

Annual Groundwater Monitoring Report

Appalachian Power Company
Mountaineer Plant
Bottom Ash Pond CCR Management Unit
Letart, WV

January 2020

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An **AEP** Company

BOUNDLESS ENERGY™

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I. Overview

This *Annual Groundwater Monitoring and Corrective Action Report* (Report) has been prepared to report the status of activities for the preceding year for the bottom ash pond CCR unit at Appalachian Power Company's, a wholly-owned subsidiary of American Electric Power Company (AEP), Mountaineer Power Plant. The USEPA's CCR rules require that the Annual Groundwater Monitoring and Corrective Action Report be posted to the operating record for the preceding year no later than January 31.

In general, the following activities were completed in 2019:

- Groundwater samples were collected and analyzed for Appendix III and Appendix IV constituents, as specified in 40 CFR 257.95 *et seq.* and AEP's *Groundwater Sampling and Analysis Plan*;
- Groundwater was sampled in April, June, and September 2019 as part of the Assessment Monitoring Program requirements;
- Groundwater data underwent various validation tests, including tests for completeness, valid values, transcription errors, and consistent units;
- Notification of a statistically significant level (SSL) of constituent above groundwater protection standard (GWPS) was completed;
- Assessment of Corrective Action was initiated, an Assessment of Corrective Measures report was completed, and a corrective action public meeting was held. Evaluation of selection of remedy is ongoing.
- Monitoring wells were installed and developed as part of the Nature and Extent Study and Assessment of Corrective Measures around the CCR unit in accordance with the requirements of 40 CFR 257.95;

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

- A map, aerial photograph or a drawing showing the CCR management unit(s), all groundwater monitoring wells and monitoring well identification numbers.
- Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a statement as to why that happened.
- All of the monitoring data collected, including the rate and direction of groundwater flow, plus a summary showing the number of samples collected per monitoring well, the dates the samples were collected and whether the sample was collected as part of detection monitoring or assessment monitoring programs (Attached as **Appendix 1**).

- A summary of any transition between monitoring programs or an alternate monitoring frequency, for example the date and circumstances for transitioning from detection monitoring to assessment monitoring, in addition to identifying the constituents detected at a statistically significant increase over background concentrations (**Appendix 4**).
- Other information required to be included in the annual report such as alternate source demonstration or 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

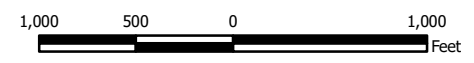
The figure that follows depicts the PE-certified groundwater monitoring network, the monitoring well locations and their corresponding identification numbers. The total groundwater monitoring network includes 4 up-gradient wells and 8 down-gradient wells. The monitoring well distribution adequately cover down-gradient and up-gradient areas as detailed in the *Ground Water Monitoring Well Network Evaluation* report that was placed in the American Electric Power CCR public internet site on March 9, 2017. Additional wells are shown in the figure that were installed as part of the Nature and Extent Characterization study.



- Monitoring Well Network**
- Compliance Sampling Location
 - Background Sampling Location
 - Nature and Extent Wells
 - Bottom Ash Ponds

Notes

- Monitoring well coordinates provided by AEP.
- Site features based on information available in Ash Pond System-CCR Groundwater Monitoring Well Network Evaluation (Arcadis, 2016) provided by AEP.



Site Layout
CCR Bottom Ash Ponds
 AEP Mountaineer Generating Plant
 Letart, West Virginia

Geosyntec
 consultants

Figure
1

Columbus, Ohio 2020/01/24

III. Monitoring Wells Installed or Decommissioned

There was installation of 10 additional groundwater monitoring wells at the Mountaineer Bottom Ash Pond as part of the characterization of nature and extent of a release from the BAP. These are:

- MW-1921, MW-1922S, MW-1922D, MW-1923, MW-1924, MW-1925, MW-1926, MW-1927, MW-1928, MW-1929

An additional monitoring well was also installed in 2018 and included in the 2019 nature and extent study.

- MW-1805

Additionally, three monitoring wells that were installed as part of a subsurface investigation in 2006 have been included in the sampling and analysis as a part of the nature and extent characterization.

- MW-107, MW-112, MW-203

Boring logs and well construction forms for these 14 monitoring wells are included in **Appendix 5**.

IV. Groundwater Quality Data and Static Water Elevation Data and Flow Rate

Appendix 1 contains tables showing the groundwater quality data collected during the establishment of background quality, detection monitoring, and assessment monitoring. Static water elevation data from each monitoring event also are shown in **Appendix 1**, along with the groundwater velocity calculations, groundwater flow direction and potentiometric maps developed after each sampling event. It is important to note that MW-1928 although installed, was unable to be sampled due to very low groundwater yield the first attempt and the monitoring well being dry and not recovering on the following attempts.

V. Groundwater Quality Data Statistical Analysis

Statistical analysis of the first 257.95(d)(1) (assessment monitoring of all Appendix III and detected Appendix IV parameters) resulted in a SSL above the GWPS for lithium on January 8, 2019. A notice of this SSL was placed in the facility electronic operating record and on the publicly available internet site. The next 257.95(d)(1) sampling and analysis continued to result in a SSL above the lithium GWPS on July 12, 2019 and a notice was subsequently made and placed in the facility electronic operating record and on the publicly available internet site. The second 257.95(d)(1) groundwater sampling, laboratory analysis, and statistical analysis resulted

in a SSL above the lithium GWPS on December 23, 2019 and a notice was subsequently made and placed in the facility electronic operating record and will be placed on the publicly available internet site within 30 days of the operating record notice. The notice of statistically significant levels above the groundwater protection standard can be found in **Appendix 4** and on the publicly available internet site at <https://www.aep.com/environment/ccr>. The statistical analysis reports completed in 2019 related to the September 2018 assessment monitoring, April 2019 assessment monitoring, and September 2019 sampling events can be found in **Appendix 2** of this report.

VI. Alternative Source Demonstrations

No alternative source demonstrations were completed related to the assessment monitoring sampling events and statistical analysis.

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

The Mountaineer Bottom Ash Pond CCR Unit transitioned from the Assessment Monitoring program to the Assessment of Corrective Measures program on March 26, 2019 due to the SSL above a GWPS on January 8, 2019. An Assessment of Corrective Measures Report was completed on June 24, 2019. A public meeting was held to present the assessment of corrective measure options. At this time, the selection of remedy is on-going and a semi-annual report describing the progress in selecting and designing the remedy will be completed in early 2020. Semi-annual assessment monitoring sampling and analysis will continue during the assessment of corrective measures and selection of remedy. The notice for initiating an assessment of corrective measures can be found in **Appendix 4** of this report and on the publicly available internet site at <https://www.aep.com/environment/ccr>.

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

VIII. Other Information Required

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 this annual groundwater report preparation.

X. A Projection of Key Activities for the Upcoming Year

Key activities for 2020 include:

- Assessment monitoring on a twice per year schedule;
- Continue evaluation of the selection of remedy;
- Prepare a selection of remedy semi-annual progress report;
- Responding to any new data received in light of what the CCR rule requires; and
- Preparation of the next annual groundwater report.

APPENDIX 1

Tables follow that show the groundwater monitoring data collected and rate and direction of groundwater flow. The dates that the samples were collected are also shown.

**Table 1 - Groundwater Data Summary: MW-107
Mountaineer - 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
4/10/2019	Assessment	0.614	270	71.4	0.21	6.8	1270	518
6/18/2019	Assessment	0.592	245	71.7	0.22	6.8	1250	545
9/10/2019	Assessment	0.696	316	79.7	0.19	7.1	1410	631

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-107
Mountaineer - 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
4/10/2019	Assessment	<0.10 U	1.08	68.3	<0.1 U	0.05 J	0.4 J	1.03	1.854	0.21	0.4 J	0.02 J	<0.002 U	<2 U	0.7 J	<0.5 U
6/18/2019	Assessment	0.03 J	0.44	69.4	<0.02 U	0.05	0.08 J	1.45	0.2284	0.22	0.04 J	<0.009 U	<0.002 U	<0.4 U	0.6	<0.1 U
9/10/2019	Assessment	0.02 J	0.44	67.8	<0.02 U	0.04 J	0.07 J	1.08	3.5	0.19	<0.05 U	0.00358	<0.002 U	<0.4 U	0.8	<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-112
Mountaineer - 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
6/19/2019	Assessment	0.283	142	37.2	0.24	7.17	668	255

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-112
Mountaineer - 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
6/19/2019	Assessment	<0.02 U	0.40	76.9	<0.02 U	<0.01 U	0.2 J	0.02 J	0.0507	0.24	0.02 J	<0.009 U	<0.002 U	11.2	1.5	<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-203
Mountaineer - 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
6/18/2019	Assessment	0.1 J	115	31.4	0.22	7.2	472	86.8
9/11/2019	Assessment	0.104	106	10.1	0.22	7.1	435	65.5

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-203
Mountaineer - 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
6/18/2019	Assessment	<0.02 U	0.30	34.7	<0.02 U	<0.01 U	0.2 J	0.054	0.1139	0.22	0.113	<0.009 U	<0.002 U	2 J	1.4	<0.1 U
9/11/2019	Assessment	0.02 J	0.33	31.6	<0.02 U	<0.01 U	0.2 J	0.139	0.381	0.22	0.2 J	0.00230	<0.002 U	1 J	1.1	<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-1601A
Mountaineer - 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
9/28/2016	Background	0.211	141	21.8	0.17	7.6	538	130
11/1/2016	Background	0.170	122	17.3	0.19	7.2	534	136
12/19/2016	Background	0.196	130	20.4	0.18	7.2	544	141
2/20/2017	Background	0.253	117	31.0	0.20	7.2	568	135
3/27/2017	Background	0.515	119	42.1	0.19	7.1	530	148
4/18/2017	Background	0.259	130	55.3	0.19	7.1	580	169
5/15/2017	Background	0.224	159	74.4	0.18	7.7	676	197
6/12/2017	Background	0.285	138	57.7	0.18	6.9	586	170
10/30/2017	Detection	0.224	137	49.4	0.19	7.1	564	169
5/10/2018	Assessment	--	--	--	0.16	7.3	--	--
9/20/2018	Assessment	0.251	148	51.0	0.19	7.1	638	189
4/9/2019	Assessment	0.224	155	44.4	0.1 J	7.1	692	176
6/20/2019	Assessment	0.160	165	48.6	0.16	7.3	730	207
9/11/2019	Assessment	0.153	164	45.8	0.14	7.0	749	221

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-1601A
Mountaineer - 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
9/28/2016	Background	0.05	0.62	46.6	<0.005 U	0.01 J	0.3	0.116	0.43758	0.17	0.132	0.002	<0.002 U	2.61	1.3	0.053
11/1/2016	Background	0.05 J	0.61	45.2	<0.005 U	0.02 J	1.3	0.086	2.011	0.19	0.108	0.001	<0.002 U	2.36	1.1	0.058
12/19/2016	Background	0.05 J	0.65	47.0	<0.005 U	0.02 J	0.806	0.282	1.544	0.18	0.383	<0.0002 U	<0.002 U	0.93	1.1	0.04 J
2/20/2017	Background	0.03 J	0.55	41.4	<0.005 U	0.02 J	0.198	0.132	0.313	0.20	0.139	0.005	<0.002 U	1.42	1.4	0.070
3/27/2017	Background	0.03 J	0.49	40.2	<0.005 U	0.01 J	0.225	0.097	0.495	0.19	0.069	0.006	<0.002 U	2.85	1.0	0.03 J
4/18/2017	Background	0.03 J	0.59	47.5	<0.004 U	0.01 J	0.170	0.093	0.814	0.19	0.052	0.007	0.003 J	1.53	1.5	0.04 J
5/15/2017	Background	0.04 J	0.79	56.9	<0.004 U	0.02 J	0.166	0.154	1.279	0.18	0.141	<0.0002 U	<0.002 U	2.04	1.3	0.04 J
6/12/2017	Background	0.04 J	0.61	49.0	<0.004 U	0.02 J	0.152	0.098	0.599	0.18	0.063	0.004	<0.002 U	1.13	1.5	0.04 J
5/10/2018	Assessment	0.03 J	0.55	63.9	<0.004 U	0.02 J	0.153	0.083	0.767	0.16	0.034	0.004	<0.002 U	0.99	1.5	0.03 J
9/20/2018	Assessment	0.03 J	0.58	55.3	<0.004 U	0.02 J	0.131	0.059	0.696	0.19	0.005 J	0.004	<0.002 U	0.76	1.1	0.04 J
4/9/2019	Assessment	<0.10 U	0.61	52.0	<0.1 U	<0.05 U	0.2 J	0.2 J	1.168	0.1 J	<0.1 U	0.02 J	<0.002 U	<2 U	1.1	<0.5 U
6/20/2019	Assessment	0.03 J	0.63	63.1	<0.02 U	0.02 J	0.314	0.03 J	0.45	0.16	0.07 J	<0.009 U	<0.002 U	0.9 J	1.3	<0.1 U
9/11/2019	Assessment	0.03 J	0.62	65.3	<0.02 U	0.02 J	0.370	0.03 J	1.168	0.14	<0.05 U	0.00184	<0.002 U	0.9 J	1.1	<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-1602
Mountaineer - 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
9/28/2016	Background	0.141	74.9	7.95	0.17	7.3	412	167
11/1/2016	Background	0.115	71.1	8.70	0.18	6.6	424	178
12/19/2016	Background	0.120	74.7	9.91	0.18	6.9	470	188
2/20/2017	Background	0.093	69.6	9.76	0.19	6.5	494	193
3/27/2017	Background	0.240	86.6	12.0	0.19	6.3	504	231
4/17/2017	Background	0.107	91.1	12.1	0.20	6.7	520	248
5/15/2017	Background	0.115	105	12.6	0.19	7.0	598	273
6/12/2017	Background	0.153	94.0	11.8	0.20	6.8	588	269
10/30/2017	Detection	0.093	78.1	8.41	0.23	6.7	468	184
5/10/2018	Assessment	--	--	--	0.23	7.0	--	--
9/20/2018	Assessment	0.109	81.6	10.5	0.25	7.1	502	195
4/9/2019	Assessment	0.09 J	99.8	11.4	0.20	6.6	595	221
6/20/2019	Assessment	0.1 J	91.2	10.7	0.23	7.0	606	267
9/11/2019	Assessment	0.111	95.1	10.4	0.21	6.7	603	259

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-1602
Mountaineer - 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
9/28/2016	Background	0.02 J	0.40	27.1	<0.005 U	0.02 J	0.2	0.217	0.275	0.17	0.255	0.013	<0.002 U	0.90	0.08 J	0.092
11/1/2016	Background	0.02 J	0.35	28.7	<0.005 U	0.02 J	0.6	0.108	2.086	0.18	0.070	0.014	<0.002 U	1.48	0.1	0.116
12/19/2016	Background	0.02 J	0.43	28.9	<0.005 U	0.01 J	1.65	0.225	0.7053	0.18	0.272	0.008	<0.002 U	0.56	0.08 J	0.02 J
2/20/2017	Background	<0.01 U	0.35	26.9	<0.005 U	0.01 J	0.194	0.052	0.75	0.19	0.052	0.013	<0.002 U	0.63	0.1	0.02 J
3/27/2017	Background	0.01 J	0.34	29.9	<0.005 U	0.02 J	0.456	0.059	0.679	0.19	0.063	0.019	<0.002 U	1.49	0.2	0.01 J
4/17/2017	Background	0.02 J	0.36	32.1	<0.004 U	0.01 J	0.240	0.049	0.337	0.20	0.087	0.017	0.002 J	0.66	0.1	0.01 J
5/15/2017	Background	0.02 J	0.42	33.2	<0.004 U	0.02 J	0.136	0.072	1.9116	0.19	0.078	0.009	<0.002 U	1.28	0.1	0.04 J
6/12/2017	Background	0.03 J	0.36	33.1	<0.004 U	0.01 J	0.408	0.066	0.2898	0.20	0.061	0.018	<0.002 U	0.53	0.1	0.02 J
5/10/2018	Assessment	0.02 J	0.34	31.2	0.005 J	0.01 J	0.121	0.036	0.342	0.23	0.038	0.015	<0.002 U	0.71	0.1	0.03 J
9/20/2018	Assessment	0.01 J	0.32	26.7	<0.004 U	0.01 J	0.210	0.02 J	0.683	0.25	0.01 J	0.012	<0.002 U	0.84	0.07 J	0.02 J
4/9/2019	Assessment	<0.10 U	0.4 J	29.0	<0.1 U	<0.05 U	<0.2 U	<0.1 U	1.0509	0.20	<0.1 U	0.02 J	<0.002 U	3 J	0.2 J	<0.5 U
6/20/2019	Assessment	0.02 J	0.33	29.5	<0.02 U	0.01 J	0.2 J	0.03 J	0.1531	0.23	0.07 J	0.01 J	<0.002 U	0.9 J	0.1 J	<0.1 U
9/11/2019	Assessment	<0.02 U	0.31	27.3	<0.02 U	0.01 J	0.2 J	<0.02 U	0.451	0.21	<0.05 U	0.00979	<0.002 U	1 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-1603
Mountaineer - 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
9/28/2016	Background	0.327	124	15.7	0.07 J	7.3	618	388
11/2/2016	Background	0.334	146	22.8	0.08 J	6.6	814	483
12/19/2016	Background	0.495	164	30.1	0.1 J	7.4	908	504
2/20/2017	Background	0.543	169	27.4	0.1 J	6.8	962	485
3/28/2017	Background	0.781	181	25.2	0.1 J	6.6	918	476
4/17/2017	Background	0.519	170	22.9	0.1 J	6.9	910	474
5/15/2017	Background	0.546	187	24.7	0.1 J	7.4	910	470
6/12/2017	Background	0.535	176	20.5	0.1 J	7.0	878	482
10/30/2017	Detection	0.360	171	13.1	0.1 J	6.6	872	553
5/10/2018	Assessment	--	--	--	0.09 J	6.6	--	--
9/20/2018	Assessment	0.324	167	14.0	0.09	6.6	920	524
4/9/2019	Assessment	0.408	182	15.8	0.11	6.8	918	429
6/20/2019	Assessment	0.299	162	10.9	0.09	7.0	878	434
9/11/2019	Assessment	0.308	156	10.0	0.09	6.7	853	421

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-1603
Mountaineer - 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
9/28/2016	Background	0.02 J	0.36	29.5	<0.005 U	0.02 J	0.3	0.317	0.0927	0.07 J	0.253	0.021	<0.002 U	1.21	0.1	0.02 J
11/2/2016	Background	0.02 J	0.36	34.1	<0.005 U	0.01 J	0.4	0.166	2.593	0.08 J	0.131	0.022	<0.002 U	2.47	0.4	0.04 J
12/19/2016	Background	0.03 J	0.40	33.1	<0.005 U	0.01 J	2.37	0.134	0.966	0.1 J	0.084	0.010	<0.002 U	0.36	0.3	0.063
2/20/2017	Background	0.01 J	0.37	31.7	<0.005 U	0.01 J	0.229	0.105	0.384	0.1 J	0.077	0.012	<0.002 U	0.37	0.4	0.02 J
3/28/2017	Background	0.02 J	0.36	32.9	<0.005 U	0.01 J	0.545	0.093	0.2071	0.1 J	0.080	0.020	<0.002 U	0.72	0.2	<0.01 U
4/17/2017	Background	0.03 J	0.52	33.7	0.005 J	0.01 J	0.304	0.377	0.6154	0.1 J	0.308	0.018	0.003 J	0.27	0.2	0.01 J
5/15/2017	Background	0.03 J	0.43	33.0	<0.004 U	0.01 J	0.415	0.101	1.6052	0.1 J	0.079	0.012	<0.002 U	0.71	0.1	0.02 J
6/12/2017	Background	0.03 J	0.35	32.0	<0.004 U	0.01 J	0.963	0.085	0.776	0.1 J	0.059	0.021	<0.002 U	0.29	0.1	0.01 J
5/10/2018	Assessment	0.02 J	0.31	41.3	0.007 J	0.01 J	0.099	0.054	0.363	0.09 J	0.042	0.021	<0.002 U	0.14	0.2	0.02 J
9/20/2018	Assessment	0.02 J	0.26	35.9	<0.004 U	0.01 J	0.102	0.032	0.881	0.09	0.02 J	0.022	<0.002 U	0.07 J	0.4	0.01 J
4/9/2019	Assessment	<0.10 U	0.56	32.4	<0.1 U	<0.05 U	0.4 J	0.622	2.389	0.11	0.5 J	0.030	<0.002 U	<2 U	0.4 J	<0.5 U
6/20/2019	Assessment	0.03 J	0.41	30.7	<0.02 U	0.01 J	0.249	0.204	0.2974	0.09	0.176	<0.009 U	<0.002 U	0.9 J	0.3	<0.1 U
9/11/2019	Assessment	0.03 J	0.35	30.9	<0.02 U	0.01 J	0.205	0.112	1.07	0.09	0.1 J	0.015	<0.002 U	0.5 J	0.2	<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-1604D
Mountaineer - 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
9/26/2016	Background	3.54	306	111	0.18	7.3	1650	865
11/1/2016	Background	2.98	277	116	0.19	7.3	1580	866
12/20/2016	Background	3.07	289	118	0.17	7.4	1630	863
2/21/2017	Background	3.01	260	111	0.21	7.2	1640	823
3/28/2017	Background	4.18	293	112	0.19	7.2	1660	814
4/19/2017	Background	2.97	269	109	0.20	7.2	1570	797
5/16/2017	Background	2.95	300	112	0.18	7.9	1610	828
6/13/2017	Background	2.98	283	118	0.18	7.5	1620	856
10/30/2017	Detection	2.60	295	116	0.20	7.2	1570	833
1/22/2018	Detection	3.07	291	118	--	7.2	1620	862
5/9/2018	Assessment	--	--	--	0.21	7.1	--	--
9/19/2018	Assessment	1.33	144	41.3	0.19	7.2	838	313
4/9/2019	Assessment	2.82	236	100	0.15	6.9	1300	539
6/19/2019	Assessment	1.66	196	93.0	0.14	7.2	1110	461
9/9/2019	Assessment	2.18	217	82.2	0.17	7.0	1210	551

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-1604D
Mountaineer - 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
9/26/2016	Background	0.14	0.48	29.1	<0.005 U	0.14	0.4	1.76	1.38	0.18	0.106	0.059	<0.002 U	19.8	0.9	0.235
11/1/2016	Background	0.15	0.59	28.4	<0.005 U	0.17	0.5	1.78	1.056	0.19	0.039	0.057	0.036	20.0	1.0	0.261
12/20/2016	Background	0.14	0.57	30.3	<0.005 U	0.17	0.798	1.92	1.45	0.17	0.02 J	0.045	<0.002 U	20.8	1.0	0.283
2/21/2017	Background	0.11	0.45	26.2	<0.005 U	0.13	0.297	1.85	0.824	0.21	0.02 J	0.050	<0.002 U	17.4	0.7	0.264
3/28/2017	Background	0.13	0.41	28.9	<0.005 U	0.13	0.416	1.74	0.806	0.19	0.022	0.064	<0.002 U	18.2	0.7	0.336
4/19/2017	Background	0.12	0.49	27.9	<0.004 U	0.09	0.323	1.60	1.537	0.20	0.584	0.051	0.003 J	17.4	0.7	0.217
5/16/2017	Background	0.13	0.54	27.5	<0.004 U	0.10	0.079	1.60	3.489	0.18	0.027	0.052	<0.002 U	18.1	0.5	0.231
6/13/2017	Background	0.15	0.46	27.9	<0.008 U	0.15	0.180	1.95	1.058	0.18	0.03 J	0.058	<0.002 U	18.3	0.8	0.256
5/9/2018	Assessment	0.04 J	0.34	32.0	<0.004 U	0.04	0.195	0.314	0.687	0.21	0.035	0.024	<0.002 U	2.05	1.4	0.02 J
9/19/2018	Assessment	0.04 J	0.29	37.0	<0.004 U	0.03	0.169	0.203	0.316	0.19	0.303	0.016	<0.002 U	1.57	3.8	0.02 J
4/9/2019	Assessment	<0.10 U	0.4 J	42.5	<0.1 U	0.05 J	0.2 J	0.345	0.957	0.15	<0.1 U	0.038	<0.002 U	<2 U	2.0	<0.5 U
6/19/2019	Assessment	0.04 J	0.28	52.9	<0.02 U	0.04 J	0.212	0.242	0.1922	0.14	0.07 J	<0.009 U	<0.002 U	1 J	3.1	<0.1 U
9/9/2019	Assessment	0.03 J	0.30	55.6	<0.02 U	0.03 J	0.345	0.181	0.464	0.17	<0.05 U	0.0188	<0.002 U	2 J	3.4	<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-1604S
Mountaineer - 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
9/26/2016	Background	2.12	178	83.9	0.20	7.0	1280	602
11/1/2016	Background	1.90	167	99.4	0.21	7.1	1310	626
12/20/2016	Background	2.35	165	99.9	0.19	7.2	1300	618
2/21/2017	Background	3.08	168	112	0.21	7.0	1430	634
3/28/2017	Background	4.04	180	116	0.20	6.9	1420	663
4/19/2017	Background	3.68	191	130	0.21	7.0	1500	716
5/16/2017	Background	3.63	202	122	0.19	7.7	1510	708
6/13/2017	Background	3.48	182	112	0.20	7.5	1400	685
10/30/2017	Detection	2.17	167	85.3	0.21	7.1	1150	544
1/22/2018	Detection	2.36	--	105	--	6.9	1312	602
5/9/2018	Assessment	--	--	--	0.22	7.4	--	--
9/19/2018	Assessment	2.49	262	109	0.22	7.3	1500	742
4/9/2019	Assessment	3.50	301	132	0.19	7.1	1650	703
6/19/2019	Assessment	3.15	278	127	0.16	7.3	1580	741
9/9/2019	Assessment	3.23	267	128	0.20	7.3	1520	770

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-1604S
Mountaineer - 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
9/26/2016	Background	0.04 J	0.39	29.4	<0.005 U	0.03	0.2	0.358	0.136	0.20	0.114	0.034	<0.002 U	3.20	3.1	0.03 J
11/1/2016	Background	0.04 J	0.46	27.2	<0.005 U	0.04	0.3	0.307	0.769	0.21	0.065	0.035	<0.002 U	2.47	2.5	0.02 J
12/20/2016	Background	0.04 J	0.42	26.6	<0.005 U	0.04	1.97	0.390	0.5256	0.19	0.093	0.023	<0.002 U	2.71	2.7	0.03 J
2/21/2017	Background	0.03 J	0.42	26.7	<0.005 U	0.04	0.379	0.501	0.92	0.21	0.140	0.033	<0.002 U	2.52	2.2	0.03 J
3/28/2017	Background	0.03 J	0.37	31.6	<0.005 U	0.03	0.692	0.308	0.585	0.20	0.055	0.042	<0.002 U	2.53	2.2	0.119
4/19/2017	Background	0.03 J	0.44	28.9	<0.004 U	0.04	0.158	0.317	0.722	0.21	0.051	0.041	0.003 J	2.53	1.7	0.02 J
5/16/2017	Background	0.04 J	0.51	32.2	<0.004 U	0.04	0.098	0.317	2.577	0.19	0.100	0.033	<0.002 U	2.54	2.0	0.04 J
6/13/2017	Background	0.03 J	0.41	28.7	<0.004 U	0.04	0.149	0.308	0.598	0.20	0.033	0.038	<0.002 U	2.41	2.5	0.02 J
5/9/2018	Assessment	0.13	0.33	28.7	0.024	0.15	0.107	1.83	1.173	0.22	0.034	0.051	<0.002 U	16.2	1.0	0.22
9/19/2018	Assessment	0.13	0.32	26.6	<0.004 U	0.15	0.093	1.88	1.159	0.22	0.02 J	0.052	<0.002 U	15.6	0.8	0.251
4/9/2019	Assessment	0.20 J	0.54	29.1	<0.1 U	0.27	0.3 J	2.41	1.472	0.19	<0.1 U	0.061	<0.002 U	17.8	1.2	<0.5 U
6/19/2019	Assessment	0.15	0.33	29.0	<0.02 U	0.21	0.09 J	2.16	1.256	0.16	<0.02 U	0.032	<0.002 U	16.6	1.0	0.3 J
9/9/2019	Assessment	0.14	0.34	29.0	<0.02 U	0.21	0.1 J	2.14	1.15	0.20	<0.05 U	0.0476	<0.002 U	16.3	1.0	0.3 J

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-1605D
Mountaineer - 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
9/27/2016	Background	12.2	462	195	0.18	7.6	2650	1480
11/2/2016	Background	9.96	381	195	0.19	7.4	2510	1500
12/20/2016	Background	9.35	341	168	0.18	7.4	2300	1290
2/21/2017	Background	9.16	318	163	0.20	7.3	2290	1190
3/28/2017	Background	11.6	344	169	0.20	7.2	2350	1200
4/18/2017	Background	9.06	360	172	0.20	7.5	2280	1180
5/16/2017	Background	8.77	374	187	0.20	7.9	2240	1130
6/13/2017	Background	9.09	351	196	0.17	--	2260	1190
10/31/2017	Detection	7.83	324	198	0.21	7.3	2170	1170
1/22/2018	Detection	9.33	321	197	--	7.2	2060	1070
5/9/2018	Assessment	--	--	--	0.23	7.5	--	--
9/19/2018	Assessment	9.11	278	188	0.22	7.6	1960	972
4/9/2019	Assessment	6.90	247	169	0.22	7.3	1710	791
6/19/2019	Assessment	6.57	265	165	0.19	7.5	1890	877
9/10/2019	Assessment	8.57	283	168	0.17	7.2	2050	974

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-1605D
Mountaineer - 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
9/27/2016	Background	0.03 J	2.29	31.5	<0.01 U	0.04	0.1	1.91	1.06	0.18	0.080	0.085	<0.002 U	54.6	0.2	0.06 J
11/2/2016	Background	0.03 J	2.48	30.6	<0.01 U	0.04	0.2	1.79	1.925	0.19	0.044	0.078	<0.002 U	52.4	0.2	0.05 J
12/20/2016	Background	0.03 J	2.26	28.2	<0.01 U	0.04 J	2.29	1.75	2.662	0.18	0.03 J	0.063	<0.002 U	54.7	0.3	0.05 J
2/21/2017	Background	0.04 J	2.23	25.9	<0.005 U	0.03	0.282	1.84	1.033	0.20	0.021	0.071	<0.002 U	46.8	0.2	0.138
3/28/2017	Background	0.04 J	2.01	27.9	<0.005 U	0.03	0.556	1.69	0.578	0.20	0.02 J	0.086	<0.002 U	44.6	0.2	0.090
4/18/2017	Background	0.03 J	2.25	25.8	<0.008 U	0.02 J	0.127	1.69	0.821	0.20	0.02 J	0.077	0.002 J	43.2	0.2 J	0.04 J
5/16/2017	Background	0.03 J	2.45	26.3	<0.004 U	0.02 J	0.099	1.63	3.433	0.20	0.01 J	0.075	<0.002 U	48.1	0.2	0.04 J
6/13/2017	Background	0.04 J	1.99	27.2	<0.008 U	0.04	0.120	1.86	0.668	0.17	0.02 J	0.081	<0.002 U	45.5	0.4	0.05 J
5/9/2018	Assessment	0.03 J	2.22	21.6	<0.004 U	0.01 J	0.067	1.51	0.523	0.23	0.02 J	0.062	<0.002 U	46.4	0.2	0.04 J
9/19/2018	Assessment	0.04 J	2.51	25.9	<0.004 U	0.02 J	0.229	1.80	0.759	0.22	0.01 J	0.060	<0.002 U	47.9	0.3	0.05 J
4/9/2019	Assessment	0.04 J	2.81	26.4	<0.02 U	0.01 J	0.06 J	1.56	0.543	0.22	0.03 J	0.075	<0.002 U	40.6	0.2	<0.1 U
6/19/2019	Assessment	<0.04 U	2.67	28.6	<0.04 U	0.02 J	0.2 J	1.65	0.831	0.19	<0.04 U	0.02 J	<0.002 U	40.0	0.2 J	<0.2 U
9/10/2019	Assessment	0.03 J	2.78	33.1	<0.02 U	0.03 J	0.04 J	1.69	1.641	0.17	<0.05 U	0.0561	<0.002 U	39.7	0.3	<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-1605S
Mountaineer - 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
9/27/2016	Background	8.30	224	150	0.24	7.5	1910	965
11/1/2016	Background	6.55	220	159	0.25	7.3	1930	1010
12/20/2016	Background	7.30	279	173	0.22	7.4	2160	1180
2/21/2017	Background	9.04	249	179	0.25	7.2	2220	1110
3/28/2017	Background	10.8	261	212	0.25	7.1	2250	1110
4/18/2017	Background	8.69	244	180	0.23	7.4	2120	1100
5/16/2017	Background	8.75	251	217	0.26	7.7	2160	1060
6/13/2017	Background	8.80	218	191	0.24	7.8	1980	1000
10/31/2017	Detection	5.88	212	222	0.25	7.2	2000	1040
1/22/2018	Detection	10.1	231	220	--	7.1	1970	976
5/9/2018	Assessment	--	--	--	0.30	7.2	--	--
9/19/2018	Assessment	7.75	182	171	0.32	7.4	1650	793
4/9/2019	Assessment	9.39	164	140	0.33	7.2	1450	599
6/19/2019	Assessment	7.02	156	140	0.23	7.4	1510	649
9/10/2019	Assessment	8.05	174	149	0.26	7.2	1470	694

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-1605S
Mountaineer - 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
9/27/2016	Background	0.16	1.38	49.6	0.02 J	0.13	0.6	3.16	0.777	0.24	2.18	0.086	<0.002 U	25.8	1.1	0.174
11/1/2016	Background	0.07	0.93	38.2	0.009 J	0.08	0.7	1.26	2.692	0.25	0.793	0.084	<0.002 U	23.9	0.9	0.055
12/20/2016	Background	0.07 J	0.88	37.0	<0.01 U	0.08	2.85	0.861	0.337	0.22	0.410	0.076	<0.002 U	22.9	0.7	0.05 J
2/21/2017	Background	0.04 J	0.86	36.0	0.007 J	0.08	0.39	1.10	0.785	0.25	0.636	0.068	<0.002 U	17.5	1.1	0.055
3/28/2017	Background	0.03 J	0.63	32.5	<0.005 U	0.06	0.349	0.448	0.466	0.25	0.181	0.076	<0.002 U	15.4	1.0	0.102
4/18/2017	Background	0.06 J	0.74	31.9	<0.008 U	0.08	0.245	0.715	0.827	0.23	0.285	0.067	0.003 J	20.8	3.0	0.04 J
5/16/2017	Background	0.06 J	0.88	33.3	<0.008 U	0.08	0.585	0.647	2.733	0.26	0.382	0.076	<0.002 U	18.6	1.7	0.06 J
6/13/2017	Background	0.05 J	0.75	30.8	<0.008 U	0.08	0.387	0.708	0.611	0.24	0.541	0.071	<0.002 U	17.8	1.7	0.05 J
5/9/2018	Assessment	0.04 J	0.50	23.5	<0.004 U	0.06	0.083	0.518	0.3045	0.30	0.056	0.051	<0.002 U	15.6	2.0	0.04 J
9/19/2018	Assessment	0.04 J	0.49	23.1	<0.004 U	0.05	0.644	0.360	0.347	0.32	0.093	0.049	<0.002 U	15.1	1.0	0.04 J
4/9/2019	Assessment	0.05 J	0.64	25.2	<0.02 U	0.05	0.293	0.631	0.369	0.33	0.331	0.079	<0.002 U	15.9	0.7	<0.1 U
6/19/2019	Assessment	0.04 J	0.47	23.6	<0.02 U	0.05 J	0.1 J	0.279	0.424	0.23	0.08 J	0.040	<0.002 U	13.6	0.6	<0.1 U
9/10/2019	Assessment	0.04 J	0.59	29.6	<0.02 U	0.05 J	0.237	0.379	0.542	0.26	0.202	0.0524	<0.002 U	14.2	0.4	<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-1606D
Mountaineer - 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
9/27/2016	Background	4.29	278	190	0.25	7.2	1710	813
11/2/2016	Background	3.97	252	201	0.28	7.4	1720	796
12/20/2016	Background	4.96	260	206	0.24	7.5	1690	796
2/21/2017	Background	5.48	242	190	0.26	7.3	1670	759
3/28/2017	Background	6.90	247	187	0.26	7.2	1700	739
4/18/2017	Background	5.46	274	104	0.26	7.4	1690	385
5/16/2017	Background	5.26	278	218	0.26	8.0	1730	764
6/13/2017	Background	5.90	262	219	0.24	7.5	1680	752
10/31/2017	Detection	7.03	287	213	0.24	7.3	1590	770
1/23/2018	Detection	9.59	322	237	--	7.4	1730	760
5/9/2018	Assessment	--	--	--	0.26	7.4	--	--
9/19/2018	Assessment	7.27	260	201	0.26	7.2	1610	722
4/8/2019	Assessment	7.32	265	214	0.26	7.2	1600	682
6/19/2019	Assessment	7.79	281	231	0.1 J	7.4	1690	693
9/10/2019	Assessment	6.38	281	244	0.49	7.4	1700	588

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-1606D
Mountaineer - 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
9/27/2016	Background	0.19	0.71	64.0	0.005 J	0.07	0.3	2.20	8.459	0.25	0.522	0.129	<0.002 U	81.4	1.8	0.123
11/2/2016	Background	0.19	0.84	62.6	<0.005 U	0.07	0.9	1.92	3.659	0.28	0.491	0.120	<0.002 U	81.2	4.7	0.092
12/20/2016	Background	0.16	0.63	58.4	<0.005 U	0.06	0.736	1.52	1.179	0.24	0.164	0.110	<0.002 U	83.2	3.6	0.094
2/21/2017	Background	0.16	0.51	52.6	<0.005 U	0.07	0.300	1.33	1.71	0.26	0.082	0.109	<0.002 U	76.6	4.1	0.119
3/28/2017	Background	0.15	0.44	53.6	<0.005 U	0.05	0.541	1.17	1.459	0.26	0.087	0.130	<0.002 U	73.3	3.6	0.113
4/18/2017	Background	0.25	1.38	64.2	0.01 J	0.08	0.853	4.26	1.212	0.26	2.04	0.119	0.004 J	71.5	4.1	0.097
5/16/2017	Background	0.19	0.63	56.7	0.031	0.07	0.163	1.39	3.18	0.26	0.162	0.124	<0.002 U	79.1	5.9	0.095
6/13/2017	Background	0.16	0.52	52.0	<0.008 U	0.08	0.153	1.46	1.026	0.24	0.084	0.132	<0.002 U	77.8	8.1	0.09 J
5/9/2018	Assessment	0.16	0.44	53.0	<0.004 U	0.07	0.198	1.40	0.972	0.26	0.115	0.112	<0.002 U	70.3	2.6	0.086
9/19/2018	Assessment	0.15	0.38	48.9	0.004 J	0.07	0.151	1.17	0.4378	0.26	0.01 J	0.107	<0.002 U	65.3	3.3	0.108
4/8/2019	Assessment	0.15	0.35	47.3	<0.02 U	0.07	0.1 J	1.25	0.94	0.26	0.03 J	0.124	<0.002 U	71.8	8.1	<0.1 U
6/19/2019	Assessment	0.14	0.37	49.4	<0.02 U	0.09	0.07 J	1.36	0.933	0.1 J	<0.02 U	0.058	<0.002 U	68.3	9.6	0.1 J
9/10/2019	Assessment	0.15	0.40	51.4	<0.02 U	0.08	0.1 J	1.09	2.2714	0.49	<0.05 U	0.0835	<0.002 U	68.5	1.0	<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-1606S
Mountaineer - 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
9/27/2016	Background	5.25	219	182	0.50	6.0	1470	621
11/2/2016	Background	4.57	183	183	0.57	7.2	1470	638
12/20/2016	Background	5.35	200	170	0.46	7.3	1420	621
2/21/2017	Background	5.03	211	231	0.46	7.1	1500	578
3/28/2017	Background	6.67	217	226	0.45	7.0	1500	589
4/18/2017	Background	5.80	228	217	0.43	7.2	1540	615
5/16/2017	Background	5.72	228	227	0.45	7.7	3230	635
6/13/2017	Background	6.12	230	230	0.45	7.4	1540	643
10/31/2017	Detection	9.54	226	187	0.46	7.1	1410	644
1/23/2018	Detection	6.62	218	184	0.43	7.2	1450	660
5/9/2018	Assessment	--	--	--	0.44	6.9	--	--
9/19/2018	Assessment	5.87	199	219	0.46	7.1	1370	571
4/8/2019	Assessment	7.68	229	223	0.54	6.8	1480	592
6/19/2019	Assessment	6.08	223	232	0.25	7.2	1490	581
9/10/2019	Assessment	6.19	229	221	0.28	7.3	1460	705

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-1606S
Mountaineer - 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
9/27/2016	Background	0.16	0.88	76.7	<0.005 U	0.08	0.2	0.466	0.592	0.50	0.234	0.116	<0.002 U	112	1.2	0.074
11/2/2016	Background	0.17	0.94	69.7	<0.005 U	0.07	0.4	0.432	1.55	0.57	0.207	0.103	<0.002 U	112	1.0	0.06
12/20/2016	Background	0.16	0.83	71.6	<0.005 U	0.07	1.26	0.280	1.656	0.46	0.084	0.102	<0.002 U	101	0.9	0.063
2/21/2017	Background	0.15	0.88	77.2	<0.005 U	0.08	0.384	0.372	0.993	0.46	0.158	0.108	<0.002 U	93.1	0.7	0.086
3/28/2017	Background	0.14	0.78	75.7	<0.005 U	0.06	0.742	0.258	0.945	0.45	0.096	0.126	<0.002 U	90.1	0.7	0.100
4/18/2017	Background	0.16	0.86	74.2	<0.004 U	0.07	0.134	0.234	1.303	0.43	0.070	0.117	0.002 J	92.4	0.8	0.062
5/16/2017	Background	0.16	0.90	74.1	<0.004 U	0.07	0.093	0.241	2.167	0.45	0.062	0.110	<0.002 U	90.2	0.9	0.069
6/13/2017	Background	0.16	0.81	77.1	<0.008 U	0.09	0.178	0.281	1.28	0.45	0.090	0.118	<0.002 U	95.7	0.9	0.07 J
5/9/2018	Assessment	0.14	0.72	73.2	<0.004 U	0.08	0.056	0.318	0.3443	0.44	0.040	0.107	<0.002 U	70.2	2.0	0.076
9/19/2018	Assessment	0.13	0.69	64.8	0.005 J	0.06	0.297	0.260	0.439	0.46	0.02 J	0.096	<0.002 U	70.6	2.8	0.112
4/8/2019	Assessment	0.15	0.70	63.1	<0.02 U	0.07	0.08 J	0.320	0.595	0.54	0.107	0.117	<0.002 U	67.7	1.4	<0.1 U
6/19/2019	Assessment	0.15	0.63	67.2	<0.02 U	0.08	0.08 J	0.171	1.0123	0.25	0.111	0.056	<0.002 U	58.9	1.3	0.1 J
9/10/2019	Assessment	0.13	0.67	70.4	<0.02 U	0.07	0.08 J	0.312	2.682	0.28	<0.05 U	0.0877	<0.002 U	54.9	2.7	<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-1607D
Mountaineer - 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
9/27/2016	Background	1.64	141	88.3	0.54	6.9	744	285
11/2/2016	Background	1.42	155	103	0.61	7.8	856	376
12/20/2016	Background	1.46	187	118	0.50	7.7	1050	474
1/23/2017	Background	--	--	--	--	7.5	--	--
2/21/2017	Background	1.54	165	107	0.51	7.6	1010	415
3/29/2017	Background	1.89	162	106	0.52	7.6	938	393
4/18/2017	Background	1.58	168	104	0.52	7.6	904	383
5/16/2017	Background	1.54	156	102	0.52	8.4	876	347
6/14/2017	Background	1.50	159	104	0.49	7.6	872	365
10/31/2017	Detection	1.76	214	138	0.47	7.6	1290	626
1/23/2018	Detection	2.34	244	150	0.44	7.5	1380	668
5/10/2018	Assessment	--	--	--	0.54	7.5	--	--
9/20/2018	Assessment	2.44	222	163	0.52	7.7	1450	662
4/8/2019	Assessment	3.10	232	162	0.52	7.4	1480	656
6/19/2019	Assessment	3.14	234	167	0.40	7.8	1600	710
9/10/2019	Assessment	3.65	233	174	0.56	7.7	1610	699

