 1.227, based on IQR multiplier of 3.

Constituent: Combined Radium 226 + 228 Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

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).

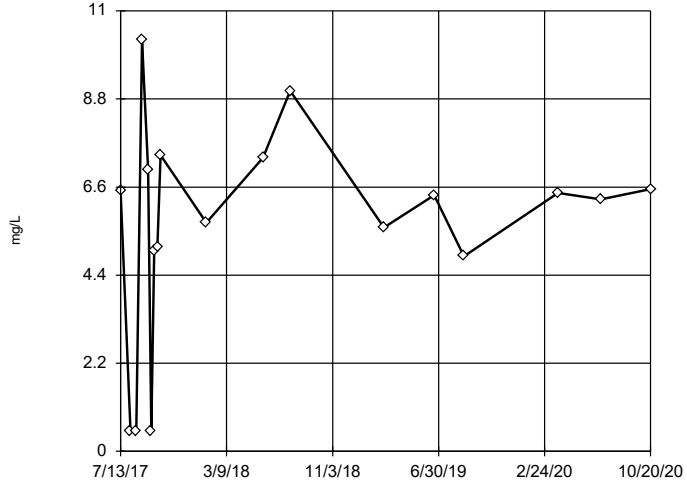
High cutoff = 5.724, low cutoff = 0.09832, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

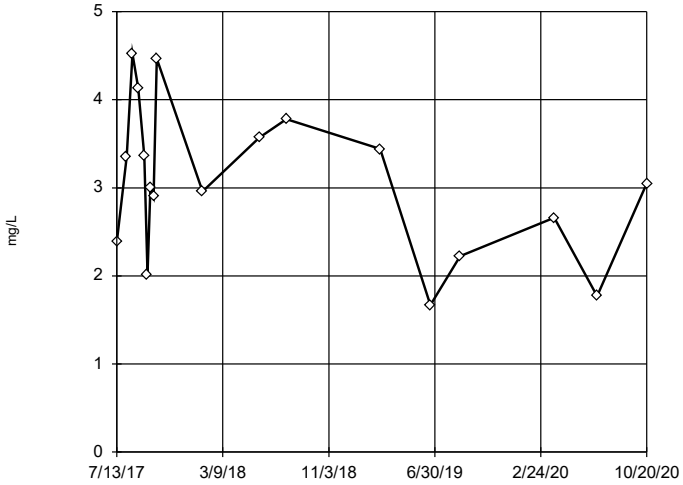
High cutoff = 11.54, low cutoff = -7.561, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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.

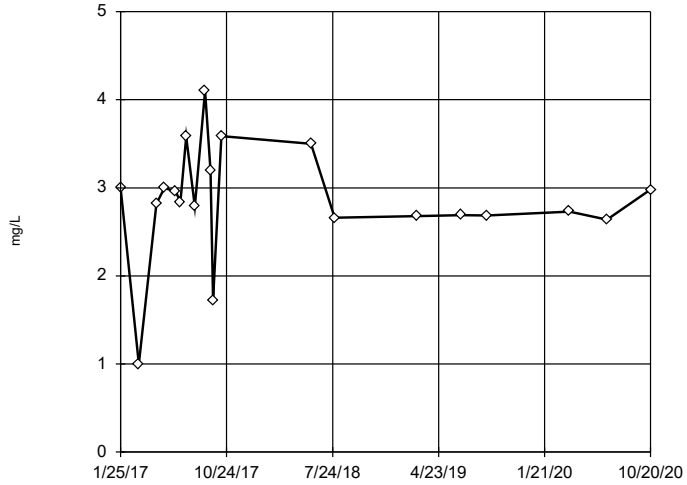
High cutoff = 7.784, low cutoff = -1.803, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening

SP-2



n = 20

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

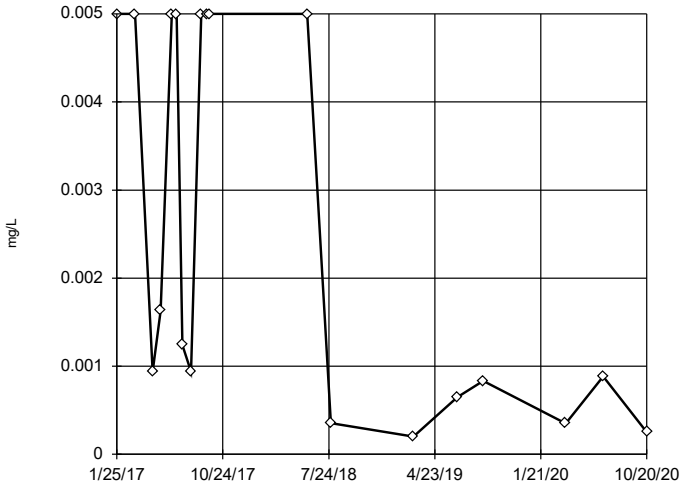
Data were square transformed to achieve best W statistic (graph shown in original units).

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).

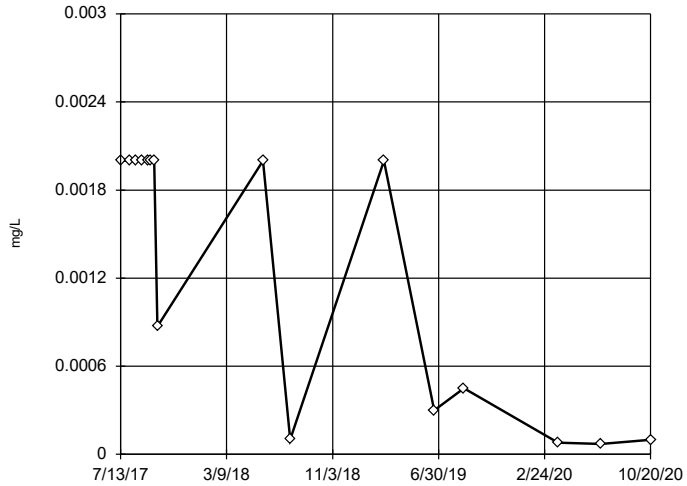
High cutoff = 2.276, low cutoff = 0.000001428, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

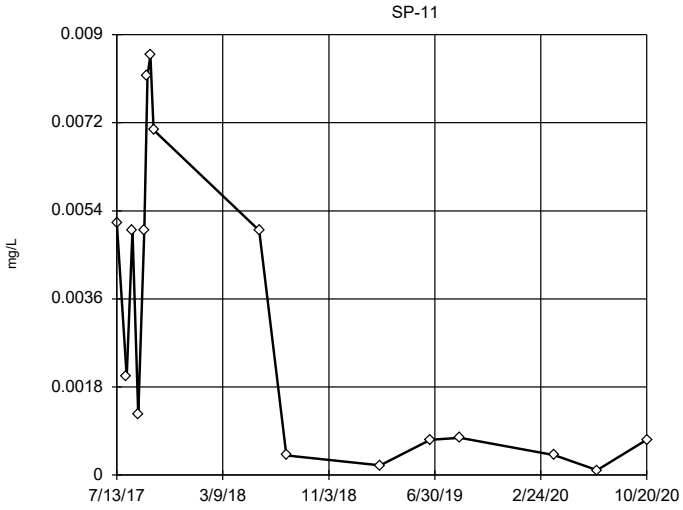
High cutoff = 2.989, low cutoff = 1.2e-7, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

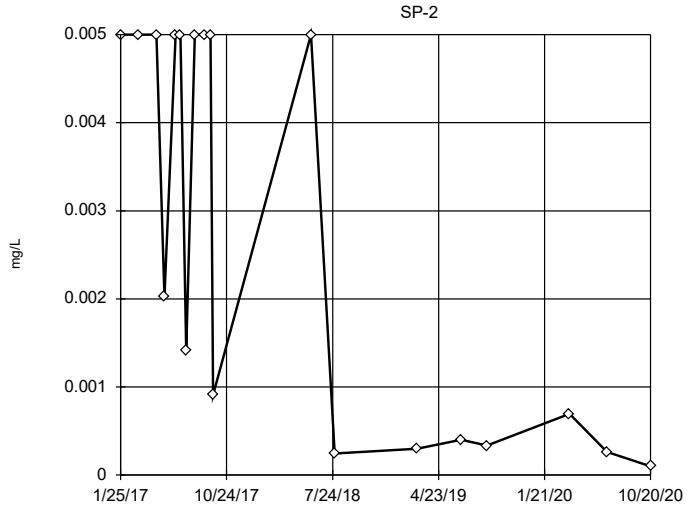
High cutoff = 4.174, low cutoff = 6.6e-7, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening

SP-2



n = 19

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

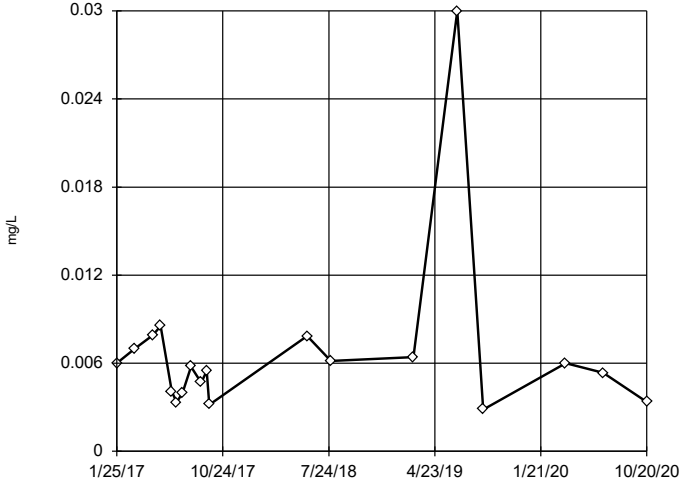
Data were natural log transformed to achieve best W statistic (graph shown in original units).

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).

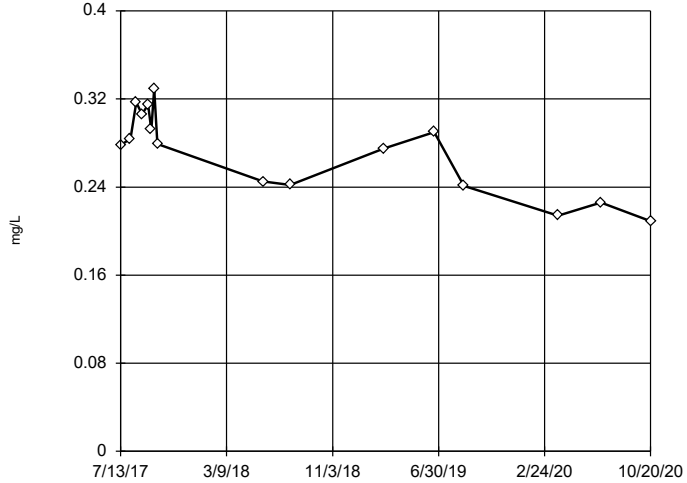
High cutoff = 0.03896, low cutoff = 0.0007097, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

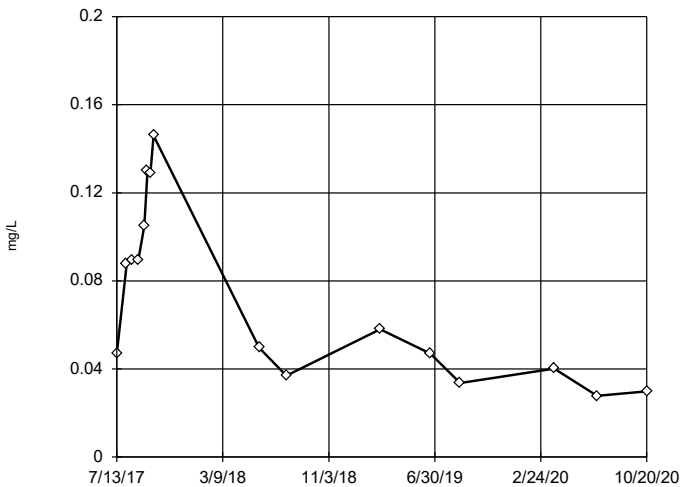
High cutoff = 0.4276, low cutoff = -0.1872, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening

SP-2

n = 19

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

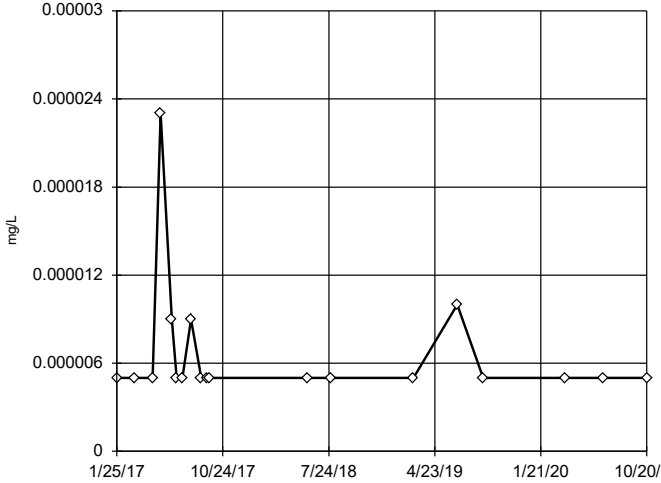
Ladder of Powers transformations did not improve normality; analysis run on raw data.

High cutoff = 0.2173, low cutoff = -0.0725, 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-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).

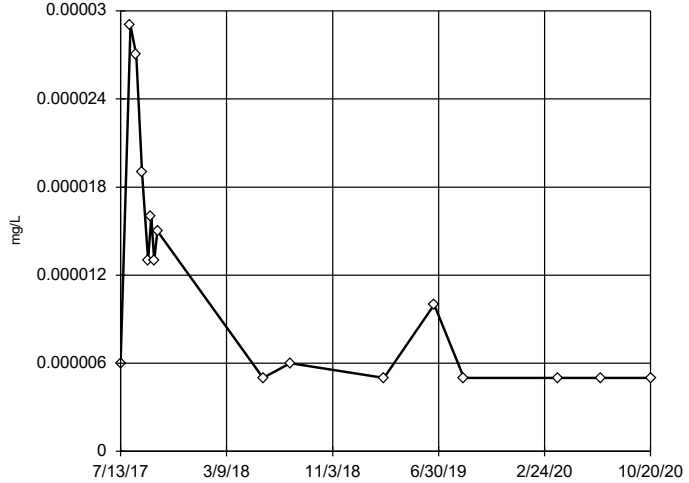
The results were invalidated, because the lower and upper quartiles are equal.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

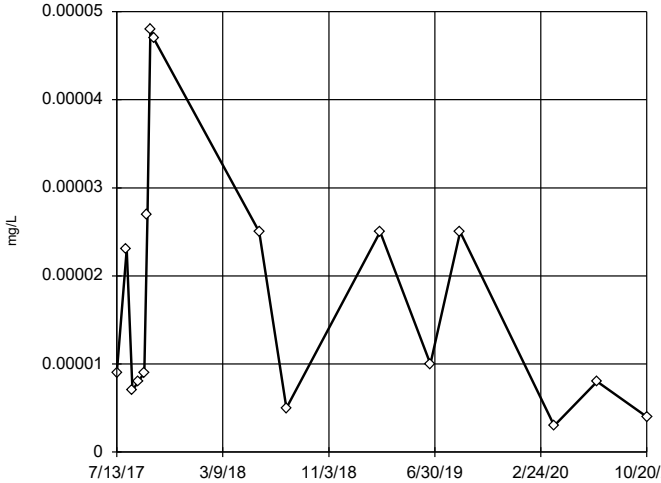
High cutoff = 0.0004608, low cutoff = 1.7e-7, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

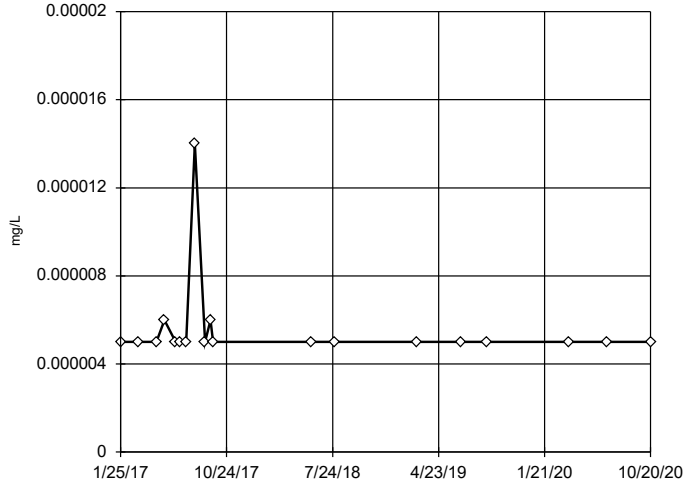
High cutoff = 0.0009321, low cutoff = 2.0e-7, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening

SP-2



n = 19

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

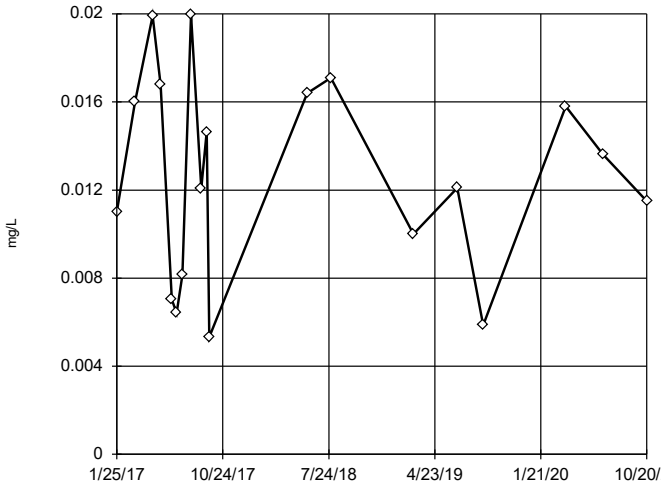
Data were natural log transformed to achieve best W statistic (graph shown in original units).

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.

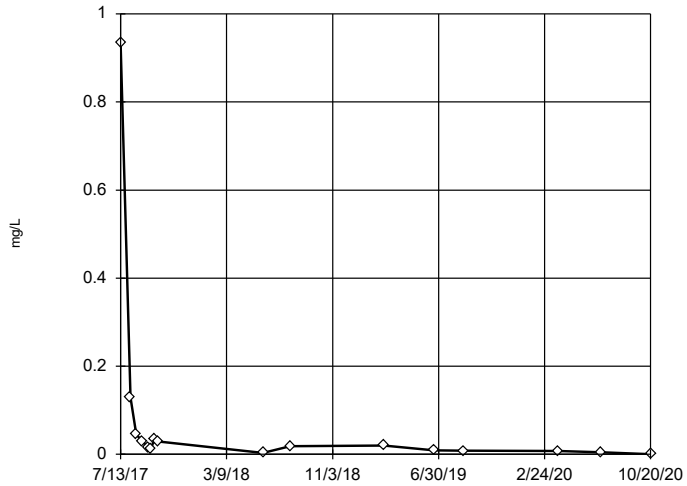
High cutoff = 0.04118, low cutoff = -0.01664, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

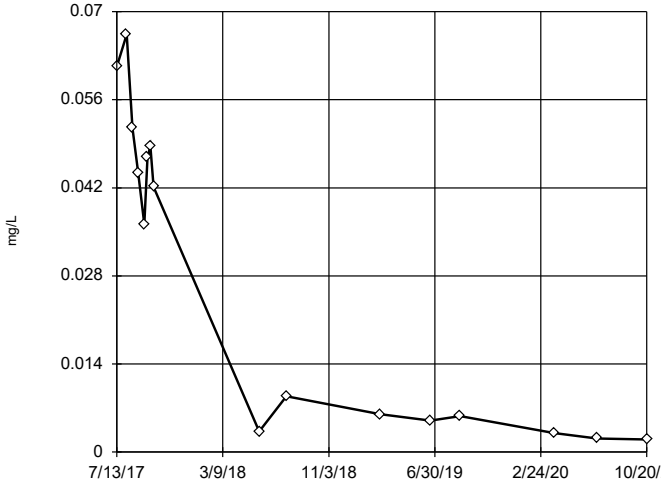
High cutoff = 2.512, low cutoff = 0.0001025, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

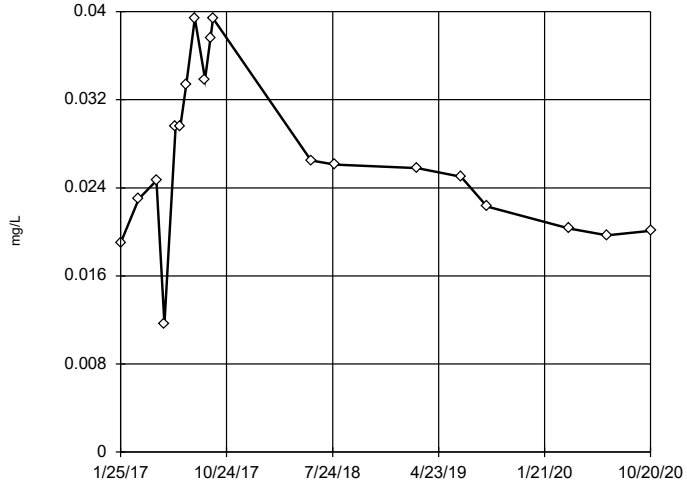
High cutoff = 78.62, low cutoff = 0.000002456, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening

SP-2



n = 19

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

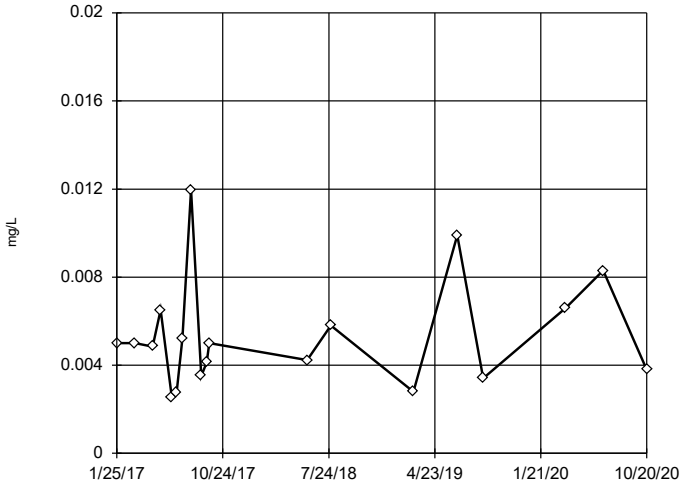
Data were square root transformed to achieve best W statistic (graph shown in original units).

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).

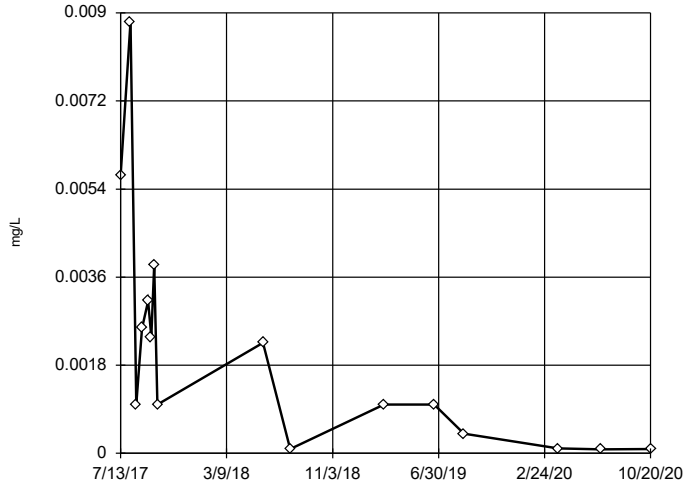
High cutoff = 0.04153, low cutoff = 0.0005502, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

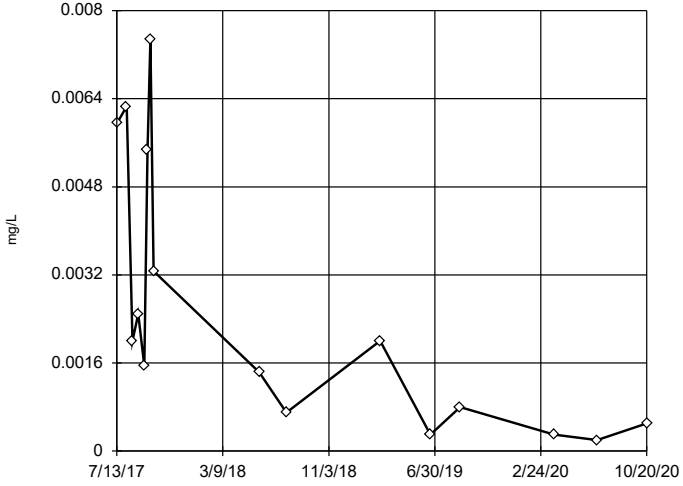
High cutoff = 0.05724, low cutoff = -0.006225, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

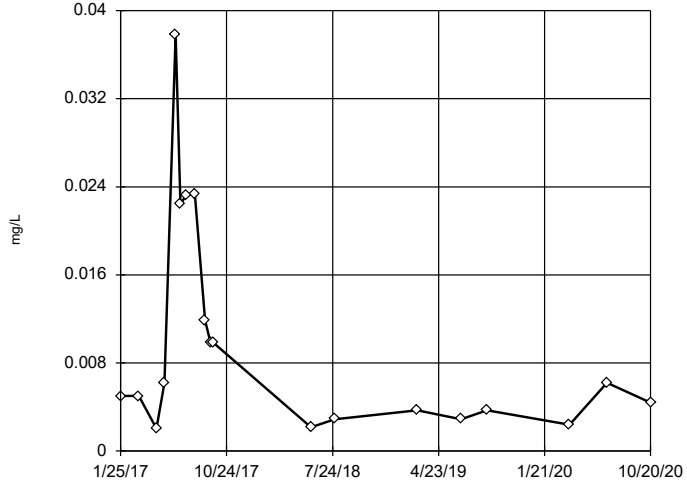
High cutoff = 1.539, low cutoff = 0.000001624, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening

SP-2



n = 19

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

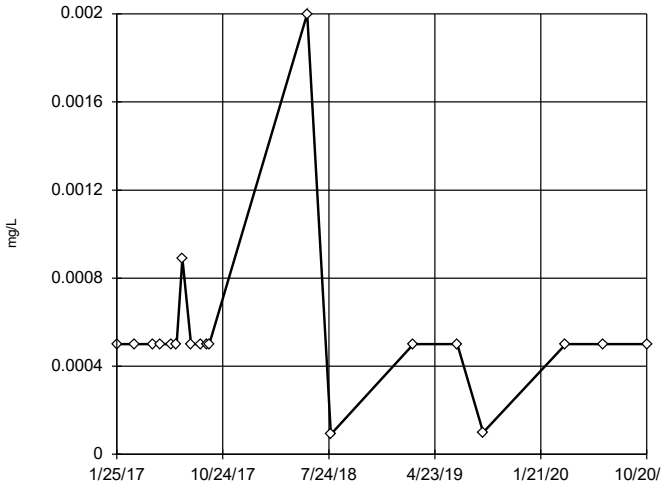
Data were natural log transformed to achieve best W statistic (graph shown in original units).

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).

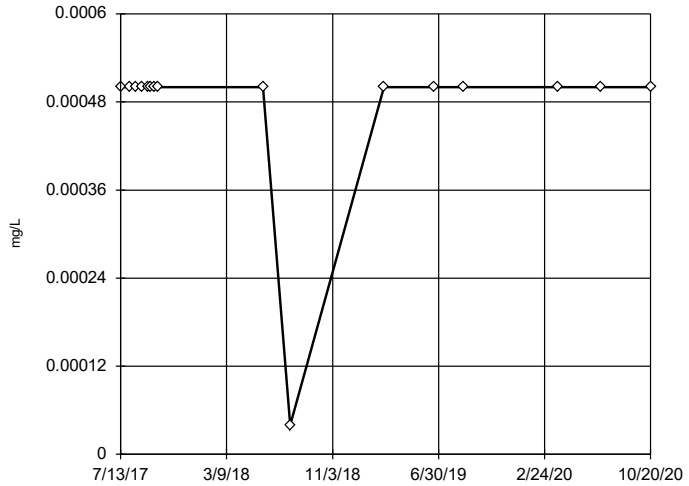
The results were invalidated, because the lower and upper quartiles are equal.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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.

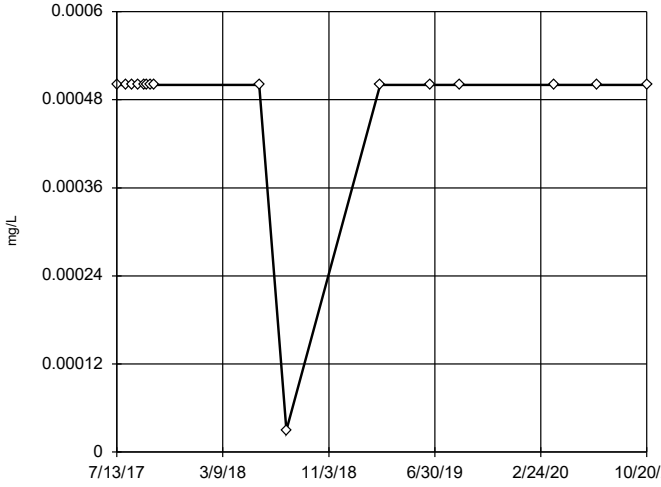
The results were invalidated, because the lower and upper quartiles are equal.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

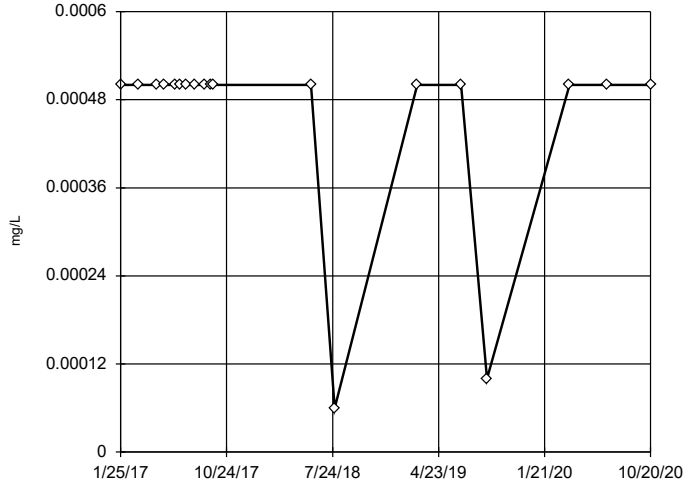
The results were invalidated, because the lower and upper quartiles are equal.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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**

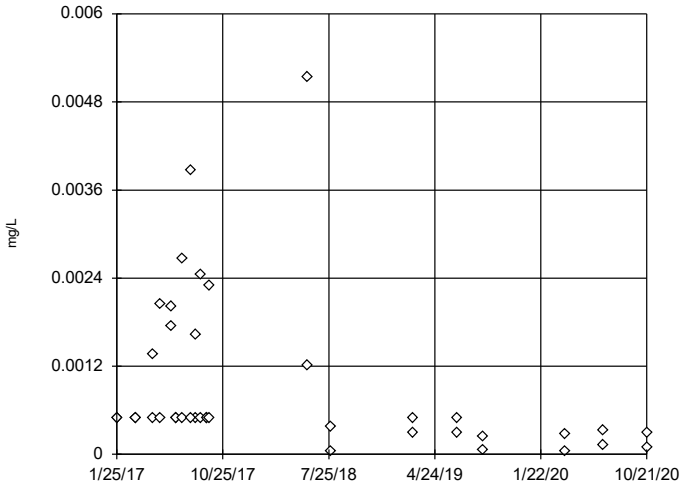
Tukey's Outlier Analysis - Upgradient Wells - All Results

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).

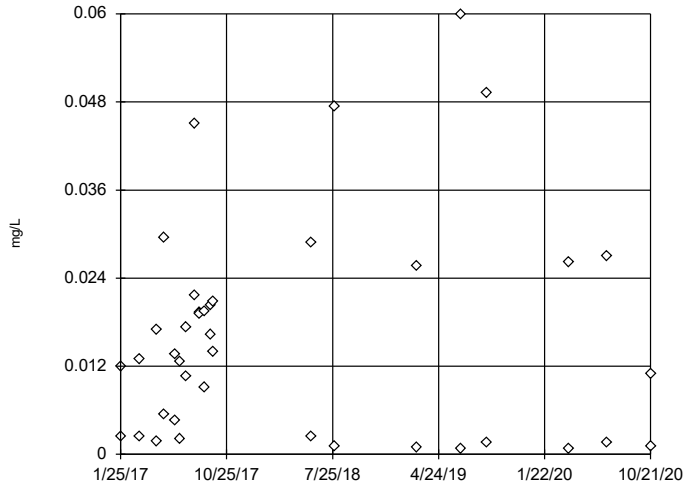
High cutoff = 0.09104, low cutoff = 0.000004366, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

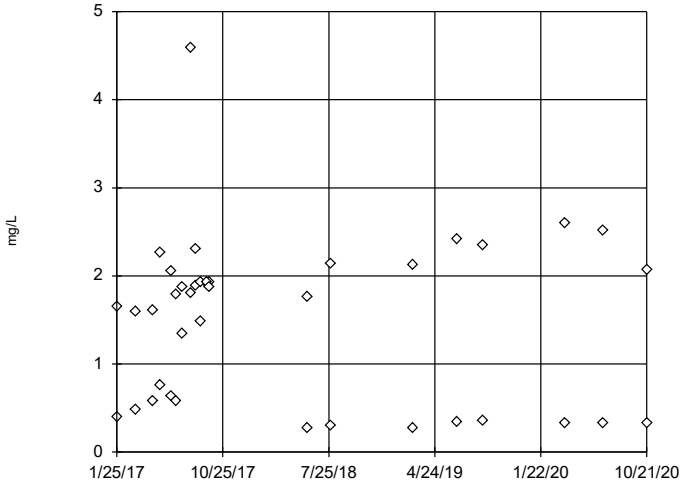
High cutoff = 0.1868, low cutoff = -0.05599, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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.

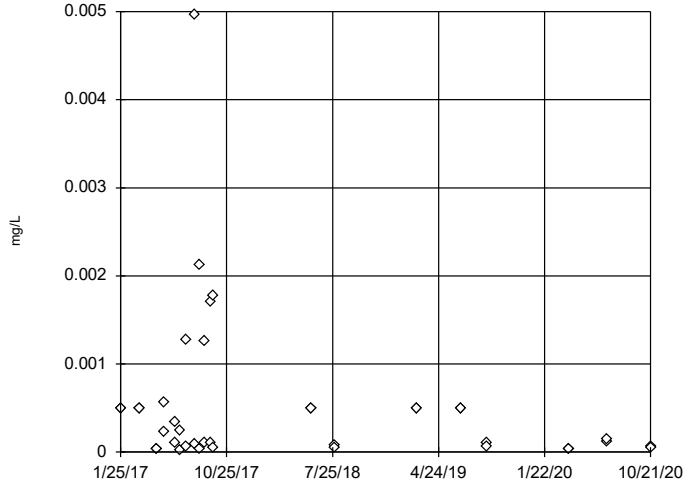
High cutoff = 6.661, low cutoff = -4.074, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening, Pooled Background

SP-4,SP-5R



n = 40

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

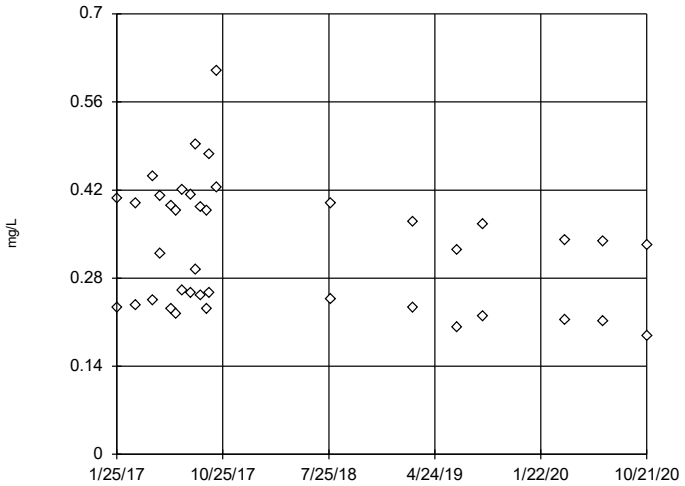
Data were natural log transformed to achieve best W statistic (graph shown in original units).

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).

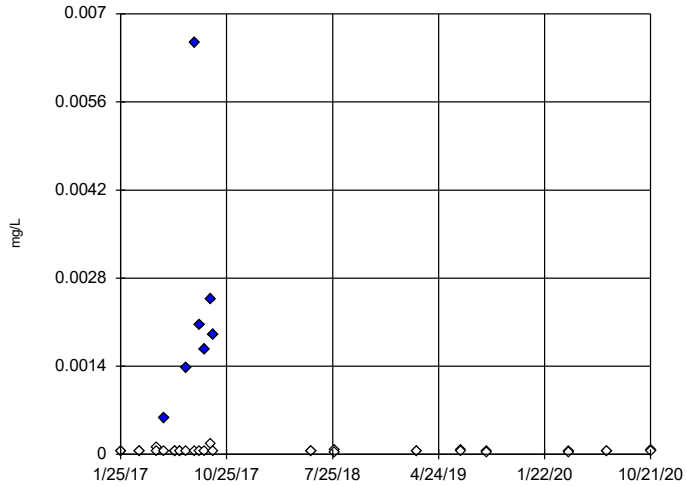
High cutoff = 1.966, low cutoff = 0.0476, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

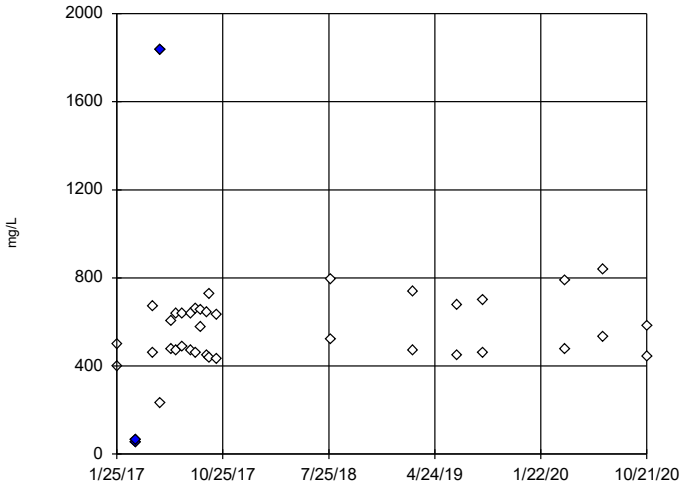
High cutoff = 0.0001921, low cutoff = 0.00001822, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

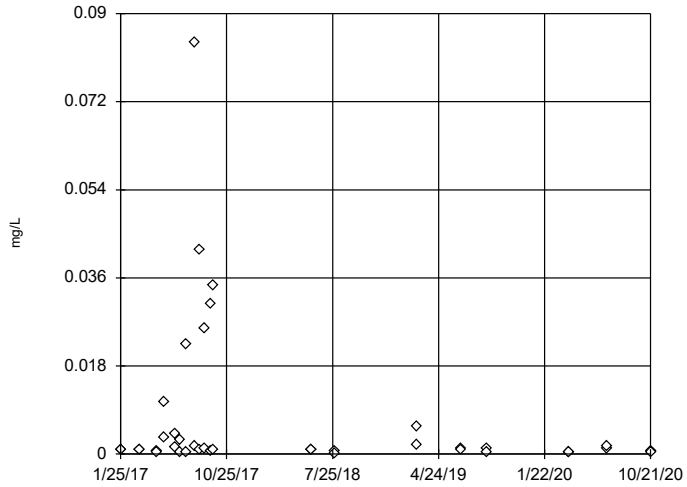
High cutoff = 1463, low cutoff = 77.16, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening, Pooled Background

SP-4,SP-5R



n = 40

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

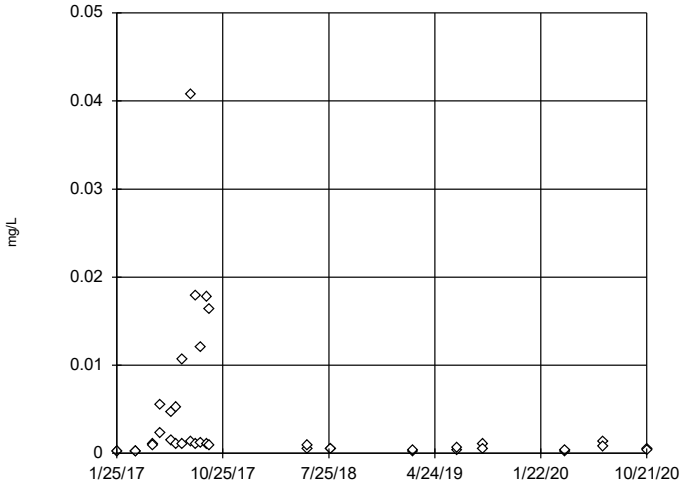
Data were natural log transformed to achieve best W statistic (graph shown in original units).

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.

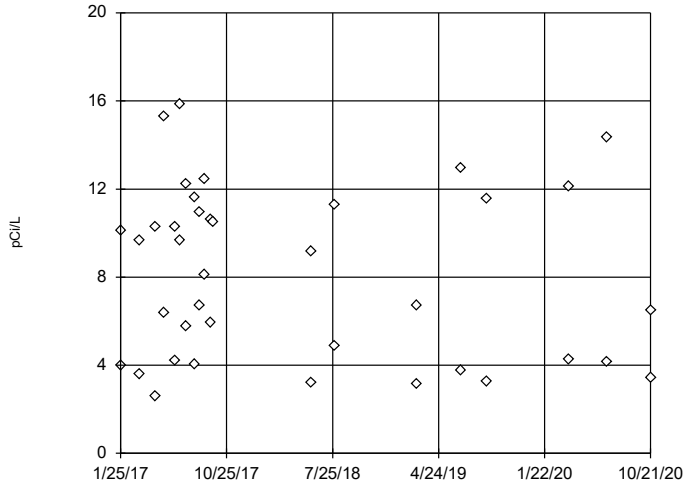
Data were natural log transformed to achieve best W statistic (graph shown in original units).

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.

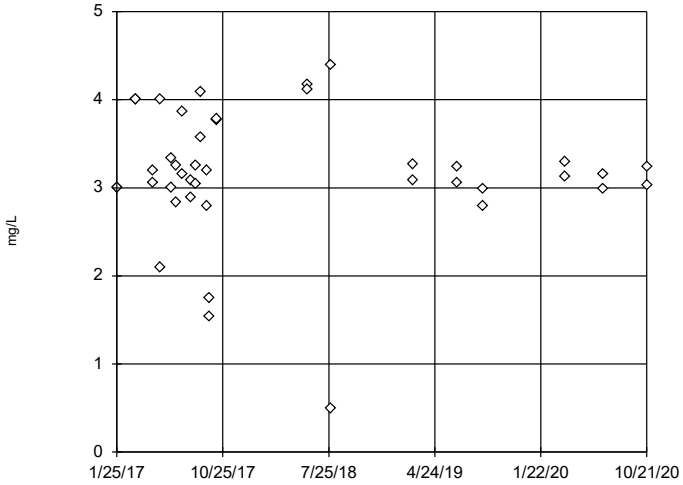
Data were square root transformed to achieve best W statistic (graph shown in original units).

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.

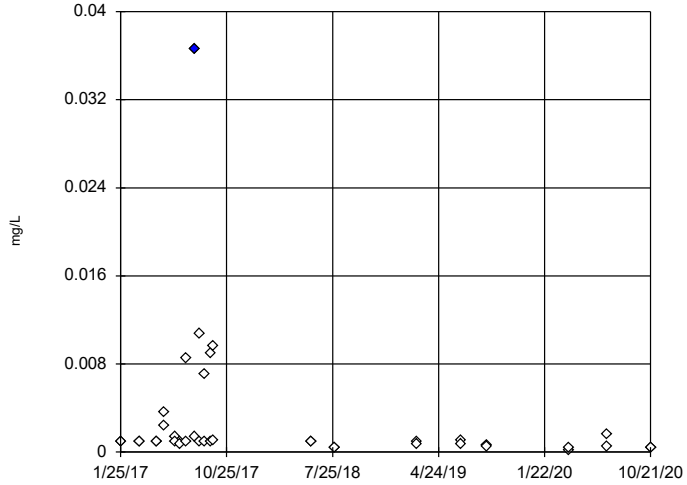
Data were square transformed to achieve best W statistic (graph shown in original units).

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.

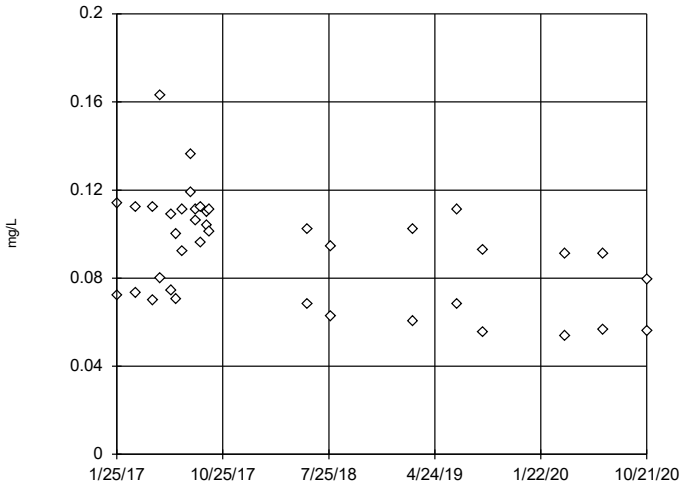
Data were natural log transformed to achieve best W statistic (graph shown in original units).

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.

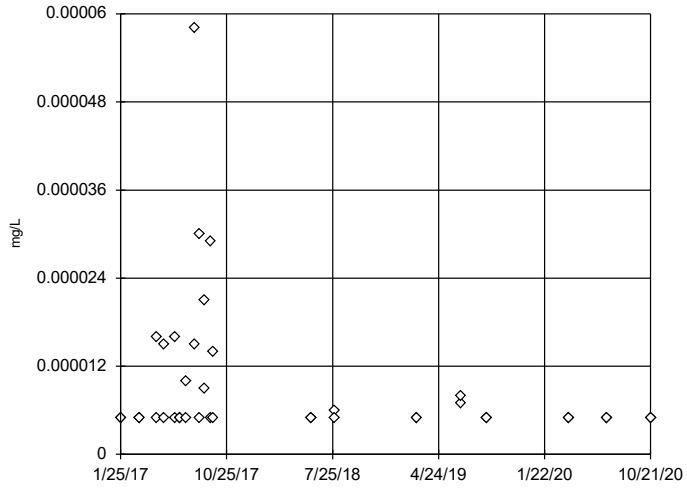
Constituent: Lithium Analysis Run 12/28/2020 2:56 PM View: Outlier

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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.

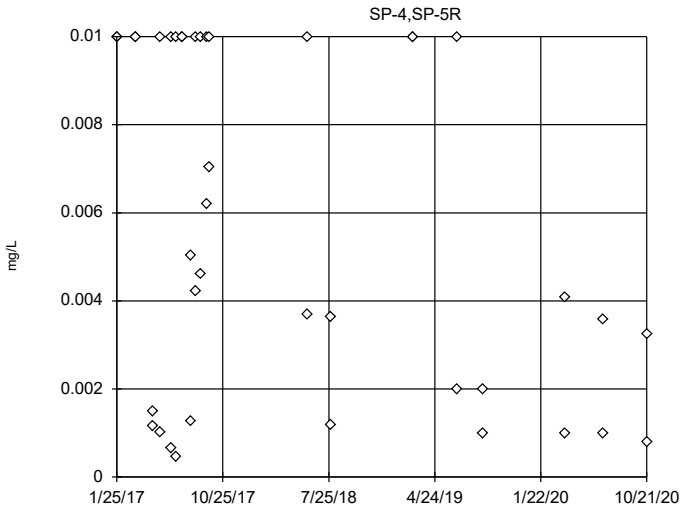
Constituent: Mercury Analysis Run 12/28/2020 2:56 PM View: Outlier

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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

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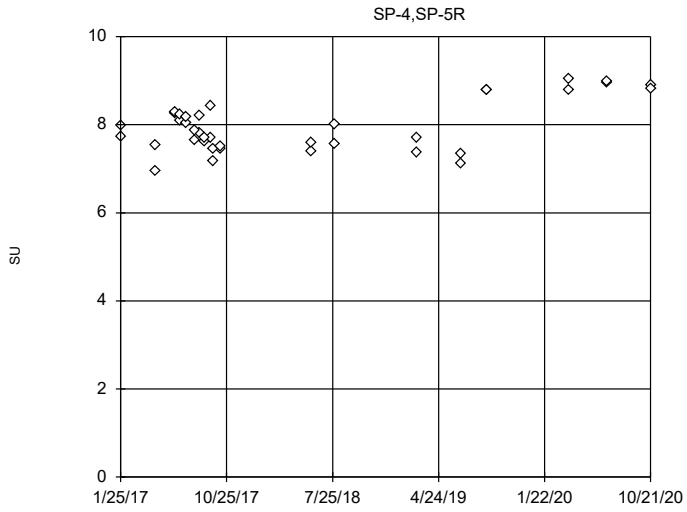
Tukey's Outlier Screening, Pooled Background

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).

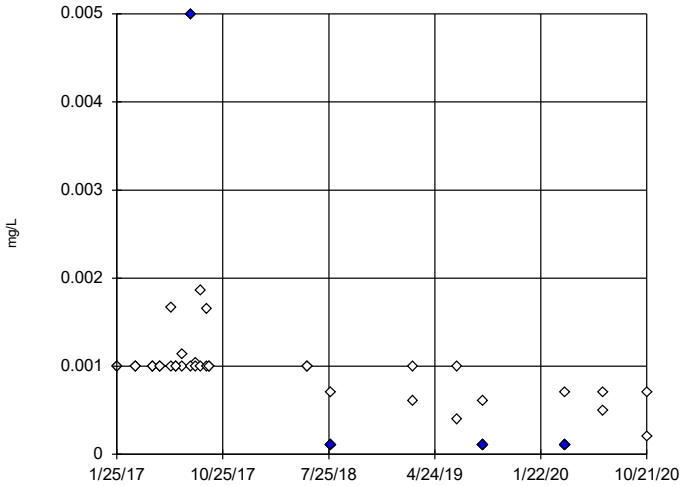
High cutoff = 11.41, low cutoff = 5.513, based on IQR multiplier of 3.

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



n = 40

Outliers are drawn as solid.
Tukey's method selected by user.

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

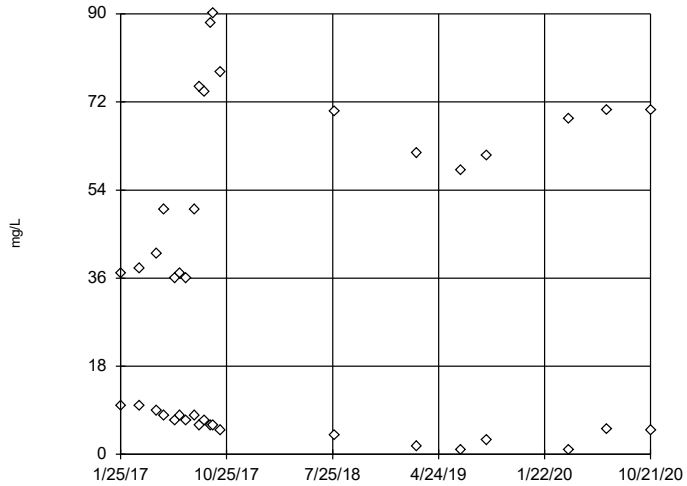
High cutoff = 0.002386, low cutoff = 0.0001678, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

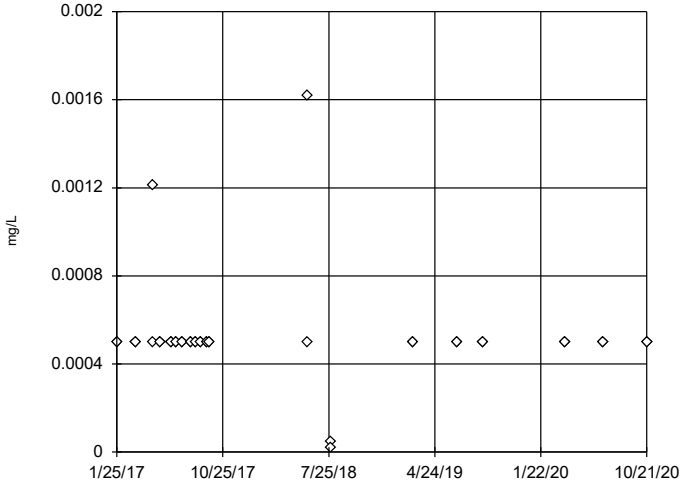
High cutoff = 65156, low cutoff = 0.00564, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

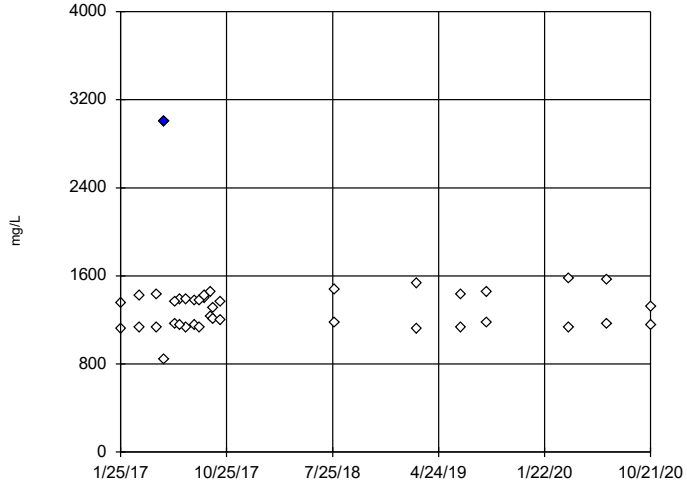
The results were invalidated, because the lower and upper quartiles are equal.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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 = 2688, low cutoff = 608.3, based on IQR multiplier of 3.

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

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

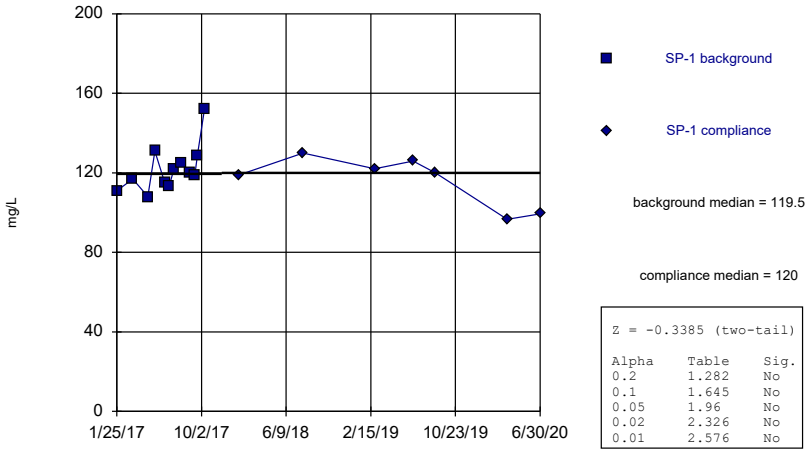
Welch's t-test/Mann-Whitney - All Results

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

Constituent	Well	Calc.	0.01	Method
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



Z = -0.3385 (two-tail)

Alpha	Table	Sig.
0.2	1.282	No
0.1	1.645	No
0.05	1.96	No
0.02	2.326	No
0.01	2.576	No

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

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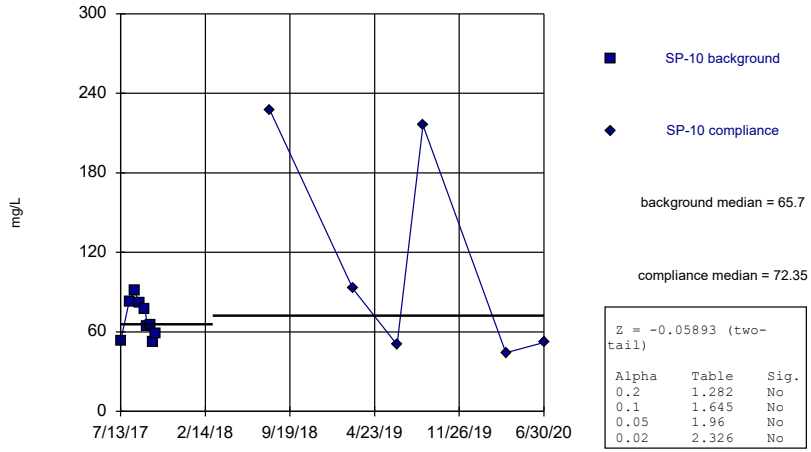
Mann-Whitney (Wilcoxon Rank Sum)

SP-10



Z = -0.05893 (two-tail)

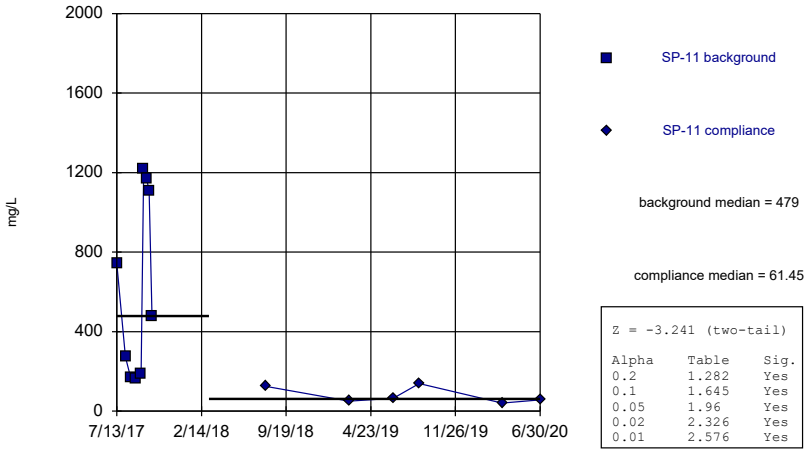
Alpha	Table	Sig.
0.2	1.282	No
0.1	1.645	No
0.05	1.96	No
0.02	2.326	No

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Mann-Whitney (Wilcoxon Rank Sum)

SP-11



Z = -3.241 (two-tail)

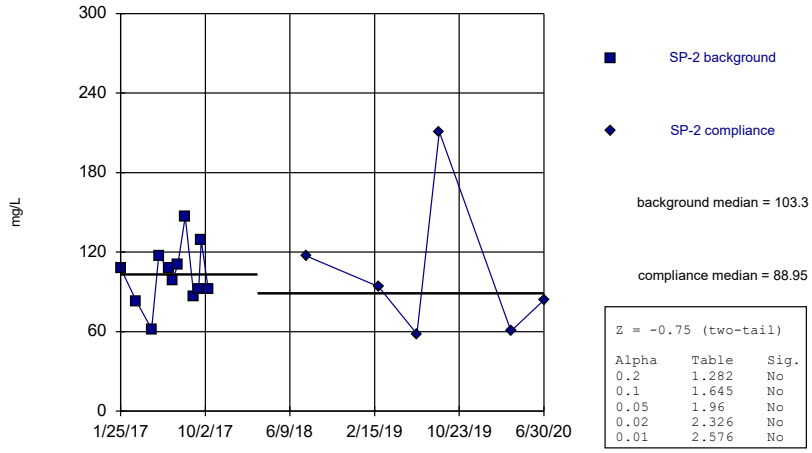
Alpha	Table	Sig.
0.2	1.282	Yes
0.1	1.645	Yes
0.05	1.96	Yes
0.02	2.326	Yes
0.01	2.576	Yes

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Mann-Whitney (Wilcoxon Rank Sum)

SP-2



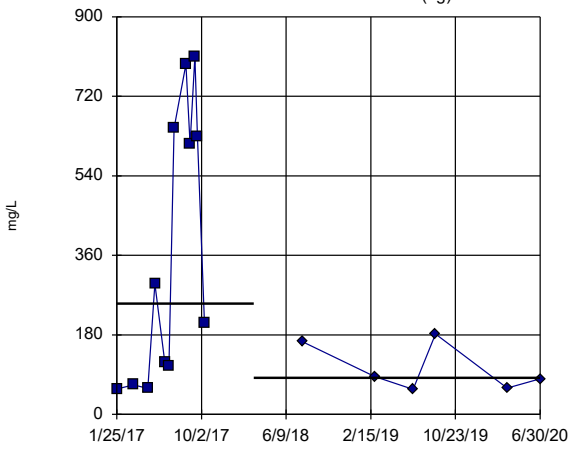
Z = -0.75 (two-tail)

Alpha	Table	Sig.
0.2	1.282	No
0.1	1.645	No
0.05	1.96	No
0.02	2.326	No
0.01	2.576	No

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)



SP-4 background

SP-4 compliance

background median = 251

compliance median = 83.05

Z = -1.733 (two-tail)

Alpha	Table	Sig.
0.2	1.282	Yes
0.1	1.645	Yes
0.05	1.96	No
0.02	2.326	No
0.01	2.576	No

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

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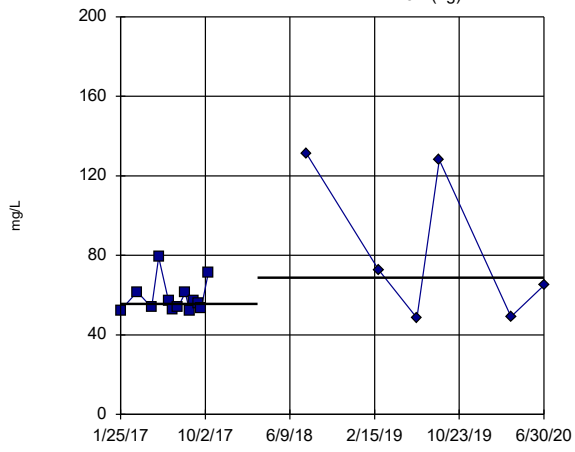
Mann-Whitney (Wilcoxon Rank Sum)

SP-5R (bg)



SP-5R background

SP-5R compliance

background median = 55.6

compliance median = 68.85

Z = 0.8336 (two-tail)

Alpha	Table	Sig.
0.2	1.282	No
0.1	1.645	No
0.05	1.96	No
0.02	2.326	No
0.01	2.576	No

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

FIGURE E.

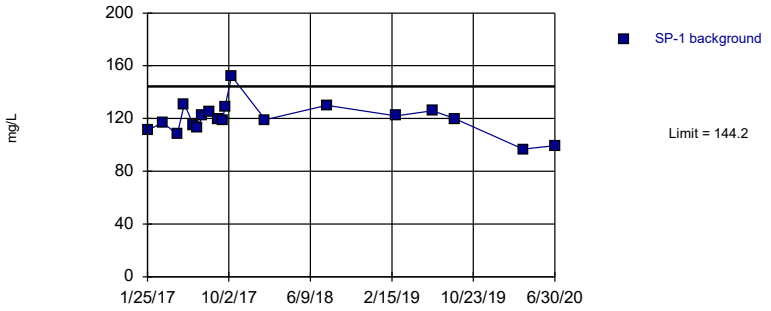
Appendix III - Intrawell Prediction Limits - All Results

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

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	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

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

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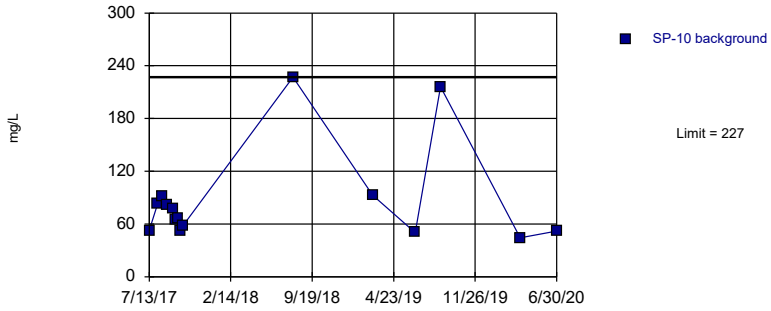
Prediction Limit

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

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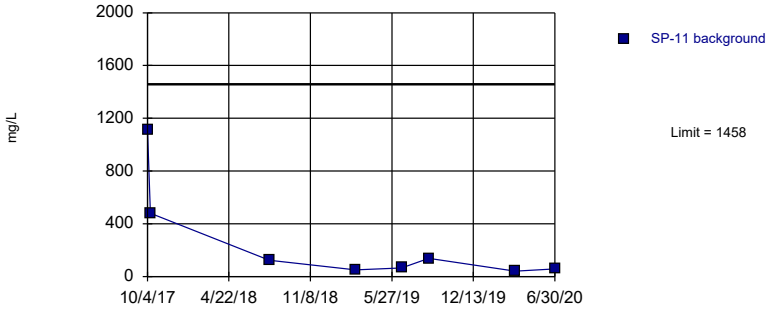
Prediction Limit

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

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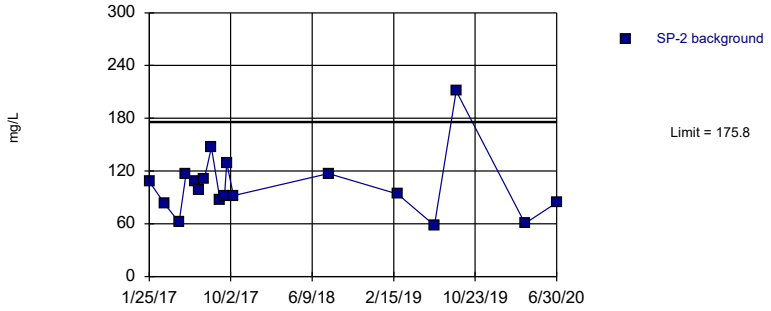
Prediction Limit

Intrawell Parametric, SP-2

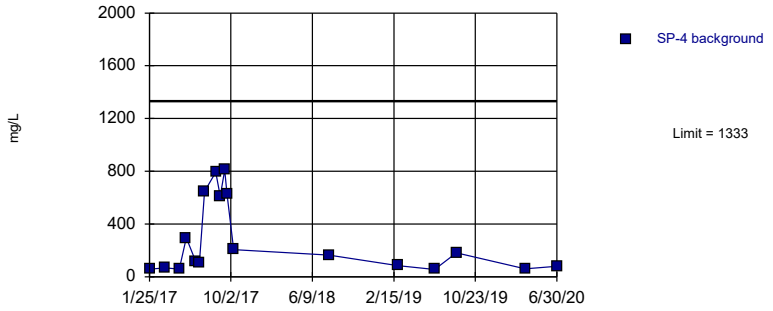


Background Data Summary: Mean=103.2, Std. Dev.=35.71, n=18. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8694, critical = 0.858. Kappa = 2.032 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.00188. Assumes 1 future value.

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

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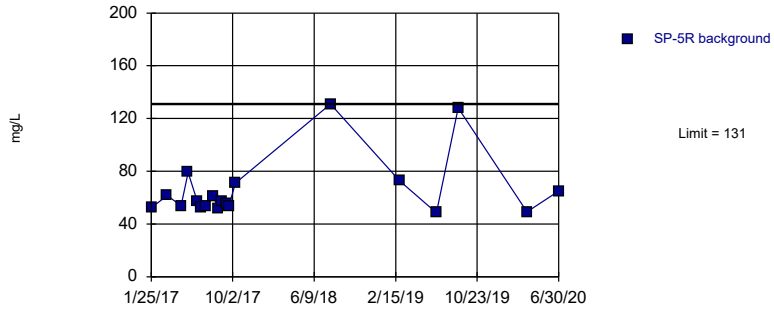
Prediction Limit

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

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**
Sulfate (mg/L)	**SP-5R (bg)**	**-2.968**	**-145**	**-81**	**Yes**	**20**	**0**	**n/a**	**n/a**	**0.01**	**NP**

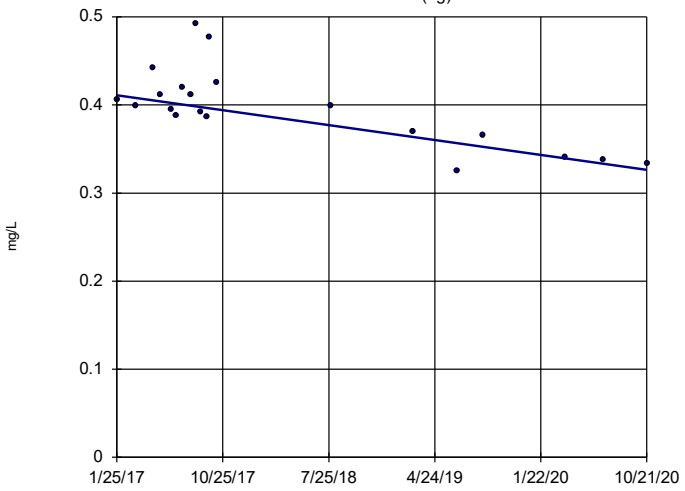
Trend Tests - Interwell Upgradient Well - All Results

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)



n = 20

Slope = -0.02259 units per year.

Mann-Kendall statistic = -89 critical = -81

Decreasing trend significant at 99% confidence level (α = 0.005 per tail).

Constituent: Boron Analysis Run 12/28/2020 3:35 PM View: Interwell

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

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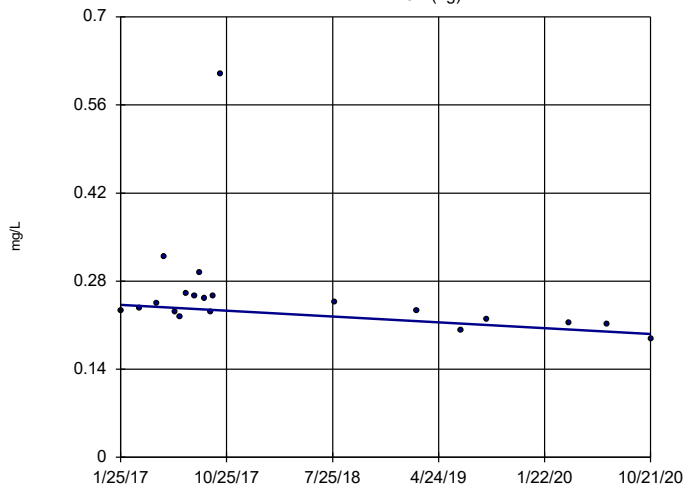
Sen's Slope Estimator

SP-5R (bg)



n = 20

Slope = -0.01237 units per year.

