

Annual Groundwater Monitoring Report

Appalachian Power Company
John E. Amos Plant
Bottom Ash Pond CCR Management Unit
Winfield, West Virginia

January 2020

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BOUNDLESS ENERGY™

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I. Overview

This *Annual Groundwater Monitoring* (Report) has been prepared to report the status of activities for the preceding year for an existing Bottom Ash Pond (BAP) CCR unit at Appalachian Power Company's, a wholly-owned subsidiary of American Electric Power Company (AEP) John E. Amos Power Plant. The USEPA's CCR rules require that the Annual Groundwater Monitoring Report be posted to the operating record for the preceding year no later than January 31.

In general, the following activities were completed:

- Groundwater data underwent various validation tests, including tests for completeness, valid values, transcription errors, and consistent units;
- Statistical analysis of assessment monitoring samples analyzed in November 2018, April 2019, and November 2019 were completed in 2019;
- As required by the CCR assessment monitoring program, two rounds of sampling that included all the Appendix III and detected Appendix IV parameters were performed in March and July 2019 in accordance with 40 CFR §§257.95(d)(1). A "screening" sample was obtained in accordance with 40 CFR §§257.95(b) and completed in June 2019. All detected parameters from the analysis of the June 2019 samples were included in the March and July 2019 sampling events. No statistically significant levels (SSL's) above groundwater protection standards (GWPS) occurred. The Amos BAP CCR Unit remains in the Assessment Monitoring Program per the federal CCR Rule.

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

- A map/aerial photograph showing the BAP Complex 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, if applicable (**Appendix 5**).
- 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 (**Appendix 1**).
- Results of the required statistical analysis of groundwater monitoring results (**Appendix 2**).
- Discussion of any alternative source demonstrations completed (**Appendix 3**).

- 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, if applicable (**Appendix 4**).
- Other information required to be included in the annual report such as assessment of corrective measures, 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

Figure 1 depicts the PE-certified groundwater monitoring network, the monitoring well locations, and their corresponding identification numbers. The monitoring well distribution adequately covers downgradient and upgradient areas as detailed in the *Groundwater Monitoring Network Evaluation Report* that was placed in the American Electric Power CCR public internet site on March 9, 2017. The CCR groundwater quality monitoring network includes the following:

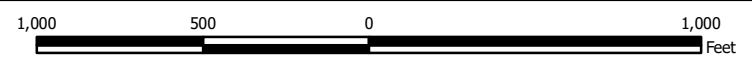
- Four upgradient wells MW-6, MW-1601, MW-1602A, and MW-1603A; and
- Six downgradient wells MW-1, MW-4, MW-5, MW-1604, MW-1605, and MW-1606.




- Legend**
- Monitoring Well Network**
-  Upgradient Sampling Location
 -  Downgradient Sampling Location
 -  Ash Pond System

Notes

- Monitoring well coordinates provided by AEP.
- Site features based on information available in the Ash Pond- CCR Groundwater Monitoring Well Network Evaluation - Amos Plant (Arcadis, 2016) provided by AEP.
- Rev. 1: Updated CCR Unit boundary. September 13, 2018



Site Layout Ash Pond System	
AEP Amos Generating Plant Winfield, West Virginia	
	
Columbus, Ohio	2018/12/24
Figure 1	

III. Monitoring Wells Installed or Decommissioned

There were no monitoring wells installed or decommissioned in 2019 at the Amos Plant Bottom Ash Pond Complex. The network design, as summarized in the *Groundwater Monitoring Network Evaluation Report (March 2017)* and as posted at the CCR web site for John E. Amos Plant, did not change. That evaluation report, viewable on the AEP CCR web site, discusses the facility location, the hydrogeological setting, the hydrostratigraphic units, the uppermost aquifer, and the design of the groundwater monitoring well network including downgradient and upgradient monitoring well locations.

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

Appendix 1 contains tables showing the groundwater quality data collected during the establishment of background quality and the groundwater monitoring samples collected during 2019. Static water elevation data from each monitoring event in 2019 are also shown in **Appendix 1**, along with the groundwater velocity calculations, groundwater flow direction and potentiometric maps developed after each sampling event.

V. Groundwater Quality Data Statistical Analysis

Statistical analysis of the assessment monitoring samples taken in November 2018 was completed in January 2019. No SSLs above a GWPS were identified. That report has been placed on the publicly accessible CCR website for John E. Amos Plant at <https://www.aep.com/requiredpostings/ccr/Amos> and is included in **Appendix 2**. Groundwater monitoring samples collected in March and July 2019 underwent statistical analysis. Those statistical analysis reports are also included in **Appendix 2**. No SSLs above a GWPS were identified in 2019. Therefore, the Amos BAP will remain in Assessment Monitoring.

VI. Alternative Source Demonstration

No alternative source demonstrations were performed in 2019.

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

There have been no transitions between monitoring requirements at the Amos BAP since the transition to Assessment Monitoring in 2018.

Regarding defining an alternate monitoring frequency, the groundwater velocity and monitoring well production are high enough at this facility that no modification to the monitoring frequency is needed.

VIII. Other Information Required

The BAP has progressed from detection monitoring to its current status in assessment monitoring. All required information has been included in this annual groundwater monitoring report.

IX. Description of Any Problems Encountered in 2019 and Actions Taken

No significant problems were encountered. The low flow sampling effort went smoothly and the schedule was met to support the 2019 annual groundwater report preparation covering the year 2019 groundwater monitoring activities.

X. A Projection of Key Activities for the Upcoming Year

Key activities for 2020 include:

- Remain in assessment monitoring and sample all CCR wells at the BAP semi-annually for the Appendix III and IV parameters in accordance with 40 CFR §§257.95. Perform statistical analysis on the sampling results and compare the results of Appendix IV concentrations in downgradient wells to the GWPSs.
- If a GWPS is exceeded in a downgradient well the following activities will be undertaken:
 - Characterize the nature and extent of a release by installing additional GW wells as necessary, estimate the quantity of material released and the concentrations of Appendix IV parameters that are in the material, and sample all wells to characterize the nature and extent of the release.
 - If contaminants have migrated off-site, notify all persons who own land that directly overlies any part of the plume of contamination.
 - Perform an alternate source demonstration (ASD) investigating whether the exceedance was caused by a source other than the BAP or was a result of an error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality.

- If a successful ASD cannot be made, initiate an assessment of corrective measures and follow all of those requirements.
- Responding to any new data received in light of what the CCR rule requires.
- Preparation of the 2020 annual groundwater report.

APPENDIX 1 - GW Quality Data, GW Flow Directions, GW Flow Rates
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Tables follow, showing the groundwater monitoring data collected in 2019, groundwater monitoring data collected during background sampling, 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.

**Table 1 - Groundwater Data Summary: MW-1
Amos - BAP
Appendix III Constituents**

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Total Dissolved Solids	Sulfate
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
7/26/2016	Background	0.042	41.6	61.6	<0.05 U	5.0	320	146
8/22/2016	Background	0.051	41.6	60.3	<0.05 U	4.9	320	148
10/19/2016	Background	0.031	43.7	64.9	<0.05 U	5.1	348	150
11/7/2016	Background	--	--	--	--	5.1	--	--
12/13/2016	Background	0.053	42.9	69.0	<0.05 U	5.0	318	153
2/7/2017	Background	0.056	40.4	62.9	0.03 J	5.5	314	139
3/13/2017	Background	0.108	38.1	64.2	0.02 J	5.2	330	140
5/22/2017	Background	0.082	35.7	62.6	0.03 J	6.1	316	138
6/20/2017	Background	0.092	38.2	65.1	<0.02 U	5.2	348	147
11/1/2017	Detection	0.039	43.7	75.8	0.03 J	5.0	358	156
1/9/2018	Detection	--	43.2	83.2	--	4.9	362	164
5/3/2018	Assessment	0.095	39.9	71.8	0.02 J	7.3	328	154
9/4/2018	Assessment	0.094	38.3	67.9	0.03 J	5.1	338	145
3/14/2019	Assessment	0.2 J	38.4	55.2	0.03 J	5.2	321	138
6/10/2019	Assessment	0.08 J	35.9	64.4	0.03 J	10.2	330	141
7/22/2019	Assessment	0.05 J	36.8	57.4	0.02 J	4.9	362	143

Notes:

mg/L: milligrams per liter

SU: standard unit

<: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

Table 1 - Groundwater Data Summary: MW-1

Amos - BAP

Appendix IV 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	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
7/26/2016	Background	0.02 J	0.13	30.2	0.107	2.09	0.1	10.7	0.528	<0.05 U	0.134	0.004	<0.002 U	1.67	0.09 J	0.04 J
8/22/2016	Background	0.01 J	0.12	28.5	0.105	2.02	0.1	12.3	0.725	<0.05 U	0.081	0.003	<0.002 U	1.48	0.1	0.04 J
10/19/2016	Background	0.02 J	0.15	31.1	0.119	2.33	0.510	13.9	1.86	<0.05 U	0.133	0.0008 J	<0.002 U	2.33	0.1	0.066
11/7/2016	Background	--	--	--	--	--	--	--	0.615	--	--	--	--	--	--	--
12/13/2016	Background	0.01 J	0.16	28.9	0.115	2.55	1.24	14.6	0.136	<0.05 U	0.102	0.014	<0.002 U	1.38	0.2	0.04 J
2/7/2017	Background	0.01 J	0.20	25.4	0.115	2.43	0.141	14.9	0.609	0.03 J	0.093	0.004	<0.002 U	0.79	0.1	0.056
3/13/2017	Background	0.02 J	0.14	26.3	0.112	2.36	0.566	12.5	0.675	0.02 J	0.129	0.002	<0.002 U	1.15	0.1	0.03 J
5/22/2017	Background	0.03 J	0.09	25.8	0.114	2.54	0.113	9.69	0.707	0.03 J	0.066	0.006	0.002 J	0.31	0.1 J	0.04 J
6/20/2017	Background	0.02 J	0.10	27.7	0.123	2.65	0.173	9.38	0.587	<0.02 U	0.062	0.005	<0.002 U	0.34	0.09 J	0.04 J
5/3/2018	Assessment	0.01 J	0.13	27.8	0.143	3.12	0.093	15.1	1.74	0.02 J	0.068	0.004	<0.002 U	0.62	0.2	0.04 J
9/4/2018	Assessment	0.22	0.18	29.4	0.130	2.97	0.548	17.7	0.575	0.03 J	1.16	0.003	--	0.34	0.2	0.05 J
3/14/2019	Assessment	0.05 J	0.12	26.9	0.131	3.48	0.255	10.3	0.887	0.03 J	0.252	<0.09 U	--	0.5 J	0.09 J	<0.1 U
6/10/2019	Assessment	0.02 J	0.11	27.5	0.125	2.14	0.2 J	12.8	0.998	0.03 J	0.08 J	<0.009 U	<0.002 U	<0.4 U	0.1 J	<0.1 U
7/22/2019	Assessment	<0.02 U	0.09 J	26.4	0.136	2.47	0.06 J	13.5	0.825	0.02 J	0.08 J	0.00257	--	<0.4 U	0.2 J	<0.1 U

Notes:

µg/L: micrograms per liter

SU: standard unit

<: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

pCi/L: picocuries per liter

**Table 1 - Groundwater Data Summary: MW-4
Amos - BAP
Appendix III Constituents**

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Total Dissolved Solids	Sulfate
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
7/25/2016	Background	0.074	16.2	11.7	0.07 J	5.9	190	44.8
8/23/2016	Background	0.054	17.9	10.9	0.04 J	5.5	184	39.2
10/18/2016	Background	0.07	15.2	12.2	<0.05 U	5.7	206	44.5
11/8/2016	Background	--	--	12.8	0.03 J	5.7	170	47.3
12/12/2016	Background	0.079	16.3	14.0	0.04 J	5.5	348	48
2/8/2017	Background	0.087	15.3	13.4	0.06 J	5.6	176	46.1
3/14/2017	Background	0.093	15.8	12.9	0.05 J	5.8	185	43.5
5/22/2017	Background	0.099	15.3	13.2	0.04 J	6.3	192	43.9
6/19/2017	Background	0.097	15.0	13.3	0.03 J	5.5	196	50.9
11/1/2017	Detection	0.073	14.2	12.3	0.06	5.5	210	43.0
5/3/2018	Assessment	0.100	15.9	14.4	0.06 J	5.9	178	49.2
9/5/2018	Assessment	0.067	13.3	13.4	0.06	7.0	179	42.4
3/15/2019	Assessment	<0.2 U	14.5	13.3	0.06 J	5.5	184	42.8
6/10/2019	Assessment	0.06 J	14.4	13.0	0.06	6.8	172	43.3
7/23/2019	Assessment	0.06 J	14.8	13.4	0.04 J	5.4	186	44.5

Notes:

mg/L: milligrams per liter

SU: standard unit

<: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

Table 1 - Groundwater Data Summary: MW-4

Amos - BAP

Appendix IV 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	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
7/25/2016	Background	0.05 J	13.6	101	0.068	0.18	0.5	26.6	0.539	0.07 J	0.502	0.007	<0.002 U	11.1	0.07 J	0.055
8/23/2016	Background	0.02 J	4.34	90.8	0.051	0.03	0.3	5.55	0.405	0.04 J	0.275	0.002	<0.002 U	19.2	0.08 J	0.01 J
10/18/2016	Background	0.11	15.8	84.1	0.055	0.53	0.600	85.9	1.884	<0.05 U	0.395	0.002	<0.002 U	2.44	0.1	0.156
11/8/2016	Background	--	--	--	--	--	--	--	0.457	0.03 J	--	--	--	--	--	--
12/12/2016	Background	0.03 J	3.35	96.0	0.049	0.09	1.18	10.9	2.116	0.04 J	0.255	0.012	<0.002 U	0.75	0.1 J	0.090
2/8/2017	Background	0.02 J	8.17	82.5	0.045	0.12	0.290	18.9	0.46	0.06 J	0.306	0.001	<0.002 U	0.93	0.07 J	0.099
3/14/2017	Background	0.03 J	5.36	91.0	0.043	0.16	0.327	23.3	1.339	0.05 J	0.192	0.0005 J	<0.002 U	0.51	0.07 J	0.072
5/22/2017	Background	0.04 J	6.38	96.2	0.053	0.09	0.226	20.8	0.55	0.04 J	0.188	0.008	<0.002 U	0.49	0.08 J	0.068
6/19/2017	Background	0.02 J	5.65	88.5	0.049	0.08	0.216	22.1	0.929	0.03 J	0.247	0.002	<0.002 U	0.31	0.1	0.069
5/3/2018	Assessment	<0.01 U	1.15	93.1	0.046	0.04	0.175	7.93	1.569	0.06 J	0.153	0.0008 J	<0.002 U	0.31	0.06 J	0.01 J
9/5/2018	Assessment	0.05 J	11.0	89.1	0.037	0.21	0.200	25.8	0.623	0.06	0.083	0.003	--	0.28	0.06 J	0.109
3/15/2019	Assessment	<0.02 U	1.63	80.4	0.05 J	0.05	0.2 J	9.81	0.501	0.06 J	0.219	<0.09 U	--	<0.4 U	0.06 J	<0.1 U
6/10/2019	Assessment	<0.02 U	2.5	90.5	0.06 J	0.07	0.274	10.5	0.787	0.06	0.406	<0.009 U	<0.002 U	<0.4 U	0.08 J	<0.1 U
7/23/2019	Assessment	0.03 J	2.48	84.6	0.07 J	0.05	0.236	7.24	0.486	0.04 J	0.430	0.00162	--	<0.4 U	0.1 J	<0.1 U

Notes:

µg/L: micrograms per liter

SU: standard unit

<: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

pCi/L: picocuries per liter

**Table 1 - Groundwater Data Summary: MW-5
Amos - BAP
Appendix III Constituents**

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Total Dissolved Solids	Sulfate
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
7/26/2016	Background	0.051	19.7	21.4	0.04 J	5.8	156	57.7
8/23/2016	Background	0.014	18.4	21.3	0.04 J	5.4	136	57.5
10/18/2016	Background	0.018	18.6	20.0	<0.05 U	5.9	188	56
11/8/2016	Background	--	--	20.1	0.05 J	5.8	176	56.5
12/12/2016	Background	0.002 J	18.1	20.4	0.03 J	5.7	154	54.1
2/8/2017	Background	0.032	16.3	19.6	0.05 J	5.8	158	51.1
3/14/2017	Background	0.028	16.5	19.5	0.03 J	5.9	172	51.5
5/22/2017	Background	0.046	16.8	18.9	0.04 J	6.6	180	51.1
6/19/2017	Background	0.06	11.4	19.1	0.03 J	5.6	170	57.3
11/1/2017	Detection	0.033	15.7	17.5	0.05 J	5.7	190	53.9
5/3/2018	Assessment	0.156	16.6	17.8	0.04 J	6.3	166	51.9
9/4/2018	Assessment	0.028	15.2	17.8	0.05 J	5.8	151	45.4
3/15/2019	Assessment	<0.2 U	16.2	18.5	0.05 J	5.7	180	51.3
6/10/2019	Assessment	0.04 J	15.7	16.9	0.05 J	5.9	178	48.4
7/23/2019	Assessment	<0.04 U	14.9	15.3	0.04 J	5.6	162	45.2

Notes:

mg/L: milligrams per liter

SU: standard unit

<: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

Table 1 - Groundwater Data Summary: MW-5

Amos - BAP

Appendix IV 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	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
7/26/2016	Background	0.03 J	2.71	170	0.039	0.01 J	0.2	0.966	1.264	0.04 J	0.123	0.0005 J	<0.002 U	2.15	<0.03 U	0.04 J
8/23/2016	Background	0.01 J	2.42	157	0.029	0.007 J	0.2	1.01	0.406	0.04 J	0.056	0.004	<0.002 U	2.57	<0.03 U	0.01 J
10/18/2016	Background	0.05	4.00	166	0.079	0.007 J	0.841	1.45	1.123	<0.05 U	0.667	0.004	<0.002 U	2.20	0.09 J	0.01 J
11/8/2016	Background	--	--	--	--	--	--	--	1.099	0.05 J	--	--	--	--	--	--
12/12/2016	Background	0.08	3.41	166	0.053	0.006 J	0.892	1.14	1.46	0.03 J	0.264	0.006	<0.002 U	1.01	0.04 J	0.02 J
2/8/2017	Background	0.04 J	3.26	141	0.051	0.006 J	0.237	0.981	3.676	0.05 J	0.216	0.003	<0.002 U	0.99	<0.03 U	0.01 J
3/14/2017	Background	0.03 J	2.79	152	0.033	0.007 J	0.170	0.949	1.055	0.03 J	0.022	0.002	<0.002 U	0.49	<0.03 U	0.01 J
5/22/2017	Background	0.04 J	2.74	151	0.052	0.007 J	0.195	1.11	1.062	0.04 J	0.236	0.013	<0.002 U	0.31	0.03 J	<0.01 U
6/19/2017	Background	0.02 J	3.25	155	0.053	0.006 J	0.237	0.997	1.099	0.03 J	0.207	0.002	<0.002 U	0.22	0.05 J	<0.01 U
5/3/2018	Assessment	0.02 J	3.18	149	0.049	0.006 J	0.237	1.03	1.631	0.04 J	0.147	0.0004 J	<0.002 U	0.31	0.05 J	<0.01 U
9/4/2018	Assessment	0.02 J	2.34	157	0.034	0.01 J	0.122	1.03	0.3383	0.05 J	0.038	0.002	--	0.15	<0.03 U	0.03 J
3/15/2019	Assessment	0.02 J	3.63	162	0.06 J	<0.01 U	0.344	1.21	0.853	0.05 J	0.124	<0.09 U	--	<0.4 U	<0.03 U	<0.1 U
6/10/2019	Assessment	<0.02 U	2.85	155	0.04 J	<0.01 U	0.1 J	1.13	0.89	0.05 J	0.04 J	<0.009 U	<0.002 U	<0.4 U	<0.03 U	<0.1 U
7/23/2019	Assessment	0.10	6.74	158	0.121	<0.01 U	0.291	1.12	0.811	0.04 J	0.762	0.00153	--	<0.4 U	0.08 J	<0.1 U

Notes:

µg/L: micrograms per liter

SU: standard unit

<: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

pCi/L: picocuries per liter

**Table 1 - Groundwater Data Summary: MW-6
Amos - BAP
Appendix III Constituents**

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Total Dissolved Solids	Sulfate
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
7/26/2016	Background	0.117	12.2	8.88	0.08 J	6.2	204	2.8
8/24/2016	Background	0.023	12.2	10.7	0.03 J	5.5	244	6.1
10/19/2016	Background	0.006	11.3	8.67	0.04 J	6.1	196	3.7
11/8/2016	Background	--	--	--	--	6.0	--	--
12/13/2016	Background	<0.002 U	12.4	9.79	0.04 J	5.9	190	2.1
2/8/2017	Background	0.051	11.6	10.3	0.06 J	6.0	170	2.8
3/14/2017	Background	0.048	11.5	9.90	0.05 J	6.1	203	2.1
5/23/2017	Background	0.037	11.9	11.5	0.04 J	6.2	238	4.4
6/20/2017	Background	0.183	11.6	9.61	0.07	6.0	222	2.5
11/1/2017	Detection	0.017	12.2	11.6	0.07	5.9	258	5.5
5/3/2018	Assessment	0.056	12	10.1	0.07	6.3	188	2.9
9/4/2018	Assessment	<0.002 U	11.3	8.97	0.09	6.0	176	1.3
3/15/2019	Assessment	<0.2 U	12.4	10.4	0.05 J	5.9	226	1.6
6/10/2019	Assessment	<0.02 U	11.8	9.68	0.08	9.3	205	2.2
7/24/2019	Assessment	0.04 J	12.1	9.71	0.05 J	5.9	199	2.2

Notes:

mg/L: milligrams per liter

SU: standard unit

<: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

Table 1 - Groundwater Data Summary: MW-6

Amos - BAP

Appendix IV 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	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
7/26/2016	Background	0.03 J	33.6	191	0.065	0.01 J	1.5	13.6	1.3779	0.08 J	1.25	0.002	<0.002 U	1.77	0.2	0.075
8/24/2016	Background	0.01 J	33.4	185	0.037	0.01 J	1.0	12.4	0.961	0.03 J	0.581	0.003	<0.002 U	0.97	0.2	0.070
10/19/2016	Background	0.01 J	34.4	171	0.026	0.006 J	0.647	11.0	1.941	0.04 J	0.281	0.0005 J	<0.002 U	0.78	0.2	0.185
11/8/2016	Background	--	--	--	--	--	--	--	1.026	--	--	--	--	--	--	--
12/13/2016	Background	0.02 J	33.9	169	0.038	0.007 J	1.88	10.6	1.635	0.04 J	0.515	0.006	<0.002 U	0.53	0.2	0.060
2/8/2017	Background	0.02 J	32.8	157	0.038	0.007 J	0.817	12.3	20.83	0.06 J	0.574	0.004	<0.002 U	0.60	0.2	0.055
3/14/2017	Background	0.02 J	36.3	168	0.037	0.006 J	1.54	12.0	1.178	0.05 J	0.416	<0.0002 U	<0.002 U	0.62	0.2	0.054
5/23/2017	Background	0.04 J	33.6	183	0.032	0.006 J	0.748	13.1	1.013	0.04 J	0.305	0.006	<0.002 U	0.41	0.2	0.053
6/20/2017	Background	0.02 J	32.4	169	0.022	<0.005 U	0.496	10.7	1.345	0.07	0.157	0.0003 J	<0.002 U	0.44	0.1	0.055
5/3/2018	Assessment	0.01 J	34.1	163	0.028	<0.005 U	0.455	11.9	2.0087	0.07	0.216	<0.0002 U	<0.002 U	0.50	0.2	0.092
9/4/2018	Assessment	0.16	29.8	147	0.01 J	0.03	0.38	9.16	0.769	0.09	0.214	<0.0002 U	--	0.46	0.1	0.084
3/15/2019	Assessment	0.06 J	32.0	184	0.106	0.02 J	1.82	14.0	0.865	0.05 J	1.72	<0.09 U	--	0.5 J	0.4	0.1 J
6/10/2019	Assessment	0.03 J	34.3	161	<0.02 U	<0.01 U	0.309	9.72	0.688	0.08	0.104	<0.009 U	<0.002 U	0.5 J	0.1 J	<0.1 U
7/24/2019	Assessment	<0.02 U	34.2	164	0.03 J	<0.01 U	0.418	8.97	0.657	0.05 J	0.2 J	0.00114	--	0.4 J	0.1 J	<0.1 U

Notes:

µg/L: micrograms per liter

SU: standard unit

<: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

pCi/L: picocuries per liter

Table 1 - Groundwater Data Summary: MW-1601

**Amos - BAP
Appendix III Constituents**

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Total Dissolved Solids	Sulfate
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
7/26/2016	Background	0.07	11.8	7.17	0.06 J	5.8	120	54.5
8/24/2016	Background	0.035	10.9	6.54	0.05 J	5.6	142	49.1
10/18/2016	Background	<0.002 U	10.1	6.56	0.05 J	6.0	136	39.6
11/7/2016	Background	--	--	6.79	0.05 J	5.9	122	39.7
12/13/2016	Background	<0.002 U	10.4	7.79	0.04 J	5.8	140	43.6
2/7/2017	Background	0.109	11.6	9.09	0.05 J	6.0	168	55.6
3/13/2017	Background	0.107	11.2	9.89	0.04 J	6.0	169	57.4
5/23/2017	Background	0.17	11.2	9.75	0.04 J	5.9	182	52.8
6/20/2017	Background	0.107	10.4	8.59	0.04 J	5.9	184	51.3
11/2/2017	Detection	0.087	8.91	9.91	0.05 J	5.8	164	39.1
5/4/2018	Assessment	0.070	11.0	10.3	0.05 J	6.1	159	53.0
9/5/2018	Assessment	<0.002 U	11.6	10.4	0.04 J	7.8	157	52.2
3/19/2019	Assessment	0.05 J	11.9	8.80	<0.01 U	5.8	176	52.7
6/12/2019	Assessment	<0.02 U	11.0	10.0	0.05 J	6.7	185	48.8
7/24/2019	Assessment	<0.04 U	10.3	10.3	0.05 J	5.9	154	44.6

Notes:

mg/L: milligrams per liter

SU: standard unit

<: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

Table 1 - Groundwater Data Summary: MW-1601

Amos - BAP

Appendix IV 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	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
7/26/2016	Background	0.01 J	4.57	128	0.03	0.02	0.4	7.24	0.106	0.06 J	0.366	0.003	<0.002 U	0.32	0.07 J	0.01 J
8/24/2016	Background	<0.01 U	5.14	120	0.02 J	0.02 J	0.3	6.19	0.975	0.05 J	0.109	0.007	<0.002 U	0.62	0.09 J	0.02 J
10/18/2016	Background	0.01 J	5.64	118	0.027	0.02 J	0.688	4.04	2.413	0.05 J	0.265	0.003	<0.002 U	0.26	0.1 J	0.065
11/7/2016	Background	--	--	--	--	--	--	--	0.842	0.05 J	--	--	--	--	--	--
12/13/2016	Background	0.02 J	5.38	113	0.027	0.02 J	1.35	4.67	1.101	0.04 J	0.272	0.009	<0.002 U	0.16	0.1	0.02 J
2/7/2017	Background	<0.01 U	5.09	107	0.025	0.02 J	0.224	6.20	35.021	0.05 J	0.227	0.004	<0.002 U	0.21	0.1	0.01 J
3/13/2017	Background	<0.01 U	5.54	117	0.023	0.02 J	0.588	6.47	0.7405	0.04 J	0.161	0.004	<0.002 U	0.16	0.05 J	0.01 J
5/23/2017	Background	0.02 J	7.08	122	0.051	0.02	0.740	5.48	0.573	0.04 J	0.687	0.007	<0.002 U	0.21	0.2	0.02 J
6/20/2017	Background	0.02 J	5.57	113	0.02 J	0.02 J	0.215	4.72	1.037	0.04 J	0.142	0.003	<0.002 U	0.17	0.06 J	0.02 J
5/4/2018	Assessment	0.01 J	6.44	112	0.038	0.02	0.353	4.43	1.723	0.05 J	0.397	0.010	<0.002 U	0.20	0.1	0.02 J
9/5/2018	Assessment	0.02 J	5.39	90.4	0.01 J	0.02	0.270	6.73	0.252	0.04 J	0.045	0.002	--	0.08 J	<0.03 U	0.02 J
3/19/2019	Assessment	<0.02 U	6.55	122	0.02 J	0.01 J	0.1 J	3.41	0.666	<0.01 U	0.105	0.02 J	--	<0.4 U	0.04 J	<0.1 U
6/12/2019	Assessment	<0.02 U	6.02	118	0.04 J	0.02 J	0.2 J	2.75	0.533	0.05 J	0.154	<0.009 U	<0.002 U	<0.4 U	0.08 J	<0.1 U
7/24/2019	Assessment	<0.02 U	6.63	130	0.02 J	0.01 J	0.2 J	3.01	1.005	0.05 J	0.2 J	0.00141	--	<0.4 U	0.06 J	<0.1 U

Notes:

µg/L: micrograms per liter

SU: standard unit

<: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

pCi/L: picocuries per liter

Table 1 - Groundwater Data Summary: MW-1602A

Geosyntec Consultants, Inc.

Amos - BAP

Appendix III Constituents

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Total Dissolved Solids	Sulfate
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
7/26/2016	Background	0.063	18.2	38.4	0.18	7.0	172	18.7
8/24/2016	Background	0.015	18.2	37.9	0.17	6.1	200	17.7
10/19/2016	Background	0.003 J	17.3	37.2	0.1 J	6.7	242	15.0
11/9/2016	Background	--	--	--	--	6.3	--	--
12/13/2016	Background	<0.002 U	18.8	39.1	0.1 J	6.5	170	10.7
2/8/2017	Background	0.051	17.7	37.3	0.1 J	6.7	144	9.8
3/15/2017	Background	0.039	16.1	38.1	0.1 J	6.8	209	11.4
5/23/2017	Background	0.081	18.5	38.8	0.1 J	6.7	224	11.4
6/20/2017	Background	0.09	18.5	38.3	0.1 J	6.5	178	13.5
11/2/2017	Detection	0.05	18.6	38	0.1 J	6.5	254	12.8
5/10/2018	Assessment	0.127	19.5	39.1	0.16	7.2	184	13.2
9/5/2018	Assessment	<0.002 U	18.1	40.0	0.14	6.4	176	12.7
3/19/2019	Assessment	0.03 J	19.6	41.0	0.14	6.6	232	13.2
6/11/2019	Assessment	<0.02 U	18.8	41.9	0.16	9.5	217	13.8
7/23/2019	Assessment	<0.04 U	16.7	39.4	0.13	6.3	201	10.3

Notes:

mg/L: milligrams per liter

SU: standard unit

<: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

Table 1 - Groundwater Data Summary: MW-1602A

Amos - BAP

Appendix IV 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	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
7/26/2016	Background	0.12	17.6	220	0.085	0.02 J	1.7	4.19	7.914	0.18	7.94	0.004	<0.002 U	3.62	0.2	0.02 J
8/24/2016	Background	0.04 J	18.1	209	0.036	0.006 J	1.1	3.04	0.569	0.17	2.8	0.003	<0.002 U	2.8	0.2	0.01 J
10/19/2016	Background	0.10	18.3	213	0.064	0.01 J	1.46	2.38	2.65	0.1 J	6.56	0.003	0.003 J	2.0	0.2	0.063
11/9/2016	Background	--	--	--	--	--	--	--	0.874	--	--	--	--	--	--	--
12/13/2016	Background	0.08	19.3	217	0.048	0.01 J	2.24	2.00	0.989	0.1 J	4.53	0.006	0.002 J	1.90	0.2	0.02 J
2/8/2017	Background	0.05	19.1	194	0.051	0.009 J	0.981	1.87	6.853	0.1 J	4.07	0.005	<0.002 U	1.68	0.2	0.224
3/15/2017	Background	0.04 J	21.5	198	0.055	0.008 J	0.951	1.47	1.094	0.1 J	2.65	0.0005 J	0.002 J	1.22	0.2	0.01 J
5/23/2017	Background	0.04 J	20.8	221	0.029	0.006 J	0.568	1.23	1.833	0.1 J	2.11	0.005	<0.002 U	1.22	0.1	<0.01 U
6/20/2017	Background	0.07	20.3	224	0.043	0.01 J	0.807	1.30	0.901	0.1 J	2.68	<0.0002 U	<0.002 U	1.55	0.2	0.01 J
5/10/2018	Assessment	0.03 J	20.4	223	0.022	<0.005 U	0.437	0.940	0.438	0.16	0.982	0.004	<0.002 U	0.91	0.1	<0.01 U
9/5/2018	Assessment	0.08	20.5	223	0.055	0.01 J	0.855	1.05	0.941	0.14	5.99	0.001	--	0.71	0.2	0.03 J
3/19/2019	Assessment	0.04 J	19.7	217	0.04 J	<0.01 U	0.472	0.691	0.5231	0.14	2.64	<0.009 U	--	0.7 J	0.09 J	<0.1 U
6/11/2019	Assessment	<0.04 U	20.6	229	<0.04 U	<0.02 U	0.3 J	0.523	1.144	0.16	0.677	<0.009 U	<0.002 U	<0.8 U	<0.06 U	<0.2 U
7/23/2019	Assessment	<0.02 U	21.7	213	<0.02 U	<0.01 U	0.297	0.545	0.888	0.13	1.08	0.000908	--	0.7 J	0.06 J	<0.1 U

Notes:

µg/L: micrograms per liter

SU: standard unit

<: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

pCi/L: picocuries per liter

Table 1 - Groundwater Data Summary: MW-1603A

Geosyntec Consultants, Inc.

Amos - BAP

Appendix III Constituents

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Total Dissolved Solids	Sulfate
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
7/26/2016	Background	0.051	17.4	4.76	0.29	7.3	116	0.9
8/24/2016	Background	0.012	16.9	5.62	0.28	6.2	84	0.1
10/19/2016	Background	<0.002 U	17.2	5.11	0.29	7.0	168	<0.04 U
11/9/2016	Background	--	--	5.6	0.28	6.5	90	<0.04 U
12/13/2016	Background	<0.002 U	16.6	5.41	0.20	6.7	93	<0.04 U
2/9/2017	Background	0.038	15.5	5.00	0.22	7.0	80	<0.04 U
3/15/2017	Background	0.025	15.6	5.12	0.24	7.1	102	<0.04 U
5/24/2017	Background	0.061	15.2	5.35	0.23	6.8	108	<0.04 U
6/20/2017	Background	0.069	14.6	4.93	0.23	6.7	100	<0.04 U
11/2/2017	Detection	0.035	15.2	5.61	0.24	6.7	150	<0.04 U
5/2/2018	Assessment	0.051	17.2	5.18	0.28	6.8	100	<0.04 U
9/5/2018	Assessment	<0.002 U	15.8	4.99	0.28	6.7	89	<0.04 U
3/15/2019	Assessment	<0.2 U	15.5	5.65	0.27	7.1	95	<0.06 U
6/11/2019	Assessment	<0.02 U	15.5	5.7	0.31	8.8	95	<0.06 U
7/24/2019	Assessment	<0.04 U	14.4	5.73	0.28	6.8	102	<0.06 U

Notes:

mg/L: milligrams per liter

SU: standard unit

<: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

Table 1 - Groundwater Data Summary: MW-1603A

Amos - BAP

Appendix IV 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	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
7/26/2016	Background	0.04 J	78	303	0.052	0.01 J	1.2	1.04	1.619	0.29	1.35	0.002	<0.002 U	2.11	0.09 J	0.01 J
8/24/2016	Background	0.03 J	77.6	264	0.044	0.008 J	1.0	0.725	0.726	0.28	1.07	0.007	<0.002 U	1.36	0.1 J	<0.01 U
10/19/2016	Background	0.04 J	73.7	258	0.096	0.01 J	1.94	1.23	2.39	0.29	2.18	<0.0002 U	<0.002 U	1.34	0.2	0.02 J
11/9/2016	Background	--	--	--	--	--	--	--	1.039	0.28	--	--	--	--	--	--
12/13/2016	Background	0.05 J	78.3	270	0.102	0.01 J	3.27	1.13	0.524	0.20	1.81	0.009	<0.002 U	1.22	0.2	0.03 J
2/9/2017	Background	0.01 J	78.3	229	0.055	0.008 J	0.915	0.746	0.693	0.22	1.19	0.0005 J	<0.002 U	1.15	0.2	0.075
3/15/2017	Background	0.04 J	83.4	245	0.070	0.01 J	1.42	1.02	0.974	0.24	1.25	0.002	0.002 J	1.27	0.1	0.01 J
5/24/2017	Background	0.05	63.3	233	0.033	0.009 J	0.999	0.619	0.72	0.23	0.900	0.011	<0.002 U	1.56	0.09 J	<0.01 U
6/20/2017	Background	0.03 J	81.3	257	0.054	0.02	1.12	0.846	0.603	0.23	0.970	0.004	<0.002 U	1.11	0.1	0.01 J
5/2/2018	Assessment	0.04 J	80.0	251	0.093	0.01 J	1.82	1.52	0.23065	0.28	1.60	0.0008 J	<0.002 U	1.21	0.3	0.02 J
9/5/2018	Assessment	0.02 J	87.1	242	0.006 J	0.007 J	0.180	0.246	0.577	0.28	0.045	0.002	--	1.07	0.04 J	0.01 J
3/15/2019	Assessment	<0.02 U	89.9	252	<0.02 U	<0.01 U	0.407	0.360	1.261	0.27	0.232	<0.09 U	--	1 J	0.05 J	<0.1 U
6/11/2019	Assessment	<0.02 U	90.3	255	<0.02 U	<0.01 U	0.28	0.288	0.3562	0.31	0.163	<0.009 U	<0.002 U	1 J	0.04 J	<0.1 U
7/24/2019	Assessment	<0.02 U	85.8	249	0.04 J	<0.01 U	0.650	0.517	0.439	0.28	0.580	0.00087	--	1 J	0.07 J	<0.1 U

Notes:

µg/L: micrograms per liter

SU: standard unit

<: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

pCi/L: picocuries per liter

Table 1 - Groundwater Data Summary: MW-1604

Geosyntec Consultants, Inc.

Amos - BAP

Appendix III Constituents

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Total Dissolved Solids	Sulfate
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
7/26/2016	Background	0.116	20.5	23	0.1 J	6.2	236	2.2
8/22/2016	Background	0.074	18.0	22.9	0.05 J	6.2	168	0.3
10/18/2016	Background	0.059	18.2	22.6	0.05 J	6.3	196	0.3
11/8/2016	Background	--	--	22.5	0.05 J	6.2	206	0.3
12/13/2016	Background	0.042	17.9	24.0	0.05 J	6.1	182	0.9
2/8/2017	Background	0.094	16.6	23.1	0.09	6.2	172	0.7
3/14/2017	Background	0.083	16.1	24.1	0.08	6.4	204	0.9
5/23/2017	Background	0.129	17.4	26.1	0.08	6.1	222	2.2
6/20/2017	Background	0.152	16.2	25.2	0.09	6.2	224	1.2
11/1/2017	Detection	0.153	16.8	23.4	0.1	6.1	228	0.5
5/3/2018	Assessment	0.200	17.8	25.5	0.13	6.4	210	<0.04 U
9/5/2018	Assessment	0.043	15.1	22.8	0.12	7.2	180	<0.04 U
3/15/2019	Assessment	<0.2 U	13.1	16.6	0.09	6.3	170	<0.06 U
6/10/2019	Assessment	0.09 J	16.5	24.4	0.11	8.7	60	<0.06 U
7/24/2019	Assessment	0.132	18.7	27.0	0.07	5.9	242	<0.06 U

Notes:

mg/L: milligrams per liter

SU: standard unit

<: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

Table 1 - Groundwater Data Summary: MW-1604

Amos - BAP

Appendix IV 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	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
7/26/2016	Background	0.05 J	4.43	139	0.087	0.007 J	1.9	2.06	3.5822	0.1 J	1.58	0.002	<0.002 U	0.74	0.2	0.02 J
8/22/2016	Background	0.04 J	5.15	147	0.063	0.02 J	1.4	1.06	0.695	0.05 J	1.14	0.004	0.002 J	0.64	0.2	0.02 J
10/18/2016	Background	0.03 J	4.60	134	0.048	0.005 J	1.27	0.805	1.387	0.05 J	0.869	<0.0002 U	<0.002 U	0.30	0.2	0.01 J
11/8/2016	Background	--	--	--	--	--	--	--	0.512	0.05 J	--	--	--	--	--	--
12/13/2016	Background	0.02 J	4.58	137	0.038	<0.004 U	1.20	0.632	1.743	0.05 J	0.603	0.004	<0.002 U	0.25	0.2	0.02 J
2/8/2017	Background	0.02 J	4.52	125	0.039	<0.004 U	0.814	0.638	1.239	0.09	0.719	0.004	<0.002 U	0.32	0.2	0.05 J
3/14/2017	Background	0.02 J	4.46	132	0.038	<0.004 U	0.824	0.570	0.892	0.08	0.482	0.0008 J	<0.002 U	0.22	0.2	<0.01 U
5/23/2017	Background	0.04 J	3.90	142	0.042	<0.005 U	0.836	0.647	0.859	0.08	0.444	0.006	<0.002 U	0.21	0.2	<0.01 U
6/20/2017	Background	0.02 J	4.44	146	0.040	<0.005 U	0.706	0.601	1.459	0.09	0.406	0.003	<0.002 U	0.20	0.2	<0.01 U
5/3/2018	Assessment	0.02 J	6.33	146	0.047	<0.005 U	0.556	0.494	1.334	0.13	0.230	<0.0002 U	<0.002 U	0.25	0.2	0.01 J
9/5/2018	Assessment	0.03 J	6.11	135	0.043	<0.005 U	0.649	0.533	0.248	0.12	0.349	0.0008 J	--	0.22	0.3	0.01 J
3/15/2019	Assessment	0.04 J	6.78	118	0.07 J	<0.01 U	0.931	0.406	0.596	0.09	1.19	<0.09 U	--	<0.4 U	0.2	<0.1 U
6/10/2019	Assessment	0.05 J	4.88	142	0.142	<0.01 U	0.360	0.306	0.831	0.11	0.148	<0.009 U	<0.002 U	<0.4 U	0.1 J	<0.1 U
7/24/2019	Assessment	<0.02 U	4.76	170	0.06 J	<0.01 U	1.33	0.415	0.943	0.07	0.294	0.000485	--	0.4 J	0.1 J	<0.1 U

Notes:

µg/L: micrograms per liter

SU: standard unit

<: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

pCi/L: picocuries per liter

Table 1 - Groundwater Data Summary: MW-1605

Geosyntec Consultants, Inc.

Amos - BAP

Appendix III Constituents

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Total Dissolved Solids	Sulfate
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
7/26/2016	Background	0.091	63.6	111	0.09	6.2	490	170
8/22/2016	Background	0.038	50.8	114	0.08	5.9	440	174
10/17/2016	Background	0.025	57.5	108	0.06 J	6.1	446	161
11/8/2016	Background	--	--	116	0.06 J	5.9	456	162
12/12/2016	Background	<0.002 U	53.9	125	<0.05 U	5.8	920	164
2/7/2017	Background	0.055	47.6	110	<0.05 U	5.9	472	161
3/13/2017	Background	0.039	45.7	106	0.03 J	5.8	455	173
5/22/2017	Background	0.071	46.4	109	0.03 J	6.6	458	171
6/19/2017	Background	0.103	48.1	111	<0.02 U	5.5	462	193
11/1/2017	Detection	0.076	50.0	113	0.03 J	5.6	488	212
1/9/2018	Detection	--	45.9	108	--	5.5	462	202
5/3/2018	Assessment	0.109	47.0	97.7	<0.02 U	6.1	434	246
9/5/2018	Assessment	<0.002 U	49.4	97.1	0.03 J	5.6	483	213
3/14/2019	Assessment	<0.2 U	45.4	92.5	<0.01 U	5.6	507	222
6/11/2019	Assessment	0.06 J	45.5	91.8	0.02 J	5.7	530	226
7/24/2019	Assessment	0.06 J	46.5	91.6	0.02 J	5.4	517	226

Notes:

mg/L: milligrams per liter

SU: standard unit

<: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

Table 1 - Groundwater Data Summary: MW-1605

Amos - BAP

Appendix IV 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	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
7/26/2016	Background	0.04 J	5.7	83.2	0.035	<0.004 U	0.4	32.1	1.722	0.09	0.201	0.008	<0.002 U	0.66	0.05 J	<0.01 U
8/22/2016	Background	0.03 J	4.96	69.1	0.027	<0.004 U	0.1	24.5	0.683	0.08	0.062	0.004	<0.002 U	0.39	0.06 J	<0.01 U
10/17/2016	Background	0.02 J	4.98	67.3	0.034	<0.004 U	0.244	15.8	5.063	0.06 J	0.038	0.005	<0.002 U	0.27	0.06 J	<0.01 U
11/8/2016	Background	--	--	--	--	--	--	--	1.249	0.06 J	--	--	--	--	--	--
12/12/2016	Background	0.03 J	4.33	73.8	0.060	0.005 J	0.645	11.5	0.853	<0.05 U	0.159	0.011	<0.002 U	0.30	0.1	0.062
2/7/2017	Background	0.03 J	4.03	68.8	0.063	<0.004 U	0.381	10.3	0.586	<0.05 U	0.298	0.004	<0.002 U	0.36	0.1	0.04 J
3/13/2017	Background	0.01 J	3.70	75.1	0.056	<0.004 U	0.456	9.14	1.073	0.03 J	0.059	0.005	<0.002 U	0.12	0.03 J	<0.01 U
5/22/2017	Background	0.03 J	3.38	80.5	0.062	<0.005 U	0.193	8.77	0.852	0.03 J	0.071	0.003	<0.002 U	0.15	0.04 J	0.02 J
6/19/2017	Background	0.01 J	3.64	82.2	0.061	<0.005 U	0.250	9.07	0.746	<0.02 U	0.050	0.004	<0.002 U	0.12	0.08 J	<0.01 U
5/3/2018	Assessment	0.01 J	3.34	80.4	0.069	0.009 J	0.176	9.75	1.068	<0.02 U	0.148	0.006	<0.002 U	0.10	0.1	0.01 J
9/5/2018	Assessment	0.02 J	3.19	103	0.074	0.02 J	0.260	10.7	0.916	0.03 J	0.080	0.003	--	0.1 J	0.07 J	0.02 J
3/14/2019	Assessment	<0.02 U	2.95	88.1	0.08 J	<0.01 U	0.2 J	8.83	0.3036	<0.01 U	0.161	<0.09 U	--	<0.4 U	0.05 J	<0.1 U
6/11/2019	Assessment	<0.02 U	3.01	93.2	0.07 J	0.01 J	0.2 J	9.09	1.061	0.02 J	0.06 J	<0.009 U	<0.002 U	<0.4 U	0.06 J	<0.1 U
7/24/2019	Assessment	<0.02 U	2.82	108	0.09 J	<0.01 U	0.306	8.57	0.739	0.02 J	0.2 J	0.00255	--	<0.4 U	0.08 J	<0.1 U

Notes:

µg/L: micrograms per liter

SU: standard unit

<: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

pCi/L: picocuries per liter

Table 1 - Groundwater Data Summary: MW-1606

Geosyntec Consultants, Inc.

**Amos - BAP
Appendix III Constituents**

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Total Dissolved Solids	Sulfate
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
7/25/2016	Background	0.084	43.4	55.5	0.03 J	5.7	410	189
8/23/2016	Background	0.023	45.6	56.8	<0.05 U	5.3	372	186
10/17/2016	Background	0.013	47.3	61.5	<0.05 U	5.6	390	202
11/7/2016	Background	--	--	--	--	5.5	--	--
12/12/2016	Background	<0.002 U	50.4	27.0	<0.02 U	5.3	418	215
2/7/2017	Background	0.048	42.2	57.9	<0.05 U	5.7	370	179
3/14/2017	Background	0.036	42.2	59.5	<0.05 U	5.6	384	180
5/23/2017	Background	0.061	49.2	75.0	<0.05 U	5.6	442	199
6/19/2017	Background	0.108	48.3	78.8	<0.05 U	5.3	440	219
11/1/2017	Detection	0.055	51.6	91.4	<0.05 U	5.3	462	227
1/8/2018	Detection	--	43.9	88.3	--	8.4	400	190
5/4/2018	Assessment	0.077	53.0	119	0.03 J	7.5	478	232
9/5/2018	Assessment	0.032	51.7	133	<0.02 U	5.4	507	202
3/15/2019	Assessment	<0.2 U	59.0	157	<0.01 U	5.4	597	232
6/11/2019	Assessment	0.04 J	56.6	177	0.02 J	6.7	571	204
7/24/2019	Assessment	0.04 J	52.8	186	0.02 J	5.4	597	191

Notes:

mg/L: milligrams per liter

SU: standard unit

<: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

Table 1 - Groundwater Data Summary: MW-1606

Amos - BAP

Appendix IV 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	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
7/25/2016	Background	0.04 J	2.89	71.8	0.112	0.12	1.3	14.9	0.2045	0.03 J	1.01	0.005	<0.002 U	0.26	0.09 J	0.03 J
8/23/2016	Background	0.02 J	2.58	67.2	0.087	0.14	0.6	14.5	1.039	<0.05 U	0.483	0.007	<0.002 U	0.14	0.1 J	0.01 J
10/17/2016	Background	0.03 J	2.58	69.5	0.131	0.14	1.58	13.1	1.347	<0.05 U	1.20	0.006	0.002 J	0.15	0.2	0.02 J
11/7/2016	Background	--	--	--	--	--	--	--	1.331	--	--	--	--	--	--	--
12/12/2016	Background	0.03 J	2.55	65.8	0.100	0.17	1.03	13.9	0.651	<0.02 U	0.588	0.010	<0.002 U	0.12	0.2	0.04 J
2/7/2017	Background	0.03 J	3.50	57.5	0.134	0.31	1.76	14.2	0.886	<0.05 U	1.55	0.003	<0.002 U	0.29	0.3	0.05 J
3/14/2017	Background	0.02 J	3.52	56.3	0.091	0.16	0.920	13.4	2.45	<0.05 U	0.572	0.003	<0.002 U	0.14	0.1	0.01 J
5/23/2017	Background	0.02 J	2.83	59.8	0.085	0.12	0.286	14.2	0.236	<0.05 U	0.448	0.007	<0.002 U	0.1 J	0.1	0.01 J
6/19/2017	Background	0.03 J	3.42	61.8	0.097	0.13	0.596	13.7	0.769	<0.05 U	0.666	<0.0002 U	<0.002 U	0.13	0.09 J	0.02 J
5/4/2018	Assessment	0.01 J	2.81	58.7	0.088	0.15	0.289	16.9	1.012	0.03 J	0.286	0.003	<0.002 U	0.07 J	0.1	0.02 J
9/5/2018	Assessment	0.01 J	2.21	61.0	0.073	0.17	0.249	16.4	0.1805	<0.02 U	0.088	0.003	--	0.04 J	0.06 J	0.01 J
3/15/2019	Assessment	0.03 J	2.94	74.6	0.152	0.19	1.24	18.2	0.295	<0.01 U	1.06	<0.09 U	--	<0.4 U	0.2 J	<0.1 U
6/11/2019	Assessment	<0.02 U	2.44	64.1	0.08 J	0.18	0.2 J	16.5	0.4433	0.02 J	0.181	<0.009 U	<0.002 U	<0.4 U	0.06 J	<0.1 U
7/24/2019	Assessment	0.03 J	3.44	72.9	0.14	0.21	1.14	16.2	0.743	0.02 J	1.11	0.0034	--	<0.4 U	0.2 J	<0.1 U

Notes:
 µg/L: micrograms per liter
 SU: standard unit
 <: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.
 J: Estimated value. Parameter was detected at concentration below the reporting limit
 --: Not analyzed
 pCi/L: picocuries per liter

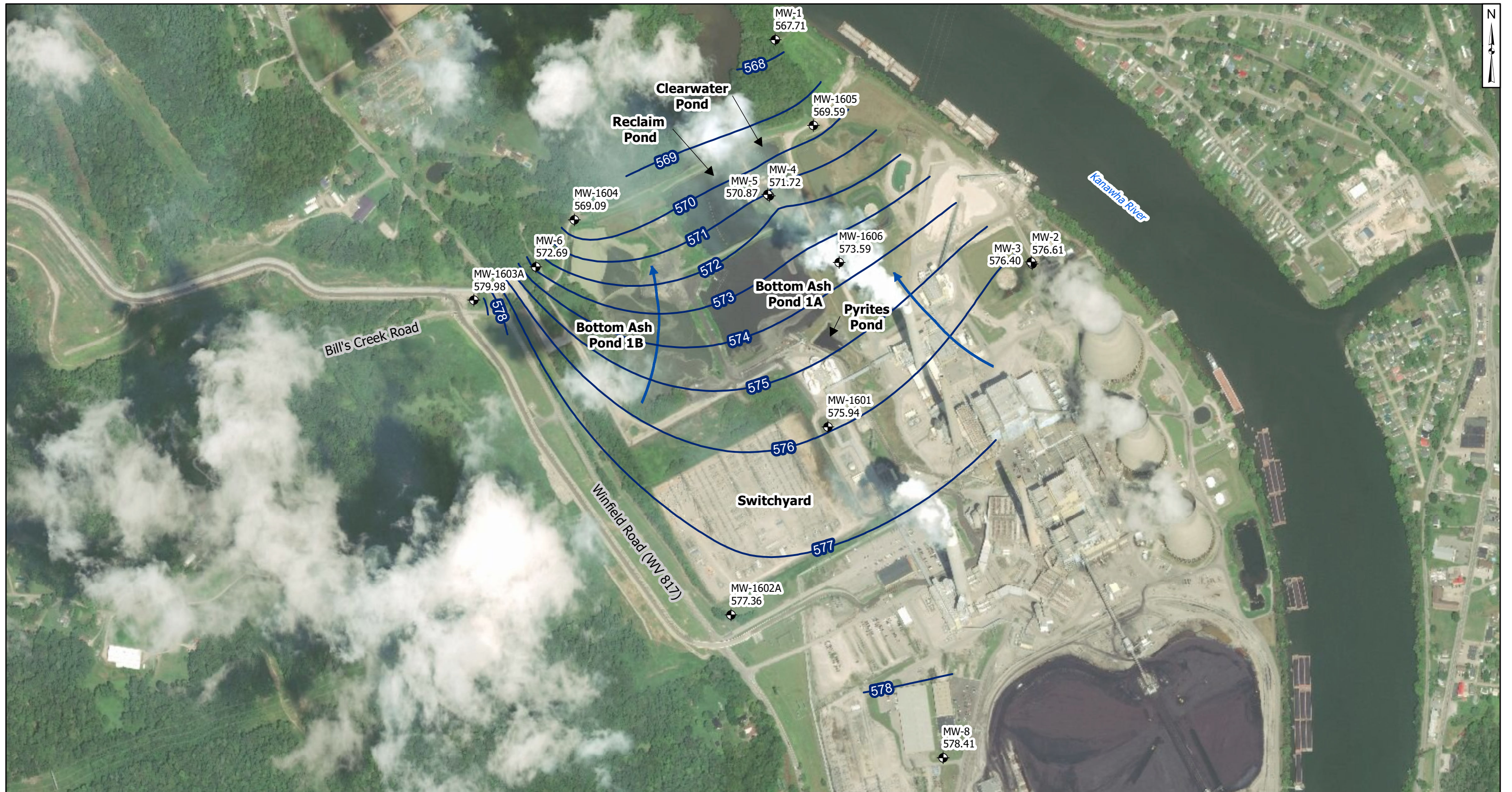
**Table 2: Residence Time Calculation Summary
Amos Bottom Ash Pond**

CCR Management Unit	Monitoring Well	Well Diameter (inches)	2019-03		2019-06		2019-07	
			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	MW-1 ^[2]	2.0	27.5	2.2	22.1	2.7	23.7	2.6
	MW-4 ^[2]	2.0	72.9	0.8	100	0.6	64.5	0.9
	MW-5 ^[2]	2.0	40.0	1.5	39.6	1.5	41.6	1.5
	MW-6 ^[1]	2.0	74.1	0.8	157	0.4	75.7	0.8
	MW-1601 ^[1]	2.0	20.4	3.0	17.6	3.5	16.6	3.7
	MW-1602A ^[1]	2.0	7.7	7.9	8.7	7.0	7.2	8.5
	MW-1603A ^[1]	2.0	138	0.4	131	0.5	131	0.5
	MW-1604 ^[2]	2.0	84.2	0.7	78.1	0.8	86.8	0.7
	MW-1605 ^[2]	2.0	29.7	2.1	24.8	2.5	25.5	2.4
MW-1606 ^[2]	2.0	29.7	2.0	28.7	2.1	23.8	2.6	

Notes:

[1] - Background Well

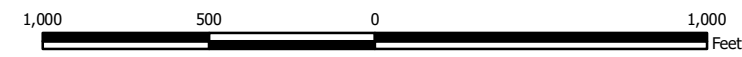
[2] - Downgradient Well



- Legend**
- Monitoring Well Location
 - ➔ Groundwater Flow Direction
 - Groundwater Elevation Contour

Notes

- Monitoring well coordinates and water level data (collected on March 14, 2019) provided by AEP.
- Groundwater elevation units are feet above mean sea level.
- Site features based on information available in the Ash Pond- CCR Groundwater Monitoring Well Network Evaluation - Amos Plant (Arcadis, 2016) provided by AEP.



**Potentiometric Surface Map - Uppermost Aquifer
March 2019**

AEP Amos Generating Plant - Ash Pond System
Winfield, West Virginia

Geosyntec
consultants

Figure

1

Columbus, Ohio

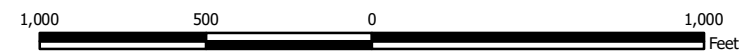
2020/01/24



- Legend**
- Monitoring Well Location
 - ➔ Groundwater Flow Direction
 - Groundwater Elevation Contour

Notes

- Monitoring well coordinates and water level data (collected on June 10, 2019) provided by AEP.
- Groundwater elevation units are feet above mean sea level.
- Site features based on information available in the Ash Pond- CCR Groundwater Monitoring Well Network Evaluation - Amos Plant (Arcadis, 2016) provided by AEP.



**Potentiometric Surface Map - Uppermost Aquifer
June 2019**

AEP Amos Generating Plant - Ash Pond System
Winfield, West Virginia

Geosyntec
consultants

Figure

2

Columbus, Ohio

2019/12/26



- Legend**
- Monitoring Well Location
 - ➔ Groundwater Flow Direction
 - Groundwater Elevation Contour

Notes

- Monitoring well coordinates and water level data (collected on July 22, 2019) provided by AEP.
- Groundwater elevation units are feet above mean sea level.
- Site features based on information available in the Ash Pond- CCR Groundwater Monitoring Well Network Evaluation - Amos Plant (Arcadis, 2016) provided by AEP.



**Potentiometric Surface Map - Uppermost Aquifer
July 2019**

AEP Amos Generating Plant - Ash Pond System
Winfield, West Virginia

Geosyntec
consultants

Figure

3

Columbus, Ohio

2020/01/14

APPENDIX 2 - Statistical Analysis

Statistical analysis reports completed in 2019 follow.

STATISTICAL ANALYSIS SUMMARY
BOTTOM ASH POND
Amos Plant
Winfield, West Virginia

Submitted to



1 Riverside Plaza
Columbus, Ohio 43215-2372

Submitted by



engineers | scientists | innovators

941 Chatham Lane
Suite 103
Columbus, Ohio 43221

January 8, 2019

CHA8473

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LIST OF TABLES

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Table 2	Groundwater Protection Standards
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LIST OF ATTACHMENTS

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

LIST OF ACRONYMS AND ABBREVIATIONS

AEP	American Electric Power
BAP	Bottom Ash Pond
CCR	Coal Combustion Residuals
CCV	Continuing Calibration Verification
CFR	Code of Federal Regulations
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
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
USEPA	United States Environmental Protection Agency
UTL	Upper Tolerance Limit

SECTION 1

EXECUTIVE SUMMARY

In accordance with the United States Environmental Protection Agency's (USEPA's) regulations regarding the disposal of coal combustion residuals (CCR) in landfills and surface impoundments (40 CFR 257.90-257.98, "CCR rule"), groundwater monitoring has been conducted at the Bottom Ash Pond (BAP), an existing CCR unit at the Amos Power Plant located in Winfield, West Virginia.

Based on detection monitoring conducted in 2017 and 2018, statistically significant increases (SSIs) over background were concluded for calcium, chloride, total dissolved solids (TDS), and sulfate at the BAP. An alternate source was not identified at the time, so two assessment monitoring events were conducted at the BAP in 2018, in accordance with 40 CFR 257.95.

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. Groundwater protection standards (GWPSs) were established for the Appendix IV parameters. Confidence intervals were calculated for Appendix IV parameters at the compliance wells to assess whether Appendix IV parameters were present at a statistically significant level (SSL) above the GWPS. No SSLs were identified, but Appendix III concentrations for calcium, chloride, pH, sulfate, and TDS remained above background. Thus, either the unit will remain in assessment monitoring or an alternative source demonstration will be conducted to evaluate if the unit can return to detection 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 40 CFR 257.95(b) and 257.95(d)(1). Samples from both sampling events were analyzed for the Appendix III and Appendix IV parameters. A summary of data collected during assessment monitoring 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.9.5 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 January 2017 *Statistical Analysis Plan* (AEP, 2017), except where noted below. Time series plots and results for all completed statistical tests are provided in Attachment B.

The data obtained to meet the requirements of 40 CFR 257.95(b) and 257.95(d)(1) were screened for potential outliers. No outliers were identified. Outliers identified from the background and detection monitoring events conducted through January 2018 were summarized in a previous report (Geosyntec, 2018).

2.2.1 Establishment of GWPSs

A GWPS was established for each Appendix IV parameter in accordance with 40 CFR 257.95(h) and the *Statistical Analysis Plan* (AEP, 2017). The established GWPS was determined to be the greater value of the background concentration and the maximum contaminant level (MCL) or regional screening level (RSL) for each Appendix IV 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.

Generally, tolerance limits were calculated parametrically with 95% coverage and 95% confidence. Non-parametric tolerance limits were calculated for arsenic, cadmium, fluoride, selenium, and thallium due to apparent non-normal distributions and for mercury 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 IV SSLs

A confidence interval was constructed for each Appendix IV 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.

No SSLs were identified at the Amos BAP.

2.2.3 Evaluation of Potential Appendix III SSIs

The CCR rule allows CCR units to move from assessment monitoring to detection monitoring if all Appendix III and Appendix IV parameters were at or below background levels for two consecutive sampling events [40 CFR 257.95(e)]. Since no Appendix IV SSLs were identified, Appendix III results were analyzed to assess whether concentrations of Appendix III parameters at the compliance wells exceeded background concentrations.

Prediction limits were calculated for the Appendix III parameters to represent background values. As described in the January 2018 *Statistical Analysis Summary* report (Geosyntec, 2018), intrawell tests were used to evaluate potential SSIs for fluoride and pH, whereas interwell tests were used to evaluate potential SSIs for boron, calcium, chloride, sulfate, and TDS.

Prediction limits for the interwell tests were recalculated using data collected during the 2018 assessment monitoring events. Eight data points (i.e., two samples from four background wells) were added to the background dataset for each interwell test. New data were tested for outliers prior to being added to the background dataset. The updated prediction limits were calculated for a one-of-two retesting procedure, as during detection monitoring. The values of the updated prediction limits were similar to the values of the prediction limits calculated during detection monitoring. The revised prediction limits were used to evaluate potential SSIs for boron, calcium, chloride, sulfate, and TDS.

For the intrawell tests, limited data made it possible to add only two data points (i.e., two samples from each compliance well) to each background dataset. Because two sample results are insufficient to compare against the existing background dataset, the prediction limits were not updated for the intrawell tests at this time. The prediction limits calculated during detection monitoring were used to evaluate potential SSIs for fluoride and pH.

Data collected during the second assessment monitoring event from each compliance well were compared to the prediction limits to evaluate SSIs. 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:

- Calcium concentrations exceeded the interwell UPL of 19.5 mg/L at MW-1 (39.9 mg/L and 38.3 mg/L), MW-1605 (47.0 mg/L and 49.4 mg/L), and MW-1606 (53.0 mg/L and 51.7 mg/L).
- Chloride concentrations exceeded the interwell UPL of 40 mg/L at MW-1 (71.9 mg/L and 67.9 mg/L), MW-1605 (97.1 mg/L for both events), and MW-1606 (119 mg/L and 133 mg/L).
- Sulfate concentrations exceeded the interwell UPL of 57.4 mg/L at MW-1 (154 mg/L and 145 mg/L), MW-1605 (246 mg/L and 213 mg/L), and MW-1606 (232 mg/L and 202 mg/L).
- TDS concentrations exceeded the interwell UPL of 250 mg/L at MW-1 (328 mg/L and 338 mg/L), MW-1605 (434 mg/L and 483 mg/L), and MW-1606 (478 mg/L and 507 mg/L).

Based on these results, concentrations of Appendix III parameters exceeded background levels at compliance wells at the Amos BAP during assessment monitoring. As a result, the Amos BAP CCR unit will remain in assessment monitoring.

2.3 Conclusions

Two assessment monitoring events were conducted in 2018 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 2018 data. GWPSs were established for the Appendix IV parameters. A confidence interval was constructed at each compliance well for each Appendix IV parameter; SSLs were concluded if the entire confidence interval exceeded the GWPS. No SSLs were identified.

The Appendix III results were evaluated to assess whether concentrations of Appendix III parameters exceeded background levels. Interwell tests were used to evaluate potential SSIs for boron, calcium, chloride, sulfate, and TDS, and intrawell tests were used to evaluate potential SSIs for fluoride and pH. The prediction limits for the interwell tests were updated with additional data collected from the background wells. Prediction limits were recalculated using a one-of-two retesting procedure. The prediction limits calculated during detection monitoring were used for the intrawell tests. Calcium, chloride, pH, sulfate, and TDS results exceeded background levels.

Based on this evaluation, the Amos BAP CCR unit will either remain in assessment monitoring or an ASD will be conducted to evaluate if the unit can return to detection monitoring.

SECTION 3

REFERENCES

American Electric Power (AEP). 2017. Statistical Analysis Plan – Amos Plant. January 2017.

Geosyntec Consultants (Geosyntec). 2018. Statistical Analysis Summary – Bottom Ash Pond, John E. Amos Plant, Winfield, West Virginia. January 15, 2018.

TABLES

**Table 1 – Groundwater Data Summary
Amos – Bottom Ash Pond**

Parameter	Unit	BAP-MW-1		BAP-MW-4		BAP-MW-5		BAP-MW-6		BAP-MW-1601		BAP-MW-1602A		BAP-MW-1603A		BAP-MW-1604		BAP-MW-1605		BAP-MW-1606	
		5/3/2018	9/4/2018	5/3/2018	9/5/2018	5/3/2018	9/4/2018	5/3/2018	9/4/2018	5/4/2018	9/5/2018	5/10/2018	9/5/2018	5/2/2018	9/5/2018	5/3/2018	9/5/2018	5/3/2018	9/5/2018	5/4/2018	9/5/2018
Antimony	µg/L	0.0100 J	0.220	0.05 U	0.0500 J	0.0200 J	0.0200 J	0.0100 J	0.160	0.0100 J	0.0200 J	0.0300 J	0.0800	0.0400 J	0.0200 J	0.0200 J	0.0300 J	0.0100 J	0.0200 J	0.0100 J	0.0100 J
Arsenic	µg/L	0.130	0.180	1.15	11.0	3.18	2.34	34.1	29.8	6.44	5.39	20.4	20.5	80.0	87.1	6.33	6.11	3.34	3.19	2.81	2.21
Barium	µg/L	27.8	29.4	93.1	89.1	149	157	163	147	112	90.4	223	223	251	242	146	135	80.4	103	58.7	61.0
Beryllium	µg/L	0.143	0.130	0.0460	0.0370	0.0490	0.0340	0.0280	0.0100 J	0.0380	0.0100 J	0.0220	0.0550	0.0930	0.00600 J	0.0470	0.0430	0.0690	0.0740	0.0880	0.0730
Boron	mg/L	0.0950	0.0940	0.100	0.0670	0.156	0.0280	0.0560	0.005 U	0.0700	0.005 U	0.127	0.005 U	0.0510	0.005 U	0.200	0.0430	0.109	0.005 U	0.0770	0.0320
Cadmium	µg/L	3.12	2.97	0.0400	0.210	0.00600 J	0.0100 J	0.02 U	0.0300	0.0200	0.0200	0.02 U	0.0100 J	0.0100 J	0.00700 J	0.02 U	0.02 U	0.00900 J	0.0200 J	0.150	0.170
Calcium	mg/L	39.9	38.3	15.9	13.3	16.6	15.2	12.0	11.3	11.0	11.6	19.5	18.1	17.2	15.8	17.8	15.1	47.0	49.4	53.0	51.7
Chloride	mg/L	71.8	67.9	14.4	13.4	17.8	17.8	10.1	8.97	10.3	10.4	39.1	40.0	5.18	4.99	25.5	22.8	97.7	97.1	119	133
Chromium	µg/L	0.0930	0.548	0.175	0.200	0.237	0.122	0.455	0.380	0.353	0.270	0.437	0.855	1.82	0.180	0.556	0.649	0.176	0.260	0.289	0.249
Cobalt	µg/L	15.1	17.7	7.93	25.8	1.03	1.03	11.9	9.16	4.43	6.73	0.940	1.05	1.52	0.246	0.494	0.533	9.75	10.7	16.9	16.4
Combined Radium	pCi/L	1.74	0.575	1.57	0.623	1.63	0.338	2.01	0.769	1.72	0.252	0.438	0.941	0.231	0.577	1.33	0.248	1.07	0.916	1.01	0.181
Fluoride	mg/L	0.0200 J	0.0300 J	0.0600 J	0.0600	0.0400 J	0.0500 J	0.0700	0.0900	0.0500 J	0.0400 J	0.160	0.140	0.280	0.280	0.130	0.120	0.06 U	0.0300 J	0.0300 J	0.06 U
Lead	µg/L	0.0680	1.16	0.153	0.0830	0.147	0.0380	0.216	0.214	0.397	0.0450	0.982	5.99	1.60	0.0450	0.230	0.349	0.148	0.0800	0.286	0.0880
Lithium	mg/L	0.00400	0.00300	0.000800 J	0.00300	0.000400 J	0.00200	0.001 U	0.001 U	0.0100	0.00200	0.00400	0.00100	0.000800 J	0.00200	0.001 U	0.000800 J	0.00600	0.00300	0.00300	0.00300
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	-
Molybdenum	µg/L	0.620	0.340	0.310	0.280	0.310	0.150	0.500	0.460	0.200	0.0800 J	0.910	0.710	1.21	1.07	0.250	0.220	0.100	0.100 J	0.0700 J	0.0400 J
Selenium	µg/L	0.200	0.200	0.0600 J	0.0600 J	0.0500 J	0.1 U	0.200	0.100	0.100	0.1 U	0.100	0.200	0.300	0.0400 J	0.200	0.300	0.100	0.0700 J	0.100	0.0600 J
Total Dissolved Solids	mg/L	328	338	178	179	166	151	188	176	159	157	184	176	100	89.0	210	180	434	483	478	507
Sulfate	mg/L	154	145	49.2	42.4	51.9	45.4	2.90	1.30	53.0	52.2	13.2	12.7	0.1 U	0.1 U	0.1 U	0.1 U	246	213	232	202
Thallium	µg/L	0.0400 J	0.0500 J	0.0100 J	0.109	0.05 U	0.0300 J	0.0920	0.0840	0.0200 J	0.0200 J	0.05 U	0.0300 J	0.0200 J	0.0100 J	0.0100 J	0.0100 J	0.0100 J	0.0200 J	0.0200 J	0.0100 J
pH	SU	7.31	5.11	5.88	7.00	6.33	5.75	6.34	6.04	6.14	7.76	7.24	6.42	6.76	6.71	6.43	7.20	6.11	5.62	7.49	5.43

Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

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

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

-: Not analyzed

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

Constituent Name	MCL	RSL	Calculated UTL
Antimony, Total (mg/L)	0.006		0.0001
Arsenic, Total (mg/L)	0.01		0.087
Barium, Total (mg/L)	2		0.31
Beryllium, Total (mg/L)	0.004		0.000092
Cadmium, Total (mg/L)	0.005		0.00003
Chromium, Total (mg/L)	0.1		0.0026
Cobalt, Total (mg/L)	n/a	0.006	0.031
Combined Radium, Total (pCi/L)	5		5.2
Fluoride, Total (mg/L)	4		0.29
Lead, Total (mg/L)	n/a	0.015	0.0066
Lithium, Total (mg/L)	n/a	0.04	0.012
Mercury, Total (mg/L)	0.002		0.000005
Molybdenum, Total (mg/L)	n/a	0.1	0.003
Selenium, Total (mg/L)	0.05		0.0003
Thallium, Total (mg/L)	0.002		0.00022

Notes:

Grey cell indicates calculated UTL is higher than MCL.

MCL = Maximum Contaminant Level

RSL = Regional Screening Level

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

The higher of the calculated UTL or MCL/RSL is used as the GWPS.

**Table 3: Appendix III Data Evaluation
Amos Plant - Bottom Ash Pond**

Geosyntec Consultants, Inc.

Parameter	Units	Description	MW-1		MW-4		MW-5		MW-1604		MW-1605		MW-1606	
			5/3/2018	9/4/2018	5/3/2018	9/5/2018	5/3/2018	9/4/2018	5/3/2018	9/5/2018	5/3/2018	9/5/2018	5/4/2018	9/5/2018
Boron	mg/L	Interwell Background Value (UPL)	0.165											
		Assessment Monitoring Result	0.095	0.094	0.1	0.067	0.156	0.028	0.200	0.043	0.109	0.002	0.077	0.032
Calcium	mg/L	Interwell Background Value (UPL)	19.5											
		Assessment Monitoring Result	39.9	38.3	15.9	13.3	16.6	15.2	17.8	15.1	47.0	49.4	53.0	51.7
Chloride	mg/L	Interwell Background Value (UPL)	40											
		Assessment Monitoring Result	71.8	67.9	14.4	13.4	17.8	17.8	25.5	22.8	97.7	97.1	119	133
Fluoride	mg/L	Intrawell Background Value (UPL)	0.06		0.247		0.2		0.127		0.108		0.2	
		Assessment Monitoring Result	0.02	0.03	0.06	0.06	0.04	0.05	0.13	0.12	0.02	0.03	0.03	0.02
pH	SU	Intrawell Background Value (UPL)	6.13		6.39		6.66		6.43		6.74		5.97	
		Intrawell Background Value (LPL)	4.90		5.04		4.96		6.00		5.18		5.03	
		Assessment Monitoring Result	7.31	5.11	5.88	7.00	6.33	5.75	6.43	7.20	6.11	5.62	7.49	5.43
Sulfate	mg/L	Interwell Background Value (UPL)	57											
		Assessment Monitoring Result	154	145	49.2	42.4	51.9	45.4	0.04	0.04	246	213	232	202
Total Dissolved Solids	mg/L	Interwell Background Value (UPL)	250											
		Assessment Monitoring Result	328	338	178	179	166	151	210	180	434	483	478	507

Notes:

UPL: Upper prediction limit

LPL: Lower prediction limit

NA: Not analyzed

Bold values exceed the background value.

Background values are shaded gray.

ATTACHMENT A

Certification by Qualified Professional Engineer

Certification by Qualified Professional Engineer

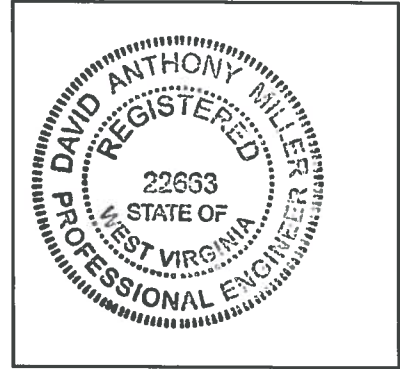
I certify that the selected and above described statistical method is appropriate for evaluating the groundwater monitoring data for the Amos Bottom Ash Pond CCR management area and that the requirements of 40 CFR 257.93(f) have been met.

DAVID ANTHONY MILLER

Printed Name of Licensed Professional Engineer

David Anthony Miller

Signature



22663

License Number

WEST VIRGINIA

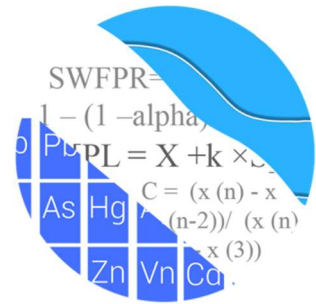
Licensing State

01.08.19

Date

ATTACHMENT B
Statistical Analysis Output

GROUNDWATER STATS CONSULTING



November 11, 2018

Geosyntec Consultants
Attn: Ms. Allison Kreinberg
150 E. Wilson Bridge Rd., #232
Worthington, OH 43085

Re: Amos Bottom Ash Pond
Assessment Monitoring Event – September 2018

Dear Ms. Kreinberg,

Groundwater Stats Consulting (GSC), formerly the statistical consulting division of Sanitas Technologies, is pleased to provide the evaluation of groundwater data for the September 2018 Assessment Monitoring event for American Electric Power Company's Amos Bottom Ash Pond. 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 2016. The monitoring well network, as provided by Geosyntec Consultants, consists of the following:

- **Upgradient wells:** BAP-MW-1601, BAP-MW-1602A, BAP-MW-1603A, and BAP-MW-6; and
- **Downgradient wells:** BAP-MW-1, BAP-MW-1604, BAP-MW-1605, BAP-MW-1606, BAP-MW-4, and BAP-MW-5.

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 CCR program consists of the following constituents:

- **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.

Time series plots for Appendix III and IV parameters are provided for all wells and constituents; and are used to evaluate concentrations over the entire record. Values in background which have previously been flagged as outliers may be seen in a lighter font and disconnected symbol on the graphs.

Evaluation of Appendix III Parameters

Interwell prediction limits combined with a 1-of-2 verification strategy were constructed for boron, calcium, chloride, sulfate and TDS; and intrawell prediction limits combined with a 1-of-2 verification strategy were constructed for fluoride and pH. In the event of an initial exceedance of compliance well data, the 1-of-2 resample plan allows for collection of one additional sample to determine whether the initial exceedance is confirmed. When the resample confirms the initial exceedance, a statistically significant increase (SSI) is identified and further research would be required to identify the cause of the exceedance (i.e. impact from the site, natural variation, or an off-site source). If the resample falls within the statistical limit, the initial exceedance is considered a false positive result and, therefore, no further action is necessary. SSIs were noted for some of the Appendix III parameters and the results of those findings may be found in the Prediction Limit Summary tables following this letter.

When a statistically significant increase is identified, the data are further evaluated using the Sen's Slope/Mann Kendall trend test to determine whether data are statistically increasing, decreasing or stable. No statistically significant trends were found except for a statistically significant increasing trend for chloride in upgradient well MW-BAP-1601 and in downgradient well MW-BAP-1606. The Trend Test Summary Table follows this letter. Typically when trends are noted in upgradient wells, it is an indication of changing groundwater quality unrelated to the facility.

Evaluation of Appendix IV Parameters

Parametric tolerance limits were used to calculate background limits from pooled upgradient well data for Appendix IV parameters with a target of 95% confidence and

95% coverage to determine the Alternate Contaminant Level (ACL). 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 Regional Screening Levels (RSLs) 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.

Confidence intervals were then constructed on downgradient wells for each of the Appendix IV parameters using the highest limit of either the MCL, RSL, or ACL as discussed above. Only when the entire confidence interval is above a GWPS is the well/constituent pair considered to exceed its respective standard. No exceedances were noted for any of the well/constituent pairs. A summary of the confidence interval results follows this letter.

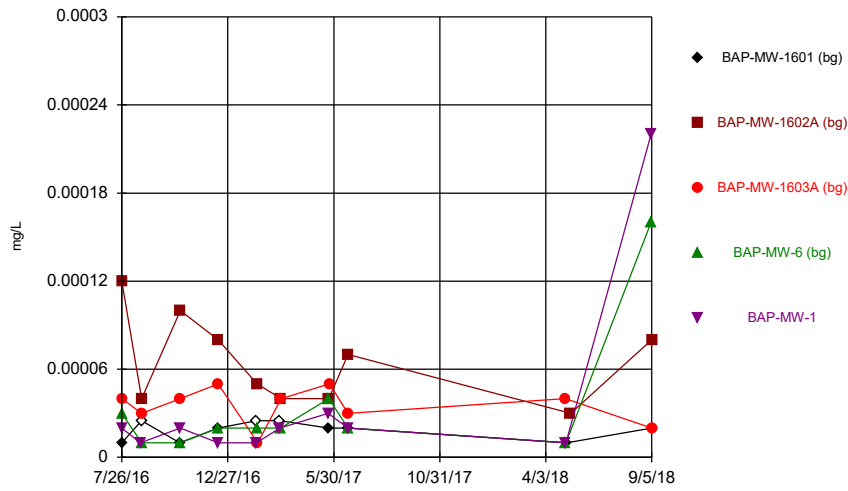
Thank you for the opportunity to assist you in the statistical analysis of groundwater quality for Amos Bottom Ash Pond. If you have any questions or comments, please feel free to contact me.

For Groundwater Stats Consulting,

A handwritten signature in black ink that reads "Kristina Rayner". The signature is written in a cursive, flowing style.

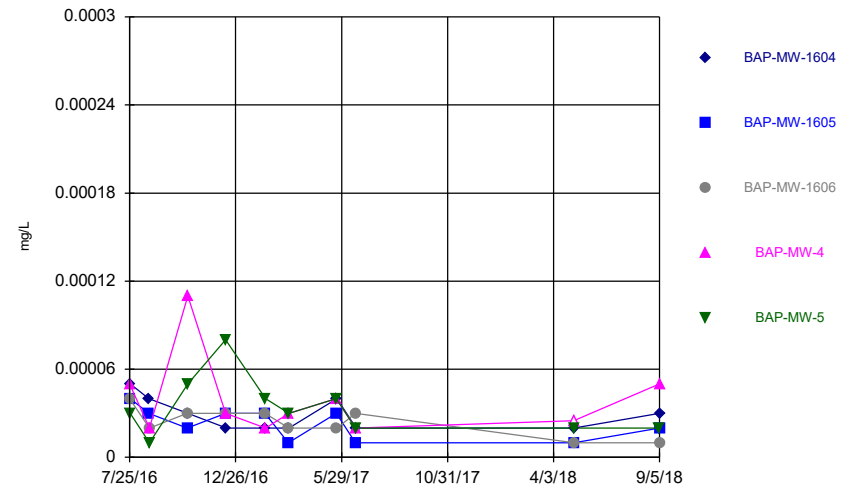
Kristina L. Rayner
Groundwater Statistician

Time Series



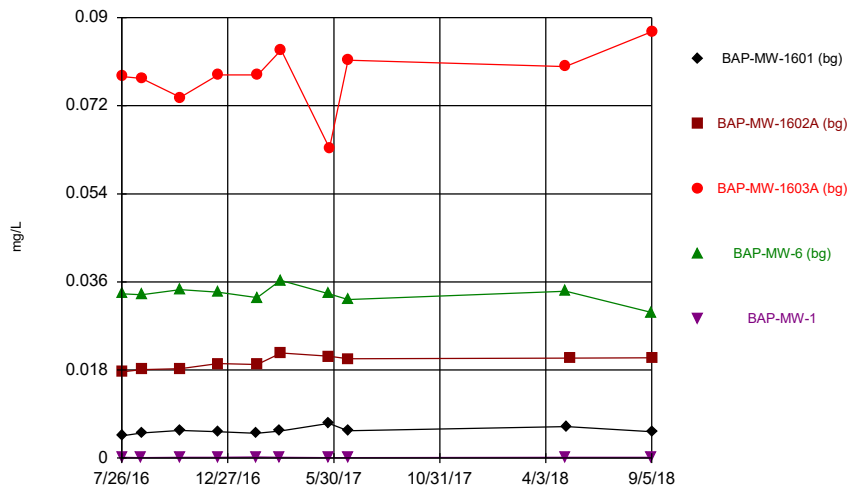
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Time Series



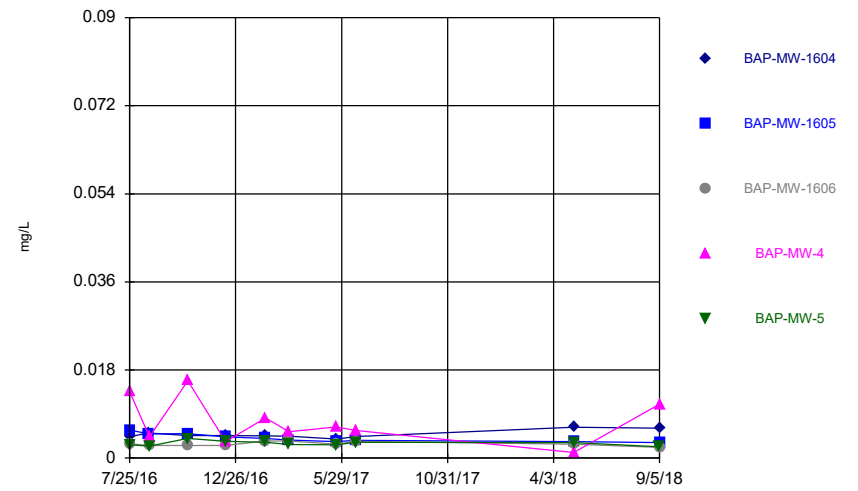
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Time Series



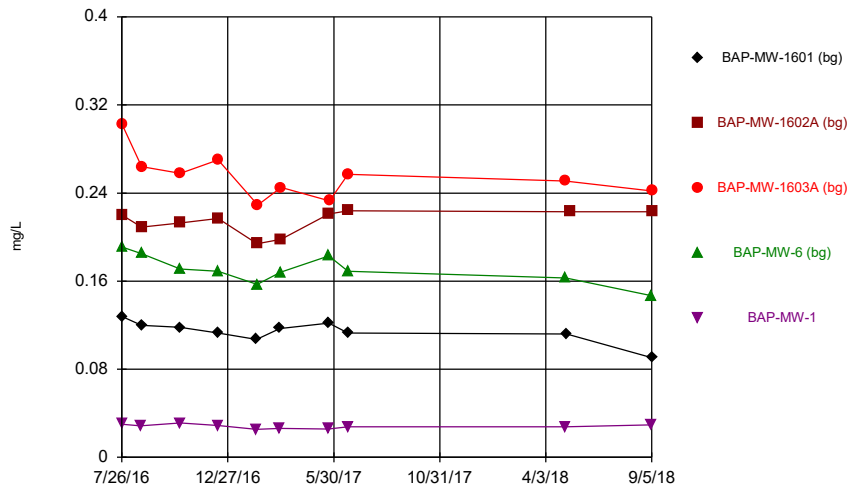
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Time Series



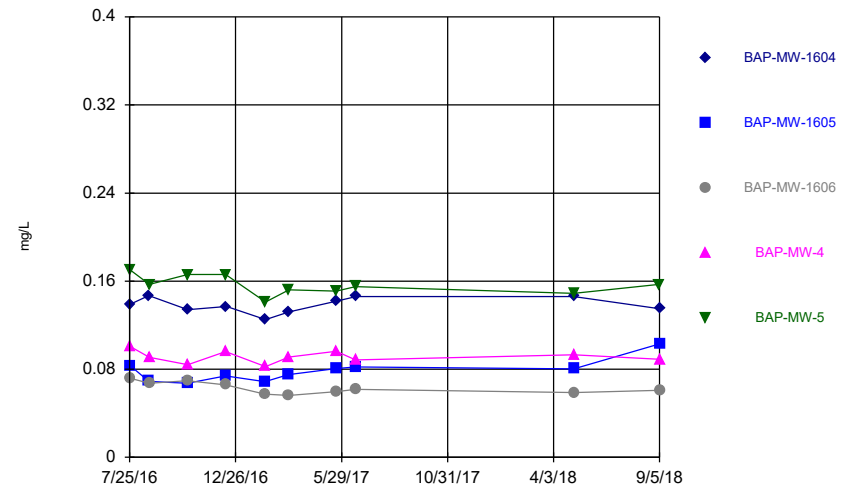
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Time Series



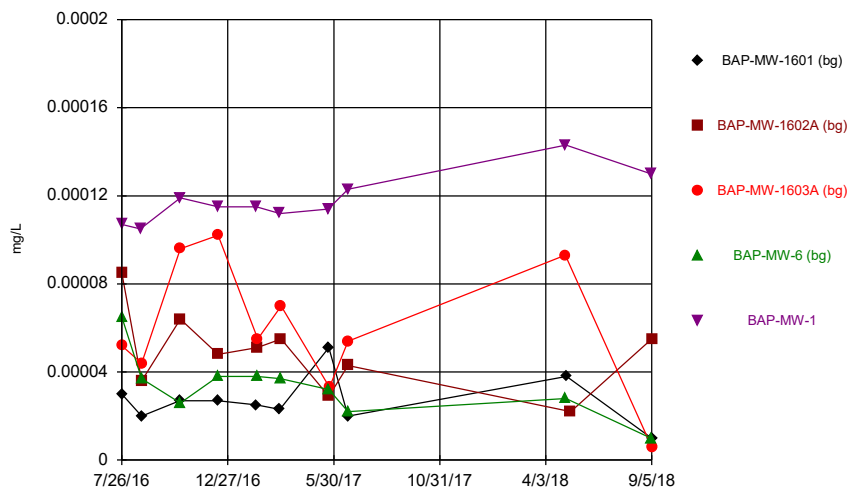
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Time Series



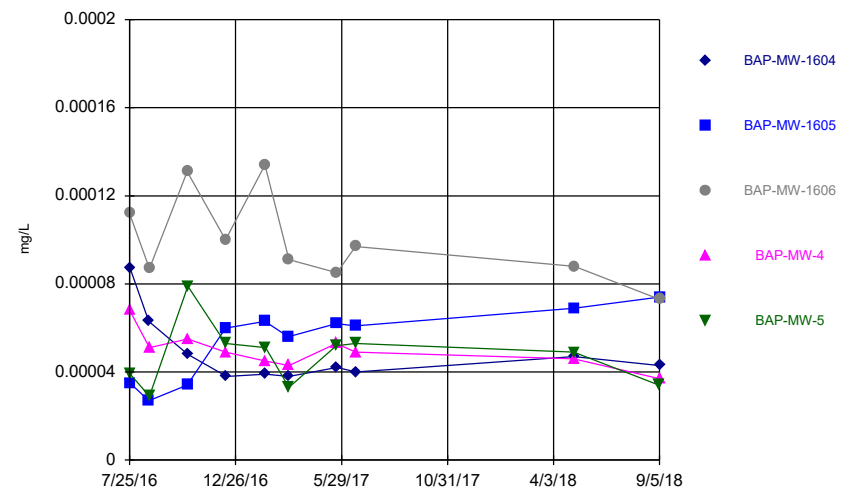
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Time Series



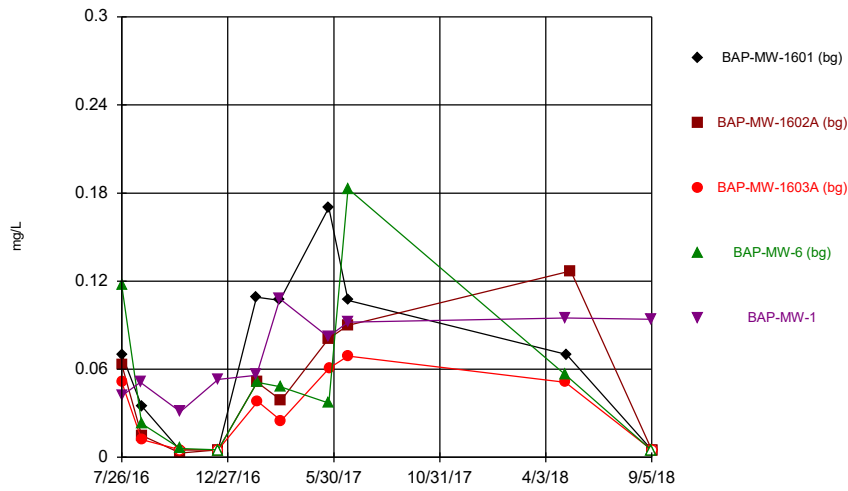
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Time Series



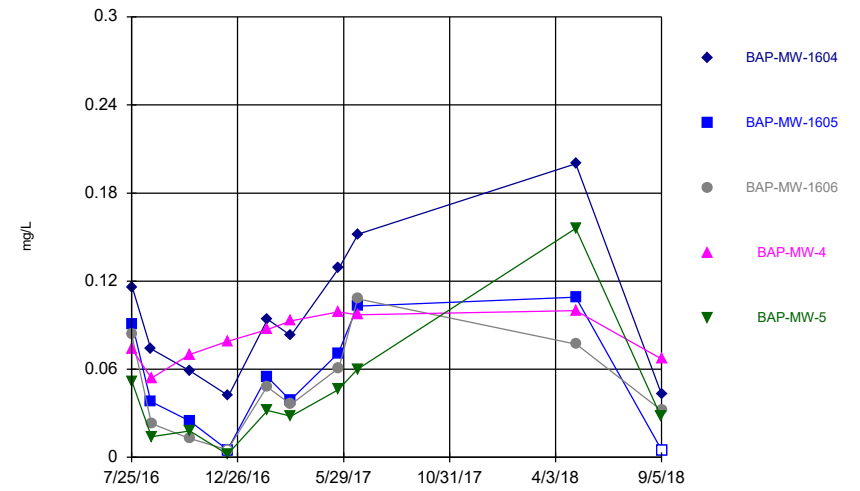
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Time Series



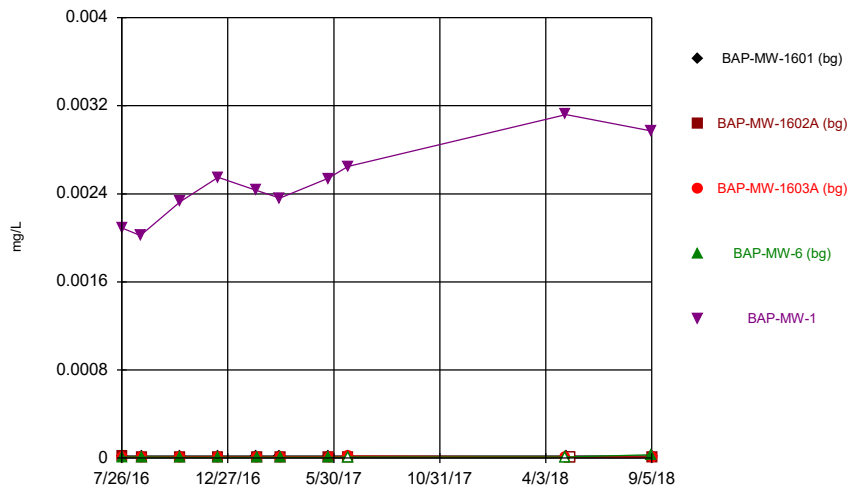
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Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



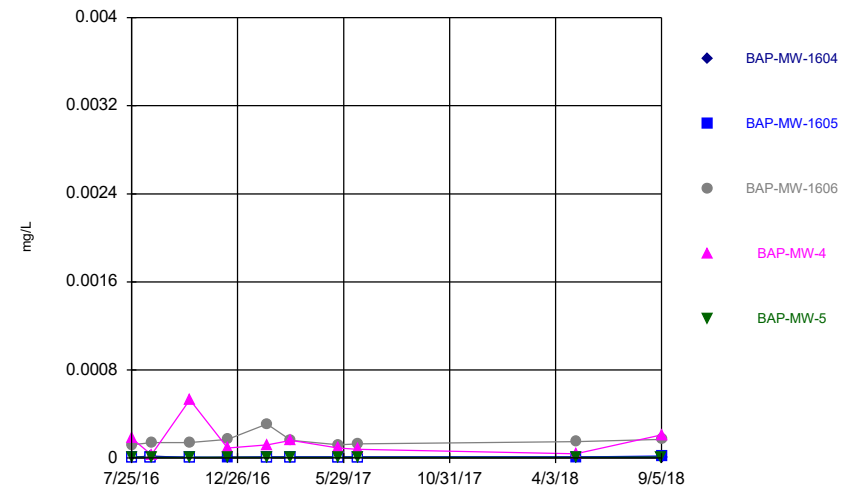
Constituent: Boron, total Analysis Run 10/30/2018 5:20 AM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



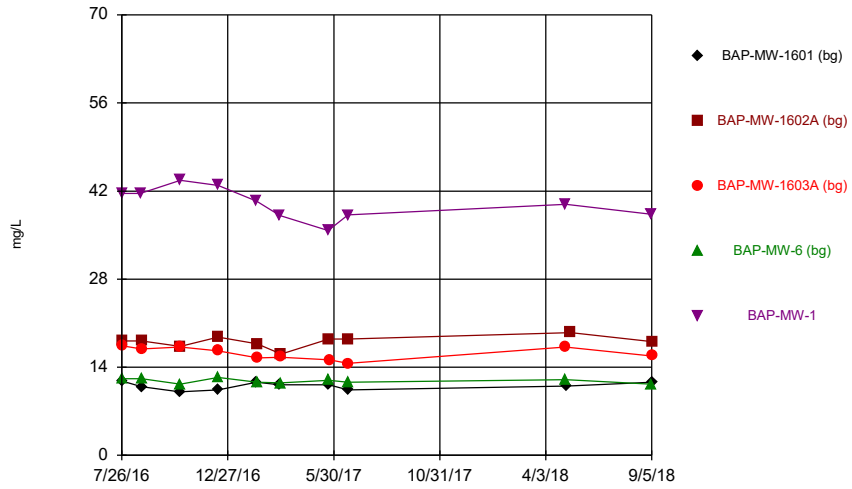
Constituent: Cadmium, total Analysis Run 10/30/2018 5:21 AM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



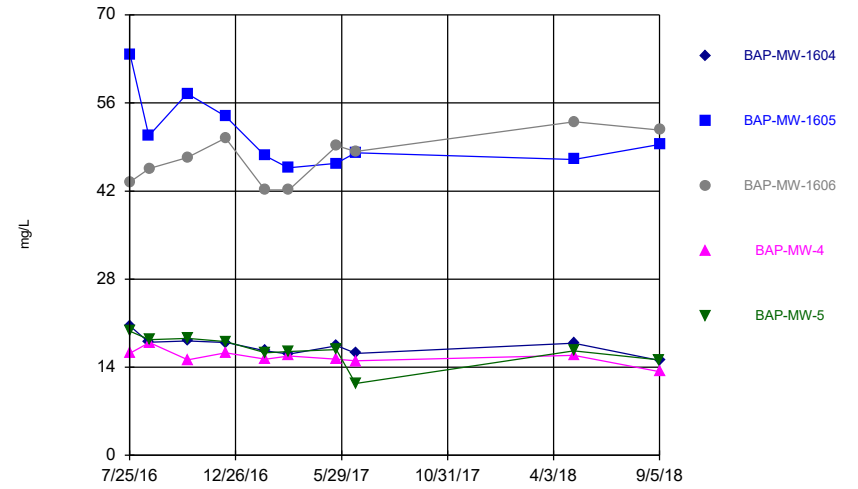
Constituent: Cadmium, total Analysis Run 10/30/2018 5:21 AM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



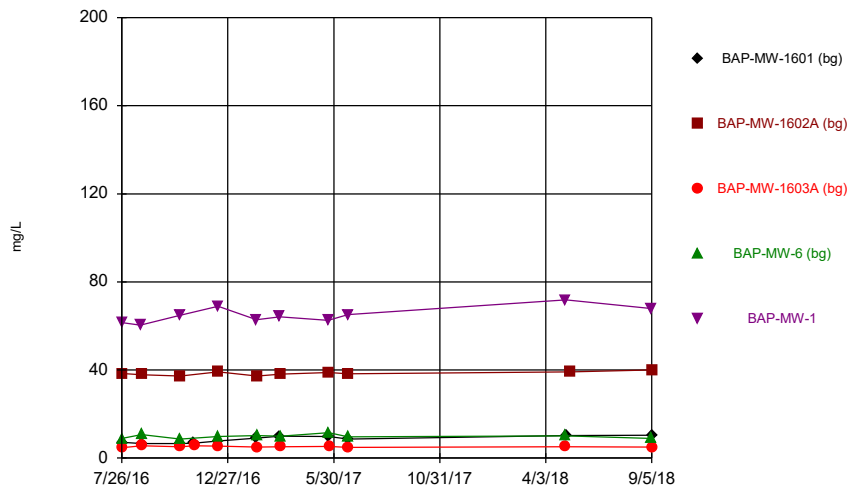
Constituent: Calcium, total Analysis Run 10/30/2018 5:21 AM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



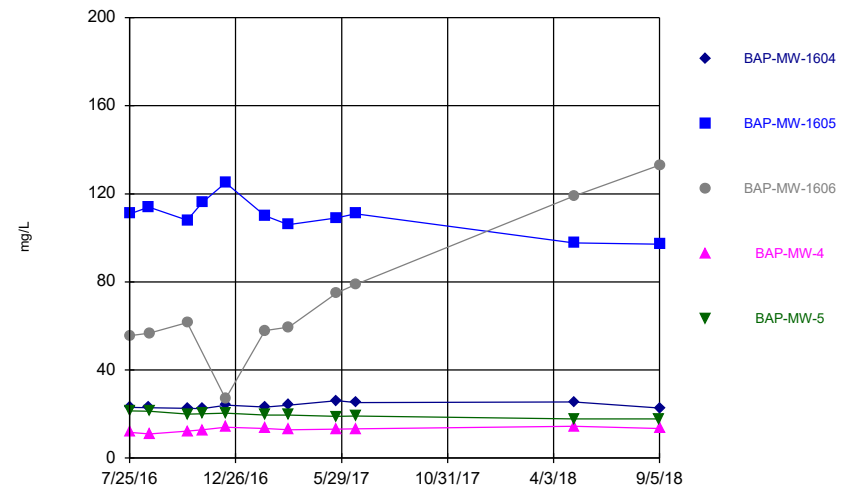
Constituent: Calcium, total Analysis Run 10/30/2018 5:21 AM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



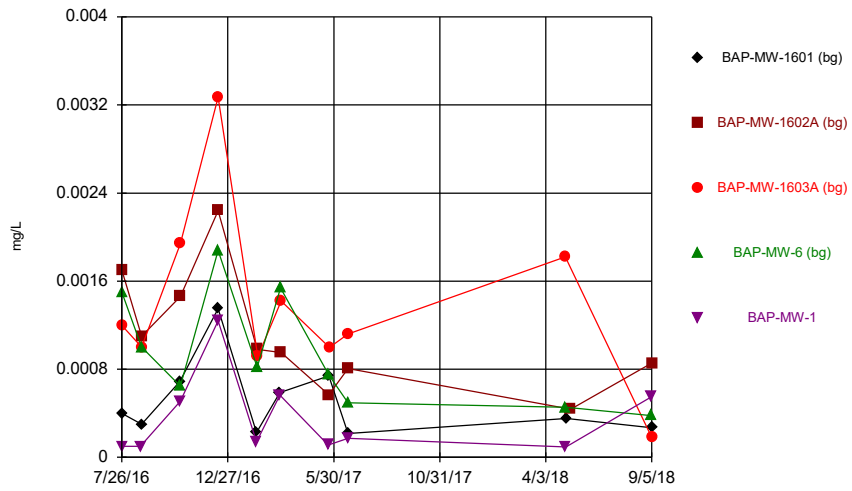
Constituent: Chloride, total Analysis Run 10/30/2018 5:21 AM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



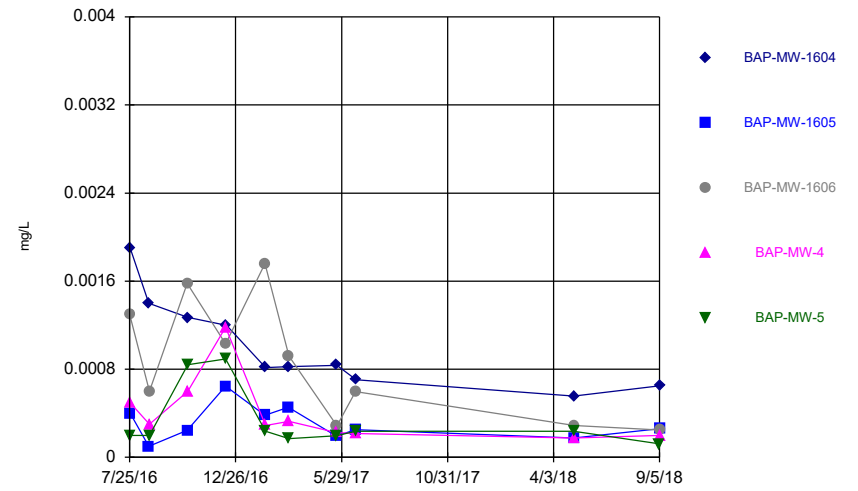
Constituent: Chloride, total Analysis Run 10/30/2018 5:21 AM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



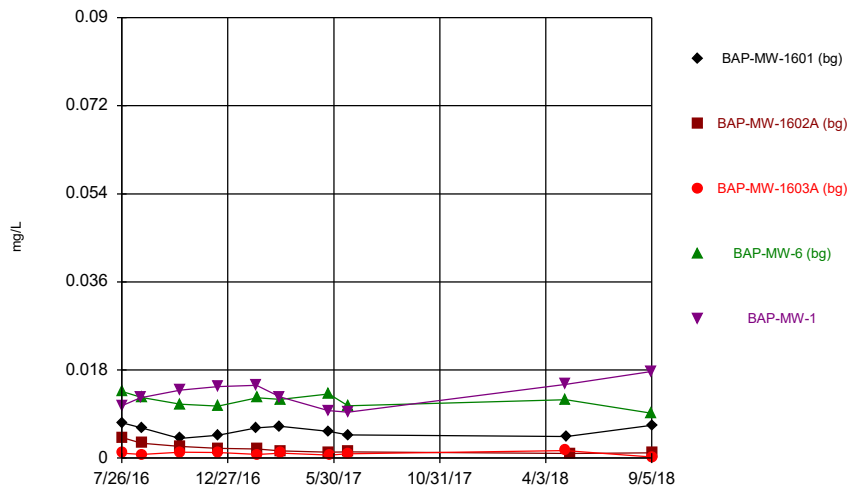
Constituent: Chromium, total Analysis Run 10/30/2018 5:21 AM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



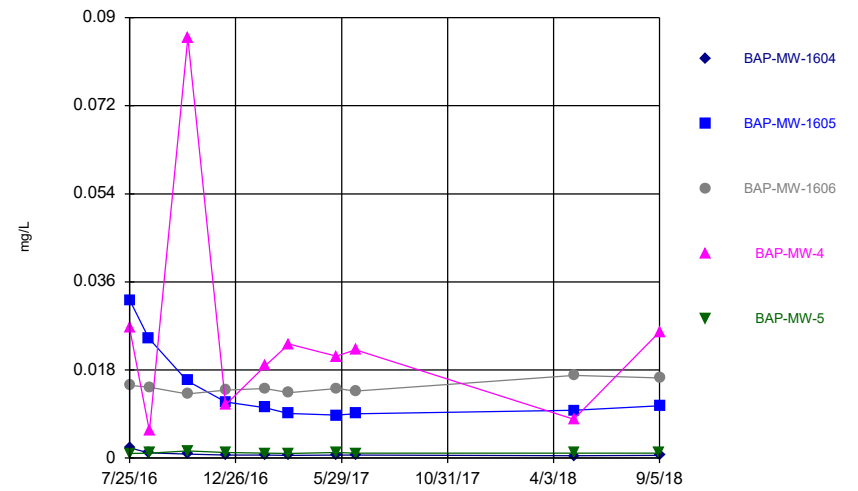
Constituent: Chromium, total Analysis Run 10/30/2018 5:21 AM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