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-1607D
Mountaineer - 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
9/27/2016	Background	0.04 J	0.91	117	<0.005 U	0.02 J	0.3	0.439	0.86	0.54	0.179	0.068	<0.002 U	96.2	0.1	0.05 J
11/2/2016	Background	0.03 J	1.02	155	<0.005 U	0.02 J	0.7	0.396	3.997	0.61	0.058	0.069	<0.002 U	91.1	0.07 J	0.04 J
12/20/2016	Background	0.03 J	1.02	168	<0.005 U	0.005 J	2.07	0.526	1.689	0.50	0.038	0.075	<0.002 U	89.6	0.03 J	0.04 J
2/21/2017	Background	0.03 J	1.14	133	<0.005 U	<0.004 U	0.090	0.481	0.883	0.51	0.041	0.072	<0.002 U	87.7	0.03 J	0.04 J
3/29/2017	Background	0.05	1.24	140	0.008 J	0.03	0.602	0.805	1.872	0.52	0.628	0.087	0.002 J	85.9	0.5	0.062
4/18/2017	Background	0.03 J	1.00	126	<0.004 U	<0.005 U	0.133	0.414	1.535	0.52	0.070	0.079	0.002 J	81.8	0.05 J	0.02 J
5/16/2017	Background	0.03 J	1.11	129	<0.004 U	<0.005 U	0.078	0.399	1.265	0.52	0.041	0.087	<0.002 U	91.2	0.04 J	0.02 J
6/14/2017	Background	0.03 J	0.98	131	<0.004 U	<0.005 U	0.141	0.439	1.764	0.49	0.124	0.088	<0.002 U	90.8	0.03 J	0.04 J
5/10/2018	Assessment	0.03 J	1.15	73.5	<0.004 U	<0.005 U	0.051	0.521	1.254	0.54	0.043	0.089	<0.002 U	80.9	<0.03 U	0.02 J
9/20/2018	Assessment	0.03 J	1.34	92.3	<0.004 U	<0.005 U	0.158	0.769	0.926	0.52	0.044	0.104	<0.002 U	83.4	<0.03 U	0.04 J
4/8/2019	Assessment	0.03 J	1.31	75.7	<0.02 U	<0.01 U	0.07 J	0.778	1.3269	0.52	0.05 J	0.127	<0.002 U	79.8	0.05 J	<0.1 U
6/19/2019	Assessment	0.03 J	1.61	82.3	<0.02 U	<0.01 U	0.1 J	0.799	1.31	0.40	0.07 J	0.072	<0.002 U	81.8	0.06 J	<0.1 U
9/10/2019	Assessment	0.03 J	1.53	79.3	<0.02 U	0.01 J	0.05 J	0.848	1.855	0.56	<0.05 U	0.110	<0.002 U	82.1	0.09 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-1607S
Mountaineer - 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
10/31/2016	Background	1.38	126	90.8	0.31	7.6	670	213
11/2/2016	Background	1.35	126	90.6	0.32	7.6	698	214
12/21/2016	Background	1.02	129	92.7	0.33	7.7	716	246
2/21/2017	Background	1.27	131	91.9	0.29	7.5	746	244
3/28/2017	Background	1.70	131	93.1	0.28	7.4	706	233
4/18/2017	Background	1.65	135	92.6	0.30	7.6	678	225
5/16/2017	Background	1.64	133	97.5	0.29	8.2	746	221
6/14/2017	Background	1.74	136	96.3	0.27	7.5	708	229
10/31/2017	Detection	1.32	165	100	0.28	7.5	860	343
1/23/2018	Detection	1.49	--	111	--	7.4	--	--
5/10/2018	Assessment	--	--	--	0.29	7.4	--	--
9/20/2018	Assessment	1.71	220	151	0.28	7.6	1160	478
4/8/2019	Assessment	2.35	226	153	0.26	7.2	1310	504
6/19/2019	Assessment	2.46	233	154	0.19	7.5	1370	524
9/10/2019	Assessment	3.21	198	167	0.27	7.7	1350	465

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-1607S
Mountaineer - 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
10/31/2016	Background	0.46	1.86	56.7	0.01 J	0.06	0.8	2.59	2.504	0.31	1.40	0.098	0.003 J	48.4	7.1	0.060
11/2/2016	Background	0.45	1.30	55.5	<0.005 U	0.04	0.4	0.752	1.338	0.32	0.264	0.092	<0.002 U	50.4	7.0	0.05 J
12/21/2016	Background	0.84	11.2	114	0.123	0.22	3.10	20.1	2.81	0.33	11.0	0.088	0.012	45.7	9.4	0.150
2/21/2017	Background	0.42	1.19	63.9	0.007 J	0.03	0.325	1.21	1.974	0.29	0.267	0.091	<0.002 U	41.3	9.0	0.069
3/28/2017	Background	0.43	1.17	66.8	<0.005 U	0.02	0.390	0.942	1.153	0.28	0.134	0.110	<0.002 U	39.2	9.2	0.052
4/18/2017	Background	0.55	1.62	67.6	0.01 J	0.06	0.514	2.60	1.632	0.30	1.25	0.102	0.003 J	45.1	8.9	0.058
5/16/2017	Background	0.50	1.17	63.7	<0.004 U	0.03	0.226	0.851	2.408	0.29	0.159	0.094	<0.002 U	48.1	9.1	0.05 J
6/14/2017	Background	0.48	1.10	62.9	<0.004 U	0.03	0.200	0.936	1.017	0.27	0.138	0.106	<0.002 U	46.1	9.4	0.05 J
5/10/2018	Assessment	0.44	0.93	71.1	<0.004 U	0.04	0.121	1.18	1.29	0.29	0.128	0.103	<0.002 U	43.2	11.4	0.064
9/20/2018	Assessment	0.42	0.90	80.6	<0.004 U	0.04	0.086	0.840	0.584	0.28	0.094	0.118	<0.002 U	41.5	8.8	0.089
4/8/2019	Assessment	0.40	0.94	72.7	<0.02 U	0.04 J	0.376	1.21	0.723	0.26	0.09 J	0.141	<0.002 U	37.9	7.0	<0.1 U
6/19/2019	Assessment	0.44	0.96	81.0	<0.02 U	0.04 J	0.428	0.990	1.121	0.19	0.108	0.075	<0.002 U	34.6	5.6	<0.1 U
9/10/2019	Assessment	0.41	0.87	67.7	<0.02 U	0.05 J	0.357	0.971	2.765	0.27	0.09 J	0.0990	<0.002 U	35.0	4.3	<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-1608
Mountaineer - 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
9/27/2016	Background	0.150	93.8	6.55	0.27	7.4	368	70.6
11/1/2016	Background	0.113	86.2	6.43	0.30	7.3	352	64.3
12/19/2016	Background	0.118	83.0	4.25	0.26	7.3	338	58.3
2/22/2017	Background	0.156	83.3	4.37	0.25	7.1	398	94.4
3/27/2017	Background	0.238	80.3	5.27	0.24	6.8	350	112
4/17/2017	Background	0.233	101	7.08	0.23	7.0	424	168
5/15/2017	Background	0.200	102	8.62	0.23	7.8	475	208
6/12/2017	Background	0.169	110	8.23	0.21	6.7	486	204
10/31/2017	Detection	0.140	94.7	5.13	0.22	7.1	430	131
5/10/2018	Assessment	--	--	--	0.18	6.8	--	--
9/20/2018	Assessment	0.169	128	6.59	0.21	7.2	572	256
4/9/2019	Assessment	0.156	102	6.82	0.20	6.9	451	179
6/18/2019	Assessment	0.116	86.5	5.06	0.16	6.2	416	144
9/10/2019	Assessment	0.124	92.0	4.01	0.20	7.1	369	109

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-1608
Mountaineer - 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
9/27/2016	Background	0.10	0.82	42.0	0.02 J	0.03	0.9	1.21	0.454	0.27	0.881	0.003	<0.002 U	2.35	1.2	0.03 J
11/1/2016	Background	0.04 J	0.53	33.4	<0.005 U	0.02 J	0.6	0.254	2.282	0.30	0.232	0.004	<0.002 U	2.16	1.3	0.081
12/19/2016	Background	0.04 J	0.68	32.2	0.009 J	0.02	2.78	0.588	0.379	0.26	0.405	<0.0002 U	<0.002 U	1.94	1.1	0.03 J
2/22/2017	Background	0.03 J	0.52	32.4	<0.005 U	0.01 J	0.364	0.240	1.235	0.25	0.205	0.003	<0.002 U	1.40	1.5	0.053
3/27/2017	Background	0.03 J	0.56	31.4	<0.005 U	0.01 J	0.335	0.330	0.417	0.24	0.274	0.006	<0.002 U	2.49	1.3	0.04 J
4/17/2017	Background	0.04 J	0.50	35.3	<0.004 U	0.01 J	0.223	0.196	0.1298	0.23	0.173	0.006	0.002 J	1.89	1.3	0.01 J
5/15/2017	Background	0.04 J	0.49	35.1	<0.004 U	0.008 J	0.151	0.098	0.857	0.23	0.073	0.006	<0.002 U	2.08	1.0	0.01 J
6/12/2017	Background	0.03 J	0.49	36.4	<0.004 U	0.006 J	0.277	0.040	0.146	0.21	0.024	0.016	<0.002 U	1.57	1.1	0.02 J
5/10/2018	Assessment	0.02 J	0.37	46.6	0.009 J	0.01 J	0.126	0.095	0.565	0.18	0.079	0.0003 J	<0.002 U	0.53	0.9	0.02 J
9/20/2018	Assessment	0.03 J	0.42	42.6	<0.004 U	0.008 J	0.264	0.052	0.55	0.21	0.037	0.004	<0.002 U	1.18	1.2	0.02 J
4/9/2019	Assessment	0.04 J	0.56	41.2	<0.02 U	0.02 J	0.372	0.597	0.2435	0.20	0.454	0.01 J	<0.002 U	1 J	1.2	<0.1 U
6/18/2019	Assessment	0.03 J	0.40	32	<0.02 U	0.01 J	0.306	0.05 J	0.104	0.16	0.06 J	<0.009 U	<0.002 U	0.8 J	0.8	<0.1 U
9/10/2019	Assessment	0.03 J	0.52	26.8	0.05 J	<0.01 U	0.327	0.056	1.348	0.20	0.06 J	0.00286	<0.002 U	1 J	1.0	<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-1805
Mountaineer - 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
4/10/2019	Assessment	4.24	147	146	0.36	7.8	1500	639
6/19/2019	Assessment	6.38	280	156	0.1 J	7.5	1860	894
9/10/2019	Assessment	6.00	273	--	--	7.4	--	--
9/11/2019	Assessment	--	--	167	0.24	--	1880	908

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-1805
Mountaineer - 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
4/10/2019	Assessment	2.14	20.3	54.3	<0.1 U	<0.05 U	1.00	3.31	3.12	0.36	1.21	0.043	<0.002 U	80.1	<0.3 U	<0.5 U
6/19/2019	Assessment	<0.04 U	66.3	42.4	<0.04 U	<0.02 U	0.2 J	4.91	1.412	0.1 J	<0.04 U	0.032	<0.002 U	96.2	0.1 J	<0.2 U
9/10/2019	Assessment	0.07 J	70.4	41.9	<0.02 U	<0.01 U	0.415	3.39	2.7353	0.24*	0.1 J	0.0426	<0.002 U	78.0	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

* Sample collected on 9/11/2019

**Table 1 - Groundwater Data Summary: MW-1921
Mountaineer - 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
4/10/2019	Assessment	0.571	55.9	34.7	0.77	7.6	452	106
6/19/2019	Assessment	0.644	77.7	33.3	0.87	8.2	435	128
9/11/2019	Assessment	0.647	79.6	--	--	7.6	--	--
9/13/2019	Assessment	--	--	33.2	0.79	--	438	131

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-1921
Mountaineer - 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
4/10/2019	Assessment	0.10 J	3.36	68.0	<0.1 U	<0.05 U	1.13	2.64	1.678	0.77	0.944	0.075	0.002 J	478	0.4 J	<0.5 U
6/19/2019	Assessment	0.10	1.19	51.2	<0.02 U	<0.01 U	0.07 J	0.860	0.276	0.87	0.06 J	0.074	<0.002 U	502	0.2 J	<0.1 U
9/11/2019	Assessment	0.10 J	1.25	50.8	<0.02 U	0.03 J	0.1 J	0.692	1.228	0.79*	0.08 J	0.0926	<0.002 U	500	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

* Sample collected on 9/11/2019

**Table 1 - Groundwater Data Summary: MW-1922D
Mountaineer - 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
4/9/2019	Assessment	1.00	145	53.5	0.29	7.5	908	333
6/19/2019	Assessment	0.725	121	44.1	0.31	7.6	724	269
9/10/2019	Assessment	0.44	96.5	--	--	7.6	--	--
9/11/2019	Assessment	--	--	32.7	0.33	--	566	167

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-1922D
Mountaineer - 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
4/9/2019	Assessment	0.88	323	69.3	<0.1 U	<0.05 U	0.4 J	1.02	2.64	0.29	0.1 J	0.02 J	<0.002 U	488	<0.2 U	<0.5 U
6/19/2019	Assessment	0.29	716	54.7	<0.02 U	<0.01 U	<0.04 U	0.530	3.332	0.31	<0.02 U	<0.009 U	<0.002 U	515	0.04 J	<0.1 U
9/10/2019	Assessment	1.04	839	51.0	<0.02 U	0.01 J	0.08 J	0.492	3.089	0.33*	<0.05 U	0.0126	<0.002 U	478	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

* Sample collected on 9/11/2019

**Table 1 - Groundwater Data Summary: MW-1922S
Mountaineer - 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
4/9/2019	Assessment	7.66	359	171	0.16	7.2	2090	978
6/20/2019	Assessment	6.95	335	169	0.17	7.4	2090	1020
9/10/2019	Assessment	6.34	342	--	--	7.3	--	--
9/11/2019	Assessment	--	--	179	0.19	--	2060	1070

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-1922S
Mountaineer - 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
4/9/2019	Assessment	<0.10 U	1.95	30.7	<0.1 U	<0.05 U	0.3 J	1.83	2.124	0.16	0.3 J	0.082	<0.002 U	43.5	<0.2 U	<0.5 U
6/20/2019	Assessment	<0.04 U	1.89	26.9	<0.04 U	<0.02 U	0.2 J	1.37	1.156	0.17	0.08 J	0.03 J	<0.002 U	36.4	0.07 J	<0.2 U
9/10/2019	Assessment	0.02 J	1.75	26.5	<0.02 U	<0.01 U	0.2 J	1.23	2.945	0.19*	0.1 J	0.0556	<0.002 U	33.9	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

* Sample collected on 9/11/2019

**Table 1 - Groundwater Data Summary: MW-1923
Mountaineer - 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
4/10/2019	Assessment	1.09	113	38.0	0.16	7.6	584	181
6/18/2019	Assessment	0.804	91.4	35.9	0.16	7.3	526	147
9/11/2019	Assessment	0.756	105	38.3	0.13	6.8	545	159

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-1923
Mountaineer - 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
4/10/2019	Assessment	0.20 J	0.55	77.6	<0.1 U	<0.05 U	0.3 J	0.317	0.706	0.16	0.1 J	0.223	<0.002 U	160	23.8	<0.5 U
6/18/2019	Assessment	0.21	0.56	72.9	<0.02 U	0.01 J	0.353	0.657	0.836	0.16	0.255	0.135	<0.002 U	101	14.4	<0.1 U
9/11/2019	Assessment	0.24	0.75	86.6	<0.02 U	0.03 J	0.541	1.01	2.099	0.13	0.543	0.137	<0.002 U	84.2	14.0	<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-1924
Mountaineer - 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
4/10/2019	Assessment	7.49	286	136	0.42	6.9	1700	766
6/18/2019	Assessment	6.22	243	122	0.38	7.3	1570	721
9/11/2019	Assessment	4.89	238	109	0.44	7.1	1500	662

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-1924
Mountaineer - 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
4/10/2019	Assessment	0.20 J	0.91	59.8	<0.1 U	0.2 J	0.3 J	2.29	0.921	0.42	0.3 J	0.133	<0.002 U	89.5	1.3	<0.5 U
6/18/2019	Assessment	0.06 J	0.55	69.5	<0.02 U	0.05	0.1 J	2.74	1.417	0.38	0.07 J	0.087	<0.002 U	69.0	3.6	<0.1 U
9/11/2019	Assessment	0.07 J	0.61	54.5	<0.02 U	0.06	0.2 J	4.10	1.719	0.44	0.218	0.102	<0.002 U	76.7	3.5	<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-1925
Mountaineer - 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
4/10/2019	Assessment	4.17	172	128	0.33	7.2	1460	624
6/19/2019	Assessment	5.21	242	147	0.25	7.6	1520	686
9/10/2019	Assessment	5.86	249	147	0.26	7.2	1500	683

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-1925
Mountaineer - 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
4/10/2019	Assessment	0.20 J	0.88	46.6	<0.1 U	0.06 J	0.4 J	1.65	2.726	0.33	0.4 J	0.094	<0.002 U	76.0	6.2	<0.5 U
6/19/2019	Assessment	0.18	0.35	48.0	<0.02 U	0.04 J	0.1 J	1.28	1.245	0.25	0.04 J	0.095	<0.002 U	63.5	6.3	<0.1 U
9/10/2019	Assessment	0.20	0.41	45.0	<0.02 U	0.06	0.1 J	1.27	1.041	0.26	0.2 J	0.0947	<0.002 U	54.6	4.1	<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-1926
Mountaineer - 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
4/10/2019	Assessment	0.263	95.4	57.8	0.25	7.2	506	67.4
6/20/2019	Assessment	0.165	82.1	23.2	0.28	7.3	416	47.8
9/11/2019	Assessment	0.145	87.6	--	--	7.3	--	--
9/13/2019	Assessment	--	--	8.57	0.24	--	396	26.4

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-1926
Mountaineer - 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
4/10/2019	Assessment	0.10 J	0.95	28.8	<0.1 U	0.06 J	0.4 J	5.05	1.327	0.25	0.981	0.01 J	<0.002 U	9 J	0.3 J	<0.5 U
6/20/2019	Assessment	0.08 J	0.38	22.9	<0.02 U	0.05	0.06 J	1.81	0.524	0.28	0.05 J	<0.009 U	<0.002 U	7.05	0.3	<0.1 U
9/11/2019	Assessment	0.07 J	0.37	23.9	<0.02 U	0.06	0.09 J	1.17	0.4608	0.24*	0.07 J	0.00624	<0.002 U	5.38	0.4	<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

* Sample collected on 9/11/2019

**Table 1 - Groundwater Data Summary: MW-1927
Mountaineer - 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
4/10/2019	Assessment	0.654	151	20.3	0.18	7.3	898	327
6/20/2019	Assessment	0.513	159	15.6	0.13	7.8	849	335
9/11/2019	Assessment	0.498	143	--	--	7.0	--	--
9/13/2019	Assessment	--	--	15.2	0.14	--	839	306

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-1927
Mountaineer - 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
4/10/2019	Assessment	0.30 J	0.4 J	63.4	<0.1 U	<0.05 U	<0.2 U	0.319	1.533	0.18	0.1 J	0.03 J	<0.002 U	7 J	0.8 J	<0.5 U
6/20/2019	Assessment	0.15	0.28	61.5	<0.02 U	0.05 J	0.1 J	0.251	0.866	0.13	0.03 J	<0.009 U	<0.002 U	2.82	0.3	<0.1 U
9/11/2019	Assessment	0.12	0.27	58.7	<0.02 U	0.05	0.08 J	0.225	1.415	0.14*	<0.05 U	0.00638	<0.002 U	2 J	0.4	<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

* Sample collected on 9/11/2019

**Table 1 - Groundwater Data Summary: MW-1929
Mountaineer - 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
4/10/2019	Assessment	0.243	115	11.7	0.19	7.5	574	214
6/18/2019	Assessment	0.219	97.8	13.6	0.20	7.5	541	237
9/10/2019	Assessment	0.236	113	15.1	0.19	7.6	528	234

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-1929
Mountaineer - 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
4/10/2019	Assessment	<0.10 U	0.80	56.9	<0.1 U	<0.05 U	0.5 J	3.03	0.823	0.19	1.15	0.01 J	<0.002 U	<2 U	1.3	<0.5 U
6/18/2019	Assessment	0.02 J	0.37	47.6	<0.02 U	0.02 J	0.2 J	0.157	0.398	0.20	0.08 J	<0.009 U	<0.002 U	0.7 J	1.3	<0.1 U
9/10/2019	Assessment	0.03 J	0.47	52.1	<0.02 U	0.01 J	0.280	0.606	2.994	0.19	0.274	0.0048	<0.002 U	0.7 J	1.7	<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

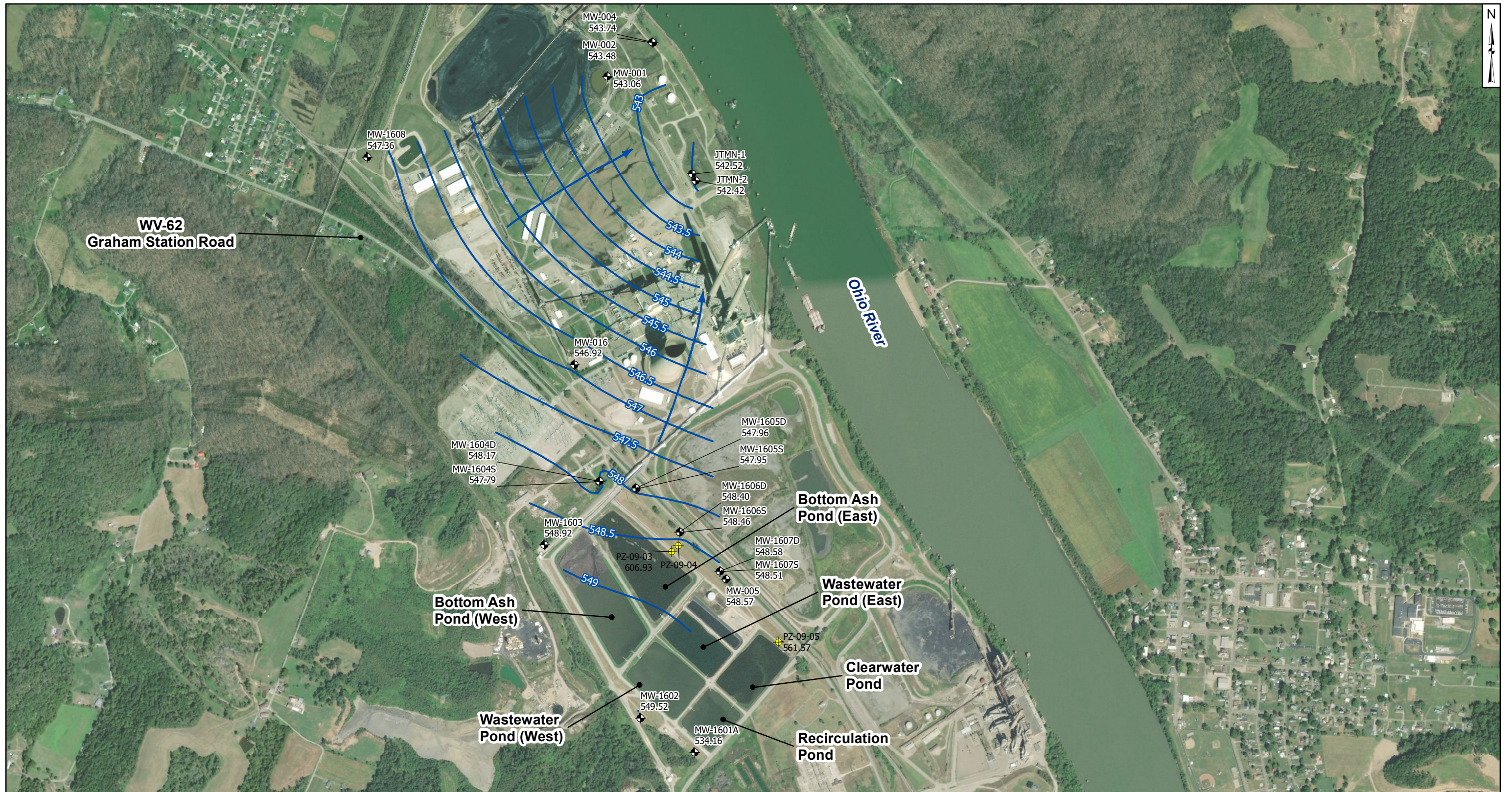
**Table 2: Residence Time Calculation Summary - Bottom Ash
Pond Mountaineer Bottom Ash Pond**

CCR Management Unit	Monitoring Well	Well Diameter (inches)	2019-04		2019-06		2019-09	
			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-1601A ^[1]	2.0	1,743	0.03	145	0.4	227	0.3
	MW-1602 ^[1]	2.0	120	0.5	177	0.3	208	0.3
	MW-1603 ^[1]	2.0	279	0.2	192	0.3	366	0.2
	MW-1604D ^[2]	2.0	148	0.4	6,426	0.01	231	0.3
	MW-1604S ^[2]	2.0	314	0.2	5,275	0.01	407	0.1
	MW-1605D ^[2]	2.0	252	0.2	234	0.3	355	0.2
	MW-1605S ^[2]	2.0	244	0.2	91.1	0.7	363	0.2
	MW-1606D ^[2]	2.0	293	0.2	1,048	0.1	224	0.3
	MW-1606S ^[2]	2.0	337	0.2	1,697	0.04	267	0.2
	MW-1607D ^[2]	2.0	139	0.4	1,337	0.05	98.5	0.6
	MW-1607S ^[2]	2.0	162	0.4	1,556	0.04	126	0.5
MW-1608 ^[1]	2.0	343	0.2	294	0.2	238	0.3	

Notes:

[1] - Background Well

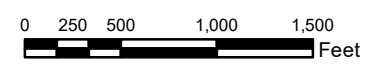
[2] - Downgradient Well



- Legend**
- ◆ Monitoring Well
 - ⊕ Piezometer
 - ➔ Approximate Groundwater Flow Direction
 - Groundwater Elevation Contour

Notes

- Monitoring well coordinates and water level data (collected on April 8, 2019) provided by AEP.
- Site features based on information available in Ash Pond System-CCR Groundwater Monitoring Well Network Evaluation (Arcadis, 2016) provided by AEP.
- Groundwater elevation units are feet above mean sea level.
- Water levels from piezometers were inconsistent with other local data and not used to create groundwater contours.
- Normal lower pool elevation of the Ohio River at Racine Lock and Dam is 539.5 ft amsl (USACE).
- Intermittent usage of pumping wells for plant activities impact water levels in the vicinity. In general, shallow groundwater beneath the plant flows northeast towards the Ohio River.
- MW-1601A was not used in contouring due to anomalous/inconsistent reading.



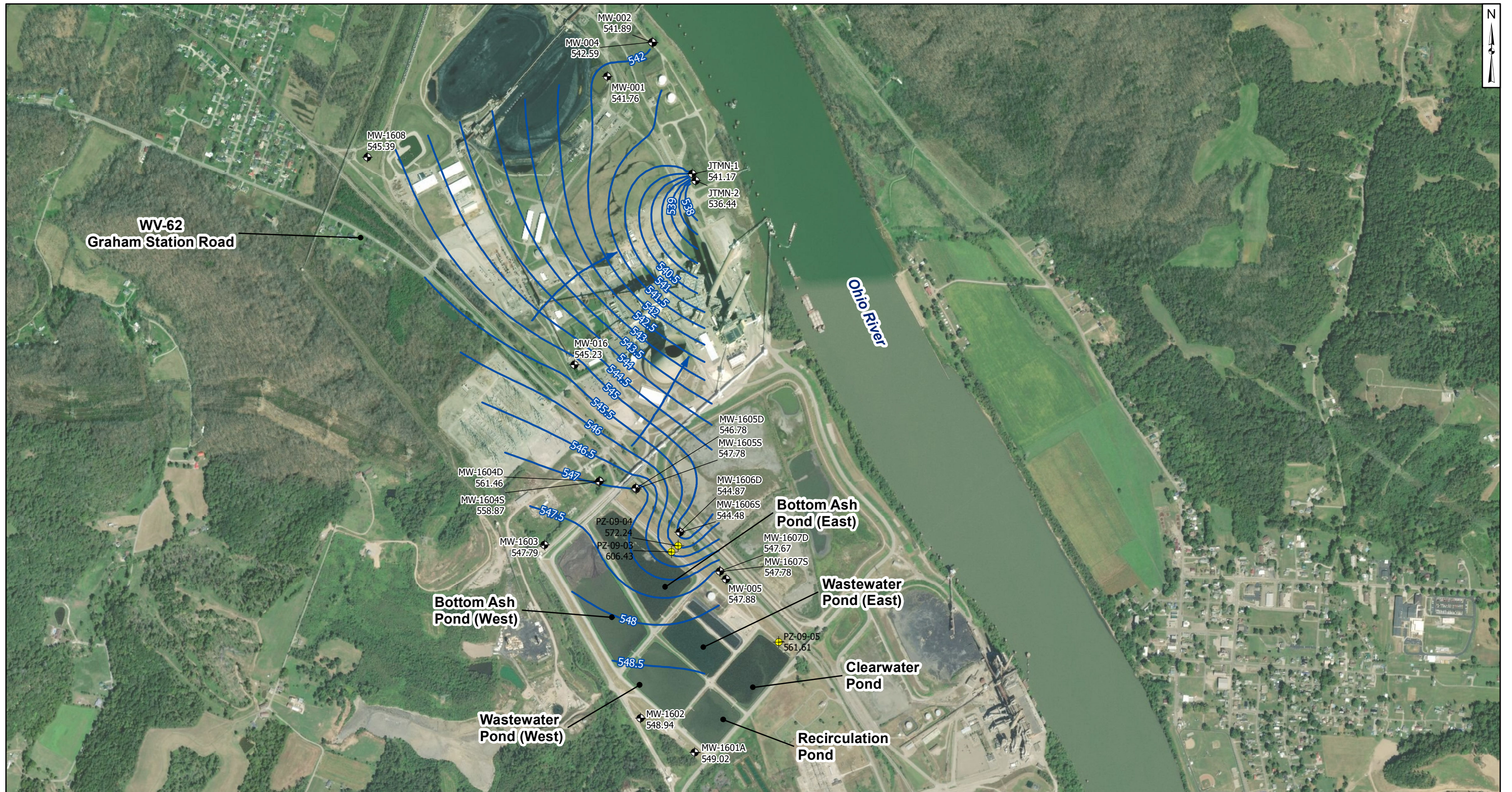
**Potentiometric Surface Map - Uppermost Aquifer
April 2019**

AEP Mountaineer Generating Plant - Bottom Ash Ponds
New Haven, West Virginia



Figure
1

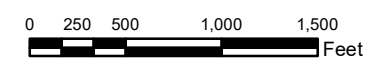
Columbus, Ohio 2019/12/30



- Legend**
- ◆ Monitoring Well
 - ⊕ Piezometer
 - ➔ Approximate Groundwater Flow Direction
 - Groundwater Elevation Contour

Notes

- Monitoring well coordinates and water level data (collected on June 17, 2019) provided by AEP.
- Site features based on information available in Ash Pond System-CCR Groundwater Monitoring Well Network Evaluation (Arcadis, 2016) provided by AEP.
- Groundwater elevation units are feet above mean sea level.
- Water levels from piezometers were inconsistent with other local data and not used to create groundwater contours.
- Normal lower pool elevation of the Ohio River at Racine Lock and Dam is 539.5 ft amsl (USACE).
- Intermittent usage of pumping wells for plant activities impact water levels in the vicinity. In general, shallow groundwater beneath the plant flows northeast towards the Ohio River.
- MW-1604S and MW-1604D were not used in contouring due to anomalous/inconsistent readings.



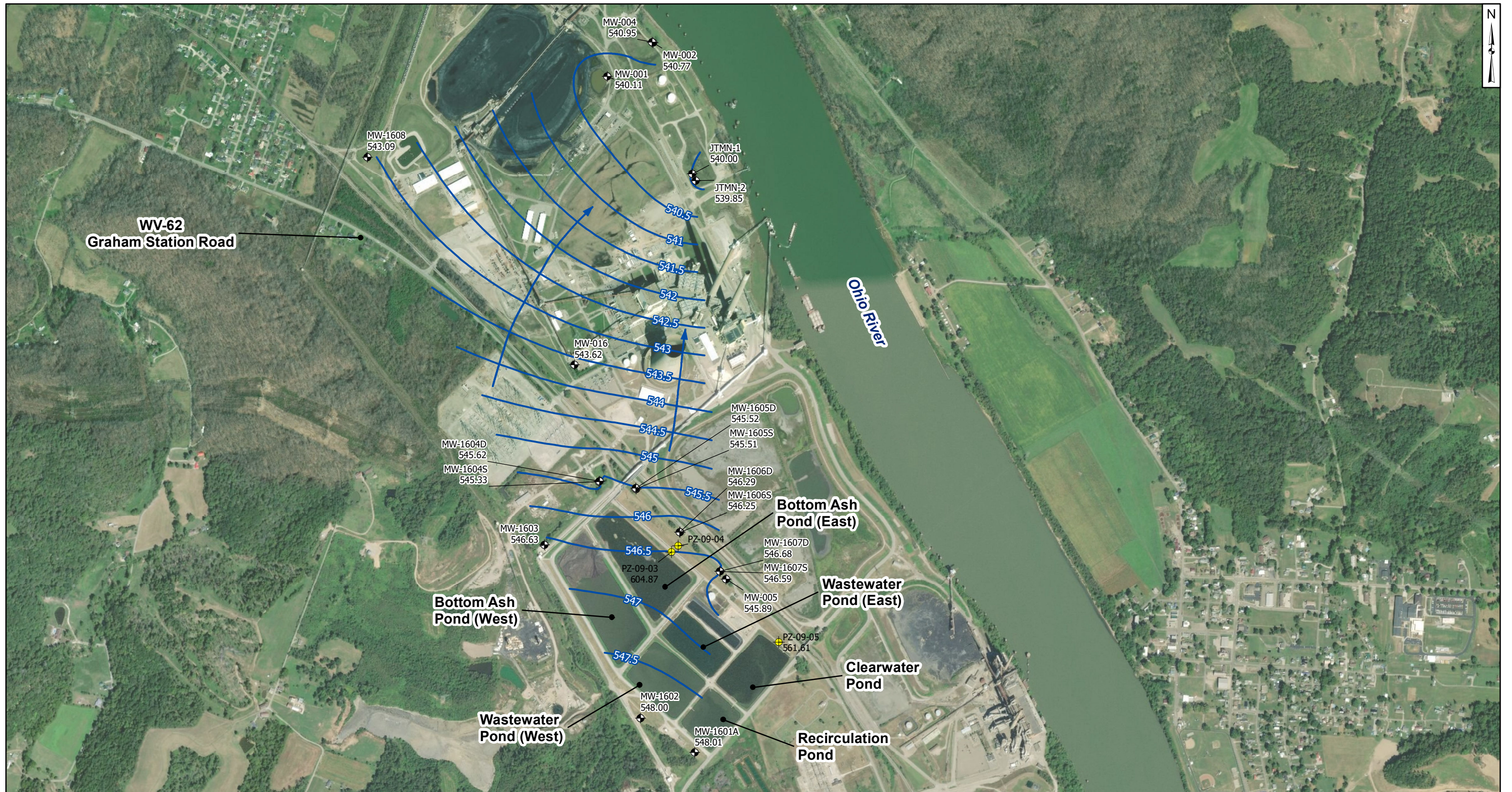
**Potentiometric Surface Map - Uppermost Aquifer
June 2019**

AEP Mountaineer Generating Plant - Bottom Ash Ponds
New Haven, West Virginia

Geosyntec
consultants

Figure
2

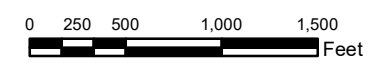
Columbus, Ohio 2019/12/31



- Legend**
- ◆ Monitoring Well
 - ⊕ Piezometer
 - ➔ Approximate Groundwater Flow Direction
 - Groundwater Elevation Contour

Notes

- Monitoring well coordinates and water level data (collected on September 9, 2019) provided by AEP.
- Site features based on information available in Ash Pond System-CCR Groundwater Monitoring Well Network Evaluation (Arcadis, 2016) provided by AEP.
- Groundwater elevation units are feet above mean sea level.
- Water levels from piezometers were inconsistent with other local data and not used to create groundwater contours.
- Normal lower pool elevation of the Ohio River at Racine Lock and Dam is 539.5 ft amsl (USACE).
- Intermittent usage of pumping wells for plant activities impact water levels in the vicinity. In general, shallow groundwater beneath the plant flows northeast toward the Ohio River.



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

AEP Mountaineer Generating Plant - Bottom Ash Ponds
New Haven, West Virginia



Figure
3

Columbus, Ohio 2019/12/31

Appendix 2

The groundwater data statistical analyses completed in 2019 follow.

STATISTICAL ANALYSIS SUMMARY
BOTTOM ASH POND
Mountaineer Plant
New Haven, West Virginia

Submitted to



1 Riverside Plaza
Columbus, Ohio 43215-2372

Submitted by



engineers | scientists | innovators

941 Chatham Lane
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January 8, 2019

CHA8473

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LIST OF TABLES

Table 1	Groundwater Data Summary
Table 2	Groundwater Protection Standards

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 Mountaineer Power Plant located in New Haven, West Virginia.

Based on detection monitoring conducted in 2017 and 2018, statistically significant increases (SSIs) over background were concluded for boron, 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. SSLs were identified for lithium. Thus, either the unit will move to an assessment of corrective measures or an alternative source demonstration (ASD) will be conducted to evaluate if the unit can remain in assessment monitoring. Certification of the selected statistical methods by a qualified professional engineer is documented in Attachment A.

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 IV parameters, while samples from the second sampling event were also analyzed for Appendix III 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.

Tolerance limits were generally calculated parametrically with 95% coverage and 95% confidence. Non-parametric tolerance limits were calculated for antimony, cadmium, and selenium due to apparent non-normal distributions and for beryllium and 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.

The following SSLs were identified at the Mountaineer BAP:

- LCLs for lithium exceeded the GWPS of 0.04 mg/L at MW-1605D (0.0653 mg/L), MW-1605S (0.0594 mg/L), MW-1606D (0.111 mg/L), MW-1606S (0.102 mg/L), MW-1607D (0.0718 mg/L), MW-1607S (0.0918 mg/L).

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

2.3 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. SSLs were identified for lithium.

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

SECTION 3

REFERENCES

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

Geosyntec Consultants (Geosyntec). 2018. Statistical Analysis Summary – Bottom Ash Pond, Mountaineer Plant, New Haven, West Virginia. January 15, 2018.

TABLES

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

Parameter	Unit	MW-1601A		MW-1602		MW-1603		MW-1604D		MW-1604S		MW-1605D		MW-1605S	
		5/10/2018	9/20/2018	5/10/2018	9/20/2018	5/10/2018	9/20/2018	5/9/2018	9/19/2018	5/9/2018	9/19/2018	5/9/2018	9/19/2018	5/9/2018	9/19/2018
Antimony	µg/L	0.0300 J	0.0300 J	0.0200 J	0.0100 J	0.0200 J	0.0200 J	0.0400 J	0.0400 J	0.130	0.130	0.0300 J	0.0400 J	0.0400 J	0.0400 J
Arsenic	µg/L	0.550	0.580	0.340	0.320	0.310	0.260	0.340	0.290	0.330	0.320	2.22	2.51	0.500	0.490
Barium	µg/L	63.9	55.3	31.2	26.7	41.3	35.9	32.0	37.0	28.7	26.6	21.6	25.9	23.5	23.1
Beryllium	µg/L	0.02 U	0.02 U	0.00500 J	0.02 U	0.00700 J	0.02 U	0.02 U	0.02 U	0.0240	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Boron	mg/L	-	0.251	-	0.109	-	0.324	-	1.33	-	2.49	-	9.11	-	7.75
Cadmium	µg/L	0.0200 J	0.0200 J	0.0100 J	0.0100 J	0.0100 J	0.0100 J	0.0400	0.0300	0.150	0.150	0.0100 J	0.0200 J	0.0600	0.0500
Calcium	mg/L	-	148	-	81.6	-	167	-	144	-	262	-	278	-	182
Chloride	mg/L	-	51.0	-	10.5	-	14.0	-	41.3	-	109	-	188	-	171
Chromium	µg/L	0.153	0.131	0.121	0.210	0.0990	0.102	0.195	0.169	0.107	0.0930	0.0670	0.229	0.0830	0.644
Cobalt	µg/L	0.0830	0.0590	0.0360	0.0200 J	0.0540	0.0320	0.314	0.203	1.83	1.88	1.51	1.80	0.518	0.360
Combined Radium	pCi/L	0.767	0.696	0.342	0.683	0.363	0.881	0.687	0.316	1.17	1.16	0.523	0.759	0.305	0.347
Fluoride	mg/L	0.160	0.190	0.230	0.250	0.0900 J	0.0900	0.210	0.190	0.220	0.220	0.230	0.220	0.300	0.320
Lead	µg/L	0.0340	0.00500 J	0.0380	0.0100 J	0.0420	0.0200 J	0.0350	0.303	0.0340	0.0200 J	0.0200 J	0.0100 J	0.0560	0.0930
Lithium	mg/L	0.00400	0.00400	0.0150	0.0120	0.0210	0.0220	0.0240	0.0160	0.0510	0.0520	0.0620	0.0600	0.0510	0.0490
Mercury	µg/L	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Molybdenum	µg/L	0.990	0.760	0.710	0.840	0.140	0.0700 J	2.05	1.57	16.2	15.6	46.4	47.9	15.6	15.1
Selenium	µg/L	1.50	1.10	0.100	0.0700 J	0.200	0.400	1.40	3.80	1.00	0.800	0.200	0.300	2.00	1.00
Total Dissolved Solids	mg/L	-	638	-	502	-	920	-	838	-	1500	-	1960	-	1650
Sulfate	mg/L	-	189	-	195	-	524	-	313	-	742	-	972	-	793
Thallium	µg/L	0.0300 J	0.0400 J	0.0300 J	0.0200 J	0.0200 J	0.0100 J	0.0200 J	0.0200 J	0.220	0.251	0.0400 J	0.0500 J	0.0400 J	0.0400 J
pH	SU	7.30	7.14	7.01	7.14	6.55	6.58	7.09	7.21	7.43	7.30	7.46	7.57	7.21	7.35

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 method detection limit and is reported as the reporting limit

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

-: Not sampled

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

Parameter	Unit	MW-1606D		MW-1606S		MW-1607D		MW-1607S		MW-1608	
		5/9/2018	9/19/2018	5/9/2018	9/19/2018	5/10/2018	9/20/2018	5/10/2018	9/20/2018	5/10/2018	9/20/2018
Antimony	µg/L	0.160	0.150	0.140	0.130	0.0300 J	0.0300 J	0.440	0.420	0.0200 J	0.0300 J
Arsenic	µg/L	0.440	0.380	0.720	0.690	1.15	1.34	0.930	0.900	0.370	0.420
Barium	µg/L	53.0	48.9	73.2	64.8	73.5	92.3	71.1	80.6	46.6	42.6
Beryllium	µg/L	0.02 U	0.00400 J	0.02 U	0.00500 J	0.02 U	0.02 U	0.02 U	0.02 U	0.00900 J	0.02 U
Boron	mg/L	-	7.27	-	5.87	-	2.44	-	1.71	-	0.169
Cadmium	µg/L	0.0700	0.0700	0.0800	0.0600	0.02 U	0.02 U	0.0400	0.0400	0.0100 J	0.00800 J
Calcium	mg/L	-	260	-	199	-	222	-	220	-	128
Chloride	mg/L	-	201	-	219	-	163	-	151	-	6.59
Chromium	µg/L	0.198	0.151	0.0560	0.297	0.0510	0.158	0.121	0.0860	0.126	0.264
Cobalt	µg/L	1.40	1.17	0.318	0.260	0.521	0.769	1.18	0.840	0.0950	0.0520
Combined Radium	pCi/L	0.972	0.438	0.344	0.439	1.25	0.926	1.29	0.584	0.565	0.550
Fluoride	mg/L	0.260	0.260	0.440	0.460	0.540	0.520	0.290	0.280	0.180	0.210
Lead	µg/L	0.115	0.0100 J	0.0400	0.0200 J	0.0430	0.0440	0.128	0.0940	0.0790	0.0370
Lithium	mg/L	0.112	0.107	0.107	0.0960	0.0890	0.104	0.103	0.118	0.000300 J	0.00400
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	70.3	65.3	70.2	70.6	80.9	83.4	43.2	41.5	0.530	1.18
Selenium	µg/L	2.60	3.30	2.00	2.80	0.10 U	0.10 U	11.4	8.80	0.900	1.20
Total Dissolved Solids	mg/L	-	1610	-	1370	-	1450	-	1160	-	572
Sulfate	mg/L	-	722	-	571	-	662	-	478	-	256
Thallium	µg/L	0.0860	0.108	0.0760	0.112	0.0200 J	0.0400 J	0.0640	0.0890	0.0200 J	0.0200 J
pH	SU	7.43	7.19	6.93	7.10	7.54	7.73	7.40	7.57	6.78	7.17

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 method detection limit and is reported as the reporting limit

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

-: Not sampled

**Table 2: Groundwater Protection Standards
Mountaineer 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		0.00075
Barium, Total (mg/L)	2		0.058
Beryllium, Total (mg/L)	0.004		0.00002
Cadmium, Total (mg/L)	0.005		0.00003
Chromium, Total (mg/L)	0.1		0.0019
Cobalt, Total (mg/L)	n/a	0.006	0.00066
Combined Radium, Total (pCi/L)	5		2.36
Fluoride, Total (mg/L)	4		0.3
Lead, Total (mg/L)	n/a	0.015	0.00052
Lithium, Total (mg/L)	n/a	0.04	0.031
Mercury, Total (mg/L)	0.002		0.000005
Molybdenum, Total (mg/L)	n/a	0.1	0.0029
Selenium, Total (mg/L)	0.05		0.0015
Thallium, Total (mg/L)	0.002		0.000093

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/RSL is used as the GWPS.