Mann-Kendall statistic = -65 critical = -81

Trend not significant at 99% confidence level (α = 0.005 per tail).

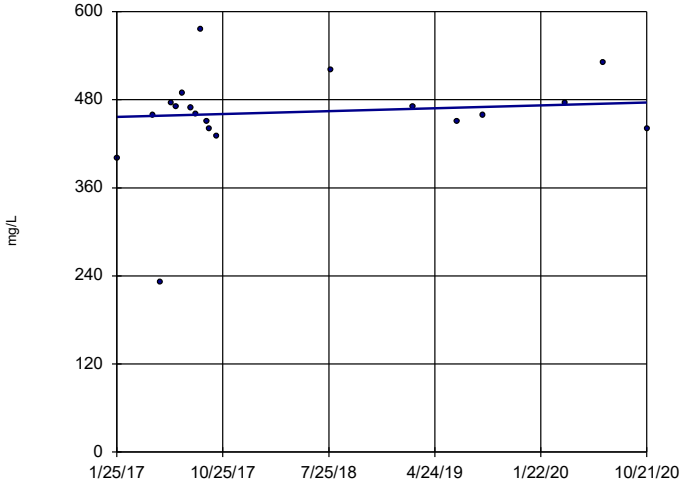
Constituent: Boron Analysis Run 12/28/2020 3:35 PM View: Interwell

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Sen's Slope Estimator

SP-4 (bg)



n = 19

Slope = 5.207 units per year.

Mann-Kendall statistic = 18 critical = 74

Trend not significant at 99% confidence level (α = 0.005 per tail).

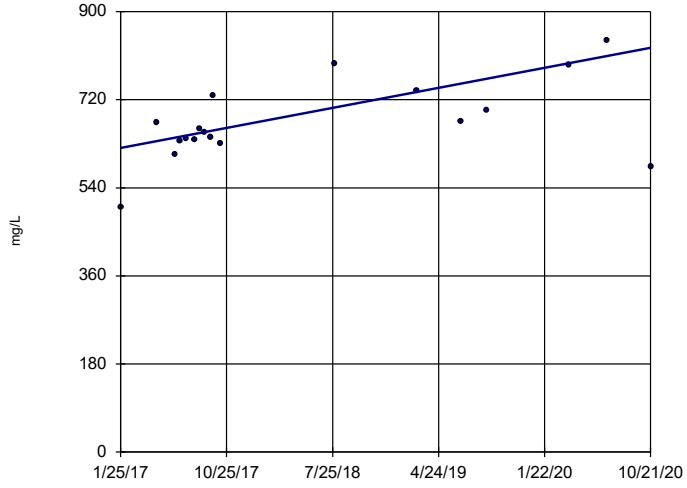
Constituent: Chloride Analysis Run 12/28/2020 3:35 PM View: Interwell

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Sen's Slope Estimator

SP-5R (bg)



n = 18

Slope = 54.75 units per year.

Mann-Kendall statistic = 67 critical = 68

Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Chloride Analysis Run 12/28/2020 3:35 PM View: Interwell

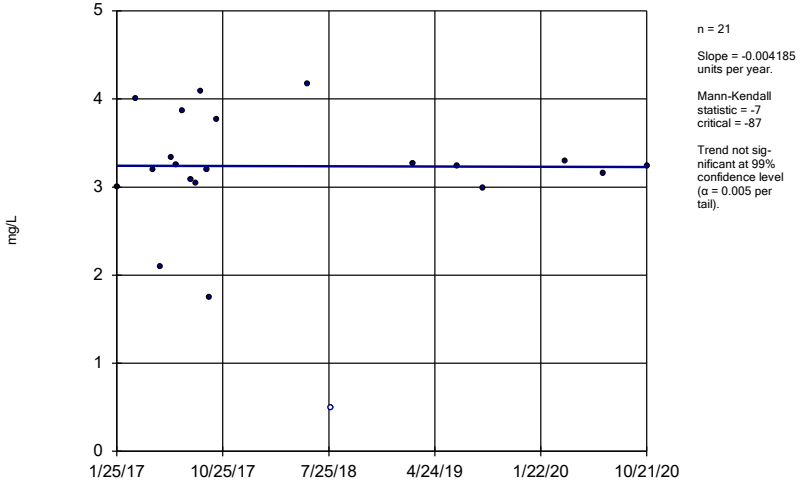
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Hollow symbols indicate censored values.

Sen's Slope Estimator

SP-4 (bg)



n = 21

Slope = -0.004185 units per year.

Mann-Kendall statistic = -7 critical = -87

Trend not significant at 99% confidence level (α = 0.005 per tail).

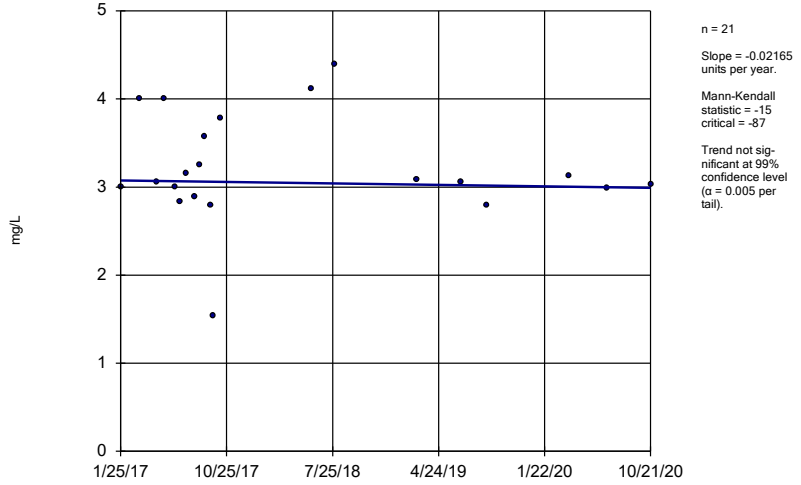
Constituent: Fluoride Analysis Run 12/28/2020 3:35 PM View: Interwell

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Sen's Slope Estimator

SP-5R (bg)



n = 21

Slope = -0.02165 units per year.

Mann-Kendall statistic = -15 critical = -87

Trend not significant at 99% confidence level (α = 0.005 per tail).

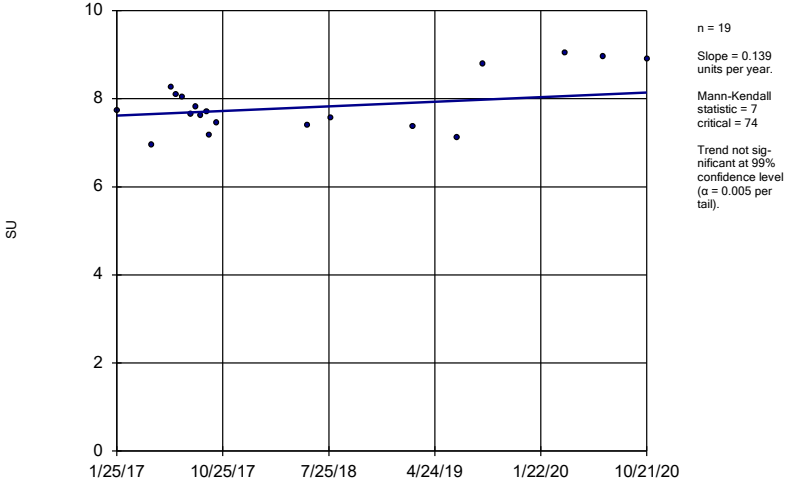
Constituent: Fluoride Analysis Run 12/28/2020 3:35 PM View: Interwell

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Sen's Slope Estimator

SP-4 (bg)



n = 19

Slope = 0.139 units per year.

Mann-Kendall statistic = 7 critical = 74

Trend not significant at 99% confidence level (α = 0.005 per tail).

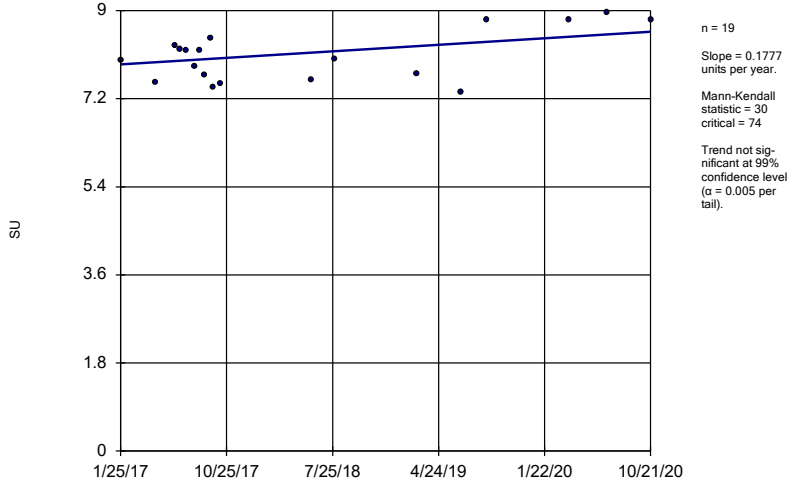
Constituent: pH, field Analysis Run 12/28/2020 3:35 PM View: Interwell

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Sen's Slope Estimator

SP-5R (bg)



n = 19

Slope = 0.1777 units per year.

Mann-Kendall statistic = 30 critical = 74

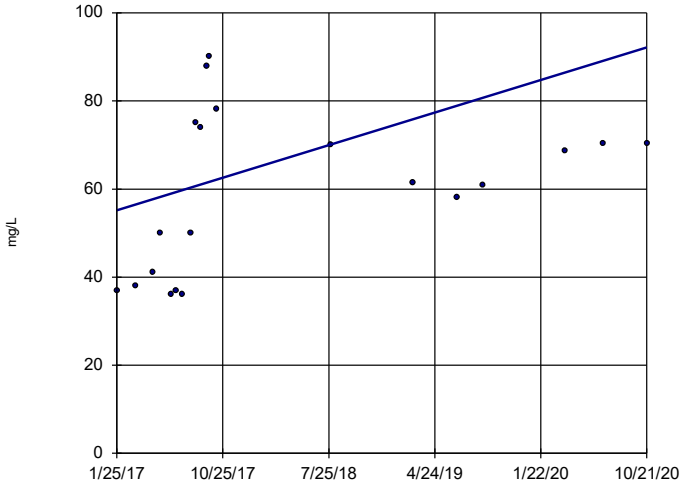
Trend not significant at 99% confidence level (α = 0.005 per tail).

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)



n = 20

Slope = 9.878 units per year.

Mann-Kendall statistic = 75 critical = 81

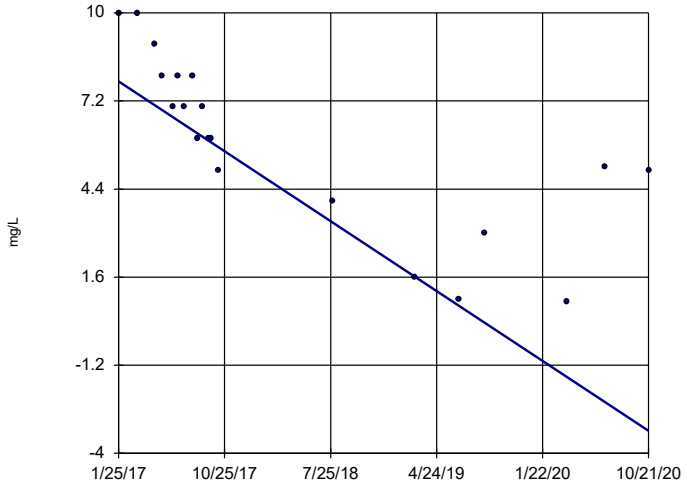
Trend not significant at 99% confidence level (α = 0.005 per tail).

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Sen's Slope Estimator

SP-5R (bg)



n = 20

Slope = -2.968 units per year.

Mann-Kendall statistic = -145 critical = -81

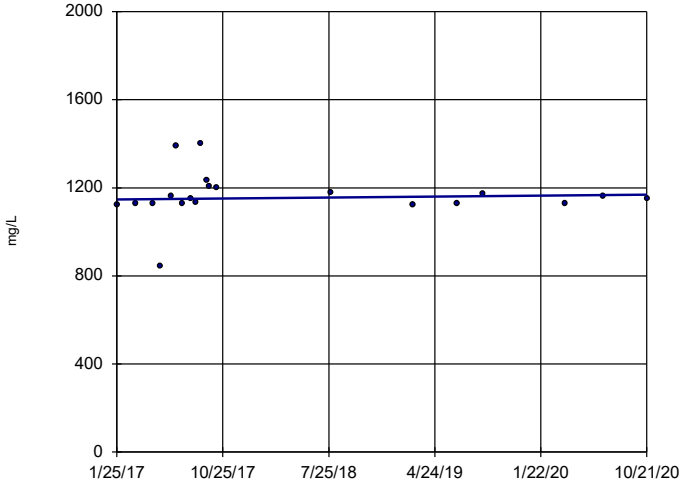
Decreasing trend significant at 99% confidence level (α = 0.005 per tail).

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Sen's Slope Estimator

SP-4 (bg)



n = 20

Slope = 5.88 units per year.

Mann-Kendall statistic = 25 critical = 81

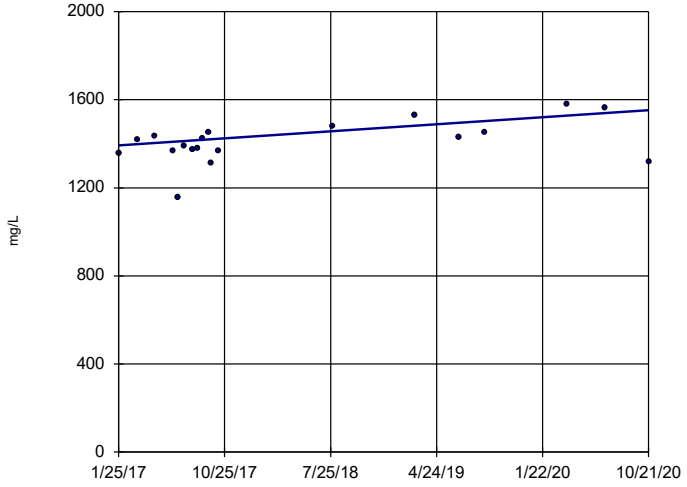
Trend not significant at 99% confidence level (α = 0.005 per tail).

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Sen's Slope Estimator

SP-5R (bg)



n = 19

Slope = 42.48 units per year.

Mann-Kendall statistic = 60 critical = 74

Trend not significant at 99% confidence level (α = 0.005 per tail).

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

FIGURE G.

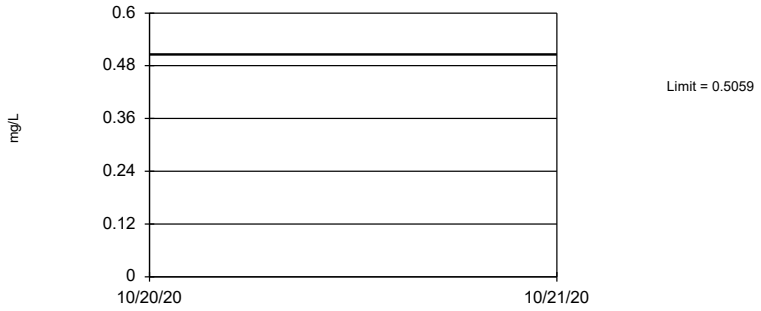
Appendix III - Interwell Prediction Limits - All Results

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

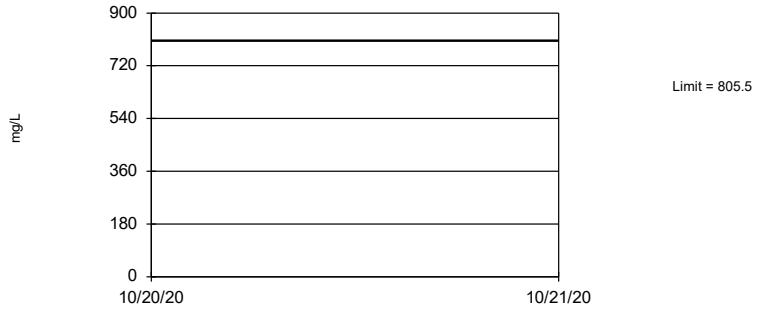


Background Data Summary: Mean=0.327, Std. Dev.=0.09795, n=40. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9231, critical = 0.919. Kappa = 1.826 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.00188. Assumes 4 future values.

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

Prediction Limit

Interwell Parametric

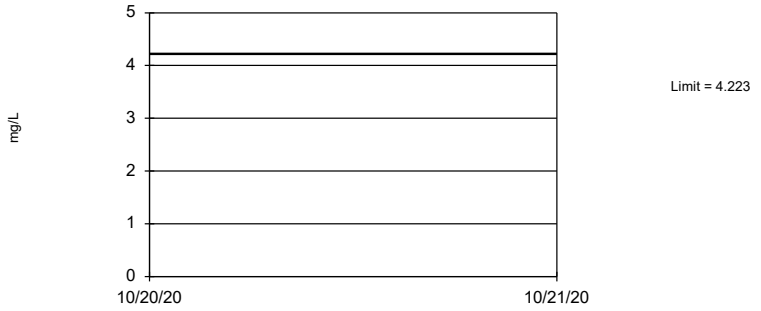


Background Data Summary: Mean=562.9, Std. Dev.=131.8, n=37. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9509, critical = 0.914. Kappa = 1.84 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.00188. Assumes 4 future values.

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

Prediction Limit

Interwell Parametric

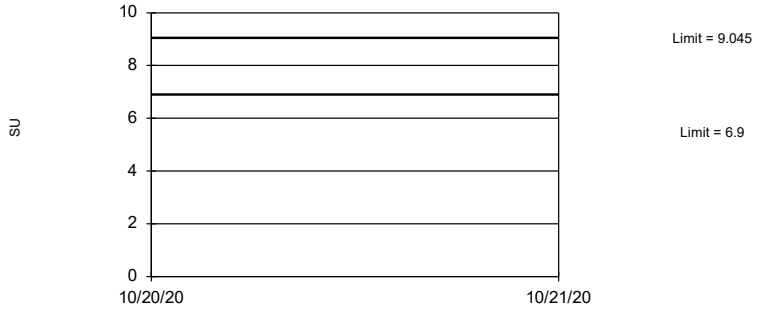


Background Data Summary (based on square transformation): Mean=10.54, Std. Dev.=4.005, n=42, 2.381% NDs. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9295, critical = 0.922. Kappa = 1.822 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.00188.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

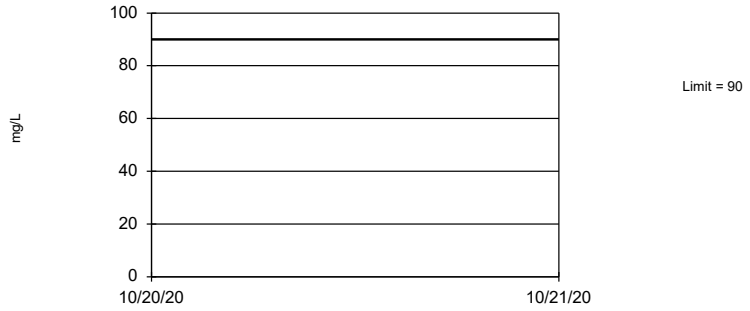


Background Data Summary: Mean=7.973, Std. Dev.=0.5842, n=38. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9337, critical = 0.916. Kappa = 1.836 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.0009398. Assumes 4 future values.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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.**

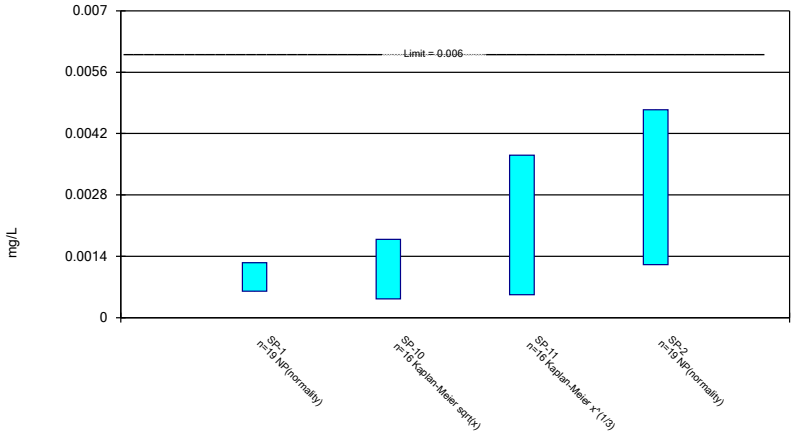
Confidence Intervals Summary - All Results

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	0.00000428	78.95	None	No	0.01	NP (NDs)
Mercury (mg/L)	SP-10	0.000019	0.000005	0.002	No	16	0.0000115	0.00000798	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	0.00000206	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

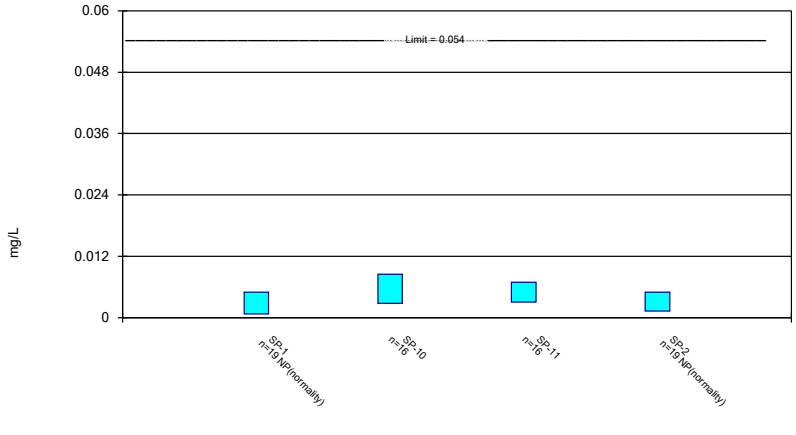
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



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

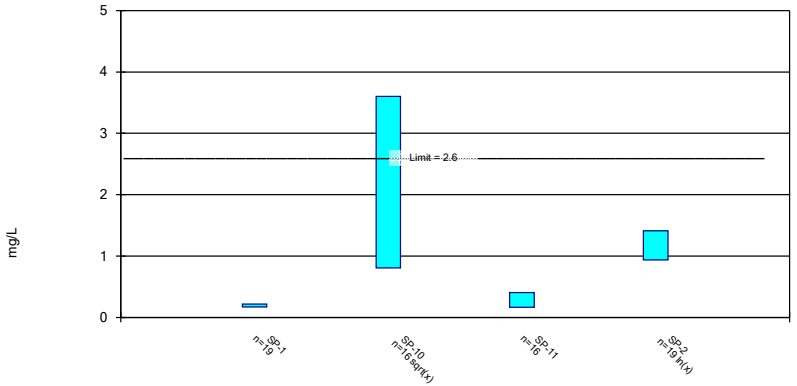
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



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

Parametric Confidence Interval

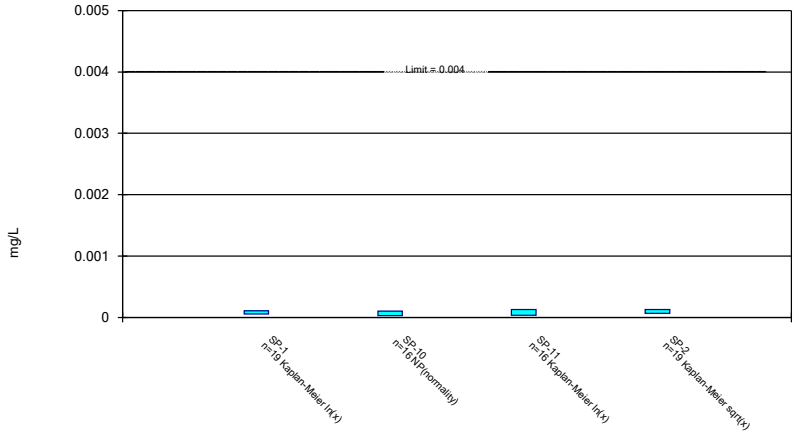
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: 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

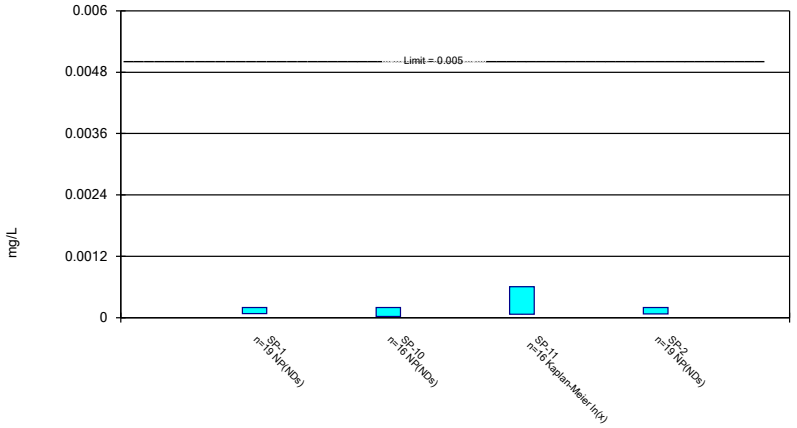
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



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

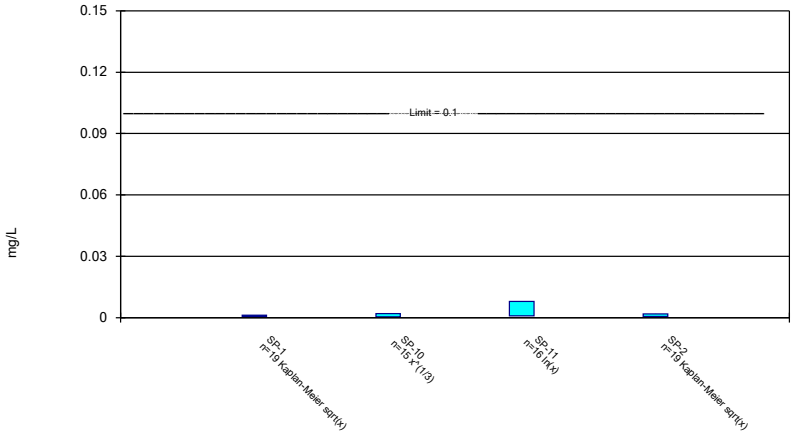
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



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

Parametric Confidence Interval

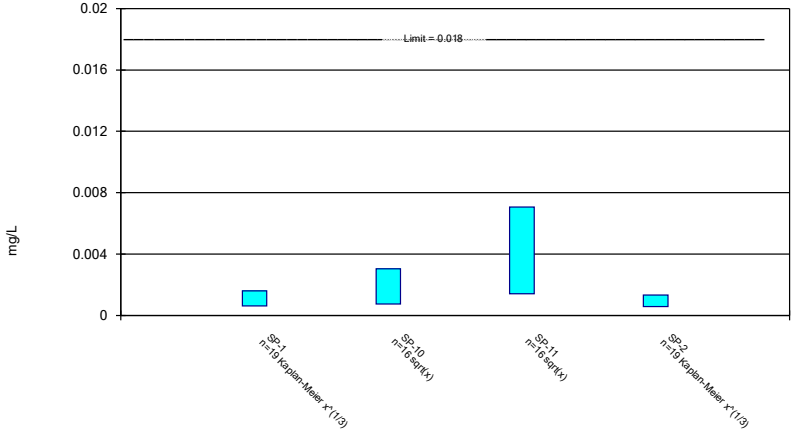
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



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

Parametric Confidence Interval

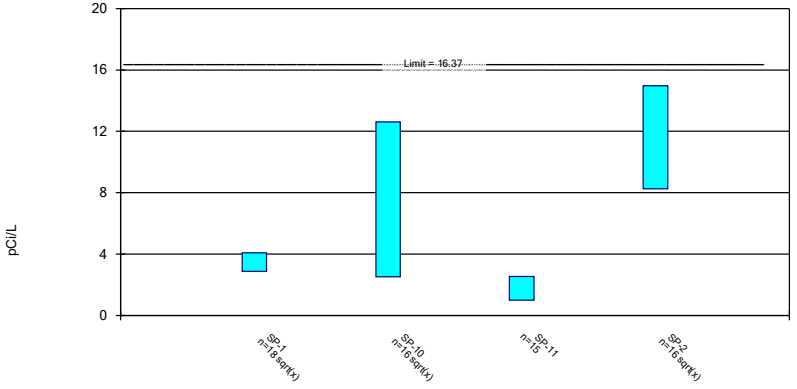
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



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

Parametric Confidence Interval

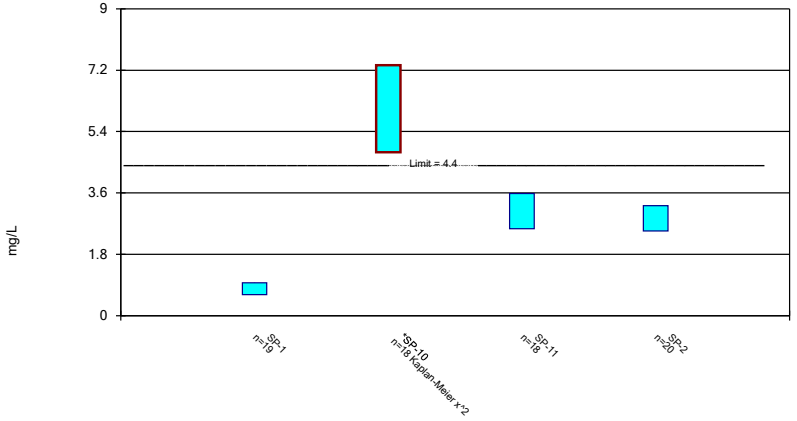
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



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

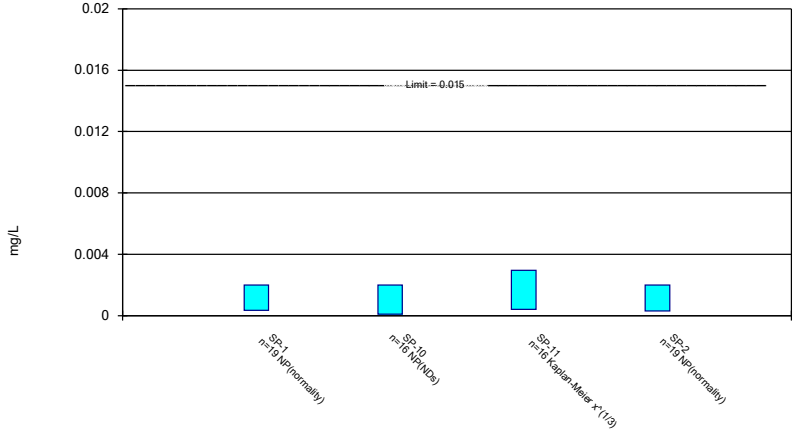
Compliance limit is exceeded.* Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



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

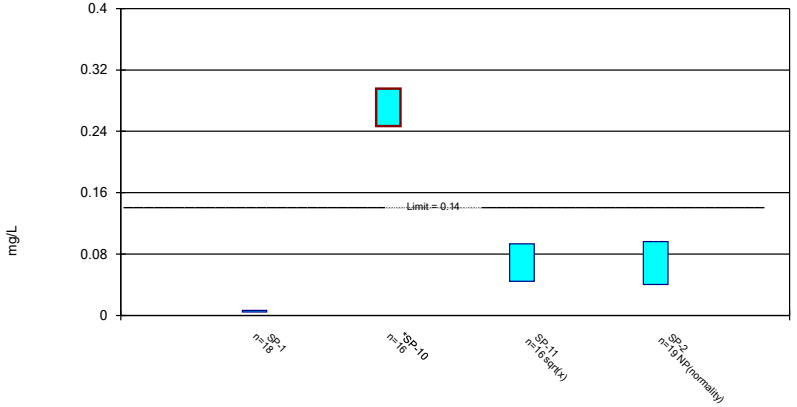
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



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

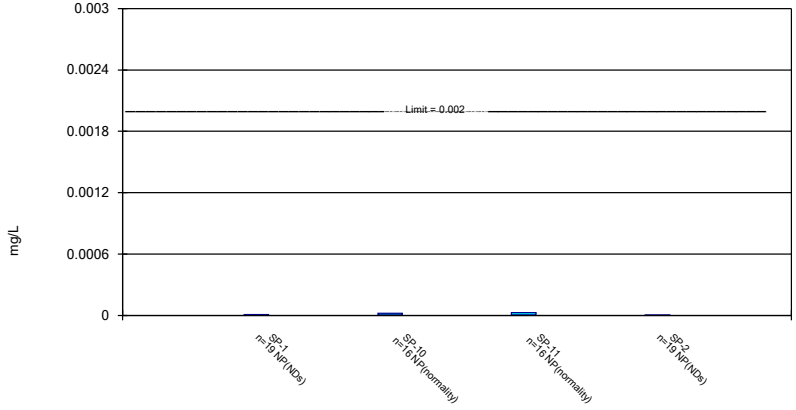
Compliance limit is exceeded.* Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



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

Non-Parametric Confidence Interval

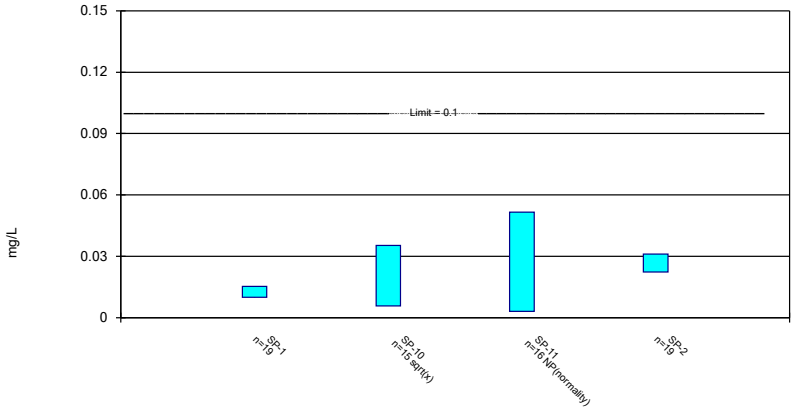
Compliance Limit is not exceeded. Per-well alpha = 0.01.



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

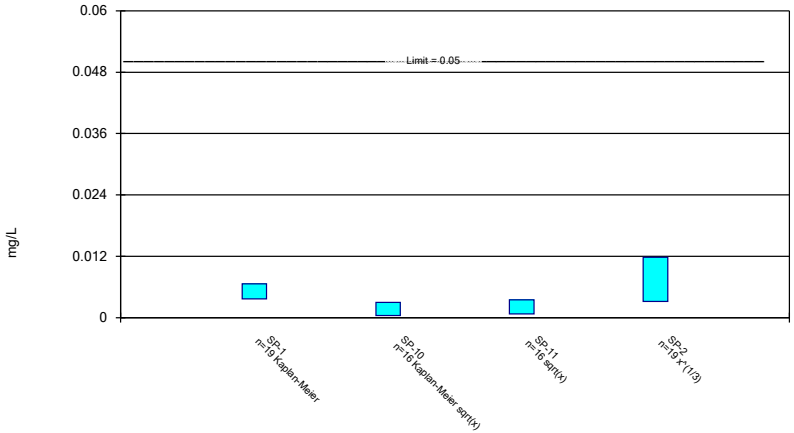
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



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

Parametric Confidence Interval

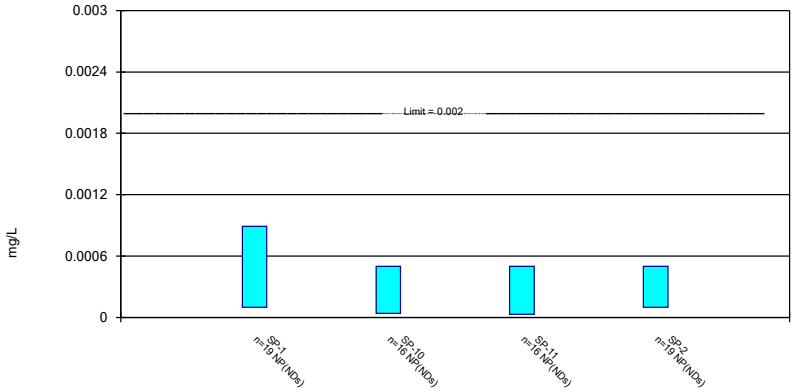
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



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

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

Submitted to

AMERICAN ELECTRIC POWER

1 Riverside Plaza
Columbus, Ohio 43215-2372

Submitted by

Geosyntec consultants

engineers | scientists | innovators

941 Chatham Lane
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August 4, 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
NPS	Northeastern Power Station
ODEQ	Oklahoma Department of Environmental Quality
OAC	Oklahoma Administrative Code
QA	Quality Assurance
QC	Quality Control
SSI	Statistically Significant Increase
SSL	Statistically Significant Level
TDS	Total Dissolved Solids
UPL	Upper Prediction 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 (NPS) 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). While a lithium exceedance at SP-10 was observed above the GWPS, an alternate source demonstration (ASD) submitted to ODEQ on May 1, 2019 attributed the elevated lithium concentrations at SP-10 to natural variation (Geosyntec, 2019). On October 29, 2019, ODEQ provided a letter to AEP documenting acceptance of the ASD (ODEQ, 2019). Thus, the BAP remained in assessment monitoring. Similarly, a fluoride exceedance at SP-10 was observed above the GWPS and an ASD was submitted to ODEQ on January 26, 2021 which attributed the elevated fluoride concentrations at SP-10 to natural variation (Geosyntec, 2021a). On June 4, 2021, ODEQ provided a letter to AEP documenting acceptance of the ASD (ODEQ, 2021). Thus, the BAP remained in assessment monitoring.

Two assessment monitoring events were conducted at the BAP in March and April 2021, in accordance with OAC 252:517-9-6(b) and OAC 252:517-9-6(d), respectively. Results of these events 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 the usability of the data.

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 Appendix B parameters were present at a statistically significant level (SSL) above the GWPS. SSLs were identified for fluoride and lithium. Thus, an ASD will be submitted to ODEQ demonstrating that conditions at the unit remain consistent with previous submittals and the unit will remain in assessment monitoring. Certification of the selected statistical methods by a qualified professional engineer is documented in Attachment A.

SECTION 2

BOTTOM ASH POND EVALUATION

2.1 Data Validation & QA/QC

During the assessment monitoring program, two sets of samples were collected for analysis from each upgradient and downgradient well to meet the requirements of OAC 252:517-9-6(b) (March 2021) and 252:517-9-6(d)(1) (April 2021). Samples from both sampling events were analyzed for the Appendix A and Appendix B parameters. A summary of data collected during these assessment monitoring events 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.9.6.28 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, 2018) for the samples collected in April 2021 except where noted below. Time series plots and results for all completed statistical tests are provided in Attachment B.

The data obtained in March and April 2021 were screened for potential outliers. No outliers were identified for these events.

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, 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 calculated confidence limits were compared to the GWPSs provided in Table 2. The GWPSs were established during a

previous statistical analysis as either the greater value of the background concentration or the maximum contaminant level (MCL) and risk-based level specified in OAC 252:517-9-6(h) for each Appendix B parameter (Geosyntec, 2021b).

The following SSLs were identified at the Northeastern BAP:

- The LCL for fluoride exceeded the GWPS of 4.40 mg/L at SP-10 (5.01 mg/L).
- The LCL for lithium exceeded the GWPS of 0.140 mg/L at SP-10 (0.242 mg/L).

ODEQ previously noted in a letter provided to the NPS that "If 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). Thus, an alternative source demonstration 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 exceeded background concentrations.

Data collected during the April 2021 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 (1.03 mg/L) and SP-11 (0.562 mg/L).
- Chloride concentrations exceeded the interwell UPL of 806 mg/L at SP-2 (1,130 mg/L) and SP-10 (2,000 mg/L).
- Fluoride concentrations exceeded the interwell UPL of 4.22 mg/L at SP-10 (6.84 mg/L).
- Sulfate concentrations exceeded the interwell UPL of 90.0 mg/L at SP-11 (232 mg/L).
- TDS concentrations exceeded the interwell UPL of 1,580 mg/L at SP-2 (2,000 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 April 2021 sample was above the UPL or below the LPL. Based on these results, boron, chloride, fluoride, sulfate, and TDS concentrations exceeded background levels at compliance wells at the Northeastern BAP during 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 March and April 2021 data. 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 prediction limits, with exceedances identified for boron, chloride, fluoride, sulfate, and TDS.

Based on this evaluation, the Northeastern BAP CCR unit will remain in assessment monitoring following submittal of an ASD to ODEQ demonstrating that conditions at the unit remain consistent with previous submittals.

SECTION 3

REFERENCES

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

Geosyntec. 2021a. Alternative Source Demonstration Report – State CCR Rule. Northeastern Power Station – Bottom Ash Pond. Oologah, Oklahoma. January.

Geosyntec. 2021b. Statistical Analysis Summary – Bottom Ash Pond. Northeastern Power Station. Oologah, Oklahoma, February.

Geosyntec. 2019. Alternative Source Demonstration Report – State CCR Rule. Northeastern Power Station Bottom Ash Pond. April.

Oklahoma Department of Environmental Quality (ODEQ). 2019. Letter Transmittal – Alternate Source Demonstration for Lithium – Bottom Ash Pond. October.

ODEQ. 2021. Letter Transmittal – Alternate Source Demonstration for Fluoride and Lithium Exceedance – Bottom Ash Pond. June.

TABLES

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

Geosyntec Consultants, Inc.

Well ID		SP-1		SP-10		SP-11		SP-2		SP-4		SP-5R	
Well Classification		Compliance		Compliance		Compliance		Compliance		Background		Background	
Parameter	Unit	3/3/2021	4/12/2021	3/3/2021	4/12/2021	3/3/2021	4/12/2021	3/3/2021	4/12/2021	3/3/2021	4/12/2021	3/3/2021	4/12/2021
Antimony	µg/L	0.51	0.46	0.08 J	0.12	0.06 J	0.19	1.09	0.84	0.27	0.22	0.16	0.09 J
Arsenic	µg/L	0.53	0.54	0.36	1.14	1.33	2.14	1.07	1.53	0.99	1.41	6.56	7.12
Barium	µg/L	144	158	5,530	6,360	330	212	1,050	1,790	367	435	1,840	2,180
Beryllium	µg/L	0.05 J	0.04 J	0.02 J	0.03 J	0.1 U	0.02 J	0.09 J	0.112	0.04 J	0.09 J	0.05 J	0.05 J
Boron	mg/L	0.169	0.186	0.853	1.03	0.371	0.562	0.140	0.255	0.347	0.393	0.188	0.215
Cadmium	µg/L	0.08	0.05	0.03 J	0.01 J	0.01 J	0.02 J	0.06	0.04 J	0.06	0.04 J	0.27	0.01 J
Calcium	mg/L	105	104	40.4	43.8	39.0	79.6	72.0	91.5	58.7	70.8	52.4	54.6
Chloride	mg/L	-	37.2	-	2,000	-	130	-	1,130	-	495	-	725
Chromium	µg/L	0.426	0.359	0.409	0.277	0.243	0.944	0.700	0.559	0.449	1.03	0.496	0.415
Cobalt	µg/L	0.307	0.202	0.199	0.218	0.939	1.52	0.323	1.10	0.207	0.921	0.391	0.378
Combined Radium	pCi/L	4.27	3.47	18.84	20.36	0.901	1.354	11.81	7.87	5.49	4.09	13.31	14.1
Fluoride	mg/L	0.85	0.88	7.12	6.84	2.88	1.66	3.00	3.19	3.50	3.49	3.18	3.20
Lead	µg/L	0.259	0.2 J	0.230	0.1 J	0.1 J	0.224	0.253	0.211	1.17	0.392	0.793	0.325
Lithium	mg/L	0.00443	0.00549	0.218	0.221	0.0396	0.0248	0.0523	0.0862	0.0594	0.0613	0.0856	0.0894
Mercury	µg/L	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Molybdenum	µg/L	14.3	13.7	1 J	5.01	2 J	2 J	17.1	14.6	3.60	2.94	0.7 J	1 J
Selenium	µg/L	4.5	3.9	0.08 J	0.5 U	0.2 J	0.2 J	3.5	1.1	0.6	0.4 J	0.1 J	0.1 J
Sulfate	mg/L	-	50.0	-	15.4	-	232	-	12.4	-	68.1	-	7.0
Thallium	µg/L	0.5 U	0.05 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.05 J	0.5 U	0.5 U	0.5 U	0.5 U
Total Dissolved Solids	mg/L	-	438	-	3,540	-	918	-	2,000	-	1,160	-	1,420
pH	SU	7.4	7.6	7.7	8.1	7.7	7.8	7.5	7.6	7.8	7.7	7.6	7.9

Notes:
µg/L: micrograms per liter
mg/L: milligrams per liter
pCi/L: picocuries per liter
SU: standard unit
U: Non-detect value. For statistical analysis, parameters which were not detected were replaced with the reporting limit.
J: Estimated value. Parameter was detected in concentrations below the reporting limit.
-: Not analyzed

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
UTL = Upper Tolerance Limit
GWPS = Groundwater Protection Standard
Calculated UTL 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 A Data Summary
Northeastern Plant - Bottom Ash Pond

Geosyntec Consultants, Inc.

Analyte	Unit	Description	SP-1	SP-2	SP-10	SP-11
			4/12/2021	4/12/2021	4/12/2021	4/12/2021
Boron	mg/L	Interwell Background Value (UPL)	0.506			
		Analytical Result	0.186	0.255	**1.03**	**0.562**
Calcium	mg/L	Intrawell Background Value (UPL)	144	176	227	1,460
		Analytical Result	104	91.5	43.8	79.6
Chloride	mg/L	Interwell Background Value (UPL)	806			
		Analytical Result	37.2	**1,130**	**2,000**	130
Fluoride	mg/L	Interwell Background Value (UPL)	4.22			
		Analytical Result	0.88	3.19	**6.84**	1.66
pH	SU	Interwell Background Value (UPL)	9.0			
		Interwell Background Value (LPL)	6.9			
		Analytical Result	7.6	7.6	8.1	7.8
Sulfate	mg/L	Interwell Background Value (UPL)	90.0			
		Analytical Result	50.0	12.4	15.4	**232**
Total Dissolved Solids	mg/L	Interwell Background Value (UPL)	1,580			
		Analytical Result	438	**2,000**	**3,540**	918

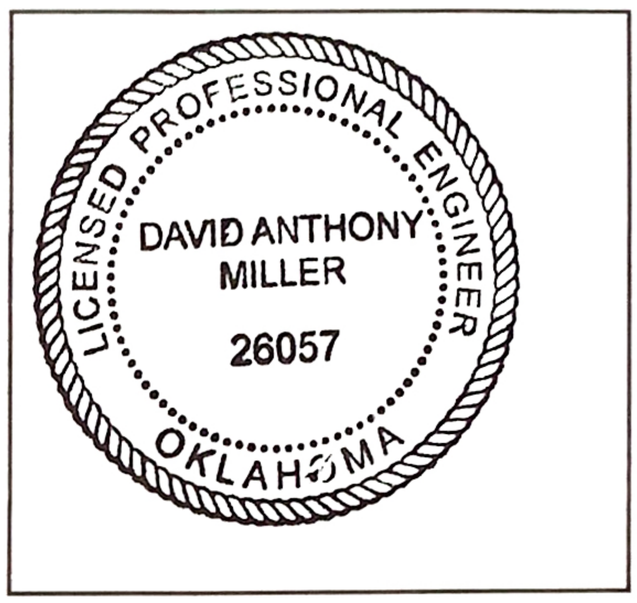
Notes:
UPL: Upper prediction limit
LPL: Lower prediction limit
Bold values exceed the background value.
Background values are shaded gray.

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	OKLAHOMA	08.04.21
License Number	Licensing State	Date

ATTACHMENT B

Statistical Analysis Output

GROUNDWATER STATS CONSULTING

August 2, 2021

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

Re: Northeastern BAP (Bottom Ash Pond)
Assessment Monitoring Statistics – April 2021

Dear Ms. Kreinberg,

Groundwater Stats Consulting, formerly the statistical consulting division of Sanitas Technologies, is pleased to provide the April 2021 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 Kristina Rayner, Groundwater Statistician and Founder of Groundwater Stats Consulting.

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. 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.

Evaluation of Appendix B Parameters – April 2021

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. A summary of previously flagged outliers follows this report (Figure C).

Tolerance Limits

Parametric tolerance limits were used to calculate background limits from pooled upgradient well data through October 2020 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. 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) 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).

Confidence Intervals

Confidence intervals were then constructed on downgradient wells with data through April 2021 for each of the Appendix B parameters using the highest limit of the MCL or background limit as discussed above for the GWPS (Figure E). 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,

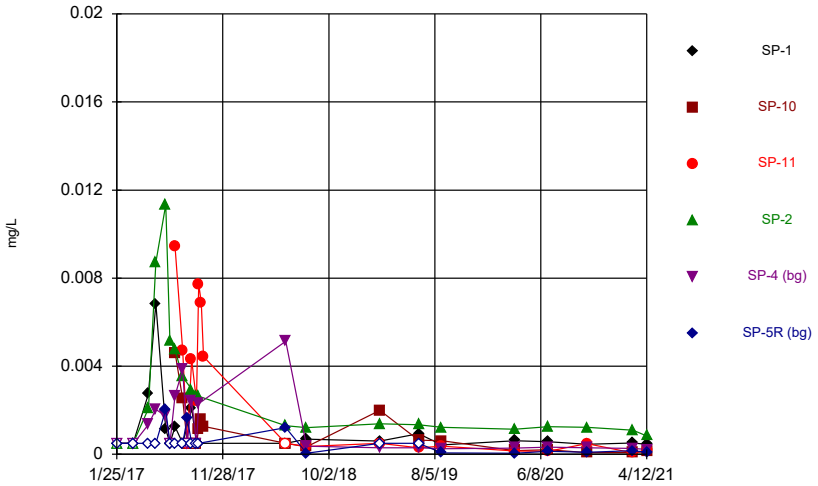
Andrew T. Collins
Project Manager

Kristina L. Rayner
Groundwater Statistician

FIGURE A.

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

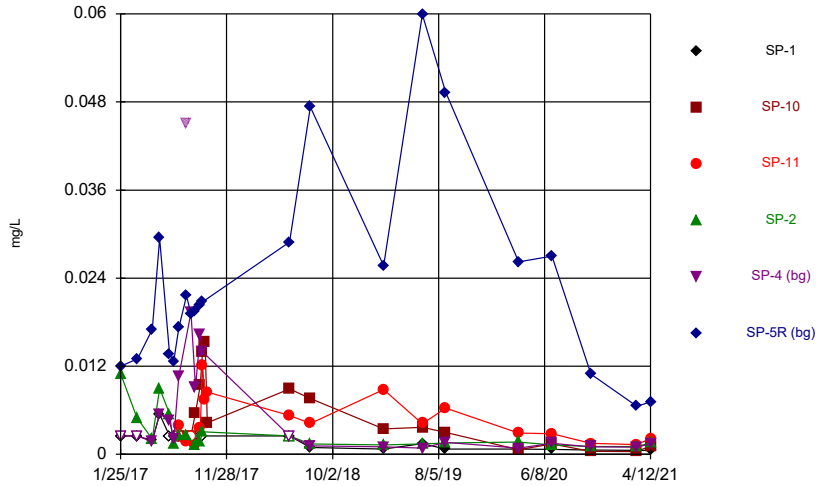
Time Series



Constituent: Antimony Analysis Run 6/14/2021 2:59 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

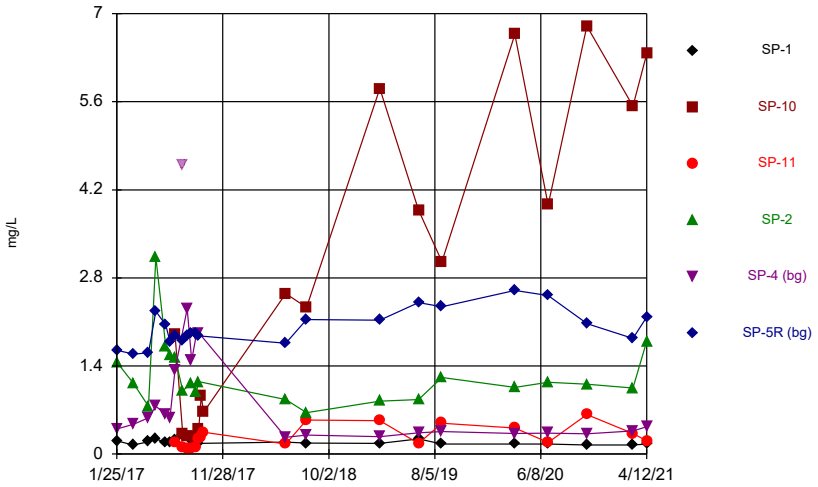
Time Series



Constituent: Arsenic Analysis Run 6/14/2021 2:59 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG

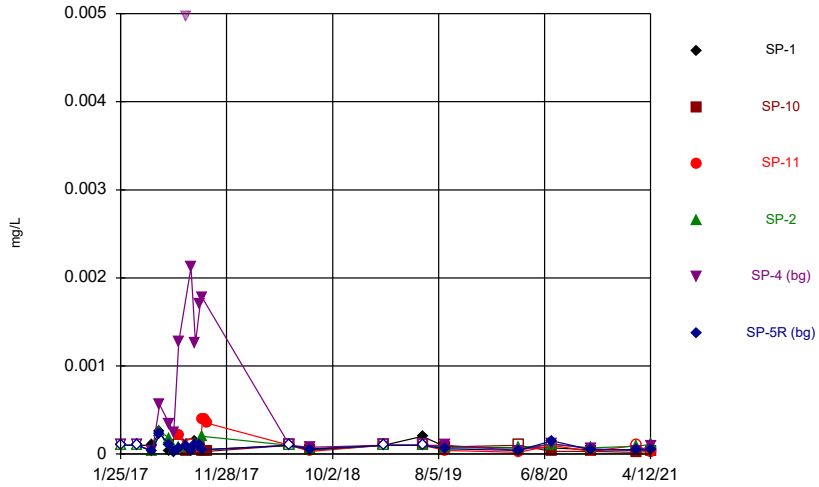
Time Series



Constituent: Barium Analysis Run 6/14/2021 2:59 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

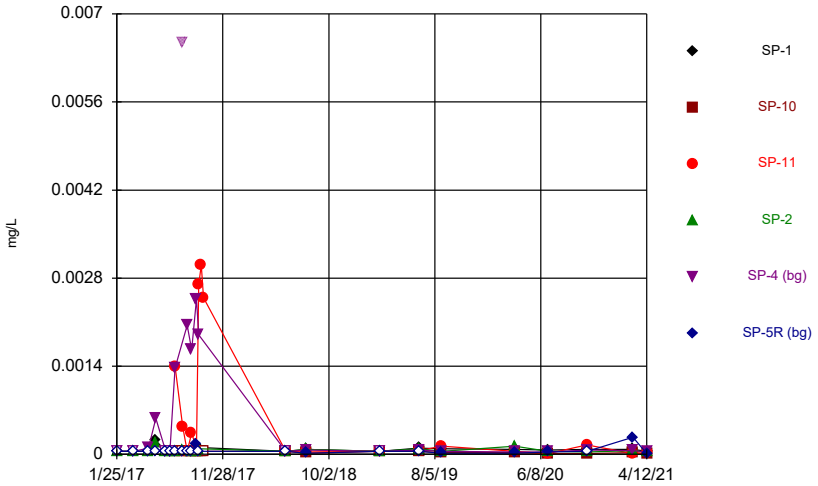
Time Series



Constituent: Beryllium Analysis Run 6/14/2021 2:59 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

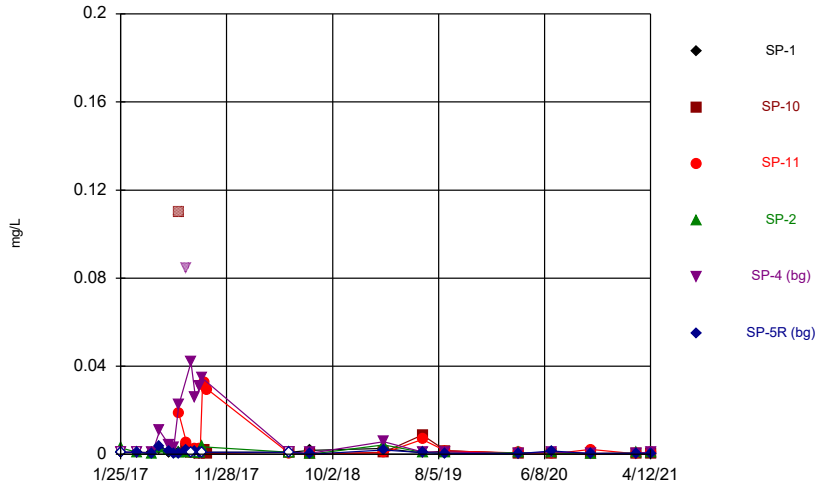
Time Series



Constituent: Cadmium Analysis Run 6/14/2021 2:59 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

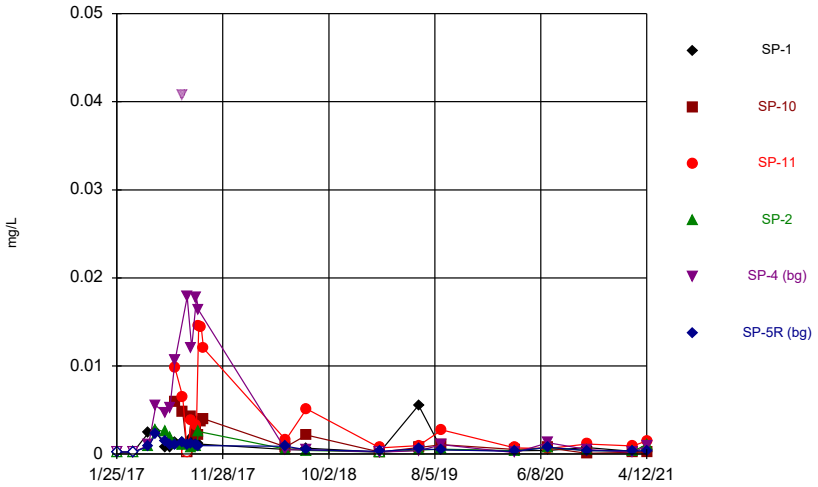
Time Series



Constituent: Chromium Analysis Run 6/14/2021 2:59 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

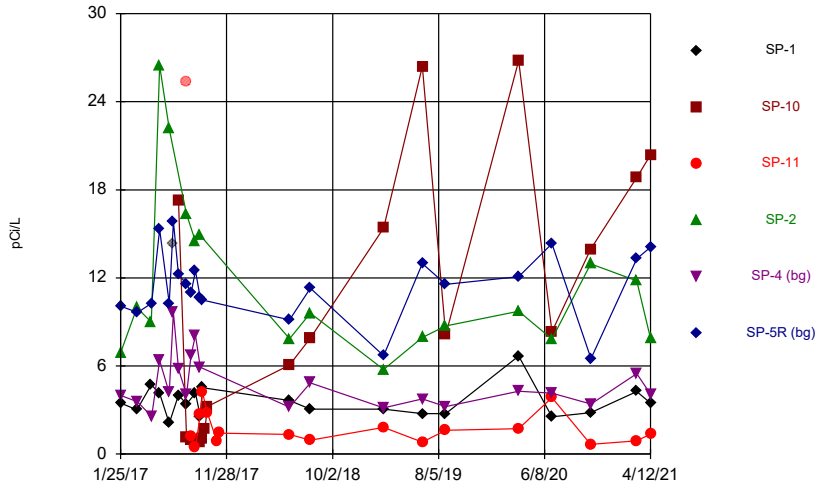
Time Series



Constituent: Cobalt Analysis Run 6/14/2021 2:59 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG

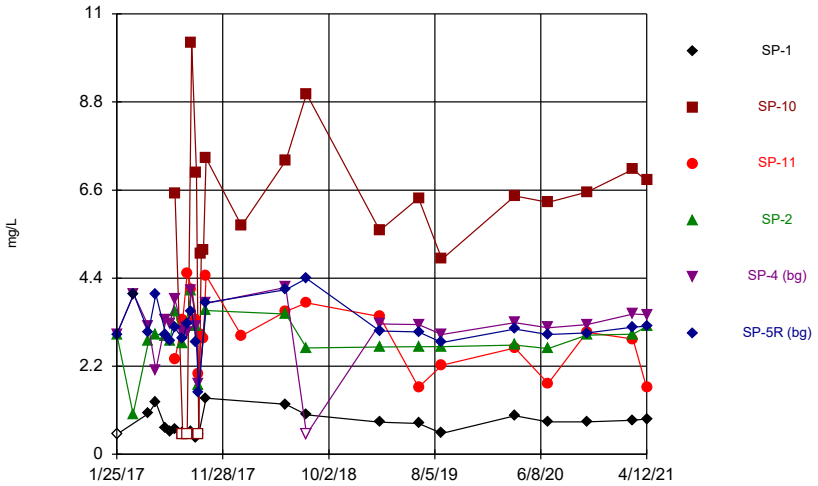
Time Series



Constituent: Combined Radium 226 + 228 Analysis Run 6/14/2021 2:59 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

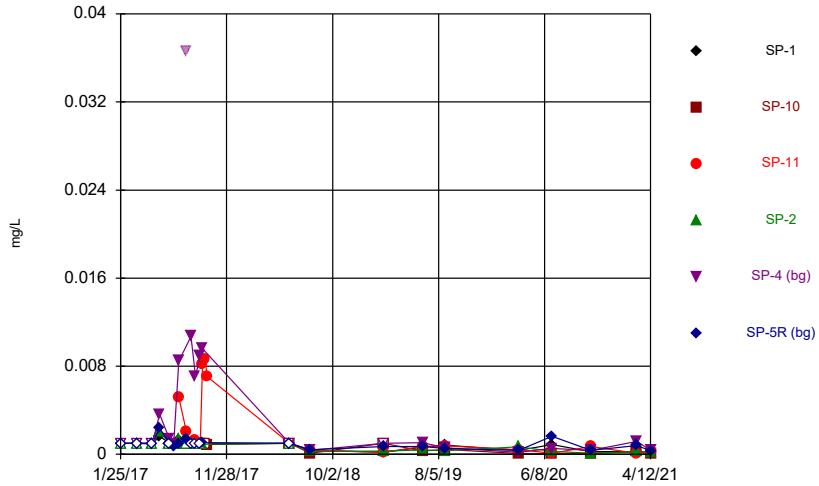
Time Series



Constituent: Fluoride Analysis Run 6/14/2021 2:59 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

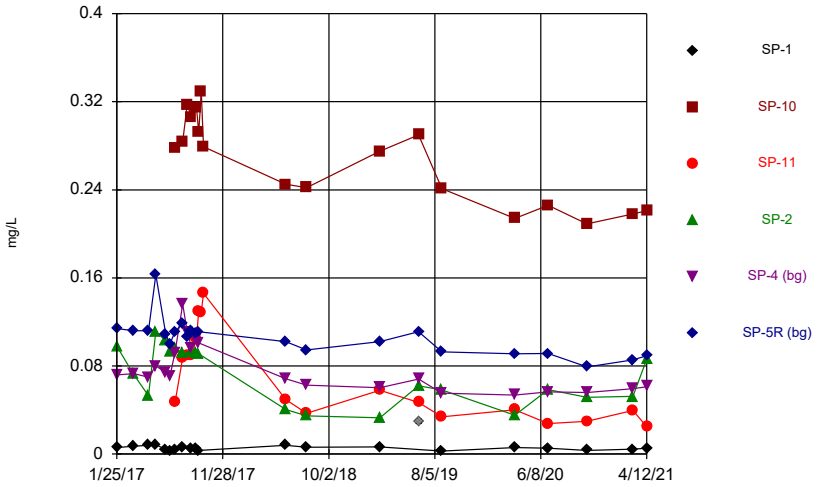
Time Series



Constituent: Lead Analysis Run 6/14/2021 2:59 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG

Time Series



Constituent: Lithium Analysis Run 6/14/2021 2:59 PM View: Appendix IV
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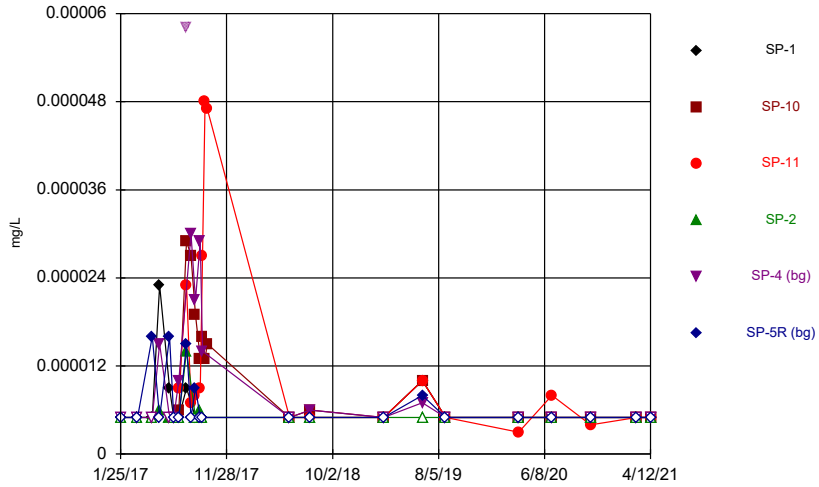
Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

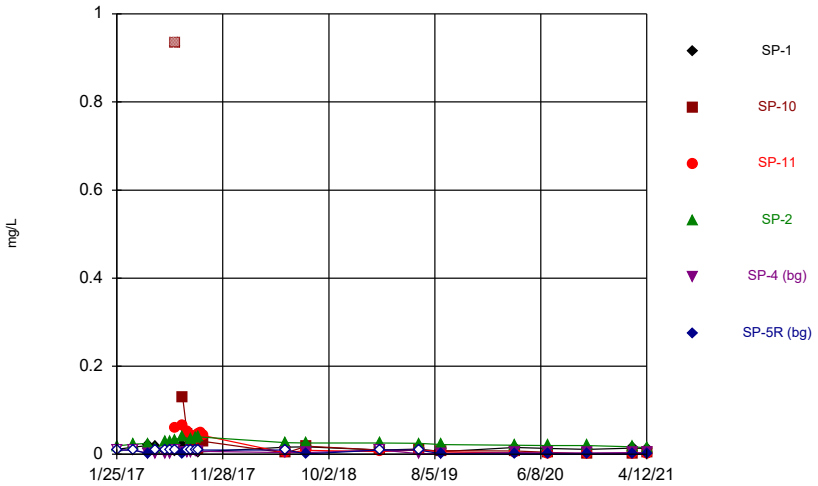
Time Series



Constituent: Mercury Analysis Run 6/14/2021 2:59 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

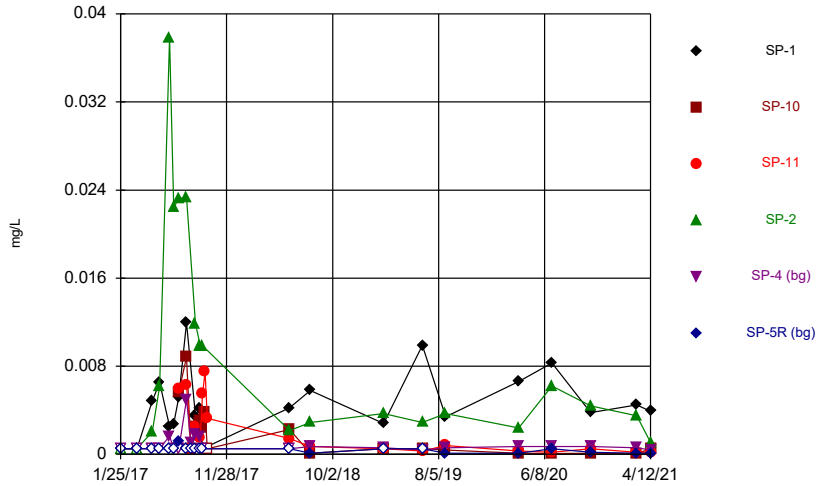
Time Series



Constituent: Molybdenum Analysis Run 6/14/2021 2:59 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

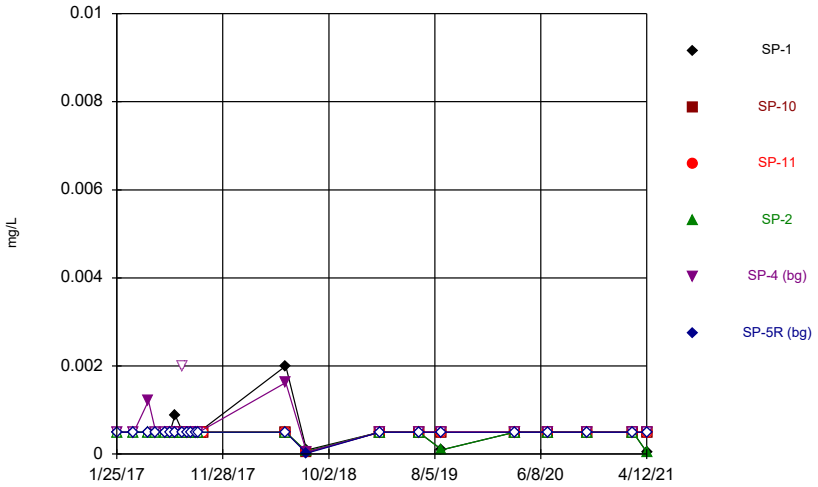
Time Series



Constituent: Selenium Analysis Run 6/14/2021 2:59 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

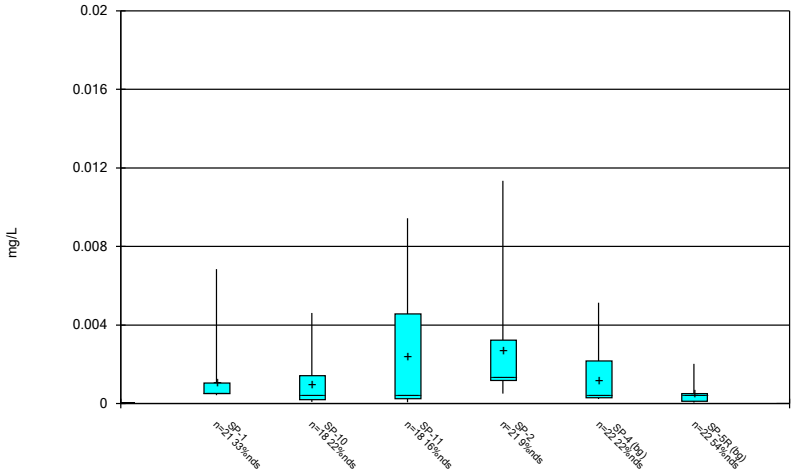
Time Series



Constituent: Thallium Analysis Run 6/14/2021 2:59 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

FIGURE B.