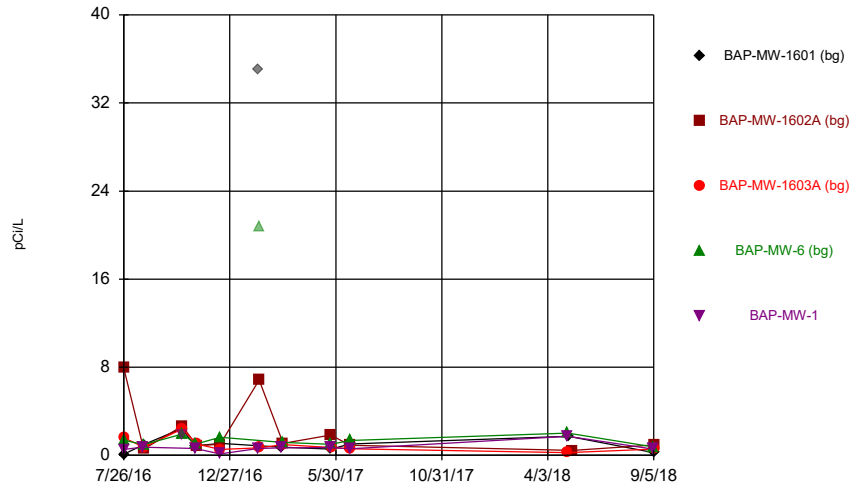
Constituent: Cobalt, total Analysis Run 10/30/2018 5:21 AM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



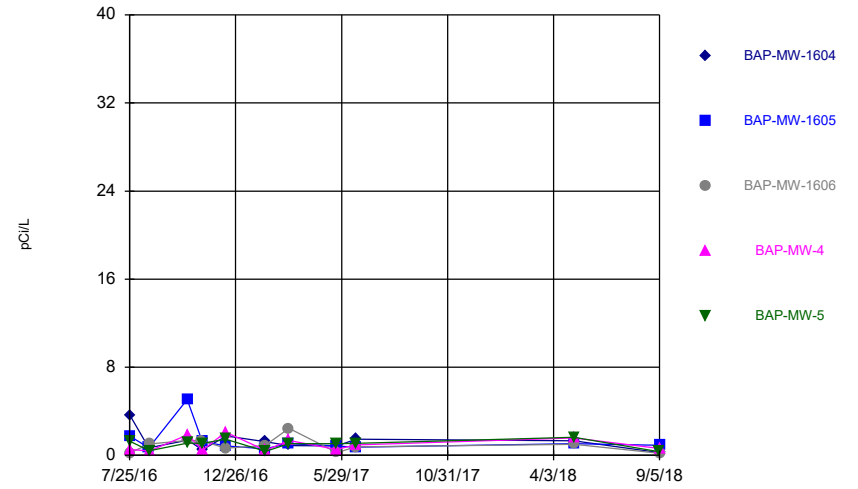
Constituent: Cobalt, total Analysis Run 10/30/2018 5:21 AM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



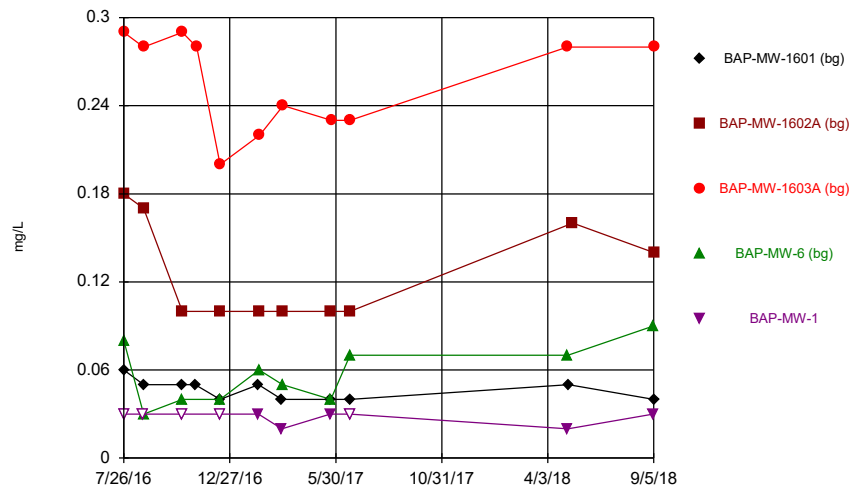
Constituent: Combined Radium 226 + 228 Analysis Run 10/30/2018 5:21 AM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



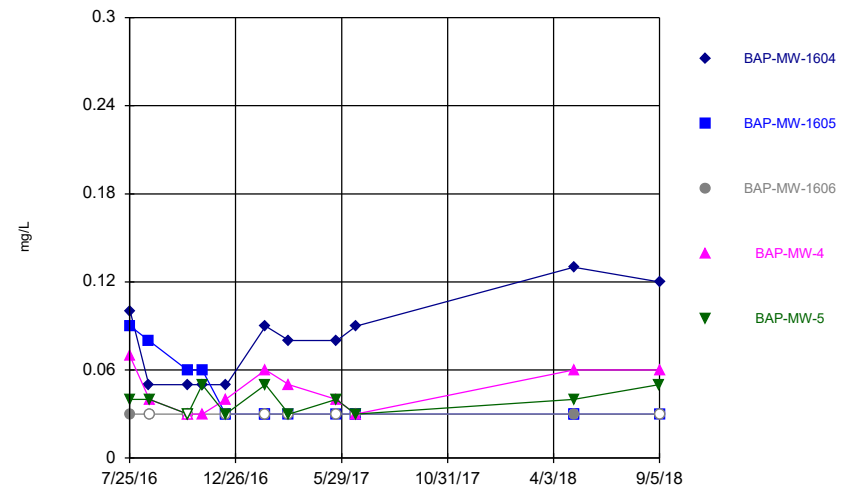
Constituent: Combined Radium 226 + 228 Analysis Run 10/30/2018 5:21 AM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



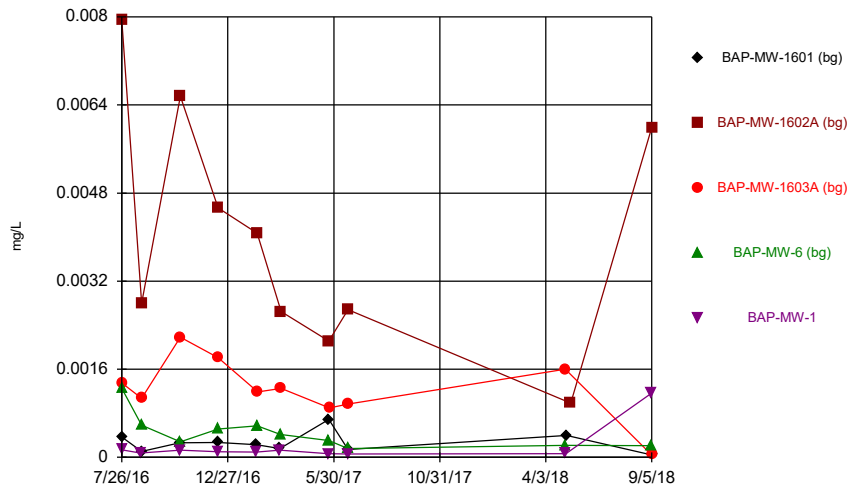
Constituent: Fluoride, total Analysis Run 10/30/2018 5:21 AM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



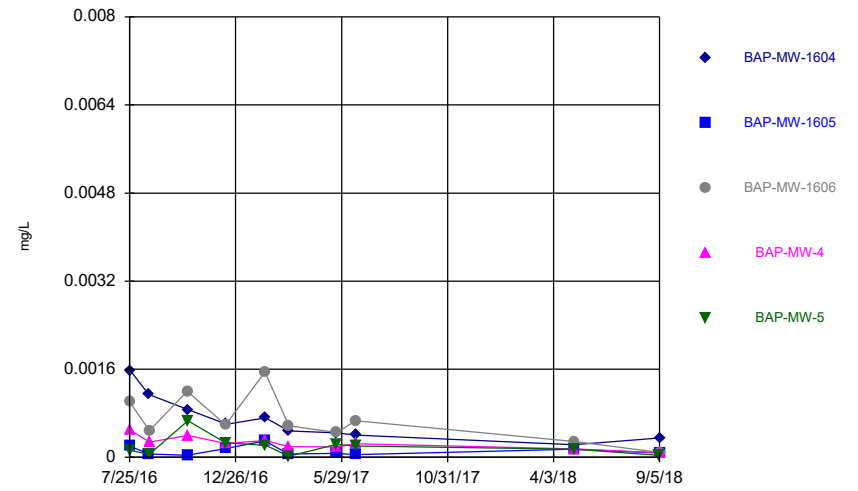
Constituent: Fluoride, total Analysis Run 10/30/2018 5:21 AM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



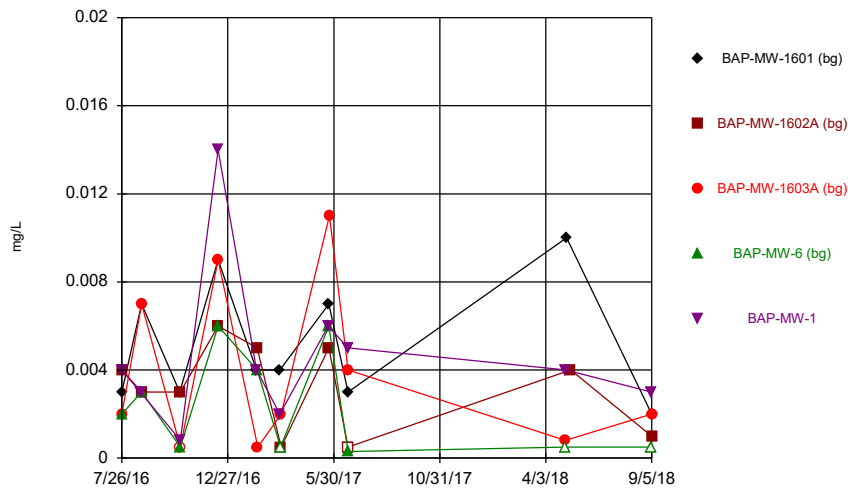
Constituent: Lead, total Analysis Run 10/30/2018 5:21 AM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



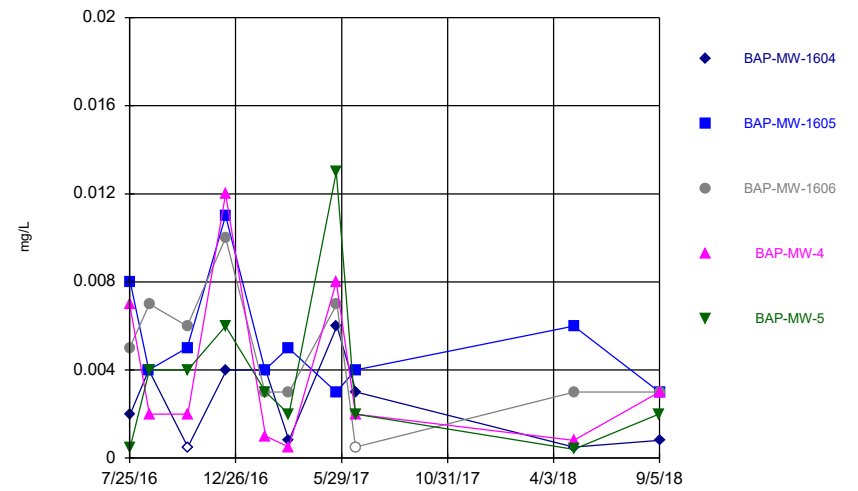
Constituent: Lead, total Analysis Run 10/30/2018 5:21 AM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



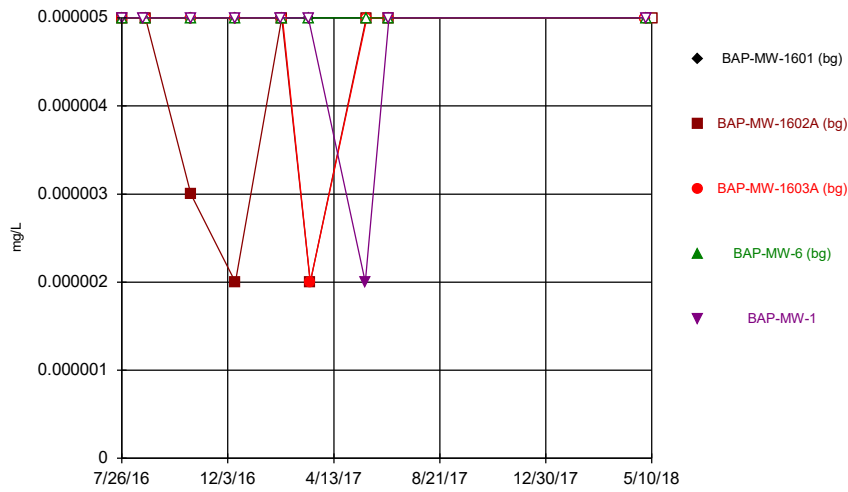
Constituent: Lithium, total Analysis Run 10/30/2018 5:21 AM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



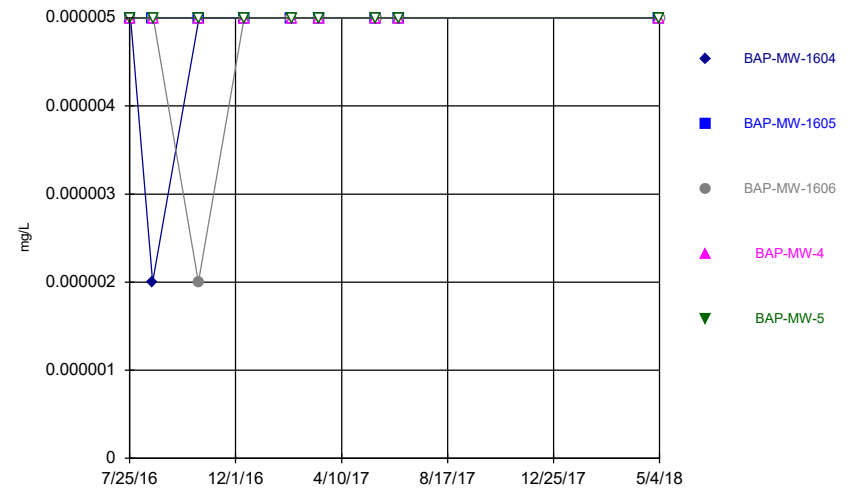
Constituent: Lithium, total Analysis Run 10/30/2018 5:21 AM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



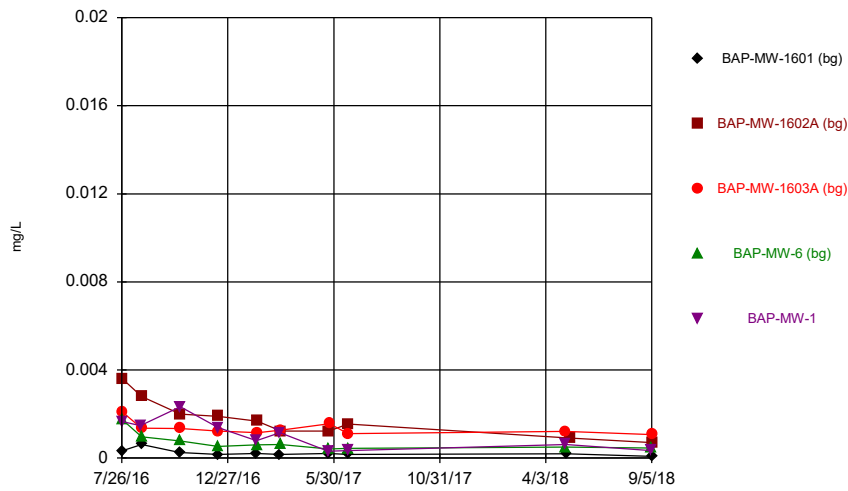
Constituent: Mercury, total Analysis Run 10/30/2018 5:21 AM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



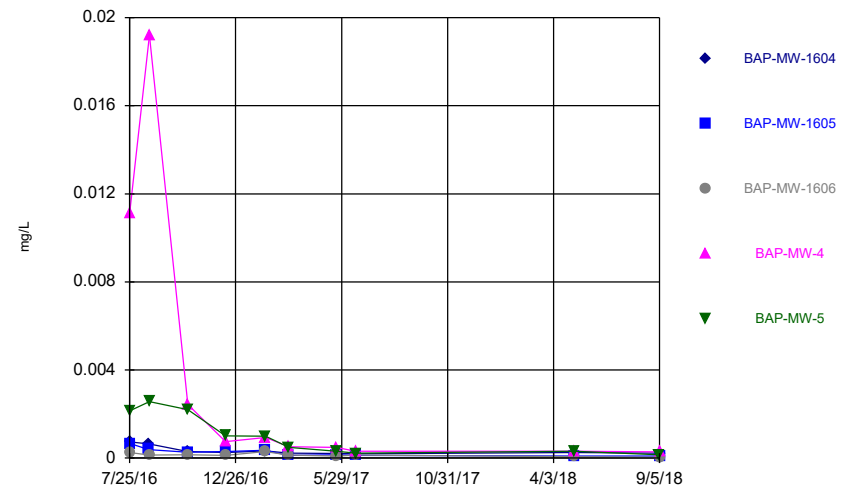
Constituent: Mercury, total Analysis Run 10/30/2018 5:21 AM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



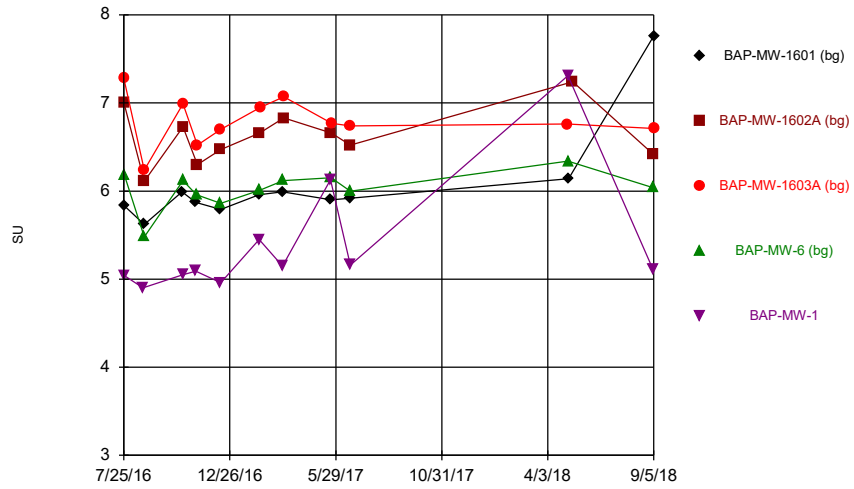
Constituent: Molybdenum, total Analysis Run 10/30/2018 5:22 AM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

Time Series

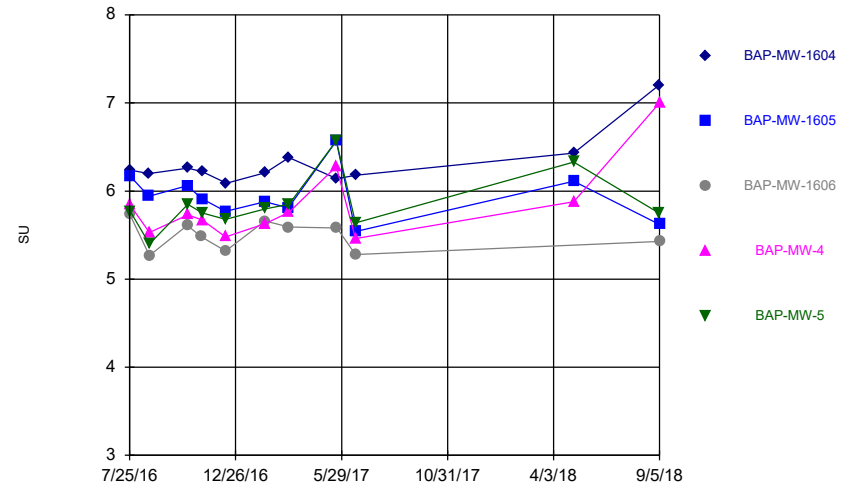


Constituent: Molybdenum, total Analysis Run 10/30/2018 5:22 AM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

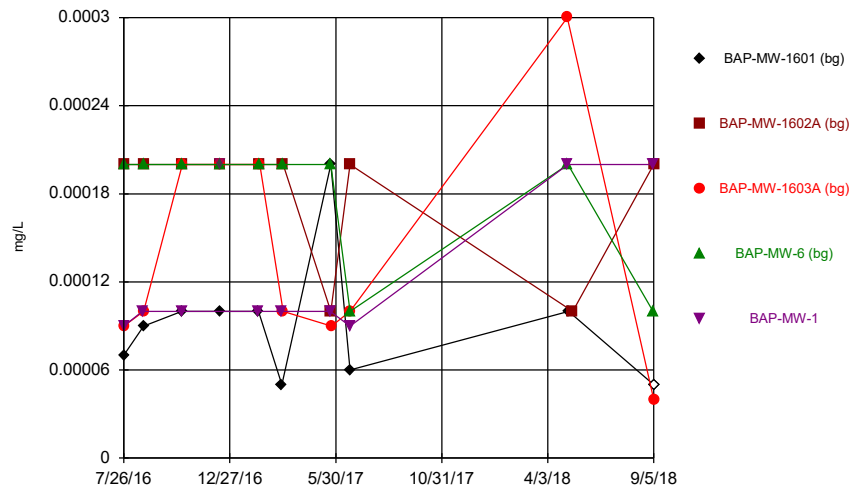
Time Series



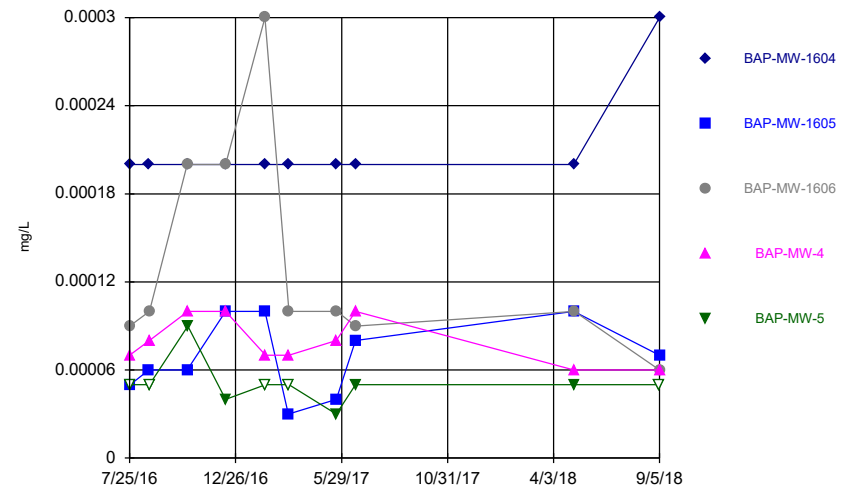
Time Series



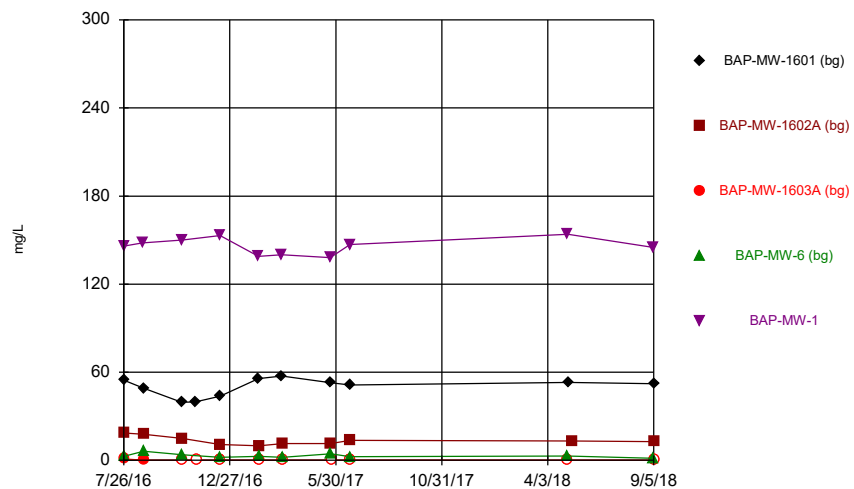
Time Series



Time Series

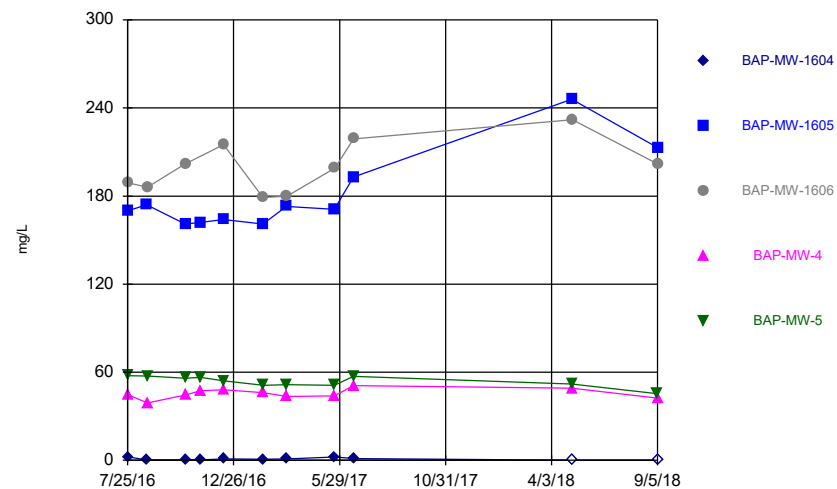


Time Series



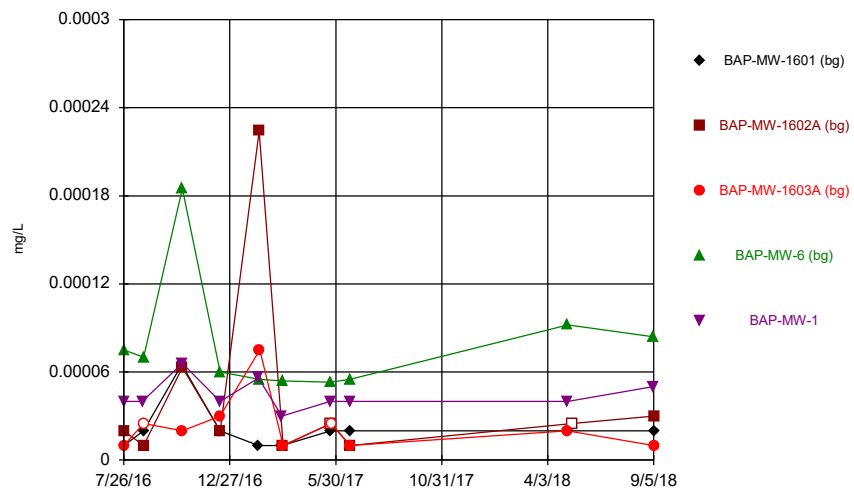
Constituent: Sulfate, total Analysis Run 10/30/2018 5:22 AM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



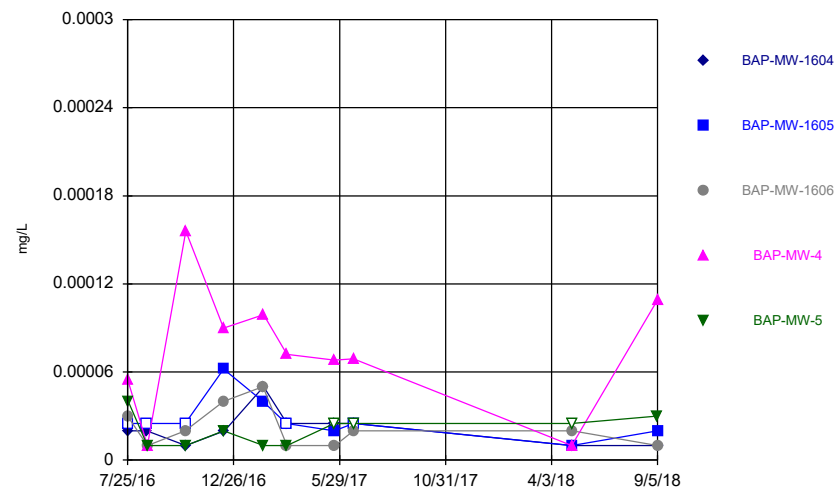
Constituent: Sulfate, total Analysis Run 10/30/2018 5:22 AM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



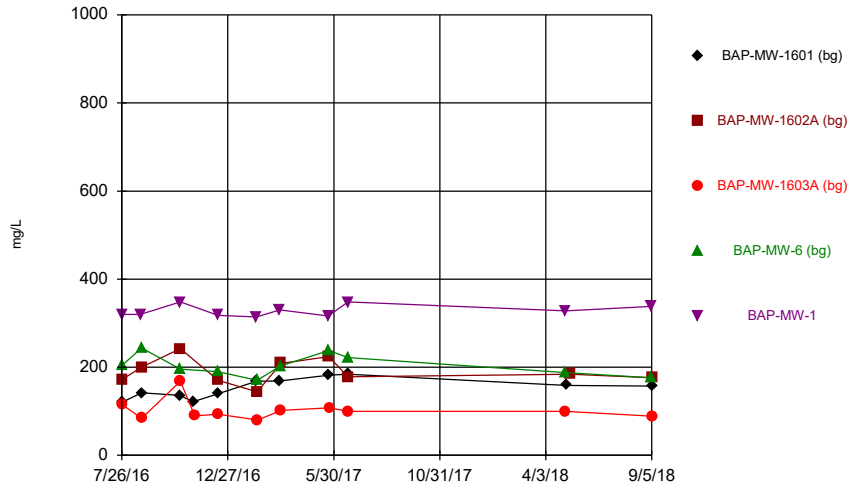
Constituent: Thallium, total Analysis Run 10/30/2018 5:22 AM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



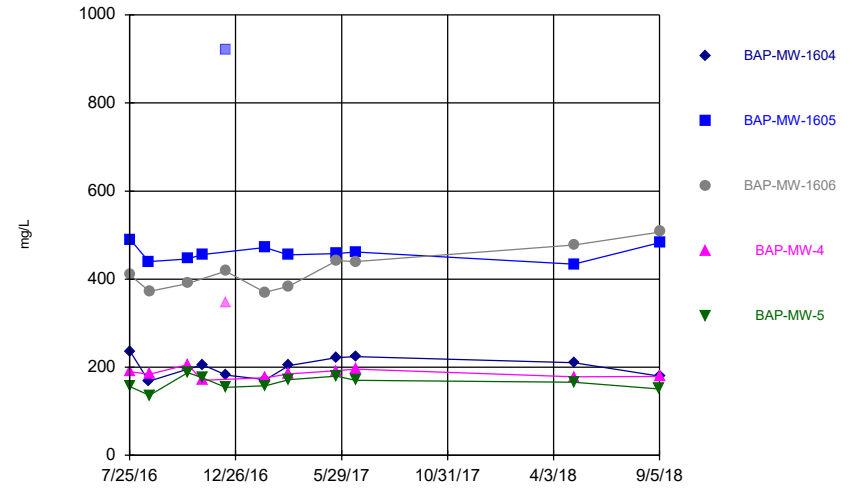
Constituent: Thallium, total Analysis Run 10/30/2018 5:22 AM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



Constituent: Total Dissolved Solids [TDS] Analysis Run 10/30/2018 5:22 AM View: Descriptive
 Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



Constituent: Total Dissolved Solids [TDS] Analysis Run 10/30/2018 5:22 AM View: Descriptive
 Amos BAP Client: Geosyntec Data: Amos BAP

Interwell Prediction Limit Summary Table - Significant Results

Amos BAP Client: Geosyntec Data: Amos BAP Printed 10/29/2018, 8:51 AM

Constituent	Well	Upper Lim.	Date	Observ.	Sig.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Calcium, total (mg/L)	BAP-MW-1	19.5	9/4/2018	38.3	Yes	40	n/a	n/a	0	n/a	n/a	0.001129	NP Inter (normality) ...
Calcium, total (mg/L)	BAP-MW-1605	19.5	9/5/2018	49.4	Yes	40	n/a	n/a	0	n/a	n/a	0.001129	NP Inter (normality) ...
Calcium, total (mg/L)	BAP-MW-1606	19.5	9/5/2018	51.7	Yes	40	n/a	n/a	0	n/a	n/a	0.001129	NP Inter (normality) ...
Chloride, total (mg/L)	BAP-MW-1	40	9/4/2018	67.9	Yes	42	n/a	n/a	0	n/a	n/a	0.001052	NP Inter (normality) ...
Chloride, total (mg/L)	BAP-MW-1605	40	9/5/2018	97.1	Yes	42	n/a	n/a	0	n/a	n/a	0.001052	NP Inter (normality) ...
Chloride, total (mg/L)	BAP-MW-1606	40	9/5/2018	133	Yes	42	n/a	n/a	0	n/a	n/a	0.001052	NP Inter (normality) ...
Sulfate, total (mg/L)	BAP-MW-1	57.4	9/4/2018	145	Yes	42	n/a	n/a	21.43	n/a	n/a	0.001052	NP Inter (normality) ...
Sulfate, total (mg/L)	BAP-MW-1605	57.4	9/5/2018	213	Yes	42	n/a	n/a	21.43	n/a	n/a	0.001052	NP Inter (normality) ...
Sulfate, total (mg/L)	BAP-MW-1606	57.4	9/5/2018	202	Yes	42	n/a	n/a	21.43	n/a	n/a	0.001052	NP Inter (normality) ...
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-1	249.7	9/4/2018	338	Yes	42	160.5	46.33	0	None	No	0.001254	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-1605	249.7	9/5/2018	483	Yes	42	160.5	46.33	0	None	No	0.001254	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-1606	249.7	9/5/2018	507	Yes	42	160.5	46.33	0	None	No	0.001254	Param Inter 1 of 2

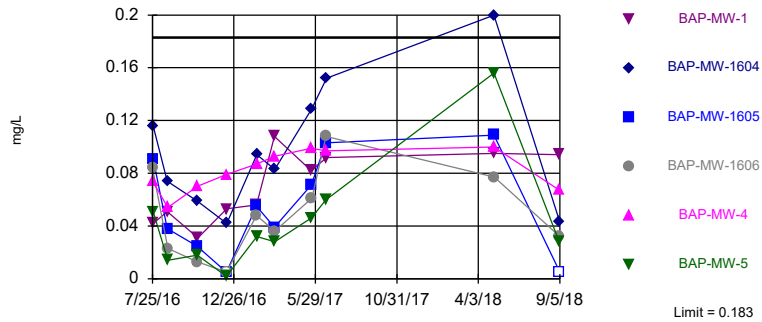
Interwell Prediction Limit Summary Table - All Results

Amos BAP Client: Geosyntec Data: Amos BAP Printed 10/29/2018, 8:51 AM

Constituent	Well	Upper Lim.	Date	Observ.	Sig.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Boron, total (mg/L)	BAP-MW-1	0.183	9/4/2018	0.094	No	40	n/a	n/a	25	n/a	n/a	0.001129	NP Inter (normality) ...
Boron, total (mg/L)	BAP-MW-1604	0.183	9/5/2018	0.043	No	40	n/a	n/a	25	n/a	n/a	0.001129	NP Inter (normality) ...
Boron, total (mg/L)	BAP-MW-1605	0.183	9/5/2018	0.005ND	No	40	n/a	n/a	25	n/a	n/a	0.001129	NP Inter (normality) ...
Boron, total (mg/L)	BAP-MW-1606	0.183	9/5/2018	0.032	No	40	n/a	n/a	25	n/a	n/a	0.001129	NP Inter (normality) ...
Boron, total (mg/L)	BAP-MW-4	0.183	9/5/2018	0.067	No	40	n/a	n/a	25	n/a	n/a	0.001129	NP Inter (normality) ...
Boron, total (mg/L)	BAP-MW-5	0.183	9/4/2018	0.028	No	40	n/a	n/a	25	n/a	n/a	0.001129	NP Inter (normality) ...
Calcium, total (mg/L)	BAP-MW-1	19.5	9/4/2018	38.3	Yes	40	n/a	n/a	0	n/a	n/a	0.001129	NP Inter (normality) ...
Calcium, total (mg/L)	BAP-MW-1604	19.5	9/5/2018	15.1	No	40	n/a	n/a	0	n/a	n/a	0.001129	NP Inter (normality) ...
Calcium, total (mg/L)	BAP-MW-1605	19.5	9/5/2018	49.4	Yes	40	n/a	n/a	0	n/a	n/a	0.001129	NP Inter (normality) ...
Calcium, total (mg/L)	BAP-MW-1606	19.5	9/5/2018	51.7	Yes	40	n/a	n/a	0	n/a	n/a	0.001129	NP Inter (normality) ...
Calcium, total (mg/L)	BAP-MW-4	19.5	9/5/2018	13.3	No	40	n/a	n/a	0	n/a	n/a	0.001129	NP Inter (normality) ...
Calcium, total (mg/L)	BAP-MW-5	19.5	9/4/2018	15.2	No	40	n/a	n/a	0	n/a	n/a	0.001129	NP Inter (normality) ...
Chloride, total (mg/L)	BAP-MW-1	40	9/4/2018	67.9	Yes	42	n/a	n/a	0	n/a	n/a	0.001052	NP Inter (normality) ...
Chloride, total (mg/L)	BAP-MW-1604	40	9/5/2018	22.8	No	42	n/a	n/a	0	n/a	n/a	0.001052	NP Inter (normality) ...
Chloride, total (mg/L)	BAP-MW-1605	40	9/5/2018	97.1	Yes	42	n/a	n/a	0	n/a	n/a	0.001052	NP Inter (normality) ...
Chloride, total (mg/L)	BAP-MW-1606	40	9/5/2018	133	Yes	42	n/a	n/a	0	n/a	n/a	0.001052	NP Inter (normality) ...
Chloride, total (mg/L)	BAP-MW-4	40	9/5/2018	13.4	No	42	n/a	n/a	0	n/a	n/a	0.001052	NP Inter (normality) ...
Chloride, total (mg/L)	BAP-MW-5	40	9/4/2018	17.8	No	42	n/a	n/a	0	n/a	n/a	0.001052	NP Inter (normality) ...
Sulfate, total (mg/L)	BAP-MW-1	57.4	9/4/2018	145	Yes	42	n/a	n/a	21.43	n/a	n/a	0.001052	NP Inter (normality) ...
Sulfate, total (mg/L)	BAP-MW-1604	57.4	9/5/2018	0.1ND	No	42	n/a	n/a	21.43	n/a	n/a	0.001052	NP Inter (normality) ...
Sulfate, total (mg/L)	BAP-MW-1605	57.4	9/5/2018	213	Yes	42	n/a	n/a	21.43	n/a	n/a	0.001052	NP Inter (normality) ...
Sulfate, total (mg/L)	BAP-MW-1606	57.4	9/5/2018	202	Yes	42	n/a	n/a	21.43	n/a	n/a	0.001052	NP Inter (normality) ...
Sulfate, total (mg/L)	BAP-MW-4	57.4	9/5/2018	42.4	No	42	n/a	n/a	21.43	n/a	n/a	0.001052	NP Inter (normality) ...
Sulfate, total (mg/L)	BAP-MW-5	57.4	9/4/2018	45.4	No	42	n/a	n/a	21.43	n/a	n/a	0.001052	NP Inter (normality) ...
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-1	249.7	9/4/2018	338	Yes	42	160.5	46.33	0	None	No	0.001254	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-1604	249.7	9/5/2018	180	No	42	160.5	46.33	0	None	No	0.001254	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-1605	249.7	9/5/2018	483	Yes	42	160.5	46.33	0	None	No	0.001254	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-1606	249.7	9/5/2018	507	Yes	42	160.5	46.33	0	None	No	0.001254	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-4	249.7	9/5/2018	179	No	42	160.5	46.33	0	None	No	0.001254	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-5	249.7	9/4/2018	151	No	42	160.5	46.33	0	None	No	0.001254	Param Inter 1 of 2

Within Limit

Prediction Limit
Interwell Non-parametric

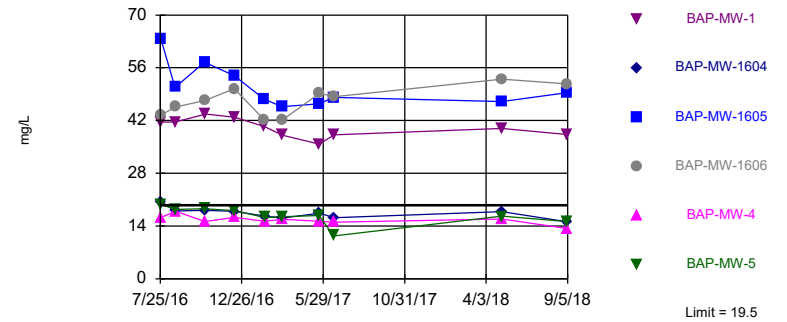


Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 40 background values. 25% NDs. Annual per-constituent alpha = 0.01347. Individual comparison alpha = 0.001129 (1 of 2). Comparing 6 points to limit.

Constituent: Boron, total Analysis Run 10/29/2018 8:49 AM View: PL's - Interwell
Amos BAP Client: Geosyntec Data: Amos BAP

Exceeds Limit: BAP-MW-1, BAP-MW-1605,
BAP-MW-1606

Prediction Limit
Interwell Non-parametric

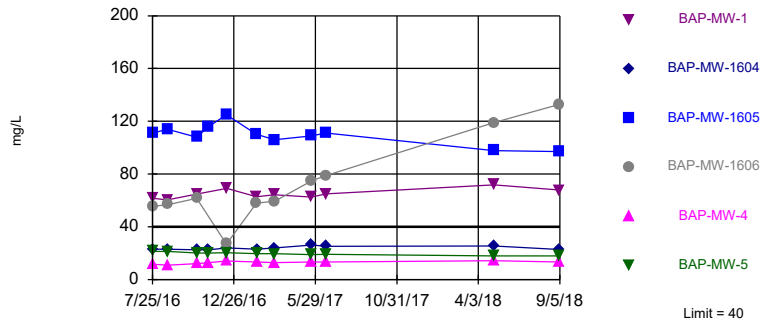


Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 40 background values. Annual per-constituent alpha = 0.01347. Individual comparison alpha = 0.001129 (1 of 2). Comparing 6 points to limit.

Constituent: Calcium, total Analysis Run 10/29/2018 8:49 AM View: PL's - Interwell
Amos BAP Client: Geosyntec Data: Amos BAP

Exceeds Limit: BAP-MW-1, BAP-MW-1605,
BAP-MW-1606

Prediction Limit
Interwell Non-parametric

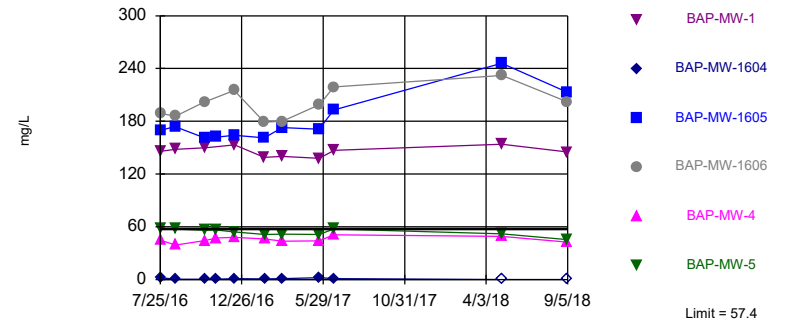


Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 42 background values. 0.1255% NDs. Annual per-constituent alpha = 0.01255. Individual comparison alpha = 0.001052 (1 of 2). Comparing 6 points to limit.

Constituent: Chloride, total Analysis Run 10/29/2018 8:49 AM View: PL's - Interwell
Amos BAP Client: Geosyntec Data: Amos BAP

Exceeds Limit: BAP-MW-1, BAP-MW-1605,
BAP-MW-1606

Prediction Limit
Interwell Non-parametric

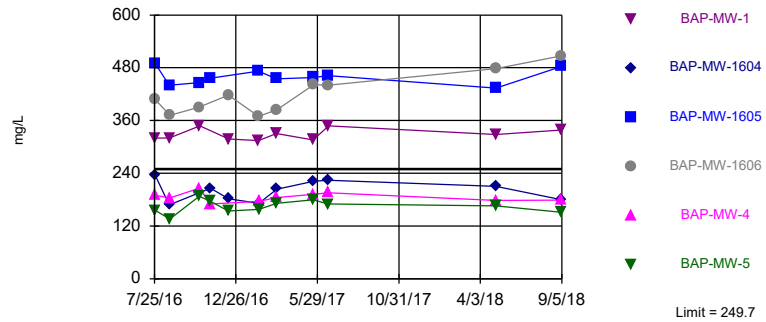


Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 42 background values. 21.43% NDs. Annual per-constituent alpha = 0.01255. Individual comparison alpha = 0.001052 (1 of 2). Comparing 6 points to limit.

Constituent: Sulfate, total Analysis Run 10/29/2018 8:49 AM View: PL's - Interwell
Amos BAP Client: Geosyntec Data: Amos BAP

Exceeds Limit: BAP-MW-1, BAP-MW-1605,
BAP-MW-1606

Prediction Limit
Interwell Parametric



Background Data Summary: Mean=160.5, Std. Dev.=46.33, n=42. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9476, critical = 0.922. Kappa = 1.926 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.001254. Comparing 6 points to limit.

Constituent: Total Dissolved Solids [TDS] Analysis Run 10/29/2018 8:49 AM View: PL's - Interwell
Amos BAP Client: Geosyntec Data: Amos BAP

Intrawell Prediction Limit Summary Table - Significant Results

Amos BAP Client: Geosyntec Data: Amos BAP Printed 10/30/2018, 10:43 AM

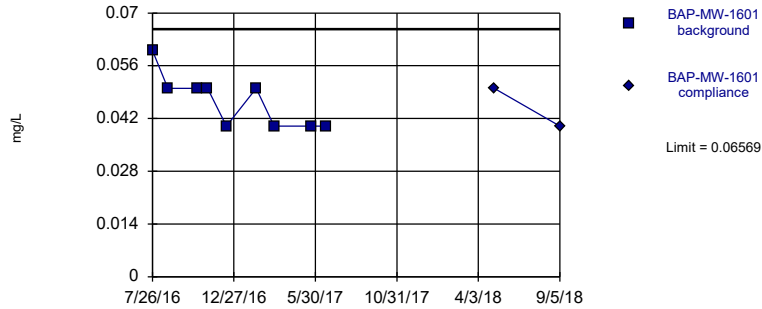
Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
pH, field (SU)	BAP-MW-1601	6.191	5.558	9/5/2018	7.76	Yes	9	5.874	0.1176	0	None	No	0.0006268	Param 1 of 2
pH, field (SU)	BAP-MW-1604	6.431	5.995	9/4/2018	7.2	Yes	9	6.213	0.08109	0	None	No	0.0006268	Param 1 of 2
pH, field (SU)	BAP-MW-4	6.385	5.035	9/5/2018	7	Yes	9	5.71	0.2508	0	None	No	0.0006268	Param 1 of 2

Intrawell Prediction Limit Summary Table - All Results

Amos BAP Client: Geosyntec Data: Amos BAP Printed 10/29/2018, 8:54 AM

Constituent	Well	Upper Lim.	Date	Observ.	Sig.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Fluoride, total (mg/L)	BAP-MW-1601	0.06569	9/5/2018	0.04	No	9	0.04667	0.007071	0	None	No	0.001254	Param 1 of 2
Fluoride, total (mg/L)	BAP-MW-1602A	0.18	9/5/2018	0.14	No	8	n/a	n/a	0	n/a	n/a	0.02144	NP (normality) 1 of 2
Fluoride, total (mg/L)	BAP-MW-1603A	0.3428	9/5/2018	0.28	No	9	0.2511	0.03408	0	None	No	0.001254	Param 1 of 2
Fluoride, total (mg/L)	BAP-MW-6	0.1001	9/4/2018	0.09	No	8	0.05125	0.01727	0	None	No	0.001254	Param 1 of 2
Fluoride, total (mg/L)	BAP-MW-1	0.06	9/4/2018	0.03	No	8	n/a	n/a	62.5	n/a	n/a	0.02144	NP (NDs) 1 of 2
Fluoride, total (mg/L)	BAP-MW-1604	0.1273	9/5/2018	0.12	No	9	0.07111	0.02088	0	None	No	0.001254	Param 1 of 2
Fluoride, total (mg/L)	BAP-MW-1605	0.1078	9/5/2018	0.03	No	9	0.04556	0.02315	33.33	Kapla...	No	0.001254	Param 1 of 2
Fluoride, total (mg/L)	BAP-MW-1606	0.06	9/5/2018	0.06ND	No	8	n/a	n/a	87.5	n/a	n/a	0.02144	NP (NDs) 1 of 2
Fluoride, total (mg/L)	BAP-MW-4	0.1119	9/5/2018	0.06	No	9	0.05111	0.02261	11.11	None	No	0.001254	Param 1 of 2
Fluoride, total (mg/L)	BAP-MW-5	0.1109	9/4/2018	0.05	No	9	0.351	0.04812	11.11	None	x^(1/3)	0.001254	Param 1 of 2
pH, field (SU)	BAP-MW-1601	6.191	9/5/2018	7.76	Yes	9	5.874	0.1176	0	None	No	0.0006268	Param 1 of 2
pH, field (SU)	BAP-MW-1602A	7.323	9/4/2018	6.42	No	9	6.588	0.2732	0	None	No	0.0006268	Param 1 of 2
pH, field (SU)	BAP-MW-1603A	7.64	9/5/2018	6.71	No	9	6.807	0.3098	0	None	No	0.0006268	Param 1 of 2
pH, field (SU)	BAP-MW-6	6.568	9/4/2018	6.04	No	9	5.987	0.2162	0	None	No	0.0006268	Param 1 of 2
pH, field (SU)	BAP-MW-1	6.13	9/4/2018	5.11	No	9	n/a	n/a	0	n/a	n/a	0.03619	NP (normality) 1 of 2
pH, field (SU)	BAP-MW-1604	6.431	9/4/2018	7.2	Yes	9	6.213	0.08109	0	None	No	0.0006268	Param 1 of 2
pH, field (SU)	BAP-MW-1605	6.74	9/5/2018	5.62	No	9	5.961	0.2895	0	None	No	0.0006268	Param 1 of 2
pH, field (SU)	BAP-MW-1606	5.973	9/5/2018	5.43	No	9	5.503	0.1746	0	None	No	0.0006268	Param 1 of 2
pH, field (SU)	BAP-MW-4	6.385	9/5/2018	7	Yes	9	5.71	0.2508	0	None	No	0.0006268	Param 1 of 2
pH, field (SU)	BAP-MW-5	6.663	9/4/2018	5.75	No	9	5.812	0.3162	0	None	No	0.0006268	Param 1 of 2

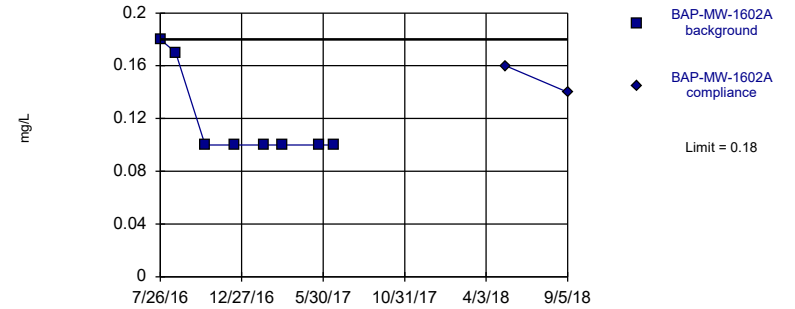
Within Limit Prediction Limit
Intrawell Parametric



Background Data Summary: Mean=0.04667, Std. Dev.=0.007071, n=9. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8049, critical = 0.764. Kappa = 2.69 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254.

Constituent: Fluoride, total Analysis Run 10/29/2018 8:52 AM View: PL's - Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

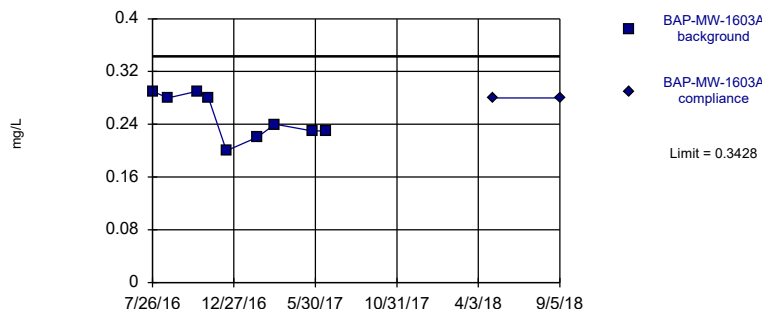
Within Limit Prediction Limit
Intrawell Non-parametric



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 8 background values. Well-constituent pair annual alpha = 0.04242. Individual comparison alpha = 0.02144 (1 of 2).

Constituent: Fluoride, total Analysis Run 10/29/2018 8:52 AM View: PL's - Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

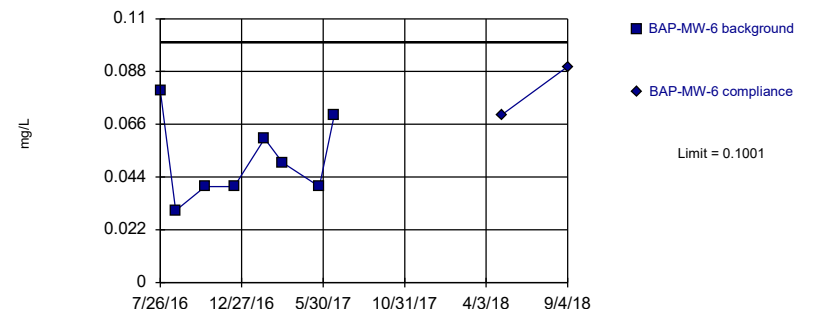
Within Limit Prediction Limit
Intrawell Parametric



Background Data Summary: Mean=0.2511, Std. Dev.=0.03408, n=9. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8781, critical = 0.764. Kappa = 2.69 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254.

Constituent: Fluoride, total Analysis Run 10/29/2018 8:52 AM View: PL's - Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

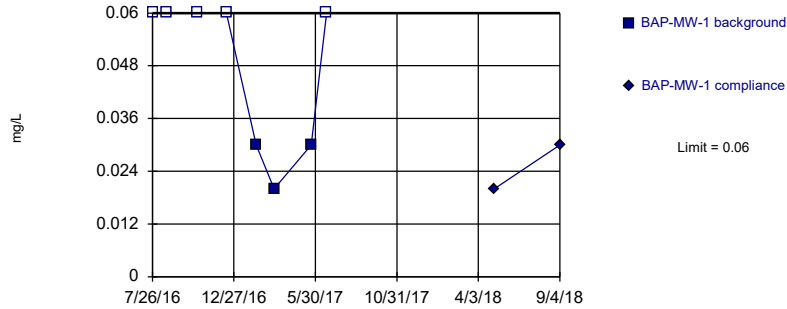
Within Limit Prediction Limit
Intrawell Parametric



Background Data Summary: Mean=0.05125, Std. Dev.=0.01727, n=8. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.919, critical = 0.749. Kappa = 2.831 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254.

Constituent: Fluoride, total Analysis Run 10/29/2018 8:52 AM View: PL's - Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

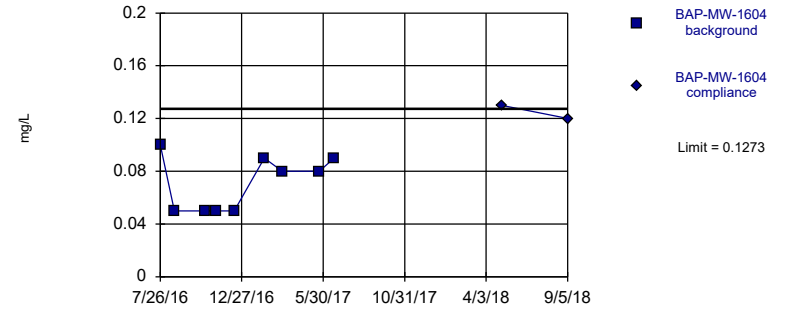
Within Limit Prediction Limit
 Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 8 background values. 62.5% NDs. Well-constituent pair annual alpha = 0.04242. Individual comparison alpha = 0.02144 (1 of 2).

Constituent: Fluoride, total Analysis Run 10/29/2018 8:52 AM View: PL's - Intrawell
 Amos BAP Client: Geosyntec Data: Amos BAP

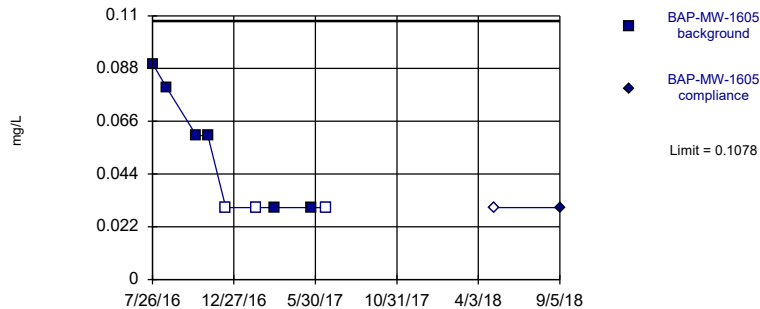
Within Limit Prediction Limit
 Intrawell Parametric



Background Data Summary: Mean=0.07111, Std. Dev.=0.02088, n=9. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.81, critical = 0.764. Kappa = 2.69 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254.

Constituent: Fluoride, total Analysis Run 10/29/2018 8:52 AM View: PL's - Intrawell
 Amos BAP Client: Geosyntec Data: Amos BAP

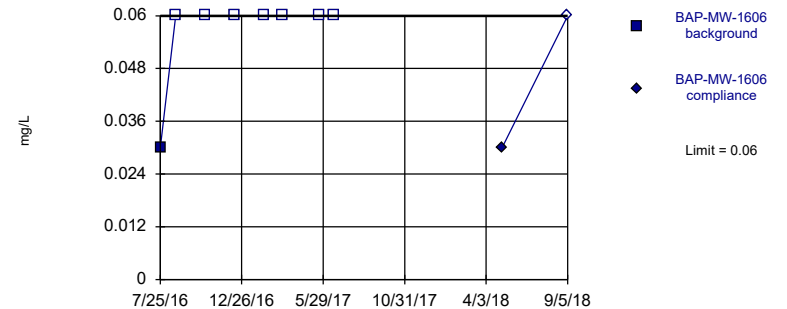
Within Limit Prediction Limit
 Intrawell Parametric



Background Data Summary (after Kaplan-Meier Adjustment): Mean=0.04556, Std. Dev.=0.02315, n=9, 33.33% NDs. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8602, critical = 0.764. Kappa = 2.69 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254.

Constituent: Fluoride, total Analysis Run 10/29/2018 8:52 AM View: PL's - Intrawell
 Amos BAP Client: Geosyntec Data: Amos BAP

Within Limit Prediction Limit
 Intrawell Non-parametric

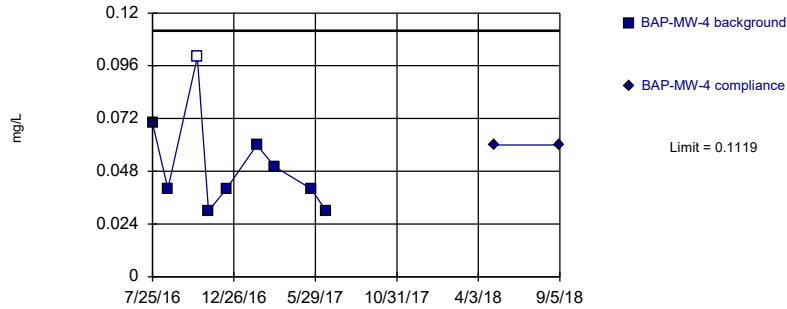


Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 8 background values. 87.5% NDs. Well-constituent pair annual alpha = 0.04242. Individual comparison alpha = 0.02144 (1 of 2).

Constituent: Fluoride, total Analysis Run 10/29/2018 8:52 AM View: PL's - Intrawell
 Amos BAP Client: Geosyntec Data: Amos BAP

Within Limit

Prediction Limit
Intrawell Parametric

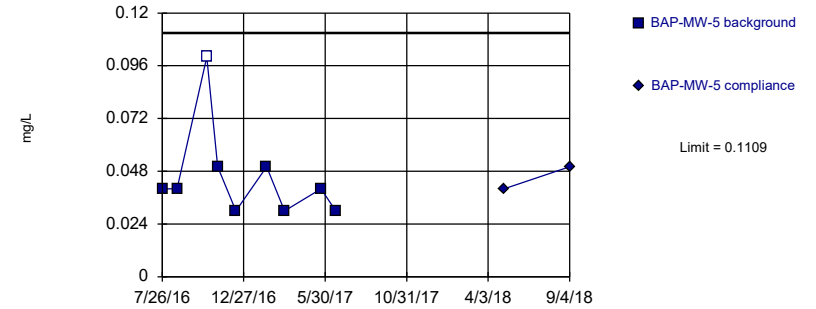


Background Data Summary: Mean=0.05111, Std. Dev.=0.02261, n=9, 11.11% NDs. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.854, critical = 0.764. Kappa = 2.69 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254.

Constituent: Fluoride, total Analysis Run 10/29/2018 8:52 AM View: PL's - Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

Within Limit

Prediction Limit
Intrawell Parametric

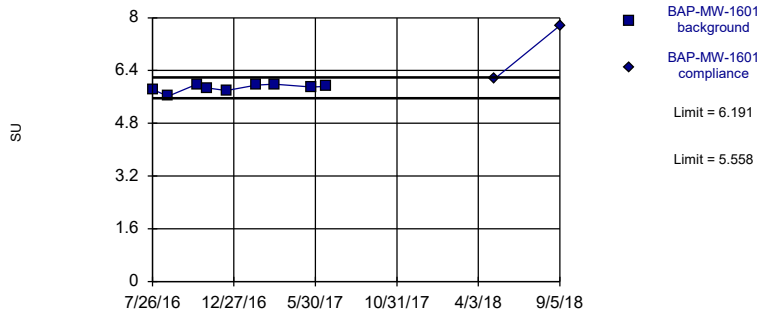


Background Data Summary (based on cube root transformation): Mean=0.351, Std. Dev.=0.04812, n=9, 11.11% NDs. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.7834, critical = 0.764. Kappa = 2.69 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254.

Constituent: Fluoride, total Analysis Run 10/29/2018 8:52 AM View: PL's - Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

Exceeds Limits

Prediction Limit
Intrawell Parametric

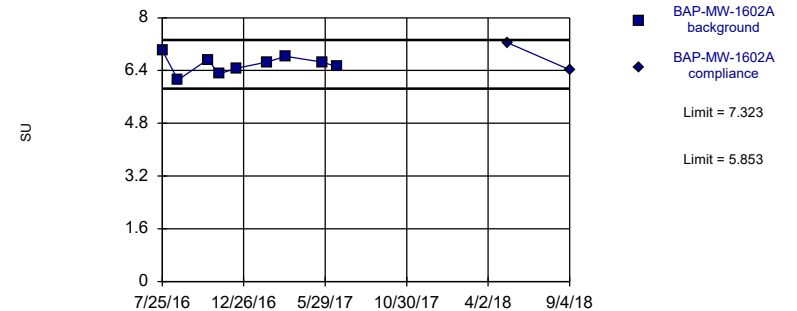


Background Data Summary: Mean=5.874, Std. Dev.=0.1176, n=9. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8865, critical = 0.764. Kappa = 2.69 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254.

Constituent: pH, field Analysis Run 10/29/2018 8:52 AM View: PL's - Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

Within Limits

Prediction Limit
Intrawell Parametric

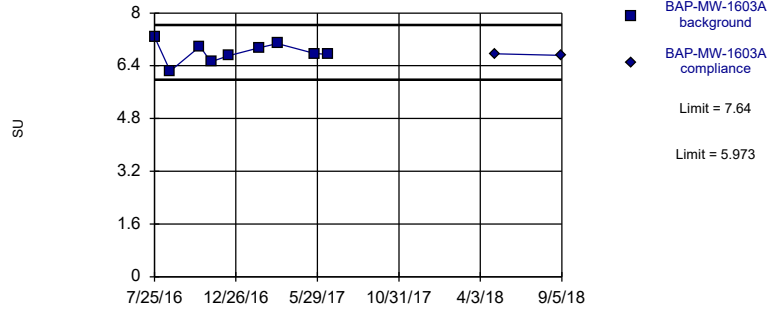


Background Data Summary: Mean=6.588, Std. Dev.=0.2732, n=9. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9838, critical = 0.764. Kappa = 2.69 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254.

Constituent: pH, field Analysis Run 10/29/2018 8:52 AM View: PL's - Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

Within Limits

Prediction Limit
Intrawell Parametric

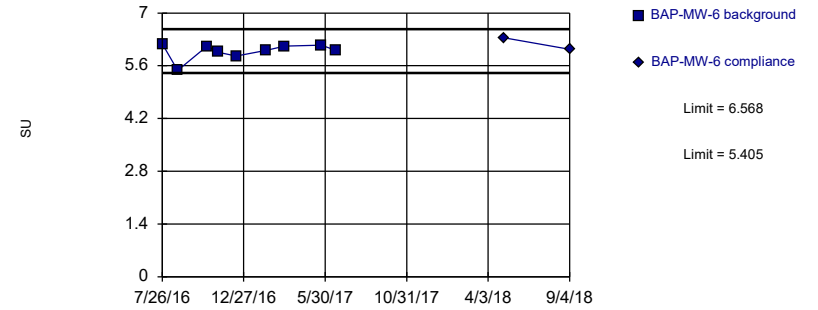


Background Data Summary: Mean=6.807, Std. Dev.=0.3098, n=9. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9809, critical = 0.764. Kappa = 2.69 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254.

Constituent: pH, field Analysis Run 10/29/2018 8:52 AM View: PL's - Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

Within Limits

Prediction Limit
Intrawell Parametric

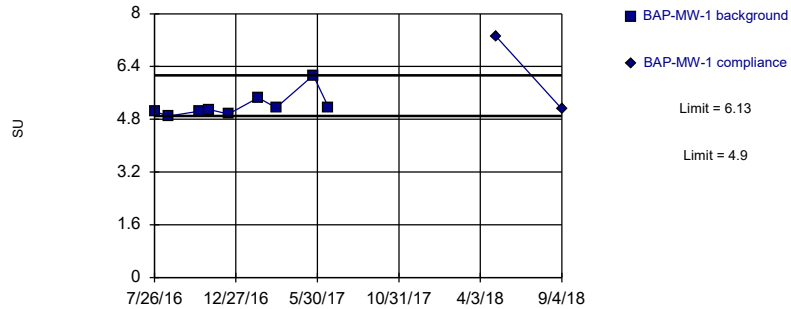


Background Data Summary: Mean=5.987, Std. Dev.=0.2162, n=9. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.807, critical = 0.764. Kappa = 2.69 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254.

Constituent: pH, field Analysis Run 10/29/2018 8:53 AM View: PL's - Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

Within Limits

Prediction Limit
Intrawell Non-parametric

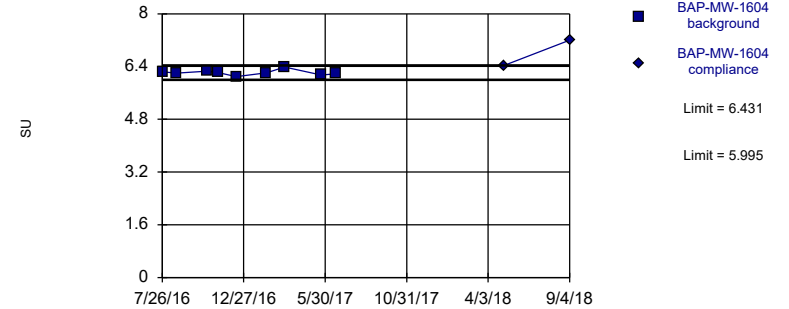


Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limits are highest and lowest of 9 background values. Well-constituent pair annual alpha = 0.07172. Individual comparison alpha = 0.03619 (1 of 2).

Constituent: pH, field Analysis Run 10/29/2018 8:53 AM View: PL's - Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

Exceeds Limits

Prediction Limit
Intrawell Parametric



Background Data Summary: Mean=6.213, Std. Dev.=0.08109, n=9. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9491, critical = 0.764. Kappa = 2.69 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254.

Constituent: pH, field Analysis Run 10/29/2018 8:53 AM View: PL's - Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

Trend Test Summary Table - Significant Results

Amos BAP Client: Geosyntec Data: Amos BAP Printed 10/29/2018, 8:59 AM

<u>Constituent</u>	<u>Well</u>	<u>Slope</u>	<u>Calc.</u>	<u>Critical</u>	<u>Sig.</u>	<u>N</u>	<u>%NDs</u>	<u>Normality</u>	<u>Xform</u>	<u>Alpha</u>	<u>Method</u>
Chloride, total (mg/L)	BAP-MW-1601 (bg)	2.04	41	34	Yes	11	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	BAP-MW-1606	37.21	35	30	Yes	10	0	n/a	n/a	0.01	NP

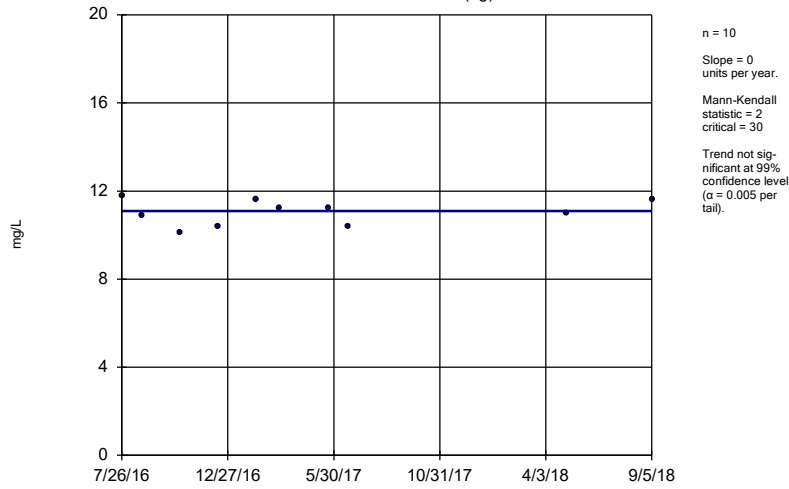
Trend Test Summary Table - All Results

Amos BAP Client: Geosyntec Data: Amos BAP Printed 10/29/2018, 8:59 AM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Calcium, total (mg/L)	BAP-MW-1601 (bg)	0	2	30	No	10	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	BAP-MW-1602A (bg)	0.3638	7	30	No	10	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	BAP-MW-1603A (bg)	-2.086	-20	-30	No	10	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	BAP-MW-6 (bg)	-0.2483	-12	-30	No	10	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	BAP-MW-1	-2.592	-20	-30	No	10	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	BAP-MW-1605	-5.883	-19	-30	No	10	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	BAP-MW-1606	3.689	20	30	No	10	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	BAP-MW-1601 (bg)	2.04	41	34	Yes	11	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	BAP-MW-1602A (bg)	0.7575	20	30	No	10	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	BAP-MW-1603A (bg)	-0.1662	-11	-34	No	11	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	BAP-MW-6 (bg)	0.1599	3	30	No	10	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	BAP-MW-1	3.318	21	30	No	10	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	BAP-MW-1605	-7.282	-24	-34	No	11	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	BAP-MW-1606	37.21	35	30	Yes	10	0	n/a	n/a	0.01	NP
pH, field (SU)	BAP-MW-1601 (bg)	0.2525	30	34	No	11	0	n/a	n/a	0.01	NP
pH, field (SU)	BAP-MW-1602A (bg)	0.09656	4	34	No	11	0	n/a	n/a	0.01	NP
pH, field (SU)	BAP-MW-1603A (bg)	-0.0467	-5	-34	No	11	0	n/a	n/a	0.01	NP
pH, field (SU)	BAP-MW-6 (bg)	0.0904	12	34	No	11	0	n/a	n/a	0.01	NP
pH, field (SU)	BAP-MW-1604	0.1104	11	34	No	11	0	n/a	n/a	0.01	NP
pH, field (SU)	BAP-MW-4	0.2067	13	34	No	11	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	BAP-MW-1601 (bg)	2.048	11	34	No	11	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	BAP-MW-1602A (bg)	-2.244	-12	-30	No	10	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	BAP-MW-1603A (bg)	0	-10	-34	No	11	81.82	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	BAP-MW-6 (bg)	-0.8295	-13	-30	No	10	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	BAP-MW-1	-0.474	-1	-30	No	10	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	BAP-MW-1605	25.59	26	34	No	11	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	BAP-MW-1606	14.6	16	30	No	10	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (m...	BAP-MW-1601 (bg)	43.91	29	34	No	11	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (m...	BAP-MW-1602A (bg)	-1.652	-1	-30	No	10	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (m...	BAP-MW-1603A (bg)	-2.314	-6	-34	No	11	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (m...	BAP-MW-6 (bg)	-10.66	-13	-30	No	10	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (m...	BAP-MW-1	5.407	7	30	No	10	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (m...	BAP-MW-1605	9.821	5	30	No	10	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (m...	BAP-MW-1606	54.07	25	30	No	10	0	n/a	n/a	0.01	NP

Sen's Slope Estimator

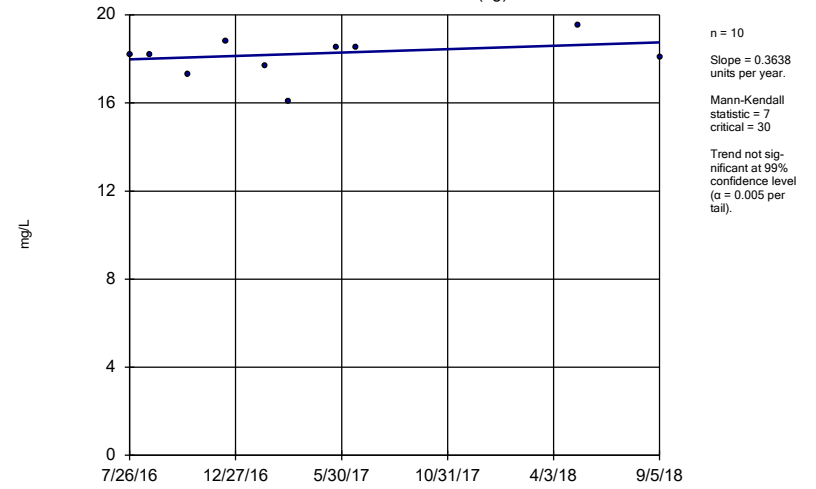
BAP-MW-1601 (bg)



Constituent: Calcium, total Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix III
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

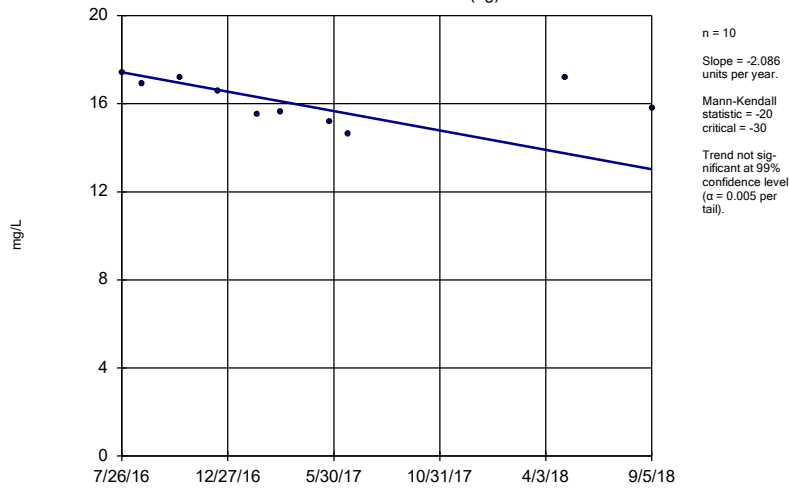
BAP-MW-1602A (bg)



Constituent: Calcium, total Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix III
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

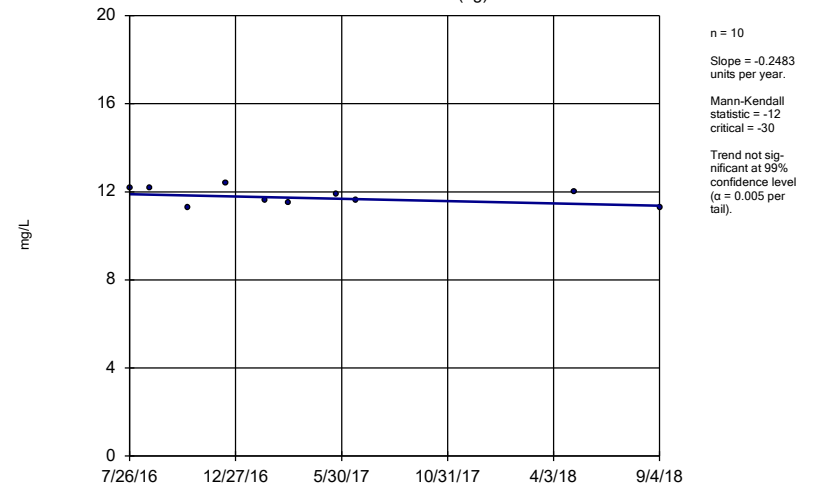
BAP-MW-1603A (bg)



Constituent: Calcium, total Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix III
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

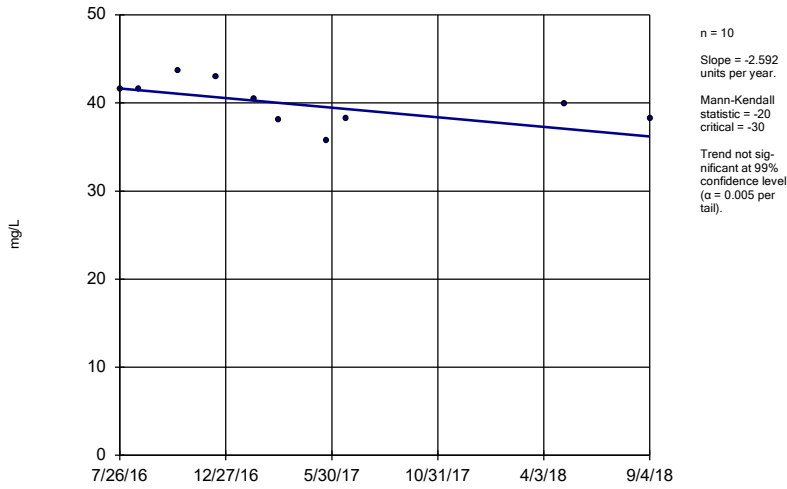
BAP-MW-6 (bg)



Constituent: Calcium, total Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix III
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

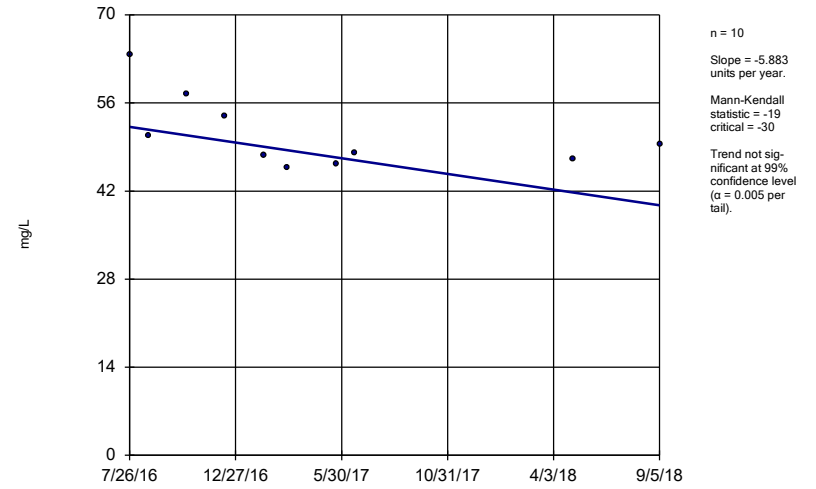
BAP-MW-1



Constituent: Calcium, total Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix III
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

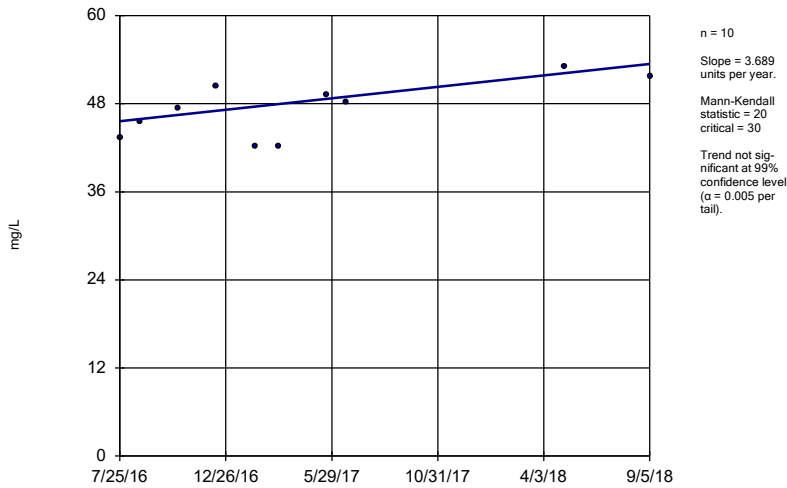
BAP-MW-1605



Constituent: Calcium, total Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix III
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

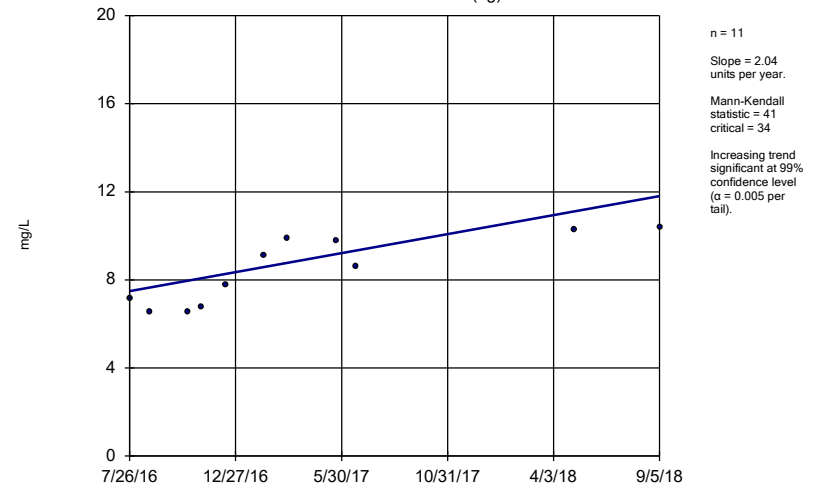
BAP-MW-1606



Constituent: Calcium, total Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix III
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

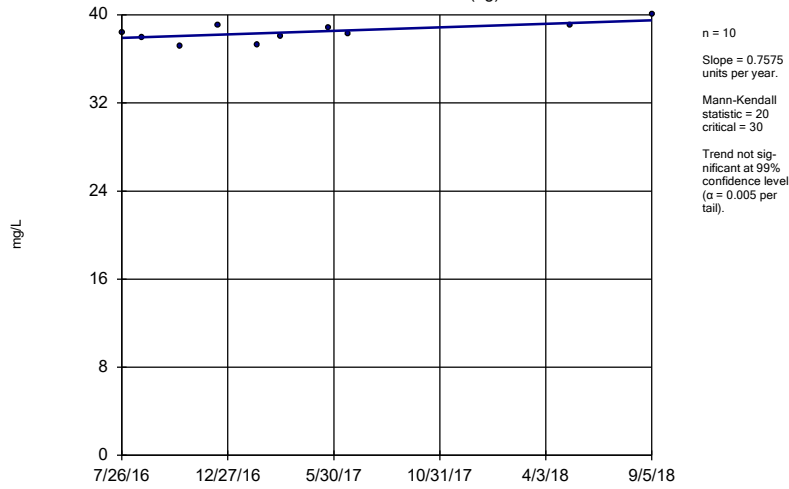
BAP-MW-1601 (bg)



Constituent: Chloride, total Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix III
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

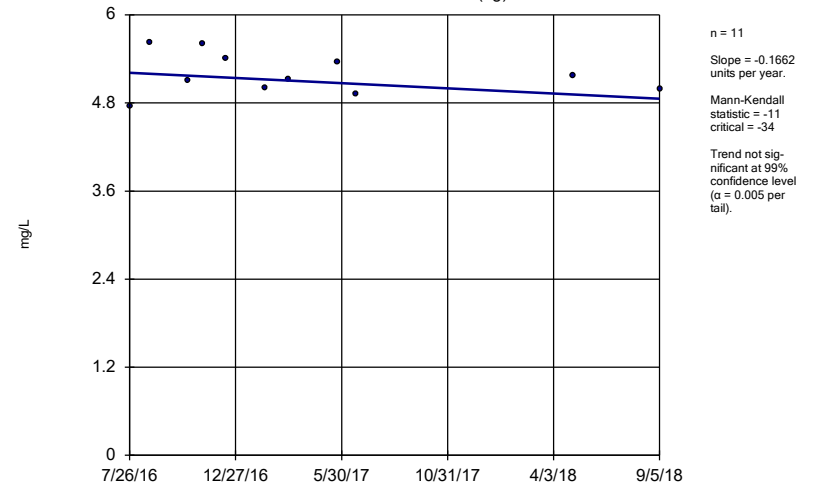
BAP-MW-1602A (bg)



Constituent: Chloride, total Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix III
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

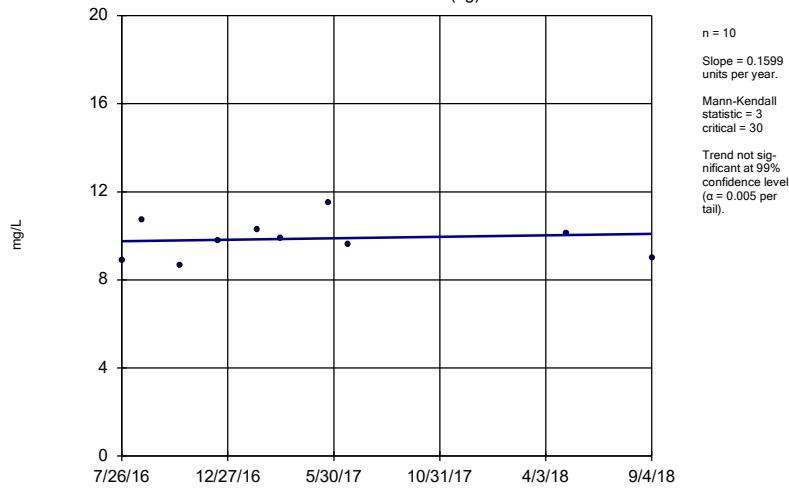
BAP-MW-1603A (bg)



Constituent: Chloride, total Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix III
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

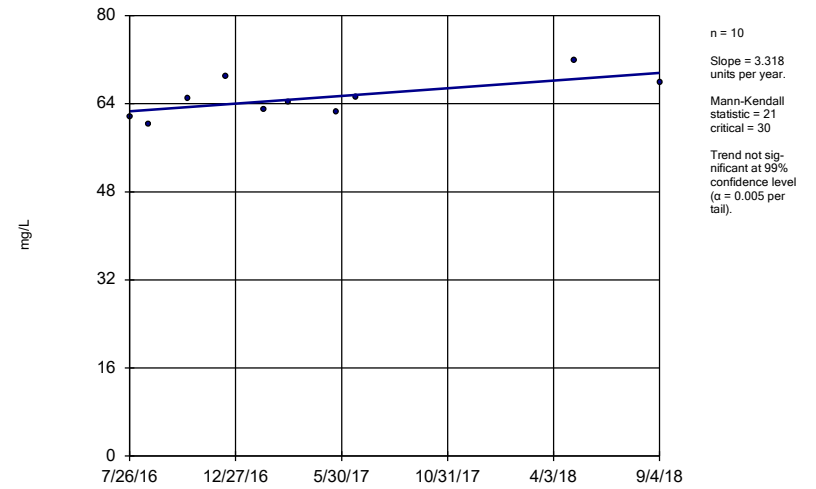
BAP-MW-6 (bg)



Constituent: Chloride, total Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix III
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

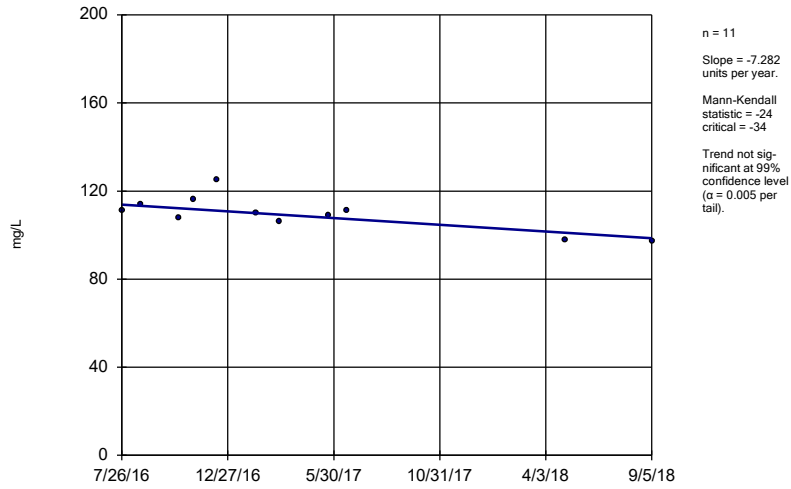
BAP-MW-1



Constituent: Chloride, total Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix III
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

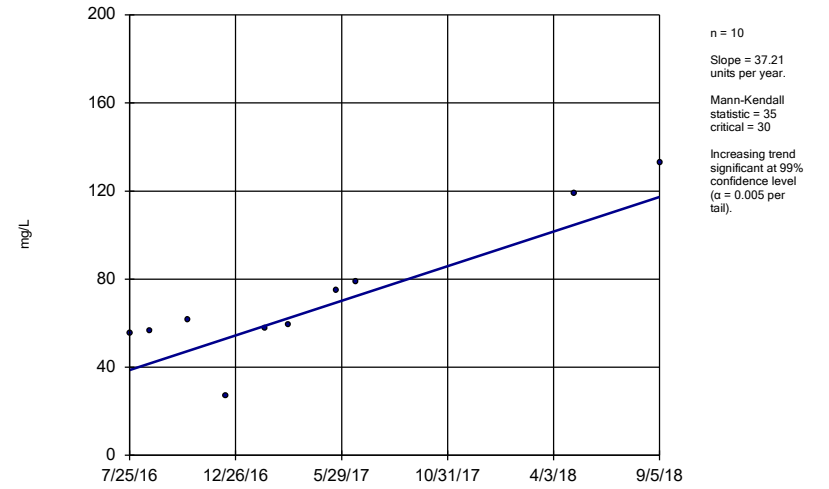
BAP-MW-1605



Constituent: Chloride, total Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix III
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

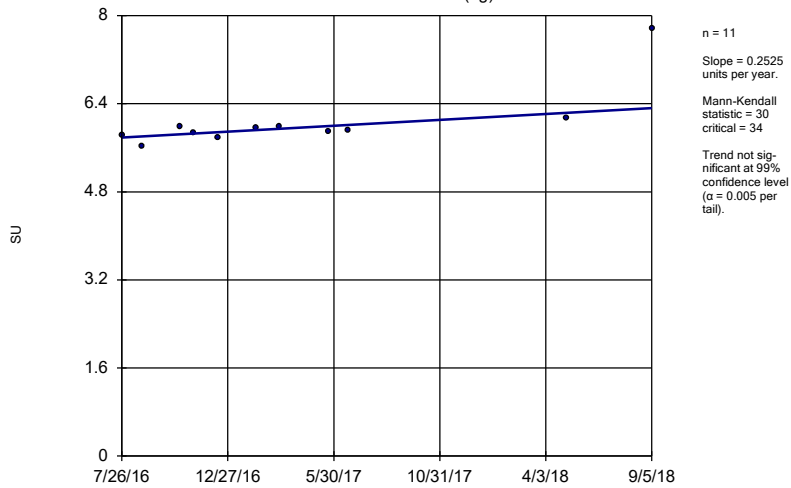
BAP-MW-1606



Constituent: Chloride, total Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix III
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

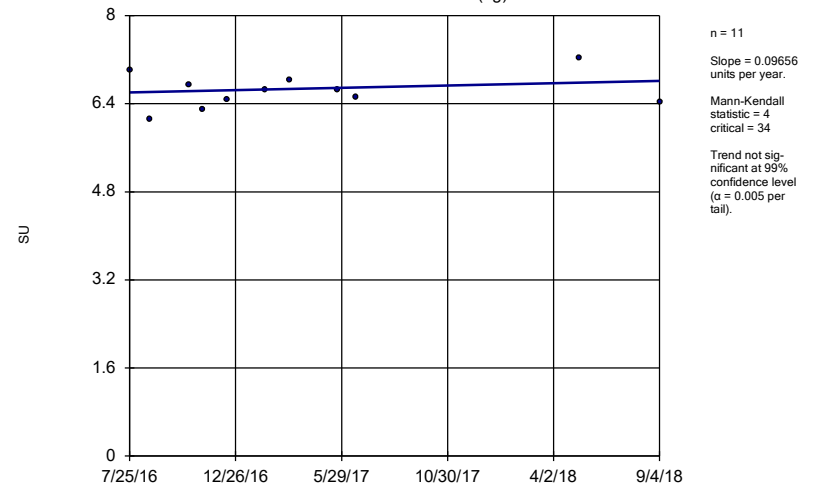
BAP-MW-1601 (bg)



Constituent: pH, field Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix III
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

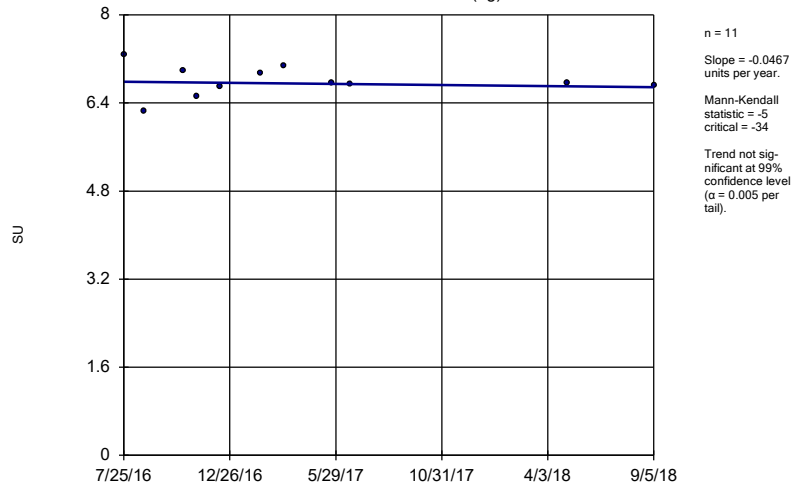
BAP-MW-1602A (bg)



Constituent: pH, field Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix III
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

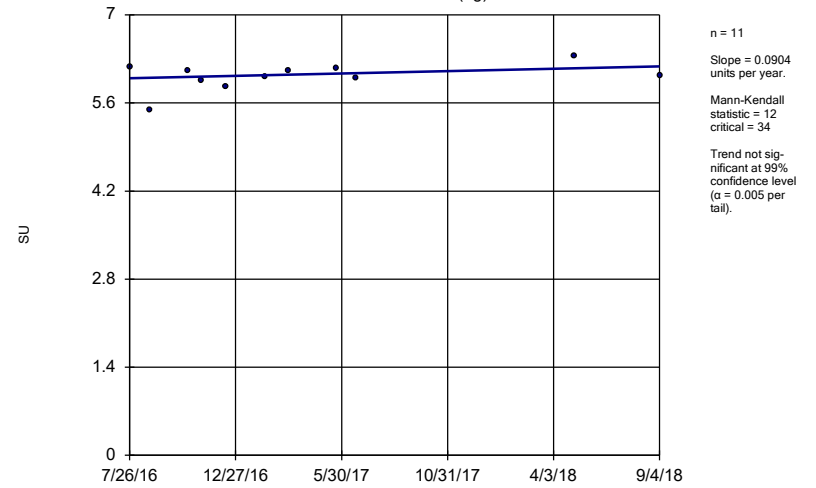
BAP-MW-1603A (bg)



Constituent: pH, field Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix III
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

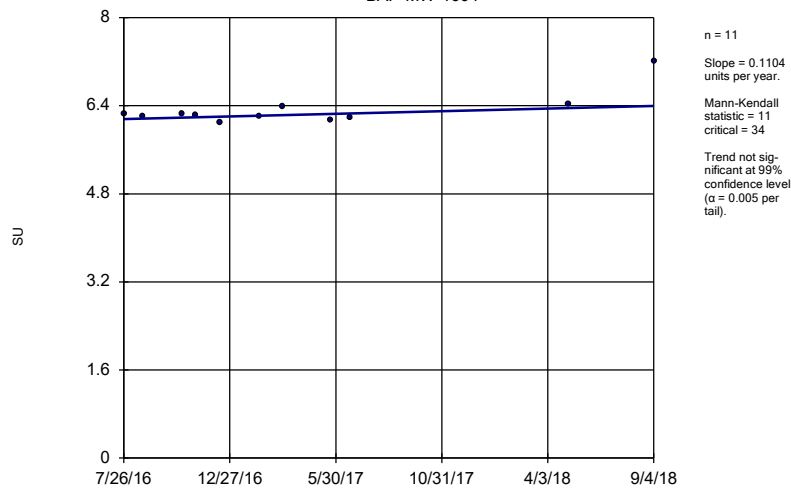
BAP-MW-6 (bg)



Constituent: pH, field Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix III
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

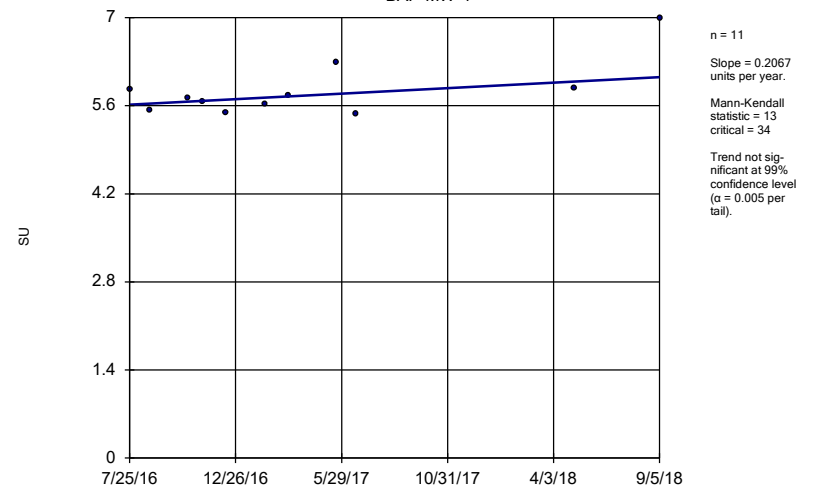
BAP-MW-1604



Constituent: pH, field Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix III
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

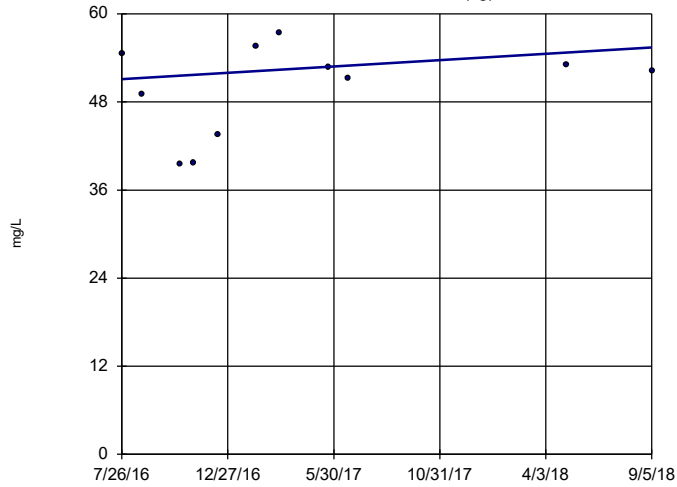
BAP-MW-4



Constituent: pH, field Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix III
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

BAP-MW-1601 (bg)

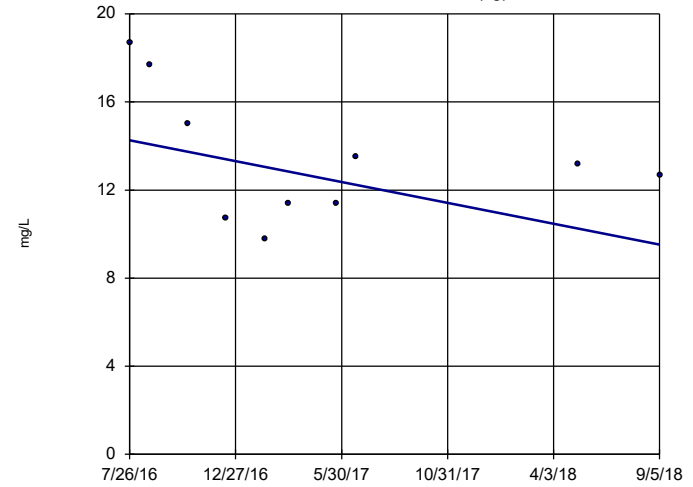


n = 11
 Slope = 2.048
 units per year.
 Mann-Kendall
 statistic = 11
 critical = 34
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Sulfate, total Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix III
 Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

BAP-MW-1602A (bg)

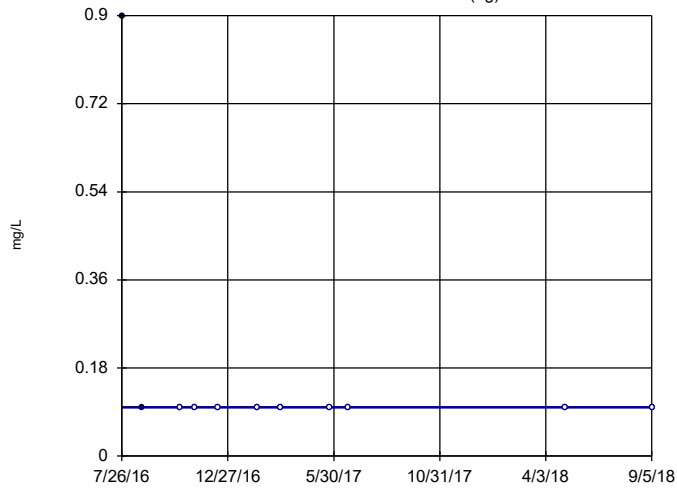


n = 10
 Slope = -2.244
 units per year.
 Mann-Kendall
 statistic = -12
 critical = -30
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Sulfate, total Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix III
 Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

BAP-MW-1603A (bg)

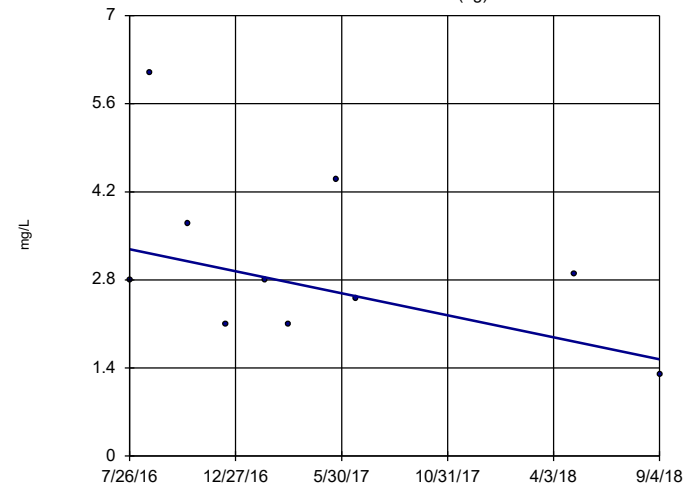


n = 11
 Slope = 0
 units per year.
 Mann-Kendall
 statistic = -10
 critical = -34
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Sulfate, total Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix III
 Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

BAP-MW-6 (bg)

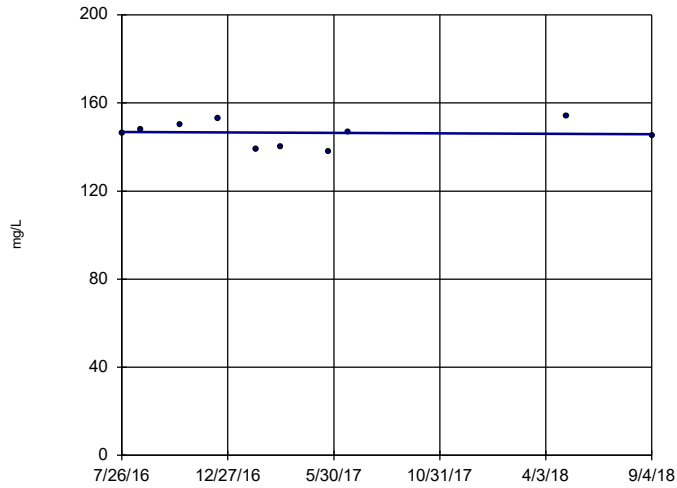


n = 10
 Slope = -0.8295
 units per year.
 Mann-Kendall
 statistic = -13
 critical = -30
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Sulfate, total Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix III
 Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

BAP-MW-1

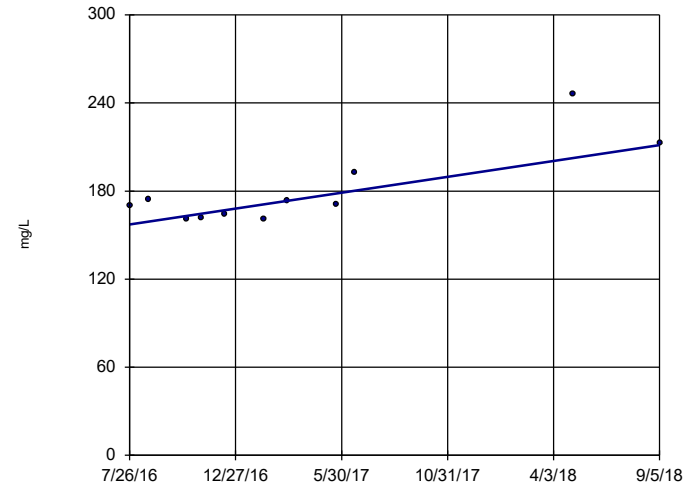


n = 10
 Slope = -0.474
 units per year.
 Mann-Kendall
 statistic = -1
 critical = -30
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Sulfate, total Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix III
 Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

BAP-MW-1605

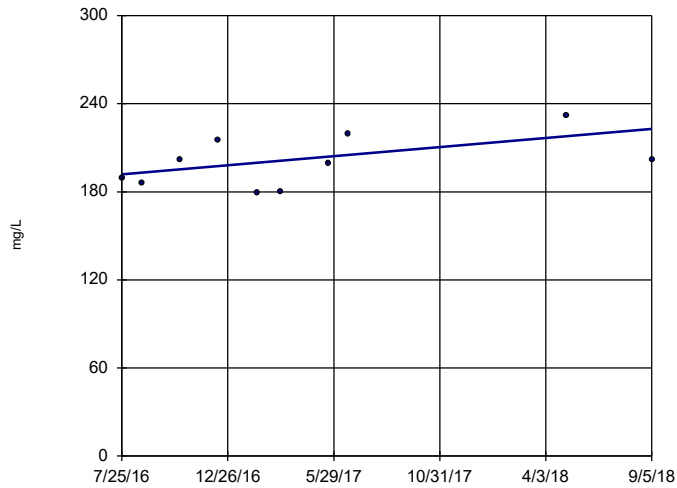


n = 11
 Slope = 25.59
 units per year.
 Mann-Kendall
 statistic = 26
 critical = 34
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Sulfate, total Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix III
 Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

BAP-MW-1606

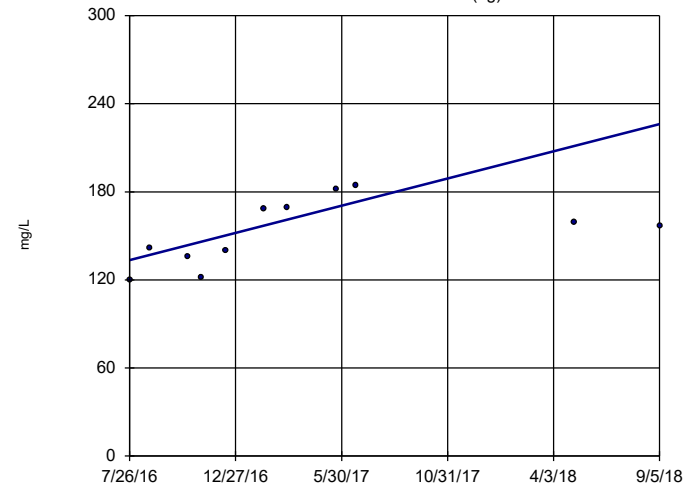


n = 10
 Slope = 14.6
 units per year.
 Mann-Kendall
 statistic = 16
 critical = 30
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Sulfate, total Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix III
 Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

BAP-MW-1601 (bg)

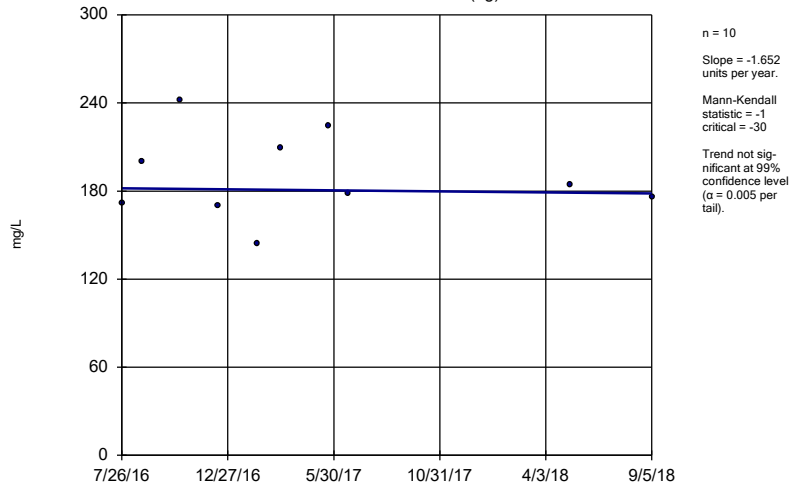


n = 11
 Slope = 43.91
 units per year.
 Mann-Kendall
 statistic = 29
 critical = 34
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Total Dissolved Solids [TDS] Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendi
 Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

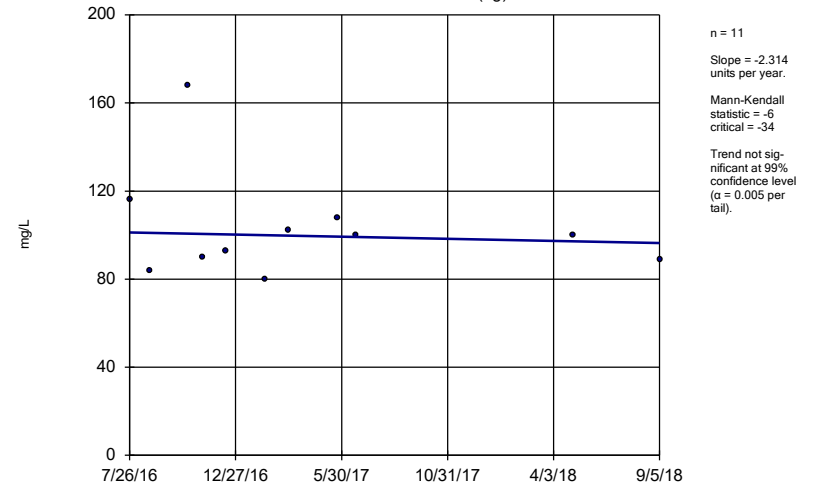
BAP-MW-1602A (bg)



Constituent: Total Dissolved Solids [TDS] Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

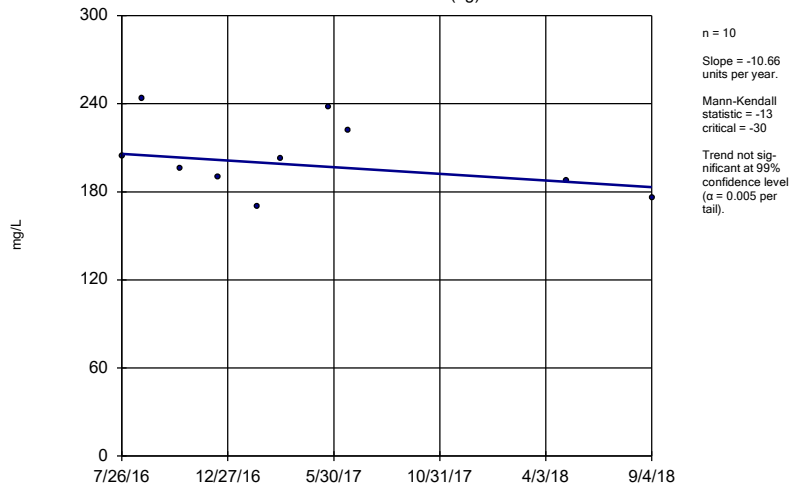
BAP-MW-1603A (bg)



Constituent: Total Dissolved Solids [TDS] Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

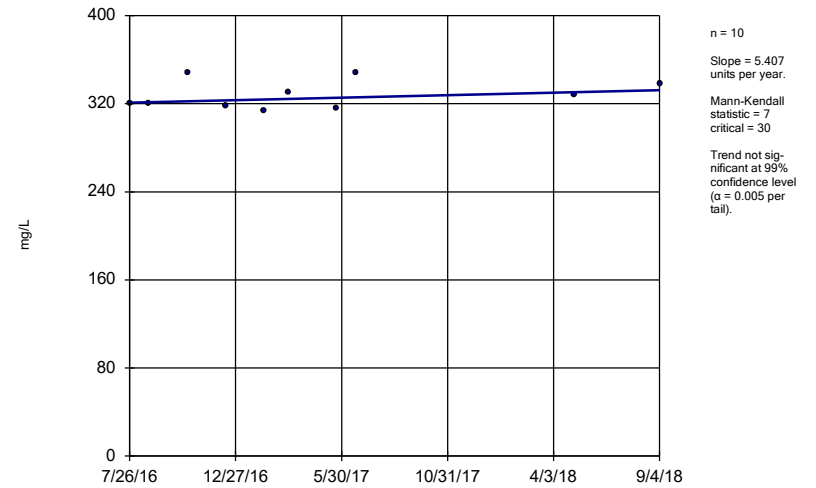
BAP-MW-6 (bg)



Constituent: Total Dissolved Solids [TDS] Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

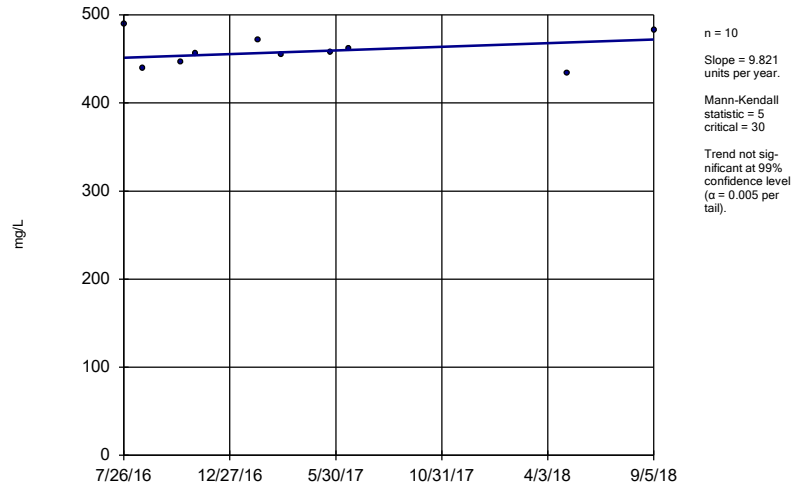
BAP-MW-1



Constituent: Total Dissolved Solids [TDS] Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendix
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

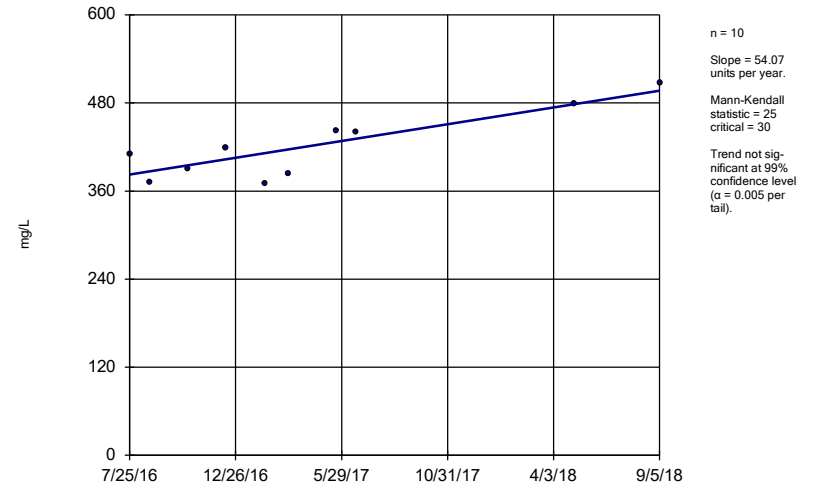
BAP-MW-1605



Constituent: Total Dissolved Solids [TDS] Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendi
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

BAP-MW-1606



Constituent: Total Dissolved Solids [TDS] Analysis Run 10/29/2018 8:57 AM View: Trend Tests - Appendi
Amos BAP Client: Geosyntec Data: Amos BAP

Tolerance Limits - All Results

Amos BAP Client: Geosyntec Data: Amos BAP Printed 10/29/2018, 1:57 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg.N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Antimony, total (mg/L)	n/a	0.0001355	n/a	n/a	n/a	n/a	40	-10.44	0.7208	7.5	None	ln(x)	0.05	Inter
Arsenic, total (mg/L)	n/a	0.0871	n/a	n/a	n/a	n/a	40	n/a	n/a	0	n/a	n/a	0.1285	NP Inter(normal...
Barium, total (mg/L)	n/a	0.3051	n/a	n/a	n/a	n/a	40	0.1884	0.05488	0	None	No	0.05	Inter
Beryllium, total (mg/L)	n/a	0.00009176	n/a	n/a	n/a	n/a	40	0.000042430.0000...	0	0	None	No	0.05	Inter
Cadmium, total (mg/L)	n/a	0.00003	n/a	n/a	n/a	n/a	40	n/a	n/a	7.5	n/a	n/a	0.1285	NP Inter(normal...
Chromium, total (mg/L)	n/a	0.002601	n/a	n/a	n/a	n/a	40	0.02988	0.009935	0	None	sqrt(x)	0.05	Inter
Cobalt, total (mg/L)	n/a	0.03144	n/a	n/a	n/a	n/a	40	-5.775	1.089	0	None	ln(x)	0.05	Inter
Combined Radium 226 + 228 (pCi/L)	n/a	5.202	n/a	n/a	n/a	n/a	42	0.009383	0.7762	0	None	ln(x)	0.05	Inter
Fluoride, total (mg/L)	n/a	0.29	n/a	n/a	n/a	n/a	42	n/a	n/a	0	n/a	n/a	0.116	NP Inter(normal...
Lead, total (mg/L)	n/a	0.006603	n/a	n/a	n/a	n/a	40	0.09786	0.04221	0	None	x^(1/3)	0.05	Inter
Lithium, total (mg/L)	n/a	0.01172	n/a	n/a	n/a	n/a	40	0.05518	0.02496	12.5	None	sqrt(x)	0.05	Inter
Mercury, total (mg/L)	n/a	0.000005	n/a	n/a	n/a	n/a	36	n/a	n/a	88.89	n/a	n/a	0.1578	NP Inter(NDs)
Molybdenum, total (mg/L)	n/a	0.003033	n/a	n/a	n/a	n/a	40	0.02951	0.01202	0	None	sqrt(x)	0.05	Inter
Selenium, total (mg/L)	n/a	0.0003	n/a	n/a	n/a	n/a	40	n/a	n/a	2.5	n/a	n/a	0.1285	NP Inter(normal...
Thallium, total (mg/L)	n/a	0.000224	n/a	n/a	n/a	n/a	40	n/a	n/a	10	n/a	n/a	0.1285	NP Inter(normal...