ATTACHMENT A

Certification by Qualified Professional Engineer

Certification by Qualified Professional Engineer

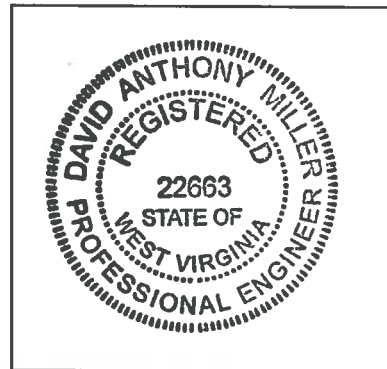
I certify that the selected and above described statistical method is appropriate for evaluating the groundwater monitoring data for the Mountaineer Bottom Ash Pond CCR management area and that the requirements of 40 CFR 257.93(f) have been met.

DAVID ANTHONY MILLER

Printed Name of Licensed Professional Engineer

David Anthony Miller

Signature



22663

License Number

WEST VIRGINIA

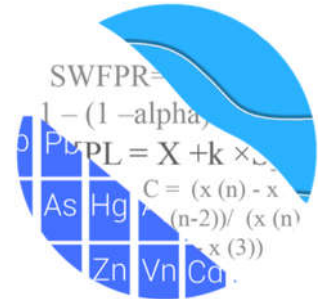
Licensing State

01.08.19

Date

ATTACHMENT B
Statistical Analysis Output

GROUNDWATER STATS CONSULTING



December 3, 2018

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

Re: Mountaineer BAP
Assessment Monitoring Event – September 2018

Groundwater Stats Consulting, formerly the statistical consulting division of Sanitas Technologies, is pleased to provide the statistical analysis of the September 2018 groundwater data for American Electric Power Inc.'s Mountaineer 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:** MW-1601A, MW-1602, MW-1603, MW-1608; and
- **Downgradient wells:** MW-1604D, MW-1604S, MW-1605D, MW-1605S, MW-1606D, MW-1606S, MW-1607D, MW-1607S.

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 previously flagged during the screening as outliers may be seen in a lighter font and disconnected symbol on the time series graphs.

Evaluation of Appendix III Parameters

Interwell prediction limits combined with a 1-of-2 verification strategy were constructed for boron, calcium, chloride, fluoride, sulfate and TDS; and intrawell prediction limits combined with a 1-of-2 verification strategy were constructed for pH. The statistical method selected for each parameter was determined based on the results of the screening analysis performed in December 2017.

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 several 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 concentrations are statistically increasing, decreasing or stable. Upgradient wells are included in the trend analyses to identify whether similar patterns exist upgradient of the site which is an indication of natural variability in groundwater unrelated to practices at the site.

Statistically significant increasing trends were found for several constituents in both upgradient and downgradient wells. A statistically significant increasing trend was noted for calcium in well MW-1607S; however, with the exception of the most recent sample, historical concentrations are similar and, in some cases, lower than those reported in upgradient wells. Further research beyond the scope of this analysis would be required to identify the cause for any changing groundwater concentrations in downgradient wells

(i.e. result of practices at the site, natural variation, or an off-site source). A Trend Test summary table follows this letter.

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 confidence interval exceedances were found except for lithium in wells MW-1605D, MW1605S, MW-1606D, MW-1606S, MW-1607D and MW-1607S. 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 Mountaineer BAP. If you have any questions or comments, please feel free to contact me.

For Groundwater Stats Consulting,

A handwritten signature in cursive script that reads "Kristina Rayner".

Kristina L. Rayner
Groundwater Statistician

Data were sent electronically to Groundwater Stats Consulting, and the statistical analysis was reviewed by Dr. Kirk Cameron, PhD Statistician with MacStat Consulting, primary author of the USEPA Unified Guidance, and Senior Advisor to Groundwater Stats Consulting.

The following constituents were evaluated: Appendix III parameters – boron, calcium, chloride, fluoride, pH, sulfate, and TDS; and Appendix IV parameters - 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 at all wells are provided for the purpose of screening data at these wells (Figure A). Additionally, box plots are included for all constituents at upgradient and downgradient wells (Figure B). The time series plots are used to initially screen for suspected outliers and trends, while the box plots provide visual representation of variation within individual wells and between all wells.

Data at all wells were evaluated for the following: 1) outliers; 2) trends; 3) most appropriate statistical method for Appendix III parameters based on site characteristics of groundwater data upgradient of the facility; and 4) eligibility of downgradient wells when intrawell statistical methods are recommended. Power curves are provided to demonstrate that the selected statistical methods for Appendix III parameters comply with the USEPA Unified Guidance recommendations as discussed below.

Summary of Statistical Method:

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

Background Screening

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 (Figure C).

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 two outliers for chloride and one low outlier for pH in well MW-1607D; however, these values were not flagged due to all concentrations being consistent over time and similar to concentrations in neighboring wells. The high value identified as an outlier for pH at well MW-1607D was, however, flagged in the database. 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 (Figure D). 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 handful of statistically significant trends as may be seen on the Trend Test Summary table that accompanies the trend tests. All trends were relatively low in magnitude when compared to average concentrations. One exception is chloride in upgradient well MW-1601A which shows a statistically significant increasing trend over time. However, concentrations in this well are similar to neighboring upgradient well concentrations and, therefore, required no adjustment at this time. This well will continue to be monitored and re-evaluated as more data are collected.

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 (Figure E). 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; therefore, these data were further evaluated as described for the appropriateness of intrawell testing to accommodate the groundwater quality. A summary table of the ANOVA results is included with the reports.

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 (Figure F). 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 (Figure G). 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 pH; while confidence intervals were above their respective background limits in at least one well for all other Appendix III parameters. Therefore, intrawell methods are recommended for pH, and interwell methods are initially recommended for boron, calcium, chloride, fluoride, 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 based on a 1-of-2 resample plan that will be used for future comparisons (Figure H). Interwell prediction limits, combined with a 1-of-2 resample plan, were constructed from upgradient wells (Figure I). 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 when a minimum of 2 new samples are available. 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. A summary table of the background prediction limits follows this letter.

Appendix IV – Assessment Monitoring Program

During an Assessment Monitoring program confidence intervals are constructed at all wells for detected Appendix IV parameters. A minimum of 4 samples is required to construct confidence intervals; however, 8 samples are generally recommended for better representation of the true average population. Established Maximum Contaminant Levels (MCLs) are used as the GWPS comparisons, unless background limits are higher as discussed below. Parametric confidence intervals are constructed with 99% confidence when data follow a normal or transformed-normal distribution. For all other cases, nonparametric confidence intervals are constructed, with the confidence level based on the number of samples available. The GWPS is exceeded only when the entire confidence interval exceeds its respective GWPS.

Background limits are established for the Appendix IV parameters using upper tolerance limits constructed with 95% confidence/95% coverage using pooled upgradient well data, for comparison against established MCLs. When background limits, or Alternate Contaminant Levels (ACLs), are higher than established MCLs, the CCR Rule recommends using these ACLs as the GWPS for the confidence interval comparisons. Additionally, tolerance limits are also recommended to establish ACLs for Appendix IV parameters, cobalt, lithium, and molybdenum, which do not have established MCLs. Since the scope of this project included screening and development of background limits for Appendix III Detection Monitoring statistics, comparison of the Appendix IV parameters with confidence intervals was not included in this report.

Recommendations

In summary, as a result of the background screening described in this letter, intrawell prediction limits combined with a 1-of-2 resample plan are recommended for pH; and interwell prediction limits combined with a 1-of-2 resample plan are recommended for boron, calcium, chloride, fluoride, sulfate, and TDS. The statistical analyses will be constructed according to the USEPA Unified Guidance, based on seven Appendix III parameters and eight downgradient wells.

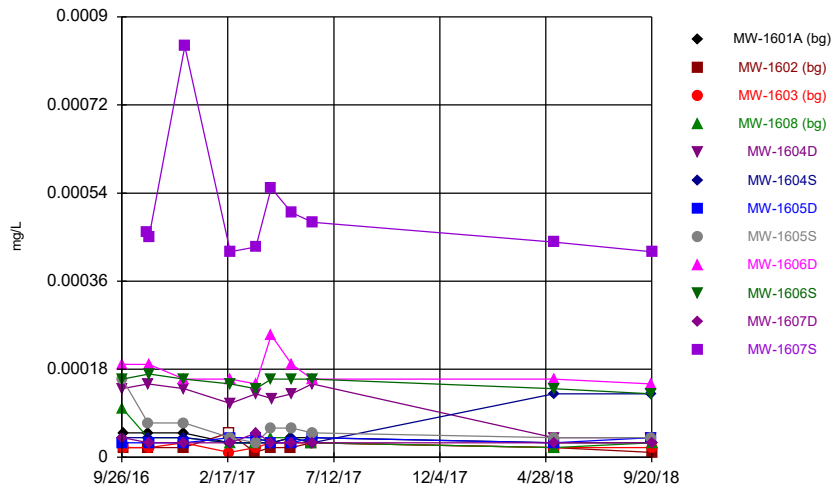
Thank you for the opportunity to assist you in the statistical analysis of groundwater quality for the Mountaineer Bottom Ash Pond. If you have any questions or comments, please feel free to contact me.

For Groundwater Stats Consulting,

A handwritten signature in black ink, appearing to read "Kristina L. Rayner". The signature is written in a cursive, flowing style.

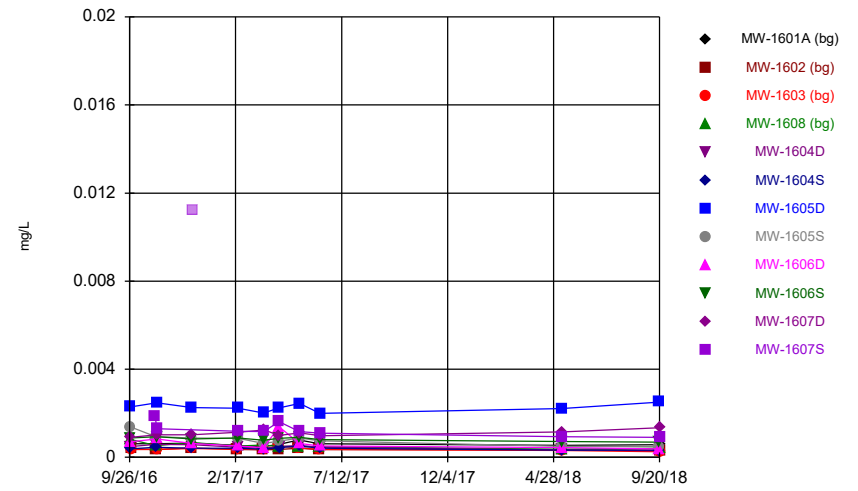
Kristina L. Rayner
Groundwater Statistician

Time Series



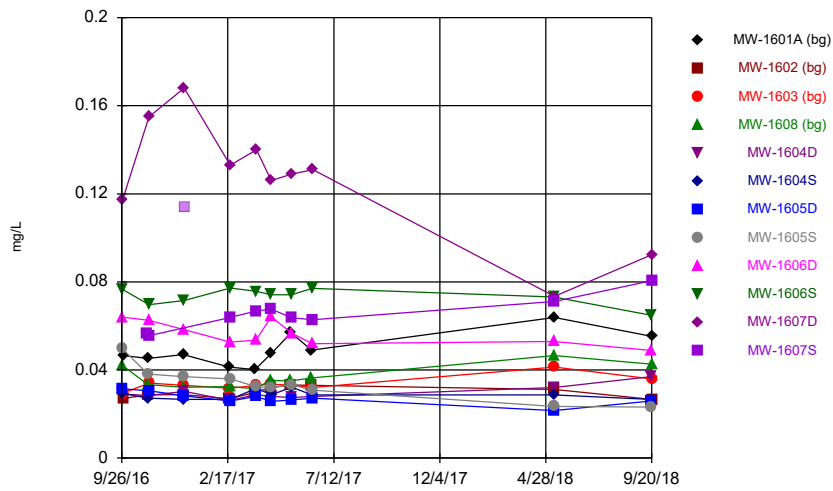
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Time Series



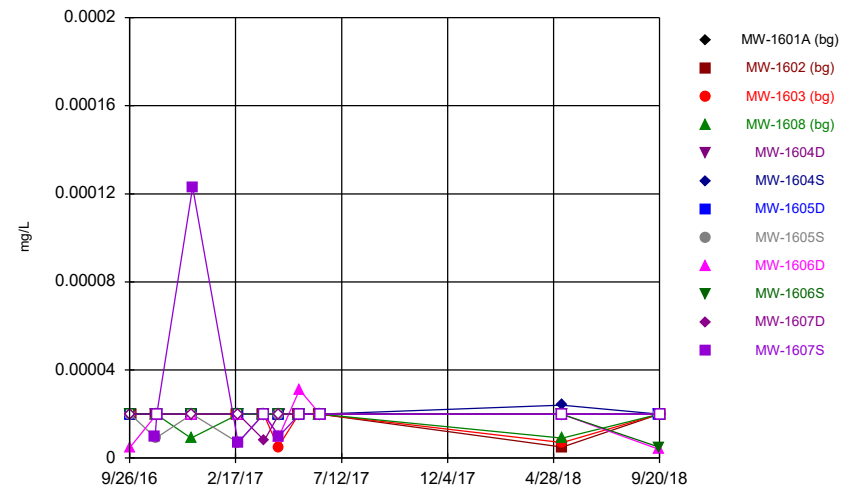
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Time Series



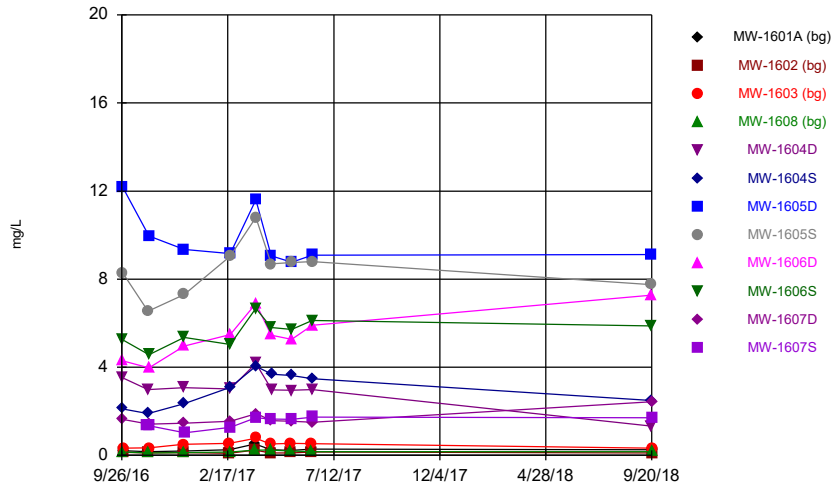
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Time Series



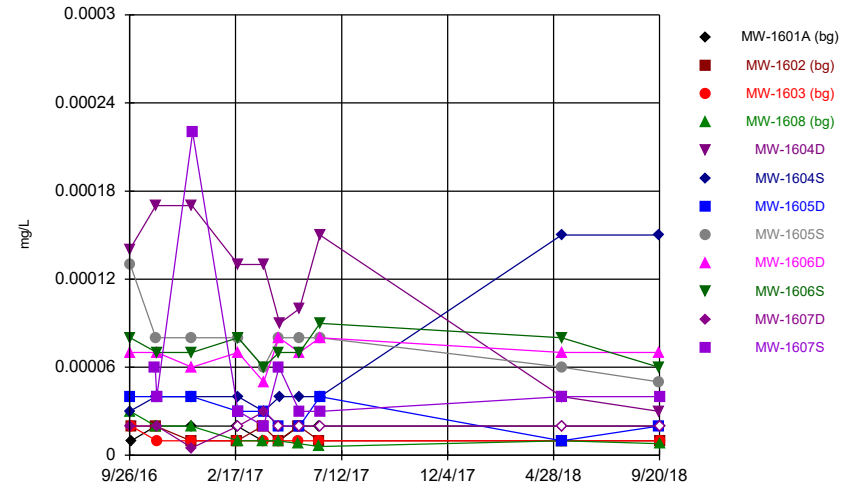
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Time Series



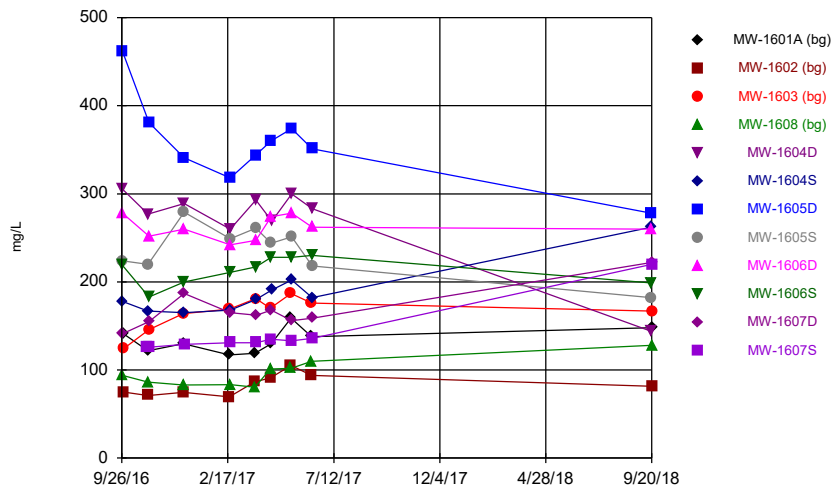
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Time Series



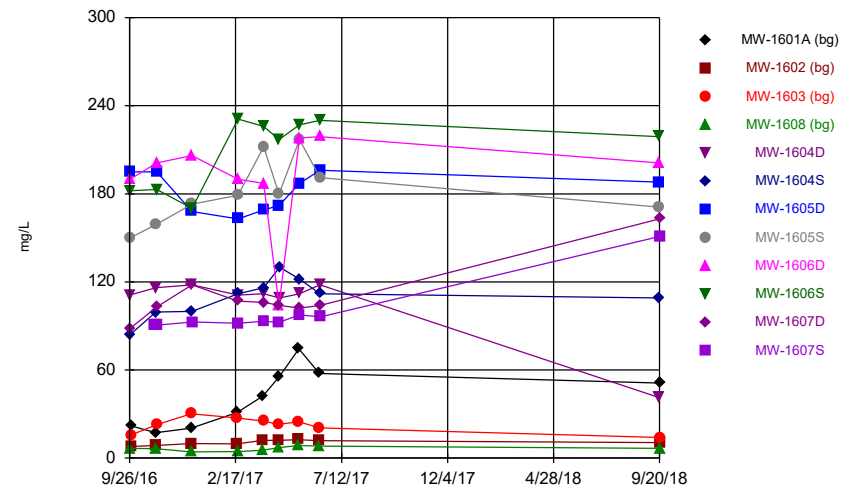
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Time Series



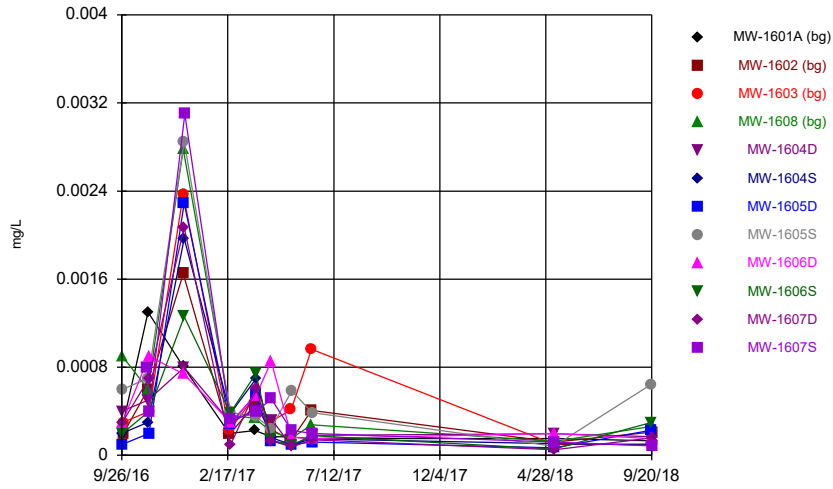
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Time Series



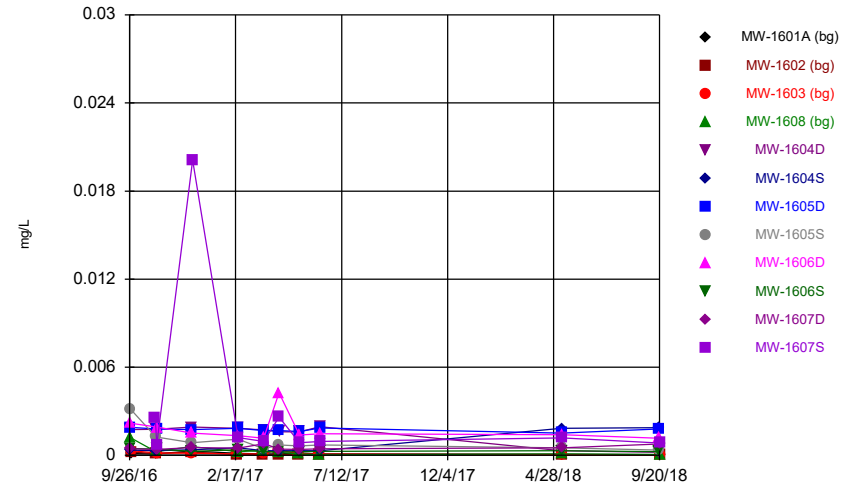
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Time Series



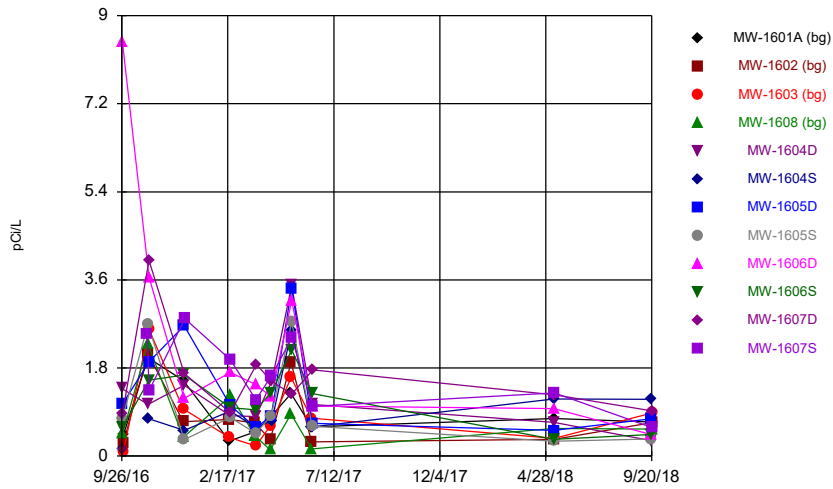
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Time Series



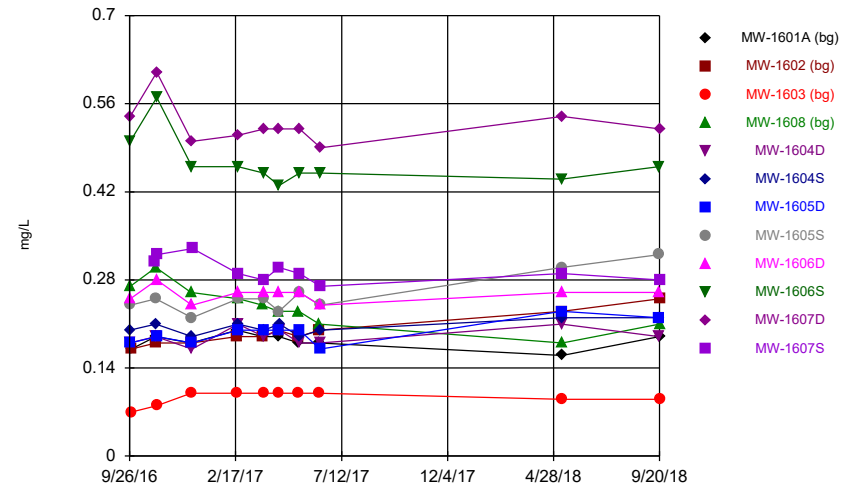
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Time Series



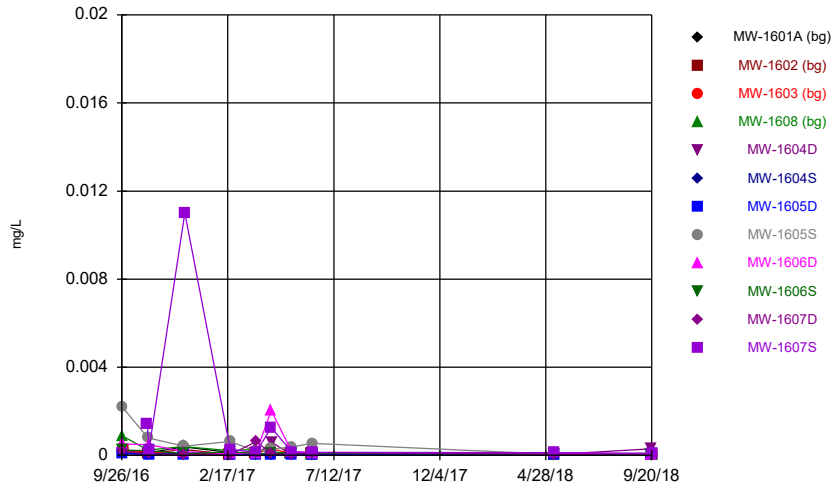
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Time Series



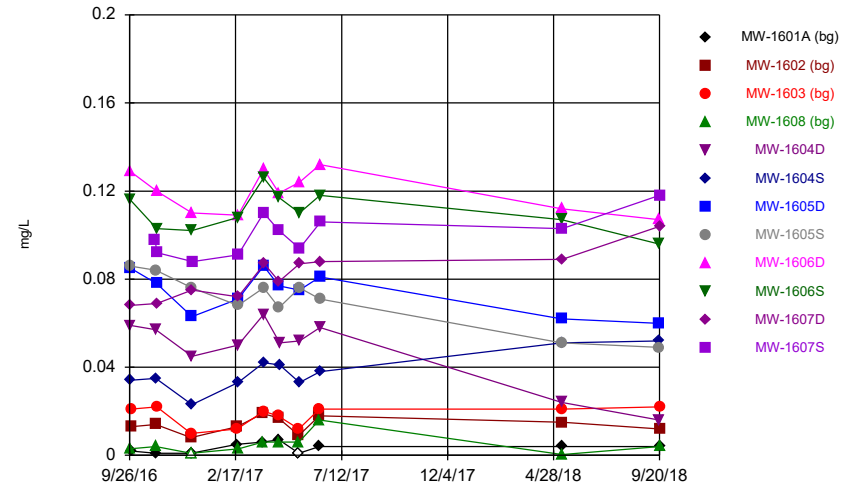
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Time Series



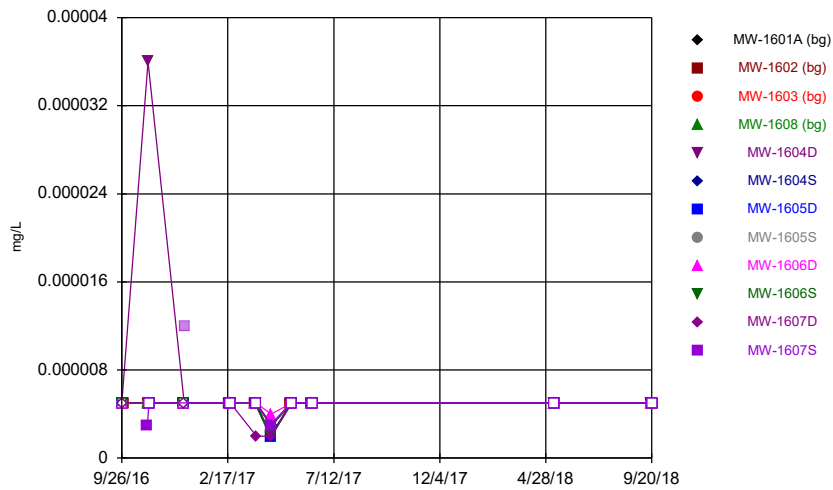
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Time Series



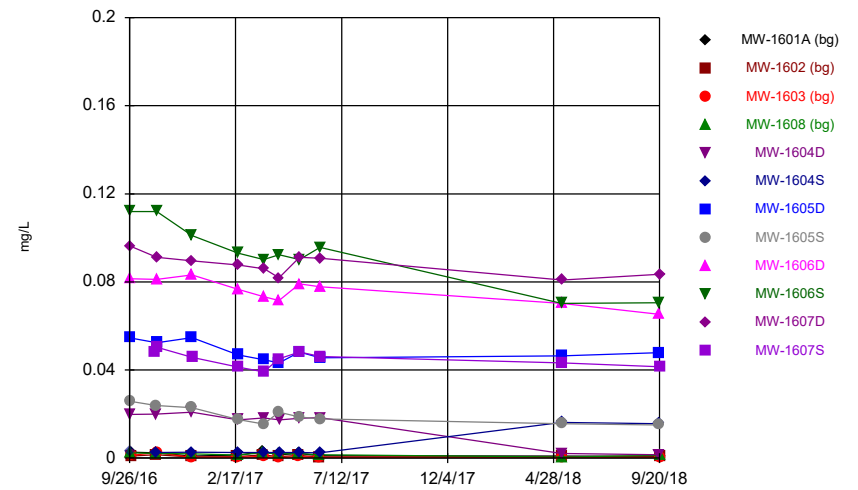
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Time Series



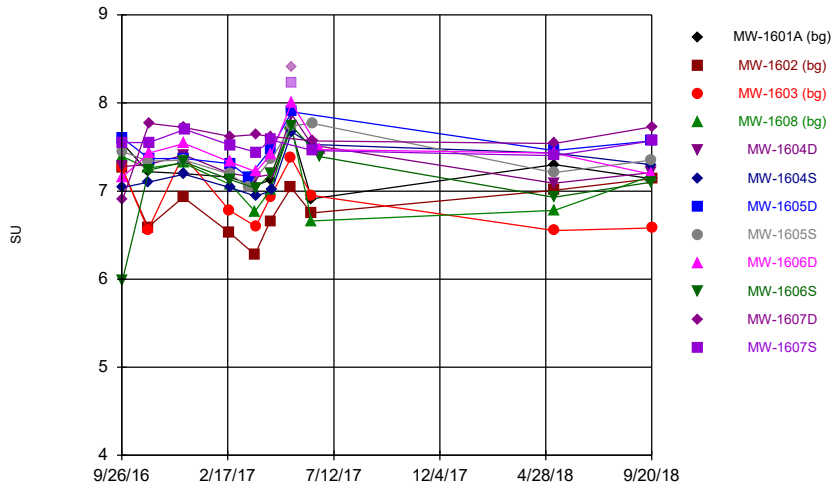
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Time Series



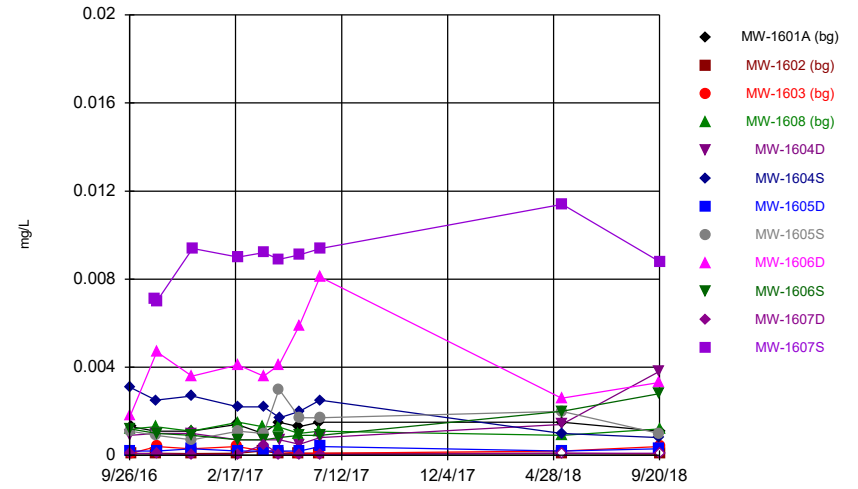
Constituent: Molybdenum, total Analysis Run 12/3/2018 8:23 AM View: Descriptive
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Time Series



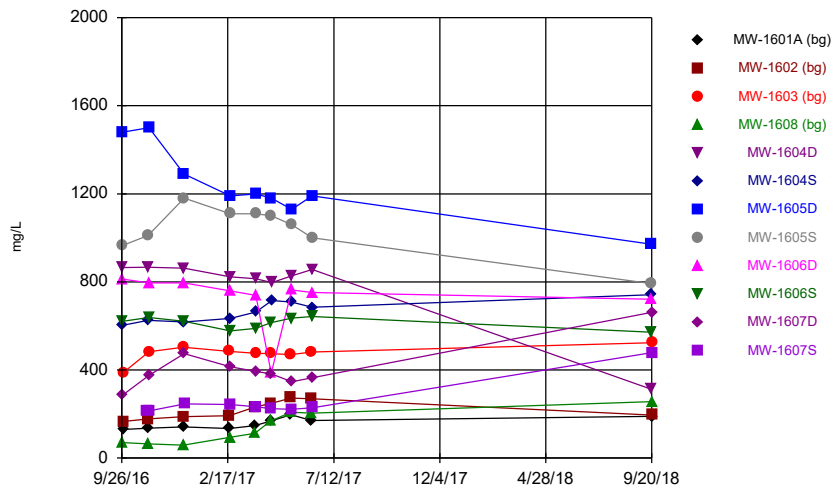
Constituent: pH, field Analysis Run 12/3/2018 8:23 AM View: Descriptive
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Time Series



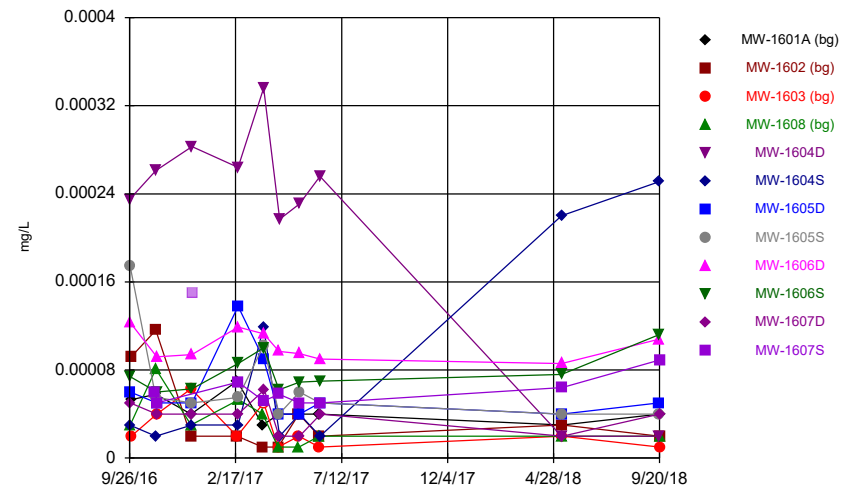
Constituent: Selenium, total Analysis Run 12/3/2018 8:23 AM View: Descriptive
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Time Series



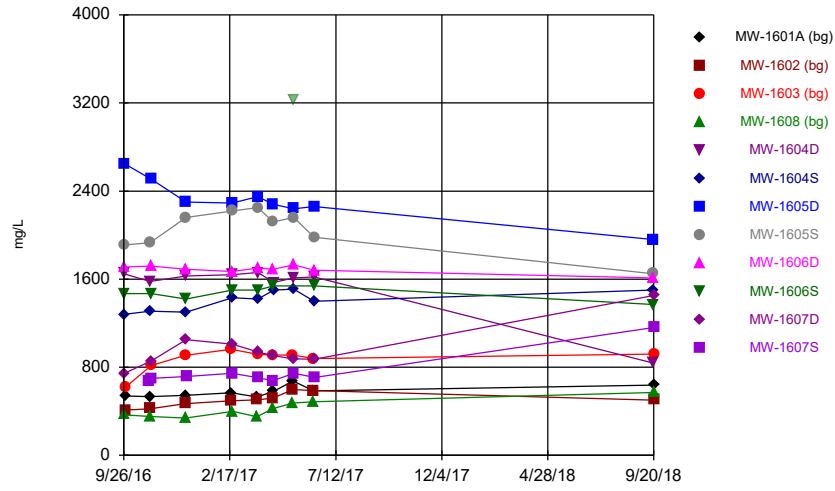
Constituent: Sulfate, total Analysis Run 12/3/2018 8:24 AM View: Descriptive
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Time Series



Constituent: Thallium, total Analysis Run 12/3/2018 8:24 AM View: Descriptive
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Time Series



Constituent: Total Dissolved Solids [TDS] Analysis Run 12/3/2018 8:24 AM View: Descriptive
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Interwell Prediction Limit Summary Table - Significant Results

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 12/3/2018, 6:38 AM

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)	MW-1604D	0.6495	n/a	9/19/2018	1.33	Yes	36	0.6179	0.1221	0	None	x^(1/3)	0.0009403	Param 1 of 2
Boron, total (mg/L)	MW-1604S	0.6495	n/a	9/19/2018	2.49	Yes	36	0.6179	0.1221	0	None	x^(1/3)	0.0009403	Param 1 of 2
Boron, total (mg/L)	MW-1605D	0.6495	n/a	9/19/2018	9.11	Yes	36	0.6179	0.1221	0	None	x^(1/3)	0.0009403	Param 1 of 2
Boron, total (mg/L)	MW-1605S	0.6495	n/a	9/19/2018	7.75	Yes	36	0.6179	0.1221	0	None	x^(1/3)	0.0009403	Param 1 of 2
Boron, total (mg/L)	MW-1606D	0.6495	n/a	9/19/2018	7.27	Yes	36	0.6179	0.1221	0	None	x^(1/3)	0.0009403	Param 1 of 2
Boron, total (mg/L)	MW-1606S	0.6495	n/a	9/19/2018	5.87	Yes	36	0.6179	0.1221	0	None	x^(1/3)	0.0009403	Param 1 of 2
Boron, total (mg/L)	MW-1607D	0.6495	n/a	9/20/2018	2.44	Yes	36	0.6179	0.1221	0	None	x^(1/3)	0.0009403	Param 1 of 2
Boron, total (mg/L)	MW-1607S	0.6495	n/a	9/20/2018	1.71	Yes	36	0.6179	0.1221	0	None	x^(1/3)	0.0009403	Param 1 of 2
Calcium, total (mg/L)	MW-1604S	192.1	n/a	9/19/2018	262	Yes	36	119.6	35.73	0	None	No	0.0009403	Param 1 of 2
Calcium, total (mg/L)	MW-1605D	192.1	n/a	9/19/2018	278	Yes	36	119.6	35.73	0	None	No	0.0009403	Param 1 of 2
Calcium, total (mg/L)	MW-1606D	192.1	n/a	9/19/2018	260	Yes	36	119.6	35.73	0	None	No	0.0009403	Param 1 of 2
Calcium, total (mg/L)	MW-1606S	192.1	n/a	9/19/2018	199	Yes	36	119.6	35.73	0	None	No	0.0009403	Param 1 of 2
Calcium, total (mg/L)	MW-1607D	192.1	n/a	9/20/2018	222	Yes	36	119.6	35.73	0	None	No	0.0009403	Param 1 of 2
Calcium, total (mg/L)	MW-1607S	192.1	n/a	9/20/2018	220	Yes	36	119.6	35.73	0	None	No	0.0009403	Param 1 of 2
Chloride, total (mg/L)	MW-1604S	59.92	n/a	9/19/2018	109	Yes	36	2.553	0.6694	0	None	x^(1/3)	0.0009403	Param 1 of 2
Chloride, total (mg/L)	MW-1605D	59.92	n/a	9/19/2018	188	Yes	36	2.553	0.6694	0	None	x^(1/3)	0.0009403	Param 1 of 2
Chloride, total (mg/L)	MW-1605S	59.92	n/a	9/19/2018	171	Yes	36	2.553	0.6694	0	None	x^(1/3)	0.0009403	Param 1 of 2
Chloride, total (mg/L)	MW-1606D	59.92	n/a	9/19/2018	201	Yes	36	2.553	0.6694	0	None	x^(1/3)	0.0009403	Param 1 of 2
Chloride, total (mg/L)	MW-1606S	59.92	n/a	9/19/2018	219	Yes	36	2.553	0.6694	0	None	x^(1/3)	0.0009403	Param 1 of 2
Chloride, total (mg/L)	MW-1607D	59.92	n/a	9/20/2018	163	Yes	36	2.553	0.6694	0	None	x^(1/3)	0.0009403	Param 1 of 2
Chloride, total (mg/L)	MW-1607S	59.92	n/a	9/20/2018	151	Yes	36	2.553	0.6694	0	None	x^(1/3)	0.0009403	Param 1 of 2
Fluoride, total (mg/L)	MW-1605S	0.2944	n/a	9/19/2018	0.32	Yes	40	0.178	0.05788	0	None	No	0.0009403	Param 1 of 2
Fluoride, total (mg/L)	MW-1606S	0.2944	n/a	9/19/2018	0.46	Yes	40	0.178	0.05788	0	None	No	0.0009403	Param 1 of 2
Fluoride, total (mg/L)	MW-1607D	0.2944	n/a	9/20/2018	0.52	Yes	40	0.178	0.05788	0	None	No	0.0009403	Param 1 of 2
Sulfate, total (mg/L)	MW-1604S	610.7	n/a	9/19/2018	742	Yes	36	6.043	1.202	0	None	x^(1/3)	0.0009403	Param 1 of 2
Sulfate, total (mg/L)	MW-1605D	610.7	n/a	9/19/2018	972	Yes	36	6.043	1.202	0	None	x^(1/3)	0.0009403	Param 1 of 2
Sulfate, total (mg/L)	MW-1605S	610.7	n/a	9/19/2018	793	Yes	36	6.043	1.202	0	None	x^(1/3)	0.0009403	Param 1 of 2
Sulfate, total (mg/L)	MW-1606D	610.7	n/a	9/19/2018	722	Yes	36	6.043	1.202	0	None	x^(1/3)	0.0009403	Param 1 of 2
Sulfate, total (mg/L)	MW-1607D	610.7	n/a	9/20/2018	662	Yes	36	6.043	1.202	0	None	x^(1/3)	0.0009403	Param 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1604S	1016	n/a	9/19/2018	1500	Yes	36	8.31	0.8575	0	None	x^(1/3)	0.0009403	Param 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1605D	1016	n/a	9/19/2018	1960	Yes	36	8.31	0.8575	0	None	x^(1/3)	0.0009403	Param 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1605S	1016	n/a	9/19/2018	1650	Yes	36	8.31	0.8575	0	None	x^(1/3)	0.0009403	Param 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1606D	1016	n/a	9/19/2018	1610	Yes	36	8.31	0.8575	0	None	x^(1/3)	0.0009403	Param 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1606S	1016	n/a	9/19/2018	1370	Yes	36	8.31	0.8575	0	None	x^(1/3)	0.0009403	Param 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1607D	1016	n/a	9/20/2018	1450	Yes	36	8.31	0.8575	0	None	x^(1/3)	0.0009403	Param 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1607S	1016	n/a	9/20/2018	1160	Yes	36	8.31	0.8575	0	None	x^(1/3)	0.0009403	Param 1 of 2

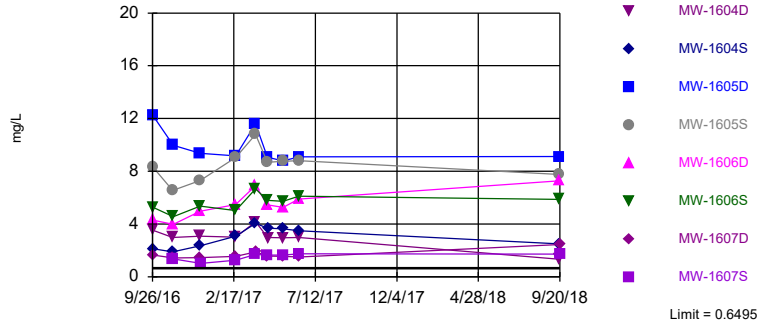
Interwell Prediction Limit Summary Table - All Results