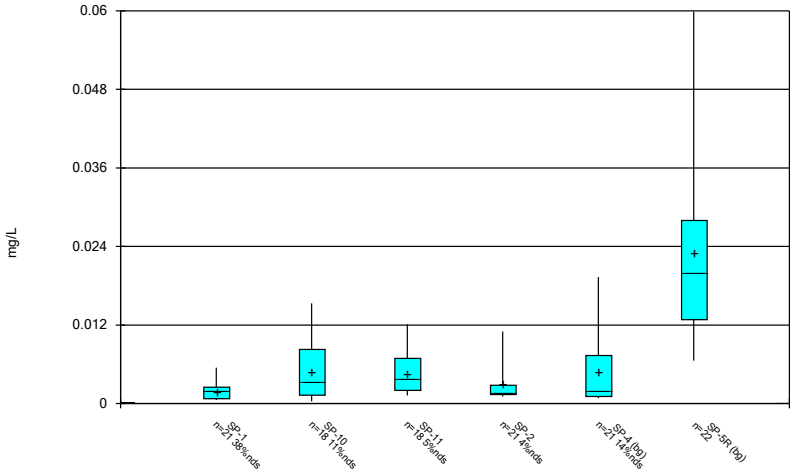
Box & Whiskers Plot



Constituent: Antimony Analysis Run 6/14/2021 3:01 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG

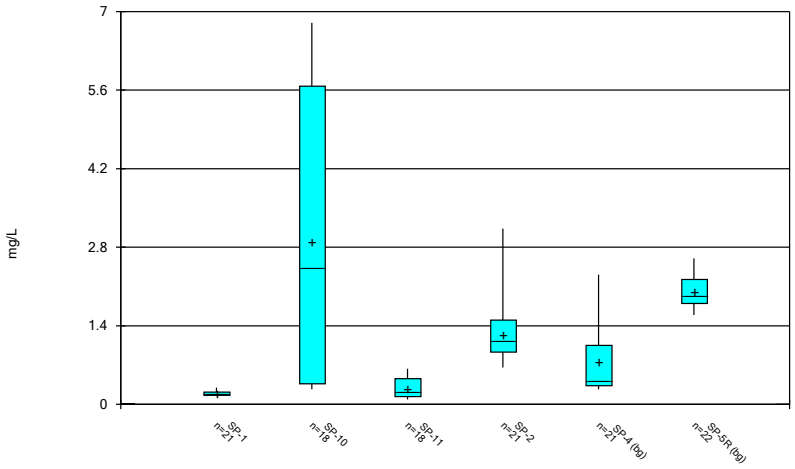
Box & Whiskers Plot



Constituent: Arsenic Analysis Run 6/14/2021 3:01 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG

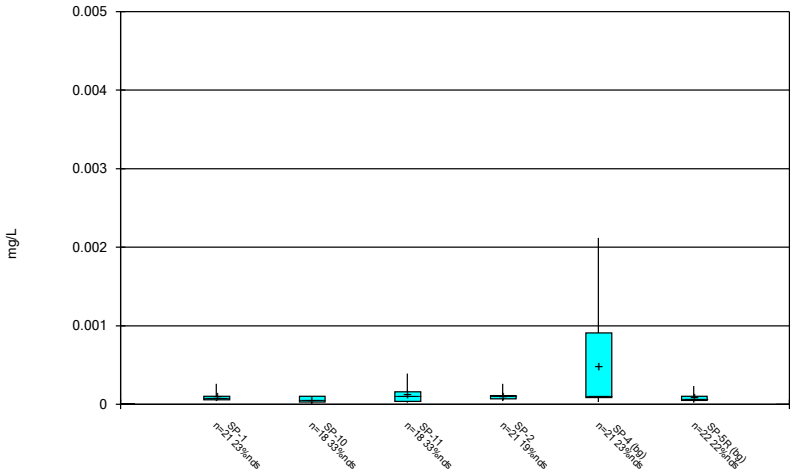
Box & Whiskers Plot



Constituent: Barium Analysis Run 6/14/2021 3:01 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

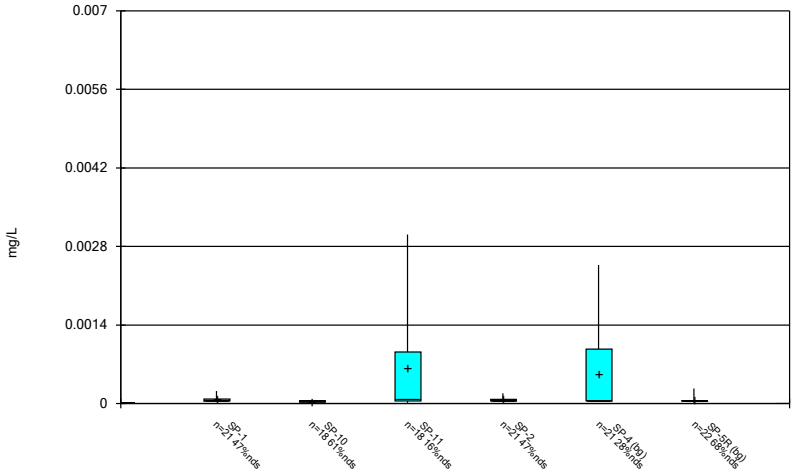
Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG

Box & Whiskers Plot



Constituent: Beryllium Analysis Run 6/14/2021 3:01 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

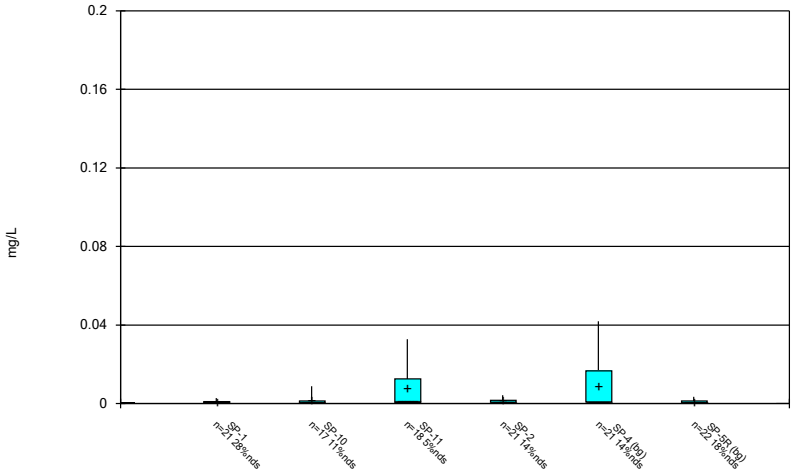
Box & Whiskers Plot



Constituent: Cadmium Analysis Run 6/14/2021 3:01 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG

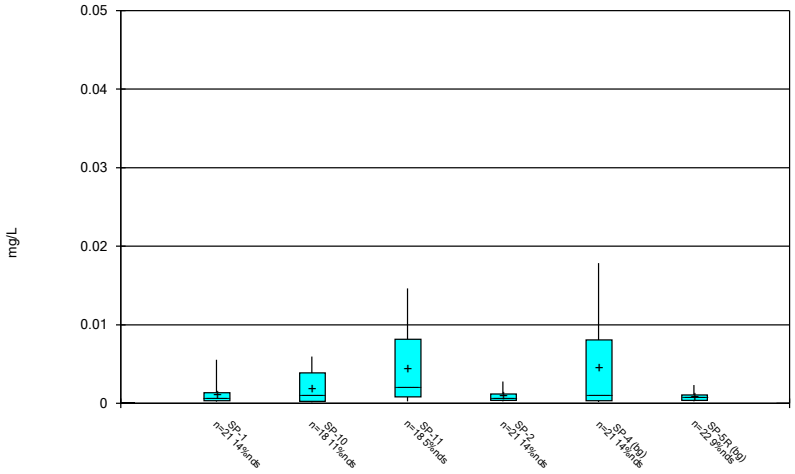
Box & Whiskers Plot



Constituent: Chromium Analysis Run 6/14/2021 3:01 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG

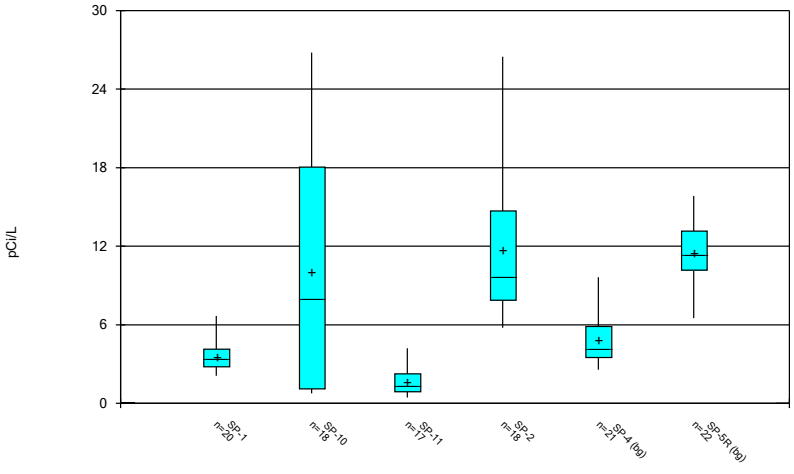
Box & Whiskers Plot



Constituent: Cobalt Analysis Run 6/14/2021 3:01 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

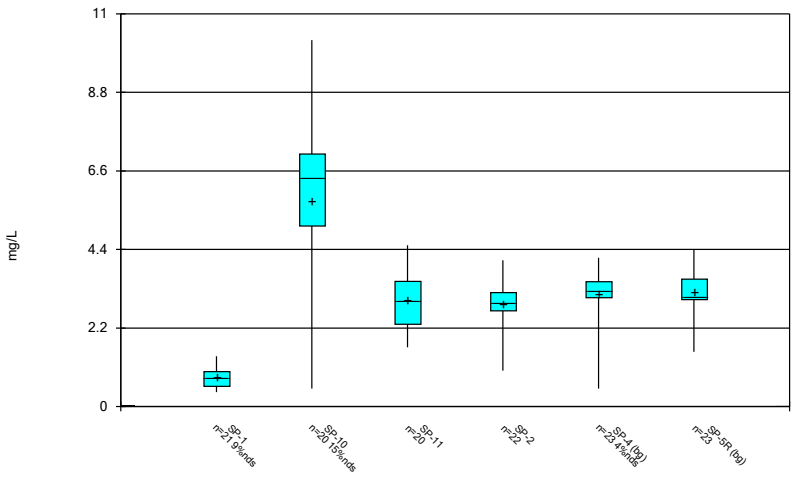
Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG

Box & Whiskers Plot



Constituent: Combined Radium 226 + 228 Analysis Run 6/14/2021 3:01 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

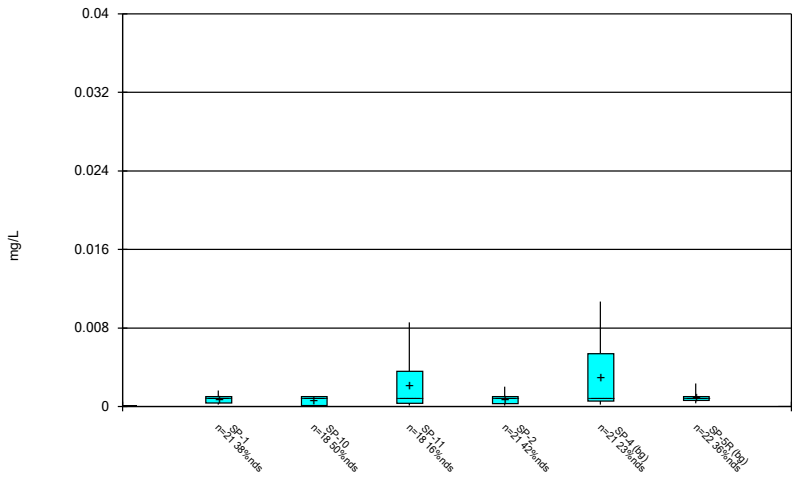
Box & Whiskers Plot



Constituent: Fluoride Analysis Run 6/14/2021 3:01 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG

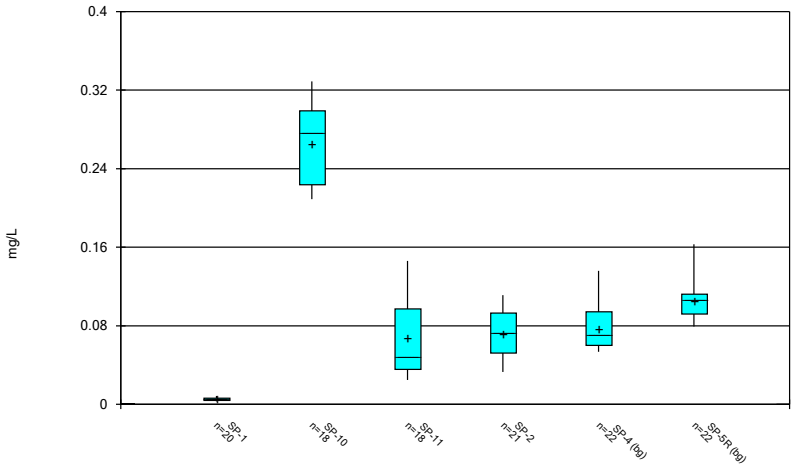
Box & Whiskers Plot



Constituent: Lead Analysis Run 6/14/2021 3:01 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG

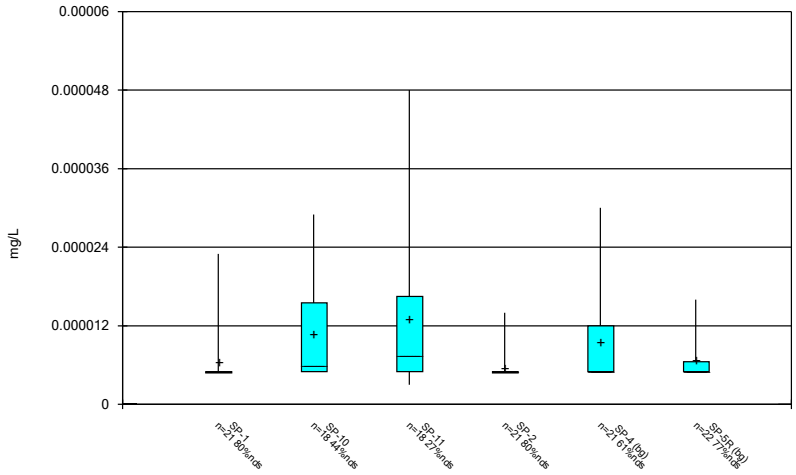
Box & Whiskers Plot



Constituent: Lithium Analysis Run 6/14/2021 3:01 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG

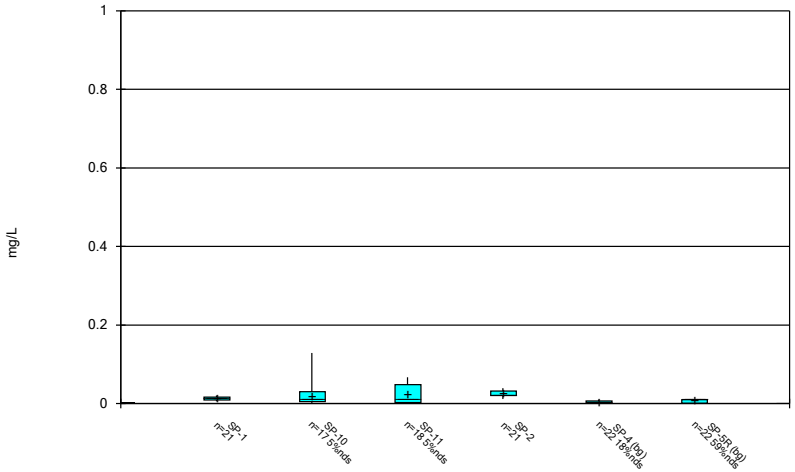
Box & Whiskers Plot



Constituent: Mercury Analysis Run 6/14/2021 3:01 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG

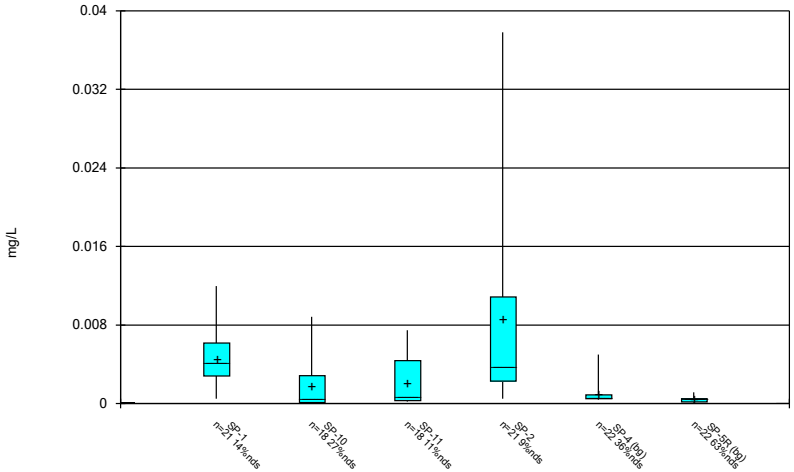
Box & Whiskers Plot



Constituent: Molybdenum Analysis Run 6/14/2021 3:01 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG

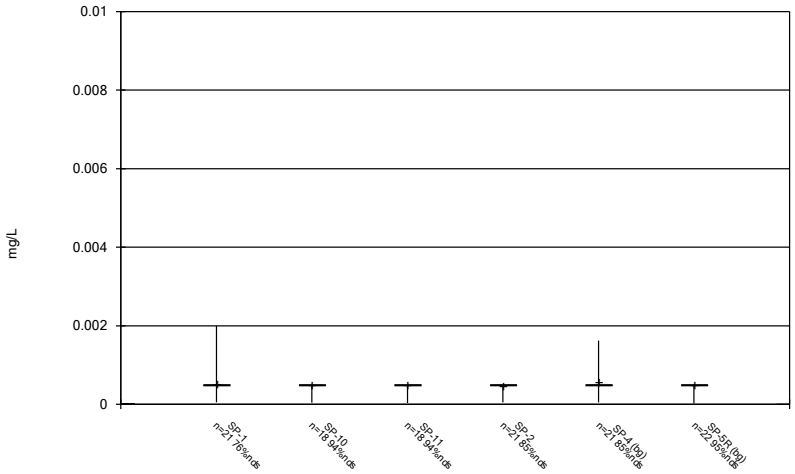
Box & Whiskers Plot



Constituent: Selenium Analysis Run 6/14/2021 3:02 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG

Box & Whiskers Plot



Constituent: Thallium Analysis Run 6/14/2021 3:02 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

FIGURE C.

Outlier Summary

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 6/14/2021, 3:03 PM

	SP-4 Arsenic (mg/L)	SP-4 Barium (mg/L)	SP-4 Beryllium (mg/L)	SP-4 Cadmium (mg/L)	SP-10 Chromium (mg/L)	SP-4 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)
3/13/2017										4 (o)
6/27/2017								14.29 (o)		
7/13/2017					0.11 (o)					
8/4/2017	0.04498 (o)	4.59 (o)	0.00497 (o)	0.00655 (o)		0.08415 (o)	0.04069 (o)		25.367 (o)	
6/20/2019										

	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)
3/13/2017					
6/27/2017					
7/13/2017				0.934 (o)	
8/4/2017	0.03663 (o)		5.8E-05 (o)		<0.0005 (o)
6/20/2019		0.03 (J,o)			

FIGURE D.

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.

FIGURE E.

Confidence Intervals - Significant Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 6/15/2021, 2:14 PM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Fluoride (mg/L)	**SP-10**	**7.335**	**5.005**	**4.4**	**Yes**	**20**	**5.748**	**2.593**	**15**	**None**	**x^2**	**0.01**	**Param.**
Lithium (mg/L)	**SP-10**	**0.2893**	**0.2419**	**0.14**	**Yes**	**18**	**0.2656**	**0.03915**	**0**	**None**	**No**	**0.01**	**Param.**

Confidence Intervals - All Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 6/15/2021, 2:14 PM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Antimony (mg/L)	SP-1	0.00114	0.0005	0.006	No	21	0.001089	0.001447	33.33	None	No	0.01	NP (normality)
Antimony (mg/L)	SP-10	0.001502	0.0003233	0.006	No	18	0.0009661	0.001145	22.22	Kaplan-Meier	sqrt(x)	0.01	Param.
Antimony (mg/L)	SP-11	0.002241	0.0002999	0.006	No	18	0.002412	0.003056	16.67	Kaplan-Meier	ln(x)	0.01	Param.
Antimony (mg/L)	SP-2	0.003336	0.00122	0.006	No	21	0.002705	0.002778	9.524	None	x^(1/3)	0.01	Param.
Antimony (mg/L)	SP-4 (bg)	0.00204	0.00029	0.006	No	22	0.001212	0.001354	22.73	None	No	0.01	NP (normality)
Antimony (mg/L)	SP-5R (bg)	0.00121	0.00013	0.006	No	22	0.0005227	0.0005004	54.55	None	No	0.01	NP (NDs)
Arsenic (mg/L)	SP-1	0.001492	0.0007063	0.054	No	21	0.001795	0.001186	38.1	Kaplan-Meier	x^(1/3)	0.01	Param.
Arsenic (mg/L)	SP-10	0.006612	0.001861	0.054	No	18	0.004812	0.004502	11.11	None	sqrt(x)	0.01	Param.
Arsenic (mg/L)	SP-11	0.005889	0.00253	0.054	No	18	0.004486	0.00306	5.556	None	sqrt(x)	0.01	Param.
Arsenic (mg/L)	SP-2	0.00305	0.00129	0.054	No	21	0.002857	0.002673	4.762	None	No	0.01	NP (normality)
Arsenic (mg/L)	SP-4 (bg)	0.004881	0.001546	0.054	No	21	0.004814	0.005632	14.29	None	ln(x)	0.01	Param.
Arsenic (mg/L)	SP-5R (bg)	0.02838	0.01518	0.054	No	22	0.02297	0.01371	0	None	sqrt(x)	0.01	Param.
Barium (mg/L)	SP-1	0.2109	0.1674	2.6	No	21	0.1891	0.03937	0	None	No	0.01	Param.
Barium (mg/L)	SP-10	5.81	0.33	2.6	No	18	2.889	2.458	0	None	No	0.01	NP (normality)
Barium (mg/L)	SP-11	0.3876	0.1787	2.6	No	18	0.2831	0.1726	0	None	No	0.01	Param.
Barium (mg/L)	SP-2	1.45	0.9672	2.6	No	21	1.246	0.5285	0	None	x^(1/3)	0.01	Param.
Barium (mg/L)	SP-4 (bg)	1.34	0.327	2.6	No	21	0.7491	0.6364	0	None	No	0.01	NP (normality)
Barium (mg/L)	SP-5R (bg)	2.165	1.858	2.6	No	22	2.012	0.2863	0	None	No	0.01	Param.
Beryllium (mg/L)	SP-1	0.0001073	0.00005131	0.004	No	21	0.00009476	0.00005259	23.81	Kaplan-Meier	sqrt(x)	0.01	Param.
Beryllium (mg/L)	SP-10	0.0001	0.00003	0.004	No	18	0.00006072	0.00003234	33.33	None	No	0.01	NP (normality)
Beryllium (mg/L)	SP-11	0.0001056	0.00003064	0.004	No	18	0.0001283	0.0001235	33.33	Kaplan-Meier	ln(x)	0.01	Param.
Beryllium (mg/L)	SP-2	0.0001243	0.00006541	0.004	No	21	0.0001048	0.00005184	19.05	Kaplan-Meier	sqrt(x)	0.01	Param.
Beryllium (mg/L)	SP-4 (bg)	0.00126	0.000078	0.004	No	21	0.0004922	0.0006809	23.81	None	No	0.01	NP (normality)
Beryllium (mg/L)	SP-5R (bg)	0.00008381	0.00003605	0.004	No	22	0.0000815	0.00004694	22.73	Kaplan-Meier	sqrt(x)	0.01	Param.
Cadmium (mg/L)	SP-1	0.00009	0.00005	0.005	No	21	0.00007333	0.00003877	47.62	None	No	0.01	NP (normality)
Cadmium (mg/L)	SP-10	0.00005	0.00002	0.005	No	18	0.00003833	0.00001618	61.11	None	No	0.01	NP (NDs)
Cadmium (mg/L)	SP-11	0.0004295	0.00004588	0.005	No	18	0.0006161	0.00103	16.67	Kaplan-Meier	ln(x)	0.01	Param.
Cadmium (mg/L)	SP-2	0.00008	0.00005	0.005	No	21	0.00006571	0.00003385	47.62	None	No	0.01	NP (normality)
Cadmium (mg/L)	SP-4 (bg)	0.00137	0.00005	0.005	No	21	0.0005171	0.0008156	28.57	None	No	0.01	NP (normality)
Cadmium (mg/L)	SP-5R (bg)	0.00016	0.00004	0.005	No	22	0.00005864	0.00005488	68.18	None	No	0.01	NP (NDs)
Chromium (mg/L)	SP-1	0.00111	0.0004862	0.1	No	21	0.0009932	0.0006665	28.57	Kaplan-Meier	sqrt(x)	0.01	Param.
Chromium (mg/L)	SP-10	0.001378	0.0003213	0.1	No	17	0.001297	0.002039	11.76	None	ln(x)	0.01	Param.
Chromium (mg/L)	SP-11	0.00611	0.0007839	0.1	No	18	0.007638	0.01165	5.556	None	ln(x)	0.01	Param.
Chromium (mg/L)	SP-2	0.001711	0.0006307	0.1	No	21	0.001311	0.001145	14.29	None	sqrt(x)	0.01	Param.
Chromium (mg/L)	SP-4 (bg)	0.02248	0.00064	0.1	No	21	0.008983	0.01333	14.29	None	No	0.01	NP (normality)
Chromium (mg/L)	SP-5R (bg)	0.00108	0.0004203	0.1	No	22	0.0009425	0.0007502	18.18	Kaplan-Meier	sqrt(x)	0.01	Param.
Cobalt (mg/L)	SP-1	0.001356	0.0004687	0.018	No	21	0.001103	0.001223	14.29	None	x^(1/3)	0.01	Param.
Cobalt (mg/L)	SP-10	0.002642	0.000622	0.018	No	18	0.001909	0.001866	11.11	None	sqrt(x)	0.01	Param.
Cobalt (mg/L)	SP-11	0.00578	0.001285	0.018	No	18	0.00448	0.004904	5.556	None	x^(1/3)	0.01	Param.
Cobalt (mg/L)	SP-2	0.001243	0.0004989	0.018	No	21	0.0009596	0.0007941	14.29	None	sqrt(x)	0.01	Param.
Cobalt (mg/L)	SP-4 (bg)	0.003652	0.0005856	0.018	No	21	0.004633	0.006294	14.29	None	ln(x)	0.01	Param.
Cobalt (mg/L)	SP-5R (bg)	0.001074	0.0005355	0.018	No	22	0.0008046	0.0005014	9.091	None	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	SP-1	4.141	2.971	16.37	No	20	3.556	1.03	0	None	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	SP-10	13.75	3.39	16.37	No	18	9.948	9.022	0	None	sqrt(x)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	SP-11	2.211	0.9901	16.37	No	17	1.685	1.091	0	None	sqrt(x)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	SP-2	14.12	8.404	16.37	No	18	11.68	5.495	0	None	x^(1/3)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	SP-4 (bg)	5.765	3.805	16.37	No	21	4.785	1.777	0	None	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	SP-5R (bg)	12.73	10.17	16.37	No	22	11.45	2.384	0	None	No	0.01	Param.
Fluoride (mg/L)	SP-1	0.9518	0.6432	4.4	No	21	0.7975	0.2798	9.524	None	No	0.01	Param.
Fluoride (mg/L)	**SP-10**	**7.335**	**5.005**	**4.4**	**Yes**	**20**	**5.748**	**2.593**	**15**	**None**	**x^2**	**0.01**	**Param.**
Fluoride (mg/L)	SP-11	3.482	2.498	4.4	No	20	2.99	0.8672	0	None	No	0.01	Param.
Fluoride (mg/L)	SP-2	3.229	2.629	4.4	No	22	2.88	0.6265	0	None	x^2	0.01	Param.
Fluoride (mg/L)	SP-4 (bg)	3.56	2.904	4.4	No	23	3.153	0.7985	4.348	None	x^2	0.01	Param.
Fluoride (mg/L)	SP-5R (bg)	3.517	2.904	4.4	No	23	3.211	0.5858	0	None	No	0.01	Param.

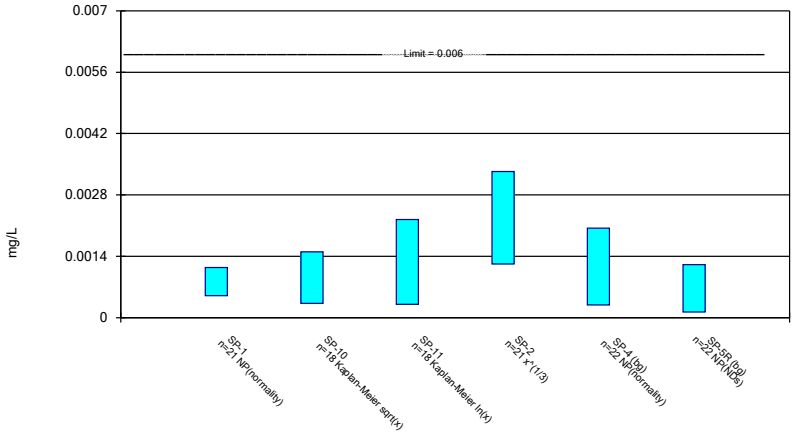
Confidence Intervals - All Results

Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 6/15/2021, 2:14 PM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Lead (mg/L)	SP-1	0.001	0.000351	0.015	No	21	0.0007971	0.0003863	38.1	None	No	0.01	NP (normality)
Lead (mg/L)	SP-10	0.001	0.0001	0.015	No	18	0.0006278	0.0004234	50	None	No	0.01	NP (normality)
Lead (mg/L)	SP-11	0.001773	0.0002931	0.015	No	18	0.002157	0.002904	16.67	Kaplan-Meier	ln(x)	0.01	Param.
Lead (mg/L)	SP-2	0.000771	0.0002795	0.015	No	21	0.0007686	0.0004787	42.86	Kaplan-Meier	sqrt(x)	0.01	Param.
Lead (mg/L)	SP-4 (bg)	0.002528	0.0006096	0.015	No	21	0.00288	0.0036	23.81	Kaplan-Meier	ln(x)	0.01	Param.
Lead (mg/L)	SP-5R (bg)	0.001096	0.000569	0.015	No	22	0.000927	0.0004596	36.36	Kaplan-Meier	sqrt(x)	0.01	Param.
Lithium (mg/L)	SP-1	0.00633	0.004447	0.14	No	20	0.005389	0.001657	0	None	No	0.01	Param.
Lithium (mg/L)	**SP-10**	**0.2893**	**0.2419**	**0.14**	**Yes**	**18**	**0.2656**	**0.03915**	**0**	**None**	**No**	**0.01**	**Param.**
Lithium (mg/L)	SP-11	0.08628	0.04205	0.14	No	18	0.06727	0.03932	0	None	sqrt(x)	0.01	Param.
Lithium (mg/L)	SP-2	0.08575	0.05775	0.14	No	21	0.07175	0.02538	0	None	No	0.01	Param.
Lithium (mg/L)	SP-4 (bg)	0.08638	0.06465	0.14	No	22	0.07642	0.02158	0	None	sqrt(x)	0.01	Param.
Lithium (mg/L)	SP-5R (bg)	0.1133	0.09635	0.14	No	22	0.1054	0.01676	0	None	x^(1/3)	0.01	Param.
Mercury (mg/L)	SP-1	0.000009	0.000005	0.002	No	21	0.000006476	0.000004094	80.95	None	No	0.01	NP (NDs)
Mercury (mg/L)	SP-10	0.000016	0.000005	0.002	No	18	0.00001078	0.000007788	44.44	None	No	0.01	NP (normality)
Mercury (mg/L)	SP-11	0.000023	0.000005	0.002	No	18	0.00001294	0.00001408	27.78	None	No	0.01	NP (normality)
Mercury (mg/L)	SP-2	0.000005	0.000005	0.002	No	21	0.000005524	0.000001965	80.95	None	No	0.01	NP (NDs)
Mercury (mg/L)	SP-4 (bg)	0.000014	0.000005	0.002	No	21	0.000009381	0.000007953	61.9	None	No	0.01	NP (NDs)
Mercury (mg/L)	SP-5R (bg)	0.000008	0.000005	0.002	No	22	0.000006773	0.000003766	77.27	None	No	0.01	NP (NDs)
Molybdenum (mg/L)	SP-1	0.01518	0.01031	0.1	No	21	0.01274	0.004411	0	None	No	0.01	Param.
Molybdenum (mg/L)	SP-10	0.02791	0.005255	0.1	No	17	0.0216	0.03061	5.882	None	x^(1/3)	0.01	Param.
Molybdenum (mg/L)	SP-11	0.04861	0.00215	0.1	No	18	0.02457	0.02406	5.556	None	No	0.01	NP (normality)
Molybdenum (mg/L)	SP-2	0.02997	0.02132	0.1	No	21	0.02565	0.007841	0	None	No	0.01	Param.
Molybdenum (mg/L)	SP-4 (bg)	0.004119	0.002206	0.1	No	22	0.004522	0.003107	18.18	Kaplan-Meier	No	0.01	Param.
Molybdenum (mg/L)	SP-5R (bg)	0.01	0.001	0.1	No	22	0.006323	0.004525	59.09	Kaplan-Meier	No	0.01	NP (NDs)
Selenium (mg/L)	SP-1	0.006194	0.002969	0.05	No	21	0.004581	0.002923	14.29	None	No	0.01	Param.
Selenium (mg/L)	SP-10	0.001567	0.0001783	0.05	No	18	0.001777	0.00238	27.78	Kaplan-Meier	ln(x)	0.01	Param.
Selenium (mg/L)	SP-11	0.002223	0.0004664	0.05	No	18	0.002116	0.002463	11.11	None	ln(x)	0.01	Param.
Selenium (mg/L)	SP-2	0.01135	0.002938	0.05	No	21	0.0086	0.009924	9.524	None	sqrt(x)	0.01	Param.
Selenium (mg/L)	SP-4 (bg)	0.00104	0.0005	0.05	No	22	0.0009368	0.001	36.36	None	No	0.01	NP (normality)
Selenium (mg/L)	SP-5R (bg)	0.0005	0.0002	0.05	No	22	0.0004245	0.0002365	63.64	None	No	0.01	NP (NDs)
Thallium (mg/L)	SP-1	0.00089	0.0001	0.002	No	21	0.00053	0.0003817	76.19	None	No	0.01	NP (NDs)
Thallium (mg/L)	SP-10	0.0005	0.00004	0.002	No	18	0.0004744	0.0001084	94.44	None	No	0.01	NP (NDs)
Thallium (mg/L)	SP-11	0.0005	0.00003	0.002	No	18	0.0004739	0.0001108	94.44	None	No	0.01	NP (NDs)
Thallium (mg/L)	SP-2	0.0005	0.0001	0.002	No	21	0.0004386	0.0001544	85.71	None	No	0.01	NP (NDs)
Thallium (mg/L)	SP-4 (bg)	0.00121	0.00005	0.002	No	21	0.0005657	0.0003058	85.71	None	No	0.01	NP (NDs)
Thallium (mg/L)	SP-5R (bg)	0.0005	0.00002	0.002	No	22	0.0004782	0.0001023	95.45	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 6/15/2021 2:13 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

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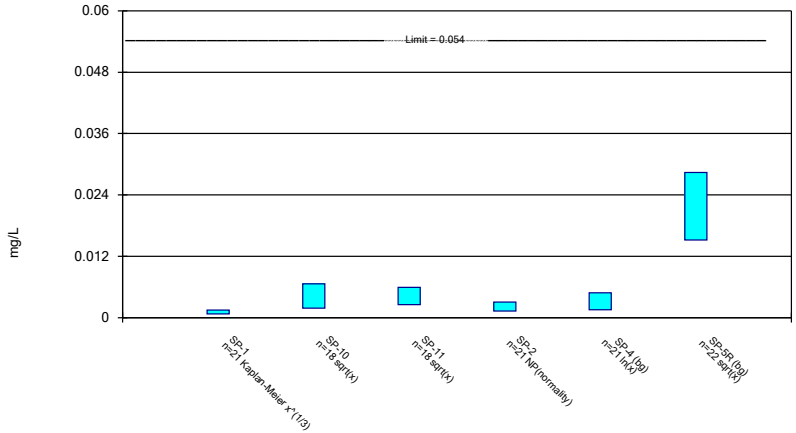
Parametric and Non-Parametric (NP) Confidence Interval

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

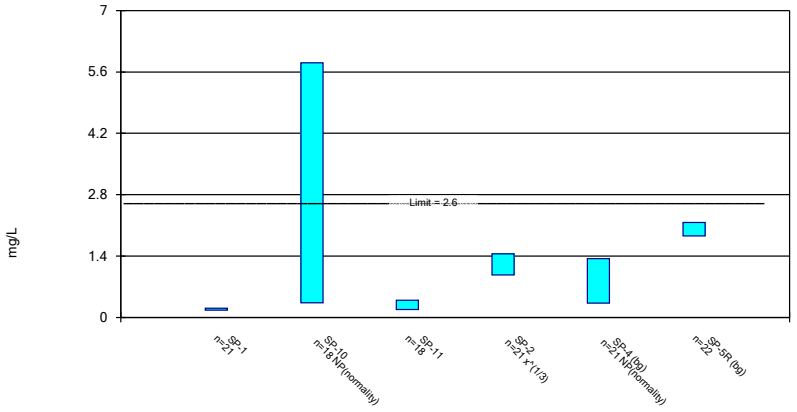


Constituent: Arsenic Analysis Run 6/15/2021 2:13 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG

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.



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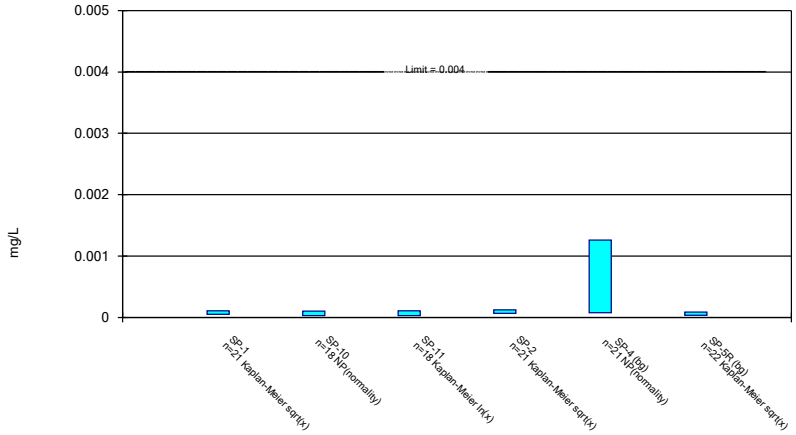
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG

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.



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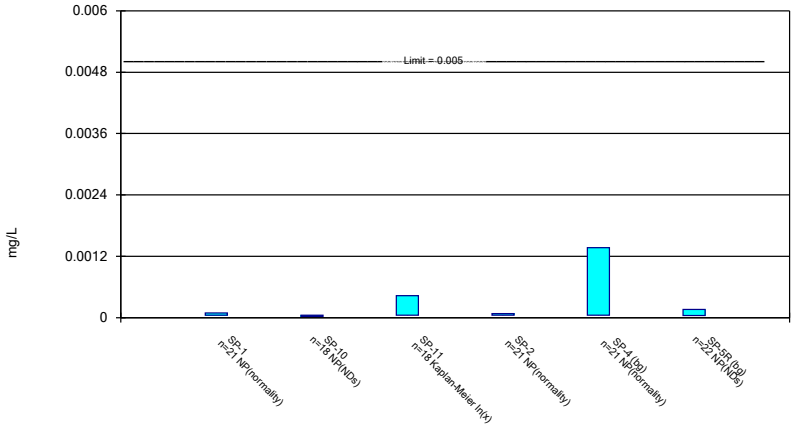
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

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.



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Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Parametric and Non-Parametric (NP) Confidence Interval

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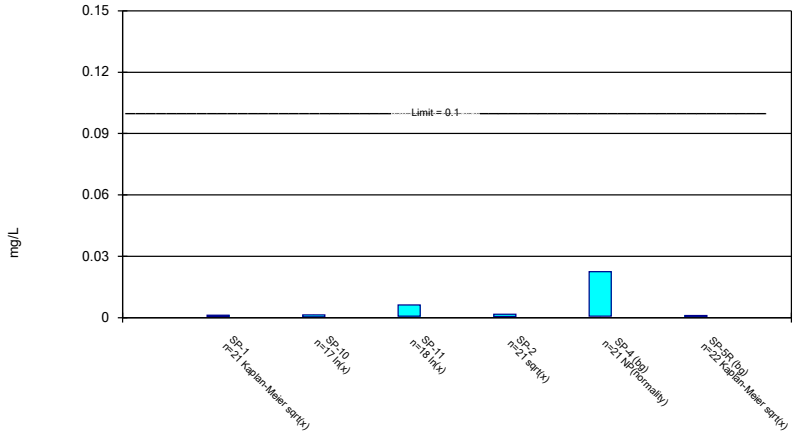

Constituent: Chromium Analysis Run 6/15/2021 2:13 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Parametric Confidence Interval

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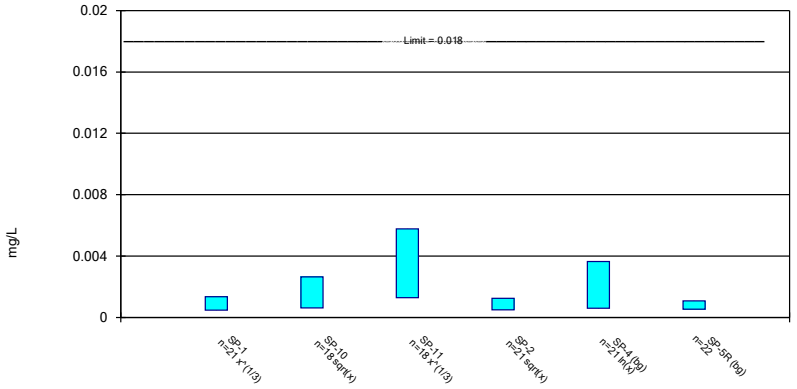

Constituent: Cobalt Analysis Run 6/15/2021 2:13 PM View: Appendix IV
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Parametric Confidence Interval

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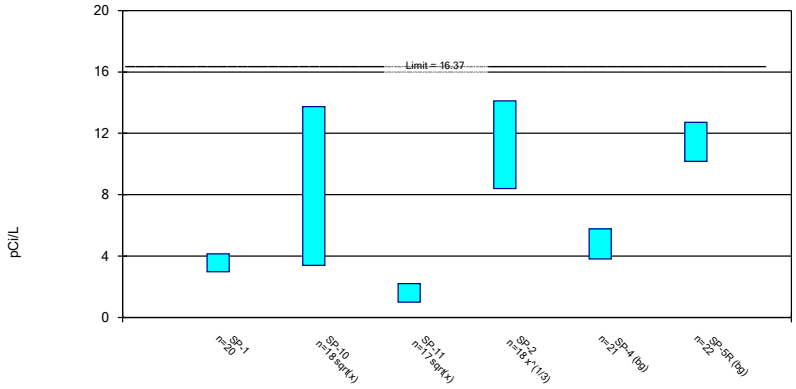

Constituent: Combined Radium 226 + 228 Analysis Run 6/15/2021 2:13 PM View: Appendix IV
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Parametric Confidence Interval

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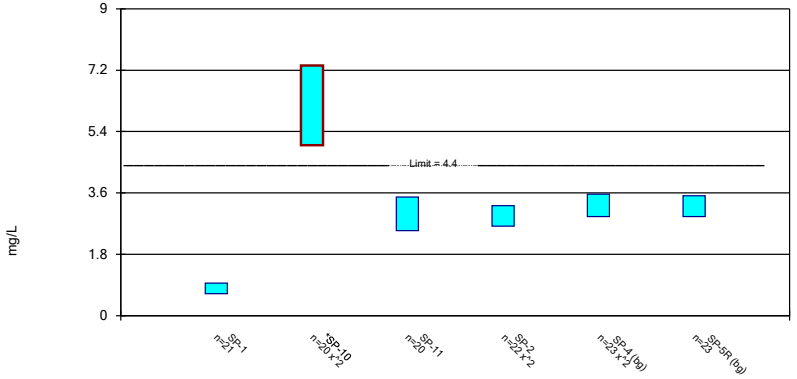
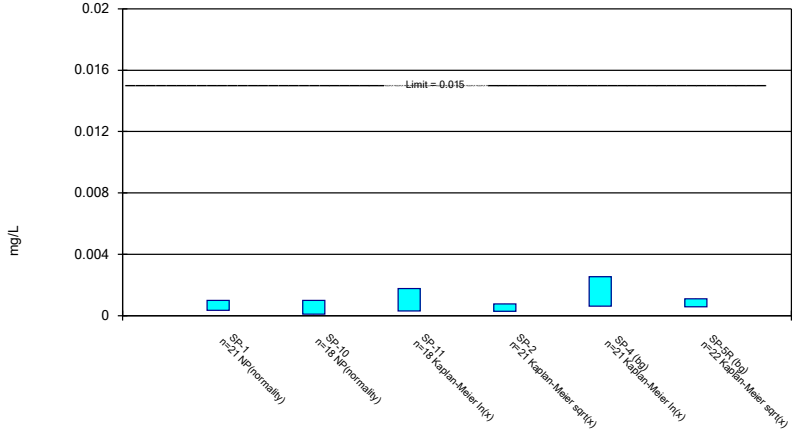


Constituent: Fluoride Analysis Run 6/15/2021 2:13 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG

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 6/15/2021 2:13 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG

Parametric Confidence Interval

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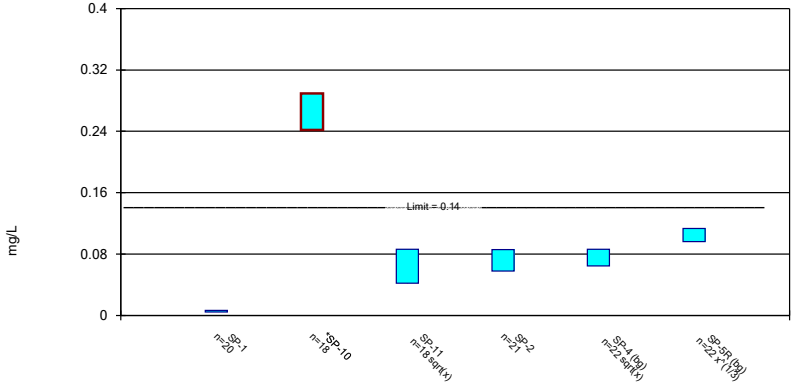

Constituent: Lithium Analysis Run 6/15/2021 2:13 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG

Non-Parametric Confidence Interval

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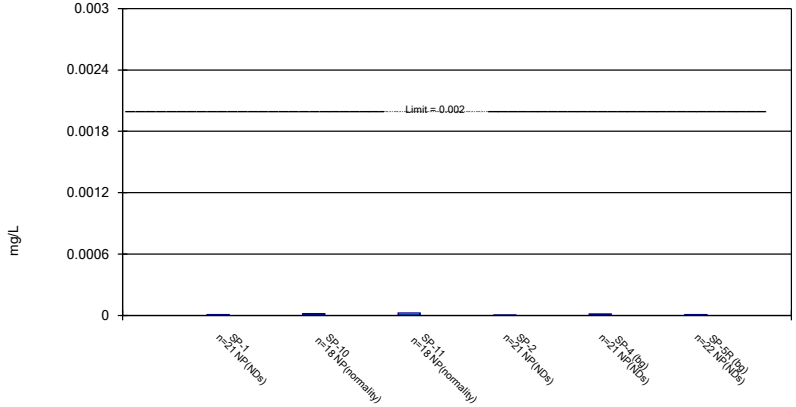

Constituent: Mercury Analysis Run 6/15/2021 2:13 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Parametric and Non-Parametric (NP) Confidence Interval

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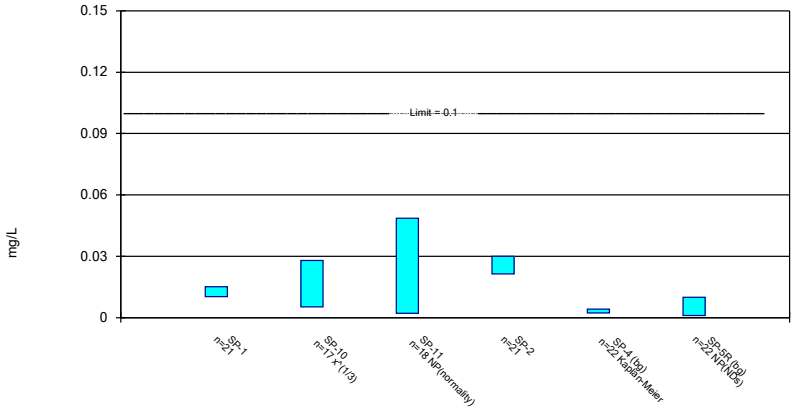

Constituent: Molybdenum Analysis Run 6/15/2021 2:13 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG

Parametric and Non-Parametric (NP) Confidence Interval

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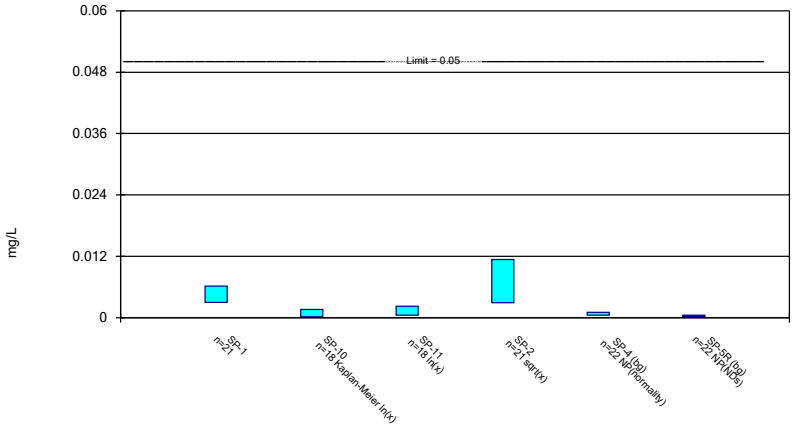

Constituent: Selenium Analysis Run 6/15/2021 2:13 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.28 Groundwater Stats Consulting. UG

Non-Parametric Confidence Interval

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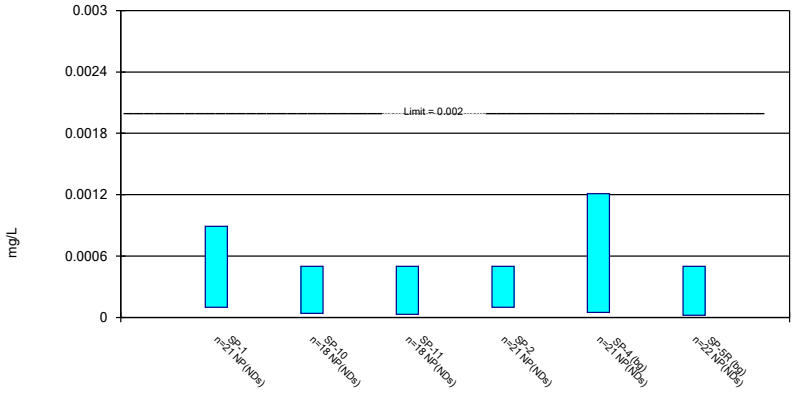

Constituent: Thallium Analysis Run 6/15/2021 2:13 PM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

APPENDIX 3

Alternative Source Demonstrations

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

January 26, 2021

Via electronic mail

Ms. Hillary Young
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. Young,

PSO received ODEQ's correspondence dated January 24, 2020 in which ODEQ accepted the ASD for the lithium detected in SP-10 during the February 2019 sampling event. ODEQ indicated that if lithium continues to exceed the GWPS in the future and conditions have not changed, NPS may refer to the October 24, 2019 ASD approval and continue assessment monitoring for the BAP in accordance with OAC 252:517-9-6(g)(3)(B).

On October 28, 2020, the statistical evaluation of the first semi-annual 2020 assessment monitoring event for the BAP was certified and in that statistical evaluation report, it was determined that the Lower Confidence Level (LCL) for lithium (0.252 mg/L) exceeded the GWPS of 0.15 mg/L at SP-10. The detected lithium concentration in SP-10 was 0.226 mg/L.

Additionally, it was determined that the LCL for fluoride (4.60 mg/L) exceeded the GWPS (calculated Upper Tolerance Limit (UTL) of 4.40 mg/L) was exceeded at SP-10. The detected fluoride concentration in SP-10 was 6.29 mg/L.

Attached is an alternative source demonstration outlining the lines of evidence that the conditions at the BAP have not changed and these exceedances are the result of natural variations occurring in the groundwater surrounding the BAP.

Please do not hesitate to contact me if you have any questions or would like to discuss. I can be reached by email at: jcparker-witt@aep.com or by phone at: (318) 673-3816.

Sincerely,

Jill Parker-Witt

Jill Parker-Witt, P.E.
AEP, Engineer Principal

Attachments

ALTERNATIVE SOURCE DEMONSTRATION REPORT STATE CCR RULE

Northeastern Power Station
Bottom Ash Pond
Oologah, Oklahoma

Submitted to

AMERICAN ELECTRIC POWER

1 Riverside Plaza
Columbus, Ohio 43215-2372

Submitted by

Geosyntec consultants

engineers | scientists | innovators

941 Chatham Lane
Suite 103
Columbus, OH 43221

January 2021

CHA8495

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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
EPRI	Electric Power Research Institute
GSC	Groundwater Stats Consulting, LLC
GWPS	Groundwater Protection Standard
LCL	Lower Confidence Limit
OAC	Oklahoma Administrative Code
ODEQ	Oklahoma Department of Environmental Quality
OGS	Oklahoma Geological Survey
QA	Quality Assurance
QC	Quality Control
SPLP	Synthetic Precipitation Leaching Procedure
SSL	Statistically Significant Level
UTL	Upper Tolerance Limit
USEPA	United States Environmental Protection Agency
XRD	X-Ray Diffraction

SECTION 1

INTRODUCTION AND SUMMARY

The Bottom Ash Pond (BAP) is a regulated coal combustion residual (CCR) management unit at the Northeastern Power Station in Oogolah, Oklahoma. An annual screening event and a semiannual assessment monitoring event were conducted at the BAP on March 30, 2020 and June 30, 2020 in accordance with OAC 252:517-9-6(b) and OAC: 252:517-9-6(d)(1), respectively.

The monitoring data were submitted to Groundwater Stats Consulting, LLC (GSC) for statistical analysis. Groundwater protection standards (GWPSs) were re-established for each Appendix B parameter in accordance with United States Environmental Protection Agency's (USEPA's) *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities – Unified Guidance* (Unified Guidance; USEPA, 2009). Confidence intervals were calculated for Appendix B parameters at the BAP compliance wells to assess whether Appendix B parameters were present at a statistically significant level (SSL) above the GWPS. An SSL was concluded if the lower confidence limit (LCL) exceeded the GWPS (i.e., if the entire confidence interval exceeded the GWPS). SSLs were identified for lithium and fluoride at SP-10 (Geosyntec, 2020). The LCL for lithium at SP-10 of 0.252 milligrams per liter (mg/L) exceeded the GWPS of 0.15 mg/L. The LCL for fluoride at SP-10 of 4.60 mg/L exceeded the GWPS of 4.40 mg/L.

1.1 CCR Rule Requirements

Oklahoma Department of Environmental Quality (ODEQ) regulations regarding assessment monitoring of CCR landfills and surface impoundments provide owners and operators with the option to make an alternative source demonstration (ASD) when an SSL is identified (OAC 252:517-9-6(g)(3)(B)). An owner or operator may:

> *Demonstrate that a source other than the CCR unit caused the contamination, or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. Any such demonstration must be supported by a report that includes the factual or evidentiary basis for any conclusions and must be certified to be accurate by a qualified professional engineer and submitted to DEQ for approval. If a successful demonstration is made, the owner or operator must continue monitoring in accordance with the assessment monitoring program pursuant to this Section…*

Pursuant to OAC 252:517-9-6(g)(3)(B), Geosyntec Consultants, Inc. (Geosyntec) has prepared this ASD report to document that the SSLs identified for lithium and fluoride should not be attributed to the BAP.

1.2 Demonstration of Alternative Sources

An evaluation was completed to assess possible alternative sources to which the identified SSL could be attributed. Alternative sources were identified amongst five types, based on methodology provided by EPRI (2017):

- ASD Type I: Sampling Causes;
- ASD Type II: Laboratory Causes;
- ASD Type III: Statistical Evaluation Causes;
- ASD Type IV: Natural Variation; and
- ASD Type V: Alternative Sources.

A demonstration was conducted to show that the SSLs identified for lithium and fluoride at SP-10 were based on Type IV causes and not by a release from the BAP.

SECTION 2

ALTERNATIVE SOURCE DEMONSTRATION

In accordance with OAC 252:517-9-6(g)(3)(B), the owner of operator of a CCR unit has 90 days from finding that any of the constituents listed in Appendix B have been detected at an SSL exceeding the GWPS to demonstrate that a source other than the CCR unit caused the SSL. The methodology used to evaluate the SSLs identified for lithium and fluoride and the proposed alternative sources are described below.

2.1 Site Setting

2.1.1 Regional Geology

The generalized stratigraphic column of the regional geology in the Site vicinity is summarized below:

Series	Group	Formation
Desmoinesian	Marmaton	Oolagah
		Labette
		Fort Scott Limestone
	Cherokee	Senora
		Boggy
		Savanna

The Site is underlain by the Oologah Formation. The Oologah Formation is characterized as a dark gray argillaceous limestone with a small amount of fissile shale (Oakes et al., 1952). The limestone is typically dense to moderately crystalline, unjointed, and thinly to massively bedded. The Oologah Formation is approximately 80 to 100 feet thick and is subdivided into three members, the Altamont Limestone, the Bandera Shale, and the Pawnee Limestone (in descending order) as described below:

- *Altamont Limestone*. Grayish orange pink to medium gray limestone, mudstone, wackestones and locally packstones. The texture varies from thin and somewhat wavy to medium planar and is influenced by the presence of fossil algal material. The bedding of the upper portion of the member is typically thinner than the lower portion (Oklahoma Geological Survey [OGS], 2005). The thickness of the Altamont Limestone typically ranges from approximately 65 to 100 feet.
- *Bandera Shale*. Medium dark gray to dark gray, well-laminated to fissile shale. The nearest published thickness of this member is approximately 2-feet about 13 miles south of the Site (OGS, 2005; Woodruff and Cooper, 1928).
- *Pawnee Limestone*. Medium gray, slightly wavy, thin to medium bedded limestone. The bedding is typically 2 to 4-inches thick but can reach 12 inches in thickness. The Pawnee

Limestone contains abundant fossil debris and varies in thickness from approximately 19 to 22 feet (OGS, 2005).

The Ologah Formation is underlain by the Labette Formation, a grayish-brown to dark gray, laminated clayshale. The clayshale contains some zones of weakly calcareous shale, and multiple horizons of sandy shale to sandstone. The thickness of the Labette Formation typically ranges from approximately 120 to 180 feet. A zone of alternating shale and sandstone (Peru Sandstone) or shale and limestone (Sageeyah Limestone) may be present near the top of the Labette Formation. This member (if present) does not typically contain fossils and varies in thickness up to 20 feet south of the Site (OGS, 2005).

The Labette Formation is underlain by the Fort Scott Formation which consists of three members, in descending order: the Higginsville Limestone; the Little Osage Shale; and the Blackjack Creek Limestone. The Fort Scott Formation limestone consists primarily of a light gray, thin to medium, wavy-bedded fossiliferous wackestone and mudstone (OGS, 2004).

2.1.2 Site Geology

Two soil borings (BAP-B1 and BAP-B2) were advanced in the vicinity of the BAP by Geosyntec staff in early 2019 to clarify the Site geology. The locations of these borings are shown on **Figure 1**. The deeper of those boring (BAP-B1) was advanced to 186 ft below ground surface (bgs). Detailed discussion of these borings, supplemented by boring logs and photologs, was provided in the 2019 ASD completed for lithium at SP-10 (Geosyntec, 2019). The borings and associated mineralogical analyses of rock samples indicated that limestone is present at depths to at least 72 ft bgs. This limestone unit is underlain by a shale unit. The following is a general summary of the geologic units encountered at BAP-B1:

Geologic Unit	Depth (ft bgs)	Elevation (ft amsl)[1]
Unconsolidated Soil	0 to 3	625.8 to 622.8
Limestone (Ologah Formation)	3 to 100	622.8 to 525.8
Shale (Labette Formation)	100 to 181	525.8 to 444.8
Limestone (Fort Scott Formation)	181 to 186	444.8 to 439.8

Note: 1. ft amsl = feet above mean sea level

The wells within the CCR compliance network (SP-1, SP-2, SP-4, SP-5R, SP-10, and SP-11) monitor the upper limestone unit (Ologah Limestone), which was determined to contain the shallow aquifer at the site. Monitoring well SP-10 is screened from 40.25-50.75 ft bgs. Based on the BAP-B1 boring log and logs for other borings near the BAP, the screened interval may be inclusive of the Altamont limestone member (upper portion of the Ologah Formation) and the

Pawnee member (lower portion of the Oologah Formation). At several boring locations, thin horizons of shale (1-2 inches thick) were identified from elevations of approximately 25 to 75 ft bgs. A 2-inch thick shale horizon was found to occur around 46 ft bgs in multiple boring logs. This shale horizon may be the Bandera Shale.

Boring BAP-B2 was advanced in the vicinity of SP-10, the monitoring well containing SSLs for lithium and fluoride, and SP-9, its paired deeper well. A thin (approximately 2-inch) shale horizon was observed at 46 ft bgs, which is within the screened interval of SP-10. This horizon is underlain by interbedded shale and limestone. As described in the 2019 ASD (Geosyntec, 2019), samples were collected from four intervals at boring BAP-B2 for laboratory analysis, as summarized below:

Sample Depth (ft bgs)	Sample ID	Description
32.0-32.4	SP-10-LOG-1	Upper limestone
46.0-47.0	SP-10-LOG-2	Shale lens within the screened interval of SP-10
46.0-47.0	SP-10-LOG-3	Limestone within screened interval of SP-10
72.0-72.4	SP-10-LOG-4	Limestone within the screened interval of SP-9

X-ray diffraction (XRD) analysis of samples confirmed that limestone is present at depths to at least 72 ft bgs. The analyses also confirmed the horizon observed at 46 ft bgs is a shale lens comprised of primarily 2:1 high activity clay minerals illite and smectite. The mineralogy results of these samples are provided in **Table 1**.

2.2 Lithium

An ASD was previously generated for lithium which identified the shale lenses present within the screened interval at SP-10 as the likely alternative source (Geosyntec, 2019). A supplemental September 2019 memorandum from AEP to ODEQ (AEP, 2019) provided results documenting lower concentrations of lithium in the BAP sediment and BAP pore water than those observed at SP-10. The sediment leached 0.001 mg/L of lithium, and the pore water was found to contain 0.003 mg/L of lithium (AEP, 2019). These concentrations are two orders of magnitude below the lithium LCL at SP-10 (0.252 mg/L) and the lithium GWPS (0.15 mg/L).

As discussed in the 2019 memorandum, a review of the major ion chemistry of the BAP in contrast to SP-10 groundwater chemistry illustrates very different chemical compositions of these two sample types (**Figure 2**). SP-10 groundwater samples plot in a tight cluster on a Piper diagram, displaying a predominantly sodium/potassium-chloride composition which is clearly distinct from BAP samples, which have more cation variation and very little chloride. If a release from the BAP had occurred, the major ion chemistry of SP-10 groundwater would be expected to deviate from a sodium/potassium-chloride type and approach the more calcium-bicarbonate/sulfate dominant BAP samples on the Piper diagram. In contrast, the most recent SP-10 sample (March 2020) plots furthest away from the BAP samples (greater chloride component), showing no indication of BAP influences at SP-10.

Further, statistical analysis of lithium concentrations at SP-10 over time did not demonstrate a statistically significant positive trend (**Figure 3**). Lithium concentrations appear to have stabilized since the comparatively higher concentrations observed in 2017. The three most recent samples have contained the lowest levels of lithium observed at SP-10 since routine sampling began in 2017. These results suggest that the lines of evidence provided in the 2019 ASD are still valid, concluding that the BAP is not the source of lithium at SP-10.

2.3 Fluoride

Solid and liquid phase samples collected from the BAP in July 2019 and included in the 2019 memorandum (AEP, 2019) indicate that fluoride concentrations within the BAP are less than groundwater concentration at SP-10 as well as the fluoride GWPS. Fluoride in pore water was not detected above the method detection limit (0.083 mg/L). Furthermore, extractable fluoride from the BAP sediments was measured at 0.458 mg/L via SPLP extraction. A surface water sample collected from the BAP in January 2019 had a reported fluoride concentration of 0.34 mg/L. The analytical laboratory reports for these samples are provided in **Attachment A**.

These concentrations of fluoride are an order of magnitude below the fluoride LCL at SP-10 (4.60 mg/L) and the GWPS (4.40 mg/L). Since January 2019 (the date of the BAP sampling) there have been no notable changes in coal handling or sourcing at the plant that would have affected the composition of the ash or pond water in the BAP. Therefore, the BAP is not the source of fluoride at SP-10.

As discussed in Section 2.3, **Figure 2** illustrates the distinct geochemical compositions of SP-10 groundwater and the BAP. These results do not support a mixing scenario between the BAP and SP-10 to account for SP-10 groundwater compositions. Statistical analysis of fluoride concentrations at SP-10 over time did not demonstrate a statistically significant positive trend (**Figure 4**), with variable concentrations over time since routine groundwater sampling began in 2017.

Geologic samples collected from a shale lens and limestone section of the BAP-B2 rock core were submitted to TestAmerica, Inc. for analysis of total fluoride. The rock core samples were mechanically crushed and extracted with deionized water. The concentration of fluoride in the contact water (as determined by USEPA Method 9056A) was converted back to a solid phase concentration. Using this method, extractable fluoride was identified within the rock cores at a concentration of 1.6 milligrams per kilogram (mg/Kg) in the limestone sample and 4.3 mg/Kg in the shale sample. These results suggest that fluoride at the Site is associated with the shale lenses, which were previously noted within the screened interval at SP-10 (Geosyntec, 2019).

According to XRD mineralogy results (**Table 1**), shale lenses within the shallow limestone aquifer near SP-10 are predominantly composed of clay minerals such as kaolinite (2 wt.%), chlorite (3 wt. %), illite (38 wt.%), and mixed layer illite-smectite (24 wt.%). Multiple laboratory studies have demonstrated that kaolinite and smectite are able to sorb fluoride, with the maximum sorption capacity controlled primarily by pH (Kau et al., 1997; Agarwal et al., 2002). Sorption capacity in

kaolinite and smectite is greatest under mildly acidic conditions (pH 4-6) and decreases with increasing pH above 7 SU (Agarwal et al., 2002). SP-10 groundwater had an average pH of 8.6 SU during the recent sampling events, suggesting that desorption from these clay minerals provides an alternative source for fluoride at SP-10.

2.4 Proposed Alternative Sources

Low concentrations of lithium and fluoride in the BAP and BAP sediments, including pore water, suggest that the BAP is not the source of these exceedances. As described in a previous ASD (Geosyntec, 2019), the release of lithium from the clay minerals in the shale lens located at 46 ft bgs within 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.

2.5 Sampling Requirements

As the ASD described above supports the position that the identified SSLs are not due to a release from the BAP, the unit will remain in the assessment monitoring program. Groundwater sampling at the unit will continue in accordance with OAC 252:517-9-6 on a semi-annual basis.

SECTION 3

CONCLUSIONS AND RECOMMENDATIONS

The preceding information serves as the ASD prepared in accordance with OAC 252:517-9-6(g)(3)(B) and supports the position that the SSLs of lithium and fluoride at SP-10 identified during the first semi-annual assessment monitoring event of 2020 were not due to a release from the BAP. The identified SSLs were, instead, attributed to 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 by a qualified professional engineer is provided in **Attachment B**.