Confidence Interval - All Results (No Significant Results)

Amos BAP Client: Geosyntec Data: Amos BAP Printed 10/29/2018, 2:10 PM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	%NDs	Transform	Alpha	Method
Antimony, total (mg/L)	BAP-MW-1	0.00003	0.00001	0.006	No	10	0	No	0.011	NP (normality)
Antimony, total (mg/L)	BAP-MW-1604	0.00004	0.00002	0.006	No	10	0	No	0.011	NP (normality)
Antimony, total (mg/L)	BAP-MW-1605	0.00003245	0.00001355	0.006	No	10	0	No	0.01	Param.
Antimony, total (mg/L)	BAP-MW-1606	0.00003262	0.00001538	0.006	No	10	0	No	0.01	Param.
Antimony, total (mg/L)	BAP-MW-4	0.00005506	0.00002082	0.006	No	10	10	ln(x)	0.01	Param.
Antimony, total (mg/L)	BAP-MW-5	0.00005194	0.00001606	0.006	No	10	0	No	0.01	Param.
Arsenic, total (mg/L)	BAP-MW-1	0.0001703	0.0001097	0.087	No	10	0	No	0.01	Param.
Arsenic, total (mg/L)	BAP-MW-1604	0.005498	0.00419	0.087	No	10	0	ln(x)	0.01	Param.
Arsenic, total (mg/L)	BAP-MW-1605	0.004879	0.003371	0.087	No	10	0	No	0.01	Param.
Arsenic, total (mg/L)	BAP-MW-1606	0.003291	0.002487	0.087	No	10	0	No	0.01	Param.
Arsenic, total (mg/L)	BAP-MW-4	0.01164	0.003321	0.087	No	10	0	No	0.01	Param.
Arsenic, total (mg/L)	BAP-MW-5	0.003461	0.002559	0.087	No	10	0	No	0.01	Param.
Barium, total (mg/L)	BAP-MW-1	0.02979	0.02643	2	No	10	0	No	0.01	Param.
Barium, total (mg/L)	BAP-MW-1604	0.1447	0.1319	2	No	10	0	No	0.01	Param.
Barium, total (mg/L)	BAP-MW-1605	0.08767	0.06901	2	No	10	0	No	0.01	Param.
Barium, total (mg/L)	BAP-MW-1606	0.06768	0.0582	2	No	10	0	No	0.01	Param.
Barium, total (mg/L)	BAP-MW-4	0.09626	0.0862	2	No	10	0	No	0.01	Param.
Barium, total (mg/L)	BAP-MW-5	0.1643	0.1485	2	No	10	0	No	0.01	Param.
Beryllium, total (mg/L)	BAP-MW-1	0.0001284	0.0001082	0.004	No	10	0	No	0.01	Param.
Beryllium, total (mg/L)	BAP-MW-1604	0.000063	0.000038	0.004	No	10	0	No	0.011	NP (normality)
Beryllium, total (mg/L)	BAP-MW-1605	0.00006851	0.00003969	0.004	No	10	0	No	0.01	Param.
Beryllium, total (mg/L)	BAP-MW-1606	0.0001177	0.00008191	0.004	No	10	0	No	0.01	Param.
Beryllium, total (mg/L)	BAP-MW-4	0.000057	0.0000422	0.004	No	10	0	No	0.01	Param.
Beryllium, total (mg/L)	BAP-MW-5	0.00006014	0.00003426	0.004	No	10	0	No	0.01	Param.
Cadmium, total (mg/L)	BAP-MW-1	0.002816	0.002196	0.005	No	10	0	No	0.01	Param.
Cadmium, total (mg/L)	BAP-MW-1604	0.00001	0.000005	0.005	No	10	70	No	0.011	NP (normality)
Cadmium, total (mg/L)	BAP-MW-1605	0.00001	0.000005	0.005	No	10	70	No	0.011	NP (normality)
Cadmium, total (mg/L)	BAP-MW-1606	0.00017	0.00012	0.005	No	10	0	No	0.011	NP (normality)
Cadmium, total (mg/L)	BAP-MW-4	0.0002523	0.00004855	0.005	No	10	0	sqrt(x)	0.01	Param.
Cadmium, total (mg/L)	BAP-MW-5	0.00001	0.000006	0.005	No	10	0	No	0.011	NP (normality)
Chromium, total (mg/L)	BAP-MW-1	0.0005457	0.0001008	0.1	No	10	0	ln(x)	0.01	Param.
Chromium, total (mg/L)	BAP-MW-1604	0.001389	0.0006417	0.1	No	10	0	No	0.01	Param.
Chromium, total (mg/L)	BAP-MW-1605	0.000454	0.000167	0.1	No	10	0	No	0.01	Param.
Chromium, total (mg/L)	BAP-MW-1606	0.001352	0.0003704	0.1	No	10	0	No	0.01	Param.
Chromium, total (mg/L)	BAP-MW-4	0.0005991	0.0001856	0.1	No	10	0	x^(1/3)	0.01	Param.
Chromium, total (mg/L)	BAP-MW-5	0.000841	0.000122	0.1	No	10	0	No	0.011	NP (normality)
Cobalt, total (mg/L)	BAP-MW-1	0.01545	0.01071	0.031	No	10	0	No	0.01	Param.
Cobalt, total (mg/L)	BAP-MW-1604	0.00106	0.000494	0.031	No	10	0	No	0.011	NP (normality)
Cobalt, total (mg/L)	BAP-MW-1605	0.0245	0.00877	0.031	No	10	0	No	0.011	NP (normality)
Cobalt, total (mg/L)	BAP-MW-1606	0.01563	0.01341	0.031	No	10	0	No	0.01	Param.
Cobalt, total (mg/L)	BAP-MW-4	0.0388	0.009215	0.031	No	10	0	x^(1/3)	0.01	Param.
Cobalt, total (mg/L)	BAP-MW-5	0.00114	0.000949	0.031	No	10	0	No	0.011	NP (normality)
Combined Radium 226 + 228 (pCi/L)	BAP-MW-1	0.725	0.136	5.2	No	10	0	No	0.011	NP (normality)
Combined Radium 226 + 228 (pCi/L)	BAP-MW-1604	1.889	0.5899	5.2	No	11	0	sqrt(x)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	BAP-MW-1605	1.722	0.586	5.2	No	11	0	No	0.006	NP (normality)
Combined Radium 226 + 228 (pCi/L)	BAP-MW-1606	1.467	0.3698	5.2	No	11	0	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	BAP-MW-4	1.452	0.4849	5.2	No	11	0	sqrt(x)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	BAP-MW-5	1.356	0.6261	5.2	No	11	0	No	0.01	Param.
Fluoride, total (mg/L)	BAP-MW-1	0.03	0.02	4	No	10	50	No	0.011	NP (normality)
Fluoride, total (mg/L)	BAP-MW-1604	0.1049	0.05691	4	No	11	0	No	0.01	Param.
Fluoride, total (mg/L)	BAP-MW-1605	0.08	0.03	4	No	11	36.36	No	0.006	NP (normality)
Fluoride, total (mg/L)	BAP-MW-1606	0.03	0.03	4	No	10	80	No	0.011	NP (NDs)
Fluoride, total (mg/L)	BAP-MW-4	0.05831	0.03442	4	No	11	9.091	No	0.01	Param.
Fluoride, total (mg/L)	BAP-MW-5	0.05	0.03	4	No	11	9.091	No	0.006	NP (normality)
Lead, total (mg/L)	BAP-MW-1	0.000134	0.000062	0.015	No	10	0	No	0.011	NP (normality)

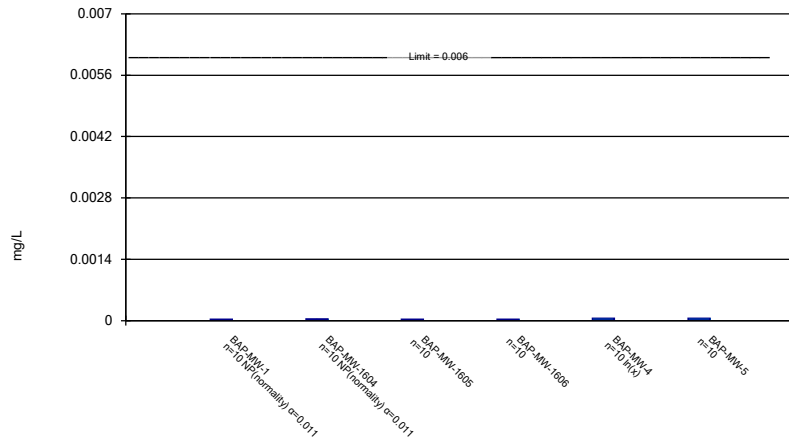
Confidence Interval - All Results (No Significant Results)

Amos BAP Client: Geosyntec Data: Amos BAP Printed 10/29/2018, 2:10 PM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	%NDs	Transform	Alpha	Method
Lead, total (mg/L)	BAP-MW-1604	0.001052	0.0003123	0.015	No	10	0	No	0.01	Param.
Lead, total (mg/L)	BAP-MW-1605	0.0001913	0.00004187	0.015	No	10	0	No	0.01	Param.
Lead, total (mg/L)	BAP-MW-1606	0.001083	0.0002952	0.015	No	10	0	No	0.01	Param.
Lead, total (mg/L)	BAP-MW-4	0.0003676	0.0001516	0.015	No	10	0	No	0.01	Param.
Lead, total (mg/L)	BAP-MW-5	0.0003333	0.00005414	0.015	No	10	0	sqrt(x)	0.01	Param.
Lithium, total (mg/L)	BAP-MW-1	0.007208	0.001837	0.04	No	10	0	sqrt(x)	0.01	Param.
Lithium, total (mg/L)	BAP-MW-1604	0.004321	0.0004802	0.04	No	10	20	No	0.01	Param.
Lithium, total (mg/L)	BAP-MW-1605	0.007278	0.00327	0.04	No	10	0	sqrt(x)	0.01	Param.
Lithium, total (mg/L)	BAP-MW-1606	0.007232	0.002268	0.04	No	10	10	No	0.01	Param.
Lithium, total (mg/L)	BAP-MW-4	0.006619	0.0008654	0.04	No	10	0	sqrt(x)	0.01	Param.
Lithium, total (mg/L)	BAP-MW-5	0.006293	0.0009319	0.04	No	10	0	sqrt(x)	0.01	Param.
Mercury, total (mg/L)	BAP-MW-1	0.0000025	0.000002	0.002	No	9	88.89	No	0.002	NP (NDs)
Mercury, total (mg/L)	BAP-MW-1604	0.0000025	0.000002	0.002	No	9	88.89	No	0.002	NP (NDs)
Mercury, total (mg/L)	BAP-MW-1605	0.0000025	0.0000025	0.002	No	9	100	No	0.002	NP (NDs)
Mercury, total (mg/L)	BAP-MW-1606	0.0000025	0.000002	0.002	No	9	88.89	No	0.002	NP (NDs)
Mercury, total (mg/L)	BAP-MW-4	0.0000025	0.0000025	0.002	No	9	100	No	0.002	NP (NDs)
Mercury, total (mg/L)	BAP-MW-5	0.0000025	0.0000025	0.002	No	9	100	No	0.002	NP (NDs)
Molybdenum, total (mg/L)	BAP-MW-1	0.001646	0.0004363	0.1	No	10	0	No	0.01	Param.
Molybdenum, total (mg/L)	BAP-MW-1604	0.00064	0.0002	0.1	No	10	0	No	0.011	NP (normality)
Molybdenum, total (mg/L)	BAP-MW-1605	0.0004174	0.00009656	0.1	No	10	0	No	0.01	Param.
Molybdenum, total (mg/L)	BAP-MW-1606	0.000213	0.00007499	0.1	No	10	0	No	0.01	Param.
Molybdenum, total (mg/L)	BAP-MW-4	0.0111	0.00028	0.1	No	10	0	No	0.011	NP (normality)
Molybdenum, total (mg/L)	BAP-MW-5	0.001773	0.0002631	0.1	No	10	0	sqrt(x)	0.01	Param.
Selenium, total (mg/L)	BAP-MW-1	0.0002	0.00009	0.05	No	9	0	No	0.002	NP (normality)
Selenium, total (mg/L)	BAP-MW-1604	0.0002	0.0002	0.05	No	10	0	No	0.011	NP (normality)
Selenium, total (mg/L)	BAP-MW-1605	0.00009182	0.00004618	0.05	No	10	0	No	0.01	Param.
Selenium, total (mg/L)	BAP-MW-1606	0.0001843	0.0000772	0.05	No	10	0	ln(x)	0.01	Param.
Selenium, total (mg/L)	BAP-MW-4	0.00009323	0.00006477	0.05	No	10	0	No	0.01	Param.
Selenium, total (mg/L)	BAP-MW-5	0.00005	0.00003	0.05	No	10	50	No	0.011	NP (normality)
Thallium, total (mg/L)	BAP-MW-1	0.00005297	0.00003532	0.002	No	10	0	sqrt(x)	0.01	Param.
Thallium, total (mg/L)	BAP-MW-1604	0.000025	0.00001	0.002	No	10	30	No	0.011	NP (Cohens/xfm)
Thallium, total (mg/L)	BAP-MW-1605	0.00004	0.00001	0.002	No	10	50	No	0.011	NP (Cohens/xfm)
Thallium, total (mg/L)	BAP-MW-1606	0.00003315	0.00001043	0.002	No	10	0	sqrt(x)	0.01	Param.
Thallium, total (mg/L)	BAP-MW-4	0.0001131	0.00003452	0.002	No	10	0	No	0.01	Param.
Thallium, total (mg/L)	BAP-MW-5	0.00005358	0.00001078	0.002	No	10	30	No	0.01	Param.

Parametric and Non-Parametric (NP) Confidence Interval

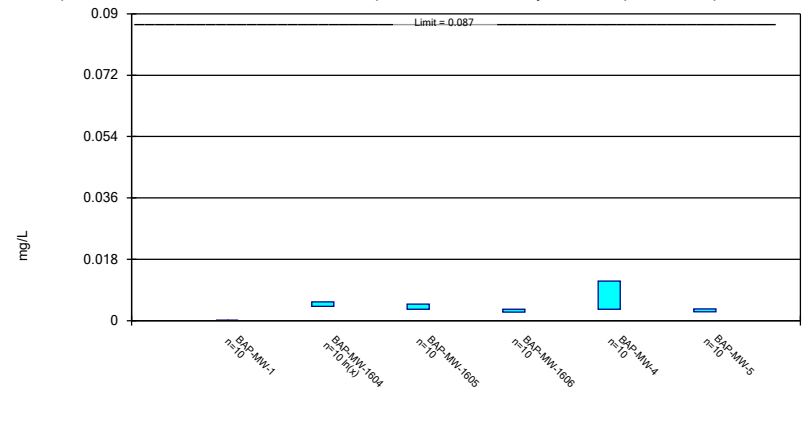
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Antimony, total Analysis Run 10/29/2018 2:08 PM View: UTL's - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

Parametric Confidence Interval

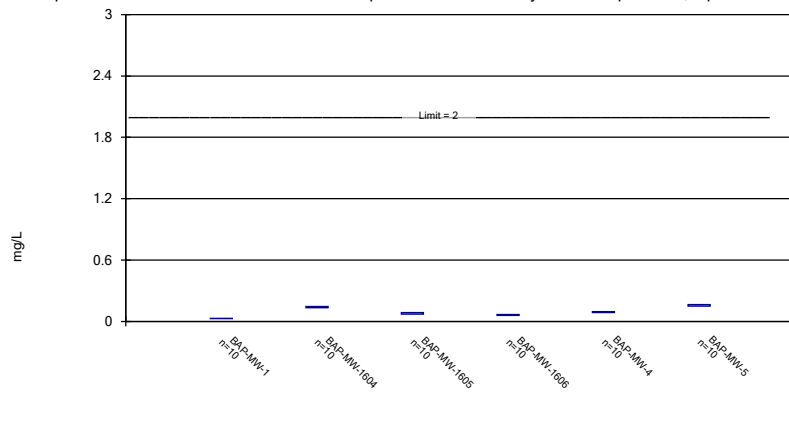
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Arsenic, total Analysis Run 10/29/2018 2:08 PM View: UTL's - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

Parametric Confidence Interval

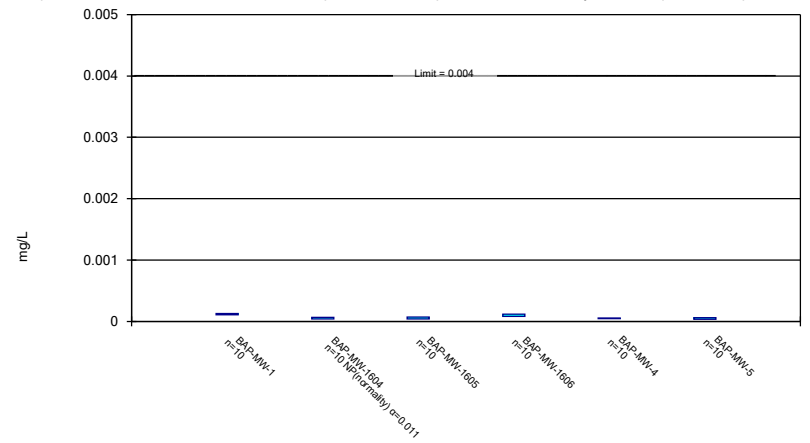
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Barium, total Analysis Run 10/29/2018 2:08 PM View: UTL's - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

Parametric and Non-Parametric (NP) Confidence Interval

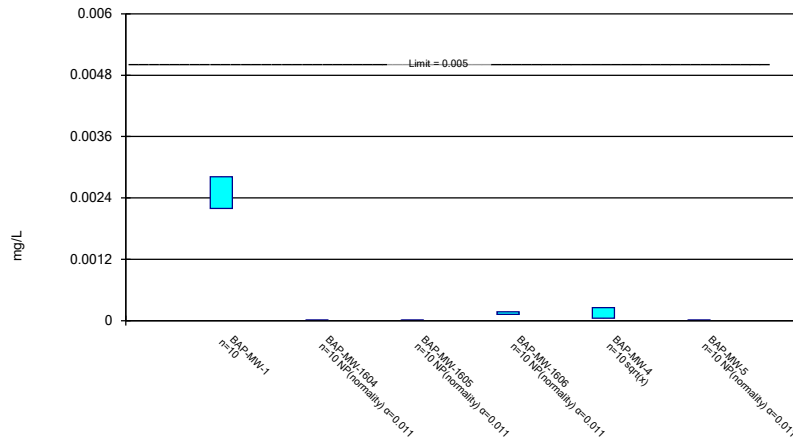
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Beryllium, total Analysis Run 10/29/2018 2:08 PM View: UTL's - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

Parametric and Non-Parametric (NP) Confidence Interval

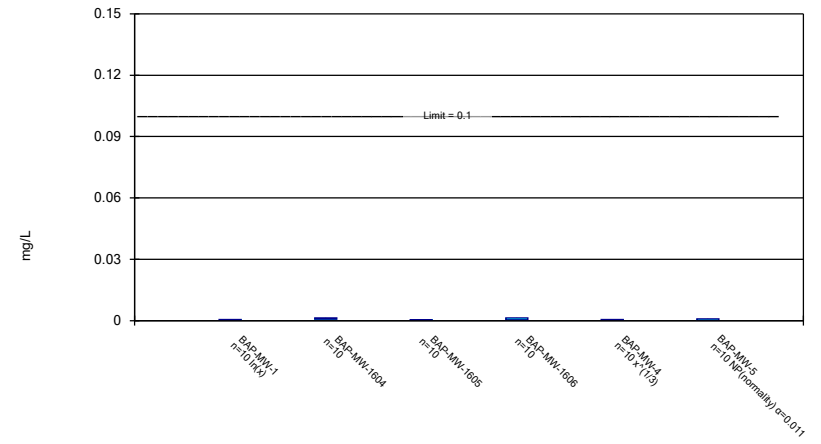
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Cadmium, total Analysis Run 10/29/2018 2:08 PM View: UTL's - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

Parametric and Non-Parametric (NP) Confidence Interval

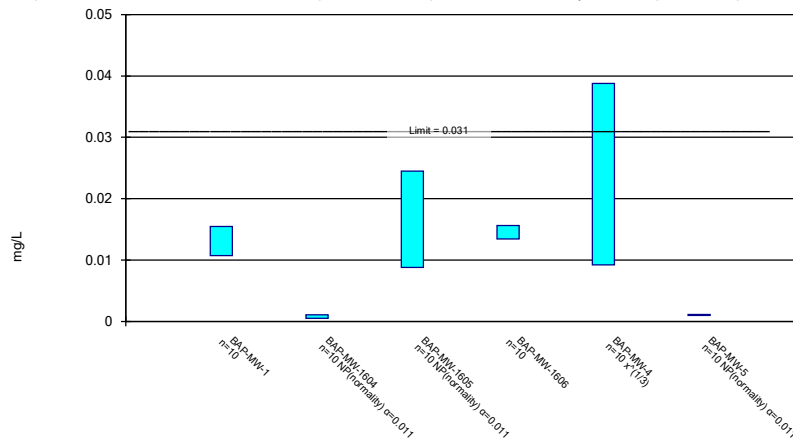
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Chromium, total Analysis Run 10/29/2018 2:08 PM View: UTL's - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

Parametric and Non-Parametric (NP) Confidence Interval

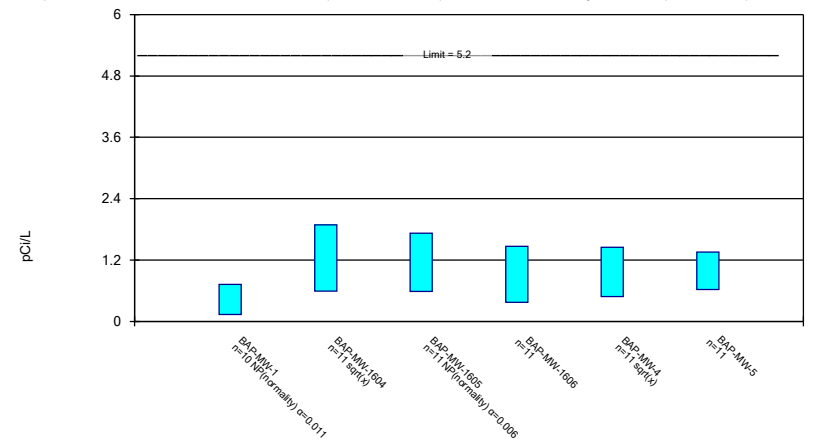
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Cobalt, total Analysis Run 10/29/2018 2:08 PM View: UTL's - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

Parametric and Non-Parametric (NP) Confidence Interval

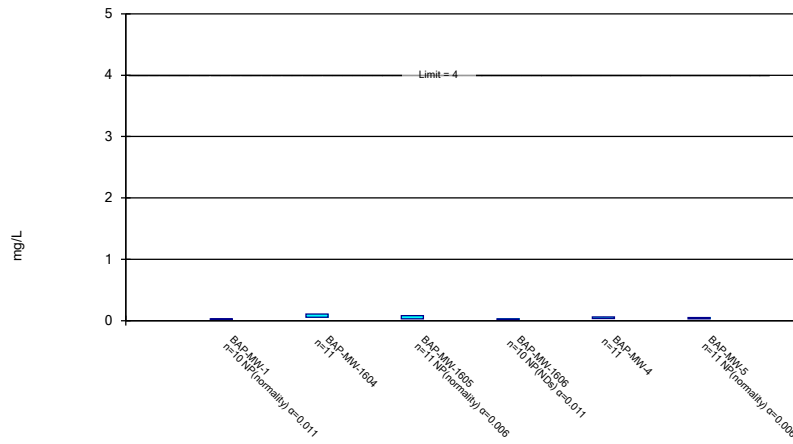
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Combined Radium 226 + 228 Analysis Run 10/29/2018 2:08 PM View: UTL's - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

Parametric and Non-Parametric (NP) Confidence Interval

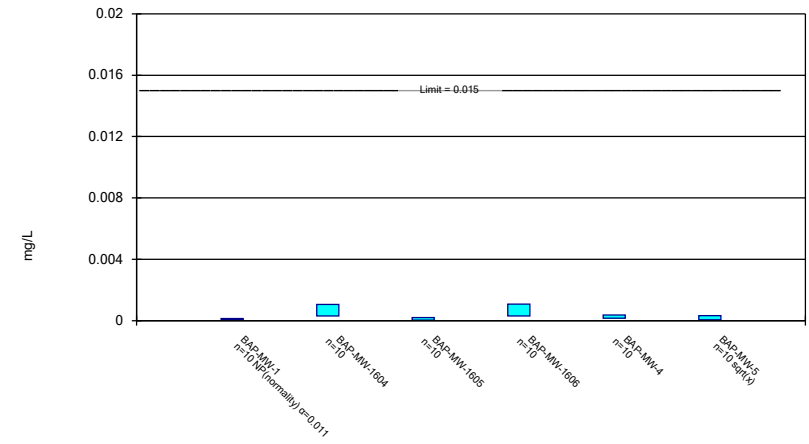
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Fluoride, total Analysis Run 10/29/2018 2:08 PM View: UTL's - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

Parametric and Non-Parametric (NP) Confidence Interval

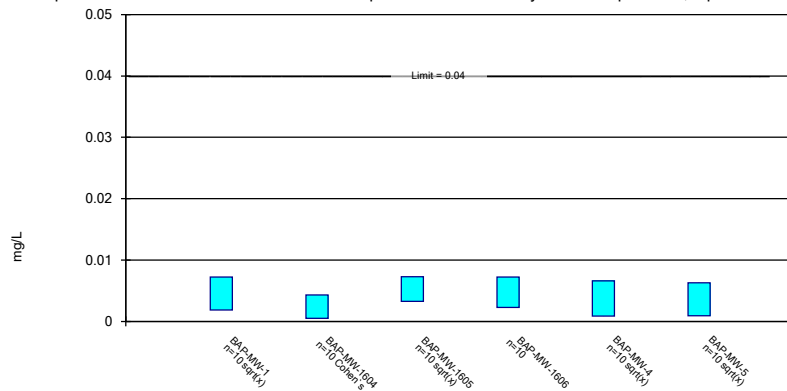
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Lead, total Analysis Run 10/29/2018 2:08 PM View: UTL's - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

Parametric Confidence Interval

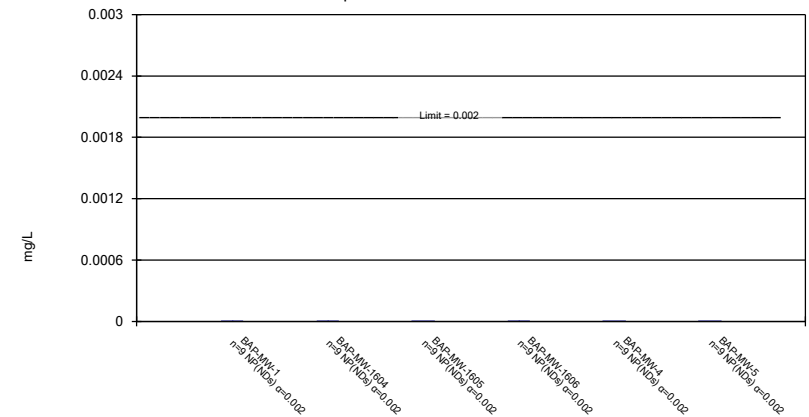
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Lithium, total Analysis Run 10/29/2018 2:08 PM View: UTL's - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

Non-Parametric Confidence Interval

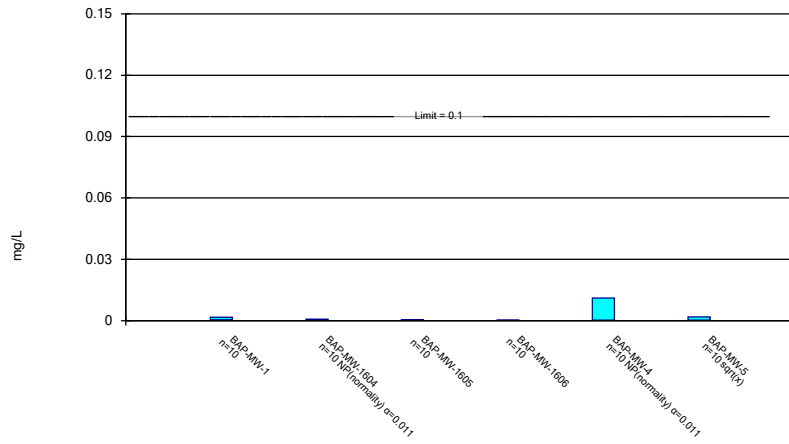
Compliance Limit is not exceeded.



Constituent: Mercury, total Analysis Run 10/29/2018 2:08 PM View: UTL's - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

Parametric and Non-Parametric (NP) Confidence Interval

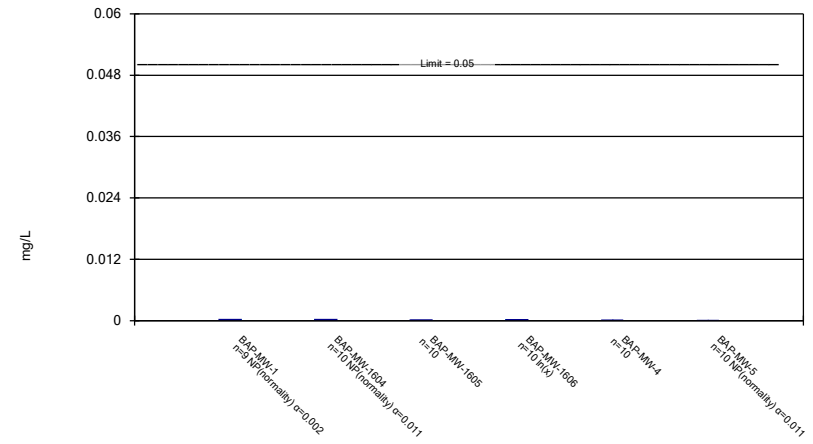
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Molybdenum, total Analysis Run 10/29/2018 2:08 PM View: UTL's - App IV
 Amos BAP Client: Geosyntec Data: Amos BAP

Parametric and Non-Parametric (NP) Confidence Interval

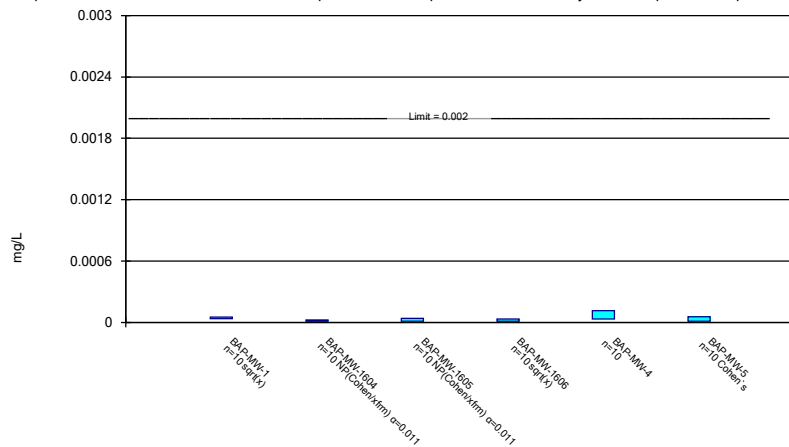
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Selenium, total Analysis Run 10/29/2018 2:08 PM View: UTL's - App IV
 Amos BAP Client: Geosyntec Data: Amos BAP

Parametric and Non-Parametric (NP) Confidence Interval

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



Constituent: Thallium, total Analysis Run 10/29/2018 2:09 PM View: UTL's - App IV
 Amos BAP Client: Geosyntec Data: Amos BAP

STATISTICAL ANALYSIS SUMMARY
BOTTOM ASH POND
Amos Plant
Winfield, West Virginia

Submitted to



1 Riverside Plaza
Columbus, Ohio 43215-2372

Submitted by



engineers | scientists | innovators

941 Chatham Lane
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July 10, 2019

CHA8473

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LIST OF ATTACHMENTS

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

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
CFR	Code of Federal Regulations
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
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
USEPA	United States Environmental Protection Agency
UTL	Upper Tolerance Limit

SECTION 1

EXECUTIVE SUMMARY

In accordance with the United States Environmental Protection Agency's (USEPA's) regulations regarding the disposal of coal combustion residuals (CCR) in landfills and surface impoundments (40 CFR 257.90-257.98, "CCR rule"), groundwater monitoring has been conducted at the Bottom Ash Pond (BAP), an existing CCR unit at the Amos Power Plant located in Winfield, West Virginia.

Based on detection monitoring conducted in 2017 and 2018, statistically significant increases (SSIs) over background were concluded for calcium, chloride, total dissolved solids (TDS), and sulfate at the BAP. An alternative source was not identified at the time, so two assessment monitoring events were conducted at the BAP in 2018, in accordance with 40 CFR 257.95. No SSLs were identified during these events, and the unit remained in assessment monitoring. A semi-annual assessment monitoring event was also completed in March 2019, with the results of the March 2019 event 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. Groundwater protection standards (GWPSs) were re-established for the Appendix IV parameters. Confidence intervals were calculated for Appendix IV parameters at the compliance wells to assess whether Appendix IV parameters were present at a statistically significant level (SSL) above the GWPS. No SSLs were identified, but Appendix III concentrations for boron, calcium, chloride, pH, sulfate, and TDS remained above background. Thus, either the unit will remain in assessment monitoring or an alternative source demonstration (ASD) will be conducted to evaluate if the unit can return to detection 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, one set of samples was collected for analysis from each upgradient and downgradient well to meet the requirements of 40 CFR 257.95(d)(1). Samples from the March 2019 semi-annual sampling event were analyzed for the Appendix III and Appendix IV parameters detected during the 40 CFR 257.95(b) event completed in May 2018. 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.9.6.14 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 January 2017 *Statistical Analysis Plan* (AEP, 2017). Time series plots and results for all completed statistical tests are provided in Attachment B.

The data obtained to meet the requirements of 40 CFR 257.95(d)(1) were screened for potential outliers. No outliers were identified.

2.2.1 Establishment of GWPSs

A GWPS was established for each Appendix IV parameter in accordance with 40 CFR 257.95(h) and the *Statistical Analysis Plan* (AEP, 2017). 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 40 CFR 257.95(h)(2) for each Appendix IV 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. Generally, tolerance limits were calculated parametrically with 95% coverage and 95% confidence. Non-parametric tolerance limits were calculated for arsenic, cadmium, fluoride,

selenium, and thallium due to apparent non-normal distributions and for mercury 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 IV SSLs

A confidence interval was constructed for each Appendix IV 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.

No SSLs were identified at the Amos BAP.

2.2.3 Evaluation of Potential Appendix III SSIs

The CCR rule allows CCR units to move from assessment monitoring to detection monitoring if all Appendix III and Appendix IV parameters are at or below background levels for two consecutive sampling events [40 CFR 257.95(e)]. Since no Appendix IV SSLs were identified, Appendix III results were analyzed to assess whether concentrations of Appendix III parameters at the compliance wells exceeded background concentrations.

Prediction limits were calculated for the Appendix III parameters to represent background values. As described in the January 2018 *Statistical Analysis Summary* report (Geosyntec, 2018), intrawell tests were used to evaluate potential SSIs for fluoride and pH, whereas interwell tests were used to evaluate potential SSIs for boron, calcium, chloride, sulfate, and TDS.

Prediction limits for the interwell tests were recalculated using data collected during the March 2019 assessment monitoring event. Four data points (i.e., one samples from four background wells) were added to the background dataset for each interwell test. New data were tested for outliers prior to being added to the background dataset. The updated prediction limits were calculated for a one-of-two retesting procedure, as during detection monitoring. The values of the updated prediction limits were similar to the values of the prediction limits calculated during detection monitoring. The revised interwell prediction limits were used to evaluate potential SSIs for boron, calcium, chloride, sulfate, and TDS.

For the intrawell tests, limited data made it possible to add only one data point (i.e., one sample from each compliance well) to each background dataset. Because one sample result is insufficient to compare against the existing background dataset, the prediction limits were not updated for the intrawell tests at this time. The intrawell prediction limits calculated during detection monitoring were used to evaluate potential SSIs for fluoride and pH.

Data collected during the September 2018 and March 2019 assessment monitoring events from each compliance well were compared to the prediction limits to evaluate if results were 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 0.183 mg/L at MW-1 (0.20 mg/L), MW-1604 (<0.2 mg/L), MW-1605 (<0.2 mg/L), MW-1606 (<0.2 mg/L), MW-4 (<0.2 mg/L), and MW-4 (<0.2 mg/L). However, boron was not detected at any of these wells except for MW-1, and so is reported as the method detection limit (0.2 mg/L).
- Calcium concentrations exceeded the interwell UPL of 19.6 mg/L at MW-1 (38.3 mg/L and 38.4 mg/L), MW-1605 (49.4 mg/L and 45.4 mg/L), and MW-1606 (51.7 mg/L and 59.0 mg/L).
- Chloride concentrations exceeded the interwell UPL of 41.0 mg/L at MW-1 (67.9 mg/L and 55.2 mg/L), MW-1605 (97.1 mg/L and 92.5 mg/L), and MW-1606 (133 mg/L and 157 mg/L).
- pH exceeded the intrawell background value (UPL) of 6.4 SU at MW-1604 (7.2 SU) and MW-4 (7.0 SU) during the September 2018 event.
- Sulfate concentrations exceeded the interwell UPL of 57.4 mg/L at MW-1 (145 mg/L and 138 mg/L), MW-1605 (213 mg/L and 222 mg/L), and MW-1606 (202 mg/L and 232 mg/L).
- TDS concentrations exceeded the interwell UPL of 253 mg/L at MW-1 (338 mg/L and 321 mg/L), MW-1605 (483 mg/L and 507 mg/L), and MW-1606 (507 mg/L and 597 mg/L).

Based on these results, concentrations of Appendix III parameters exceeded background levels at compliance wells at the Amos BAP during assessment monitoring. As a result, the Amos BAP CCR unit will remain in 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 2019 data. GWPSs were re-established for the Appendix IV parameters. A confidence interval was constructed at each compliance well for each Appendix IV parameter; SSLs were concluded if the entire confidence interval exceeded the GWPS. No SSLs were identified.

The Appendix III results were evaluated to assess whether concentrations of Appendix III parameters exceeded background levels. Interwell tests were used to evaluate potential SSIs for boron, calcium, chloride, sulfate, and TDS, and intrawell tests were used to evaluate potential SSIs for fluoride and pH. The prediction limits for the interwell tests were updated with additional data collected from the background wells. Prediction limits were recalculated using a one-of-two retesting procedure. The prediction limits calculated during detection monitoring were used for

the intrawell tests. Boron, calcium, chloride, pH, sulfate, and TDS results exceeded background levels.

Based on this evaluation, either the Amos BAP CCR unit will remain in assessment monitoring or an ASD will be conducted to evaluate if the unit can return to detection monitoring.

SECTION 3

REFERENCES

American Electric Power (AEP). 2017. Statistical Analysis Plan – Amos Plant. January 2017.

Geosyntec Consultants (Geosyntec). 2018. Statistical Analysis Summary – Bottom Ash Pond, John E. Amos Plant, Winfield, West Virginia. January 15, 2018.

TABLES

**Table 1 - Groundwater Data Summary
Amos - Bottom Ash Pond**

Parameter	Unit	BAP-MW-1	BAP-MW-4	BAP-MW-5	BAP-MW-6	BAP-MW-1601	BAP-MW-1602A	BAP-MW-1603A	BAP-MW-1604	BAP-MW-1605	BAP-MW-1606
		3/14/2019	3/15/2019	3/15/2019	3/15/2019	3/19/2019	3/19/2019	3/15/2019	3/15/2019	3/14/2019	3/15/2019
Antimony	µg/L	0.0500 J	0.100 U	0.0200 J	0.0600 J	0.100 U	0.0400 J	0.100 U	0.0400 J	0.100 U	0.0300 J
Arsenic	µg/L	0.120	1.63	3.63	32.0	6.55	19.7	89.9	6.78	2.95	2.94
Barium	µg/L	26.9	80.4	162	184	122	217	252	118	88.1	74.6
Beryllium	µg/L	0.131	0.0500 J	0.0600 J	0.106	0.0200 J	0.0400 J	0.100 U	0.0700 J	0.0800 J	0.152
Boron	mg/L	0.200 J	1.00 U	1.00 U	1.00 U	0.0500 J	0.0300 J	1.00 U	1.00 U	1.00 U	1.00 U
Cadmium	µg/L	3.48	0.0500	0.0500 U	0.0200 J	0.0100 J	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.190
Calcium	mg/L	38.4	14.5	16.2	12.4	11.9	19.6	15.5	13.1	45.4	59.0
Chloride	mg/L	55.2	13.3	18.5	10.4	8.80	41.0	5.65	16.6	92.5	157
Chromium	µg/L	0.255	0.200 J	0.344	1.82	0.100 J	0.472	0.407	0.931	0.200 J	1.24
Cobalt	µg/L	10.3	9.81	1.21	14.0	3.41	0.691	0.360	0.406	8.83	18.2
Combined Radium	pCi/L	0.887	0.501	0.853	0.865	0.666	0.523	1.26	0.596	0.304	0.295
Fluoride	mg/L	0.0300 J	0.0600 J	0.0500 J	0.0500 J	0.0600 U	0.140	0.270	0.0900	0.0600 U	0.0600 U
Lead	µg/L	0.252	0.219	0.124	1.72	0.105	2.64	0.232	1.19	0.161	1.06
Lithium	mg/L	0.300 U	0.300 U	0.300 U	0.300 U	0.0200 J	0.0300 U	0.300 U	0.300 U	0.300 U	0.300 U
Mercury	µg/L	-	-	-	-	-	-	-	-	-	-
Molybdenum	µg/L	0.500 J	2.00 U	2.00 U	0.500 J	2.00 U	0.700 J	1.00 J	2.00 U	2.00 U	2.00 U
Selenium	µg/L	0.0900 J	0.0600 J	0.200 U	0.400	0.0400 J	0.0900 J	0.0500 J	0.200	0.0500 J	0.200 J
Total Dissolved Solids	mg/L	321	184	180	226	176	232	95.0	170	507	597
Sulfate	mg/L	138	42.8	51.3	1.60	52.7	13.2	0.400 U	0.400 U	222	232
Thallium	µg/L	0.500 U	0.500 U	0.500 U	0.100 J	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
pH	SU	5.17	5.52	5.68	5.92	5.76	6.55	7.10	6.30	5.56	5.40

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
Amos Plant - Bottom Ash Pond**

Constituent Name	MCL	CCR Rule-Specified	Background Limit
Antimony, Total (mg/L)	0.006		0.0001
Arsenic, Total (mg/L)	0.01		0.09
Barium, Total (mg/L)	2		0.31
Beryllium, Total (mg/L)	0.004		0.0001
Cadmium, Total (mg/L)	0.005		0.00003
Chromium, Total (mg/L)	0.1		0.0026
Cobalt, Total (mg/L)	n/a	0.006	0.032
Combined Radium, Total (pCi/L)	5		4.7
Fluoride, Total (mg/L)	4		0.29
Lead, Total (mg/L)	n/a	0.015	0.0064
Lithium, Total (mg/L)	n/a	0.04	0.013
Mercury, Total (mg/L)	0.002		0.000005
Molybdenum, Total (mg/L)	n/a	0.1	0.003
Selenium, Total (mg/L)	0.05		0.0004
Thallium, Total (mg/L)	0.002		0.0005

Notes:

Grey cell indicates calculated UTL is higher than MCL.

MCL = Maximum Contaminant Level

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

The higher of the calculated UTL or MCL/Rule-Specified Level is used as the GWPS.

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

Parameter	Units	Description	MW-1		MW-1604		MW-1605		MW-1606		MW-4		MW-5	
			9/4/2018	3/14/2019	9/5/2018	3/15/2019	9/5/2018	3/14/2019	9/5/2018	3/15/2019	9/5/2018	3/15/2019	9/4/2018	3/15/2019
Boron	mg/L	Interwell Background Value (UPL)	0.183											
		Detection Monitoring Result	0.09	0.20	0.04	< 0.2*	0.002	< 0.2*	0.03	< 0.2*	0.07	< 0.2*	0.03	< 0.2*
Calcium	mg/L	Interwell Background Value (UPL)	19.6											
		Detection Monitoring Result	38.3	38.4	15.1	13.1	49.4	45.4	51.7	59.0	13.3	14.5	15.2	16.2
Chloride	mg/L	Interwell Background Value (UPL)	41.0											
		Detection Monitoring Result	67.9	55.2	22.8	16.6	97.1	92.5	133	157	13.4	13.3	17.8	18.5
Fluoride	mg/L	Intrawell Background Value (UPL)	0.060		0.127		0.108		0.060		0.112		0.111	
		Detection Monitoring Result	0.030	0.030	0.120	0.090	0.030	<0.01	0.02	<0.01	0.060	0.060	0.050	0.050
pH	SU	Intrawell Background Value (UPL)	6.1		6.4		6.7		6.0		6.4		6.7	
		Intrawell Background Value (LPL)	4.9		6.0		5.2		5.0		5.0		5.0	
		Detection Monitoring Result	5.1	5.2	7.2	6.3	5.6	5.6	5.4	5.4	7.0	5.5	5.8	5.7
Sulfate	mg/L	Interwell Background Value (UPL)	57.4											
		Detection Monitoring Result	145	138	0.04	0.06	213	222	202	232	42.4	42.8	45.4	51.3
Total Dissolved Solids	mg/L	Interwell Background Value (UPL)	253											
		Detection Monitoring Result	338	321	180	170	483	507	507	597	179	184	151	180

Notes:
 UPL: Upper prediction limit
 LPL: Lower prediction limit
 *: < represents a value below the method detection limit.
 -: Not Sampled
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 Amos Bottom Ash Pond CCR management area and that the requirements of 40 CFR 257.93(f) have been met.

DAVID ANTHONY MILLER

Printed Name of Licensed Professional Engineer

David Anthony Miller

Signature

22663

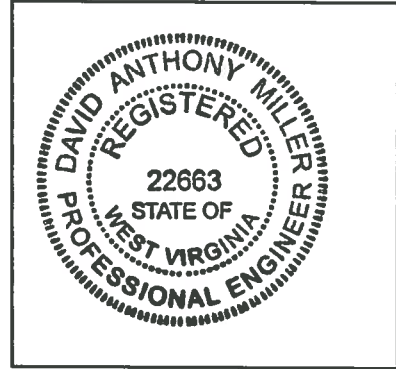
License Number

WEST VIRGINIA

Licensing State

07.10.19

Date

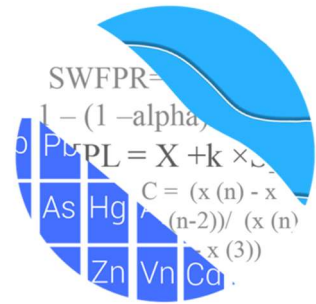


ATTACHMENT B
Statistical Analysis Output

GROUNDWATER STATS CONSULTING

July 9, 2019

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



Re: Amos Bottom Ash Pond
Assessment Monitoring Event – March 2019

Dear Ms. Kreinberg,

Groundwater Stats Consulting (GSC), formerly the statistical consulting division of Sanitas Technologies, is pleased to provide the evaluation of groundwater data for the March 2019 Assessment Monitoring event for American Electric Power Company's Amos Bottom Ash Pond. 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 2016. The monitoring well network, as provided by Geosyntec Consultants, consists of the following:

- **Upgradient wells:** BAP-MW-1601, BAP-MW-1602A, BAP-MW-1603A, and BAP-MW-6; and
- **Downgradient wells:** BAP-MW-1, BAP-MW-1604, BAP-MW-1605, BAP-MW-1606, BAP-MW-4, and BAP-MW-5.

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 CCR program consists of the following constituents:

- **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.

Time series plots for Appendix III and IV parameters are provided for all wells and constituents; and are used to evaluate concentrations over the entire record (Figure A). Values in background which have previously been flagged as outliers may be seen in a lighter font and disconnected symbol on the graphs. Additionally, a summary of flagged values follows this letter (Figure B).

Evaluation of Appendix III Parameters

Interwell prediction limits combined with a 1-of-2 verification strategy were constructed for boron, calcium, chloride, sulfate and TDS; and intrawell prediction limits combined with a 1-of-2 verification strategy were constructed for fluoride and pH (Figures C and D, respectively). The statistical method selected for each parameter was determined based on the results of the evaluation performed in December 2017; and all proposed background data were screened for outliers and trends at that time. 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. All values flagged as outliers may be seen on the Outlier Summary report following this letter. No obvious trending patterns were observed in the upgradient wells.

Intrawell prediction limits utilize the background data set that was originally screened in 2017. As recommended in the EPA Unified Guidance (2009), the background data set will be tested for the purpose of updating statistical limits using the Mann-Whitney two-sample test when an additional four to eight measurements are available.

In the event of an initial exceedance of compliance well data, the 1-of-2 resample plan allows for collection of one additional sample to determine whether the initial exceedance is confirmed. When the resample confirms the initial exceedance, a statistically significant increase (SSI) is identified, and further research would be required to identify the cause of the exceedance (i.e. impact from the site, natural variation, or an

off-site source). If the resample falls within the statistical limit, the initial exceedance is considered a false positive result, and, therefore, no further action is necessary.

Prediction limit exceedances were noted for calcium, sulfate and TDS in at least one downgradient well. The results of those findings may be found in the Prediction Limit Summary tables following this letter.

When a statistically significant increase is identified, the data are further evaluated using the Sen's Slope/Mann Kendall trend test to determine whether data are statistically increasing, decreasing or stable (Figure E). Upgradient wells are included to determine whether similar patterns exist upgradient of the facility which is an indication of naturally changing groundwater. Statistically significant increasing trends were found for chloride in upgradient well BAP-MW-1601 and in downgradient well BAP-MW-1606; and for total dissolved solids in downgradient well BAP-MW-1606. The Trend Test Summary Table follows this letter.

Evaluation of Appendix IV Parameters

Interwell Tolerance limits were used to calculate background limits from all available pooled upgradient well data for Appendix IV parameters to determine the Alternate Contaminant Level (ACL) for each constituent (Figure F). Background data are screened for outliers and extreme trending patterns that would lead to artificially elevated statistical limits. Any flagged values may be seen on the Outlier Summary following this letter.

Parametric limits use a target of 95% confidence and 95% coverage. 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 CCR-Rule specified levels 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 G).

Confidence intervals were then constructed on downgradient wells for each of the Appendix IV parameters using the highest limit of either the MCL, CCR-Rule specified levels, or background as discussed above (Figure H). Only when the entire confidence interval is above a GWPS is the well/constituent pair considered to exceed its respective standard. No exceedances were noted for any of the well/constituent pairs. A summary of the confidence interval results follows this letter.

Thank you for the opportunity to assist you in the statistical analysis of groundwater quality for Amos Bottom Ash Pond. If you have any questions or comments, please feel free to contact me.

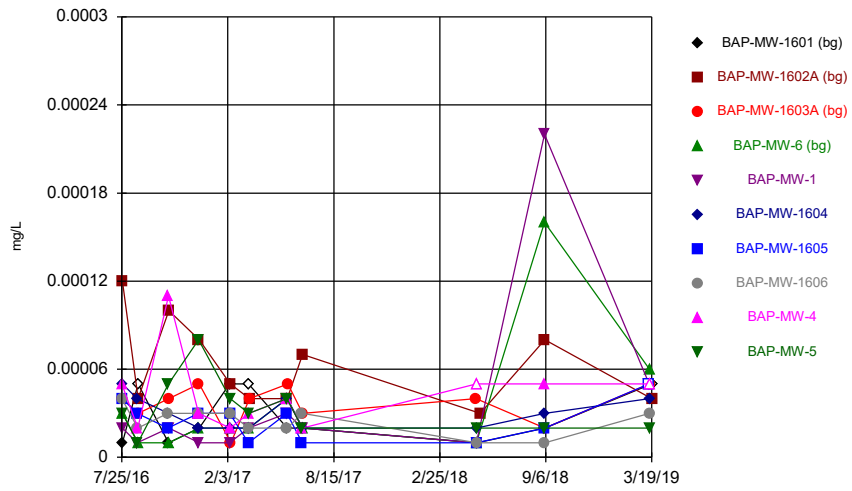
For Groundwater Stats Consulting,

A handwritten signature in black ink that reads "Kristina Rayner". The signature is written in a cursive, flowing style.

Kristina L. Rayner, Groundwater Statistician

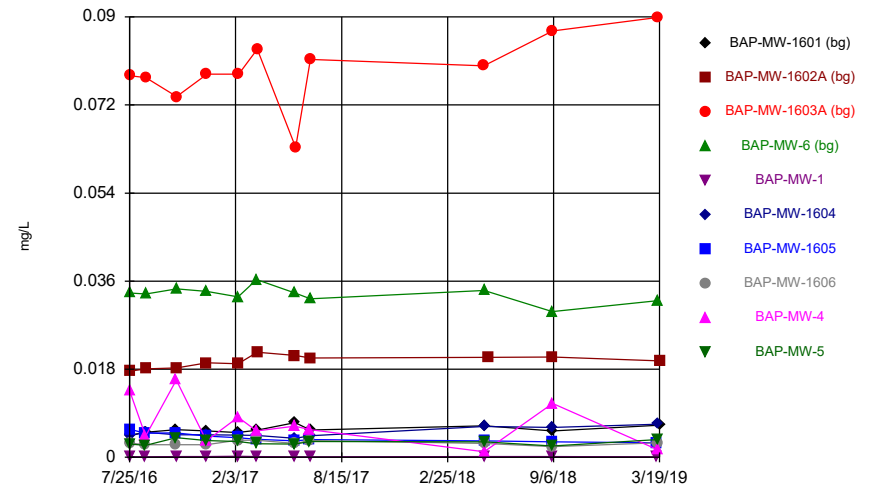
FIGURE A: TIME SERIES

Time Series



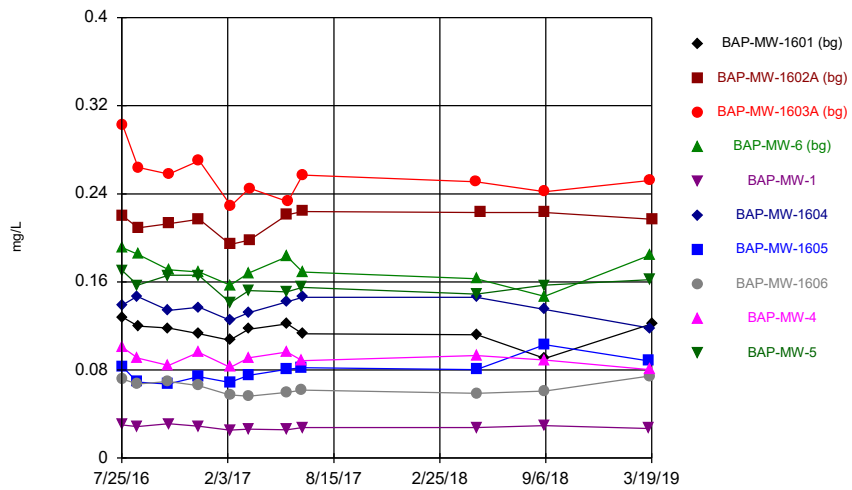
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Time Series



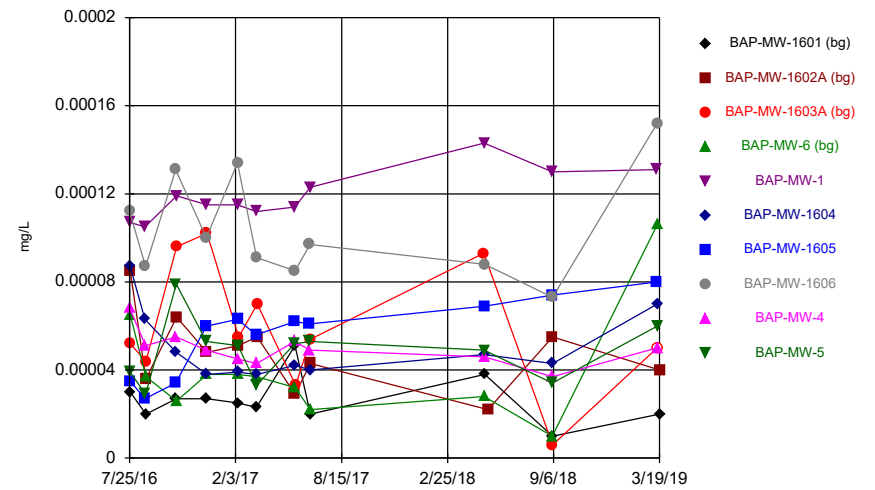
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Time Series



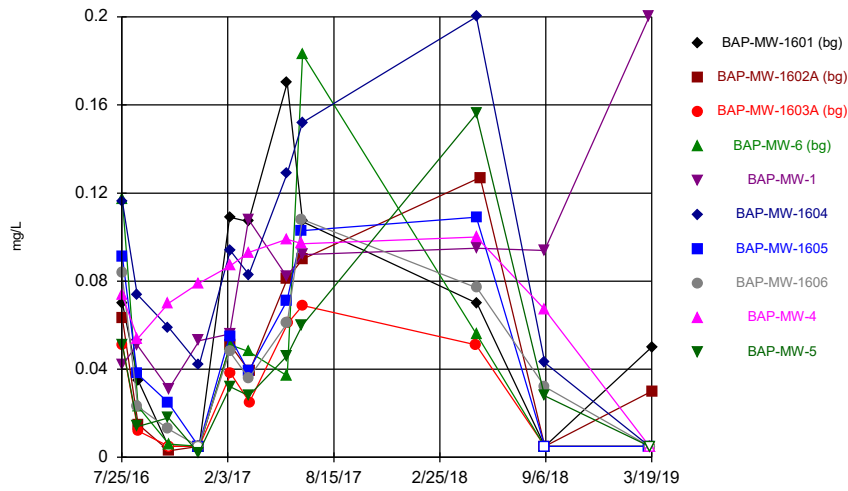
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Time Series



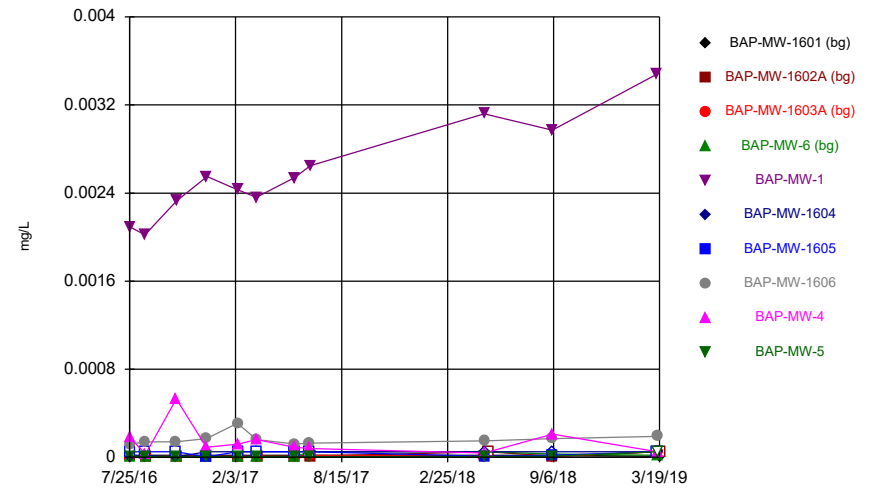
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Time Series



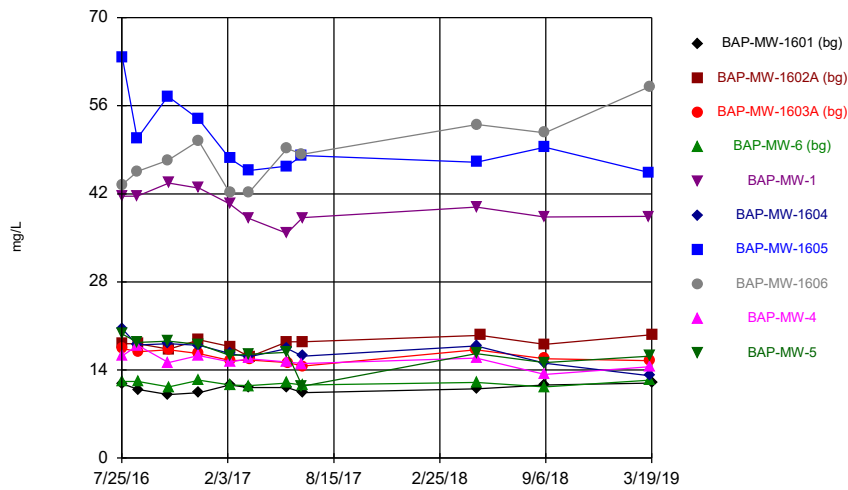
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Time Series



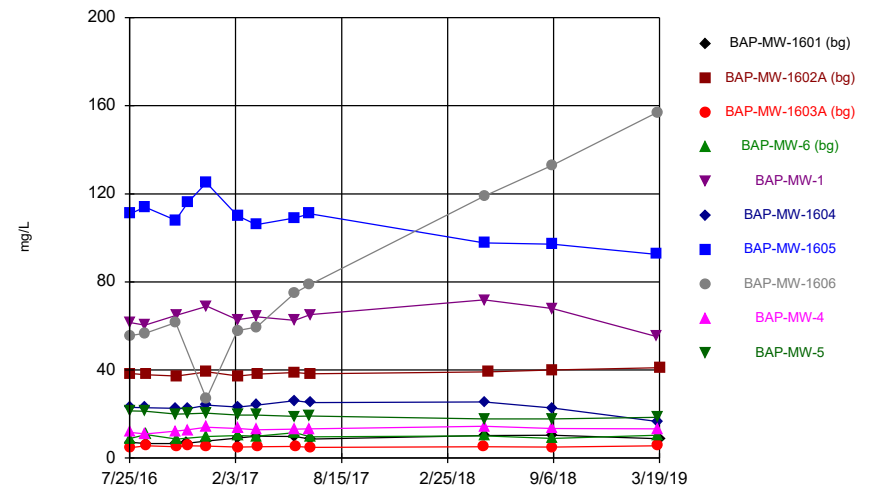
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Time Series



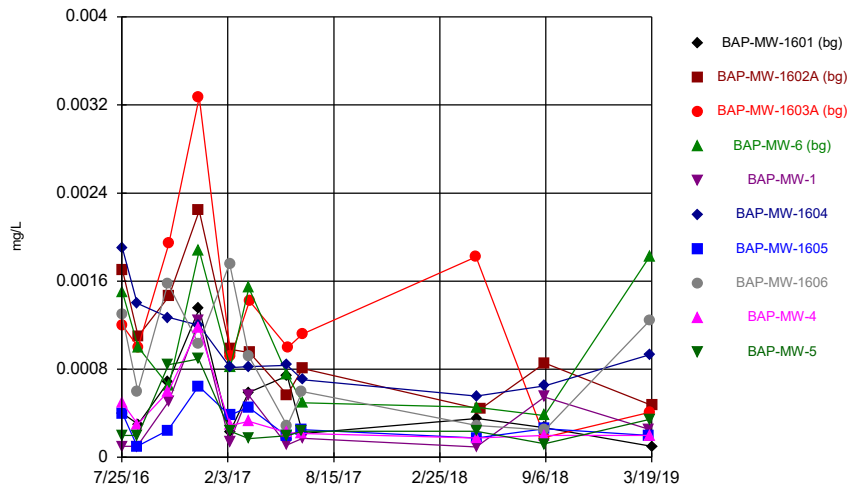
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Time Series



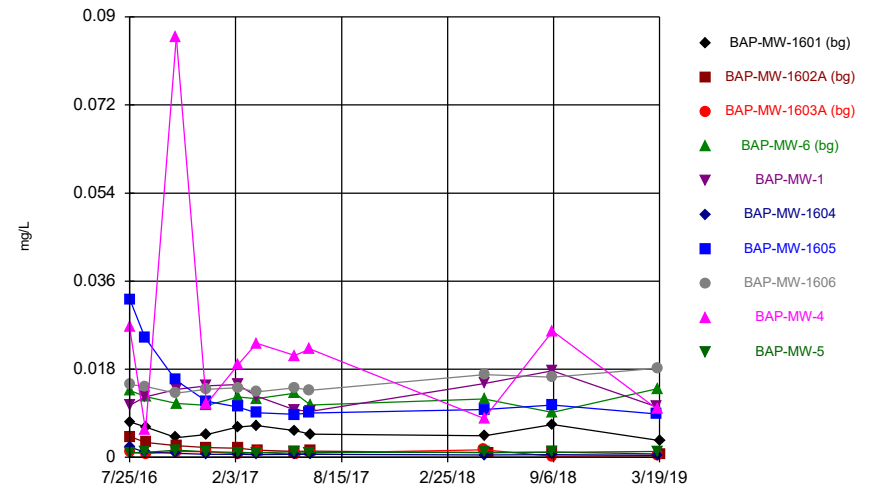
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Time Series



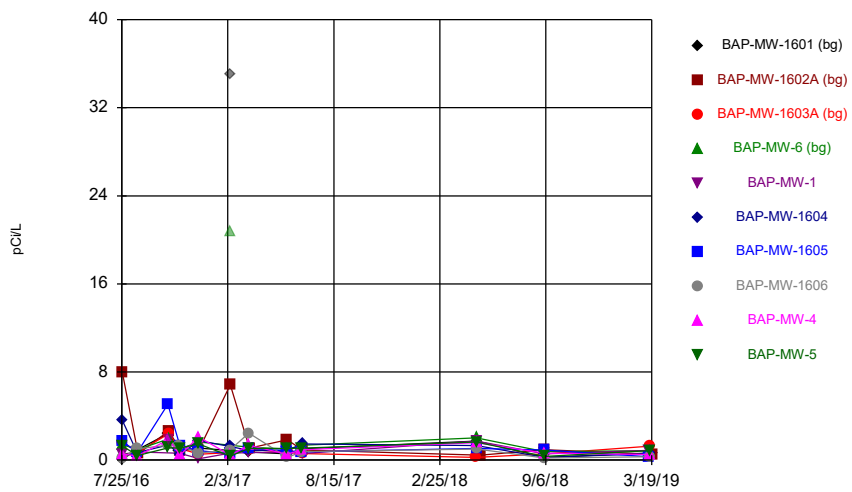
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Time Series



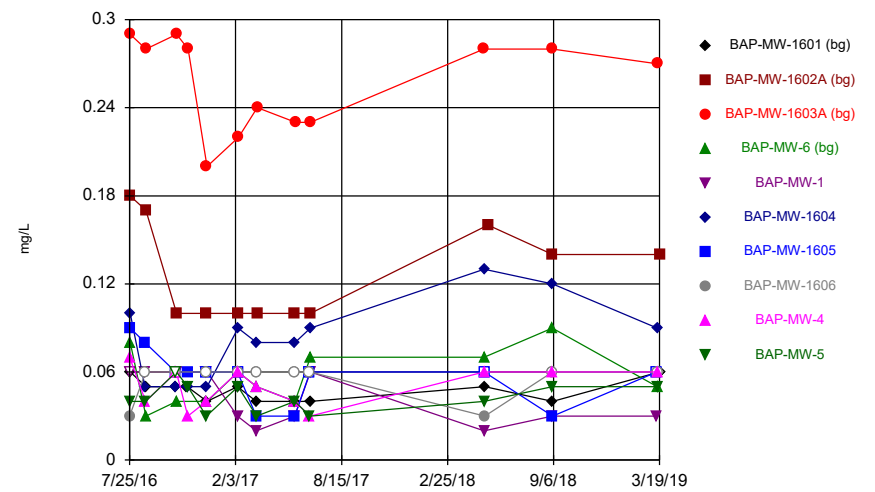
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Time Series



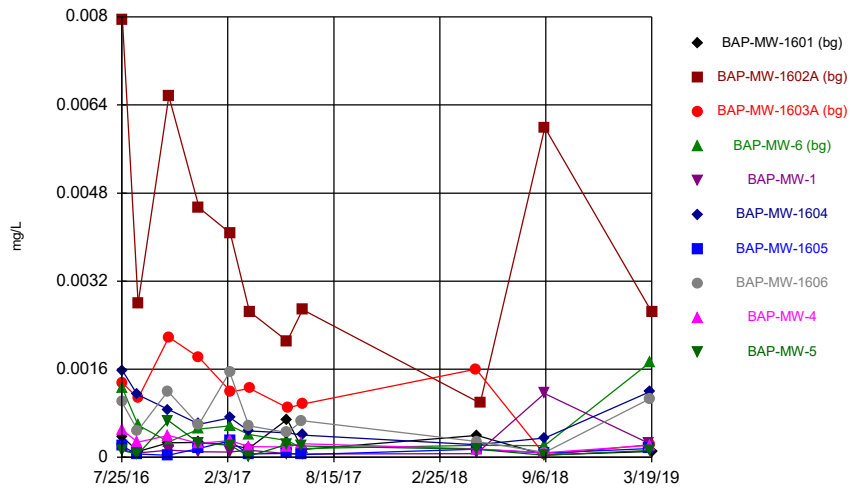
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Time Series



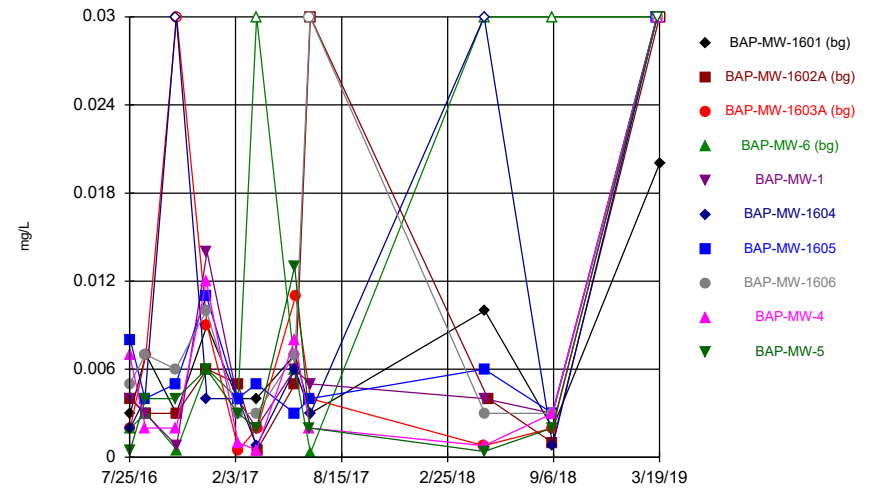
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Time Series



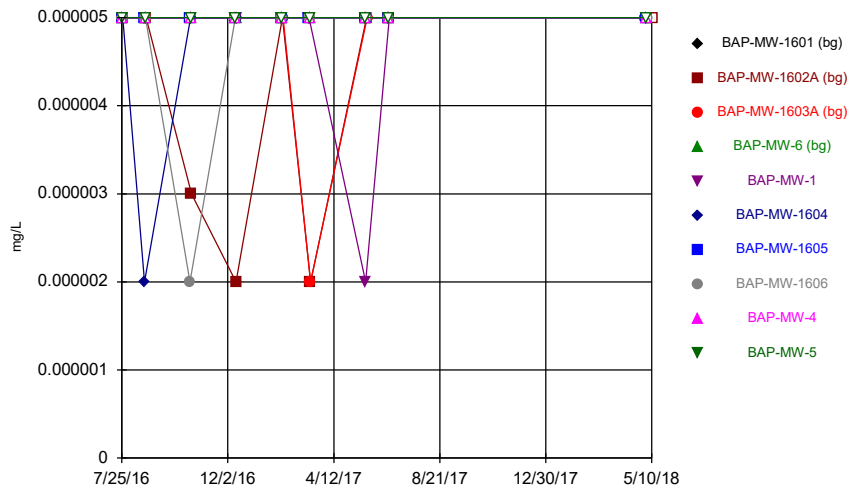
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Time Series



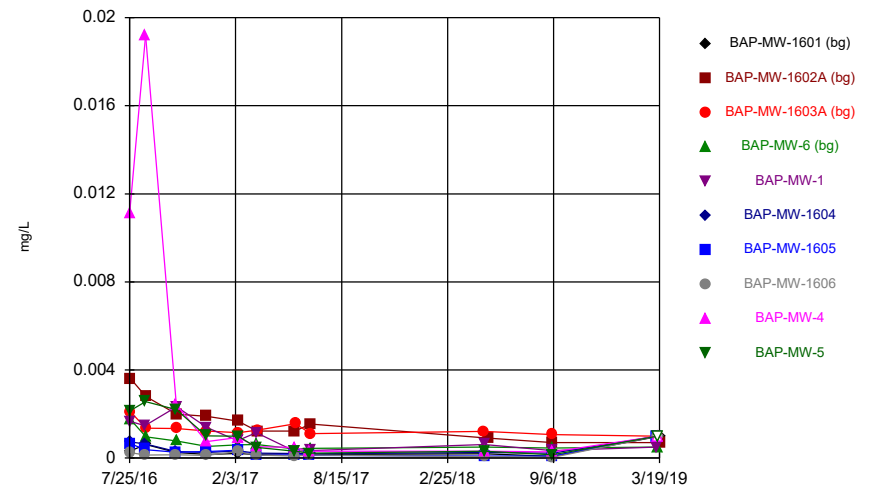
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Time Series



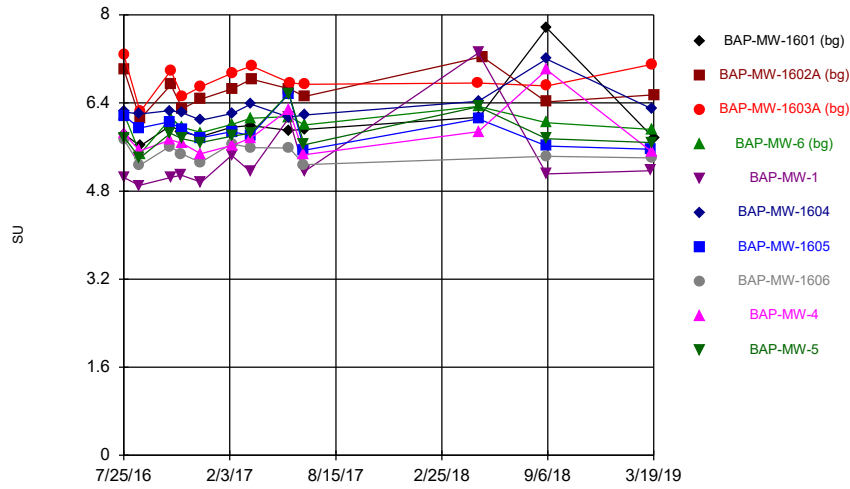
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Time Series



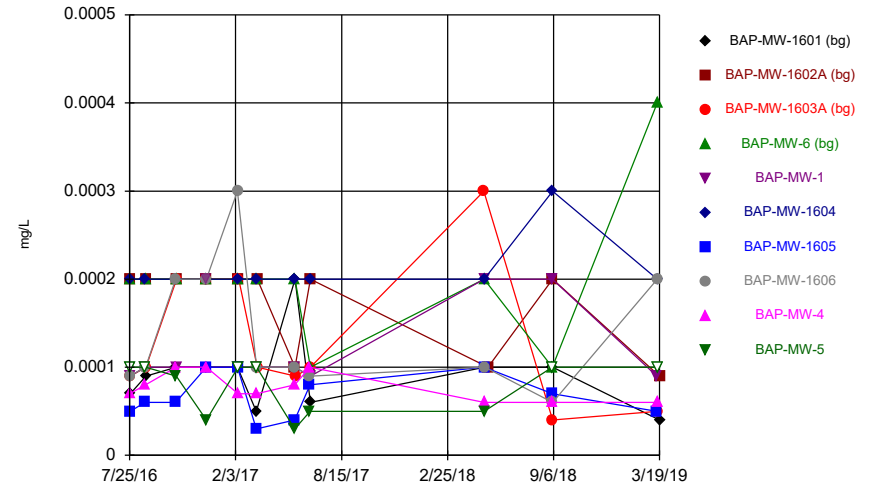
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Time Series



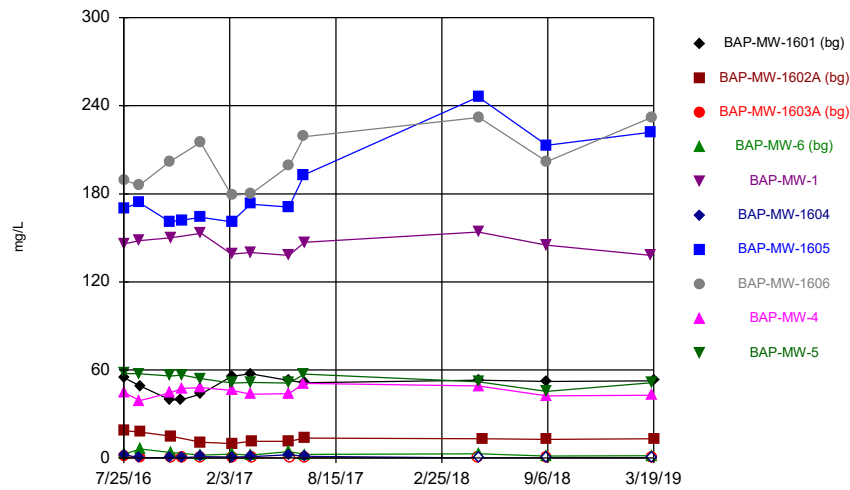
Constituent: pH, field Analysis Run 7/8/2019 4:29 PM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



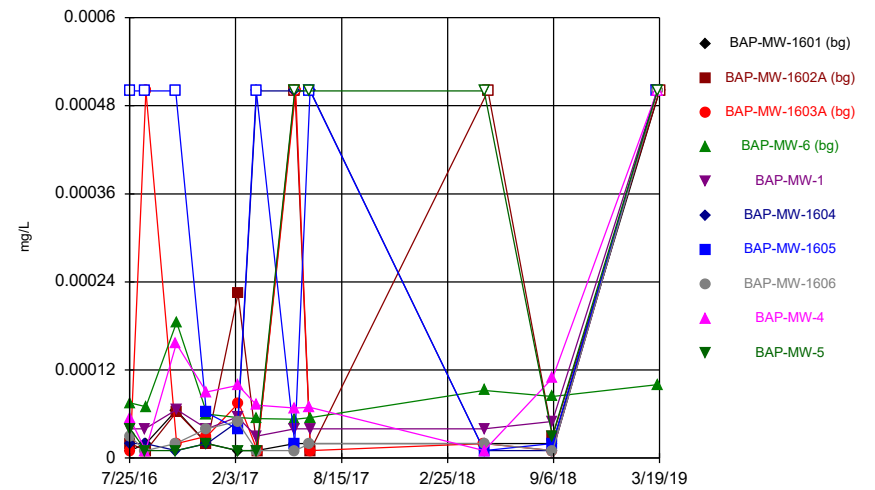
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Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



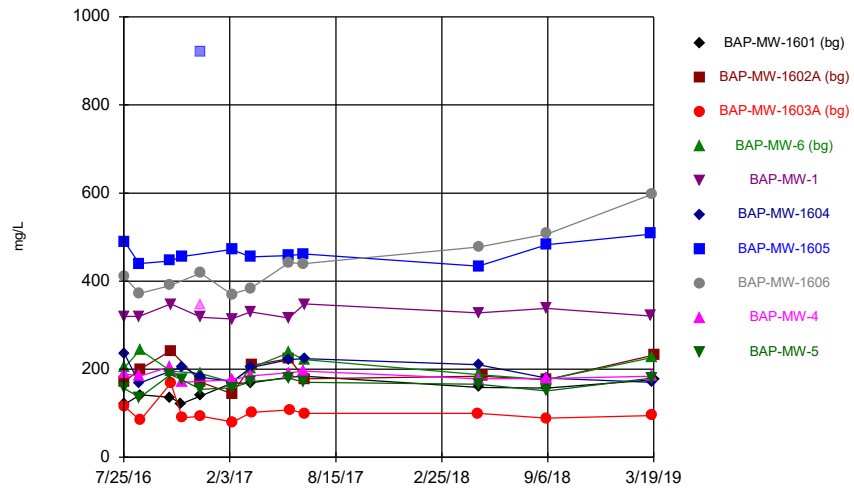
Constituent: Sulfate, total Analysis Run 7/8/2019 4:29 PM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



Constituent: Thallium, total Analysis Run 7/8/2019 4:29 PM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



Constituent: Total Dissolved Solids [TDS] Analysis Run 7/8/2019 4:29 PM View: Descriptive
Amos BAP Client: Geosyntec Data: Amos BAP

FIGURE B: OUTLIER SUMMARY

Outlier Summary

Amos BAP Client: Geosyntec Data: Amos BAP Printed 7/8/2019, 4:01 PM

	BAP-MW-1601 Combined Radium 226 + 228 (pCi/L)	BAP-MW-6 Combined Radium 226 + 228 (pCi/L)	BAP-MW-1 Combined Radium 226 + 228 (pCi/L)	BAP-MW-1 Selenium, total (mg/L)	BAP-MW-1605 Total Dissolved Solids [TDS] (mg/L)	BAP-MW-4 Total Dissolved Solids [TDS] (mg/L)
10/19/2016	1.86 (o)					
12/12/2016			920 (o)		348 (o)	
12/13/2016				0.0002 (o)		
2/7/2017	35.021 (o)					
2/8/2017	20.83 (o)					

FIGURE C: INTERWELL PREDICTION LIMITS

Interwell Prediction Limit Summary - Significant Results

Amos BAP Client: Geosyntec Data: Amos BAP Printed 6/24/2019, 2:34 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Calcium, total (mg/L)	BAP-MW-1	19.6	n/a	3/14/2019	38.4	Yes	44	n/a	n/a	0	n/a	n/a	0.0009736	NP Inter (normality) 1 of 2
Calcium, total (mg/L)	BAP-MW-1605	19.6	n/a	3/14/2019	45.4	Yes	44	n/a	n/a	0	n/a	n/a	0.0009736	NP Inter (normality) 1 of 2
Calcium, total (mg/L)	BAP-MW-1606	19.6	n/a	3/15/2019	59	Yes	44	n/a	n/a	0	n/a	n/a	0.0009736	NP Inter (normality) 1 of 2
Chloride, total (mg/L)	BAP-MW-1	41	n/a	3/14/2019	55.2	Yes	46	n/a	n/a	0	n/a	n/a	0.0008958	NP Inter (normality) 1 of 2
Chloride, total (mg/L)	BAP-MW-1605	41	n/a	3/14/2019	92.5	Yes	46	n/a	n/a	0	n/a	n/a	0.0008958	NP Inter (normality) 1 of 2
Chloride, total (mg/L)	BAP-MW-1606	41	n/a	3/15/2019	157	Yes	46	n/a	n/a	0	n/a	n/a	0.0008958	NP Inter (normality) 1 of 2
Sulfate, total (mg/L)	BAP-MW-1	57.4	n/a	3/14/2019	138	Yes	46	n/a	n/a	21.74	n/a	n/a	0.0008958	NP Inter (normality) 1 of 2
Sulfate, total (mg/L)	BAP-MW-1605	57.4	n/a	3/14/2019	222	Yes	46	n/a	n/a	21.74	n/a	n/a	0.0008958	NP Inter (normality) 1 of 2
Sulfate, total (mg/L)	BAP-MW-1606	57.4	n/a	3/15/2019	232	Yes	46	n/a	n/a	21.74	n/a	n/a	0.0008958	NP Inter (normality) 1 of 2
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-1	253.3	n/a	3/14/2019	321	Yes	46	162.3	47.56	0	None	No	0.001254	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-1605	253.3	n/a	3/14/2019	507	Yes	46	162.3	47.56	0	None	No	0.001254	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-1606	253.3	n/a	3/15/2019	597	Yes	46	162.3	47.56	0	None	No	0.001254	Param Inter 1 of 2

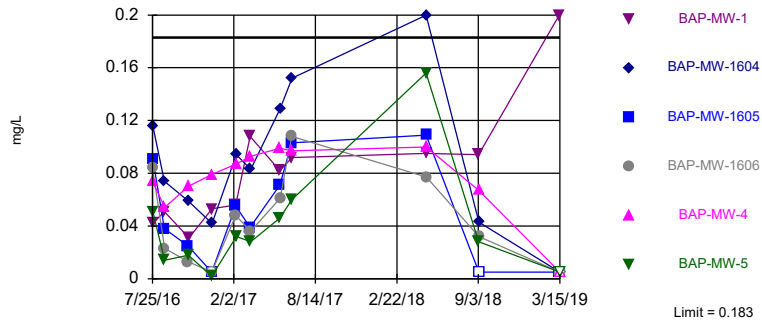
Interwell Prediction Limit Summary - All Results

Amos BAP Client: Geosyntec Data: Amos BAP Printed 6/24/2019, 2:34 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Boron, total (mg/L)	BAP-MW-1	0.183	n/a	3/14/2019	0.2	No	44	n/a	n/a	27.27	n/a	n/a	0.0009736	NP Inter (normality) 1 of 2
Boron, total (mg/L)	BAP-MW-1604	0.183	n/a	3/15/2019	0.005ND	No	44	n/a	n/a	27.27	n/a	n/a	0.0009736	NP Inter (normality) 1 of 2
Boron, total (mg/L)	BAP-MW-1605	0.183	n/a	3/14/2019	0.005ND	No	44	n/a	n/a	27.27	n/a	n/a	0.0009736	NP Inter (normality) 1 of 2
Boron, total (mg/L)	BAP-MW-1606	0.183	n/a	3/15/2019	0.005ND	No	44	n/a	n/a	27.27	n/a	n/a	0.0009736	NP Inter (normality) 1 of 2
Boron, total (mg/L)	BAP-MW-4	0.183	n/a	3/15/2019	0.005ND	No	44	n/a	n/a	27.27	n/a	n/a	0.0009736	NP Inter (normality) 1 of 2
Boron, total (mg/L)	BAP-MW-5	0.183	n/a	3/15/2019	0.005ND	No	44	n/a	n/a	27.27	n/a	n/a	0.0009736	NP Inter (normality) 1 of 2
Calcium, total (mg/L)	BAP-MW-1	19.6	n/a	3/14/2019	38.4	Yes	44	n/a	n/a	0	n/a	n/a	0.0009736	NP Inter (normality) 1 of 2
Calcium, total (mg/L)	BAP-MW-1604	19.6	n/a	3/15/2019	13.1	No	44	n/a	n/a	0	n/a	n/a	0.0009736	NP Inter (normality) 1 of 2
Calcium, total (mg/L)	BAP-MW-1605	19.6	n/a	3/14/2019	45.4	Yes	44	n/a	n/a	0	n/a	n/a	0.0009736	NP Inter (normality) 1 of 2
Calcium, total (mg/L)	BAP-MW-1606	19.6	n/a	3/15/2019	59	Yes	44	n/a	n/a	0	n/a	n/a	0.0009736	NP Inter (normality) 1 of 2
Calcium, total (mg/L)	BAP-MW-4	19.6	n/a	3/15/2019	14.5	No	44	n/a	n/a	0	n/a	n/a	0.0009736	NP Inter (normality) 1 of 2
Calcium, total (mg/L)	BAP-MW-5	19.6	n/a	3/15/2019	16.2	No	44	n/a	n/a	0	n/a	n/a	0.0009736	NP Inter (normality) 1 of 2
Chloride, total (mg/L)	BAP-MW-1	41	n/a	3/14/2019	55.2	Yes	46	n/a	n/a	0	n/a	n/a	0.0008958	NP Inter (normality) 1 of 2
Chloride, total (mg/L)	BAP-MW-1604	41	n/a	3/15/2019	16.6	No	46	n/a	n/a	0	n/a	n/a	0.0008958	NP Inter (normality) 1 of 2
Chloride, total (mg/L)	BAP-MW-1605	41	n/a	3/14/2019	92.5	Yes	46	n/a	n/a	0	n/a	n/a	0.0008958	NP Inter (normality) 1 of 2
Chloride, total (mg/L)	BAP-MW-1606	41	n/a	3/15/2019	157	Yes	46	n/a	n/a	0	n/a	n/a	0.0008958	NP Inter (normality) 1 of 2
Chloride, total (mg/L)	BAP-MW-4	41	n/a	3/15/2019	13.3	No	46	n/a	n/a	0	n/a	n/a	0.0008958	NP Inter (normality) 1 of 2
Chloride, total (mg/L)	BAP-MW-5	41	n/a	3/15/2019	18.5	No	46	n/a	n/a	0	n/a	n/a	0.0008958	NP Inter (normality) 1 of 2
Sulfate, total (mg/L)	BAP-MW-1	57.4	n/a	3/14/2019	138	Yes	46	n/a	n/a	21.74	n/a	n/a	0.0008958	NP Inter (normality) 1 of 2
Sulfate, total (mg/L)	BAP-MW-1604	57.4	n/a	3/15/2019	0.2ND	No	46	n/a	n/a	21.74	n/a	n/a	0.0008958	NP Inter (normality) 1 of 2
Sulfate, total (mg/L)	BAP-MW-1605	57.4	n/a	3/14/2019	222	Yes	46	n/a	n/a	21.74	n/a	n/a	0.0008958	NP Inter (normality) 1 of 2
Sulfate, total (mg/L)	BAP-MW-1606	57.4	n/a	3/15/2019	232	Yes	46	n/a	n/a	21.74	n/a	n/a	0.0008958	NP Inter (normality) 1 of 2
Sulfate, total (mg/L)	BAP-MW-4	57.4	n/a	3/15/2019	42.8	No	46	n/a	n/a	21.74	n/a	n/a	0.0008958	NP Inter (normality) 1 of 2
Sulfate, total (mg/L)	BAP-MW-5	57.4	n/a	3/15/2019	51.3	No	46	n/a	n/a	21.74	n/a	n/a	0.0008958	NP Inter (normality) 1 of 2
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-1	253.3	n/a	3/14/2019	321	Yes	46	162.3	47.56	0	None	No	0.001254	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-1604	253.3	n/a	3/15/2019	170	No	46	162.3	47.56	0	None	No	0.001254	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-1605	253.3	n/a	3/14/2019	507	Yes	46	162.3	47.56	0	None	No	0.001254	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-1606	253.3	n/a	3/15/2019	597	Yes	46	162.3	47.56	0	None	No	0.001254	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-4	253.3	n/a	3/15/2019	184	No	46	162.3	47.56	0	None	No	0.001254	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-5	253.3	n/a	3/15/2019	180	No	46	162.3	47.56	0	None	No	0.001254	Param Inter 1 of 2

Within Limit

Prediction Limit
 Interwell Non-parametric

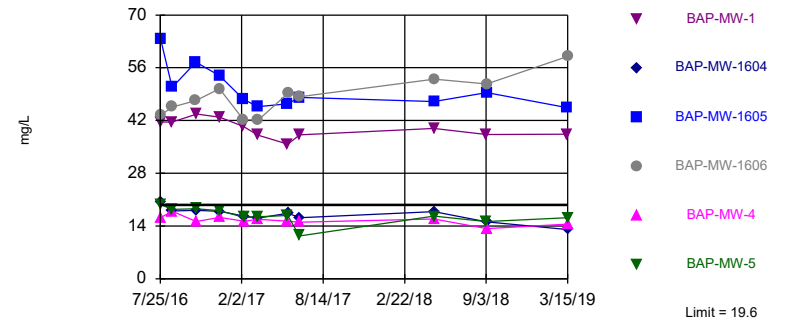


Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 44 background values. 27.27% NDs. Annual per-constituent alpha = 0.01162. Individual comparison alpha = 0.0009736 (1 of 2). Comparing 6 points to limit.

Constituent: Boron, total Analysis Run 6/24/2019 2:31 PM View: PL's - Interwell
 Amos BAP Client: Geosyntec Data: Amos BAP

Exceeds Limit: BAP-MW-1, BAP-MW-1605,
 BAP-MW-1606

Prediction Limit
 Interwell Non-parametric

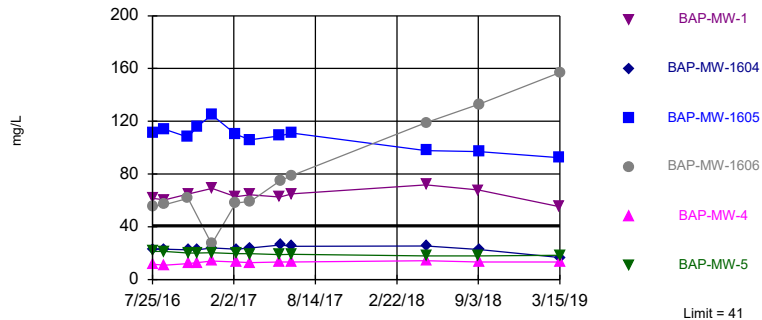


Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 44 background values. Annual per-constituent alpha = 0.01162. Individual comparison alpha = 0.0009736 (1 of 2). Comparing 6 points to limit.

Constituent: Calcium, total Analysis Run 6/24/2019 2:31 PM View: PL's - Interwell
 Amos BAP Client: Geosyntec Data: Amos BAP

Exceeds Limit: BAP-MW-1, BAP-MW-1605,
 BAP-MW-1606

Prediction Limit
 Interwell Non-parametric

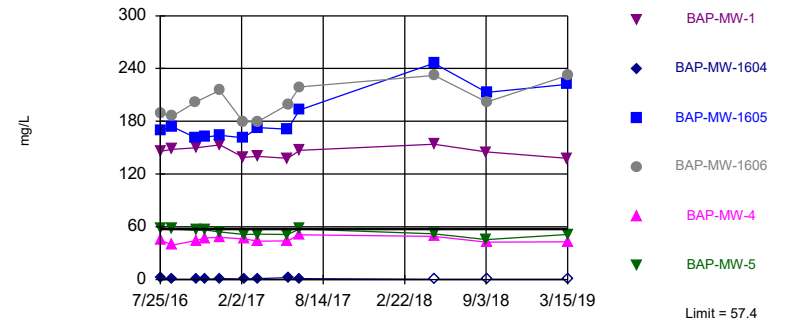


Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 46 background values. 21.74% NDs. Annual per-constituent alpha = 0.0107. Individual comparison alpha = 0.0008958 (1 of 2). Comparing 6 points to limit.

Constituent: Chloride, total Analysis Run 6/24/2019 2:31 PM View: PL's - Interwell
 Amos BAP Client: Geosyntec Data: Amos BAP

Exceeds Limit: BAP-MW-1, BAP-MW-1605,
 BAP-MW-1606

Prediction Limit
 Interwell Non-parametric

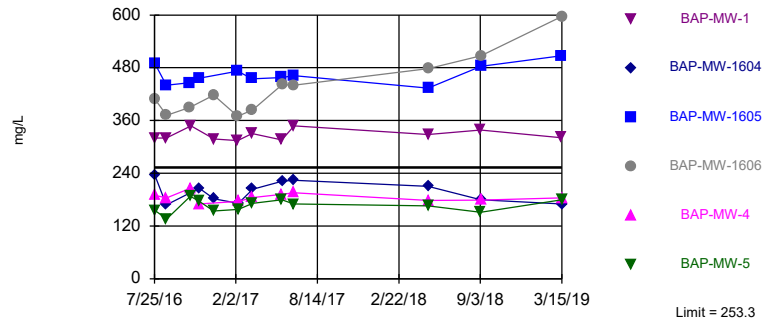


Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 46 background values. 21.74% NDs. Annual per-constituent alpha = 0.0107. Individual comparison alpha = 0.0008958 (1 of 2). Comparing 6 points to limit.

Constituent: Sulfate, total Analysis Run 6/24/2019 2:32 PM View: PL's - Interwell
 Amos BAP Client: Geosyntec Data: Amos BAP

Exceeds Limit: BAP-MW-1, BAP-MW-1605,
BAP-MW-1606

Prediction Limit
Interwell Parametric



Background Data Summary: Mean=162.3, Std. Dev.=47.56, n=46. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9397, critical = 0.927. Kappa = 1.913 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.001254. Comparing 6 points to limit.