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 12/3/2018, 6:38 AM

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)	MW-1604D	0.6495	n/a	9/19/2018	1.33	Yes	36	0.6179	0.1221	0	None	x^(1/3)	0.0009403	Param 1 of 2
Boron, total (mg/L)	MW-1604S	0.6495	n/a	9/19/2018	2.49	Yes	36	0.6179	0.1221	0	None	x^(1/3)	0.0009403	Param 1 of 2
Boron, total (mg/L)	MW-1605D	0.6495	n/a	9/19/2018	9.11	Yes	36	0.6179	0.1221	0	None	x^(1/3)	0.0009403	Param 1 of 2
Boron, total (mg/L)	MW-1605S	0.6495	n/a	9/19/2018	7.75	Yes	36	0.6179	0.1221	0	None	x^(1/3)	0.0009403	Param 1 of 2
Boron, total (mg/L)	MW-1606D	0.6495	n/a	9/19/2018	7.27	Yes	36	0.6179	0.1221	0	None	x^(1/3)	0.0009403	Param 1 of 2
Boron, total (mg/L)	MW-1606S	0.6495	n/a	9/19/2018	5.87	Yes	36	0.6179	0.1221	0	None	x^(1/3)	0.0009403	Param 1 of 2
Boron, total (mg/L)	MW-1607D	0.6495	n/a	9/20/2018	2.44	Yes	36	0.6179	0.1221	0	None	x^(1/3)	0.0009403	Param 1 of 2
Boron, total (mg/L)	MW-1607S	0.6495	n/a	9/20/2018	1.71	Yes	36	0.6179	0.1221	0	None	x^(1/3)	0.0009403	Param 1 of 2
Calcium, total (mg/L)	MW-1604D	192.1	n/a	9/19/2018	144	No	36	119.6	35.73	0	None	No	0.0009403	Param 1 of 2
Calcium, total (mg/L)	MW-1604S	192.1	n/a	9/19/2018	262	Yes	36	119.6	35.73	0	None	No	0.0009403	Param 1 of 2
Calcium, total (mg/L)	MW-1605D	192.1	n/a	9/19/2018	278	Yes	36	119.6	35.73	0	None	No	0.0009403	Param 1 of 2
Calcium, total (mg/L)	MW-1605S	192.1	n/a	9/19/2018	182	No	36	119.6	35.73	0	None	No	0.0009403	Param 1 of 2
Calcium, total (mg/L)	MW-1606D	192.1	n/a	9/19/2018	260	Yes	36	119.6	35.73	0	None	No	0.0009403	Param 1 of 2
Calcium, total (mg/L)	MW-1606S	192.1	n/a	9/19/2018	199	Yes	36	119.6	35.73	0	None	No	0.0009403	Param 1 of 2
Calcium, total (mg/L)	MW-1607D	192.1	n/a	9/20/2018	222	Yes	36	119.6	35.73	0	None	No	0.0009403	Param 1 of 2
Calcium, total (mg/L)	MW-1607S	192.1	n/a	9/20/2018	220	Yes	36	119.6	35.73	0	None	No	0.0009403	Param 1 of 2
Chloride, total (mg/L)	MW-1604D	59.92	n/a	9/19/2018	41.3	No	36	2.553	0.6694	0	None	x^(1/3)	0.0009403	Param 1 of 2
Chloride, total (mg/L)	MW-1604S	59.92	n/a	9/19/2018	109	Yes	36	2.553	0.6694	0	None	x^(1/3)	0.0009403	Param 1 of 2
Chloride, total (mg/L)	MW-1605D	59.92	n/a	9/19/2018	188	Yes	36	2.553	0.6694	0	None	x^(1/3)	0.0009403	Param 1 of 2
Chloride, total (mg/L)	MW-1605S	59.92	n/a	9/19/2018	171	Yes	36	2.553	0.6694	0	None	x^(1/3)	0.0009403	Param 1 of 2
Chloride, total (mg/L)	MW-1606D	59.92	n/a	9/19/2018	201	Yes	36	2.553	0.6694	0	None	x^(1/3)	0.0009403	Param 1 of 2
Chloride, total (mg/L)	MW-1606S	59.92	n/a	9/19/2018	219	Yes	36	2.553	0.6694	0	None	x^(1/3)	0.0009403	Param 1 of 2
Chloride, total (mg/L)	MW-1607D	59.92	n/a	9/20/2018	163	Yes	36	2.553	0.6694	0	None	x^(1/3)	0.0009403	Param 1 of 2
Chloride, total (mg/L)	MW-1607S	59.92	n/a	9/20/2018	151	Yes	36	2.553	0.6694	0	None	x^(1/3)	0.0009403	Param 1 of 2
Fluoride, total (mg/L)	MW-1604D	0.2944	n/a	9/19/2018	0.19	No	40	0.178	0.05788	0	None	No	0.0009403	Param 1 of 2
Fluoride, total (mg/L)	MW-1604S	0.2944	n/a	9/19/2018	0.22	No	40	0.178	0.05788	0	None	No	0.0009403	Param 1 of 2
Fluoride, total (mg/L)	MW-1605D	0.2944	n/a	9/19/2018	0.22	No	40	0.178	0.05788	0	None	No	0.0009403	Param 1 of 2
Fluoride, total (mg/L)	MW-1605S	0.2944	n/a	9/19/2018	0.32	Yes	40	0.178	0.05788	0	None	No	0.0009403	Param 1 of 2
Fluoride, total (mg/L)	MW-1606D	0.2944	n/a	9/19/2018	0.26	No	40	0.178	0.05788	0	None	No	0.0009403	Param 1 of 2
Fluoride, total (mg/L)	MW-1606S	0.2944	n/a	9/19/2018	0.46	Yes	40	0.178	0.05788	0	None	No	0.0009403	Param 1 of 2
Fluoride, total (mg/L)	MW-1607D	0.2944	n/a	9/20/2018	0.52	Yes	40	0.178	0.05788	0	None	No	0.0009403	Param 1 of 2
Fluoride, total (mg/L)	MW-1607S	0.2944	n/a	9/20/2018	0.28	No	40	0.178	0.05788	0	None	No	0.0009403	Param 1 of 2
Sulfate, total (mg/L)	MW-1604D	610.7	n/a	9/19/2018	313	No	36	6.043	1.202	0	None	x^(1/3)	0.0009403	Param 1 of 2
Sulfate, total (mg/L)	MW-1604S	610.7	n/a	9/19/2018	742	Yes	36	6.043	1.202	0	None	x^(1/3)	0.0009403	Param 1 of 2
Sulfate, total (mg/L)	MW-1605D	610.7	n/a	9/19/2018	972	Yes	36	6.043	1.202	0	None	x^(1/3)	0.0009403	Param 1 of 2
Sulfate, total (mg/L)	MW-1605S	610.7	n/a	9/19/2018	793	Yes	36	6.043	1.202	0	None	x^(1/3)	0.0009403	Param 1 of 2
Sulfate, total (mg/L)	MW-1606D	610.7	n/a	9/19/2018	722	Yes	36	6.043	1.202	0	None	x^(1/3)	0.0009403	Param 1 of 2
Sulfate, total (mg/L)	MW-1606S	610.7	n/a	9/19/2018	571	No	36	6.043	1.202	0	None	x^(1/3)	0.0009403	Param 1 of 2
Sulfate, total (mg/L)	MW-1607D	610.7	n/a	9/20/2018	662	Yes	36	6.043	1.202	0	None	x^(1/3)	0.0009403	Param 1 of 2
Sulfate, total (mg/L)	MW-1607S	610.7	n/a	9/20/2018	478	No	36	6.043	1.202	0	None	x^(1/3)	0.0009403	Param 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1604D	1016	n/a	9/19/2018	838	No	36	8.31	0.8575	0	None	x^(1/3)	0.0009403	Param 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1604S	1016	n/a	9/19/2018	1500	Yes	36	8.31	0.8575	0	None	x^(1/3)	0.0009403	Param 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1605D	1016	n/a	9/19/2018	1960	Yes	36	8.31	0.8575	0	None	x^(1/3)	0.0009403	Param 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1605S	1016	n/a	9/19/2018	1650	Yes	36	8.31	0.8575	0	None	x^(1/3)	0.0009403	Param 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1606D	1016	n/a	9/19/2018	1610	Yes	36	8.31	0.8575	0	None	x^(1/3)	0.0009403	Param 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1606S	1016	n/a	9/19/2018	1370	Yes	36	8.31	0.8575	0	None	x^(1/3)	0.0009403	Param 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1607D	1016	n/a	9/20/2018	1450	Yes	36	8.31	0.8575	0	None	x^(1/3)	0.0009403	Param 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1607S	1016	n/a	9/20/2018	1160	Yes	36	8.31	0.8575	0	None	x^(1/3)	0.0009403	Param 1 of 2

Exceeds Limit: MW-1604D, MW-1604S, MW-1605D, MW-1605S, MW-1606D, MW-1

Prediction Limit
Interwell Parametric

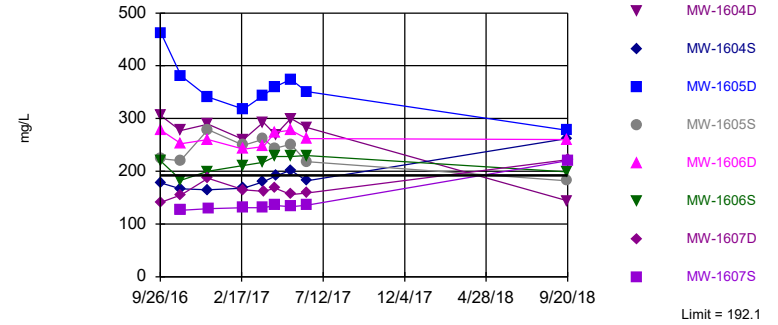


Background Data Summary (based on cube root transformation): Mean=0.6179, Std. Dev.=0.1221, n=36. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9135, critical = 0.912. Kappa = 2.031 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.0009403. Comparing 8 points to limit.

Constituent: Boron, total Analysis Run 12/3/2018 6:35 AM View: PL's - Interwell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Exceeds Limit: MW-1604S, MW-1605D, MW-1606D, MW-1606S, MW-1607D, MW-1

Prediction Limit
Interwell Parametric

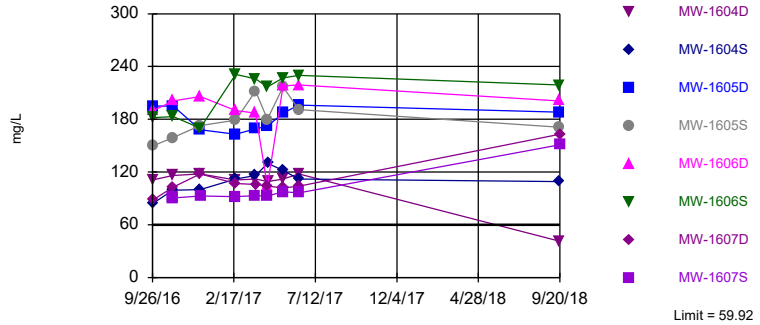


Background Data Summary: Mean=119.6, Std. Dev.=35.73, n=36. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9272, critical = 0.912. Kappa = 2.031 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.0009403. Comparing 8 points to limit.

Constituent: Calcium, total Analysis Run 12/3/2018 6:35 AM View: PL's - Interwell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Exceeds Limit: MW-1604S, MW-1605D, MW-1605S, MW-1606D, MW-1606S, MW-1

Prediction Limit
Interwell Parametric

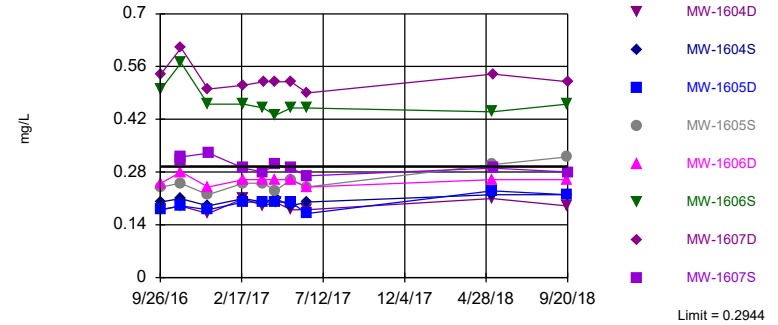


Background Data Summary (based on cube root transformation): Mean=2.553, Std. Dev.=0.6694, n=36. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9317, critical = 0.912. Kappa = 2.031 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.0009403. Comparing 8 points to limit.

Constituent: Chloride, total Analysis Run 12/3/2018 6:35 AM View: PL's - Interwell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Exceeds Limit: MW-1605S, MW-1606S, MW-1607D

Prediction Limit
Interwell Parametric

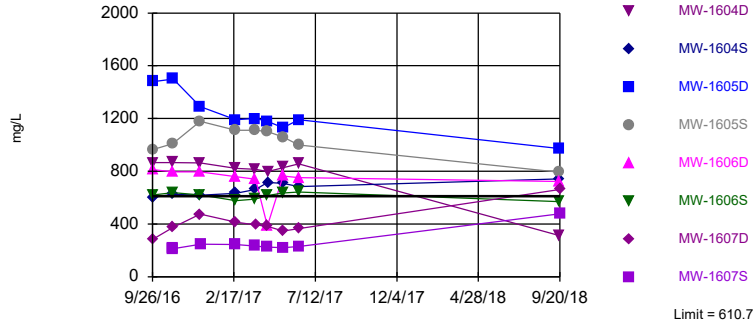


Background Data Summary: Mean=0.178, Std. Dev.=0.05788, n=40. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9253, critical = 0.919. Kappa = 2.012 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.0009403. Comparing 8 points to limit.

Constituent: Fluoride, total Analysis Run 12/3/2018 6:35 AM View: PL's - Interwell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Exceeds Limit: MW-1604S, MW-1605D,
MW-1605S, MW-1606D, MW-1607D

Prediction Limit
Interwell Parametric

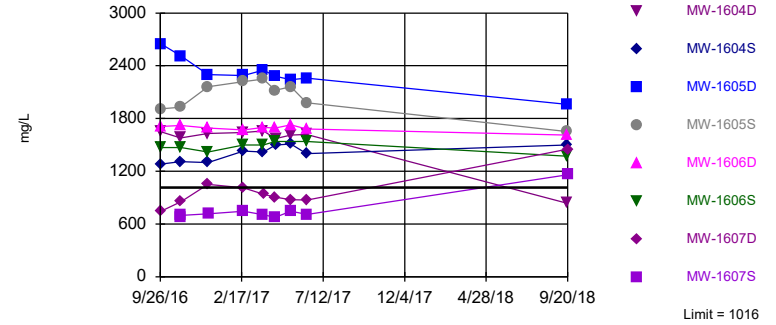


Background Data Summary (based on cube root transformation): Mean=6.043, Std. Dev.=1.202, n=36. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9171, critical = 0.912. Kappa = 2.031 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.0009403. Comparing 8 points to limit.

Constituent: Sulfate, total Analysis Run 12/3/2018 6:35 AM View: PL's - Interwell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Exceeds Limit: MW-1604S, MW-1605D,
MW-1605S, MW-1606D, MW-1606S, MW-1

Prediction Limit
Interwell Parametric



Background Data Summary (based on cube root transformation): Mean=8.31, Std. Dev.=0.8575, n=36. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9144, critical = 0.912. Kappa = 2.031 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.0009403. Comparing 8 points to limit.

Constituent: Total Dissolved Solids [TDS] Analysis Run 12/3/2018 6:35 AM View: PL's - Interwell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

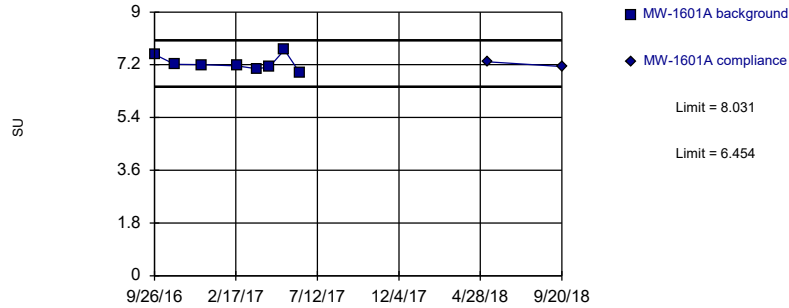
Intrawell Prediction Limit Summary Table - All Results (No Significant Results)

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 12/3/2018, 6:44 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)	MW-1601A	8.031	6.454	9/20/2018	7.14	No 8	7.243	0.2615	0	None	No	0.0004701	Param 1 of 2
pH, field (SU)	MW-1602	7.694	5.816	9/20/2018	7.14	No 8	6.755	0.3115	0	None	No	0.0004701	Param 1 of 2
pH, field (SU)	MW-1603	7.999	5.971	9/20/2018	6.58	No 8	6.985	0.3366	0	None	No	0.0004701	Param 1 of 2
pH, field (SU)	MW-1608	8.216	6.092	9/19/2018	7.17	No 8	7.154	0.3523	0	None	No	0.0004701	Param 1 of 2
pH, field (SU)	MW-1604D	8.08	6.653	9/19/2018	7.21	No 8	7.366	0.2368	0	None	No	0.0004701	Param 1 of 2
pH, field (SU)	MW-1604S	7.991	6.389	9/19/2018	7.3	No 8	7.19	0.2657	0	None	No	0.0004701	Param 1 of 2
pH, field (SU)	MW-1605D	8.258	6.653	9/19/2018	7.57	No 7	7.456	0.2388	0	None	No	0.0004701	Param 1 of 2
pH, field (SU)	MW-1605S	8.152	6.66	9/19/2018	7.35	No 8	7.406	0.2476	0	None	No	0.0004701	Param 1 of 2
pH, field (SU)	MW-1606D	8.222	6.671	9/19/2018	7.19	No 8	7.446	0.2573	0	None	No	0.0004701	Param 1 of 2
pH, field (SU)	MW-1606S	8.662	5.6	9/19/2018	7.1	No 8	7.131	0.508	0	None	No	0.0004701	Param 1 of 2
pH, field (SU)	MW-1607D	7.77	6.9	9/20/2018	7.73	No 7	n/a	n/a	0	n/a	n/a	0.05531	NP (normality) 1 of 2
pH, field (SU)	MW-1607S	7.831	7.255	9/20/2018	7.57	No 7	7.543	0.08577	0	None	No	0.0004701	Param 1 of 2

Within Limits

Prediction Limit Intrawell Parametric

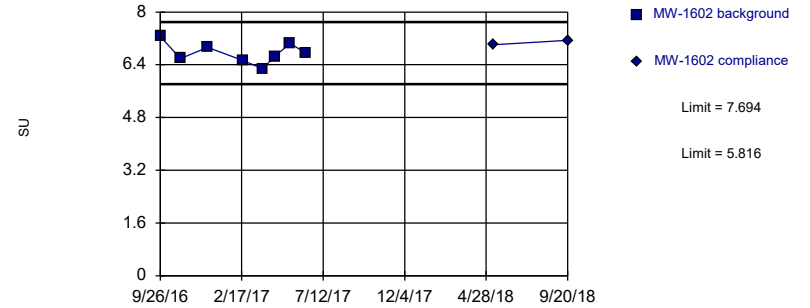


Background Data Summary: Mean=7.243, Std. Dev.=0.2615, n=8. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.902, critical = 0.749. Kappa = 3.014 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.0009403.

Constituent: pH, field Analysis Run 12/3/2018 6:40 AM View: PL's - Intrawell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Within Limits

Prediction Limit Intrawell Parametric

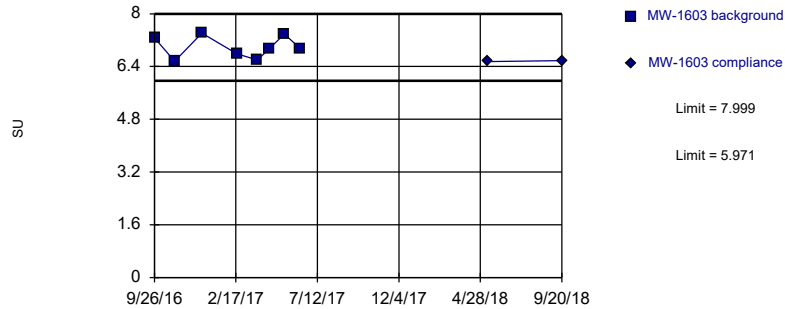


Background Data Summary: Mean=6.755, Std. Dev.=0.3115, n=8. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9867, critical = 0.749. Kappa = 3.014 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.0009403.

Constituent: pH, field Analysis Run 12/3/2018 6:40 AM View: PL's - Intrawell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Within Limits

Prediction Limit Intrawell Parametric

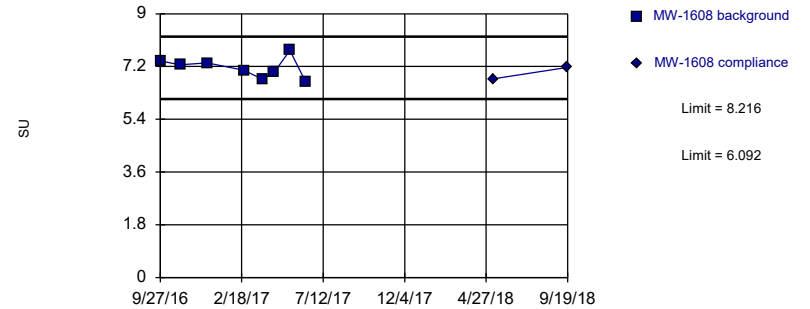


Background Data Summary: Mean=6.985, Std. Dev.=0.3366, n=8. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9063, critical = 0.749. Kappa = 3.014 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.0009403.

Constituent: pH, field Analysis Run 12/3/2018 6:40 AM View: PL's - Intrawell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Within Limits

Prediction Limit Intrawell Parametric

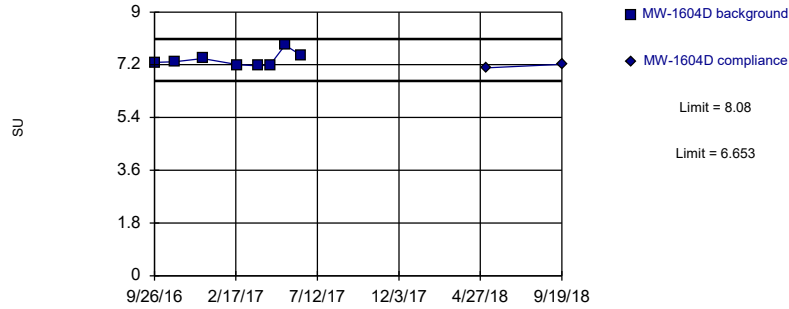


Background Data Summary: Mean=7.154, Std. Dev.=0.3523, n=8. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9751, critical = 0.749. Kappa = 3.014 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.0009403.

Constituent: pH, field Analysis Run 12/3/2018 6:40 AM View: PL's - Intrawell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Within Limits

Prediction Limit
Intrawell Parametric

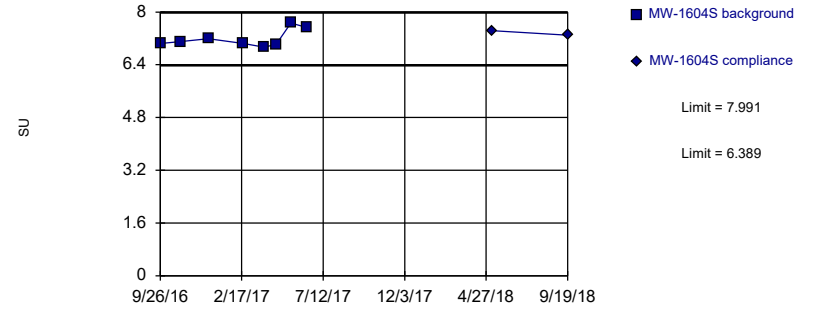


Background Data Summary: Mean=7.366, Std. Dev.=0.2368, n=8. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8333, critical = 0.749. Kappa = 3.014 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.0009403.

Constituent: pH, field Analysis Run 12/3/2018 6:40 AM View: PL's - Intrawell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Within Limits

Prediction Limit
Intrawell Parametric

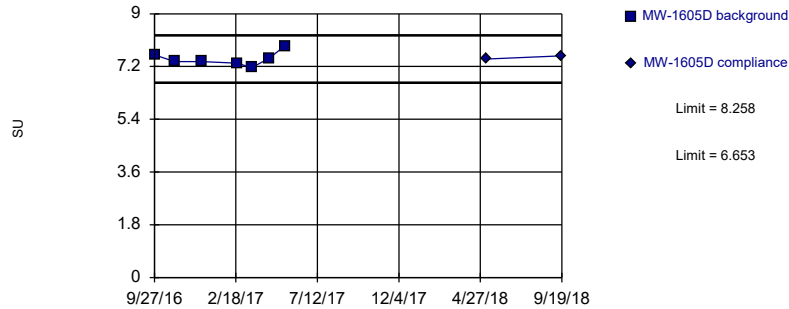


Background Data Summary: Mean=7.19, Std. Dev.=0.2657, n=8. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8184, critical = 0.749. Kappa = 3.014 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.0009403.

Constituent: pH, field Analysis Run 12/3/2018 6:40 AM View: PL's - Intrawell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Within Limits

Prediction Limit
Intrawell Parametric

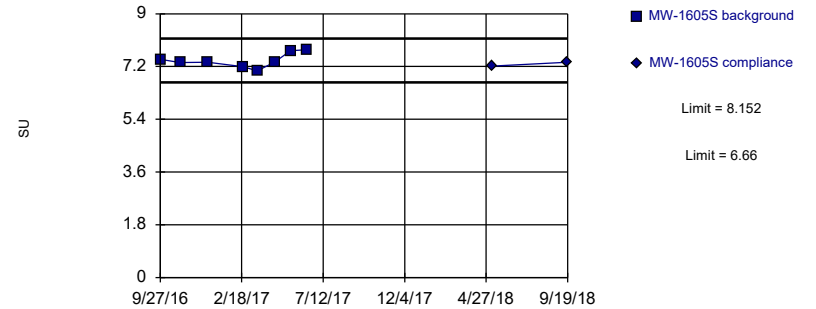


Background Data Summary: Mean=7.456, Std. Dev.=0.2388, n=7. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9315, critical = 0.73. Kappa = 3.361 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.0009403.

Constituent: pH, field Analysis Run 12/3/2018 6:40 AM View: PL's - Intrawell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Within Limits

Prediction Limit
Intrawell Parametric

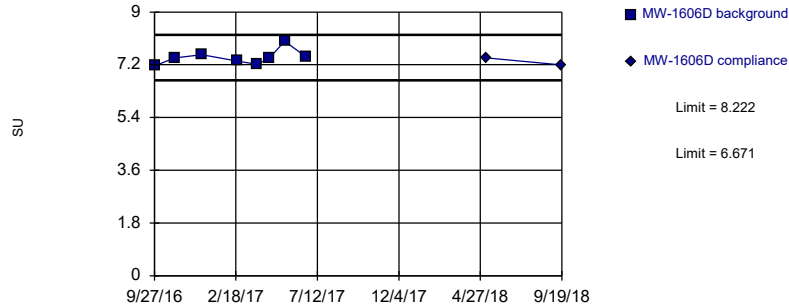


Background Data Summary: Mean=7.406, Std. Dev.=0.2476, n=8. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9237, critical = 0.749. Kappa = 3.014 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.0009403.

Constituent: pH, field Analysis Run 12/3/2018 6:40 AM View: PL's - Intrawell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Within Limits

Prediction Limit
Intrawell Parametric

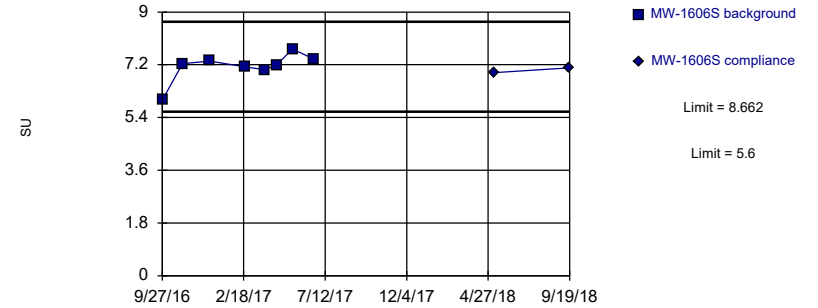


Background Data Summary: Mean=7.446, Std. Dev.=0.2573, n=8. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8686, critical = 0.749. Kappa = 3.014 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.0009403.

Constituent: pH, field Analysis Run 12/3/2018 6:40 AM View: PL's - Intrawell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Within Limits

Prediction Limit
Intrawell Parametric

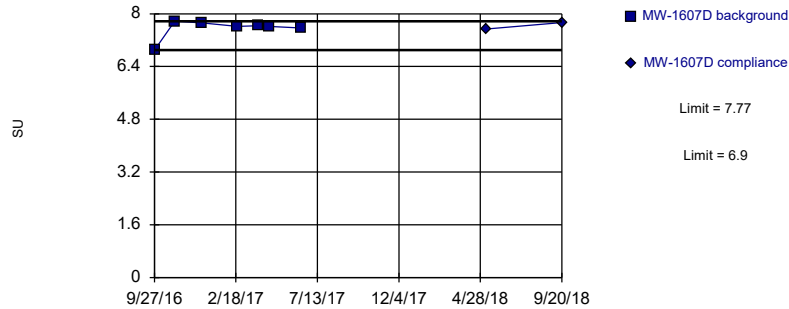


Background Data Summary: Mean=7.131, Std. Dev.=0.508, n=8. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8107, critical = 0.749. Kappa = 3.014 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.0009403.

Constituent: pH, field Analysis Run 12/3/2018 6:40 AM View: PL's - Intrawell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Within Limits

Prediction Limit
Intrawell Non-parametric

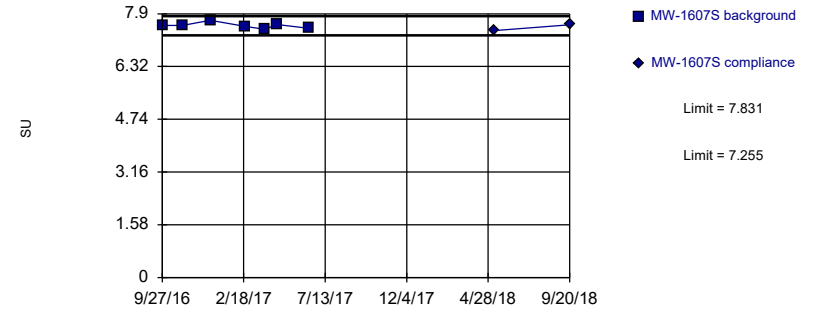


Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limits are highest and lowest of 7 background values. Well-constituent pair annual alpha = 0.1091. Individual comparison alpha = 0.05531 (1 of 2).

Constituent: pH, field Analysis Run 12/3/2018 6:40 AM View: PL's - Intrawell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Within Limits

Prediction Limit
Intrawell Parametric



Background Data Summary: Mean=7.543, Std. Dev.=0.08577, n=7. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9302, critical = 0.73. Kappa = 3.361 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.0009403.

Constituent: pH, field Analysis Run 12/3/2018 6:40 AM View: PL's - Intrawell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Trend Test Summary Table - Significant Results

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 12/3/2018, 8:36 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>
Calcium, total (mg/L)	MW-1607S	16.37	32	25	Yes	9	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	MW-1607S	12.46	26	25	Yes	9	0	n/a	n/a	0.01	NP
Fluoride, total (mg/L)	MW-1602 (bg)	0.03724	38	30	Yes	10	0	n/a	n/a	0.01	NP
Fluoride, total (mg/L)	MW-1608 (bg)	-0.06348	-39	-30	Yes	10	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	MW-1601A (bg)	52.31	28	25	Yes	9	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	MW-1602 (bg)	140.9	26	25	Yes	9	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	MW-1608 (bg)	191.7	28	25	Yes	9	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	MW-1604S	100.2	28	25	Yes	9	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	MW-1605D	-336.3	-27	-25	Yes	9	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	MW-1602 (bg)	203.2	26	25	Yes	9	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	MW-1605D	-320.7	-30	-25	Yes	9	0	n/a	n/a	0.01	NP

Trend Test Summary Table - All Results

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 12/3/2018, 8:36 AM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Boron, total (mg/L)	MW-1601A (bg)	0.07813	14	25	No	9	0	n/a	n/a	0.01	NP
Boron, total (mg/L)	MW-1602 (bg)	-0.003813	-3	-25	No	9	0	n/a	n/a	0.01	NP
Boron, total (mg/L)	MW-1603 (bg)	0.09386	8	25	No	9	0	n/a	n/a	0.01	NP
Boron, total (mg/L)	MW-1608 (bg)	0.03387	13	25	No	9	0	n/a	n/a	0.01	NP
Boron, total (mg/L)	MW-1604D	-0.3259	-19	-25	No	9	0	n/a	n/a	0.01	NP
Boron, total (mg/L)	MW-1604S	2.133	12	25	No	9	0	n/a	n/a	0.01	NP
Boron, total (mg/L)	MW-1605D	-1.432	-20	-25	No	9	0	n/a	n/a	0.01	NP
Boron, total (mg/L)	MW-1605S	0.7029	8	25	No	9	0	n/a	n/a	0.01	NP
Boron, total (mg/L)	MW-1606D	1.645	22	25	No	9	0	n/a	n/a	0.01	NP
Boron, total (mg/L)	MW-1606S	0.9538	18	25	No	9	0	n/a	n/a	0.01	NP
Boron, total (mg/L)	MW-1607D	0.2427	9	25	No	9	0	n/a	n/a	0.01	NP
Boron, total (mg/L)	MW-1607S	0.5123	18	25	No	9	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	MW-1601A (bg)	15.24	11	25	No	9	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	MW-1602 (bg)	28.4	16	25	No	9	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	MW-1603 (bg)	47.47	20	25	No	9	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	MW-1608 (bg)	22.55	18	25	No	9	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	MW-1604S	45.11	24	25	No	9	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	MW-1605D	-51.95	-12	-25	No	9	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	MW-1606D	2.086	2	25	No	9	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	MW-1606S	43.85	13	25	No	9	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	MW-1607D	24.49	12	25	No	9	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	MW-1607S	16.37	32	25	Yes	9	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	MW-1601A (bg)	60.97	24	25	No	9	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	MW-1602 (bg)	5.271	20	25	No	9	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	MW-1603 (bg)	-5.669	-10	-25	No	9	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	MW-1608 (bg)	1.415	14	25	No	9	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	MW-1604S	41.14	17	25	No	9	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	MW-1605D	2.681	7	25	No	9	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	MW-1605S	48.88	18	25	No	9	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	MW-1606D	8.223	6	25	No	9	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	MW-1606S	33.57	14	25	No	9	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	MW-1607D	10.3	7	25	No	9	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	MW-1607S	12.46	26	25	Yes	9	0	n/a	n/a	0.01	NP
Fluoride, total (mg/L)	MW-1601A (bg)	0	-4	-30	No	10	0	n/a	n/a	0.01	NP
Fluoride, total (mg/L)	MW-1602 (bg)	0.03724	38	30	Yes	10	0	n/a	n/a	0.01	NP
Fluoride, total (mg/L)	MW-1603 (bg)	0	5	30	No	10	0	n/a	n/a	0.01	NP
Fluoride, total (mg/L)	MW-1608 (bg)	-0.06348	-39	-30	Yes	10	0	n/a	n/a	0.01	NP
Fluoride, total (mg/L)	MW-1605S	0.04044	21	30	No	10	0	n/a	n/a	0.01	NP
Fluoride, total (mg/L)	MW-1606S	-0.02483	-21	-30	No	10	0	n/a	n/a	0.01	NP
Fluoride, total (mg/L)	MW-1607D	0	-4	-30	No	10	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	MW-1601A (bg)	52.31	28	25	Yes	9	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	MW-1602 (bg)	140.9	26	25	Yes	9	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	MW-1603 (bg)	16.59	4	25	No	9	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	MW-1608 (bg)	191.7	28	25	Yes	9	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	MW-1604S	100.2	28	25	Yes	9	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	MW-1605D	-336.3	-27	-25	Yes	9	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	MW-1605S	-168.5	-11	-25	No	9	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	MW-1606D	-75.65	-23	-25	No	9	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	MW-1607D	70.09	4	25	No	9	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	MW-1601A (bg)	74.12	22	25	No	9	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	MW-1602 (bg)	203.2	26	25	Yes	9	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	MW-1603 (bg)	20.19	13	25	No	9	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	MW-1608 (bg)	149	24	25	No	9	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	MW-1604S	188.5	21	25	No	9	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	MW-1605D	-320.7	-30	-25	Yes	9	0	n/a	n/a	0.01	NP

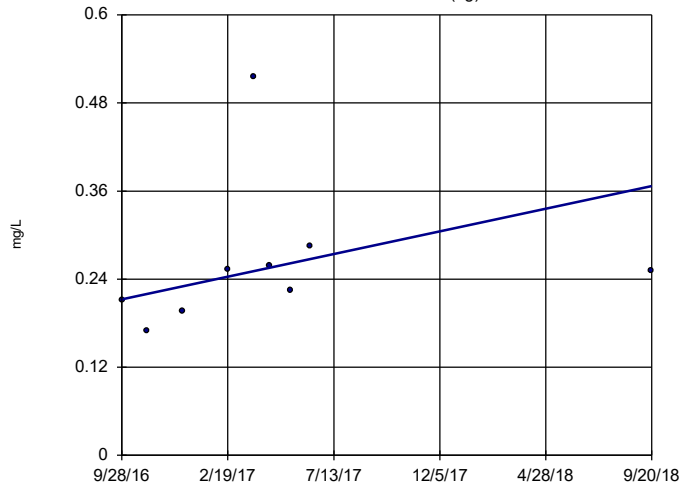
Trend Test Summary Table - All Results

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 12/3/2018, 8:36 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>
Total Dissolved Solids [TDS] (mg/L)	MW-1605S	-61.34	-1	-25	No	9	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	MW-1606D	-47.88	-13	-25	No	9	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	MW-1606S	74.74	7	21	No	8	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	MW-1607D	142.3	6	25	No	9	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	MW-1607S	112	17	25	No	9	0	n/a	n/a	0.01	NP

Sen's Slope Estimator

MW-1601A (bg)

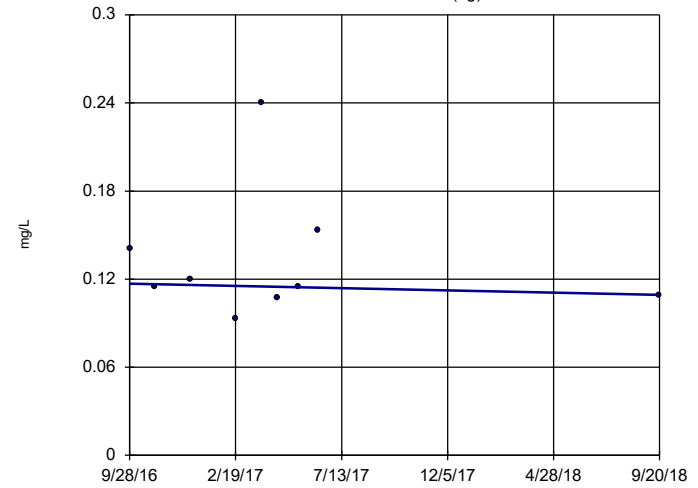


n = 9
Slope = 0.07813 units per year.
Mann-Kendall statistic = 14
critical = 25
Trend not significant at 99% confidence level ($\alpha = 0.005$ per tail).

Constituent: Boron, total Analysis Run 12/3/2018 8:31 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1602 (bg)

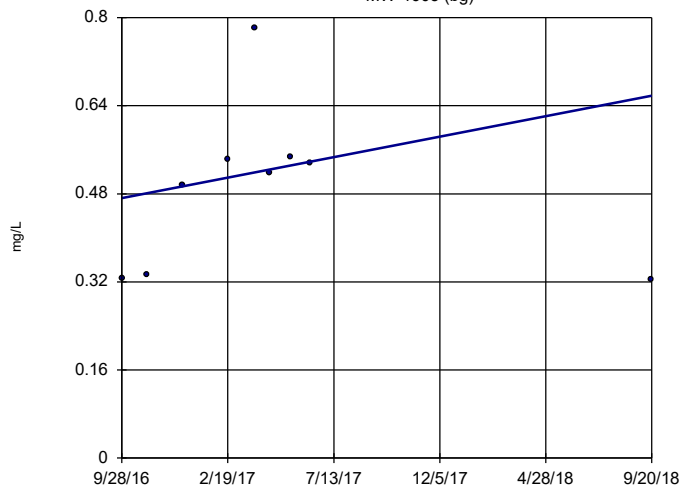


n = 9
Slope = -0.003813 units per year.
Mann-Kendall statistic = -3
critical = -25
Trend not significant at 99% confidence level ($\alpha = 0.005$ per tail).

Constituent: Boron, total Analysis Run 12/3/2018 8:31 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1603 (bg)

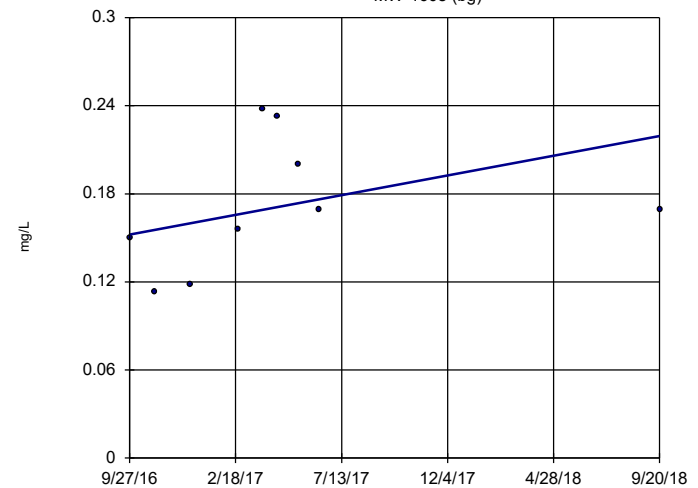


n = 9
Slope = 0.09386 units per year.
Mann-Kendall statistic = 8
critical = 25
Trend not significant at 99% confidence level ($\alpha = 0.005$ per tail).

Constituent: Boron, total Analysis Run 12/3/2018 8:31 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1608 (bg)

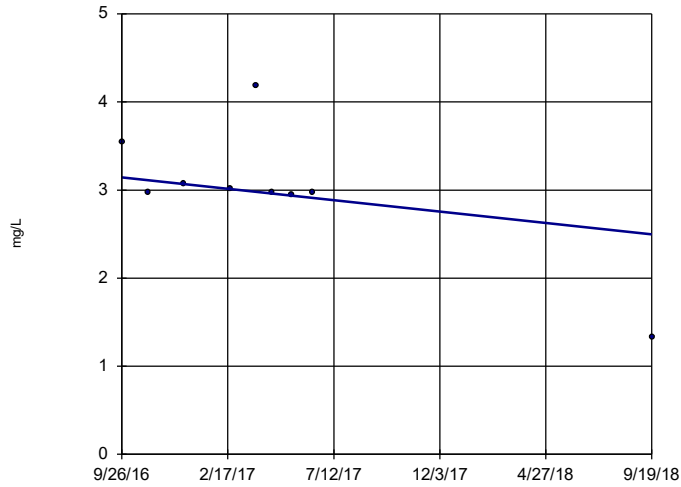


n = 9
Slope = 0.03387 units per year.
Mann-Kendall statistic = 13
critical = 25
Trend not significant at 99% confidence level ($\alpha = 0.005$ per tail).