SECTION 4

REFERENCES

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TABLES

Table 1: X-Ray Diffraction Laboratory Analysis Results
Northeastern Plant Bottom Ash Pond

Geosyntec Consultants

Sample ID	SP-10-LOG 1	SP-10-LOG 2	SP-10-LOG 4	SP-10-LOG 4
Depth (ft bgs)	32-32.4	46	46	72-72.4
Description	Upper Limestone	Shale within screened interval of SP-10	Limestone within screened interval of SP-10	Limestone within screened interval of SP-9
Quartz	1	20	3	6
Albite	ND	4	ND	ND
Microcline	ND	1	ND	ND
Calcite	95	2	93	91
Ferroan Dolomite	4	ND	ND	2
Siderite	ND	1	ND	ND
Pyrite	ND	5	1	ND
Kaolinite	ND	2	1	<0.5
Chlorite	ND	3	<0.5	ND
Illite/Mica	ND	38	1	1
Mixed-Layered Illite/Smectite	ND	24	1	<0.5
% Illite Layers in ML I/S	*N/A*	*75*	*75*	*BDL*

Notes:
Results are shown as percentage of the bulk material.
ND - not detected
N/A: not applicable
BDL: below detection limit

FIGURES

Legend

- Out of Network Wells
- In Network Wells
- Soil Borings
- Bottom Ash Pond
- Impoundment

Notes
- Aerial imagery obtained from ESRI

500 250 0 500 Feet

Soil Boring and Monitoring Well Locations Map

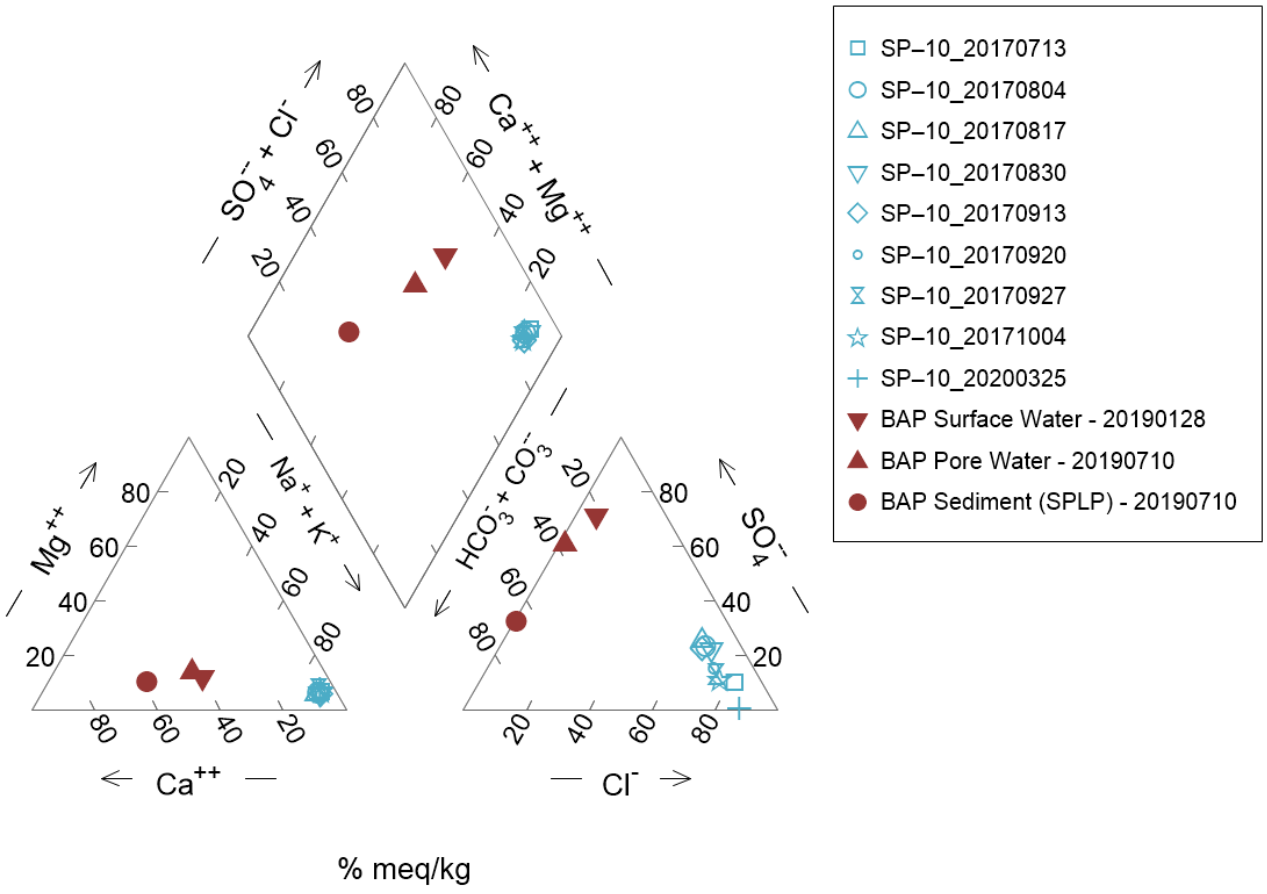
AEP Northeastern Power Plant - Bottom Ash Pond
Oologah, Oklahoma

Geosyntec consultants

Columbus, Ohio | January 25, 2021

Figure 1

P:\Projects\AEP\Legal Department - ASD Review\Northeastern\BAP\2020-11 F ASD Investigation\Figures_Tables\AEP-Northeastern_BAP_Soil Boring Locations.mxd. HDuff. 1/25/2021. Project/Phase/Task.



Notes: SPLP – Synthetic Precipitation Leaching Procedure.

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

Geosyntec consultants | AMERICAN ELECTRIC POWER | Figure **2**

Columbus, Ohio | January 19, 2021

internal info: path, date revised, author

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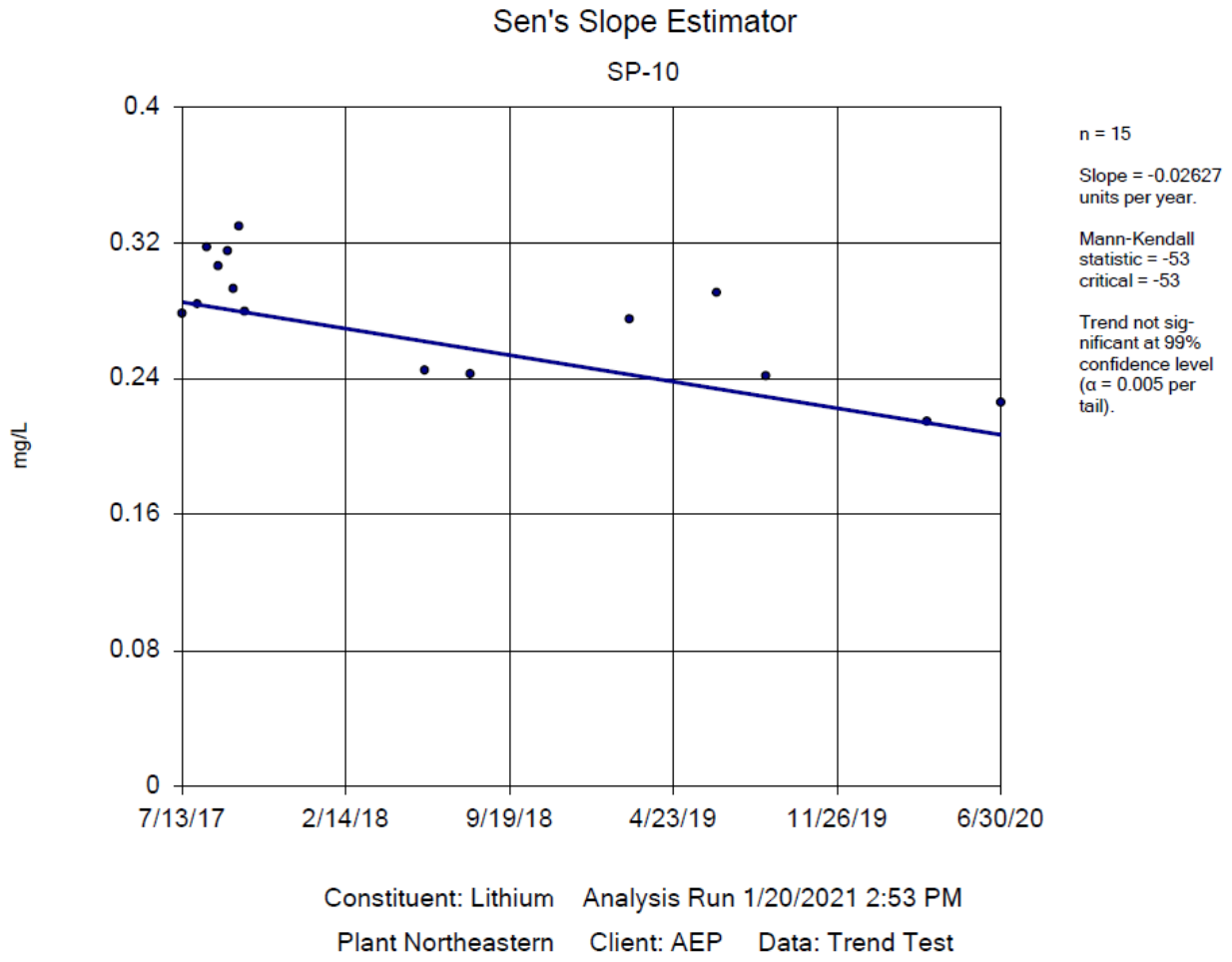

Lithium Trend Test – SP-10
Northeastern Bottom Ash Pond

Geosyntec consultants	AMERICAN ELECTRIC POWER	Figure 3
Columbus, Ohio	January 20, 2021	

internal info: path, date revised, author

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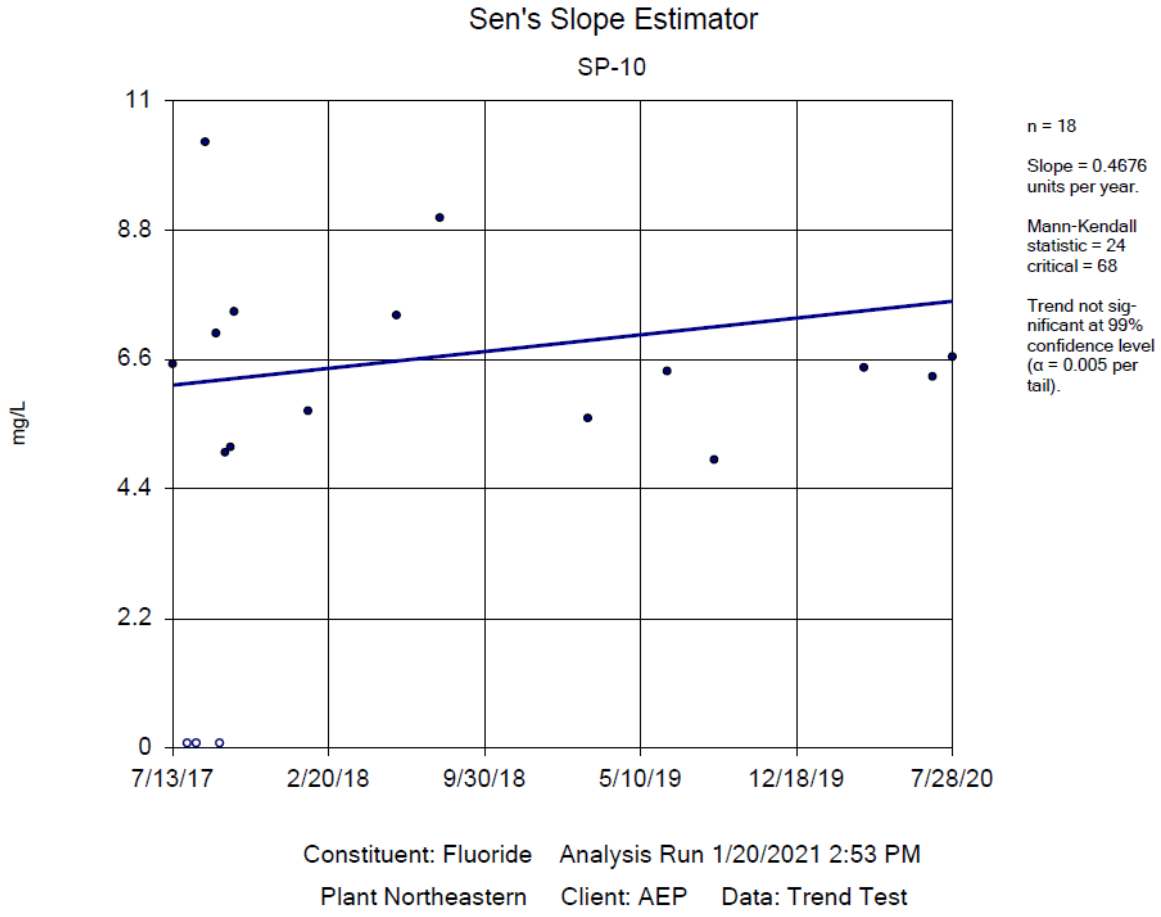
Hollow symbols indicate censored values.



Fluoride Trend Test – SP-10
Northeastern Bottom Ash Pond

Geosyntec consultants | AMERICAN ELECTRIC POWER | Figure 4

Columbus, Ohio | January 20, 2021

internal info: path, date revised, author

ATTACHMENT A
Analytical Laboratory Reports

502 North Allen Ave.
Shreveport, LA 71101
Phone: (318) 673-3802
Fax: (318) 673-3960

AEP ANALYTICAL CHEMISTRY SERVICES
Analysis Report

Report ID : 40115
Date Received: 07/12/2019

Company: SEP - Environmental (JP-W)
Contact: Jill Parker-Witt
Phone: (318) 673-3816

Address: 502 N. Allen Avenue
Shreveport, LA 71101
Fax: (318) 673-3960

AEP Sample ID : 226939
Cust Sample ID: Sediment
Sample Desc.: BAP Sediment SPLP

Collected Date: 07/10/2019
Location: NE BAP Sediment Sample

By: BW
Matrix: Liquid

SPLP (226939)

Parameter	Value	Unit	Det. Limit	Dil./Conc.	Method	Analysis Date/Time	Codes	Tech
Aluminum	0.777	mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 21:45		JDB
Antimony	< 0.005	mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 21:45		JDB
Arsenic	< 0.005	mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 21:45		JDB
Barium	0.352	mg/L	0.001	1	EPA 1312/6010B 1996	07/25/2019 21:45		JDB
Beryllium	< 0.001	mg/L	0.001	1	EPA 1312/6010B 1996	07/25/2019 21:45		JDB
Boron	0.389	mg/L	0.01	1	EPA 1312/6010B 1996	07/25/2019 21:45		JDB
Cadmium	< 0.001	mg/L	0.001	1	EPA 1312/6010B 1996	07/25/2019 21:45		JDB
Calcium	24.3	mg/L	0.01	1	EPA 1312/6010B 1996	07/25/2019 21:45		JDB
Chromium	< 0.001	mg/L	0.001	1	EPA 1312/6010B 1996	07/25/2019 21:45		JDB
Cobalt	< 0.005	mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 21:45		JDB
Copper	0.004	mg/L	0.001	1	EPA 1312/6010B 1996	07/25/2019 21:45		JDB
Iron	0.1	mg/L	0.01	1	EPA 1312/6010B 1996	07/25/2019 21:45		JDB
Lead	< 0.005	mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 21:45		JDB
Lithium	0.001	mg/L	0.001	1	EPA 1312/6010B 1996	07/25/2019 21:45		JDB
Magnesium	2.44	mg/L	0.01	1	EPA 1312/6010B 1996	07/25/2019 21:45		JDB
Manganese	0.01	mg/L	0.001	1	EPA 1312/6010B 1996	07/25/2019 21:45		JDB
Molybdenum	< 0.005	mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 21:45		JDB
Nickel	< 0.025	mg/L	0.025	1	EPA 1312/6010B 1996	07/25/2019 21:45		JDB
Potassium	0.703	mg/L	0.01	1	EPA 1312/6010B 1996	07/25/2019 21:45		JDB
Selenium	< 0.005	mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 21:45		JDB
Silver	< 0.001	mg/L	0.001	1	EPA 1312/6010B 1996	07/25/2019 21:45		JDB
Sodium	14.9	mg/L	0.01	1	EPA 1312/6010B 1996	07/25/2019 21:45		JDB
Strontium	0.327	mg/L	0.001	1	EPA 1312/6010B 1996	07/25/2019 21:45		JDB
Thallium	< 0.005	mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 21:45		JDB
Tin	0.011	mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 21:45		JDB
Titanium	0.012	mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 21:45		JDB

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Date Received: 07/12/2019

Company: SEP - Environmental (JP-W)
Contact: Jill Parker-Witt
Phone: (318) 673-3816

Address: 502 N. Allen Avenue
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Vanadium	0.023	mg/L	0.001	1	EPA 1312/6010B 1996	07/25/2019 21:45		JDB
Zinc	0.067	mg/L	0.005	1	EPA 1312/6010B 1996	07/25/2019 21:45		JDB

Water (226939)

Parameter	Value	Unit	Det. Limit	Dil./Conc.	Method	Analysis Date/Time	Codes	Tech
Alkalinity, Bicarbonate	101.24	mg/L	5	1	SM 2320 B-2011	08/06/2019 15:30	H1	JTD
Alkalinity, Carbonate	< 5	mg/L	5	1	SM 2320 B-2011	08/06/2019 15:30	H1	JTD
Alkalinity, Total	101.24	mg/L	5	1	SM 2320 B-2011	08/06/2019 15:30	H1	JTD
Chloride	0.839	mg/L	0.219	1	EPA 300.0	08/04/2019 5:20		GB
Fluoride	0.458	mg/L	0.083	1	EPA 300.0	08/04/2019 5:20		GB
Sulfate	38	mg/L	0.140	1	EPA 300.0	08/04/2019 5:20		GB

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AEP Sample ID : 226940
Cust Sample ID: Liquid portion
Sample Desc.: BAP Sediment

Collected Date: 07/10/2019
Location: NE BAP Sediment Sample

By: BW
Matrix: Liquid

Metals (226940)

Parameter	Value	Unit	Det. Limit	Dil./Conc.	Method	Analysis Date/Time	Codes	Tech
Aluminum	0.076	mg/L	0.005	1	EPA 6010B 1996	07/25/2019 21:37		JDB
Antimony	< 0.005	mg/L	0.005	1	EPA 6010B 1996	07/25/2019 21:37		JDB
Arsenic	< 0.005	mg/L	0.005	1	EPA 6010B 1996	07/25/2019 21:37		JDB
Barium	0.083	mg/L	0.001	1	EPA 6010B 1996	07/25/2019 21:37		JDB
Beryllium	< 0.001	mg/L	0.001	1	EPA 6010B 1996	07/25/2019 21:37		JDB
Boron	0.754	mg/L	0.01	1	EPA 6010B 1996	07/25/2019 21:37		JDB
Cadmium	< 0.001	mg/L	0.001	1	EPA 6010B 1996	07/25/2019 21:37		JDB
Calcium	85.7	mg/L	0.01	1	EPA 6010B 1996	07/25/2019 21:37		JDB
Chromium	< 0.001	mg/L	0.001	1	EPA 6010B 1996	07/25/2019 21:37		JDB
Cobalt	< 0.005	mg/L	0.005	1	EPA 6010B 1996	07/25/2019 21:37		JDB
Copper	0.004	mg/L	0.001	1	EPA 6010B 1996	07/25/2019 21:37		JDB
Iron	< 0.01	mg/L	0.01	1	EPA 6010B 1996	07/25/2019 21:37		JDB
Lead	< 0.005	mg/L	0.005	1	EPA 6010B 1996	07/25/2019 21:37		JDB
Lithium	0.003	mg/L	0.001	1	EPA 6010B 1996	07/25/2019 21:37		JDB
Magnesium	17.4	mg/L	0.01	1	EPA 6010B 1996	07/25/2019 21:37		JDB
Manganese	0.032	mg/L	0.001	1	EPA 6010B 1996	07/25/2019 21:37		JDB
Molybdenum	0.027	mg/L	0.005	1	EPA 6010B 1996	07/25/2019 21:37		JDB
Nickel	< 0.025	mg/L	0.025	1	EPA 6010B 1996	07/25/2019 21:37		JDB
Potassium	6.94	mg/L	0.01	1	EPA 6010B 1996	07/25/2019 21:37		JDB
Selenium	0.005	mg/L	0.005	1	EPA 6010B 1996	07/25/2019 21:37		JDB
Silver	< 0.001	mg/L	0.001	1	EPA 6010B 1996	07/25/2019 21:37		JDB
Sodium	99.9	mg/L	0.01	1	EPA 6010B 1996	07/25/2019 21:37		JDB
Strontium	1.22	mg/L	0.001	1	EPA 6010B 1996	07/25/2019 21:37		JDB
Thallium	< 0.005	mg/L	0.005	1	EPA 6010B 1996	07/25/2019 21:37		JDB
Tin	< 0.005	mg/L	0.005	1	EPA 6010B 1996	07/25/2019 21:37		JDB
Titanium	< 0.005	mg/L	0.005	1	EPA 6010B 1996	07/25/2019 21:37		JDB

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Vanadium	0.006	mg/L	0.001	1	EPA 6010B 1996	07/25/2019 21:37		JDB
Zinc	< 0.005	mg/L	0.005	1	EPA 6010B 1996	07/25/2019 21:37		JDB

Water (226940)

Parameter	Value	Unit	Det. Limit	Dil./Conc.	Method	Analysis Date/Time	Codes	Tech
Alkalinity, Bicarbonate	399.2	mg/L	5	1	SM 2320 B-2011	08/06/2019 15:30	H1	JTD
Alkalinity, Carbonate	< 5	mg/L	5	1	SM 2320 B-2011	08/06/2019 15:30	H1	JTD
Alkalinity, Total	399.2	mg/L	5	1	SM 2320 B-2011	08/06/2019 15:30	H1	JTD
Chloride	14	mg/L	0.219	1	EPA 300.0	08/04/2019 5:58		GB
Fluoride	< 0.083	mg/L	0.083	1	EPA 300.0	08/04/2019 5:58		GB
Sulfate	514	mg/L	0.140	1:10	EPA 300.0	08/04/2019 6:16		GB

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Quality Control Data

* Quality control units are the same as reported analytical results

Date	Parameter	Sample ID	Blank Value *	Standard			Spike			Surrogate % Recovery	Duplicate % Difference	Tech
				Value *	Recovery*	%	Value *	Recovery*	%			
8/6/2019	Alkalinity, Total			50	50.84	101.7						JTD
8/6/2019	Alkalinity, Total	227498	<5	50	52.62	105.2	50	47.14	94.3		2.5	JTD
7/25/2019	Aluminum	227041.1	<0.005	2	2.0229733	101.1	2	2.2242	111.2		0.0	JDB
7/25/2019	Aluminum	226939.1	<0.005	2	2.0229733	101.1	2	2.071639	103.6		0.4	JDB
7/25/2019	Antimony	227041.1	<0.005	0.8	0.8092462	101.2	0.8	0.7671843	95.9		0.5	JDB
7/25/2019	Antimony	226939.1	<0.005	0.8	0.8092462	101.2	0.8	0.8159776	102.0		0.2	JDB
7/25/2019	Arsenic	227041.1	<0.005	0.8	0.8086795	101.1	0.8	0.7758421	97.0		0.0	JDB
7/25/2019	Arsenic	226939.1	<0.005	0.8	0.8086795	101.1	0.8	0.8086275	101.1		0.1	JDB
7/25/2019	Barium	226939.1	<0.001	0.2	0.2080557	104.0	0.2	0.209543	104.8		0.1	JDB
7/25/2019	Barium	227041.1	<0.05	0.2	0.2080557	104.0	0.2	0.1829767	91.5		0.4	JDB
7/25/2019	Beryllium	226939.1	<0.001	0.2	0.2122779	106.1	0.2	0.2142832	107.1		0.3	JDB
7/25/2019	Beryllium	227041.1	<0.001	0.2	0.2122779	106.1	0.2	0.1992329	99.6		0.4	JDB
7/25/2019	Boron	226939.1	<0.01	0.3	0.2995651	99.9	0.3	0.2984183	99.5		0.7	JDB
7/25/2019	Boron	227041.1	<0.5	0.3	0.2995651	99.9	0.3	0.2855333	95.2		0.5	JDB
7/25/2019	Cadmium	227041.1	<0.001	0.2	0.2069934	103.5	0.2	0.1836838	91.8		0.6	JDB
7/25/2019	Cadmium	226939.1	<0.001	0.2	0.2069934	103.5	0.2	0.2061243	103.1		0.5	JDB
7/25/2019	Calcium	226939.1	<0.01	1	1.0087505	100.9	1	1.0243667	102.4		0.9	JDB
7/25/2019	Chromium	226939.1	<0.001	0.4	0.4116387	102.9	0.4	0.4125529	103.1		0.4	JDB
7/25/2019	Chromium	227041.1	<0.001	0.4	0.4116387	102.9	0.4	0.3867339	96.7		0.3	JDB
7/25/2019	Cobalt	226939.1	<0.005	0.2	0.2043482	102.2	0.2	0.2054714	102.7		0.4	JDB
7/25/2019	Cobalt	227041.1	<0.005	0.2	0.2043482	102.2	0.2	0.1839347	92.0		0.4	JDB
7/25/2019	Copper	227041.1	<0.001	0.3	0.3066399	102.2	0.3	0.2963301	98.8		0.1	JDB
7/25/2019	Copper	226939.1	<0.001	0.3	0.3066399	102.2	0.3	0.3109092	103.6		0.1	JDB
7/25/2019	Iron	227041.1	<0.5	3	3.1158893	103.9	150	159.28837	106.2		0.8	JDB
7/25/2019	Iron	226939.1	<0.01	3	3.1158893	103.9	3	3.1231158	104.1		1.0	JDB
7/25/2019	Lead	226939.1	<0.005	1	1.0430644	104.3	1	1.0416574	104.2		0.4	JDB
7/25/2019	Lead	227041.1	<0.005	1	1.0430644	104.3	1	0.9320653	93.2		0.6	JDB
7/25/2019	Lithium	227041.1	<0.001	0.2	0.2119096	106.0	0.2	0.2353987	117.7		0.1	JDB
7/25/2019	Lithium	226939.1	<0.001	0.2	0.2119096	106.0	0.2	0.2163799	108.2		0.4	JDB
7/25/2019	Magnesium	226939.1	<0.01	2	2.0868175	104.3	2	2.0877567	104.4		0.2	JDB
7/25/2019	Magnesium	227041.1	<0.5	2	2.0868175	104.3	2	1.9791333	99.0		0.6	JDB
7/25/2019	Manganese	227041.1	<0.001	0.2	0.2072869	103.6	0.2	0.16684	83.4		0.7	JDB

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7/25/2019	Manganese	226939.1	<0.001	0.2	0.2072869	103.6	0.2	0.2077536	103.9		0.2	JDB
7/25/2019	Molybdenum	226939.1	<0.005	0.2	0.2067657	103.4	0.2	0.2076129	103.8		0.4	JDB
7/25/2019	Molybdenum	227041.1	<0.005	0.2	0.2067657	103.4	0.2	0.197727	98.9		0.5	JDB
7/25/2019	Nickel	227041.1	<0.025	0.5	0.5192594	103.9	0.5	0.46183	92.4		0.6	JDB
7/25/2019	Nickel	226939.1	<0.025	0.5	0.5192594	103.9	0.5	0.5209379	104.2		0.6	JDB
7/25/2019	Potassium	226939.1	<0.01	10	9.3692109	93.7	10	9.4631223	94.6		0.2	JDB
7/25/2019	Potassium	227041.1	<0.01	10	9.3692109	93.7	10	11.11754	111.2		0.3	JDB
7/25/2019	Selenium	227041.1	<0.005	2	1.9998495	100.0	2	1.991203	99.6		0.7	JDB
7/25/2019	Selenium	226939.1	<0.005	2	1.9998495	100.0	2	1.9816300	99.1		0.8	JDB
7/25/2019	Silver	227041.1	<0.001	0.075	0.0712930	95.1	0.075	0.0708639	94.5		0.2	JDB
7/25/2019	Silver	226939.1	<0.001	0.075	0.0712930	95.1	0.075	0.0714285	95.2		0.1	JDB
7/25/2019	Sodium	226939.1	<0.01	3	3.1384831	104.6	3	2.4693667	82.3		0.1	JDB
7/25/2019	Sodium	227041.1	<0.5	3	3.1384831	104.6	3	2.3746333	79.2		0.0	JDB
7/25/2019	Strontium	226939.1	<0.001	0.2	0.2059899	103.0	0.2	0.2081687	104.1		0.4	JDB
7/25/2019	Thallium	226939.1	<0.005	0.4	0.4152040	103.8	0.4	0.4171124	104.3		0.0	JDB
7/25/2019	Thallium	227041.1	<0.005	0.4	0.4152040	103.8	0.4	0.3682771	92.1		1.2	JDB
7/25/2019	Tin	226939.1	<0.005	0.7	0.6995446	99.9	0.7	0.6930628	99.0		0.2	JDB
7/25/2019	Tin	227041.1	<0.005	0.7	0.6995446	99.9	0.7	0.644164	92.0		0.2	JDB
7/25/2019	Titanium	227041.1	<0.005	0.2	0.2109341	105.5	0.2	0.2098874	104.9		0.2	JDB
7/25/2019	Titanium	226939.1	<0.005	0.2	0.2109341	105.5	0.2	0.2124567	106.2		0.1	JDB
7/25/2019	Vanadium	226939.1	<0.001	0.3	0.3076519	102.6	0.3	0.3104754	103.5		0.4	JDB
7/25/2019	Vanadium	227041.1	<0.001	0.3	0.3076519	102.6	0.3	0.2997157	99.9		0.6	JDB
7/25/2019	Zinc	226939.1	<0.005	0.2	0.2091679	104.6	0.2	0.2081374	104.1		0.3	JDB
7/25/2019	Zinc	227041.1	<0.005	0.2	0.2091679	104.6	0.2	0.1851907	92.6		0.1	JDB

On 7/30/2019, Jill asked for us to add Chloride, Fluoride, and Sulfate.

Code	***Code Description***
H1	Sample analysis performed past holding time

Jonathan Barnhill
Quality Assurance Officer

08-Aug-19
Report Date

JOB 7-15-19

Chain of Custody Record

Program: Coal Combustion Residuals (CCR)

Shreveport Chemical Laboratory (SCL)
502 N. Allen Ave.
Shreveport , LA 71101
Contacts: Jonathan Barnhill (318-673-3803)

Project Name: NE BAP Sediment sample
Contact Name: Bryan White
Contact Phone: 8-719-0873
Sampler(s): BRYAN WHITE

Analysis Turnaround Time (In Calendar Days) - **RUSH**

Site Contact:

Date:

For Lab Use Only:
COC/Order #: 4/0115

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Sampler(s) Initials	Li							Sample Specific Notes:
BAP Sediment	7-10-19	1600	grab	solid/water	1L		X							SPLP on the sediment particles, also run Li analysis of pore water
	JOB 7-15-19													

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____; F= filter in field

Special Instructions/QC Requirements & Comments: **Submit results to Jill Parker-Witt**

Relinquished by:	Company:	Date/Time:	Received by:	Date/Time:
William Matthew Stephens	AEP-PSO	7/11/19 10:05		
Relinquished by:	Company:	Date/Time:	Received by:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Date/Time:
				7/12/19 14:34

SHREVEPORT CHEMICAL LABORATORY

502 N. Allen Ave.
Shreveport, LA 71101
Phone 318-673-3802
FAX 318-673-3960

PROJECT R

Container Type					Delivery Type				
Ice Chest	Bag	Action Pak	PCB Mailer	Bottle	UPS	FEDEX	US Mail	Walk in	Shuttle
(Other) Box					Other				
					Tracking #				

Client: Bryan White
Received By: JTD
Received Date: 7/12/19
Open Date:

Sample Matrix: DGA | PCB Oil | Water | Oil | Soil
Solid | (Liquid) | Other

Container Temp Read: 28 (Thermometer Serial #F04103)
Correction Factor: +1.2
Corrected Temp: 29.2

Project I.D.

Were samples received on ice? YES NO

Did container arrive in good condition?	(YES)	NO
Was sample documentation received?	(YES)	NO
Was documentation filled out properly?	(YES) JTD 7/12/19	(NO) Date and time for collection not filled
Were samples labeled properly?	(YES)	NO
Were correct containers used?	(YES)	NO
Were the pH's of samples appropriately checked?	YES	(NO) N/A

Total number of sample containers: 1

Was any corrective action taken? NO

Person Contacted: Jill Parker W.T.F
Date & Time: 7-12-19 1520

Comments: Informed Jill that No Date and time was entered for collection she said she would contact the sampler and get that information. JDB 7-12-19

Form REP-703
Rev. 1, 11/2013

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
T: 614-836-4221, Audinet 210-4221
F: 614-836-4168, Audinet 210-4168
http://aepenv/labs

Water Analysis

Location: Northeastern Station ***Report Date: 2/6/2019***

Bottom Ash Pond

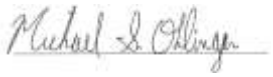
Sample was not collected in the correct container for Hg

Sample Number: 190311-001 **Date Collected: 01/28/2019 11:03** **Date Received: 1/29/2019**

Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Antimony, Sb	0.51	ug/L		0.2	0.04	GES	02/04/2019 13:52	EPA 200.8-1994, Rev. 5.4
Arsenic, As	2.34	ug/L		0.2	0.06	GES	02/04/2019 13:52	EPA 200.8-1994, Rev. 5.4
Barium, Ba	203	ug/L		0.2	0.04	GES	02/04/2019 13:52	EPA 200.8-1994, Rev. 5.4
Beryllium, Be	< 0.04	ug/L	U	0.2	0.04	GES	02/04/2019 13:52	EPA 200.8-1994, Rev. 5.4
Cadmium, Cd	0.02	ug/L	J	0.1	0.02	GES	02/04/2019 13:52	EPA 200.8-1994, Rev. 5.4
Chromium, Cr	3.40	ug/L		0.4	0.08	GES	02/04/2019 13:52	EPA 200.8-1994, Rev. 5.4
Cobalt, Co	0.176	ug/L		0.1	0.04	GES	02/04/2019 13:52	EPA 200.8-1994, Rev. 5.4
Lead, Pb	0.329	ug/L		0.2	0.04	GES	02/04/2019 13:52	EPA 200.8-1994, Rev. 5.4
Mercury, Hg	0.004	ug/L	J	0.005	0.002	JAB	01/31/2019	EPA 245.7-2005, Rev. 2.0
Molybdenum, Mo	20.1	ug/L		4	0.8	GES	02/04/2019 13:52	EPA 200.8-1994, Rev. 5.4
Selenium, Se	4.5	ug/L		0.4	0.06	GES	02/04/2019 13:52	EPA 200.8-1994, Rev. 5.4
Thallium, Tl	< 0.2	ug/L	U	1	0.2	GES	02/04/2019 13:52	EPA 200.8-1994, Rev. 5.4
Boron, B	0.709	mg/L		0.1	0.02	DAM	02/04/2019 15:54	EPA 200.7-1994, Rev. 4.4
Calcium, Ca	78.5	mg/L		0.3	0.04	DAM	02/04/2019 15:54	EPA 200.7-1994, Rev. 4.4
Lithium, Li	< 0.009	mg/L	U	0.03	0.009	DAM	02/04/2019 15:54	EPA 200.7-1994, Rev. 4.4
Magnesium, Mg	13.6	mg/L		0.05	0.01	DAM	02/04/2019 15:54	EPA 200.7-1994, Rev. 4.4
Potassium, K	5.66	mg/L		0.5	0.2	DAM	02/04/2019 15:54	EPA 200.7-1994, Rev. 4.4
Sodium, Na	106	mg/L		0.2	0.06	DAM	02/04/2019 15:54	EPA 200.7-1994, Rev. 4.4
Strontium, Sr	0.981	mg/L		0.005	0.0008	DAM	02/04/2019 15:54	EPA 200.7-1994, Rev. 4.4
Alkalinity, as CaCO3	137	mg/L		10	3	GES	01/30/2019	SM 2320B-2011
Bromide, Br	0.328	mg/L		0.2	0.04	CRJ	01/31/2019 14:10	EPA 300.1-1997, Rev. 1.0
Surrogate recovery high due to chlorate being in the as-rec'd sample.								
Chloride, Cl	25.2	mg/L		0.04	0.01	CRJ	01/31/2019 14:10	EPA 300.1-1997, Rev. 1.0
Surrogate recovery high due to chlorate being in the as-rec'd sample.								
Fluoride, F	0.34	mg/L		0.06	0.01	CRJ	01/31/2019 14:10	EPA 300.1-1997, Rev. 1.0
Surrogate recovery high due to chlorate being in the as-rec'd sample.								
Residue, Filterable, TDS	704	mg/L		40	10	KAL	02/01/2019	SM 2540C-2011
Sulfate, SO4	341	mg/L		2	0.3	CRJ	02/01/2019 03:35	EPA 300.1-1997, Rev. 1.0
Hydrogen Ion (pH)	7.57	s.u.		0.1	0.02	GES	01/30/2019	SM 4500-H B-2011
pH was analyzed beyond the 15 minute hold period.								

Sample was not collected in the correct container for Hg

U: Analyte was analyzed and not detected at or above adjusted Method Detection Limit
J: Analyte was positively identified, though the quantitation was below Reporting Limit.



Michael Ohlinger, Chemist

Email msohlinger@aep.com *Tel.*

Fax 614-836-4168 *Audinet 8-210-*

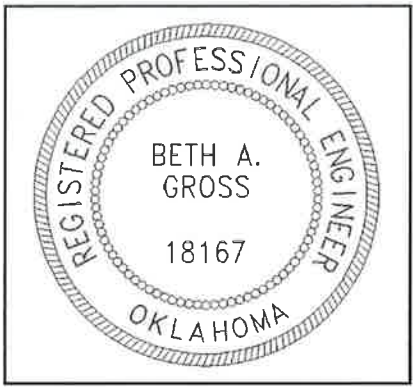
ATTACHMENT B
Certification by Qualified Professional Engineer

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
Tallahassee, Florida 32308

Oklahoma Firm Certificate of
Authorization No. 1996
Exp. 6/30/2022

18167	Oklahoma	Jan 26, 2021
License Number	Licensing State	Date

Geosyntec consultants

941 Chatham Lane, Suite 103
Columbus, Ohio 43221
PH 614.468.0421
www.geosyntec.com

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 Oogolah, 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

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.

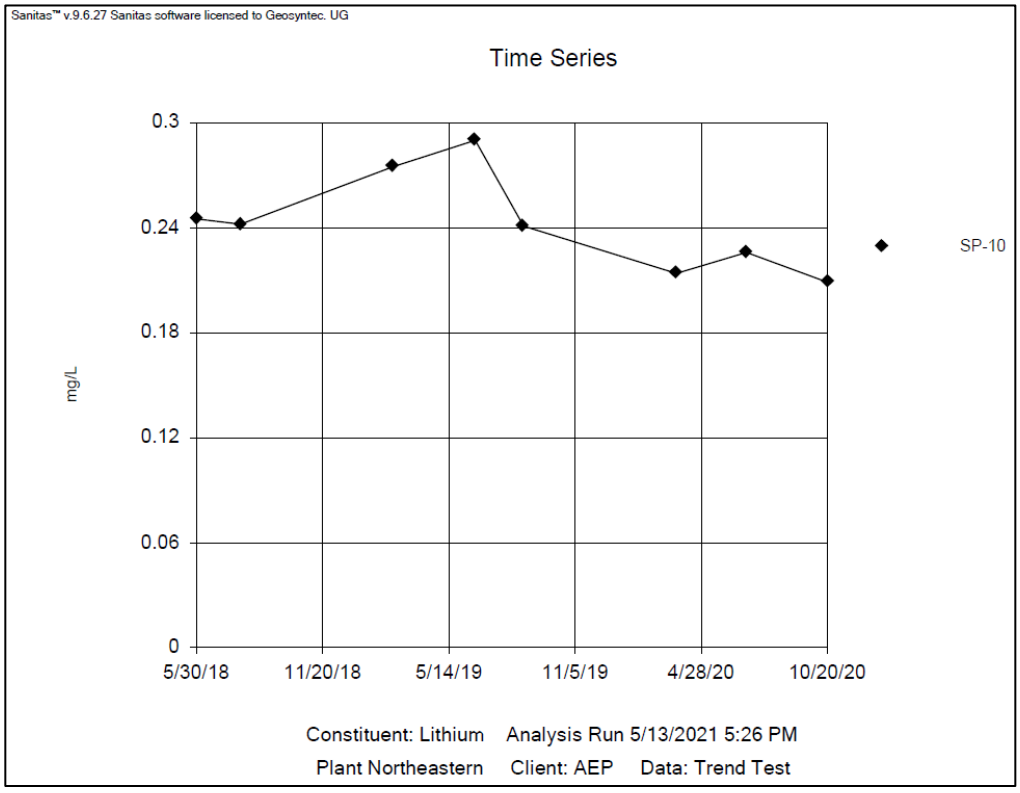
The information above, as well as the information presented in previous ASDs (Geosyntec, 2019; Geosyntec, 2021), continue to support the position that lithium and fluoride concentrations are a result of natural variation in the underlying lithology, including the presence of shale lenses containing lithium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

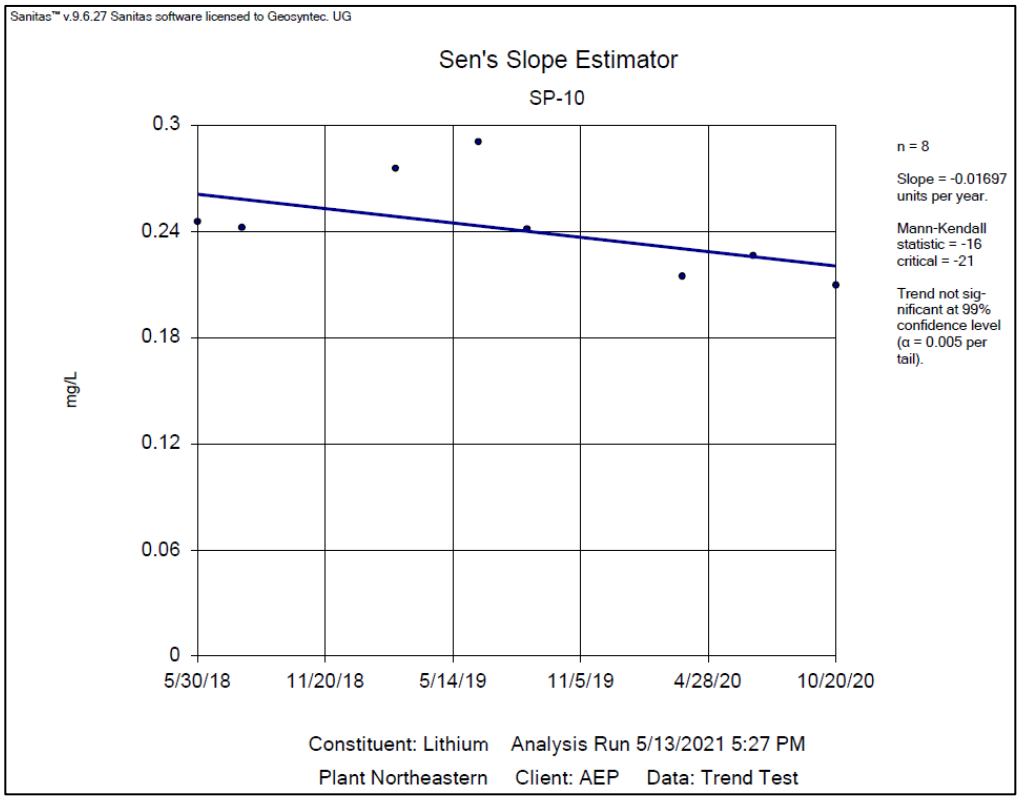
******

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



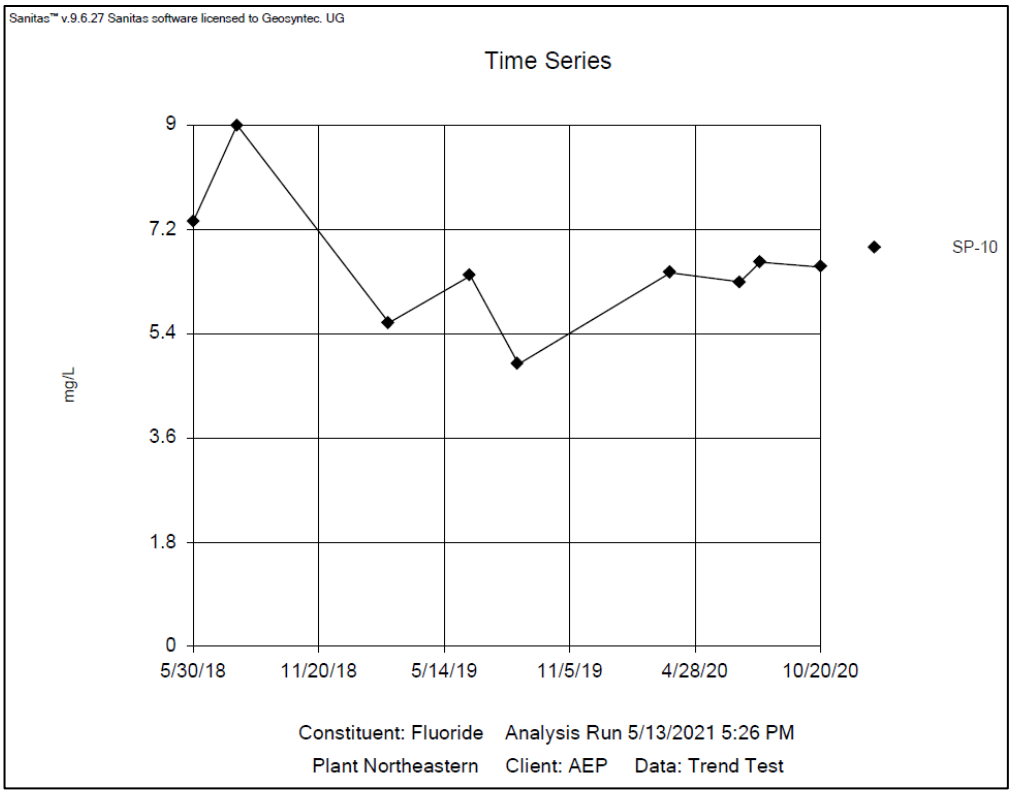


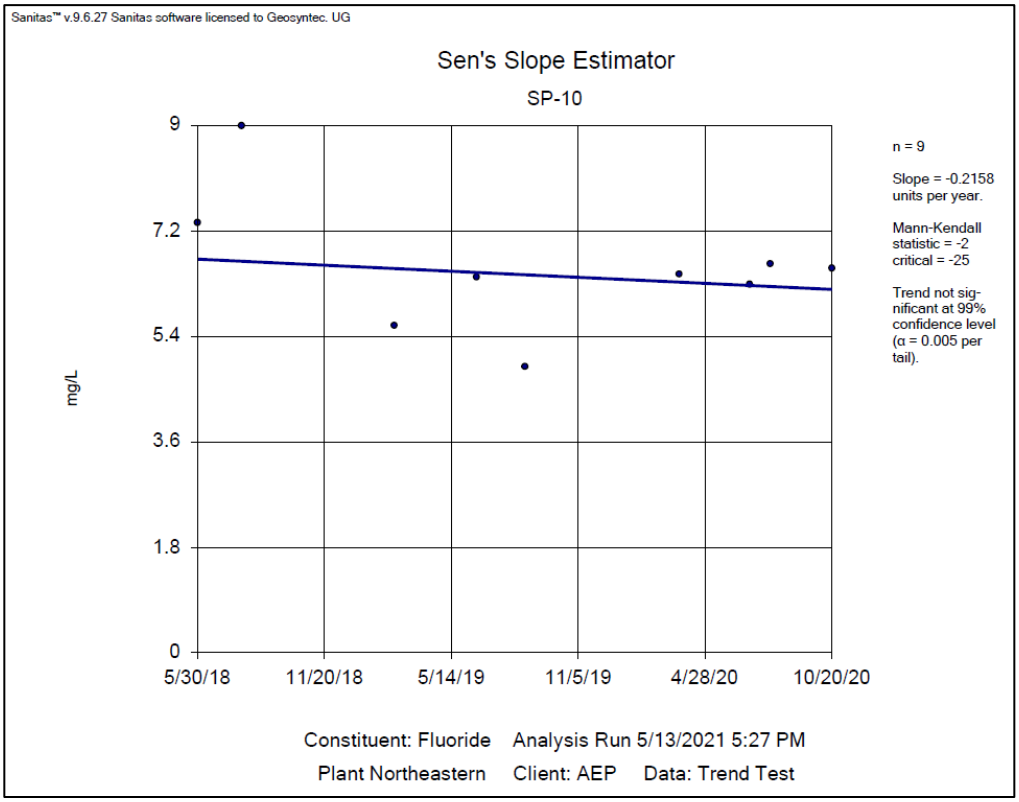
Lithium Time Series and Trend Test – SP-10

Northeastern Bottom Ash Pond

Geosyntec consultants	AMERICAN ELECTRIC POWER	Figure 1
Columbus, Ohio	May 7, 2021	

internal info: path, date revised, author





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

Geosyntec consultants	AMERICAN ELECTRIC POWER	Figure 2
Columbus, Ohio	May 7, 2021	

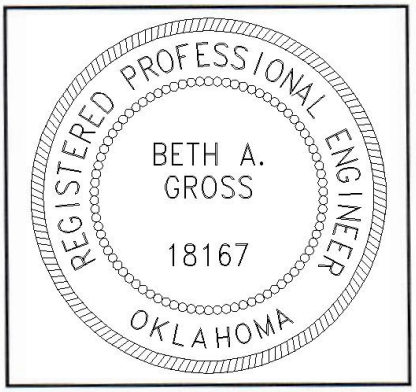
internal info: path, date revised, author

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

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Tallahassee, Florida 32308

Oklahoma Firm Certificate of
Authorization No. 1996
Exp. 6/30/2022

18167	Oklahoma	May 17, 2021
License Number	Licensing State	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

Geosyntec consultants
engineers | scientists | innovators

941 Chatham Lane
Suite 103
Columbus, Ohio 43221

February 19, 2021
CHA8500

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LIST OF ATTACHMENTS

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-Francía 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

Geosyntec Consultants, Inc.

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

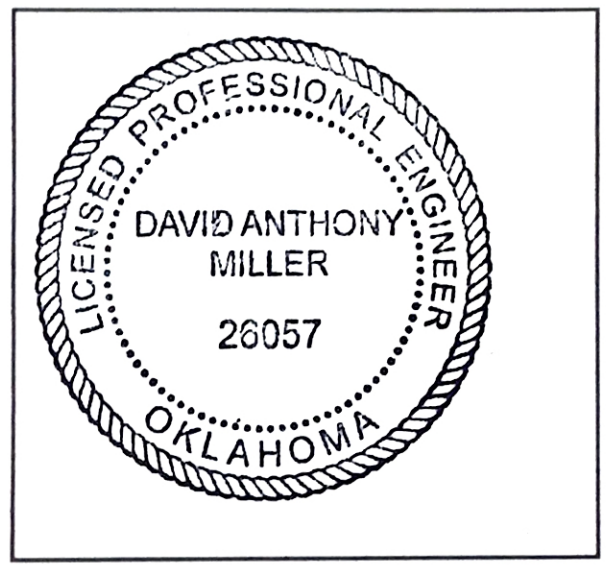
Notes:
UPL: Upper prediction limit
LPL: Lower prediction limit
Bold values exceed the background value.
Background values are shaded gray.

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	OKLAHOMA	02.19.21
License Number	Licensing State	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

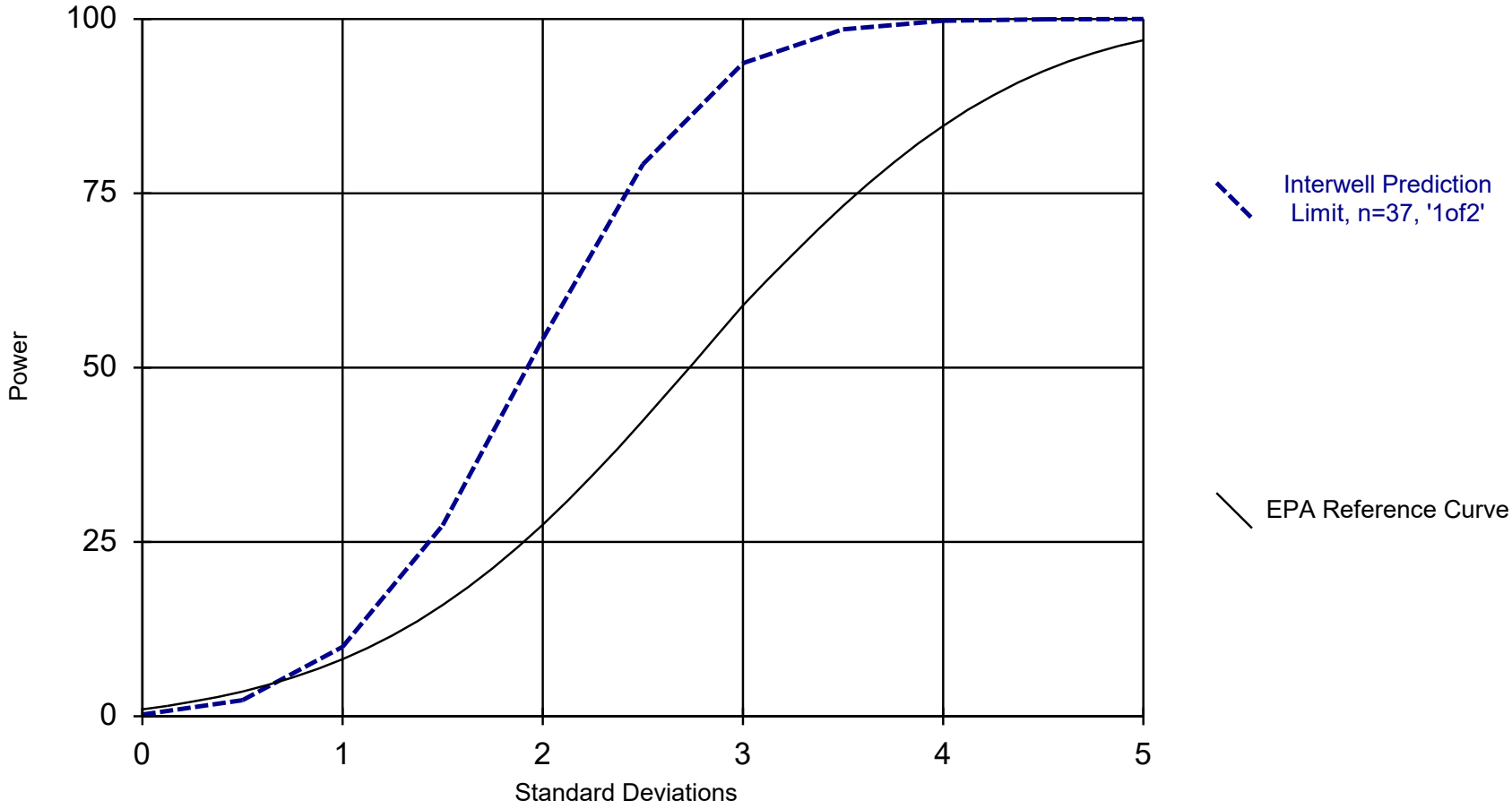
Date: 12/28/2020 3:29 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Calcium (mg/L)

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

Interwell Power Curve

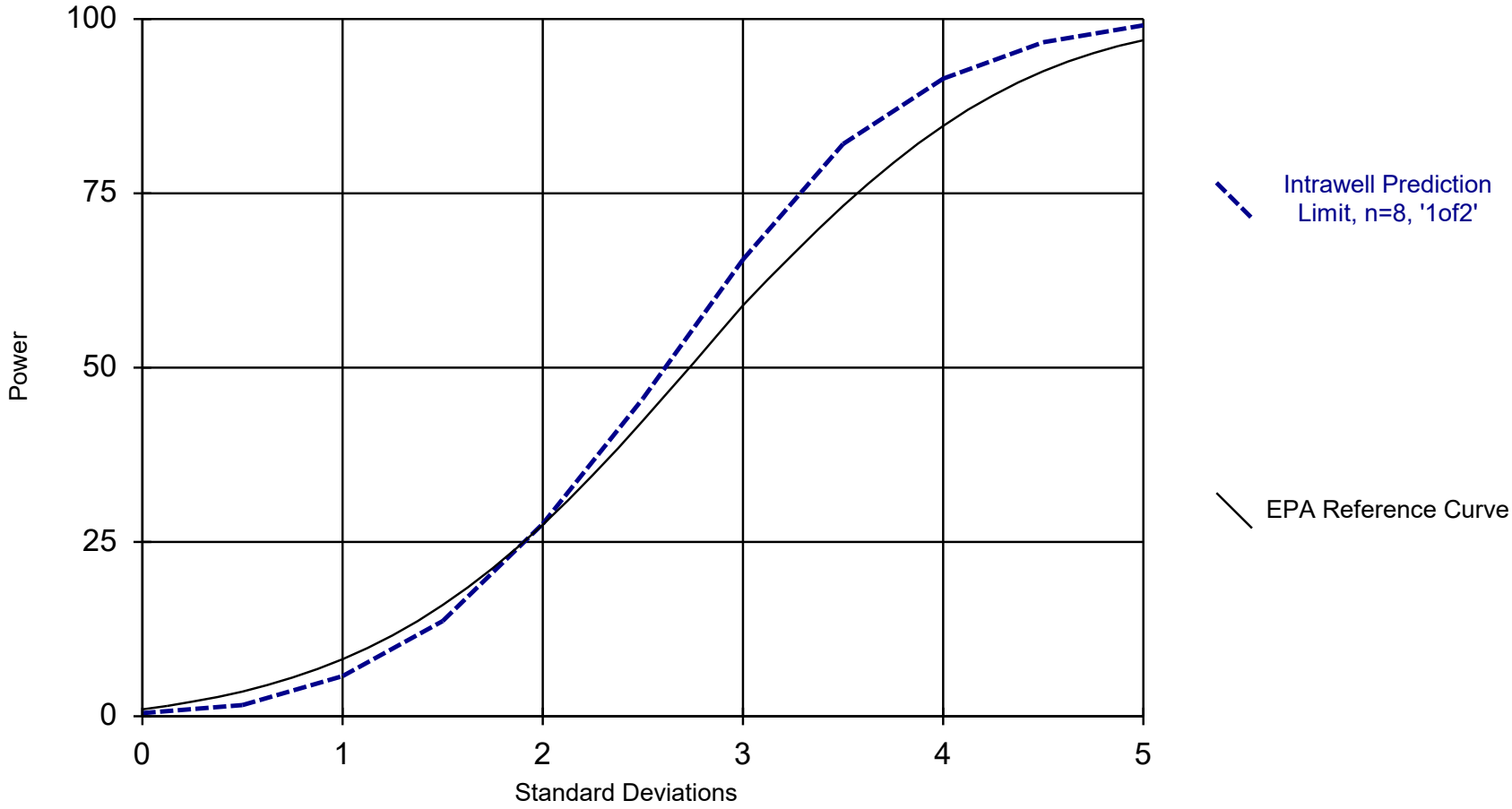


Kappa = 1.84, based on 4 compliance wells and 7 constituents, evaluated semi-annually (this report reflects annual total).

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

Constituent	Well	Outlier	Value(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
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

Constituent	Well	Calc.	0.01	Method
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

Constituent	Well	Calc.	0.01	Method
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

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**
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

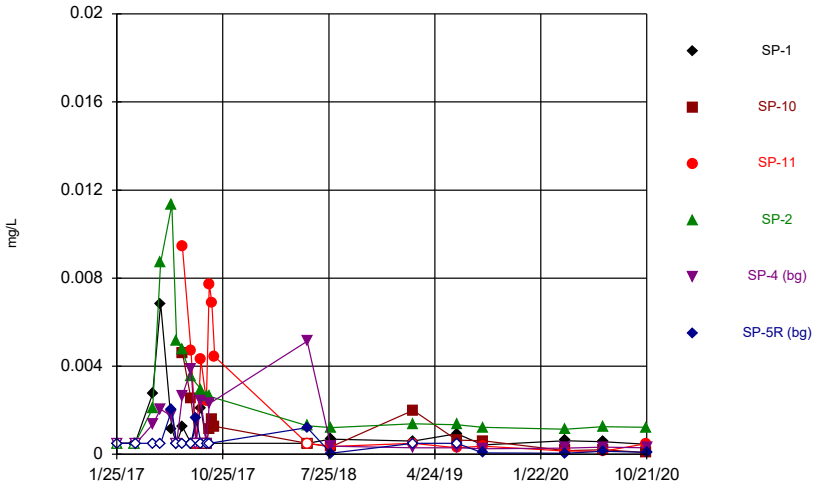
Northeastern BAP Client: Geosyntec Data: Northeastern BAP Printed 12/29/2020, 11:40 AM

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	0.00000428	78.95	None	No	0.01	NP (NDs)
Mercury (mg/L)	SP-10	0.000019	0.000005	0.002	No	16	0.0000115	0.00000798	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	0.00000206	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.

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

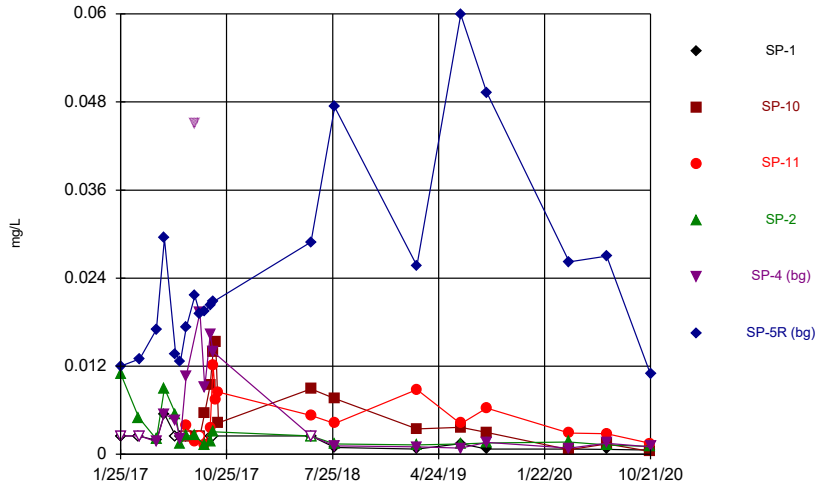
Time Series



Constituent: Antimony Analysis Run 12/18/2020 4:40 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

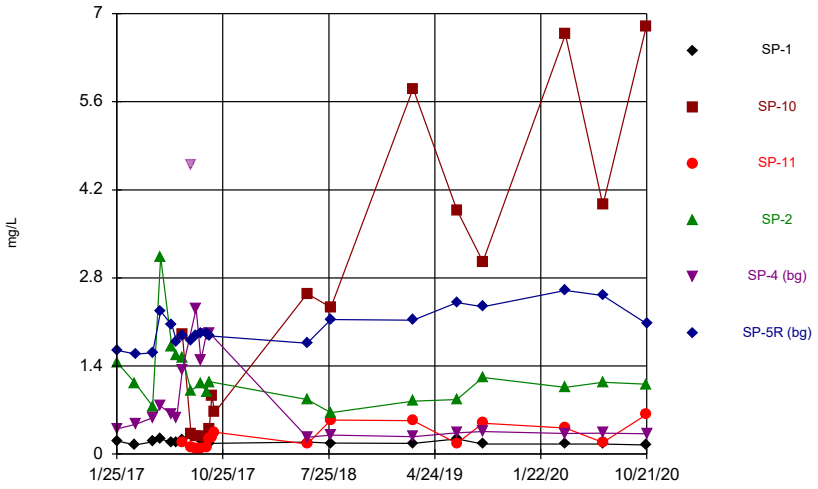
Time Series



Constituent: Arsenic Analysis Run 12/18/2020 4:40 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

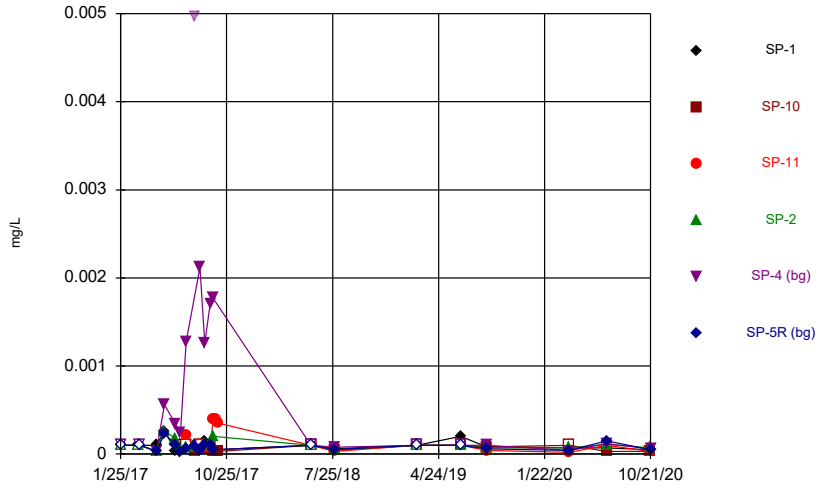
Time Series



Constituent: Barium Analysis Run 12/18/2020 4:40 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

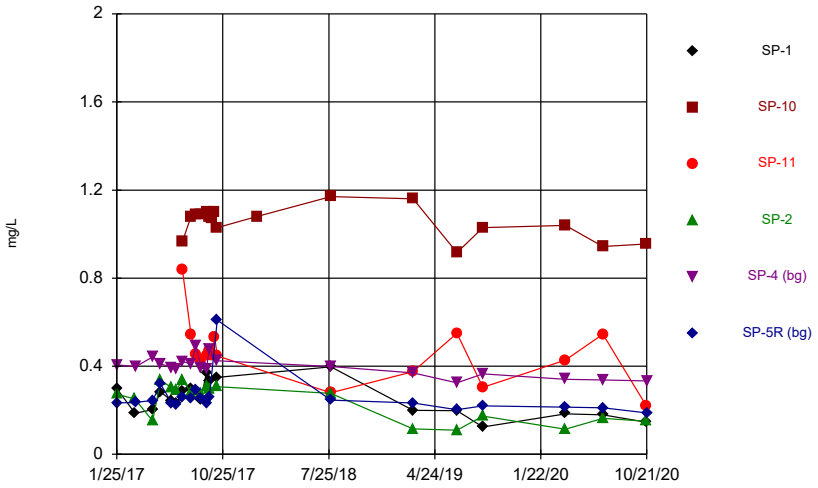
Time Series



Constituent: Beryllium Analysis Run 12/18/2020 4:40 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Time Series



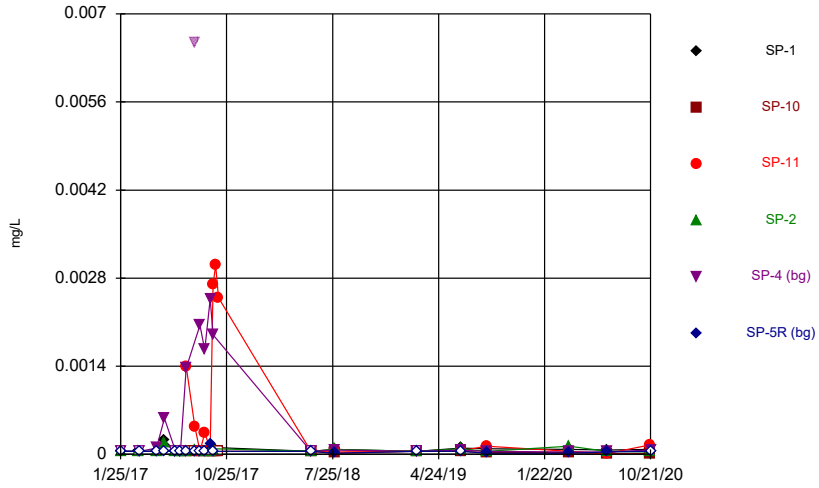
Constituent: Boron Analysis Run 12/18/2020 4:40 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Hollow symbols indicate censored values.