Constituent: Total Dissolved Solids [TDS] Analysis Run 6/24/2019 2:32 PM View: PL's - Interwell
Amos BAP Client: Geosyntec Data: Amos BAP

FIGURE D: INTRAWELL PREDICTION LIMITS

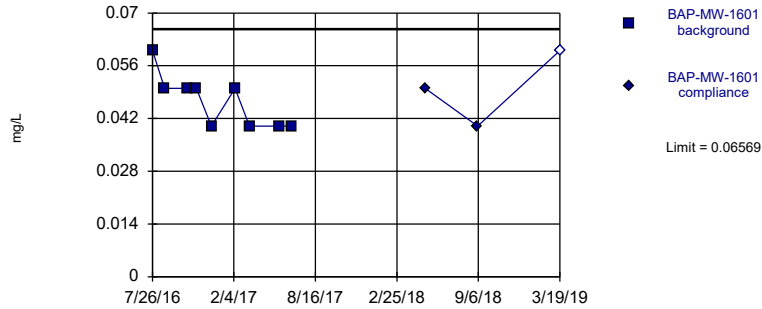
Intrawell Prediction Limit Summary - All Results (No Significant)

Amos BAP Client: Geosyntec Data: Amos BAP Printed 7/8/2019, 4:20 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Fluoride, total (mg/L)	BAP-MW-1	0.06	n/a	3/14/2019	0.03	No	8	n/a	n/a	62.5	n/a	n/a	0.02144	NP (NDs) 1 of 2
Fluoride, total (mg/L)	BAP-MW-1601	0.06569	n/a	3/19/2019	0.06ND	No	9	0.04667	0.007071	0	None	No	0.001254	Param 1 of 2
Fluoride, total (mg/L)	BAP-MW-1602A	0.18	n/a	3/19/2019	0.14	No	8	n/a	n/a	0	n/a	n/a	0.02144	NP (normality) 1 of 2
Fluoride, total (mg/L)	BAP-MW-1603A	0.3428	n/a	3/15/2019	0.27	No	9	0.2511	0.03408	0	None	No	0.001254	Param 1 of 2
Fluoride, total (mg/L)	BAP-MW-1604	0.1273	n/a	3/15/2019	0.09	No	9	0.07111	0.02088	0	None	No	0.001254	Param 1 of 2
Fluoride, total (mg/L)	BAP-MW-1605	0.1078	n/a	3/14/2019	0.06ND	No	9	0.04556	0.02315	33.33	Kaplan-Meier	No	0.001254	Param 1 of 2
Fluoride, total (mg/L)	BAP-MW-1606	0.06	n/a	3/15/2019	0.06ND	No	8	n/a	n/a	87.5	n/a	n/a	0.02144	NP (NDs) 1 of 2
Fluoride, total (mg/L)	BAP-MW-4	0.2468	n/a	3/15/2019	0.06	No	9	-2.972	0.5846	11.11	None	ln(x)	0.001254	Param 1 of 2
Fluoride, total (mg/L)	BAP-MW-5	0.2	n/a	3/15/2019	0.05	No	9	n/a	n/a	11.11	n/a	n/a	0.01809	NP (normality) 1 of 2
Fluoride, total (mg/L)	BAP-MW-6	0.1001	n/a	3/15/2019	0.05	No	8	0.05125	0.01727	0	None	No	0.001254	Param 1 of 2
pH, field (SU)	BAP-MW-1	6.13	4.9	3/14/2019	5.17	No	9	n/a	n/a	0	n/a	n/a	0.03619	NP (normality) 1 of 2
pH, field (SU)	BAP-MW-1601	6.191	5.558	3/19/2019	5.76	No	9	5.874	0.1176	0	None	No	0.0006268	Param 1 of 2
pH, field (SU)	BAP-MW-1602A	7.323	5.853	3/19/2019	6.55	No	9	6.588	0.2732	0	None	No	0.0006268	Param 1 of 2
pH, field (SU)	BAP-MW-1603A	7.64	5.973	3/15/2019	7.1	No	9	6.807	0.3098	0	None	No	0.0006268	Param 1 of 2
pH, field (SU)	BAP-MW-1604	6.431	5.995	3/15/2019	6.3	No	9	6.213	0.08109	0	None	No	0.0006268	Param 1 of 2
pH, field (SU)	BAP-MW-1605	6.74	5.182	3/14/2019	5.56	No	9	5.961	0.2895	0	None	No	0.0006268	Param 1 of 2
pH, field (SU)	BAP-MW-1606	5.973	5.034	3/15/2019	5.4	No	9	5.503	0.1746	0	None	No	0.0006268	Param 1 of 2
pH, field (SU)	BAP-MW-4	6.385	5.035	3/15/2019	5.52	No	9	5.71	0.2508	0	None	No	0.0006268	Param 1 of 2
pH, field (SU)	BAP-MW-5	6.663	4.961	3/15/2019	5.68	No	9	5.812	0.3162	0	None	No	0.0006268	Param 1 of 2
pH, field (SU)	BAP-MW-6	6.568	5.405	3/15/2019	5.92	No	9	5.987	0.2162	0	None	No	0.0006268	Param 1 of 2

Within Limit

Prediction Limit
 Intrawell Parametric

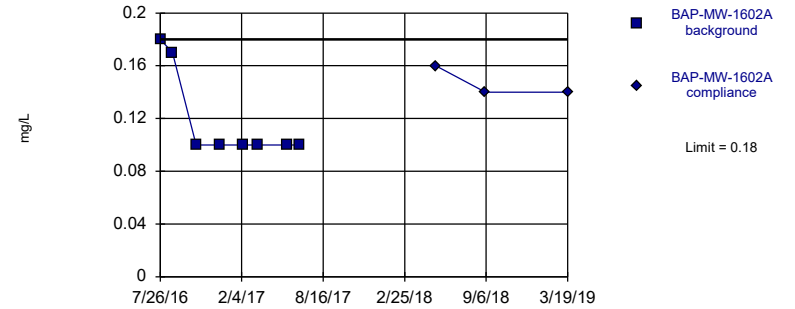


Background Data Summary: Mean=0.04667, Std. Dev.=0.007071, n=9. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8049, critical = 0.764. Kappa = 2.69 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254.

Constituent: Fluoride, total Analysis Run 7/8/2019 4:17 PM View: PL's - Intrawell
 Amos BAP Client: Geosyntec Data: Amos BAP

Within Limit

Prediction Limit
 Intrawell Non-parametric

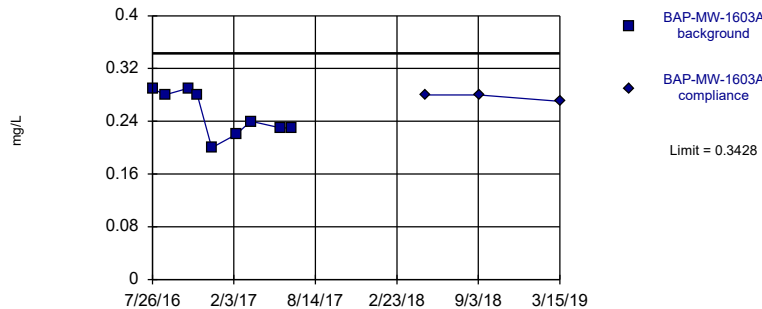


Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 8 background values. Well-constituent pair annual alpha = 0.04242. Individual comparison alpha = 0.02144 (1 of 2).

Constituent: Fluoride, total Analysis Run 7/8/2019 4:17 PM View: PL's - Intrawell
 Amos BAP Client: Geosyntec Data: Amos BAP

Within Limit

Prediction Limit
 Intrawell Parametric

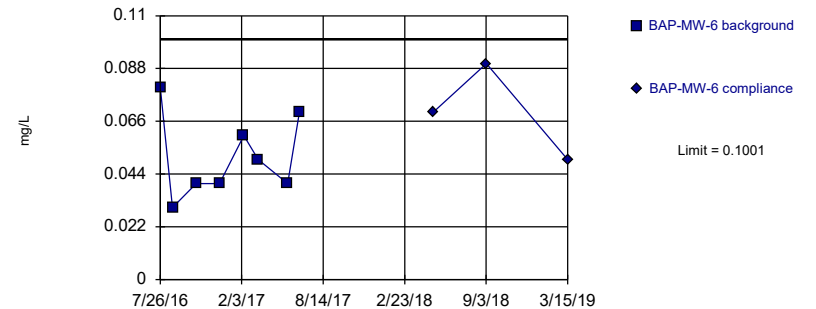


Background Data Summary: Mean=0.2511, Std. Dev.=0.03408, n=9. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8781, critical = 0.764. Kappa = 2.69 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254.

Constituent: Fluoride, total Analysis Run 7/8/2019 4:17 PM View: PL's - Intrawell
 Amos BAP Client: Geosyntec Data: Amos BAP

Within Limit

Prediction Limit
 Intrawell Parametric

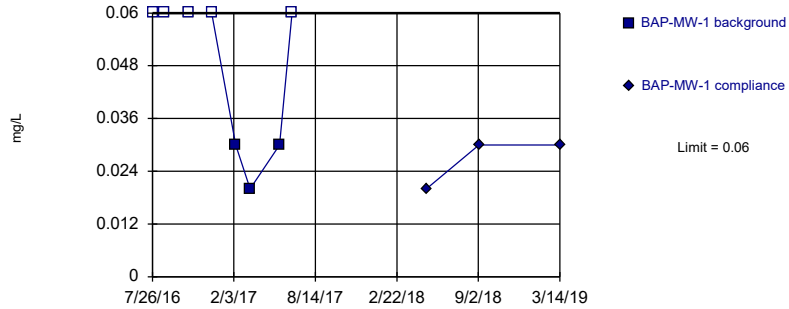


Background Data Summary: Mean=0.05125, Std. Dev.=0.01727, n=8. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.919, critical = 0.749. Kappa = 2.831 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254.

Constituent: Fluoride, total Analysis Run 7/8/2019 4:17 PM View: PL's - Intrawell
 Amos BAP Client: Geosyntec Data: Amos BAP

Within Limit

Prediction Limit
Intrawell Non-parametric

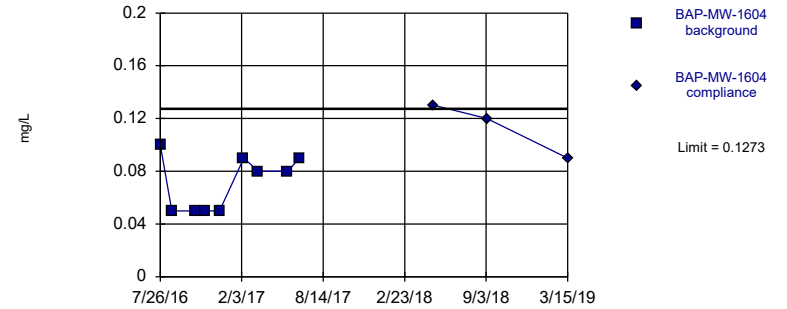


Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 8 background values. 62.5% NDs. Well-constituent pair annual alpha = 0.04242. Individual comparison alpha = 0.02144 (1 of 2).

Constituent: Fluoride, total Analysis Run 7/8/2019 4:17 PM View: PL's - Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

Within Limit

Prediction Limit
Intrawell Parametric

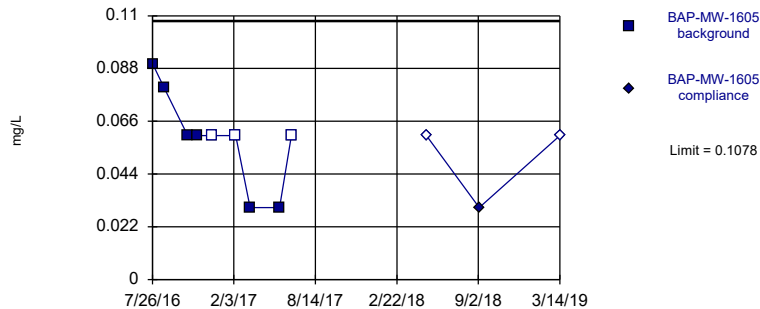


Background Data Summary: Mean=0.07111, Std. Dev.=0.02088, n=9. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.81, critical = 0.764. Kappa = 2.69 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254.

Constituent: Fluoride, total Analysis Run 7/8/2019 4:17 PM View: PL's - Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

Within Limit

Prediction Limit
Intrawell Parametric

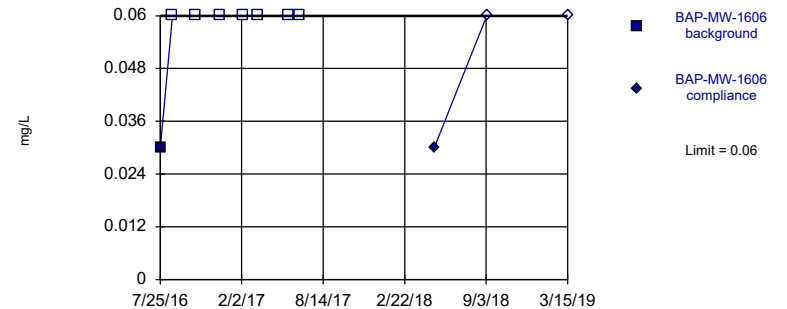


Background Data Summary (after Kaplan-Meier Adjustment): Mean=0.04556, Std. Dev.=0.02315, n=9, 33.33% NDs. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8602, critical = 0.764. Kappa = 2.69 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254.

Constituent: Fluoride, total Analysis Run 7/8/2019 4:17 PM View: PL's - Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

Within Limit

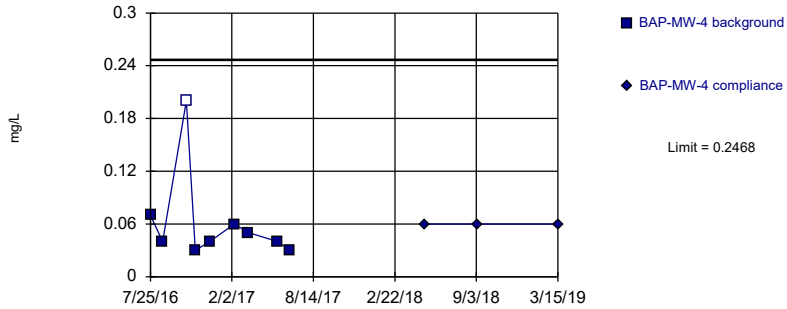
Prediction Limit
Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 8 background values. 87.5% NDs. Well-constituent pair annual alpha = 0.04242. Individual comparison alpha = 0.02144 (1 of 2).

Constituent: Fluoride, total Analysis Run 7/8/2019 4:17 PM View: PL's - Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

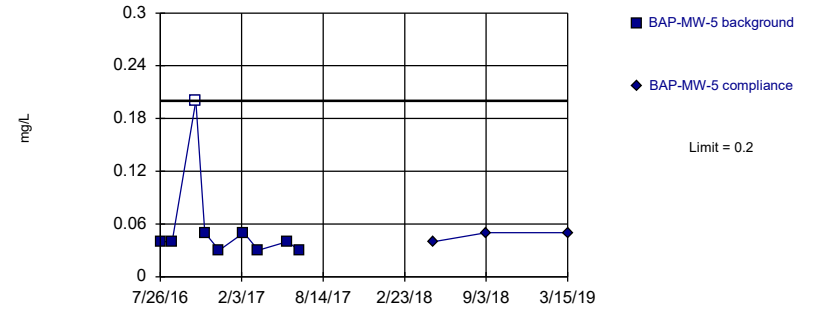
Within Limit Prediction Limit
Intrawell Parametric



Background Data Summary (based on natural log transformation): Mean=-2.972, Std. Dev.=0.5846, n=9, 11.11% NDs. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8153, critical = 0.764. Kappa = 2.69 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254.

Constituent: Fluoride, total Analysis Run 7/8/2019 4:17 PM View: PL's - Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

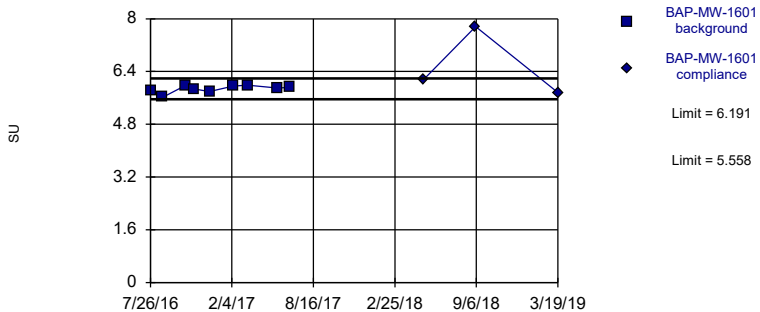
Within Limit Prediction Limit
Intrawell Non-parametric



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 9 background values. 11.11% NDs. Well-constituent pair annual alpha = 0.03586. Individual comparison alpha = 0.01809 (1 of 2).

Constituent: Fluoride, total Analysis Run 7/8/2019 4:17 PM View: PL's - Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

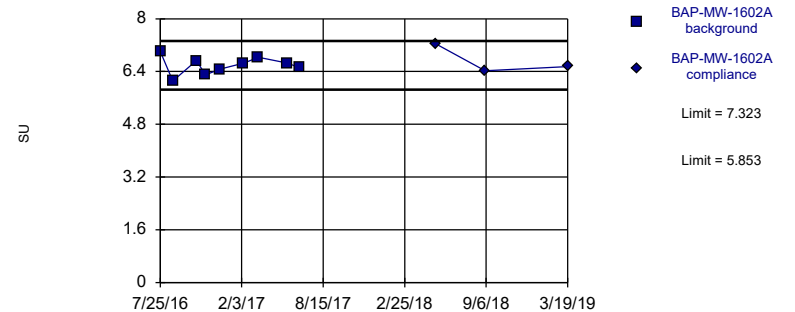
Within Limits Prediction Limit
Intrawell Parametric



Background Data Summary: Mean=5.874, Std. Dev.=0.1176, n=9. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8865, critical = 0.764. Kappa = 2.69 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254.

Constituent: pH, field Analysis Run 7/8/2019 4:17 PM View: PL's - Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

Within Limits Prediction Limit
Intrawell Parametric

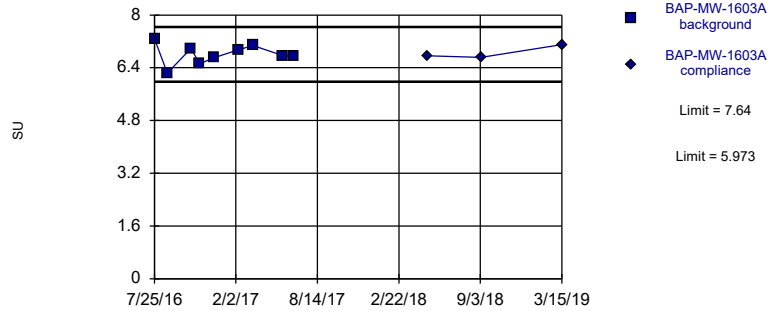


Background Data Summary: Mean=6.588, Std. Dev.=0.2732, n=9. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9838, critical = 0.764. Kappa = 2.69 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254.

Constituent: pH, field Analysis Run 7/8/2019 4:17 PM View: PL's - Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

Within Limits

Prediction Limit
Intrawell Parametric

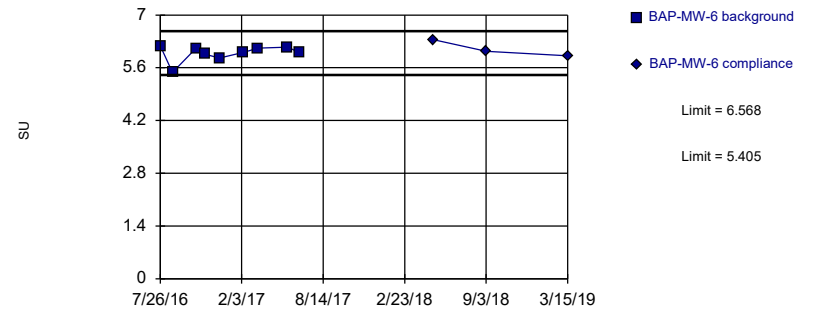


Background Data Summary: Mean=6.807, Std. Dev.=0.3098, n=9. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9809, critical = 0.764. Kappa = 2.69 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254.

Constituent: pH, field Analysis Run 7/8/2019 4:18 PM View: PL's - Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

Within Limits

Prediction Limit
Intrawell Parametric

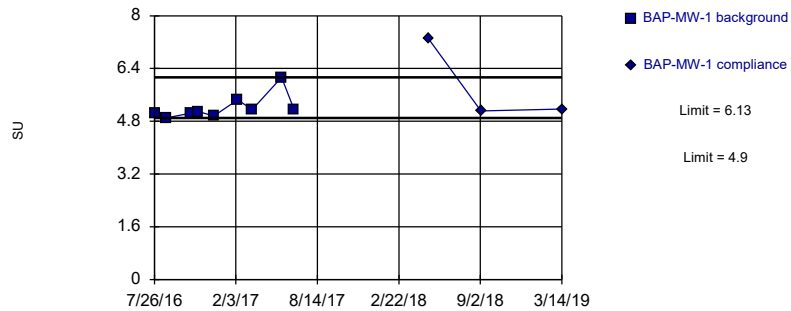


Background Data Summary: Mean=5.987, Std. Dev.=0.2162, n=9. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.807, critical = 0.764. Kappa = 2.69 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254.

Constituent: pH, field Analysis Run 7/8/2019 4:18 PM View: PL's - Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

Within Limits

Prediction Limit
Intrawell Non-parametric

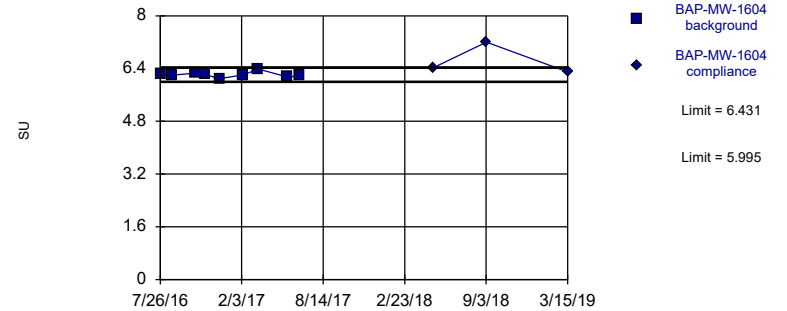


Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limits are highest and lowest of 9 background values. Well-constituent pair annual alpha = 0.07172. Individual comparison alpha = 0.03619 (1 of 2).

Constituent: pH, field Analysis Run 7/8/2019 4:18 PM View: PL's - Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

Within Limits

Prediction Limit
Intrawell Parametric

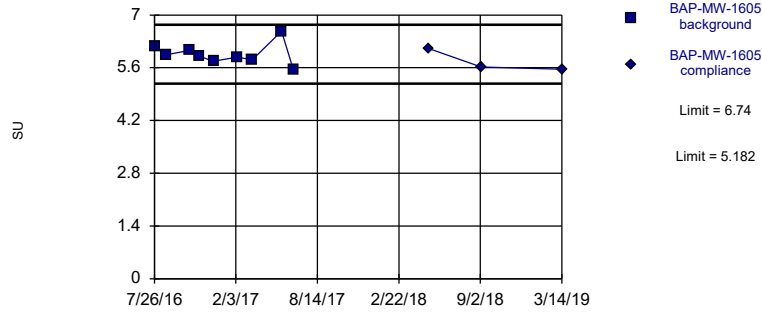


Background Data Summary: Mean=6.213, Std. Dev.=0.08109, n=9. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9491, critical = 0.764. Kappa = 2.69 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254.

Constituent: pH, field Analysis Run 7/8/2019 4:18 PM View: PL's - Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

Within Limits

Prediction Limit
Intrawell Parametric

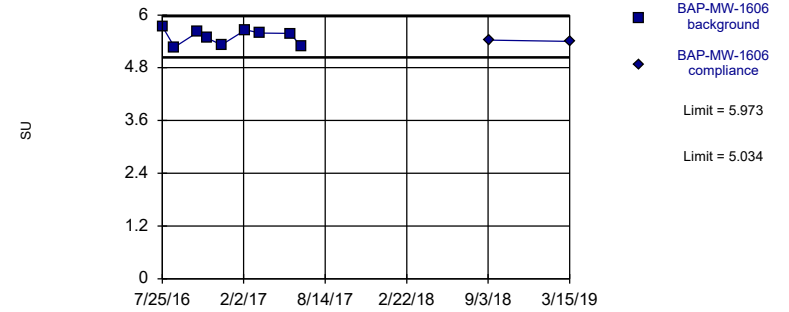


Background Data Summary: Mean=5.961, Std. Dev.=0.2895, n=9. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9339, critical = 0.764. Kappa = 2.69 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254.

Constituent: pH, field Analysis Run 7/8/2019 4:18 PM View: PL's - Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

Within Limits

Prediction Limit
Intrawell Parametric

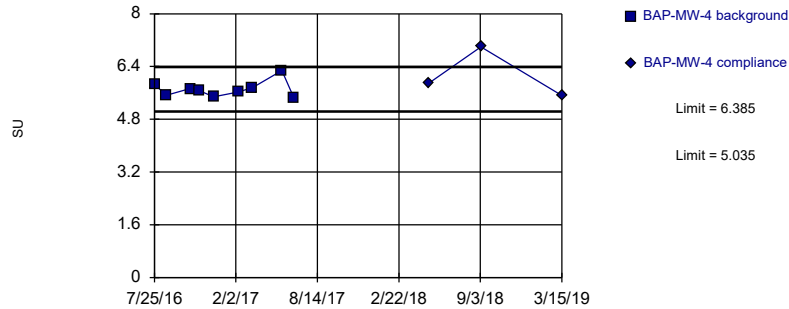


Background Data Summary: Mean=5.503, Std. Dev.=0.1746, n=9. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8973, critical = 0.764. Kappa = 2.69 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254.

Constituent: pH, field Analysis Run 7/8/2019 4:18 PM View: PL's - Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

Within Limits

Prediction Limit
Intrawell Parametric

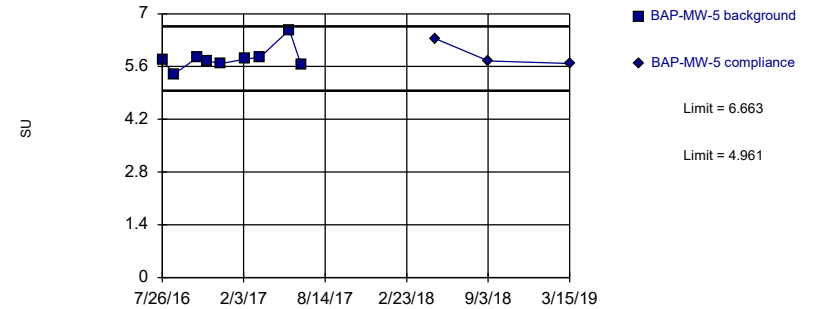


Background Data Summary: Mean=5.71, Std. Dev.=0.2508, n=9. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8598, critical = 0.764. Kappa = 2.69 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254.

Constituent: pH, field Analysis Run 7/8/2019 4:18 PM View: PL's - Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

Within Limits

Prediction Limit
Intrawell Parametric



Background Data Summary: Mean=5.812, Std. Dev.=0.3162, n=9. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.7908, critical = 0.764. Kappa = 2.69 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254.

Constituent: pH, field Analysis Run 7/8/2019 4:18 PM View: PL's - Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

FIGURE E: TREND TESTS

Trend Test Summary Table - Significant Results

Amos BAP Client: Geosyntec Data: Amos BAP Printed 7/8/2019, 4:12 PM

<u>Constituent</u>	<u>Well</u>	<u>Slope</u>	<u>Calc.</u>	<u>Critical</u>	<u>Sig.</u>	<u>N</u>	<u>%NDs</u>	<u>Normality</u>	<u>Xform</u>	<u>Alpha</u>	<u>Method</u>
Chloride, total (mg/L)	BAP-MW-1601 (bg)	1.691	42	38	Yes	12	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	BAP-MW-1606	39.66	45	34	Yes	11	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-1606	66.32	35	34	Yes	11	0	n/a	n/a	0.01	NP

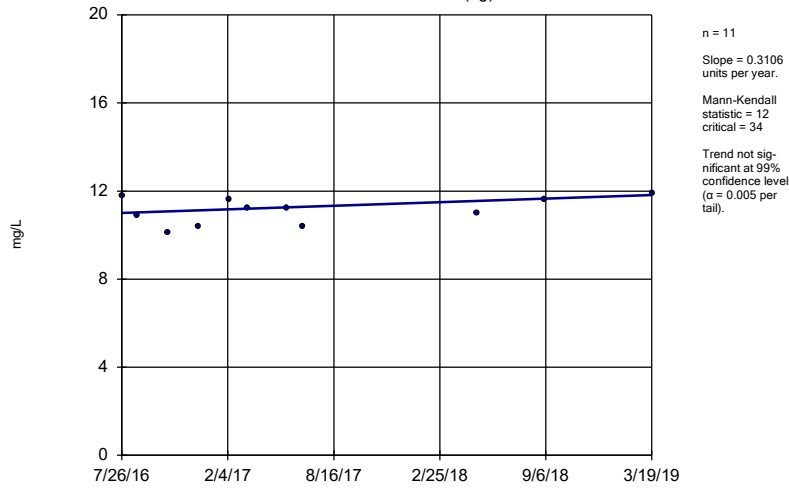
Trend Test Summary Table - All Results

Amos BAP Client: Geosyntec Data: Amos BAP Printed 7/8/2019, 4:12 PM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Calcium, total (mg/L)	BAP-MW-1601 (bg)	0.3106	12	34	No	11	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	BAP-MW-1602A (bg)	0.4257	17	34	No	11	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	BAP-MW-1603A (bg)	-0.8588	-25	-34	No	11	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	BAP-MW-6 (bg)	0	-3	-34	No	11	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	BAP-MW-1	-2.001	-22	-34	No	11	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	BAP-MW-1605	-4.297	-29	-34	No	11	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	BAP-MW-1606	4.813	30	34	No	11	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	BAP-MW-1601 (bg)	1.691	42	38	Yes	12	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	BAP-MW-1602A (bg)	0.9824	30	34	No	11	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	BAP-MW-1603A (bg)	0.002683	0	38	No	12	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	BAP-MW-6 (bg)	0.2236	9	34	No	11	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	BAP-MW-1	2.421	11	34	No	11	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	BAP-MW-1605	-7.725	-35	-38	No	12	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	BAP-MW-1606	39.66	45	34	Yes	11	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	BAP-MW-1601 (bg)	1.675	12	38	No	12	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	BAP-MW-1602A (bg)	-1.157	-11	-34	No	11	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	BAP-MW-1603A (bg)	0	-1	-38	No	12	83.33	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	BAP-MW-6 (bg)	-0.711	-21	-34	No	11	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	BAP-MW-1	-1.474	-10	-34	No	11	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	BAP-MW-1605	24.91	35	38	No	12	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	BAP-MW-1606	14.87	25	34	No	11	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-1601 (bg)	22.43	36	38	No	12	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-1602A (bg)	6.657	7	34	No	11	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-1603A (bg)	-2.598	-7	-38	No	12	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-6 (bg)	-6.626	-7	-34	No	11	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-1	1.334	7	34	No	11	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-1605	17.3	15	34	No	11	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-1606	66.32	35	34	Yes	11	0	n/a	n/a	0.01	NP

Sen's Slope Estimator

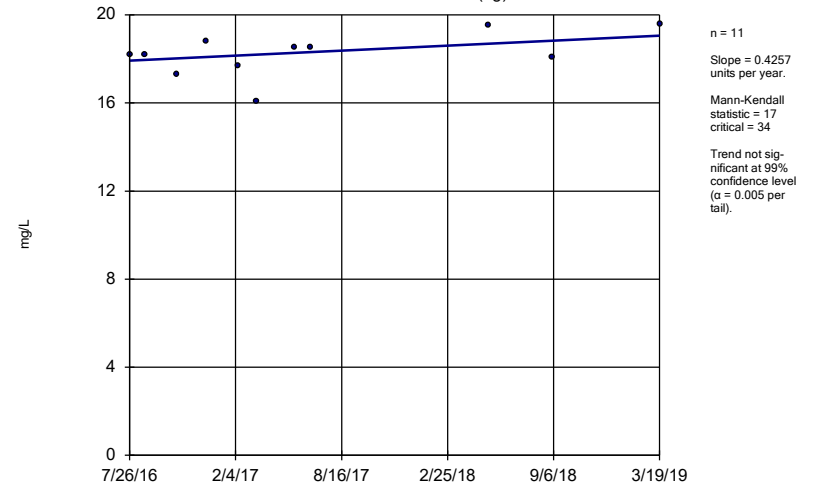
BAP-MW-1601 (bg)



Constituent: Calcium, total Analysis Run 7/8/2019 4:07 PM View: Trend Tests
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

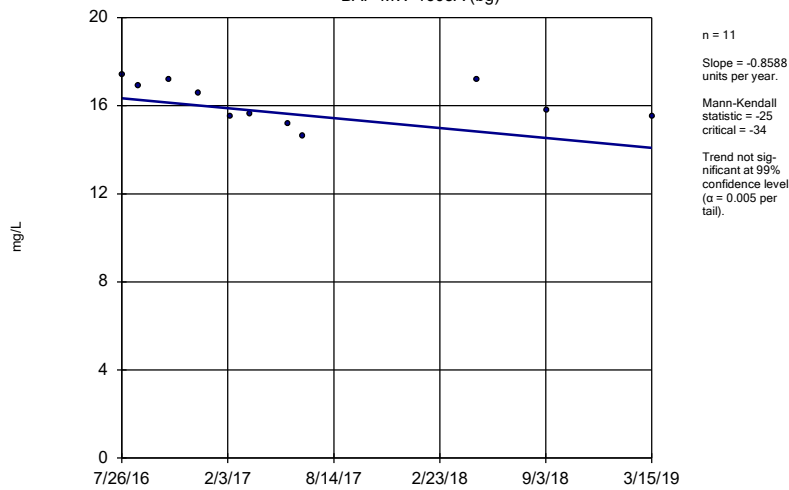
BAP-MW-1602A (bg)



Constituent: Calcium, total Analysis Run 7/8/2019 4:07 PM View: Trend Tests
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

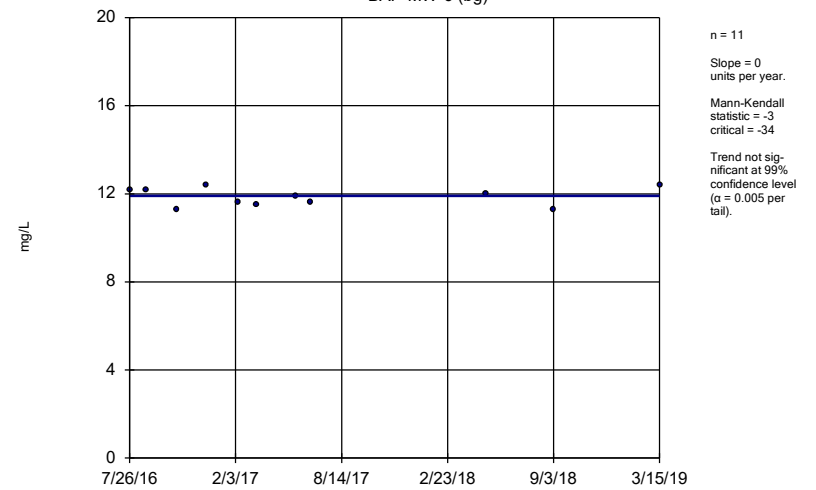
BAP-MW-1603A (bg)



Constituent: Calcium, total Analysis Run 7/8/2019 4:07 PM View: Trend Tests
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

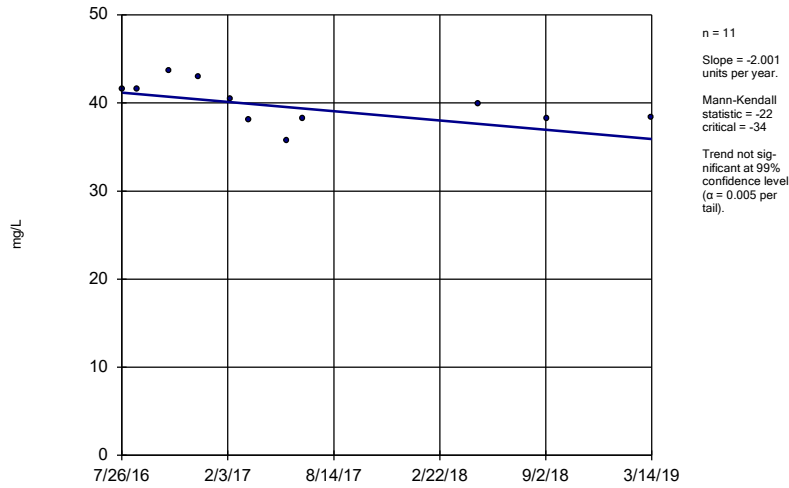
BAP-MW-6 (bg)



Constituent: Calcium, total Analysis Run 7/8/2019 4:07 PM View: Trend Tests
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

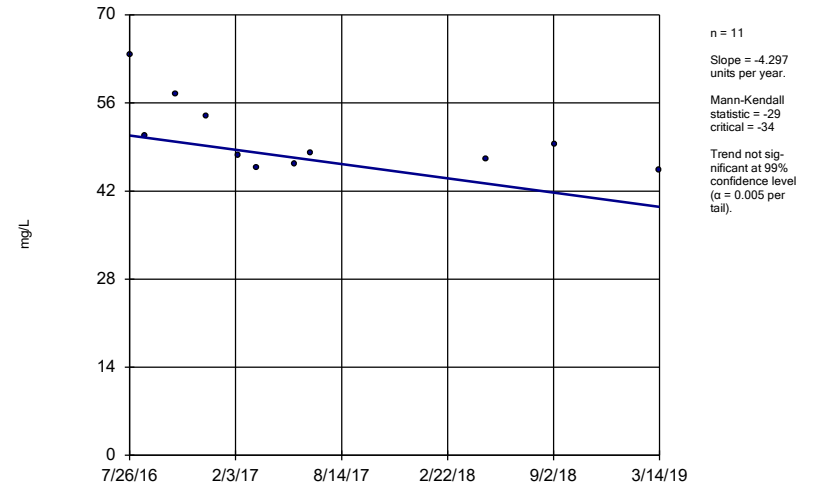
BAP-MW-1



Constituent: Calcium, total Analysis Run 7/8/2019 4:07 PM View: Trend Tests
 Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

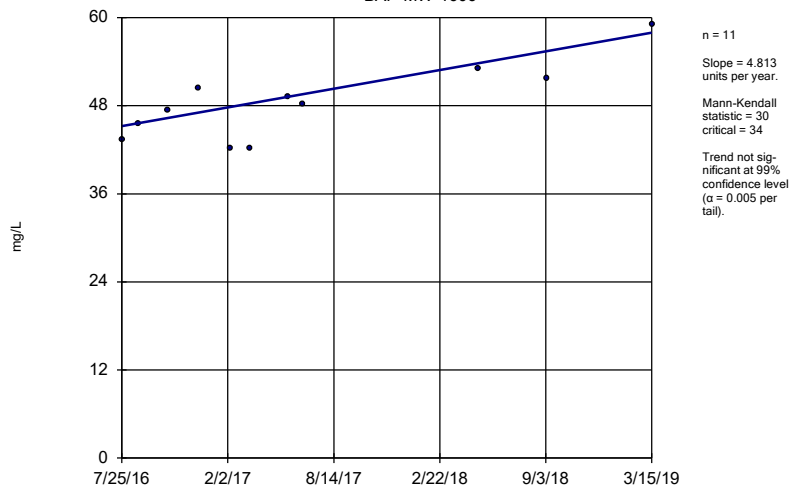
BAP-MW-1605



Constituent: Calcium, total Analysis Run 7/8/2019 4:07 PM View: Trend Tests
 Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

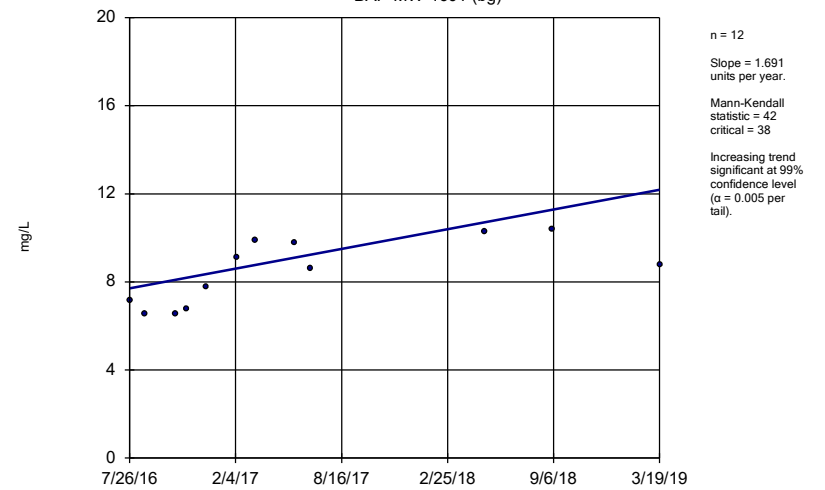
BAP-MW-1606



Constituent: Calcium, total Analysis Run 7/8/2019 4:07 PM View: Trend Tests
 Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

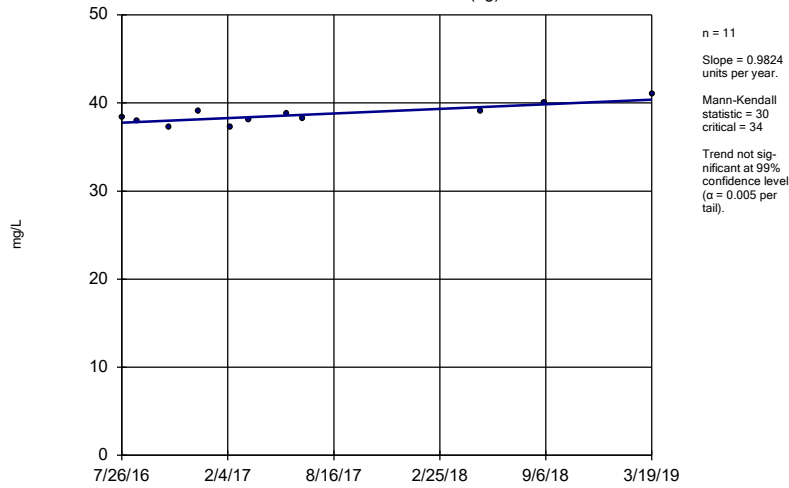
BAP-MW-1601 (bg)



Constituent: Chloride, total Analysis Run 7/8/2019 4:07 PM View: Trend Tests
 Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

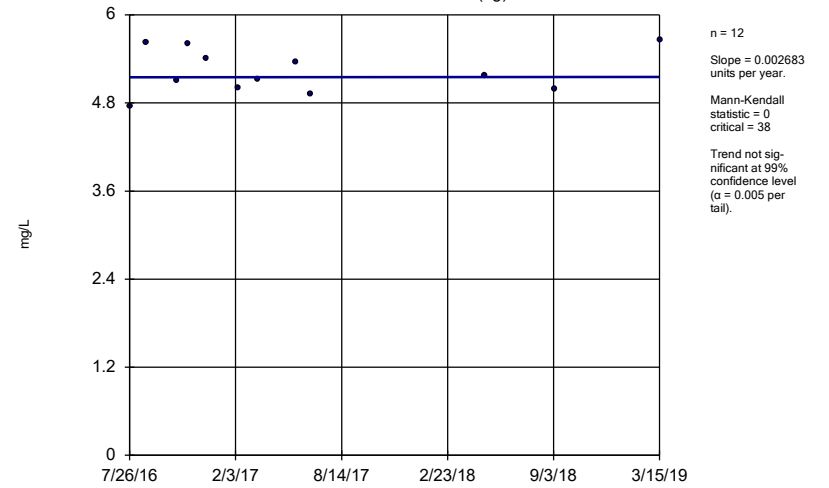
BAP-MW-1602A (bg)



Constituent: Chloride, total Analysis Run 7/8/2019 4:07 PM View: Trend Tests
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

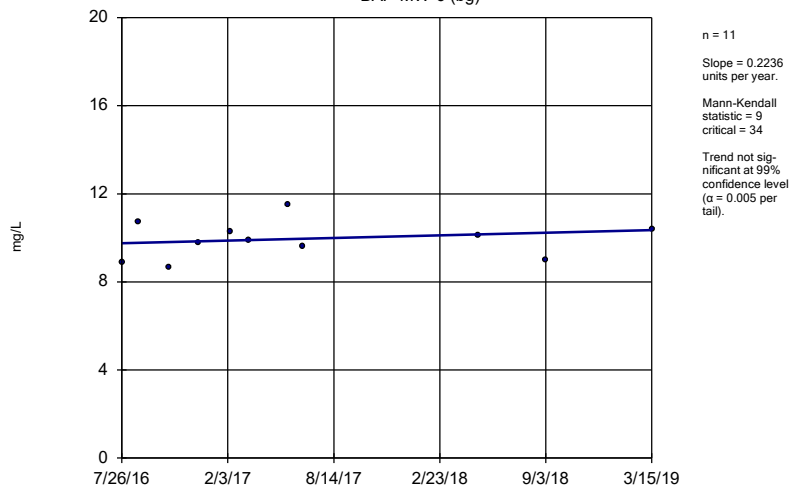
BAP-MW-1603A (bg)



Constituent: Chloride, total Analysis Run 7/8/2019 4:07 PM View: Trend Tests
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

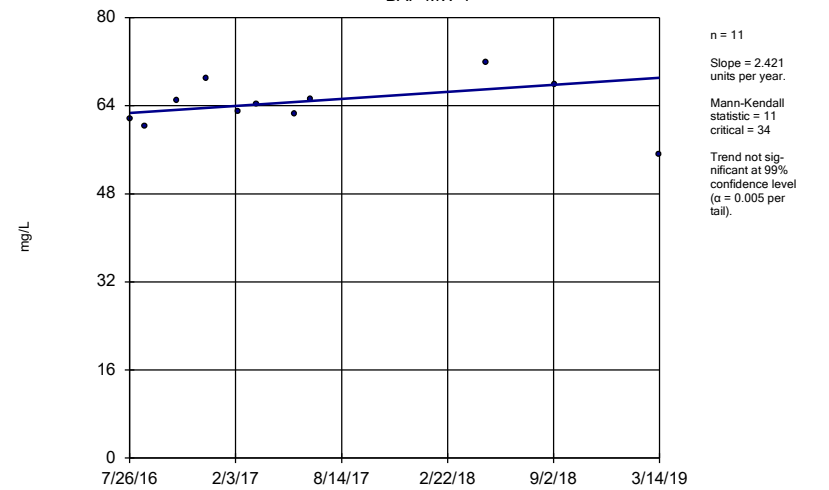
BAP-MW-6 (bg)



Constituent: Chloride, total Analysis Run 7/8/2019 4:07 PM View: Trend Tests
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

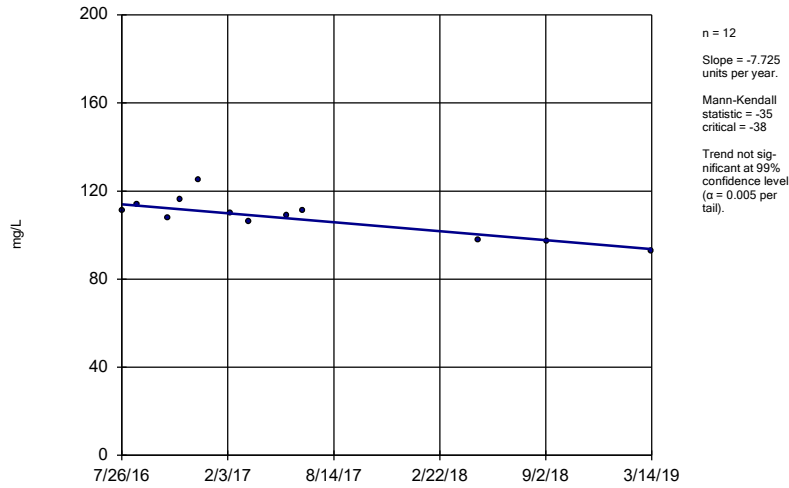
BAP-MW-1



Constituent: Chloride, total Analysis Run 7/8/2019 4:07 PM View: Trend Tests
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

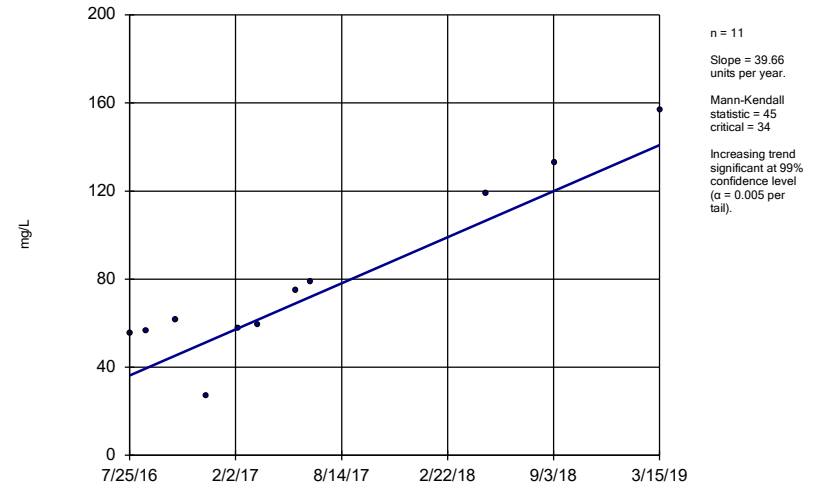
BAP-MW-1605



Constituent: Chloride, total Analysis Run 7/8/2019 4:08 PM View: Trend Tests
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

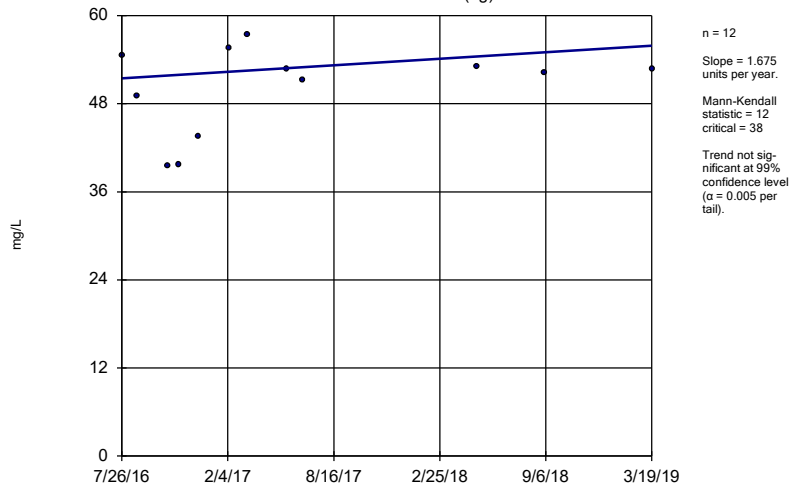
BAP-MW-1606



Constituent: Chloride, total Analysis Run 7/8/2019 4:08 PM View: Trend Tests
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

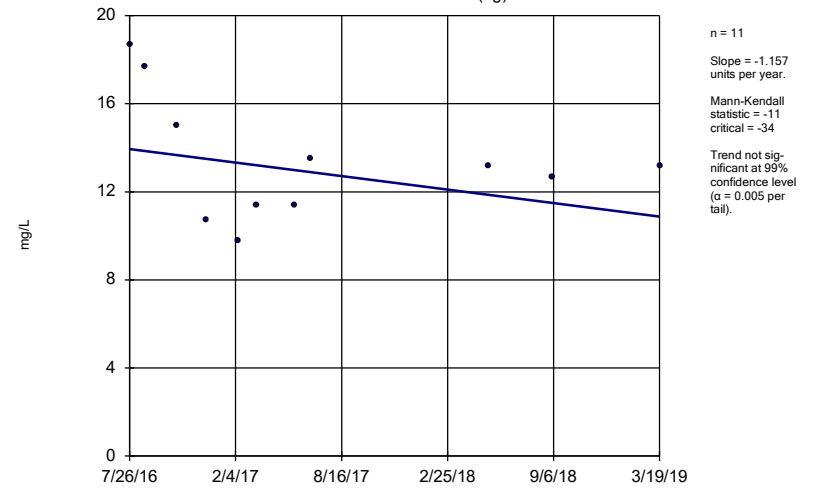
BAP-MW-1601 (bg)



Constituent: Sulfate, total Analysis Run 7/8/2019 4:08 PM View: Trend Tests
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

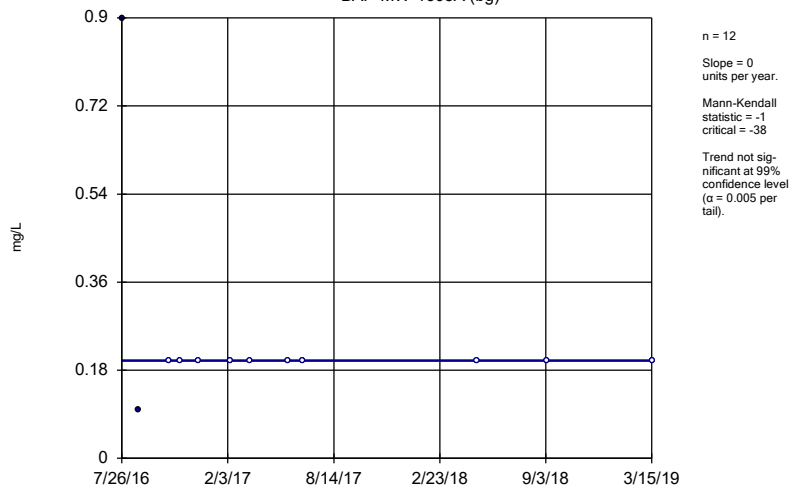
BAP-MW-1602A (bg)



Constituent: Sulfate, total Analysis Run 7/8/2019 4:08 PM View: Trend Tests
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

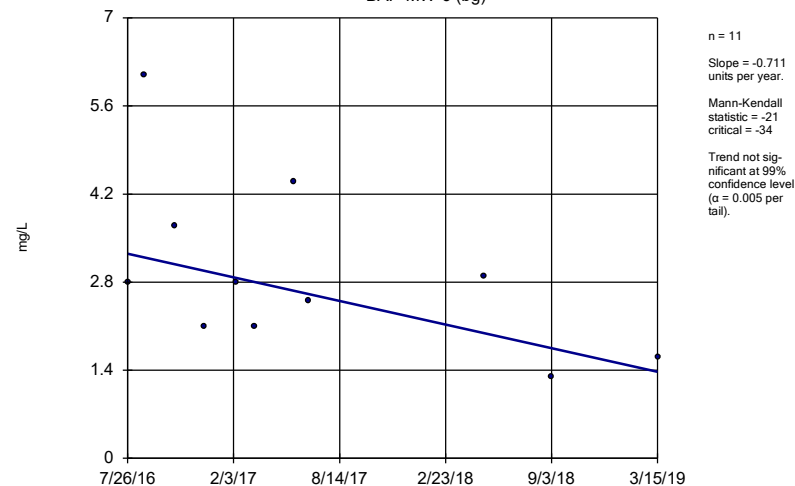
BAP-MW-1603A (bg)



Constituent: Sulfate, total Analysis Run 7/8/2019 4:08 PM View: Trend Tests
 Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

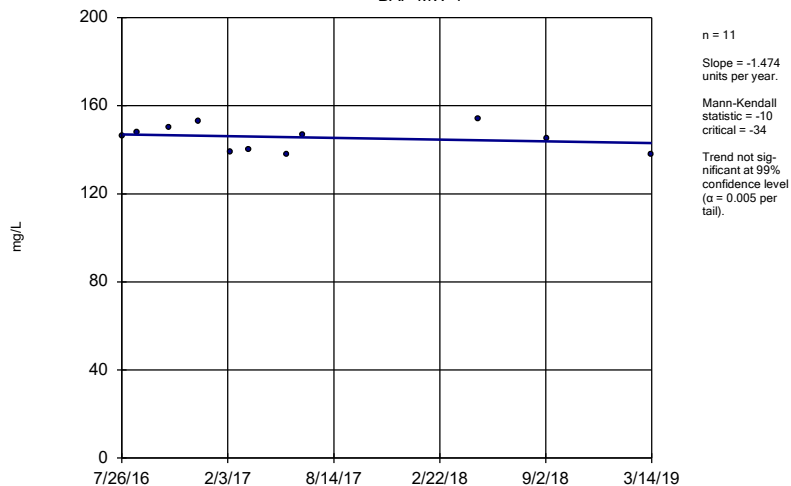
BAP-MW-6 (bg)



Constituent: Sulfate, total Analysis Run 7/8/2019 4:08 PM View: Trend Tests
 Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

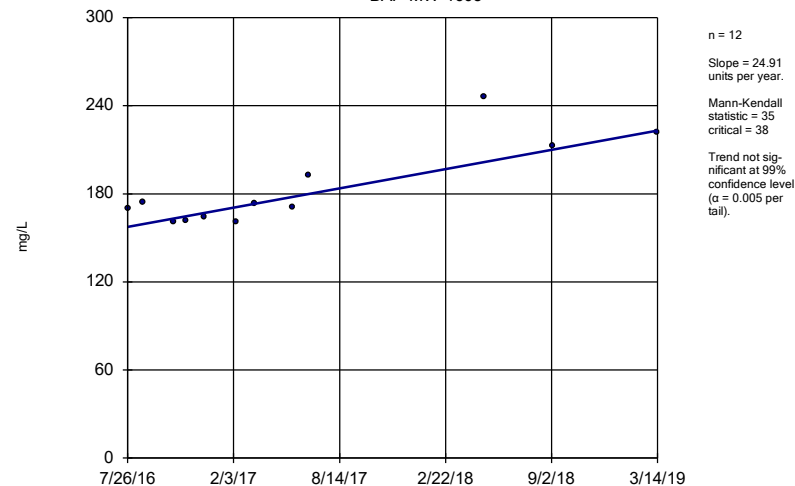
BAP-MW-1



Constituent: Sulfate, total Analysis Run 7/8/2019 4:08 PM View: Trend Tests
 Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

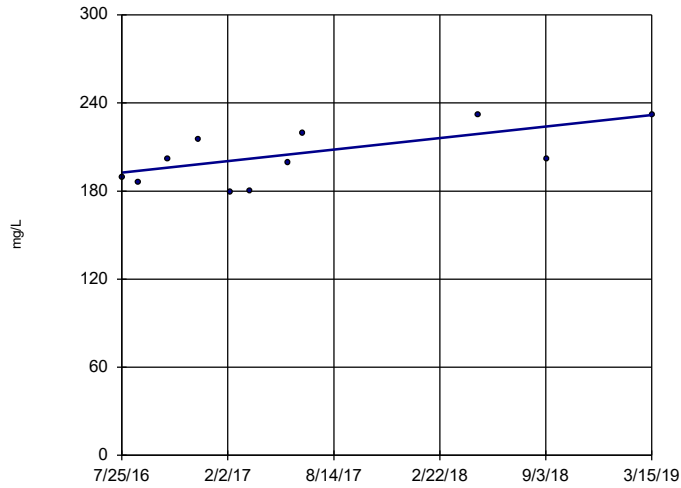
BAP-MW-1605



Constituent: Sulfate, total Analysis Run 7/8/2019 4:08 PM View: Trend Tests
 Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

BAP-MW-1606

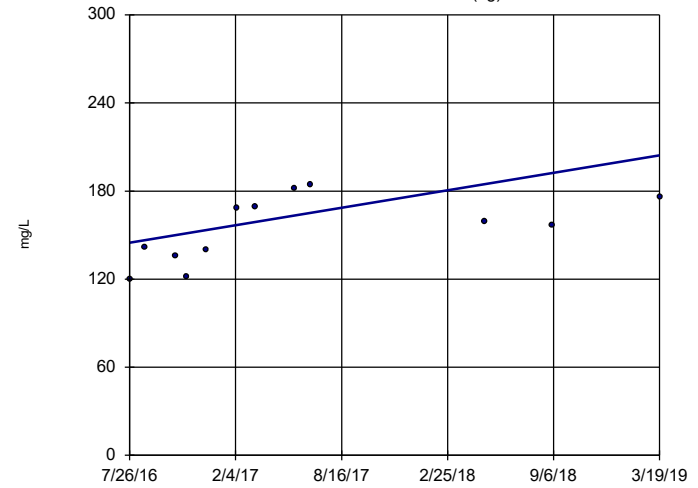


n = 11
 Slope = 14.87
 units per year.
 Mann-Kendall
 statistic = 25
 critical = 34
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Sulfate, total Analysis Run 7/8/2019 4:08 PM View: Trend Tests
 Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

BAP-MW-1601 (bg)

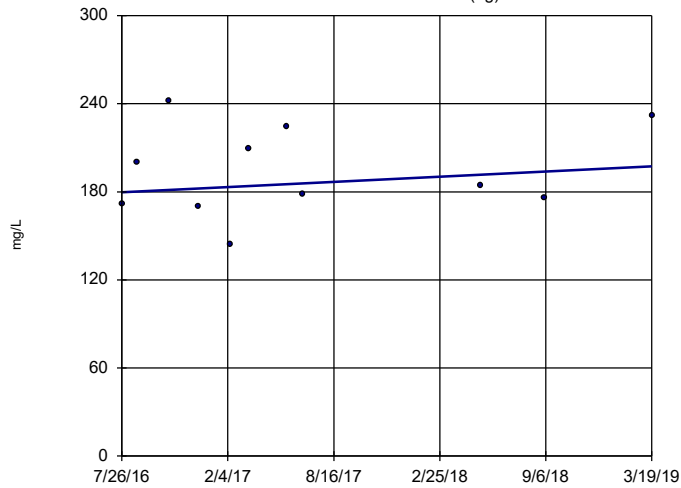


n = 12
 Slope = 22.43
 units per year.
 Mann-Kendall
 statistic = 36
 critical = 38
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Total Dissolved Solids [TDS] Analysis Run 7/8/2019 4:08 PM View: Trend Tests
 Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

BAP-MW-1602A (bg)

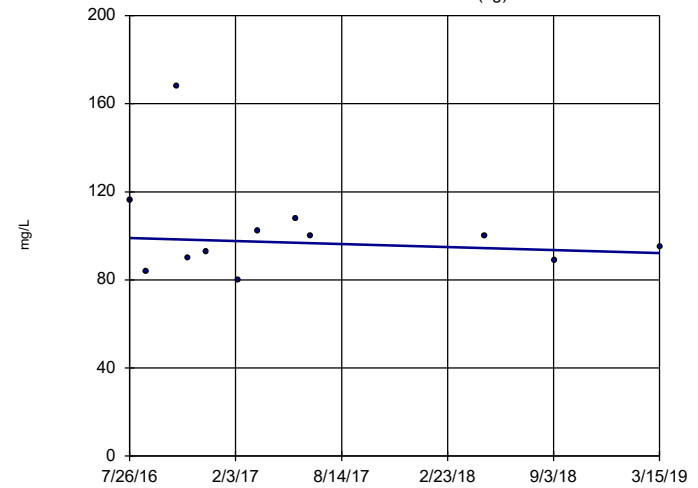


n = 11
 Slope = 6.657
 units per year.
 Mann-Kendall
 statistic = 7
 critical = 34
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Total Dissolved Solids [TDS] Analysis Run 7/8/2019 4:08 PM View: Trend Tests
 Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

BAP-MW-1603A (bg)

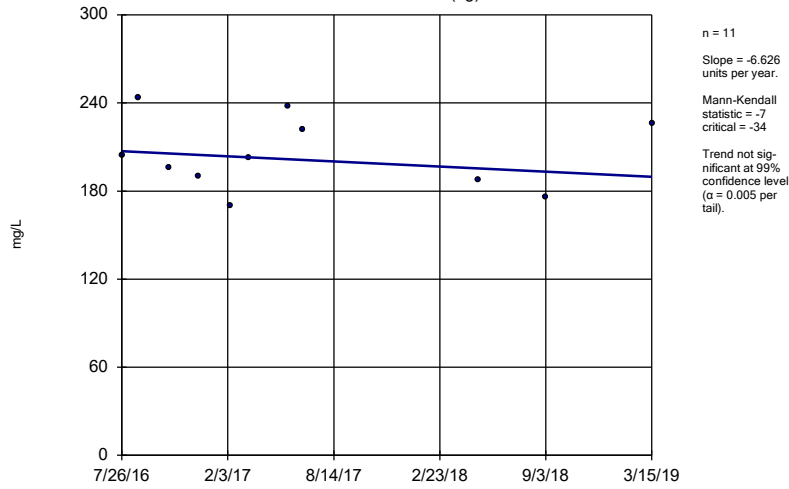


n = 12
 Slope = -2.598
 units per year.
 Mann-Kendall
 statistic = -7
 critical = -38
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Total Dissolved Solids [TDS] Analysis Run 7/8/2019 4:08 PM View: Trend Tests
 Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

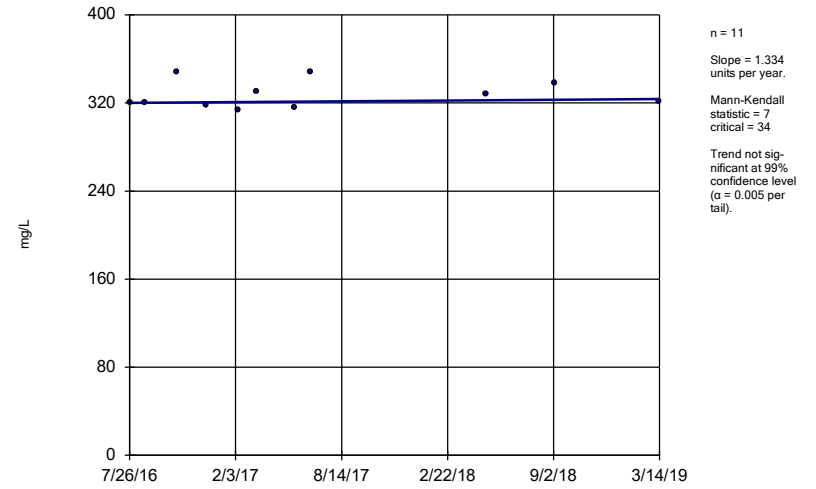
BAP-MW-6 (bg)



Constituent: Total Dissolved Solids [TDS] Analysis Run 7/8/2019 4:08 PM View: Trend Tests
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

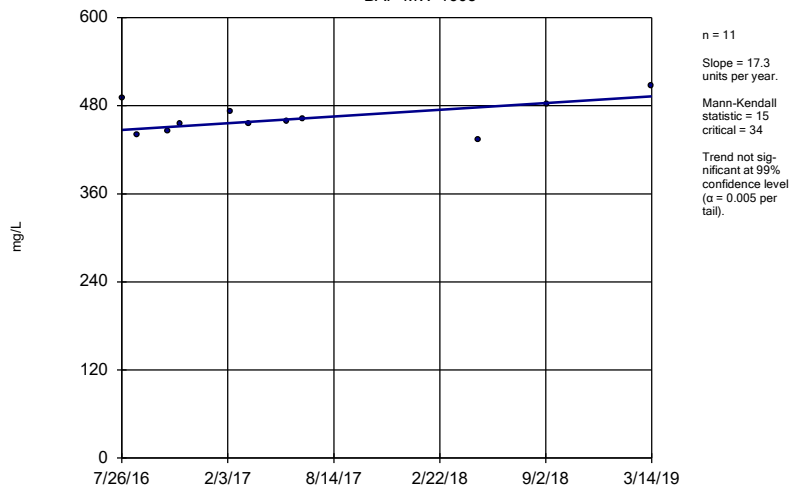
BAP-MW-1



Constituent: Total Dissolved Solids [TDS] Analysis Run 7/8/2019 4:08 PM View: Trend Tests
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

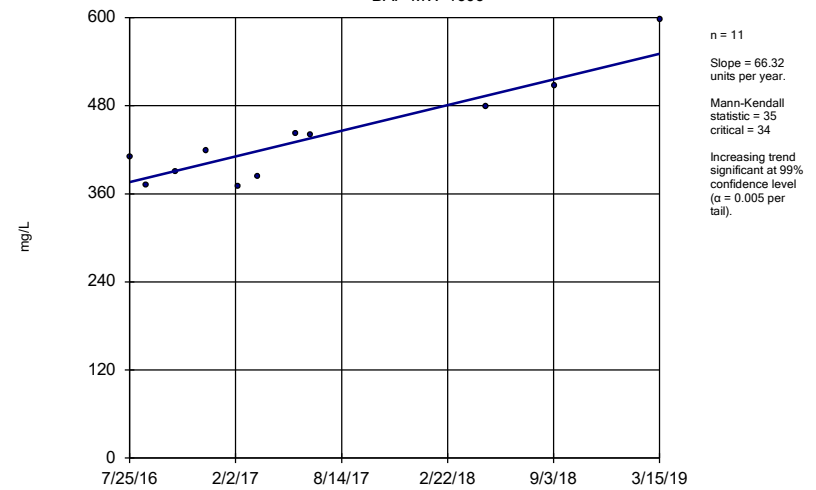
BAP-MW-1605



Constituent: Total Dissolved Solids [TDS] Analysis Run 7/8/2019 4:08 PM View: Trend Tests
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

BAP-MW-1606



Constituent: Total Dissolved Solids [TDS] Analysis Run 7/8/2019 4:08 PM View: Trend Tests
Amos BAP Client: Geosyntec Data: Amos BAP

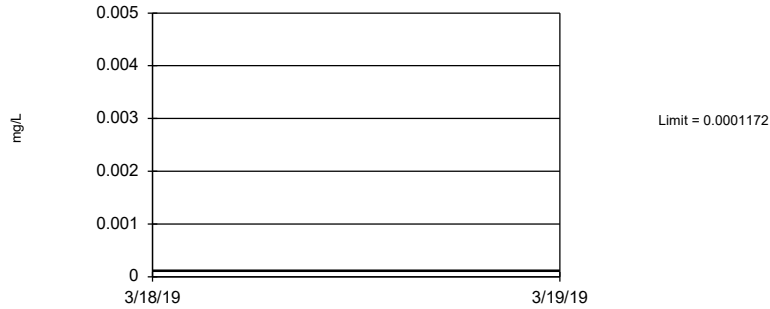
FIGURE F: TOLERANCE LIMITS

Tolerance Limit Summary Table

Amos BAP Client: Geosyntec Data: Amos BAP Printed 5/28/2019, 11:44 AM

<u>Constituent</u>	<u>Well</u>	<u>Upper Lim.</u>	<u>Bg N</u>	<u>Bg Mean</u>	<u>Std. Dev.</u>	<u>%NDs</u>	<u>ND Adj.</u>	<u>Transform</u>	<u>Alpha</u>	<u>Method</u>
Antimony, total (mg/L)	n/a	0.0001172	44	0.03269	0.007742	11.36	None	x^(1/3)	0.05	Inter
Arsenic, total (mg/L)	n/a	0.0899	44	n/a	n/a	0	n/a	n/a	0.1047	NP Inter(normality)
Barium, total (mg/L)	n/a	0.3029	44	0.1889	0.05429	0	None	No	0.05	Inter
Beryllium, total (mg/L)	n/a	0.0001031	44	0.006345	0.001816	2.273	None	sqrt(x)	0.05	Inter
Cadmium, total (mg/L)	n/a	0.00003	44	n/a	n/a	11.36	n/a	n/a	0.1047	NP Inter(normality)
Chromium, total (mg/L)	n/a	0.002592	44	0.02931	0.01029	0	None	sqrt(x)	0.05	Inter
Cobalt, total (mg/L)	n/a	0.03204	44	-5.822	1.134	0	None	ln(x)	0.05	Inter
Combined Radium 226 + 228 (pCi/L)	n/a	4.73	46	-0.01249	0.7507	0	None	ln(x)	0.05	Inter
Fluoride, total (mg/L)	n/a	0.29	46	n/a	n/a	2.174	n/a	n/a	0.09447	NP Inter(normality)
Lead, total (mg/L)	n/a	0.006355	44	0.09729	0.0419	0	None	x^(1/3)	0.05	Inter
Lithium, total (mg/L)	n/a	0.01321	44	-6.947	1.248	18.18	Kaplan-Meier	ln(x)	0.05	Inter
Mercury, total (mg/L)	n/a	0.000005	36	n/a	n/a	88.89	n/a	n/a	0.1578	NP Inter(NDs)
Molybdenum, total (mg/L)	n/a	0.002868	44	0.02938	0.01152	2.273	None	sqrt(x)	0.05	Inter
Selenium, total (mg/L)	n/a	0.0004	44	n/a	n/a	2.273	n/a	n/a	0.1047	NP Inter(normality)
Thallium, total (mg/L)	n/a	0.0005	44	n/a	n/a	15.91	n/a	n/a	0.1047	NP Inter(normality)

Tolerance Limit Interwell Parametric



95% coverage. Background Data Summary (based on cube root transformation): Mean=0.03269, Std. Dev.=0.007742, n=44, 11.36% NDs. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9335, critical = 0.924. Report alpha = 0.05.

Constituent: Antimony, total Analysis Run 5/28/2019 11:42 AM View: UTL's - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

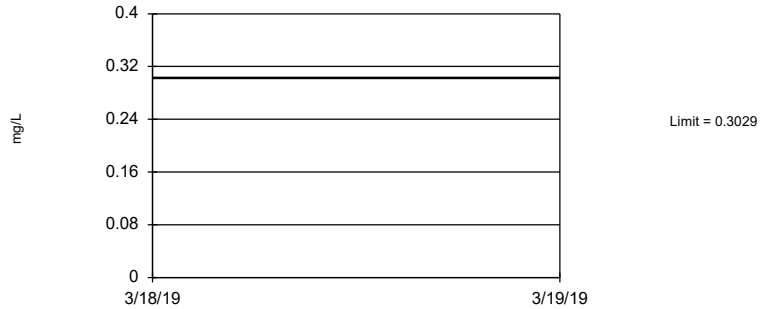
Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 44 background values. 90.04% coverage at alpha=0.01; 93.55% coverage at alpha=0.05; 98.24% coverage at alpha=0.5. Report alpha = 0.1047.

Constituent: Arsenic, total Analysis Run 5/28/2019 11:42 AM View: UTL's - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

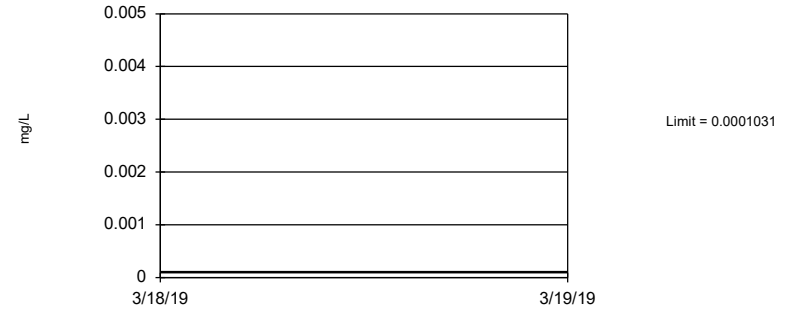
Tolerance Limit Interwell Parametric



95% coverage. Background Data Summary: Mean=0.1889, Std. Dev.=0.05429, n=44. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.95, critical = 0.924. Report alpha = 0.05.

Constituent: Barium, total Analysis Run 5/28/2019 11:42 AM View: UTL's - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

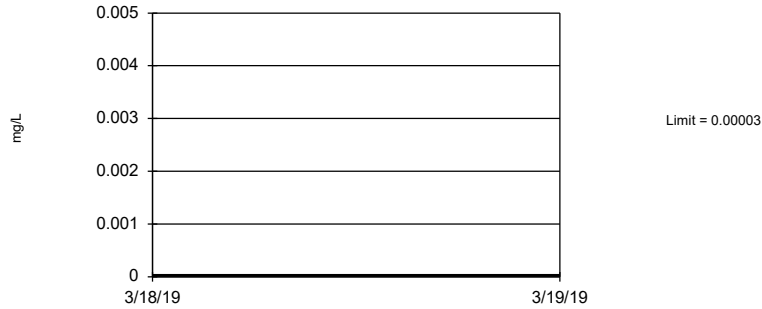
Tolerance Limit Interwell Parametric



95% coverage. Background Data Summary (based on square root transformation): Mean=0.006345, Std. Dev.=0.001816, n=44, 2.273% NDs. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9689, critical = 0.924. Report alpha = 0.05.

Constituent: Beryllium, total Analysis Run 5/28/2019 11:42 AM View: UTL's - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

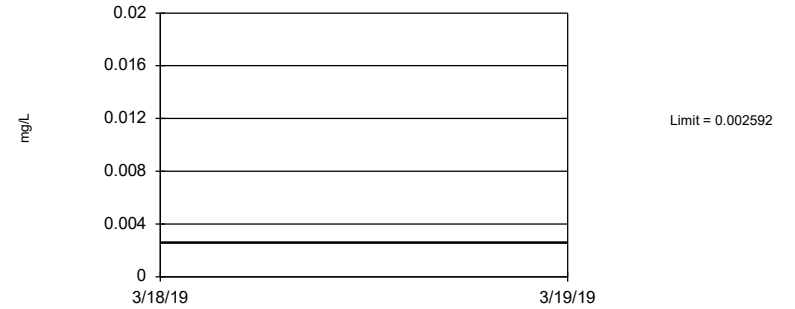
Tolerance Limit
Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 44 background values. 11.36% NDs. 90.04% coverage at alpha=0.01; 93.55% coverage at alpha=0.05; 98.24% coverage at alpha=0.5. Report alpha = 0.1047.

Constituent: Cadmium, total Analysis Run 5/28/2019 11:42 AM View: UTL's - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

Tolerance Limit
Interwell Parametric



95% coverage. Background Data Summary (based on square root transformation): Mean=0.02931, Std. Dev.=0.01029, n=44. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9802, critical = 0.924. Report alpha = 0.05.

Constituent: Chromium, total Analysis Run 5/28/2019 11:42 AM View: UTL's - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

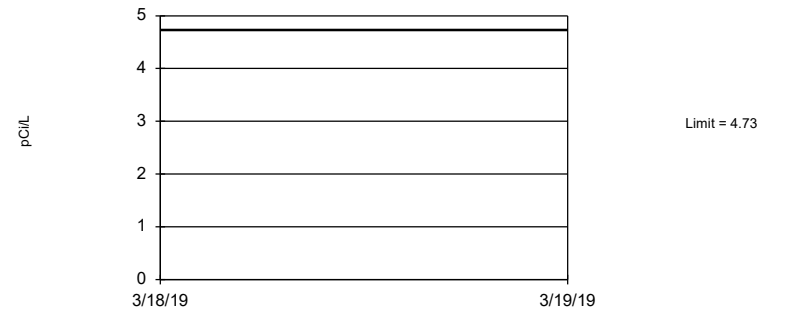
Tolerance Limit
Interwell Parametric



95% coverage. Background Data Summary (based on natural log transformation): Mean=-5.822, Std. Dev.=1.134, n=44. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9247, critical = 0.924. Report alpha = 0.05.

Constituent: Cobalt, total Analysis Run 5/28/2019 11:42 AM View: UTL's - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

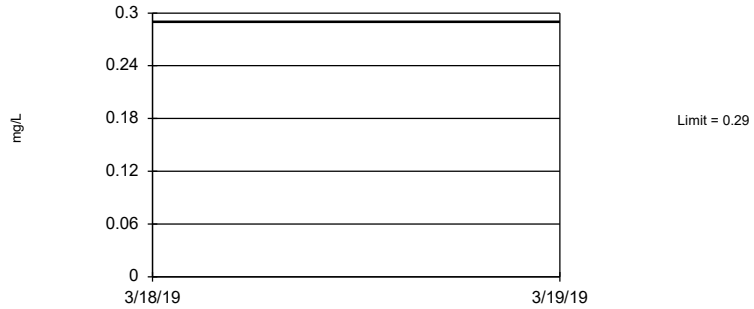
Tolerance Limit
Interwell Parametric



95% coverage. Background Data Summary (based on natural log transformation): Mean=-0.01249, Std. Dev.=0.7507, n=46. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9504, critical = 0.927. Report alpha = 0.05.

Constituent: Combined Radium 226 + 228 Analysis Run 5/28/2019 11:42 AM View: UTL's - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

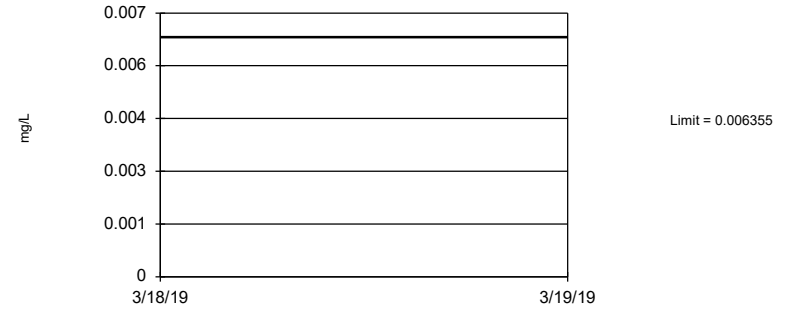
Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 46 background values. 2.174% NDs. 90.43% coverage at alpha=0.01; 93.55% coverage at alpha=0.05; 98.63% coverage at alpha=0.5. Report alpha = 0.09447.

Constituent: Fluoride, total Analysis Run 5/28/2019 11:42 AM View: UTL's - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

Tolerance Limit Interwell Parametric



95% coverage. Background Data Summary (based on cube root transformation): Mean=0.09729, Std. Dev.=0.0419, n=44. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9386, critical = 0.924. Report alpha = 0.05.

Constituent: Lead, total Analysis Run 5/28/2019 11:42 AM View: UTL's - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

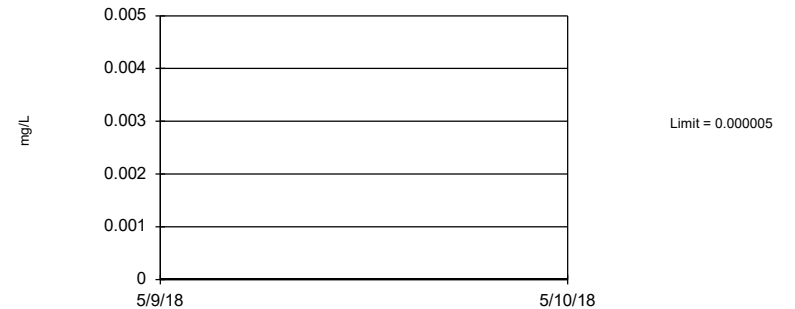
Tolerance Limit Interwell Parametric



95% coverage. Background Data Summary (based on natural log transformation) (after Kaplan-Meier Adjustment): Mean=-6.947, Std. Dev.=1.248, n=44, 18.18% NDs. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.932, critical = 0.924. Report alpha = 0.05.

Constituent: Lithium, total Analysis Run 5/28/2019 11:42 AM View: UTL's - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

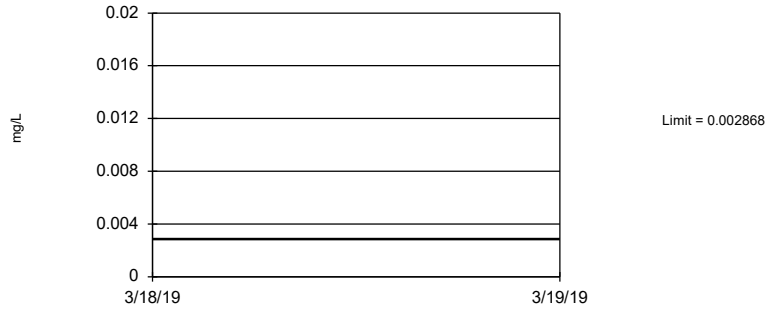
Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 75%. Limit is highest of 36 background values. 88.89% NDs. 88.09% coverage at alpha=0.01; 91.99% coverage at alpha=0.05; 98.24% coverage at alpha=0.5. Report alpha = 0.1578.

Constituent: Mercury, total Analysis Run 5/28/2019 11:42 AM View: UTL's - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

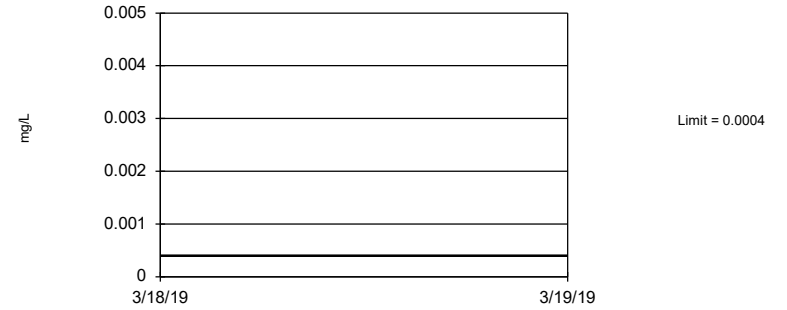
Tolerance Limit Interwell Parametric



95% coverage. Background Data Summary (based on square root transformation): Mean=0.02938, Std. Dev.=0.01152, n=44, 2.273% NDs. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9725, critical = 0.924. Report alpha = 0.05.

Constituent: Molybdenum, total Analysis Run 5/28/2019 11:42 AM View: UTL's - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

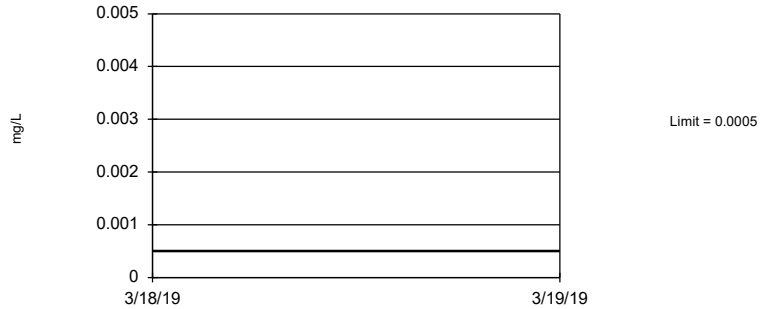
Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 44 background values. 2.273% NDs. 90.04% coverage at alpha=0.01; 93.55% coverage at alpha=0.05; 98.24% coverage at alpha=0.5. Report alpha = 0.1047.

Constituent: Selenium, total Analysis Run 5/28/2019 11:43 AM View: UTL's - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

Tolerance Limit Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 44 background values. 15.91% NDs. 90.04% coverage at alpha=0.01; 93.55% coverage at alpha=0.05; 98.24% coverage at alpha=0.5. Report alpha = 0.1047.

Constituent: Thallium, total Analysis Run 5/28/2019 11:43 AM View: UTL's - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

FIGURE G: GROUNDWATER PROTECTION STANDARDS

AMOS BAP GWPS				
Constituent Name	MCL	Rule-Based	Background	GWPS
Antimony, Total (mg/L)	0.006		0.00012	0.006
Arsenic, Total (mg/L)	0.01		0.09	0.09
Barium, Total (mg/L)	2		0.31	2
Beryllium, Total (mg/L)	0.004		0.0001	0.004
Cadmium, Total (mg/L)	0.005		0.00003	0.005
Chromium, Total (mg/L)	0.1		0.0026	0.1
Cobalt, Total (mg/L)	n/a	0.006	0.032	0.032
Combined Radium, Total (pCi/L)	5		4.7	5
Fluoride, Total (mg/L)	4		0.29	4
Lead, Total (mg/L)	0.015		0.0064	0.015
Lithium, Total (mg/L)	n/a	0.04	0.013	0.04
Mercury, Total (mg/L)	0.002		0.000005	0.002
Molybdenum, Total (mg/L)	n/a	0.1	0.0029	0.1
Selenium, Total (mg/L)	0.05		0.0004	0.05
Thallium, Total (mg/L)	0.002		0.0005	0.002

Grey cell indicates Background is higher than MCL.

MCL = Maximum Contaminant Level

GWPS - Groundwater Protection Standard

FIGURE H: CONFIDENCE INTERVALS

Confidence Interval Summary Table - All Results (No Significant Results)

Amos BAP Client: Geosyntec Data: Amos BAP Printed 5/28/2019, 11:56 AM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Lower Compl.	Sig.	N	%NDs	Transform	Alpha	Method
Antimony, total (mg/L)	BAP-MW-1	0.00005	0.00001	0.006	n/a	No	11	0	No	0.006	NP (normality)
Antimony, total (mg/L)	BAP-MW-1604	0.00004	0.00002	0.006	n/a	No	11	0	No	0.006	NP (normality)
Antimony, total (mg/L)	BAP-MW-1605	0.00003623	0.00001468	0.006	n/a	No	11	9.091	No	0.01	Param.
Antimony, total (mg/L)	BAP-MW-1606	0.00003233	0.00001676	0.006	n/a	No	11	0	No	0.01	Param.
Antimony, total (mg/L)	BAP-MW-4	0.00005	0.00002	0.006	n/a	No	11	18.18	No	0.006	NP (Cohens/xfm)
Antimony, total (mg/L)	BAP-MW-5	0.00004901	0.00001644	0.006	n/a	No	11	0	No	0.01	Param.
Arsenic, total (mg/L)	BAP-MW-1	0.0001655	0.0001108	0.09	n/a	No	11	0	No	0.01	Param.
Arsenic, total (mg/L)	BAP-MW-1604	0.005768	0.004262	0.09	n/a	No	11	0	x^(1/3)	0.01	Param.
Arsenic, total (mg/L)	BAP-MW-1605	0.004748	0.003288	0.09	n/a	No	11	0	No	0.01	Param.
Arsenic, total (mg/L)	BAP-MW-1606	0.00325	0.002537	0.09	n/a	No	11	0	No	0.01	Param.
Arsenic, total (mg/L)	BAP-MW-4	0.01092	0.002981	0.09	n/a	No	11	0	No	0.01	Param.
Arsenic, total (mg/L)	BAP-MW-5	0.003495	0.002638	0.09	n/a	No	11	0	No	0.01	Param.
Barium, total (mg/L)	BAP-MW-1	0.02952	0.02648	2	n/a	No	11	0	No	0.01	Param.
Barium, total (mg/L)	BAP-MW-1604	0.144	0.1289	2	n/a	No	11	0	No	0.01	Param.
Barium, total (mg/L)	BAP-MW-1605	0.08785	0.0706	2	n/a	No	11	0	No	0.01	Param.
Barium, total (mg/L)	BAP-MW-1606	0.06912	0.05888	2	n/a	No	11	0	No	0.01	Param.
Barium, total (mg/L)	BAP-MW-4	0.09546	0.08503	2	n/a	No	11	0	No	0.01	Param.
Barium, total (mg/L)	BAP-MW-5	0.1641	0.1497	2	n/a	No	11	0	No	0.01	Param.
Beryllium, total (mg/L)	BAP-MW-1	0.000129	0.00011	0.004	n/a	No	11	0	No	0.01	Param.
Beryllium, total (mg/L)	BAP-MW-1604	0.00007	0.000038	0.004	n/a	No	11	0	No	0.006	NP (normality)
Beryllium, total (mg/L)	BAP-MW-1605	0.00007079	0.00004212	0.004	n/a	No	11	0	No	0.01	Param.
Beryllium, total (mg/L)	BAP-MW-1606	0.0001251	0.00008397	0.004	n/a	No	11	0	No	0.01	Param.
Beryllium, total (mg/L)	BAP-MW-4	0.00005619	0.00004308	0.004	n/a	No	11	0	No	0.01	Param.
Beryllium, total (mg/L)	BAP-MW-5	0.00006027	0.00003645	0.004	n/a	No	11	0	No	0.01	Param.
Cadmium, total (mg/L)	BAP-MW-1	0.002962	0.002227	0.005	n/a	No	11	0	No	0.01	Param.
Cadmium, total (mg/L)	BAP-MW-1604	0.00005	0.000005	0.005	n/a	No	11	72.73	No	0.006	NP (normality)
Cadmium, total (mg/L)	BAP-MW-1605	0.00005	0.000005	0.005	n/a	No	11	72.73	No	0.006	NP (normality)
Cadmium, total (mg/L)	BAP-MW-1606	0.00019	0.00012	0.005	n/a	No	11	0	No	0.006	NP (normality)
Cadmium, total (mg/L)	BAP-MW-4	0.0002288	0.00004804	0.005	n/a	No	11	0	sqrt(x)	0.01	Param.
Cadmium, total (mg/L)	BAP-MW-5	0.00001	0.000006	0.005	n/a	No	11	9.091	No	0.006	NP (normality)
Chromium, total (mg/L)	BAP-MW-1	0.0005442	0.0001063	0.1	n/a	No	11	0	x^(1/3)	0.01	Param.
Chromium, total (mg/L)	BAP-MW-1604	0.00134	0.0006759	0.1	n/a	No	11	0	No	0.01	Param.
Chromium, total (mg/L)	BAP-MW-1605	0.0004306	0.0001703	0.1	n/a	No	11	0	No	0.01	Param.
Chromium, total (mg/L)	BAP-MW-1606	0.00134	0.0004505	0.1	n/a	No	11	0	No	0.01	Param.
Chromium, total (mg/L)	BAP-MW-4	0.0005178	0.0001961	0.1	n/a	No	11	0	ln(x)	0.01	Param.
Chromium, total (mg/L)	BAP-MW-5	0.000841	0.000122	0.1	n/a	No	11	0	No	0.006	NP (normality)
Cobalt, total (mg/L)	BAP-MW-1	0.01504	0.01061	0.032	n/a	No	11	0	No	0.01	Param.
Cobalt, total (mg/L)	BAP-MW-1604	0.00106	0.000406	0.032	n/a	No	11	0	No	0.006	NP (normality)
Cobalt, total (mg/L)	BAP-MW-1605	0.0245	0.00877	0.032	n/a	No	11	0	No	0.006	NP (normality)
Cobalt, total (mg/L)	BAP-MW-1606	0.0162	0.01351	0.032	n/a	No	11	0	No	0.01	Param.
Cobalt, total (mg/L)	BAP-MW-4	0.03519	0.009206	0.032	n/a	No	11	0	x^(1/3)	0.01	Param.
Cobalt, total (mg/L)	BAP-MW-5	0.00121	0.000949	0.032	n/a	No	11	0	No	0.006	NP (normality)
Combined Radium 226 + 228 (pCi/L)	BAP-MW-1	0.887	0.136	5	n/a	No	11	0	No	0.006	NP (normality)
Combined Radium 226 + 228 (pCi/L)	BAP-MW-1604	1.76	0.5864	5	n/a	No	12	0	sqrt(x)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	BAP-MW-1605	1.656	0.5764	5	n/a	No	12	0	ln(x)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	BAP-MW-1606	1.379	0.3541	5	n/a	No	12	0	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	BAP-MW-4	1.278	0.4914	5	n/a	No	12	0	ln(x)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	BAP-MW-5	1.308	0.6504	5	n/a	No	12	0	No	0.01	Param.
Fluoride, total (mg/L)	BAP-MW-1	0.06	0.02	4	n/a	No	11	45.45	No	0.006	NP (normality)
Fluoride, total (mg/L)	BAP-MW-1604	0.1033	0.06003	4	n/a	No	12	0	No	0.01	Param.
Fluoride, total (mg/L)	BAP-MW-1605	0.08	0.03	4	n/a	No	12	41.67	No	0.01	NP (normality)
Fluoride, total (mg/L)	BAP-MW-1606	0.06	0.03	4	n/a	No	11	81.82	No	0.006	NP (NDs)
Fluoride, total (mg/L)	BAP-MW-4	0.06058	0.03942	4	n/a	No	12	8.333	No	0.01	Param.
Fluoride, total (mg/L)	BAP-MW-5	0.05007	0.03493	4	n/a	No	12	8.333	No	0.01	Param.
Lead, total (mg/L)	BAP-MW-1	0.000252	0.000062	0.015	n/a	No	11	0	No	0.006	NP (normality)

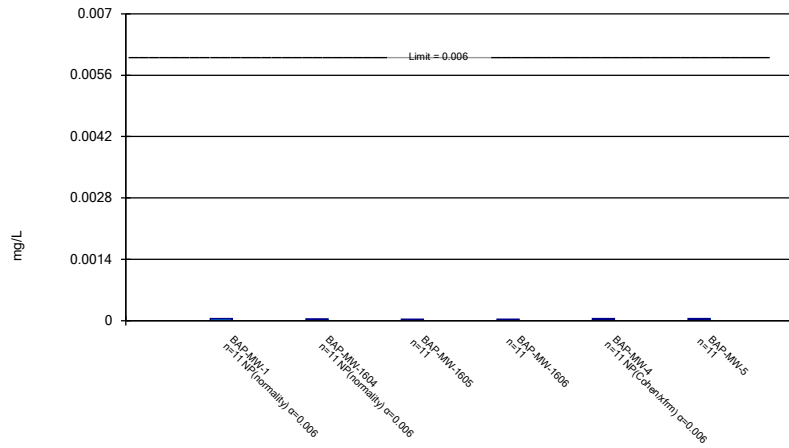
Confidence Interval Summary Table - All Results (No Significant Results) Page 2

Amos BAP Client: Geosyntec Data: Amos BAP Printed 5/28/2019, 11:56 AM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Lower Compl.	Sig.	N	%NDs	Transform	Alpha	Method
Lead, total (mg/L)	BAP-MW-1604	0.00108	0.0003767	0.015	n/a	No	11	0	No	0.01	Param.
Lead, total (mg/L)	BAP-MW-1605	0.0001878	0.00005349	0.015	n/a	No	11	0	No	0.01	Param.
Lead, total (mg/L)	BAP-MW-1606	0.001084	0.0003616	0.015	n/a	No	11	0	No	0.01	Param.
Lead, total (mg/L)	BAP-MW-4	0.0003522	0.0001597	0.015	n/a	No	11	0	No	0.01	Param.
Lead, total (mg/L)	BAP-MW-5	0.0003063	0.00006098	0.015	n/a	No	11	0	sqrt(x)	0.01	Param.
Lithium, total (mg/L)	BAP-MW-1	0.014	0.0008	0.04	n/a	No	11	9.091	No	0.006	NP (normality)
Lithium, total (mg/L)	BAP-MW-1604	0.15	0.0008	0.04	n/a	No	11	27.27	No	0.006	NP (normality)
Lithium, total (mg/L)	BAP-MW-1605	0.011	0.003	0.04	n/a	No	11	9.091	No	0.006	NP (normality)
Lithium, total (mg/L)	BAP-MW-1606	0.15	0.003	0.04	n/a	No	11	18.18	No	0.006	NP (normality)
Lithium, total (mg/L)	BAP-MW-4	0.01318	0.00093	0.04	n/a	No	11	9.091	ln(x)	0.01	Param.
Lithium, total (mg/L)	BAP-MW-5	0.0132	0.0009161	0.04	n/a	No	11	9.091	ln(x)	0.01	Param.
Mercury, total (mg/L)	BAP-MW-1	0.000005	0.000002	0.002	n/a	No	9	88.89	No	0.002	NP (NDs)
Mercury, total (mg/L)	BAP-MW-1604	0.000005	0.000002	0.002	n/a	No	9	88.89	No	0.002	NP (NDs)
Mercury, total (mg/L)	BAP-MW-1605	0.000005	0.000005	0.002	n/a	No	9	100	No	0.002	NP (NDs)
Mercury, total (mg/L)	BAP-MW-1606	0.000005	0.000002	0.002	n/a	No	9	88.89	No	0.002	NP (NDs)
Mercury, total (mg/L)	BAP-MW-4	0.000005	0.000005	0.002	n/a	No	9	100	No	0.002	NP (NDs)
Mercury, total (mg/L)	BAP-MW-5	0.000005	0.000005	0.002	n/a	No	9	100	No	0.002	NP (NDs)
Molybdenum, total (mg/L)	BAP-MW-1	0.001545	0.0004391	0.1	n/a	No	11	0	No	0.01	Param.
Molybdenum, total (mg/L)	BAP-MW-1604	0.00074	0.0002	0.1	n/a	No	11	9.091	No	0.006	NP (normality)
Molybdenum, total (mg/L)	BAP-MW-1605	0.0005098	0.000118	0.1	n/a	No	11	9.091	sqrt(x)	0.01	Param.
Molybdenum, total (mg/L)	BAP-MW-1606	0.0003029	0.00007582	0.1	n/a	No	11	9.091	ln(x)	0.01	Param.
Molybdenum, total (mg/L)	BAP-MW-4	0.0111	0.00028	0.1	n/a	No	11	9.091	No	0.006	NP (normality)
Molybdenum, total (mg/L)	BAP-MW-5	0.001671	0.0003205	0.1	n/a	No	11	9.091	sqrt(x)	0.01	Param.
Selenium, total (mg/L)	BAP-MW-1	0.0002	0.00009	0.05	n/a	No	10	0	No	0.011	NP (normality)
Selenium, total (mg/L)	BAP-MW-1604	0.0002	0.0002	0.05	n/a	No	11	0	No	0.006	NP (normality)
Selenium, total (mg/L)	BAP-MW-1605	0.00008805	0.00004649	0.05	n/a	No	11	0	No	0.01	Param.
Selenium, total (mg/L)	BAP-MW-1606	0.0001921	0.00008255	0.05	n/a	No	11	0	x^(1/3)	0.01	Param.
Selenium, total (mg/L)	BAP-MW-4	0.00009018	0.00006389	0.05	n/a	No	11	0	x^(1/3)	0.01	Param.
Selenium, total (mg/L)	BAP-MW-5	0.0001	0.00003	0.05	n/a	No	11	54.55	No	0.006	NP (normality)
Thallium, total (mg/L)	BAP-MW-1	0.000066	0.00003	0.002	n/a	No	11	9.091	No	0.006	NP (normality)
Thallium, total (mg/L)	BAP-MW-1604	0.0005	0.00001	0.002	n/a	No	11	36.36	No	0.006	NP (normality)
Thallium, total (mg/L)	BAP-MW-1605	0.0005	0.00001	0.002	n/a	No	11	54.55	No	0.006	NP (normality)
Thallium, total (mg/L)	BAP-MW-1606	0.0005	0.00001	0.002	n/a	No	11	9.091	No	0.006	NP (normality)
Thallium, total (mg/L)	BAP-MW-4	0.0001787	0.00002791	0.002	n/a	No	11	9.091	x^(1/3)	0.01	Param.
Thallium, total (mg/L)	BAP-MW-5	0.0005	0.00001	0.002	n/a	No	11	36.36	No	0.006	NP (normality)

Parametric and Non-Parametric (NP) Confidence Interval

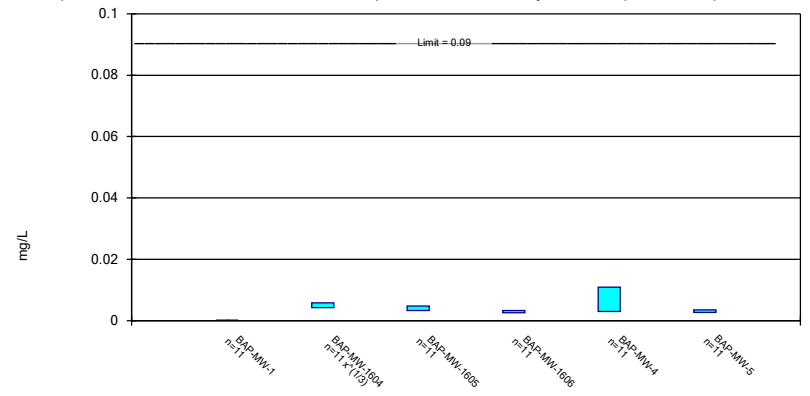
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Antimony, total Analysis Run 5/28/2019 11:53 AM View: Confidence Intervals - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

Parametric Confidence Interval

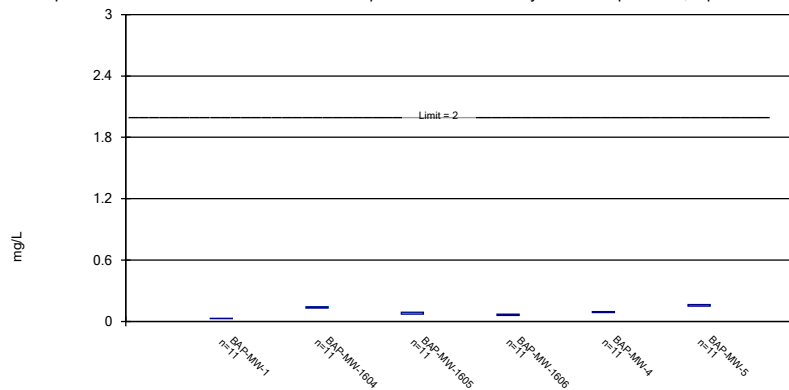
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Arsenic, total Analysis Run 5/28/2019 11:53 AM View: Confidence Intervals - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

Parametric Confidence Interval

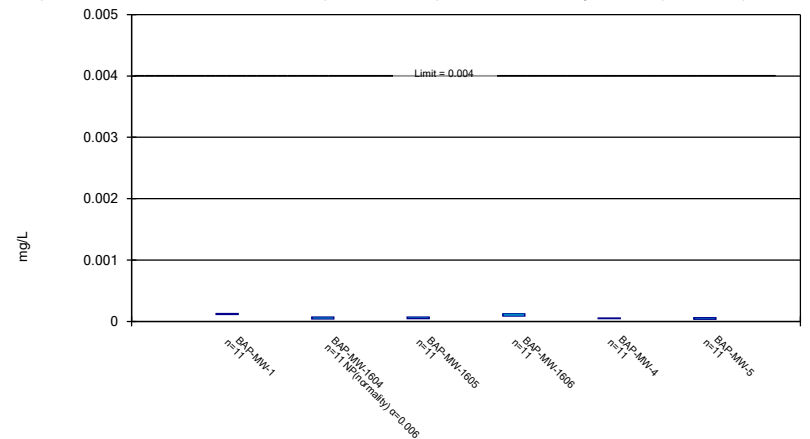
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Barium, total Analysis Run 5/28/2019 11:53 AM View: Confidence Intervals - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

Parametric and Non-Parametric (NP) Confidence Interval

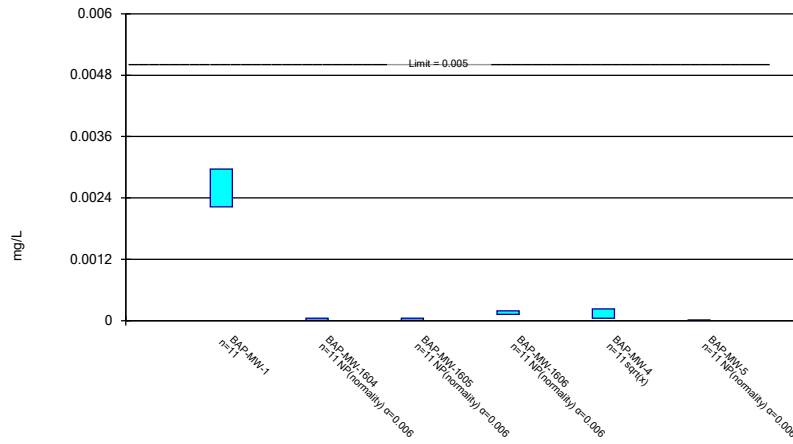
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Beryllium, total Analysis Run 5/28/2019 11:53 AM View: Confidence Intervals - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

Parametric and Non-Parametric (NP) Confidence Interval

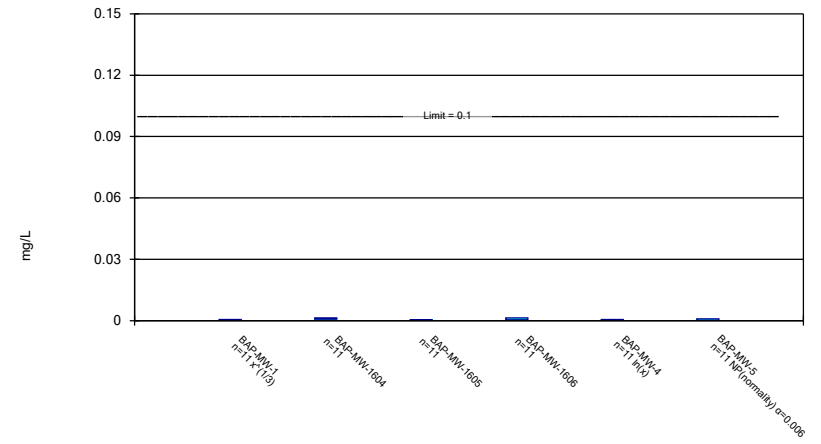
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Cadmium, total Analysis Run 5/28/2019 11:53 AM View: Confidence Intervals - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

Parametric and Non-Parametric (NP) Confidence Interval

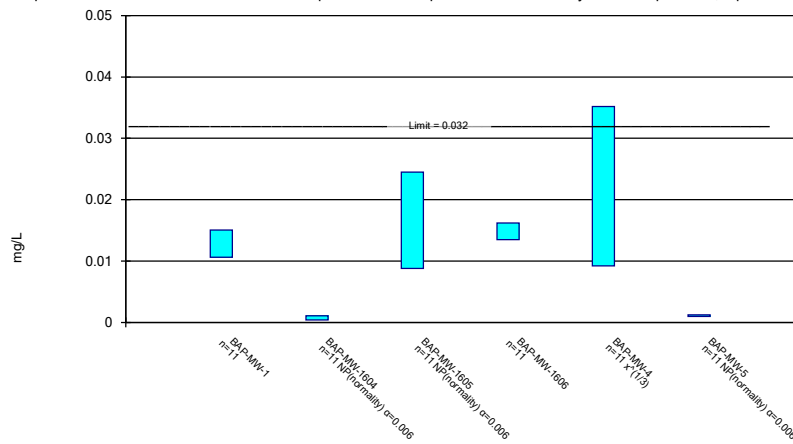
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Chromium, total Analysis Run 5/28/2019 11:53 AM View: Confidence Intervals - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

Parametric and Non-Parametric (NP) Confidence Interval

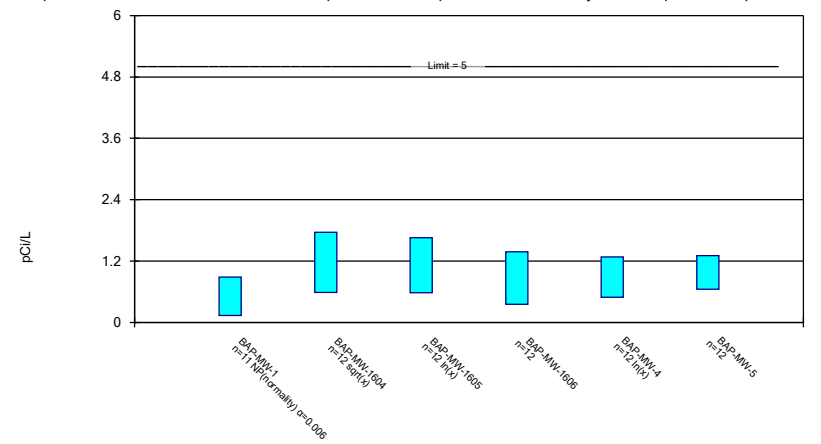
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Cobalt, total Analysis Run 5/28/2019 11:53 AM View: Confidence Intervals - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

Parametric and Non-Parametric (NP) Confidence Interval

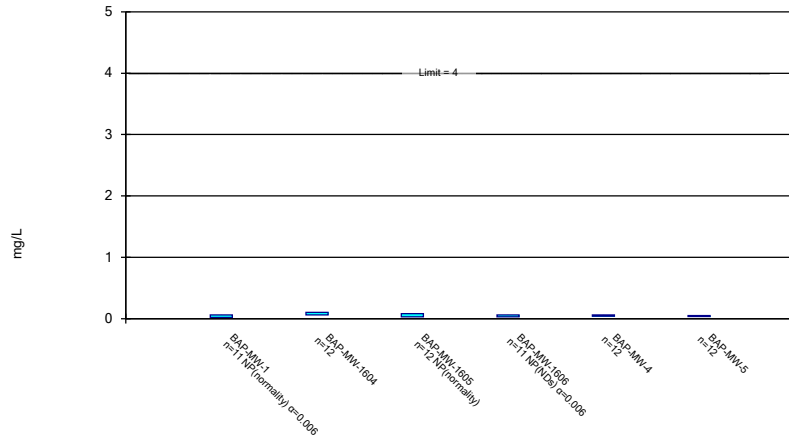
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Combined Radium 226 + 228 Analysis Run 5/28/2019 11:53 AM View: Confidence Intervals -
Amos BAP Client: Geosyntec Data: Amos BAP

Parametric and Non-Parametric (NP) Confidence Interval

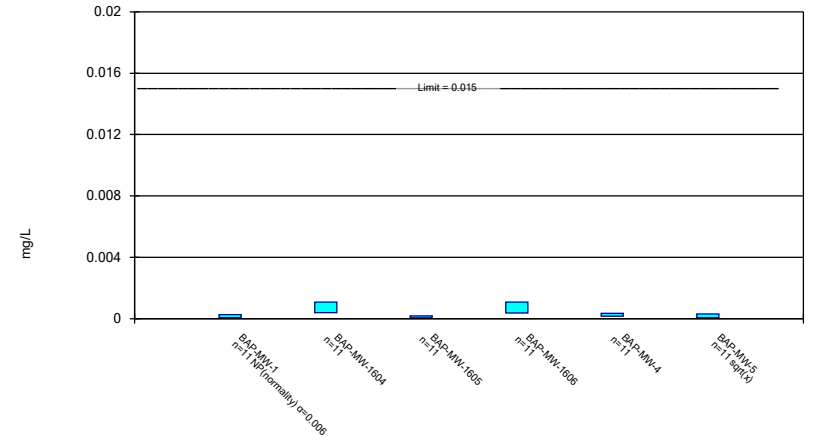
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Fluoride, total Analysis Run 5/28/2019 11:53 AM View: Confidence Intervals - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

Parametric and Non-Parametric (NP) Confidence Interval

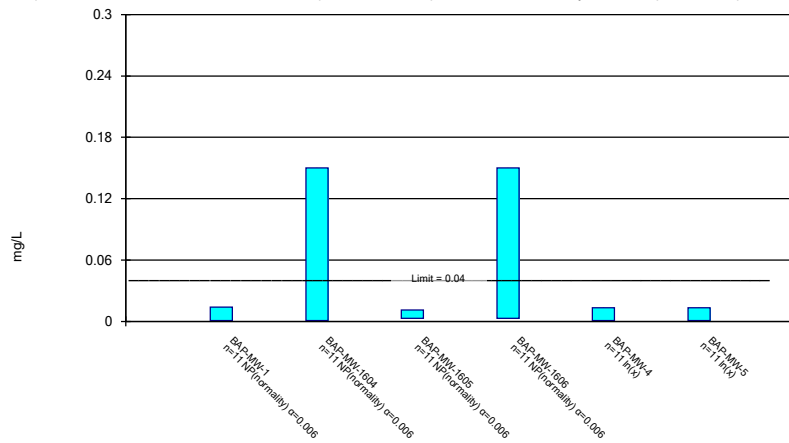
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Lead, total Analysis Run 5/28/2019 11:53 AM View: Confidence Intervals - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

Parametric and Non-Parametric (NP) Confidence Interval

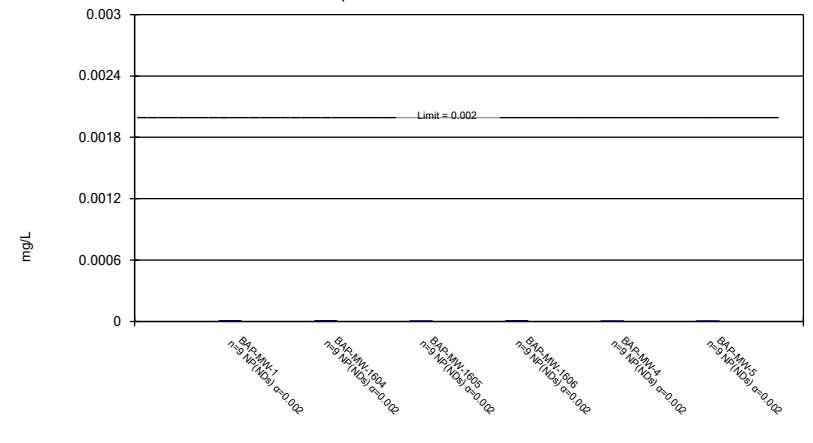
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Lithium, total Analysis Run 5/28/2019 11:53 AM View: Confidence Intervals - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

Non-Parametric Confidence Interval

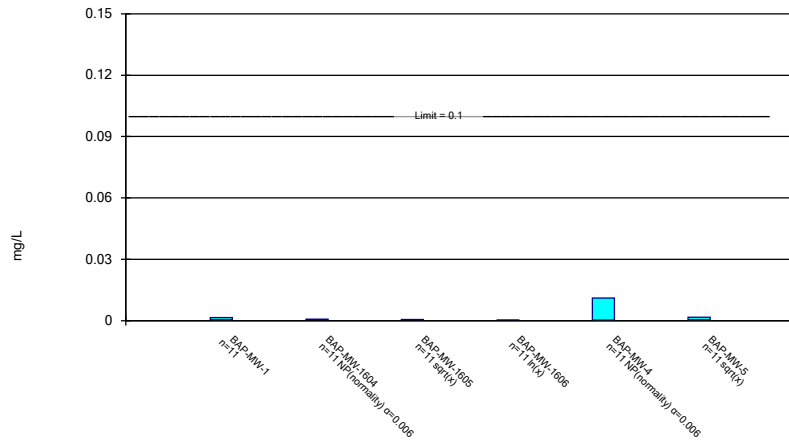
Compliance Limit is not exceeded.