Constituent: Boron, total Analysis Run 12/3/2018 8:31 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1604D

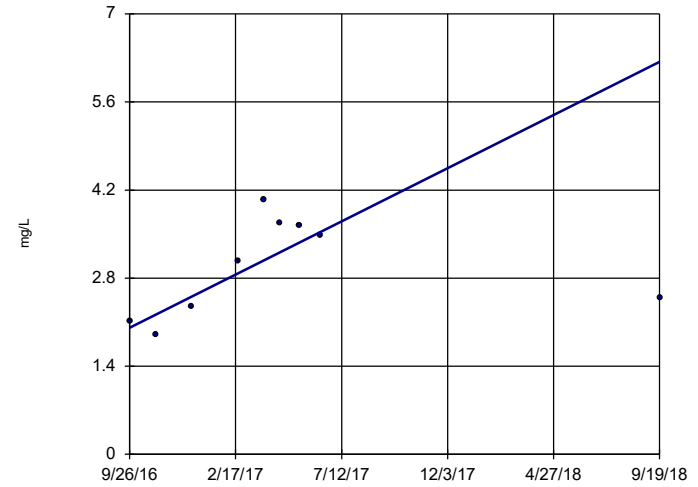


n = 9
 Slope = -0.3259
 units per year.
 Mann-Kendall
 statistic = -19
 critical = -25
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Boron, total Analysis Run 12/3/2018 8:31 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1604S

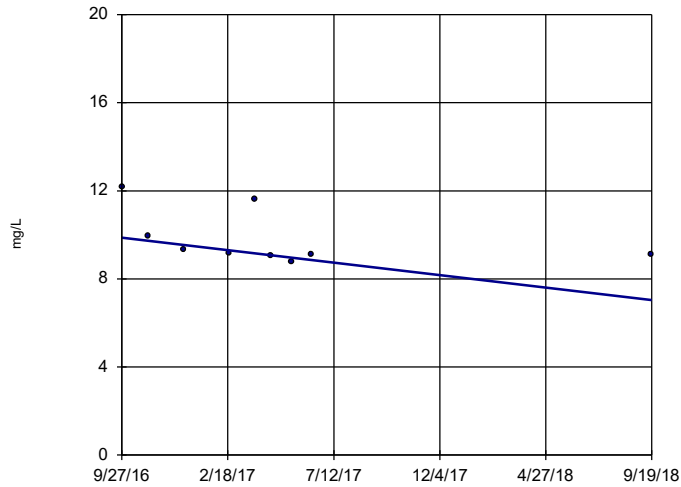


n = 9
 Slope = 2.133
 units per year.
 Mann-Kendall
 statistic = 12
 critical = 25
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Boron, total Analysis Run 12/3/2018 8:31 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1605D

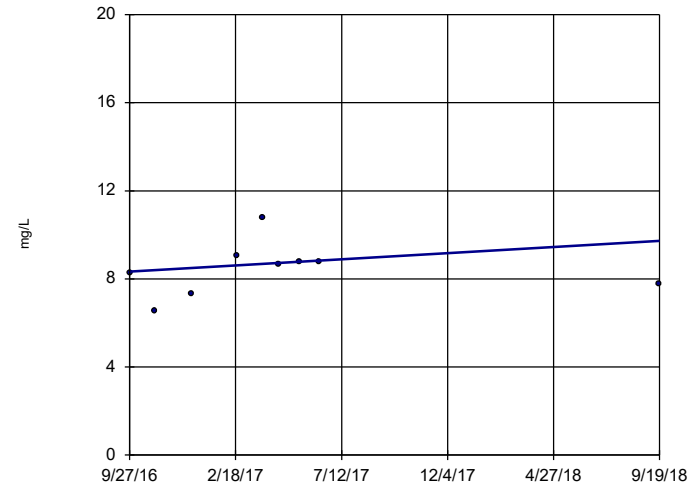


n = 9
 Slope = -1.432
 units per year.
 Mann-Kendall
 statistic = -20
 critical = -25
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Boron, total Analysis Run 12/3/2018 8:31 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1605S

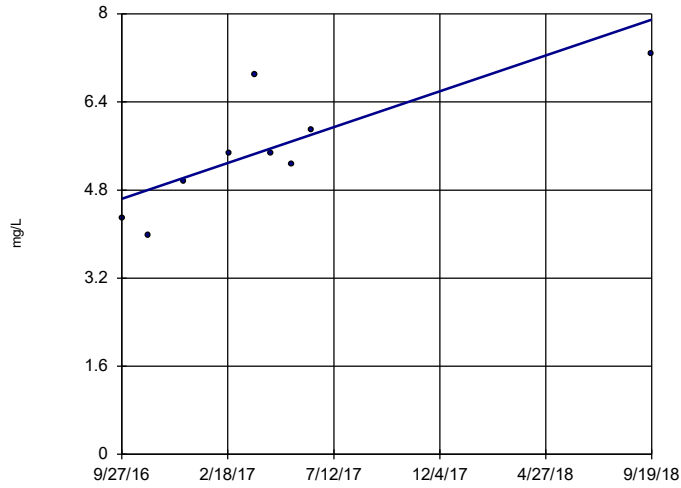


n = 9
 Slope = 0.7029
 units per year.
 Mann-Kendall
 statistic = 8
 critical = 25
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Boron, total Analysis Run 12/3/2018 8:31 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1606D

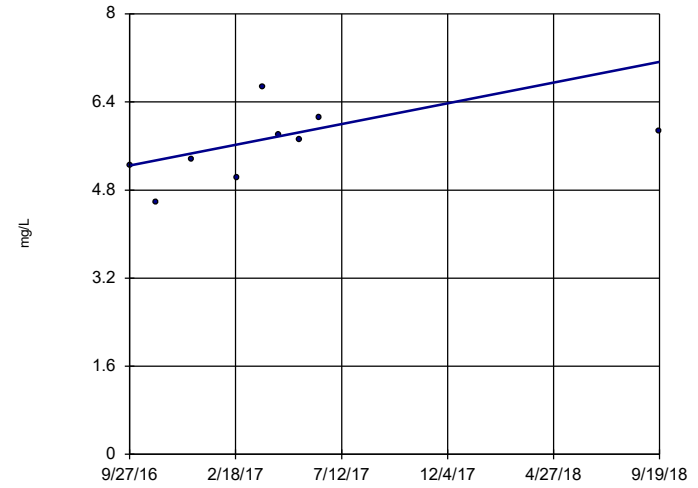


n = 9
 Slope = 1.645 units per year.
 Mann-Kendall statistic = 22
 critical = 25
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Boron, total Analysis Run 12/3/2018 8:31 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1606S

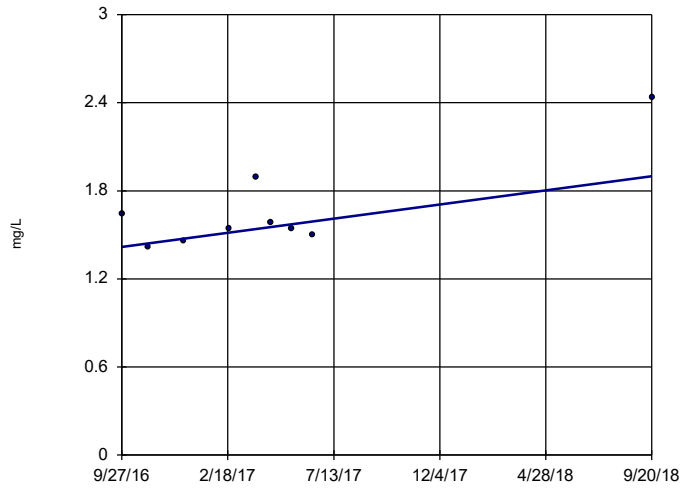


n = 9
 Slope = 0.9538 units per year.
 Mann-Kendall statistic = 18
 critical = 25
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Boron, total Analysis Run 12/3/2018 8:31 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1607D

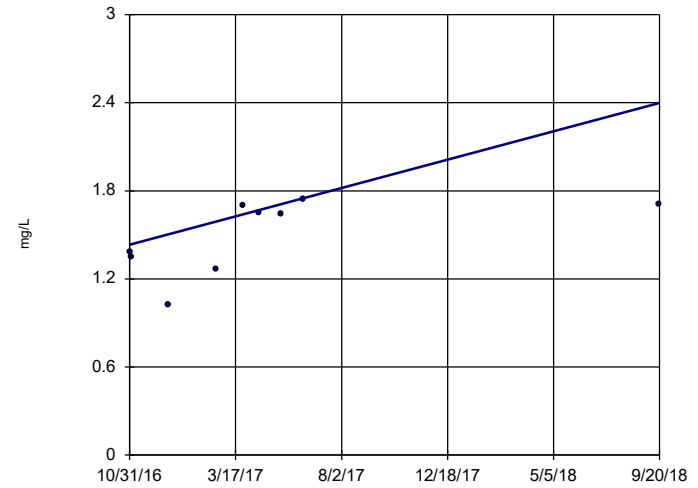


n = 9
 Slope = 0.2427 units per year.
 Mann-Kendall statistic = 9
 critical = 25
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Boron, total Analysis Run 12/3/2018 8:31 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1607S

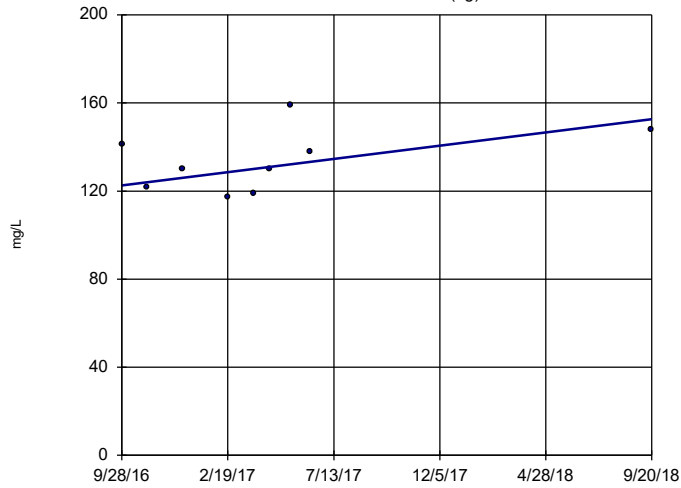


n = 9
 Slope = 0.5123 units per year.
 Mann-Kendall statistic = 18
 critical = 25
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Boron, total Analysis Run 12/3/2018 8:31 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1601A (bg)

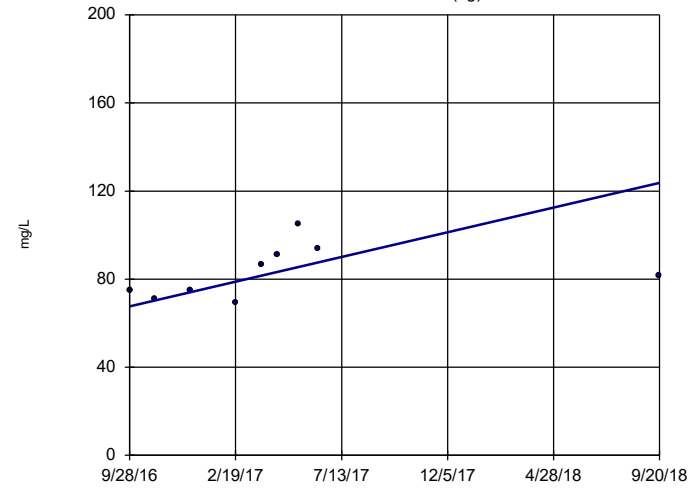


n = 9
 Slope = 15.24
 units per year.
 Mann-Kendall
 statistic = 11
 critical = 25
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Calcium, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1602 (bg)

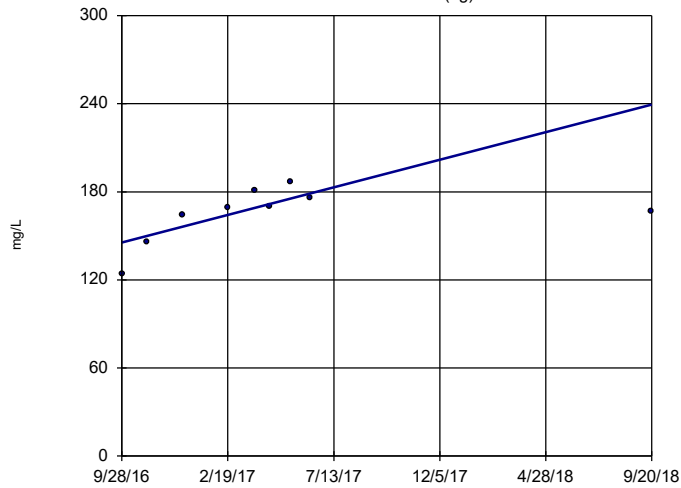


n = 9
 Slope = 28.4
 units per year.
 Mann-Kendall
 statistic = 16
 critical = 25
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Calcium, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1603 (bg)

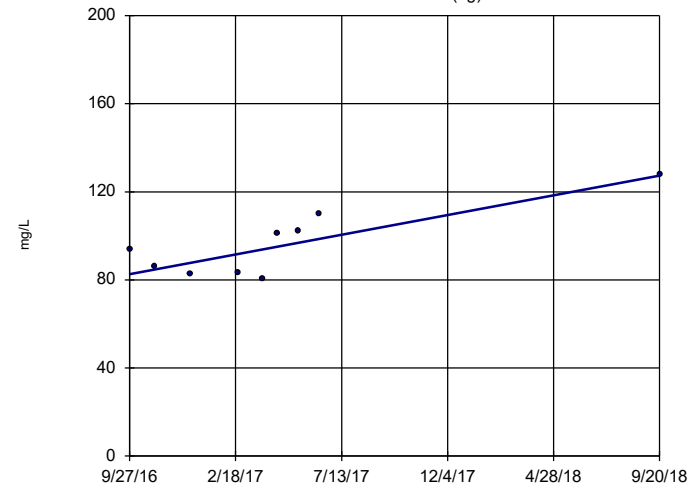


n = 9
 Slope = 47.47
 units per year.
 Mann-Kendall
 statistic = 20
 critical = 25
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Calcium, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1608 (bg)

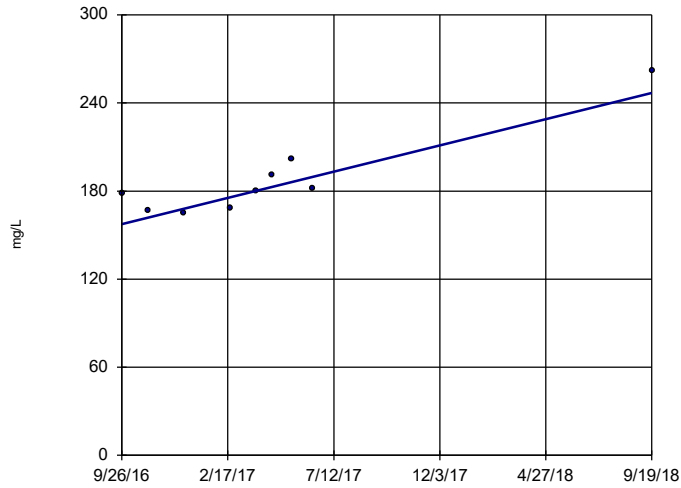


n = 9
 Slope = 22.55
 units per year.
 Mann-Kendall
 statistic = 18
 critical = 25
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Calcium, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1604S

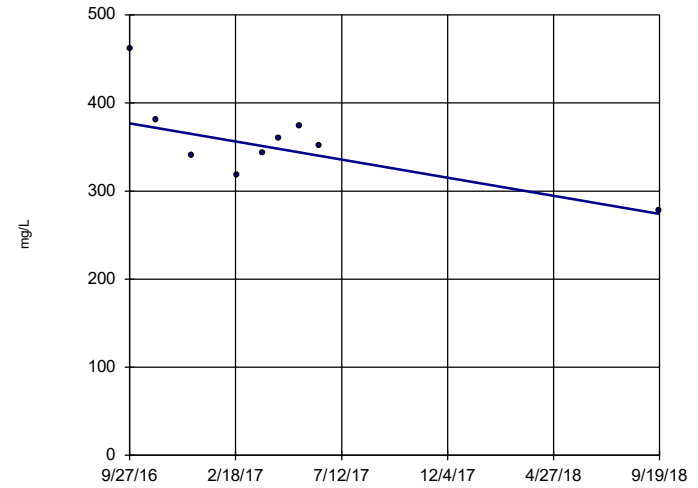


n = 9
 Slope = 45.11 units per year.
 Mann-Kendall statistic = 24
 critical = 25
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Calcium, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1605D

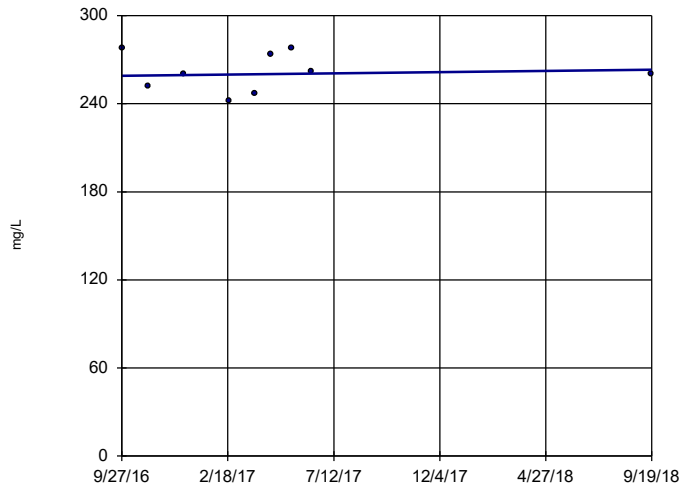


n = 9
 Slope = -51.95 units per year.
 Mann-Kendall statistic = -12
 critical = -25
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Calcium, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1606D

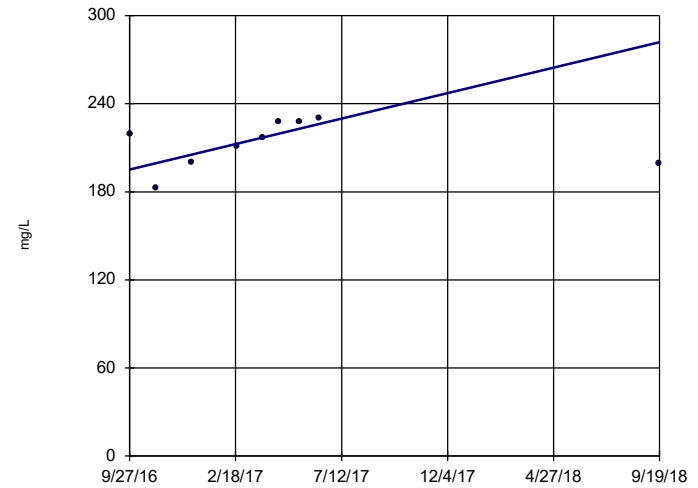


n = 9
 Slope = 2.086 units per year.
 Mann-Kendall statistic = 2
 critical = 25
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Calcium, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1606S

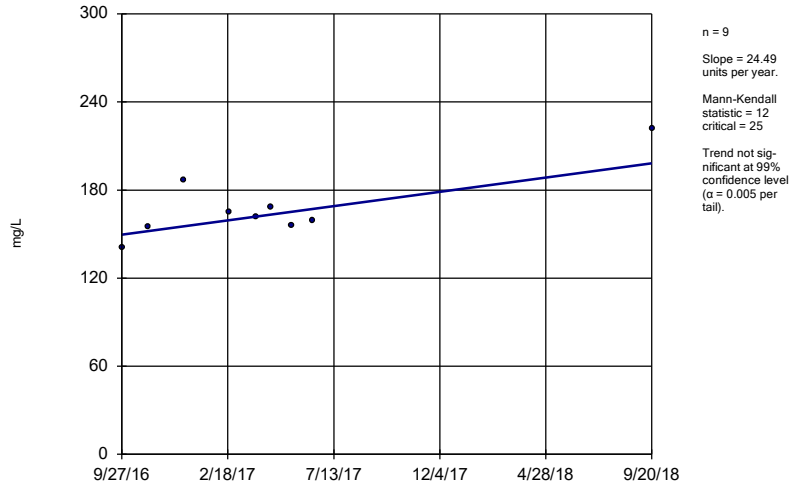


n = 9
 Slope = 43.85 units per year.
 Mann-Kendall statistic = 13
 critical = 25
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Calcium, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

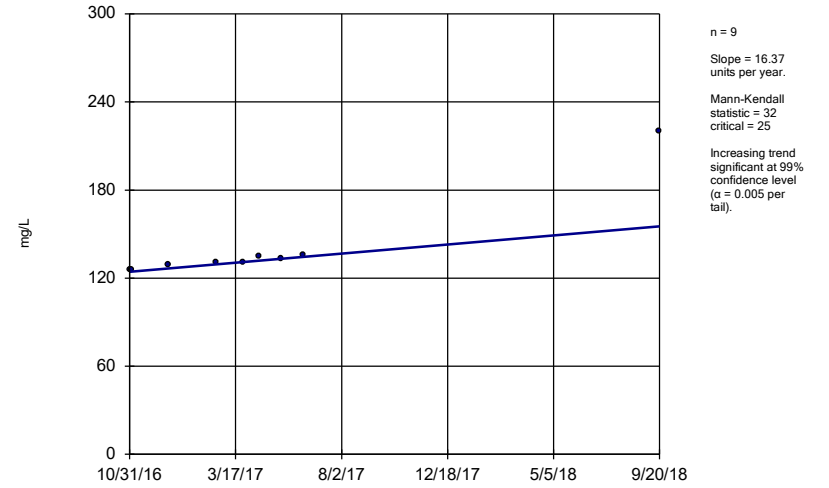
MW-1607D



Constituent: Calcium, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

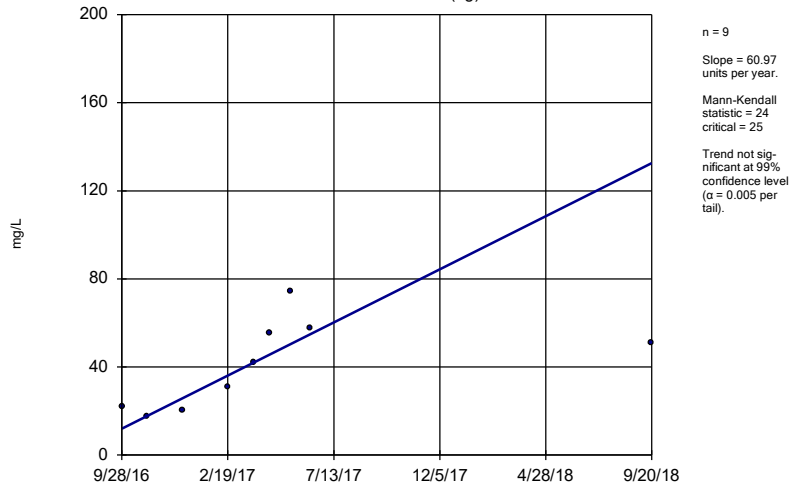
MW-1607S



Constituent: Calcium, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

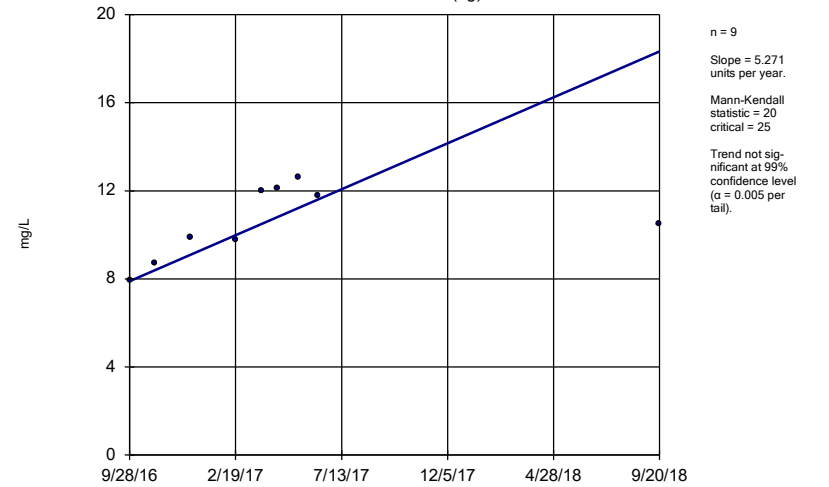
MW-1601A (bg)



Constituent: Chloride, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

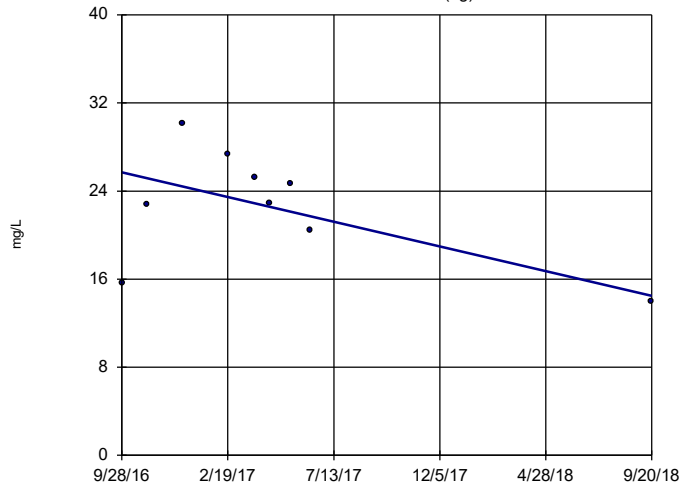
MW-1602 (bg)



Constituent: Chloride, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1603 (bg)

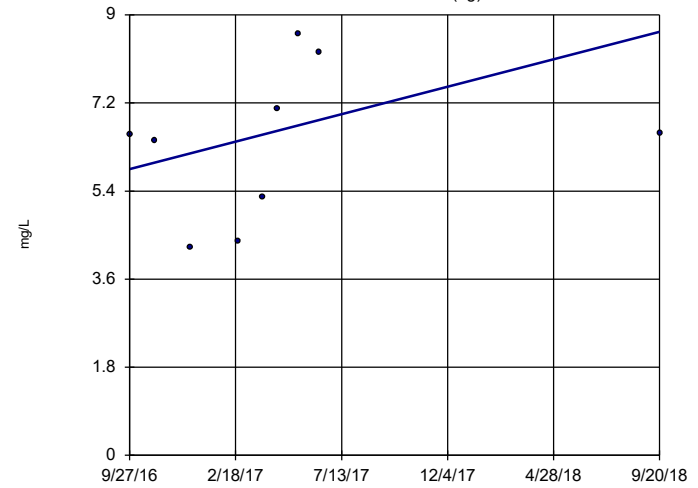


n = 9
 Slope = -5.669 units per year.
 Mann-Kendall statistic = -10
 critical = -25
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Chloride, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1608 (bg)

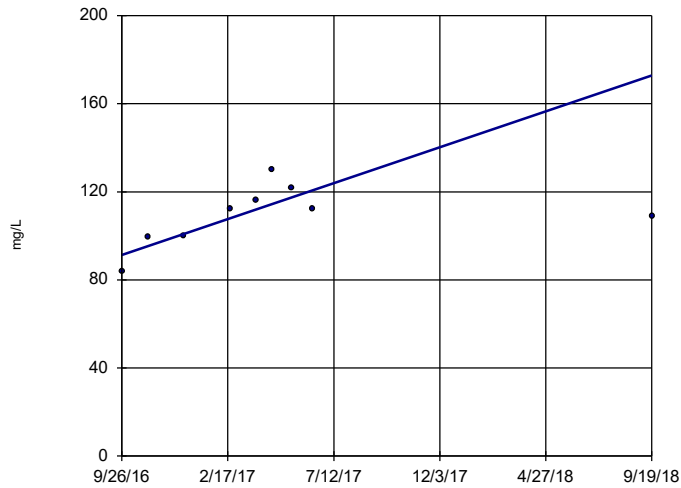


n = 9
 Slope = 1.415 units per year.
 Mann-Kendall statistic = 14
 critical = 25
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Chloride, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1604S

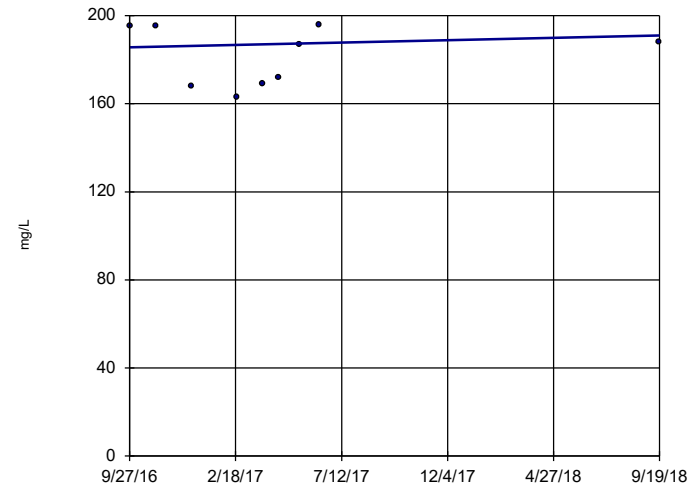


n = 9
 Slope = 41.14 units per year.
 Mann-Kendall statistic = 17
 critical = 25
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Chloride, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1605D

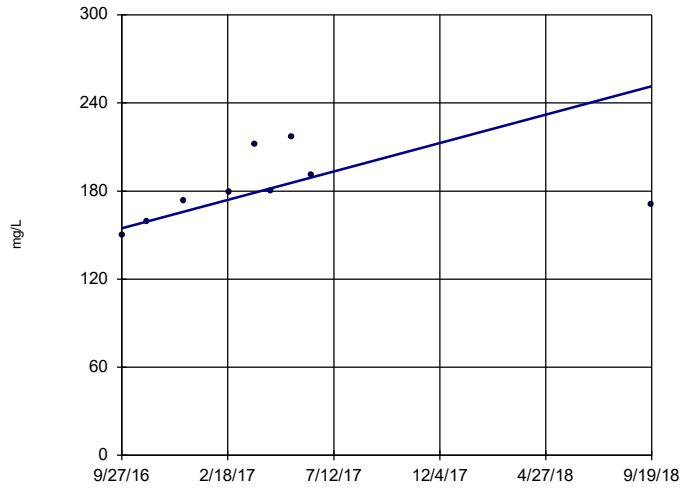


n = 9
 Slope = 2.681 units per year.
 Mann-Kendall statistic = 7
 critical = 25
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Chloride, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1605S

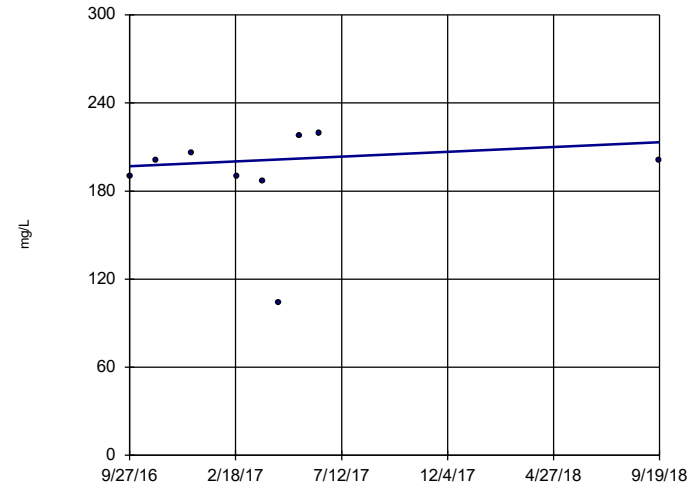


n = 9
 Slope = 48.88 units per year.
 Mann-Kendall statistic = 18
 critical = 25
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Chloride, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1606D

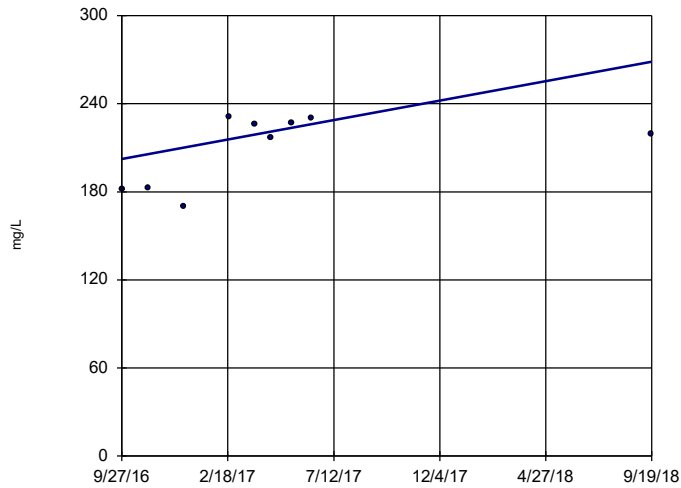


n = 9
 Slope = 8.223 units per year.
 Mann-Kendall statistic = 6
 critical = 25
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Chloride, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1606S

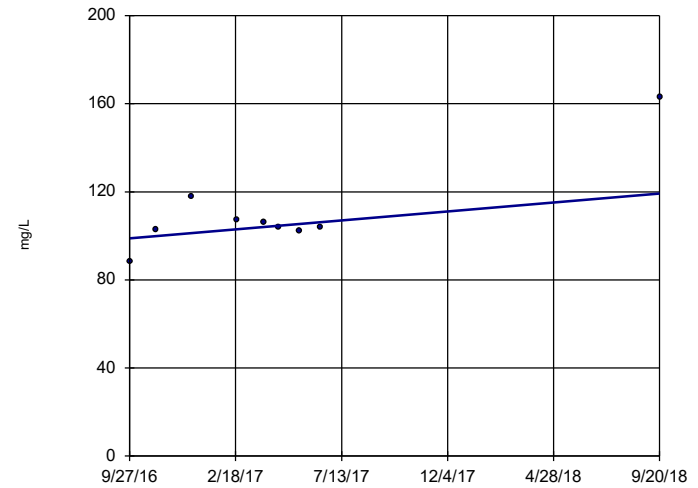


n = 9
 Slope = 33.57 units per year.
 Mann-Kendall statistic = 14
 critical = 25
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Chloride, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1607D

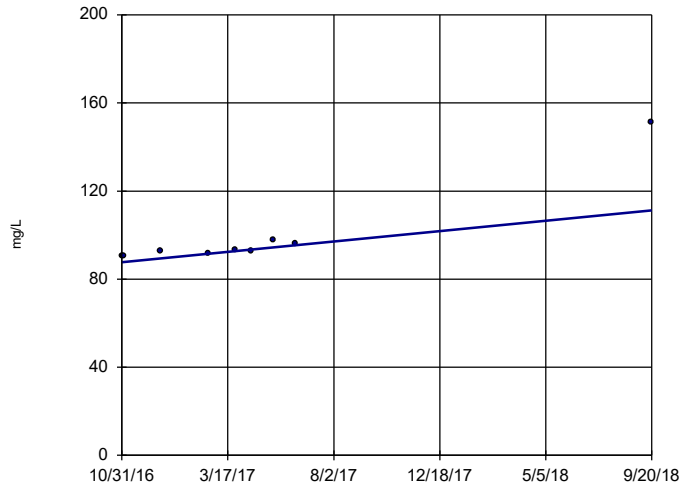


n = 9
 Slope = 10.3 units per year.
 Mann-Kendall statistic = 7
 critical = 25
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Chloride, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

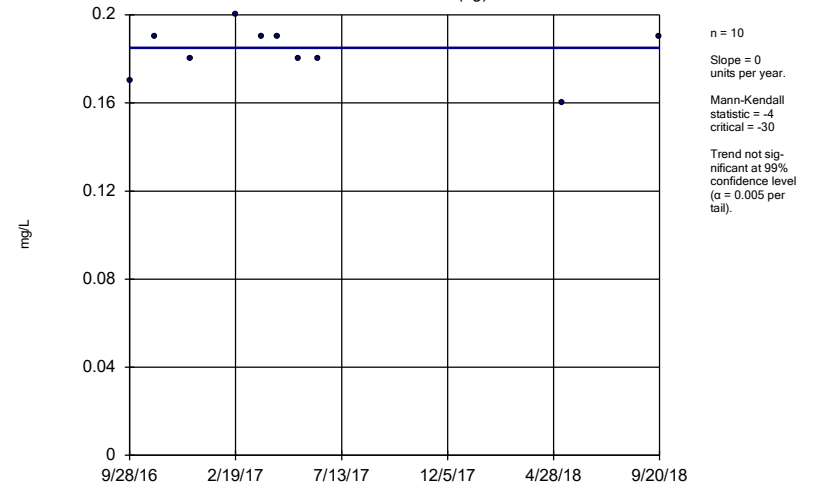
MW-1607S



Constituent: Chloride, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

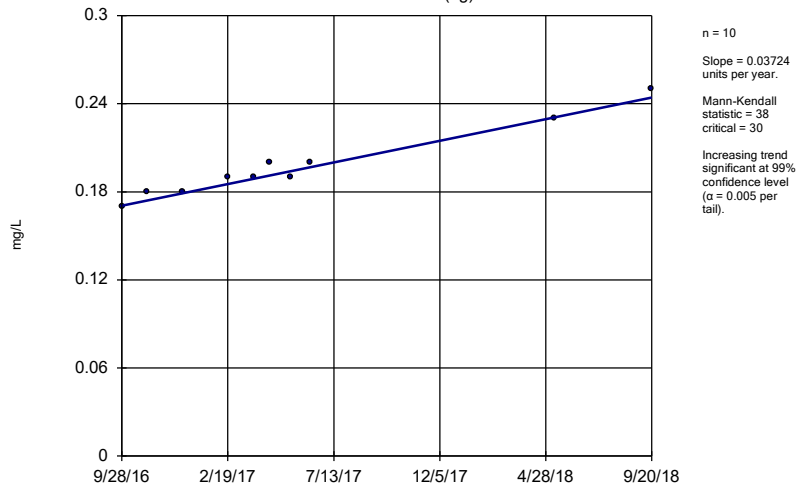
MW-1601A (bg)



Constituent: Fluoride, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

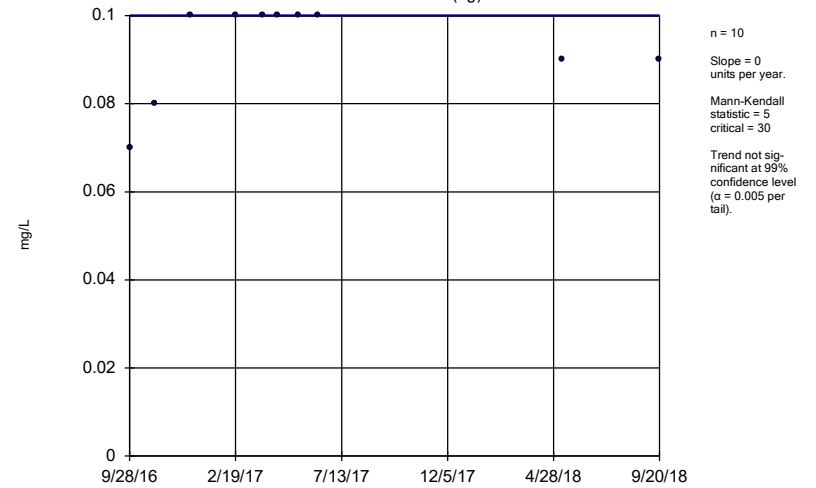
MW-1602 (bg)



Constituent: Fluoride, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

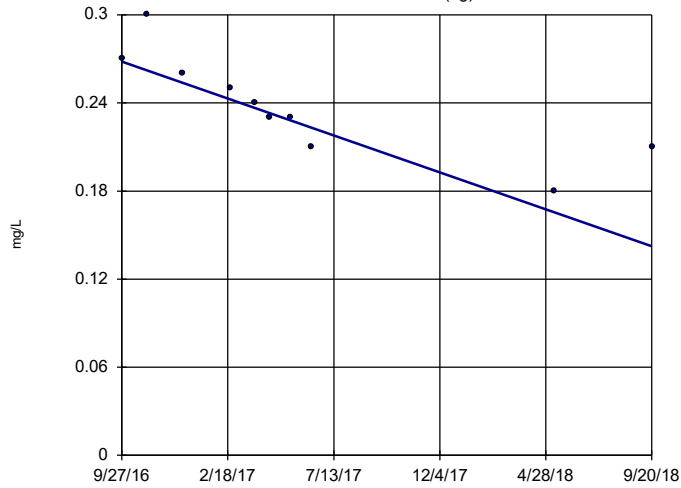
MW-1603 (bg)



Constituent: Fluoride, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1608 (bg)

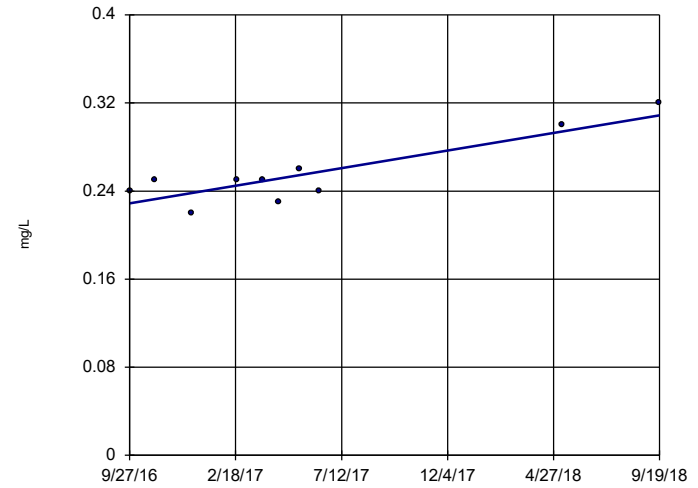


n = 10
 Slope = -0.06348 units per year.
 Mann-Kendall statistic = -39
 critical = -30
 Decreasing trend significant at 99% confidence level (α = 0.005 per tail).

Constituent: Fluoride, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1605S

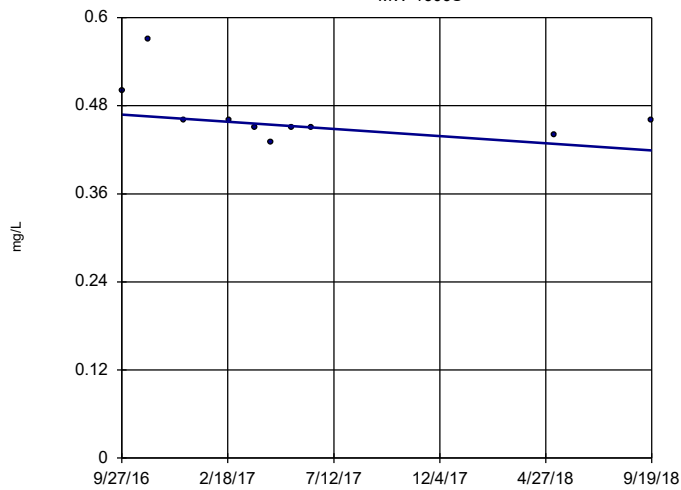


n = 10
 Slope = 0.04044 units per year.
 Mann-Kendall statistic = 21
 critical = 30
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Fluoride, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1606S

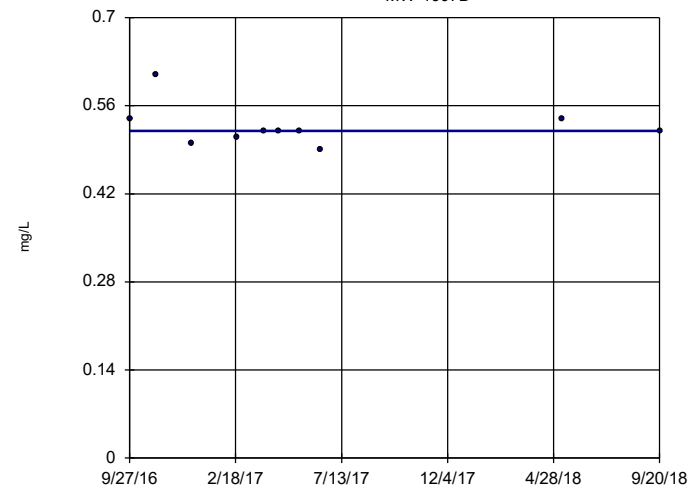


n = 10
 Slope = -0.02483 units per year.
 Mann-Kendall statistic = -21
 critical = -30
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Fluoride, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1607D

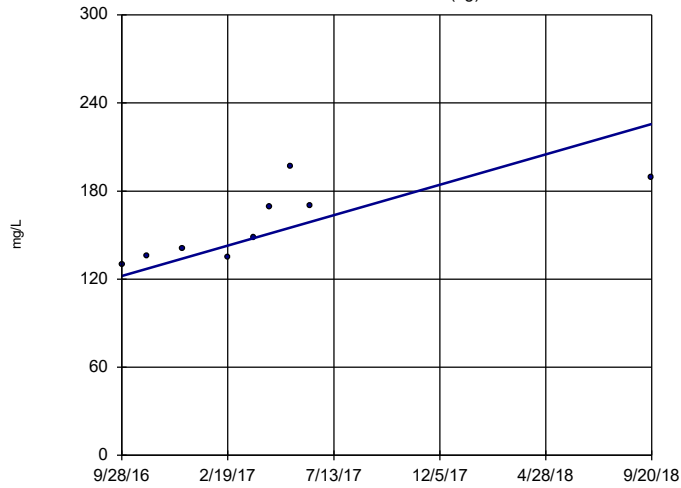


n = 10
 Slope = 0 units per year.
 Mann-Kendall statistic = -4
 critical = -30
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Fluoride, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1601A (bg)

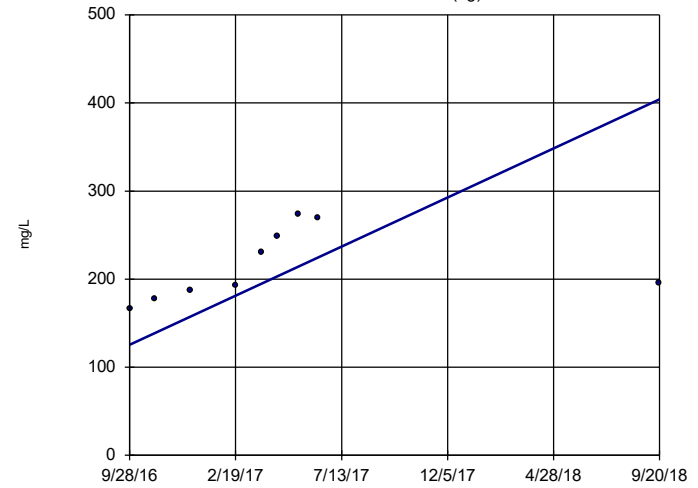


n = 9
 Slope = 52.31
 units per year.
 Mann-Kendall
 statistic = 28
 critical = 25
 Increasing trend
 significant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Sulfate, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1602 (bg)

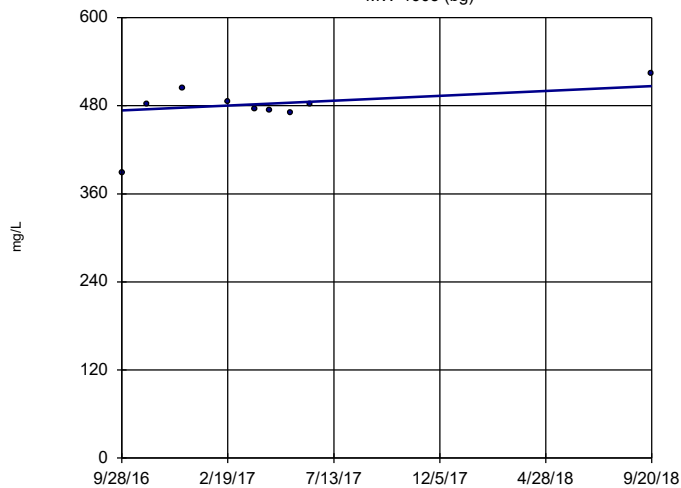


n = 9
 Slope = 140.9
 units per year.
 Mann-Kendall
 statistic = 26
 critical = 25
 Increasing trend
 significant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Sulfate, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1603 (bg)

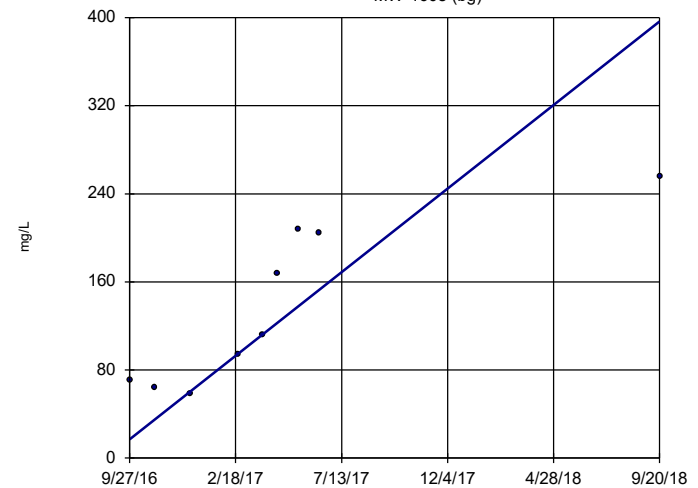


n = 9
 Slope = 16.59
 units per year.
 Mann-Kendall
 statistic = 4
 critical = 25
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Sulfate, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1608 (bg)

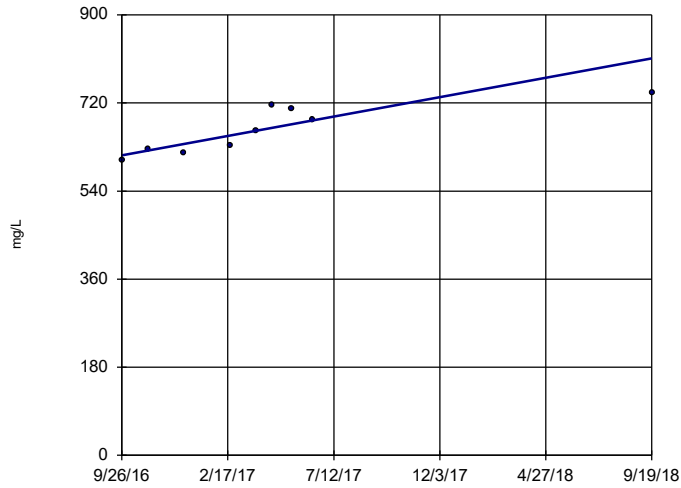


n = 9
 Slope = 191.7
 units per year.
 Mann-Kendall
 statistic = 28
 critical = 25
 Increasing trend
 significant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Sulfate, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1604S

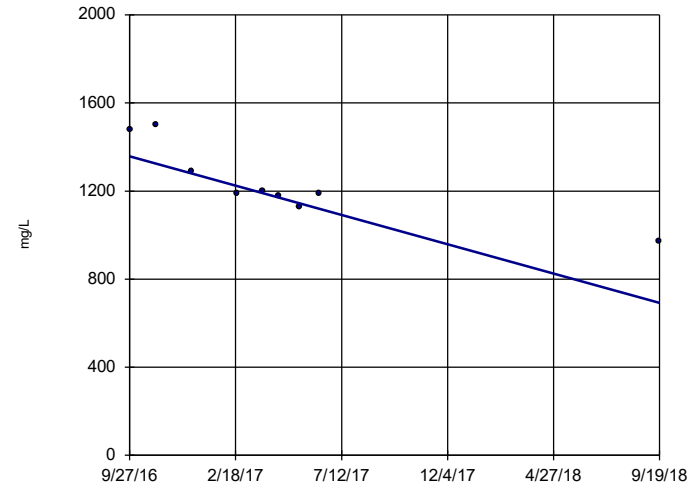


n = 9
 Slope = 100.2 units per year.
 Mann-Kendall statistic = 28
 critical = 25
 Increasing trend significant at 99% confidence level (α = 0.005 per tail).