Time Series

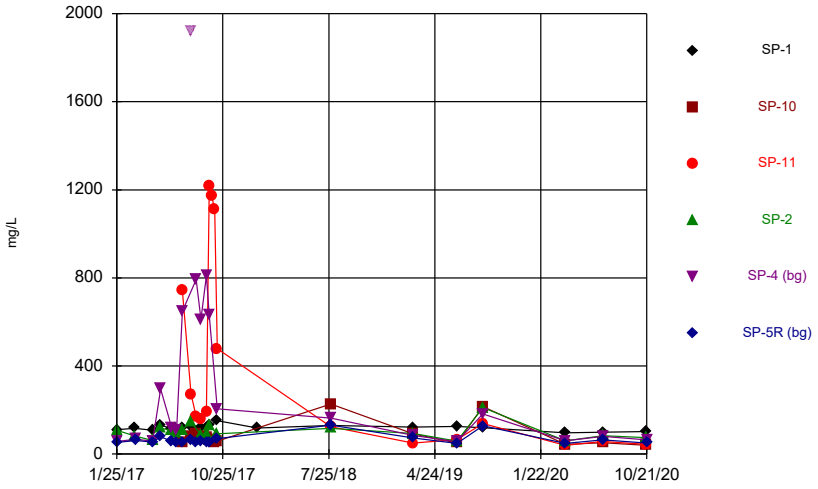


Constituent: Cadmium Analysis Run 12/18/2020 4:40 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Time Series

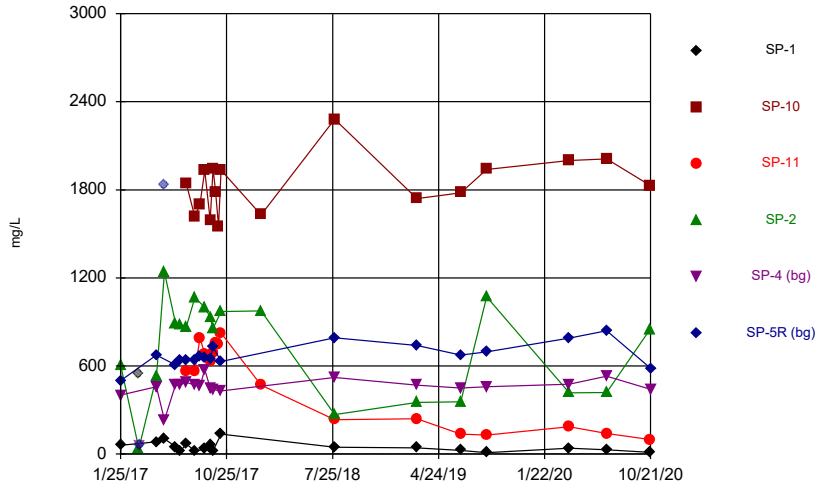


Constituent: Calcium Analysis Run 12/18/2020 4:40 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Time Series

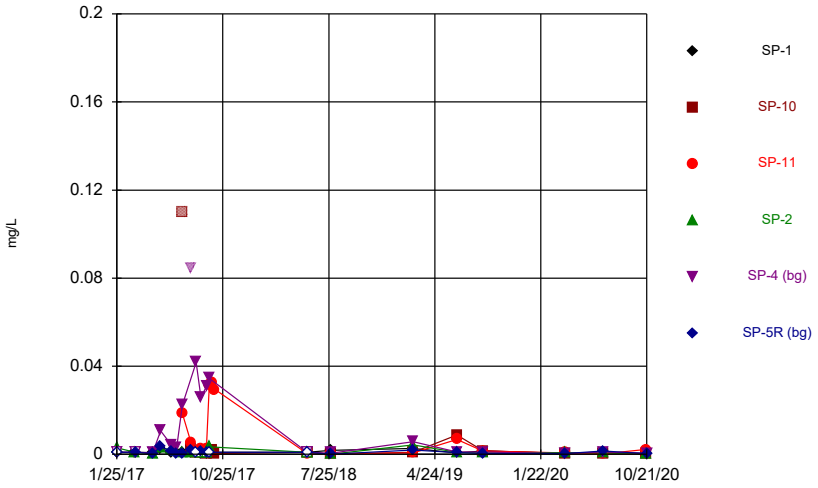


Constituent: Chloride Analysis Run 12/18/2020 4:40 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

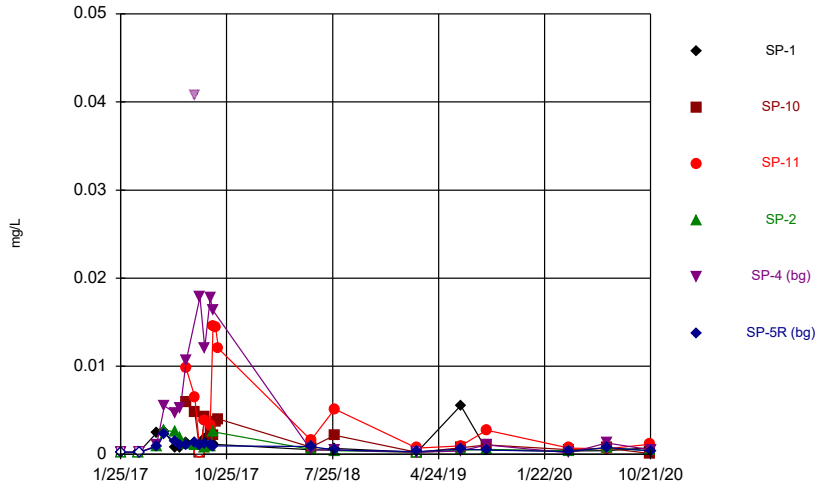
Time Series



Constituent: Chromium Analysis Run 12/18/2020 4:40 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

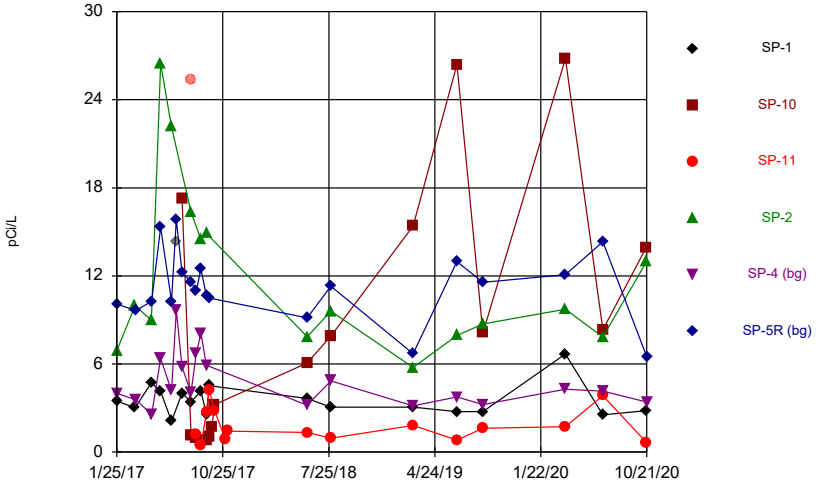
Time Series



Constituent: Cobalt Analysis Run 12/18/2020 4:40 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

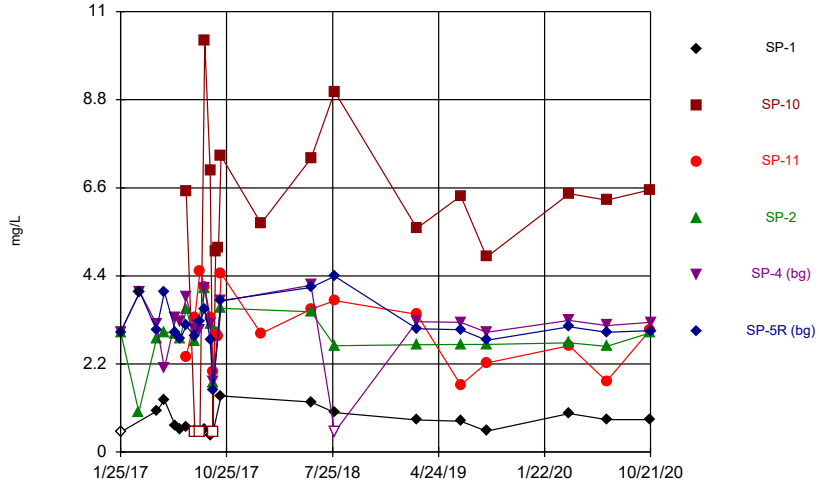
Time Series



Constituent: Combined Radium 226 + 228 Analysis Run 12/18/2020 4:40 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

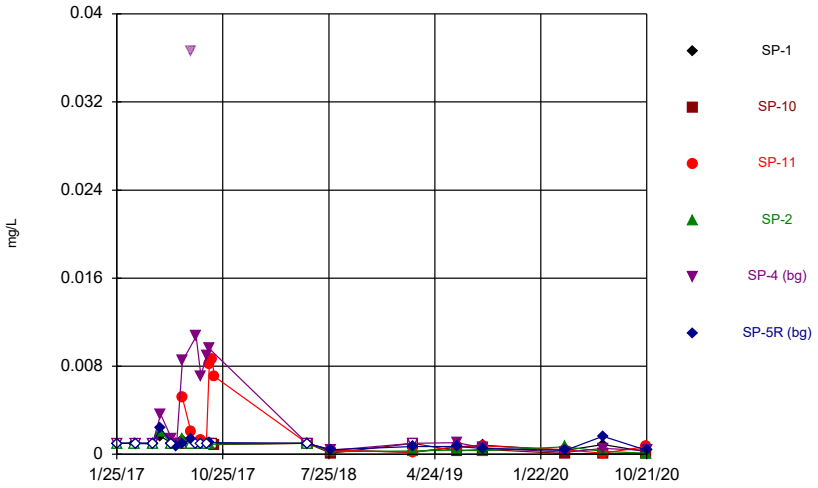
Time Series



Constituent: Fluoride Analysis Run 12/18/2020 4:40 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

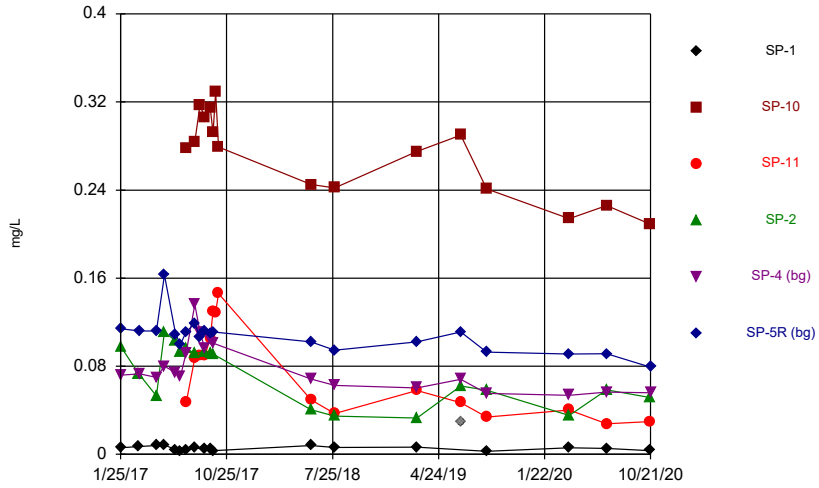
Time Series



Constituent: Lead Analysis Run 12/18/2020 4:40 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

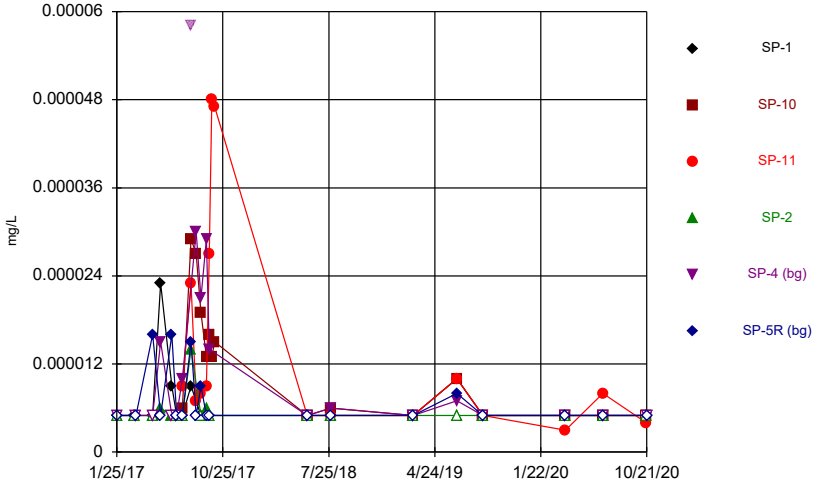
Time Series



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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

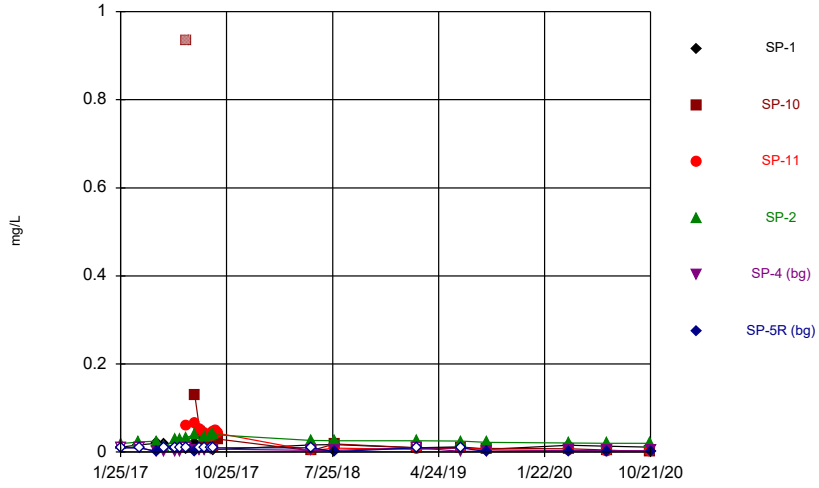
Time Series



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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

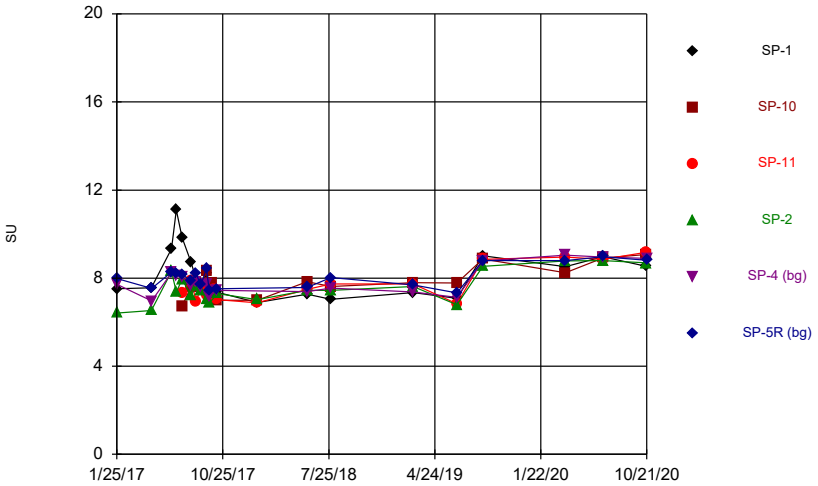
Time Series



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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Time Series

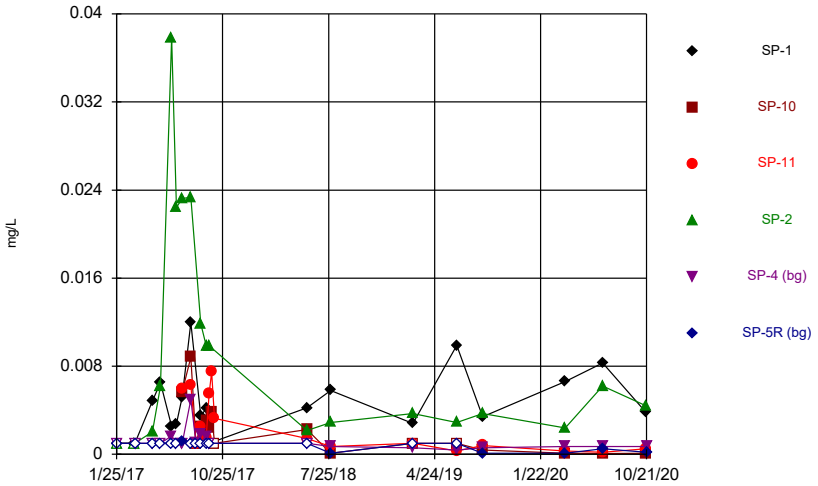


Constituent: pH, field Analysis Run 12/18/2020 4:41 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

Time Series

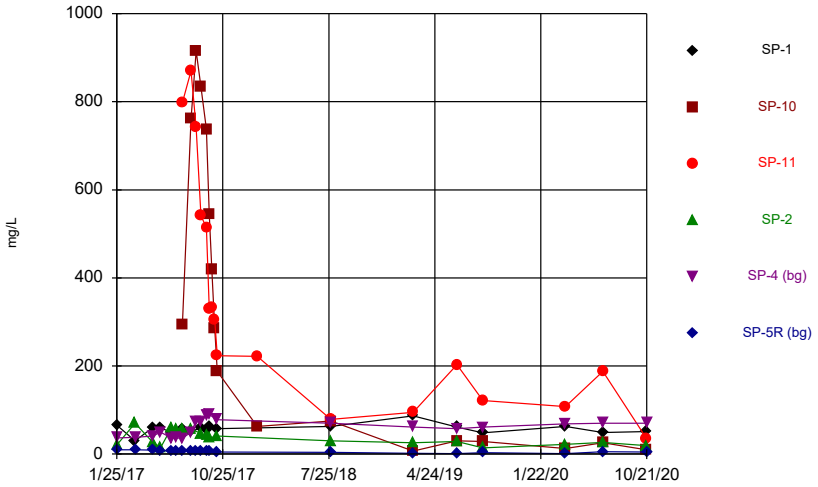


Constituent: Selenium Analysis Run 12/18/2020 4:41 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Time Series

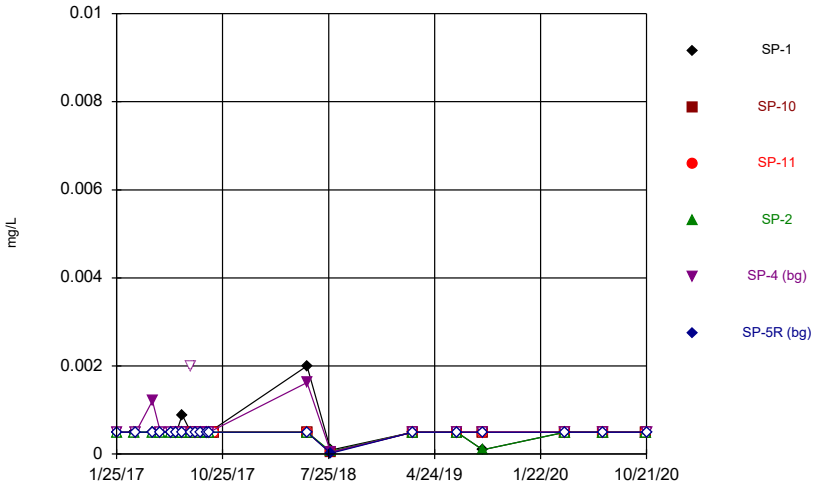


Constituent: Sulfate Analysis Run 12/18/2020 4:41 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG
Hollow symbols indicate censored values.

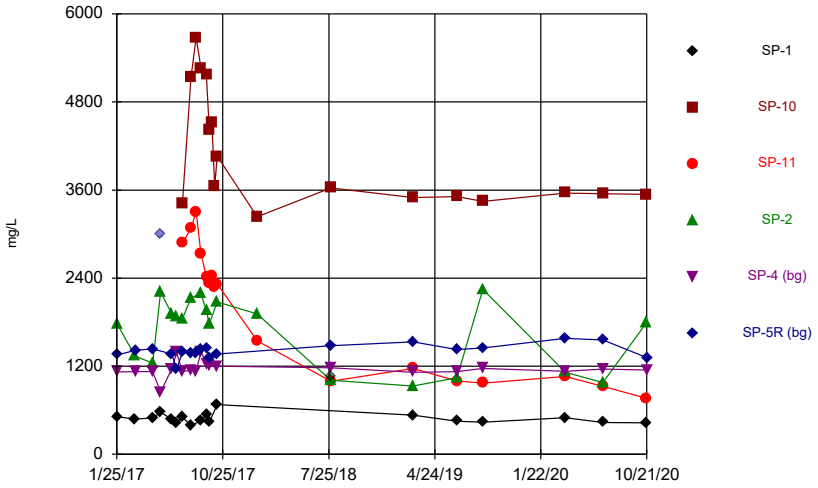
Time Series



Constituent: Thallium Analysis Run 12/18/2020 4:41 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Time Series

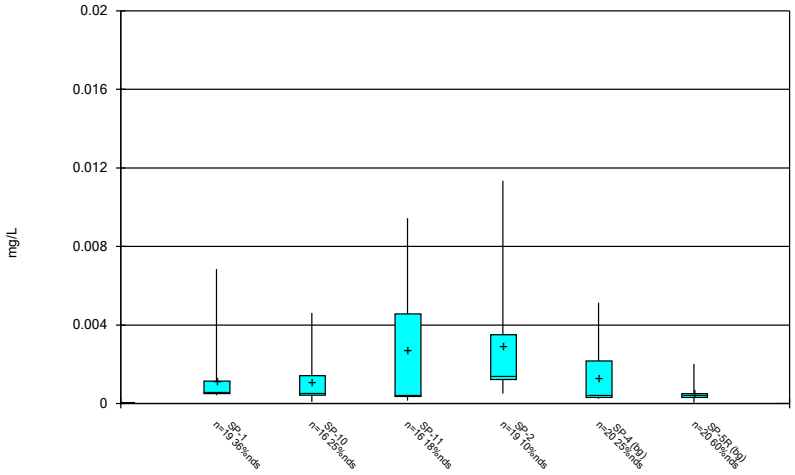


Constituent: Total Dissolved Solids [TDS] Analysis Run 12/18/2020 4:41 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

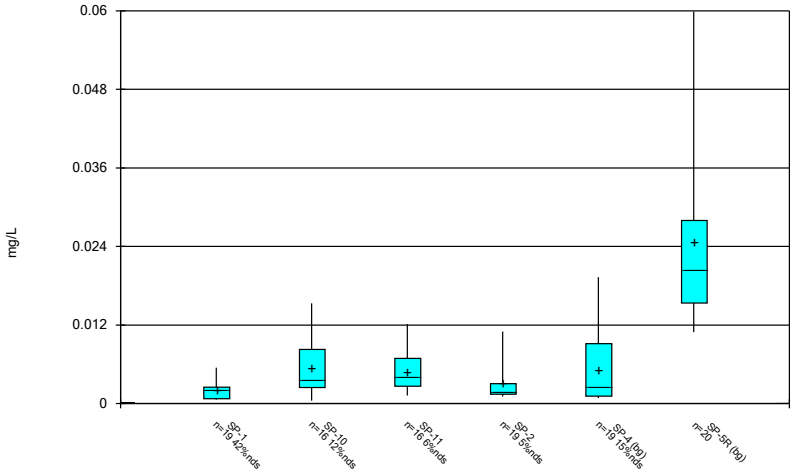
FIGURE B.

Box & Whiskers Plot



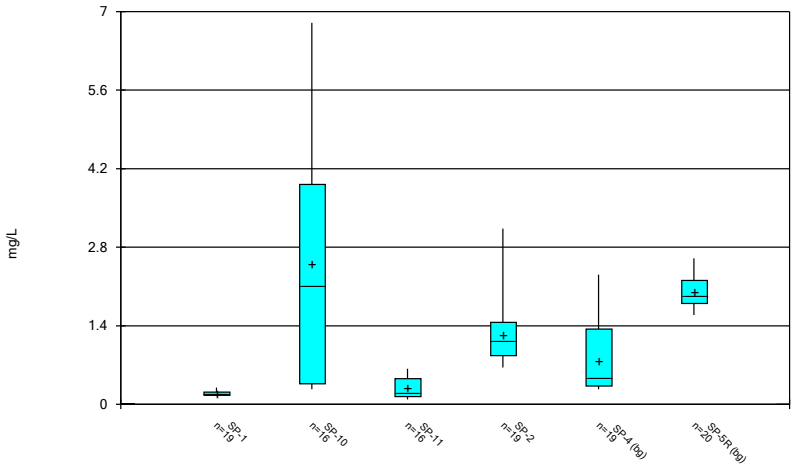
Constituent: Antimony Analysis Run 12/18/2020 4:42 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



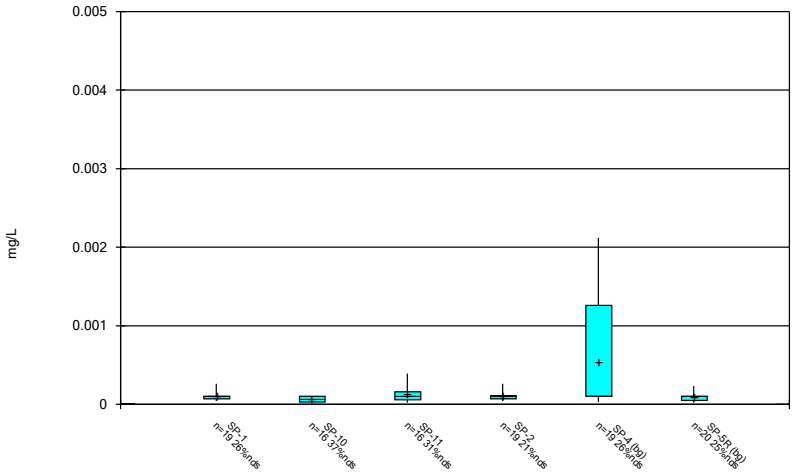
Constituent: Arsenic Analysis Run 12/18/2020 4:42 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



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

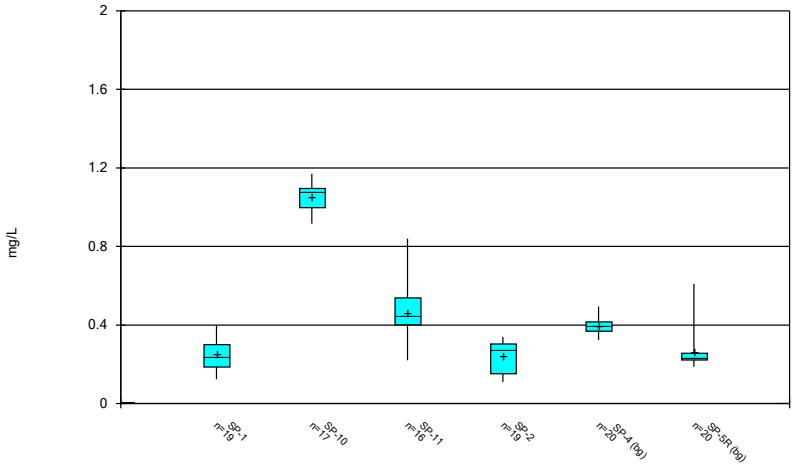
Box & Whiskers Plot



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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Box & Whiskers Plot

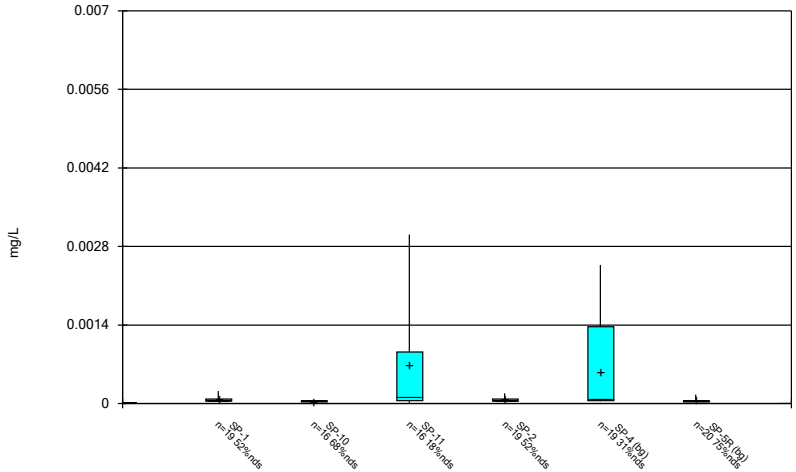


Constituent: Boron Analysis Run 12/18/2020 4:42 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Box & Whiskers Plot

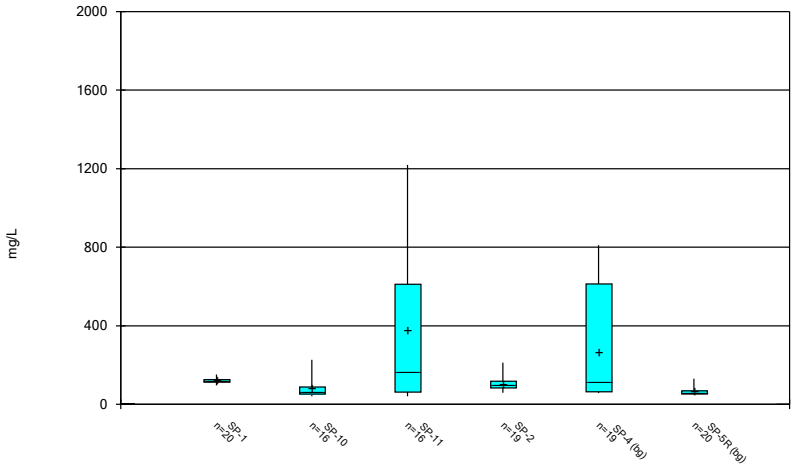


Constituent: Cadmium Analysis Run 12/18/2020 4:42 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Box & Whiskers Plot

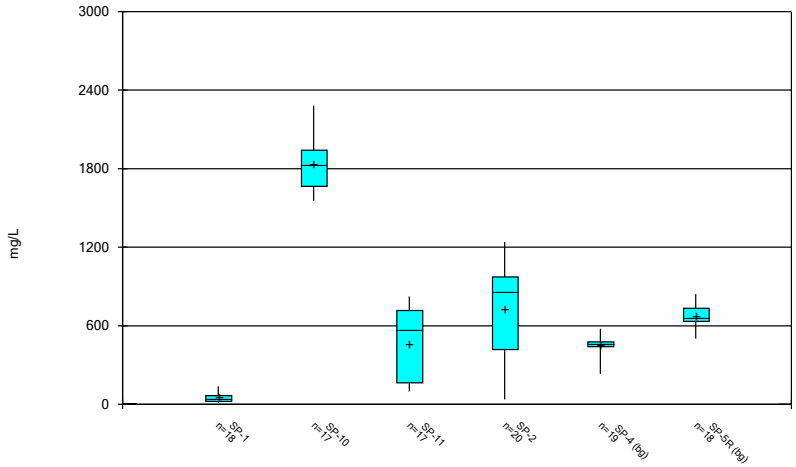


Constituent: Calcium Analysis Run 12/18/2020 4:42 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

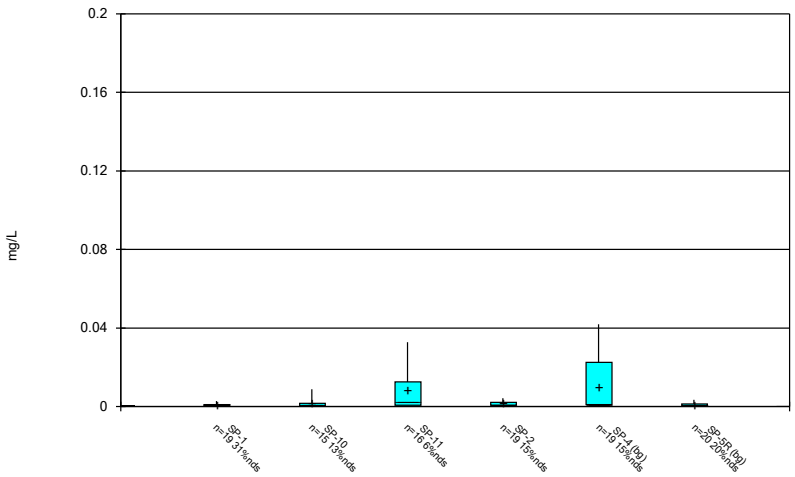
Box & Whiskers Plot



Constituent: Chloride Analysis Run 12/18/2020 4:42 PM

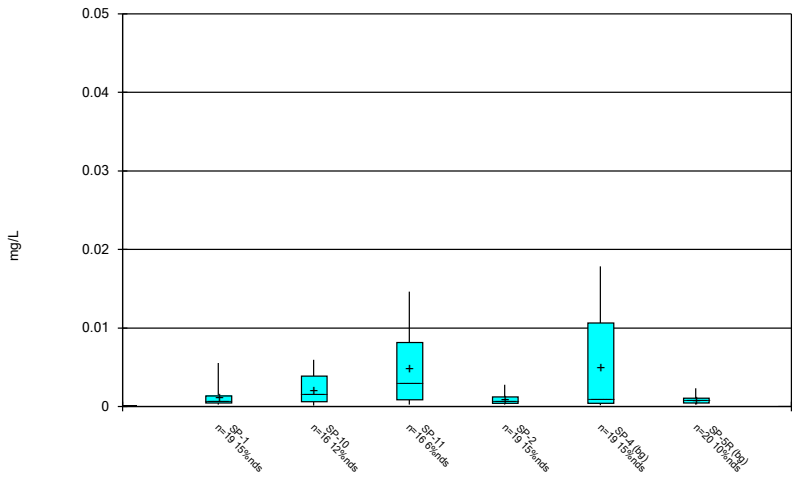
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



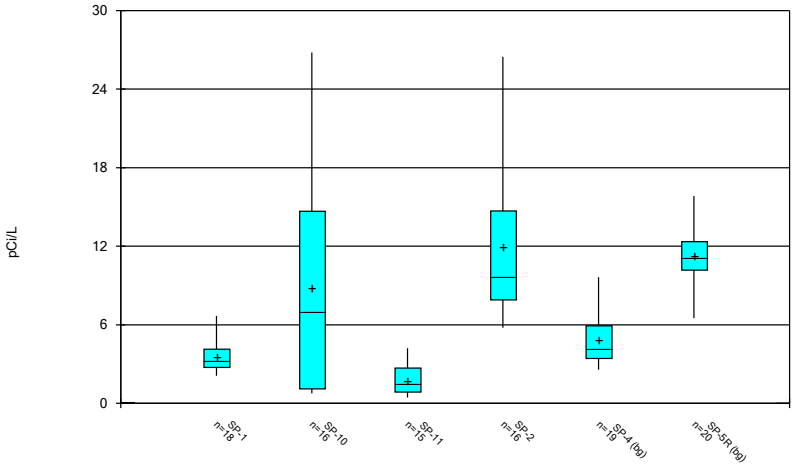
Constituent: Chromium Analysis Run 12/18/2020 4:42 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



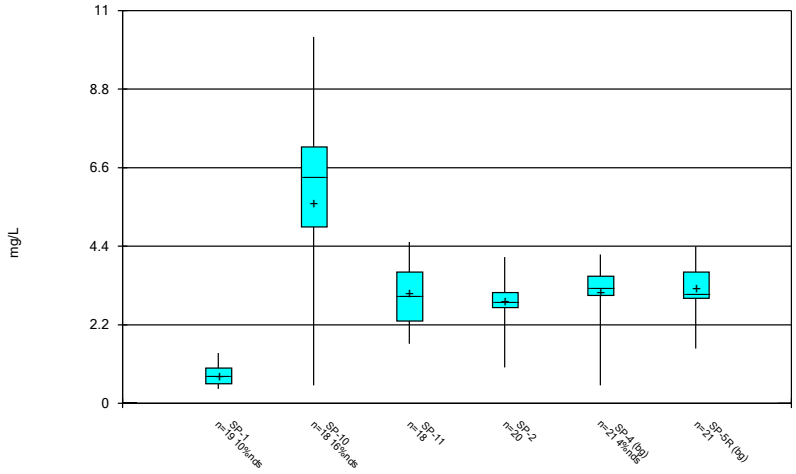
Constituent: Cobalt Analysis Run 12/18/2020 4:42 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



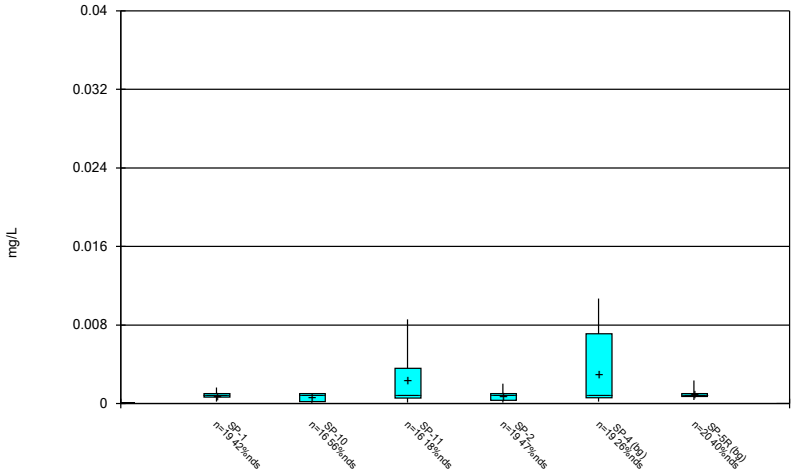
Constituent: Combined Radium 226 + 228 Analysis Run 12/18/2020 4:42 PM
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot



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

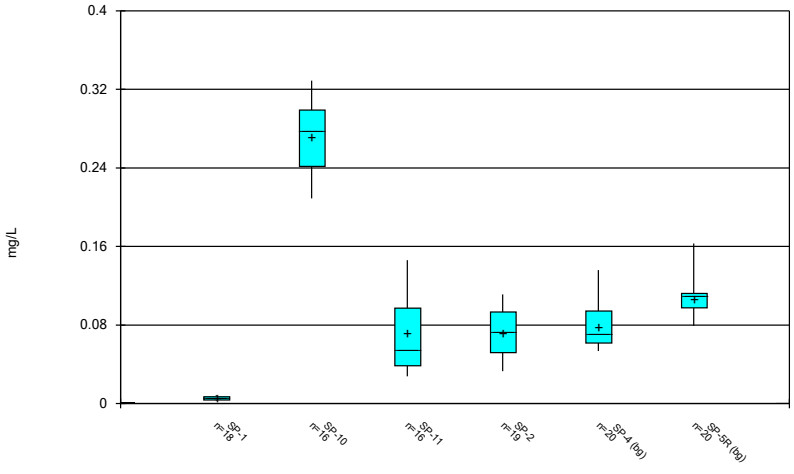
Box & Whiskers Plot



Constituent: Lead Analysis Run 12/18/2020 4:42 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

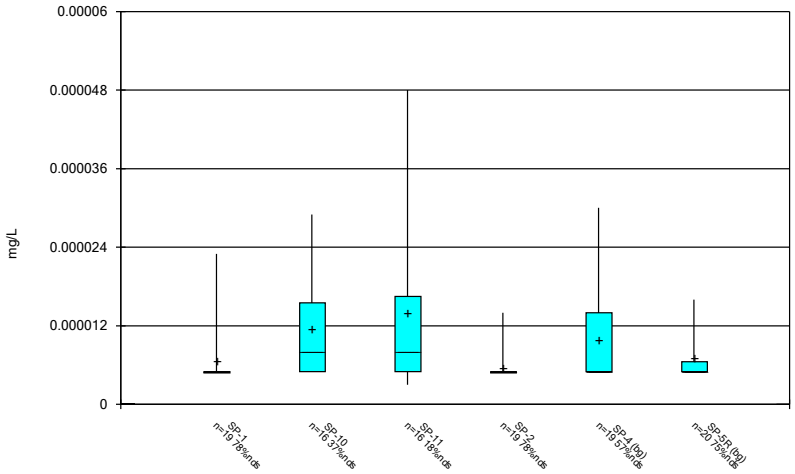
Box & Whiskers Plot



Constituent: Lithium Analysis Run 12/18/2020 4:42 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

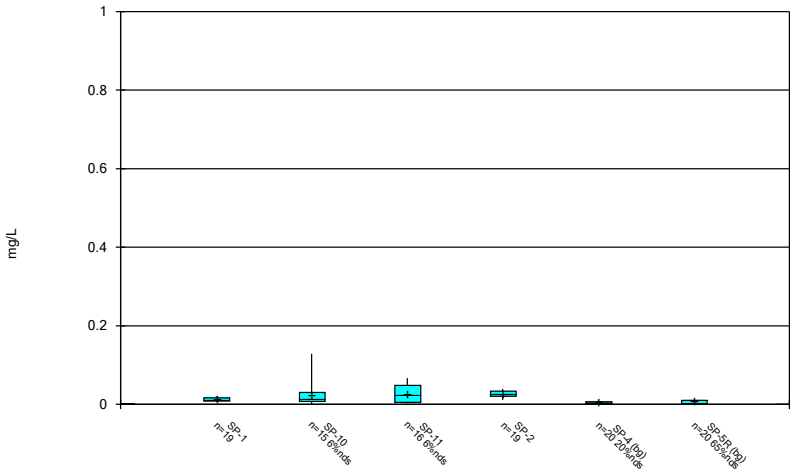
Box & Whiskers Plot



Constituent: Mercury Analysis Run 12/18/2020 4:42 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Box & Whiskers Plot

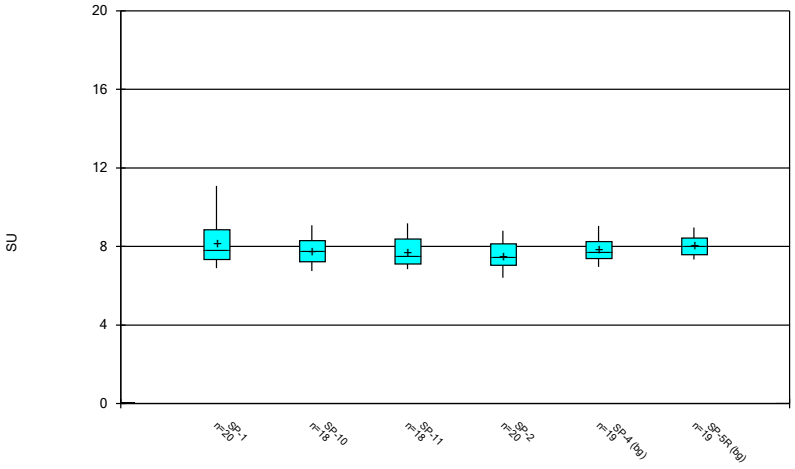


Constituent: Molybdenum Analysis Run 12/18/2020 4:42 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Box & Whiskers Plot

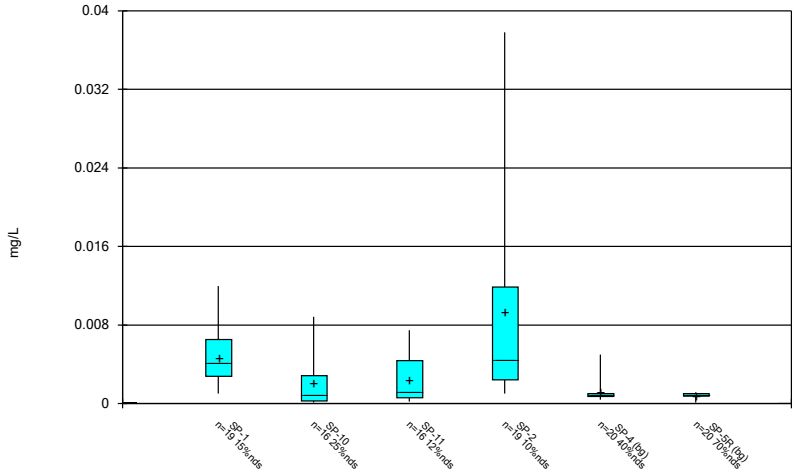


Constituent: pH, field Analysis Run 12/18/2020 4:42 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Box & Whiskers Plot

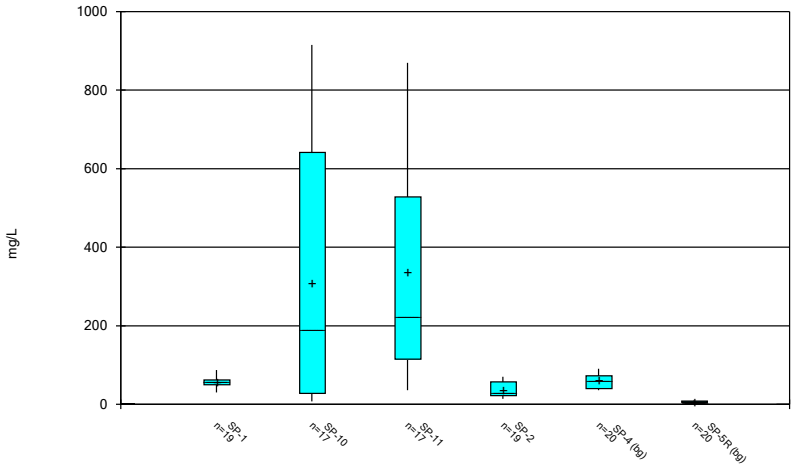


Constituent: Selenium Analysis Run 12/18/2020 4:42 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Box & Whiskers Plot

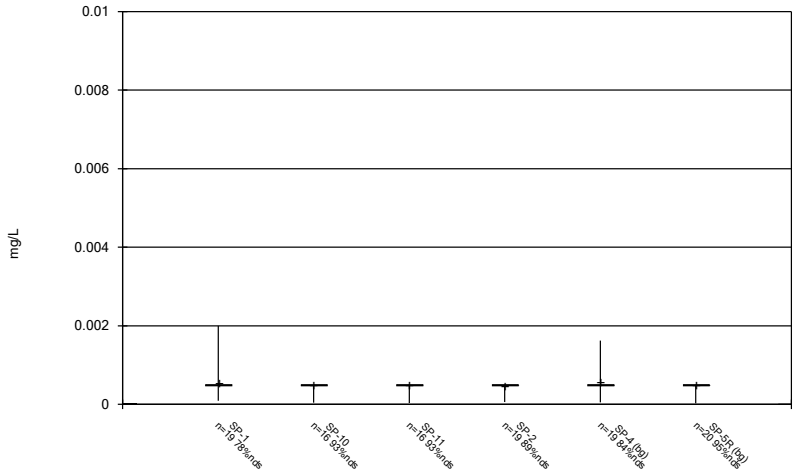


Constituent: Sulfate Analysis Run 12/18/2020 4:42 PM

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

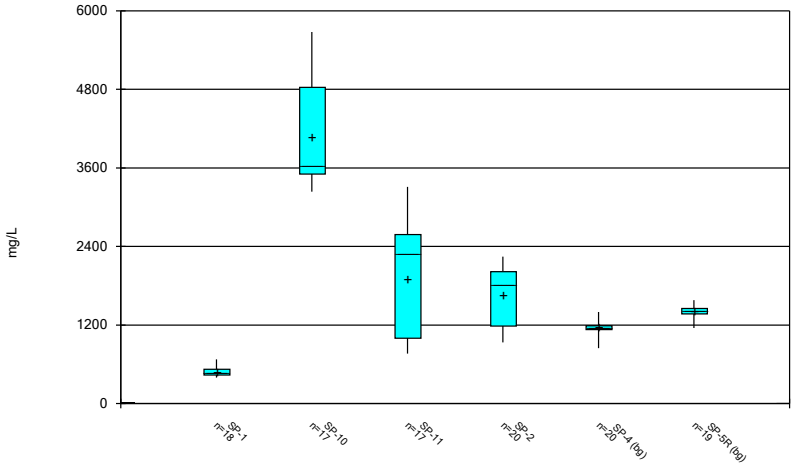
Box & Whiskers Plot



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

	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										

	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)				

	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

Constituent	Well	Outlier	Value(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
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

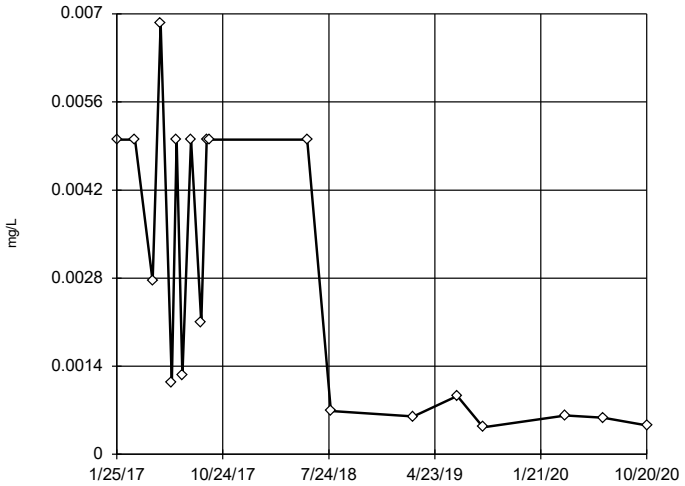
Tukey's Outlier Analysis - Downgradient Wells - All Results

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 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).

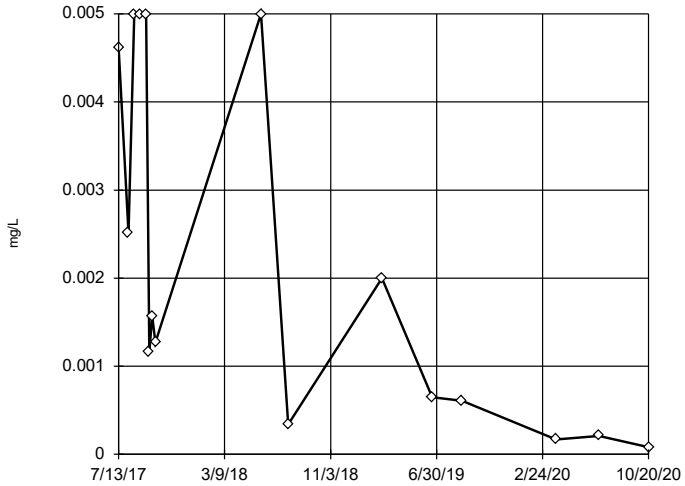
High cutoff = 2.622, low cutoff = 0.000001182, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

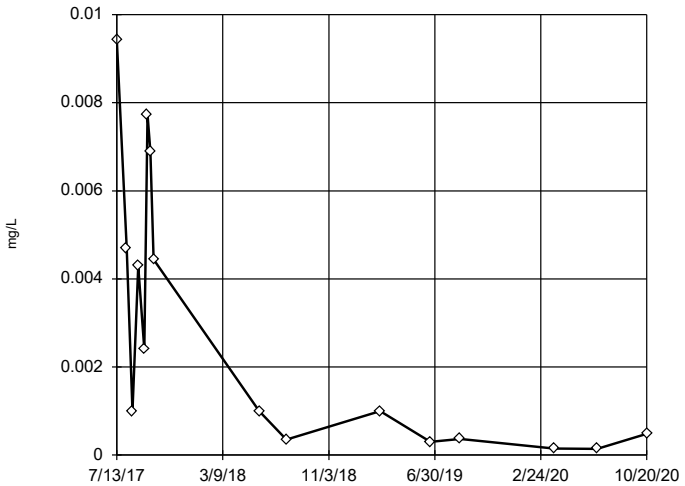
High cutoff = 5.65, low cutoff = 3.9e-7, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

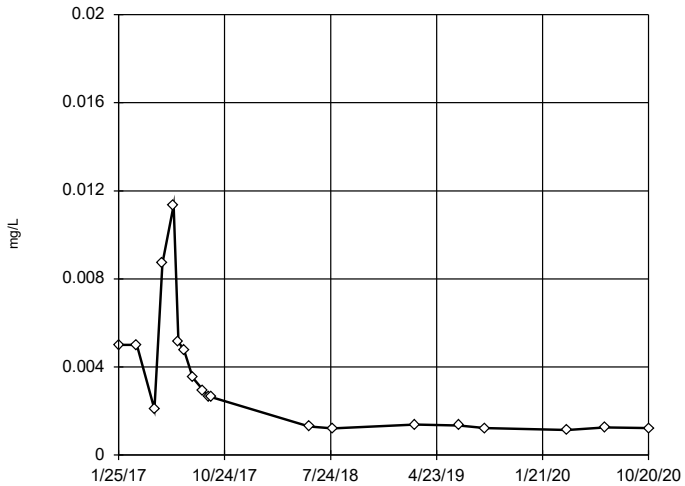
High cutoff = 9.345, low cutoff = 1.8e-7, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening

SP-2



n = 19

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

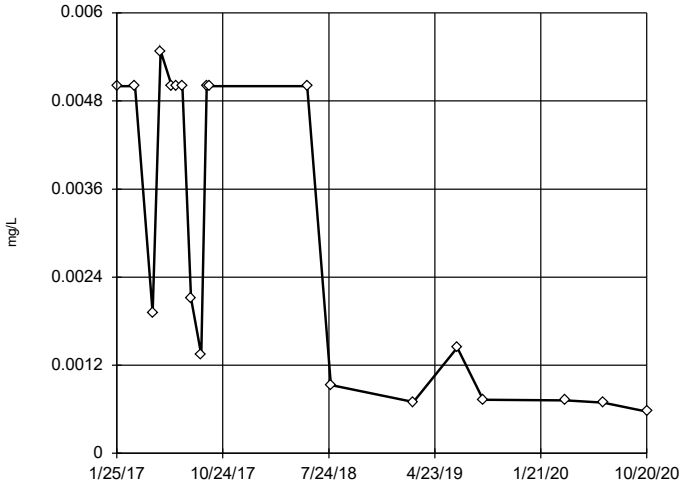
Data were natural log transformed to achieve best W statistic (graph shown in original units).

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).

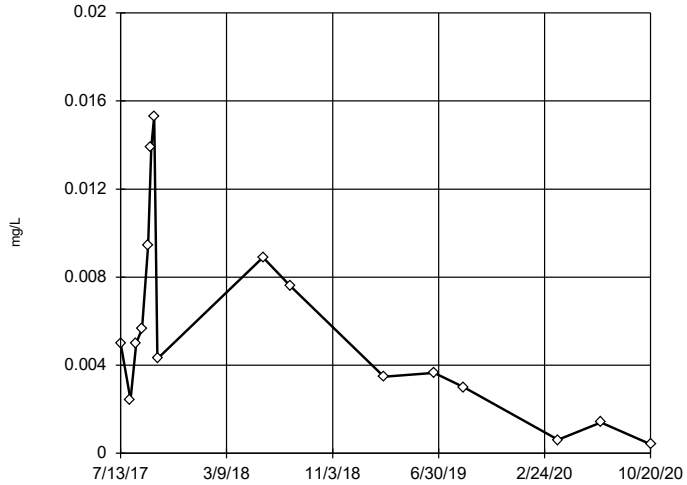
High cutoff = 1.607, low cutoff = 0.000002272, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

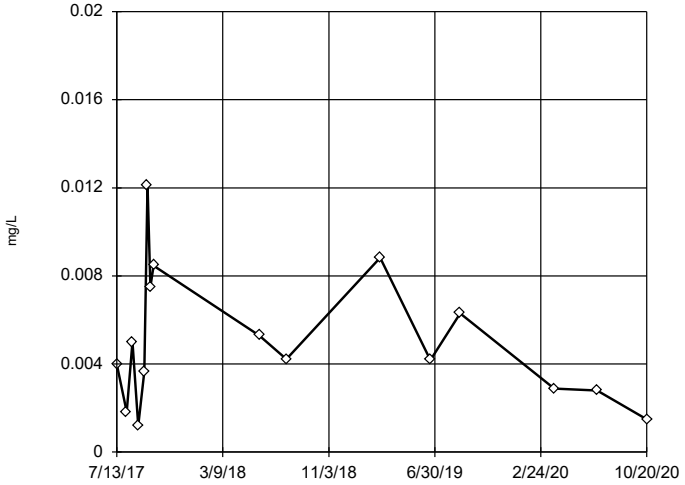
High cutoff = 0.05926, low cutoff = -0.0001145, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

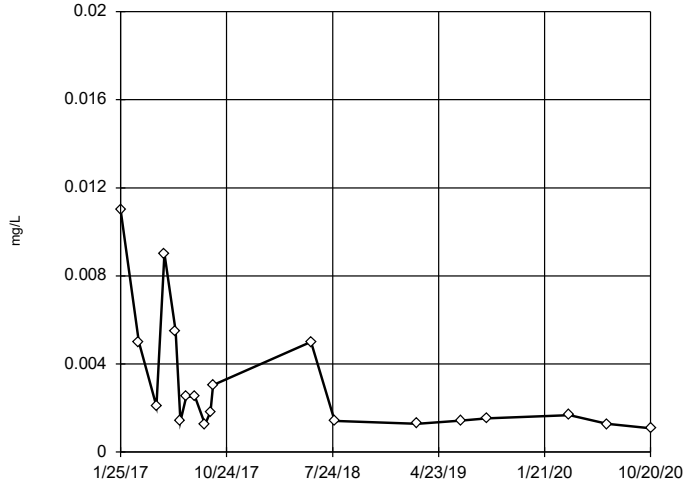
High cutoff = 0.03803, low cutoff = -9.4e-8, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening

SP-2



n = 19

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

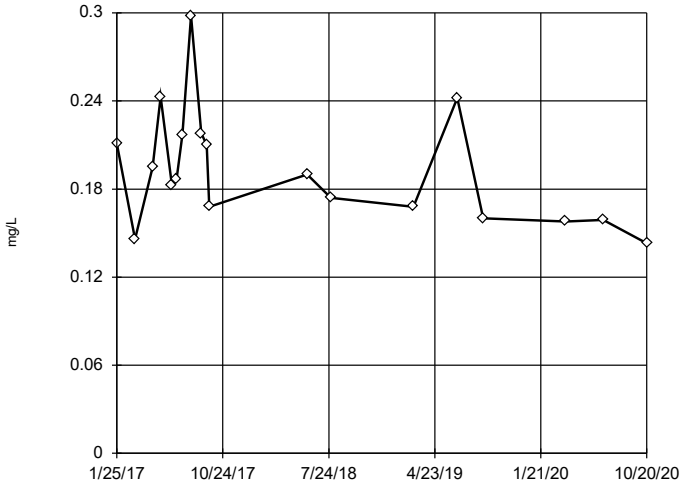
Data were natural log transformed to achieve best W statistic (graph shown in original units).

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).

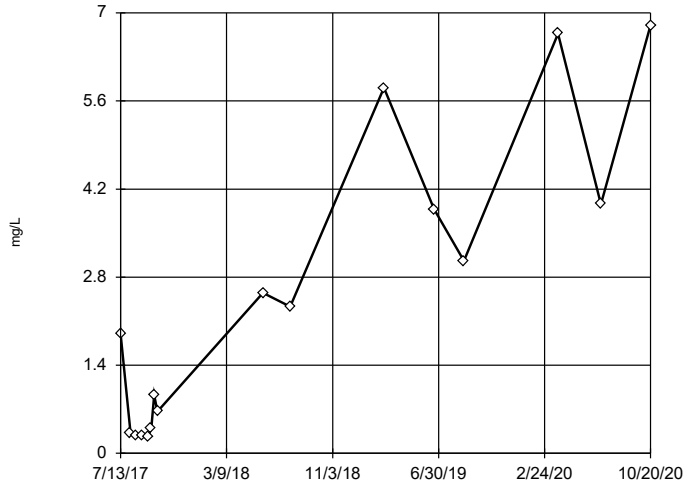
High cutoff = 0.5414, low cutoff = 0.06414, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

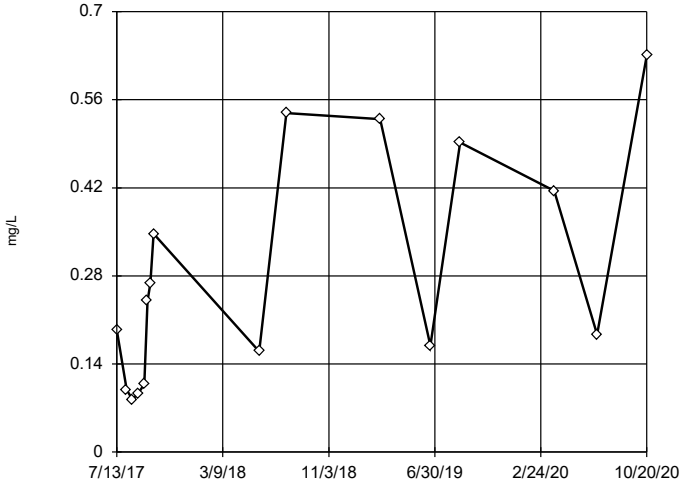
High cutoff = 72.31, low cutoff = -6.599, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

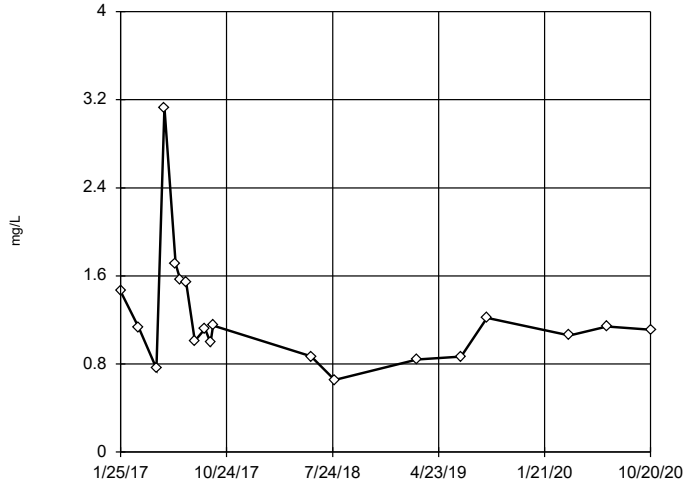
High cutoff = 18.35, low cutoff = 0.003236, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening

SP-2



n = 19

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

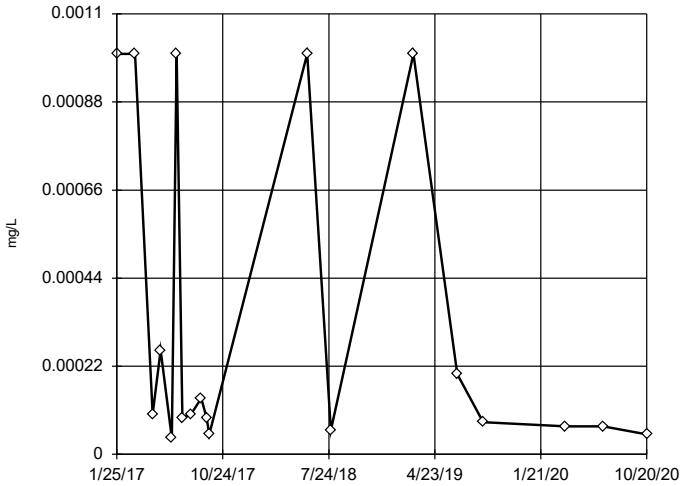
Data were natural log transformed to achieve best W statistic (graph shown in original units).

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).

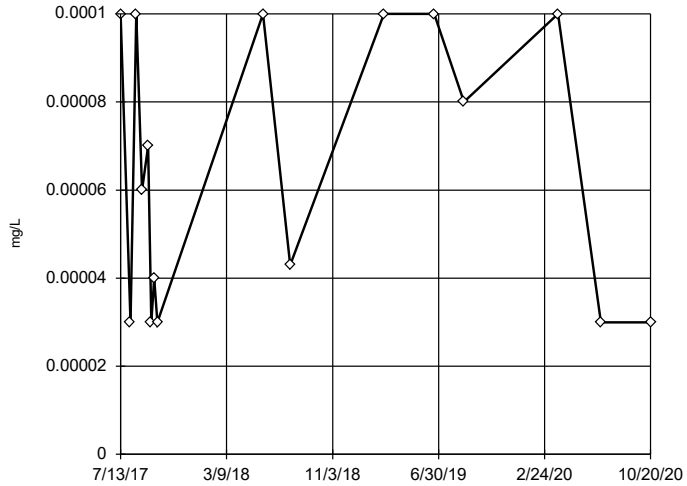
High cutoff = 2.915, low cutoff = 2.4e-8, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

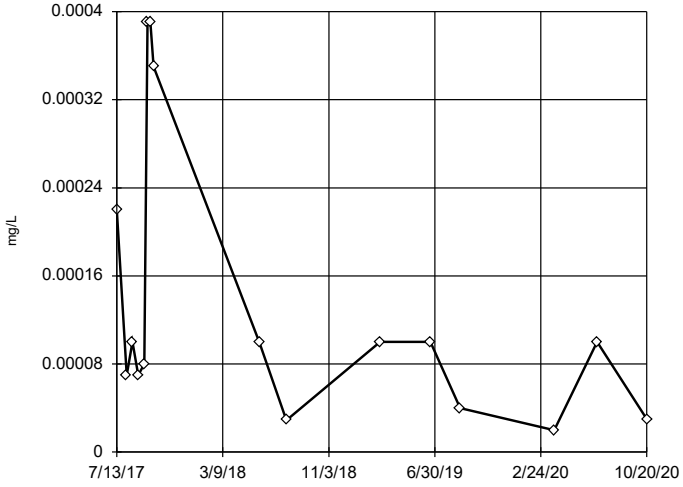
High cutoff = 0.0007901, low cutoff = -0.000003347, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

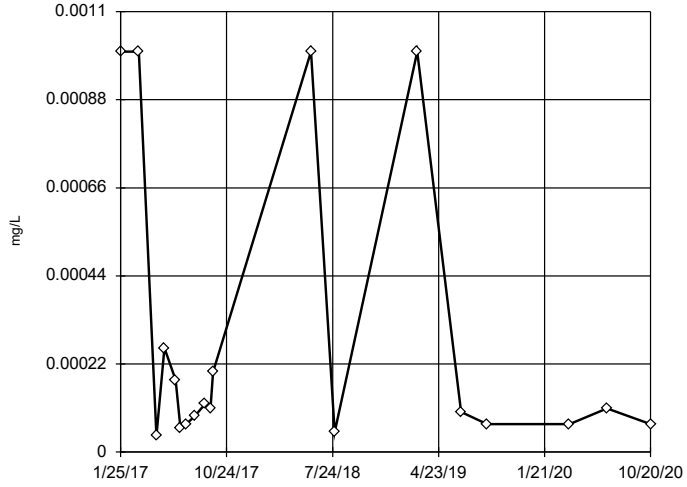
High cutoff = 0.003267, low cutoff = 0.000002403, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening

SP-2



n = 19

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

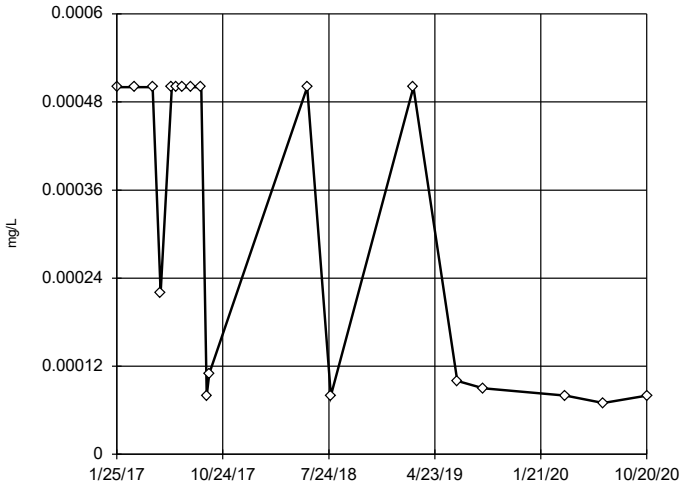
Data were natural log transformed to achieve best W statistic (graph shown in original units).

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).

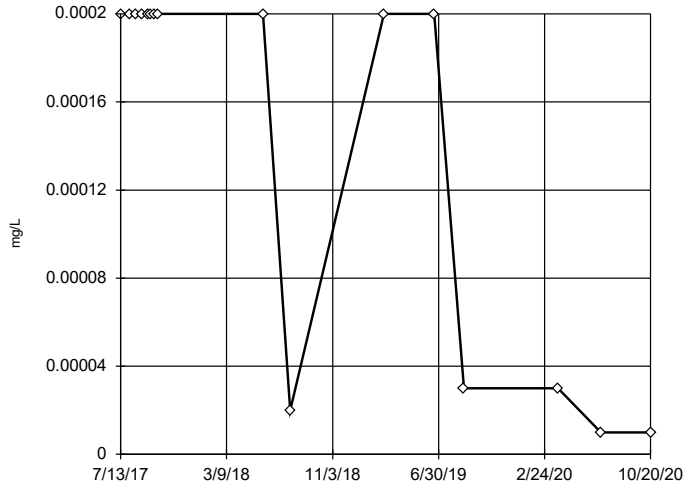
High cutoff = 0.1221, low cutoff = 3.3e-7, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

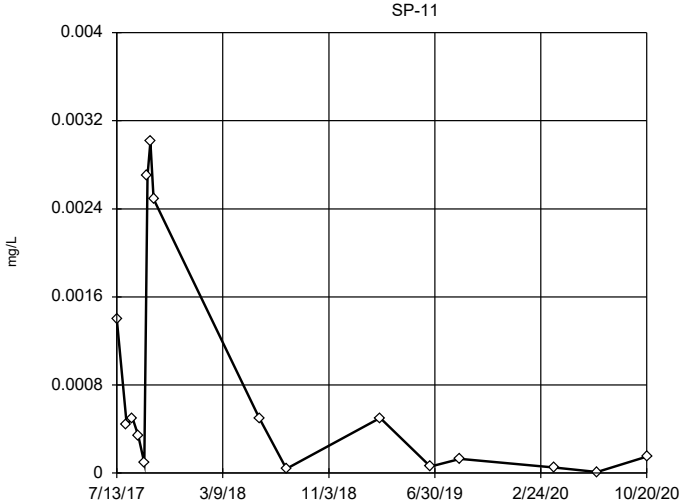
High cutoff = 0.05926, low cutoff = 1.0e-7, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

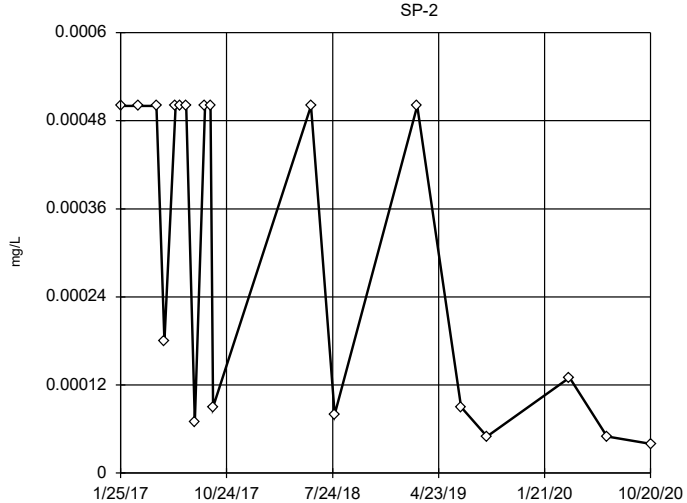
High cutoff = 1.235, low cutoff = 5.0e-8, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening

SP-2



n = 19

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

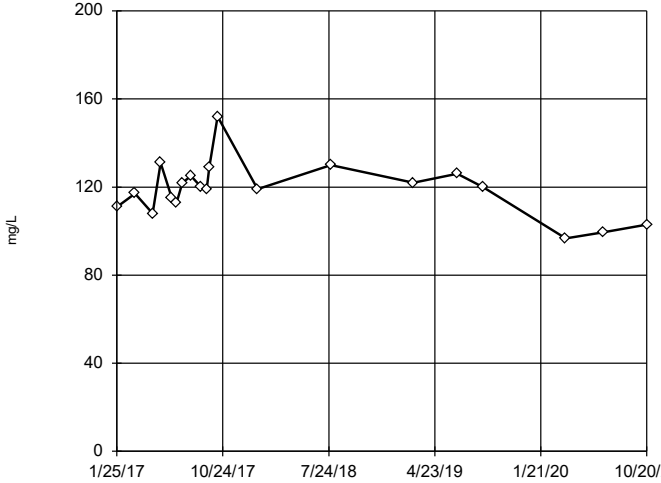
Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 0.1221, 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-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).