Constituent: Mercury, total Analysis Run 5/28/2019 11:53 AM View: Confidence Intervals - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

Parametric and Non-Parametric (NP) Confidence Interval

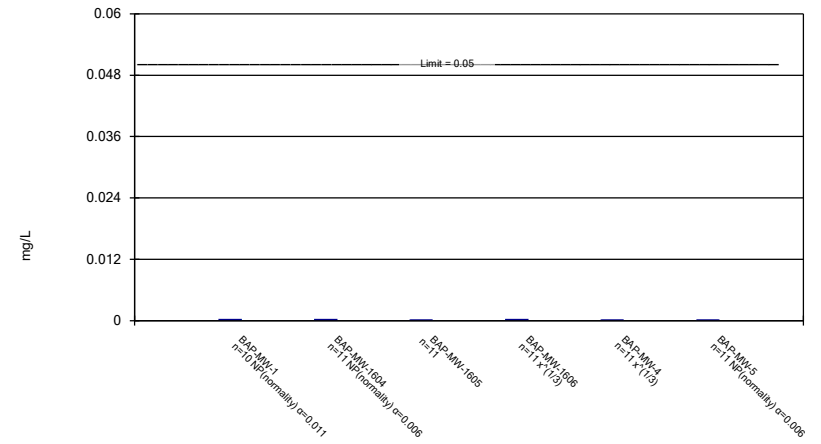
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Molybdenum, total Analysis Run 5/28/2019 11:53 AM View: Confidence Intervals - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

Parametric and Non-Parametric (NP) Confidence Interval

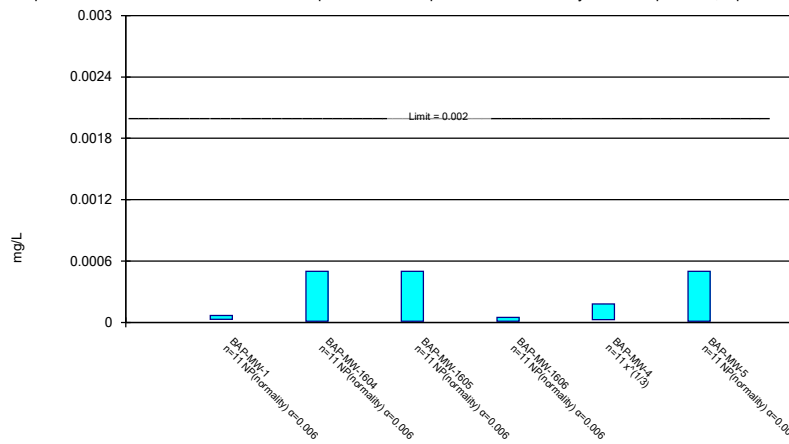
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Selenium, total Analysis Run 5/28/2019 11:53 AM View: Confidence Intervals - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

Parametric and Non-Parametric (NP) Confidence Interval

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



Constituent: Thallium, total Analysis Run 5/28/2019 11:53 AM View: Confidence Intervals - App IV
Amos BAP Client: Geosyntec Data: Amos BAP

STATISTICAL ANALYSIS SUMMARY
BOTTOM ASH POND
Amos Plant
Winfield, West Virginia

Submitted to



1 Riverside Plaza
Columbus, Ohio 43215-2372

Submitted by



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December 23, 2019

CHA8473

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LIST OF ATTACHMENTS

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Attachment B	Statistical Analysis Output

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
CFR	Code of Federal Regulations
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
QA	Quality Assurance
QC	Quality Control
SSI	Statistically Significant Increase
SSL	Statistically Significant Level
SU	Standard Units
TDS	Total Dissolved Solids
UPL	Upper Prediction Limit
USEPA	United States Environmental Protection Agency
UTL	Upper Tolerance Limit

SECTION 1

EXECUTIVE SUMMARY

In accordance with the United States Environmental Protection Agency's (USEPA's) regulations regarding the disposal of coal combustion residuals (CCR) in landfills and surface impoundments (40 CFR 257.90-257.98, "CCR rule"), groundwater monitoring has been conducted at the Bottom Ash Pond (BAP), an existing CCR unit at the Amos Power Plant located in Winfield, West Virginia.

Based on detection monitoring conducted in 2017 and 2018, statistically significant increases (SSIs) over background were concluded for calcium, chloride, total dissolved solids (TDS), and sulfate at the BAP. An alternative source was not identified following the detection monitoring events, so the BAP has been in assessment monitoring since 2018. During the first 2019 assessment monitoring event, completed in March 2019, no statistically significant levels (SSLs) were identified and the unit remained in assessment monitoring. Two additional assessment monitoring events were conducted at the BAP in June 2019 and July 2019, in accordance with 40 CFR 257.95. The statistical summary of the results of the March 2019 sampling event was completed under a separate cover (Geosyntec, 2019). Only the results of the June and July assessment events are documented in this report.

Prior to conducting the statistical analyses, the groundwater data underwent several validation tests, including those for completeness, sample tracking accuracy, transcription errors, and consistent use of measurement units. No data quality issues were identified which would impact the usability of the data.

The monitoring data were submitted to Groundwater Stats Consulting, LLC for statistical analysis. Groundwater protection standards (GWPSs) were re-established for the Appendix IV parameters. Confidence intervals were calculated for Appendix IV parameters at the compliance wells to assess whether Appendix IV parameters were present at concentrations above the GWPS. No SSLs were identified. Prediction limits were recalculated for Appendix III parameters. When compared to the revised prediction limits, concentrations for calcium, chloride, pH, sulfate, and TDS remained above background. Some pH values were also below background. Thus, either the unit will remain in assessment monitoring or an alternative source demonstration (ASD) will be conducted to evaluate if the unit can return to detection 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 40 CFR 257.95(b) (June 2019) and 257.95(d)(1) (July 2019). Samples from the June 2019 event were analyzed for all Appendix III and Appendix IV parameters. Samples from the July 2019 event were not analyzed for mercury, as it was not detected at any locations during the June event. 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.9.6.23 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 January 2017 *Statistical Analysis Plan* (AEP, 2017), except where noted below. Time series plots and results for all completed statistical tests are provided in Attachment B.

The data obtained in June and July 2019 were screened for potential outliers. Outliers were identified for pH at MW-1, MW-1601, MW-1602A, MW-1603A, MW-1604, and MW-6 in June 2019. The presence of multiple anomalously high pH values during the same event suggests field instrumentation error and these values were removed from the dataset. Outliers were also identified for beryllium at MW-1604 and selenium at MW-6 for the June 2019 event and these values were removed from the dataset.

2.2.1 Establishment of GWPSs

A GWPS was established for each Appendix IV parameter in accordance with 40 CFR 257.95(h) and the *Statistical Analysis Plan* (AEP, 2017). 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 40 CFR 257.95(h)(2) for each Appendix IV 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. Generally, tolerance limits were calculated parametrically with 95% coverage and 95% confidence. Non-parametric tolerance limits were calculated for antimony, arsenic, cadmium, combined radium, fluoride, selenium, and thallium due to apparent non-normal distributions and for mercury 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 IV SSLs

A confidence interval was constructed for each Appendix IV 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.

No SSLs were identified at the Amos BAP.

2.2.3 Establishment of Appendix III Prediction Limits

Upper prediction limits (UPL) were previously established for all Appendix III parameters following the background monitoring period (Geosyntec, 2018). Intrawell tests were used to evaluate potential SSIs for fluoride and pH, whereas interwell tests were used to evaluate potential SSIs for boron, calcium, chloride, 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 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 III limits and the Appendix IV 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 III tests only. Mann-Whitney tests were used to compare the medians of historical data (July 2016 - October 2017) to the new compliance samples (November 2017 – March 2019) for fluoride and pH. 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 would have continued to be used.

The complete Mann-Whitney test results and a summary of the significant findings can be found in Appendix B. No statistically significant differences were found between the two groups for fluoride or pH.

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

UPLs were updated using all the historical data through March 2019 to represent background values. LPLs were also updated for pH. The updated prediction limits are summarized in Table 3. Intrawell tests continued to be used to evaluate potential SSIs for fluoride and pH, whereas interwell tests continued to be used to evaluate potential SSIs for boron, calcium, chloride, sulfate, and TDS. The 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. In practice, where the initial result did not exceed the UPL, a second sample was not collected. The retesting procedures allowed achieving an acceptably high statistical power to detect changes at downgradient wells for constituents evaluated using intrawell prediction limits.

2.2.4 Evaluation of Potential Appendix III SSIs

The CCR rule allows CCR units to move from assessment monitoring to detection monitoring if all Appendix III and Appendix IV parameters were at or below background levels for two consecutive sampling events [40 CFR 257.95(e)]. Since no Appendix IV SSLs were identified, Appendix III results were analyzed to assess whether concentrations of Appendix III parameters at the compliance wells exceeded background concentrations.

Data collected during the June 2019 and July 2019 assessment monitoring events 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 4. While the pH measurements exceeded the intrawell UPL of 7.3 SU at MW-1 (10.2 SU) and the intrawell UPL of 7.2 SU at MW-1604 (8.7 SU) for the June 2019 event, both of these values were removed as outliers. The following exceedances of the upper prediction limits (UPLs) were noted:

- Calcium concentrations exceeded the interwell UPL of 19.6 mg/L at MW-1 (35.9 mg/L and 36.8 mg/L), MW-1605 (45.5 mg/L and 46.5 mg/L), and MW-1606 (56.6 mg/L and 52.8 mg/L).

- Chloride concentrations exceeded the interwell UPL of 41.0 mg/L at MW-1 (64.4 mg/L and 57.4 mg/L), MW-1605 (91.8 mg/L and 91.6 mg/L), and MW-1606 (177 mg/L and 186 mg/L).
- Sulfate concentrations exceeded the interwell UPL of 57.4 mg/L at MW-1 (141 mg/L and 143 mg/L), MW 1605 (226 mg/L for both events), and MW-1606 (204 mg/L and 191 mg/L).
- The pH values were below the intrawell LPL of 6.1 SU at MW-1604 (5.9 SU) and below the intrawell LPL of 5.5 SU at MW-4 (5.4 SU).
- TDS concentrations exceeded the interwell UPL of 260 mg/L at MW-1 (330 mg/L and 362 mg/L), MW-1605 (530 mg/L and 517 mg/L), and MW-1606 (571 mg/L and 597 mg/L).

Based on these results, concentrations of Appendix III parameters exceeded background levels at compliance wells at the Amos BAP during assessment monitoring. As a result, the Amos BAP CCR unit will remain in 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 potential outliers for pH, beryllium, and selenium in the June 2019 data. GWPSs were re-established for the Appendix IV parameters. A confidence interval was constructed at each compliance well for each Appendix IV parameter; SSLs were concluded if the entire confidence interval exceeded the GWPS. No SSLs were identified.

Revised prediction limits were calculated for Appendix III parameters. Interwell tests continued to be used to evaluate potential SSIs for boron, calcium, chloride, sulfate, and TDS, and intrawell tests continued to be used to evaluate potential SSIs for fluoride and pH. Prediction limits were recalculated using a one-of-two retesting procedure. The Appendix III results were evaluated to assess whether concentrations of Appendix III parameters exceeded background levels. Calcium, chloride, sulfate, and TDS results exceeded background levels; pH values were detected below the background levels.

Based on this evaluation, either the Amos BAP CCR unit will remain in assessment monitoring or an ASD will be conducted to evaluate if the unit can return to detection monitoring.

SECTION 3

REFERENCES

American Electric Power (AEP). 2017. Statistical Analysis Plan – Amos Plant. January 2017.

Geosyntec Consultants (Geosyntec). 2018. Statistical Analysis Summary – Bottom Ash Pond, John E. Amos Plant, Winfield, West Virginia. January 15, 2018.

Geosyntec, 2019. Statistical Analysis Summary – Bottom Ash Pond, Amos Plant, Winfield, West Virginia. July 10, 2019.

TABLES

**Table 1 - Groundwater Data Summary
Amos - Bottom Ash Pond**

Component	Unit	BAP-MW-1		BAP-MW-1601		BAP-MW-1602A		BAP-MW-1603A		BAP-MW-1604	
		6/10/2019	7/22/2019	6/12/2019	7/24/2019	6/11/2019	7/23/2019	6/11/2019	7/24/2019	6/10/2019	7/24/2019
Antimony	µg/L	0.0200 J	0.100 U	0.100 U	0.100 U	0.200 U	0.100 U	0.100 U	0.100 U	0.0500 J	0.100 U
Arsenic	µg/L	0.110	0.0900 J	6.02	6.63	20.6	21.7	90.3	85.8	4.88	4.76
Barium	µg/L	27.5	26.4	118	130	229	213	255	249	142	170
Beryllium	µg/L	0.125	0.136	0.0400 J	0.0200 J	0.200 U	0.100 U	0.100 U	0.0400 J	0.142	0.0600 J
Boron	mg/L	0.0800 J	0.0500 J	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.0900 J	0.132
Cadmium	µg/L	2.14	2.47	0.0200 J	0.0100 J	0.100 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Calcium	mg/L	35.9	36.8	11.0	10.3	18.8	16.7	15.5	14.4	16.5	18.7
Chloride	mg/L	64.4	57.4	10.0	10.3	41.9	39.4	5.70	5.73	24.4	27.0
Chromium	µg/L	0.200 J	0.0600 J	0.200 J	0.200 J	0.300 J	0.297	0.280	0.650	0.360	1.33
Cobalt	µg/L	12.8	13.5	2.75	3.01	0.523	0.545	0.288	0.517	0.306	0.415
Combined Radium	pCi/L	0.998	0.825	0.533	1.01	1.14	0.888	0.356	0.439	0.831	0.943
Fluoride	mg/L	0.0300 J	0.0200 J	0.0500 J	0.0500 J	0.160	0.130	0.310	0.280	0.110	0.0700
Lead	µg/L	0.0800 J	0.0800 J	0.154	0.200 J	0.677	1.08	0.163	0.580	0.148	0.294
Lithium	mg/L	0.0300 U	0.00257	0.0300 U	0.00141	0.0300 U	0.000908	0.0300 U	0.000870	0.0300 U	0.000485
Mercury	µg/L	0.00500 U	--	0.00500 U	--	0.00500 U	--	0.00500 U	--	0.00500 U	--
Molybdenum	µg/L	2.00 U	2.00 U	2.00 U	2.00 U	4.00 U	0.700 J	1.00 J	1.00 J	2.00 U	0.400 J
Selenium	µg/L	0.100 J	0.200 J	0.0800 J	0.0600 J	0.400 U	0.0600 J	0.0400 J	0.0700 J	0.100 J	0.100 J
Total Dissolved Solids	mg/L	330	362	185	154	217	201	95.0	102	60.0	242
Sulfate	mg/L	141	143	48.8	44.6	13.8	10.3	0.400 U	0.400 U	0.400 U	0.400 U
Thallium	µg/L	0.500 U	0.500 U	0.500 U	0.500 U	1.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
pH	SU	10.2	4.90	6.70	5.88	9.51	6.29	8.82	6.77	8.65	5.92

Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

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

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

--: Not analyzed

**Table 1 - Groundwater Data Summary
Amos - Bottom Ash Pond**

Component	Unit	BAP-MW-1605		BAP-MW-1606		BAP-MW-4		BAP-MW-5		BAP-MW-6	
		6/11/2019	7/24/2019	6/11/2019	7/24/2019	6/10/2019	7/23/2019	6/10/2019	7/23/2019	6/10/2019	7/24/2019
Antimony	µg/L	0.100 U	0.100 U	0.100 U	0.0300 J	0.100 U	0.0300 J	0.100 U	0.100	0.0300 J	0.100 U
Arsenic	µg/L	3.01	2.82	2.44	3.44	2.50	2.48	2.85	6.74	34.3	34.2
Barium	µg/L	93.2	108	64.1	72.9	90.5	84.6	155	158	161	164
Beryllium	µg/L	0.0700 J	0.0900 J	0.0800 J	0.140	0.0600 J	0.0700 J	0.0400 J	0.121	0.100 U	0.0300 J
Boron	mg/L	0.0600 J	0.0600 J	0.0400 J	0.0400 J	0.0600 J	0.0600 J	0.0400 J	0.100 U	0.100 U	0.0400 J
Cadmium	µg/L	0.0100 J	0.0500 U	0.180	0.210	0.0700	0.0500	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Calcium	mg/L	45.5	46.5	56.6	52.8	14.4	14.8	15.7	14.9	11.8	12.1
Chloride	mg/L	91.8	91.6	177	186	13.0	13.4	16.9	15.3	9.68	9.71
Chromium	µg/L	0.200 J	0.306	0.200 J	1.14	0.274	0.236	0.100 J	0.291	0.309	0.418
Cobalt	µg/L	9.09	8.57	16.5	16.2	10.5	7.24	1.13	1.12	9.72	8.97
Combined Radium	pCi/L	1.06	0.739	0.443	0.743	0.787	0.486	0.890	0.811	0.688	0.657
Fluoride	mg/L	0.0200 J	0.0200 J	0.0200 J	0.0200 J	0.0600	0.0400 J	0.0500 J	0.0400 J	0.0800	0.0500 J
Lead	µg/L	0.0600 J	0.200 J	0.181	1.11	0.406	0.430	0.0400 J	0.762	0.104	0.200 J
Lithium	mg/L	0.0300 U	0.00255	0.0300 U	0.00340	0.0300 U	0.00162	0.0300 U	0.00153	0.0300 U	0.00114
Mercury	µg/L	0.00500 U	--	0.00500 U	--	0.00500 U	--	0.00500 U	--	0.00500 U	--
Molybdenum	µg/L	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	0.500 J	0.400 J
Selenium	µg/L	0.0600 J	0.0800 J	0.0600 J	0.200 J	0.0800 J	0.100 J	0.200 U	0.0800 J	0.100 J	0.100 J
Total Dissolved Solids	mg/L	530	517	571	597	172	186	178	162	205	199
Sulfate	mg/L	226	226	204	191	43.3	44.5	48.4	45.2	2.20	2.20
Thallium	µg/L	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
pH	SU	5.74	5.42	6.67	5.43	6.81	5.43	5.87	5.58	9.32	5.89

Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

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

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

--: Not analyzed

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

Constituent Name	MCL	CCR Rule-Specified	Calculated UTL
Antimony, Total (mg/L)	0.006		0.0002
Arsenic, Total (mg/L)	0.01		0.09
Barium, Total (mg/L)	2		0.3
Beryllium, Total (mg/L)	0.004		0.0001
Cadmium, Total (mg/L)	0.005		0.00005
Chromium, Total (mg/L)	0.1		0.0022
Cobalt, Total (mg/L)	n/a	0.006	0.018
Combined Radium, Total (pCi/L)	5		7.9
Fluoride, Total (mg/L)	4		0.31
Lead, Total (mg/L)	n/a	0.015	0.0087
Lithium, Total (mg/L)	n/a	0.04	0.011
Mercury, Total (mg/L)	0.002		0.000005
Molybdenum, Total (mg/L)	n/a	0.1	0.0026
Selenium, Total (mg/L)	0.05		0.0003
Thallium, Total (mg/L)	0.002		0.0005

Notes:

Grey cell indicates calculated UTL is higher than MCL or CCR Rule-specified value.

MCL = Maximum Contaminant Level

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

The higher of the calculated UTL or MCL/Rule-Specified Level is used as the GWPS.

**Table 3: Revised Prediction Limits
Amos Plant - Bottom Ash Pond**

Parameter	Unit	Description	MW-1	MW-4	MW-5	MW-1604	MW-1605	MW-1606
Boron	mg/L	Interwell Background Value (UPL)	0.183					
Calcium	mg/L	Interwell Background Value (UPL)	19.6					
Chloride	mg/L	Interwell Background Value (UPL)	41.0					
Fluoride	mg/L	Intrawell Background Value (UPL)	0.0300	0.0822	0.0500	0.146	0.0900	0.0300
pH	SU	Intrawell Background Value (UPL)	7.3	7.0	6.5	7.2	6.6	5.9
		Intrawell Background Value (LPL)	4.9	5.5	5.2	6.1	5.2	5.1
Sulfate	mg/L	Interwell Background Value (UPL)	57.4					
Total Dissolved Solids	mg/L	Interwell Background Value (UPL)	260					

Notes:
 UPL: Upper prediction limit
 LPL: Lower prediction limit

**Table 4: Appendix III Data Summary
Amos Plant - Bottom Ash Pond**

Parameter	Unit	Description	MW-1		MW-4		MW-5		MW-1604		MW-1605		MW-1606	
			6/10/2019	7/22/2019	6/10/2019	7/23/2019	6/10/2019	7/23/2019	6/10/2019	7/24/2019	6/11/2019	7/24/2019	6/11/2019	7/24/2019
Boron	mg/L	Interwell Background Value (UPL)	0.183											
		Detection Monitoring Result	0.0800	0.0500	0.0600	0.0600	0.0400	0.0400	0.0900	0.132	0.0600	0.0600	0.0400	0.0400
Calcium	mg/L	Interwell Background Value (UPL)	19.6											
		Detection Monitoring Result	35.9	36.8	14.4	14.8	15.7	14.9	16.5	18.7	45.5	46.5	56.6	52.8
Chloride	mg/L	Interwell Background Value (UPL)	41.0											
		Detection Monitoring Result	64.4	57.4	13.0	13.4	16.9	15.3	24.4	27.0	91.8	91.6	177	186
Fluoride	mg/L	Intrawell Background Value (UPL)	0.0300		0.0822		0.0500		0.146		0.0900		0.0300	
		Detection Monitoring Result	0.0300	0.0200	0.0600	0.0400	0.0500	0.0400	0.110	0.0700	0.0200	0.0200	0.0200	0.0200
pH	SU	Intrawell Background Value (UPL)	7.3		7.0		6.5		7.2		6.6		5.9	
		Intrawell Background Value (LPL)	4.9		5.5		5.2		6.1		5.2		5.1	
		Detection Monitoring Result	10.2*	4.9	6.8	5.4	5.9	5.6	8.7*	5.9	5.7	5.4	6.7	5.4
Sulfate	mg/L	Interwell Background Value (UPL)	57.4											
		Detection Monitoring Result	141	143	43.3	44.5	48.4	45.2	0.0600	0.0600	226	226	204	191
Total Dissolved Solids	mg/L	Interwell Background Value (UPL)	260											
		Detection Monitoring Result	330	362	172	186	178	162	60.0	242	530	517	571	597

Notes:

UPL: Upper prediction limit

LPL: Lower prediction limit

Bold values exceed the background value.

Background values are shaded gray.

Asterisks indicate the value was removed from the dataset as an outlier.

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 Amos Bottom Ash Pond CCR management area and that the requirements of 40 CFR 257.93(f) have been met.

DAVID ANTHONY MILLER

Printed Name of Licensed Professional Engineer

David Anthony Miller

Signature



22663

License Number

WEST VIRGINIA

Licensing State

12.23.19

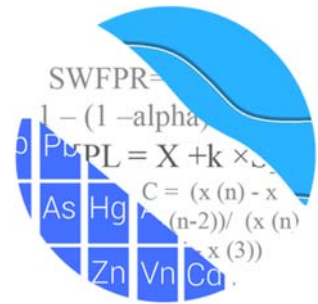
Date

ATTACHMENT B
Statistical Analysis Output

GROUNDWATER STATS CONSULTING

December 9, 2019

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



Re: Amos Bottom Ash Pond
Background Update – 2019

Dear Ms. Kreinberg,

Groundwater Stats Consulting (GSC), formerly the statistical consulting division of Sanitas Technologies, is pleased to provide the background update of groundwater data for 2019 at American Electric Power Company's Amos Bottom Ash Pond. 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 2016. The monitoring well network, as provided by Geosyntec Consultants, consists of the following:

- **Upgradient wells:** BAP-MW-1601, BAP-MW-1602A, BAP-MW-1603A, and BAP-MW-6; and
- **Downgradient wells:** BAP-MW-1, BAP-MW-1604, BAP-MW-1605, BAP-MW-1606, BAP-MW-4, and BAP-MW-5.

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 CCR program consists of the following constituents:

- **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.

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 and B, respectively). Values in background, which have previously been flagged as outliers, may be seen in a lighter font and disconnected symbol on the graphs. Additionally, a summary of flagged values follows this letter (Figure C).

Summary of Statistical Method:

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

- 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.

History of Initial Background Screening Conducted in December 2017

Outlier Evaluation

Time series plots are used to identify suspected outliers, or extreme values that would result in limits that are not conservative from a regulatory perspective, in proposed background data. Suspected outliers at all wells for Appendix III and Appendix IV parameters were formally tested using Tukey's box plot method and, when identified, flagged in the computer database with "o" and deselected prior to construction of statistical limits.

Tukey's outlier test noted a few outliers as may be seen on the Outlier Summary Table and accompanying graphs. Any values flagged as outliers are plotted in a lighter font on the time series graph. The test identified an outlier for arsenic in well BAP-MW-1604; and pH in well BAP-MW-5; however, these concentrations were similar to concentrations in neighboring wells and were not flagged as outliers. A substitution of the most recent reporting limit was applied when varying detection limits existed in data.

No true seasonal patterns were observed on the time series plots for any of the detected data; therefore, no deseasonalizing adjustments were made to the data. When seasonal patterns are observed, data may be deseasonalized so that the resulting limits will correctly account for the seasonality as a predictable pattern rather than random variation or a release.

While trends may be visual, a quantification of the trend and its significance is needed. The Sen's Slope/Mann Kendall trend test was used to evaluate all data at each well to identify statistically significant increasing or decreasing trends. In the absence of suspected contamination, significant trending data are typically not included as part of the background data used for construction of prediction limits. This step serves to eliminate the trend and, thus, reduce variation in background. When statistically significant decreasing trends are present, earlier data are evaluated to determine whether earlier concentration levels are significantly different than current reported concentrations and will be deselected as necessary. When the historical records of data are truncated for the reasons above, a summary report will be provided to show the date ranges used in construction of the statistical limits.

The results of the trend analyses showed a couple statistically significant increasing trends and several statistically significant decreasing trends were included in the previous screening. All trends were relatively low in magnitude when compared to average concentrations and data, therefore, required no adjustment at this time.

Appendix III – Determination of Spatial Variation

The Analysis of Variance (ANOVA) was used to statistically evaluate differences in average concentrations among upgradient wells, which assists in identifying the most appropriate statistical approach. Interwell tests, which compare downgradient well data to statistical limits constructed from pooled upgradient well data, are appropriate when average concentrations are similar across upgradient wells. Intrawell tests, which compare compliance data from a single well to screened historical data within the same well, are appropriate when upgradient wells exhibit spatial variation; when statistical limits constructed from upgradient wells would not be conservative from a regulatory perspective; and when downgradient water quality is unimpacted compared to upgradient water quality for the same parameter.

The ANOVA identified variation for all Appendix III parameters except for boron. Therefore, boron is eligible for interwell prediction limits, and all other parameters were further evaluated as described for the appropriateness of intrawell testing to accommodate the groundwater quality.

Appendix III - Statistical Limits

Intrawell limits constructed from carefully screened background data from within each well serve to provide statistical limits that are conservative (i.e. lower) from a regulatory perspective, and that will rapidly identify a change in more recent compliance data from within a given well. This statistical method removes the element of variation from across wells and eliminates the chance of mistaking natural spatial variation for a release from the facility. Prior to performing intrawell prediction limits, several steps are required to reasonably demonstrate downgradient water quality does not have existing impacts from the practices of the facility.

Exploratory data analysis was used as a general comparison of concentrations in downgradient wells for all Appendix III parameters recommended for intrawell analyses to concentrations reported in upgradient wells. Upper tolerance limits are used in conjunction with confidence intervals to determine whether the estimated averages in downgradient wells are higher than observed levels upgradient of the facility. The upper tolerance limits were constructed to represent the extreme upper range of possible background levels at the site.

In cases where downgradient average concentrations are higher than observed concentrations upgradient for a given constituent, an independent study and hydrogeological investigation would be required to identify local geochemical

conditions and expected groundwater quality for the region to justify an intrawell approach. Such an assessment is beyond the scope of services provided by Groundwater Stats Consulting. When there is not an obvious explanation for observed concentration differences in downgradient wells relative to reported concentrations in upgradient wells, interwell prediction limits will initially be selected for the statistical method until further evidence shows that concentrations are due to natural variation rather than a result of the facility.

Parametric tolerance limits were constructed with a target of 99% confidence and 95% coverage using pooled upgradient well data for each of the Appendix III parameters. The confidence and coverage levels for nonparametric tolerance limits are dependent upon the number of background samples. As more data are collected, the background population is better represented and the confidence and coverage levels increase.

Confidence intervals were constructed on downgradient wells for each of the Appendix III parameters, using the tolerance limits discussed above, to determine intrawell eligibility. When the entire confidence interval is above a background standard for a given parameter, interwell methods are initially recommended as the statistical method. Therefore, only parameters with confidence intervals which did not exceed background standards are eligible for intrawell prediction limits.

Confidence intervals for the above parameters were found to be within their respective background limit for fluoride and pH; while confidence intervals were above their respective background limits in at least one well for calcium, chloride, sulfate, and TDS. Therefore, intrawell methods are recommended for fluoride and pH, and interwell methods are initially recommended for boron, calcium, chloride, sulfate and TDS. As mentioned earlier, if a demonstration supports natural variation in groundwater, intrawell methods will be considered for all parameters.

All available data through June 2017 at each well were used to establish intrawell background limits for the parameters identified above based on a 1-of-2 resample plan that will be used for future comparisons. Interwell prediction limits, combined with a 1-of-2 resample plan, were constructed from upgradient wells for parameters eligible for interwell testing. Downgradient measurements will be compared to these background limits during each subsequent semi-annual sampling event.

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 will be necessary to accommodate these types of changes. In the interwell case, newer data

will be included in background during each sample event after careful screening for new outliers. In the intrawell case, data for all wells and constituents are 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 some cases, the earlier portion of data are deselected prior to construction of limits in order to provide sensitive limits that will rapidly detect 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.

In the event of an initial exceedance of compliance well data, the 1-of-2 resample plan allows for collection of an additional sample to determine whether the initial exceedance is confirmed. When the resample confirms the initial exceedance, a statistically significant increase (SSI) is identified and further research would be required to identify the cause of the exceedance (i.e. impact from the site, natural variation, or an off-site source). If the resample falls within the statistical limit, the initial exceedance is considered to be a false positive result and, therefore, no further action is necessary.

Background Update – Appendix III Parameters – November 2019

Prior to updating background data, samples were re-evaluated for all wells for intrawell parameters and all upgradient wells for interwell parameters using Tukey's outlier test and visual screening with the July 2019 samples. Note that the reporting limit during the March 2019 event for boron in wells BAP-MW-1603A, BAP-MW-1604, BAP-MW-1605, BAP-MW-1606, BAP-MW-4, BAP-MW-5, and BAP-MW-6 was 1.0 mg/L compared to a historical reporting limit of 0.005 mg/L and, therefore, these values were flagged as outliers to avoid setting a statistical limit that would not be conservative from a regulatory perspective.

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 follows this letter.

For constituents requiring intrawell prediction limits, the Mann-Whitney (Wilcoxon Rank Sum) test was used to compare the medians of historical data through June 2017 to the new compliance samples at each well through March 2019 to evaluate whether the groups are statistically different at the 99% confidence level, in which case background data may be updated with compliance data (Figure D). No statistically significant differences were found between the two groups for the well/constituent pairs.

Typically, when the test concludes that the medians of the two groups are significantly different, particularly in the downgradient wells, the background are not updated to include the newer data but will be reconsidered in the future. A summary of these results follows this letter and the test results are included with the Mann Whitney test section at the end of this report.

Intrawell prediction limits using all historical data through March 2019, combined with a 1-of-2 resample plan, were constructed for fluoride and pH (Figure E).

For parameters tested using interwell analyses, the Sen's Slope/Mann-Kendall trend test was used on upgradient wells to determine whether concentrations are statistically increasing, decreasing or stable (Figure F). No statistically significant increasing or decreasing trends were noted with the exception of increasing trends for chloride in upgradient wells BAP-MW-1601 and BAP-MW-1602A. The magnitude of these trends, however, is low relative to the average concentrations in these wells. Therefore, no adjustments were required at this time. A summary of these results is included with the trend tests.

Interwell prediction limits, combined with a 1-of-2 resample plan, were updated using all available data from upgradient wells through March 2019 for boron, calcium, chloride, 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 – November 2019

Interwell Tolerance limits were used to calculate background limits from all available pooled upgradient well data for Appendix IV parameters to determine the Alternate Contaminant Level (ACL) for each constituent (Figure H). Background data are screened for outliers and extreme trending patterns that would lead to artificially elevated statistical limits. Any flagged values may be seen on the Outlier Summary following this letter.

Parametric limits use a target of 95% confidence and 95% coverage. 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 CCR-Rule specified levels 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 for each of the Appendix IV parameters using the highest limit of the MCL, CCR-Rule specified levels, or background as discussed above (Figure J). Only when the entire confidence interval is above a GWPS is the well/constituent pair considered to exceed its respective standard. No exceedances were noted for any of the well/constituent pairs. A summary of the confidence interval results follows this letter.

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

For Groundwater Stats Consulting,



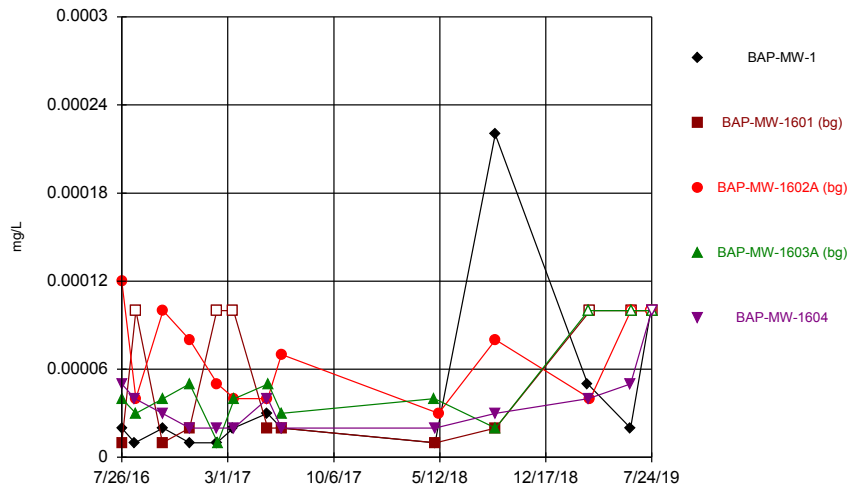
Andrew T. Collins
Groundwater Analyst



Kristina L. Rayner
Groundwater Statistician

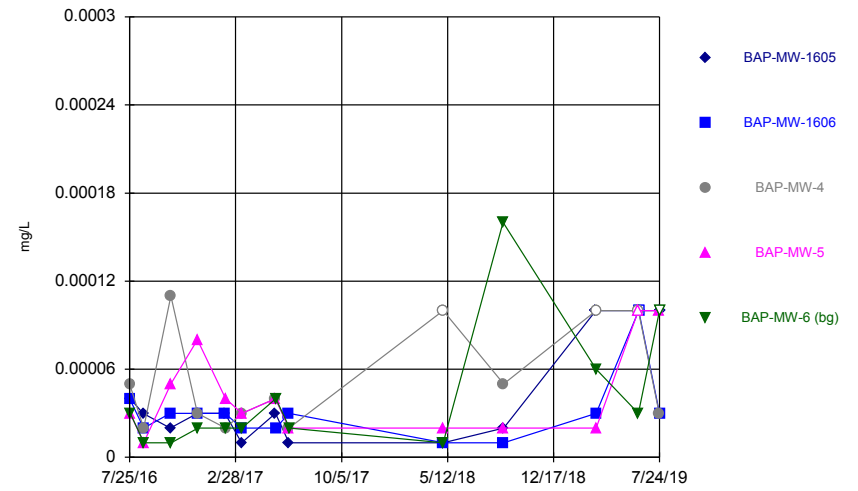
FIGURE A: TIME SERIES

Time Series



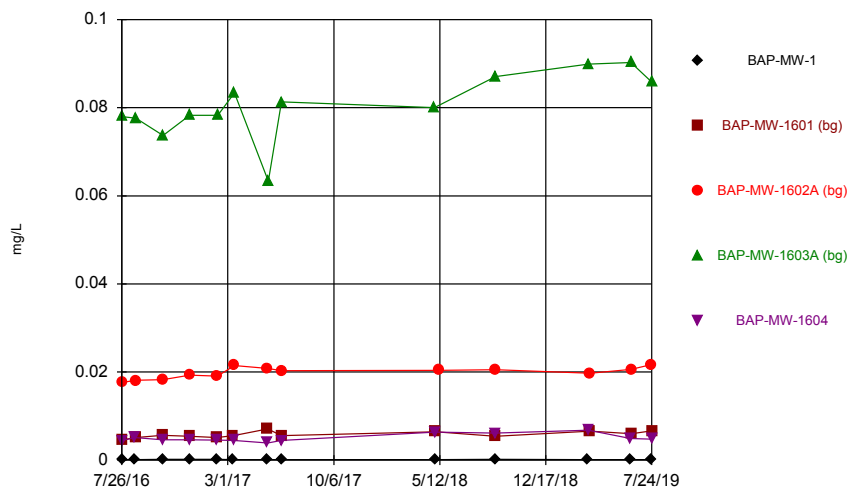
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Time Series



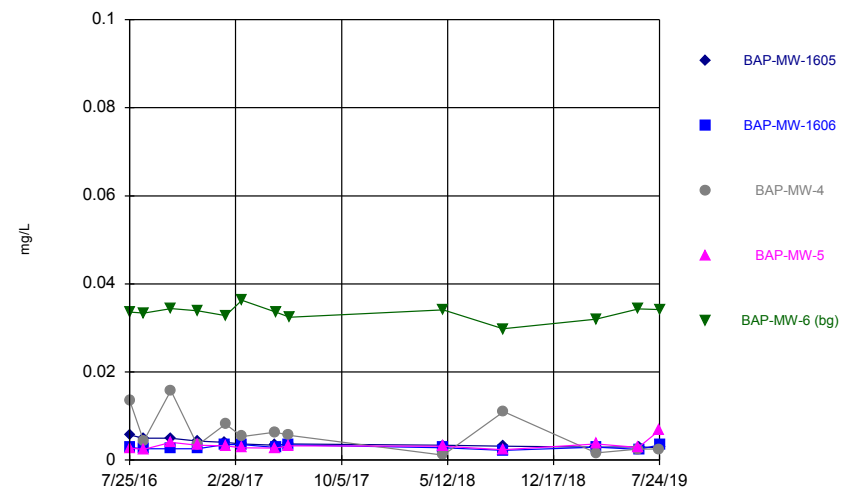
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Time Series



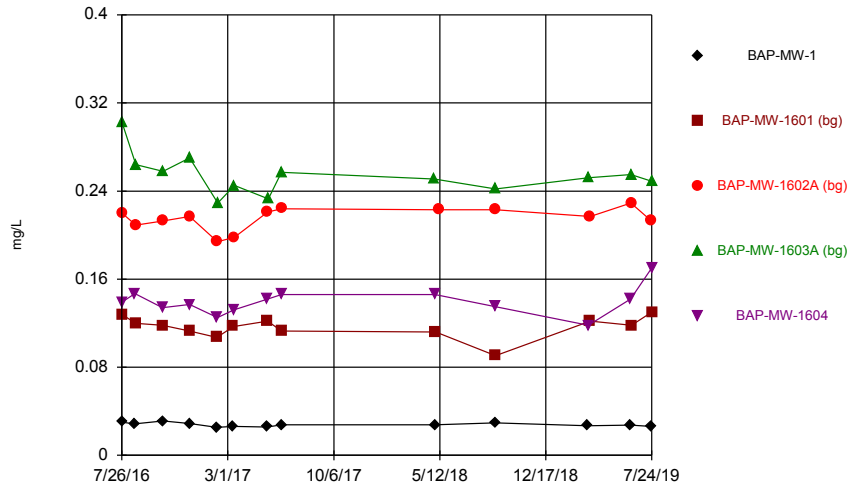
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Time Series



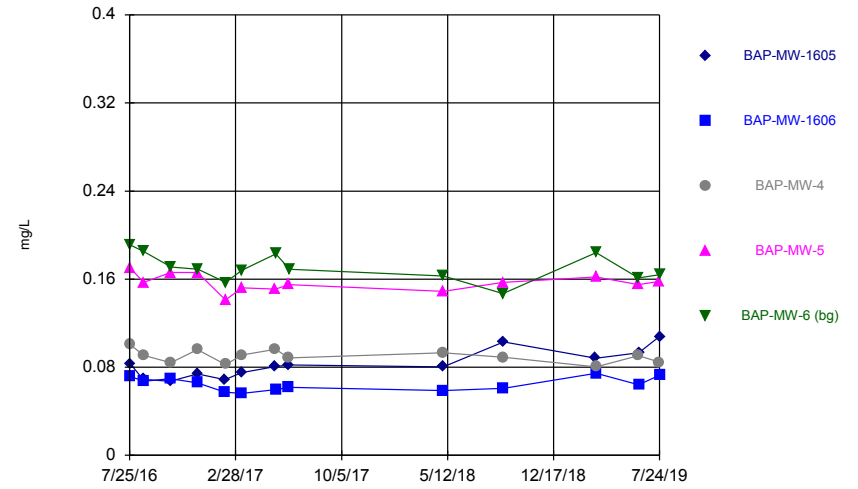
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Time Series



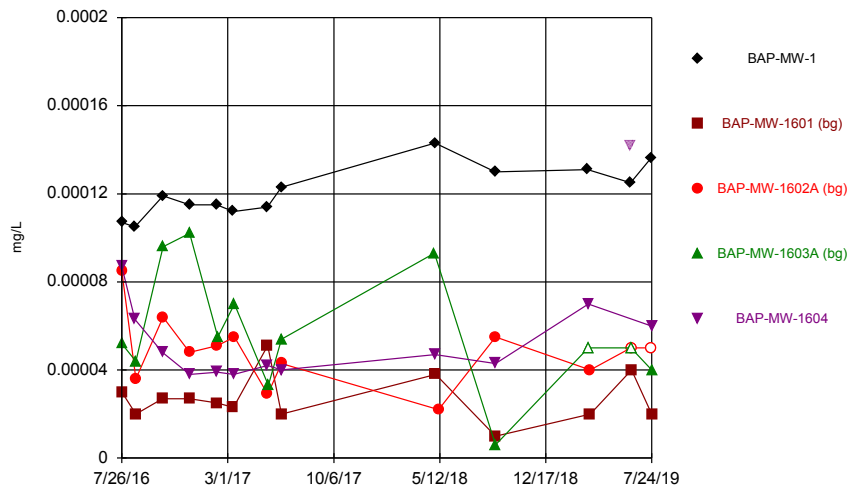
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Time Series



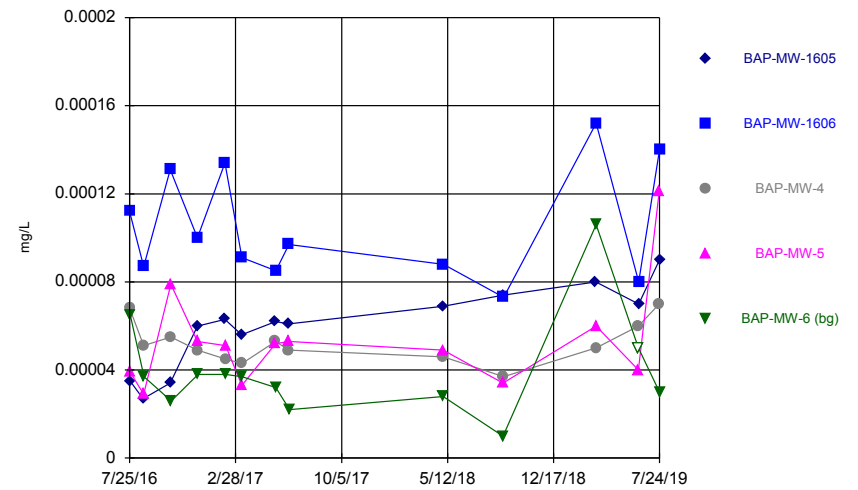
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Time Series



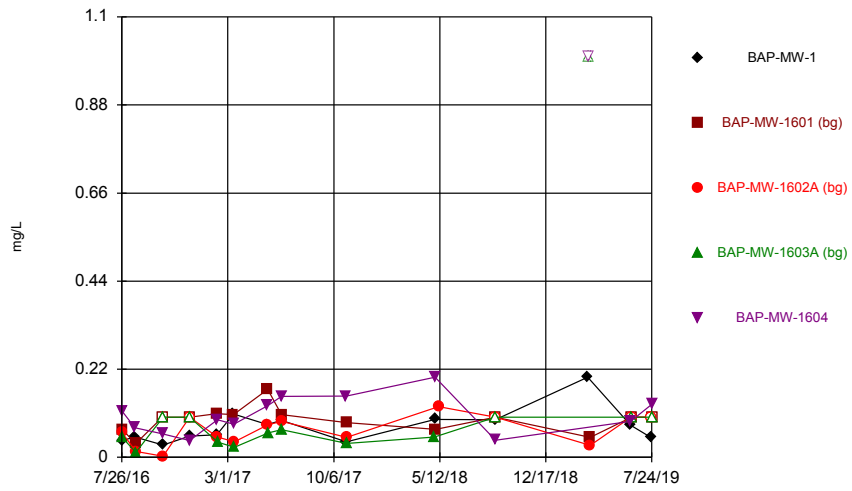
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Time Series



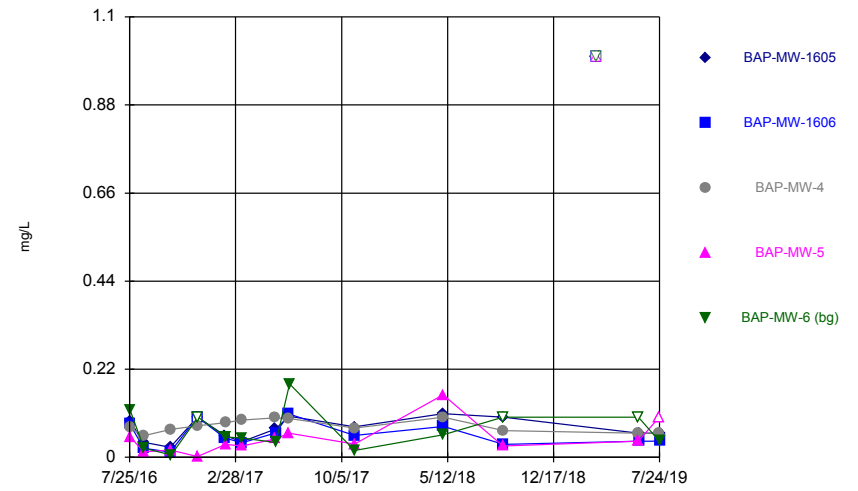
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Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



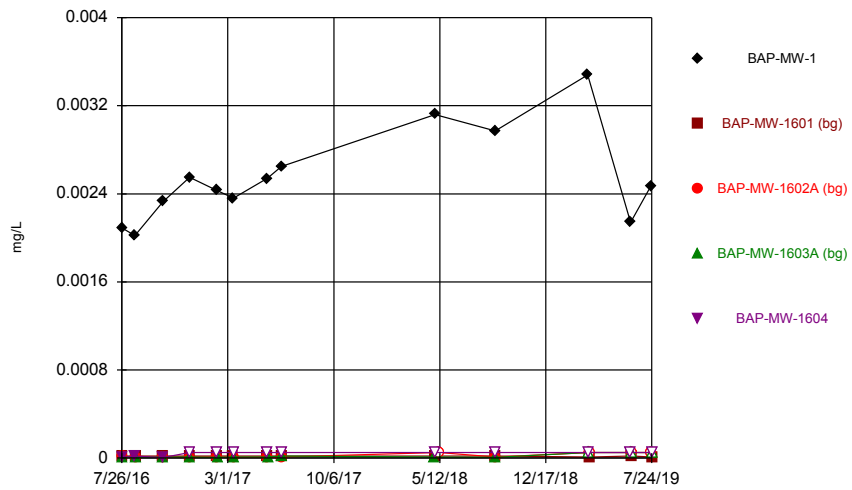
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Time Series



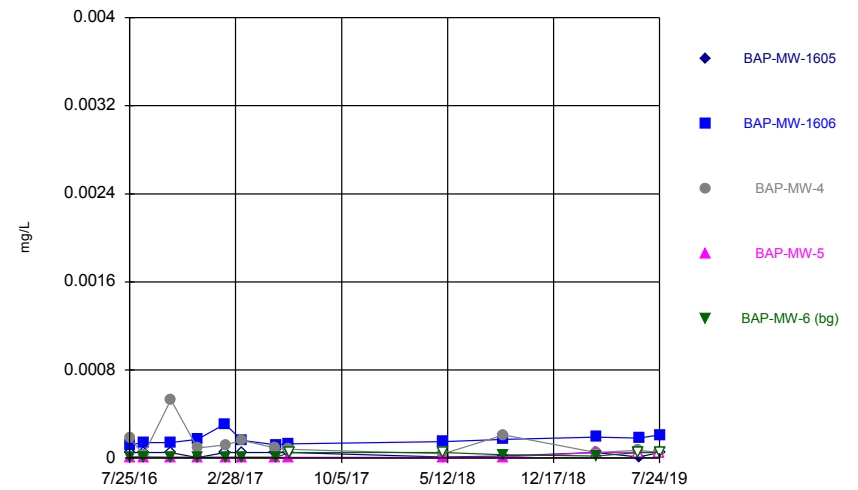
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Time Series



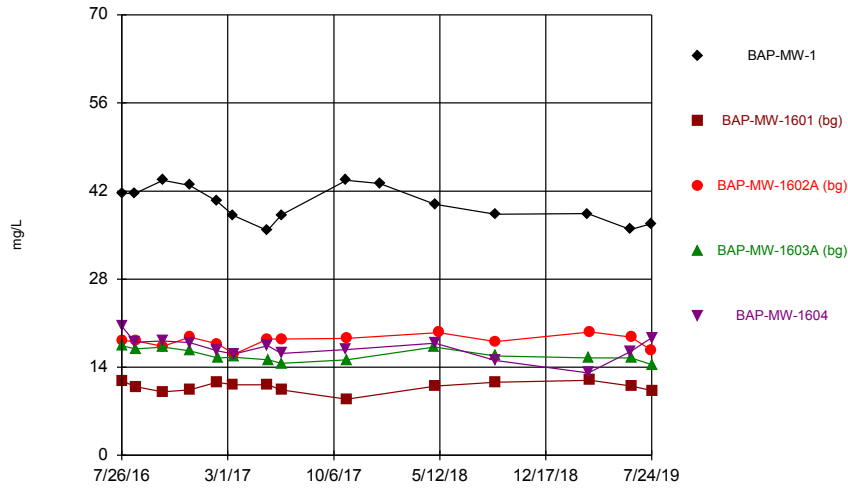
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Time Series

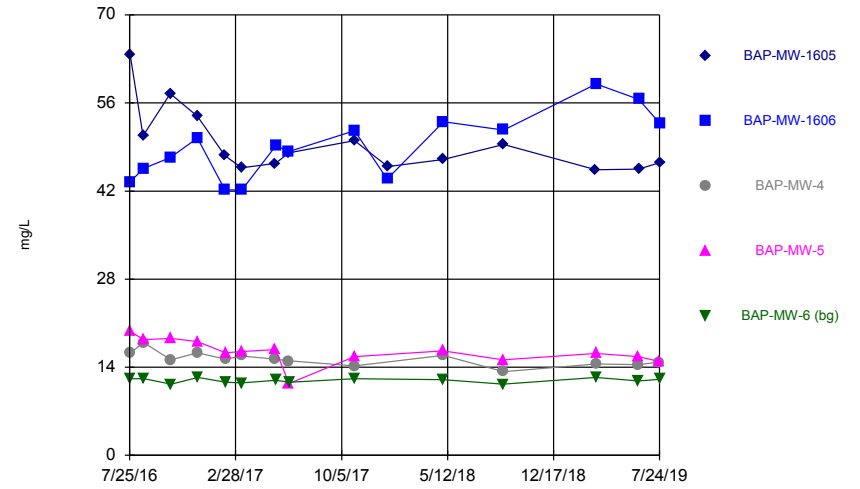


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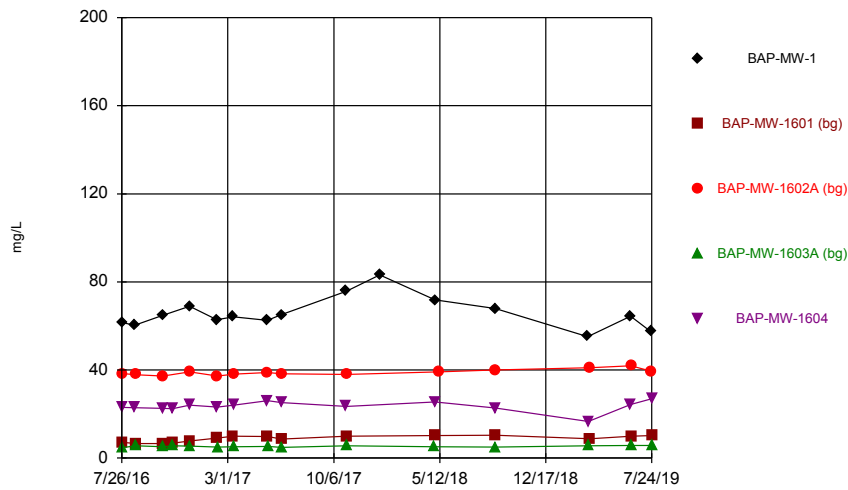
Time Series



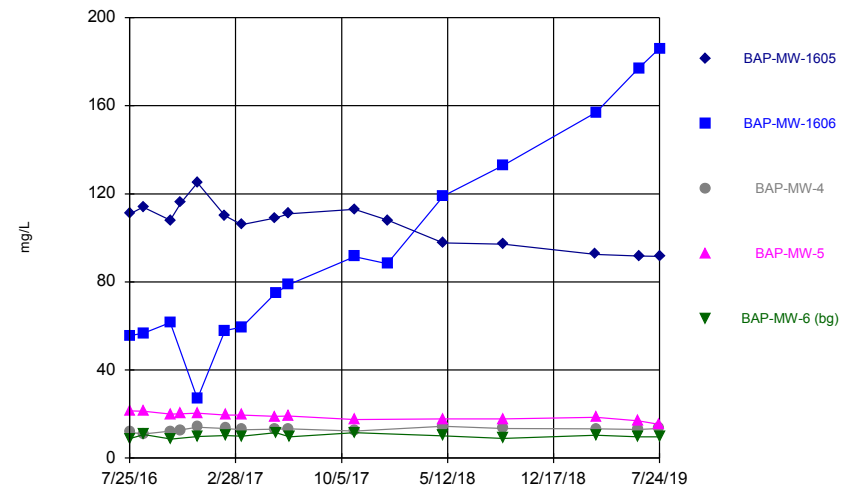
Time Series



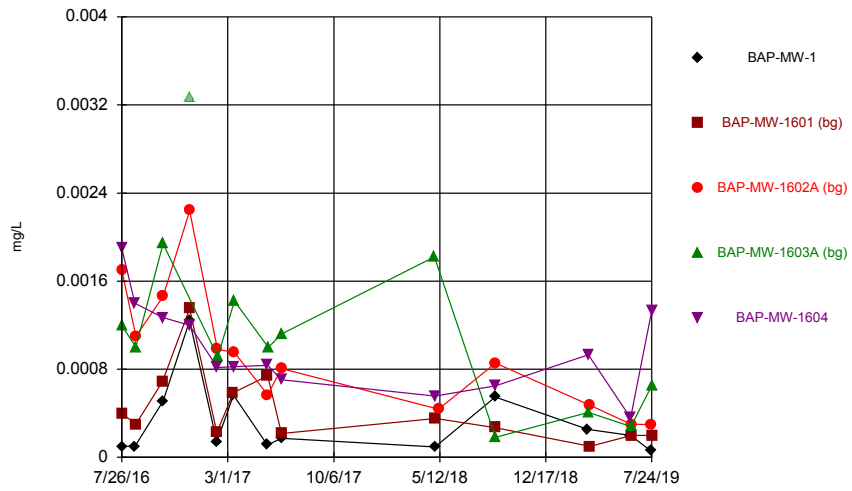
Time Series



Time Series

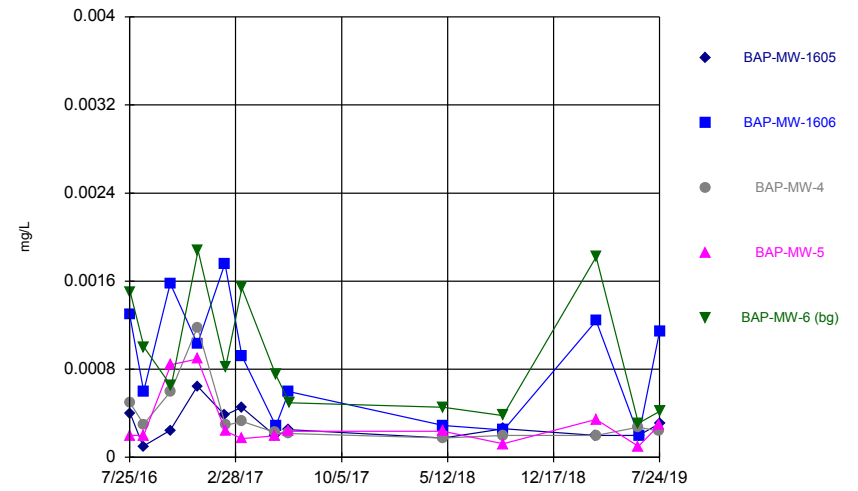


Time Series



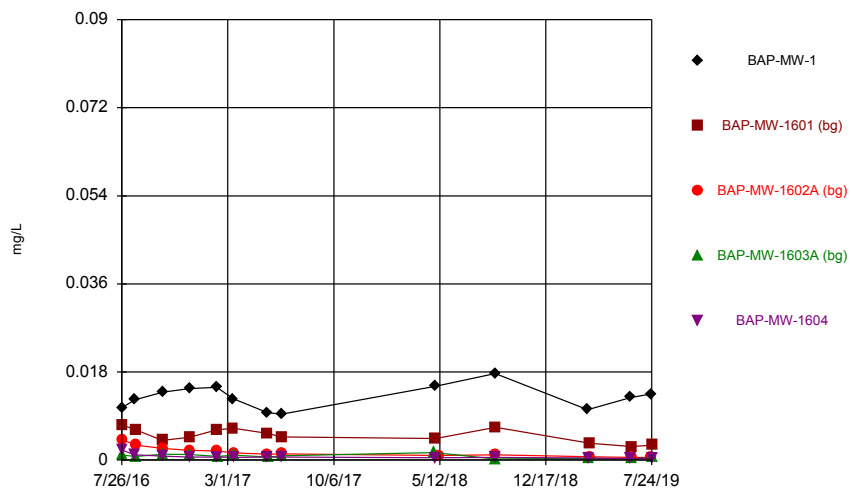
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Time Series



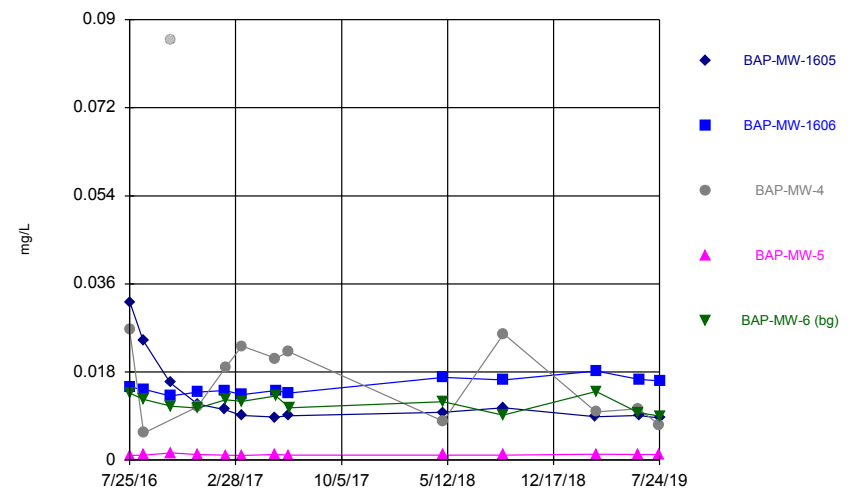
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Time Series



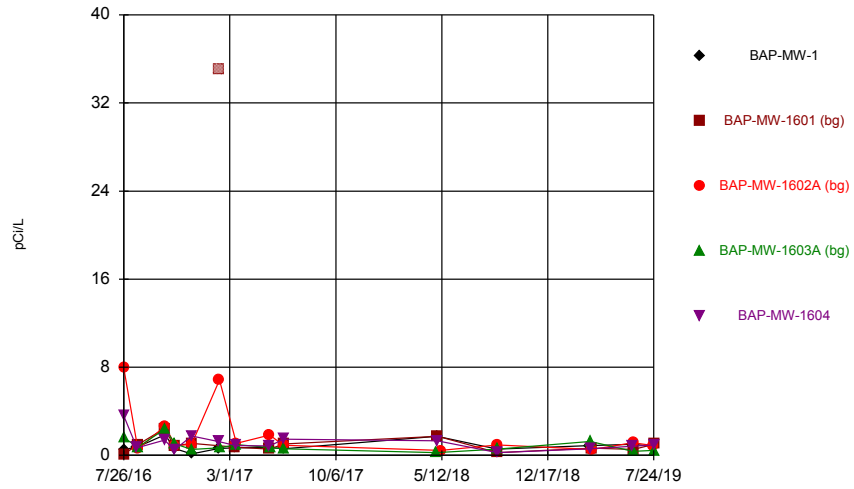
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Time Series



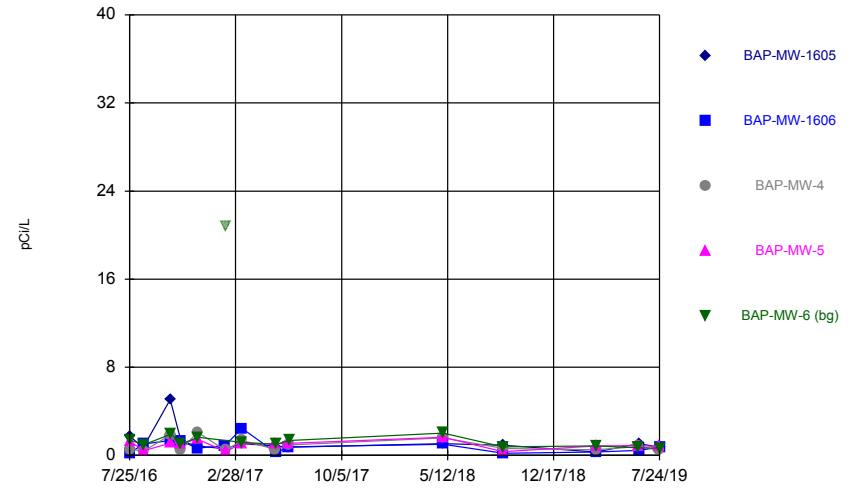
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Time Series



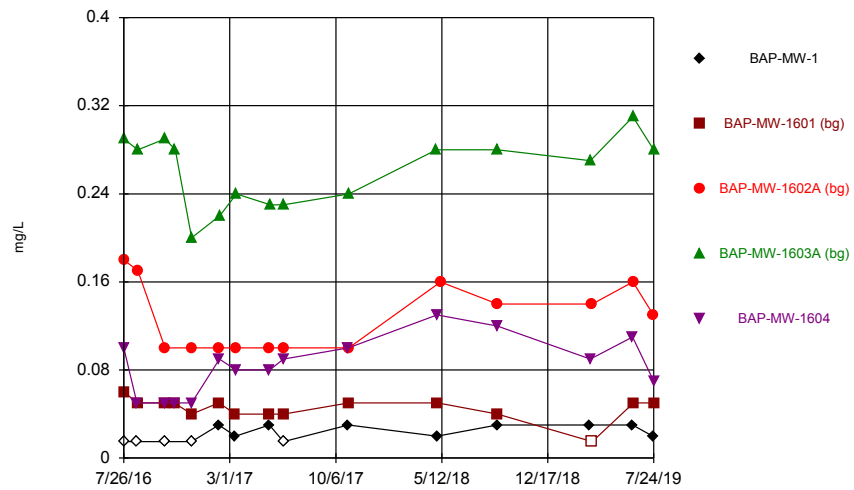
Constituent: Combined Radium 226 + 228 Analysis Run 12/9/2019 1:59 PM
Amos BAP Client: Geosyntec Data: Amos BAP

Time Series



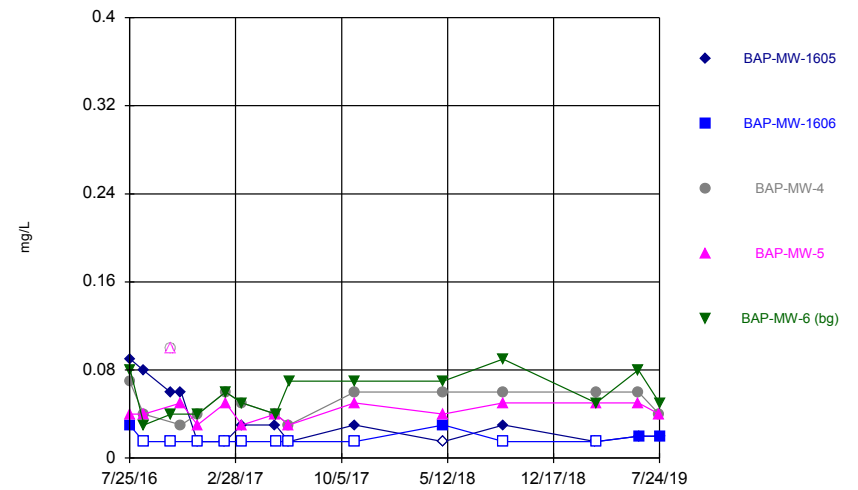
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Time Series



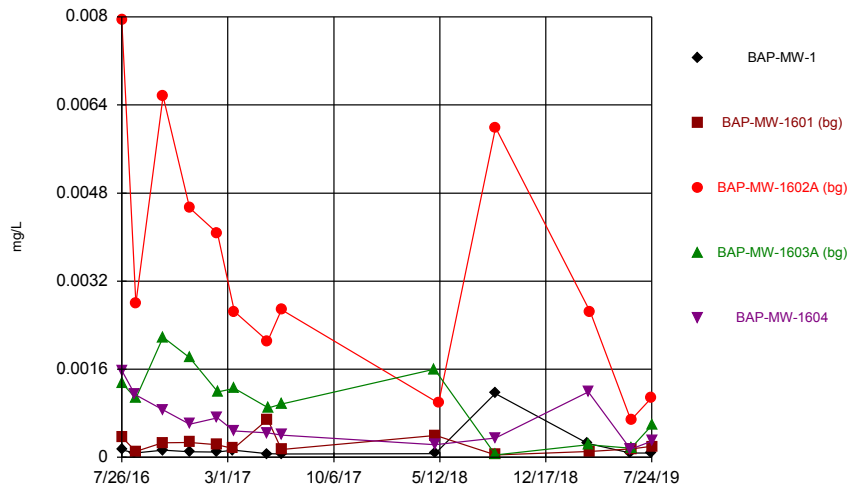
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Time Series



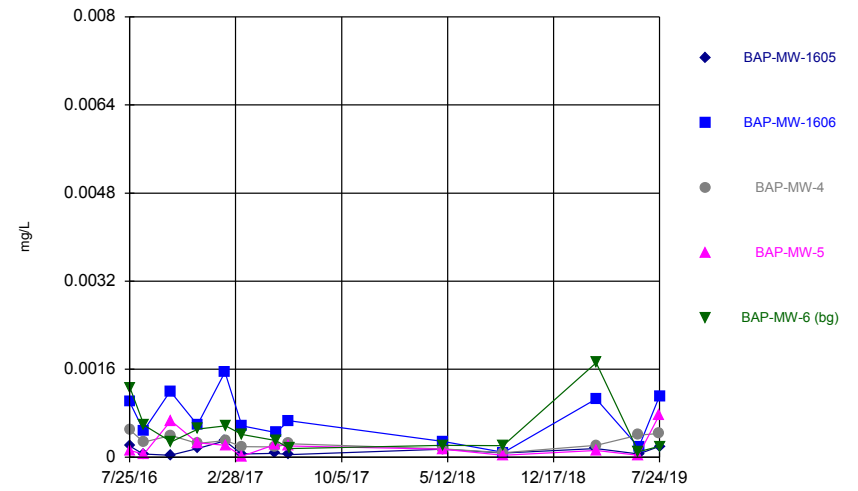
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Time Series



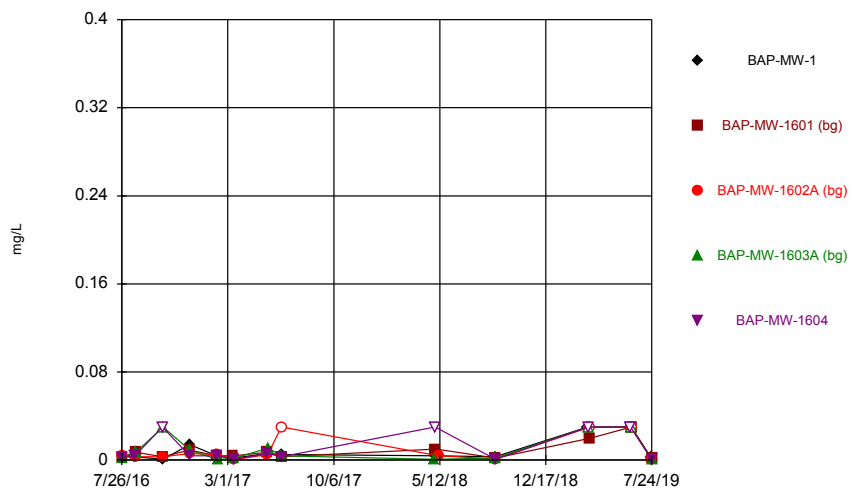
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Time Series



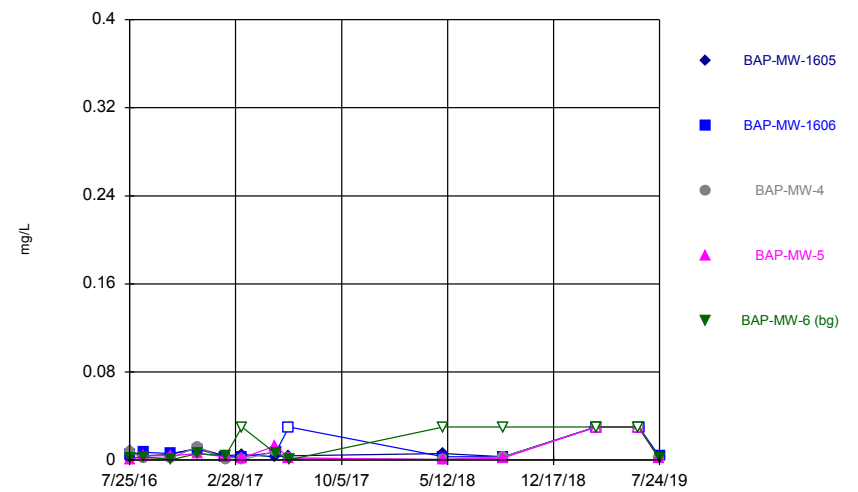
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Time Series



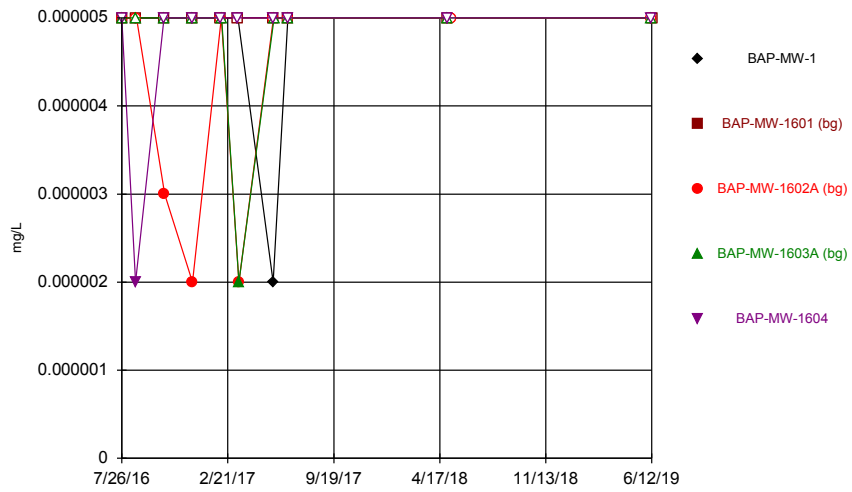
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Time Series



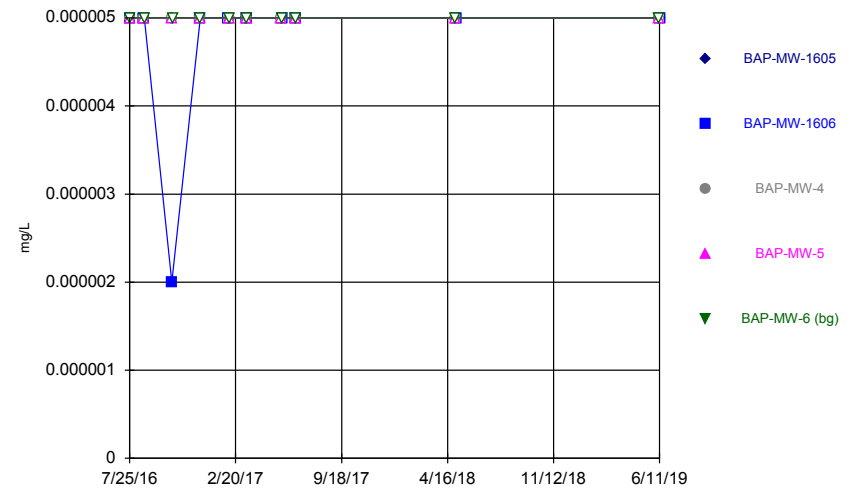
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Time Series



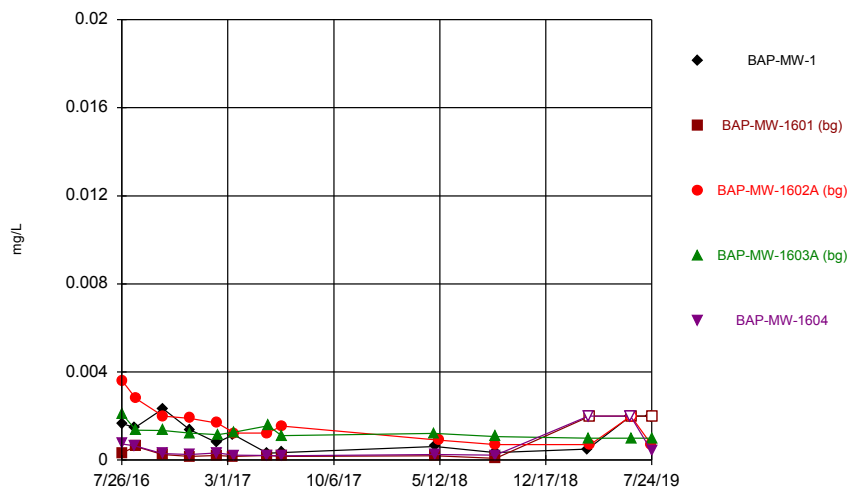
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Time Series



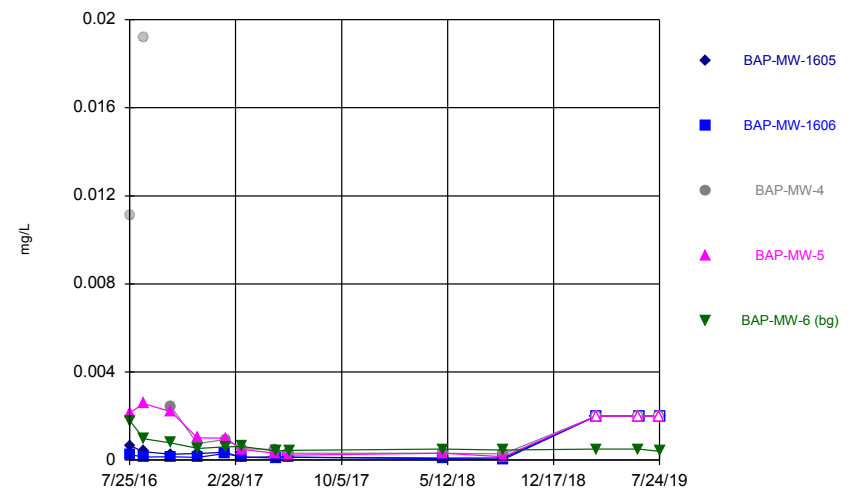
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Time Series



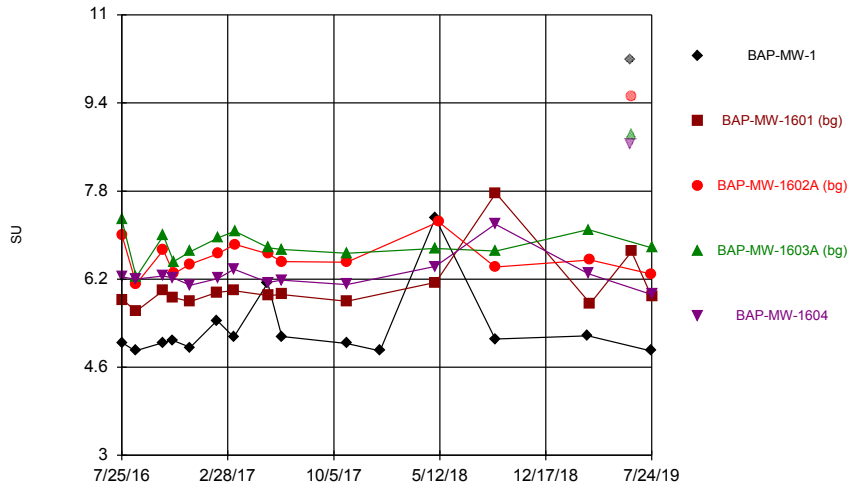
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Time Series



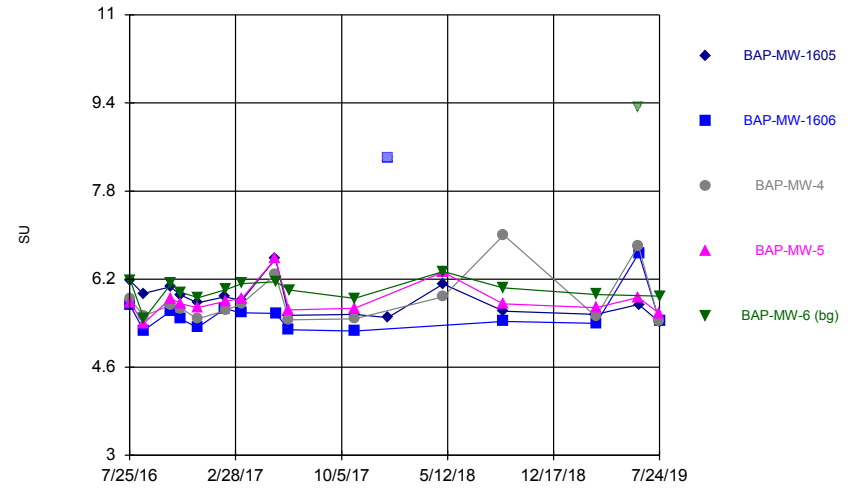
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Time Series



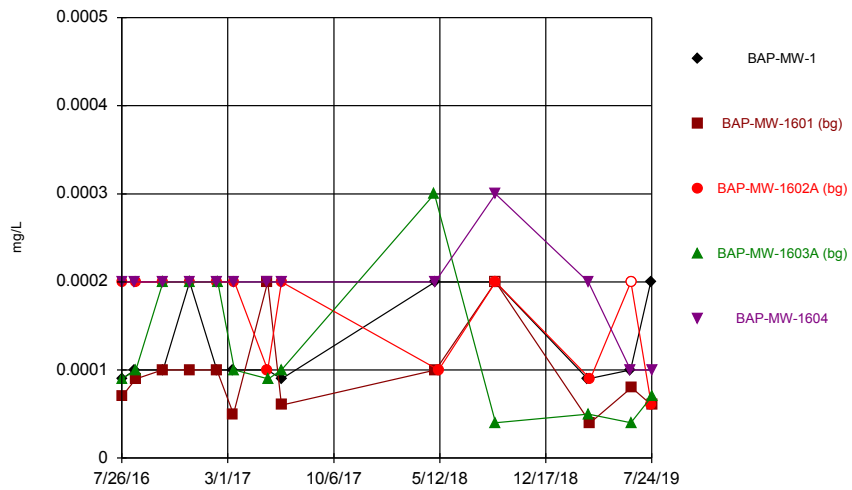
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Time Series



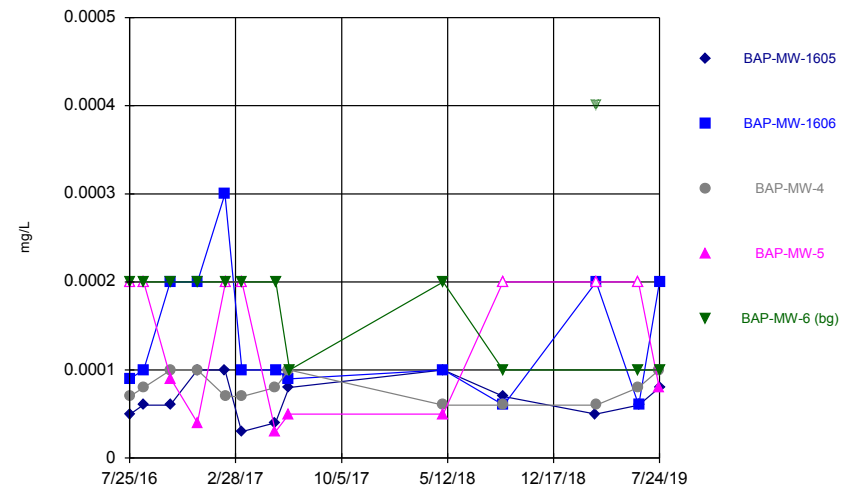
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Time Series



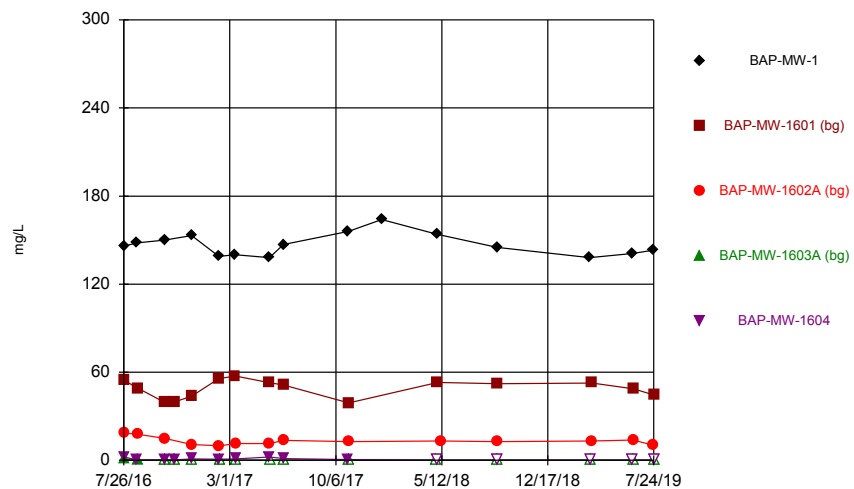
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Time Series



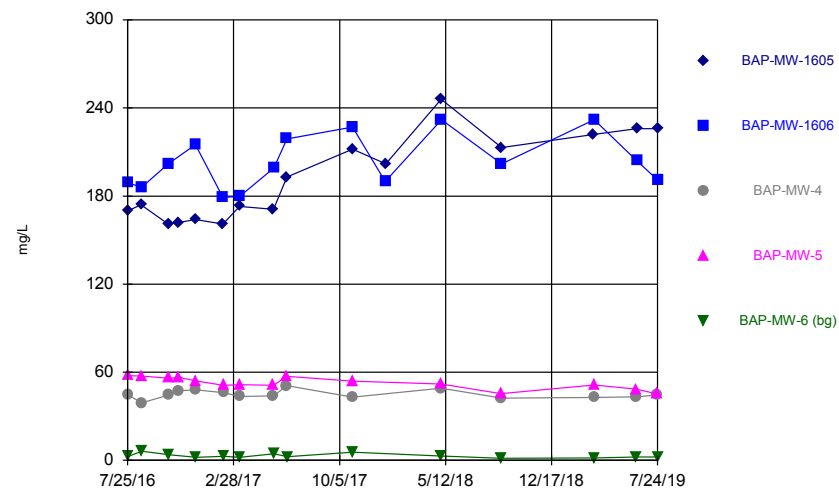
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Time Series



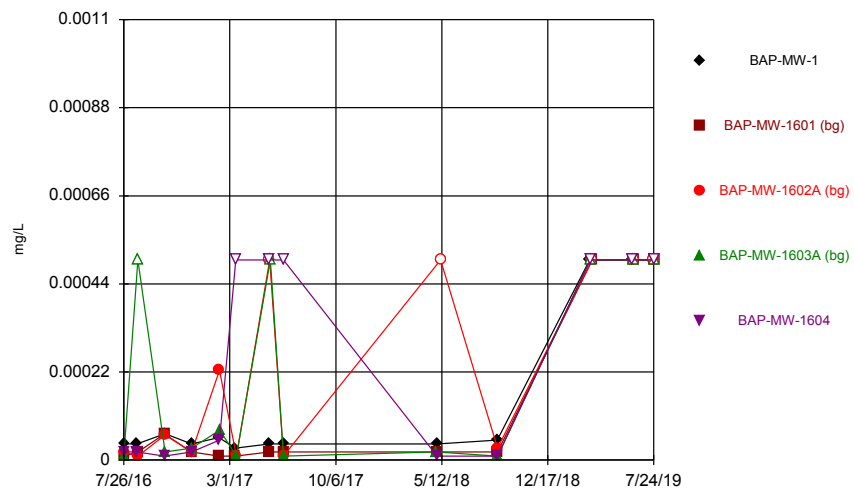
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Time Series



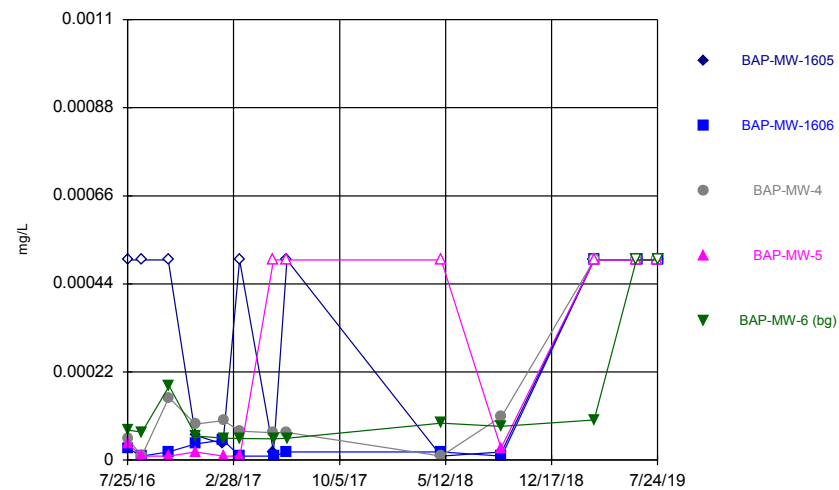
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Time Series



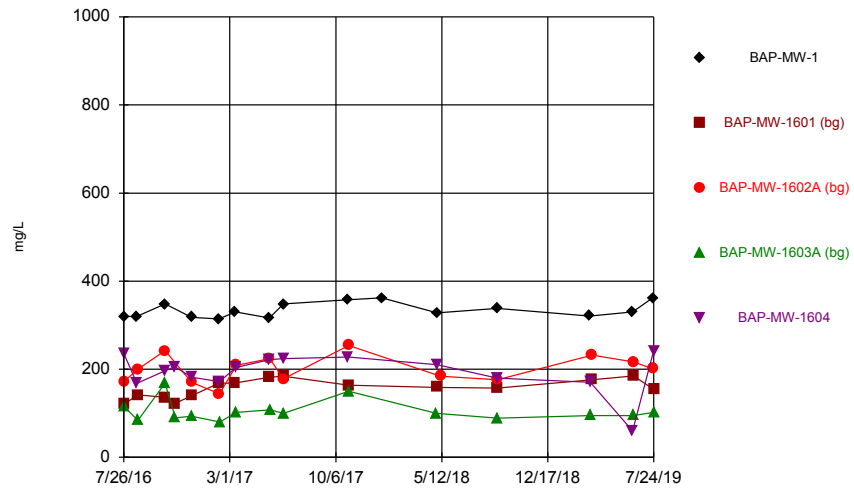
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Time Series



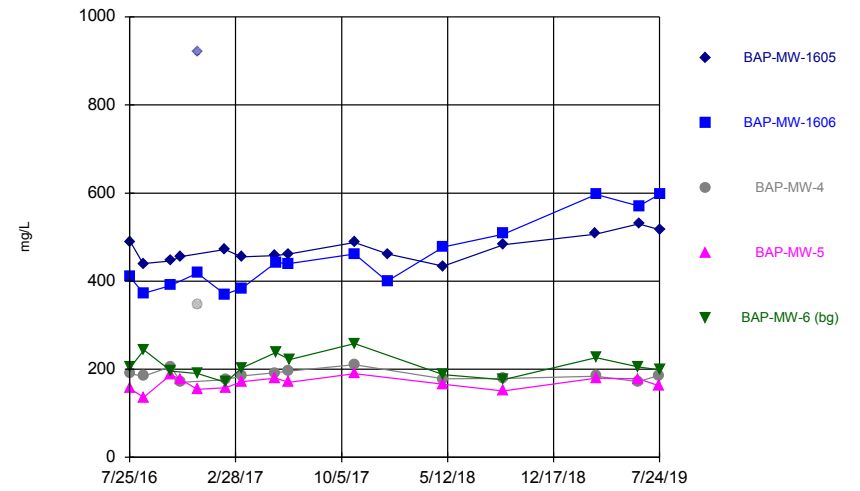
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Time Series



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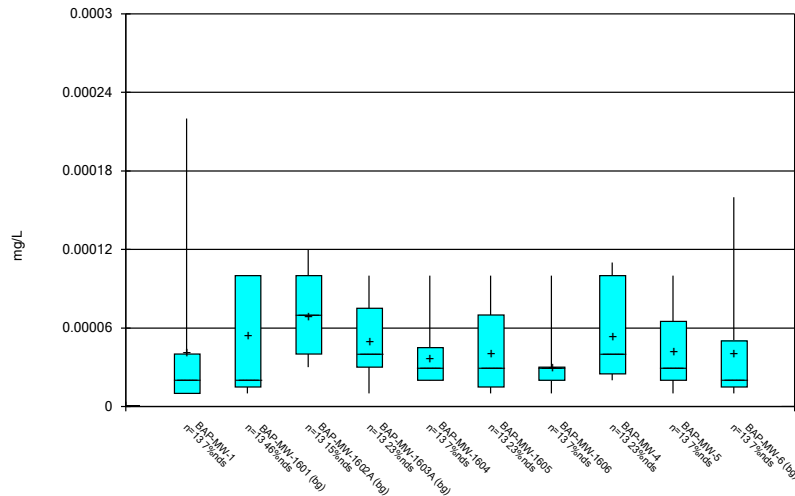
Time Series



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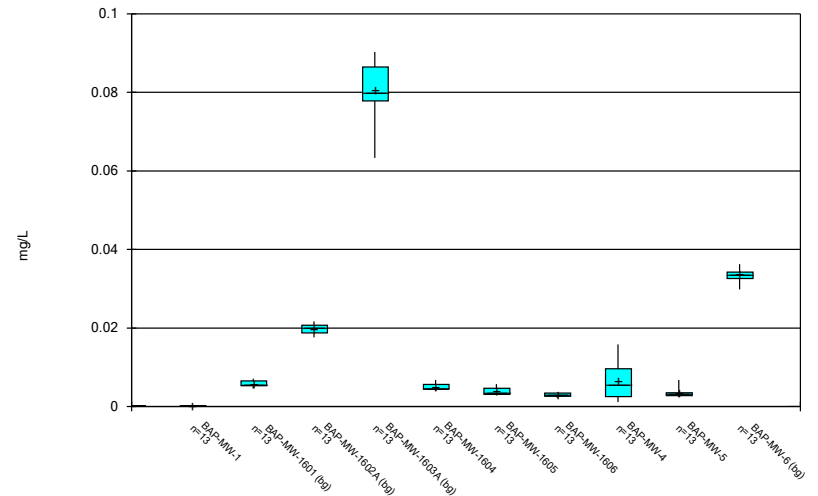
FIGURE B: BOX PLOTS

Box & Whiskers Plot



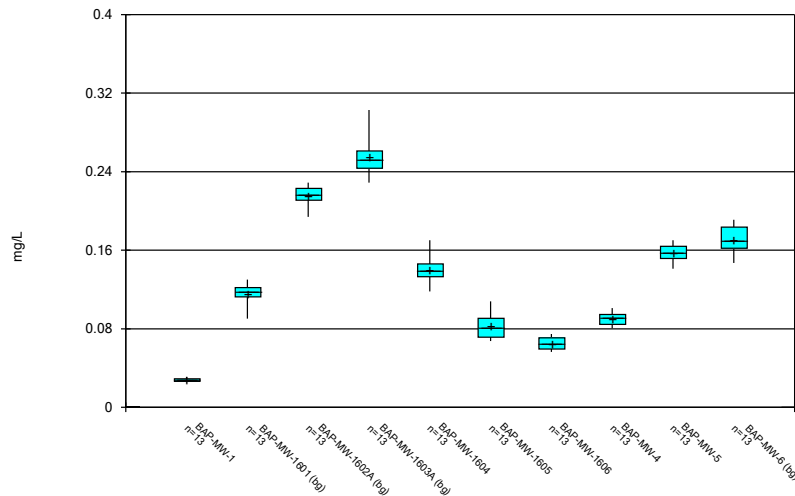
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Box & Whiskers Plot



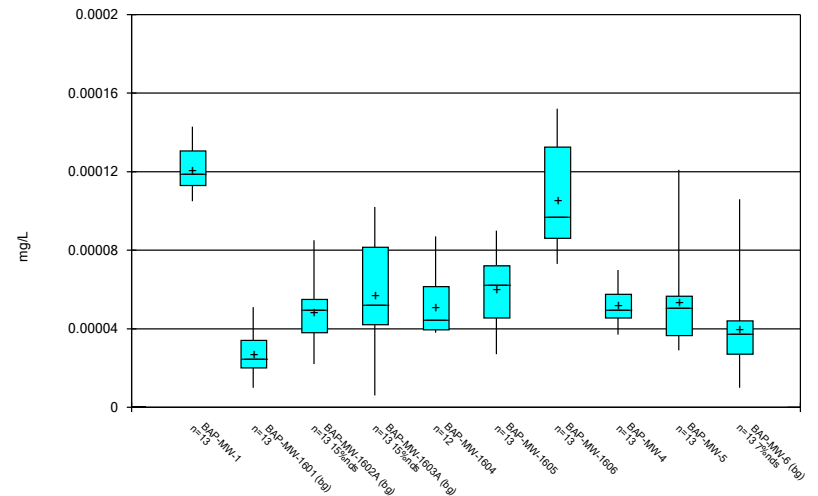
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Box & Whiskers Plot



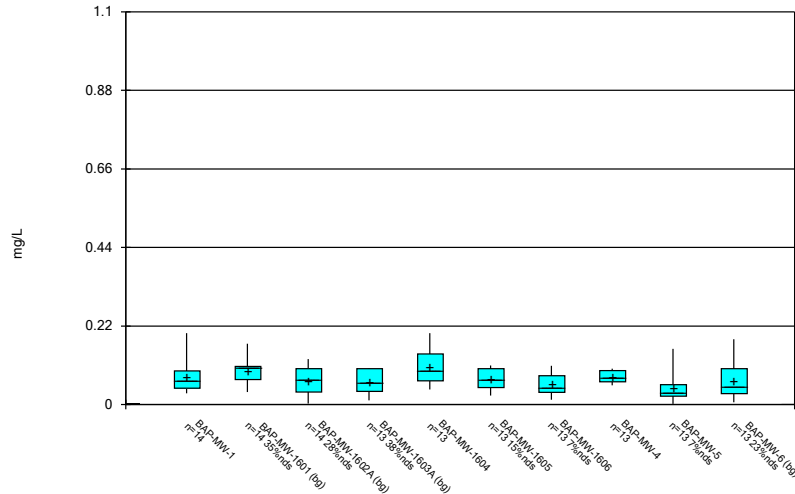
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Box & Whiskers Plot



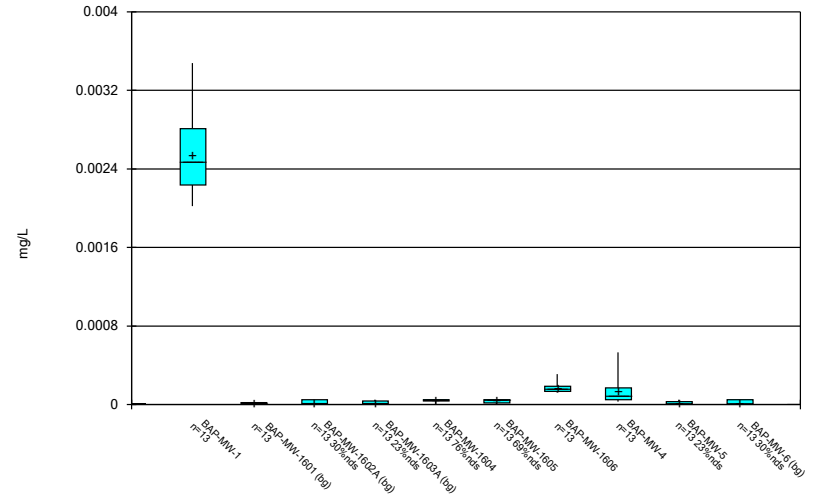
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Box & Whiskers Plot