Constituent: Sulfate, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1605D

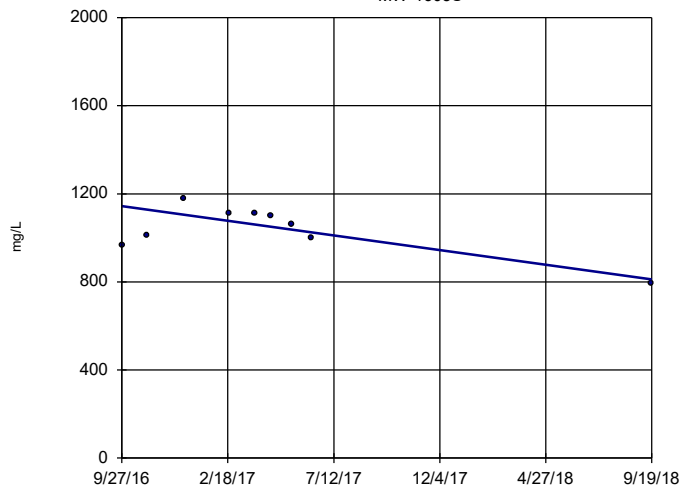


n = 9
 Slope = -336.3 units per year.
 Mann-Kendall statistic = -27
 critical = -25
 Decreasing trend significant at 99% confidence level (α = 0.005 per tail).

Constituent: Sulfate, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1605S

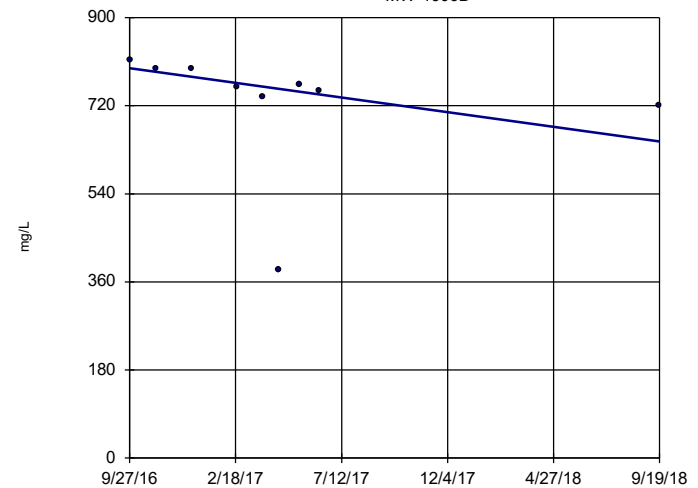


n = 9
 Slope = -168.5 units per year.
 Mann-Kendall statistic = -11
 critical = -25
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Sulfate, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1606D

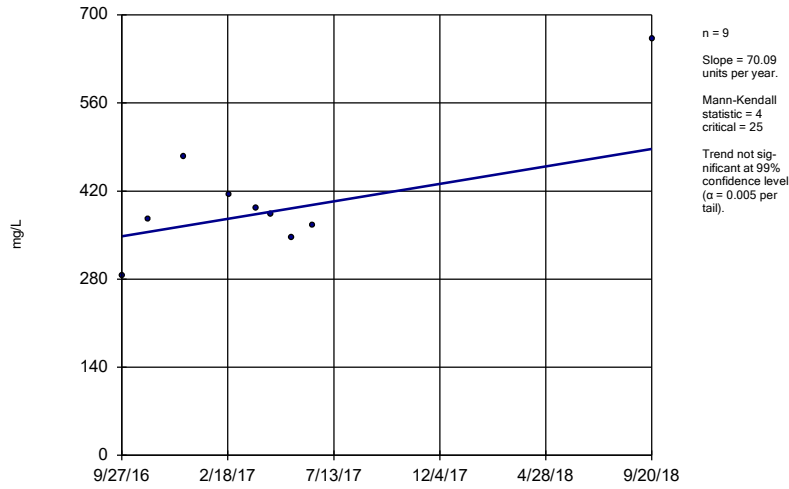


n = 9
 Slope = -75.65 units per year.
 Mann-Kendall statistic = -23
 critical = -25
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Sulfate, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

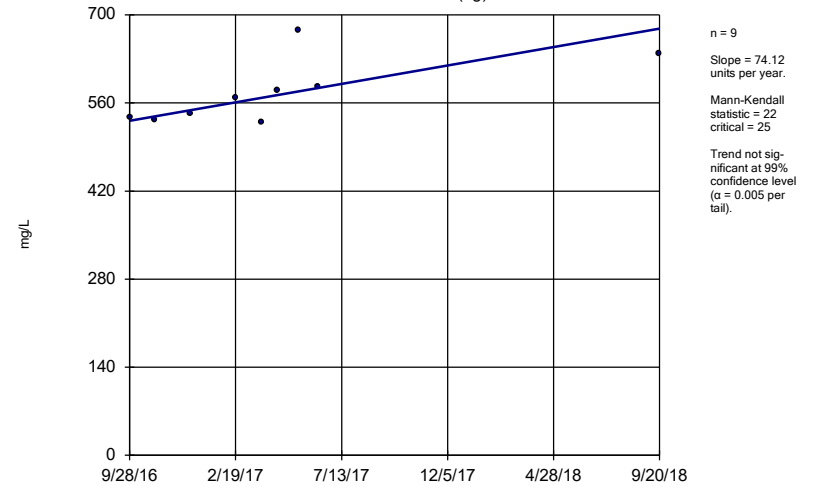
MW-1607D



Constituent: Sulfate, total Analysis Run 12/3/2018 8:32 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

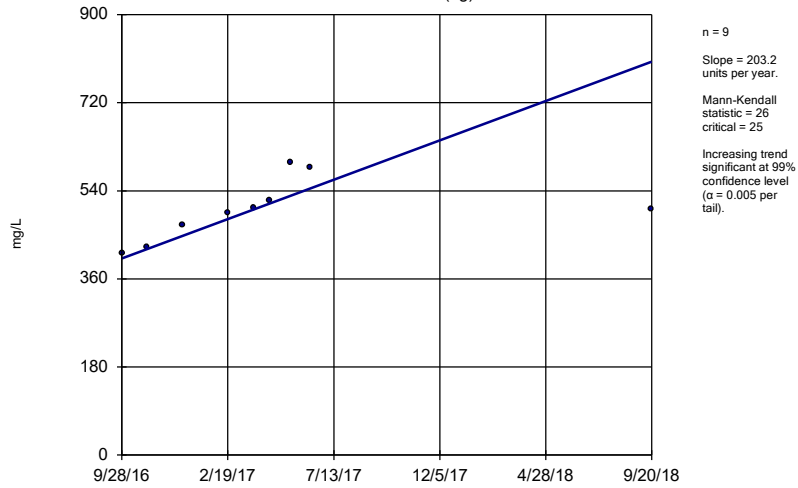
MW-1601A (bg)



Constituent: Total Dissolved Solids [TDS] Analysis Run 12/3/2018 8:32 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

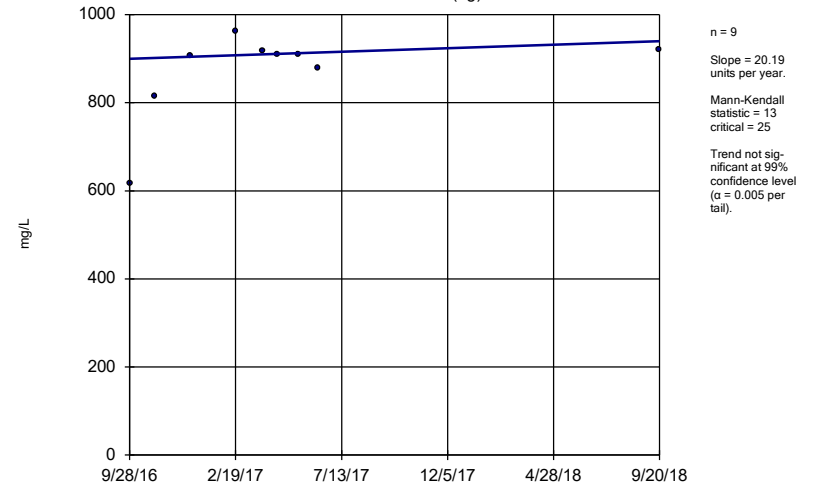
MW-1602 (bg)



Constituent: Total Dissolved Solids [TDS] Analysis Run 12/3/2018 8:32 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

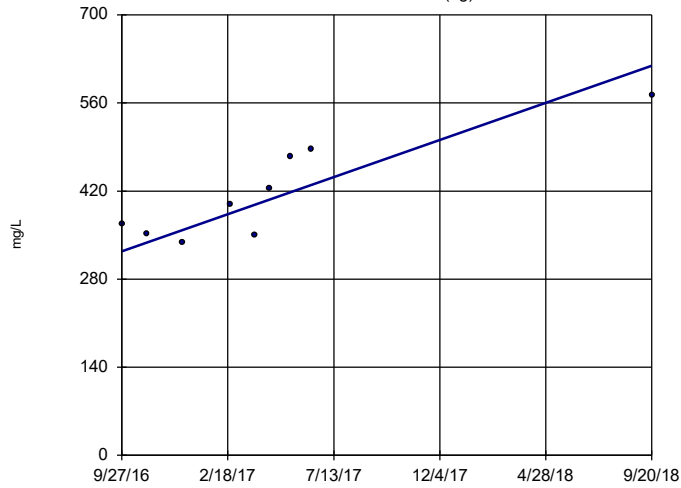
MW-1603 (bg)



Constituent: Total Dissolved Solids [TDS] Analysis Run 12/3/2018 8:32 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1608 (bg)

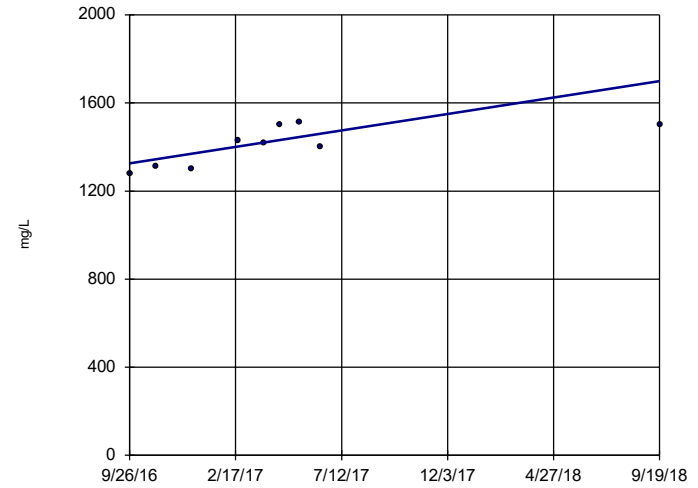


n = 9
 Slope = 149
 units per year.
 Mann-Kendall
 statistic = 24
 critical = 25
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Total Dissolved Solids [TDS] Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1604S

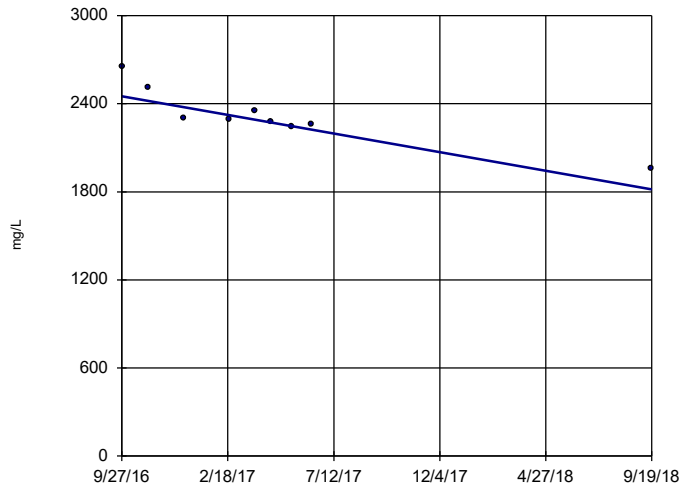


n = 9
 Slope = 188.5
 units per year.
 Mann-Kendall
 statistic = 21
 critical = 25
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Total Dissolved Solids [TDS] Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1605D

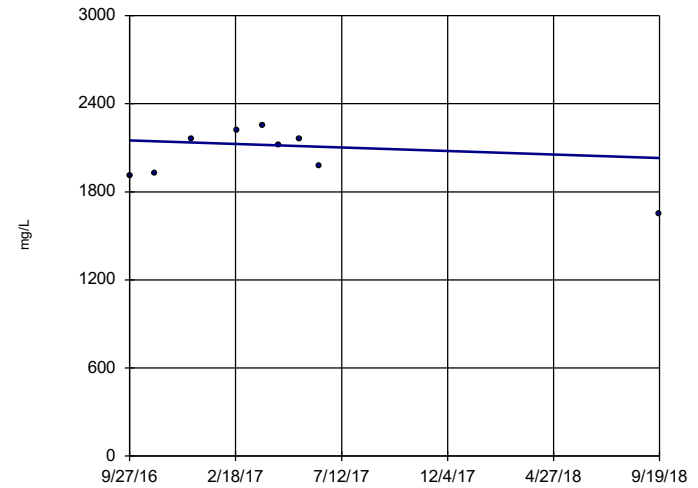


n = 9
 Slope = -320.7
 units per year.
 Mann-Kendall
 statistic = -30
 critical = -25
 Decreasing trend
 significant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Total Dissolved Solids [TDS] Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1605S

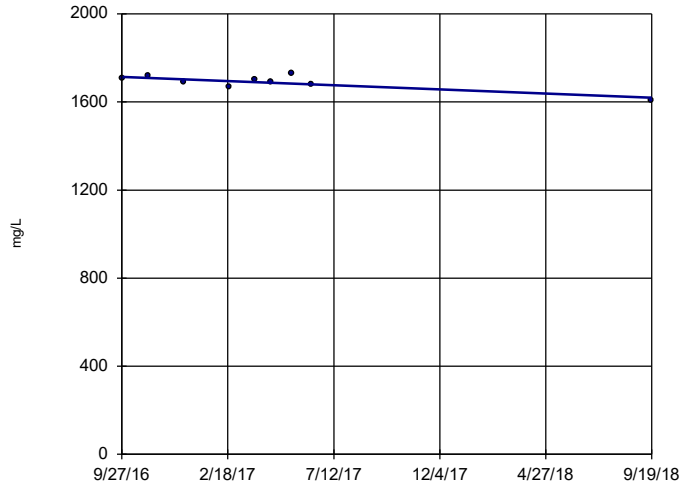


n = 9
 Slope = -61.34
 units per year.
 Mann-Kendall
 statistic = -1
 critical = -25
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Total Dissolved Solids [TDS] Analysis Run 12/3/2018 8:32 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

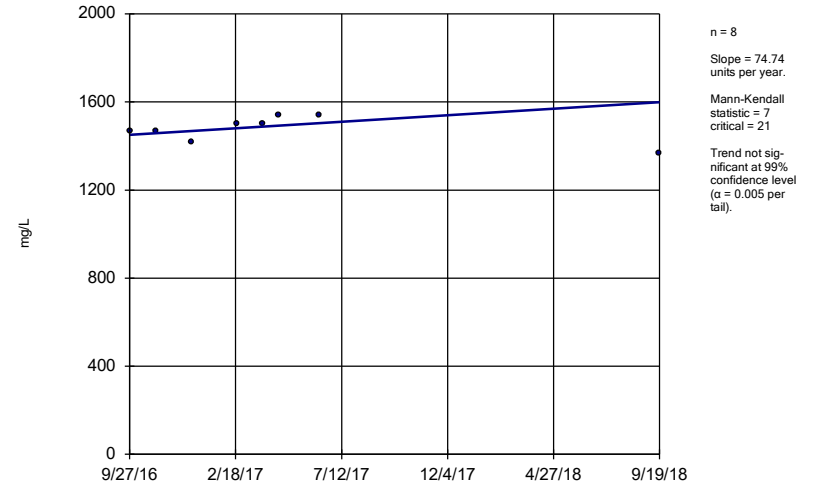
MW-1606D



Constituent: Total Dissolved Solids [TDS] Analysis Run 12/3/2018 8:32 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

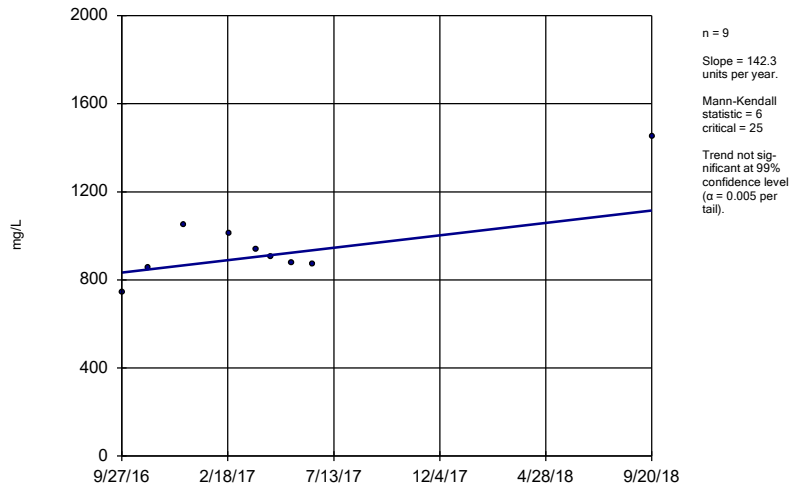
MW-1606S



Constituent: Total Dissolved Solids [TDS] Analysis Run 12/3/2018 8:32 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

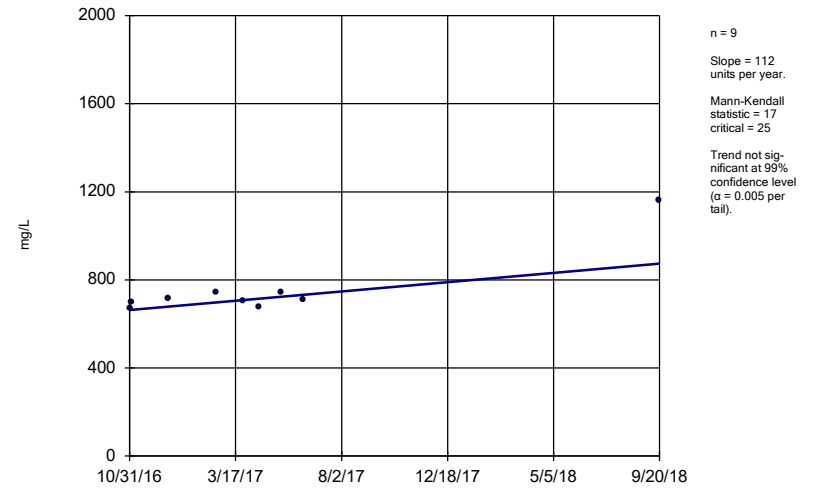
MW-1607D



Constituent: Total Dissolved Solids [TDS] Analysis Run 12/3/2018 8:32 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1607S



Constituent: Total Dissolved Solids [TDS] Analysis Run 12/3/2018 8:32 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Upper Tolerance Limits

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 12/3/2018, 9:14 AM

Constituent	Upper Lim.	Bg.N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Antimony, total (mg/L)	0.0001	40	n/a	n/a	2.5	n/a	n/a	0.1285	NP Inter(normality)
Arsenic, total (mg/L)	0.0007528	40	0.0004703	0.0001329	0	None	No	0.05	Inter
Barium, total (mg/L)	0.05785	40	-3.311	0.2167	0	None	ln(x)	0.05	Inter
Beryllium, total (mg/L)	0.00002	40	n/a	n/a	85	n/a	n/a	0.1285	NP Inter(NDs)
Cadmium, total (mg/L)	0.00003	40	n/a	n/a	0	n/a	n/a	0.1285	NP Inter(normality)
Chromium, total (mg/L)	0.00193	40	-8.045	0.8441	0	None	ln(x)	0.05	Inter
Cobalt, total (mg/L)	0.0006586	40	-9.087	0.8285	0	None	ln(x)	0.05	Inter
Combined Radium 226 + 228 (pCi/L)	2.36	40	0.8419	0.3265	0	None	sqrt(x)	0.05	Inter
Fluoride, total (mg/L)	0.301	40	0.178	0.05788	0	None	No	0.05	Inter
Lead, total (mg/L)	0.0005165	40	0.04708	0.01559	0	None	x^(1/3)	0.05	Inter
Lithium, total (mg/L)	0.03084	40	0.0924	0.03915	7.5	None	sqrt(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)	0.002886	40	0.001248	0.0007705	0	None	No	0.05	Inter
Selenium, total (mg/L)	0.0015	40	n/a	n/a	0	n/a	n/a	0.1285	NP Inter(normality)
Thallium, total (mg/L)	0.00009255	40	0.005606	0.001888	2.5	None	sqrt(x)	0.05	Inter

Confidence Intervals - Significant Results

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 12/3/2018, 6:57 AM

<u>Constituent</u>	<u>Well</u>	<u>Upper Lim.</u>	<u>Lower Lim.</u>	<u>Compliance</u>	<u>Sig.</u>	<u>N</u>	<u>%NDs</u>	<u>Transform</u>	<u>Alpha</u>	<u>Method</u>
Lithium, total (mg/L)	MW-1605D	0.08226	0.06534	0.04	Yes	10	0	No	0.01	Param.
Lithium, total (mg/L)	MW-1605S	0.08143	0.05937	0.04	Yes	10	0	No	0.01	Param.
Lithium, total (mg/L)	MW-1606D	0.1276	0.1108	0.04	Yes	10	0	No	0.01	Param.
Lithium, total (mg/L)	MW-1606S	0.1183	0.1023	0.04	Yes	10	0	No	0.01	Param.
Lithium, total (mg/L)	MW-1607D	0.09185	0.07175	0.04	Yes	10	0	No	0.01	Param.
Lithium, total (mg/L)	MW-1607S	0.1086	0.09178	0.04	Yes	10	0	No	0.01	Param.

Confidence Intervals - All Results

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 12/3/2018, 6:57 AM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	%NDs	Transform	Alpha	Method
Antimony, total (mg/L)	MW-1604D	0.000147	0.00008903	0.006	No	10	0	x^2	0.01	Param.
Antimony, total (mg/L)	MW-1604S	0.00013	0.00003	0.006	No	10	0	No	0.011	NP (normality)
Antimony, total (mg/L)	MW-1605D	0.00004	0.00003	0.006	No	10	0	No	0.011	NP (normality)
Antimony, total (mg/L)	MW-1605S	0.0000839	0.00003655	0.006	No	10	0	ln(x)	0.01	Param.
Antimony, total (mg/L)	MW-1606D	0.00019	0.00015	0.006	No	10	0	No	0.011	NP (normality)
Antimony, total (mg/L)	MW-1606S	0.0001642	0.0001418	0.006	No	10	0	No	0.01	Param.
Antimony, total (mg/L)	MW-1607D	0.00004	0.00003	0.006	No	10	0	No	0.011	NP (normality)
Antimony, total (mg/L)	MW-1607S	0.00055	0.00042	0.006	No	10	0	No	0.011	NP (normality)
Arsenic, total (mg/L)	MW-1604D	0.0005475	0.0003765	0.01	No	10	0	No	0.01	Param.
Arsenic, total (mg/L)	MW-1604S	0.0004585	0.0003555	0.01	No	10	0	No	0.01	Param.
Arsenic, total (mg/L)	MW-1605D	0.002428	0.00211	0.01	No	10	0	No	0.01	Param.
Arsenic, total (mg/L)	MW-1605S	0.001033	0.0005754	0.01	No	10	0	No	0.01	Param.
Arsenic, total (mg/L)	MW-1606D	0.0008752	0.0004153	0.01	No	10	0	sqrt(x)	0.01	Param.
Arsenic, total (mg/L)	MW-1606S	0.0009003	0.0007577	0.01	No	10	0	No	0.01	Param.
Arsenic, total (mg/L)	MW-1607D	0.001208	0.0009743	0.01	No	10	0	No	0.01	Param.
Arsenic, total (mg/L)	MW-1607S	0.001549	0.0009483	0.01	No	9	0	No	0.01	Param.
Barium, total (mg/L)	MW-1604D	0.03213	0.02689	2	No	10	0	x^(1/3)	0.01	Param.
Barium, total (mg/L)	MW-1604S	0.03045	0.02687	2	No	10	0	No	0.01	Param.
Barium, total (mg/L)	MW-1605D	0.02956	0.02462	2	No	10	0	No	0.01	Param.
Barium, total (mg/L)	MW-1605S	0.04036	0.02682	2	No	10	0	No	0.01	Param.
Barium, total (mg/L)	MW-1606D	0.06149	0.05171	2	No	10	0	No	0.01	Param.
Barium, total (mg/L)	MW-1606S	0.0769	0.06996	2	No	10	0	No	0.01	Param.
Barium, total (mg/L)	MW-1607D	0.1511	0.1019	2	No	10	0	No	0.01	Param.
Barium, total (mg/L)	MW-1607S	0.07271	0.05814	2	No	9	0	No	0.01	Param.
Beryllium, total (mg/L)	MW-1604D	0.00002	0.00002	0.004	No	10	100	No	0.011	NP (NDs)
Beryllium, total (mg/L)	MW-1604S	0.00002	0.00002	0.004	No	10	90	No	0.011	NP (NDs)
Beryllium, total (mg/L)	MW-1605D	0.00002	0.00002	0.004	No	10	100	No	0.011	NP (NDs)
Beryllium, total (mg/L)	MW-1605S	0.00002	0.000007	0.004	No	10	70	No	0.011	NP (normality)
Beryllium, total (mg/L)	MW-1606D	0.00002	0.000004	0.004	No	10	60	No	0.011	NP (normality)
Beryllium, total (mg/L)	MW-1606S	0.00002	0.000005	0.004	No	10	90	No	0.011	NP (NDs)
Beryllium, total (mg/L)	MW-1607D	0.00002	0.000008	0.004	No	10	90	No	0.011	NP (NDs)
Beryllium, total (mg/L)	MW-1607S	0.00002	0.000007	0.004	No	10	60	No	0.011	NP (normality)
Cadmium, total (mg/L)	MW-1604D	0.0001592	0.00007084	0.005	No	10	0	No	0.01	Param.
Cadmium, total (mg/L)	MW-1604S	0.00015	0.00003	0.005	No	10	0	No	0.011	NP (normality)
Cadmium, total (mg/L)	MW-1605D	0.00003882	0.00001918	0.005	No	10	0	No	0.01	Param.
Cadmium, total (mg/L)	MW-1605S	0.00008	0.00005	0.005	No	10	0	No	0.011	NP (normality)
Cadmium, total (mg/L)	MW-1606D	0.00007638	0.00006205	0.005	No	10	0	x^3	0.01	Param.
Cadmium, total (mg/L)	MW-1606S	0.00008146	0.00006454	0.005	No	10	0	No	0.01	Param.
Cadmium, total (mg/L)	MW-1607D	0.00002	0.000005	0.005	No	10	60	No	0.011	NP (normality)
Cadmium, total (mg/L)	MW-1607S	0.00006	0.00002	0.005	No	10	0	No	0.011	NP (normality)
Chromium, total (mg/L)	MW-1604D	0.0005216	0.0001498	0.1	No	10	0	No	0.01	Param.
Chromium, total (mg/L)	MW-1604S	0.0005807	0.0001015	0.1	No	10	0	ln(x)	0.01	Param.
Chromium, total (mg/L)	MW-1605D	0.0005311	0.00008298	0.1	No	10	0	ln(x)	0.01	Param.
Chromium, total (mg/L)	MW-1605S	0.001104	0.0001965	0.1	No	10	0	x^(1/3)	0.01	Param.
Chromium, total (mg/L)	MW-1606D	0.0006749	0.0001734	0.1	No	10	0	sqrt(x)	0.01	Param.
Chromium, total (mg/L)	MW-1606S	0.0006344	0.00009926	0.1	No	10	0	sqrt(x)	0.01	Param.
Chromium, total (mg/L)	MW-1607D	0.0007252	0.00006417	0.1	No	10	0	x^(1/3)	0.01	Param.
Chromium, total (mg/L)	MW-1607S	0.0008722	0.0001432	0.1	No	10	0	ln(x)	0.01	Param.
Cobalt, total (mg/L)	MW-1604D	0.001902	0.001301	0.006	No	10	0	x^3	0.01	Param.
Cobalt, total (mg/L)	MW-1604S	0.00183	0.000307	0.006	No	10	0	No	0.011	NP (normality)
Cobalt, total (mg/L)	MW-1605D	0.001854	0.00164	0.006	No	10	0	No	0.01	Param.
Cobalt, total (mg/L)	MW-1605S	0.001475	0.0004285	0.006	No	10	0	x^(1/3)	0.01	Param.
Cobalt, total (mg/L)	MW-1606D	0.0022	0.00117	0.006	No	10	0	No	0.011	NP (normality)
Cobalt, total (mg/L)	MW-1606S	0.0003873	0.0002411	0.006	No	10	0	No	0.01	Param.
Cobalt, total (mg/L)	MW-1607D	0.000769	0.000396	0.006	No	10	0	No	0.011	NP (normality)

Confidence Intervals - All Results

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 12/3/2018, 6:57 AM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	%NDs	Transform	Alpha	Method
Cobalt, total (mg/L)	MW-1607S	0.0026	0.000752	0.006	No	10	0	No	0.011	NP (normality)
Combined Radium 226 + 228 (pCi/L)	MW-1604D	1.909	0.5872	5	No	10	0	sqrt(x)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-1604S	1.424	0.5484	5	No	9	0	ln(x)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-1605D	2.096	0.5645	5	No	10	0	sqrt(x)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-1605S	1.458	0.3561	5	No	10	0	ln(x)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-1606D	3.902	0.6694	5	No	10	0	sqrt(x)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-1606S	1.644	0.6102	5	No	10	0	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-1607D	2.246	0.9231	5	No	10	0	x^(1/3)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-1607S	2.32	1.022	5	No	10	0	No	0.01	Param.
Fluoride, total (mg/L)	MW-1604D	0.2019	0.1781	4	No	10	0	No	0.01	Param.
Fluoride, total (mg/L)	MW-1604S	0.2146	0.1954	4	No	10	0	No	0.01	Param.
Fluoride, total (mg/L)	MW-1605D	0.2133	0.1807	4	No	10	0	No	0.01	Param.
Fluoride, total (mg/L)	MW-1605S	0.2836	0.2284	4	No	10	0	No	0.01	Param.
Fluoride, total (mg/L)	MW-1606D	0.26	0.24	4	No	10	0	No	0.011	NP (normality)
Fluoride, total (mg/L)	MW-1606S	0.5	0.43	4	No	10	0	No	0.011	NP (normality)
Fluoride, total (mg/L)	MW-1607D	0.54	0.49	4	No	10	0	No	0.011	NP (normality)
Fluoride, total (mg/L)	MW-1607S	0.3129	0.2791	4	No	10	0	No	0.01	Param.
Lead, total (mg/L)	MW-1604D	0.000303	0.00002	0.015	No	10	0	No	0.011	NP (normality)
Lead, total (mg/L)	MW-1604S	0.0001057	0.00003526	0.015	No	10	0	No	0.01	Param.
Lead, total (mg/L)	MW-1605D	0.00004138	0.00001242	0.015	No	10	0	x^(1/3)	0.01	Param.
Lead, total (mg/L)	MW-1605S	0.0009624	0.0001231	0.015	No	10	0	sqrt(x)	0.01	Param.
Lead, total (mg/L)	MW-1606D	0.0006317	0.00003806	0.015	No	10	0	x^(1/3)	0.01	Param.
Lead, total (mg/L)	MW-1606S	0.0001693	0.00004293	0.015	No	10	0	No	0.01	Param.
Lead, total (mg/L)	MW-1607D	0.000179	0.000038	0.015	No	10	0	No	0.011	NP (normality)
Lead, total (mg/L)	MW-1607S	0.0014	0.000094	0.015	No	10	0	No	0.011	NP (normality)
Lithium, total (mg/L)	MW-1604D	0.05993	0.03714	0.04	No	10	0	x^2	0.01	Param.
Lithium, total (mg/L)	MW-1604S	0.04601	0.03039	0.04	No	10	0	No	0.01	Param.
Lithium, total (mg/L)	MW-1605D	0.08226	0.06534	0.04	Yes	10	0	No	0.01	Param.
Lithium, total (mg/L)	MW-1605S	0.08143	0.05937	0.04	Yes	10	0	No	0.01	Param.
Lithium, total (mg/L)	MW-1606D	0.1276	0.1108	0.04	Yes	10	0	No	0.01	Param.
Lithium, total (mg/L)	MW-1606S	0.1183	0.1023	0.04	Yes	10	0	No	0.01	Param.
Lithium, total (mg/L)	MW-1607D	0.09185	0.07175	0.04	Yes	10	0	No	0.01	Param.
Lithium, total (mg/L)	MW-1607S	0.1086	0.09178	0.04	Yes	10	0	No	0.01	Param.
Mercury, total (mg/L)	MW-1604D	0.000005	0.000003	0.002	No	10	80	No	0.011	NP (NDs)
Mercury, total (mg/L)	MW-1604S	0.000005	0.000003	0.002	No	10	90	No	0.011	NP (NDs)
Mercury, total (mg/L)	MW-1605D	0.000005	0.000002	0.002	No	10	90	No	0.011	NP (NDs)
Mercury, total (mg/L)	MW-1605S	0.000005	0.000003	0.002	No	10	90	No	0.011	NP (NDs)
Mercury, total (mg/L)	MW-1606D	0.000005	0.000004	0.002	No	10	90	No	0.011	NP (NDs)
Mercury, total (mg/L)	MW-1606S	0.000005	0.000002	0.002	No	10	90	No	0.011	NP (NDs)
Mercury, total (mg/L)	MW-1607D	0.000005	0.000002	0.002	No	10	80	No	0.011	NP (NDs)
Mercury, total (mg/L)	MW-1607S	0.000005	0.000003	0.002	No	9	77.78	No	0.002	NP (NDs)
Molybdenum, total (mg/L)	MW-1604D	0.01989	0.01465	0.1	No	10	0	x^4	0.01	Param.
Molybdenum, total (mg/L)	MW-1604S	0.0162	0.00241	0.1	No	9	0	No	0.002	NP (normality)
Molybdenum, total (mg/L)	MW-1605D	0.05207	0.04477	0.1	No	10	0	No	0.01	Param.
Molybdenum, total (mg/L)	MW-1605S	0.02275	0.01593	0.1	No	10	0	No	0.01	Param.
Molybdenum, total (mg/L)	MW-1606D	0.08108	0.07086	0.1	No	10	0	No	0.01	Param.
Molybdenum, total (mg/L)	MW-1606S	0.1055	0.08	0.1	No	10	0	No	0.01	Param.
Molybdenum, total (mg/L)	MW-1607D	0.09219	0.08353	0.1	No	10	0	No	0.01	Param.
Molybdenum, total (mg/L)	MW-1607S	0.04809	0.04171	0.1	No	10	0	No	0.01	Param.
Selenium, total (mg/L)	MW-1604D	0.0014	0.0005	0.05	No	10	0	No	0.011	NP (normality)
Selenium, total (mg/L)	MW-1604S	0.002719	0.001421	0.05	No	10	0	No	0.01	Param.
Selenium, total (mg/L)	MW-1605D	0.0003	0.0002	0.05	No	10	0	No	0.011	NP (normality)
Selenium, total (mg/L)	MW-1605S	0.002039	0.0008007	0.05	No	10	0	No	0.01	Param.
Selenium, total (mg/L)	MW-1606D	0.00576	0.0026	0.05	No	10	0	No	0.01	Param.
Selenium, total (mg/L)	MW-1606S	0.002	0.0007	0.05	No	10	0	No	0.011	NP (normality)

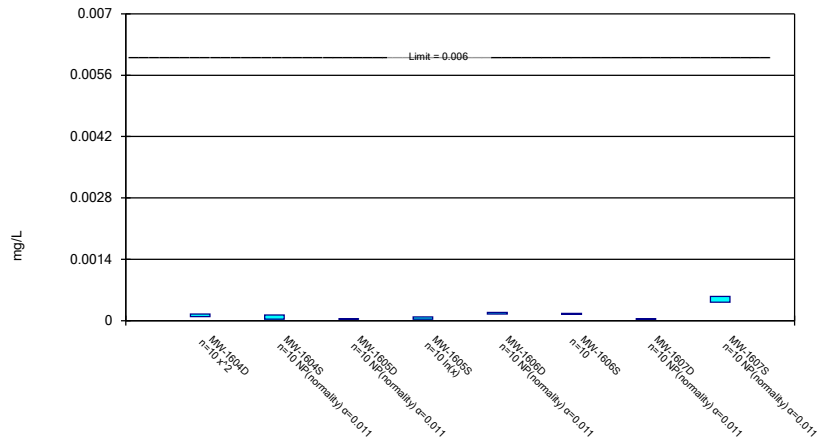
Confidence Intervals - All Results

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 12/3/2018, 6:57 AM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	%NDs	Transform	Alpha	Method
Selenium, total (mg/L)	MW-1607D	0.0001	0.00003	0.05	No	10	20	No	0.011	NP (normality)
Selenium, total (mg/L)	MW-1607S	0.01003	0.007828	0.05	No	10	0	No	0.01	Param.
Thallium, total (mg/L)	MW-1604D	0.0002929	0.0001575	0.002	No	10	0	x^2	0.01	Param.
Thallium, total (mg/L)	MW-1604S	0.00022	0.00002	0.002	No	10	0	No	0.011	NP (normality)
Thallium, total (mg/L)	MW-1605D	0.00009	0.00004	0.002	No	10	0	No	0.011	NP (normality)
Thallium, total (mg/L)	MW-1605S	0.000102	0.00004	0.002	No	10	0	No	0.011	NP (normality)
Thallium, total (mg/L)	MW-1606D	0.0001133	0.00009009	0.002	No	10	0	No	0.01	Param.
Thallium, total (mg/L)	MW-1606S	0.00009256	0.00006184	0.002	No	10	0	No	0.01	Param.
Thallium, total (mg/L)	MW-1607D	0.00004948	0.00002492	0.002	No	10	0	No	0.01	Param.
Thallium, total (mg/L)	MW-1607S	0.000089	0.00005	0.002	No	9	0	No	0.002	NP (normality)

Parametric and Non-Parametric (NP) Confidence Interval

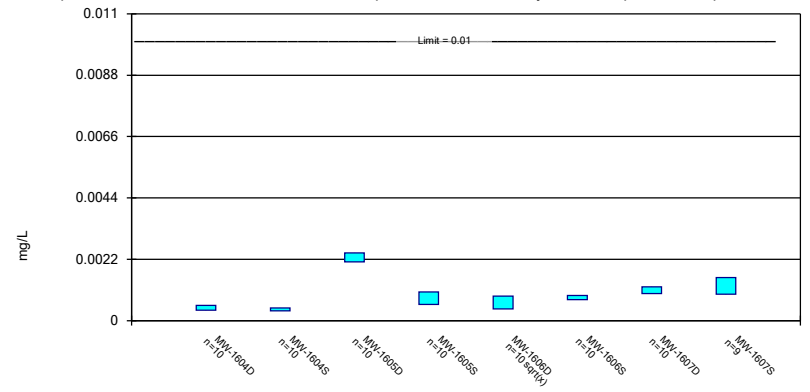
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Antimony, total Analysis Run 12/3/2018 6:55 AM View: Confidence Intervals - App IV
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric Confidence Interval

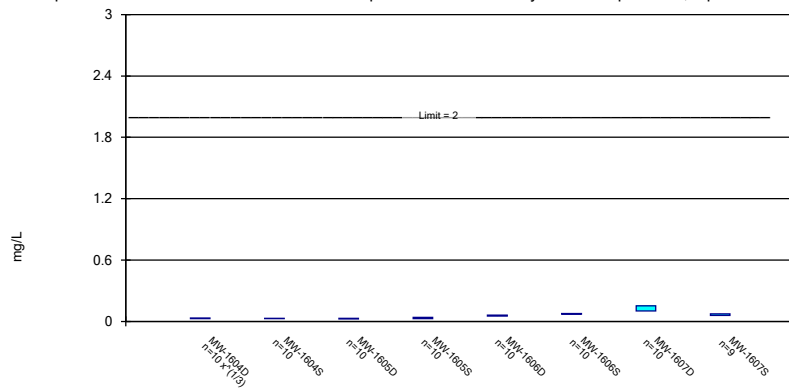
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Arsenic, total Analysis Run 12/3/2018 6:55 AM View: Confidence Intervals - App IV
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric Confidence Interval

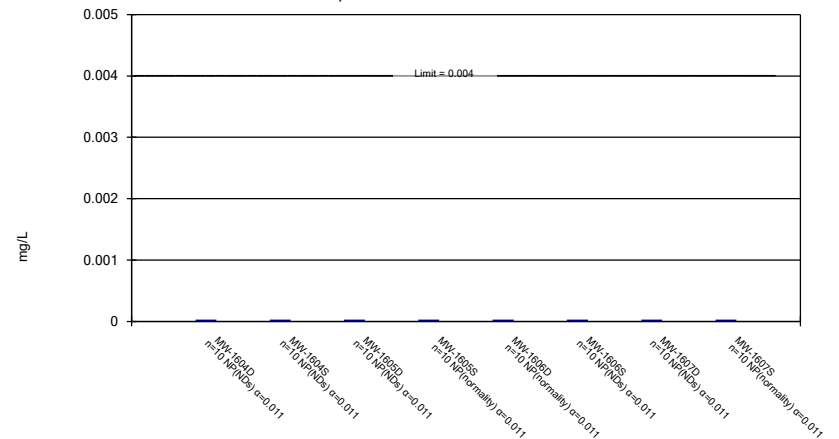
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Barium, total Analysis Run 12/3/2018 6:55 AM View: Confidence Intervals - App IV
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Non-Parametric Confidence Interval

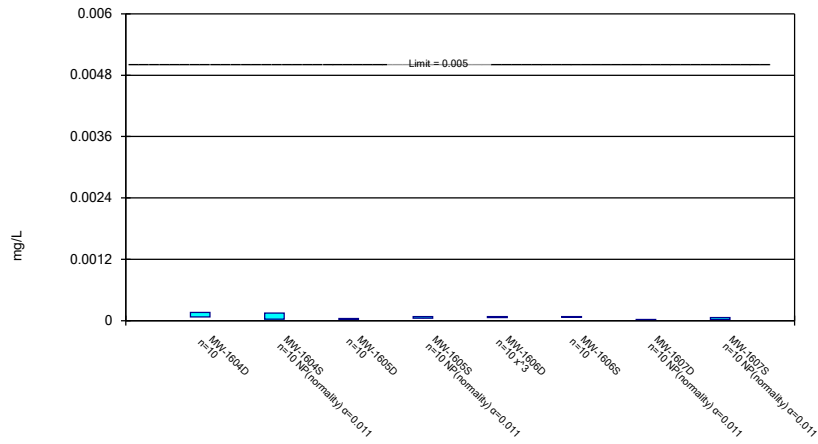
Compliance Limit is not exceeded.