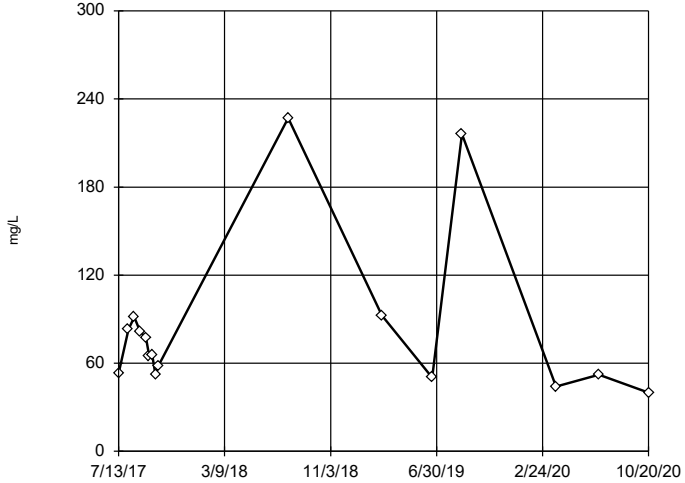
High cutoff = 176.6, low cutoff = 79.59, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

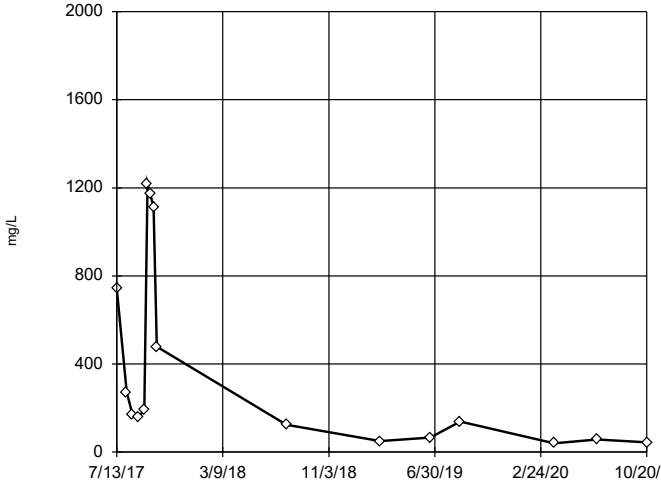
High cutoff = 405.6, low cutoff = 11.22, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

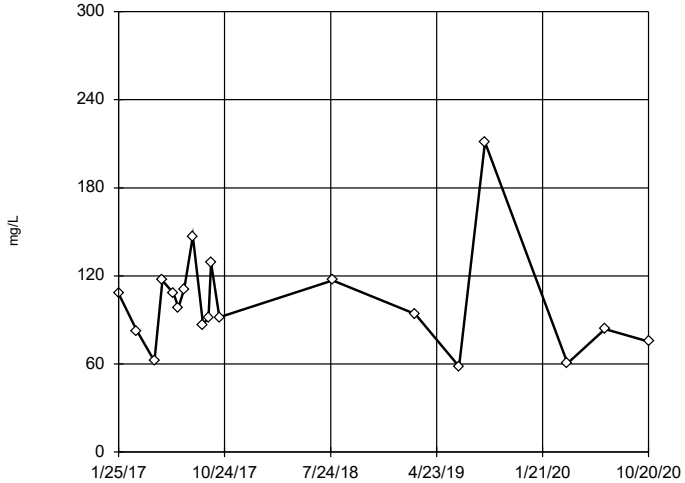
High cutoff = 548140, low cutoff = 0.06668, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening

SP-2



n = 19

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

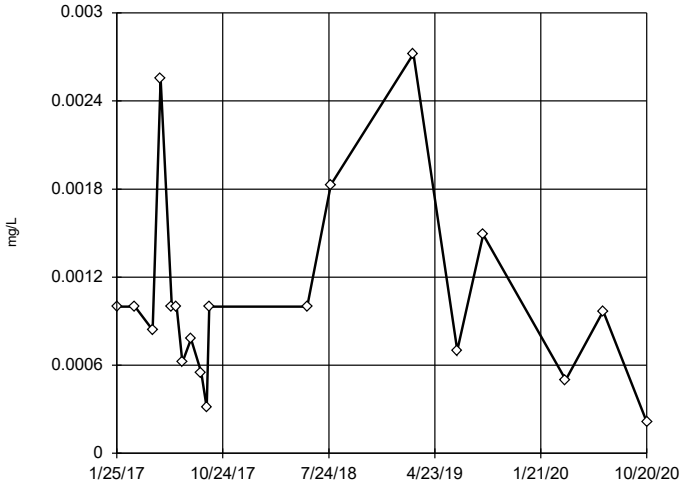
Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 332.5, low cutoff = 29.06, 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-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).

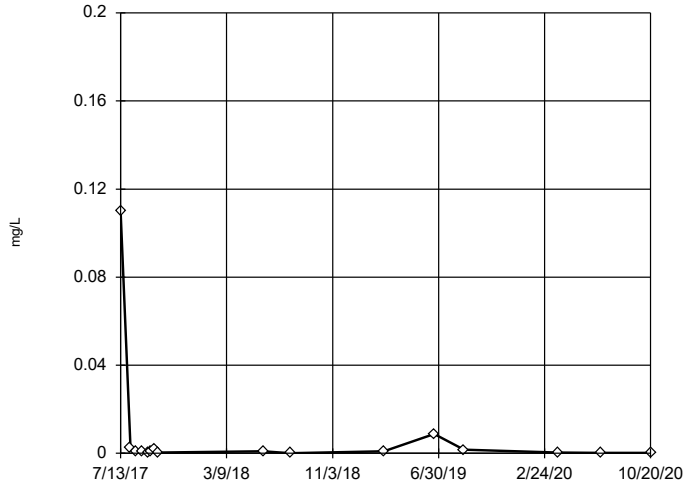
High cutoff = 0.004196, low cutoff = 0.0001478, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

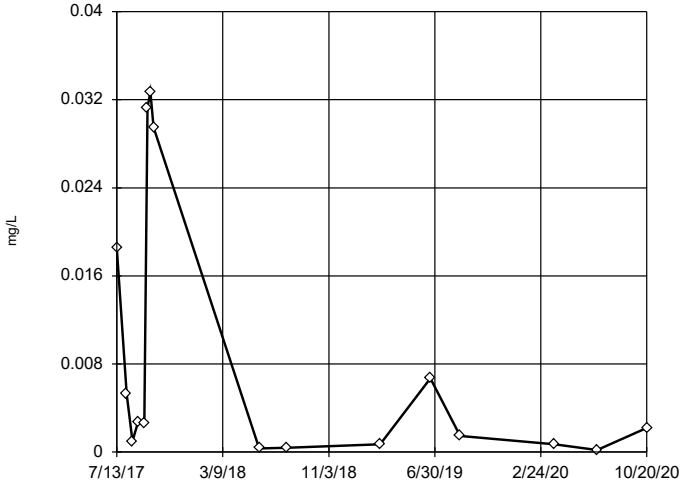
High cutoff = 0.2169, low cutoff = 0.000003125, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

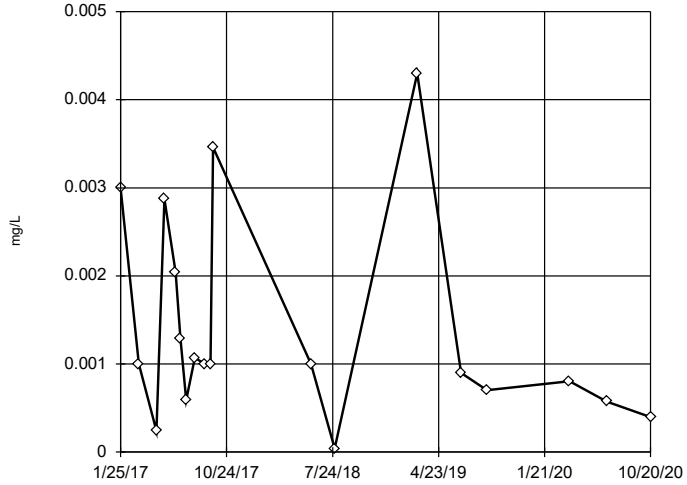
High cutoff = 44.54, low cutoff = 1.8e-7, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening

SP-2



n = 19

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

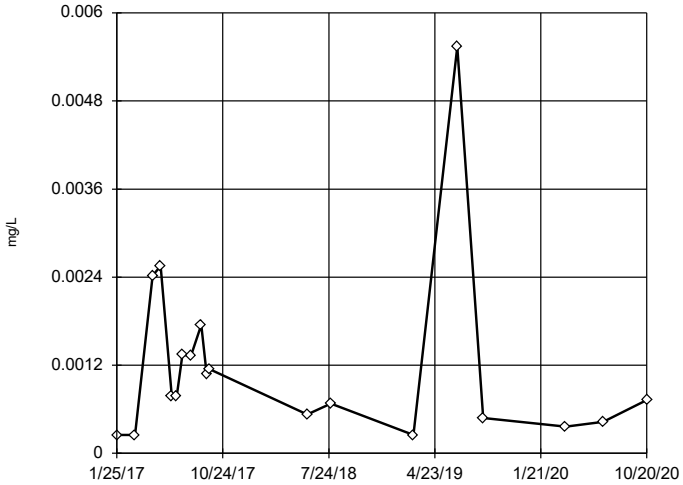
Data were cube root transformed to achieve best W statistic (graph shown in original units).

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).

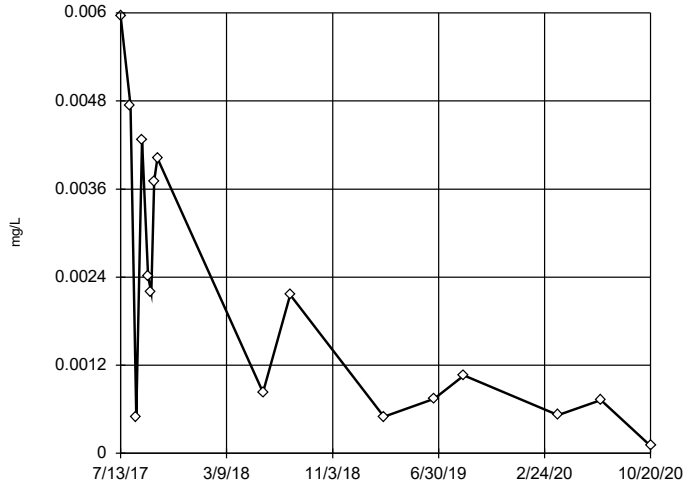
High cutoff = 0.04027, low cutoff = 0.00001434, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

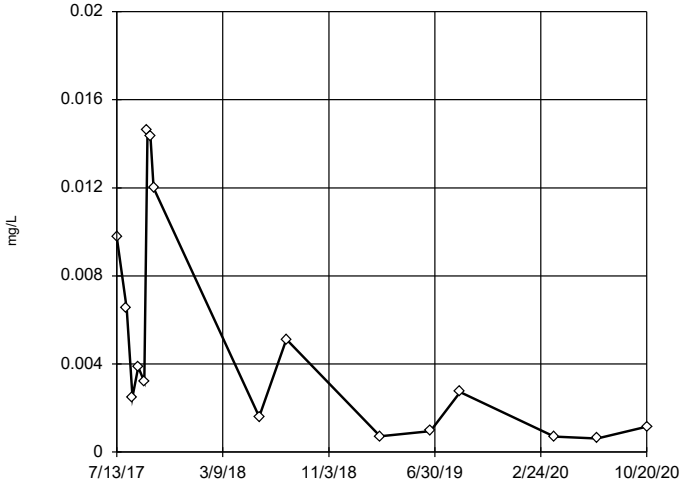
High cutoff = 0.05154, low cutoff = -0.002202, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

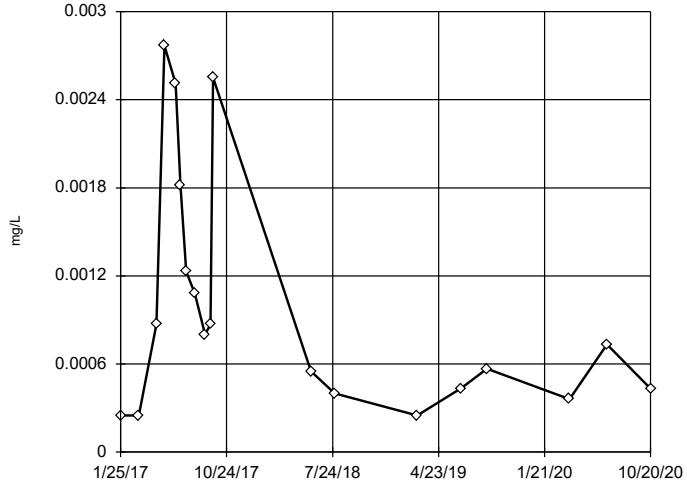
High cutoff = 3.512, low cutoff = 0.000002382, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening

SP-2



n = 19

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

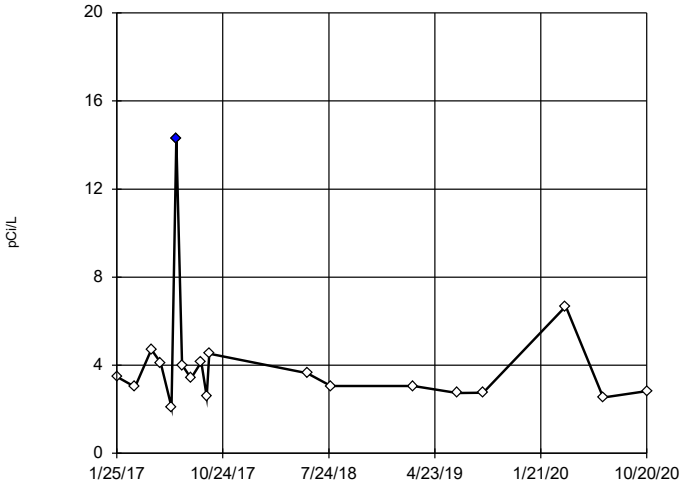
Data were natural log transformed to achieve best W statistic (graph shown in original units).

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



n = 19

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).

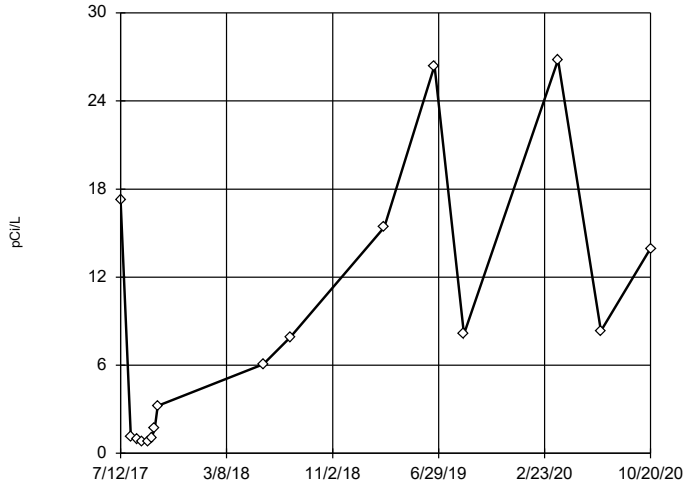
High cutoff = 14.26, low cutoff = 0.8002, based on IQR multiplier of 3.

Constituent: Combined Radium 226 + 228 Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

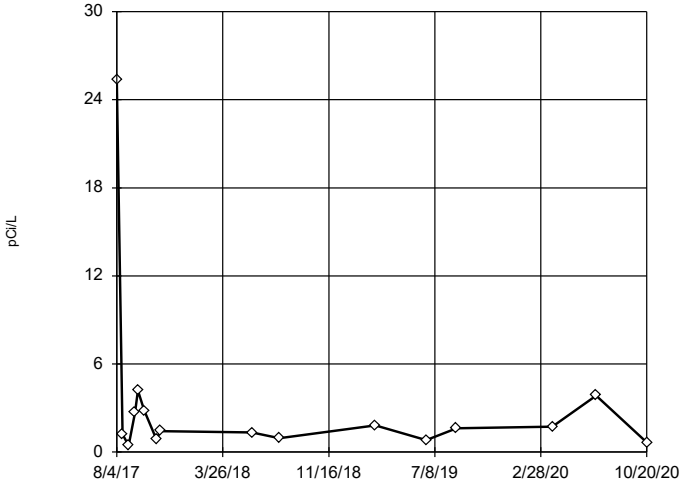
High cutoff = 299, low cutoff = -32.93, based on IQR multiplier of 3.

Constituent: Combined Radium 226 + 228 Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

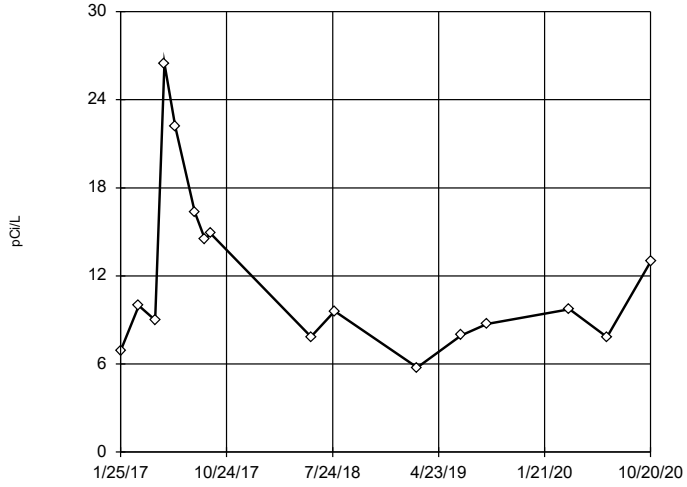
High cutoff = 77.88, low cutoff = 0.03186, based on IQR multiplier of 3.

Constituent: Combined Radium 226 + 228 Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening

SP-2



n = 16

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

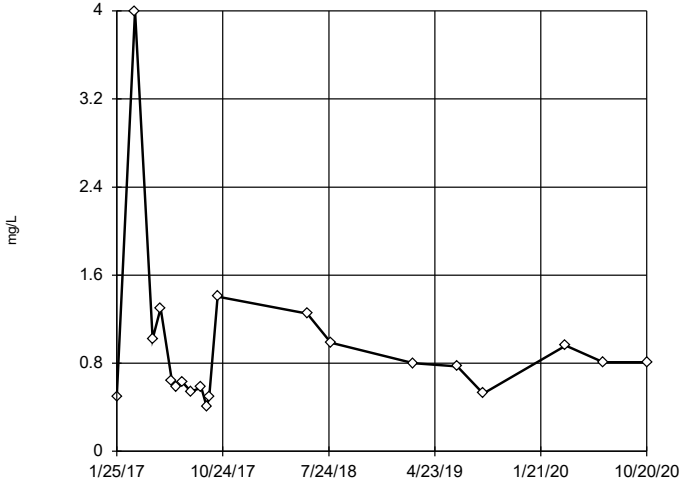
Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 94.47, low cutoff = 1.227, based on IQR multiplier of 3.

Constituent: Combined Radium 226 + 228 Analysis Run 12/28/2020 2:58 PM View: Outlier
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

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).

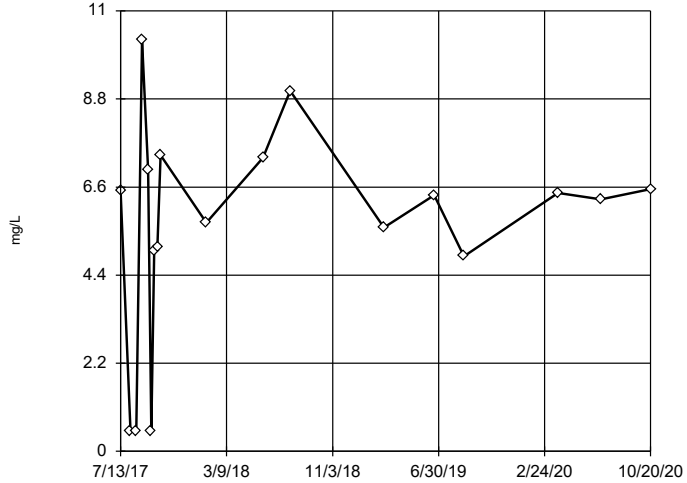
High cutoff = 5.724, low cutoff = 0.09832, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

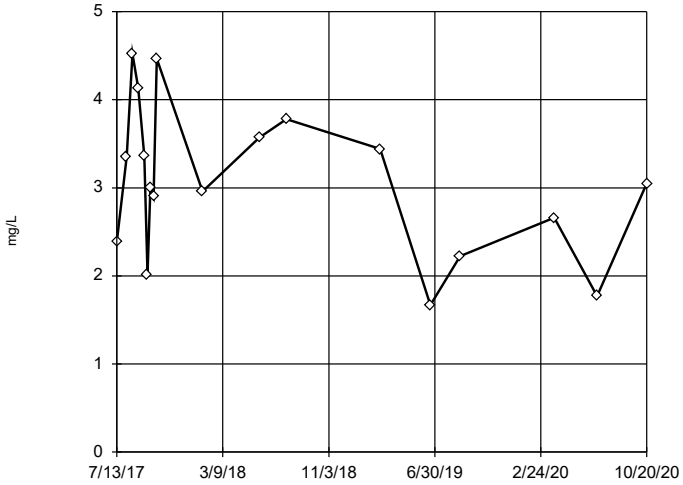
High cutoff = 11.54, low cutoff = -7.561, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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.

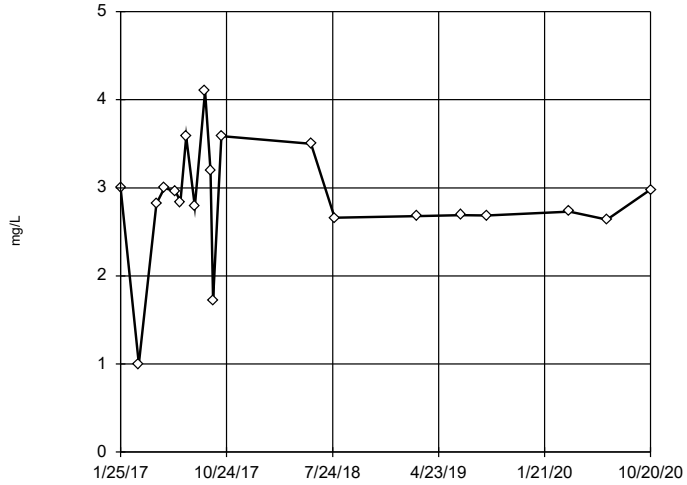
High cutoff = 7.784, low cutoff = -1.803, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening

SP-2



n = 20

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

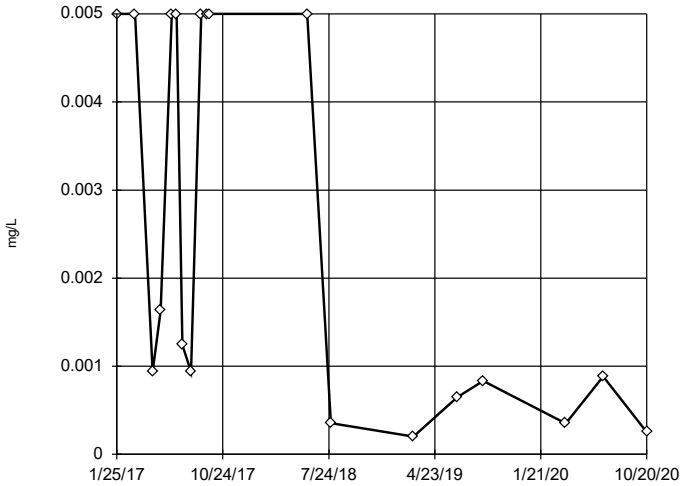
Data were square transformed to achieve best W statistic (graph shown in original units).

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).

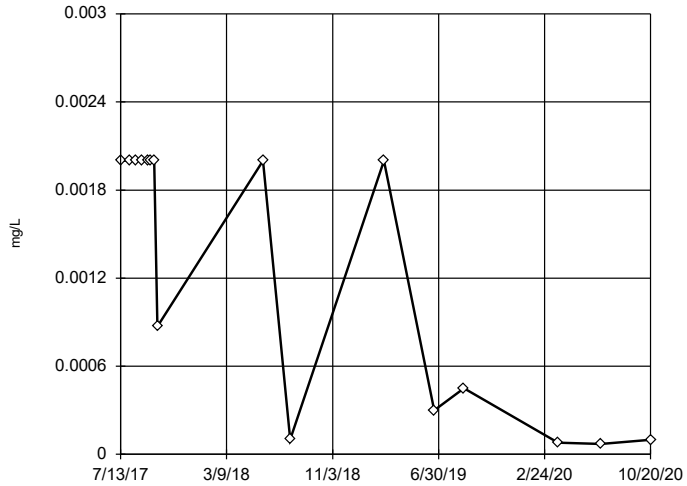
High cutoff = 2.276, low cutoff = 0.000001428, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

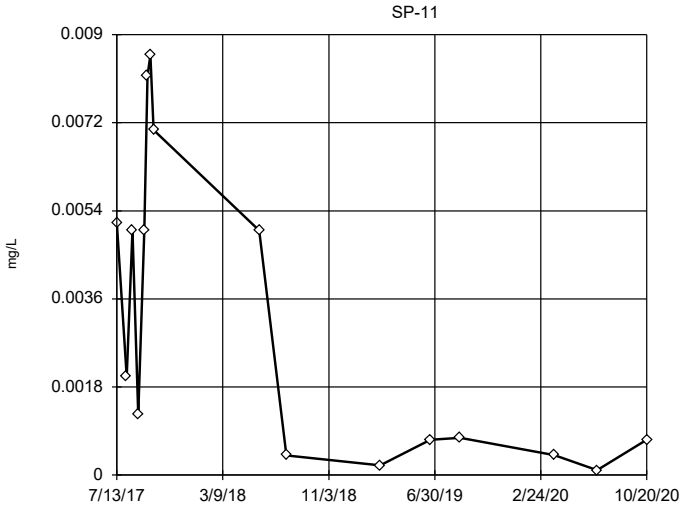
High cutoff = 2.989, low cutoff = 1.2e-7, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

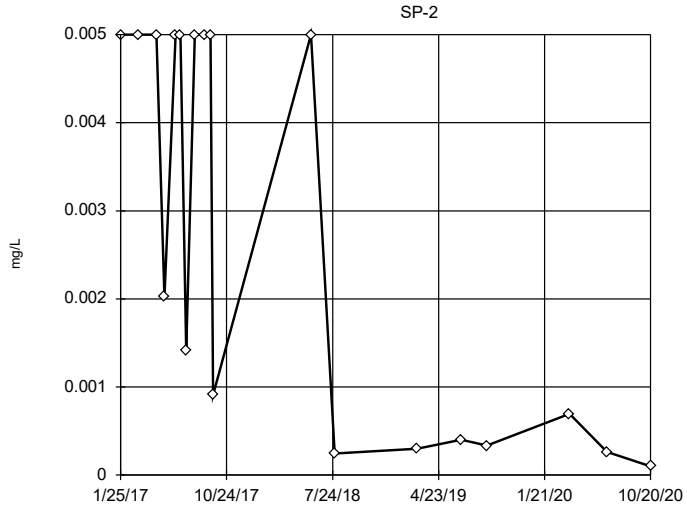
High cutoff = 4.174, low cutoff = 6.6e-7, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening

SP-2



n = 19

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

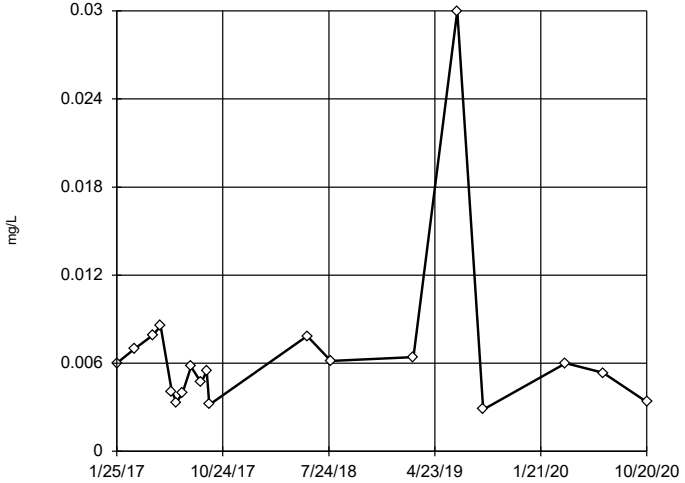
Data were natural log transformed to achieve best W statistic (graph shown in original units).

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).

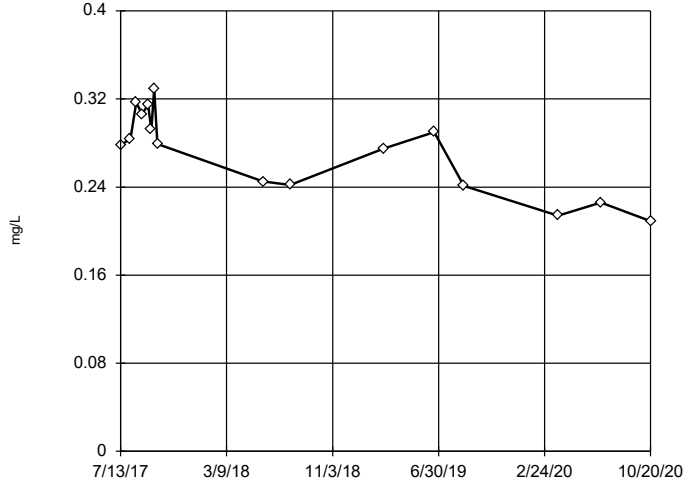
High cutoff = 0.03896, low cutoff = 0.0007097, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

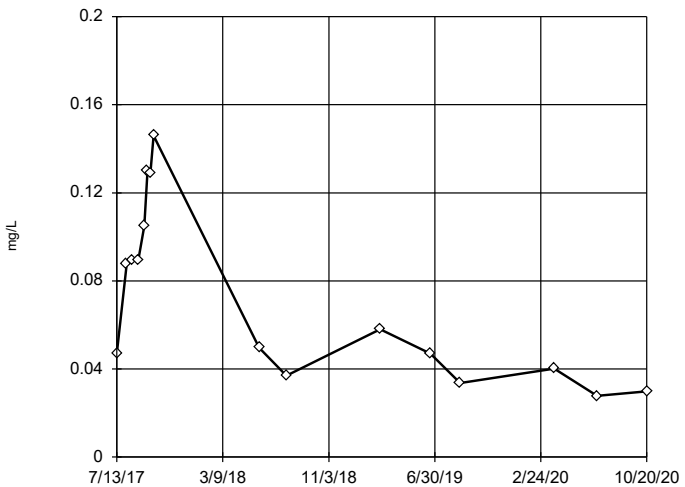
High cutoff = 0.4276, low cutoff = -0.1872, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening

SP-2

n = 19

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

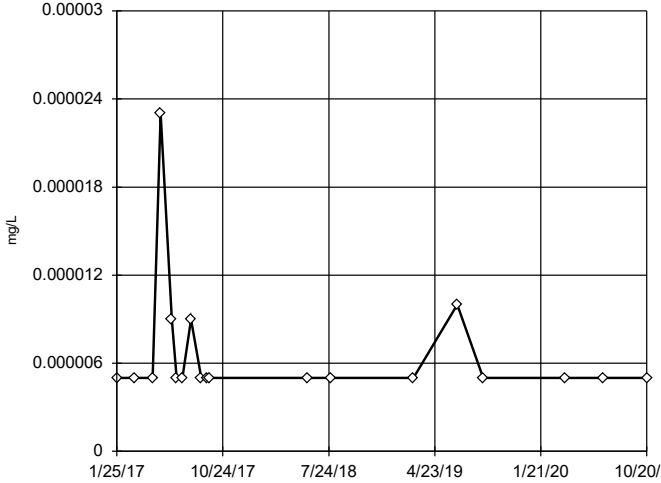
Ladder of Powers transformations did not improve normality; analysis run on raw data.

High cutoff = 0.2173, low cutoff = -0.0725, 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-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).

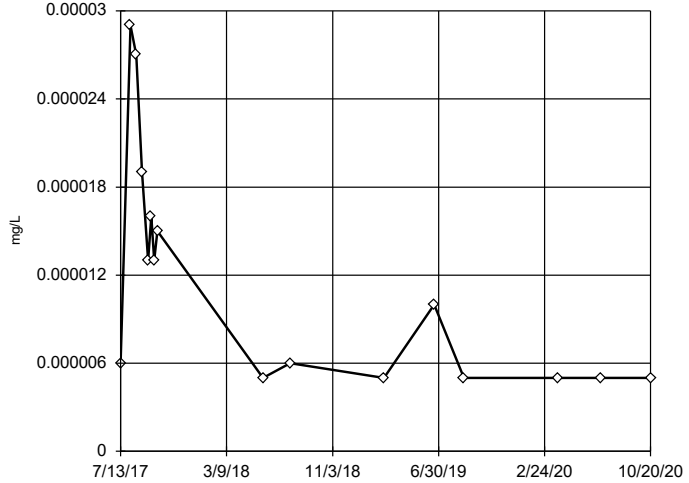
The results were invalidated, because the lower and upper quartiles are equal.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

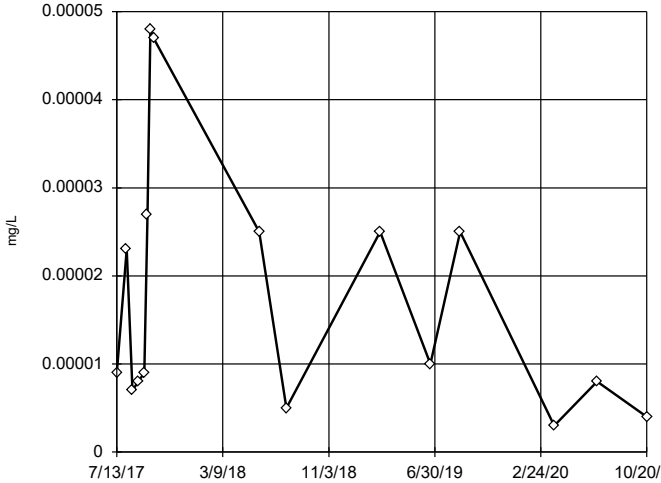
High cutoff = 0.0004608, low cutoff = 1.7e-7, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

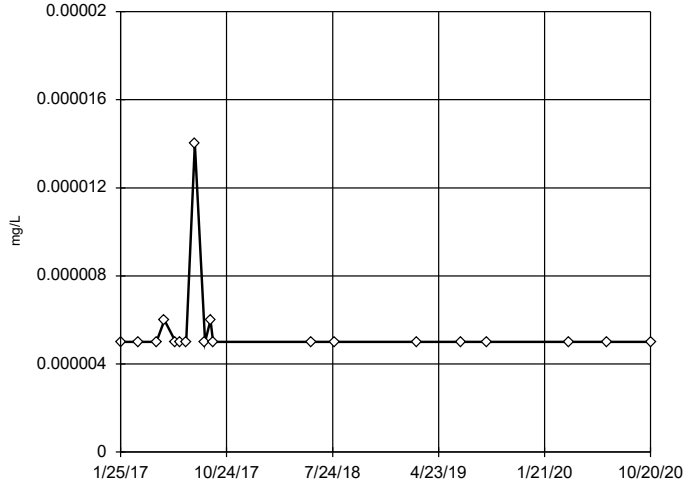
High cutoff = 0.0009321, low cutoff = 2.0e-7, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening

SP-2



n = 19

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

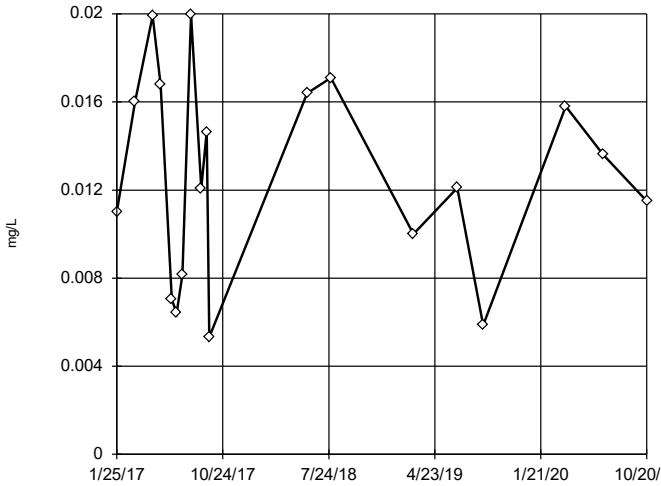
Data were natural log transformed to achieve best W statistic (graph shown in original units).

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.

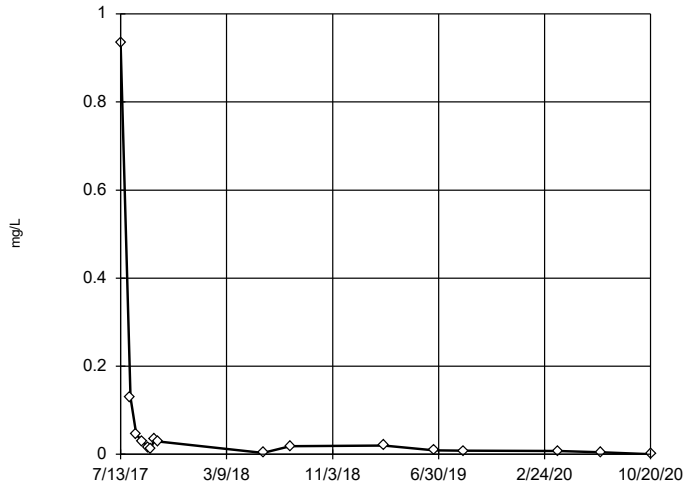
High cutoff = 0.04118, low cutoff = -0.01664, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

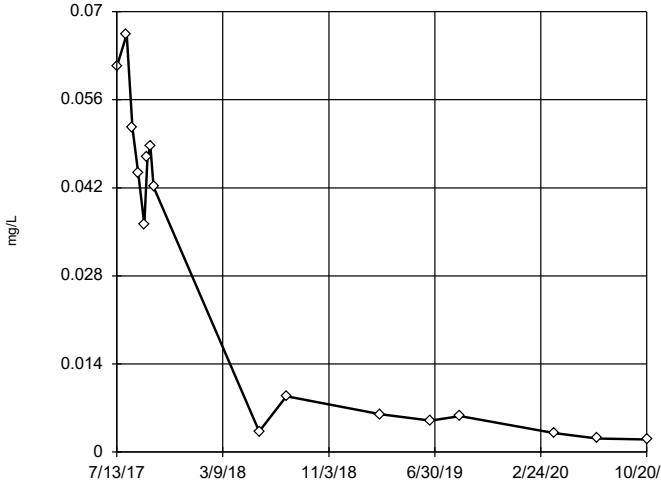
High cutoff = 2.512, low cutoff = 0.0001025, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

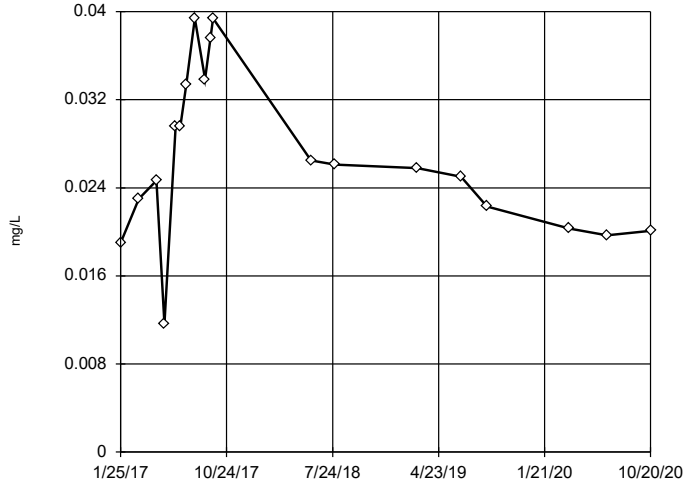
High cutoff = 78.62, low cutoff = 0.000002456, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening

SP-2



n = 19

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

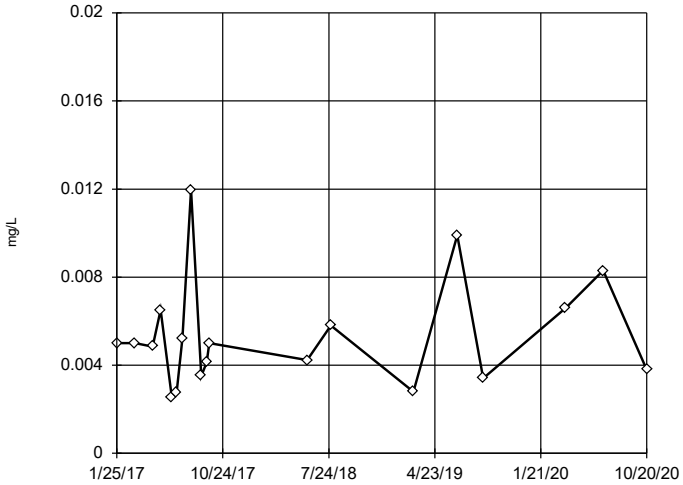
Data were square root transformed to achieve best W statistic (graph shown in original units).

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).

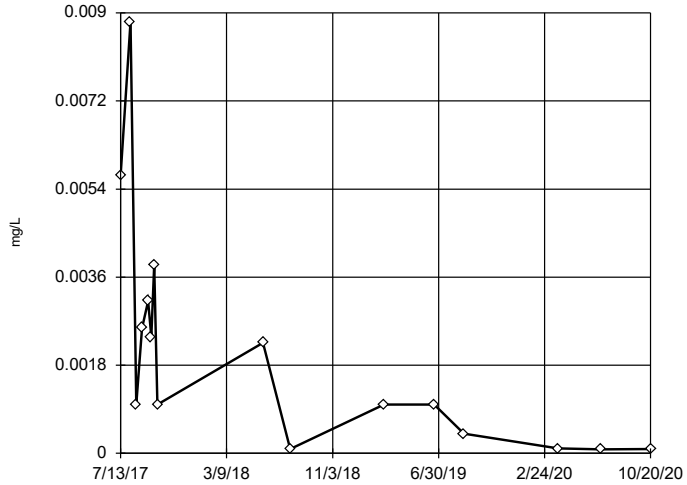
High cutoff = 0.04153, low cutoff = 0.0005502, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

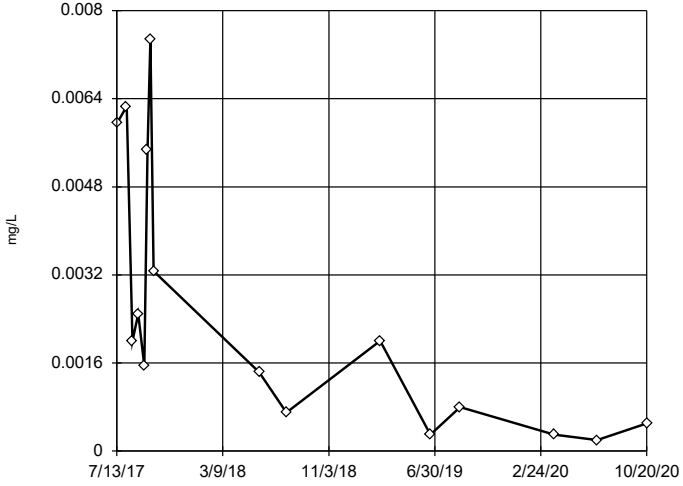
High cutoff = 0.05724, low cutoff = -0.006225, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

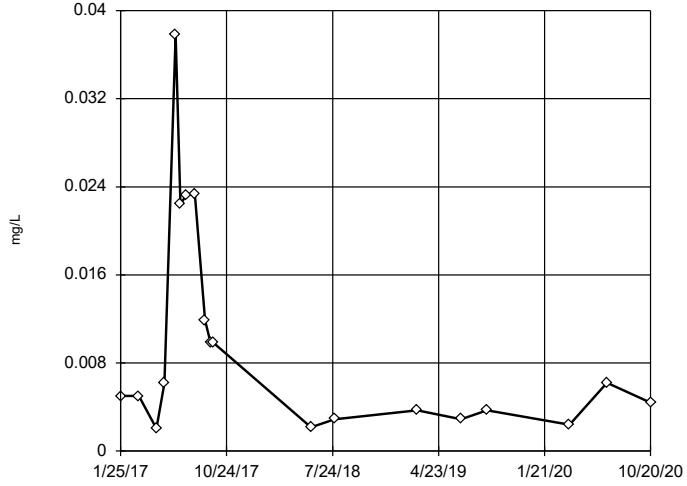
High cutoff = 1.539, low cutoff = 0.000001624, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening

SP-2



n = 19

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

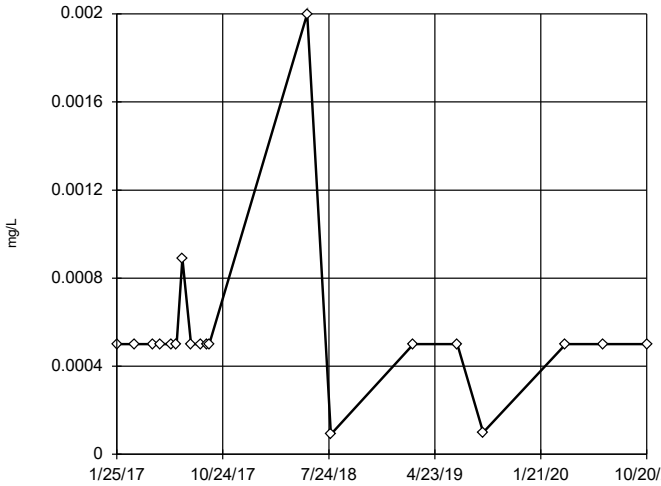
Data were natural log transformed to achieve best W statistic (graph shown in original units).

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).

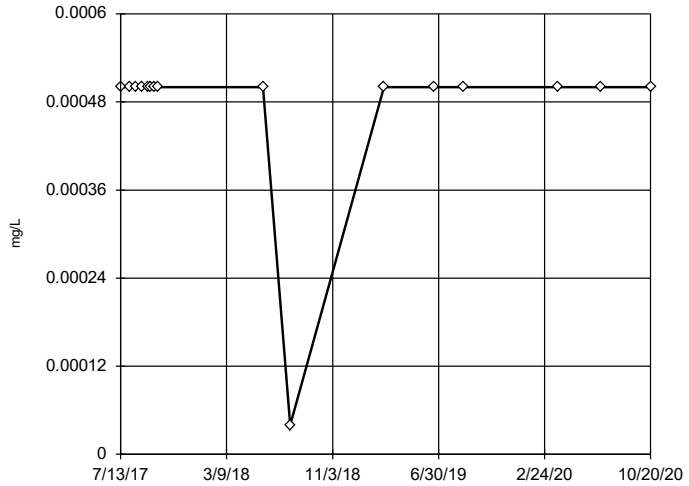
The results were invalidated, because the lower and upper quartiles are equal.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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.

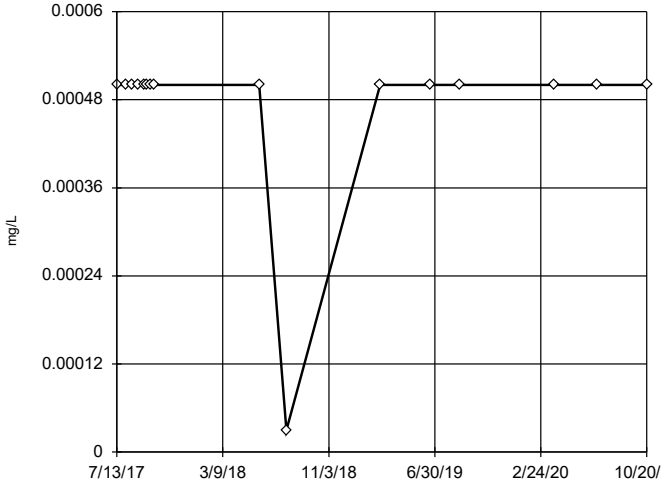
The results were invalidated, because the lower and upper quartiles are equal.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

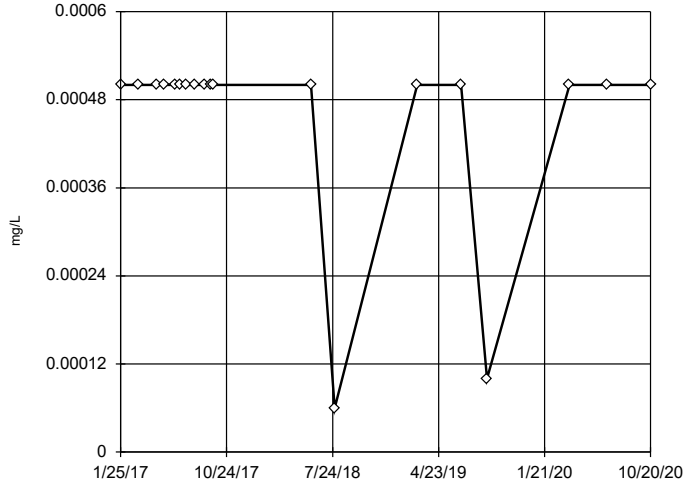
The results were invalidated, because the lower and upper quartiles are equal.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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**

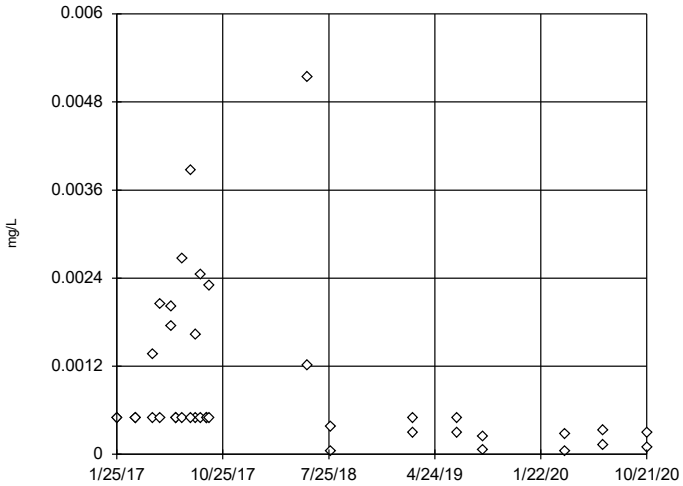
Tukey's Outlier Analysis - Upgradient Wells - All Results

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).

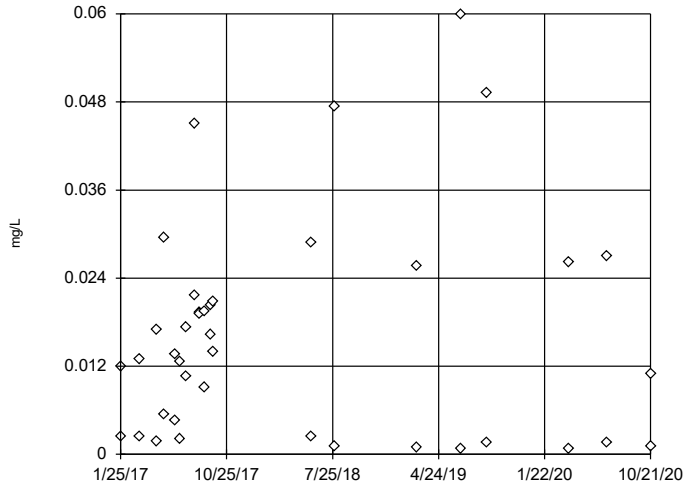
High cutoff = 0.09104, low cutoff = 0.000004366, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

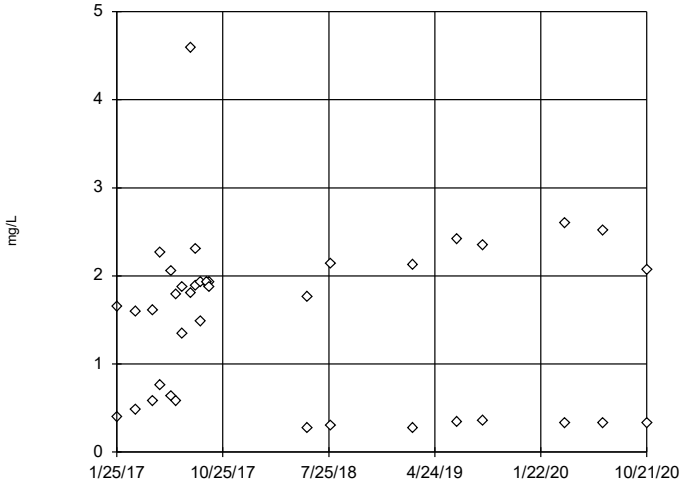
High cutoff = 0.1868, low cutoff = -0.05599, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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.

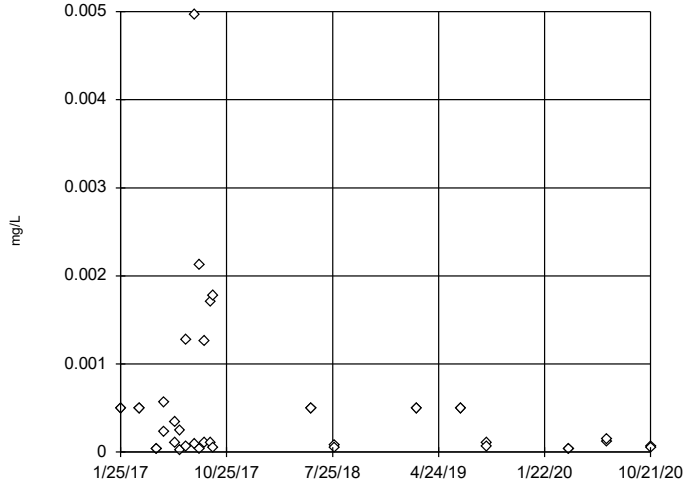
High cutoff = 6.661, low cutoff = -4.074, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening, Pooled Background

SP-4,SP-5R



n = 40

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

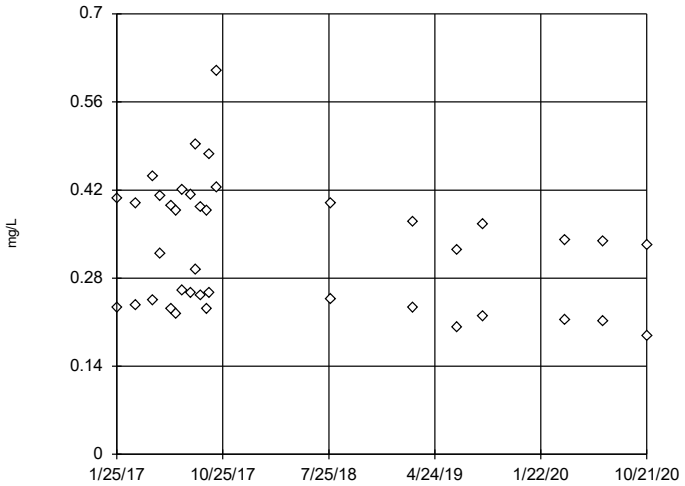
Data were natural log transformed to achieve best W statistic (graph shown in original units).

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).

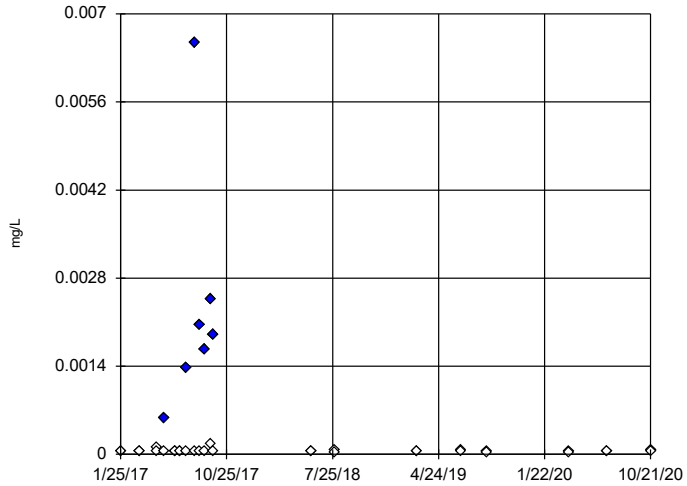
High cutoff = 1.966, low cutoff = 0.0476, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

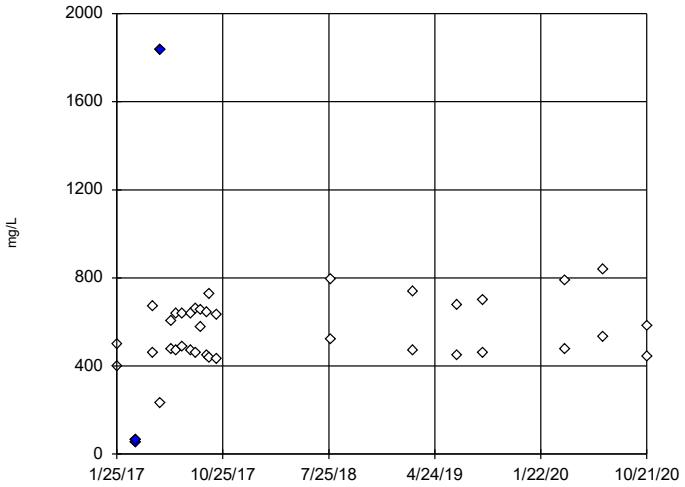
High cutoff = 0.0001921, low cutoff = 0.00001822, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

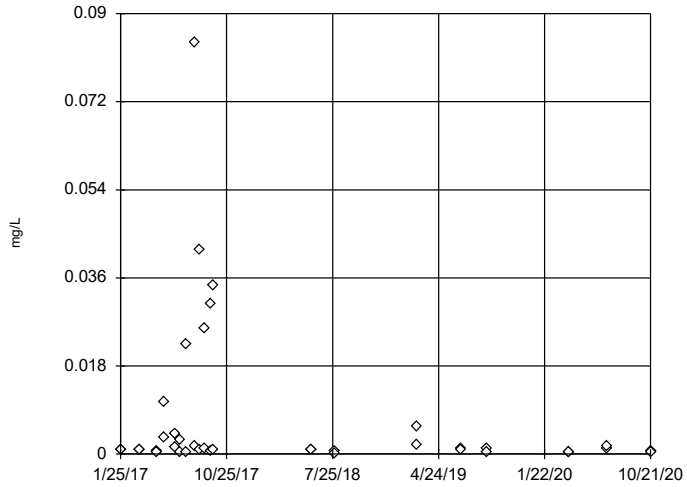
High cutoff = 1463, low cutoff = 77.16, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Tukey's Outlier Screening, Pooled Background

SP-4,SP-5R



n = 40

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

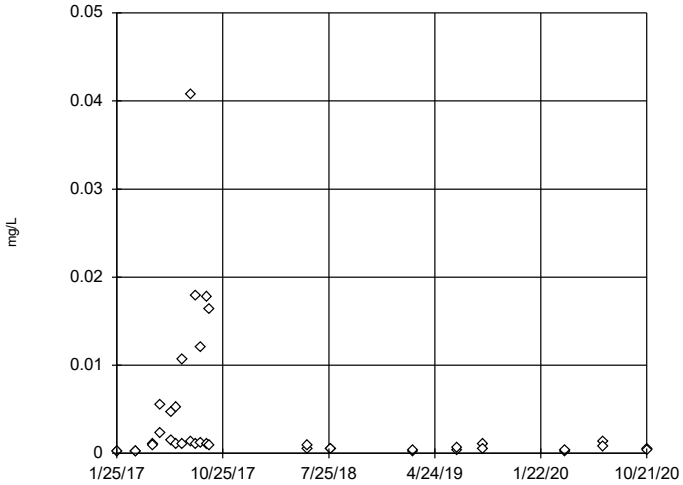
Data were natural log transformed to achieve best W statistic (graph shown in original units).

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.

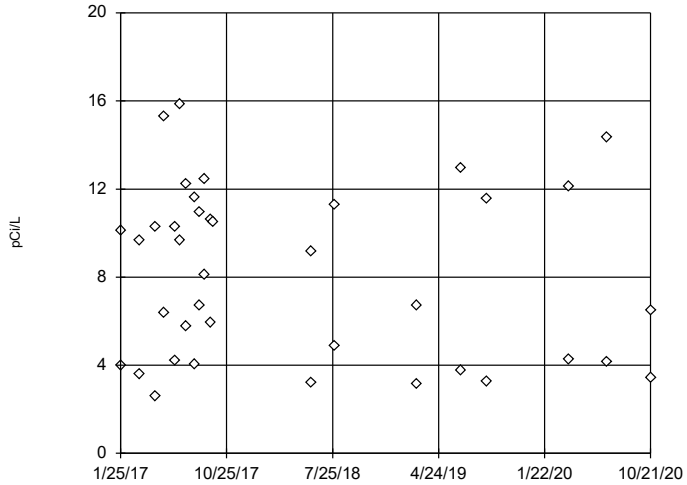
Data were natural log transformed to achieve best W statistic (graph shown in original units).

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.

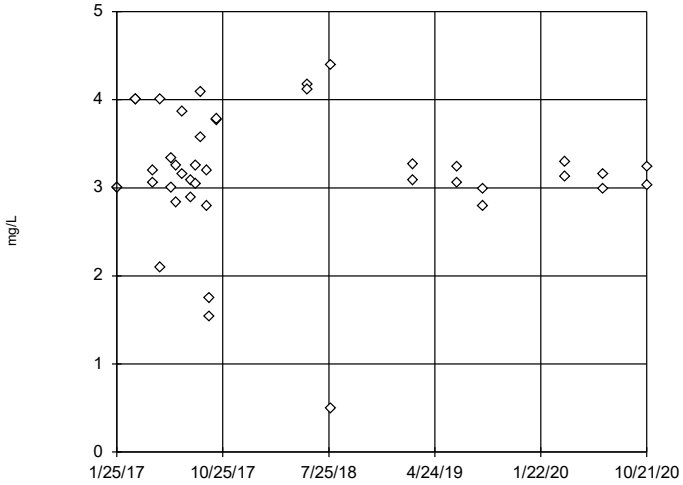
Data were square root transformed to achieve best W statistic (graph shown in original units).

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.

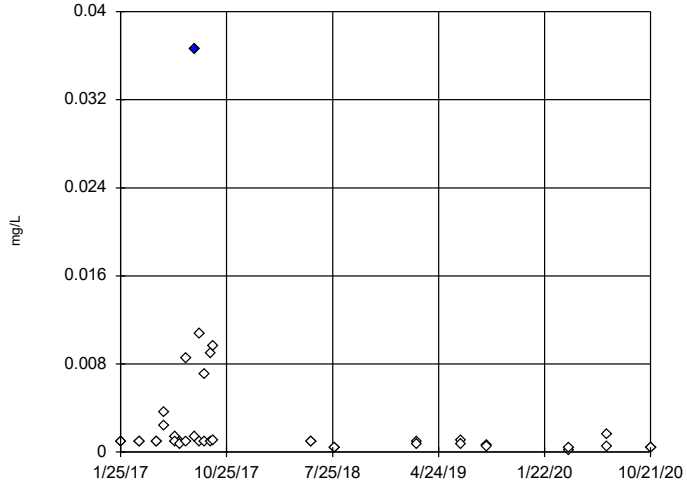
Data were square transformed to achieve best W statistic (graph shown in original units).

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.

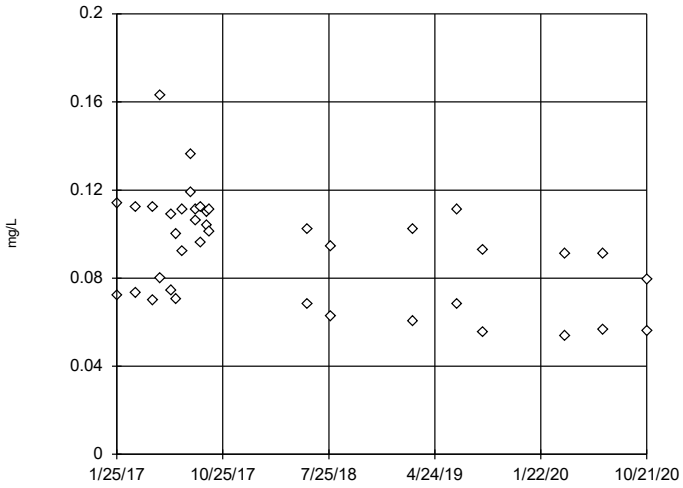
Data were natural log transformed to achieve best W statistic (graph shown in original units).

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.

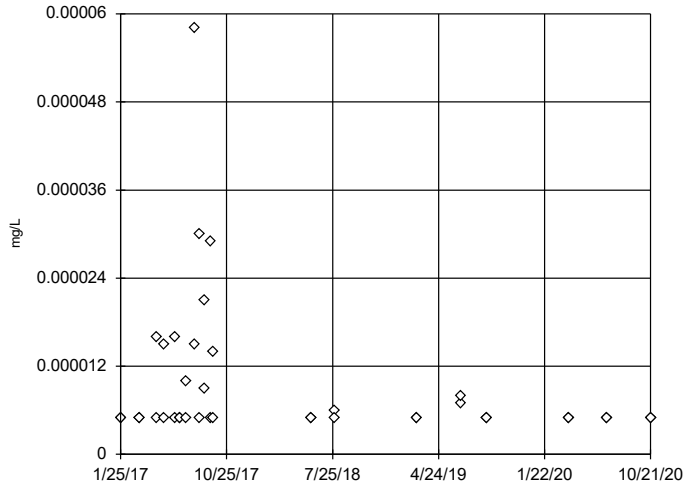
Constituent: Lithium Analysis Run 12/28/2020 2:56 PM View: Outlier

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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.

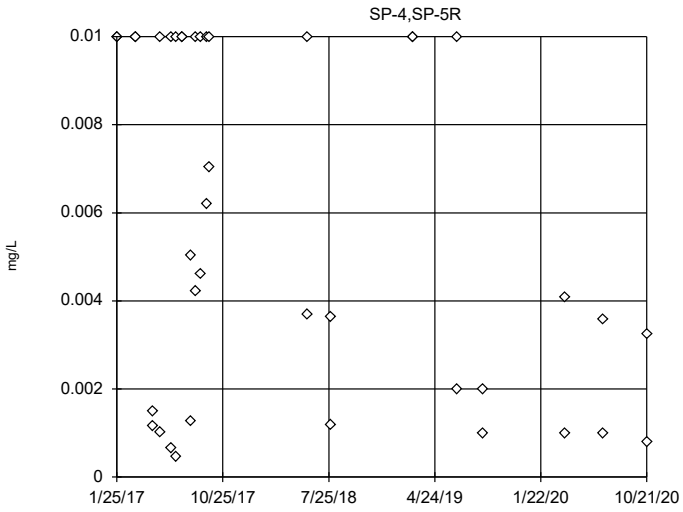
Constituent: Mercury Analysis Run 12/28/2020 2:56 PM View: Outlier

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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.

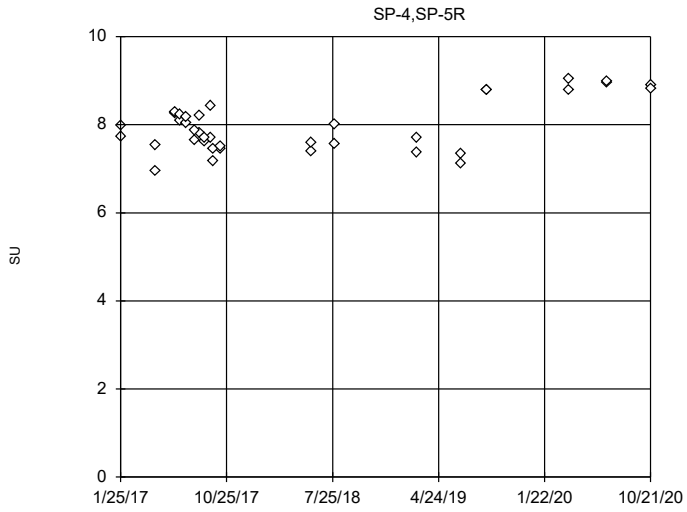
Constituent: Molybdenum Analysis Run 12/28/2020 2:56 PM View: Outlier

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

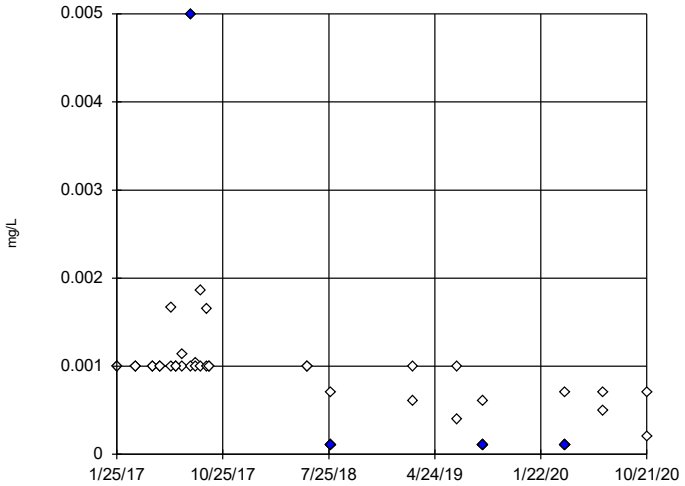
High cutoff = 11.41, low cutoff = 5.513, based on IQR multiplier of 3.