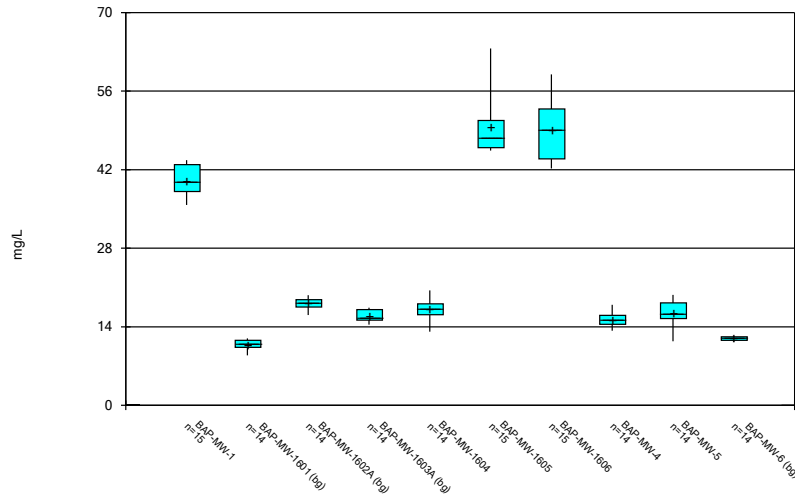
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Box & Whiskers Plot



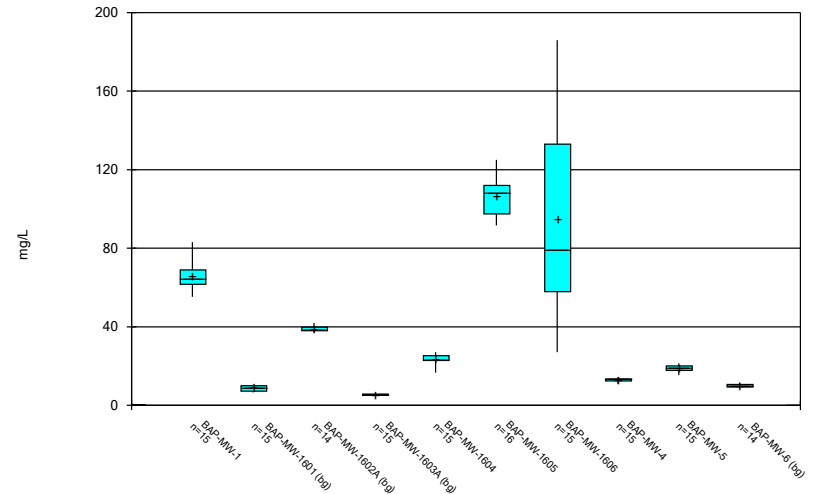
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Box & Whiskers Plot



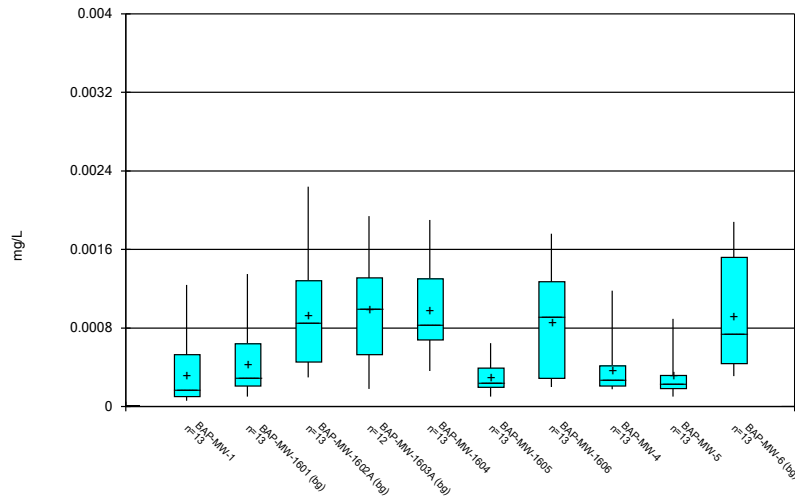
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Box & Whiskers Plot



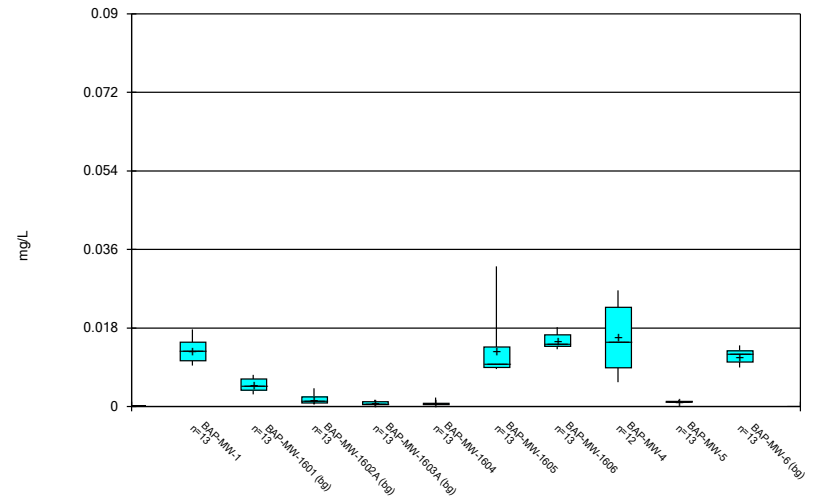
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Box & Whiskers Plot



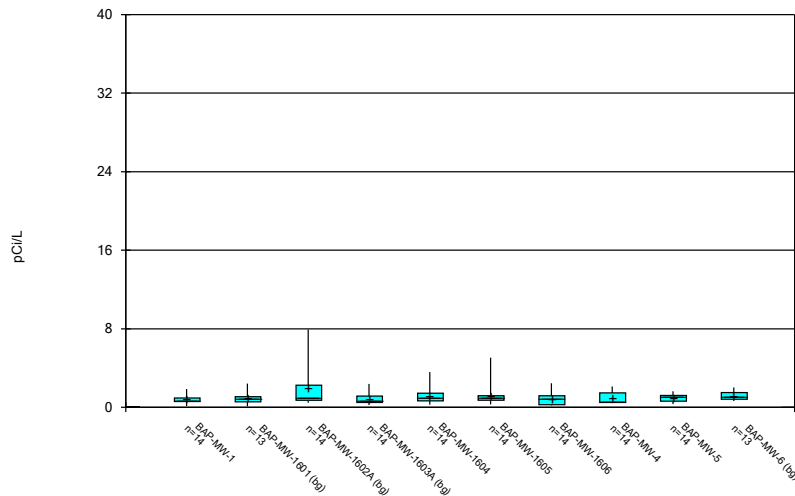
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Box & Whiskers Plot



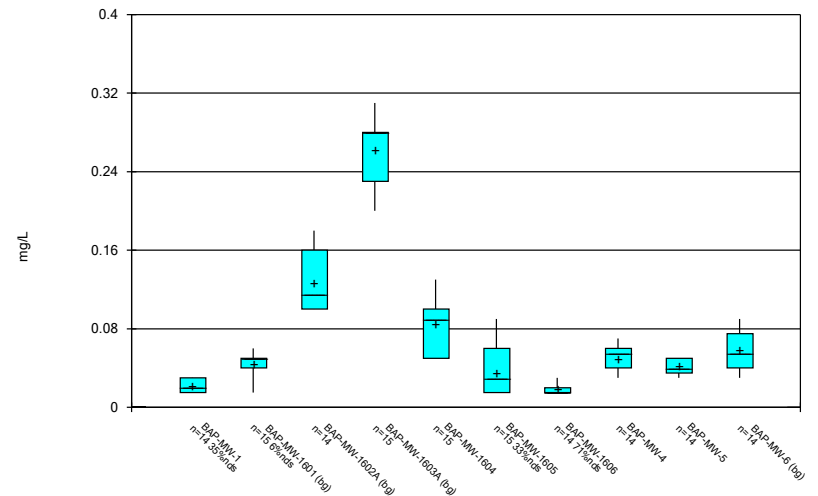
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Amos BAP Client: Geosyntec Data: Amos BAP

Box & Whiskers Plot



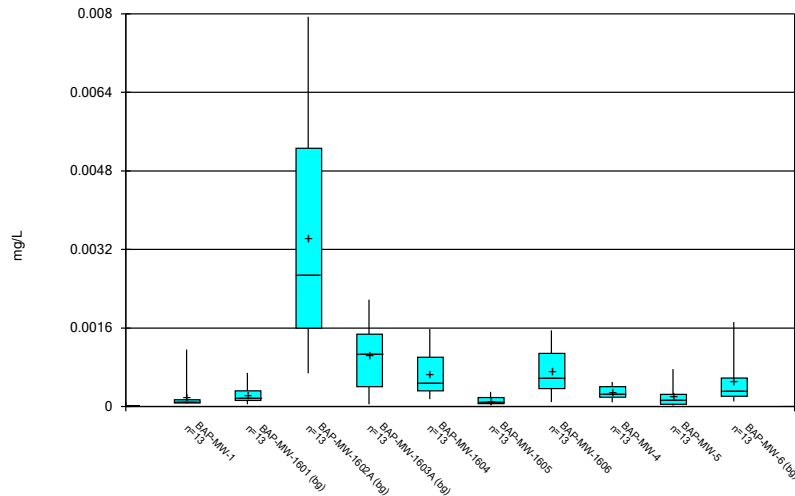
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Amos BAP Client: Geosyntec Data: Amos BAP

Box & Whiskers Plot



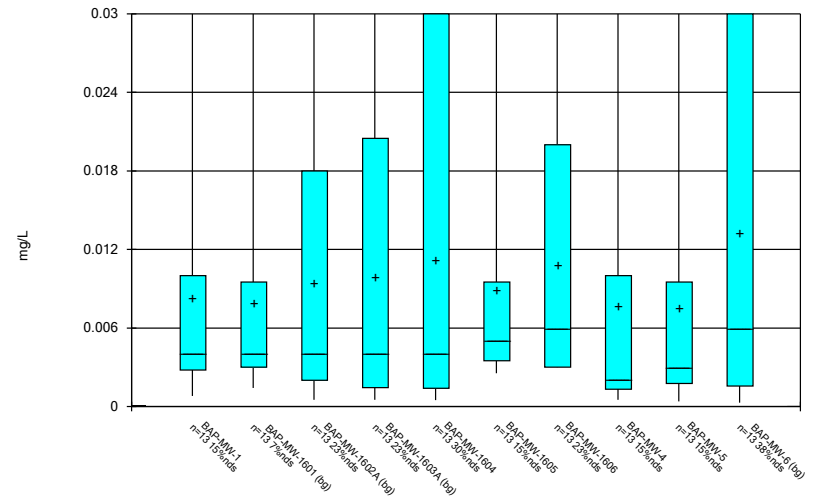
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Box & Whiskers Plot



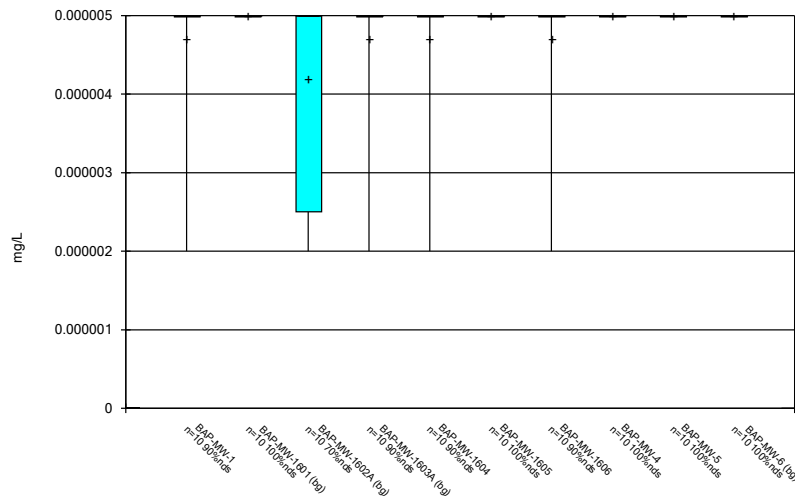
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Box & Whiskers Plot



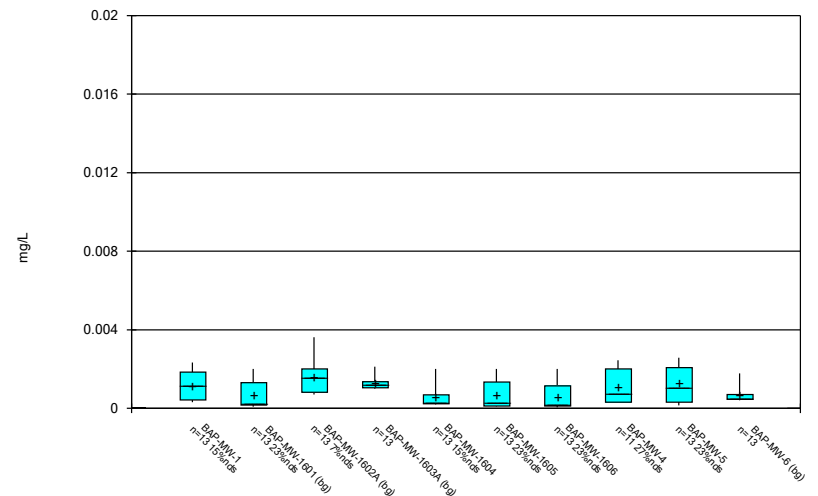
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Box & Whiskers Plot



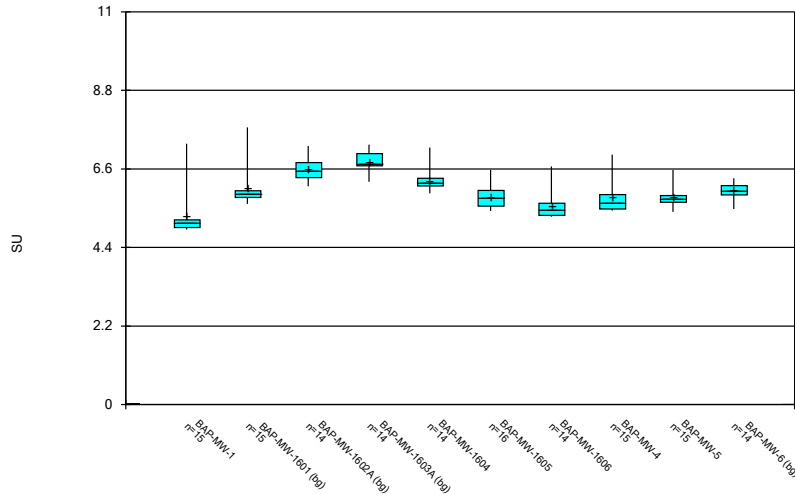
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Box & Whiskers Plot



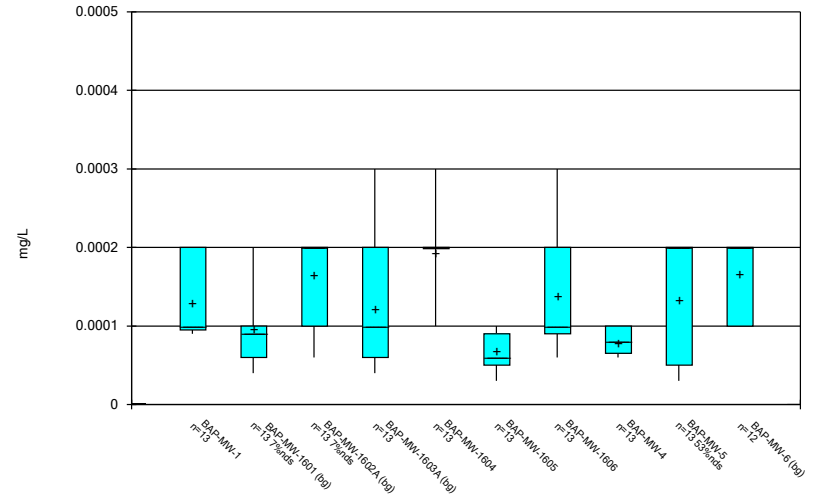
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Box & Whiskers Plot



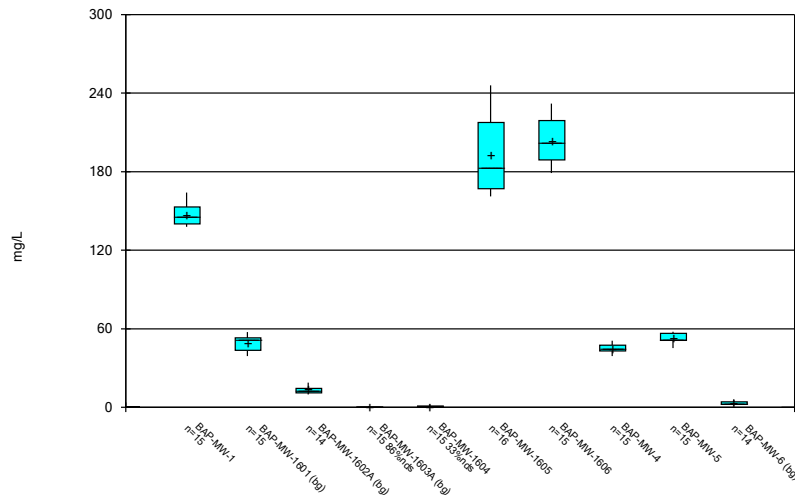
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Box & Whiskers Plot



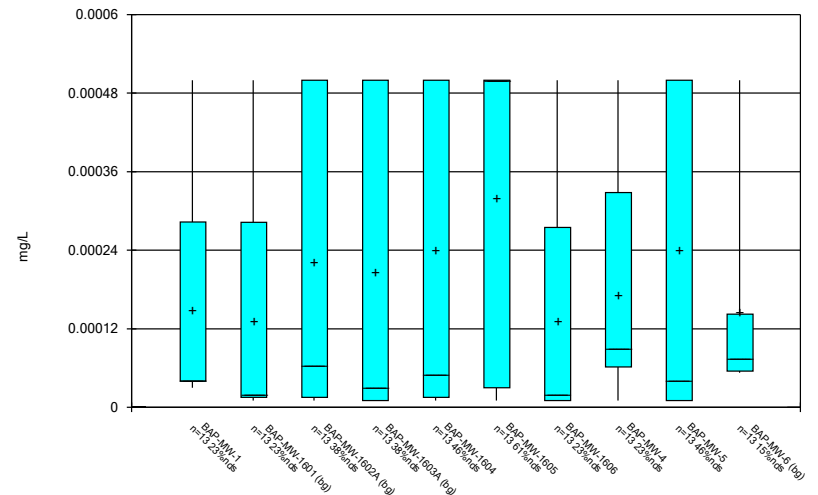
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 Amos BAP Client: Geosyntec Data: Amos BAP

Box & Whiskers Plot



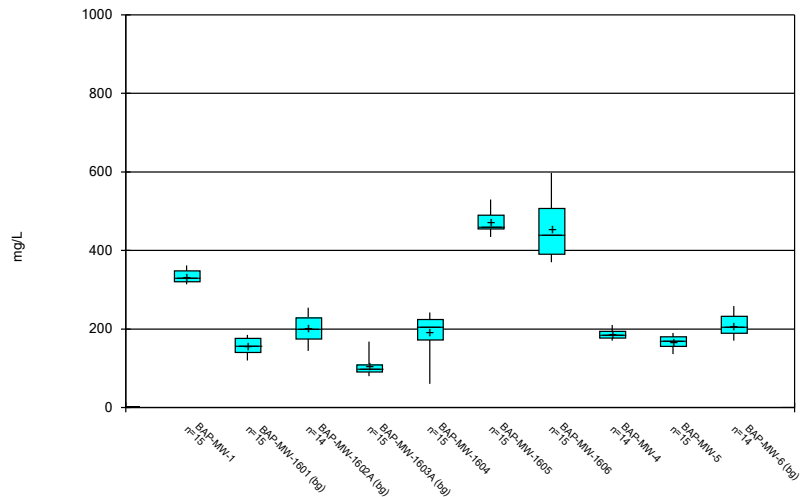
Constituent: Sulfate, total Analysis Run 12/9/2019 2:01 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

Box & Whiskers Plot



Constituent: Thallium, total Analysis Run 12/9/2019 2:01 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

Box & Whiskers Plot



Constituent: Total Dissolved Solids [TDS] Analysis Run 12/9/2019 2:01 PM
Amos BAP Client: Geosyntec Data: Amos BAP

FIGURE C: OUTLIER SUMMARY

Outlier Summary

Amos BAP Client: Geosyntec Data: Amos BAP Printed 12/9/2019, 2:02 PM

Date	BAP-MW-1604 Beryllium, total (mg/L)	BAP-MW-1603A Boron, total (mg/L)	BAP-MW-1604 Boron, total (mg/L)	BAP-MW-1605 Boron, total (mg/L)	BAP-MW-1606 Boron, total (mg/L)	BAP-MW-4 Boron, total (mg/L)	BAP-MW-5 Boron, total (mg/L)	BAP-MW-6 Boron, total (mg/L)	BAP-MW-1603A Chromium, total (mg/L)	BAP-MW-4 Cobalt, total (mg/L)
7/25/2016										
8/23/2016										
10/18/2016									0.0859 (o)	
12/12/2016										
12/13/2016									0.00327 (o)	
2/7/2017										
2/8/2017										
1/8/2018										
3/14/2019			<1 (o)							
3/15/2019	<0.1 (o)	<1 (o)		<1 (o)	<1 (o)	<0.1 (o)	<0.1 (o)			
6/10/2019	0.000142 (o)									
6/11/2019										

Date	BAP-MW-1601 Combined Radium 226 + 228 (pCi/L)	BAP-MW-6 Combined Radium 226 + 228 (pCi/L)	BAP-MW-4 Fluoride, total (mg/L)	BAP-MW-5 Fluoride, total (mg/L)	BAP-MW-4 Molybdenum, total (mg/L)	BAP-MW-1 pH, field (SU)	BAP-MW-1602A pH, field (SU)	BAP-MW-1603A pH, field (SU)	BAP-MW-1604 pH, field (SU)	BAP-MW-1606 pH, field (SU)
7/25/2016				0.0111 (o)						
8/23/2016				0.0192 (o)						
10/18/2016		<0.03 (o)	<0.03 (o)							
12/12/2016										
12/13/2016										
2/7/2017	35.021 (o)									
2/8/2017		20.83 (o)								
1/8/2018									8.4 (o)	
3/14/2019										
3/15/2019										
6/10/2019					10.19 (o)			8.65 (o)		
6/11/2019						9.51 (o)	8.82 (o)			

Outlier Summary

Amos BAP Client: Geosyntec Data: Amos BAP Printed 12/9/2019, 2:02 PM

	BAP-MW-6 pH, field (SU)	BAP-MW-6 Selenium, total (mg/L)	BAP-MW-1605 Total Dissolved Solids [TDS] (mg/L)	BAP-MW-4 Total Dissolved Solids [TDS] (mg/L)
7/25/2016				
8/23/2016				
10/18/2016				
12/12/2016		920 (o)	348 (o)	
12/13/2016				
2/7/2017				
2/8/2017				
1/8/2018				
3/14/2019				
3/15/2019		0.0004 (o)		
6/10/2019	9.32 (o)			
6/11/2019				

Upgradient Outlier Analysis - Significant Results

Amos BAP Client: Geosyntec Data: Amos BAP Printed 12/4/2019, 4:42 PM

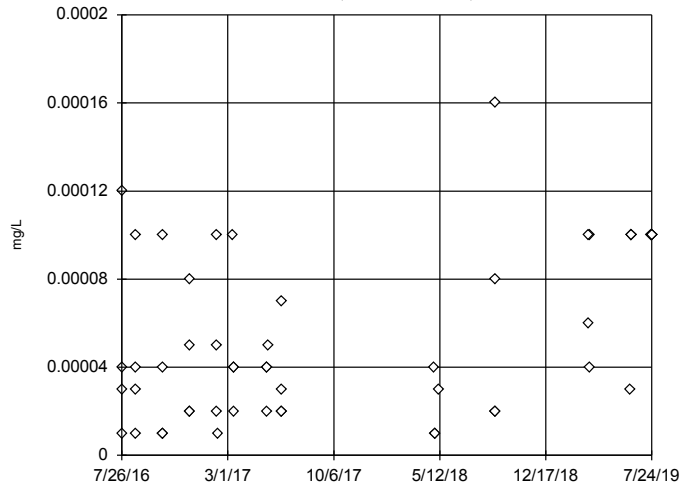
<u>Constituent</u>	<u>Well</u>	<u>Outlier</u>	<u>Value(s)</u>	<u>Method</u>	<u>Alpha</u>	<u>N</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>Distribution</u>	<u>Normality Test</u>
Combined Radium 226 + 228 (pCi/L)	BAP-MW-1601,BAP-M...	Yes	35.02,20.83	NP	NaN	56	2.197	5.34	In(x)	ShapiroFrancia

Upgradient Outlier Analysis - All Results

Amos BAP Client: Geosyntec Data: Amos BAP Printed 12/4/2019, 4:42 PM

Constituent	Well	Outlier	Value(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Antimony, total (mg/L)	BAP-MW-1601,BAP-M...	No	n/a	NP	NaN	52	0.00005346	0.00003793	x^(1/3)	ShapiroFrancia
Arsenic, total (mg/L)	BAP-MW-1601,BAP-M...	No	n/a	NP	NaN	52	0.0349	0.02862	x^(1/3)	ShapiroFrancia
Barium, total (mg/L)	BAP-MW-1601,BAP-M...	No	n/a	NP	NaN	52	0.1891	0.05365	normal	ShapiroFrancia
Beryllium, total (mg/L)	BAP-MW-1601,BAP-M...	No	n/a	NP	NaN	52	0.00004313	0.00002279	x^(1/3)	ShapiroFrancia
Boron, total (mg/L)	BAP-MW-1601,BAP-M...	No	n/a	NP	NaN	56	0.07454	0.03869	normal	ShapiroFrancia
Cadmium, total (mg/L)	BAP-MW-1601,BAP-M...	No	n/a	NP	NaN	52	0.00002083	0.00001622	ln(x)	ShapiroFrancia
Calcium, total (mg/L)	BAP-MW-1601,BAP-M...	No	n/a	NP	NaN	56	14.21	3.096	ln(x)	ShapiroFrancia
Chloride, total (mg/L)	BAP-MW-1601,BAP-M...	No	n/a	NP	NaN	58	15.45	13.5	ln(x)	ShapiroFrancia
Chromium, total (mg/L)	BAP-MW-1601,BAP-M...	No	n/a	NP	NaN	52	0.0008655	0.0006459	ln(x)	ShapiroFrancia
Cobalt, total (mg/L)	BAP-MW-1601,BAP-M...	No	n/a	NP	NaN	52	0.004737	0.00442	ln(x)	ShapiroFrancia
Combined Radium 226 + 228 (pCi/L)	BAP-MW-1601,BAP-M...	Yes	35.02,20.83	NP	NaN	56	2.197	5.34	ln(x)	ShapiroFrancia
Fluoride, total (mg/L)	BAP-MW-1601,BAP-M...	No	n/a	NP	NaN	58	0.1241	0.0907	ln(x)	ShapiroFrancia
Lead, total (mg/L)	BAP-MW-1601,BAP-M...	No	n/a	NP	NaN	52	0.001302	0.00173	ln(x)	ShapiroFrancia
Lithium, total (mg/L)	BAP-MW-1601,BAP-M...	No	n/a	NP	NaN	52	0.01015	0.01147	ln(x)	ShapiroFrancia
Mercury, total (mg/L)	BAP-MW-1601,BAP-M...	n/a	n/a	NP	NaN	40	0.000004725	8.5e-7	unknown	ShapiroWilk
Molybdenum, total (mg/L)	BAP-MW-1601,BAP-M...	No	n/a	NP	NaN	52	0.0009669	0.0006889	x^(1/3)	ShapiroFrancia
Selenium, total (mg/L)	BAP-MW-1601,BAP-M...	No	n/a	NP	NaN	52	0.0001419	0.00007433	ln(x)	ShapiroFrancia
Sulfate, total (mg/L)	BAP-MW-1601,BAP-M...	No	n/a	NP	NaN	58	16.67	20.09	ln(x)	ShapiroFrancia
Thallium, total (mg/L)	BAP-MW-1601,BAP-M...	No	n/a	NP	NaN	52	0.0001763	0.0002119	ln(x)	ShapiroFrancia
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-1601,BAP-M...	No	n/a	NP	NaN	58	166.4	48.65	normal	ShapiroFrancia

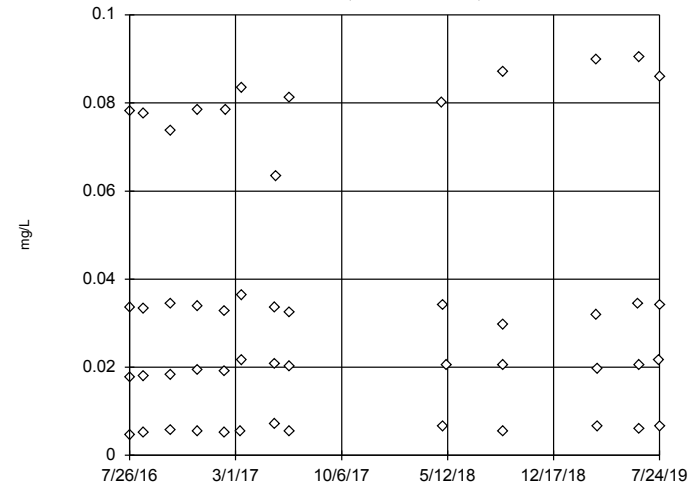
Tukey's Outlier Screening, Pooled Background
BAP-MW-1601,BAP-MW-1602A,BAP-MW-1603A...



n = 52
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 = 0.001132, low cutoff = -0.0002885, based on IQR multiplier of 3.

Constituent: Antimony, total Analysis Run 12/4/2019 4:40 PM
Amos BAP Client: Geosyntec Data: Amos BAP

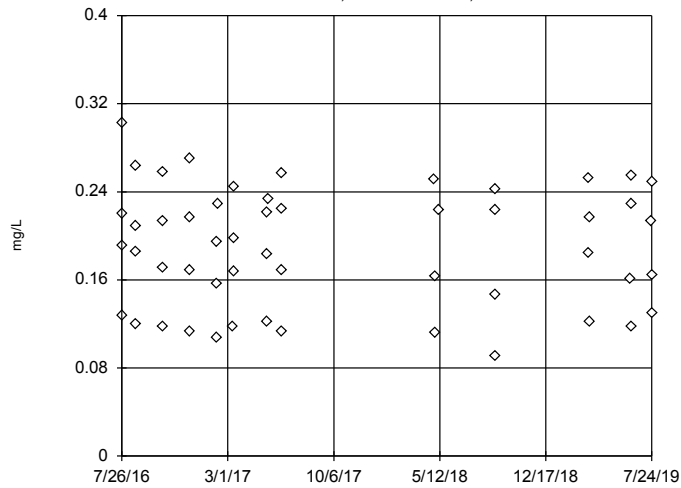
Tukey's Outlier Screening, Pooled Background
BAP-MW-1601,BAP-MW-1602A,BAP-MW-1603A...



n = 52
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 = 0.4765, low cutoff = -0.00688, based on IQR multiplier of 3.

Constituent: Arsenic, total Analysis Run 12/4/2019 4:40 PM
Amos BAP Client: Geosyntec Data: Amos BAP

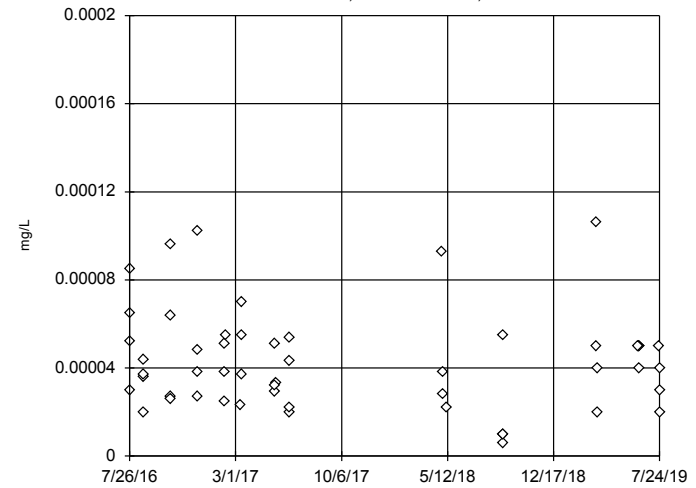
Tukey's Outlier Screening, Pooled Background
BAP-MW-1601,BAP-MW-1602A,BAP-MW-1603A...



n = 52
No outliers found.
Tukey's method selected by user.
Ladder of Powers transformations did not improve normality, analysis run on raw data.
High cutoff = 0.5005, low cutoff = -0.133, based on IQR multiplier of 3.

Constituent: Barium, total Analysis Run 12/4/2019 4:40 PM
Amos BAP Client: Geosyntec Data: Amos BAP

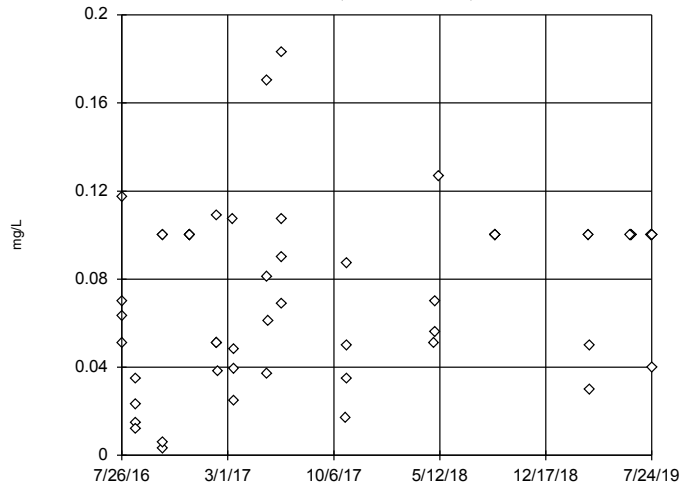
Tukey's Outlier Screening, Pooled Background
BAP-MW-1601,BAP-MW-1602A,BAP-MW-1603A...



n = 52
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 = 0.0002035, low cutoff = 5.9e-7, based on IQR multiplier of 3.

Constituent: Beryllium, total Analysis Run 12/4/2019 4:40 PM
Amos BAP Client: Geosyntec Data: Amos BAP

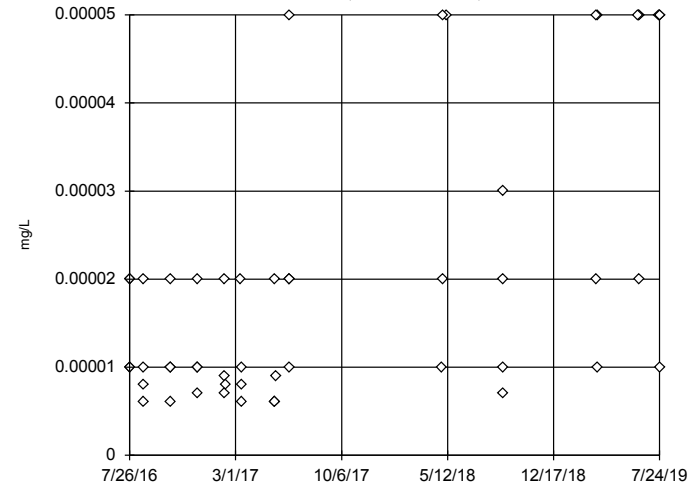
Tukey's Outlier Screening, Pooled Background
BAP-MW-1601,BAP-MW-1602A,BAP-MW-1603A...



n = 56
No outliers found.
Tukey's method selected by user.
Ladder of Powers transformations did not improve normality; analysis run on raw data.
High cutoff = 0.268, low cutoff = -0.124, based on IQR multiplier of 3.

Constituent: Boron, total Analysis Run 12/4/2019 4:40 PM
Amos BAP Client: Geosyntec Data: Amos BAP

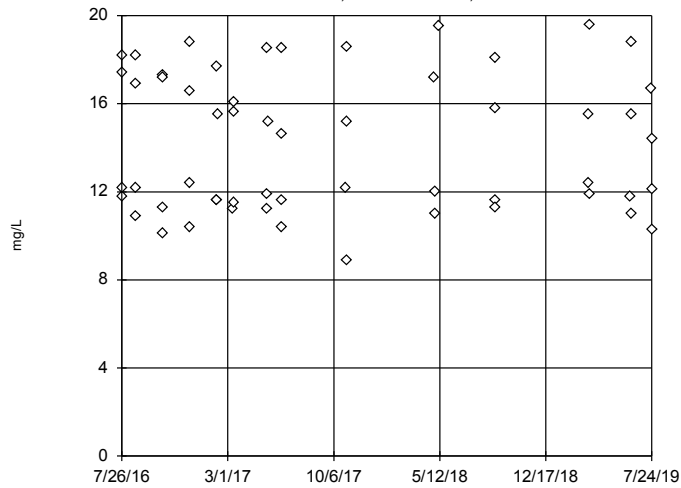
Tukey's Outlier Screening, Pooled Background
BAP-MW-1601,BAP-MW-1602A,BAP-MW-1603A...



n = 52
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 = 0.0001874, low cutoff = 0.00001013, based on IQR multiplier of 3.

Constituent: Cadmium, total Analysis Run 12/4/2019 4:40 PM
Amos BAP Client: Geosyntec Data: Amos BAP

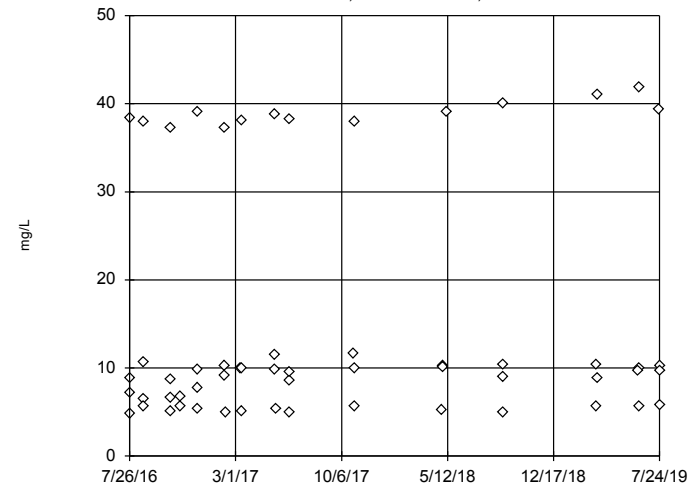
Tukey's Outlier Screening, Pooled Background
BAP-MW-1601,BAP-MW-1602A,BAP-MW-1603A...



n = 56
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 = 56.07, low cutoff = 3.558, based on IQR multiplier of 3.

Constituent: Calcium, total Analysis Run 12/4/2019 4:40 PM
Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening, Pooled Background
BAP-MW-1601,BAP-MW-1602A,BAP-MW-1603A...

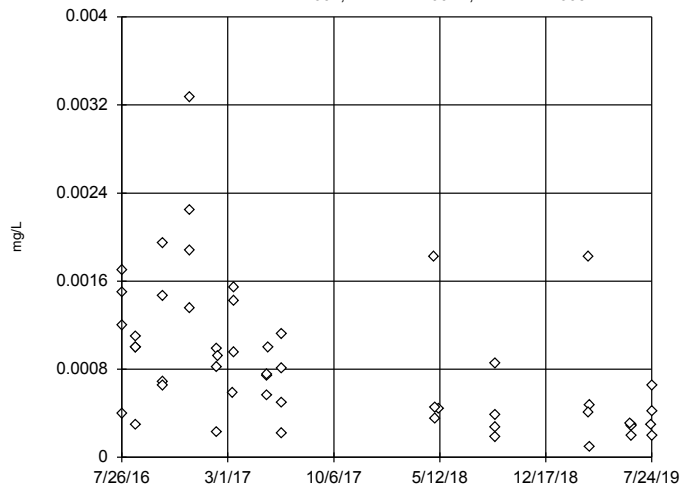


n = 58
No outliers found.
Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 997.6, low cutoff = 0.119, based on IQR multiplier of 3.

Constituent: Chloride, total Analysis Run 12/4/2019 4:40 PM
Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening, Pooled Background

BAP-MW-1601,BAP-MW-1602A,BAP-MW-1603A...

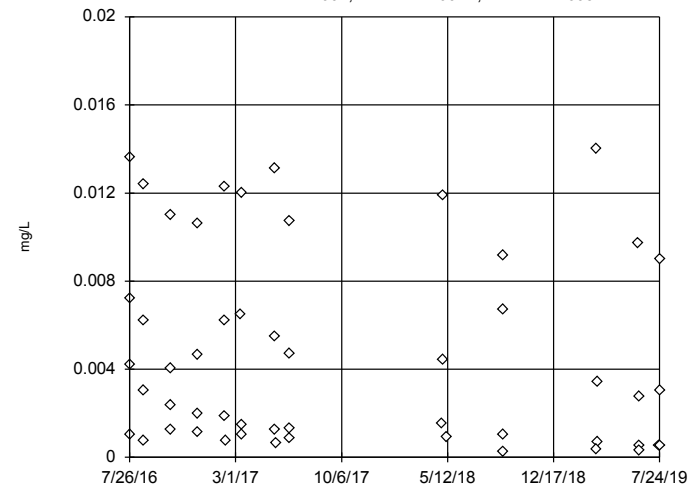


n = 52
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.03677, low cutoff = 0.00001155, based on IQR multiplier of 3.

Constituent: Chromium, total Analysis Run 12/4/2019 4:40 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening, Pooled Background

BAP-MW-1601,BAP-MW-1602A,BAP-MW-1603A...

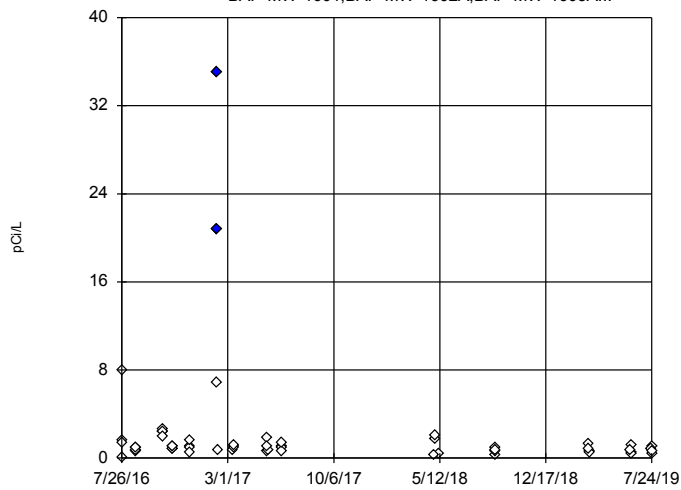


n = 52
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 3.86, low cutoff = 0.00000215, based on IQR multiplier of 3.

Constituent: Cobalt, total Analysis Run 12/4/2019 4:40 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening, Pooled Background

BAP-MW-1601,BAP-MW-1602A,BAP-MW-1603A...

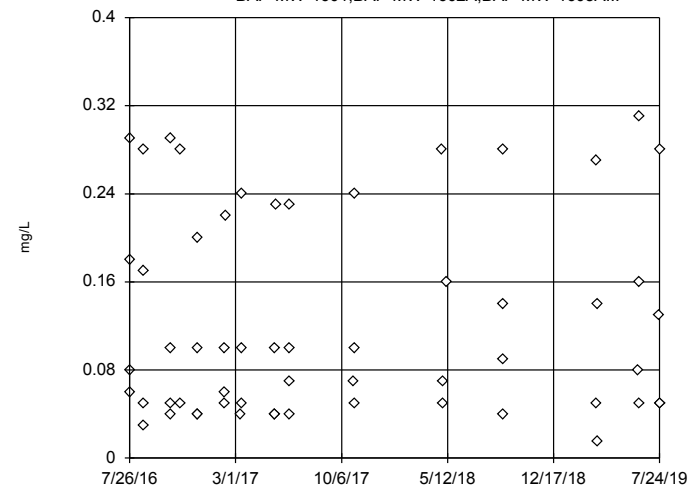


n = 56
 Outliers are drawn as solid.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 11.87, low cutoff = 0.07589, based on IQR multiplier of 3.

Constituent: Combined Radium 226 + 228 Analysis Run 12/4/2019 4:40 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening, Pooled Background

BAP-MW-1601,BAP-MW-1602A,BAP-MW-1603A...

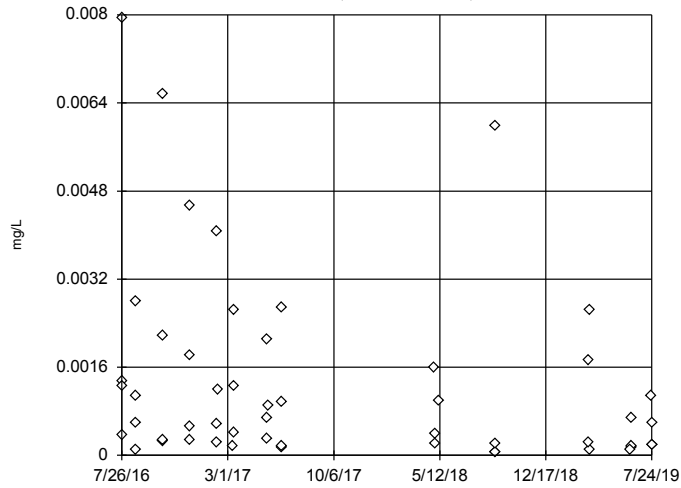


n = 58
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 15.49, low cutoff = 0.0006772, based on IQR multiplier of 3.

Constituent: Fluoride, total Analysis Run 12/4/2019 4:40 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening, Pooled Background

BAP-MW-1601,BAP-MW-1602A,BAP-MW-1603A...

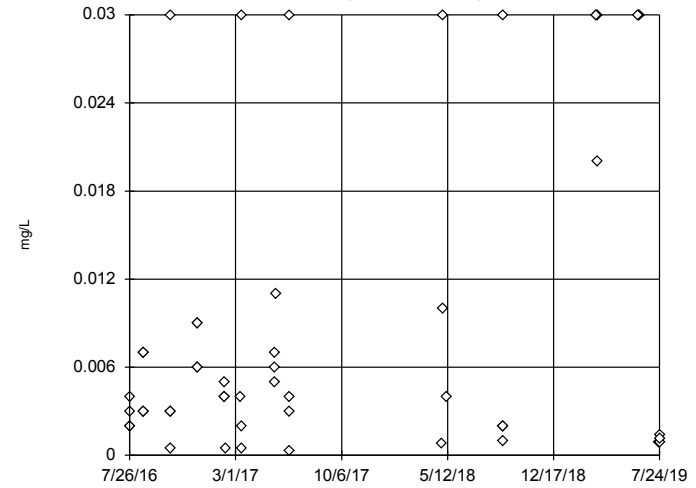


n = 52
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.7621,
 low cutoff = 4.7e-7, based on IQR multiplier of 3.

Constituent: Lead, total Analysis Run 12/4/2019 4:40 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening, Pooled Background

BAP-MW-1601,BAP-MW-1602A,BAP-MW-1603A...

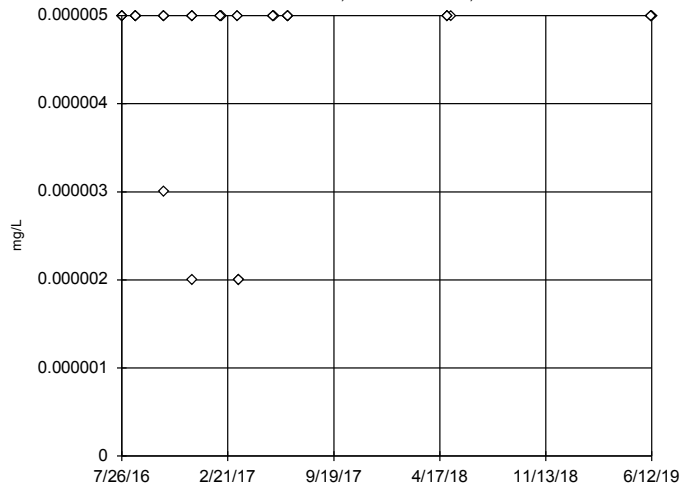


n = 52
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 6.05, low cutoff = 0.00004903, based on IQR multiplier of 3.

Constituent: Lithium, total Analysis Run 12/4/2019 4:40 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening, Pooled Background

BAP-MW-1601,BAP-MW-1602A,BAP-MW-1603A...

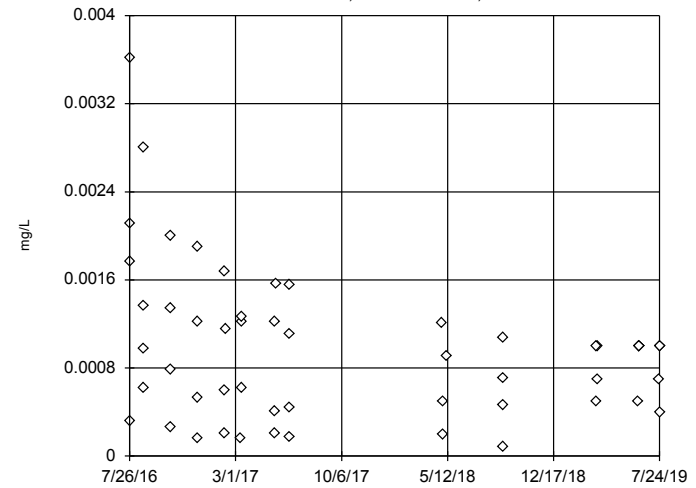


n = 40
 No outliers found.
 Tukey's method selected by user.
 Data were square transformed to achieve best W statistic (graph shown in original units).
 The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Mercury, total Analysis Run 12/4/2019 4:40 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening, Pooled Background

BAP-MW-1601,BAP-MW-1602A,BAP-MW-1603A...

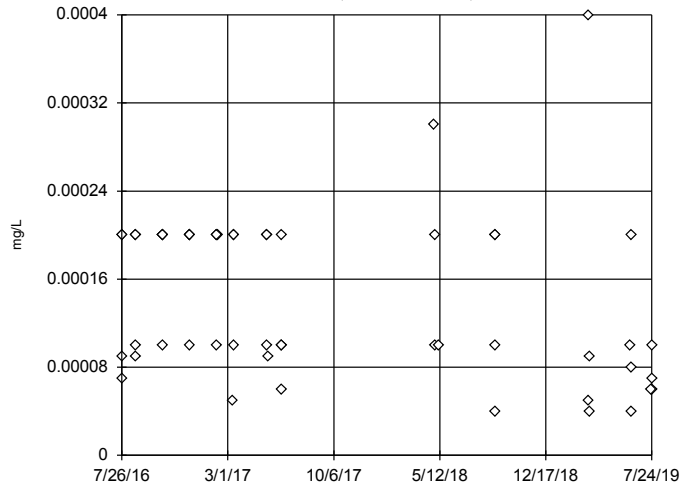


n = 52
 No outliers found.
 Tukey's method selected by user.
 Data were cube root transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.007141,
 low cutoff = 4.1e-7, based on IQR multiplier of 3.

Constituent: Molybdenum, total Analysis Run 12/4/2019 4:40 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening, Pooled Background

BAP-MW-1601,BAP-MW-1602A,BAP-MW-1603A...

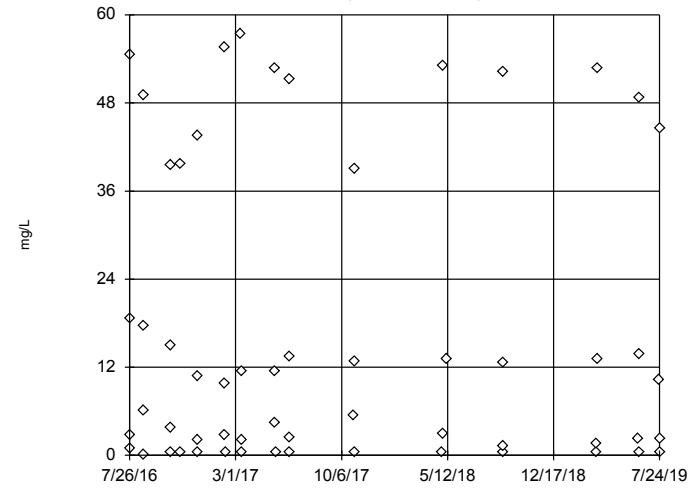


n = 52
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.002195, low cutoff = 0.00008201, based on IQR multiplier of 3.

Constituent: Selenium, total Analysis Run 12/4/2019 4:40 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening, Pooled Background

BAP-MW-1601,BAP-MW-1602A,BAP-MW-1603A...

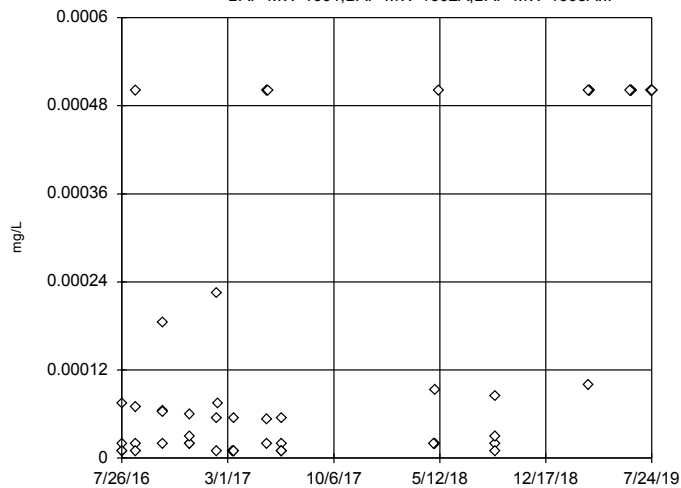


n = 58
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 1.1e7, low cutoff = 0.000002127, based on IQR multiplier of 3.

Constituent: Sulfate, total Analysis Run 12/4/2019 4:40 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening, Pooled Background

BAP-MW-1601,BAP-MW-1602A,BAP-MW-1603A...

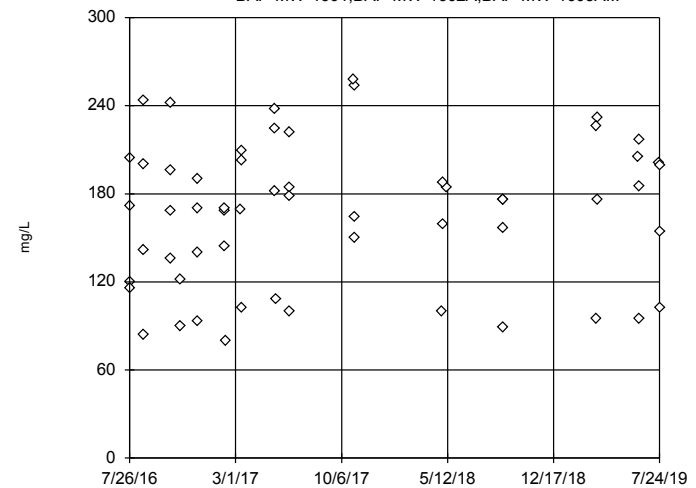


n = 52
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 7.813, low cutoff = 1.3e-9, based on IQR multiplier of 3.

Constituent: Thallium, total Analysis Run 12/4/2019 4:40 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening, Pooled Background

BAP-MW-1601,BAP-MW-1602A,BAP-MW-1603A...



n = 58
 No outliers found.
 Tukey's method selected by user.
 Ladder of Powers transformations did not improve normality, analysis run on raw data.
 High cutoff = 445, low cutoff = -122, based on IQR multiplier of 3.

Constituent: Total Dissolved Solids [TDS] Analysis Run 12/4/2019 4:40 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

Outlier Analysis - Significant Results

Amos BAP Client: Geosyntec Data: Amos BAP Printed 12/4/2019, 4:38 PM

Constituent	Well	Outlier	Value(s)	Date(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Combined Radium 226 + 228 (pCi/L)	BAP-MW-1605	Yes	5.063	10/17/2016	NP	NaN	14	1.208	1.158	ln(x)	ShapiroWilk
Lead, total (mg/L)	BAP-MW-1	Yes	0.00116	9/4/2018	NP	NaN	13	0.0001877	0.0002965	ln(x)	ShapiroWilk
pH, field (SU)	BAP-MW-1	Yes	7.31,10.19	5/3/2018,6/10/2019	NP	NaN	16	5.596	1.371	ln(x)	ShapiroWilk
pH, field (SU)	BAP-MW-1601 (bg)	Yes	7.76,6.7	9/5/2018,6/12/2019	NP	NaN	15	6.061	0.5289	ln(x)	ShapiroWilk
pH, field (SU)	BAP-MW-1602A (bg)	Yes	9.51	6/11/2019	NP	NaN	15	6.787	0.8057	ln(x)	ShapiroWilk
pH, field (SU)	BAP-MW-1603A (bg)	Yes	8.82	6/11/2019	NP	NaN	15	6.939	0.5779	ln(x)	ShapiroWilk
pH, field (SU)	BAP-MW-1604	Yes	7.2,8.65	9/4/2018,6/10/2019	NP	NaN	15	6.435	0.6752	ln(x)	ShapiroWilk
pH, field (SU)	BAP-MW-1606	Yes	8.4	1/8/2018	NP	NaN	15	5.741	0.8118	ln(x)	ShapiroWilk
pH, field (SU)	BAP-MW-5	Yes	6.57	5/22/2017	NP	NaN	15	5.813	0.2887	ln(x)	ShapiroWilk
pH, field (SU)	BAP-MW-6 (bg)	Yes	9.32	6/10/2019	NP	NaN	15	6.216	0.8806	ln(x)	ShapiroWilk

Outlier Analysis - All Results

Amos BAP Client: Geosyntec Data: Amos BAP Printed 12/4/2019, 4:38 PM

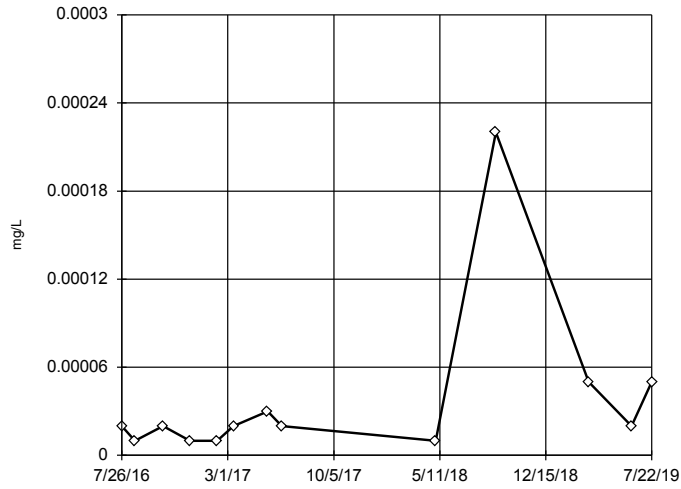
Constituent	Well	Outlier	Value(s)	Date(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Antimony, total (mg/L)	BAP-MW-1	No	n/a	n/a	NP	NaN	13	0.00003769	0.00005644	ln(x)	ShapiroWilk
Antimony, total (mg/L)	BAP-MW-1604	No	n/a	n/a	NP	NaN	13	0.00003308	0.00001251	normal	ShapiroWilk
Antimony, total (mg/L)	BAP-MW-1605	No	n/a	n/a	NP	NaN	13	0.00002923	0.00001498	normal	ShapiroWilk
Antimony, total (mg/L)	BAP-MW-1606	No	n/a	n/a	NP	NaN	13	0.00002692	0.00001109	normal	ShapiroWilk
Antimony, total (mg/L)	BAP-MW-4	No	n/a	n/a	NP	NaN	13	0.00004231	0.00002386	ln(x)	ShapiroWilk
Antimony, total (mg/L)	BAP-MW-5	No	n/a	n/a	NP	NaN	13	0.00003923	0.00002597	ln(x)	ShapiroWilk
Arsenic, total (mg/L)	BAP-MW-1	No	n/a	n/a	NP	NaN	13	0.0001323	0.00003345	ln(x)	ShapiroWilk
Arsenic, total (mg/L)	BAP-MW-1604	No	n/a	n/a	NP	NaN	13	0.004995	0.0008646	ln(x)	ShapiroWilk
Arsenic, total (mg/L)	BAP-MW-1605	No	n/a	n/a	NP	NaN	13	0.003848	0.0009016	ln(x)	ShapiroWilk
Arsenic, total (mg/L)	BAP-MW-1606	No	n/a	n/a	NP	NaN	13	0.002901	0.0004412	ln(x)	ShapiroWilk
Arsenic, total (mg/L)	BAP-MW-4	No	n/a	n/a	NP	NaN	13	0.006262	0.004658	ln(x)	ShapiroWilk
Arsenic, total (mg/L)	BAP-MW-5	No	n/a	n/a	NP	NaN	13	0.003332	0.001128	ln(x)	ShapiroWilk
Barium, total (mg/L)	BAP-MW-1	No	n/a	n/a	NP	NaN	13	0.02784	0.001727	ln(x)	ShapiroWilk
Barium, total (mg/L)	BAP-MW-1604	No	n/a	n/a	NP	NaN	13	0.1395	0.01248	ln(x)	ShapiroWilk
Barium, total (mg/L)	BAP-MW-1605	No	n/a	n/a	NP	NaN	13	0.08252	0.01276	ln(x)	ShapiroWilk
Barium, total (mg/L)	BAP-MW-1606	No	n/a	n/a	NP	NaN	13	0.06469	0.006131	ln(x)	ShapiroWilk
Barium, total (mg/L)	BAP-MW-4	No	n/a	n/a	NP	NaN	13	0.08983	0.00593	ln(x)	ShapiroWilk
Barium, total (mg/L)	BAP-MW-5	No	n/a	n/a	NP	NaN	13	0.1568	0.007883	x^2	ShapiroWilk
Beryllium, total (mg/L)	BAP-MW-1	No	n/a	n/a	NP	NaN	13	0.0001212	0.00001143	ln(x)	ShapiroWilk
Beryllium, total (mg/L)	BAP-MW-1604	No	n/a	n/a	NP	NaN	13	0.00005823	0.00002924	ln(x)	ShapiroWilk
Beryllium, total (mg/L)	BAP-MW-1605	No	n/a	n/a	NP	NaN	13	0.00006008	0.00001848	x^2	ShapiroWilk
Beryllium, total (mg/L)	BAP-MW-1606	No	n/a	n/a	NP	NaN	13	0.0001054	0.00002573	ln(x)	ShapiroWilk
Beryllium, total (mg/L)	BAP-MW-4	No	n/a	n/a	NP	NaN	13	0.000052	0.000009434	ln(x)	ShapiroWilk
Beryllium, total (mg/L)	BAP-MW-5	No	n/a	n/a	NP	NaN	13	0.00005331	0.00002427	ln(x)	ShapiroWilk
Cadmium, total (mg/L)	BAP-MW-1	No	n/a	n/a	NP	NaN	13	0.00255	0.0004225	ln(x)	ShapiroWilk
Cadmium, total (mg/L)	BAP-MW-1604	No	n/a	n/a	NP	NaN	13	0.00004092	0.00001757	sqrt(x)	ShapiroWilk
Cadmium, total (mg/L)	BAP-MW-1605	No	n/a	n/a	NP	NaN	13	0.000038	0.000019	ln(x)	ShapiroWilk
Cadmium, total (mg/L)	BAP-MW-1606	No	n/a	n/a	NP	NaN	13	0.0001685	0.00005047	ln(x)	ShapiroWilk
Cadmium, total (mg/L)	BAP-MW-4	No	n/a	n/a	NP	NaN	13	0.0001308	0.0001323	ln(x)	ShapiroWilk
Cadmium, total (mg/L)	BAP-MW-5	No	n/a	n/a	NP	NaN	13	0.00001708	0.00001882	ln(x)	ShapiroWilk
Chromium, total (mg/L)	BAP-MW-1	No	n/a	n/a	NP	NaN	13	0.0003153	0.0003324	ln(x)	ShapiroWilk
Chromium, total (mg/L)	BAP-MW-1604	No	n/a	n/a	NP	NaN	13	0.0009828	0.0004185	x^(1/3)	ShapiroWilk
Chromium, total (mg/L)	BAP-MW-1605	No	n/a	n/a	NP	NaN	13	0.0002932	0.0001453	ln(x)	ShapiroWilk
Chromium, total (mg/L)	BAP-MW-1606	No	n/a	n/a	NP	NaN	13	0.0008608	0.0005306	normal	ShapiroWilk
Chromium, total (mg/L)	BAP-MW-4	No	n/a	n/a	NP	NaN	13	0.0003634	0.0002748	ln(x)	ShapiroWilk
Chromium, total (mg/L)	BAP-MW-5	No	n/a	n/a	NP	NaN	13	0.0003128	0.0002541	ln(x)	ShapiroWilk
Cobalt, total (mg/L)	BAP-MW-1	No	n/a	n/a	NP	NaN	13	0.01287	0.002431	sqrt(x)	ShapiroWilk
Cobalt, total (mg/L)	BAP-MW-1604	No	n/a	n/a	NP	NaN	13	0.0007052	0.0004492	ln(x)	ShapiroWilk
Cobalt, total (mg/L)	BAP-MW-1605	No	n/a	n/a	NP	NaN	13	0.01293	0.00725	ln(x)	ShapiroWilk
Cobalt, total (mg/L)	BAP-MW-1606	No	n/a	n/a	NP	NaN	13	0.01508	0.001582	ln(x)	ShapiroWilk
Cobalt, total (mg/L)	BAP-MW-4	No	n/a	n/a	NP	NaN	13	0.02118	0.02084	ln(x)	ShapiroWilk
Cobalt, total (mg/L)	BAP-MW-5	No	n/a	n/a	NP	NaN	13	0.001086	0.000135	ln(x)	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	BAP-MW-1	No	n/a	n/a	NP	NaN	14	0.8191	0.4609	x^(1/3)	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	BAP-MW-1604	No	n/a	n/a	NP	NaN	14	1.165	0.808	ln(x)	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	BAP-MW-1605	Yes	5.063	10/17/2016	NP	NaN	14	1.208	1.158	ln(x)	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	BAP-MW-1606	No	n/a	n/a	NP	NaN	14	0.8276	0.6118	x^(1/3)	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	BAP-MW-4	No	n/a	n/a	NP	NaN	14	0.9033	0.5816	ln(x)	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	BAP-MW-5	No	n/a	n/a	NP	NaN	14	0.9609	0.3888	normal	ShapiroWilk
Fluoride, total (mg/L)	BAP-MW-1	No	n/a	n/a	NP	NaN	14	0.02786	0.004258	x^6	ShapiroWilk
Fluoride, total (mg/L)	BAP-MW-1604	No	n/a	n/a	NP	NaN	15	0.084	0.02613	normal	ShapiroWilk
Fluoride, total (mg/L)	BAP-MW-1605	No	n/a	n/a	NP	NaN	15	0.04	0.02171	ln(x)	ShapiroWilk
Fluoride, total (mg/L)	BAP-MW-1606	n/a	n/a	n/a	NP	NaN	14	0.02857	0.003631	unknown	ShapiroWilk
Fluoride, total (mg/L)	BAP-MW-4	No	n/a	n/a	NP	NaN	15	0.04867	0.01356	normal	ShapiroWilk
Fluoride, total (mg/L)	BAP-MW-5	No	n/a	n/a	NP	NaN	15	0.04133	0.008338	normal	ShapiroWilk
Lead, total (mg/L)	BAP-MW-1	Yes	0.00116	9/4/2018	NP	NaN	13	0.0001877	0.0002965	ln(x)	ShapiroWilk

Outlier Analysis - All Results

Amos BAP Client: Geosyntec Data: Amos BAP Printed 12/4/2019, 4:38 PM

Constituent	Well	Outlier	Value(s)	Date(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Lead, total (mg/L)	BAP-MW-1604	No	n/a	n/a	NP	NaN	13	0.0006503	0.0004308	ln(x)	ShapiroWilk
Lead, total (mg/L)	BAP-MW-1605	No	n/a	n/a	NP	NaN	13	0.0001221	0.000079	ln(x)	ShapiroWilk
Lead, total (mg/L)	BAP-MW-1606	No	n/a	n/a	NP	NaN	13	0.0007109	0.0004398	sqrt(x)	ShapiroWilk
Lead, total (mg/L)	BAP-MW-4	No	n/a	n/a	NP	NaN	13	0.0002808	0.0001218	sqrt(x)	ShapiroWilk
Lead, total (mg/L)	BAP-MW-5	No	n/a	n/a	NP	NaN	13	0.0002232	0.000233	ln(x)	ShapiroWilk
Lithium, total (mg/L)	BAP-MW-1	No	n/a	n/a	NP	NaN	13	0.008336	0.01013	ln(x)	ShapiroWilk
Lithium, total (mg/L)	BAP-MW-1604	No	n/a	n/a	NP	NaN	13	0.01116	0.01316	ln(x)	ShapiroWilk
Lithium, total (mg/L)	BAP-MW-1605	No	n/a	n/a	NP	NaN	13	0.008888	0.009646	ln(x)	ShapiroWilk
Lithium, total (mg/L)	BAP-MW-1606	No	n/a	n/a	NP	NaN	13	0.0108	0.01114	ln(x)	ShapiroWilk
Lithium, total (mg/L)	BAP-MW-4	No	n/a	n/a	NP	NaN	13	0.007686	0.01047	ln(x)	ShapiroWilk
Lithium, total (mg/L)	BAP-MW-5	No	n/a	n/a	NP	NaN	13	0.007572	0.01047	ln(x)	ShapiroWilk
Mercury, total (mg/L)	BAP-MW-1	n/a	n/a	n/a	NP	NaN	10	0.0000047	9.5e-7	unknown	ShapiroWilk
Mercury, total (mg/L)	BAP-MW-1604	n/a	n/a	n/a	NP	NaN	10	0.0000047	9.5e-7	unknown	ShapiroWilk
Mercury, total (mg/L)	BAP-MW-1605	n/a	n/a	n/a	NP	NaN	10	0.000005	0	unknown	ShapiroWilk
Mercury, total (mg/L)	BAP-MW-1606	n/a	n/a	n/a	NP	NaN	10	0.0000047	9.5e-7	unknown	ShapiroWilk
Mercury, total (mg/L)	BAP-MW-4	n/a	n/a	n/a	NP	NaN	10	0.000005	0	unknown	ShapiroWilk
Mercury, total (mg/L)	BAP-MW-5	n/a	n/a	n/a	NP	NaN	10	0.000005	0	unknown	ShapiroWilk
Molybdenum, total (mg/L)	BAP-MW-1	No	n/a	n/a	NP	NaN	13	0.001147	0.0007142	sqrt(x)	ShapiroWilk
Molybdenum, total (mg/L)	BAP-MW-1604	No	n/a	n/a	NP	NaN	13	0.0005962	0.0006452	ln(x)	ShapiroWilk
Molybdenum, total (mg/L)	BAP-MW-1605	No	n/a	n/a	NP	NaN	13	0.0006592	0.0007801	ln(x)	ShapiroWilk
Molybdenum, total (mg/L)	BAP-MW-1606	No	n/a	n/a	NP	NaN	13	0.0005723	0.0008167	ln(x)	ShapiroWilk
Molybdenum, total (mg/L)	BAP-MW-4	No	n/a	n/a	NP	NaN	13	0.003255	0.005584	ln(x)	ShapiroWilk
Molybdenum, total (mg/L)	BAP-MW-5	No	n/a	n/a	NP	NaN	13	0.001262	0.0009074	x^(1/3)	ShapiroWilk
pH, field (SU)	BAP-MW-1	Yes	7.31,10.19	5/3/2018,6/10/2019	NP	NaN	16	5.596	1.371	ln(x)	ShapiroWilk
pH, field (SU)	BAP-MW-1601 (bg)	Yes	7.76,6.7	9/5/2018,6/12/2019	NP	NaN	15	6.061	0.5289	ln(x)	ShapiroWilk
pH, field (SU)	BAP-MW-1602A (bg)	Yes	9.51	6/11/2019	NP	NaN	15	6.787	0.8057	ln(x)	ShapiroWilk
pH, field (SU)	BAP-MW-1603A (bg)	Yes	8.82	6/11/2019	NP	NaN	15	6.939	0.5779	ln(x)	ShapiroWilk
pH, field (SU)	BAP-MW-1604	Yes	7.2,8.65	9/4/2018,6/10/2019	NP	NaN	15	6.435	0.6752	ln(x)	ShapiroWilk
pH, field (SU)	BAP-MW-1605	No	n/a	n/a	NP	NaN	16	5.823	0.3031	ln(x)	ShapiroWilk
pH, field (SU)	BAP-MW-1606	Yes	8.4	1/8/2018	NP	NaN	15	5.741	0.8118	ln(x)	ShapiroWilk
pH, field (SU)	BAP-MW-4	No	n/a	n/a	NP	NaN	15	5.834	0.4887	ln(x)	ShapiroWilk
pH, field (SU)	BAP-MW-5	Yes	6.57	5/22/2017	NP	NaN	15	5.813	0.2887	ln(x)	ShapiroWilk
pH, field (SU)	BAP-MW-6 (bg)	Yes	9.32	6/10/2019	NP	NaN	15	6.216	0.8806	ln(x)	ShapiroWilk
Selenium, total (mg/L)	BAP-MW-1	No	n/a	n/a	NP	NaN	13	0.0001285	0.00004981	ln(x)	ShapiroWilk
Selenium, total (mg/L)	BAP-MW-1604	n/a	n/a	n/a	NP	NaN	13	0.0001923	0.00004935	unknown	ShapiroWilk
Selenium, total (mg/L)	BAP-MW-1605	No	n/a	n/a	NP	NaN	13	0.00006769	0.00002315	x^(1/3)	ShapiroWilk
Selenium, total (mg/L)	BAP-MW-1606	No	n/a	n/a	NP	NaN	13	0.0001385	0.00007313	ln(x)	ShapiroWilk
Selenium, total (mg/L)	BAP-MW-4	No	n/a	n/a	NP	NaN	13	0.00007923	0.00001605	ln(x)	ShapiroWilk
Selenium, total (mg/L)	BAP-MW-5	No	n/a	n/a	NP	NaN	13	0.00008	0.00002708	normal	ShapiroWilk
Thallium, total (mg/L)	BAP-MW-1	No	n/a	n/a	NP	NaN	13	0.0001494	0.0002001	ln(x)	ShapiroWilk
Thallium, total (mg/L)	BAP-MW-1604	No	n/a	n/a	NP	NaN	13	0.0002415	0.0002493	ln(x)	ShapiroWilk
Thallium, total (mg/L)	BAP-MW-1605	No	n/a	n/a	NP	NaN	13	0.0003194	0.0002381	ln(x)	ShapiroWilk
Thallium, total (mg/L)	BAP-MW-1606	No	n/a	n/a	NP	NaN	13	0.0001323	0.00021	ln(x)	ShapiroWilk
Thallium, total (mg/L)	BAP-MW-4	No	n/a	n/a	NP	NaN	13	0.0001722	0.0001908	ln(x)	ShapiroWilk
Thallium, total (mg/L)	BAP-MW-5	No	n/a	n/a	NP	NaN	13	0.0002408	0.0002499	ln(x)	ShapiroWilk

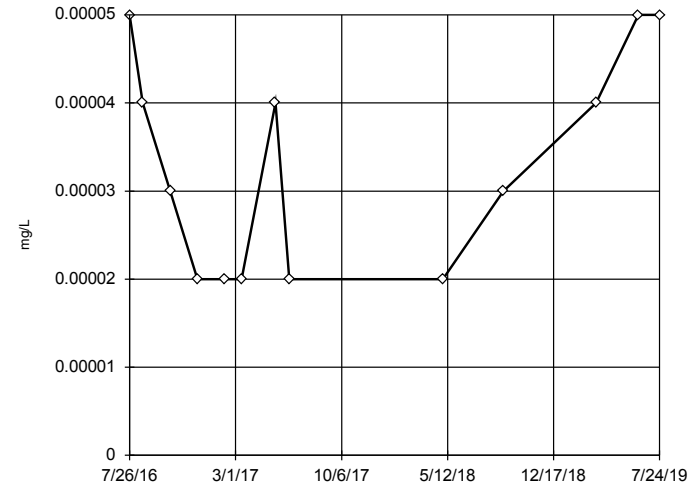
Tukey's Outlier Screening
BAP-MW-1



n = 13
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 = 0.00225, low cutoff = 1.7e-7, based on IQR multiplier of 3.

Constituent: Antimony, total Analysis Run 12/4/2019 4:35 PM
Amos BAP Client: Geosyntec Data: Amos BAP

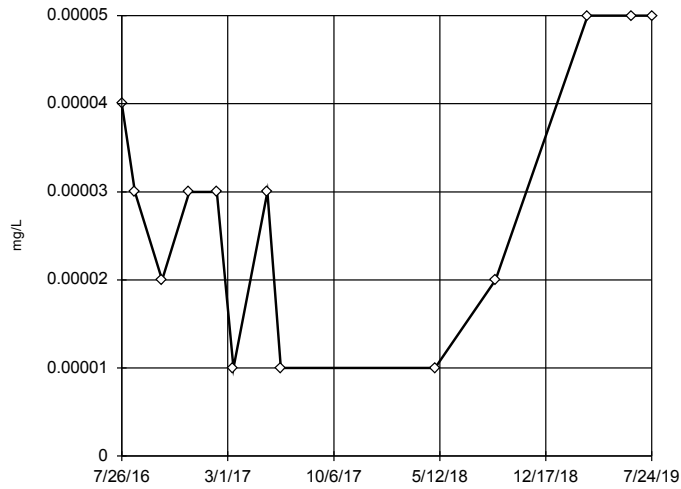
Tukey's Outlier Screening
BAP-MW-1604



n = 13
No outliers found. Tukey's method selected by user.
Ladder of Powers transformations did not improve normality; analysis run on raw data.
High cutoff = 0.00012, low cutoff = -0.000055, based on IQR multiplier of 3.

Constituent: Antimony, total Analysis Run 12/4/2019 4:35 PM
Amos BAP Client: Geosyntec Data: Amos BAP

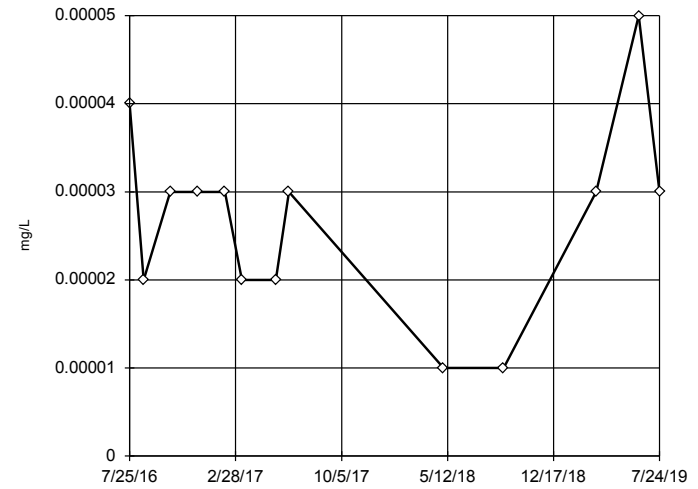
Tukey's Outlier Screening
BAP-MW-1605



n = 13
No outliers found. Tukey's method selected by user.
Ladder of Powers transformations did not improve normality; analysis run on raw data.
High cutoff = 0.000135, low cutoff = -0.000075, based on IQR multiplier of 3.

Constituent: Antimony, total Analysis Run 12/4/2019 4:35 PM
Amos BAP Client: Geosyntec Data: Amos BAP

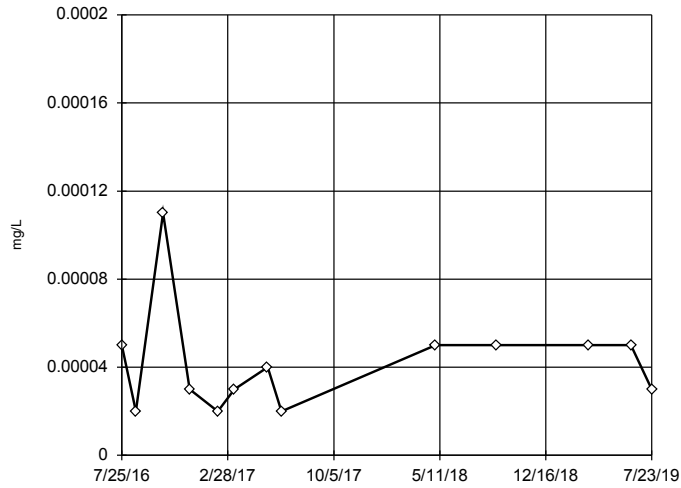
Tukey's Outlier Screening
BAP-MW-1606



n = 13
No outliers found. Tukey's method selected by user.
Ladder of Powers transformations did not improve normality; analysis run on raw data.
High cutoff = 0.00006, low cutoff = -0.00001, based on IQR multiplier of 3.

Constituent: Antimony, total Analysis Run 12/4/2019 4:35 PM
Amos BAP Client: Geosyntec Data: Amos BAP

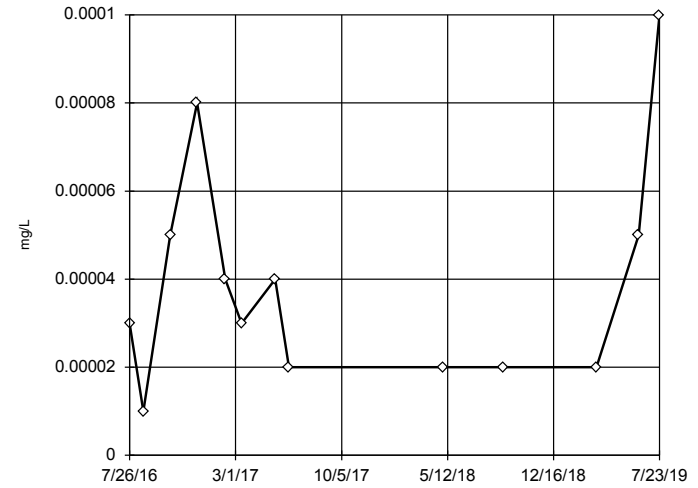
Tukey's Outlier Screening
BAP-MW-4



n = 13
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 = 0.0004253, low cutoff = 0.0000288, based on IQR multiplier of 3.

Constituent: Antimony, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

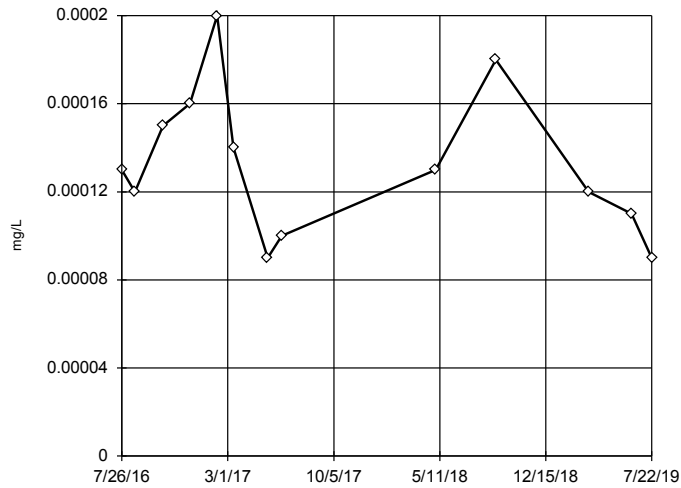
Tukey's Outlier Screening
BAP-MW-5



n = 13
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 = 0.0007812, low cutoff = 0.0000128, based on IQR multiplier of 3.

Constituent: Antimony, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

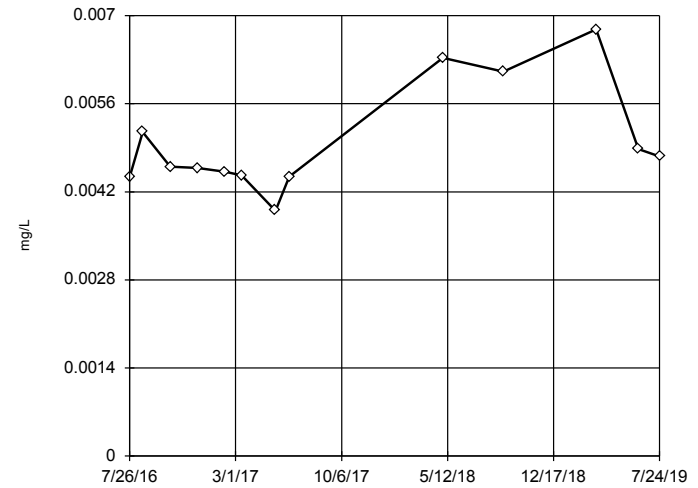
Tukey's Outlier Screening
BAP-MW-1



n = 13
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 = 0.0004993, low cutoff = 0.00003254, based on IQR multiplier of 3.

Constituent: Arsenic, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

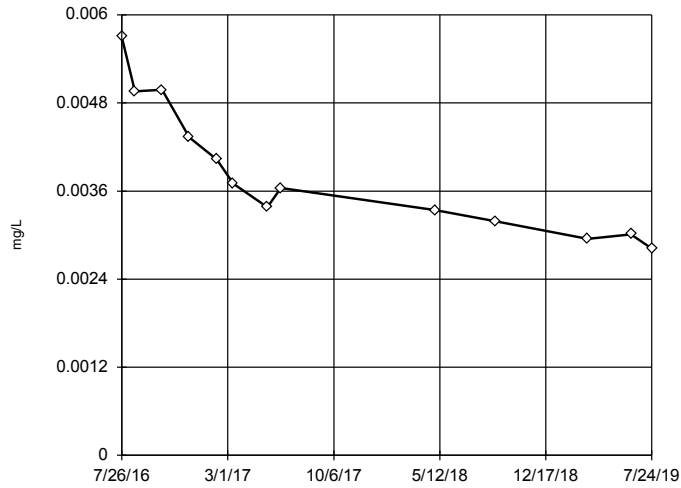
Tukey's Outlier Screening
BAP-MW-1604



n = 13
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 = 0.01124, low cutoff = 0.002222, based on IQR multiplier of 3.

Constituent: Arsenic, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

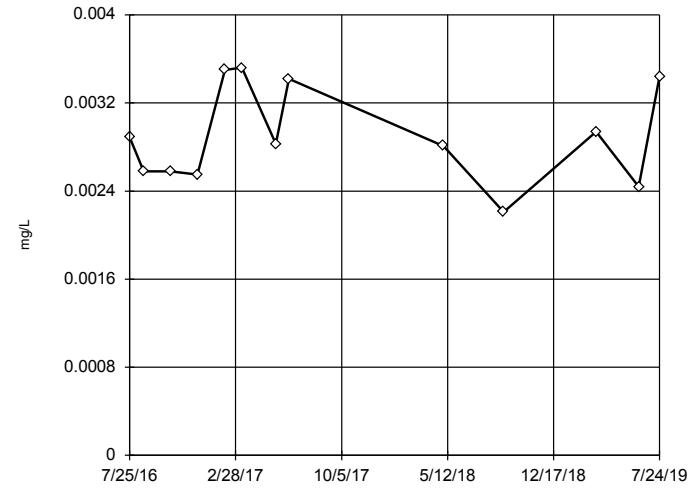
Tukey's Outlier Screening
BAP-MW-1605



n = 13
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 = 0.0155,
low cutoff = 0.0009263,
based on IQR multiplier of 3.

Constituent: Arsenic, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

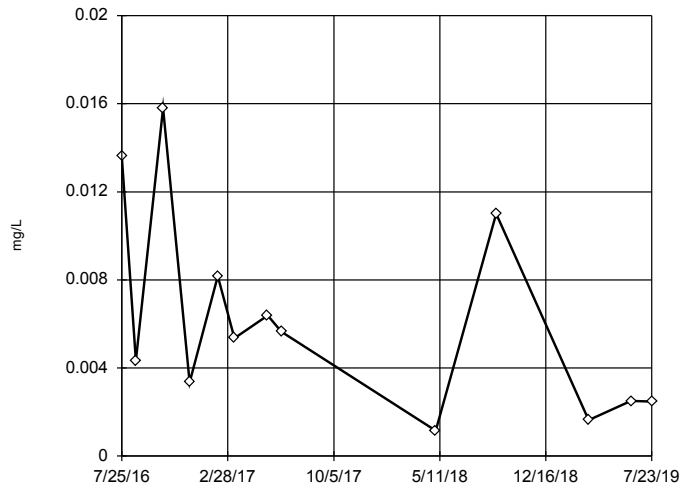
Tukey's Outlier Screening
BAP-MW-1606



n = 13
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 = 0.008202,
low cutoff = 0.001073,
based on IQR multiplier of 3.

Constituent: Arsenic, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

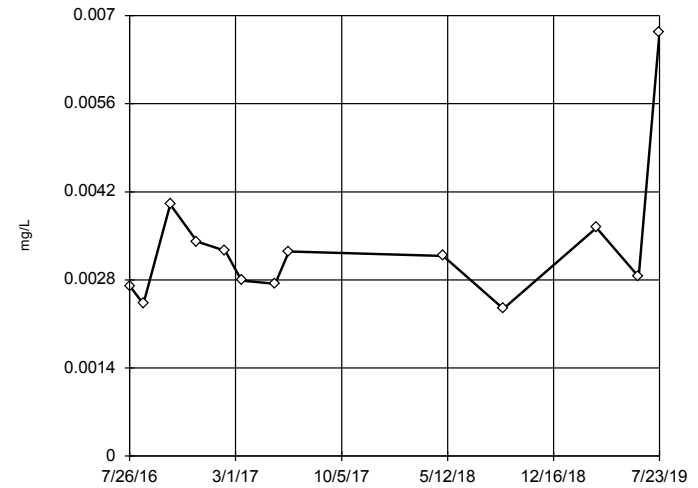
Tukey's Outlier Screening
BAP-MW-4



n = 13
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 = 0.5232,
low cutoff = 0.00004512,
based on IQR multiplier of 3.

Constituent: Arsenic, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

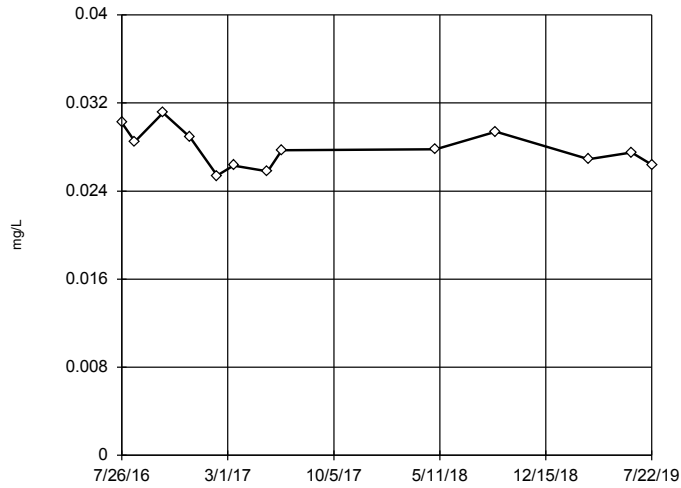
Tukey's Outlier Screening
BAP-MW-5



n = 13
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 = 0.007573,
low cutoff = 0.001266,
based on IQR multiplier of 3.

Constituent: Arsenic, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

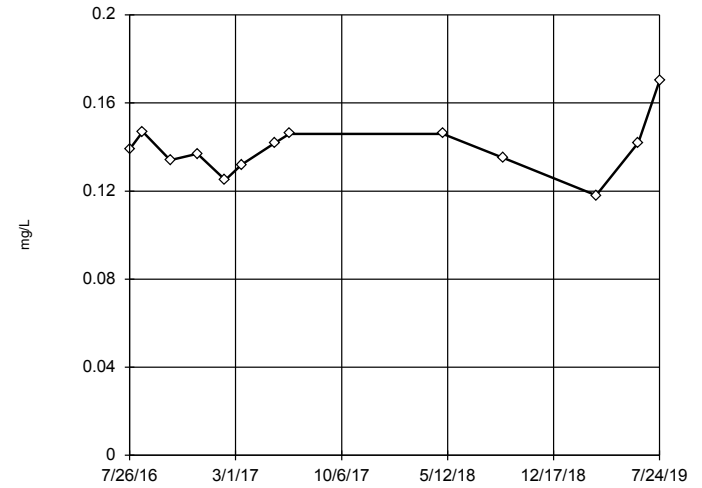
Tukey's Outlier Screening BAP-MW-1



n = 13
 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 = 0.03946,
 low cutoff = 0.01946,
 based on IQR multiplier of 3.

Constituent: Barium, total Analysis Run 12/4/2019 4:36 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

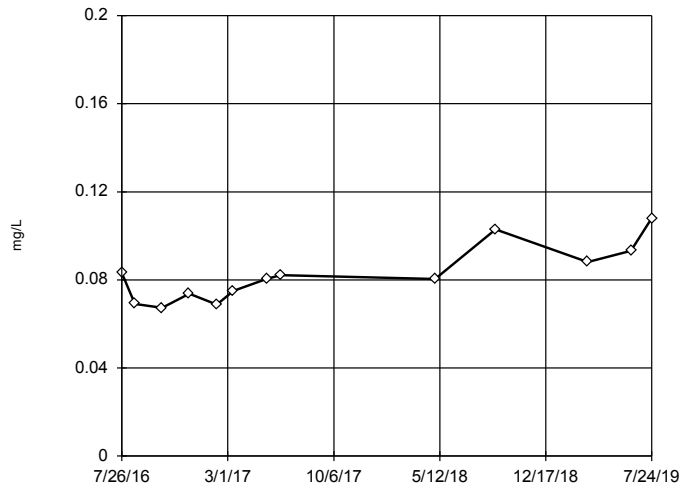
Tukey's Outlier Screening BAP-MW-1604



n = 13
 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 = 0.1931,
 low cutoff = 0.1005,
 based on IQR multiplier of 3.

Constituent: Barium, total Analysis Run 12/4/2019 4:36 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

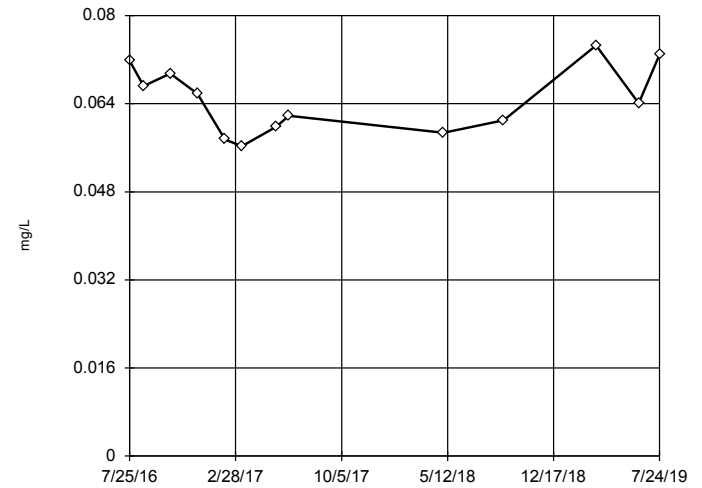
Tukey's Outlier Screening BAP-MW-1605



n = 13
 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 = 0.1851,
 low cutoff = 0.03495,
 based on IQR multiplier of 3.

Constituent: Barium, total Analysis Run 12/4/2019 4:36 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

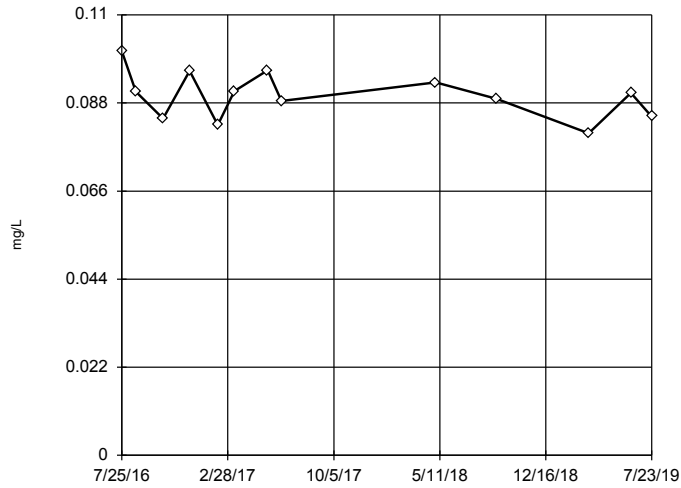
Tukey's Outlier Screening BAP-MW-1606



n = 13
 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 = 0.1197,
 low cutoff = 0.03496,
 based on IQR multiplier of 3.

Constituent: Barium, total Analysis Run 12/4/2019 4:36 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

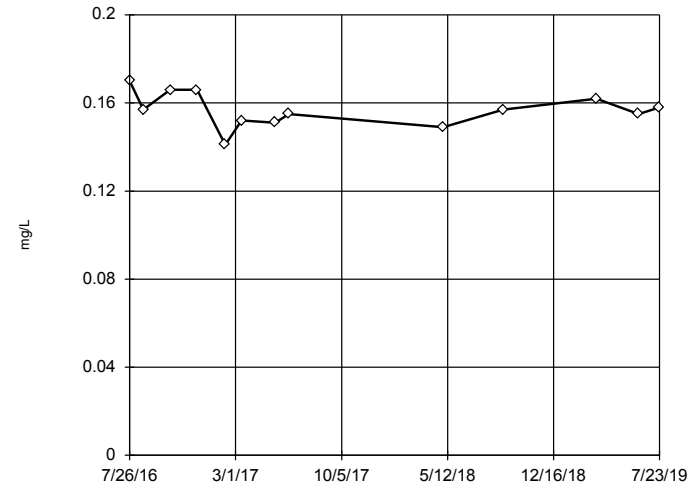
Tukey's Outlier Screening
BAP-MW-4



n = 13
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 = 0.1331, low cutoff = 0.05991, based on IQR multiplier of 3.

Constituent: Barium, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

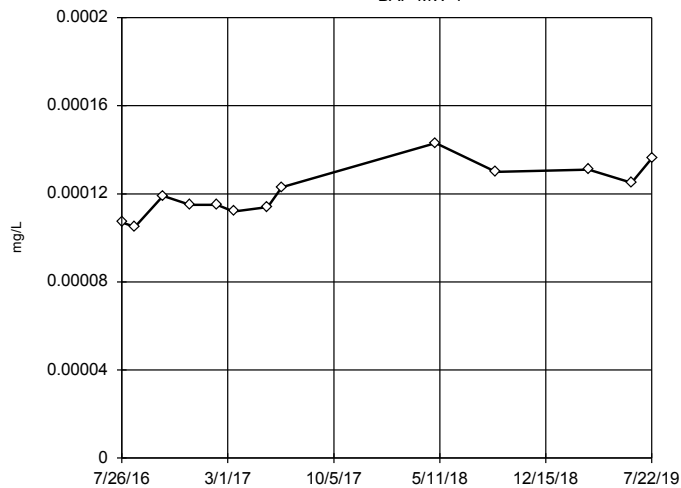
Tukey's Outlier Screening
BAP-MW-5



n = 13
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 = 0.1968, low cutoff = 0.1054, based on IQR multiplier of 3.

Constituent: Barium, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

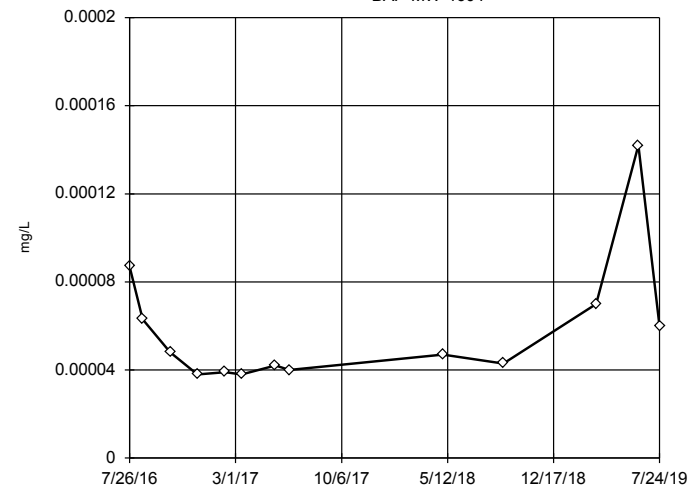
Tukey's Outlier Screening
BAP-MW-1



n = 13
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 = 0.000201, low cutoff = 0.00007335, based on IQR multiplier of 3.

Constituent: Beryllium, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

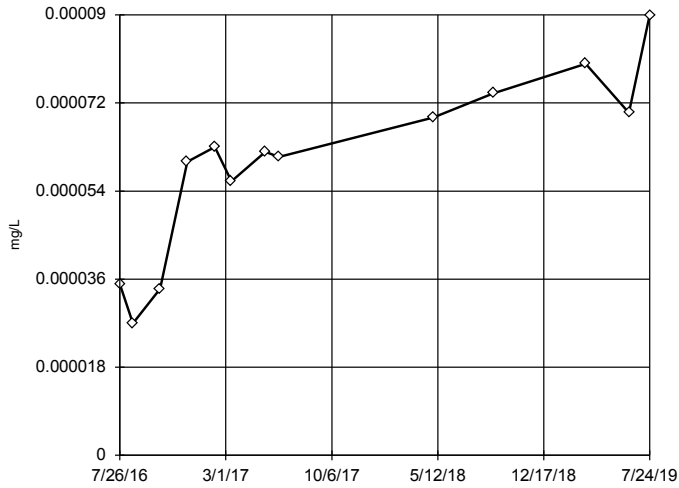
Tukey's Outlier Screening
BAP-MW-1604



n = 13
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 = 0.0003156, low cutoff = 0.00000831, based on IQR multiplier of 3.

Constituent: Beryllium, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening
BAP-MW-1605



n = 13

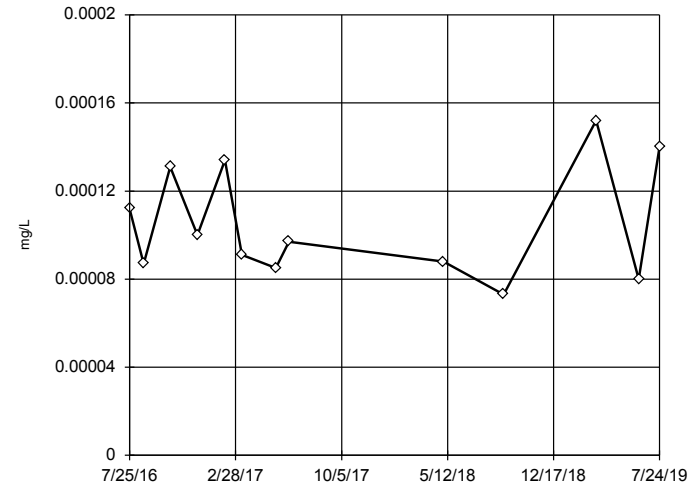
No outliers found.
Tukey's method selected by user.

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

High cutoff = 0.0001192,
low cutoff = -0.00008272,
based on IQR multiplier of 3.

Constituent: Beryllium, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening
BAP-MW-1606



n = 13

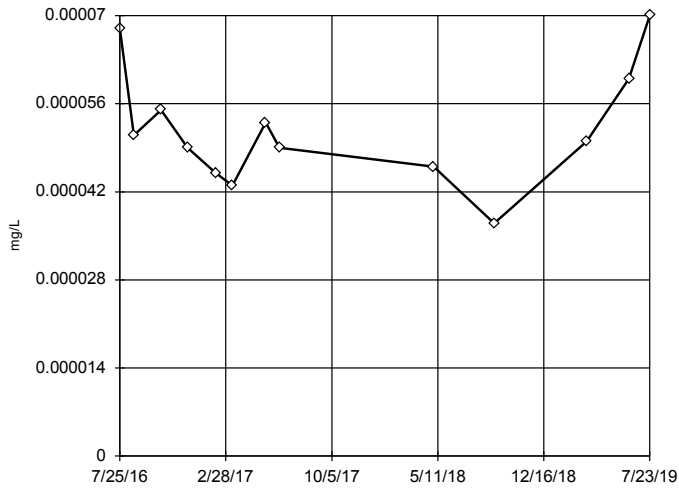
No outliers found.
Tukey's method selected by user.

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

High cutoff = 0.0004846,
low cutoff = 0.00002351,
based on IQR multiplier of 3.

Constituent: Beryllium, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening
BAP-MW-4



n = 13

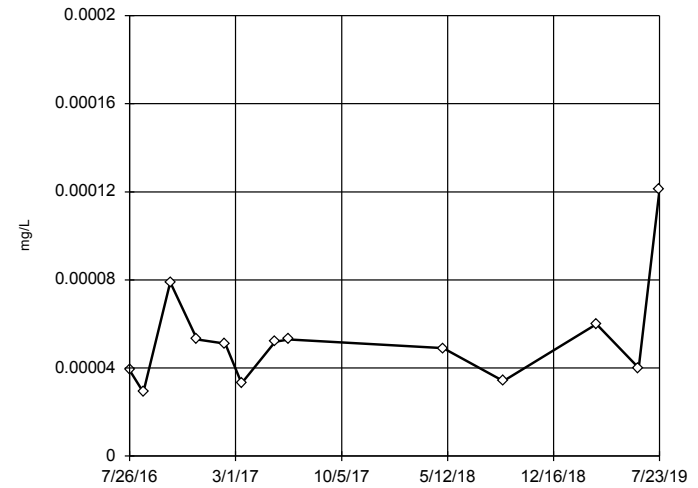
No outliers found.
Tukey's method selected by user.

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

High cutoff = 0.0001156,
low cutoff = 0.0000228,
based on IQR multiplier of 3.

Constituent: Beryllium, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening
BAP-MW-5



n = 13

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

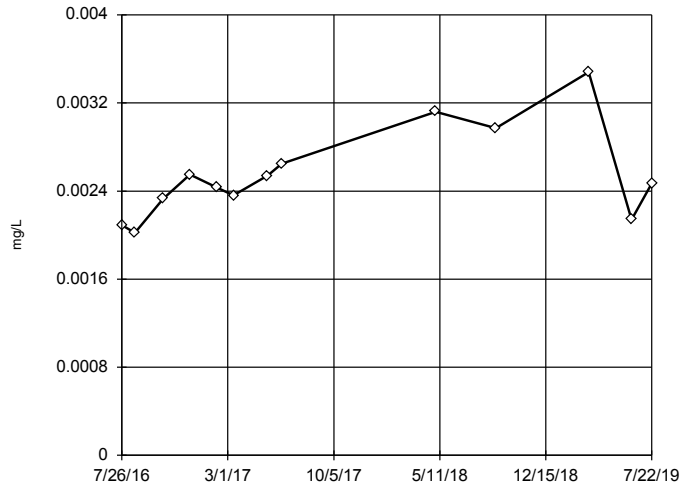
Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 0.0002094,
low cutoff = 0.000009805,
based on IQR multiplier of 3.

Constituent: Beryllium, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening

BAP-MW-1

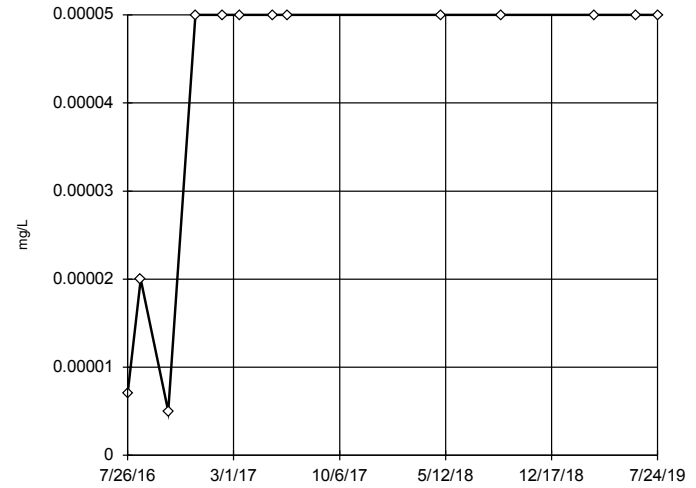


n = 13
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.005564, low cutoff = 0.001126, based on IQR multiplier of 3.