Constituent: Beryllium, total Analysis Run 12/3/2018 6:56 AM View: Confidence Intervals - App IV
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric and Non-Parametric (NP) Confidence Interval

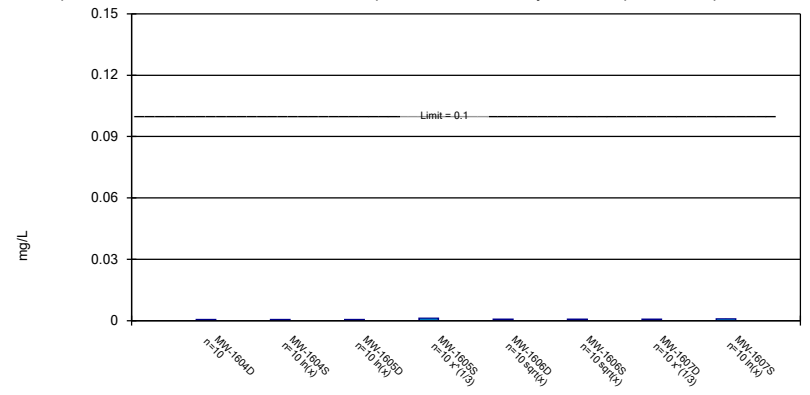
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Cadmium, total Analysis Run 12/3/2018 6:56 AM View: Confidence Intervals - App IV
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric Confidence Interval

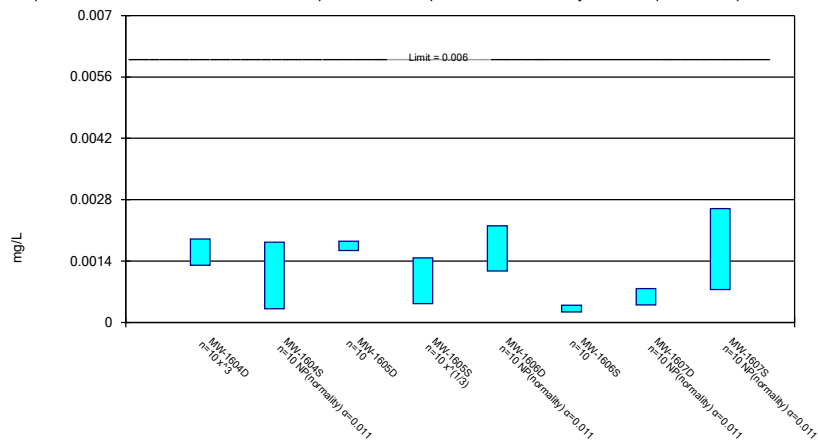
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Chromium, total Analysis Run 12/3/2018 6:56 AM View: Confidence Intervals - App IV
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric and Non-Parametric (NP) Confidence Interval

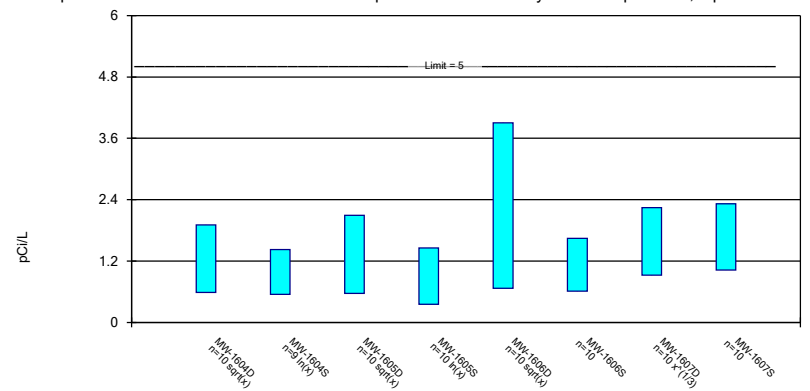
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Cobalt, total Analysis Run 12/3/2018 6:56 AM View: Confidence Intervals - App IV
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric Confidence Interval

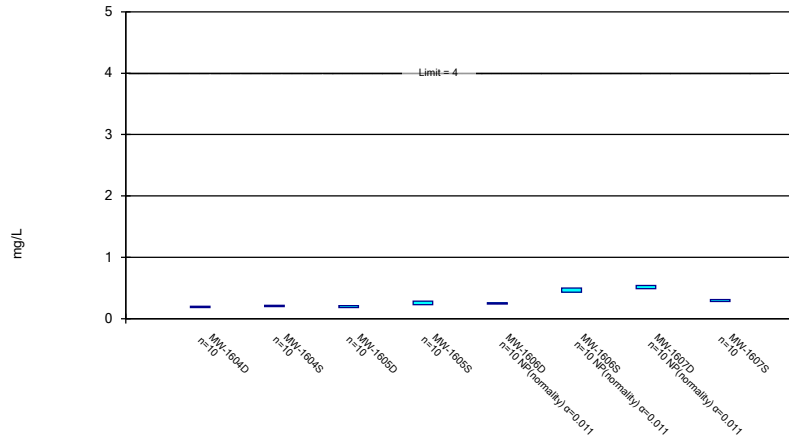
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Combined Radium 226 + 228 Analysis Run 12/3/2018 6:56 AM View: Confidence Intervals -
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric and Non-Parametric (NP) Confidence Interval

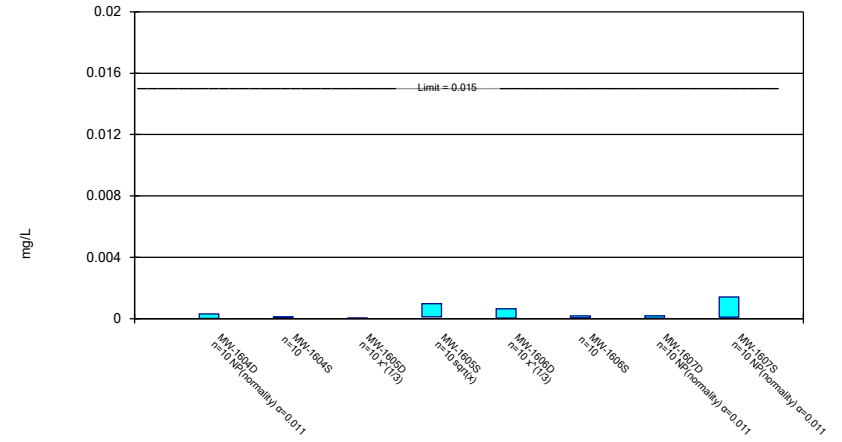
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Fluoride, total Analysis Run 12/3/2018 6:56 AM View: Confidence Intervals - App IV
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric and Non-Parametric (NP) Confidence Interval

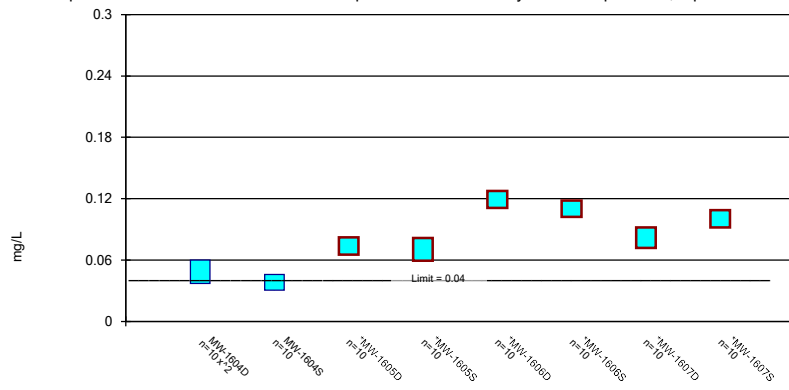
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Lead, total Analysis Run 12/3/2018 6:56 AM View: Confidence Intervals - App IV
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric Confidence Interval

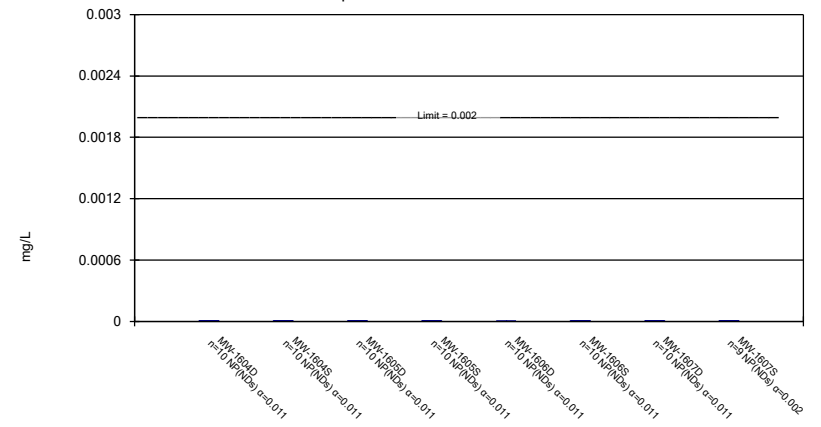
Compliance limit is exceeded.* Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Lithium, total Analysis Run 12/3/2018 6:56 AM View: Confidence Intervals - App IV
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Non-Parametric Confidence Interval

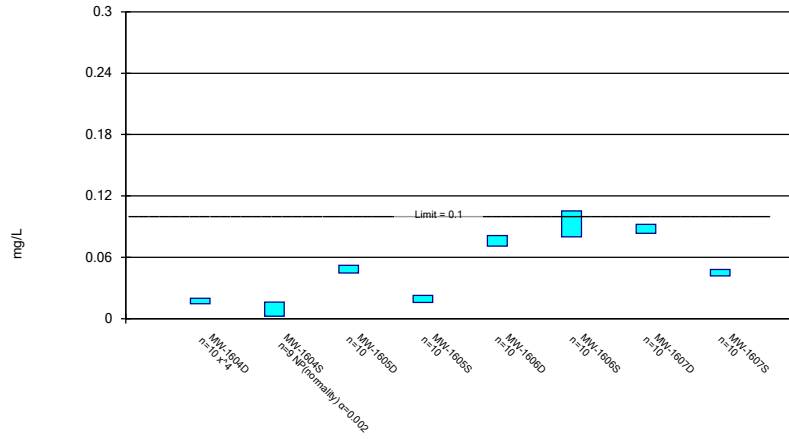
Compliance Limit is not exceeded.



Constituent: Mercury, total Analysis Run 12/3/2018 6:56 AM View: Confidence Intervals - App IV
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric and Non-Parametric (NP) Confidence Interval

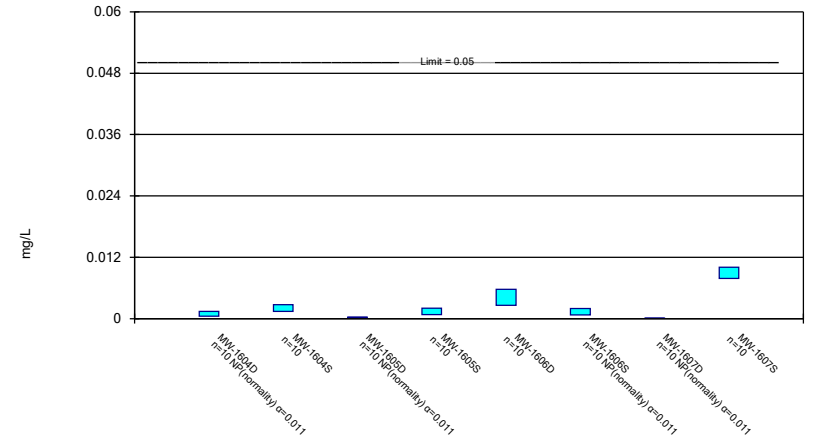
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Molybdenum, total Analysis Run 12/3/2018 6:56 AM View: Confidence Intervals - App IV
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric and Non-Parametric (NP) Confidence Interval

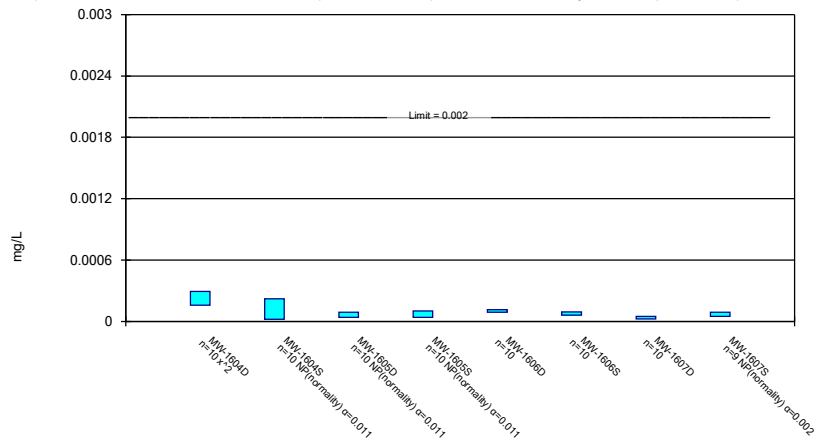
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Selenium, total Analysis Run 12/3/2018 6:56 AM View: Confidence Intervals - App IV
Mountaineer BAP Client: Geosyntec Data: Mountaineer 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 12/3/2018 6:56 AM View: Confidence Intervals - App IV
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

STATISTICAL ANALYSIS SUMMARY
BOTTOM ASH POND
Mountaineer Plant
New Haven, West Virginia

Submitted to



1 Riverside Plaza
Columbus, Ohio 43215-2372

Submitted by



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July 12, 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
LPL	Lower Prediction Limit
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
USEPA	United States Environmental Protection Agency
UPL	Upper Prediction Limit
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 Mountaineer Power Plant located in New Haven, West Virginia.

Based on detection monitoring conducted in 2017 and 2018, statistically significant increases (SSIs) over background were concluded for boron, 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. SSLs for lithium were identified at wells MW-1605D, MW-1605S, MW-1606D, MW-1606S, MW-1607D, and MW-1607S and so the unit is completing an assessment of corrective measures in accordance with 40 CFR 257.96. A semi-annual assessment monitoring event was also completed in April 2019, with the results of the April 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, with SSLs identified for lithium. 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 April 2019 semi-annual sampling event were analyzed for the Appendix III and Appendix IV parameters. A summary of data collected during this assessment monitoring event may be found in Table 1.

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

The analytical data were imported into a Microsoft Access database, where checks were completed to assess the accuracy of sample location identification and analyte identification. Where necessary, unit conversions were applied to standardize reported units across all sampling events. Exported data files were created for use with the Sanitas™ v.9.6.14 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), 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(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 antimony, cadmium, selenium,

and thallium due to apparent non-normal distributions and for beryllium and 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.

The following SSLs were identified at the Mountaineer BAP:

- LCLs for lithium exceeded the GWPS of 0.04 mg/L at MW-1605D (0.0664 mg/L), MW-1605S (0.0612), MW-1606D (0.112 mg/L), MW-1606S (0.104 mg/L), MW-1607D (0.0715 mg/L), and 1607S (0.0912 mg/L).

2.2.3 Evaluation of Potential Appendix III SSIs

While SSLs were identified, a review of the Appendix III results were also completed 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 pH, whereas interwell tests were used to evaluate potential SSIs for boron, calcium, chloride, fluoride, sulfate, and TDS.

Prediction limits for the interwell tests were recalculated using data collected during the April 2019 assessment monitoring event. Eight data points (i.e., one sample from eight 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, fluoride, 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 pH.

Data collected during April 2019 assessment monitoring event from each compliance well were compared to the prediction limits to evaluate results above background values. The results from

this event and the prediction limits are summarized in Table 3. The following exceedances of the upper prediction limits (UPLs) were noted:

- Boron concentrations exceeded the interwell value of 0.632 mg/L at MW-1604D (2.82 mg/L), MW-1604S (3.50 mg/L), MW-1605D (6.90 mg/L), MW-1605S (9.39 mg/L), MW-1606D (7.32 mg/L), MW-1606S (7.68 mg/L), MW-1607D (3.10 mg/L), and MW-1607S (2.35 mg/L).
- Calcium concentrations exceeded the interwell value of 193 mg/L at MW-1604D (236 mg/L), MW-1604S (301 mg/L), MW-1605D (247 mg/L), MW-1606D (265 mg/L), MW-1606S (229 mg/L), MW-1607D (232 mg/L), and MW-1607S (226 mg/L).
- Chloride concentrations exceeded the interwell value of 58.8 mg/L at MW-1604D (100 mg/L), MW-1604S (132 mg/L), MW-1605D (169 mg/L), MW-1605S (140 mg/L), MW-1606D (214 mg/L), MW-1606S (223 mg/L), MW-1607D (162 mg/L), and MW-1607S (153 mg/L).
- Fluoride concentrations exceeded the interwell value of 0.27 mg/L at MW-1605S (0.33 mg/L), MW-1606S (0.54 mg/L), and MW-1607D (0.52 mg/L).
- pH levels were below the intrawell lower prediction limit (LPL) of 7.3 SU at MW-1607S (7.2 SU).
- Sulfate concentrations exceeded the interwell value of 681 mg/L at MW-1604S (703 mg/L), MW-1605D (791 mg/L), and MW-1606D (682 mg/L).
- TDS concentrations exceeded the interwell value of 1054 mg/L at MW-1604D (1300 mg/L), MW-1604S (1650 mg/L), MW-1605D (1710 mg/L), MW-1605S (1450 mg/L), MW-1606D (1600 mg/L), MW-1606S (1480 mg/L), MW-1607D (1480 mg/L), and MW-1607S (1310 mg/L).

While the prediction limits were calculated assuming a one-of-two testing procedure, it was conservatively assumed that an SSI was identified if the initial sample exceeded either the UPL based on previous results. Based on these results, concentrations of Appendix III parameters exceeded background levels at compliance wells at the Mountaineer BAP during assessment monitoring.

2.3 Conclusions

A semi-annual assessment monitoring event was conducted in accordance with the CCR Rule. The laboratory and field data were reviewed prior to statistical analysis, with no QA/QC issues identified that impacted data usability. A review of outliers identified no potential outliers in the April 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. SSLs were identified for lithium.

Appendix III parameters were also evaluated, with exceedances identified for boron, calcium, chloride, fluoride, pH, sulfate, and TDS. The unit is currently completing an assessment of corrective measures and will continue semi-annual assessment monitoring.

SECTION 3

REFERENCES

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

Geosyntec Consultants (Geosyntec). 2018. Statistical Analysis Summary – Bottom Ash Pond, Mountaineer Plant, New Haven, West Virginia. January 15, 2018.

TABLES

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

Parameter	Unit	MW-1601A	MW-1602	MW-1603	MW-1604D	MW-1604S	MW-1605D	MW-1605S	MW-1606D	MW-1606S	MW-1607D	MW-1607S	MW-1608
		4/9/2019	4/9/2019	4/9/2019	4/9/2019	4/9/2019	4/9/2019	4/9/2019	4/9/2019	4/8/2019	4/8/2019	4/8/2019	4/8/2019
Antimony	µg/L	0.500 U	0.500 U	0.500 U	0.500 U	0.200 J	0.0400 J	0.0500 J	0.150	0.150	0.0300 J	0.400	0.0400 J
Arsenic	µg/L	0.610	0.400 J	0.560	0.400 J	0.540	2.81	0.640	0.350	0.700	1.31	0.940	0.560
Barium	µg/L	52.0	29.0	32.4	42.5	29.1	26.4	25.2	47.3	63.1	75.7	72.7	41.2
Beryllium	µg/L	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Boron	mg/L	0.224	0.0900 J	0.408	2.82	3.50	6.90	9.39	7.32	7.68	3.10	2.35	0.156
Cadmium	µg/L	0.200 U	0.200 U	0.200 U	0.0500 J	0.270	0.0100 J	0.0500	0.0700	0.0700	0.0500 U	0.0400 J	0.0200 J
Calcium	mg/L	155	99.8	182	236	301	247	164	265	229	232	226	102
Chloride	mg/L	44.4	11.4	15.8	100	132	169	140	214	223	162	153	6.82
Chromium	µg/L	0.200 J	1.00 U	0.400 J	0.200 J	0.300 J	0.0600 J	0.293	0.100 J	0.0800 J	0.0700 J	0.376	0.372
Cobalt	µg/L	0.200 J	0.200 U	0.622	0.345	2.41	1.56	0.631	1.25	0.320	0.778	1.21	0.597
Combined Radium	pCi/L	1.17	1.05	2.39	0.957	1.47	0.543	0.369	0.940	0.595	1.33	0.723	0.244
Fluoride	mg/L	0.100 J	0.200	0.110	0.150	0.190	0.220	0.330	0.260	0.540	0.520	0.260	0.200
Lead	µg/L	0.500 U	0.500 U	0.500 J	0.500 U	0.500 U	0.0300 J	0.331	0.0300 J	0.107	0.0500 J	0.0900 J	0.454
Lithium	mg/L	0.0200 J	0.0200 J	0.0300	0.0380	0.0610	0.0750	0.0790	0.124	0.117	0.127	0.141	0.0100 J
Mercury	µg/L	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U
Molybdenum	µg/L	10.0 U	3.00 J	10.0 U	10.0 U	17.8	40.6	15.9	71.8	67.7	79.8	37.9	1.00 J
Selenium	µg/L	1.10	0.200 J	0.400 J	2.00	1.20	0.200	0.700	8.10	1.40	0.0500 J	7.00	1.20
Total Dissolved Solids	mg/L	692	595	918	1300	1650	1710	1450	1600	1480	1480	1310	451
Sulfate	mg/L	176	221	429	539	703	791	599	682	592	656	504	179
Thallium	µg/L	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
pH	SU	7.14	6.62	6.80	6.92	7.14	7.31	7.19	7.19	6.81	7.39	7.23	6.86

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.

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

Constituent Name	MCL	CCR Rule-Specified	Background Limit
Antimony, Total (mg/L)	0.006		0.00025
Arsenic, Total (mg/L)	0.01		0.00075
Barium, Total (mg/L)	2		0.058
Beryllium, Total (mg/L)	0.004		0.00001
Cadmium, Total (mg/L)	0.005		0.00001
Chromium, Total (mg/L)	0.1		0.0018
Cobalt, Total (mg/L)	n/a	0.006	0.00076
Combined Radium, Total (pCi/L)	5		2.45
Fluoride, Total (mg/L)	4		0.28
Lead, Total (mg/L)	n/a	0.015	0.00055
Lithium, Total (mg/L)	n/a	0.04	0.027
Mercury, Total (mg/L)	0.002		0.000005
Molybdenum, Total (mg/L)	n/a	0.1	0.0042
Selenium, Total (mg/L)	0.05		0.0015
Thallium, Total (mg/L)	0.002		0.00025

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
Mountaineer Plant - Bottom Ash Pond**

Parameter	Units	Description	MW-1604D	MW-1604S	MW-1605D	MW-1605S	MW-1606D	MW-1606S	MW-1607D	MW-1607S
			4/9/2019	4/9/2019	4/9/2019	4/9/2019	4/8/2019	4/8/2019	4/8/2019	4/8/2019
Boron	mg/L	Interwell Background Value (UPL)	0.632							
		Detection Monitoring Result	2.82	3.50	6.90	9.39	7.32	7.68	3.10	2.35
Calcium	mg/L	Interwell Background Value (UPL)	193							
		Detection Monitoring Result	236	301	247	164	265	229	232	226
Chloride	mg/L	Interwell Background Value (UPL)	58.8							
		Detection Monitoring Result	100	132	169	140	214	223	162	153
Fluoride	mg/L	Interwell Background Value (UPL)	0.27							
		Detection Monitoring Result	0.15	0.19	0.22	0.33	0.26	0.54	0.52	0.26
pH	SU	Intrawell Background Value (UPL)	8.1	8.0	8.3	8.2	8.2	8.7	7.8	7.8
		Intrawell Background Value (LPL)	6.7	6.4	6.7	6.7	6.7	5.6	6.9	7.3
		Detection Monitoring Result	6.9	7.1	7.3	7.2	7.2	6.8	7.4	7.2
Sulfate	mg/L	Interwell Background Value (UPL)	681							
		Detection Monitoring Result	539	703	791	599	682	592	656	504
Total Dissolved Solids	mg/L	Interwell Background Value (UPL)	1054							
		Detection Monitoring Result	1300	1650	1710	1450	1600	1480	1480	1310

Notes:

UPL: Upper prediction limit

LPL: Lower prediction limit

*: Designates results for a duplicate sample

-: 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

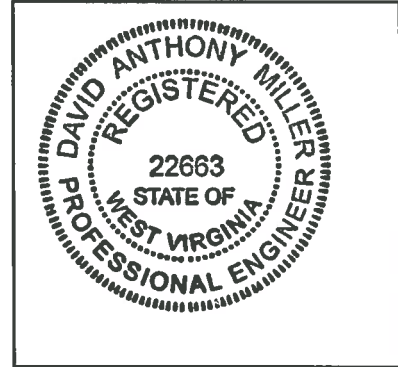
I certify that the selected and above described statistical method is appropriate for evaluating the groundwater monitoring data for the Mountaineer Bottom Ash Pond CCR management area and that the requirements of 40 CFR 257.93(f) have been met.

DAVID ANTHONY MILLER

Printed Name of Licensed Professional Engineer

David Anthony Miller

Signature



22663

License Number

WEST VIRGINIA

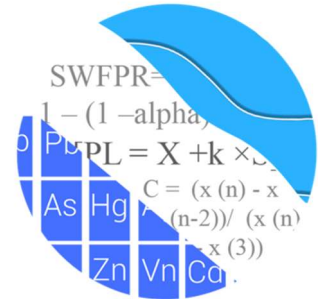
Licensing State

07.12.19

Date

ATTACHMENT B
Statistical Analysis Output

GROUNDWATER STATS CONSULTING



July 10, 2019

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

Re: Mountaineer BAP
Assessment Monitoring Event – April 2019

Groundwater Stats Consulting, formerly the statistical consulting division of Sanitas Technologies, is pleased to provide the statistical analysis of the April 2019 groundwater data for American Electric Power Inc.'s Mountaineer 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:** MW-1601A, MW-1602, MW-1603, MW-1608; and
- **Downgradient wells:** MW-1604D, MW-1604S, MW-1605D, MW-1605S, MW-1606D, MW-1606S, MW-1607D, MW-1607S.

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 previously flagged during the screening as outliers may be seen in a lighter font and disconnected symbol on the time series graphs. A summary of outliers 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, fluoride, sulfate and TDS; and intrawell prediction limits combined with a 1-of-2 verification strategy were constructed for 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 several of the downgradient wells for

boron, calcium, chloride, fluoride, pH, sulfate and TDS. Prediction Limit Summary tables follow 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 concentrations are statistically increasing, decreasing or stable (Figure E). Upgradient wells are included in the trend analyses to identify whether similar patterns exist upgradient of the site which is an indication of natural variability in groundwater unrelated to practices at the site.

Statistically significant increasing trends were found for several constituents in both upgradient and downgradient wells. For the statistically significant increasing trend noted for calcium in well MW-1607S, with the exception of the most recent sample, historical concentrations are similar and, in some cases, lower than those reported in upgradient wells. Further research beyond the scope of this analysis would be required to identify the cause for any changing groundwater concentrations in downgradient wells (i.e. result of practices at the site, natural variation, or an off-site source). A 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, or ACL 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 confidence interval exceedances were found except for lithium in wells MW-1605D,

MW1605S, MW-1606D, MW-1606S, MW-1607D and MW-1607S. A summary of the confidence interval results follows this letter.

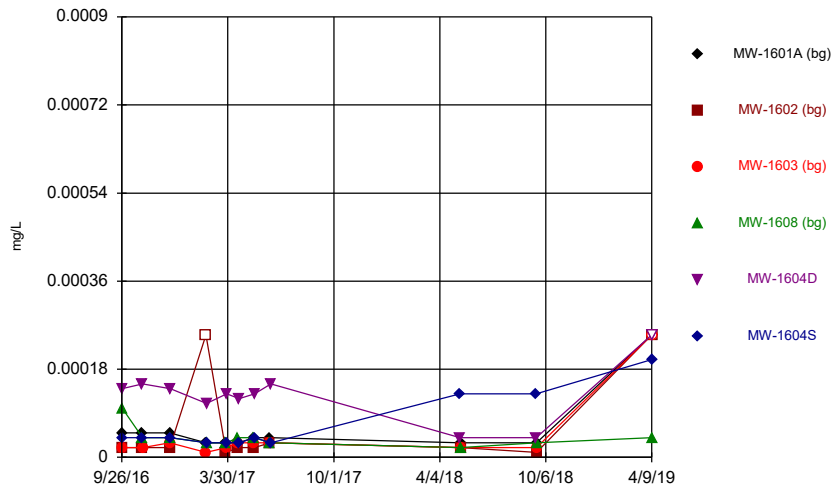
Thank you for the opportunity to assist you in the statistical analysis of groundwater quality for the Mountaineer BAP. If you have any questions or comments, please feel free to contact me.

For Groundwater Stats Consulting,

A handwritten signature in cursive script that reads "Kristina Rayner". The signature is written in black ink and is positioned below the typed name "Kristina L. Rayner".

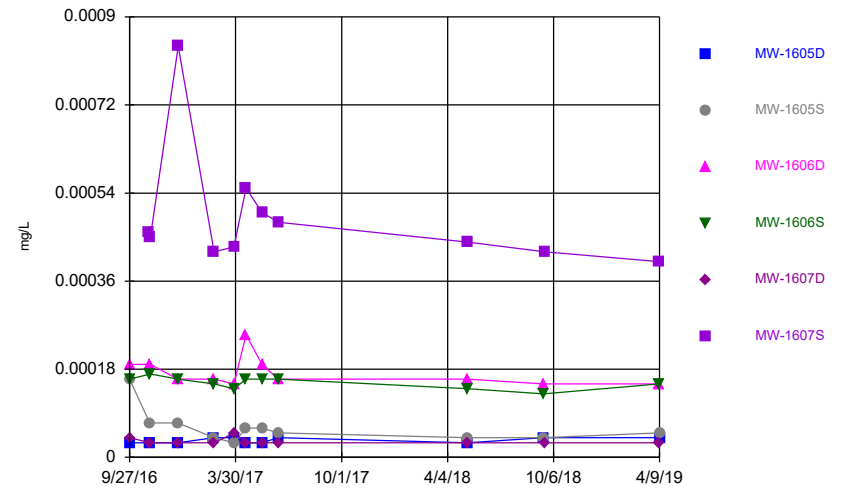
Kristina L. Rayner
Groundwater Statistician

Time Series



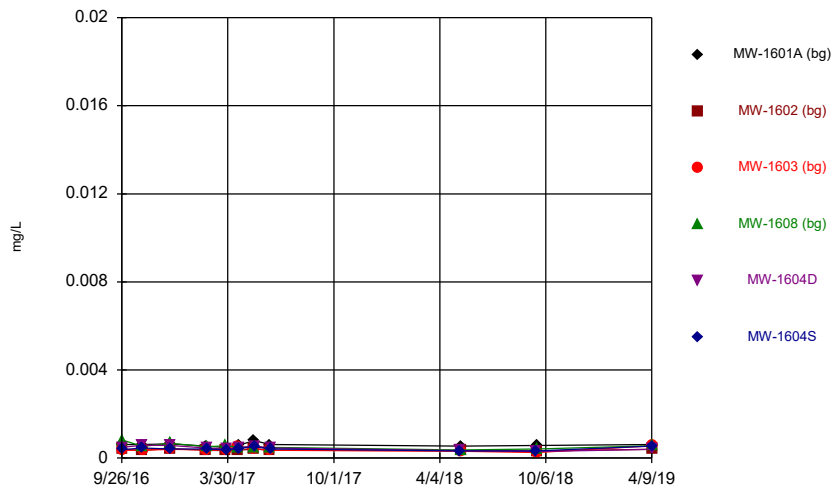
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Time Series



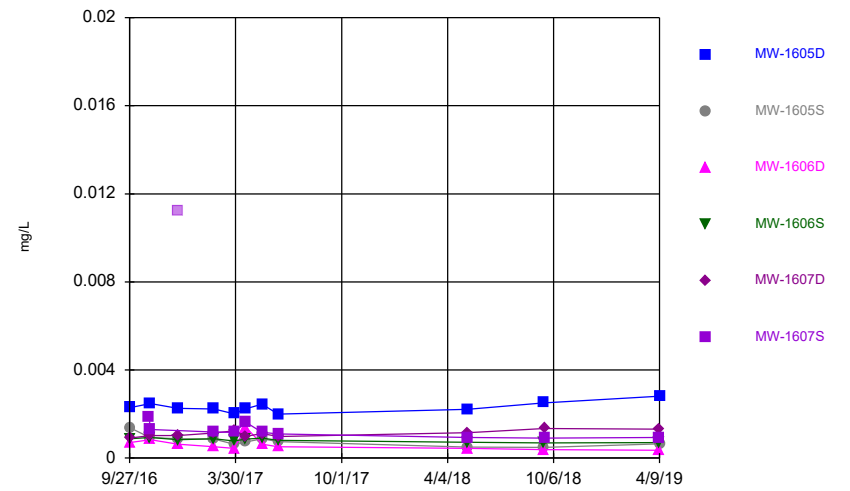
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Time Series



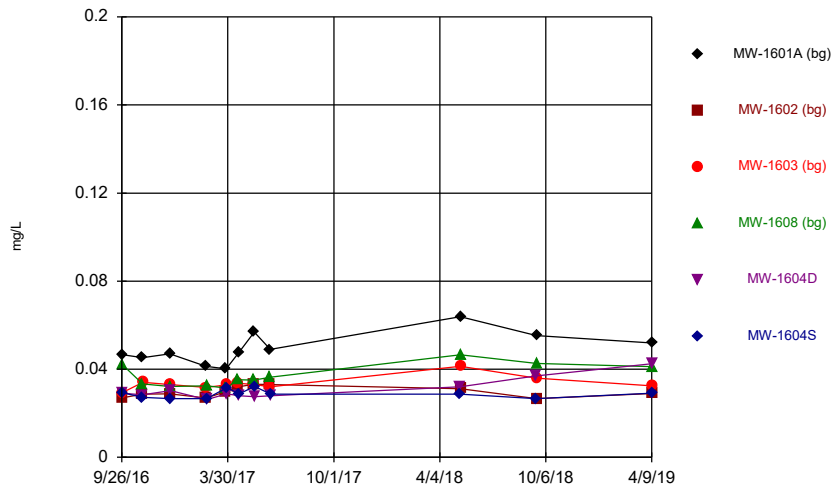
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Time Series



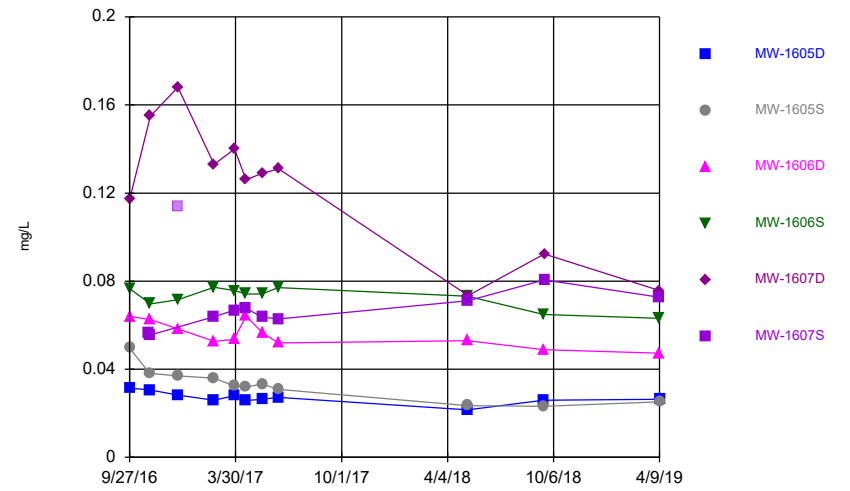
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Time Series



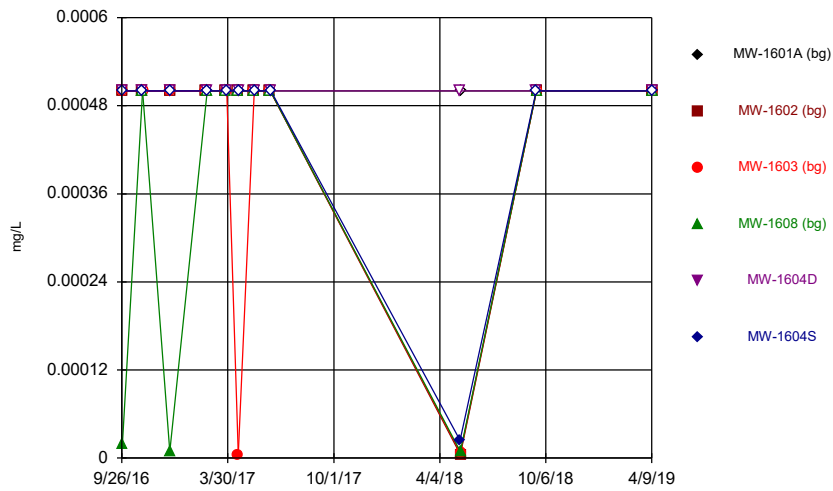
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Time Series



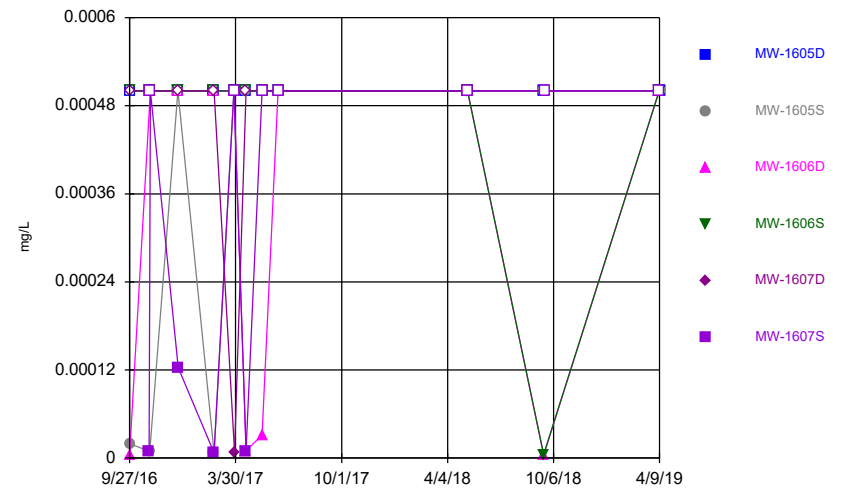
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Time Series



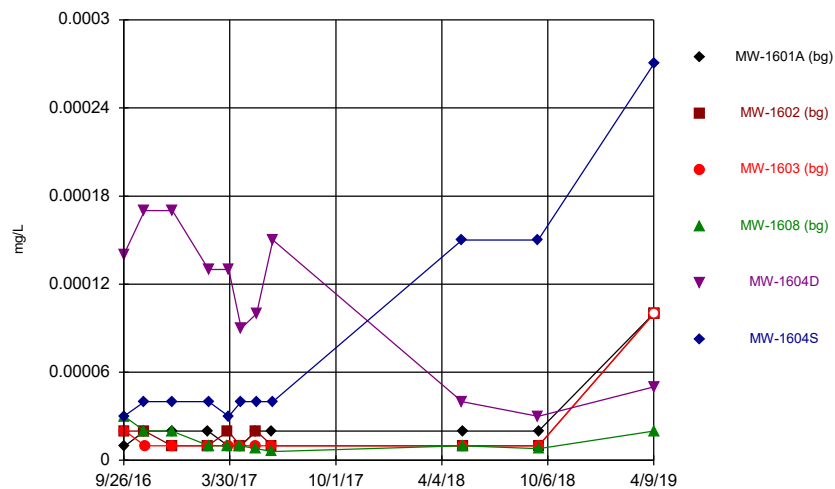
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Time Series



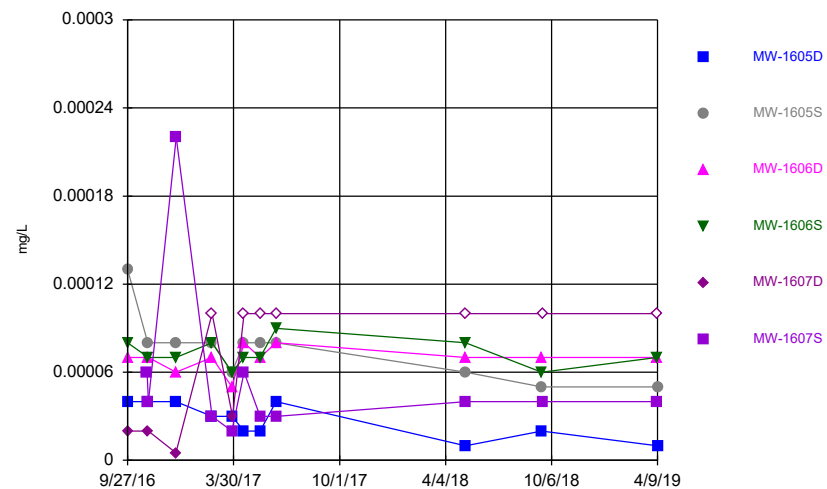
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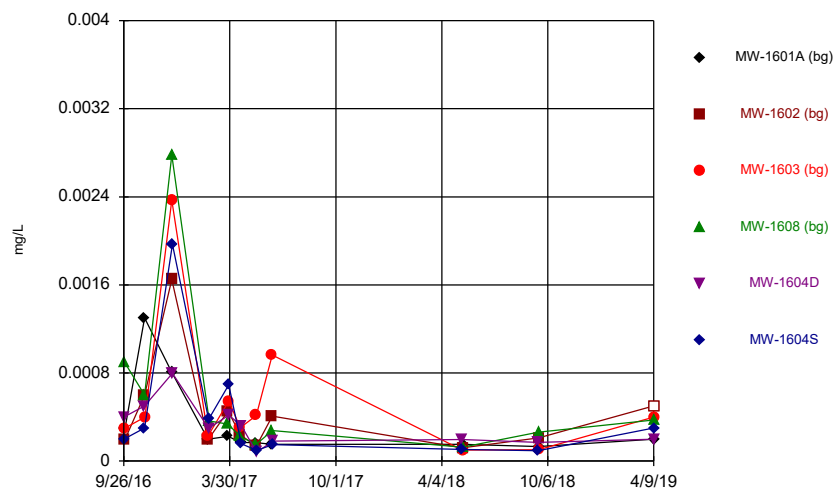
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Time Series



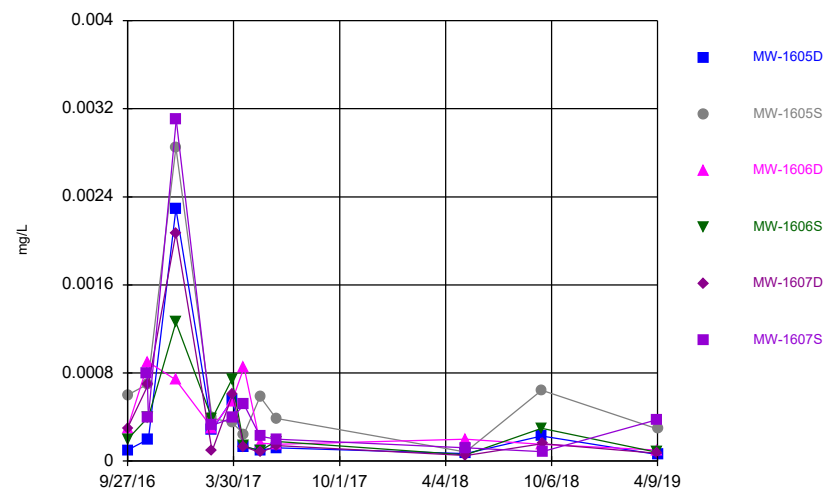
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Time Series