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



n = 40

Outliers are drawn as solid.
Tukey's method selected by user.

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

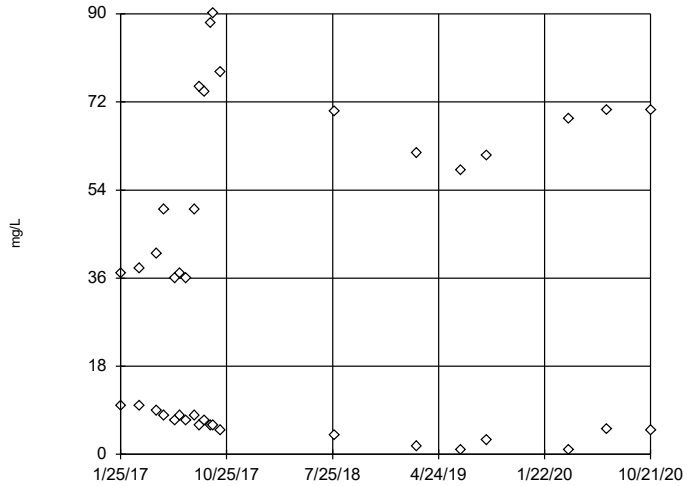
High cutoff = 0.002386, low cutoff = 0.0001678, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

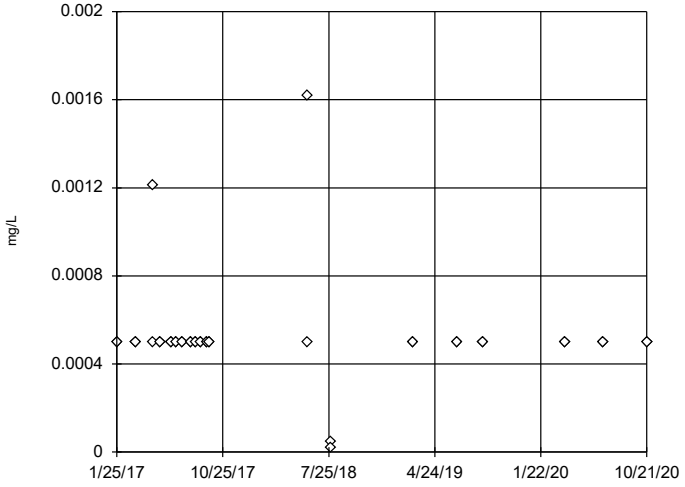
High cutoff = 65156, low cutoff = 0.00564, based on IQR multiplier of 3.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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).

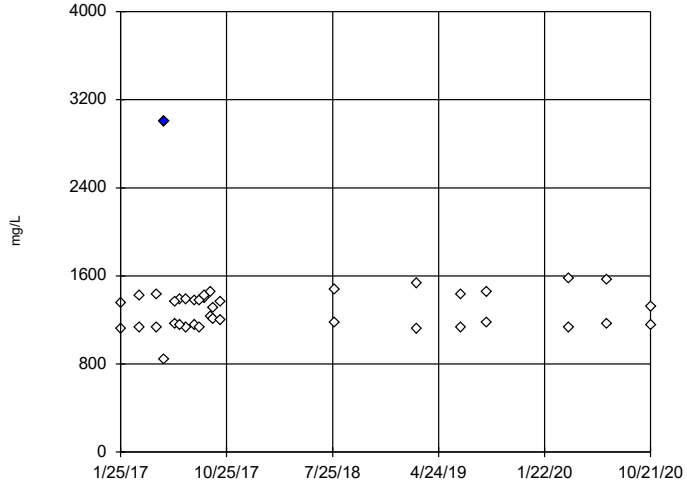
The results were invalidated, because the lower and upper quartiles are equal.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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 = 2688, low cutoff = 608.3, based on IQR multiplier of 3.

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

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

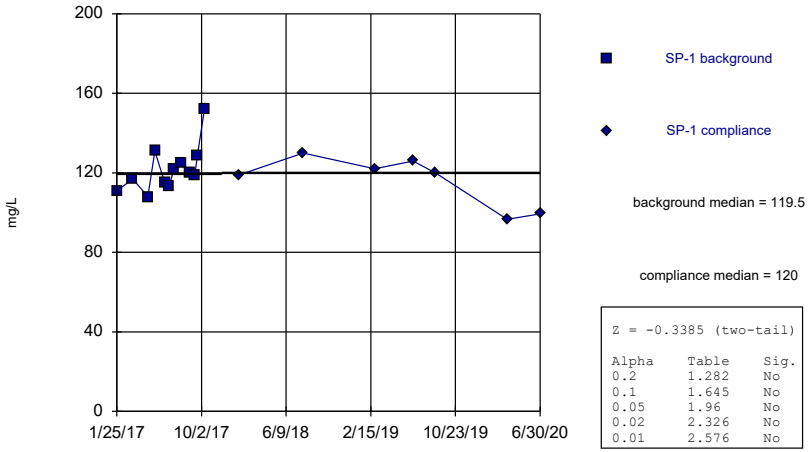
Welch's t-test/Mann-Whitney - All Results

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

Constituent	Well	Calc.	0.01	Method
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



Z = -0.3385 (two-tail)

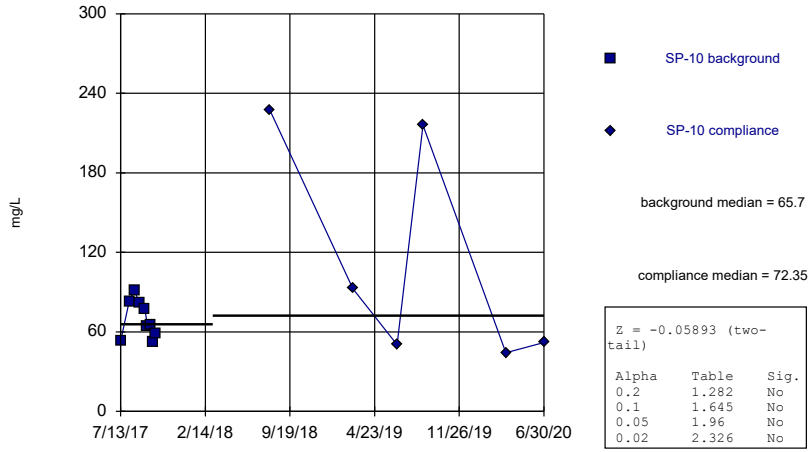
Alpha	Table	Sig.
0.2	1.282	No
0.1	1.645	No
0.05	1.96	No
0.02	2.326	No
0.01	2.576	No

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Mann-Whitney (Wilcoxon Rank Sum)

SP-10



Z = -0.05893 (two-tail)

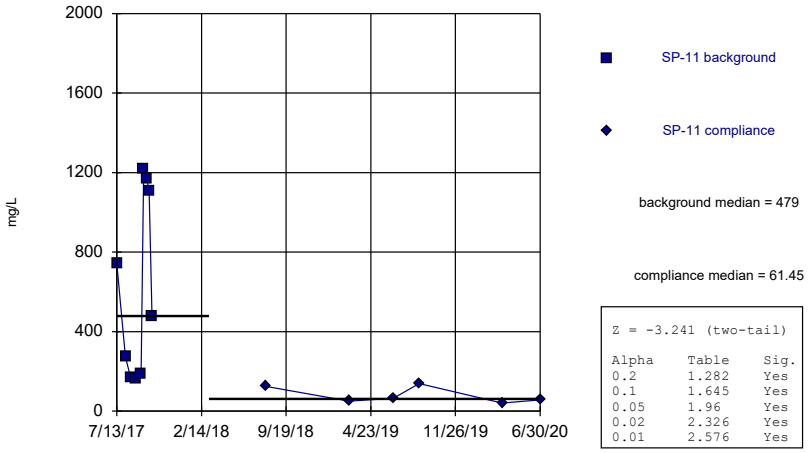
Alpha	Table	Sig.
0.2	1.282	No
0.1	1.645	No
0.05	1.96	No
0.02	2.326	No

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Mann-Whitney (Wilcoxon Rank Sum)

SP-11



Z = -3.241 (two-tail)

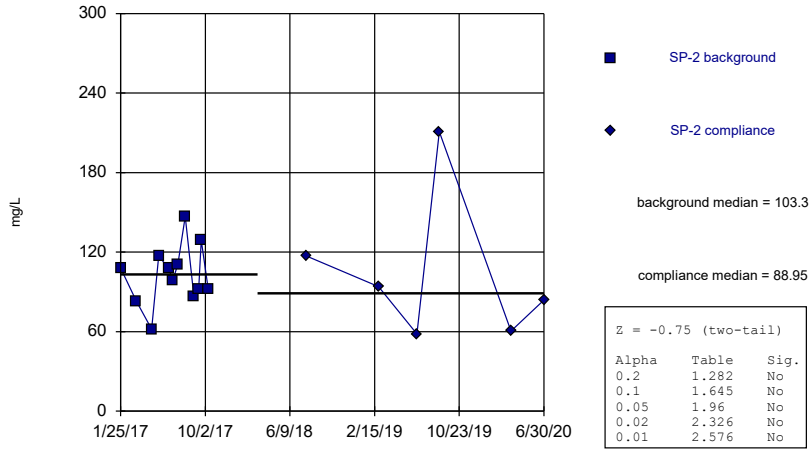
Alpha	Table	Sig.
0.2	1.282	Yes
0.1	1.645	Yes
0.05	1.96	Yes
0.02	2.326	Yes
0.01	2.576	Yes

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Mann-Whitney (Wilcoxon Rank Sum)

SP-2



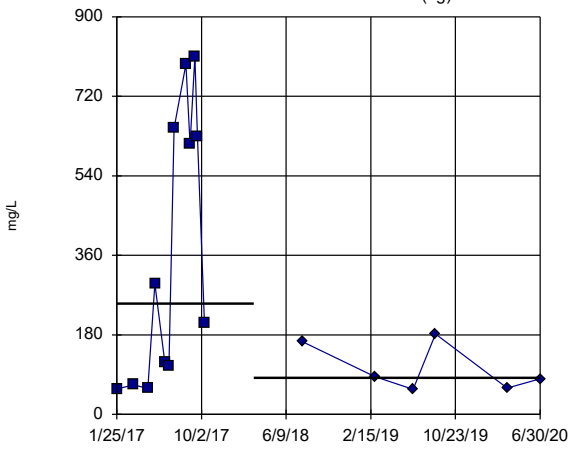
Z = -0.75 (two-tail)

Alpha	Table	Sig.
0.2	1.282	No
0.1	1.645	No
0.05	1.96	No
0.02	2.326	No
0.01	2.576	No

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)



SP-4 background

SP-4 compliance

background median = 251

compliance median = 83.05

Z = -1.733 (two-tail)

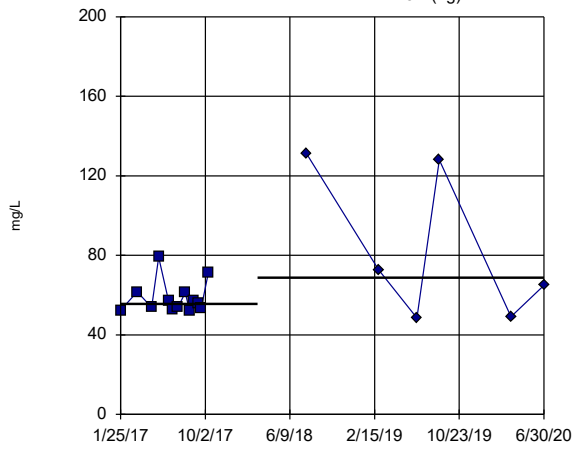
Alpha	Table	Sig.
0.2	1.282	Yes
0.1	1.645	Yes
0.05	1.96	No
0.02	2.326	No
0.01	2.576	No

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Mann-Whitney (Wilcoxon Rank Sum)

SP-5R (bg)



SP-5R background

SP-5R compliance

background median = 55.6

compliance median = 68.85

Z = 0.8336 (two-tail)

Alpha	Table	Sig.
0.2	1.282	No
0.1	1.645	No
0.05	1.96	No
0.02	2.326	No
0.01	2.576	No

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

FIGURE E.

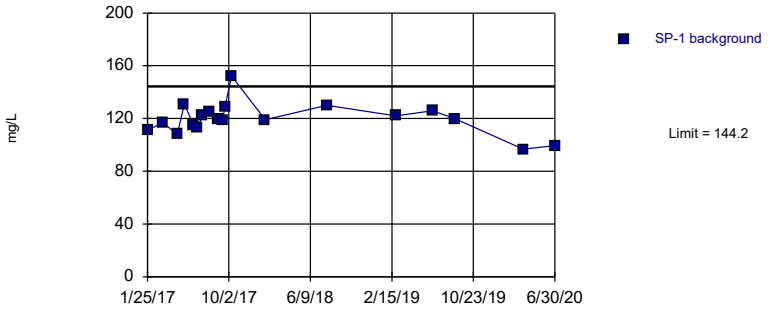
Appendix III - Intrawell Prediction Limits - All Results

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

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	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

Prediction Limit

Intrawell Parametric, SP-1



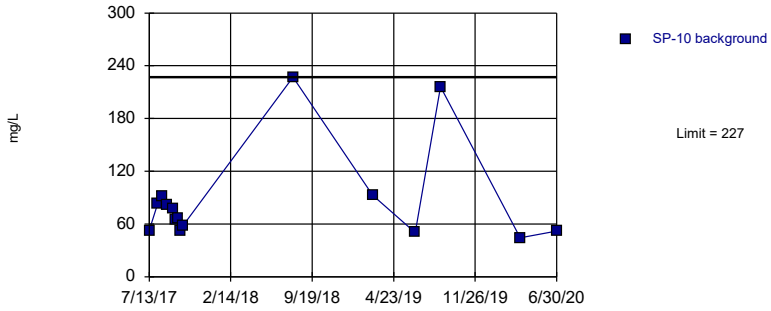
Background Data Summary: Mean=119.7, Std. Dev.=12.18, n=19. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9445, critical = 0.863. Kappa = 2.01 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.00188. Assumes 1 future value.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Prediction Limit

Intrawell Non-parametric, SP-10



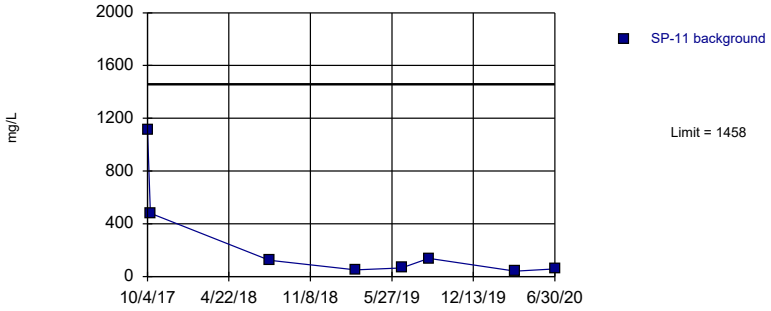
Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 15 background values. Well-constituent pair annual alpha = 0.01501. Individual comparison alpha = 0.007533 (1 of 2). Assumes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

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Prediction Limit

Intrawell Parametric, SP-11



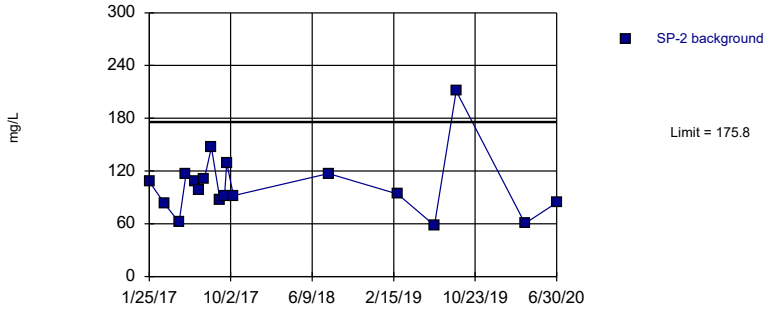
Background Data Summary (based on square root transformation): Mean=13.4, Std. Dev.=9.475, n=8. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.7642, critical = 0.749. Kappa = 2.616 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.00188. Assumes 1 future value.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Prediction Limit

Intrawell Parametric, SP-2

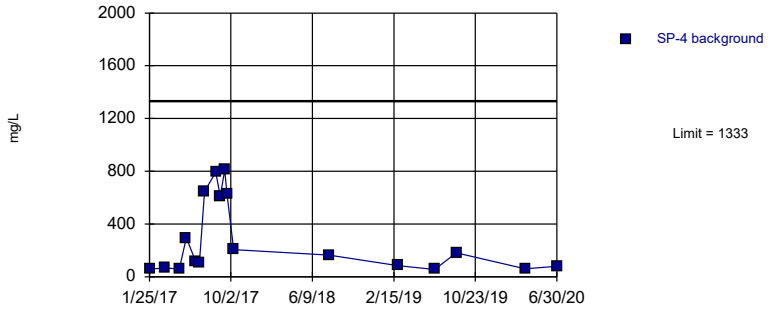


Background Data Summary: Mean=103.2, Std. Dev.=35.71, n=18. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8694, critical = 0.858. Kappa = 2.032 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.00188. Assumes 1 future value.

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)



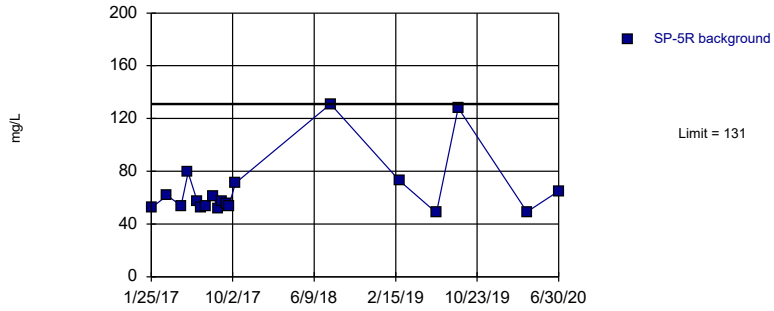
Background Data Summary (based on natural log transformation): Mean=5.155, Std. Dev.=1.004, n=18. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8679, critical = 0.858. Kappa = 2.032 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.00188. Assumes 1 future value.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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

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**
Sulfate (mg/L)	**SP-5R (bg)**	**-2.968**	**-145**	**-81**	**Yes**	**20**	**0**	**n/a**	**n/a**	**0.01**	**NP**

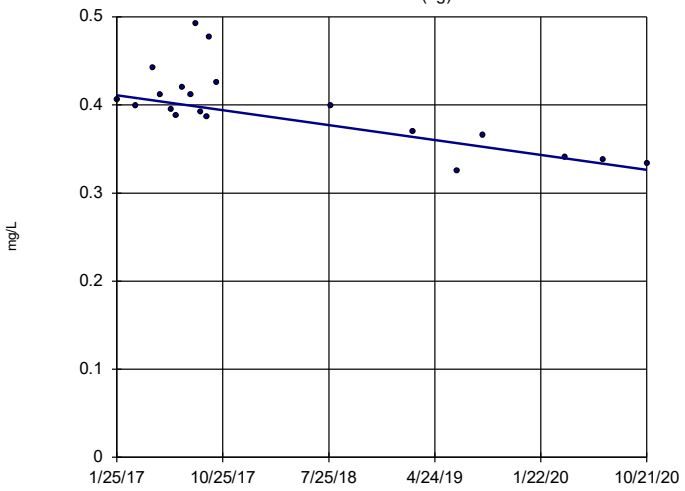
Trend Tests - Interwell Upgradient Well - All Results

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)



n = 20

Slope = -0.02259 units per year.

Mann-Kendall statistic = -89 critical = -81

Decreasing trend significant at 99% confidence level (α = 0.005 per tail).

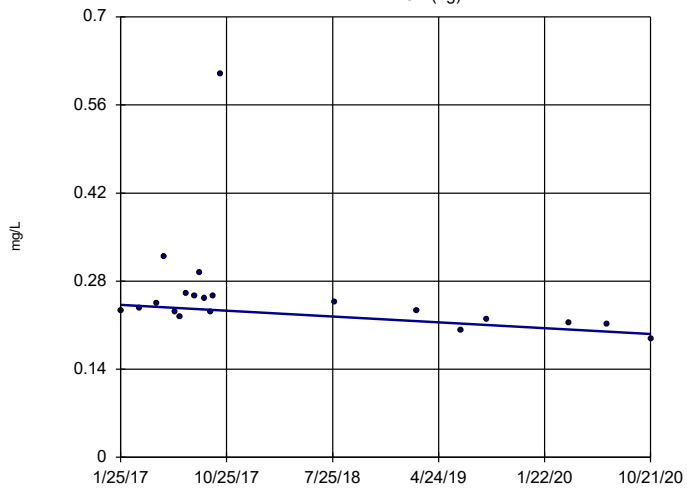
Constituent: Boron Analysis Run 12/28/2020 3:35 PM View: Interwell

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Sen's Slope Estimator

SP-5R (bg)



n = 20

Slope = -0.01237 units per year.

Mann-Kendall statistic = -65 critical = -81

Trend not significant at 99% confidence level (α = 0.005 per tail).

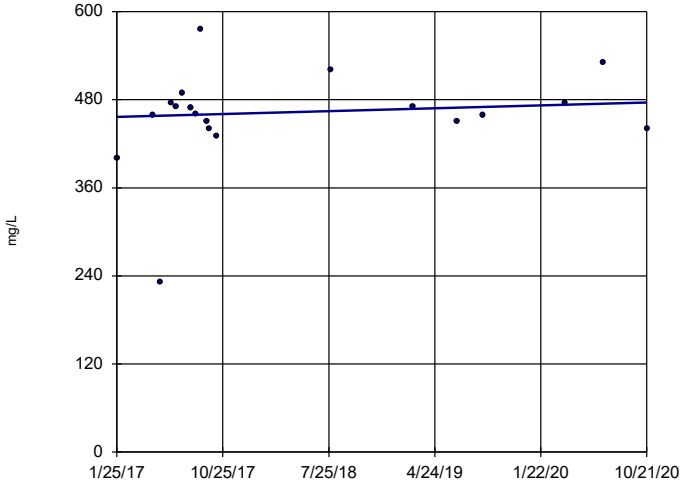
Constituent: Boron Analysis Run 12/28/2020 3:35 PM View: Interwell

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Sen's Slope Estimator

SP-4 (bg)



n = 19

Slope = 5.207 units per year.

Mann-Kendall statistic = 18 critical = 74

Trend not significant at 99% confidence level (α = 0.005 per tail).

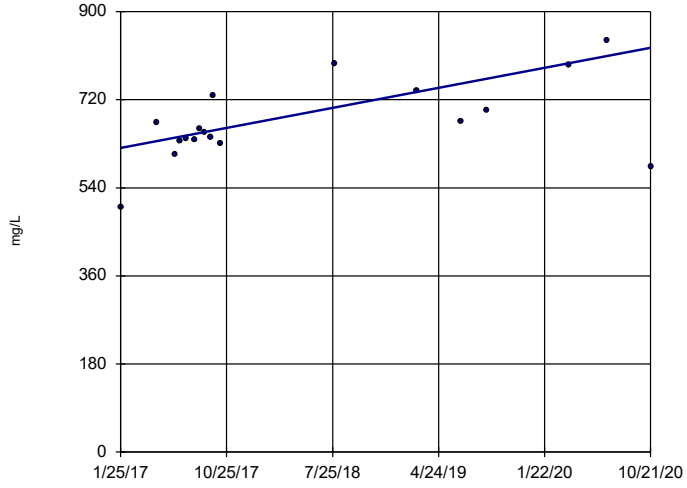
Constituent: Chloride Analysis Run 12/28/2020 3:35 PM View: Interwell

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Sen's Slope Estimator

SP-5R (bg)



n = 18

Slope = 54.75 units per year.

Mann-Kendall statistic = 67 critical = 68

Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Chloride Analysis Run 12/28/2020 3:35 PM View: Interwell

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

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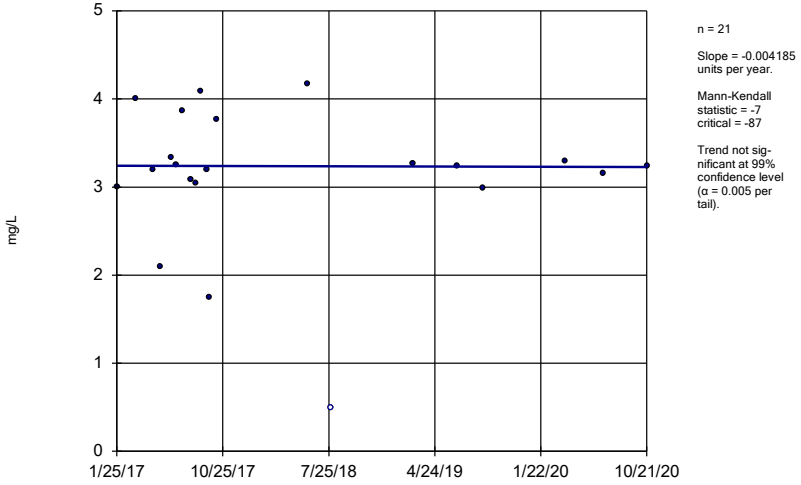
Hollow symbols indicate censored values.

Sen's Slope Estimator

SP-4 (bg)



n = 21

Slope = -0.004185 units per year.

Mann-Kendall statistic = -7 critical = -87

Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Fluoride Analysis Run 12/28/2020 3:35 PM View: Interwell

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

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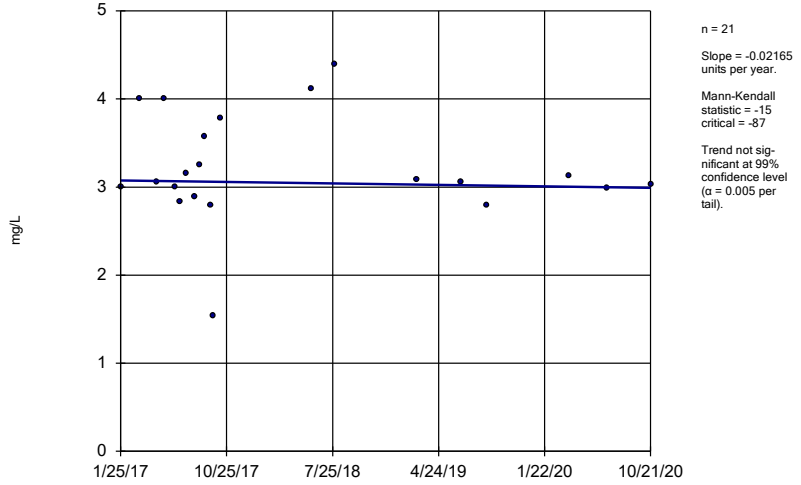
Sen's Slope Estimator

SP-5R (bg)



n = 21

Slope = -0.02165 units per year.

Mann-Kendall statistic = -15 critical = -87

Trend not significant at 99% confidence level (α = 0.005 per tail).

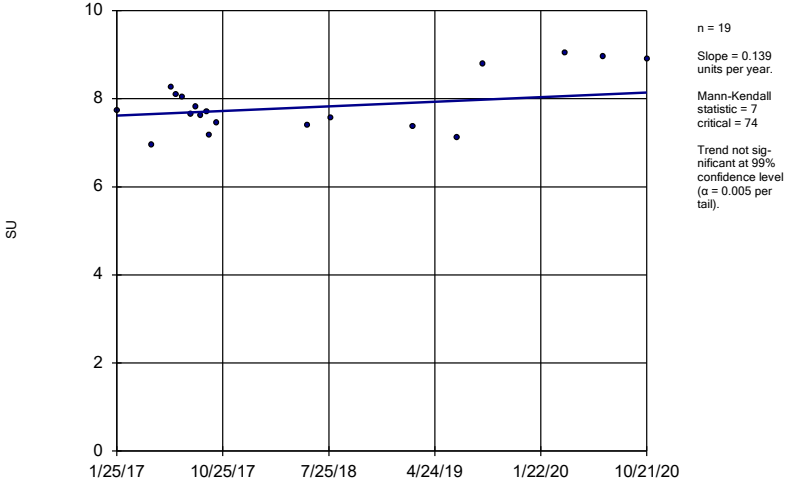
Constituent: Fluoride Analysis Run 12/28/2020 3:35 PM View: Interwell

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Sen's Slope Estimator

SP-4 (bg)



n = 19

Slope = 0.139 units per year.

Mann-Kendall statistic = 7 critical = 74

Trend not significant at 99% confidence level (α = 0.005 per tail).

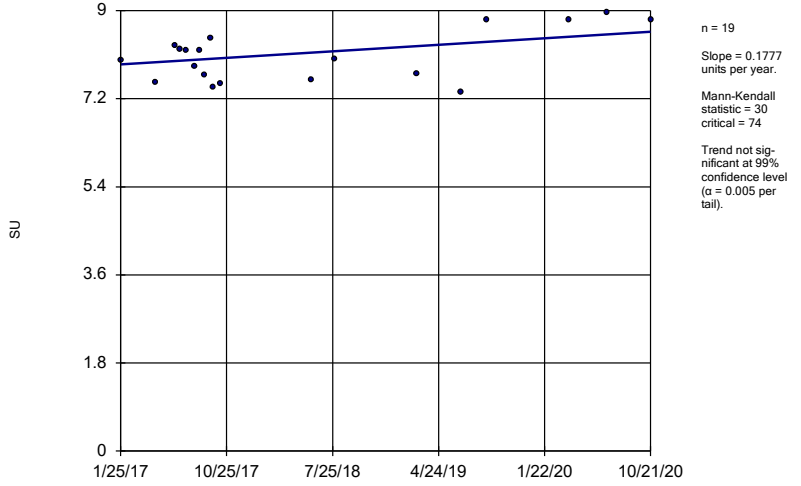
Constituent: pH, field Analysis Run 12/28/2020 3:35 PM View: Interwell

Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Sen's Slope Estimator

SP-5R (bg)



n = 19

Slope = 0.1777 units per year.

Mann-Kendall statistic = 30 critical = 74

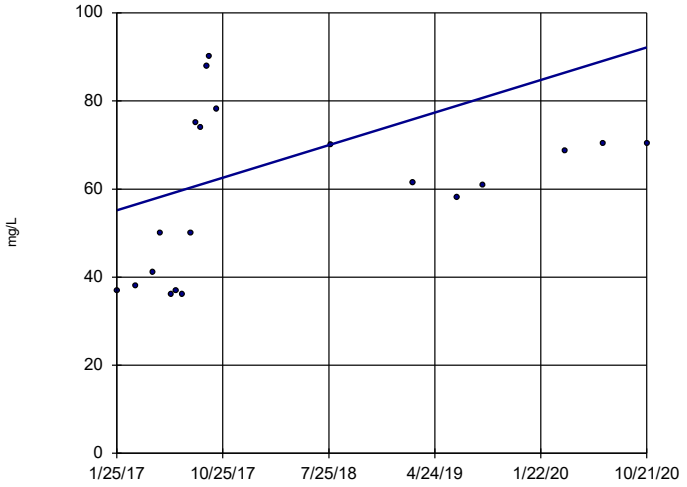
Trend not significant at 99% confidence level (α = 0.005 per tail).

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)



n = 20

Slope = 9.878 units per year.

Mann-Kendall statistic = 75 critical = 81

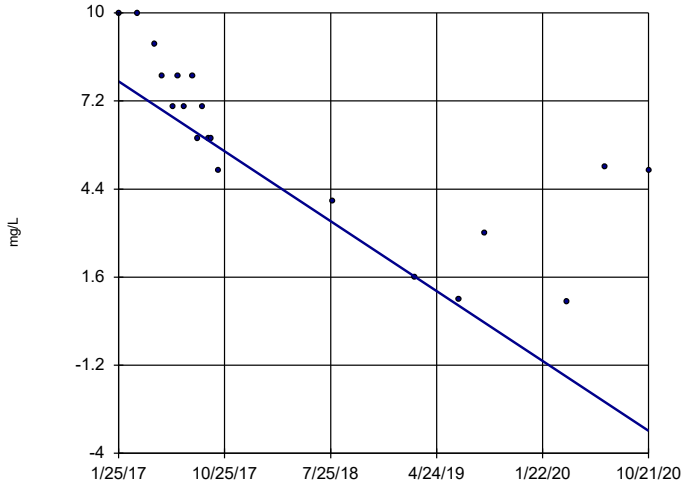
Trend not significant at 99% confidence level (α = 0.005 per tail).

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Sen's Slope Estimator

SP-5R (bg)



n = 20

Slope = -2.968 units per year.

Mann-Kendall statistic = -145 critical = -81

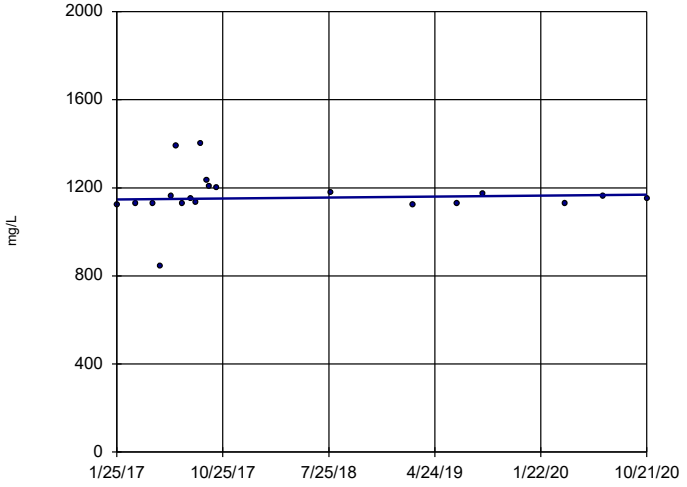
Decreasing trend significant at 99% confidence level (α = 0.005 per tail).

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Sen's Slope Estimator

SP-4 (bg)



n = 20

Slope = 5.88 units per year.

Mann-Kendall statistic = 25 critical = 81

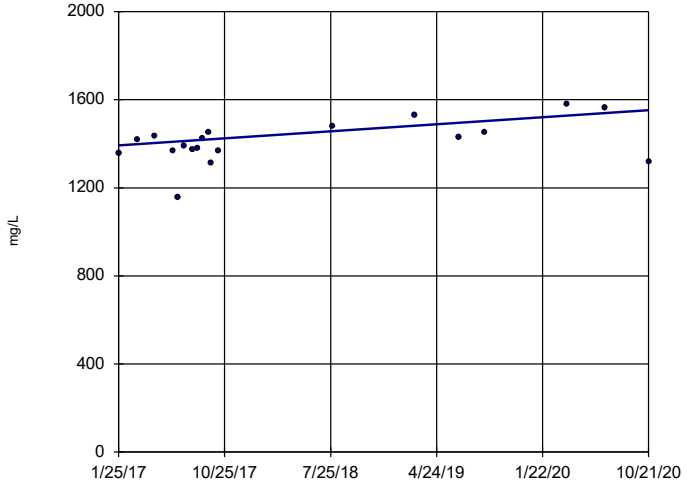
Trend not significant at 99% confidence level (α = 0.005 per tail).

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

Sen's Slope Estimator

SP-5R (bg)



n = 19

Slope = 42.48 units per year.

Mann-Kendall statistic = 60 critical = 74

Trend not significant at 99% confidence level (α = 0.005 per tail).

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

FIGURE G.

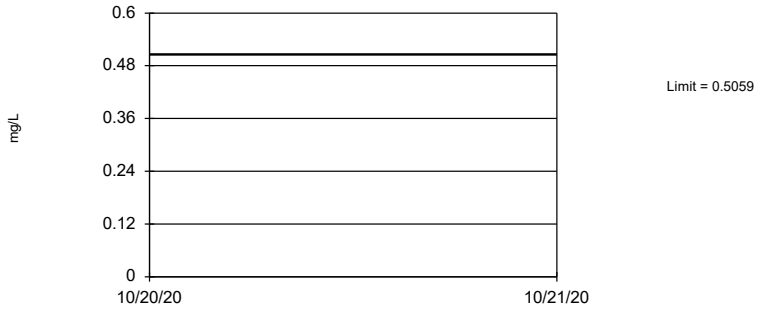
Appendix III - Interwell Prediction Limits - All Results

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

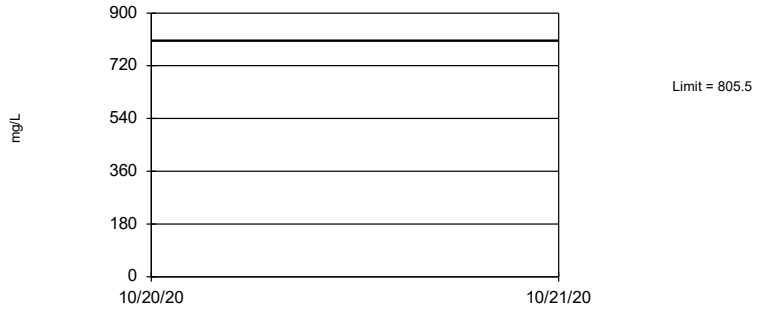


Background Data Summary: Mean=0.327, Std. Dev.=0.09795, n=40. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9231, critical = 0.919. Kappa = 1.826 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.00188. Assumes 4 future values.

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

Prediction Limit

Interwell Parametric

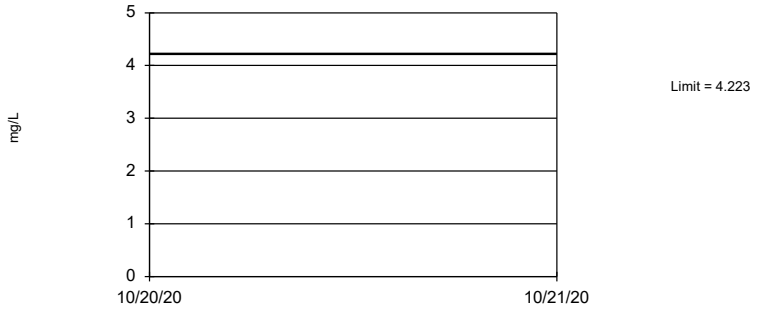


Background Data Summary: Mean=562.9, Std. Dev.=131.8, n=37. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9509, critical = 0.914. Kappa = 1.84 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.00188. Assumes 4 future values.

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

Prediction Limit

Interwell Parametric

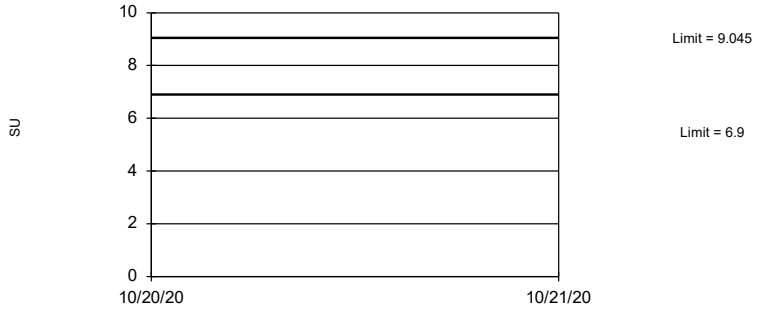


Background Data Summary (based on square transformation): Mean=10.54, Std. Dev.=4.005, n=42, 2.381% NDs. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9295, critical = 0.922. Kappa = 1.822 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.00188.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

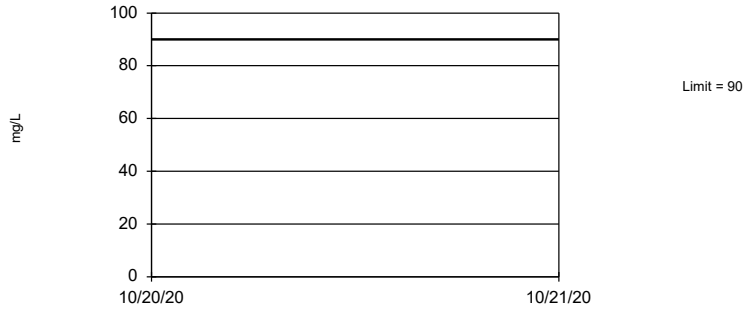


Background Data Summary: Mean=7.973, Std. Dev.=0.5842, n=38. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9337, critical = 0.916. Kappa = 1.836 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.0009398. Assumes 4 future values.

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

Sanitas™ v.9.6.27b Groundwater Stats Consulting. UG

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.**

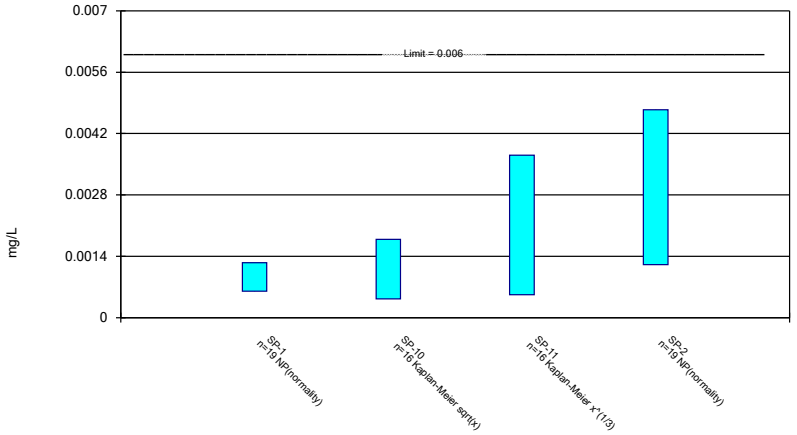
Confidence Intervals Summary - All Results

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	0.00000428	78.95	None	No	0.01	NP (NDs)
Mercury (mg/L)	SP-10	0.000019	0.000005	0.002	No	16	0.0000115	0.00000798	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	0.00000206	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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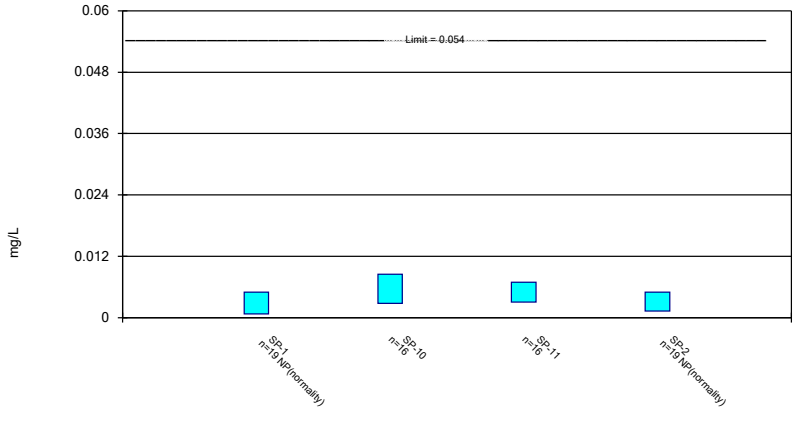
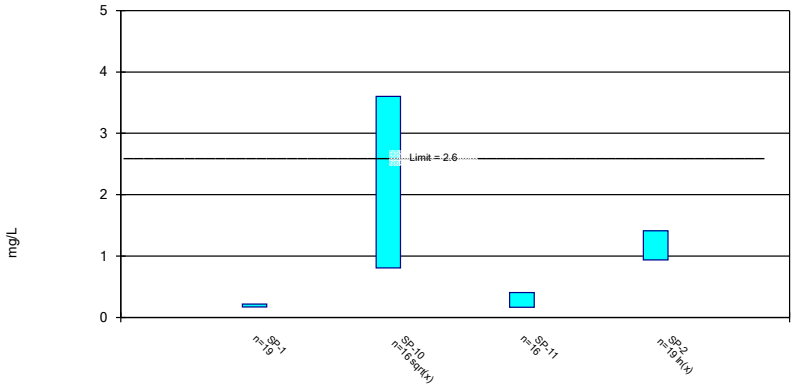


Constituent: Arsenic Analysis Run 12/29/2020 11:39 AM View: Appendix IV
Northeastern BAP Client: Geosyntec Data: Northeastern BAP

Parametric Confidence Interval

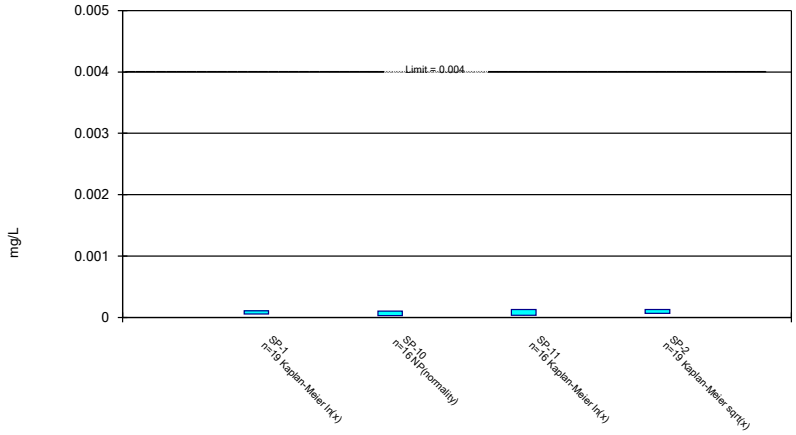
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



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

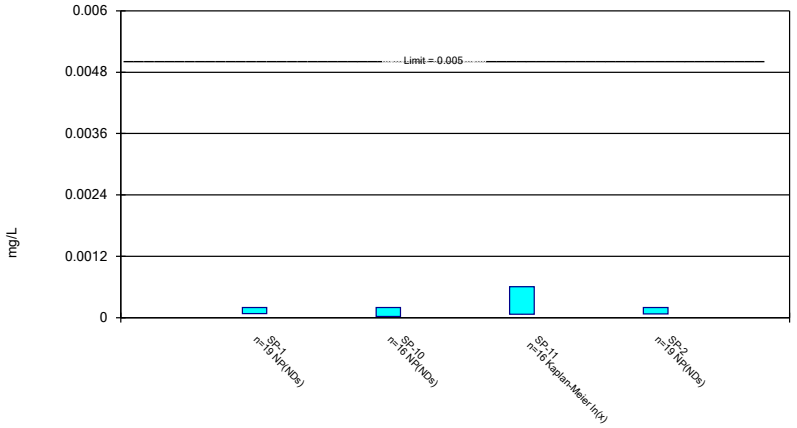
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



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

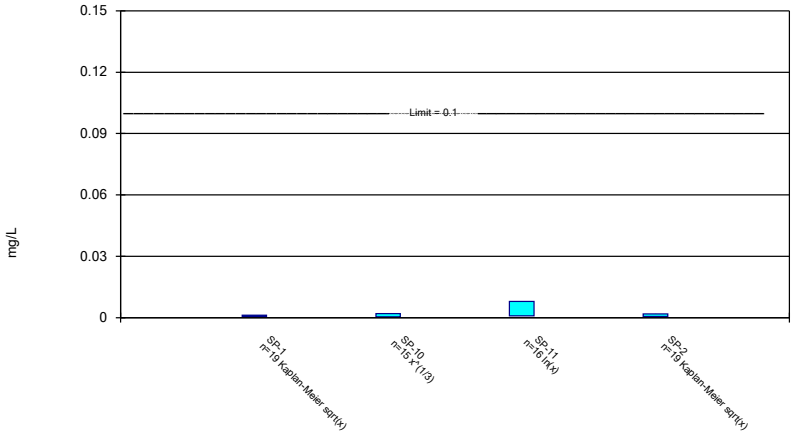
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



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

Parametric Confidence Interval

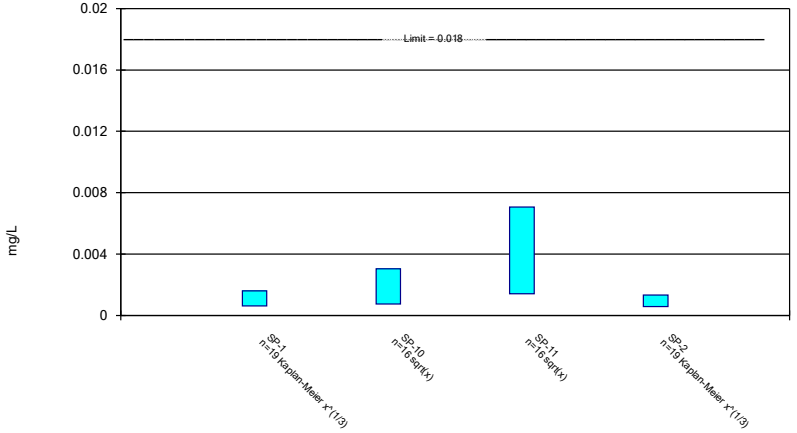
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



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

Parametric Confidence Interval

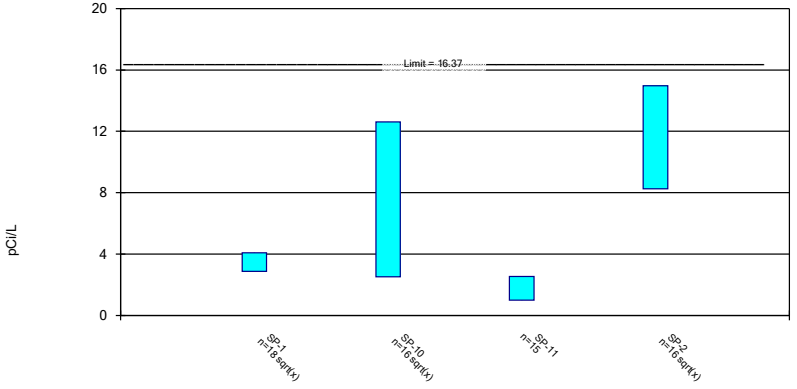
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



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

Parametric Confidence Interval

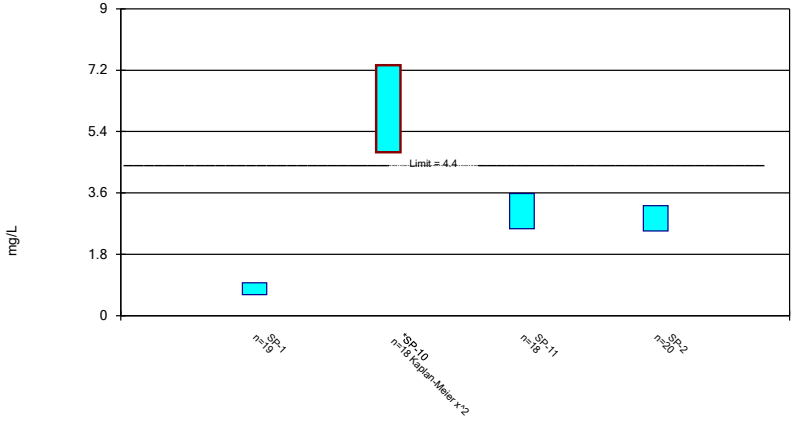
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



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

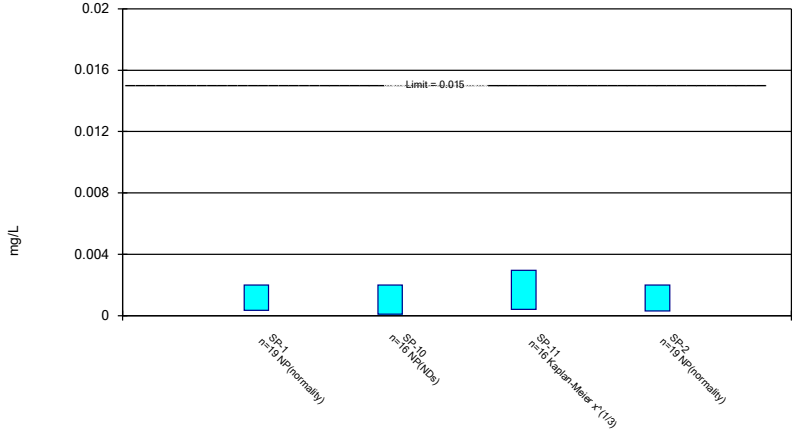
Compliance limit is exceeded.* Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



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

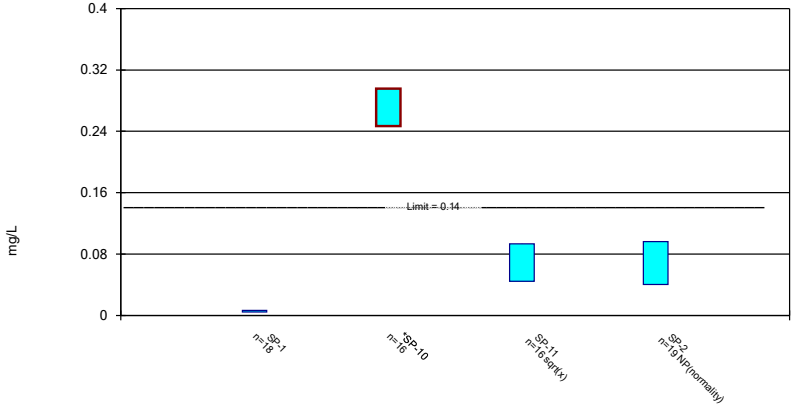
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



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

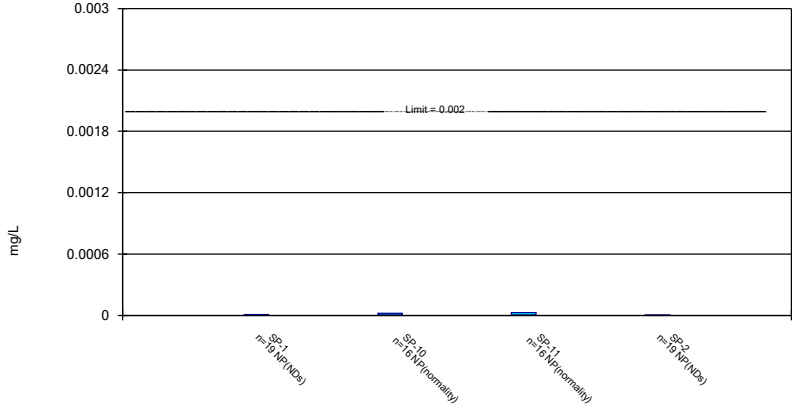
Compliance limit is exceeded.* Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



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

Non-Parametric Confidence Interval

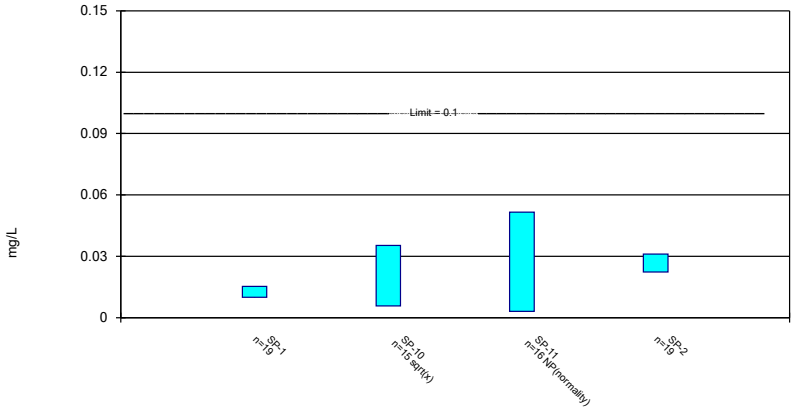
Compliance Limit is not exceeded. Per-well alpha = 0.01.



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

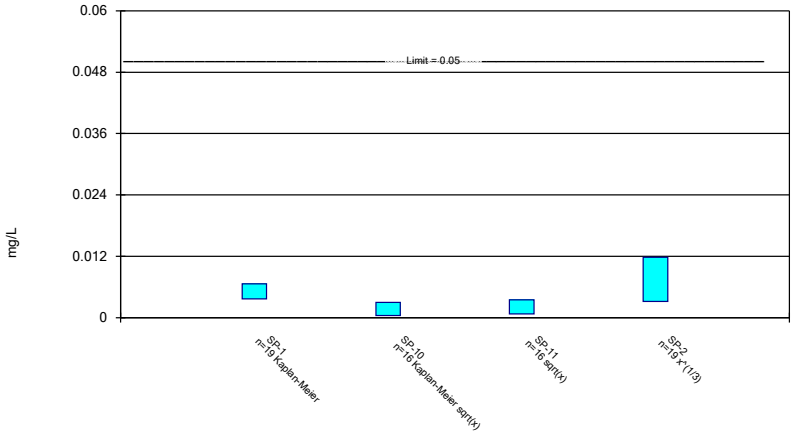
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



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

Parametric Confidence Interval

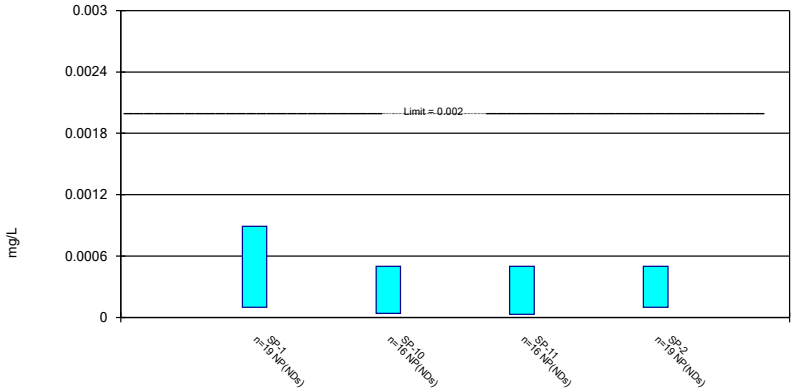
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



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

APPENDIX 6

Groundwater monitoring Field and Laboratory Reports

NORTHEASTERN POWER PLANT
GROUNDWATER SAMPLING DATA FORM

SAMPLED BY: Kenny McDonald **DATE:** 03/03/21

Well Identification Number	SP-1	SP-2	SP-4	SP-5R	SP-10	SP-11
Activities	Gauge	Gauge	Gauge	Gauge	Gauge	Gauge
Samples	Appendix IV	Appendix IV	Appendix IV	Appendix IV	Appendix IV	Appendix IV
Depth to Water (ft)	16.18	22.95	17.19	4.43	11.31	7.26
Water Level Elevation (ft. NGVD)						
Measured Depth Total Depth of Well (ft.)	37.99	38.19	38.30	78.00	54.10	34.51
Height of Water Column (ft.)	21.81	15.24	21.11	73.57	42.79	27.25
Well Size (I.D.) (inches)	2	2	2	2	2	2
Volume of Water in Well (gallons)	3.56	2.48	3.44	11.99	6.97	4.44
Water Removed From Well (gallons)	12.0	8.0	11.0	31.50	21.0	14.00
Method of Removal	Pump	Pump	Pump	Pump	Pump	Pump
Was Well Purged Dry?	No	No	No	Yes	No	No
pH (standard units)	7.40	7.45	7.78	7.64	7.73	7.71
Temperature (°C)	17.96	17.94	17.63	17.24	17.51	14.93
Conductivity (µmhos/cc)	738	3280	2120	2420	6100	1470
Turbidity (NTU)	23.1	18.2	52.3	120	21.1	21.6
Appearance	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR
Odor	NONE	NONE	NONE	NONE	SULPHUR	NONE
Containers	250 mL HNO3 125 mL HCL 3 x 1L HNO3 250 mL Cool 0-6C	250 mL HNO3 125 mL HCL 3 x 1L HNO3 250 mL Cool 0-6C	250 mL HNO3 125 mL HCL 3 x 1L HNO3 250 mL Cool 0-6C	250 mL HNO3 125 mL HCL 3 x 1L HNO3 250 mL Cool 0-6C	250 mL HNO3 125 mL HCL 3 x 1L HNO3 250 mL Cool 0-6C	250 mL HNO3 125 mL HCL 3 x 1L HNO3 250 mL Cool 0-6C
Sample Time	0938	1009	0912	0828	1102	1038
Sample Date	03/03/21	03/03/21	03/03/21	03/03/21	03/03/21	03/03/21

For 2" well multiply by	0.163
For 4" well multiply by	0.653

DUPLICATE 1400

NORTHEASTERN POWER PLANT
GROUNDWATER SAMPLING DATA FORM

SAMPLED BY: Kerry McDonald . **DATE:** 03/03/21 .

Well Identification Number	SP-3					
Activities	Gauge					
Samples	NA					
Depth to Water (ft)	11.63					
Water Level Elevation (ft. NGVD)						
Measured Depth Total Depth of Well (ft.)	37.90					
Height of Water Column (ft.)						
Well Size (I.D.) (inches)	2					
Volume of Water in Well (gallons)						
Water Removed From Well (gallons)						
Method of Removal						
Was Well Purged Dry?						
pH (standard units)						
Temperature (°C)						
Conductivity (µmhos/cc)						
Turbidity (NTU)						
Appearance						
Odor						
Containers						
Sample Time						
Sample Date						

For 2" well multiply by	0.163
For 4" well multiply by	0.653

NORTHEASTERN POWER PLANT
GROUNDWATER SAMPLING DATA FORM

SAMPLED BY: Kenny McDonald . **DATE:** 04/12-13/21 .

Well Identification Number	SP-1	SP-2	SP-4	SP-5R	SP-10	SP-11
Activities	Gauge	Gauge	Gauge	Gauge	Gauge	Gauge
Samples	Appendix III & IV	Appendix III & IV	Appendix III & IV	Appendix III & IV	Appendix III & IV	Appendix III & IV
Depth to Water (ft)	16.87	29.25	29.73	5.55	18.14	7.84
Water Level Elevation (ft. NGVD)						
Measured Depth Total Depth of Well (ft.)	37.99	38.19	38.30	78.00	54.10	34.51
Height of Water Column (ft.)	21.12	8.94	8.57	72.45	35.96	26.67
Well Size (I.D.) (inches)	2	2	2	2	2	2
Volume of Water in Well (gallons)	3.44	1.46	1.40	11.81	5.86	4.35
Water Removed From Well (gallons)	10.50	5.00	2.75	27.25	15.25	7.50
Method of Removal	Pump	Pump	Pump	Pump	Pump	Pump
Was Well Purged Dry?	No	No	Yes	Yes	Yes	Yes
pH (standard units)	7.64	7.59	7.68	7.85	8.06	7.84
Temperature (°C)	18.07	18.09	18.46	16.77	17.67	17.62
Conductivity (µmhos/cc)	773	330	2040	2720	6250	1560
Turbidity (NTU)	20.2	28.6	80.0	33.6	1.3	121
Appearance	Clear	Clear	Clear	Clear	Clear	Clear
Odor	None	None	None	None	Sulphur	None
Containers	250 mL HNO3 125 mL HCL 3 x 1L HNO3 1 L Cool 0-6C	250 mL HNO3 125 mL HCL 3 x 1L HNO3 1 L Cool 0-6C	250 mL HNO3 125 mL HCL 3 x 1L HNO3 1 L Cool 0-6C	250 mL HNO3 125 mL HCL 3 x 1L HNO3 1 L Cool 0-6C	250 mL HNO3 125 mL HCL 3 x 1L HNO3 1 L Cool 0-6C	250 mL HNO3 125 mL HCL 3 x 1L HNO3 1 L Cool 0-6C
Sample Time	1449	1421	1655	1738	1336	1352
Sample Date	4/12/2021	4/12/2021	4/12/2021	4/12/2021	4/12/2021	4/12/2021

BAP Dup 1820

For 2" well multiply by	0.163
For 4" well multiply by	0.653

NORTHEASTERN POWER PLANT
GROUNDWATER SAMPLING DATA FORM

SAMPLED BY: Kenny McDonald . **DATE:** 04/13-13/21 .

Well Identification Number	SP-3	SP-6	SP-7	SP-8	SP-9	
Activities	Gauge	Gauge	Gauge	Gauge	Gauge	
Samples	NA	NA	NA	NA	NA	
Depth to Water (ft)	16.93	21.27	24.59	5.68	63.88	
Water Level Elevation (ft. NGVD)						
Measured Depth Total Depth of Well (ft.)	37.90	73.93	84.02	74.06	78.82	
Height of Water Column (ft.)	20.97	52.66	59.43	68.38	14.94	
Well Size (I.D.) (inches)	2	2	2	2	2	
Volume of Water in Well (gallons)	3.42	8.58	9.69	11.15	2.44	
Water Removed From Well (gallons)	----	----	----	----	----	
Method of Removal	----	----	----	----	----	
Was Well Purged Dry?	----	----	----	----	----	
pH (standard units)	----	----	----	----	----	
Temperature (°C)	----	----	----	----	----	
Conductivity (µmhos/cc)	----	----	----	----	----	
Turbidity (NTU)	----	----	----	----	----	
Appearance	----	----	----	----	----	
Odor	----	----	----	----	----	
Containers	------	------	-------	------	------	
Sample Time	----	----	----	----	----	
Sample Date	----	----	----	----	----	

For 2" well multiply by	0.163
For 4" well multiply by	0.653

Form REP-703
Rev. 1, 11/2013

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
T: 614-836-4221, Audinet 210-4221
F: 614-836-4168, Audinet 210-4168
http://aepenv/labs

Water Analysis

Location: Northeastern Station ***Report Date: 3/11/2021***

SP-1

Sample Number: 210499-001 **Date Collected: 03/03/2021 09:38** **Date Received: 3/5/2021**

Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Fluoride, F	0.85	mg/L		0.06	0.01	CRJ	03/09/2021 00:42	EPA 300.1-1997, Rev. 1.0

SP-2

Sample Number: 210499-002 **Date Collected: 03/03/2021 10:09** **Date Received: 3/5/2021**

Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Fluoride, F	3.00	mg/L		0.2	0.04	CRJ	03/08/2021 23:51	EPA 300.1-1997, Rev. 1.0

SP-4

Sample Number: 210499-003 **Date Collected: 03/03/2021 09:12** **Date Received: 3/5/2021**

Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Fluoride, F	3.50	mg/L		0.2	0.04	CRJ	03/08/2021 23:26	EPA 300.1-1997, Rev. 1.0

SP-5R

Sample Number: 210499-004 **Date Collected: 03/03/2021 08:28** **Date Received: 3/5/2021**

Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Fluoride, F	3.18	mg/L		0.2	0.04	CRJ	03/08/2021 23:00	EPA 300.1-1997, Rev. 1.0

SP-10

Sample Number: 210499-005 **Date Collected: 03/03/2021 11:02** **Date Received: 3/5/2021**

Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Fluoride, F	7.12	mg/L		0.3	0.07	CRJ	03/08/2021 22:09	EPA 300.1-1997, Rev. 1.0

SP-11

Sample Number: 210499-006 **Date Collected: 03/03/2021 10:38** **Date Received: 3/5/2021**

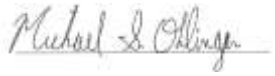
Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Fluoride, F	2.88	mg/L		0.2	0.04	CRJ	03/08/2021 21:44	EPA 300.1-1997, Rev. 1.0

Duplicate

Sample Number: 210499-007 **Date Collected: 03/03/2021 14:00** **Date Received: 3/5/2021**

Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Fluoride, F	3.17	mg/L		0.2	0.04	CRJ	03/08/2021 21:19	EPA 300.1-1997, Rev. 1.0

U: Analyte was analyzed and not detected at or above adjusted Method Detection Limit
J: Analyte was positively identified, though the quantitation was below Reporting Limit.



Michael Ohlinger, Chemist

Email msohlinger@aep.com *Tel.*

Fax 614-836-4168 *Audinet 8-210-*

Chain of Custody Record

Program: Coal Combustion Residuals (CCR)

Dolan Chemical Laboratory (DCL)
4001 Bixby Road
Groveport, Ohio 43125
Contacts: Jonathan Barnhill (318-673-3803)
Michael Ohlinger (614-836-4184)

Project Name: Northeastern PS
Contact Name: Jill Parker-Witt
Contact Phone: 318-673-3816
Sampler(s): Kenny McDonald

Analysis Turnaround Time (in Calendar Days)

Site Contact:

Date:

For Lab Use Only:
COC/Order #: 210499

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Sampler(s) Initials	B, Ca, Li, Sb, As, Ba, Be, Cd, Cr, Co, Pb, Mo, Se, TL and Na, K, Mg, Sr (250 mL bottle, pH<2, HNO_3)	dissolved Fe and Mn (Field-filter 500 mL bottle, then pH<2, HNO_3)	Fluoride (250 mL bottle, Cool, 0-6°C)	Ra-226, Ra-228 (Three (six every 10th*) 1 L bottles, pH<2, HNO_3)	HG (125 mL PTFE lined bottle, HCL**, pH<2)			Sample Specific Notes:
SP-1	3/3/2021	938	G	GW	1				X					
SP-2	3/3/2021	1009	G	GW	1				X					
SP-4	3/3/2021	912	G	GW	1				X					
SP-5R	3/3/2021	828	G	GW	1				X					
SP-10	3/3/2021	1102	G	GW	1				X					
SP-11	3/3/2021	1038	G	GW	1				X					
DUPLICATE	3/3/2021	1400	G	GW	1				X					
Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____; F= filter in field							4	F4	1	4				

* *Six 1L Bottles must be collected for Radium for every 10th sample.*

Special Instructions/QC Requirements & Comments:

Relinquished by:	Company:	Date/Time:	Received by:	Date/Time:
Kent	EAGLE	03/04/21 1400		
Relinquished by:	Company:	Date/Time:	Received by:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Date/Time:
			Michael Ohly	3/5/21 12:20PM

AEP WATER & WASTE SAMPLE RECEIPT FORM

Package Type	Delivery Type
Cooler Box Bag Envelope	PONY UPS FedEX USPS
	Other _____

Plant/Customer Northeaster **Number of Plastic Containers:** 7

Opened By MSO **Number of Glass Containers:** _____

Date/Time 3-5-21 12p **Number of Mercury Containers:** _____

Were all temperatures within 0-6°C? (Y) / N or N/A **Initial:** MSO on ice / no ice

1(IR Gun Ser# 200700311, *Expir.* 11/06/22) - If No, specify each deviation: _____

Was container in good condition? (Y) / N Comments _____

Was Chain of Custody received? (Y) / N Comments _____

Requested turnaround: Rush If **RUSH**, who was notified? _____

pH (15 min) Cr^{+6} (pres) (24 hr) NO_2 or NO_3 (48 hr) *ortho*-PO_4 (48 hr) Hg-diss (pres) (48 hr)

Was COC filled out properly? (Y) / N Comments _____

Were samples labeled properly? (Y) / N Comments _____

Were correct containers used? (Y) / N Comments _____

Was pH checked & Color Coding done? (Y) / N or N/A **Initial & Date:** MSO 3-5-21

pH paper (circle one): MQuant,PN1.09535.0001,LOT# HC904495 [OR] Lab Rat,PN4801,LOT# X000RWDG21

- Was Add'l Preservative needed? Y / (N) If Yes: By whom & when: _____ (See Prep Book)

Is sample filtration requested? Y / (N) Comments _____ (See Prep Book)

Was the customer contacted? If Yes: Person Contacted: _____

Lab ID# 210499 Initial & Date & Time : _____

Comments: _____

Logged by MSO _____

_____

Reviewed by SM _____

_____

REMINDER: Document the pertinent sample integrity information and deviations in sample receipt (as noted above) in the "Notes" field in the LIMS to be included on the report to the customer.