Constituent: Cadmium, total Analysis Run 12/4/2019 4:36 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening

BAP-MW-1604

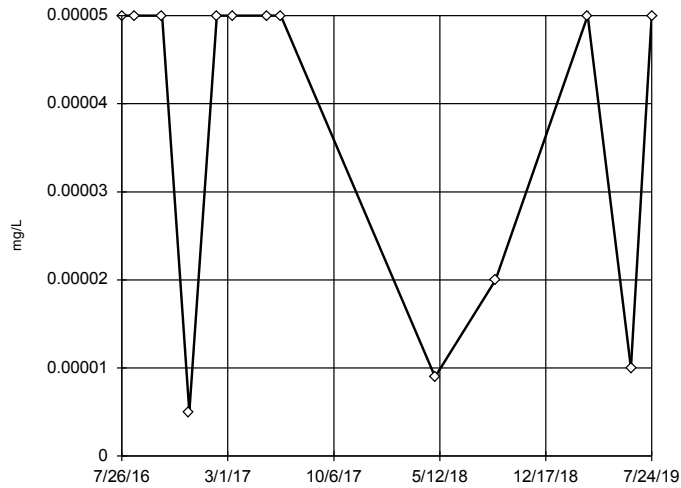


n = 13
 No outliers found.
 Tukey's method selected by user.
 Data were square root transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.0001203, low cutoff = 0.000003509, based on IQR multiplier of 3.

Constituent: Cadmium, total Analysis Run 12/4/2019 4:36 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening

BAP-MW-1605

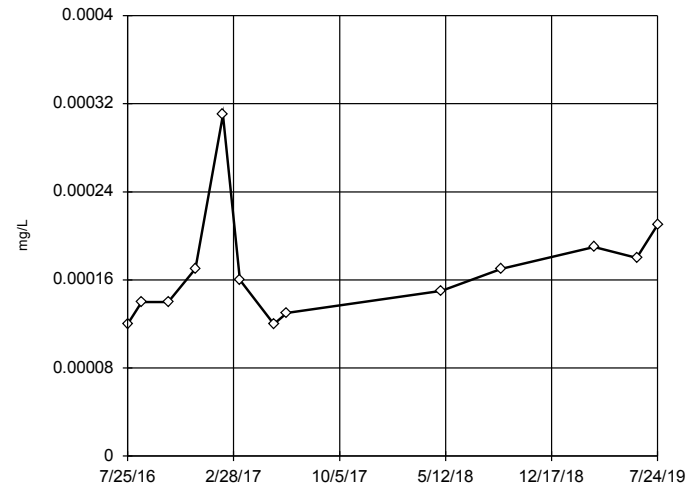


n = 13
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.00221, low cutoff = 3.2e-7, based on IQR multiplier of 3.

Constituent: Cadmium, total Analysis Run 12/4/2019 4:36 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening

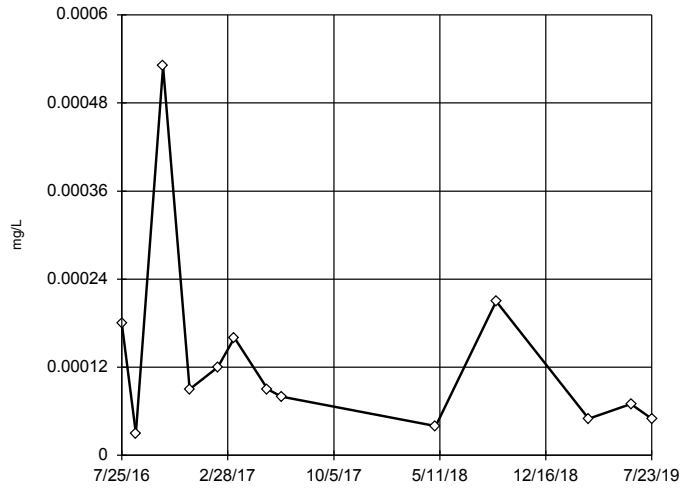
BAP-MW-1606



n = 13
 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 = 0.0004764, low cutoff = 0.00005237, based on IQR multiplier of 3.

Constituent: Cadmium, total Analysis Run 12/4/2019 4:36 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening
BAP-MW-4



n = 13
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 = 0.006636, low cutoff = 0.00001279, based on IQR multiplier of 3.

Constituent: Cadmium, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

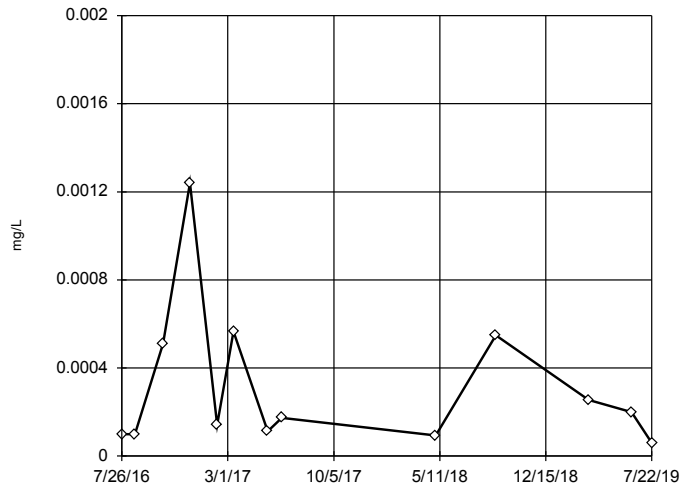
Tukey's Outlier Screening
BAP-MW-5



n = 13
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 = 0.001157, low cutoff = 1.2e-7, based on IQR multiplier of 3.

Constituent: Cadmium, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

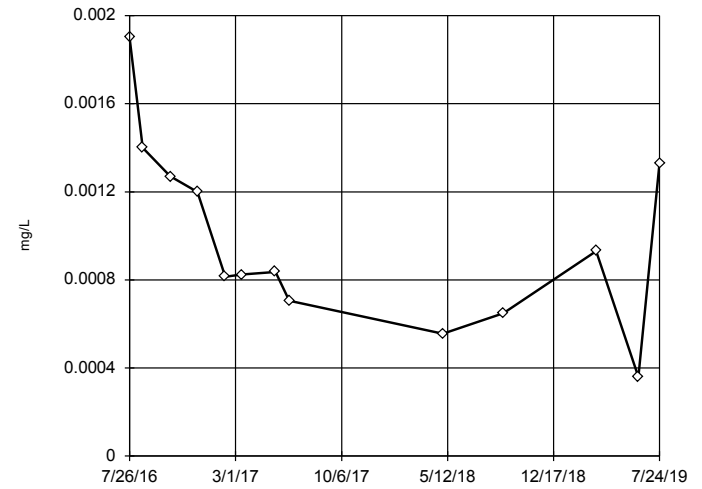
Tukey's Outlier Screening
BAP-MW-1



n = 13
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 = 0.07811, low cutoff = 6.8e-7, based on IQR multiplier of 3.

Constituent: Chromium, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

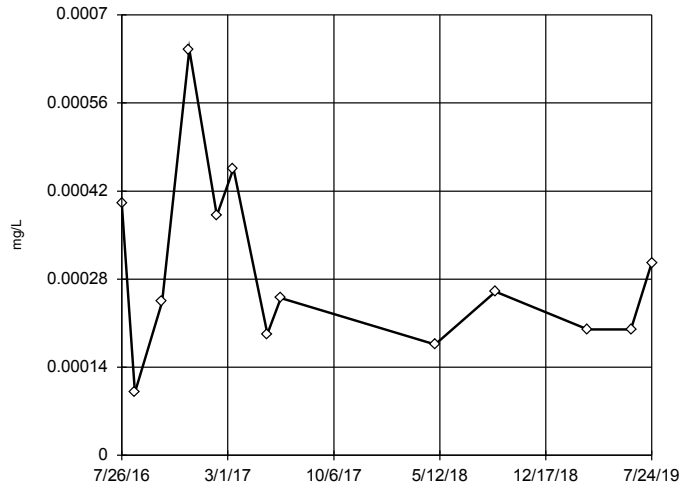
Tukey's Outlier Screening
BAP-MW-1604



n = 13
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 = 0.005186, low cutoff = 0.00001356, based on IQR multiplier of 3.

Constituent: Chromium, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

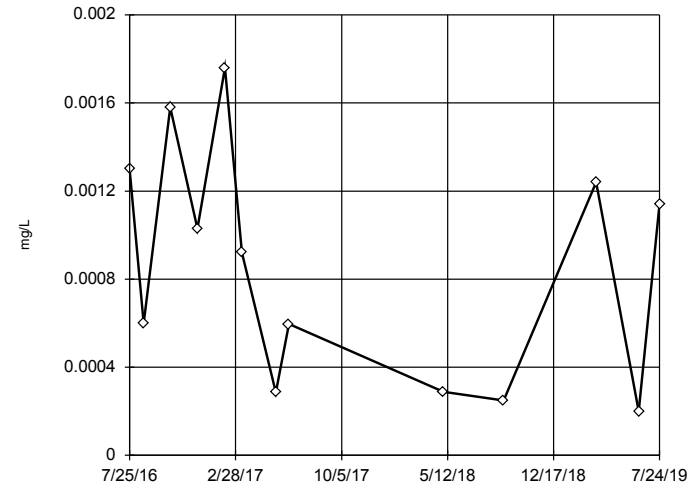
Tukey's Outlier Screening
BAP-MW-1605



n = 13
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 = 0.003063, low cutoff = 0.0002504, based on IQR multiplier of 3.

Constituent: Chromium, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

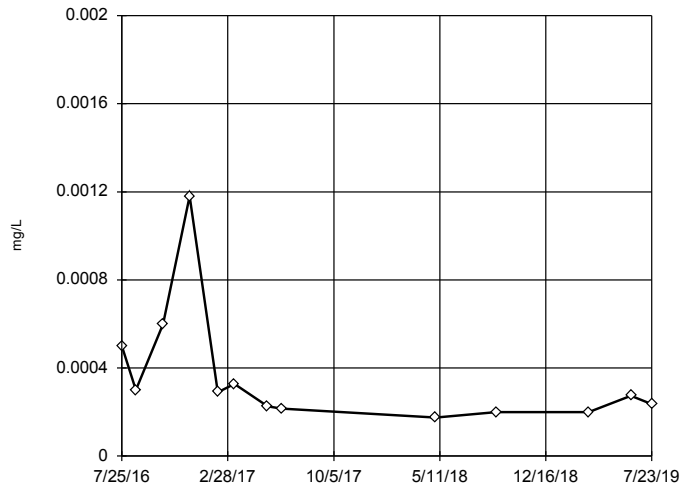
Tukey's Outlier Screening
BAP-MW-1606



n = 13
No outliers found. Tukey's method selected by user.
Ladder of Powers transformations did not improve normality; analysis run on raw data.
High cutoff = 0.004218, low cutoff = -0.00266, based on IQR multiplier of 3.

Constituent: Chromium, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

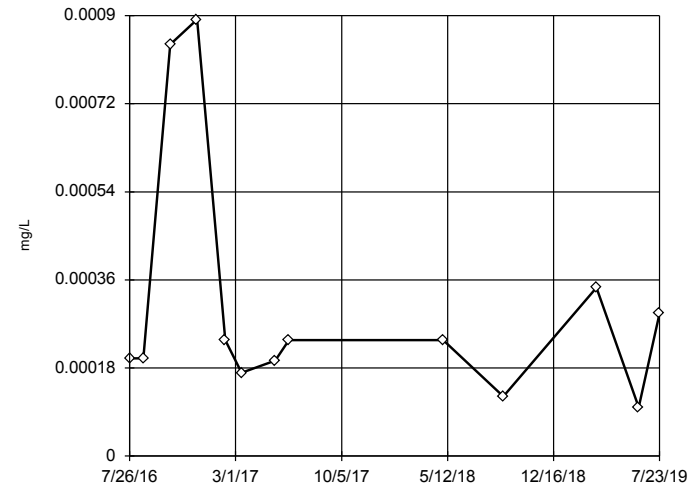
Tukey's Outlier Screening
BAP-MW-4



n = 13
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 = 0.002977, low cutoff = 0.00002823, based on IQR multiplier of 3.

Constituent: Chromium, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening
BAP-MW-5

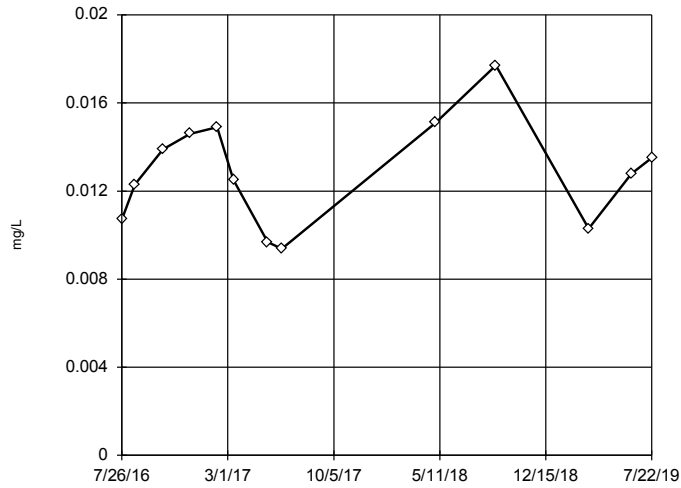


n = 13
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.00166, low cutoff = 0.0000347, based on IQR multiplier of 3.

Constituent: Chromium, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening

BAP-MW-1



n = 13

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

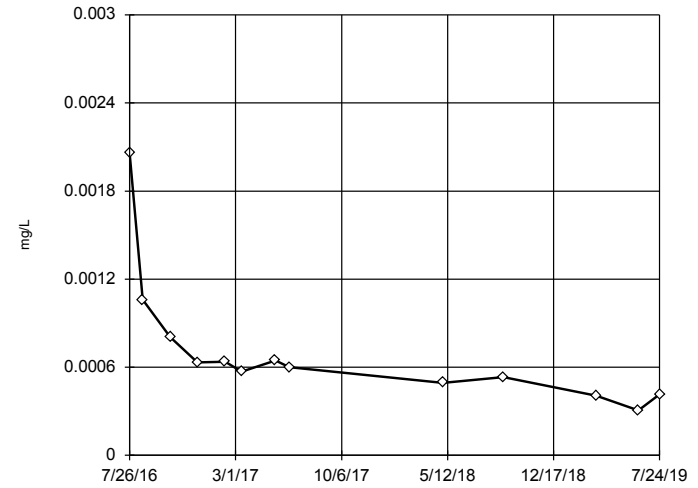
Data were square root transformed to achieve best W statistic (graph shown in original units).

High cutoff = 0.03183,
low cutoff = 0.002072,
based on IQR multiplier of 3.

Constituent: Cobalt, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening

BAP-MW-1604



n = 13

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

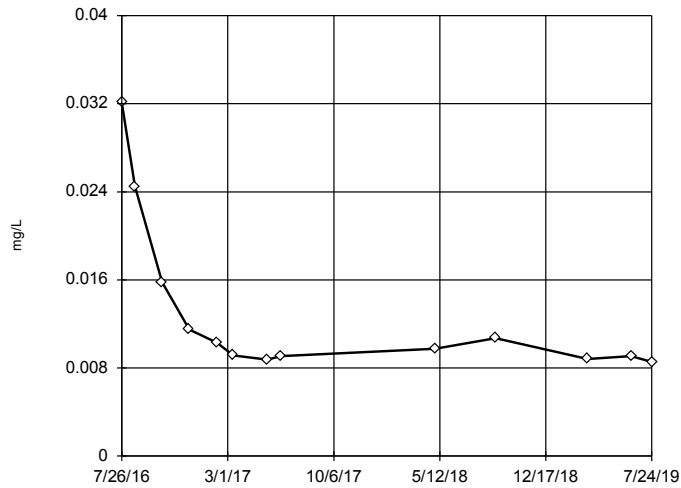
Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 0.002922,
low cutoff = 0.0001118,
based on IQR multiplier of 3.

Constituent: Cobalt, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening

BAP-MW-1605



n = 13

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

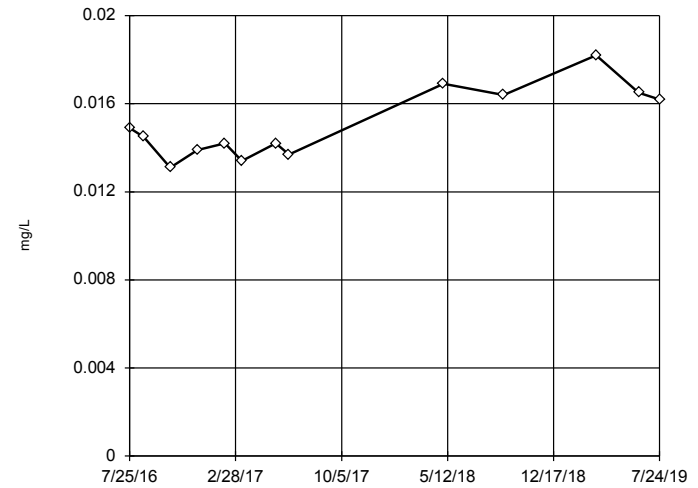
Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 0.04606,
low cutoff = 0.002619,
based on IQR multiplier of 3.

Constituent: Cobalt, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening

BAP-MW-1606



n = 13

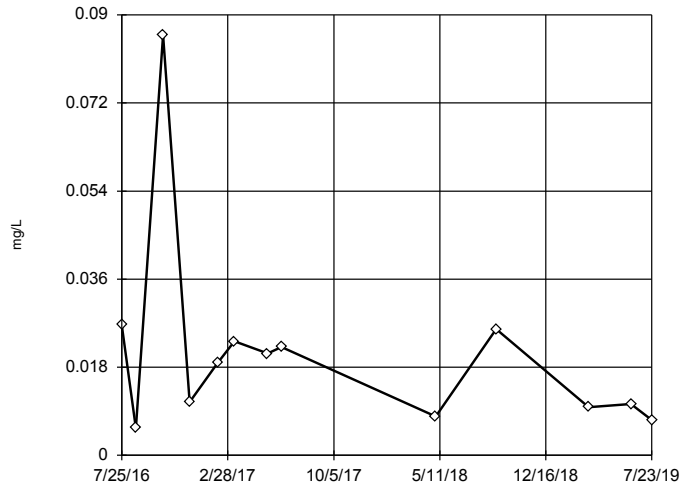
No outliers found.
Tukey's method selected by user.

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

High cutoff = 0.02786,
low cutoff = 0.008147,
based on IQR multiplier of 3.

Constituent: Cobalt, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

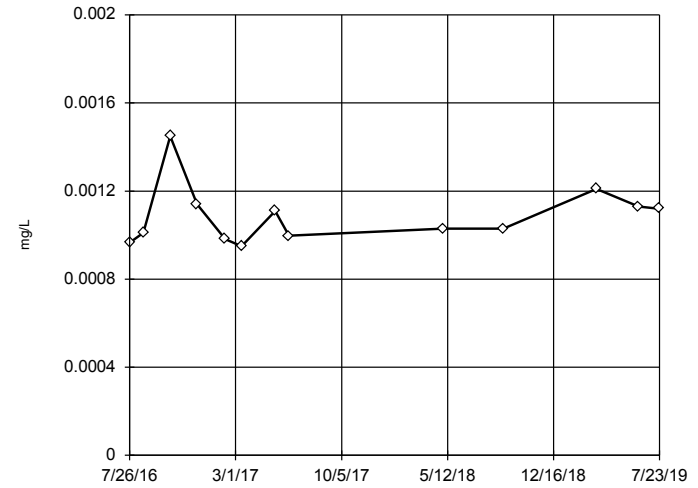
Tukey's Outlier Screening
BAP-MW-4



n = 13
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 = 0.5267, low cutoff = 0.0004106, based on IQR multiplier of 3.

Constituent: Cobalt, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

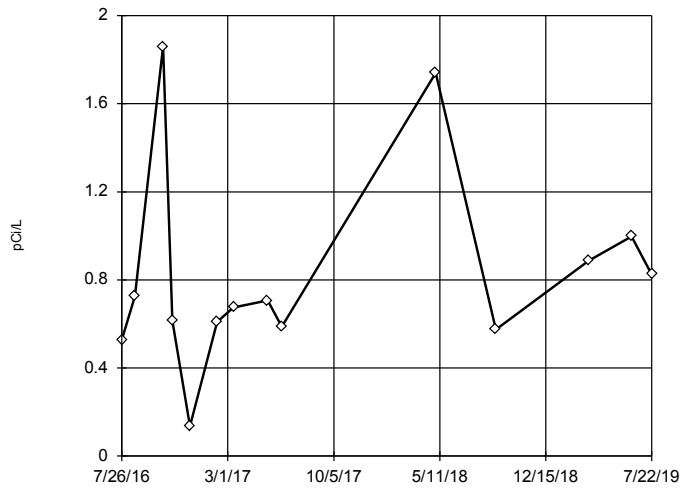
Tukey's Outlier Screening
BAP-MW-5



n = 13
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 = 0.001716, low cutoff = 0.0006543, based on IQR multiplier of 3.

Constituent: Cobalt, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

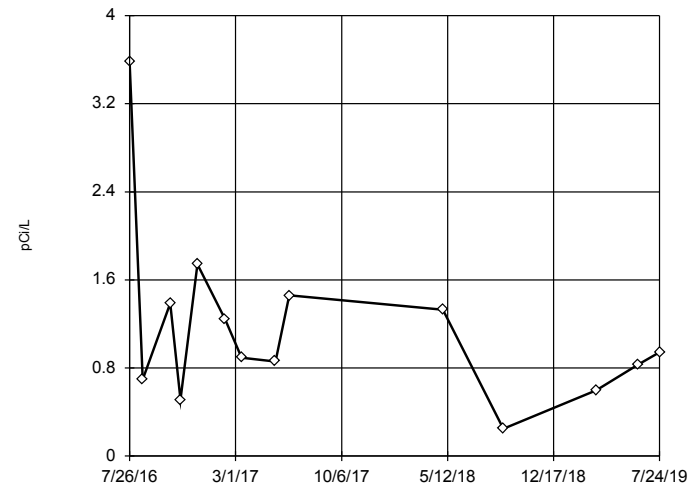
Tukey's Outlier Screening
BAP-MW-1



n = 14
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 = 2.845, low cutoff = 0.06279, based on IQR multiplier of 3.

Constituent: Combined Radium 226 + 228 Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

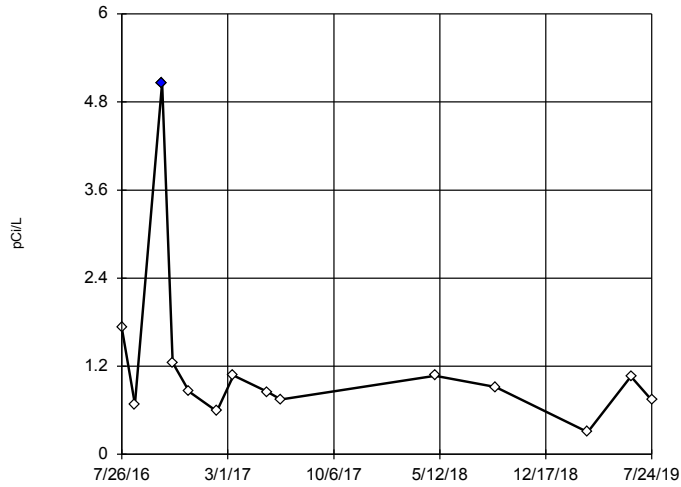
Tukey's Outlier Screening
BAP-MW-1604



n = 14
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 = 15.36, low cutoff = 0.0596, based on IQR multiplier of 3.

Constituent: Combined Radium 226 + 228 Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

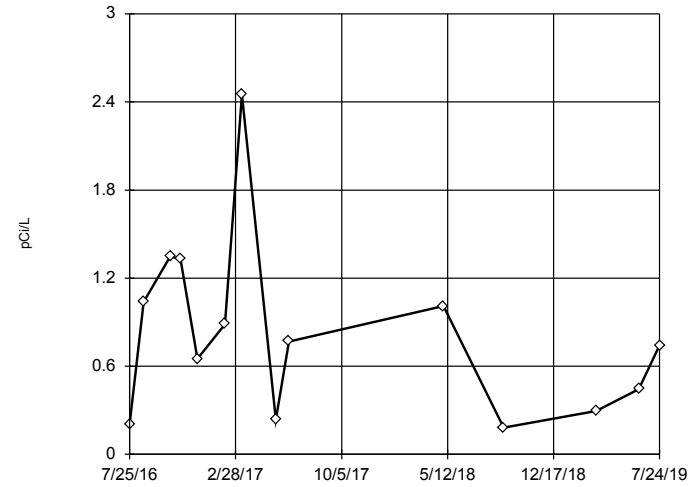
Tukey's Outlier Screening BAP-MW-1605



n = 14
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 = 5.009, low cutoff = 0.1642, based on IQR multiplier of 3.

Constituent: Combined Radium 226 + 228 Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

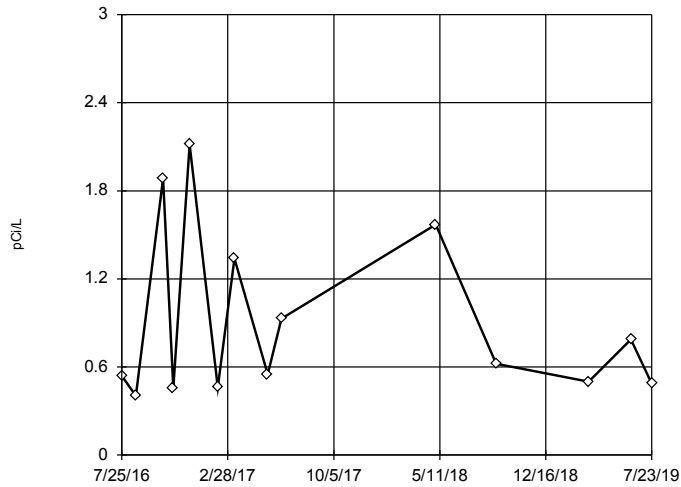
Tukey's Outlier Screening BAP-MW-1606



n = 14
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 = 12.17, low cutoff = -0.2181, based on IQR multiplier of 3.

Constituent: Combined Radium 226 + 228 Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

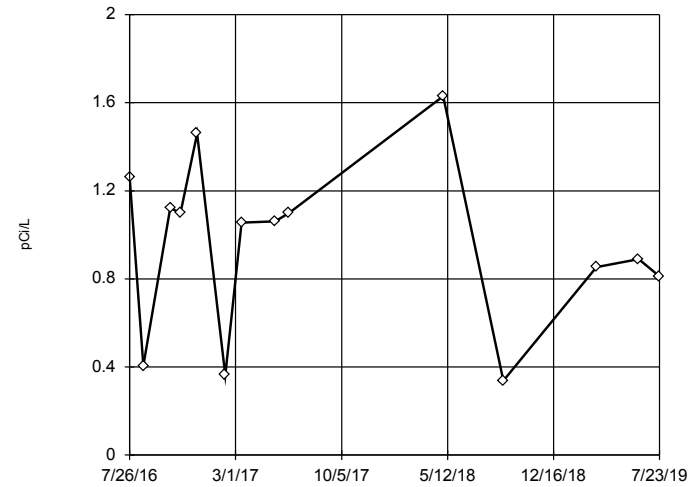
Tukey's Outlier Screening BAP-MW-4



n = 14
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 = 41.81, low cutoff = 0.0164, based on IQR multiplier of 3.

Constituent: Combined Radium 226 + 228 Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening BAP-MW-5

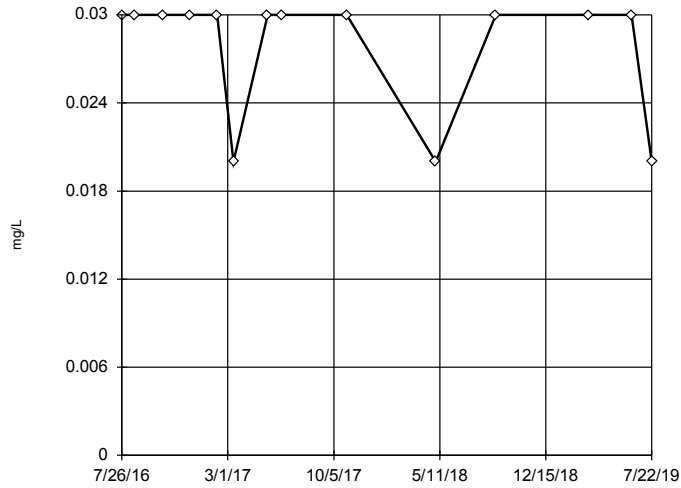


n = 14
No outliers found.
Tukey's method selected by user.
Ladder of Powers transformations did not improve normality, analysis run on raw data.
High cutoff = 2.949, low cutoff = -1.147, based on IQR multiplier of 3.

Constituent: Combined Radium 226 + 228 Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening

BAP-MW-1



n = 14

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

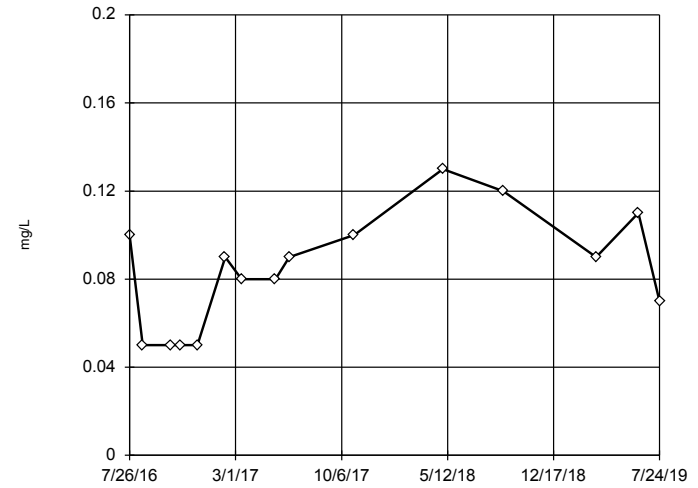
Data were x*6 transformed to achieve best W statistic (graph shown in original units).

High cutoff = 0.03464, low cutoff = -0.02905, based on IQR multiplier of 3.

Constituent: Fluoride, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening

BAP-MW-1604



n = 15

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

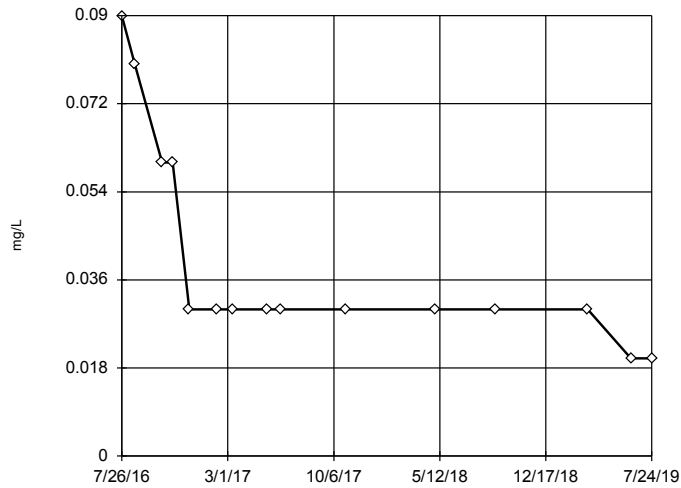
Ladder of Powers transformations did not improve normality; analysis run on raw data.

High cutoff = 0.25, low cutoff = -0.1, based on IQR multiplier of 3.

Constituent: Fluoride, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening

BAP-MW-1605



n = 15

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

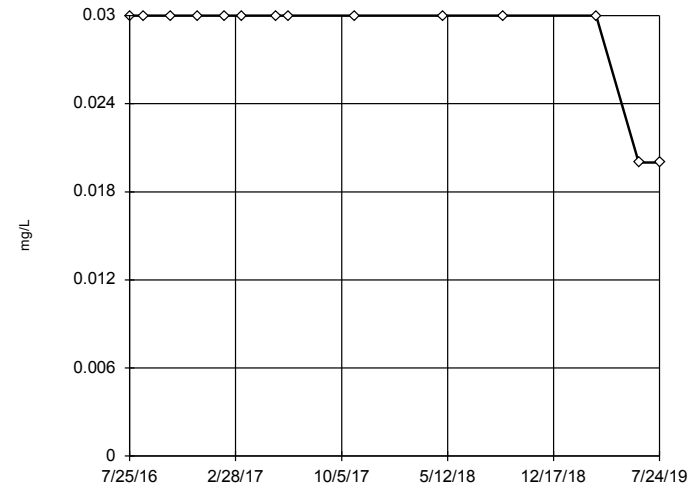
Data were natural log transformed to achieve best W statistic (graph shown in original units).

High cutoff = 0.48, low cutoff = 0.00375, based on IQR multiplier of 3.

Constituent: Fluoride, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening

BAP-MW-1606



n = 14

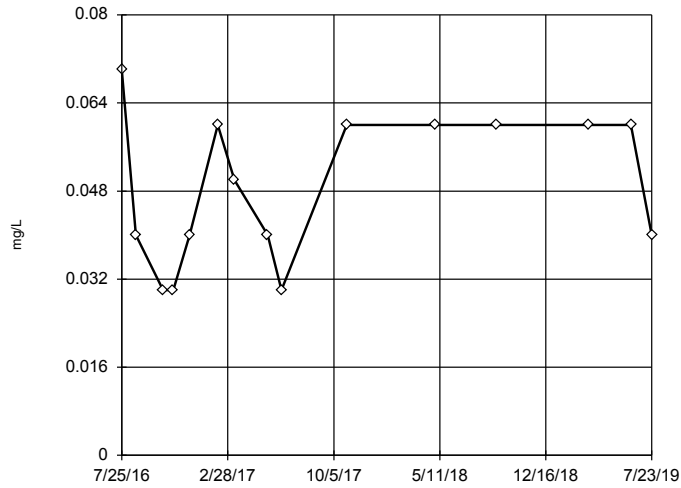
No outliers found. Tukey's method selected by user.

Data were x*6 transformed to achieve best W statistic (graph shown in original units).

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

Constituent: Fluoride, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

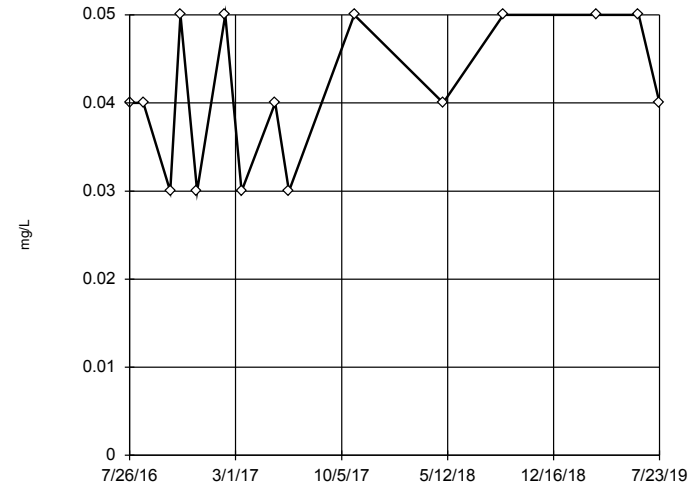
Tukey's Outlier Screening
BAP-MW-4



n = 15
No outliers found. Tukey's method selected by user.
Ladder of Powers transformations did not improve normality; analysis run on raw data.
High cutoff = 0.12, low cutoff = -0.02, based on IQR multiplier of 3.

Constituent: Fluoride, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

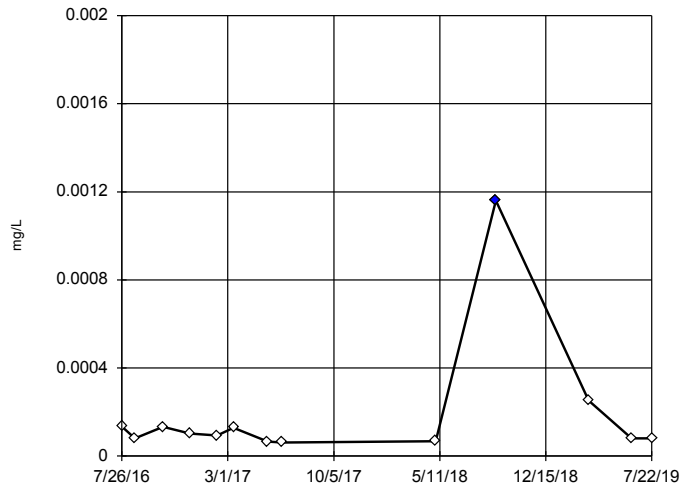
Tukey's Outlier Screening
BAP-MW-5



n = 15
No outliers found. Tukey's method selected by user.
Ladder of Powers transformations did not improve normality; analysis run on raw data.
High cutoff = 0.11, low cutoff = -0.03, based on IQR multiplier of 3.

Constituent: Fluoride, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

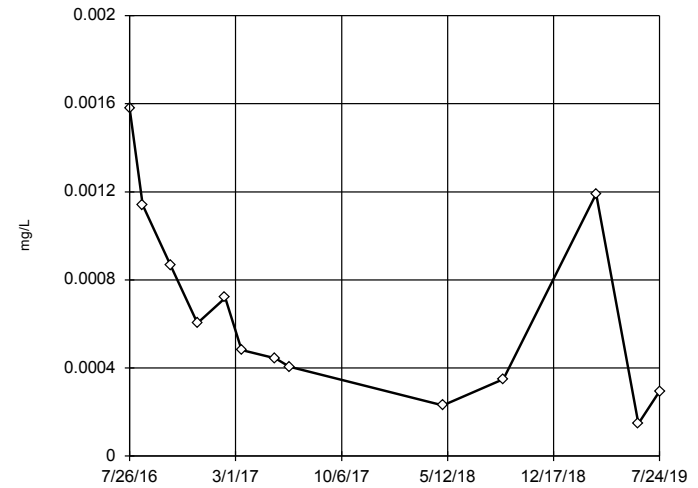
Tukey's Outlier Screening
BAP-MW-1



n = 13
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 = 0.0007916, low cutoff = 0.00001244, based on IQR multiplier of 3.

Constituent: Lead, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

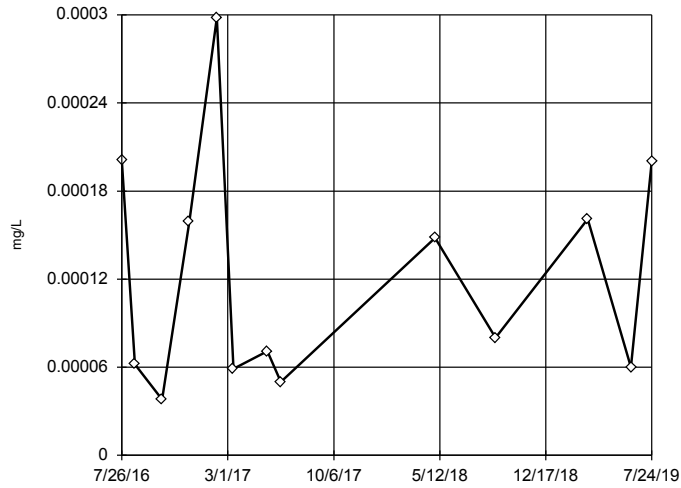
Tukey's Outlier Screening
BAP-MW-1604



n = 13
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 = 0.02986, low cutoff = 0.00001068, based on IQR multiplier of 3.

Constituent: Lead, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

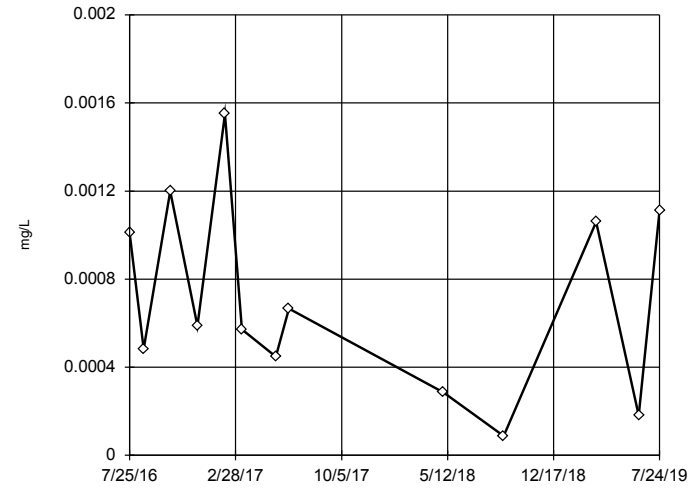
Tukey's Outlier Screening
BAP-MW-1605



n = 13
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 = 0.004923, low cutoff = 0.00002169, based on IQR multiplier of 3.

Constituent: Lead, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

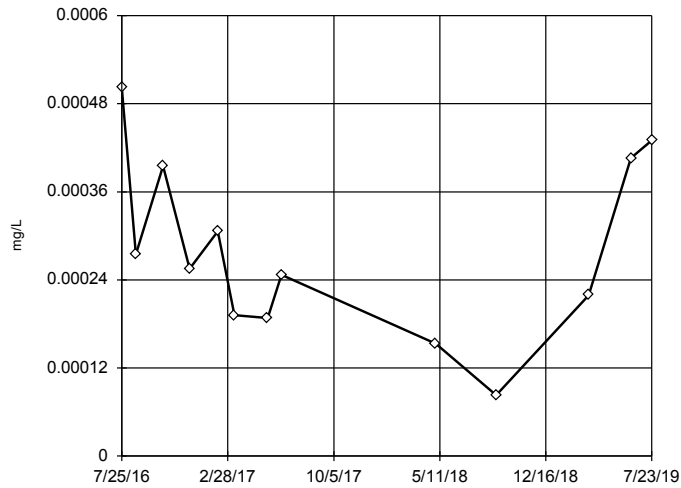
Tukey's Outlier Screening
BAP-MW-1606



n = 13
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 = 0.00557, low cutoff = -0.0005133, based on IQR multiplier of 3.

Constituent: Lead, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

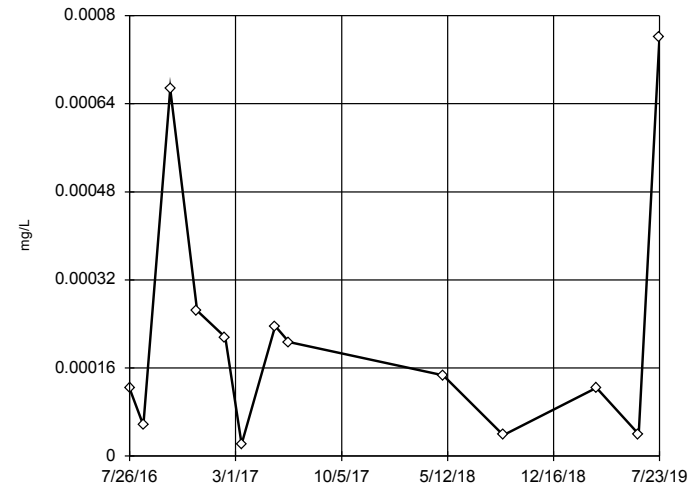
Tukey's Outlier Screening
BAP-MW-4



n = 13
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 = 0.001497, low cutoff = -0.00002402, based on IQR multiplier of 3.

Constituent: Lead, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening
BAP-MW-5

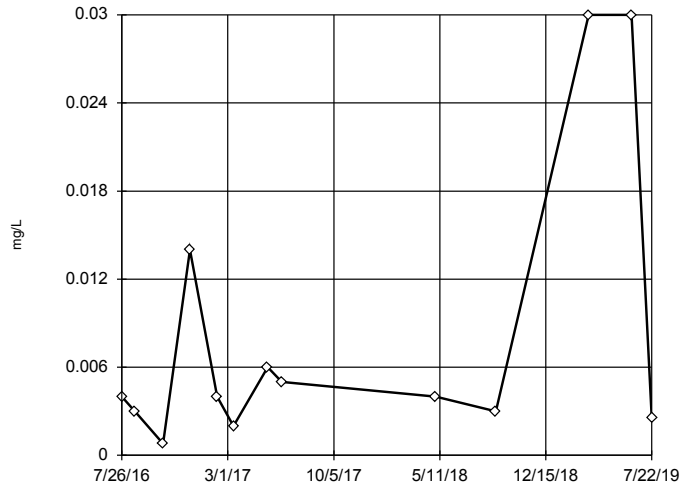


n = 13
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.03662, low cutoff = 3.2e-7, based on IQR multiplier of 3.

Constituent: Lead, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening

BAP-MW-1

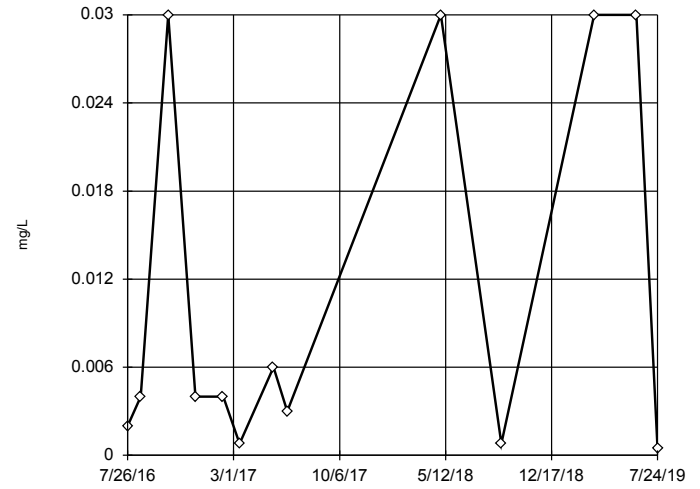


n = 13
No outliers found.
Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.3296,
low cutoff = 0.00007721,
based on IQR multiplier of 3.

Constituent: Lithium, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening

BAP-MW-1604

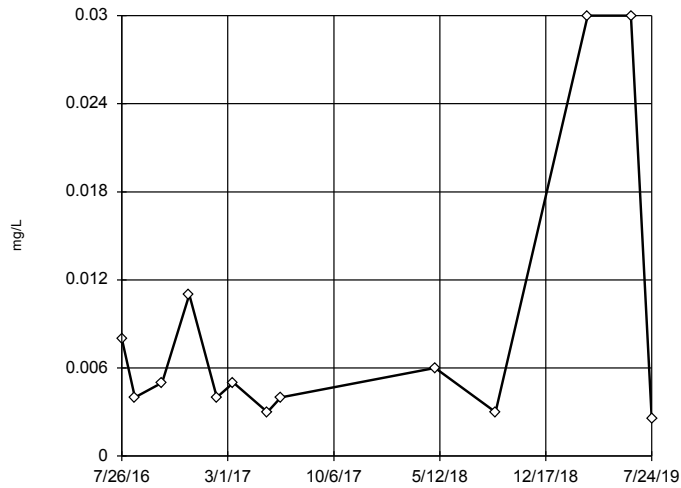


n = 13
No outliers found.
Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 400.2,
low cutoff = 9.5e-8,
based on IQR multiplier of 3.

Constituent: Lithium, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening

BAP-MW-1605

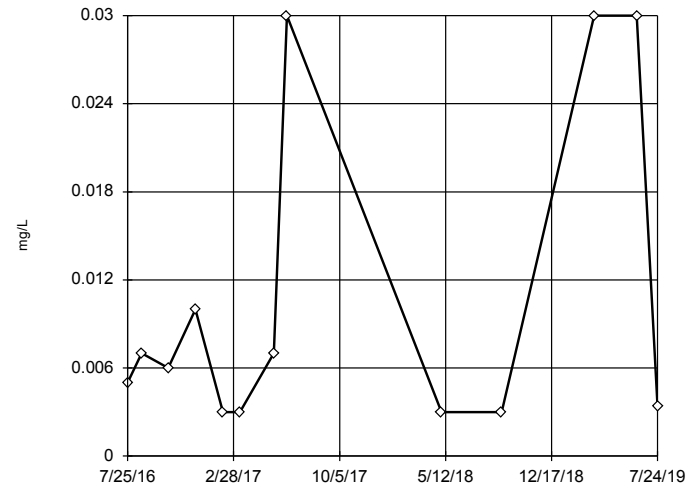


n = 13
No outliers found.
Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.1863,
low cutoff = 0.0001744,
based on IQR multiplier of 3.

Constituent: Lithium, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening

BAP-MW-1606

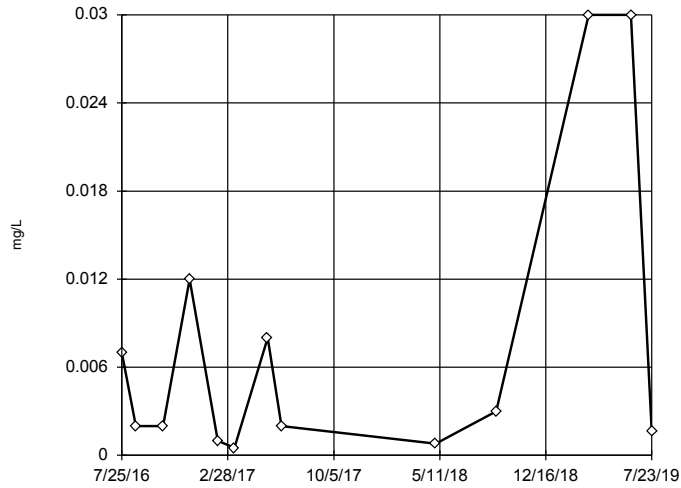


n = 13
No outliers found.
Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 3.333,
low cutoff = 0.00001559,
based on IQR multiplier of 3.

Constituent: Lithium, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening

BAP-MW-4

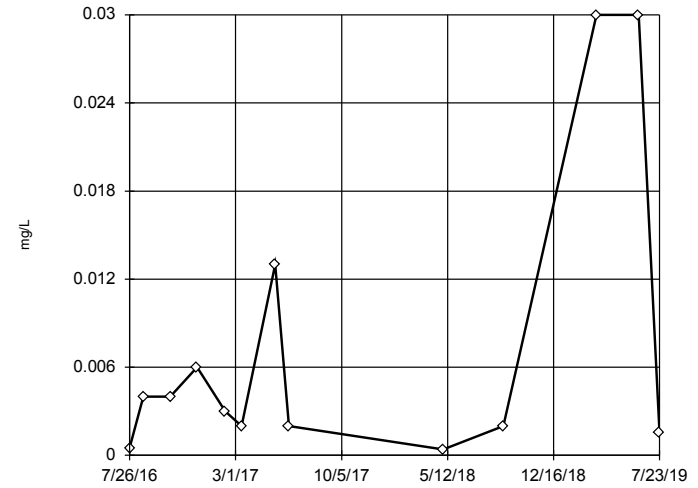


n = 13
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 4.47, low cutoff = 0.00000279, based on IQR multiplier of 3.

Constituent: Lithium, total Analysis Run 12/4/2019 4:36 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening

BAP-MW-5

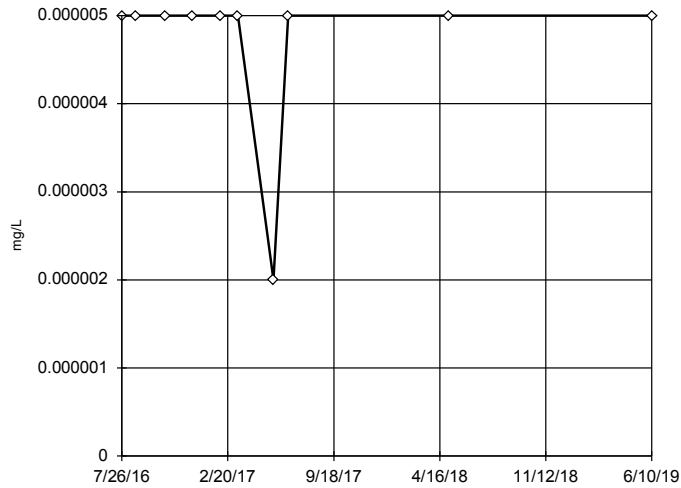


n = 13
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 1.137, low cutoff = 0.00001359, based on IQR multiplier of 3.

Constituent: Lithium, total Analysis Run 12/4/2019 4:36 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening

BAP-MW-1

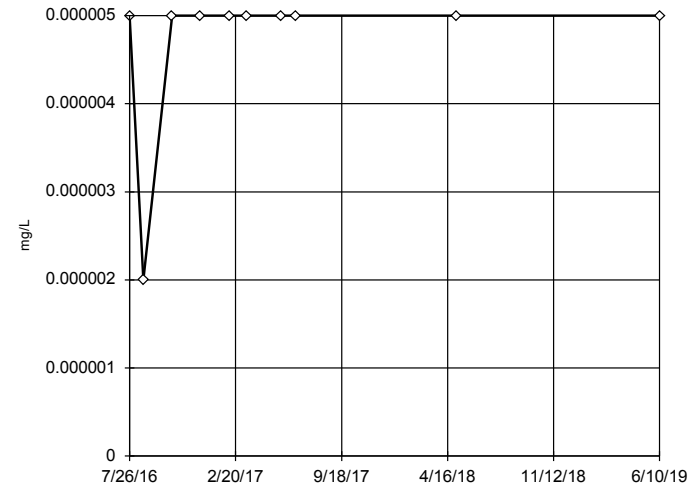


n = 10
 No outliers found.
 Tukey's method selected by user.
 Data were cube transformed to achieve best W statistic (graph shown in original units).
 The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Mercury, total Analysis Run 12/4/2019 4:36 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening

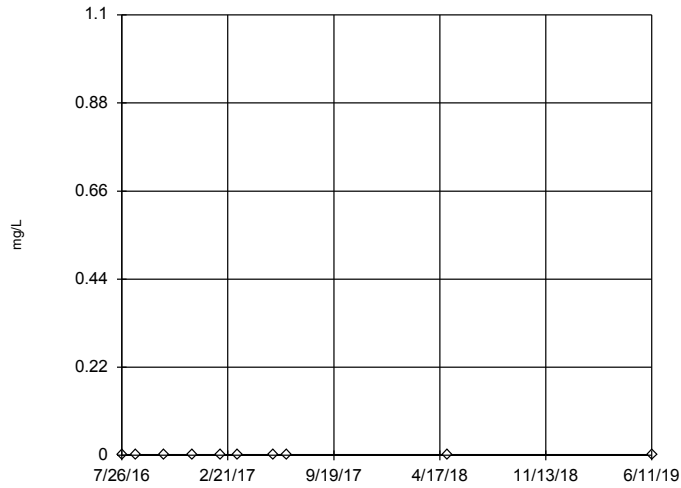
BAP-MW-1604



n = 10
 No outliers found.
 Tukey's method selected by user.
 Data were cube 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, total Analysis Run 12/4/2019 4:36 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

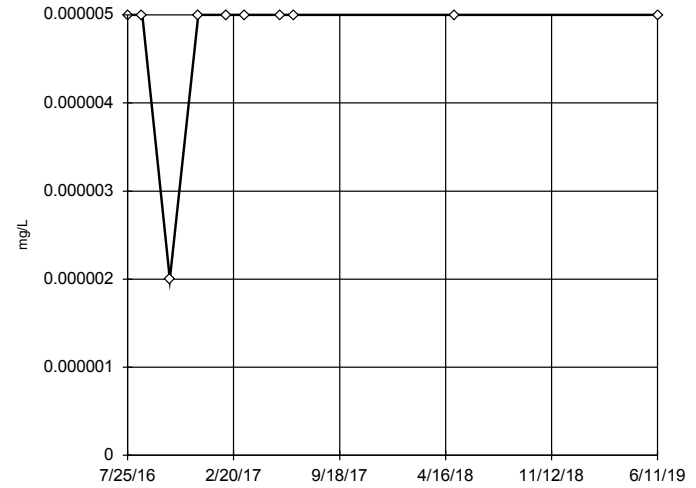
Tukey's Outlier Screening BAP-MW-1605



n = 10
 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: Mercury, total Analysis Run 12/4/2019 4:36 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

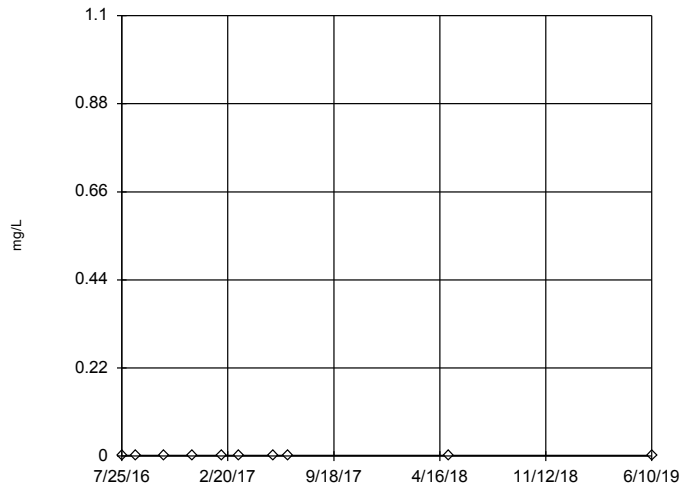
Tukey's Outlier Screening BAP-MW-1606



n = 10
 No outliers found.
 Tukey's method selected by user.
 Data were cube 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, total Analysis Run 12/4/2019 4:36 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

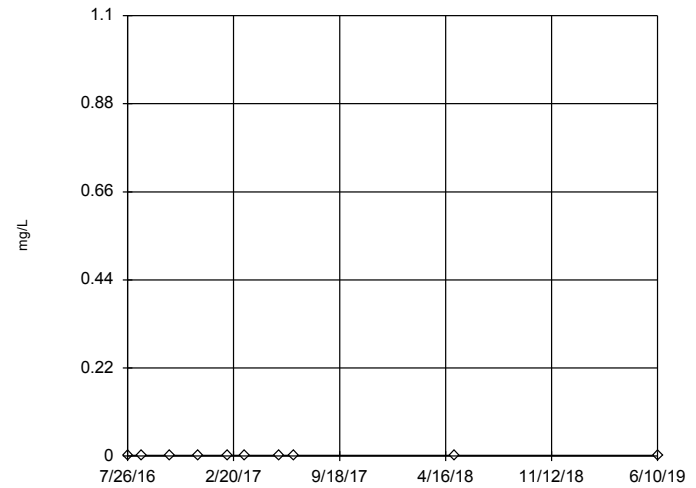
Tukey's Outlier Screening BAP-MW-4



n = 10
 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: Mercury, total Analysis Run 12/4/2019 4:36 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

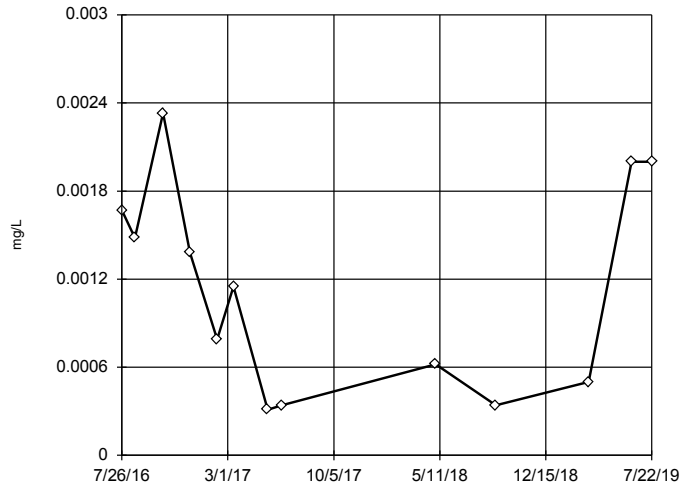
Tukey's Outlier Screening BAP-MW-5



n = 10
 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: Mercury, total Analysis Run 12/4/2019 4:36 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

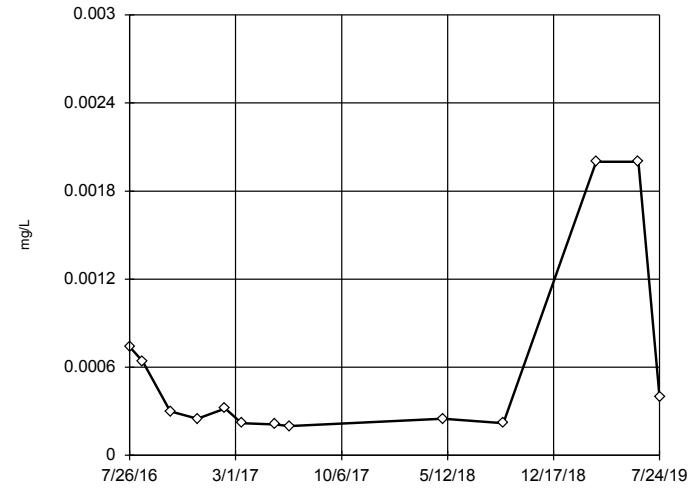
Tukey's Outlier Screening
BAP-MW-1



n = 13
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 = 0.01209, low cutoff = -0.002188, based on IQR multiplier of 3.

Constituent: Molybdenum, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

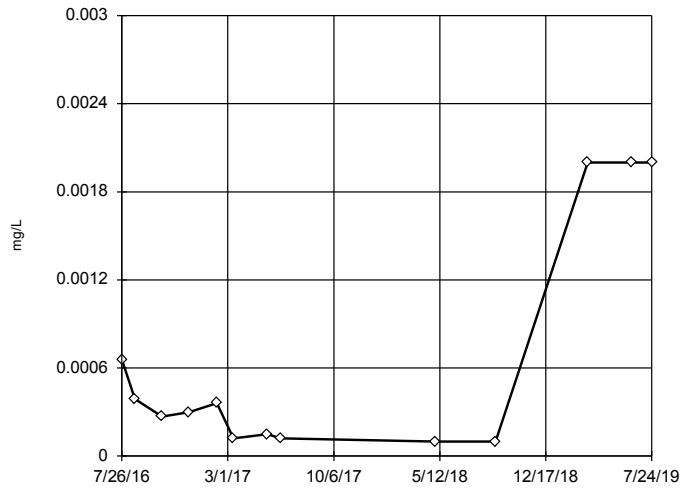
Tukey's Outlier Screening
BAP-MW-1604



n = 13
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 = 0.02106, low cutoff = 0.00007187, based on IQR multiplier of 3.

Constituent: Molybdenum, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

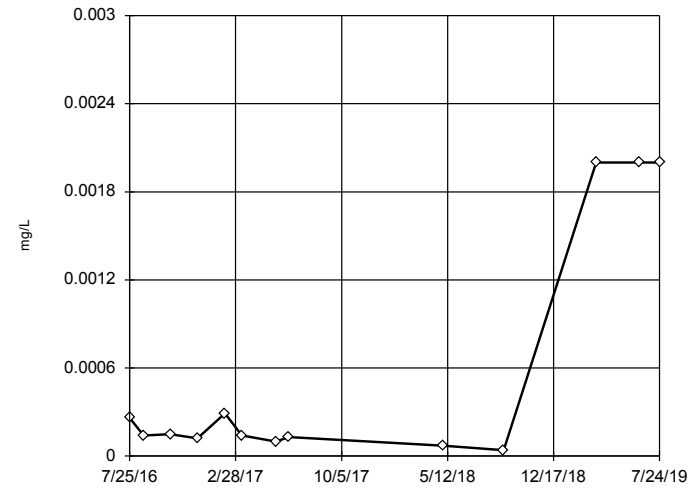
Tukey's Outlier Screening
BAP-MW-1605



n = 13
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 = 1.008, low cutoff = 1.4e-7, based on IQR multiplier of 3.

Constituent: Molybdenum, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

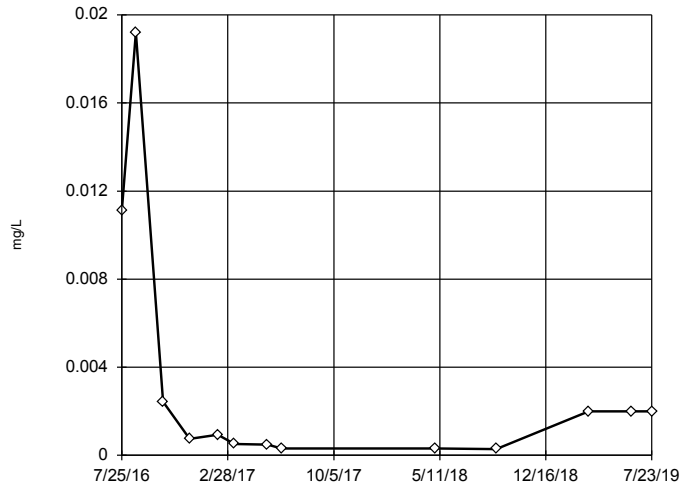
Tukey's Outlier Screening
BAP-MW-1606



n = 13
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 = 0.2559, low cutoff = 3.3e-7, based on IQR multiplier of 3.

Constituent: Molybdenum, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

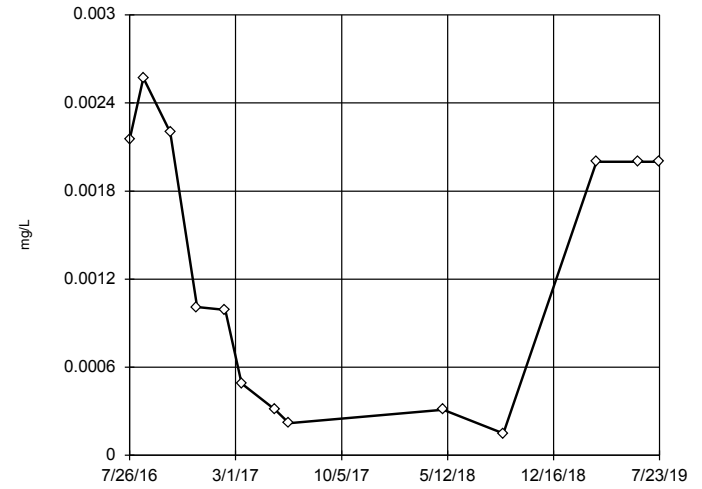
Tukey's Outlier Screening BAP-MW-4



n = 13
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 = 0.4023, low cutoff = 0.00000214, based on IQR multiplier of 3.

Constituent: Molybdenum, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

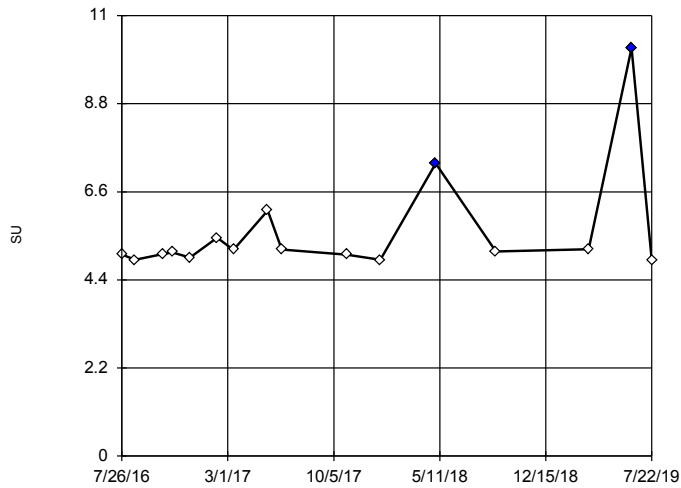
Tukey's Outlier Screening BAP-MW-5



n = 13
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 = 0.02896, low cutoff = -0.0014, based on IQR multiplier of 3.

Constituent: Molybdenum, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

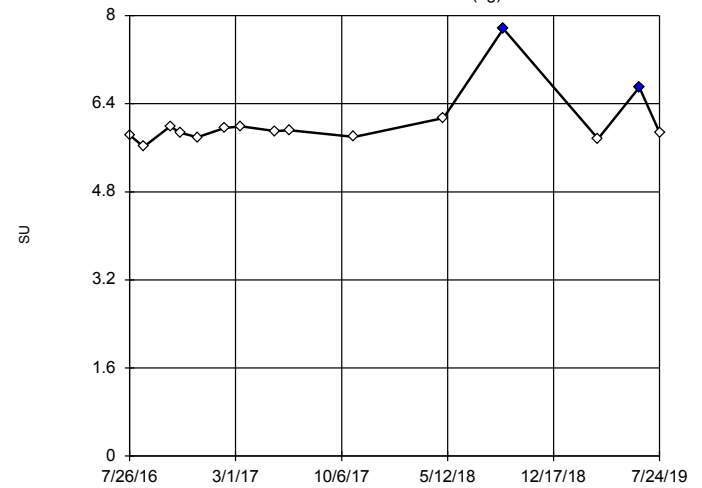
Tukey's Outlier Screening BAP-MW-1



n = 16
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 = 6.371, low cutoff = 4.162, based on IQR multiplier of 3.

Constituent: pH, field Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

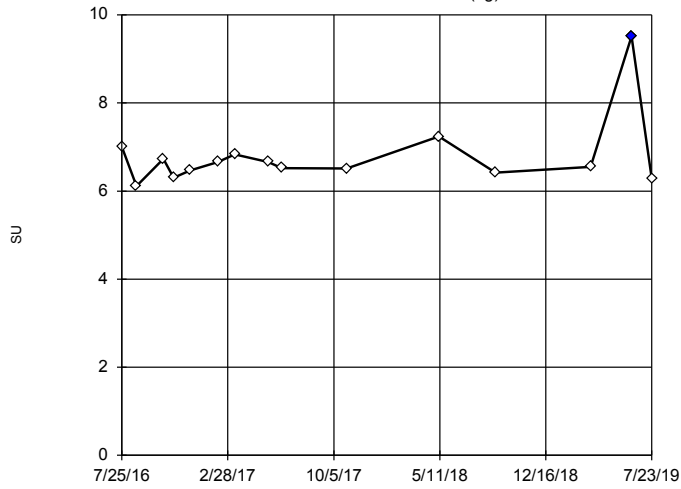
Tukey's Outlier Screening BAP-MW-1601 (bg)



n = 15
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 = 6.598, low cutoff = 5.265, based on IQR multiplier of 3.

Constituent: pH, field Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

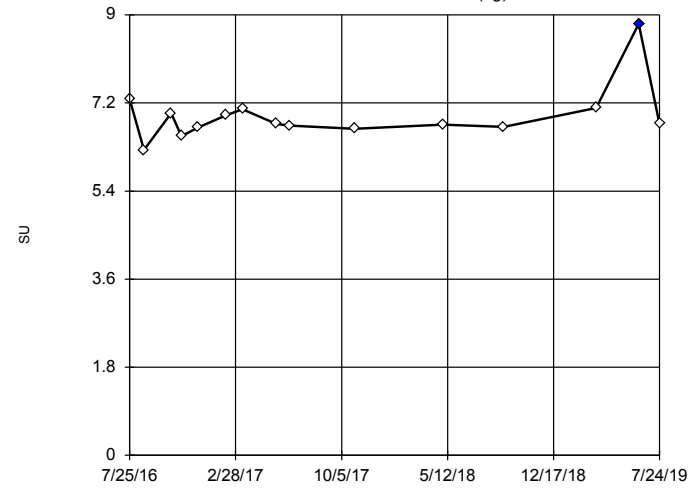
Tukey's Outlier Screening
BAP-MW-1602A (bg)



n = 15
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 = 8.224, low cutoff = 5.332, based on IQR multiplier of 3.

Constituent: pH, field Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

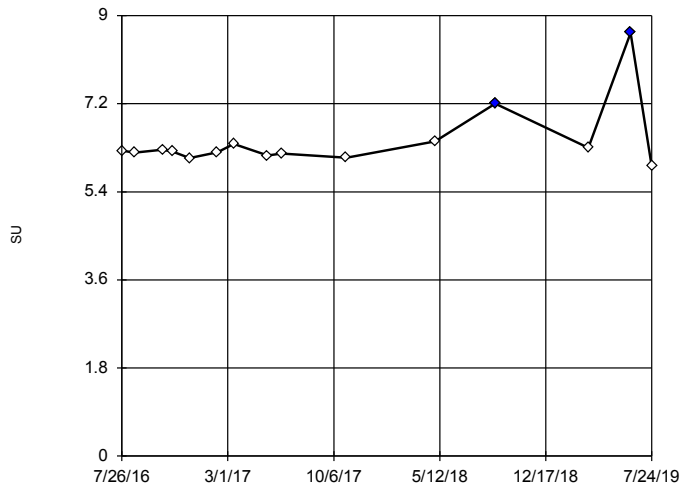
Tukey's Outlier Screening
BAP-MW-1603A (bg)



n = 15
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 = 8.307, low cutoff = 5.702, based on IQR multiplier of 3.

Constituent: pH, field Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

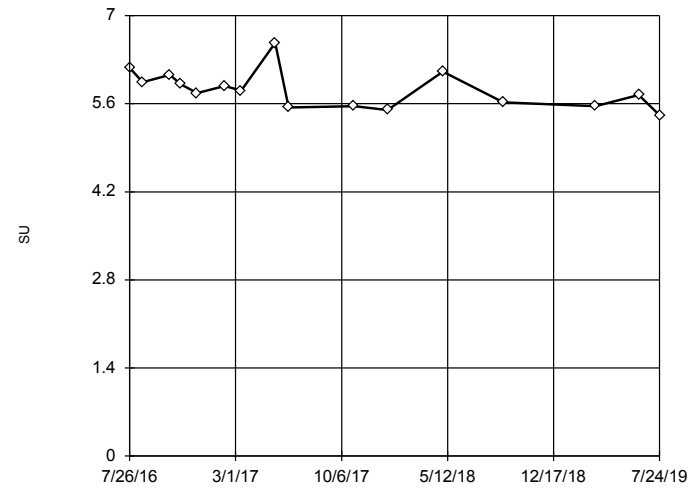
Tukey's Outlier Screening
BAP-MW-1604



n = 15
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 = 7.158, low cutoff = 5.473, based on IQR multiplier of 3.

Constituent: pH, field Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening
BAP-MW-1605

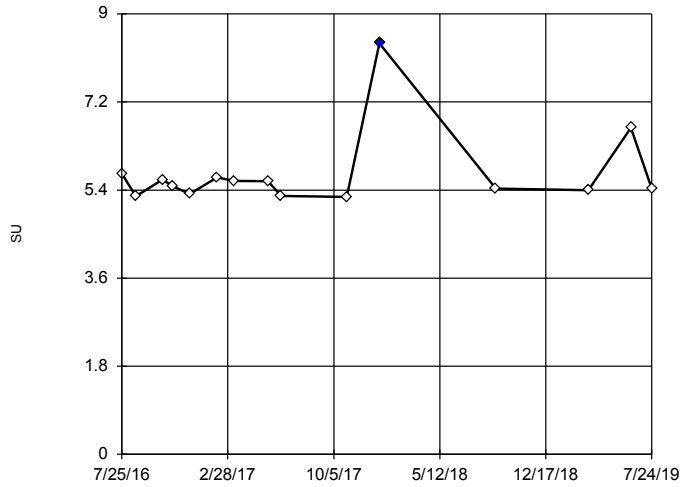


n = 16
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 7.539, low cutoff = 4.425, based on IQR multiplier of 3.

Constituent: pH, field Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening

BAP-MW-1606

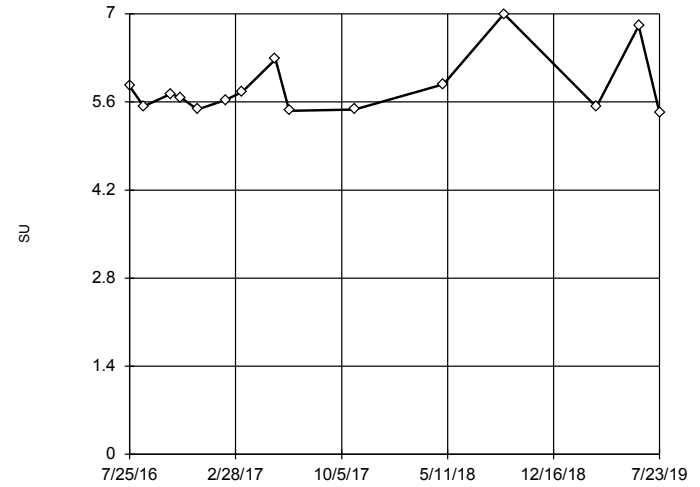


n = 15
 Outlier is drawn as solid. Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 6.816, low cutoff = 4.418, based on IQR multiplier of 3.

Constituent: pH, field Analysis Run 12/4/2019 4:36 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening

BAP-MW-4

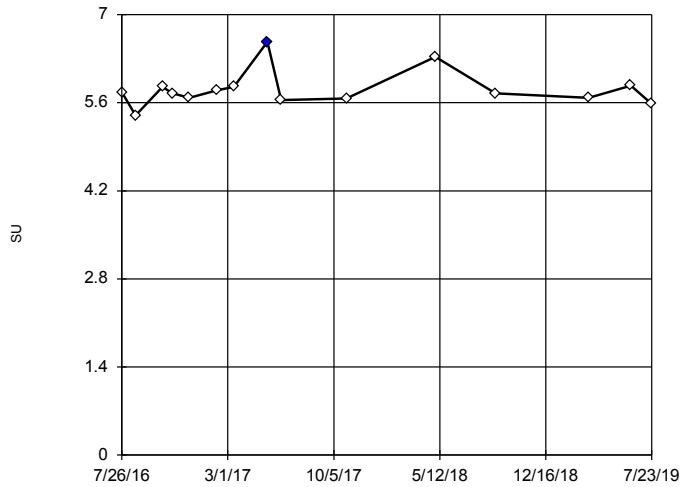


n = 15
 No outliers found. Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 7.264, low cutoff = 4.436, based on IQR multiplier of 3.

Constituent: pH, field Analysis Run 12/4/2019 4:36 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening

BAP-MW-5

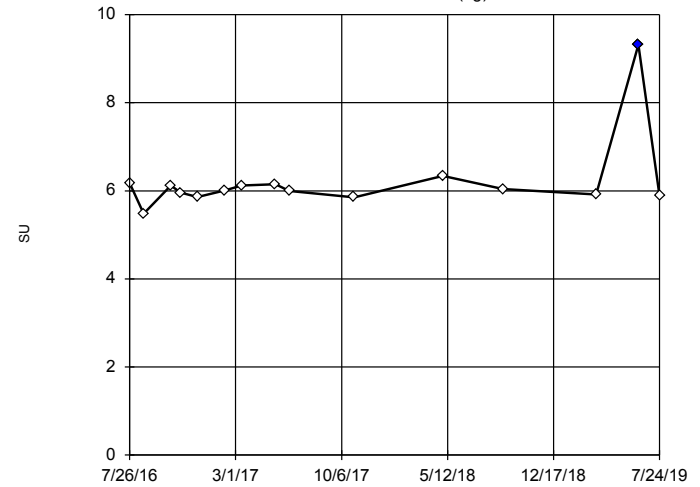


n = 15
 Outlier is drawn as solid. Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 6.425, low cutoff = 5.163, based on IQR multiplier of 3.

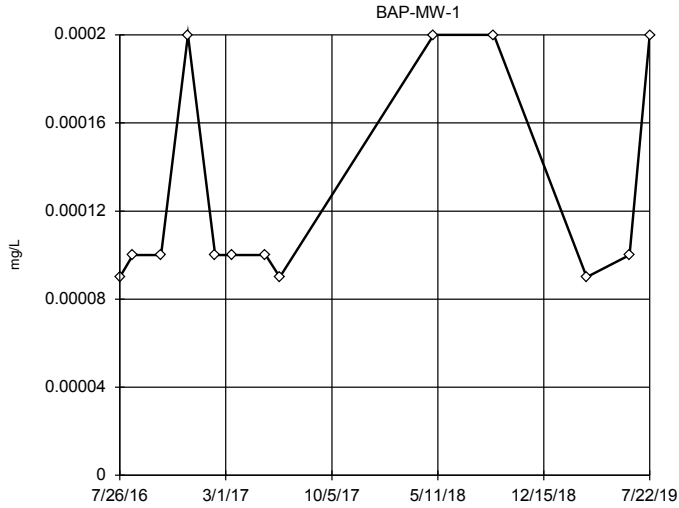
Constituent: pH, field Analysis Run 12/4/2019 4:36 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening

BAP-MW-6 (bg)



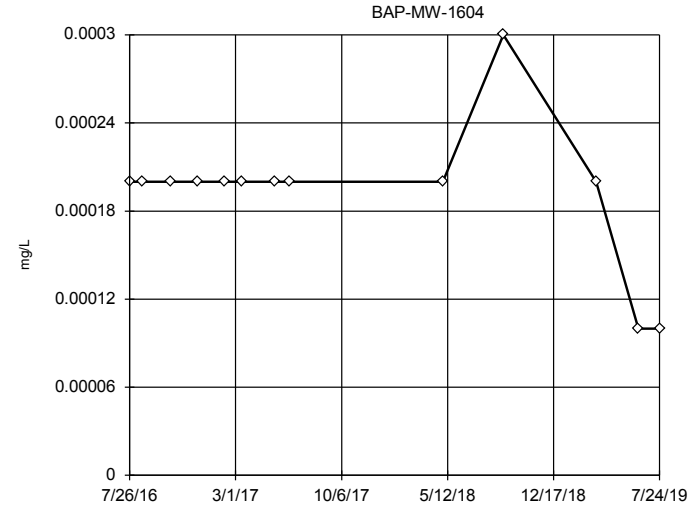
Tukey's Outlier Screening



n = 13
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 = 0.001874, low cutoff = 0.00001013, based on IQR multiplier of 3.

Constituent: Selenium, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

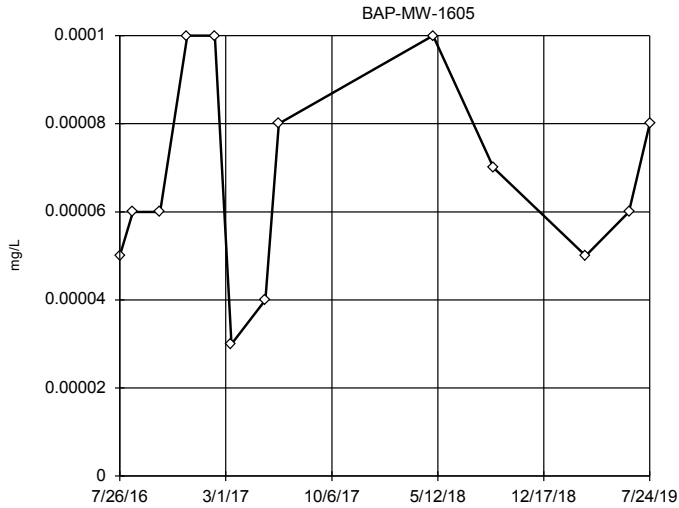
Tukey's Outlier Screening



n = 13
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: Selenium, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

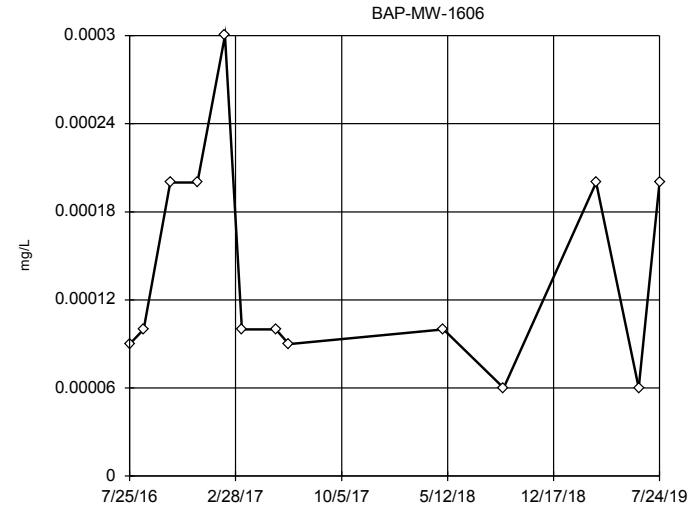
Tukey's Outlier Screening



n = 13
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 = 0.0003213, low cutoff = 0.00000225, based on IQR multiplier of 3.

Constituent: Selenium, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening

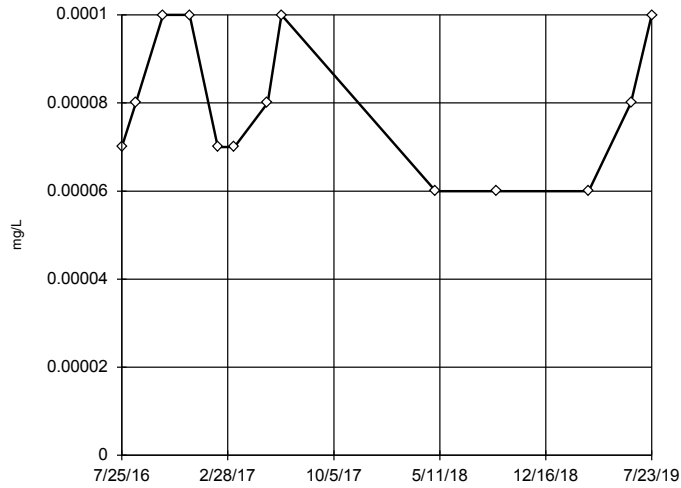


n = 13
No outliers found.
Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.002195, low cutoff = 0.000008201, based on IQR multiplier of 3.

Constituent: Selenium, total Analysis Run 12/4/2019 4:36 PM
Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening

BAP-MW-4

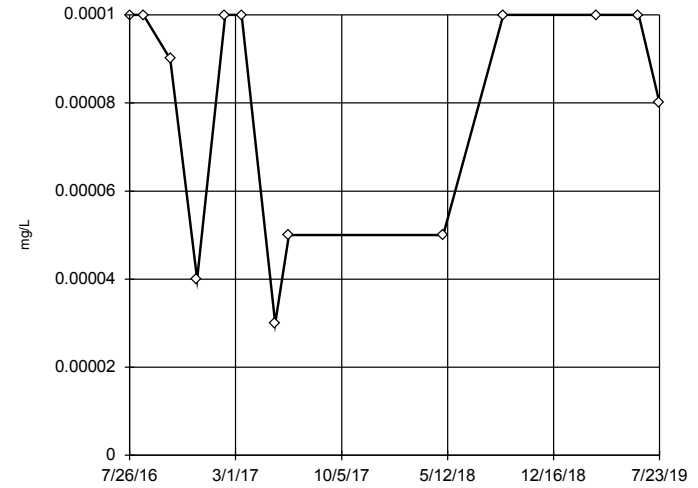


n = 13
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.0003674, low cutoff = 0.00001764, based on IQR multiplier of 3.

Constituent: Selenium, total Analysis Run 12/4/2019 4:37 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening

BAP-MW-5

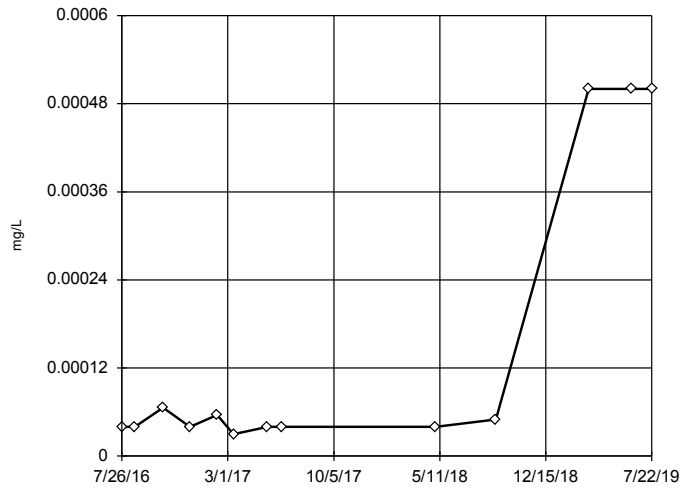


n = 13
 No outliers found.
 Tukey's method selected by user.
 Ladder of Powers transformations did not improve normality; analysis run on raw data.
 High cutoff = 0.00025, low cutoff = -0.0001, based on IQR multiplier of 3.

Constituent: Selenium, total Analysis Run 12/4/2019 4:37 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening

BAP-MW-1

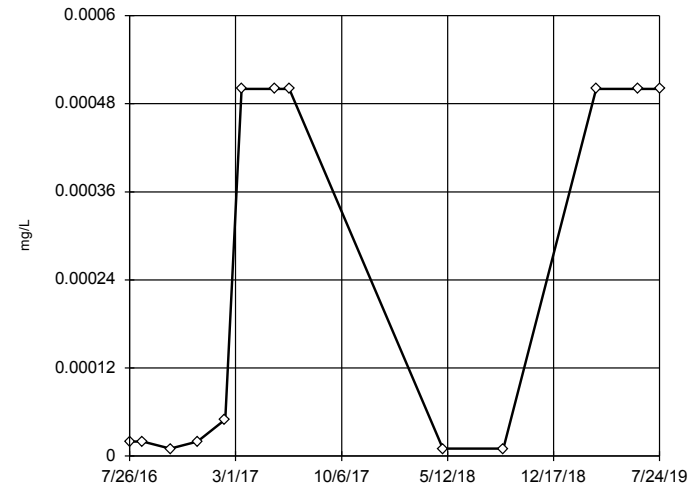


n = 13
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.01702, low cutoff = 4.3e-7, based on IQR multiplier of 3.

Constituent: Thallium, total Analysis Run 12/4/2019 4:37 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening

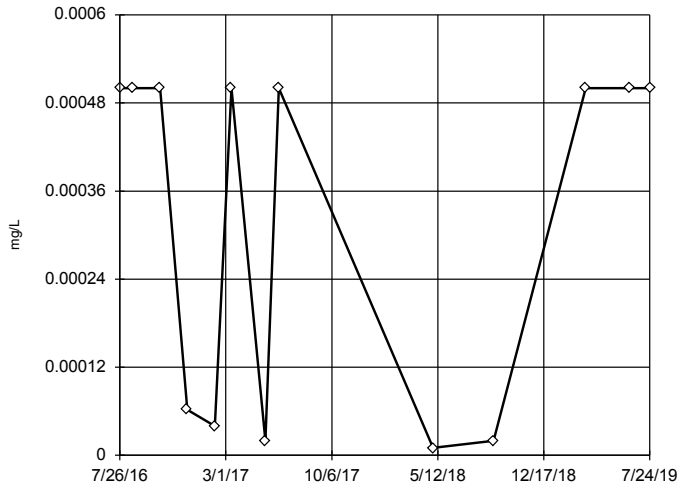
BAP-MW-1604



n = 13
 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 = 22.1, low cutoff = 3.2e-10, based on IQR multiplier of 3.

Constituent: Thallium, total Analysis Run 12/4/2019 4:37 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

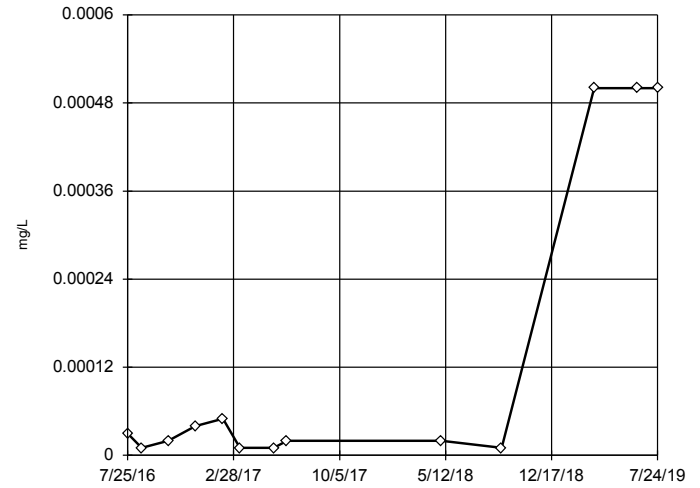
Tukey's Outlier Screening BAP-MW-1605



n = 13
 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 = 2.762, low cutoff = 5.1e-9, based on IQR multiplier of 3.

Constituent: Thallium, total Analysis Run 12/4/2019 4:37 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

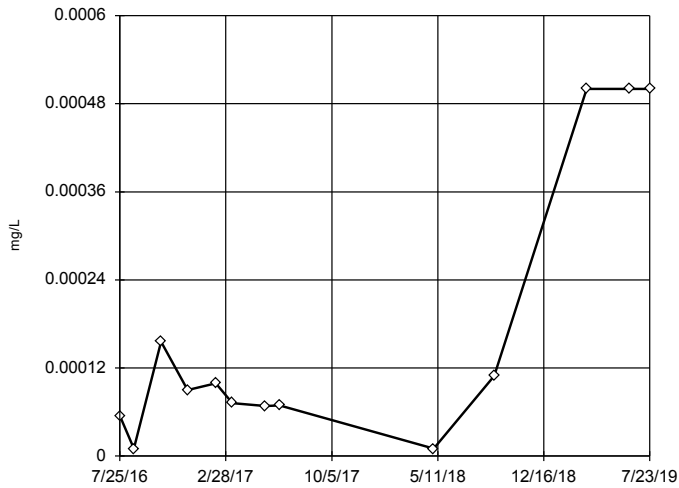
Tukey's Outlier Screening BAP-MW-1606



n = 13
 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 = 0.625, low cutoff = 2.5e-9, based on IQR multiplier of 3.

Constituent: Thallium, total Analysis Run 12/4/2019 4:37 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

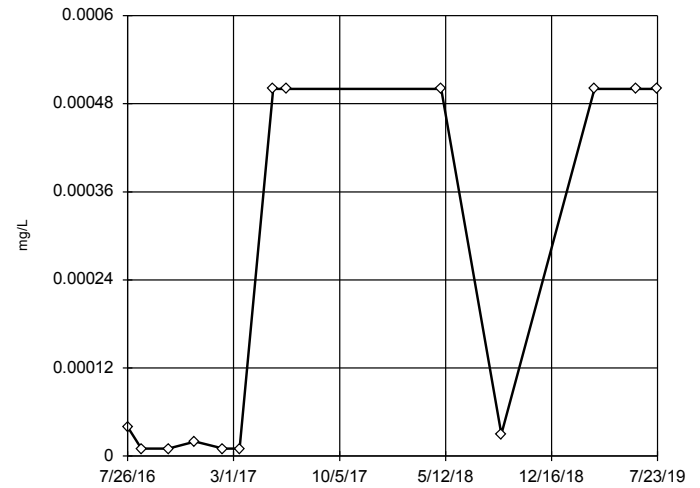
Tukey's Outlier Screening BAP-MW-4



n = 13
 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 = 0.0266, low cutoff = 6.4e-7, based on IQR multiplier of 3.

Constituent: Thallium, total Analysis Run 12/4/2019 4:37 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

Tukey's Outlier Screening BAP-MW-5



n = 13
 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 = 62.5, low cutoff = 8.0e-11, based on IQR multiplier of 3.

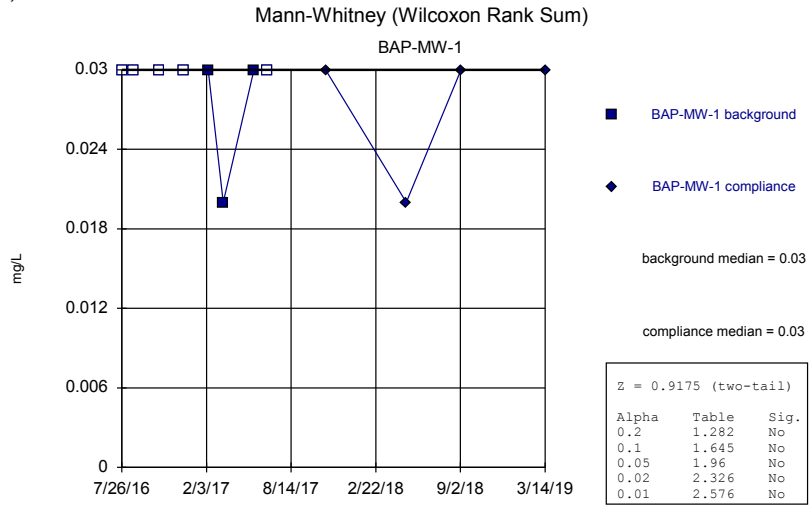
Constituent: Thallium, total Analysis Run 12/4/2019 4:37 PM
 Amos BAP Client: Geosyntec Data: Amos BAP

FIGURE D: MANN-WHITNEY ANALYSIS

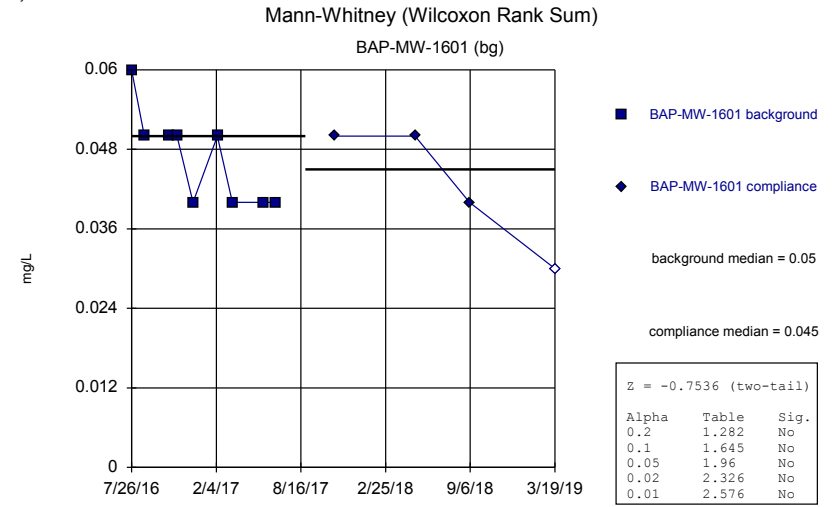
Welch's t-test/Mann-Whitney - All Results (No Significant Results)

Amos BAP Client: Geosyntec Data: Amos BAP Printed 12/9/2019, 8:51 AM

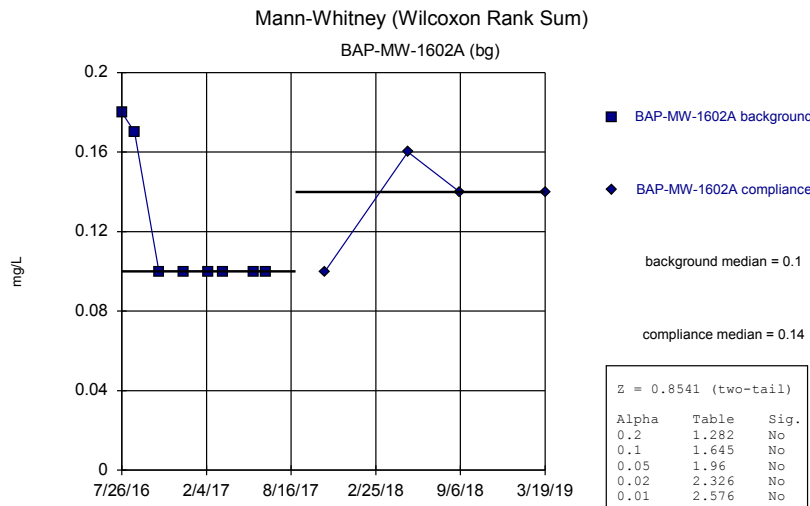
<u>Constituent</u>	<u>Well</u>	<u>Calc.</u>	<u>0.01</u>	<u>Method</u>
Fluoride, total (mg/L)	BAP-MW-1	0.9175	No	Mann-W
Fluoride, total (mg/L)	BAP-MW-1601 (bg)	-0.7536	No	Mann-W
Fluoride, total (mg/L)	BAP-MW-1602A (bg)	0.8541	No	Mann-W
Fluoride, total (mg/L)	BAP-MW-1603A (bg)	0.4714	No	Mann-W
Fluoride, total (mg/L)	BAP-MW-1604	2.367	No	Mann-W
Fluoride, total (mg/L)	BAP-MW-1605	-1.21	No	Mann-W
Fluoride, total (mg/L)	BAP-MW-1606	0.3933	No	Mann-W
Fluoride, total (mg/L)	BAP-MW-4	1.689	No	Mann-W
Fluoride, total (mg/L)	BAP-MW-5	1.628	No	Mann-W
Fluoride, total (mg/L)	BAP-MW-6 (bg)	1.553	No	Mann-W
pH, field (SU)	BAP-MW-1	0.06674	No	Mann-W
pH, field (SU)	BAP-MW-1601 (bg)	0.3863	No	Mann-W
pH, field (SU)	BAP-MW-1602A (bg)	-0.07726	No	Mann-W
pH, field (SU)	BAP-MW-1603A (bg)	-0.2315	No	Mann-W
pH, field (SU)	BAP-MW-1604	1.312	No	Mann-W
pH, field (SU)	BAP-MW-1605	-1.735	No	Mann-W
pH, field (SU)	BAP-MW-1606	-1.479	No	Mann-W
pH, field (SU)	BAP-MW-4	0.309	No	Mann-W
pH, field (SU)	BAP-MW-5	-0.3874	No	Mann-W
pH, field (SU)	BAP-MW-6 (bg)	-0.2318	No	Mann-W



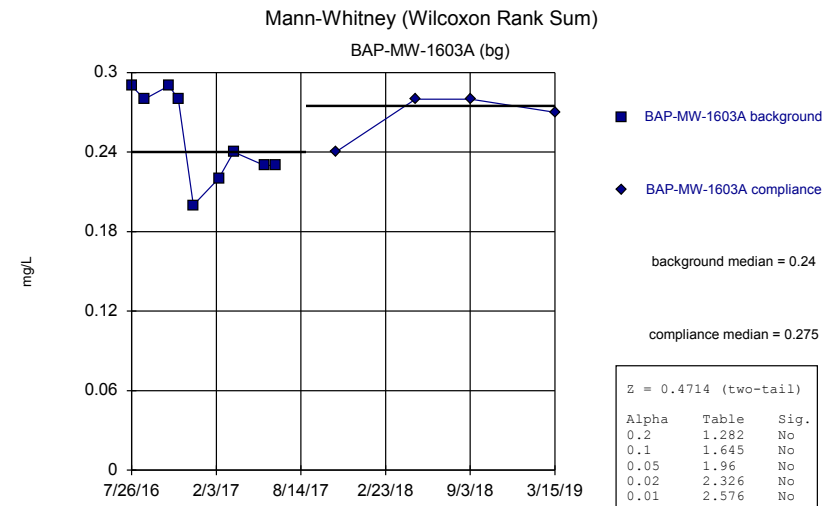
Constituent: Fluoride, total Analysis Run 12/9/2019 8:50 AM View: Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP



Constituent: Fluoride, total Analysis Run 12/9/2019 8:50 AM View: Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP



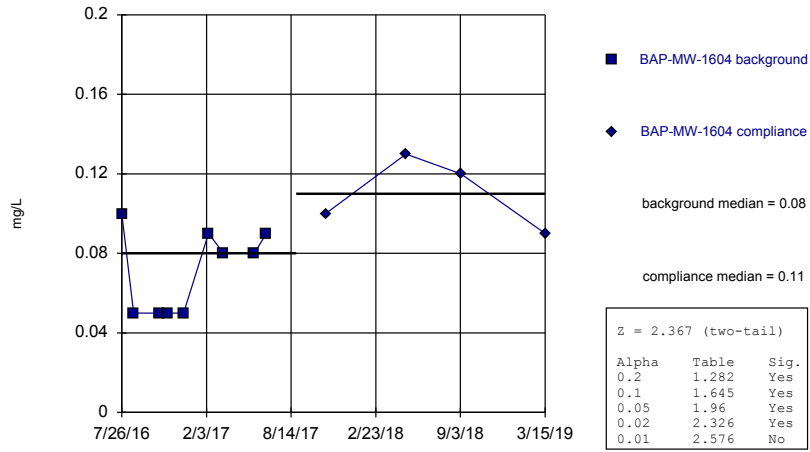
Constituent: Fluoride, total Analysis Run 12/9/2019 8:50 AM View: Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP



Constituent: Fluoride, total Analysis Run 12/9/2019 8:50 AM View: Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

Mann-Whitney (Wilcoxon Rank Sum)

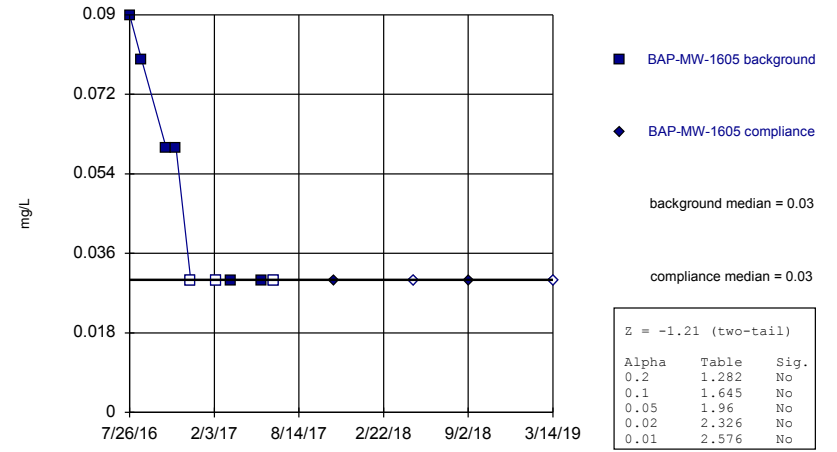
BAP-MW-1604



Constituent: Fluoride, total Analysis Run 12/9/2019 8:50 AM View: Intrawell
 Amos BAP Client: Geosyntec Data: Amos BAP

Mann-Whitney (Wilcoxon Rank Sum)

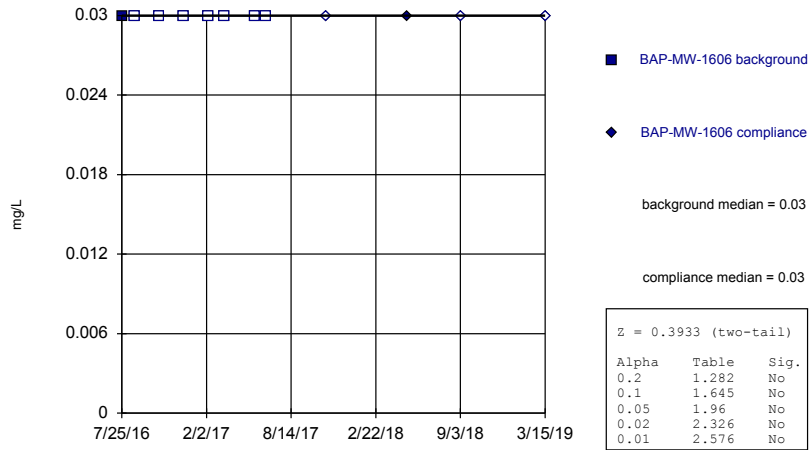
BAP-MW-1605



Constituent: Fluoride, total Analysis Run 12/9/2019 8:50 AM View: Intrawell
 Amos BAP Client: Geosyntec Data: Amos BAP

Mann-Whitney (Wilcoxon Rank Sum)

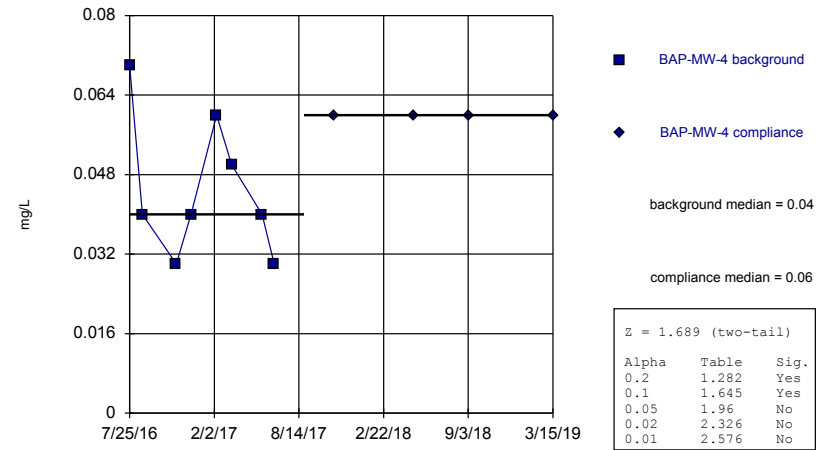
BAP-MW-1606



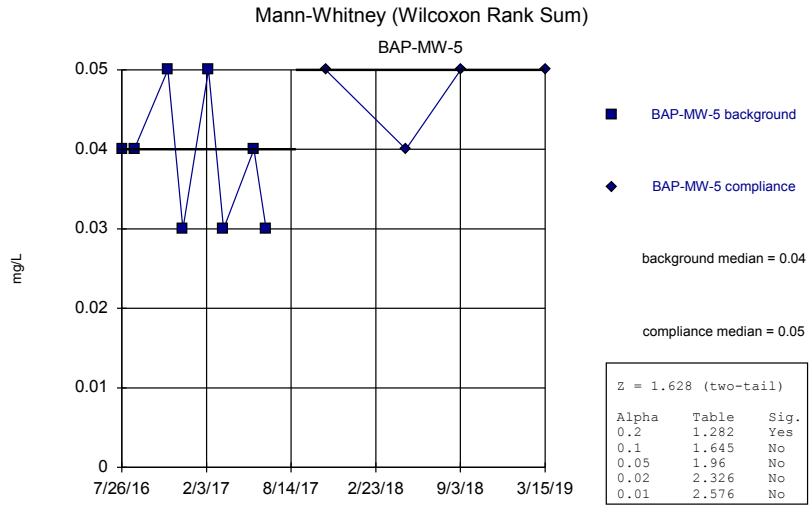
Constituent: Fluoride, total Analysis Run 12/9/2019 8:50 AM View: Intrawell
 Amos BAP Client: Geosyntec Data: Amos BAP

Mann-Whitney (Wilcoxon Rank Sum)

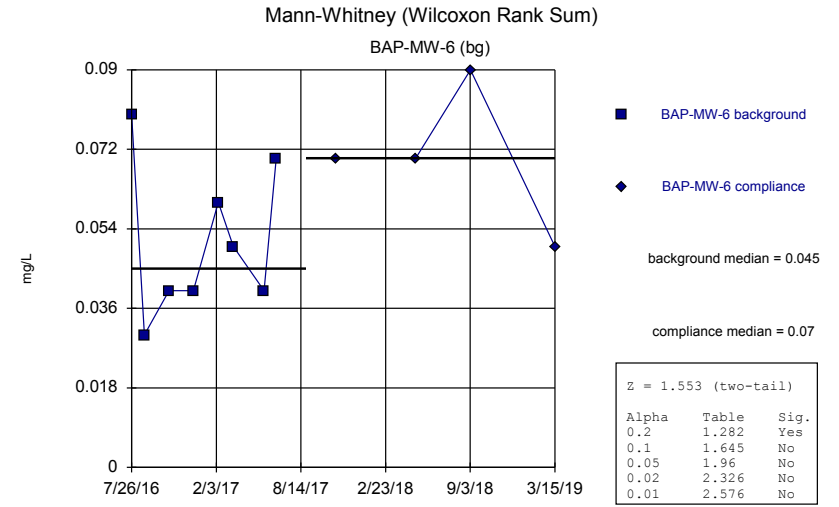
BAP-MW-4



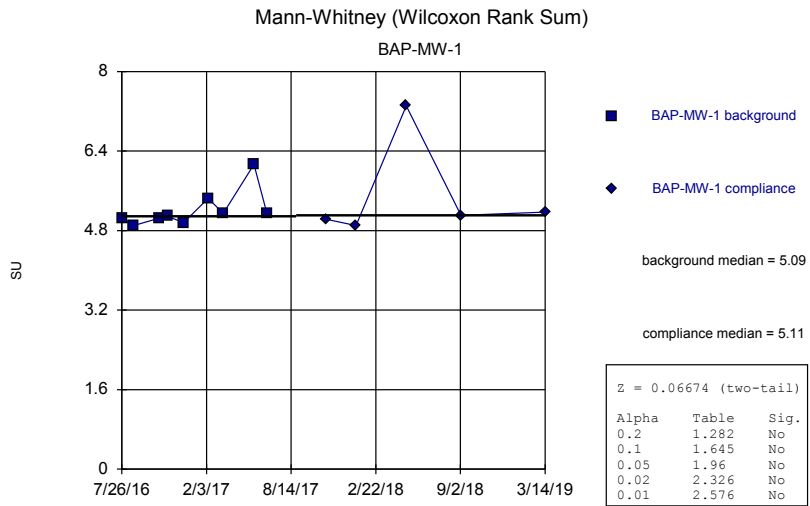
Constituent: Fluoride, total Analysis Run 12/9/2019 8:50 AM View: Intrawell
 Amos BAP Client: Geosyntec Data: Amos BAP



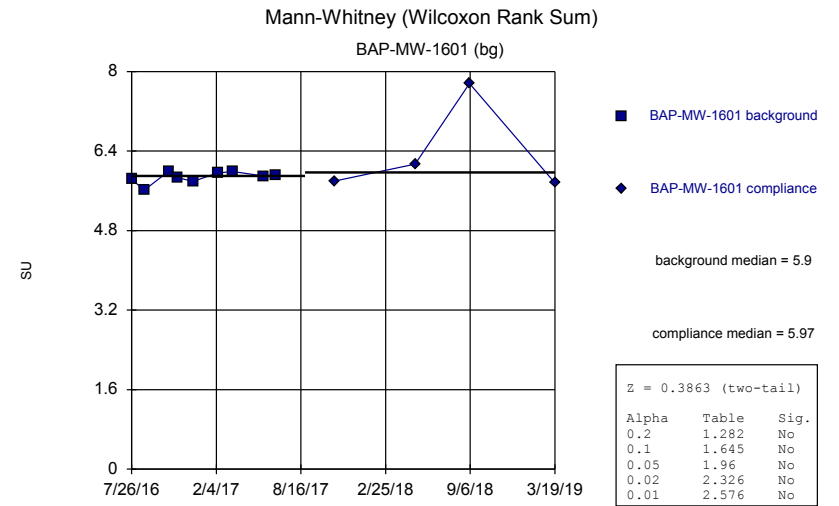
Constituent: Fluoride, total Analysis Run 12/9/2019 8:50 AM View: Intrawell
 Amos BAP Client: Geosyntec Data: Amos BAP



Constituent: Fluoride, total Analysis Run 12/9/2019 8:50 AM View: Intrawell
 Amos BAP Client: Geosyntec Data: Amos BAP

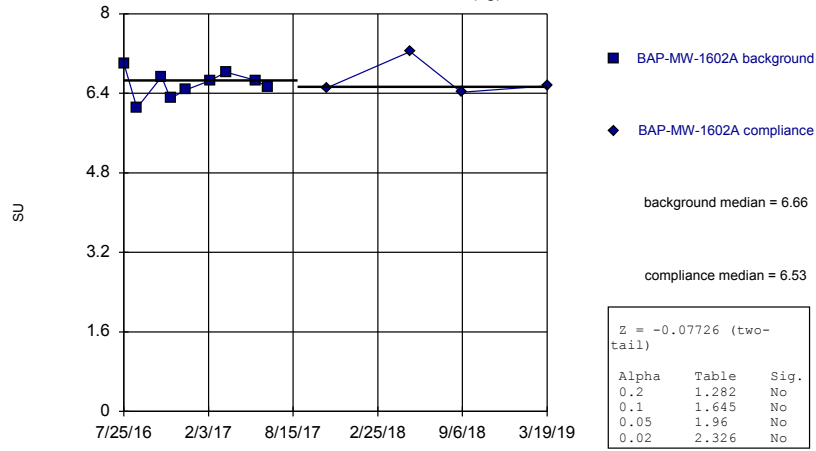


Constituent: pH, field Analysis Run 12/9/2019 8:50 AM View: Intrawell
 Amos BAP Client: Geosyntec Data: Amos BAP



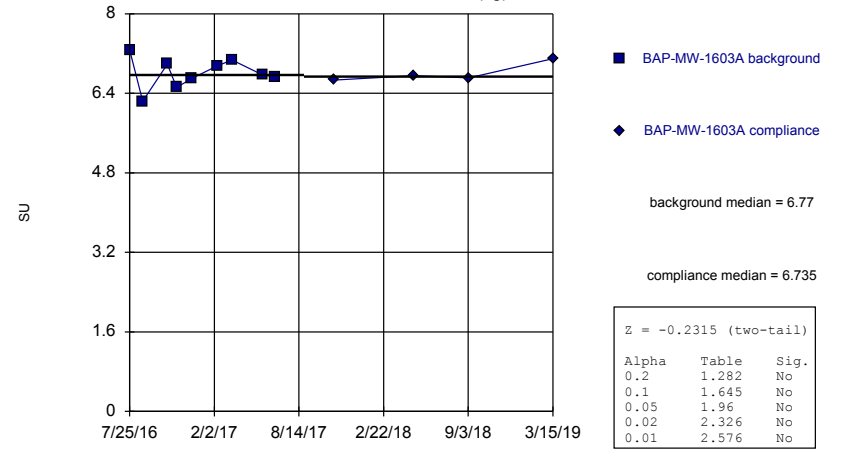
Constituent: pH, field Analysis Run 12/9/2019 8:50 AM View: Intrawell
 Amos BAP Client: Geosyntec Data: Amos BAP

Mann-Whitney (Wilcoxon Rank Sum)
BAP-MW-1602A (bg)



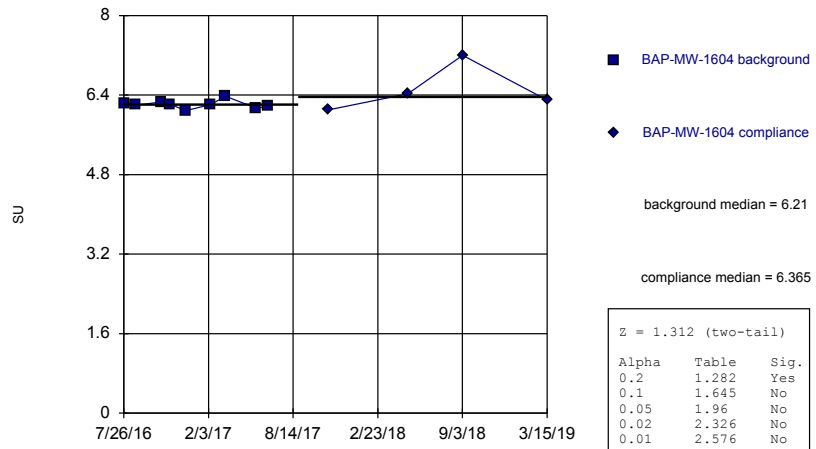
Constituent: pH, field Analysis Run 12/9/2019 8:50 AM View: Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

Mann-Whitney (Wilcoxon Rank Sum)
BAP-MW-1603A (bg)



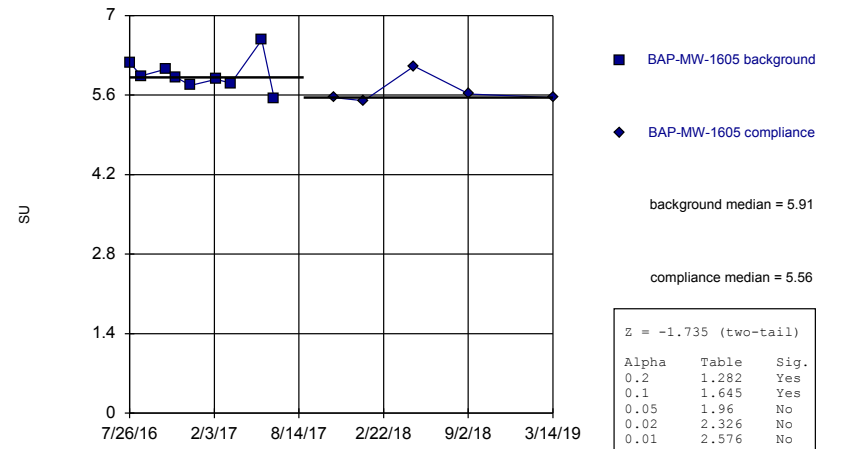
Constituent: pH, field Analysis Run 12/9/2019 8:50 AM View: Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

Mann-Whitney (Wilcoxon Rank Sum)
BAP-MW-1604



Constituent: pH, field Analysis Run 12/9/2019 8:50 AM View: Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

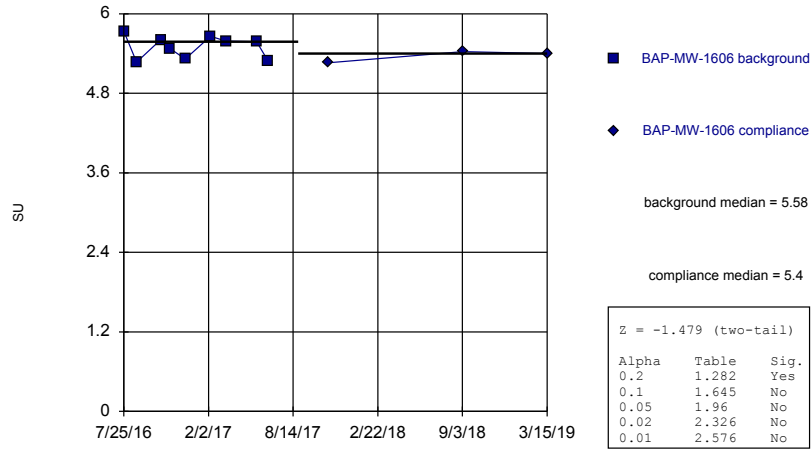
Mann-Whitney (Wilcoxon Rank Sum)
BAP-MW-1605



Constituent: pH, field Analysis Run 12/9/2019 8:50 AM View: Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

Mann-Whitney (Wilcoxon Rank Sum)

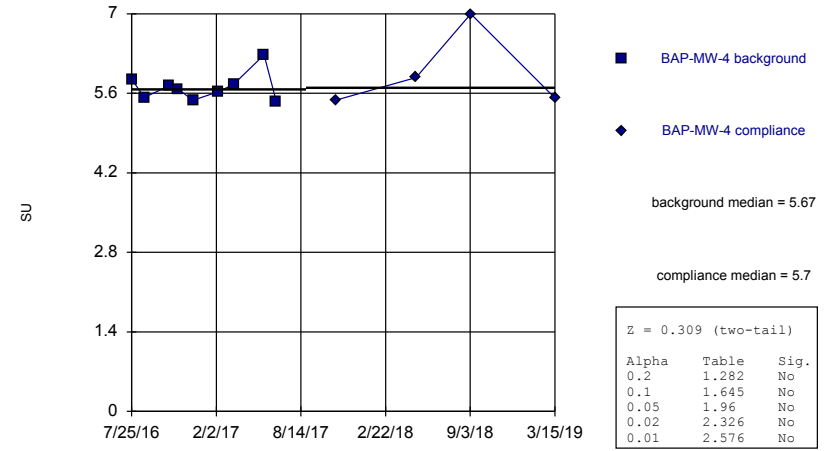
BAP-MW-1606



Constituent: pH, field Analysis Run 12/9/2019 8:50 AM View: Intrawell
 Amos BAP Client: Geosyntec Data: Amos BAP

Mann-Whitney (Wilcoxon Rank Sum)

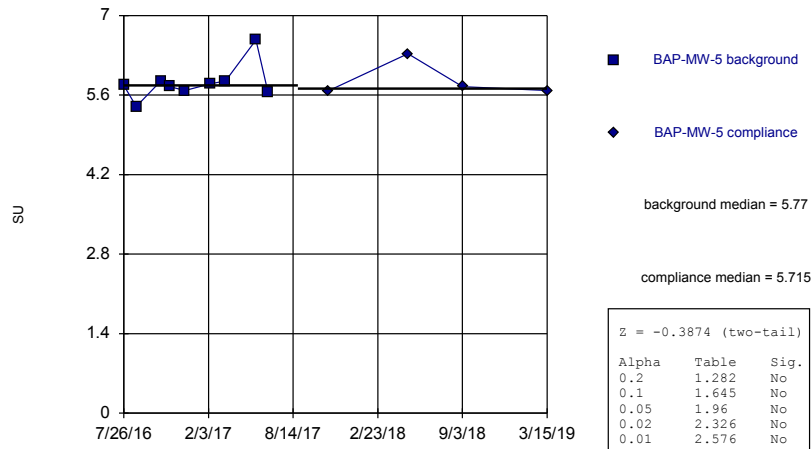
BAP-MW-4



Constituent: pH, field Analysis Run 12/9/2019 8:50 AM View: Intrawell
 Amos BAP Client: Geosyntec Data: Amos BAP

Mann-Whitney (Wilcoxon Rank Sum)

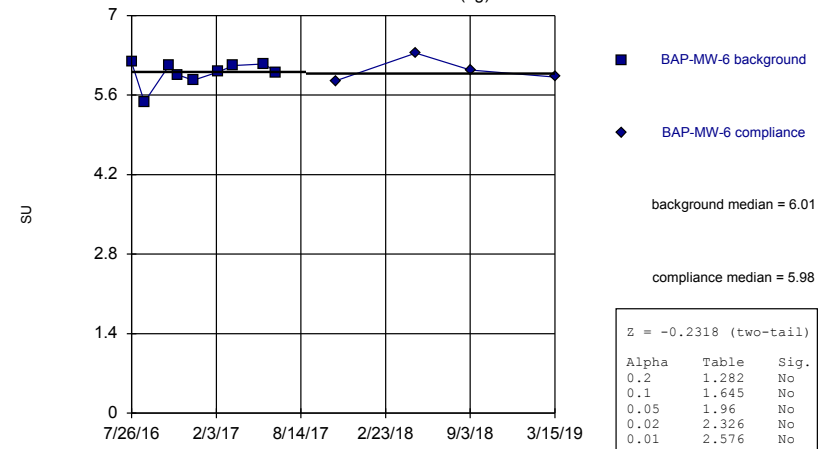
BAP-MW-5



Constituent: pH, field Analysis Run 12/9/2019 8:50 AM View: Intrawell
 Amos BAP Client: Geosyntec Data: Amos BAP

Mann-Whitney (Wilcoxon Rank Sum)

BAP-MW-6 (bg)



Constituent: pH, field Analysis Run 12/9/2019 8:50 AM View: Intrawell
 Amos BAP Client: Geosyntec Data: Amos BAP

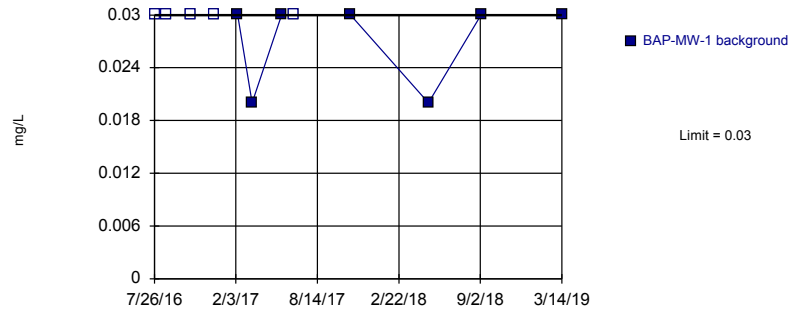
FIGURE E: INTRAWELL PREDICTION LIMITS

Intrawell Prediction Limit Summary Table - All Results

Amos BAP Client: Geosyntec Data: Amos BAP Printed 12/9/2019, 8:52 AM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Fluoride, total (mg/L)	BAP-MW-1	0.03	n/a	n/a	1 future	n/a	12	n/a	n/a	41.67	n/a	n/a	0.01077	NP Intra (normality) 1 of 2
Fluoride, total (mg/L)	BAP-MW-1601	0.06355	n/a	n/a	1 future	n/a	13	0.04538	0.007763	7.692	None	No	0.001254	Param Intra 1 of 2
Fluoride, total (mg/L)	BAP-MW-1602A	0.18	n/a	n/a	1 future	n/a	12	n/a	n/a	0	n/a	n/a	0.01077	NP Intra (normality) 1 of 2
Fluoride, total (mg/L)	BAP-MW-1603A	0.3274	n/a	n/a	1 future	n/a	13	0.2562	0.03042	0	None	No	0.001254	Param Intra 1 of 2
Fluoride, total (mg/L)	BAP-MW-1604	0.146	n/a	n/a	1 future	n/a	13	0.08308	0.02689	0	None	No	0.001254	Param Intra 1 of 2
Fluoride, total (mg/L)	BAP-MW-1605	0.09	n/a	n/a	1 future	n/a	13	n/a	n/a	38.46	n/a	n/a	0.009692	NP Intra (normality) 1 of 2
Fluoride, total (mg/L)	BAP-MW-1606	0.03	n/a	n/a	1 future	n/a	12	n/a	n/a	83.33	n/a	n/a	0.01077	NP Intra (NDs) 1 of 2
Fluoride, total (mg/L)	BAP-MW-4	0.08216	n/a	n/a	1 future	n/a	12	0.05	0.01348	0	None	No	0.001254	Param Intra 1 of 2
Fluoride, total (mg/L)	BAP-MW-5	0.05	n/a	n/a	1 future	n/a	12	n/a	n/a	0	n/a	n/a	0.01077	NP Intra (normality) 1 of 2
Fluoride, total (mg/L)	BAP-MW-6	0.102	n/a	n/a	1 future	n/a	12	0.0575	0.01865	0	None	No	0.001254	Param Intra 1 of 2
pH, field (SU)	BAP-MW-1	7.31	4.9	n/a	1 future	n/a	14	n/a	n/a	0	n/a	n/a	0.01722	NP Intra (normality) 1 of 2
pH, field (SU)	BAP-MW-1601	7.76	5.62	n/a	1 future	n/a	13	n/a	n/a	0	n/a	n/a	0.01938	NP Intra (normality) 1 of 2
pH, field (SU)	BAP-MW-1602A	7.308	5.925	n/a	1 future	n/a	13	6.616	0.2955	0	None	No	0.0006268	Param Intra 1 of 2
pH, field (SU)	BAP-MW-1603A	7.443	6.172	n/a	1 future	n/a	13	6.808	0.2715	0	None	No	0.0006268	Param Intra 1 of 2
pH, field (SU)	BAP-MW-1604	7.2	6.09	n/a	1 future	n/a	13	n/a	n/a	0	n/a	n/a	0.01938	NP Intra (normality) 1 of 2
pH, field (SU)	BAP-MW-1605	6.552	5.162	n/a	1 future	n/a	14	5.857	0.3028	0	None	No	0.0006268	Param Intra 1 of 2
pH, field (SU)	BAP-MW-1606	5.865	5.072	n/a	1 future	n/a	12	5.468	0.1663	0	None	No	0.0006268	Param Intra 1 of 2
pH, field (SU)	BAP-MW-4	7	5.46	n/a	1 future	n/a	13	n/a	n/a	0	n/a	n/a	0.01938	NP Intra (normality) 1 of 2
pH, field (SU)	BAP-MW-5	6.545	5.153	n/a	1 future	n/a	13	1.799	0.03062	0	None	x^(1/3)	0.0006268	Param Intra 1 of 2
pH, field (SU)	BAP-MW-6	6.49	5.514	n/a	1 future	n/a	13	6.002	0.2085	0	None	No	0.0006268	Param Intra 1 of 2

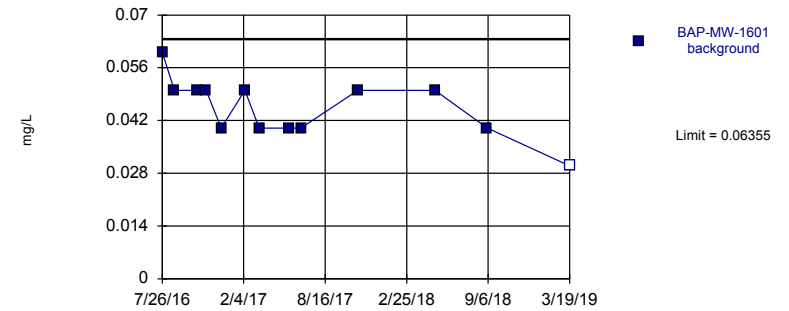
Prediction Limit
 Intrawell Non-parametric, BAP-MW-1



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 12 background values. 41.67% NDs. Well-constituent pair annual alpha = 0.02143. Individual comparison alpha = 0.01077 (1 of 2). Assumes 1 future value.

Constituent: Fluoride, total Analysis Run 12/9/2019 8:51 AM View: Intrawell
 Amos BAP Client: Geosyntec Data: Amos BAP

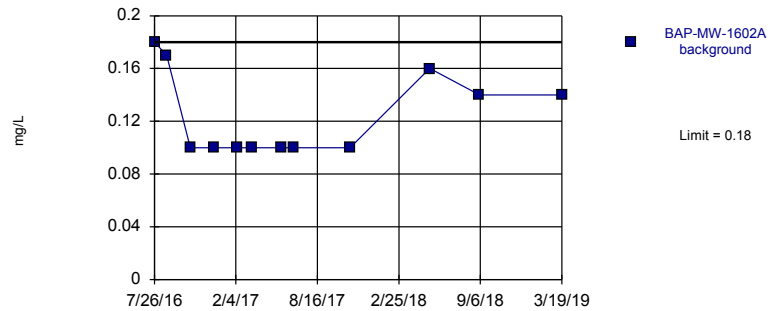
Prediction Limit
 Intrawell Parametric, BAP-MW-1601 (bg)



Background Data Summary: Mean=0.04538, Std. Dev.=0.007763, n=13, 7.692% NDs. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8754, critical = 0.814. Kappa = 2.34 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254. Assumes 1 future value.

Constituent: Fluoride, total Analysis Run 12/9/2019 8:51 AM View: Intrawell
 Amos BAP Client: Geosyntec Data: Amos BAP

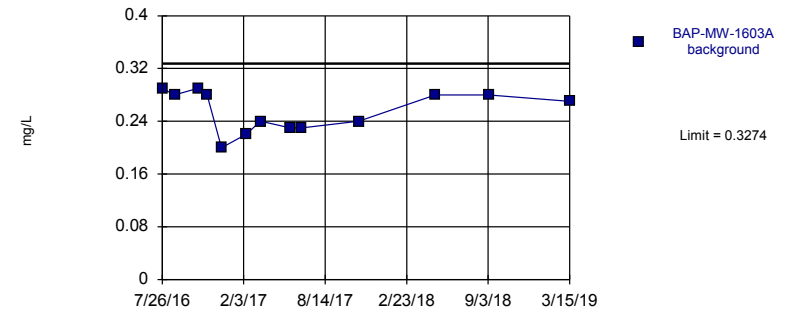
Prediction Limit
 Intrawell Non-parametric, BAP-MW-1602A (bg)



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 12 background values. Well-constituent pair annual alpha = 0.02143. Individual comparison alpha = 0.01077 (1 of 2). Assumes 1 future value.

Constituent: Fluoride, total Analysis Run 12/9/2019 8:51 AM View: Intrawell
 Amos BAP Client: Geosyntec Data: Amos BAP

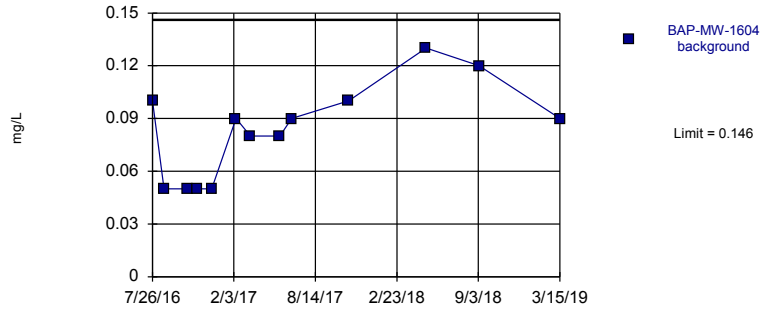
Prediction Limit
 Intrawell Parametric, BAP-MW-1603A (bg)



Background Data Summary: Mean=0.2562, Std. Dev.=0.03042, n=13. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8762, critical = 0.814. Kappa = 2.34 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254. Assumes 1 future value.

Constituent: Fluoride, total Analysis Run 12/9/2019 8:51 AM View: Intrawell
 Amos BAP Client: Geosyntec Data: Amos BAP

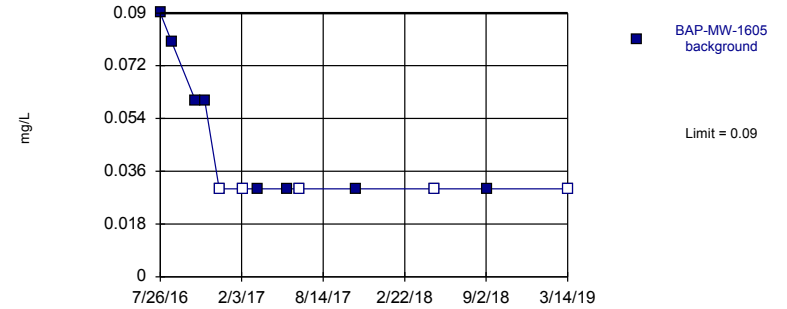
Prediction Limit
Intrawell Parametric, BAP-MW-1604



Background Data Summary: Mean=0.08308, Std. Dev.=0.02689, n=13. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9002, critical = 0.814. Kappa = 2.34 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254. Assumes 1 future value.

Constituent: Fluoride, total Analysis Run 12/9/2019 8:51 AM View: Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

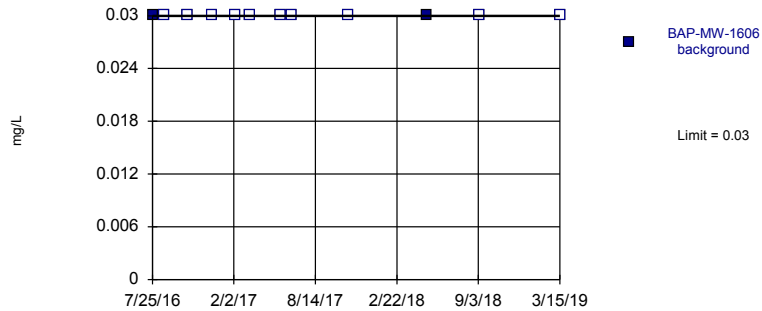
Prediction Limit
Intrawell Non-parametric, BAP-MW-1605



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 13 background values. 38.46% NDs. Well-constituent pair annual alpha = 0.01929. Individual comparison alpha = 0.009692 (1 of 2). Assumes 1 future value.

Constituent: Fluoride, total Analysis Run 12/9/2019 8:51 AM View: Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

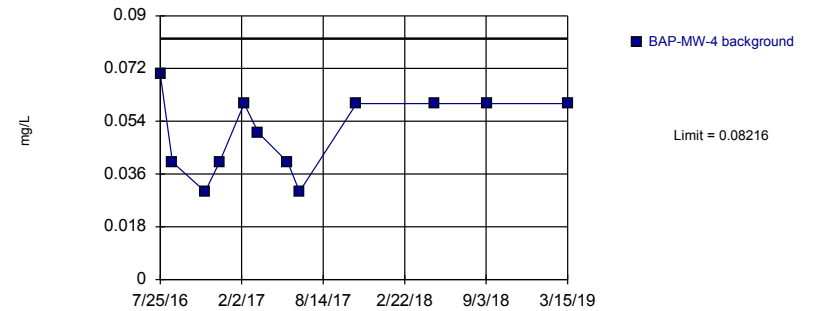
Prediction Limit
Intrawell Non-parametric, BAP-MW-1606



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 12 background values. 83.33% NDs. Well-constituent pair annual alpha = 0.02143. Individual comparison alpha = 0.01077 (1 of 2). Assumes 1 future value.

Constituent: Fluoride, total Analysis Run 12/9/2019 8:51 AM View: Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

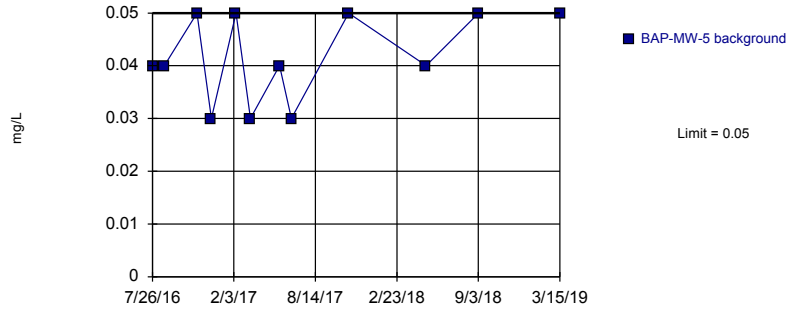
Prediction Limit
Intrawell Parametric, BAP-MW-4



Background Data Summary: Mean=0.05, Std. Dev.=0.01348, n=12. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8773, critical = 0.805. Kappa = 2.385 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254. Assumes 1 future value.

Constituent: Fluoride, total Analysis Run 12/9/2019 8:51 AM View: Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

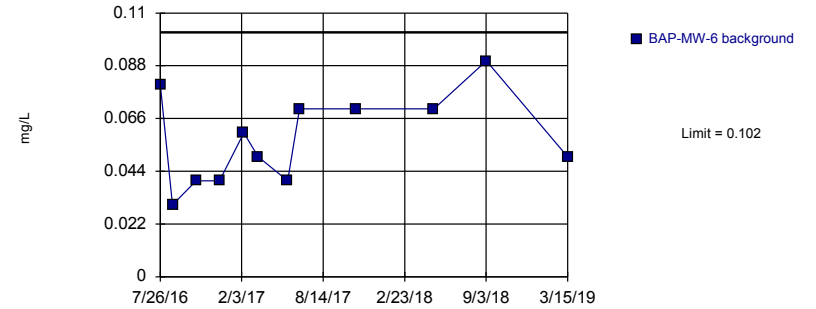
Prediction Limit
Intrawell Non-parametric, BAP-MW-5



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 12 background values. Well-constituent pair annual alpha = 0.02143. Individual comparison alpha = 0.01077 (1 of 2). Assumes 1 future value.

Constituent: Fluoride, total Analysis Run 12/9/2019 8:51 AM View: Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

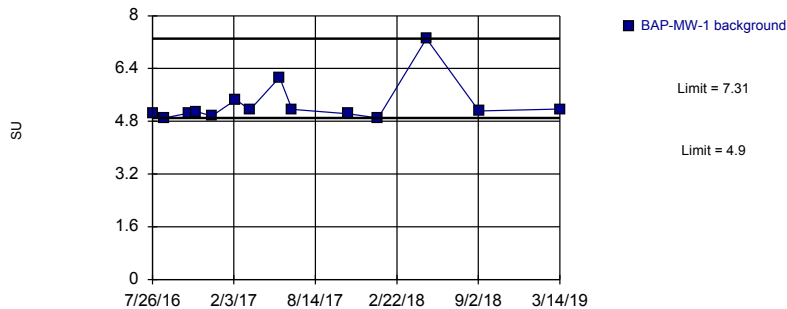
Prediction Limit
Intrawell Parametric, BAP-MW-6 (bg)



Background Data Summary: Mean=0.0575, Std. Dev.=0.01865, n=12. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9442, critical = 0.805. Kappa = 2.385 (c=7, w=6, 1 of 2, event alpha = 0.05132). Report alpha = 0.001254. Assumes 1 future value.

Constituent: Fluoride, total Analysis Run 12/9/2019 8:51 AM View: Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

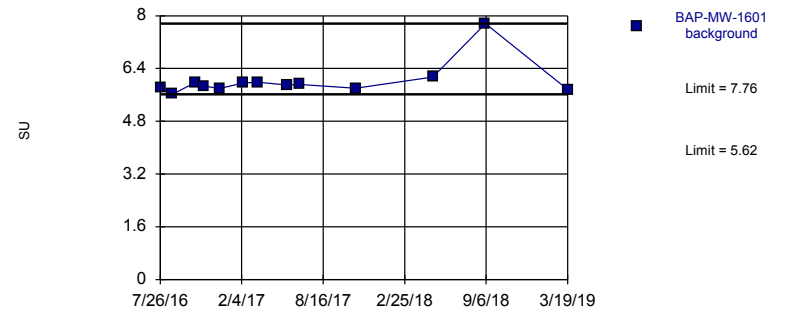
Prediction Limit
Intrawell Non-parametric, BAP-MW-1



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. Limits are highest and lowest of 14 background values. Well-constituent pair annual alpha = 0.0343. Individual comparison alpha = 0.01722 (1 of 2). Assumes 1 future value.

Constituent: pH, field Analysis Run 12/9/2019 8:51 AM View: Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

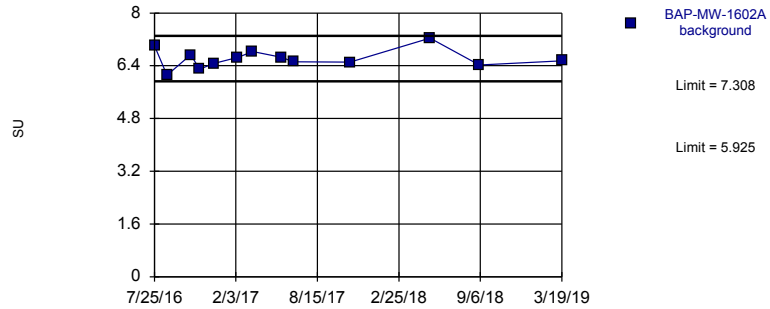
Prediction Limit
Intrawell Non-parametric, BAP-MW-1601 (bg)



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. Limits are highest and lowest of 13 background values. Well-constituent pair annual alpha = 0.03858. Individual comparison alpha = 0.01938 (1 of 2). Assumes 1 future value.

Constituent: pH, field Analysis Run 12/9/2019 8:51 AM View: Intrawell
Amos BAP Client: Geosyntec Data: Amos BAP

Prediction Limit Intrawell Parametric, BAP-MW-1602A (bg)



Prediction Limit
Intrawell Parametric, BAP-MW-1606

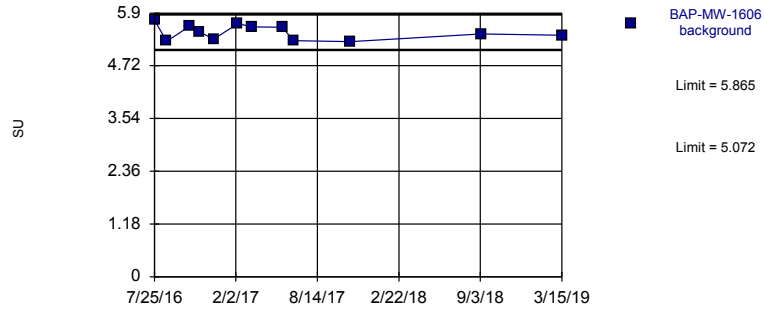


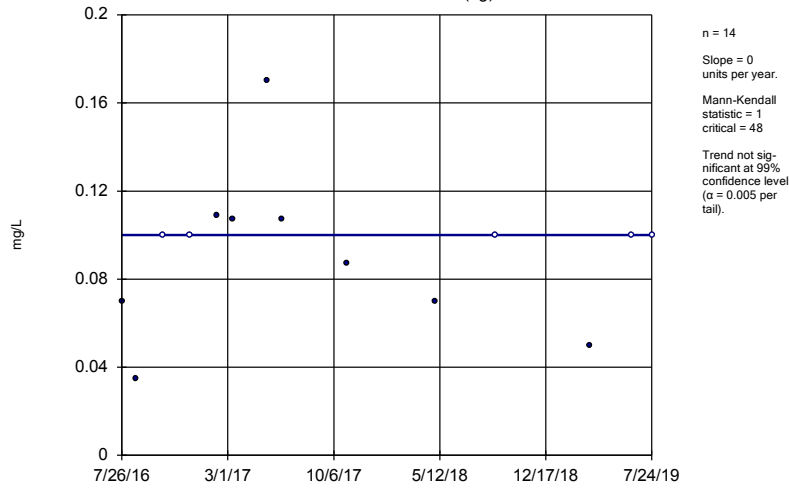
FIGURE F: TREND TESTS

Trend Tests Summary Table - Upgradient Well Trend Tests

Amos BAP Client: Geosyntec Data: Amos BAP Printed 12/9/2019, 2:26 PM

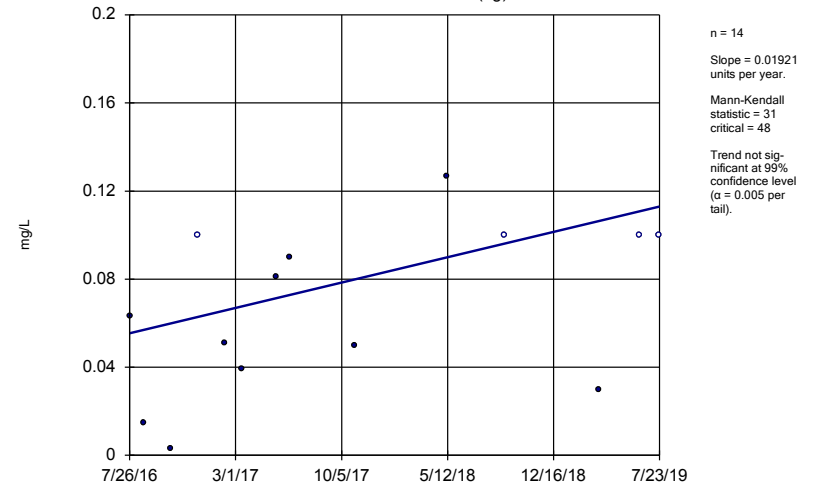
Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Boron, total (mg/L)	BAP-MW-1601 (bg)	0	1	48	No	14	35.71	n/a	n/a	0.01	NP
Boron, total (mg/L)	BAP-MW-1602A (bg)	0.01921	31	48	No	14	28.57	n/a	n/a	0.01	NP
Boron, total (mg/L)	BAP-MW-1603A (bg)	0.0167	23	43	No	13	38.46	n/a	n/a	0.01	NP
Boron, total (mg/L)	BAP-MW-6 (bg)	0.002724	5	43	No	13	23.08	n/a	n/a	0.01	NP
Calcium, total (mg/L)	BAP-MW-1601 (bg)	0	-3	-48	No	14	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	BAP-MW-1602A (bg)	0.2547	20	48	No	14	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	BAP-MW-1603A (bg)	-0.6605	-44	-48	No	14	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	BAP-MW-6 (bg)	0	1	48	No	14	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	BAP-MW-1601 (bg)	1.237	72	53	Yes	15	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	BAP-MW-1602A (bg)	0.9012	50	48	Yes	14	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	BAP-MW-1603A (bg)	0.1163	33	53	No	15	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	BAP-MW-6 (bg)	0.04777	7	48	No	14	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	BAP-MW-1601 (bg)	-0.3433	-5	-53	No	15	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	BAP-MW-1602A (bg)	-0.5076	-15	-48	No	14	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	BAP-MW-1603A (bg)	0	-1	-53	No	15	86.67	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	BAP-MW-6 (bg)	-0.5046	-26	-48	No	14	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-1601 (bg)	15.36	45	53	No	15	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-1602A (bg)	6.759	17	48	No	14	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-1603A (bg)	0	0	53	No	15	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	BAP-MW-6 (bg)	-1.58	-3	-48	No	14	0	n/a	n/a	0.01	NP

Sen's Slope Estimator
BAP-MW-1601 (bg)



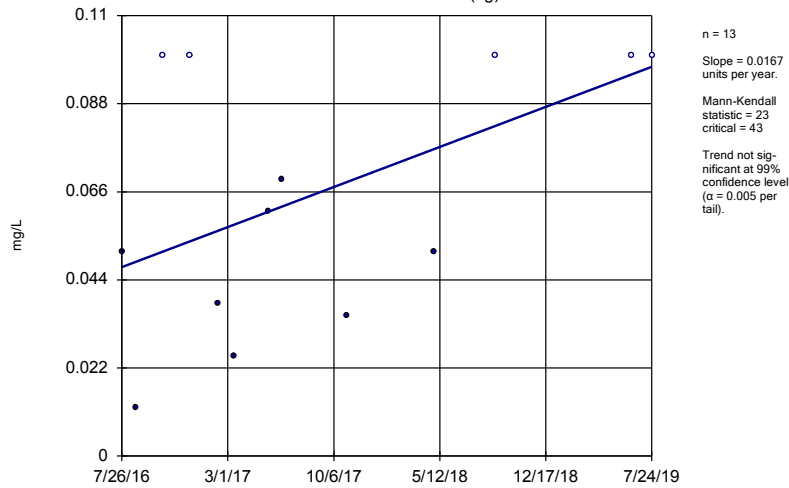
Constituent: Boron, total Analysis Run 12/9/2019 2:26 PM View: Interwell
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator
BAP-MW-1602A (bg)



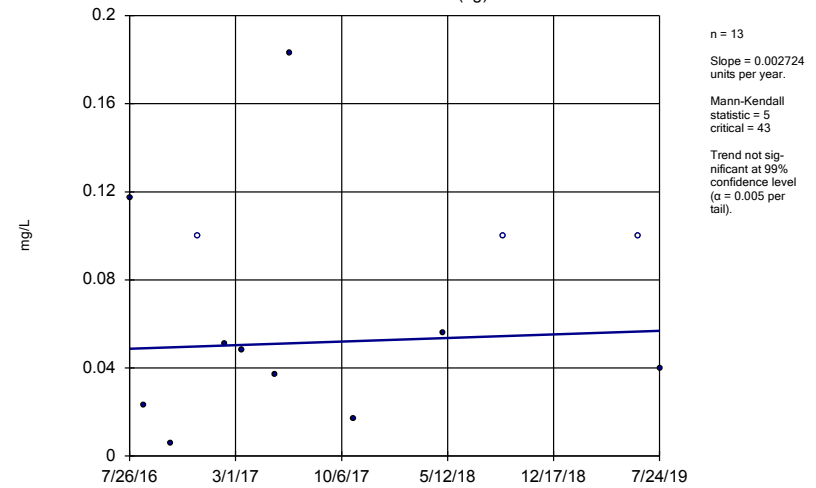
Constituent: Boron, total Analysis Run 12/9/2019 2:26 PM View: Interwell
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator
BAP-MW-1603A (bg)



Constituent: Boron, total Analysis Run 12/9/2019 2:26 PM View: Interwell
Amos BAP Client: Geosyntec Data: Amos BAP

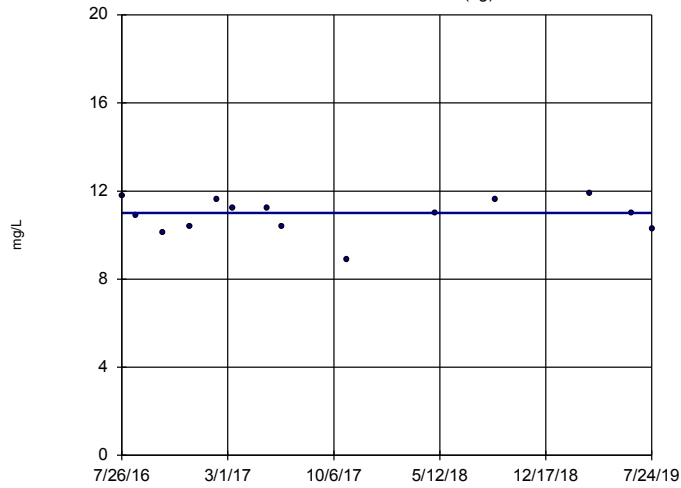
Sen's Slope Estimator
BAP-MW-6 (bg)



Constituent: Boron, total Analysis Run 12/9/2019 2:26 PM View: Interwell
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

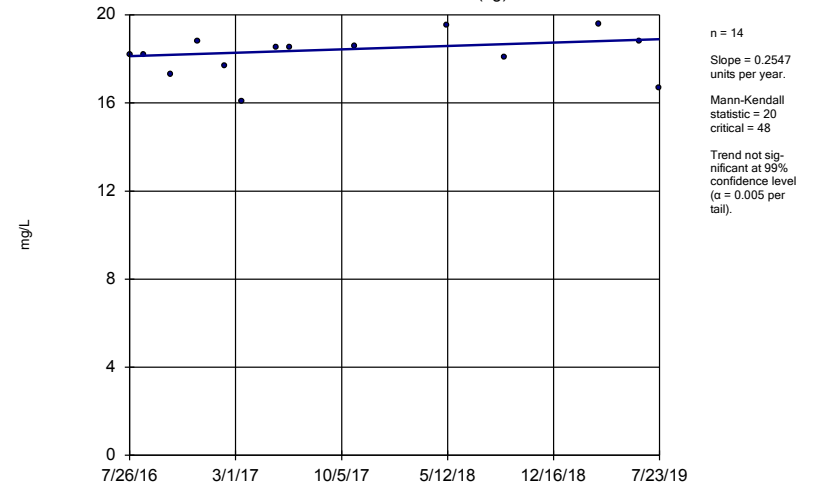
BAP-MW-1601 (bg)



Constituent: Calcium, total Analysis Run 12/9/2019 2:26 PM View: Interwell
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

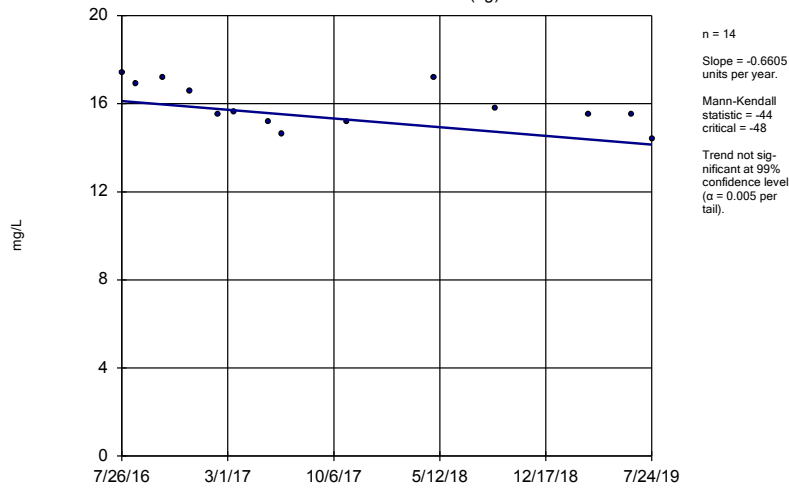
BAP-MW-1602A (bg)



Constituent: Calcium, total Analysis Run 12/9/2019 2:26 PM View: Interwell
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

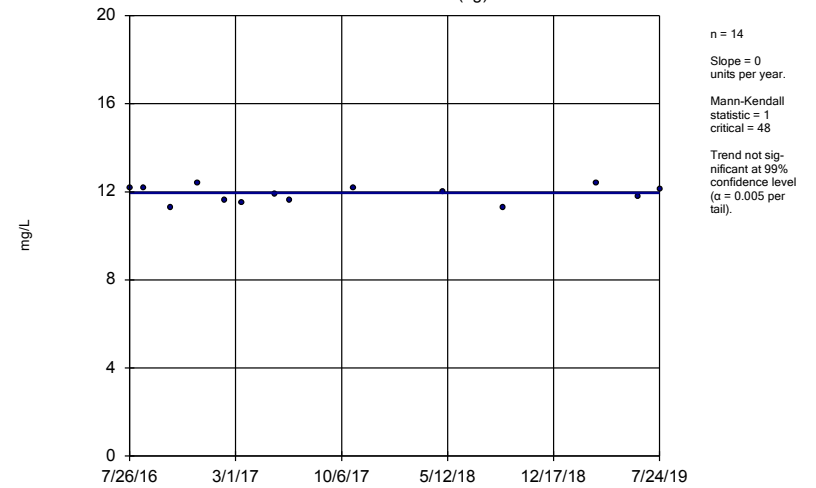
BAP-MW-1603A (bg)



Constituent: Calcium, total Analysis Run 12/9/2019 2:26 PM View: Interwell
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

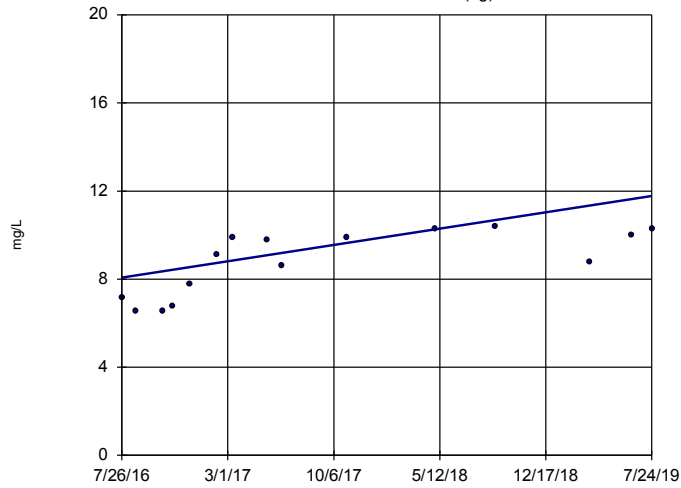
BAP-MW-6 (bg)



Constituent: Calcium, total Analysis Run 12/9/2019 2:26 PM View: Interwell
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

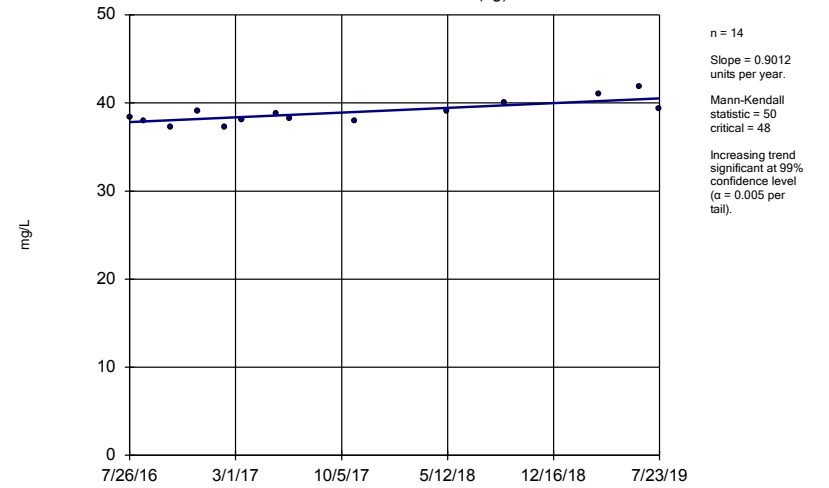
BAP-MW-1601 (bg)



Constituent: Chloride, total Analysis Run 12/9/2019 2:26 PM View: Interwell
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

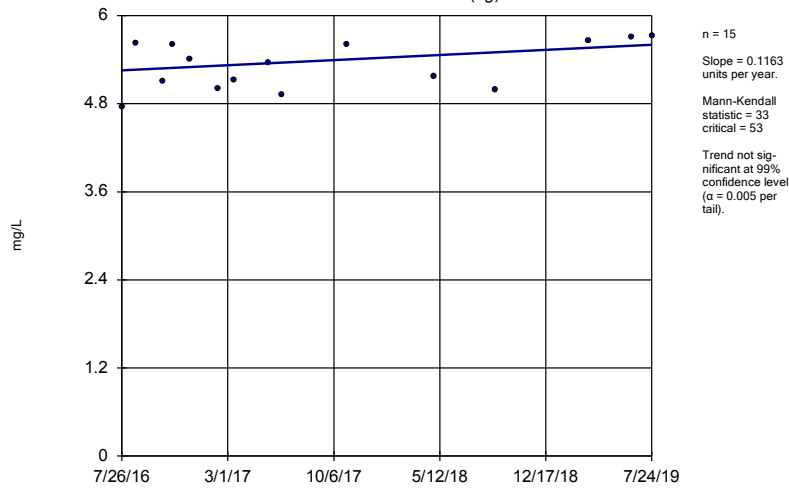
BAP-MW-1602A (bg)



Constituent: Chloride, total Analysis Run 12/9/2019 2:26 PM View: Interwell
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

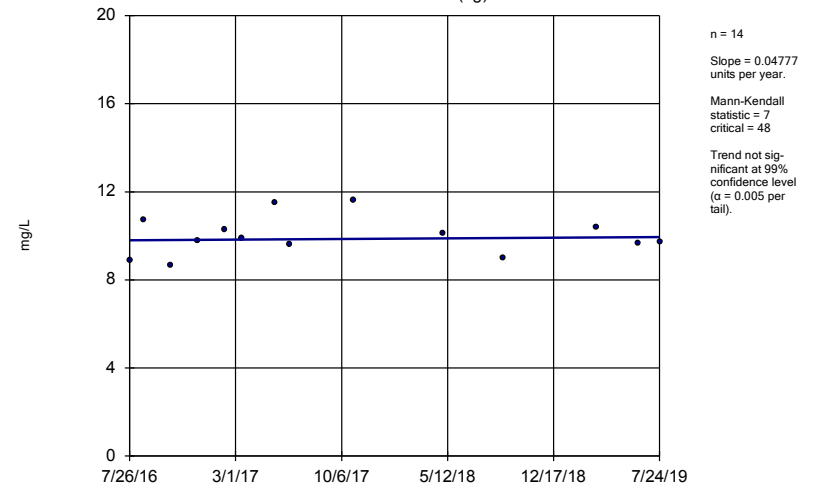
BAP-MW-1603A (bg)



Constituent: Chloride, total Analysis Run 12/9/2019 2:26 PM View: Interwell
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

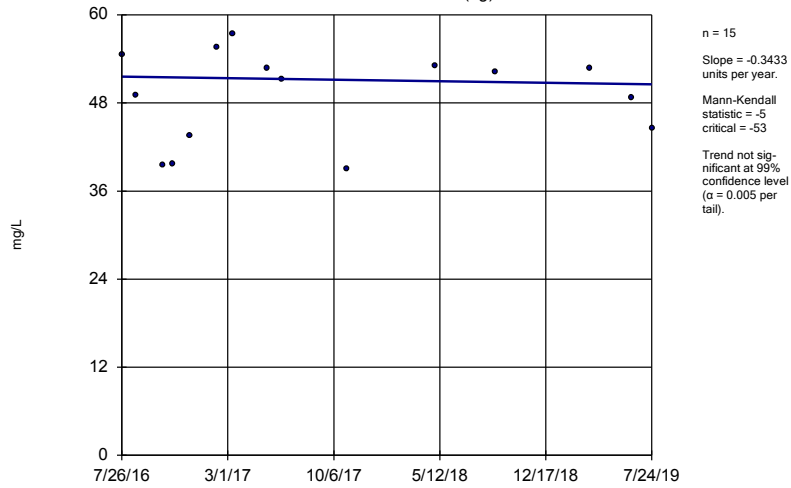
BAP-MW-6 (bg)



Constituent: Chloride, total Analysis Run 12/9/2019 2:26 PM View: Interwell
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

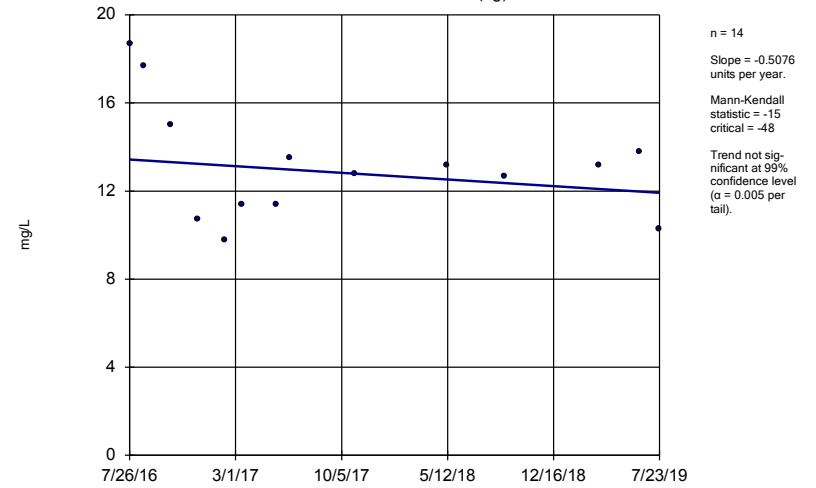
BAP-MW-1601 (bg)



Constituent: Sulfate, total Analysis Run 12/9/2019 2:26 PM View: Interwell
 Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

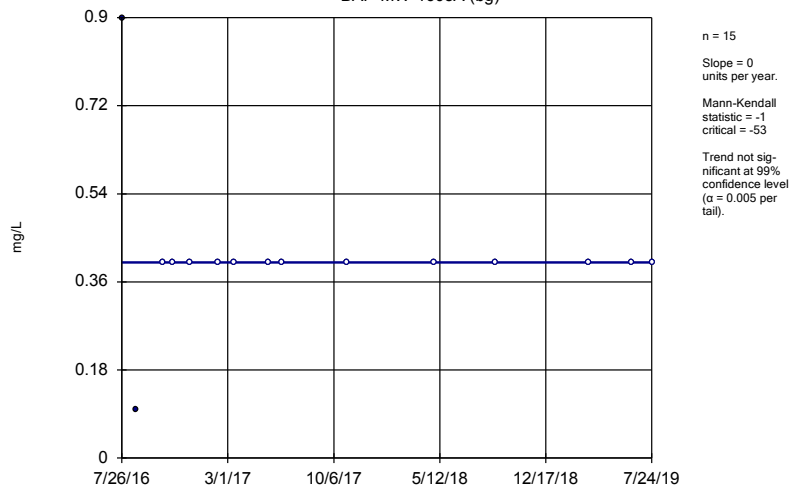
BAP-MW-1602A (bg)



Constituent: Sulfate, total Analysis Run 12/9/2019 2:26 PM View: Interwell
 Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

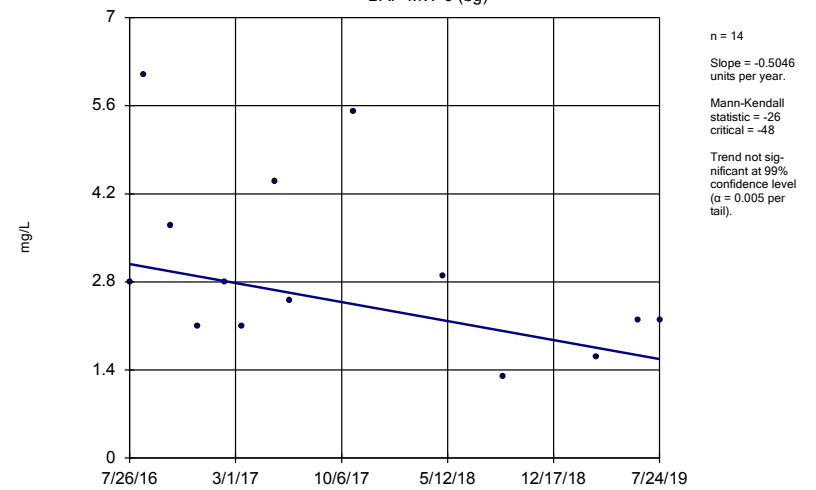
BAP-MW-1603A (bg)



Constituent: Sulfate, total Analysis Run 12/9/2019 2:26 PM View: Interwell
 Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

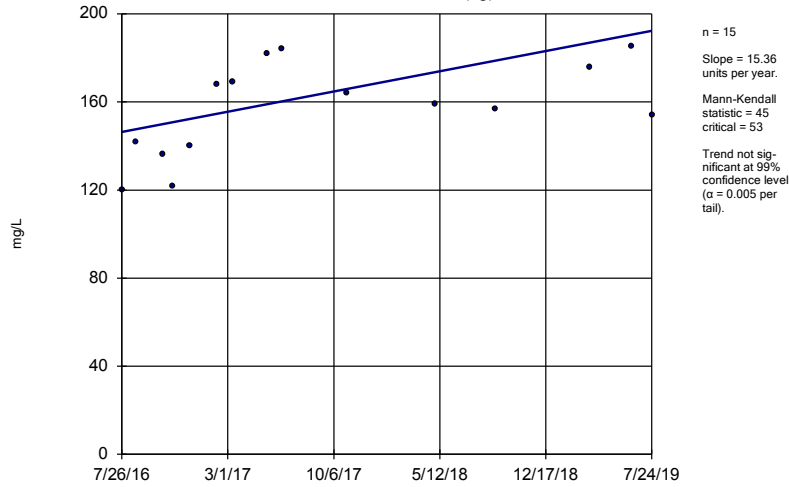
BAP-MW-6 (bg)



Constituent: Sulfate, total Analysis Run 12/9/2019 2:26 PM View: Interwell
 Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

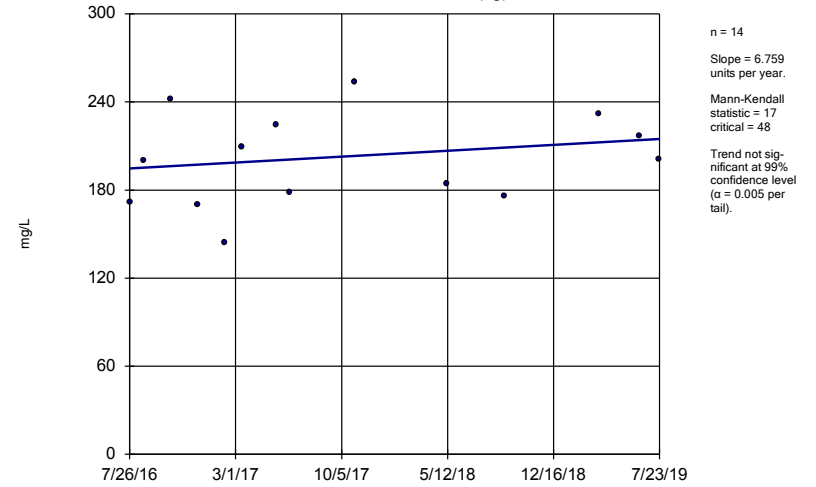
BAP-MW-1601 (bg)



Constituent: Total Dissolved Solids [TDS] Analysis Run 12/9/2019 2:26 PM View: Interwell
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

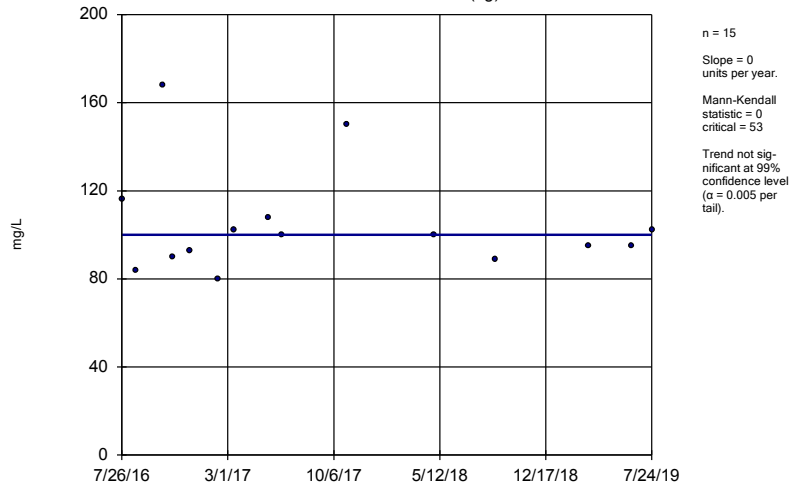
BAP-MW-1602A (bg)



Constituent: Total Dissolved Solids [TDS] Analysis Run 12/9/2019 2:26 PM View: Interwell
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

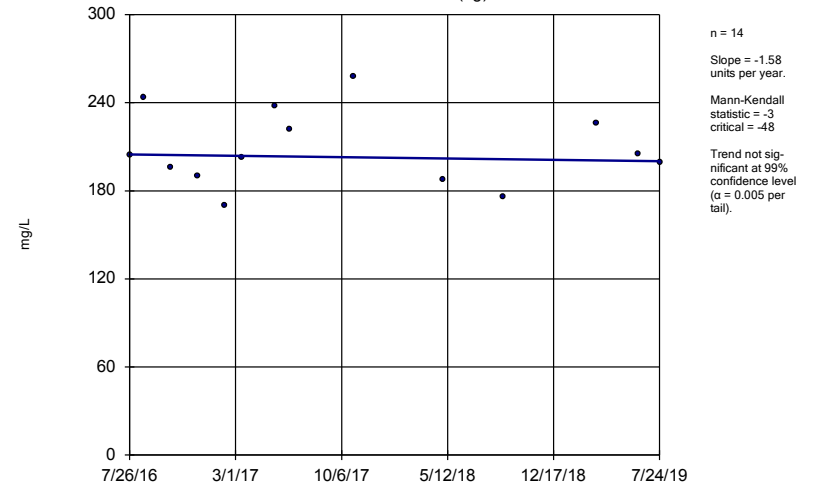
BAP-MW-1603A (bg)



Constituent: Total Dissolved Solids [TDS] Analysis Run 12/9/2019 2:26 PM View: Interwell
Amos BAP Client: Geosyntec Data: Amos BAP

Sen's Slope Estimator

BAP-MW-6 (bg)



Constituent: Total Dissolved Solids [TDS] Analysis Run 12/9/2019 2:26 PM View: Interwell
Amos BAP Client: Geosyntec Data: Amos BAP

FIGURE G: INTERWELL PREDICTION LIMITS

Interwell Prediction Limit Summary Table - All Results

Amos BAP Client: Geosyntec Data: Amos BAP Printed 12/9/2019, 2:19 PM

<u>Constituent</u>	<u>Well</u>	<u>Upper Lim.</u>	<u>Lower Lim.</u>	<u>Date</u>	<u>Observ.</u>	<u>Sig.</u>	<u>Bg</u>	<u>N Bg</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>%NDs</u>	<u>ND Adj.</u>	<u>Transform</u>	<u>Alpha</u>	<u>Method</u>
Boron, total (mg/L)	n/a	0.183	n/a	n/a	6 future	n/a	46	n/a	n/a	21.74	n/a	n/a	n/a	0.0008958	NP Inter (normality) 1 of 2
Calcium, total (mg/L)	n/a	19.6	n/a	n/a	6 future	n/a	48	n/a	n/a	0	n/a	n/a	n/a	0.000818	NP Inter (normality) 1 of 2
Chloride, total (mg/L)	n/a	41	n/a	n/a	6 future	n/a	50	n/a	n/a	0	n/a	n/a	n/a	0.0007403	NP Inter (normality) 1 of 2
Sulfate, total (mg/L)	n/a	57.4	n/a	n/a	6 future	n/a	50	n/a	n/a	22	n/a	n/a	n/a	0.0007403	NP Inter (normality) 1 of 2
Total Dissolved Solids [TDS] (mg/L)	n/a	259.6	n/a	n/a	6 future	n/a	50	165.9	49.25	0	None	No	0.001254	Param Inter 1 of 2	

FIGURE H: TOLERANCE LIMITS

Upper Tolerance Limits - App IV

Amos BAP Client: Geosyntec Data: Amos BAP Printed 11/19/2019, 10:33 AM

<u>Constituent</u>	<u>Upper Lim.</u>	<u>Bg N</u>	<u>Bg Mean</u>	<u>Std. Dev.</u>	<u>%NDs</u>	<u>ND Adj.</u>	<u>Transform</u>	<u>Alpha</u>	<u>Method</u>
Antimony, total (mg/L)	0.00016	52	n/a	n/a	23.08	n/a	n/a	0.06944	NP Inter(normality)
Arsenic, total (mg/L)	0.0903	52	n/a	n/a	0	n/a	n/a	0.06944	NP Inter(normality)
Barium, total (mg/L)	0.2992	52	0.1891	0.05365	0	None	No	0.05	Inter
Beryllium, total (mg/L)	0.00009697	52	0.006347	0.001705	9.615	None	sqrt(x)	0.05	Inter
Cadmium, total (mg/L)	0.00005	52	n/a	n/a	21.15	n/a	n/a	0.06944	NP Inter(normality)
Chromium, total (mg/L)	0.00219	51	0.02697	0.00963	0	None	sqrt(x)	0.05	Inter
Cobalt, total (mg/L)	0.01839	52	0.1494	0.05577	0	None	x^(1/3)	0.05	Inter
Combined Radium 226 + 228 (pCi/L)	7.914	54	n/a	n/a	0	n/a	n/a	0.06267	NP Inter(normality)
Fluoride, total (mg/L)	0.31	58	n/a	n/a	1.724	n/a	n/a	0.05105	NP Inter(normality)
Lead, total (mg/L)	0.00868	52	-7.404	1.294	0	None	ln(x)	0.05	Inter
Lithium, total (mg/L)	0.01115	52	-6.822	1.132	23.08	Kaplan-Meier	ln(x)	0.05	Inter
Mercury, total (mg/L)	0.000005	40	n/a	n/a	90	n/a	n/a	0.1285	NP Inter(NDs)
Molybdenum, total (mg/L)	0.002628	52	0.02922	0.01073	7.692	None	sqrt(x)	0.05	Inter
Selenium, total (mg/L)	0.0003	51	n/a	n/a	3.922	n/a	n/a	0.0731	NP Inter(normality)
Thallium, total (mg/L)	0.0005	52	n/a	n/a	28.85	n/a	n/a	0.06944	NP Inter(normality)

FIGURE I: GROUNDWATER PROTECTION STANDARDS

AMOS BAP GWPS				
Constituent Name	MCL	Rule-Based	Background	GWPS
Antimony, Total (mg/L)	0.006		0.00016	0.006
Arsenic, Total (mg/L)	0.01		0.09	0.09
Barium, Total (mg/L)	2		0.3	2
Beryllium, Total (mg/L)	0.004		0.0001	0.004
Cadmium, Total (mg/L)	0.005		0.00005	0.005
Chromium, Total (mg/L)	0.1		0.0022	0.1
Cobalt, Total (mg/L)	n/a	0.006	0.018	0.018
Combined Radium, Total (pCi/L)	5		7.9	7.9
Fluoride, Total (mg/L)	4		0.31	4
Lead, Total (mg/L)	0.015		0.0087	0.015
Lithium, Total (mg/L)	n/a	0.04	0.011	0.04
Mercury, Total (mg/L)	0.002		0.000005	0.002
Molybdenum, Total (mg/L)	n/a	0.1	0.0026	0.1
Selenium, Total (mg/L)	0.05		0.0003	0.05
Thallium, Total (mg/L)	0.002		0.0005	0.002

Grey cell indicates Background is higher than MCL.

MCL = Maximum Contaminant Level

GWPS - Groundwater Protection Standard

FIGURE J: CONFIDENCE INTERVALS

Confidence Intervals - All Results (No Significant Results)

Amos BAP Client: Geosyntec Data: Amos BAP Printed 12/4/2019, 5:01 PM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	Mean	Std. Dev.	%NDs	ND Adj.	Trans...	Alpha	Method
Antimony, total (mg/L)	BAP-MW-1	0.00005	0.00001	0.006	No	13	0.00003769	0.00005644	7.692	None	No	0.01	NP (normality)
Antimony, total (mg/L)	BAP-MW-1604	0.00005	0.00002	0.006	No	13	0.00003308	0.00001251	7.692	None	No	0.01	NP (normality)
Antimony, total (mg/L)	BAP-MW-1605	0.00007764	0.0000136	0.006	No	13	0.00002923	0.00001498	23.08	Cohen's	No	0.01	Param.
Antimony, total (mg/L)	BAP-MW-1606	0.00003517	0.00001867	0.006	No	13	0.00002692	0.00001109	7.692	None	No	0.01	Param.
Antimony, total (mg/L)	BAP-MW-4	0.00005	0.00002	0.006	No	13	0.00004231	0.00002386	23.08	None	No	0.01	NP (Cohens/xfrm)
Antimony, total (mg/L)	BAP-MW-5	0.00005508	0.0000206	0.006	No	13	0.00003923	0.00002597	7.692	None	sqrt(x)	0.01	Param.
Arsenic, total (mg/L)	BAP-MW-1	0.0001572	0.0001074	0.09	No	13	0.0001323	0.00003345	0	None	No	0.01	Param.
Arsenic, total (mg/L)	BAP-MW-1604	0.005567	0.004369	0.09	No	13	0.004995	0.0008646	0	None	ln(x)	0.01	Param.
Arsenic, total (mg/L)	BAP-MW-1605	0.004519	0.003178	0.09	No	13	0.003848	0.0009016	0	None	No	0.01	Param.
Arsenic, total (mg/L)	BAP-MW-1606	0.003229	0.002573	0.09	No	13	0.002901	0.0004412	0	None	No	0.01	Param.
Arsenic, total (mg/L)	BAP-MW-4	0.009726	0.002799	0.09	No	13	0.006262	0.004658	0	None	No	0.01	Param.
Arsenic, total (mg/L)	BAP-MW-5	0.004	0.00242	0.09	No	13	0.003332	0.001128	0	None	No	0.01	NP (normality)
Barium, total (mg/L)	BAP-MW-1	0.02912	0.02655	2	No	13	0.02784	0.001727	0	None	No	0.01	Param.
Barium, total (mg/L)	BAP-MW-1604	0.1487	0.1302	2	No	13	0.1395	0.01248	0	None	No	0.01	Param.
Barium, total (mg/L)	BAP-MW-1605	0.092	0.07303	2	No	13	0.08252	0.01276	0	None	No	0.01	Param.
Barium, total (mg/L)	BAP-MW-1606	0.06925	0.06013	2	No	13	0.06469	0.006131	0	None	No	0.01	Param.
Barium, total (mg/L)	BAP-MW-4	0.09424	0.08542	2	No	13	0.08983	0.00593	0	None	No	0.01	Param.
Barium, total (mg/L)	BAP-MW-5	0.1627	0.151	2	No	13	0.1568	0.007883	0	None	No	0.01	Param.
Beryllium, total (mg/L)	BAP-MW-1	0.0001297	0.0001127	0.004	No	13	0.0001212	0.00001143	0	None	No	0.01	Param.
Beryllium, total (mg/L)	BAP-MW-1604	0.00006197	0.00003966	0.004	No	12	0.00005125	0.00001553	0	None	x^(1/3)	0.01	Param.
Beryllium, total (mg/L)	BAP-MW-1605	0.00007382	0.00004634	0.004	No	13	0.00006008	0.00001848	0	None	No	0.01	Param.
Beryllium, total (mg/L)	BAP-MW-1606	0.0001245	0.00008625	0.004	No	13	0.0001054	0.00002573	0	None	No	0.01	Param.
Beryllium, total (mg/L)	BAP-MW-4	0.00005901	0.00004499	0.004	No	13	0.000052	0.000009434	0	None	No	0.01	Param.
Beryllium, total (mg/L)	BAP-MW-5	0.00006834	0.00003664	0.004	No	13	0.00005331	0.00002427	0	None	sqrt(x)	0.01	Param.
Cadmium, total (mg/L)	BAP-MW-1	0.002864	0.002236	0.005	No	13	0.00255	0.0004225	0	None	No	0.01	Param.
Cadmium, total (mg/L)	BAP-MW-1604	0.00005	0.000007	0.005	No	13	0.00004092	0.00001757	76.92	None	No	0.01	NP (NDs)
Cadmium, total (mg/L)	BAP-MW-1605	0.00005	0.000009	0.005	No	13	0.000038	0.000019	69.23	None	No	0.01	NP (normality)
Cadmium, total (mg/L)	BAP-MW-1606	0.0002001	0.0001336	0.005	No	13	0.0001685	0.00005047	0	None	x^(1/3)	0.01	Param.
Cadmium, total (mg/L)	BAP-MW-4	0.0001862	0.00005172	0.005	No	13	0.0001308	0.0001323	0	None	x^(1/3)	0.01	Param.
Cadmium, total (mg/L)	BAP-MW-5	0.00005	0.000006	0.005	No	13	0.00001708	0.00001882	23.08	None	No	0.01	NP (normality)
Chromium, total (mg/L)	BAP-MW-1	0.0004568	0.0001049	0.1	No	13	0.0003153	0.0003324	0	None	x^(1/3)	0.01	Param.
Chromium, total (mg/L)	BAP-MW-1604	0.001294	0.0006716	0.1	No	13	0.0009828	0.0004185	0	None	No	0.01	Param.
Chromium, total (mg/L)	BAP-MW-1605	0.0004012	0.0001851	0.1	No	13	0.0002932	0.0001453	0	None	No	0.01	Param.
Chromium, total (mg/L)	BAP-MW-1606	0.001255	0.0004662	0.1	No	13	0.0008608	0.0005306	0	None	No	0.01	Param.
Chromium, total (mg/L)	BAP-MW-4	0.0006	0.0002	0.1	No	13	0.0003634	0.0002748	0	None	No	0.01	NP (normality)
Chromium, total (mg/L)	BAP-MW-5	0.0004043	0.0001565	0.1	No	13	0.0003128	0.0002541	0	None	ln(x)	0.01	Param.
Cobalt, total (mg/L)	BAP-MW-1	0.01468	0.01107	0.018	No	13	0.01287	0.002431	0	None	No	0.01	Param.
Cobalt, total (mg/L)	BAP-MW-1604	0.0008878	0.0004373	0.018	No	13	0.0007052	0.0004492	0	None	ln(x)	0.01	Param.
Cobalt, total (mg/L)	BAP-MW-1605	0.0245	0.00877	0.018	No	13	0.01293	0.00725	0	None	No	0.01	NP (normality)
Cobalt, total (mg/L)	BAP-MW-1606	0.01626	0.01391	0.018	No	13	0.01508	0.001582	0	None	No	0.01	Param.
Cobalt, total (mg/L)	BAP-MW-4	0.02193	0.009637	0.018	No	12	0.01579	0.007836	0	None	No	0.01	Param.
Cobalt, total (mg/L)	BAP-MW-5	0.001176	0.0009904	0.018	No	13	0.001086	0.000135	0	None	ln(x)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	BAP-MW-1	1.097	0.4897	7.9	No	14	0.8191	0.4609	0	None	sqrt(x)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	BAP-MW-1604	1.603	0.6347	7.9	No	14	1.165	0.808	0	None	sqrt(x)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	BAP-MW-1605	1.498	0.6194	7.9	No	14	1.208	1.158	0	None	ln(x)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	BAP-MW-1606	1.175	0.3908	7.9	No	14	0.8276	0.6118	0	None	sqrt(x)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	BAP-MW-4	1.57	0.46	7.9	No	14	0.9033	0.5816	0	None	No	0.01	NP (normality)
Combined Radium 226 + 228 (pCi/L)	BAP-MW-5	1.236	0.6856	7.9	No	14	0.9609	0.3888	0	None	No	0.01	Param.
Fluoride, total (mg/L)	BAP-MW-1	0.03	0.02	4	No	14	0.02786	0.004258	35.71	None	No	0.01	NP (normality)
Fluoride, total (mg/L)	BAP-MW-1604	0.1017	0.06629	4	No	15	0.084	0.02613	0	None	No	0.01	Param.
Fluoride, total (mg/L)	BAP-MW-1605	0.06	0.02	4	No	15	0.04	0.02171	33.33	None	No	0.01	NP (normality)
Fluoride, total (mg/L)	BAP-MW-1606	0.03	0.02	4	No	14	0.02857	0.003631	71.43	None	No	0.01	NP (normality)
Fluoride, total (mg/L)	BAP-MW-4	0.07	0.03	4	No	14	0.05	0.01301	0	None	No	0.01	NP (normality)
Fluoride, total (mg/L)	BAP-MW-5	0.05	0.03	4	No	14	0.04214	0.008018	0	None	No	0.01	NP (normality)
Lead, total (mg/L)	BAP-MW-1	0.000252	0.000066	0.015	No	13	0.0001877	0.0002965	0	None	No	0.01	NP (normality)

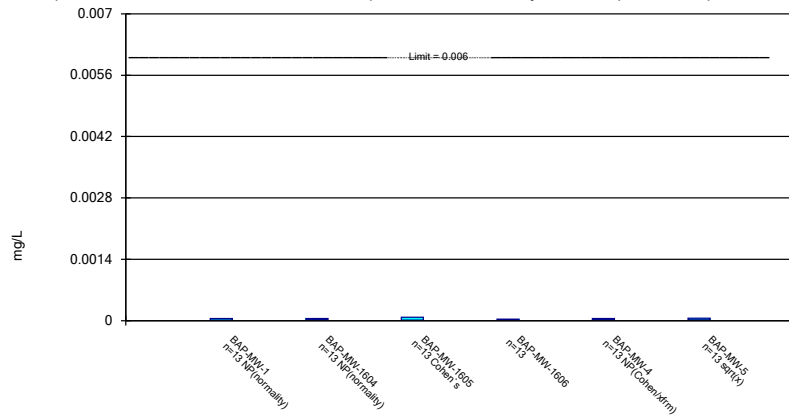
Confidence Intervals - All Results (No Significant Results)

Amos BAP Client: Geosyntec Data: Amos BAP Printed 12/4/2019, 5:01 PM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	Mean	Std. Dev.	%NDs	ND Adj.	Trans...	Alpha	Method
Lead, total (mg/L)	BAP-MW-1604	0.0009707	0.0003299	0.015	No	13	0.0006503	0.0004308	0	None	No	0.01	Param.
Lead, total (mg/L)	BAP-MW-1605	0.0001808	0.00006334	0.015	No	13	0.0001221	0.000079	0	None	No	0.01	Param.
Lead, total (mg/L)	BAP-MW-1606	0.001038	0.0003839	0.015	No	13	0.0007109	0.0004398	0	None	No	0.01	Param.
Lead, total (mg/L)	BAP-MW-4	0.0003714	0.0001902	0.015	No	13	0.0002808	0.0001218	0	None	No	0.01	Param.
Lead, total (mg/L)	BAP-MW-5	0.0003444	0.00006525	0.015	No	13	0.0002232	0.000233	0	None	sqrt(x)	0.01	Param.
Lithium, total (mg/L)	BAP-MW-1	0.014	0.002	0.04	No	13	0.008336	0.01013	15.38	None	No	0.01	NP (Cohens/xfrm)
Lithium, total (mg/L)	BAP-MW-1604	0.03	0.0008	0.04	No	13	0.01116	0.01316	30.77	None	No	0.01	NP (Cohens/xfrm)
Lithium, total (mg/L)	BAP-MW-1605	0.011	0.003	0.04	No	13	0.008888	0.009646	15.38	None	No	0.01	NP (normality)
Lithium, total (mg/L)	BAP-MW-1606	0.03	0.003	0.04	No	13	0.0108	0.01114	23.08	None	No	0.01	NP (normality)
Lithium, total (mg/L)	BAP-MW-4	0.012	0.0008	0.04	No	13	0.007686	0.01047	15.38	None	No	0.01	NP (Cohens/xfrm)
Lithium, total (mg/L)	BAP-MW-5	0.013	0.0005	0.04	No	13	0.007572	0.01047	15.38	None	No	0.01	NP (Cohens/xfrm)
Mercury, total (mg/L)	BAP-MW-1	0.000005	0.000005	0.002	No	10	0.0000047	9.5e-7	90	None	No	0.011	NP (NDs)
Mercury, total (mg/L)	BAP-MW-1604	0.000005	0.000005	0.002	No	10	0.0000047	9.5e-7	90	None	No	0.011	NP (NDs)
Mercury, total (mg/L)	BAP-MW-1605	0.000005	0.000005	0.002	No	10	0.000005	0	100	None	No	0.011	NP (NDs)
Mercury, total (mg/L)	BAP-MW-1606	0.000005	0.000005	0.002	No	10	0.0000047	9.5e-7	90	None	No	0.011	NP (NDs)
Mercury, total (mg/L)	BAP-MW-4	0.000005	0.000005	0.002	No	10	0.000005	0	100	None	No	0.011	NP (NDs)
Mercury, total (mg/L)	BAP-MW-5	0.000005	0.000005	0.002	No	10	0.000005	0	100	None	No	0.011	NP (NDs)
Molybdenum, total (mg/L)	BAP-MW-1	0.00182	0.000608	0.1	No	13	0.001147	0.0007142	15.38	Cohen's	No	0.01	Param.
Molybdenum, total (mg/L)	BAP-MW-1604	0.00074	0.00021	0.1	No	13	0.0005962	0.0006452	15.38	None	No	0.01	NP (normality)
Molybdenum, total (mg/L)	BAP-MW-1605	0.002	0.0001	0.1	No	13	0.0006592	0.0007801	23.08	None	No	0.01	NP (normality)
Molybdenum, total (mg/L)	BAP-MW-1606	0.002	0.00007	0.1	No	13	0.0005723	0.0008167	23.08	None	No	0.01	NP (normality)
Molybdenum, total (mg/L)	BAP-MW-4	0.002	0.00031	0.1	No	11	0.001093	0.0008377	27.27	None	No	0.006	NP (Cohens/xfrm)
Molybdenum, total (mg/L)	BAP-MW-5	0.0022	0.00022	0.1	No	13	0.001262	0.0009074	23.08	None	No	0.01	NP (normality)
Selenium, total (mg/L)	BAP-MW-1	0.0002	0.00009	0.05	No	13	0.0001285	0.00004981	0	None	No	0.01	NP (normality)
Selenium, total (mg/L)	BAP-MW-1604	0.0003	0.0001	0.05	No	13	0.0001923	0.00004935	0	None	No	0.01	NP (normality)
Selenium, total (mg/L)	BAP-MW-1605	0.00008491	0.00005048	0.05	No	13	0.00006769	0.00002315	0	None	No	0.01	Param.
Selenium, total (mg/L)	BAP-MW-1606	0.0001858	0.00008449	0.05	No	13	0.0001385	0.00007313	0	None	sqrt(x)	0.01	Param.
Selenium, total (mg/L)	BAP-MW-4	0.0001	0.00006	0.05	No	13	0.00007923	0.00001605	0	None	No	0.01	NP (normality)
Selenium, total (mg/L)	BAP-MW-5	0.0001	0.00004	0.05	No	13	0.00008	0.00002708	53.85	None	No	0.01	NP (normality)
Thallium, total (mg/L)	BAP-MW-1	0.0005	0.00003	0.002	No	13	0.0001494	0.0002001	23.08	None	No	0.01	NP (normality)
Thallium, total (mg/L)	BAP-MW-1604	0.0005	0.00001	0.002	No	13	0.0002415	0.0002493	46.15	None	No	0.01	NP (normality)
Thallium, total (mg/L)	BAP-MW-1605	0.0005	0.00002	0.002	No	13	0.0003194	0.0002381	61.54	None	No	0.01	NP (normality)
Thallium, total (mg/L)	BAP-MW-1606	0.0005	0.00001	0.002	No	13	0.0001323	0.00021	23.08	None	No	0.01	NP (normality)
Thallium, total (mg/L)	BAP-MW-4	0.0005	0.000055	0.002	No	13	0.0001722	0.0001908	23.08	None	No	0.01	NP (Cohens/xfrm)
Thallium, total (mg/L)	BAP-MW-5	0.0005	0.00001	0.002	No	13	0.0002408	0.0002499	46.15	None	No	0.01	NP (normality)

Parametric and Non-Parametric (NP) Confidence Interval

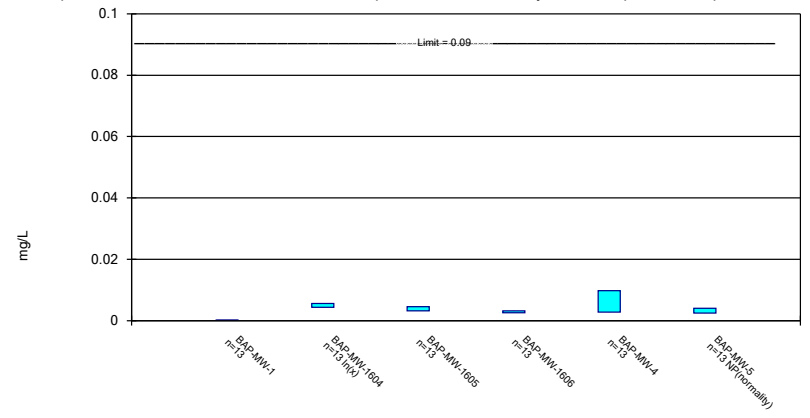
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Constituent: Antimony, total Analysis Run 12/4/2019 5:00 PM View: Appendix IV
 Amos BAP Client: Geosyntec Data: Amos BAP

Parametric and Non-Parametric (NP) Confidence Interval

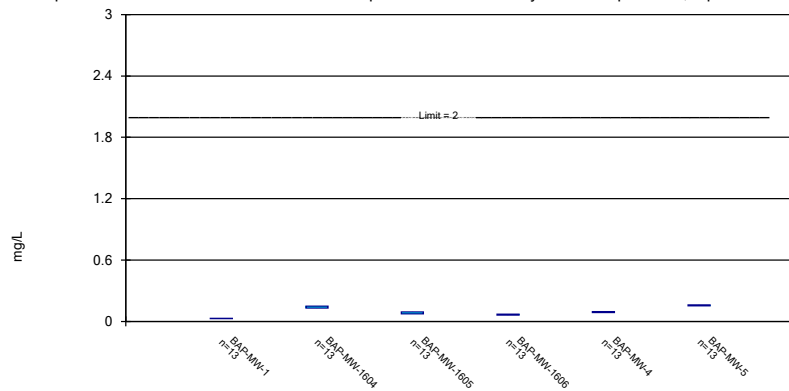
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Constituent: Arsenic, total Analysis Run 12/4/2019 5:00 PM View: Appendix IV
 Amos BAP Client: Geosyntec Data: Amos BAP

Parametric Confidence Interval

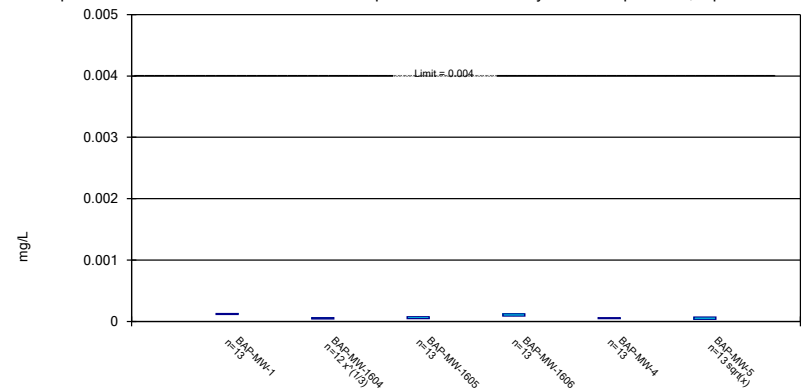
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Constituent: Barium, total Analysis Run 12/4/2019 5:00 PM View: Appendix IV
 Amos BAP Client: Geosyntec Data: Amos BAP

Parametric Confidence Interval

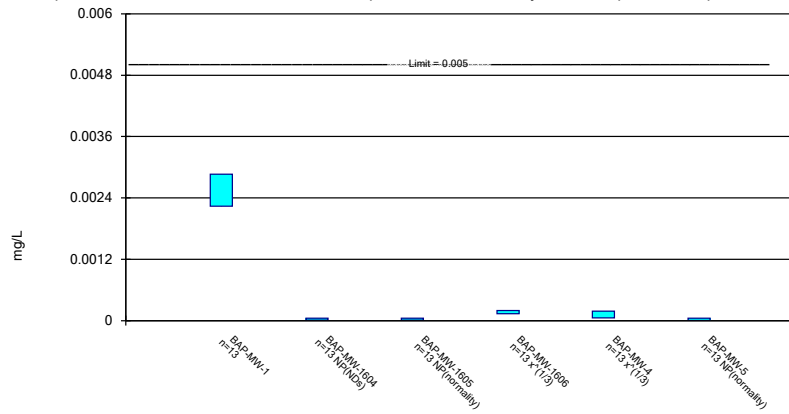
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Constituent: Beryllium, total Analysis Run 12/4/2019 5:00 PM View: Appendix IV
 Amos BAP Client: Geosyntec Data: Amos BAP

Parametric and Non-Parametric (NP) Confidence Interval

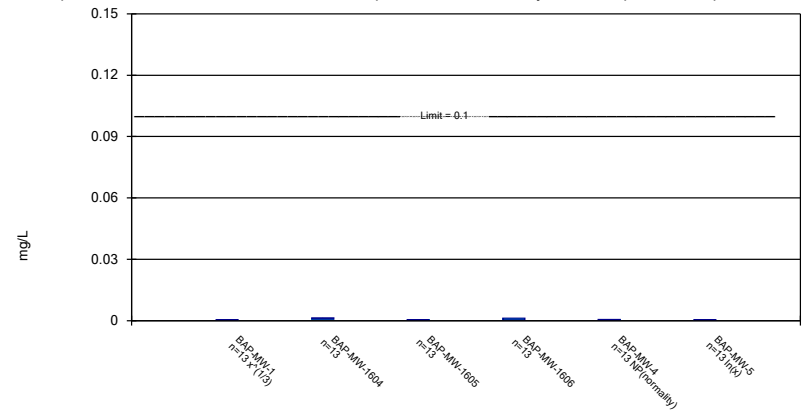
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Constituent: Cadmium, total Analysis Run 12/4/2019 5:00 PM View: Appendix IV
 Amos BAP Client: Geosyntec Data: Amos BAP

Parametric and Non-Parametric (NP) Confidence Interval

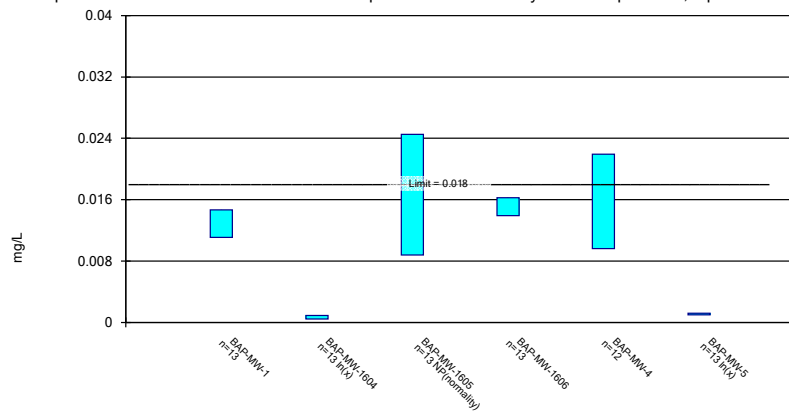
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Constituent: Chromium, total Analysis Run 12/4/2019 5:00 PM View: Appendix IV
 Amos BAP Client: Geosyntec Data: Amos BAP

Parametric and Non-Parametric (NP) Confidence Interval

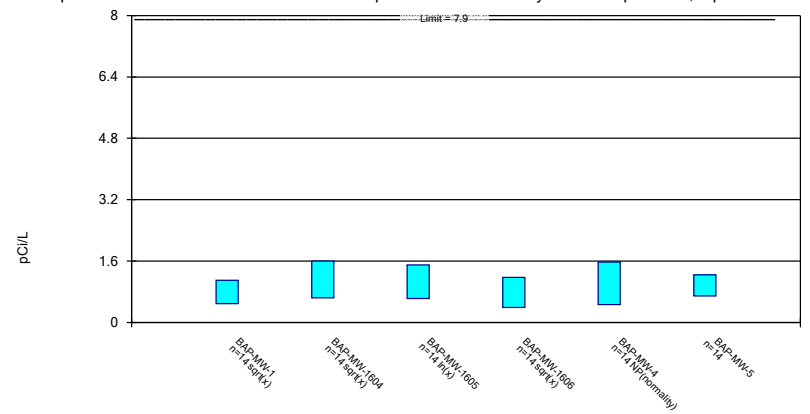
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Constituent: Cobalt, total Analysis Run 12/4/2019 5:00 PM View: Appendix IV
 Amos BAP Client: Geosyntec Data: Amos BAP

Parametric and Non-Parametric (NP) Confidence Interval

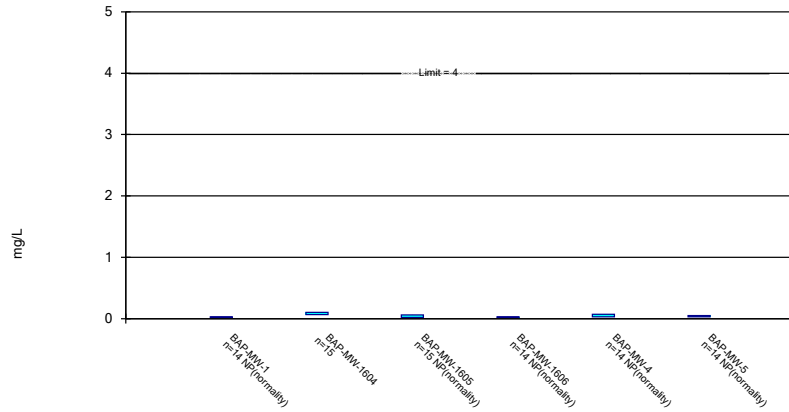
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Constituent: Combined Radium 226 + 228 Analysis Run 12/4/2019 5:00 PM View: Appendix IV
 Amos BAP Client: Geosyntec Data: Amos BAP

Parametric and Non-Parametric (NP) Confidence Interval

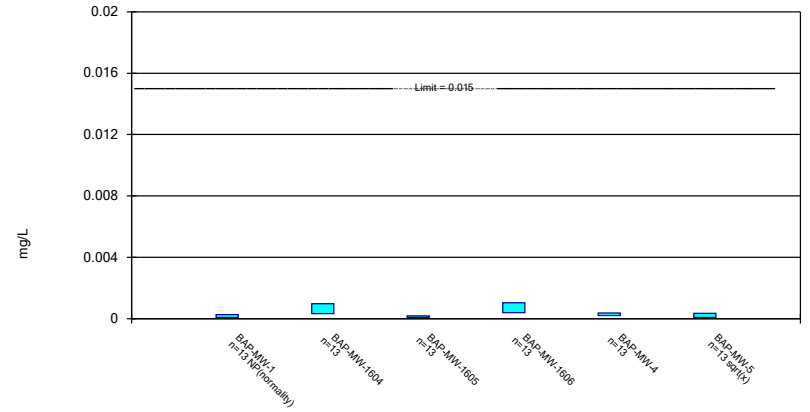
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Constituent: Fluoride, total Analysis Run 12/4/2019 5:00 PM View: Appendix IV
 Amos BAP Client: Geosyntec Data: Amos BAP

Parametric and Non-Parametric (NP) Confidence Interval

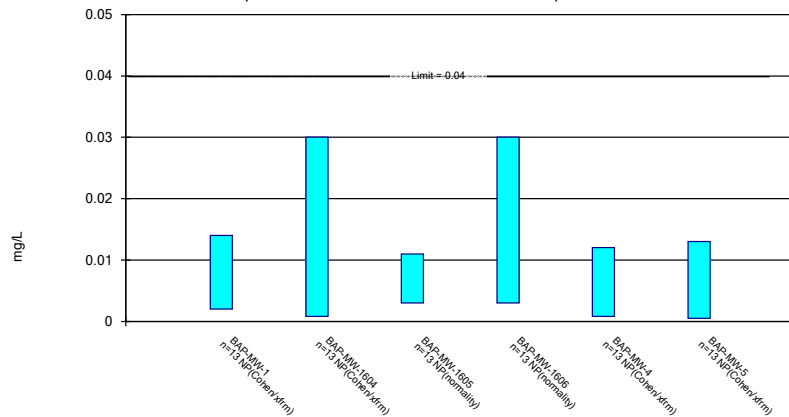
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Constituent: Lead, total Analysis Run 12/4/2019 5:00 PM View: Appendix IV
 Amos BAP Client: Geosyntec Data: Amos BAP

Non-Parametric Confidence Interval

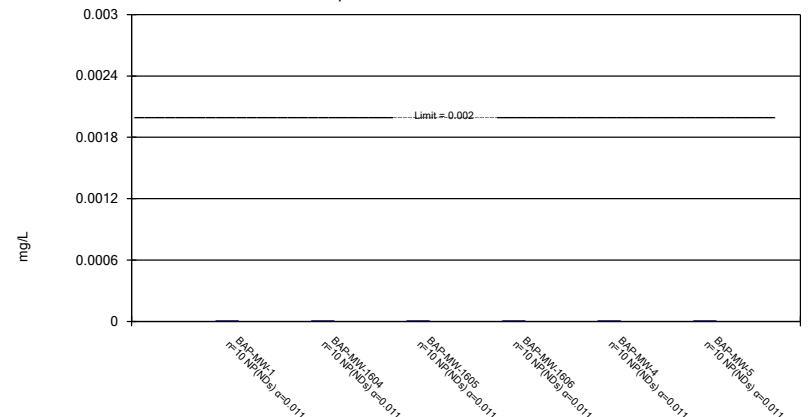
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Constituent: Lithium, total Analysis Run 12/4/2019 5:00 PM View: Appendix IV
 Amos BAP Client: Geosyntec Data: Amos BAP

Non-Parametric Confidence Interval

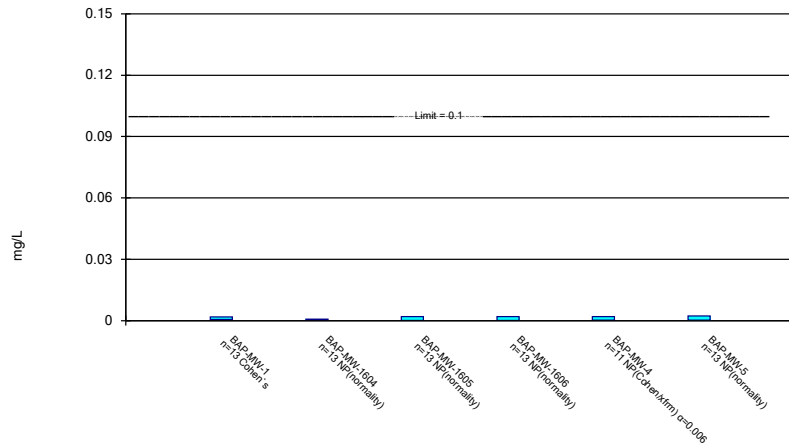
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Constituent: Mercury, total Analysis Run 12/4/2019 5:00 PM View: Appendix IV
 Amos BAP Client: Geosyntec Data: Amos BAP

Parametric and Non-Parametric (NP) Confidence Interval

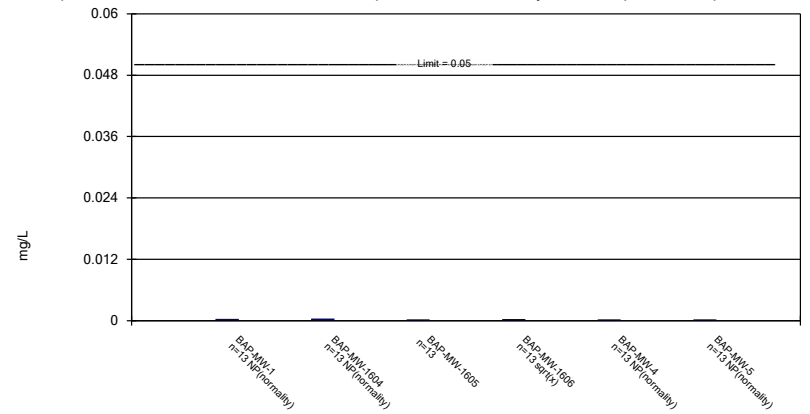
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Molybdenum, total Analysis Run 12/4/2019 5:00 PM View: Appendix IV
 Amos BAP Client: Geosyntec Data: Amos BAP

Parametric and Non-Parametric (NP) Confidence Interval

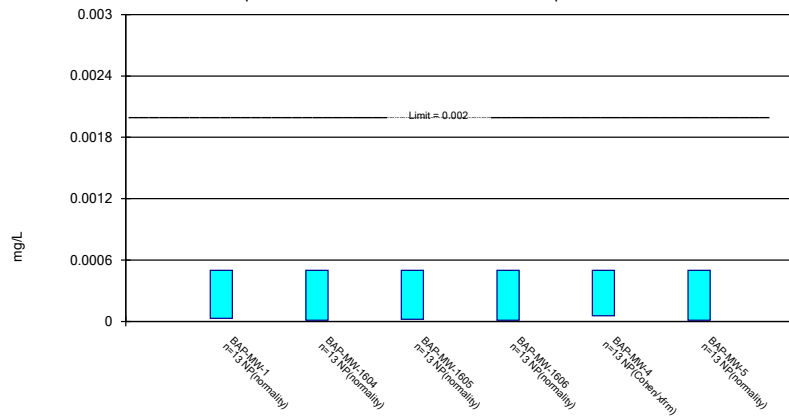
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Selenium, total Analysis Run 12/4/2019 5:00 PM View: Appendix IV
 Amos BAP Client: Geosyntec Data: Amos BAP

Non-Parametric Confidence Interval

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



Constituent: Thallium, total Analysis Run 12/4/2019 5:00 PM View: Appendix IV
 Amos BAP Client: Geosyntec Data: Amos BAP

APPENDIX 3 – Alternative Source Demonstrations

Not applicable.

APPENDIX 4 – Notice of Transition between Monitoring Programs

Not applicable.

APPENDIX 5 – Well Installation/Decommissioning Logs

Not applicable.