Form REP-703
Rev. 2, 05/2016

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F: 614-836-4168, Audinet 210-4168
http://aepenv/labs

Water Analysis

Location: Northeastern Station ***Report Date: 3/19/2021***

SP-1

Sample Number: 210515-001 **Date Collected: 03/03/2021 09:38** **Date Received: 3/8/2021**

Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Antimony, Sb	0.51	ug/L		0.1	0.02	JDB	03/11/2021 19:34	EPA 200.8-1994, Rev. 5.4
Arsenic, As	0.53	ug/L		0.1	0.03	JDB	03/11/2021 19:34	EPA 200.8-1994, Rev. 5.4
Barium, Ba	144	ug/L		0.2	0.05	JDB	03/11/2021 19:34	EPA 200.8-1994, Rev. 5.4
Beryllium, Be	0.05	ug/L	J	0.1	0.02	JDB	03/11/2021 19:34	EPA 200.8-1994, Rev. 5.4
Cadmium, Cd	0.08	ug/L		0.05	0.01	JDB	03/11/2021 19:34	EPA 200.8-1994, Rev. 5.4
Chromium, Cr	0.426	ug/L		0.2	0.04	JDB	03/11/2021 19:34	EPA 200.8-1994, Rev. 5.4
Cobalt, Co	0.307	ug/L		0.05	0.02	JDB	03/11/2021 19:34	EPA 200.8-1994, Rev. 5.4
Lead, Pb	0.259	ug/L		0.2	0.05	JDB	03/11/2021 19:34	EPA 200.8-1994, Rev. 5.4
Mercury, Hg	< 0.002	ug/L	U	0.005	0.002	JAB	03/16/2021	EPA 245.7-2005, Rev. 2.0
Molybdenum, Mo	14.3	ug/L		2	0.4	JDB	03/11/2021 19:34	EPA 200.8-1994, Rev. 5.4
Selenium, Se	4.5	ug/L		0.2	0.03	JDB	03/11/2021 19:34	EPA 200.8-1994, Rev. 5.4
Thallium, Tl	< 0.1	ug/L	U	0.5	0.1	JDB	03/11/2021 19:34	EPA 200.8-1994, Rev. 5.4
Boron, B	0.169	mg/L		0.05	0.02	JDB	03/11/2021 19:34	EPA 200.8-1994, Rev. 5.4
Calcium, Ca	105	mg/L		0.3	0.1	SH	03/11/2021 17:36	EPA 200.7-1994, Rev. 4.4
Lithium, Li	0.00443	mg/L		0.0002	0.00005	JDB	03/11/2021 19:34	EPA 200.8-1994, Rev. 5.4
Magnesium, Mg	25.4	mg/L		0.1	0.02	SH	03/11/2021 17:36	EPA 200.7-1994, Rev. 4.4
Potassium, K	0.8	mg/L	J	1	0.2	SH	03/11/2021 17:36	EPA 200.7-1994, Rev. 4.4
Sodium, Na	28.6	mg/L		0.5	0.1	SH	03/11/2021 17:36	EPA 200.7-1994, Rev. 4.4
Strontium, Sr	2.89	mg/L		0.01	0.002	SH	03/11/2021 17:36	EPA 200.7-1994, Rev. 4.4

U: Analyte was analyzed and not detected at or above adjusted Method Detection Limit
J: Analyte was positively identified, though the quantitation was below Reporting Limit.

Radiochemistry*	Result	Units	UNC* (+ / -)	MDA*	Analysis By	Analysis Date/Time	Method
Radium-228	1.62	pCi/L	0.16	0.48	ttp	3/12/2021	SW-846 9320-2014,Rev. 1.0
The LFB is outside the acceptable limit of 75-125%.							
Radium-226	2.65	pCi/L	0.34	0.20	ttp	3/11/2021	SW-846 9315-1986,Rev. 0

The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.

SP-2

Sample Number: 210515-002 **Date Collected: 03/03/2021 10:09** **Date Received: 3/8/2021**

Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Antimony, Sb	1.09	ug/L		0.1	0.02	JDB	03/11/2021 19:39	EPA 200.8-1994, Rev. 5.4
Arsenic, As	1.07	ug/L		0.1	0.03	JDB	03/11/2021 19:39	EPA 200.8-1994, Rev. 5.4
Barium, Ba	1050	ug/L		0.2	0.05	JDB	03/11/2021 19:39	EPA 200.8-1994, Rev. 5.4
•The MS is outside the acceptable limit of 75-125%.•The MSD is outside the acceptable limit of 75-125%.								
Beryllium, Be	0.09	ug/L	J	0.1	0.02	JDB	03/11/2021 19:39	EPA 200.8-1994, Rev. 5.4
Cadmium, Cd	0.06	ug/L		0.05	0.01	JDB	03/11/2021 19:39	EPA 200.8-1994, Rev. 5.4
Chromium, Cr	0.700	ug/L		0.2	0.04	JDB	03/11/2021 19:39	EPA 200.8-1994, Rev. 5.4
Cobalt, Co	0.323	ug/L		0.05	0.02	JDB	03/11/2021 19:39	EPA 200.8-1994, Rev. 5.4
Lead, Pb	0.253	ug/L		0.2	0.05	JDB	03/11/2021 19:39	EPA 200.8-1994, Rev. 5.4
Mercury, Hg	< 0.002	ug/L	U	0.005	0.002	JAB	03/16/2021	EPA 245.7-2005, Rev. 2.0
Molybdenum, Mo	17.1	ug/L		2	0.4	JDB	03/11/2021 19:39	EPA 200.8-1994, Rev. 5.4
Selenium, Se	3.5	ug/L		0.2	0.03	JDB	03/11/2021 19:39	EPA 200.8-1994, Rev. 5.4
Thallium, Tl	< 0.1	ug/L	U	0.5	0.1	JDB	03/11/2021 19:39	EPA 200.8-1994, Rev. 5.4
Boron, B	0.140	mg/L		0.05	0.02	JDB	03/11/2021 19:39	EPA 200.8-1994, Rev. 5.4
Calcium, Ca	72.0	mg/L		0.3	0.1	SH	03/11/2021 17:57	EPA 200.7-1994, Rev. 4.4
Lithium, Li	0.0523	mg/L		0.0002	0.00005	JDB	03/11/2021 19:39	EPA 200.8-1994, Rev. 5.4
•The MS is outside the acceptable limit of 75-125%.•The MSD is outside the acceptable limit of 75-125%.								
Magnesium, Mg	64.3	mg/L		0.1	0.02	SH	03/11/2021 17:57	EPA 200.7-1994, Rev. 4.4
Potassium, K	2.67	mg/L		1	0.2	SH	03/11/2021 17:57	EPA 200.7-1994, Rev. 4.4
Sodium, Na	324	mg/L		0.5	0.1	SH	03/11/2021 17:57	EPA 200.7-1994, Rev. 4.4
Strontium, Sr	12.7	mg/L		0.01	0.002	SH	03/11/2021 17:57	EPA 200.7-1994, Rev. 4.4

U: Analyte was analyzed and not detected at or above adjusted Method Detection Limit
J: Analyte was positively identified, though the quantitation was below Reporting Limit.

Radiochemistry*	Result	Units	UNC* (+ / -)	MDA*	Analysis By	Analysis Date/Time	Method
Radium-228	5.42	pCi/L	0.19	0.39	ttp	3/12/2021	SW-846 9320-2014,Rev. 1.0
The LFB is outside the acceptable limit of 75-125%.							
Radium-226	6.39	pCi/L	0.55	0.25	ttp	3/11/2021	SW-846 9315-1986,Rev. 0
The carrier recovery is outside the acceptable limit of 30-110%.							

The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.

SP-4

Sample Number: 210515-003 **Date Collected: 03/03/2021 09:12** **Date Received: 3/8/2021**

Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Antimony, Sb	0.27	ug/L		0.1	0.02	JDB	03/11/2021 19:44	EPA 200.8-1994, Rev. 5.4
Arsenic, As	0.99	ug/L		0.1	0.03	JDB	03/11/2021 19:44	EPA 200.8-1994, Rev. 5.4
Barium, Ba	367	ug/L		0.2	0.05	JDB	03/11/2021 19:44	EPA 200.8-1994, Rev. 5.4
Beryllium, Be	0.04	ug/L	J	0.1	0.02	JDB	03/11/2021 19:44	EPA 200.8-1994, Rev. 5.4
Cadmium, Cd	0.06	ug/L		0.05	0.01	JDB	03/11/2021 19:44	EPA 200.8-1994, Rev. 5.4
Chromium, Cr	0.449	ug/L		0.2	0.04	JDB	03/11/2021 19:44	EPA 200.8-1994, Rev. 5.4
Cobalt, Co	0.207	ug/L		0.05	0.02	JDB	03/11/2021 19:44	EPA 200.8-1994, Rev. 5.4
Lead, Pb	1.17	ug/L		0.2	0.05	JDB	03/11/2021 19:44	EPA 200.8-1994, Rev. 5.4
Mercury, Hg	< 0.002	ug/L	U	0.005	0.002	JAB	03/16/2021	EPA 245.7-2005, Rev. 2.0
Molybdenum, Mo	3.60	ug/L		2	0.4	JDB	03/11/2021 19:44	EPA 200.8-1994, Rev. 5.4
Selenium, Se	0.6	ug/L		0.2	0.03	JDB	03/11/2021 19:44	EPA 200.8-1994, Rev. 5.4
Thallium, Tl	< 0.1	ug/L	U	0.5	0.1	JDB	03/11/2021 19:44	EPA 200.8-1994, Rev. 5.4
Boron, B	0.347	mg/L		0.05	0.02	JDB	03/11/2021 19:44	EPA 200.8-1994, Rev. 5.4
Calcium, Ca	58.7	mg/L		0.3	0.1	SH	03/11/2021 18:02	EPA 200.7-1994, Rev. 4.4
Lithium, Li	0.0594	mg/L		0.0002	0.00005	JDB	03/11/2021 19:44	EPA 200.8-1994, Rev. 5.4
Magnesium, Mg	40.2	mg/L		0.1	0.02	SH	03/11/2021 18:02	EPA 200.7-1994, Rev. 4.4
Potassium, K	2.68	mg/L		1	0.2	SH	03/11/2021 18:02	EPA 200.7-1994, Rev. 4.4
Sodium, Na	323	mg/L		0.5	0.1	SH	03/11/2021 18:02	EPA 200.7-1994, Rev. 4.4
Strontium, Sr	8.24	mg/L		0.01	0.002	SH	03/11/2021 18:02	EPA 200.7-1994, Rev. 4.4

U: Analyte was analyzed and not detected at or above adjusted Method Detection Limit
J: Analyte was positively identified, though the quantitation was below Reporting Limit.

Radiochemistry*	Result	Units	UNC* (+ / -)	MDA*	Analysis By	Analysis Date/Time	Method
Radium-228	1.86	pCi/L	0.16	0.47	ttp	3/12/2021	SW-846 9320-2014,Rev. 1.0
The LFB is outside the acceptable limit of 75-125%.							
Radium-226	3.63	pCi/L	0.42	0.29	ttp	3/11/2021	SW-846 9315-1986,Rev. 0

The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.

SP-5R

Sample Number: 210515-004 **Date Collected: 03/03/2021 08:28** **Date Received: 3/8/2021**

Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Antimony, Sb	0.16	ug/L		0.1	0.02	JDB	03/11/2021 19:49	EPA 200.8-1994, Rev. 5.4
Arsenic, As	6.56	ug/L		0.1	0.03	JDB	03/11/2021 19:49	EPA 200.8-1994, Rev. 5.4
Barium, Ba	1840	ug/L		0.2	0.05	JDB	03/11/2021 19:49	EPA 200.8-1994, Rev. 5.4
Beryllium, Be	0.05	ug/L	J	0.1	0.02	JDB	03/11/2021 19:49	EPA 200.8-1994, Rev. 5.4
Cadmium, Cd	0.27	ug/L		0.05	0.01	JDB	03/11/2021 19:49	EPA 200.8-1994, Rev. 5.4
Chromium, Cr	0.496	ug/L		0.2	0.04	JDB	03/11/2021 19:49	EPA 200.8-1994, Rev. 5.4
Cobalt, Co	0.391	ug/L		0.05	0.02	JDB	03/11/2021 19:49	EPA 200.8-1994, Rev. 5.4
Lead, Pb	0.793	ug/L		0.2	0.05	JDB	03/11/2021 19:49	EPA 200.8-1994, Rev. 5.4
Mercury, Hg	< 0.002	ug/L	U	0.005	0.002	JAB	03/16/2021	EPA 245.7-2005, Rev. 2.0
Molybdenum, Mo	0.7	ug/L	J	2	0.4	JDB	03/11/2021 19:49	EPA 200.8-1994, Rev. 5.4
Selenium, Se	0.1	ug/L	J	0.2	0.03	JDB	03/11/2021 19:49	EPA 200.8-1994, Rev. 5.4
Thallium, Tl	< 0.1	ug/L	U	0.5	0.1	JDB	03/11/2021 19:49	EPA 200.8-1994, Rev. 5.4
Boron, B	0.188	mg/L		0.05	0.02	JDB	03/11/2021 19:49	EPA 200.8-1994, Rev. 5.4
Calcium, Ca	52.4	mg/L		0.3	0.1	SH	03/11/2021 18:06	EPA 200.7-1994, Rev. 4.4
Lithium, Li	0.0856	mg/L		0.0002	0.00005	JDB	03/11/2021 19:49	EPA 200.8-1994, Rev. 5.4
Magnesium, Mg	31.6	mg/L		0.1	0.02	SH	03/11/2021 18:06	EPA 200.7-1994, Rev. 4.4
Potassium, K	2.75	mg/L		1	0.2	SH	03/11/2021 18:06	EPA 200.7-1994, Rev. 4.4
Sodium, Na	418	mg/L		0.5	0.1	SH	03/11/2021 18:06	EPA 200.7-1994, Rev. 4.4
Strontium, Sr	6.67	mg/L		0.01	0.002	SH	03/11/2021 18:06	EPA 200.7-1994, Rev. 4.4

U: Analyte was analyzed and not detected at or above adjusted Method Detection Limit
J: Analyte was positively identified, though the quantitation was below Reporting Limit.

Radiochemistry*	Result	Units	UNC* (+ / -)	MDA*	Analysis By	Analysis Date/Time	Method
Radium-228	2.01	pCi/L	0.15	0.42	ttp	3/12/2021	SW-846 9320-2014,Rev. 1.0
The LFB is outside the acceptable limit of 75-125%.							
Radium-226	11.3	pCi/L	0.69	0.25	ttp	3/11/2021	SW-846 9315-1986,Rev. 0
The RPD between the sample and the duplicate result exceeds 25%.The carrier recovery is outside the acceptable limit of 30-110%.							

The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.

SP-10

Sample Number: 210515-005 **Date Collected:** 03/03/2021 11:02 **Date Received:** 3/8/2021

Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Antimony, Sb	0.08	ug/L	J	0.1	0.02	JDB	03/11/2021 19:54	EPA 200.8-1994, Rev. 5.4
Arsenic, As	0.36	ug/L		0.1	0.03	JDB	03/11/2021 19:54	EPA 200.8-1994, Rev. 5.4
Barium, Ba	5530	ug/L		0.2	0.05	JDB	03/11/2021 19:54	EPA 200.8-1994, Rev. 5.4
Beryllium, Be	0.02	ug/L	J	0.1	0.02	JDB	03/11/2021 19:54	EPA 200.8-1994, Rev. 5.4
Cadmium, Cd	0.03	ug/L	J	0.05	0.01	JDB	03/11/2021 19:54	EPA 200.8-1994, Rev. 5.4
Chromium, Cr	0.409	ug/L		0.2	0.04	JDB	03/11/2021 19:54	EPA 200.8-1994, Rev. 5.4
Cobalt, Co	0.199	ug/L		0.05	0.02	JDB	03/11/2021 19:54	EPA 200.8-1994, Rev. 5.4
Lead, Pb	0.230	ug/L		0.2	0.05	JDB	03/11/2021 19:54	EPA 200.8-1994, Rev. 5.4
Mercury, Hg	< 0.002	ug/L	U	0.005	0.002	JAB	03/16/2021	EPA 245.7-2005, Rev. 2.0
Molybdenum, Mo	1	ug/L	J	2	0.4	JDB	03/11/2021 19:54	EPA 200.8-1994, Rev. 5.4
Selenium, Se	0.08	ug/L	J	0.2	0.03	JDB	03/11/2021 19:54	EPA 200.8-1994, Rev. 5.4
Thallium, Tl	< 0.1	ug/L	U	0.5	0.1	JDB	03/11/2021 19:54	EPA 200.8-1994, Rev. 5.4
Boron, B	0.853	mg/L		0.05	0.02	JDB	03/11/2021 19:54	EPA 200.8-1994, Rev. 5.4
Calcium, Ca	40.4	mg/L		0.3	0.1	SH	03/11/2021 18:10	EPA 200.7-1994, Rev. 4.4
Lithium, Li	0.218	mg/L		0.0002	0.00005	JDB	03/11/2021 19:54	EPA 200.8-1994, Rev. 5.4
Magnesium, Mg	46.3	mg/L		0.1	0.02	SH	03/11/2021 18:10	EPA 200.7-1994, Rev. 4.4
Potassium, K	6.91	mg/L		1	0.2	SH	03/11/2021 18:10	EPA 200.7-1994, Rev. 4.4
Sodium, Na	969	mg/L		0.5	0.1	SH	03/11/2021 18:10	EPA 200.7-1994, Rev. 4.4
Strontium, Sr	16.9	mg/L		0.01	0.002	SH	03/11/2021 18:10	EPA 200.7-1994, Rev. 4.4

U: Analyte was analyzed and not detected at or above adjusted Method Detection Limit
J: Analyte was positively identified, though the quantitation was below Reporting Limit.

Radiochemistry*	Result	Units	UNC* (+ / -)	MDA*	Analysis By	Analysis Date/Time	Method
Radium-228	1.24	pCi/L	0.14	0.42	ttp	3/12/2021	SW-846 9320-2014,Rev. 1.0
The LFB is outside the acceptable limit of 75-125%.							
Radium-226	17.6	pCi/L	0.84	0.18	ttp	3/11/2021	SW-846 9315-1986,Rev. 0
The carrier recovery is outside the acceptable limit of 30-110%.							

The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.

SP-11

Sample Number: 210515-006 **Date Collected: 03/03/2021 10:38** **Date Received: 3/8/2021**

Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Antimony, Sb	0.06	ug/L	J	0.1	0.02	JDB	03/11/2021 19:59	EPA 200.8-1994, Rev. 5.4
Arsenic, As	1.33	ug/L		0.1	0.03	JDB	03/11/2021 19:59	EPA 200.8-1994, Rev. 5.4
Barium, Ba	330	ug/L		0.2	0.05	JDB	03/11/2021 19:59	EPA 200.8-1994, Rev. 5.4
Beryllium, Be	< 0.02	ug/L	U	0.1	0.02	JDB	03/11/2021 19:59	EPA 200.8-1994, Rev. 5.4
Cadmium, Cd	0.01	ug/L	J	0.05	0.01	JDB	03/11/2021 19:59	EPA 200.8-1994, Rev. 5.4
Chromium, Cr	0.243	ug/L		0.2	0.04	JDB	03/11/2021 19:59	EPA 200.8-1994, Rev. 5.4
Cobalt, Co	0.939	ug/L		0.05	0.02	JDB	03/11/2021 19:59	EPA 200.8-1994, Rev. 5.4
Lead, Pb	0.1	ug/L	J	0.2	0.05	JDB	03/11/2021 19:59	EPA 200.8-1994, Rev. 5.4
Mercury, Hg	< 0.002	ug/L	U	0.005	0.002	JAB	03/16/2021	EPA 245.7-2005, Rev. 2.0
Molybdenum, Mo	2	ug/L	J	2	0.4	JDB	03/11/2021 19:59	EPA 200.8-1994, Rev. 5.4
Selenium, Se	0.2	ug/L	J	0.2	0.03	JDB	03/11/2021 19:59	EPA 200.8-1994, Rev. 5.4
Thallium, Tl	< 0.1	ug/L	U	0.5	0.1	JDB	03/11/2021 19:59	EPA 200.8-1994, Rev. 5.4
Boron, B	0.371	mg/L		0.05	0.02	JDB	03/11/2021 19:59	EPA 200.8-1994, Rev. 5.4
Calcium, Ca	39.0	mg/L		0.3	0.1	SH	03/11/2021 18:15	EPA 200.7-1994, Rev. 4.4
Lithium, Li	0.0396	mg/L		0.0002	0.00005	JDB	03/11/2021 19:59	EPA 200.8-1994, Rev. 5.4
Magnesium, Mg	13.9	mg/L		0.1	0.02	SH	03/11/2021 18:15	EPA 200.7-1994, Rev. 4.4
Potassium, K	6.27	mg/L		1	0.2	SH	03/11/2021 18:15	EPA 200.7-1994, Rev. 4.4
Sodium, Na	305	mg/L		0.5	0.1	SH	03/11/2021 18:15	EPA 200.7-1994, Rev. 4.4
Strontium, Sr	4.17	mg/L		0.01	0.002	SH	03/11/2021 18:15	EPA 200.7-1994, Rev. 4.4

U: Analyte was analyzed and not detected at or above adjusted Method Detection Limit
J: Analyte was positively identified, though the quantitation was below Reporting Limit.

Radiochemistry*	Result	Units	UNC* (+ / -)	MDA*	Analysis By	Analysis Date/Time	Method
Radium-228	0.711	pCi/L	0.18	0.57	ttp	3/12/2021	SW-846 9320-2014,Rev. 1.0
The LFB is outside the acceptable limit of 75-125%.							
Radium-226	0.19	pCi/L	0.10	0.26	ttp	3/11/2021	SW-846 9315-1986,Rev. 0

The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.

Duplicate

Sample Number: 210515-007 **Date Collected:** 03/03/2021 14:00 **Date Received:** 3/8/2021

Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Antimony, Sb	0.15	ug/L		0.1	0.02	JDB	03/11/2021 20:04	EPA 200.8-1994, Rev. 5.4
Arsenic, As	6.76	ug/L		0.1	0.03	JDB	03/11/2021 20:04	EPA 200.8-1994, Rev. 5.4
Barium, Ba	1780	ug/L		0.2	0.05	JDB	03/11/2021 20:04	EPA 200.8-1994, Rev. 5.4
Beryllium, Be	0.04	ug/L	J	0.1	0.02	JDB	03/11/2021 20:04	EPA 200.8-1994, Rev. 5.4
Cadmium, Cd	0.20	ug/L		0.05	0.01	JDB	03/11/2021 20:04	EPA 200.8-1994, Rev. 5.4
Chromium, Cr	0.400	ug/L		0.2	0.04	JDB	03/11/2021 20:04	EPA 200.8-1994, Rev. 5.4
Cobalt, Co	0.393	ug/L		0.05	0.02	JDB	03/11/2021 20:04	EPA 200.8-1994, Rev. 5.4
Lead, Pb	0.800	ug/L		0.2	0.05	JDB	03/11/2021 20:04	EPA 200.8-1994, Rev. 5.4
Mercury, Hg	< 0.002	ug/L	U	0.005	0.002	JAB	03/16/2021	EPA 245.7-2005, Rev. 2.0
Molybdenum, Mo	0.7	ug/L	J	2	0.4	JDB	03/11/2021 20:04	EPA 200.8-1994, Rev. 5.4
Selenium, Se	0.1	ug/L	J	0.2	0.03	JDB	03/11/2021 20:04	EPA 200.8-1994, Rev. 5.4
Thallium, Tl	< 0.1	ug/L	U	0.5	0.1	JDB	03/11/2021 20:04	EPA 200.8-1994, Rev. 5.4
Boron, B	0.188	mg/L		0.05	0.02	JDB	03/11/2021 20:04	EPA 200.8-1994, Rev. 5.4
Calcium, Ca	51.8	mg/L		0.3	0.1	SH	03/11/2021 18:20	EPA 200.7-1994, Rev. 4.4
Lithium, Li	0.0769	mg/L		0.0002	0.00005	JDB	03/11/2021 20:04	EPA 200.8-1994, Rev. 5.4
Magnesium, Mg	31.1	mg/L		0.1	0.02	SH	03/11/2021 18:20	EPA 200.7-1994, Rev. 4.4
Potassium, K	2.73	mg/L		1	0.2	SH	03/11/2021 18:20	EPA 200.7-1994, Rev. 4.4
Sodium, Na	408	mg/L		0.5	0.1	SH	03/11/2021 18:20	EPA 200.7-1994, Rev. 4.4
Strontium, Sr	6.56	mg/L		0.01	0.002	SH	03/11/2021 18:20	EPA 200.7-1994, Rev. 4.4

U: Analyte was analyzed and not detected at or above adjusted Method Detection Limit
J: Analyte was positively identified, though the quantitation was below Reporting Limit.

The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.

Equipment Blank

Sample Number: 210515-008 **Date Collected:** 03/03/2021 11:12 **Date Received:** 3/8/2021

Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Antimony, Sb	< 0.02	ug/L	U	0.1	0.02	JDB	03/11/2021 20:09	EPA 200.8-1994, Rev. 5.4
Arsenic, As	< 0.03	ug/L	U	0.1	0.03	JDB	03/11/2021 20:09	EPA 200.8-1994, Rev. 5.4
Barium, Ba	< 0.05	ug/L	U	0.2	0.05	JDB	03/11/2021 20:09	EPA 200.8-1994, Rev. 5.4
Beryllium, Be	< 0.02	ug/L	U	0.1	0.02	JDB	03/11/2021 20:09	EPA 200.8-1994, Rev. 5.4
Cadmium, Cd	< 0.01	ug/L	U	0.05	0.01	JDB	03/11/2021 20:09	EPA 200.8-1994, Rev. 5.4
Chromium, Cr	0.2	ug/L	J	0.2	0.04	JDB	03/11/2021 20:09	EPA 200.8-1994, Rev. 5.4
Cobalt, Co	< 0.02	ug/L	U	0.05	0.02	JDB	03/11/2021 20:09	EPA 200.8-1994, Rev. 5.4
Lead, Pb	< 0.05	ug/L	U	0.2	0.05	JDB	03/11/2021 20:09	EPA 200.8-1994, Rev. 5.4
Mercury, Hg	< 0.002	ug/L	U	0.005	0.002	JAB	03/16/2021	EPA 245.7-2005, Rev. 2.0
Molybdenum, Mo	< 0.4	ug/L	U	2	0.4	JDB	03/11/2021 20:09	EPA 200.8-1994, Rev. 5.4
Selenium, Se	< 0.03	ug/L	U	0.2	0.03	JDB	03/11/2021 20:09	EPA 200.8-1994, Rev. 5.4
Thallium, Tl	< 0.1	ug/L	U	0.5	0.1	JDB	03/11/2021 20:09	EPA 200.8-1994, Rev. 5.4
Boron, B	< 0.02	mg/L	U	0.05	0.02	JDB	03/11/2021 20:09	EPA 200.8-1994, Rev. 5.4
Calcium, Ca	< 0.1	mg/L	U	0.3	0.1	SH	03/11/2021 18:24	EPA 200.7-1994, Rev. 4.4
Lithium, Li	< 0.00005	mg/L	U	0.0002	0.00005	JDB	03/11/2021 20:09	EPA 200.8-1994, Rev. 5.4
Magnesium, Mg	< 0.02	mg/L	U	0.1	0.02	SH	03/11/2021 18:24	EPA 200.7-1994, Rev. 4.4
Potassium, K	< 0.2	mg/L	U	1	0.2	SH	03/11/2021 18:24	EPA 200.7-1994, Rev. 4.4
Sodium, Na	0.2	mg/L	J	0.5	0.1	SH	03/11/2021 18:24	EPA 200.7-1994, Rev. 4.4
Strontium, Sr	< 0.002	mg/L	U	0.01	0.002	SH	03/11/2021 18:24	EPA 200.7-1994, Rev. 4.4

U: Analyte was analyzed and not detected at or above adjusted Method Detection Limit
J: Analyte was positively identified, though the quantitation was below Reporting Limit.

The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.

Michael Ohlinger, Chemist
Email msohlinger@aep.com *Tel.*
Fax 614-836-4168 *Audinet 8-210-*

Chain of Custody Record

Program: Coal Combustion Residuals (CCR)

Dolan Chemical Laboratory (DCL)
4001 Bixby Road
Groveport, Ohio 43125
Contacts: Jonathan Barnhill (318-673-3803)
Michael Ohlinger (614-836-4184)

Project Name: Northeastern PS
Contact Name: Jill Parker-Witt
Contact Phone: 318-673-3816
Sampler(s): Kenny McDonald

Site Contact:

Date:

For Lab Use Only:
COC/Order #: 210515

Analysis Turnaround Time (in Calendar Days)

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Sampler(s) Initials	250 mL bottle, pH<2, HNO_3 — B, Ca, Li, Sb, As, Ba, Be, Cd, Cr, Co, Pb, Mo, Se, Tl, and Na, K, Mg, Sr	Field-filter 500 mL bottle, then pH<2, HNO_3 — dissolved Fe and Mn	250 mL bottle, Cool, 0-6°C — TDS, F, Cl, SO_4, and Br, Alkalinity	Three (six every 10th*) 1 L bottles, pH<2, HNO_3 — Ra-226, Ra-228	125 mL PTFE lined bottle, HCL**, pH<2 — HG			Sample Specific Notes:
SP-1	3/3/2021	938	G	GW	5		X			X	X			
SP-2	3/3/2021	1009	G	GW	5		X			X	X			
SP-4	3/3/2021	912	G	GW	5		X			X	X			
SP-5R	3/3/2021	828	G	GW	8		X			X	X			
SP-10	3/3/2021	1102	G	GW	5		X			X	X			
SP-11	3/3/2021	1038	G	GW	5		X			X	X			
DUPLICATE	3/3/2021	1400	G	GW	2		X				X			
EQUIPMENT BLANK	3/3/2021	1112	G	GW	2		X				X			
Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____; F= filter in field							4	F4	1	4				

* *Six 1L Bottles must be collected for Radium for every 10th sample.*

Special Instructions/QC Requirements & Comments:

Relinquished by:	Company:	Date/Time:	Received by:	Date/Time:
Kent	EAGLE	03/04/21 1400		
Relinquished by:	Company:	Date/Time:	Received by:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Date/Time:
			Michael Ohlg	3/8/21 1:14PM

WATER & WASTE SAMPLE RECEIPT FORM

Package Type	Delivery Type
Cooler Box Bag Envelope	PONY UPS FedEX USPS
	Other _____

Plant/Customer Northeastern **Number of Plastic Containers:** 29

Opened By SM **Number of Glass Containers:** _____

Date/Time 3-8-21 1pm **Number of Mercury Containers:** _____

Were all temperatures within 0-6°C? Y / N or N/A **Initial:** _____ on ice / no ice

1(IR Gun Ser# 200700311, *Expir.* 11/06/22) - If No, specify each deviation: _____

Was container in good condition? Y / N Comments _____

Was Chain of Custody received? Y / N Comments _____

Requested turnaround: Rush If **RUSH**, who was notified? _____

pH (15 min) Cr^{+6} (pres) (24 hr) NO_2 or NO_3 (48 hr) *ortho*-PO_4 (48 hr) Hg-diss (pres) (48 hr)

Was COC filled out properly? Y N Comments _____

Were samples labeled properly? Y N Comments _____

Were correct containers used? Y / N Comments _____

Was pH checked & Color Coding done? Y N or N/A **Initial & Date:** JWB 3-8-21

pH paper (circle one): MQuant,PN1.09535.0001,LOT# HC904495 [OR] Lab Rat,PN4801,LOT# X000RWDG21

- Was Add'l Preservative needed? Y N If Yes: By whom & when: HgLab (See Prep Book)

Is sample filtration requested? Y N Comments _____ (See Prep Book)

Was the customer contacted? If Yes: Person Contacted: _____

Lab ID# 210515 Initial & Date & Time : _____

$150 Comments: _____

Logged by _____

Reviewed by MWH

REMINDER: Document the pertinent sample integrity information and deviations in sample receipt (as noted above) in the "Notes" field in the LIMS to be included on the report to the customer.

Form REP-703
Rev. 1, 11/2013

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
T: 614-836-4221, Audinet 210-4221
F: 614-836-4168, Audinet 210-4168
http://aepenv/labs

Water Analysis

Location: Northeastern Station ***Report Date: 4/22/2021***

SP-1

Sample Number: 210876-001 **Date Collected: 04/12/2021 14:49** **Date Received: 4/15/2021**

Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Chloride, Cl	37.2	mg/L		0.04	0.01	CRJ	04/20/2021 16:45	EPA 300.1-1997, Rev. 1.0
Fluoride, F	0.88	mg/L		0.06	0.01	CRJ	04/20/2021 16:45	EPA 300.1-1997, Rev. 1.0
Residue, Filterable, TDS	438	mg/L		50	20	SDW	04/15/2021	SM 2540C-2011
Sulfate, SO4	50.0	mg/L		0.4	0.06	CRJ	04/20/2021 16:45	EPA 300.1-1997, Rev. 1.0

SP-2

Sample Number: 210876-002 **Date Collected: 04/12/2021 14:21** **Date Received: 4/15/2021**

Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Chloride, Cl	1130	mg/L		1	0.3	CRJ	04/20/2021 18:01	EPA 300.1-1997, Rev. 1.0
Fluoride, F	3.19	mg/L		0.2	0.04	CRJ	04/21/2021 00:23	EPA 300.1-1997, Rev. 1.0
Residue, Filterable, TDS	2000	mg/L		50	20	SDW	04/15/2021	SM 2540C-2011
Sulfate, SO4	12.4	mg/L		1	0.2	CRJ	04/21/2021 00:23	EPA 300.1-1997, Rev. 1.0

SP-4

Sample Number: 210876-003 **Date Collected: 04/12/2021 16:55** **Date Received: 4/15/2021**

Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Chloride, Cl	495	mg/L		1	0.3	CRJ	04/20/2021 18:27	EPA 300.1-1997, Rev. 1.0
Fluoride, F	3.49	mg/L		0.2	0.04	CRJ	04/21/2021 00:48	EPA 300.1-1997, Rev. 1.0
Residue, Filterable, TDS	1160	mg/L		50	20	SDW	04/15/2021	SM 2540C-2011
Sulfate, SO4	68.1	mg/L		1	0.2	CRJ	04/21/2021 00:48	EPA 300.1-1997, Rev. 1.0

SP-5R

Sample Number: 210876-004 **Date Collected: 04/12/2021 17:38** **Date Received: 4/15/2021**

Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Chloride, Cl	725	mg/L		1	0.3	CRJ	04/20/2021 18:52	EPA 300.1-1997, Rev. 1.0
Fluoride, F	3.20	mg/L		0.2	0.04	CRJ	04/21/2021 01:39	EPA 300.1-1997, Rev. 1.0
Residue, Filterable, TDS	1420	mg/L		50	20	SDW	04/15/2021	SM 2540C-2011
Sulfate, SO4	7.0	mg/L		1	0.2	CRJ	04/21/2021 01:39	EPA 300.1-1997, Rev. 1.0

SP-10

Sample Number: 210876-005 **Date Collected: 04/12/2021 13:36** **Date Received: 4/15/2021**

Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Chloride, Cl	2000	mg/L		5	2	CRJ	04/20/2021 23:06	EPA 300.1-1997, Rev. 1.0
Fluoride, F	6.84	mg/L		0.3	0.07	CRJ	04/20/2021 23:32	EPA 300.1-1997, Rev. 1.0
Residue, Filterable, TDS	3540	mg/L		200	80	SDW	04/15/2021	SM 2540C-2011
Sulfate, SO4	15.4	mg/L		2	0.3	CRJ	04/20/2021 23:32	EPA 300.1-1997, Rev. 1.0

SP-11

Sample Number: 210876-006 **Date Collected: 04/12/2021 13:52** **Date Received: 4/15/2021**

Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Chloride, Cl	130	mg/L		1	0.3	CRJ	04/20/2021 19:18	EPA 300.1-1997, Rev. 1.0
Fluoride, F	1.66	mg/L		0.2	0.04	CRJ	04/21/2021 02:04	EPA 300.1-1997, Rev. 1.0
Residue, Filterable, TDS	918	mg/L		100	40	SDW	04/15/2021	SM 2540C-2011
Sulfate, SO4	232	mg/L		1	0.2	CRJ	04/21/2021 02:04	EPA 300.1-1997, Rev. 1.0

BAP Duplicate

Sample Number: 210876-007 **Date Collected: 04/12/2021 18:20** **Date Received: 4/15/2021**

Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Chloride, Cl	715	mg/L		1	0.3	CRJ	04/20/2021 22:41	EPA 300.1-1997, Rev. 1.0
Fluoride, F	3.18	mg/L		0.2	0.04	CRJ	04/20/2021 20:59	EPA 300.1-1997, Rev. 1.0
Residue, Filterable, TDS	1410	mg/L		100	40	SDW	04/15/2021	SM 2540C-2011
Sulfate, SO4	7.0	mg/L		1	0.2	CRJ	04/20/2021 20:59	EPA 300.1-1997, Rev. 1.0

U: Analyte was analyzed and not detected at or above adjusted Method Detection Limit
J: Analyte was positively identified, though the quantitation was below Reporting Limit.

Michael Ohlinger, Chemist
Email msohlinger@aep.com *Tel.*
Fax 614-836-4168 *Audinet 8-210-*

Chain of Custody Record

Program: Coal Combustion Residuals (CCR)

Dolan Chemical Laboratory (DCL)
4001 Bixby Road
Groveport, Ohio 43125
Contacts: Jonathan Barnhill (318-673-3803)
Michael Ohlinger (614-836-4184)

Project Name: NE PS BAP Semi-Annual CCR sampling
Contact Name: Jill Parker-Witt
Contact Phone: 318-673-3816
Sampler(s): Kenny McDonald

Analysis Turnaround Time (in Calendar Days)
Routine (28 days for Monitoring Wells)

Site Contact:

Date:

For Lab Use Only:
COC/Order #: 210876

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Sampler(s) Initials	250 mL bottle, pH<2, HNO_3 B, Ca, Li, Sb, As, Ba, Be, Cd, Cr, Co, Pb, Mo, Se, TL	Field-filter 500 mL bottle, then pH<2, HNO_3 dissolved Fe and Mn	1 L bottle, Cool, 0-6°C TDS, F, Cl, SO_4	Three (six every 10th*) 1 L bottles, pH<2, HNO_3 Ra-226, Ra-228	250 mL Glass or 125/250 mL PTFE lined bottle, HCL**, pH<2 Hg			Sample Specific Notes:
SP-1	4/12/2021	1449	G	GW	1				X					
SP-2	4/12/2021	1421	G	GW	1				X					
SP-4	4/12/2021	1655	G	GW	1				X					
SP-5R	4/12/2021	1738	G	GW	1				X					
SP-10	4/12/2021	1336	G	GW	1				X					
SP-11	4/12/2021	1352	G	GW	1				X					
BAP DUPLICATE	4/12/2021	1820	G	GW	1				X					
Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____; F= filter in field							4	F4	1	4				

** Six 1L Bottles must be collected for Radium for every 10th sample.*

Special Instructions/QC Requirements & Comments:

Relinquished by: Kenny	Company: EAGLE	Date/Time: 04/14/21 1500	Received by:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by: Michael Ohly	Date/Time: 4/15/21 10:00Am

AEP WATER & WASTE SAMPLE RECEIPT FORM

Package Type	Delivery Type
Cooler Box Bag Envelope	PONY UPS FedEX USPS
	Other _____

Plant/Customer Northlake Number of Plastic Containers: 7

Opened By SM, MGK Number of Glass Containers: _____

Date/Time 4-15-21 10a Number of Mercury Containers: _____

Were all temperatures within 0-6°C? (Y) / N or N/A Initial: SM (on ice) / no ice

1(IR Gun Ser# 200700311, Expir. 11/06/22) - If No, specify each deviation: _____

Was container in good condition? (Y) / N Comments _____

Was Chain of Custody received? (Y) / N Comments _____

Requested turnaround: ROUTINE If RUSH, who was notified? _____

pH (15 min)	Cr^{+6} (pres) (24 hr)	NO_2 or NO_3 (48 hr)	*ortho*-PO_4 (48 hr)	Hg-diss (pres) (48 hr)

Was COC filled out properly? (Y) / N Comments _____

Were samples labeled properly? (Y) / N Comments _____

Were correct containers used? (Y) / N Comments _____

Was pH checked & Color Coding done? (Y) / N or N/A Initial & Date: SM 4-15-21

pH paper (circle one): MQuant,PN1.09535.0001,LOT# HC904495 [OR] Lab Rat,PN4801,LOT# X000RWDG21

- Was Add'l Preservative needed? Y / (N) If Yes: By whom & when: _____ (See Prep Book)

Is sample filtration requested? Y / (N) Comments _____ (See Prep Book)

Was the customer contacted? If Yes: Person Contacted: _____

Lab ID# 210876 Initial & Date & Time: _____

Logged by MSO Comments: _____

Reviewed by SM _____

_____

_____

REMINDER: Document the pertinent sample integrity information and deviations in sample receipt (as noted above) in the "Notes" field in the LIMS to be included on the report to the customer.

Form REP-703
Rev. 2, 05/2016

Dolan Chemical Laboratory
4001 Bixby Road
Groveport, OH 43125
T: 614-836-4221, Audinet 210-4221
F: 614-836-4168, Audinet 210-4168
http://aepenv/labs

Water Analysis

Location: Northeastern Station ***Report Date: 5/13/2021***

SP-1

Sample Number: 210898-001 **Date Collected: 04/12/2021 14:49** **Date Received: 4/19/2021**

Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Antimony, Sb	0.46	ug/L		0.1	0.02	GES	04/21/2021 20:36	EPA 200.8-1994, Rev. 5.4
Arsenic, As	0.54	ug/L		0.1	0.03	GES	04/21/2021 20:36	EPA 200.8-1994, Rev. 5.4
Barium, Ba	158	ug/L		0.2	0.05	GES	04/21/2021 20:36	EPA 200.8-1994, Rev. 5.4
Beryllium, Be	0.04	ug/L	J	0.1	0.007	GES	04/21/2021 20:36	EPA 200.8-1994, Rev. 5.4
Cadmium, Cd	0.05	ug/L		0.05	0.004	GES	04/21/2021 20:36	EPA 200.8-1994, Rev. 5.4
Chromium, Cr	0.359	ug/L		0.2	0.04	GES	04/21/2021 20:36	EPA 200.8-1994, Rev. 5.4
Cobalt, Co	0.202	ug/L		0.05	0.003	GES	04/21/2021 20:36	EPA 200.8-1994, Rev. 5.4
Lead, Pb	0.2	ug/L	J	0.2	0.05	GES	04/21/2021 20:36	EPA 200.8-1994, Rev. 5.4
Mercury, Hg	< 0.002	ug/L	U	0.005	0.002	JAB	04/22/2021	EPA 245.7-2005, Rev. 2.0
Molybdenum, Mo	13.7	ug/L		2	0.1	GES	04/21/2021 20:36	EPA 200.8-1994, Rev. 5.4
Selenium, Se	3.9	ug/L		0.5	0.09	GES	04/21/2021 20:36	EPA 200.8-1994, Rev. 5.4
Thallium, Tl	0.05	ug/L	J	0.5	0.04	GES	04/21/2021 20:36	EPA 200.8-1994, Rev. 5.4
Boron, B	0.186	mg/L		0.05	0.009	GES	04/21/2021 20:36	EPA 200.8-1994, Rev. 5.4
Calcium, Ca	104	mg/L		0.3	0.1	DAM	04/22/2021 13:27	EPA 200.7-1994, Rev. 4.4
Lithium, Li	0.00549	mg/L		0.0002	0.00005	GES	04/21/2021 20:36	EPA 200.8-1994, Rev. 5.4

U: Analyte was analyzed and not detected at or above adjusted Method Detection Limit
J: Analyte was positively identified, though the quantitation was below Reporting Limit.

Radiochemistry*	Result	Units	UNC* (+ / -)	MDA*	Analysis By	Analysis Date/Time	Method
Radium-228	2.08	pCi/L	0.17	0.50	ttp	5/4/2021	SW-846 9320-2014,Rev. 1.0
Radium-226	1.39	pCi/L	0.18	0.13		4/28/2021	SW-846 9315-1986,Rev. 0

The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.

SP-2

Sample Number: 210898-002 **Date Collected:** 04/12/2021 14:21 **Date Received:** 4/19/2021

Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Antimony, Sb	0.84	ug/L		0.1	0.02	GES	04/21/2021 18:22	EPA 200.8-1994, Rev. 5.4
Arsenic, As	1.53	ug/L		0.1	0.03	GES	04/21/2021 18:22	EPA 200.8-1994, Rev. 5.4
Barium, Ba	1790	ug/L		0.2	0.05	GES	04/21/2021 18:22	EPA 200.8-1994, Rev. 5.4
Beryllium, Be	0.112	ug/L		0.1	0.007	GES	04/21/2021 18:22	EPA 200.8-1994, Rev. 5.4
Cadmium, Cd	0.04	ug/L	J	0.05	0.004	GES	04/21/2021 18:22	EPA 200.8-1994, Rev. 5.4
Chromium, Cr	0.559	ug/L		0.2	0.04	GES	04/21/2021 18:22	EPA 200.8-1994, Rev. 5.4
Cobalt, Co	1.10	ug/L		0.05	0.003	GES	04/21/2021 18:22	EPA 200.8-1994, Rev. 5.4
Lead, Pb	0.211	ug/L		0.2	0.05	GES	04/21/2021 18:22	EPA 200.8-1994, Rev. 5.4
Mercury, Hg	< 0.002	ug/L	U	0.005	0.002	JAB	04/22/2021	EPA 245.7-2005, Rev. 2.0
Molybdenum, Mo	14.6	ug/L		2	0.1	GES	04/21/2021 18:22	EPA 200.8-1994, Rev. 5.4
Selenium, Se	1.1	ug/L		0.5	0.09	GES	04/21/2021 18:22	EPA 200.8-1994, Rev. 5.4
Thallium, Tl	0.05	ug/L	J	0.5	0.04	GES	04/21/2021 18:22	EPA 200.8-1994, Rev. 5.4
Boron, B	0.255	mg/L		0.05	0.009	GES	04/21/2021 18:22	EPA 200.8-1994, Rev. 5.4
Calcium, Ca	91.5	mg/L		0.3	0.1	DAM	04/22/2021 14:33	EPA 200.7-1994, Rev. 4.4
Lithium, Li	0.0862	mg/L		0.0002	0.00005	GES	04/21/2021 18:22	EPA 200.8-1994, Rev. 5.4

U: Analyte was analyzed and not detected at or above adjusted Method Detection Limit
J: Analyte was positively identified, though the quantitation was below Reporting Limit.

Radiochemistry*	Result	Units	UNC* (+ / -)	MDA*	Analysis By	Analysis Date/Time	Method
Radium-228	3.43	pCi/L	0.16	0.39	ttp	5/4/2021	SW-846 9320-2014,Rev. 1.0
Radium-226	4.44	pCi/L	0.29	0.11		4/28/2021	SW-846 9315-1986,Rev. 0

The carrier recovery is outside the acceptable limit of 30 -110 %.

The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.

SP-4

Sample Number: 210898-003 **Date Collected: 04/12/2021 16:55** **Date Received: 4/19/2021**

Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Antimony, Sb	0.22	ug/L		0.1	0.02	GES	04/21/2021 18:27	EPA 200.8-1994, Rev. 5.4
Arsenic, As	1.41	ug/L		0.1	0.03	GES	04/21/2021 18:27	EPA 200.8-1994, Rev. 5.4
Barium, Ba	435	ug/L		0.2	0.05	GES	04/21/2021 18:27	EPA 200.8-1994, Rev. 5.4
Beryllium, Be	0.09	ug/L	J	0.1	0.007	GES	04/21/2021 18:27	EPA 200.8-1994, Rev. 5.4
Cadmium, Cd	0.04	ug/L	J	0.05	0.004	GES	04/21/2021 18:27	EPA 200.8-1994, Rev. 5.4
Chromium, Cr	1.03	ug/L		0.2	0.04	GES	04/21/2021 18:27	EPA 200.8-1994, Rev. 5.4
Cobalt, Co	0.921	ug/L		0.05	0.003	GES	04/21/2021 18:27	EPA 200.8-1994, Rev. 5.4
Lead, Pb	0.392	ug/L		0.2	0.05	GES	04/21/2021 18:27	EPA 200.8-1994, Rev. 5.4
Mercury, Hg	< 0.002	ug/L	U	0.005	0.002	JAB	04/22/2021	EPA 245.7-2005, Rev. 2.0
Molybdenum, Mo	2.94	ug/L		2	0.1	GES	04/21/2021 18:27	EPA 200.8-1994, Rev. 5.4
Selenium, Se	0.4	ug/L	J	0.5	0.09	GES	04/21/2021 18:27	EPA 200.8-1994, Rev. 5.4
Thallium, Tl	< 0.04	ug/L	U	0.5	0.04	GES	04/21/2021 18:27	EPA 200.8-1994, Rev. 5.4
Boron, B	0.393	mg/L		0.05	0.009	GES	04/21/2021 18:27	EPA 200.8-1994, Rev. 5.4
Calcium, Ca	70.8	mg/L		0.3	0.1	DAM	04/22/2021 13:31	EPA 200.7-1994, Rev. 4.4
Lithium, Li	0.0613	mg/L		0.0002	0.00005	GES	04/21/2021 18:27	EPA 200.8-1994, Rev. 5.4

U: Analyte was analyzed and not detected at or above adjusted Method Detection Limit
J: Analyte was positively identified, though the quantitation was below Reporting Limit.

Radiochemistry*	Result	Units	UNC* (+ / -)	MDA*	Analysis By	Analysis Date/Time	Method
Radium-228	2.52	pCi/L	0.17	0.46	ttp	5/4/2021	SW-846 9320-2014,Rev. 1.0
Radium-226	1.57	pCi/L	0.18	0.17		4/28/2021	SW-846 9315-1986,Rev. 0

The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.

SP-5R

Sample Number: 210898-004 **Date Collected: 04/12/2021 17:38** **Date Received: 4/19/2021**

Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Antimony, Sb	0.09	ug/L	J	0.1	0.02	GES	04/21/2021 20:41	EPA 200.8-1994, Rev. 5.4
Arsenic, As	7.12	ug/L		0.1	0.03	GES	04/21/2021 20:41	EPA 200.8-1994, Rev. 5.4
Barium, Ba	2180	ug/L		1	0.2	GES	04/22/2021 16:23	EPA 200.8-1994, Rev. 5.4
Beryllium, Be	0.05	ug/L	J	0.1	0.007	GES	04/21/2021 20:41	EPA 200.8-1994, Rev. 5.4
Cadmium, Cd	0.01	ug/L	J	0.05	0.004	GES	04/21/2021 20:41	EPA 200.8-1994, Rev. 5.4
Chromium, Cr	0.415	ug/L		0.2	0.04	GES	04/21/2021 20:41	EPA 200.8-1994, Rev. 5.4
Cobalt, Co	0.378	ug/L		0.05	0.003	GES	04/21/2021 20:41	EPA 200.8-1994, Rev. 5.4
Lead, Pb	0.325	ug/L		0.2	0.05	GES	04/21/2021 20:41	EPA 200.8-1994, Rev. 5.4
Mercury, Hg	< 0.002	ug/L	U	0.005	0.002	JAB	04/22/2021	EPA 245.7-2005, Rev. 2.0
Molybdenum, Mo	1	ug/L	J	2	0.1	GES	04/21/2021 20:41	EPA 200.8-1994, Rev. 5.4
Selenium, Se	0.1	ug/L	J	0.5	0.09	GES	04/21/2021 20:41	EPA 200.8-1994, Rev. 5.4
Thallium, Tl	< 0.04	ug/L	U	0.5	0.04	GES	04/21/2021 20:41	EPA 200.8-1994, Rev. 5.4
Boron, B	0.215	mg/L		0.05	0.009	GES	04/21/2021 20:41	EPA 200.8-1994, Rev. 5.4
Calcium, Ca	54.6	mg/L		0.3	0.1	DAM	04/22/2021 13:36	EPA 200.7-1994, Rev. 4.4
Lithium, Li	0.0894	mg/L		0.0002	0.00005	GES	04/21/2021 20:41	EPA 200.8-1994, Rev. 5.4

U: Analyte was analyzed and not detected at or above adjusted Method Detection Limit
J: Analyte was positively identified, though the quantitation was below Reporting Limit.

Radiochemistry*	Result	Units	UNC* (+ / -)	MDA*	Analysis By	Analysis Date/Time	Method
Radium-228	4.35	pCi/L	0.18	0.42	ttp	5/4/2021	SW-846 9320-2014,Rev. 1.0
Radium-226	9.75	pCi/L	0.44	0.10		4/28/2021	SW-846 9315-1986,Rev. 0

The carrier recovery is outside the acceptable limit of 30 -110 %.The RPD between the sample and duplicate result exceeds 25%.

The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.

SP-10

Sample Number: 210898-005 **Date Collected:** 04/12/2021 13:36 **Date Received:** 4/19/2021

Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Antimony, Sb	0.12	ug/L		0.1	0.02	GES	04/21/2021 20:46	EPA 200.8-1994, Rev. 5.4
Arsenic, As	1.14	ug/L		0.1	0.03	GES	04/21/2021 20:46	EPA 200.8-1994, Rev. 5.4
Barium, Ba	6360	ug/L		1	0.2	GES	04/22/2021 16:28	EPA 200.8-1994, Rev. 5.4
Beryllium, Be	0.03	ug/L	J	0.1	0.007	GES	04/21/2021 20:46	EPA 200.8-1994, Rev. 5.4
Cadmium, Cd	0.01	ug/L	J	0.05	0.004	GES	04/21/2021 20:46	EPA 200.8-1994, Rev. 5.4
Chromium, Cr	0.277	ug/L		0.2	0.04	GES	04/21/2021 20:46	EPA 200.8-1994, Rev. 5.4
Cobalt, Co	0.218	ug/L		0.05	0.003	GES	04/21/2021 20:46	EPA 200.8-1994, Rev. 5.4
Lead, Pb	0.1	ug/L	J	0.2	0.05	GES	04/21/2021 20:46	EPA 200.8-1994, Rev. 5.4
Mercury, Hg	< 0.002	ug/L	U	0.005	0.002	JAB	04/23/2021	EPA 245.7-2005, Rev. 2.0
Molybdenum, Mo	5.01	ug/L		2	0.1	GES	04/21/2021 20:46	EPA 200.8-1994, Rev. 5.4
Selenium, Se	< 0.09	ug/L	U	0.5	0.09	GES	04/21/2021 20:46	EPA 200.8-1994, Rev. 5.4
Thallium, Tl	< 0.04	ug/L	U	0.5	0.04	GES	04/21/2021 20:46	EPA 200.8-1994, Rev. 5.4
Boron, B	1.03	mg/L		0.05	0.009	GES	04/21/2021 20:46	EPA 200.8-1994, Rev. 5.4
Calcium, Ca	43.8	mg/L		0.3	0.1	DAM	04/22/2021 13:40	EPA 200.7-1994, Rev. 4.4
Lithium, Li	0.221	mg/L		0.0002	0.00005	GES	04/21/2021 20:46	EPA 200.8-1994, Rev. 5.4

U: Analyte was analyzed and not detected at or above adjusted Method Detection Limit
J: Analyte was positively identified, though the quantitation was below Reporting Limit.

Radiochemistry*	Result	Units	UNC* (+ / -)	MDA*	Analysis By	Analysis Date/Time	Method
Radium-228	1.76	pCi/L	0.12	0.33	ttp	5/4/2021	SW-846 9320-2014,Rev. 1.0
The carrier recovery is outside the acceptable limit of 30-110%.							
Radium-226	18.6	pCi/L	0.60	0.066		5/10/2021	SW-846 9315-1986,Rev. 0
The carrier recovery is outside the acceptable limit of 30-110%.							

The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.

SP-11

Sample Number: 210898-006 **Date Collected: 04/12/2021 13:52** **Date Received: 4/19/2021**

Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Antimony, Sb	0.19	ug/L		0.1	0.02	GES	04/21/2021 20:51	EPA 200.8-1994, Rev. 5.4
Arsenic, As	2.14	ug/L		0.1	0.03	GES	04/21/2021 20:51	EPA 200.8-1994, Rev. 5.4
Barium, Ba	212	ug/L		0.2	0.05	GES	04/21/2021 20:51	EPA 200.8-1994, Rev. 5.4
Beryllium, Be	0.02	ug/L	J	0.1	0.007	GES	04/21/2021 20:51	EPA 200.8-1994, Rev. 5.4
Cadmium, Cd	0.02	ug/L	J	0.05	0.004	GES	04/21/2021 20:51	EPA 200.8-1994, Rev. 5.4
Chromium, Cr	0.944	ug/L		0.2	0.04	GES	04/21/2021 20:51	EPA 200.8-1994, Rev. 5.4
Cobalt, Co	1.52	ug/L		0.05	0.003	GES	04/21/2021 20:51	EPA 200.8-1994, Rev. 5.4
Lead, Pb	0.224	ug/L		0.2	0.05	GES	04/21/2021 20:51	EPA 200.8-1994, Rev. 5.4
Mercury, Hg	< 0.002	ug/L	U	0.005	0.002	JAB	04/23/2021	EPA 245.7-2005, Rev. 2.0
Molybdenum, Mo	2	ug/L	J	2	0.1	GES	04/21/2021 20:51	EPA 200.8-1994, Rev. 5.4
Selenium, Se	0.2	ug/L	J	0.5	0.09	GES	04/21/2021 20:51	EPA 200.8-1994, Rev. 5.4
Thallium, Tl	< 0.04	ug/L	U	0.5	0.04	GES	04/21/2021 20:51	EPA 200.8-1994, Rev. 5.4
Boron, B	0.562	mg/L		0.05	0.009	GES	04/21/2021 20:51	EPA 200.8-1994, Rev. 5.4
Calcium, Ca	79.6	mg/L		0.3	0.1	DAM	04/22/2021 13:45	EPA 200.7-1994, Rev. 4.4
Lithium, Li	0.0248	mg/L		0.0002	0.00005	GES	04/21/2021 20:51	EPA 200.8-1994, Rev. 5.4

U: Analyte was analyzed and not detected at or above adjusted Method Detection Limit
J: Analyte was positively identified, though the quantitation was below Reporting Limit.

Radiochemistry*	Result	Units	UNC* (+ / -)	MDA*	Analysis By	Analysis Date/Time	Method
Radium-228	0.324	pCi/L	0.14	0.47	ttp	5/4/2021	SW-846 9320-2014,Rev. 1.0
Radium-226	1.03	pCi/L	0.15	0.12		5/10/2021	SW-846 9315-1986,Rev. 0

The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.

BAP Duplicate

Sample Number: 210898-007 **Date Collected:** 04/12/2021 18:20 **Date Received:** 4/19/2021

Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Antimony, Sb	0.10	ug/L		0.1	0.02	GES	04/21/2021 20:56	EPA 200.8-1994, Rev. 5.4
Arsenic, As	7.46	ug/L		0.1	0.03	GES	04/21/2021 20:56	EPA 200.8-1994, Rev. 5.4
Barium, Ba	2070	ug/L		1	0.2	GES	04/22/2021 16:33	EPA 200.8-1994, Rev. 5.4
Beryllium, Be	0.05	ug/L	J	0.1	0.007	GES	04/21/2021 20:56	EPA 200.8-1994, Rev. 5.4
Cadmium, Cd	0.01	ug/L	J	0.05	0.004	GES	04/21/2021 20:56	EPA 200.8-1994, Rev. 5.4
Chromium, Cr	0.378	ug/L		0.2	0.04	GES	04/21/2021 20:56	EPA 200.8-1994, Rev. 5.4
Cobalt, Co	0.399	ug/L		0.05	0.003	GES	04/21/2021 20:56	EPA 200.8-1994, Rev. 5.4
Lead, Pb	0.314	ug/L		0.2	0.05	GES	04/21/2021 20:56	EPA 200.8-1994, Rev. 5.4
Mercury, Hg	< 0.002	ug/L	U	0.005	0.002	JAB	04/23/2021	EPA 245.7-2005, Rev. 2.0
Molybdenum, Mo	0.6	ug/L	J	2	0.1	GES	04/21/2021 20:56	EPA 200.8-1994, Rev. 5.4
Selenium, Se	0.1	ug/L	J	0.5	0.09	GES	04/21/2021 20:56	EPA 200.8-1994, Rev. 5.4
Thallium, Tl	< 0.04	ug/L	U	0.5	0.04	GES	04/21/2021 20:56	EPA 200.8-1994, Rev. 5.4
Boron, B	0.226	mg/L		0.05	0.009	GES	04/21/2021 20:56	EPA 200.8-1994, Rev. 5.4
Calcium, Ca	54.1	mg/L		0.3	0.1	DAM	04/22/2021 13:49	EPA 200.7-1994, Rev. 4.4
Lithium, Li	0.0902	mg/L		0.0002	0.00005	GES	04/21/2021 20:56	EPA 200.8-1994, Rev. 5.4

U: Analyte was analyzed and not detected at or above adjusted Method Detection Limit
J: Analyte was positively identified, though the quantitation was below Reporting Limit.

The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.

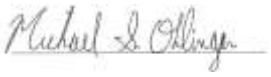
Equipment Blank BAP

Sample Number: 210898-008 **Date Collected:** 04/12/2021 14:57 **Date Received:** 4/19/2021

Parameter	Result	Units	Data Qual	RL	MDL	Analysis By	Analysis Date/Time	Method
Antimony, Sb	< 0.02	ug/L	U	0.1	0.02	GES	04/21/2021 21:01	EPA 200.8-1994, Rev. 5.4
Arsenic, As	< 0.03	ug/L	U	0.1	0.03	GES	04/21/2021 21:01	EPA 200.8-1994, Rev. 5.4
Barium, Ba	0.1	ug/L	J	0.2	0.05	GES	04/21/2021 21:01	EPA 200.8-1994, Rev. 5.4
Beryllium, Be	< 0.007	ug/L	U	0.1	0.007	GES	04/21/2021 21:01	EPA 200.8-1994, Rev. 5.4
Cadmium, Cd	< 0.004	ug/L	U	0.05	0.004	GES	04/21/2021 21:01	EPA 200.8-1994, Rev. 5.4
Chromium, Cr	0.282	ug/L		0.2	0.04	GES	04/21/2021 21:01	EPA 200.8-1994, Rev. 5.4
Cobalt, Co	0.03	ug/L	J	0.05	0.003	GES	04/21/2021 21:01	EPA 200.8-1994, Rev. 5.4
Lead, Pb	< 0.05	ug/L	U	0.2	0.05	GES	04/21/2021 21:01	EPA 200.8-1994, Rev. 5.4
Mercury, Hg	< 0.002	ug/L	U	0.005	0.002	JAB	04/23/2021	EPA 245.7-2005, Rev. 2.0
Molybdenum, Mo	< 0.1	ug/L	U	2	0.1	GES	04/21/2021 21:01	EPA 200.8-1994, Rev. 5.4
Selenium, Se	< 0.09	ug/L	U	0.5	0.09	GES	04/21/2021 21:01	EPA 200.8-1994, Rev. 5.4
Thallium, Tl	< 0.04	ug/L	U	0.5	0.04	GES	04/21/2021 21:01	EPA 200.8-1994, Rev. 5.4
Boron, B	< 0.009	mg/L	U	0.05	0.009	GES	04/21/2021 21:01	EPA 200.8-1994, Rev. 5.4
Calcium, Ca	< 0.1	mg/L	U	0.3	0.1	DAM	04/22/2021 13:53	EPA 200.7-1994, Rev. 4.4
Lithium, Li	0.00006	mg/L	J	0.0002	0.00005	GES	04/21/2021 21:01	EPA 200.8-1994, Rev. 5.4

U: Analyte was analyzed and not detected at or above adjusted Method Detection Limit
J: Analyte was positively identified, though the quantitation was below Reporting Limit.

The Required Detection Limit (RDL) is equivalent to the RL and for Radium-226 and Radium-228, the RDL is calculated to be 1.0 pCi/L. The Minimal Detectable Activity (MDA) listed with these results is sample specific and empirical. The combined standard uncertainty (UNC) is a counting uncertainty representing "one-sigma" which has the same units of measurement as the result.



Michael Ohlinger, Chemist
Email msohlinger@aep.com Tel.
Fax 614-836-4168 Audinet 8-210-

Chain of Custody Record

Program: Coal Combustion Residuals (CCR)

Dolan Chemical Laboratory (DCL)
4001 Bixby Road
Groveport, Ohio 43125
Contacts: Jonathan Barnhill (318-673-3803)
Michael Ohlinger (614-836-4184)

Project Name: NE PS BAP Semi-Annual CCR sampling

Contact Name: Jill Parker-Witt

Contact Phone: 318-673-3816

Sampler(s): Kenny McDonald

Analysis Turnaround Time (in Calendar Days)
Routine (28 days for Monitoring Wells)

Site Contact:

Date:

For Lab Use Only:
COC/Order #: ~~810~~ 210898

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Sampler(s) Initials	250 mL bottle, pH<2, HNO_3 B, Ca, Li, Sb, As, Ba, Be, Cd, Cr, Co, Pb, Mo, Se, TL	Field-filter 500 mL bottle, then pH<2, HNO_3 dissolved Fe and Mn	1 L bottle, Cool, 0-6°C TDS, F, Cl, SO_4	Three (six every 10th*) 1 L bottles, pH<2, HNO_3 Ra-226, Ra-228	250 mL Glass or 125/250 mL PTFE lined bottle, HCL**, pH<2 Hg			Sample Specific Notes:
SP-1	4/12/2021	1449	G	GW	5		X			X	X			
SP-2	4/12/2021	1421	G	GW	5		X			X	X			
SP-4	4/12/2021	1655	G	GW	5		X			X	X			
SP-5R	4/12/2021	1738	G	GW	8		X			X	X			
SP-10	4/12/2021	1336	G	GW	5		X			X	X			
SP-11	4/12/2021	1352	G	GW	5		X			X	X			
BAP DUPLICATE	4/12/2021	1820	G	GW	2		X				X			
BAP EQUIPMENT BLANK	4/12/2021	1457	G	W	2		X				X			
Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____; F= filter in field							4	F4	1	4				

** Six 1L Bottles must be collected for Radium for every 10th sample.*

Special Instructions/QC Requirements & Comments:

Relinquished by:	Company:	Date/Time:	Received by:	Date/Time:
Kutrd	EAGLE	04/14/21 1500		
Relinquished by:	Company:	Date/Time:	Received by:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by: gABeach	Date/Time: 4/19/21 1:35

AEP WATER & WASTE SAMPLE RECEIPT FORM

Package Type	Delivery Type
Cooler Box Bag Envelope	PONY UPS FedEX USPS
	Other _____

Plant/Customer Northeastern St. Number of Plastic Containers: ~~28~~ 29

Opened By JABeach Number of Glass Containers: _____

Date/Time 4/19/21 Number of Mercury Containers: 8

Were all temperatures within 0-6°C? Y / N or (N/A) Initial: _____ on ice / no ice

1(IR Gun Ser# 200700311, Expir. 11/06/22) - If No, specify each deviation: _____

Was container in good condition? (Y) / N Comments _____

Was Chain of Custody received? (Y) / N Comments _____

Requested turnaround: Routine If RUSH, who was notified? _____

pH (15 min) Cr^{+6} (pres) (24 hr) NO_2 or NO_3 (48 hr) *ortho*-PO_4 (48 hr) Hg-diss (pres) (48 hr)

Was COC filled out properly? (Y) / N Comments _____

Were samples labeled properly? (Y) / N Comments _____

Were correct containers used? (Y) / N Comments _____

Was pH checked & Color Coding done? (Y) / N or N/A Initial & Date: JAB/MSD 4/19/21

pH paper (circle one): MQuant,PN1.09535.0001,LOT# HC904495 [OR] Lab Rat,PN4801,LOT# X000RWDG21

- Was Add'l Preservative needed? (Y) / N If Yes: By whom & when: Hg lab (See Prep Book)

Is sample filtration requested? Y / (N) Comments _____ (See Prep Book)

Was the customer contacted? If Yes: Person Contacted: _____

Initial & Date & Time: _____

Lab ID# 210898

Comments: _____

Logged by JAB

Reviewed by MSD

REMINDER: Document the pertinent sample integrity information and deviations in sample receipt (as noted above) in the "Notes" field in the LIMS to be included on the report to the customer.

Record of Plan Revisions		
Revision Number	Date	Revision Description
0	Jan 2022	Initial Report
1	April. 2022	Revised COC for April 2021 monitoring event