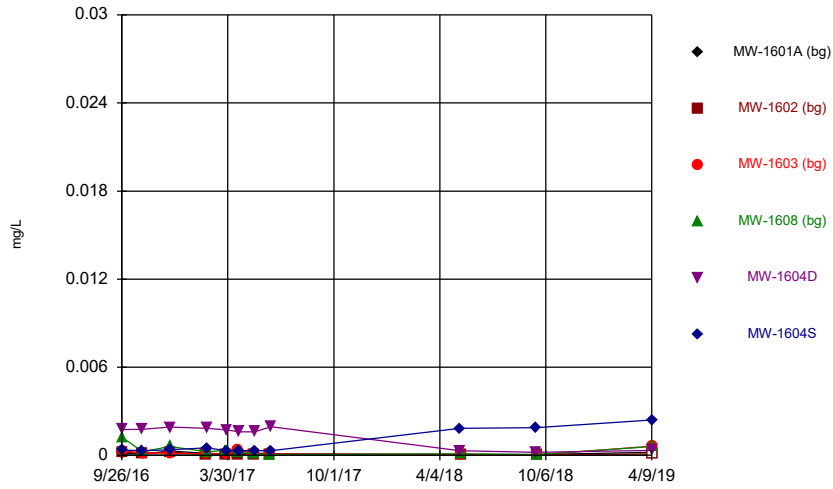
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Time Series



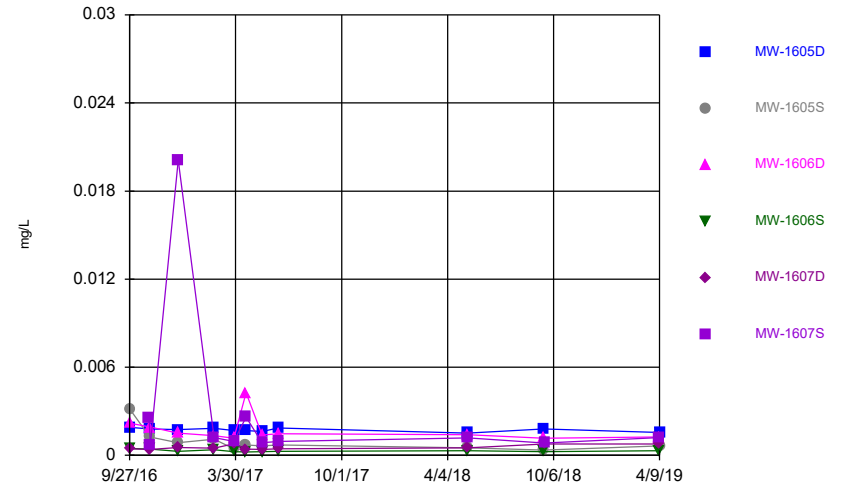
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Time Series



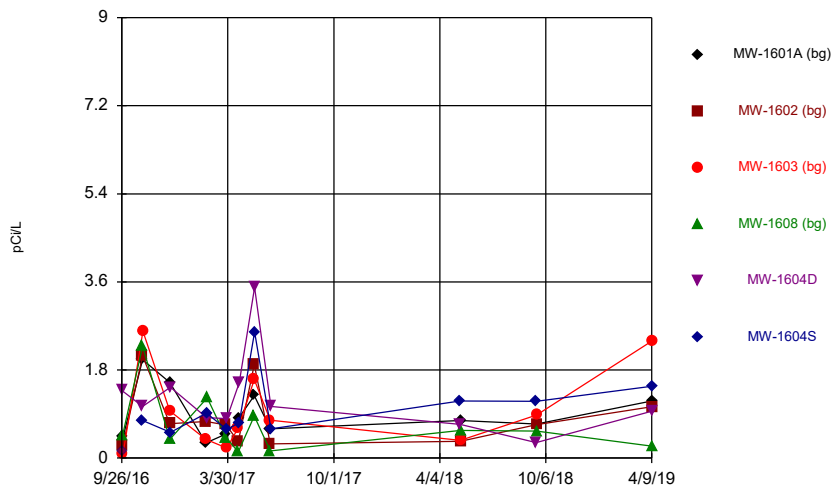
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Time Series



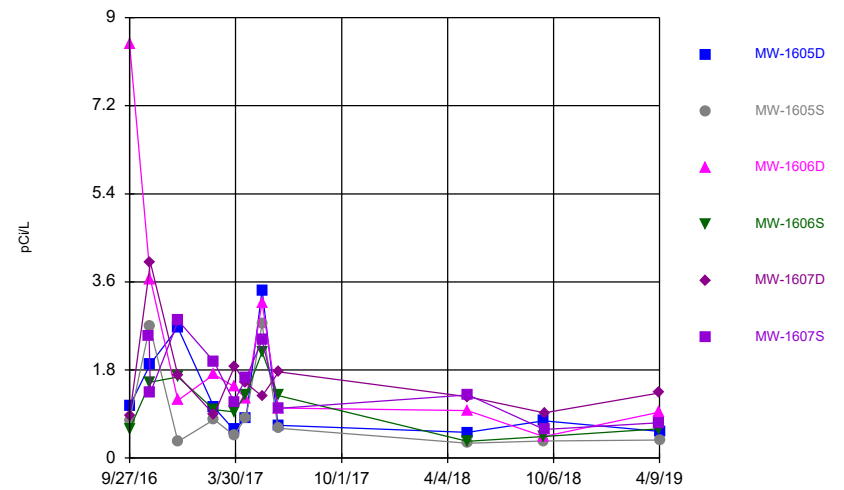
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Time Series



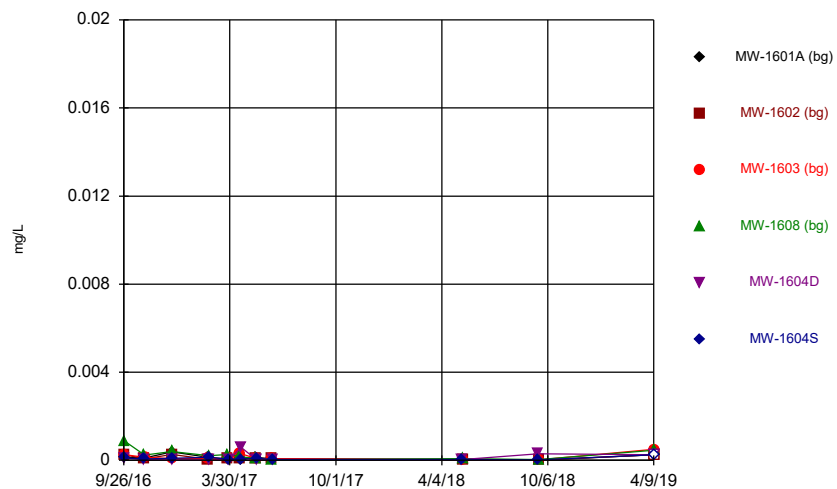
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Time Series



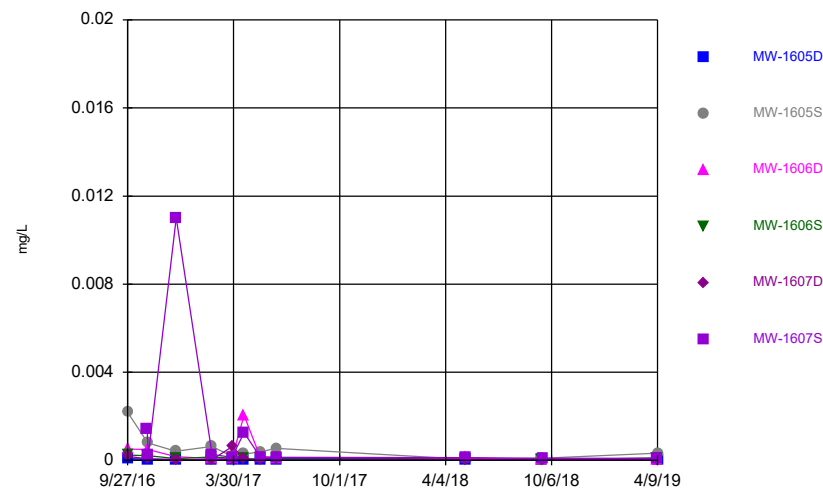
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Time Series



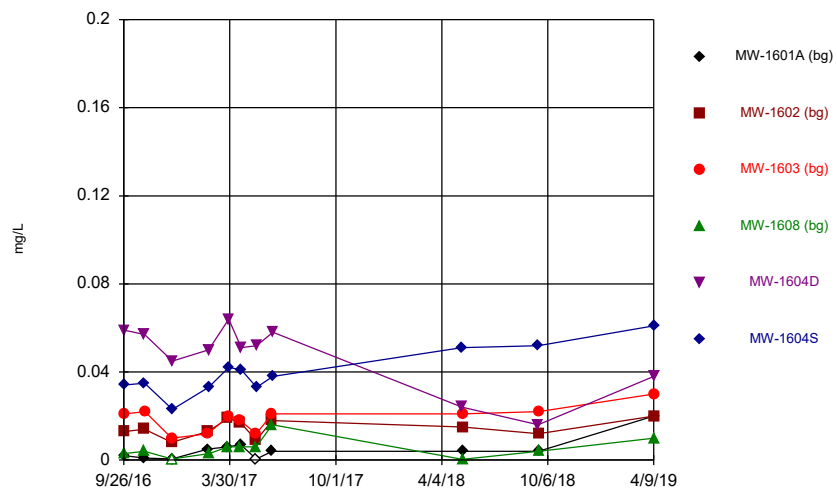
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Time Series



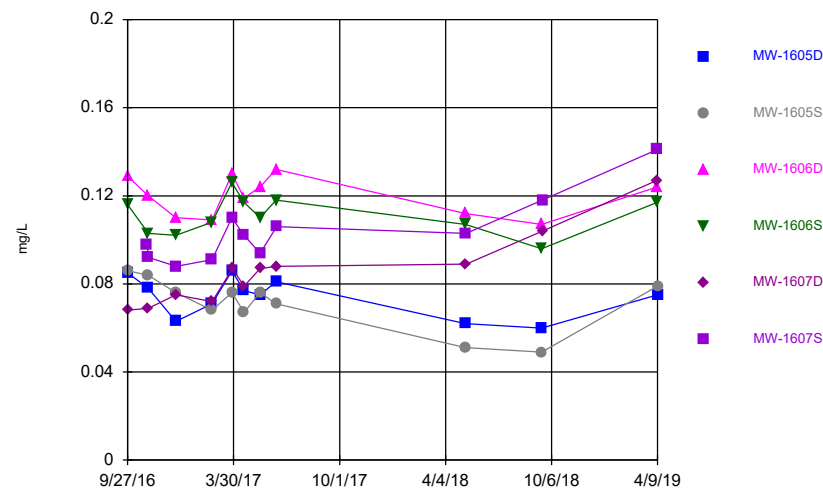
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Time Series



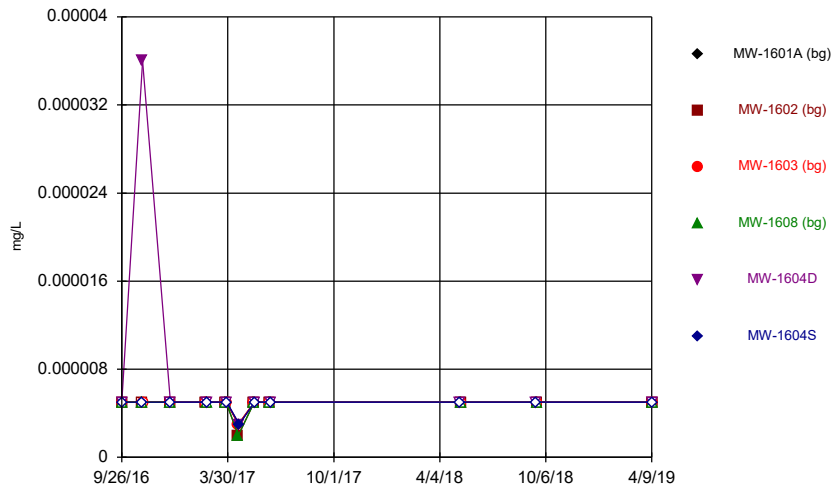
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Time Series

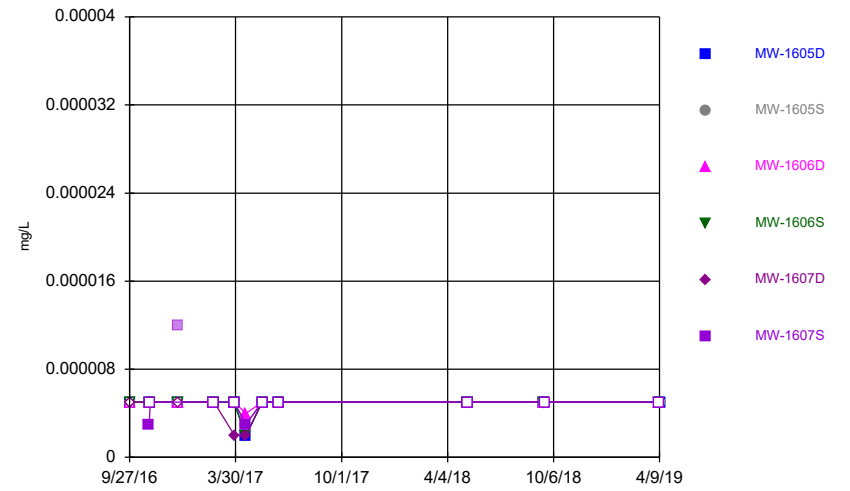


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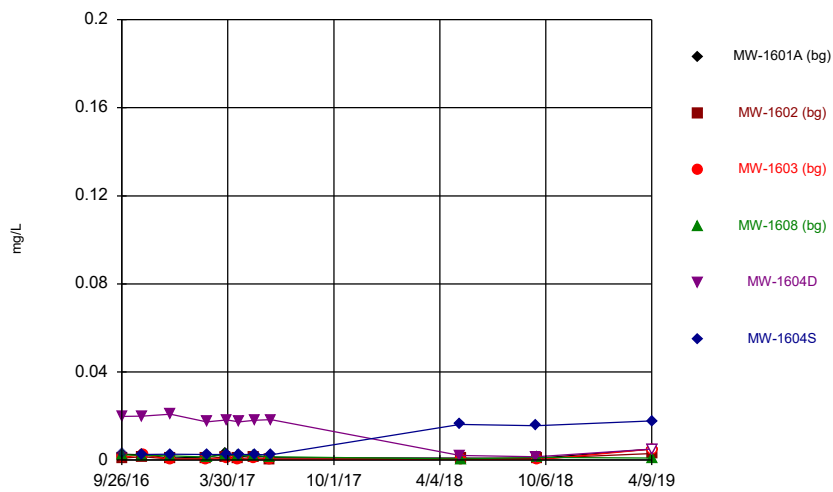
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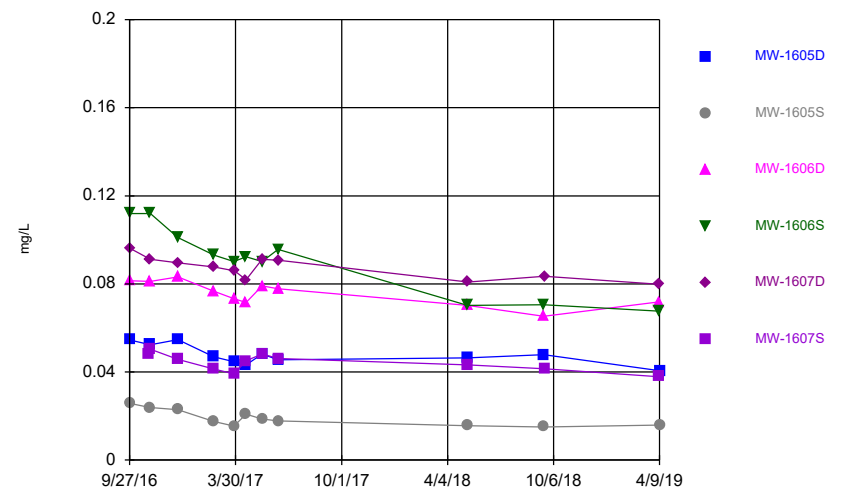
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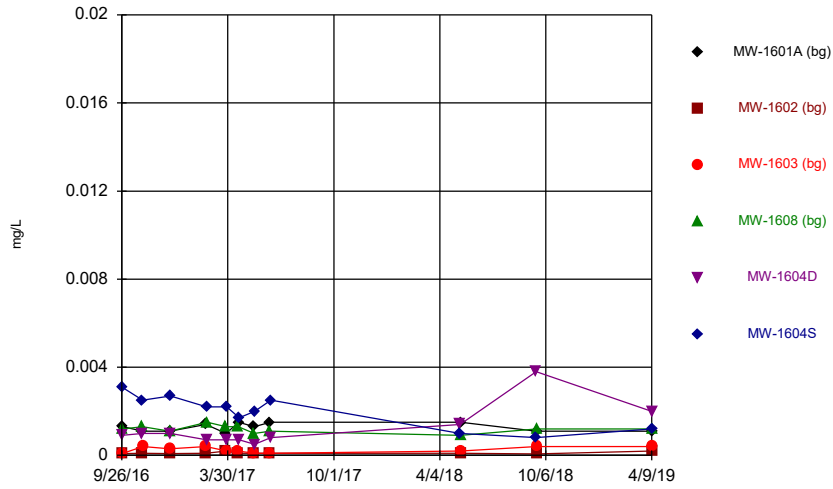
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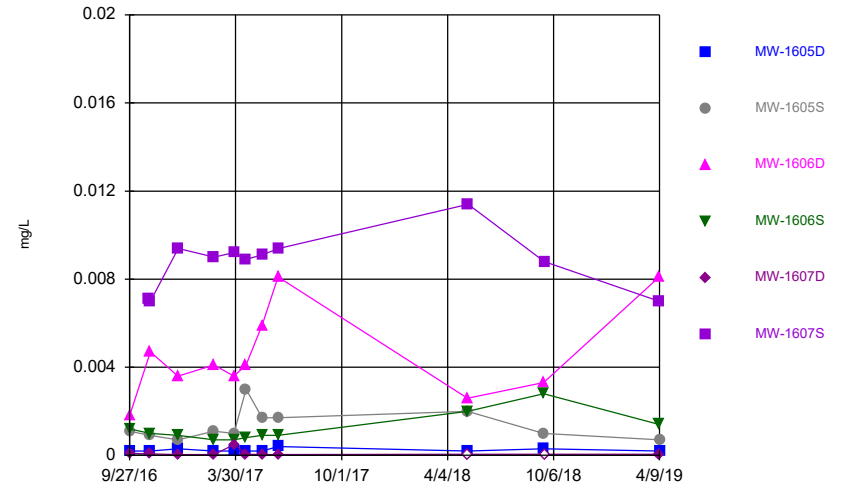


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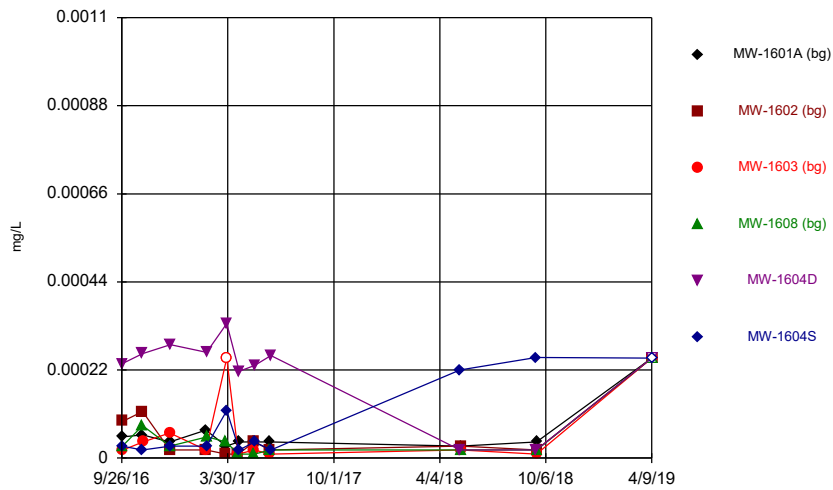
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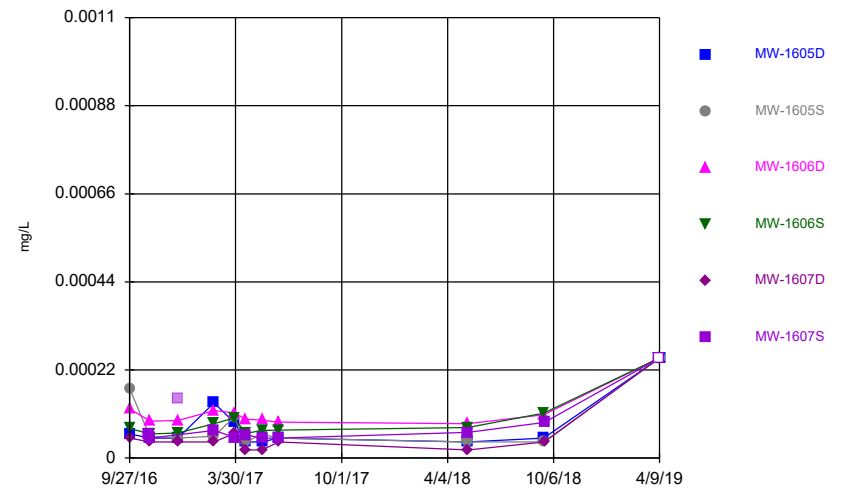
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Time Series



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Time Series



Constituent: Thallium, total Analysis Run 6/23/2019 12:52 PM View: Descriptive
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Outlier Summary Table

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 7/3/2019, 10:01 a.m.

Date	MW-1607S Arsenic, total (mg/L)	MW-1607S Barium, total (mg/L)	MW-1604S Combined Radium 226 + 228 (pCi/L)	MW-1607S Mercury, total (mg/L)	MW-1604S Molybdenum, total (mg/L)	MW-1607D pH, field (SU)	MW-1607S pH, field (SU)	MW-1607S Thallium, total (mg/L)	MW-1606S Total Dissolved Solids [TDS] (mg/L)
9/26/2016			0.136 (o)		0.0032 (o)				
12/21/2016	0.0112 (o)	0.114 (o)		1.2E-05 (o)				0.00015 (o)	
5/16/2017						8.41 (o)	8.23 (o)		3230 (o)

Interwell Prediction Limit Summary - Significant Results

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 6/30/2019, 6:31 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)	MW-1604D	0.6322	n/a	4/9/2019	2.82	Yes	40	0.6145	0.1211	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Boron, total (mg/L)	MW-1604S	0.6322	n/a	4/9/2019	3.5	Yes	40	0.6145	0.1211	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Boron, total (mg/L)	MW-1605D	0.6322	n/a	4/9/2019	6.9	Yes	40	0.6145	0.1211	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Boron, total (mg/L)	MW-1605S	0.6322	n/a	4/9/2019	9.39	Yes	40	0.6145	0.1211	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Boron, total (mg/L)	MW-1606D	0.6322	n/a	4/8/2019	7.32	Yes	40	0.6145	0.1211	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Boron, total (mg/L)	MW-1606S	0.6322	n/a	4/8/2019	7.68	Yes	40	0.6145	0.1211	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Boron, total (mg/L)	MW-1607D	0.6322	n/a	4/8/2019	3.1	Yes	40	0.6145	0.1211	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Boron, total (mg/L)	MW-1607S	0.6322	n/a	4/8/2019	2.35	Yes	40	0.6145	0.1211	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Calcium, total (mg/L)	MW-1604D	193.4	n/a	4/9/2019	236	Yes	40	121.1	35.96	0	None	No	0.0009403	Param Inter 1 of 2
Calcium, total (mg/L)	MW-1604S	193.4	n/a	4/9/2019	301	Yes	40	121.1	35.96	0	None	No	0.0009403	Param Inter 1 of 2
Calcium, total (mg/L)	MW-1605D	193.4	n/a	4/9/2019	247	Yes	40	121.1	35.96	0	None	No	0.0009403	Param Inter 1 of 2
Calcium, total (mg/L)	MW-1606D	193.4	n/a	4/8/2019	265	Yes	40	121.1	35.96	0	None	No	0.0009403	Param Inter 1 of 2
Calcium, total (mg/L)	MW-1606S	193.4	n/a	4/8/2019	229	Yes	40	121.1	35.96	0	None	No	0.0009403	Param Inter 1 of 2
Calcium, total (mg/L)	MW-1607D	193.4	n/a	4/8/2019	232	Yes	40	121.1	35.96	0	None	No	0.0009403	Param Inter 1 of 2
Calcium, total (mg/L)	MW-1607S	193.4	n/a	4/8/2019	226	Yes	40	121.1	35.96	0	None	No	0.0009403	Param Inter 1 of 2
Chloride, total (mg/L)	MW-1604D	58.8	n/a	4/9/2019	100	Yes	40	2.553	0.6638	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Chloride, total (mg/L)	MW-1604S	58.8	n/a	4/9/2019	132	Yes	40	2.553	0.6638	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Chloride, total (mg/L)	MW-1605D	58.8	n/a	4/9/2019	169	Yes	40	2.553	0.6638	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Chloride, total (mg/L)	MW-1605S	58.8	n/a	4/9/2019	140	Yes	40	2.553	0.6638	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Chloride, total (mg/L)	MW-1606D	58.8	n/a	4/8/2019	214	Yes	40	2.553	0.6638	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Chloride, total (mg/L)	MW-1606S	58.8	n/a	4/8/2019	223	Yes	40	2.553	0.6638	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Chloride, total (mg/L)	MW-1607D	58.8	n/a	4/8/2019	162	Yes	40	2.553	0.6638	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Chloride, total (mg/L)	MW-1607S	58.8	n/a	4/8/2019	153	Yes	40	2.553	0.6638	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Fluoride, total (mg/L)	MW-1605S	0.2718	n/a	4/9/2019	0.33	Yes	44	0.03409	0.01991	0	None	x^2	0.0009403	Param Inter 1 of 2
Fluoride, total (mg/L)	MW-1606S	0.2718	n/a	4/8/2019	0.54	Yes	44	0.03409	0.01991	0	None	x^2	0.0009403	Param Inter 1 of 2
Fluoride, total (mg/L)	MW-1607D	0.2718	n/a	4/8/2019	0.52	Yes	44	0.03409	0.01991	0	None	x^2	0.0009403	Param Inter 1 of 2
Sulfate, total (mg/L)	MW-1604S	680.5	n/a	4/9/2019	703	Yes	40	5.35	0.5827	0	None	ln(x)	0.0009403	Param Inter 1 of 2
Sulfate, total (mg/L)	MW-1605D	680.5	n/a	4/9/2019	791	Yes	40	5.35	0.5827	0	None	ln(x)	0.0009403	Param Inter 1 of 2
Sulfate, total (mg/L)	MW-1606D	680.5	n/a	4/8/2019	682	Yes	40	5.35	0.5827	0	None	ln(x)	0.0009403	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1604D	1054	n/a	4/9/2019	1300	Yes	40	6.35	0.3033	0	None	ln(x)	0.0009403	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1604S	1054	n/a	4/9/2019	1650	Yes	40	6.35	0.3033	0	None	ln(x)	0.0009403	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1605D	1054	n/a	4/9/2019	1710	Yes	40	6.35	0.3033	0	None	ln(x)	0.0009403	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1605S	1054	n/a	4/9/2019	1450	Yes	40	6.35	0.3033	0	None	ln(x)	0.0009403	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1606D	1054	n/a	4/8/2019	1600	Yes	40	6.35	0.3033	0	None	ln(x)	0.0009403	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1606S	1054	n/a	4/8/2019	1480	Yes	40	6.35	0.3033	0	None	ln(x)	0.0009403	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1607D	1054	n/a	4/8/2019	1480	Yes	40	6.35	0.3033	0	None	ln(x)	0.0009403	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1607S	1054	n/a	4/8/2019	1310	Yes	40	6.35	0.3033	0	None	ln(x)	0.0009403	Param Inter 1 of 2

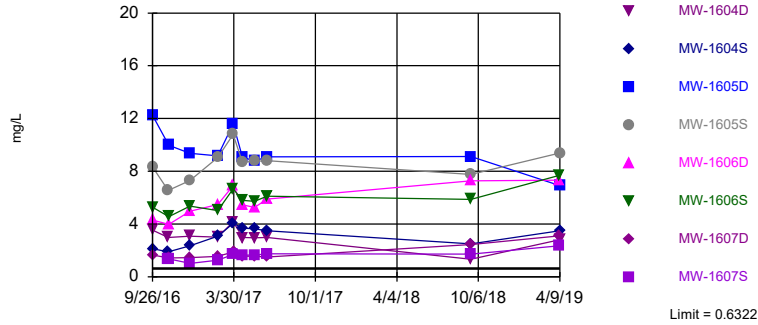
Interwell Prediction Limit Summary - All Results

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 6/30/2019, 6:31 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)	MW-1604D	0.6322	n/a	4/9/2019	2.82	Yes	40	0.6145	0.1211	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Boron, total (mg/L)	MW-1604S	0.6322	n/a	4/9/2019	3.5	Yes	40	0.6145	0.1211	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Boron, total (mg/L)	MW-1605D	0.6322	n/a	4/9/2019	6.9	Yes	40	0.6145	0.1211	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Boron, total (mg/L)	MW-1605S	0.6322	n/a	4/9/2019	9.39	Yes	40	0.6145	0.1211	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Boron, total (mg/L)	MW-1606D	0.6322	n/a	4/8/2019	7.32	Yes	40	0.6145	0.1211	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Boron, total (mg/L)	MW-1606S	0.6322	n/a	4/8/2019	7.68	Yes	40	0.6145	0.1211	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Boron, total (mg/L)	MW-1607D	0.6322	n/a	4/8/2019	3.1	Yes	40	0.6145	0.1211	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Boron, total (mg/L)	MW-1607S	0.6322	n/a	4/8/2019	2.35	Yes	40	0.6145	0.1211	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Calcium, total (mg/L)	MW-1604D	193.4	n/a	4/9/2019	236	Yes	40	121.1	35.96	0	None	No	0.0009403	Param Inter 1 of 2
Calcium, total (mg/L)	MW-1604S	193.4	n/a	4/9/2019	301	Yes	40	121.1	35.96	0	None	No	0.0009403	Param Inter 1 of 2
Calcium, total (mg/L)	MW-1605D	193.4	n/a	4/9/2019	247	Yes	40	121.1	35.96	0	None	No	0.0009403	Param Inter 1 of 2
Calcium, total (mg/L)	MW-1605S	193.4	n/a	4/9/2019	164	No	40	121.1	35.96	0	None	No	0.0009403	Param Inter 1 of 2
Calcium, total (mg/L)	MW-1606D	193.4	n/a	4/8/2019	265	Yes	40	121.1	35.96	0	None	No	0.0009403	Param Inter 1 of 2
Calcium, total (mg/L)	MW-1606S	193.4	n/a	4/8/2019	229	Yes	40	121.1	35.96	0	None	No	0.0009403	Param Inter 1 of 2
Calcium, total (mg/L)	MW-1607D	193.4	n/a	4/8/2019	232	Yes	40	121.1	35.96	0	None	No	0.0009403	Param Inter 1 of 2
Calcium, total (mg/L)	MW-1607S	193.4	n/a	4/8/2019	226	Yes	40	121.1	35.96	0	None	No	0.0009403	Param Inter 1 of 2
Chloride, total (mg/L)	MW-1604D	58.8	n/a	4/9/2019	100	Yes	40	2.553	0.6638	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Chloride, total (mg/L)	MW-1604S	58.8	n/a	4/9/2019	132	Yes	40	2.553	0.6638	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Chloride, total (mg/L)	MW-1605D	58.8	n/a	4/9/2019	169	Yes	40	2.553	0.6638	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Chloride, total (mg/L)	MW-1605S	58.8	n/a	4/9/2019	140	Yes	40	2.553	0.6638	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Chloride, total (mg/L)	MW-1606D	58.8	n/a	4/8/2019	214	Yes	40	2.553	0.6638	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Chloride, total (mg/L)	MW-1606S	58.8	n/a	4/8/2019	223	Yes	40	2.553	0.6638	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Chloride, total (mg/L)	MW-1607D	58.8	n/a	4/8/2019	162	Yes	40	2.553	0.6638	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Chloride, total (mg/L)	MW-1607S	58.8	n/a	4/8/2019	153	Yes	40	2.553	0.6638	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Fluoride, total (mg/L)	MW-1604D	0.2718	n/a	4/9/2019	0.15	No	44	0.03409	0.01991	0	None	x^2	0.0009403	Param Inter 1 of 2
Fluoride, total (mg/L)	MW-1604S	0.2718	n/a	4/9/2019	0.19	No	44	0.03409	0.01991	0	None	x^2	0.0009403	Param Inter 1 of 2
Fluoride, total (mg/L)	MW-1605D	0.2718	n/a	4/9/2019	0.22	No	44	0.03409	0.01991	0	None	x^2	0.0009403	Param Inter 1 of 2
Fluoride, total (mg/L)	MW-1605S	0.2718	n/a	4/9/2019	0.33	Yes	44	0.03409	0.01991	0	None	x^2	0.0009403	Param Inter 1 of 2
Fluoride, total (mg/L)	MW-1606D	0.2718	n/a	4/8/2019	0.26	No	44	0.03409	0.01991	0	None	x^2	0.0009403	Param Inter 1 of 2
Fluoride, total (mg/L)	MW-1606S	0.2718	n/a	4/8/2019	0.54	Yes	44	0.03409	0.01991	0	None	x^2	0.0009403	Param Inter 1 of 2
Fluoride, total (mg/L)	MW-1607D	0.2718	n/a	4/8/2019	0.52	Yes	44	0.03409	0.01991	0	None	x^2	0.0009403	Param Inter 1 of 2
Fluoride, total (mg/L)	MW-1607S	0.2718	n/a	4/8/2019	0.26	No	44	0.03409	0.01991	0	None	x^2	0.0009403	Param Inter 1 of 2
Sulfate, total (mg/L)	MW-1604D	680.5	n/a	4/9/2019	539	No	40	5.35	0.5827	0	None	ln(x)	0.0009403	Param Inter 1 of 2
Sulfate, total (mg/L)	MW-1604S	680.5	n/a	4/9/2019	703	Yes	40	5.35	0.5827	0	None	ln(x)	0.0009403	Param Inter 1 of 2
Sulfate, total (mg/L)	MW-1605D	680.5	n/a	4/9/2019	791	Yes	40	5.35	0.5827	0	None	ln(x)	0.0009403	Param Inter 1 of 2
Sulfate, total (mg/L)	MW-1605S	680.5	n/a	4/9/2019	599	No	40	5.35	0.5827	0	None	ln(x)	0.0009403	Param Inter 1 of 2
Sulfate, total (mg/L)	MW-1606D	680.5	n/a	4/8/2019	682	Yes	40	5.35	0.5827	0	None	ln(x)	0.0009403	Param Inter 1 of 2
Sulfate, total (mg/L)	MW-1606S	680.5	n/a	4/8/2019	592	No	40	5.35	0.5827	0	None	ln(x)	0.0009403	Param Inter 1 of 2
Sulfate, total (mg/L)	MW-1607D	680.5	n/a	4/8/2019	656	No	40	5.35	0.5827	0	None	ln(x)	0.0009403	Param Inter 1 of 2
Sulfate, total (mg/L)	MW-1607S	680.5	n/a	4/8/2019	504	No	40	5.35	0.5827	0	None	ln(x)	0.0009403	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1604D	1054	n/a	4/9/2019	1300	Yes	40	6.35	0.3033	0	None	ln(x)	0.0009403	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1604S	1054	n/a	4/9/2019	1650	Yes	40	6.35	0.3033	0	None	ln(x)	0.0009403	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1605D	1054	n/a	4/9/2019	1710	Yes	40	6.35	0.3033	0	None	ln(x)	0.0009403	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1605S	1054	n/a	4/9/2019	1450	Yes	40	6.35	0.3033	0	None	ln(x)	0.0009403	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1606D	1054	n/a	4/8/2019	1600	Yes	40	6.35	0.3033	0	None	ln(x)	0.0009403	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1606S	1054	n/a	4/8/2019	1480	Yes	40	6.35	0.3033	0	None	ln(x)	0.0009403	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1607D	1054	n/a	4/8/2019	1480	Yes	40	6.35	0.3033	0	None	ln(x)	0.0009403	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	MW-1607S	1054	n/a	4/8/2019	1310	Yes	40	6.35	0.3033	0	None	ln(x)	0.0009403	Param Inter 1 of 2

Exceeds Limit: MW-1604D, MW-1604S, MW-1605D, MW-1605S, MW-1606D, MW-1

Prediction Limit
Interwell Parametric

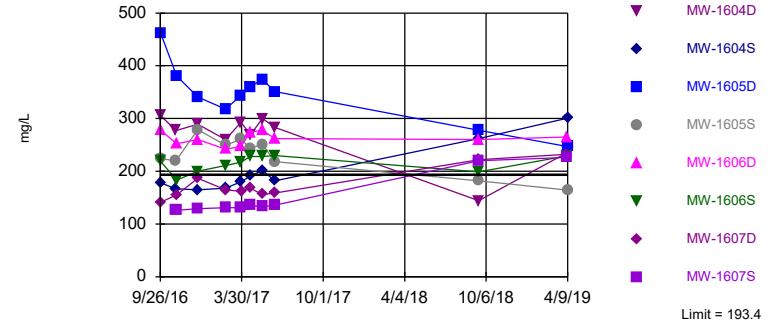


Background Data Summary (based on cube root transformation): Mean=0.6145, Std. Dev.=0.1211, n=40. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9221, critical = 0.919. Kappa = 2.012 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.0009403. Comparing 8 points to limit.

Constituent: Boron, total Analysis Run 6/30/2019 6:27 PM View: PL's - Interwell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Exceeds Limit: MW-1604D, MW-1604S, MW-1605D, MW-1606D, MW-1606S, MW-1

Prediction Limit
Interwell Parametric

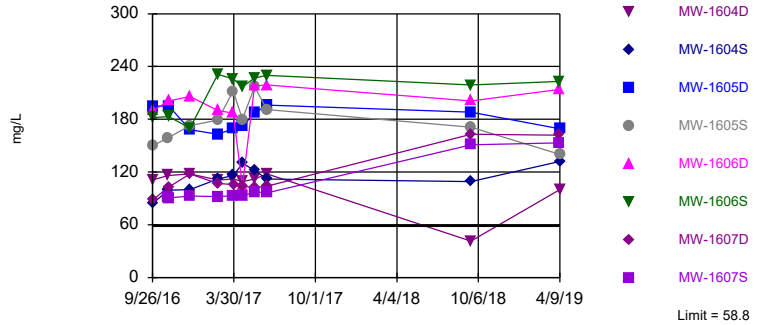


Background Data Summary: Mean=121.1, Std. Dev.=35.96, n=40. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9249, critical = 0.919. Kappa = 2.012 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.0009403. Comparing 8 points to limit.

Constituent: Calcium, total Analysis Run 6/30/2019 6:27 PM View: PL's - Interwell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Exceeds Limit: MW-1604D, MW-1604S, MW-1605D, MW-1605S, MW-1606D, MW-1

Prediction Limit
Interwell Parametric

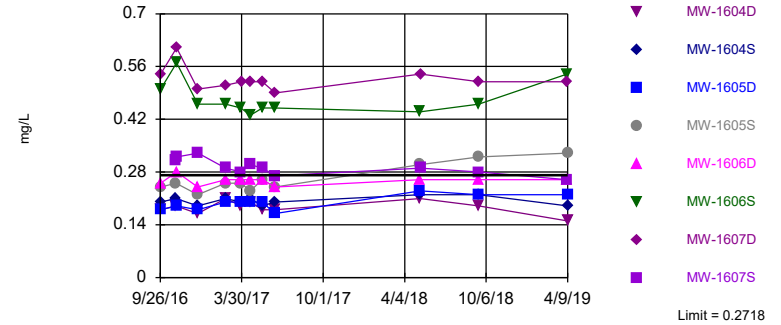


Background Data Summary (based on cube root transformation): Mean=2.553, Std. Dev.=0.6638, n=40. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9301, critical = 0.919. Kappa = 2.012 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.0009403. Comparing 8 points to limit.

Constituent: Chloride, total Analysis Run 6/30/2019 6:28 PM View: PL's - Interwell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Exceeds Limit: MW-1605S, MW-1606S, MW-1607D

Prediction Limit
Interwell Parametric

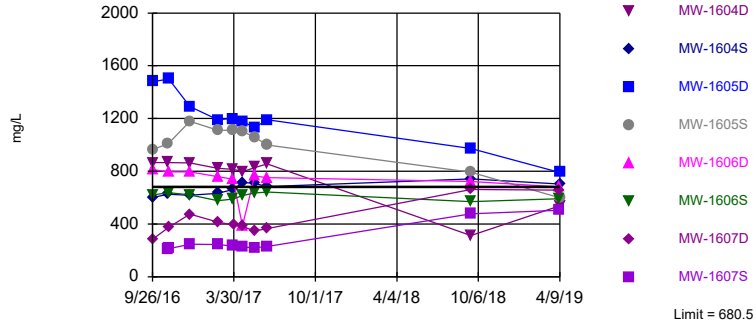


Background Data Summary (based on square transformation): Mean=0.03409, Std. Dev.=0.01991, n=44. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9267, critical = 0.924. Kappa = 1.999 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.0009403. Comparing 8 points to limit.

Constituent: Fluoride, total Analysis Run 6/30/2019 6:28 PM View: PL's - Interwell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Exceeds Limit: MW-1604S, MW-1605D, MW-1606D

Prediction Limit
Interwell Parametric

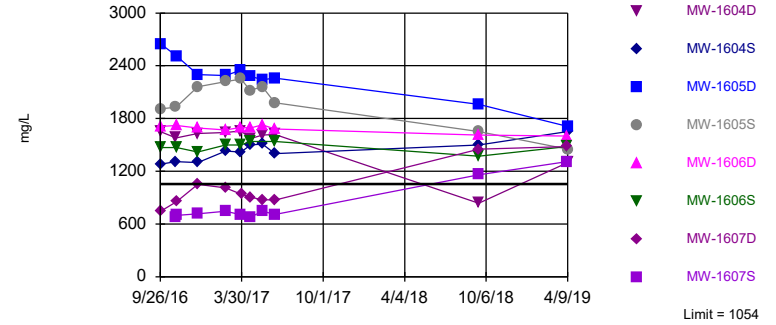


Background Data Summary (based on natural log transformation): Mean=5.35, Std. Dev.=0.5827, n=40. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9307, critical = 0.919. Kappa = 2.012 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.0009403. Comparing 8 points to limit.

Constituent: Sulfate, total Analysis Run 6/30/2019 6:28 PM View: PL's - Interwell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Exceeds Limit: MW-1604D, MW-1604S, MW-1605D, MW-1605S, MW-1606D, MW-1

Prediction Limit
Interwell Parametric



Background Data Summary (based on natural log transformation): Mean=6.35, Std. Dev.=0.3033, n=40. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.931, critical = 0.919. Kappa = 2.012 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.0009403. Comparing 8 points to limit.

Constituent: Total Dissolved Solids [TDS] Analysis Run 6/30/2019 6:28 PM View: PL's - Interwell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Intrawell Prediction Limit Summary - Significant Results

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 6/30/2019, 6:34 PM

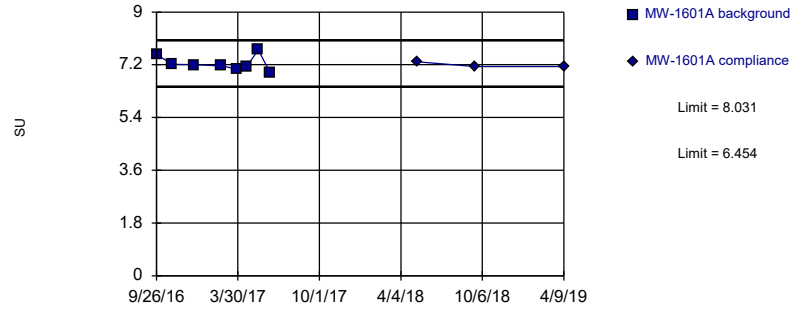
Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
pH, field (SU)	MW-1607S	7.831	7.255	4/8/2019	7.23	Yes	7	7.543	0.08577	0	None	No	0.0004701	Param 1 of 2

Intrawell Prediction Limit Summary - All Results

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 6/30/2019, 6:34 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
pH, field (SU)	MW-1601A	8.031	6.454	4/9/2019	7.14	No	8	7.243	0.2615	0	None	No	0.0004701	Param 1 of 2
pH, field (SU)	MW-1602	7.694	5.816	4/9/2019	6.62	No	8	6.755	0.3115	0	None	No	0.0004701	Param 1 of 2
pH, field (SU)	MW-1603	7.999	5.971	4/9/2019	6.8	No	8	6.985	0.3366	0	None	No	0.0004701	Param 1 of 2
pH, field (SU)	MW-1608	8.216	6.092	4/9/2019	6.86	No	8	7.154	0.3523	0	None	No	0.0004701	Param 1 of 2
pH, field (SU)	MW-1604D	8.08	6.653	4/9/2019	6.92	No	8	7.366	0.2368	0	None	No	0.0004701	Param 1 of 2
pH, field (SU)	MW-1604S	7.991	6.389	4/9/2019	7.14	No	8	7.19	0.2657	0	None	No	0.0004701	Param 1 of 2
pH, field (SU)	MW-1605D	8.258	6.653	4/9/2019	7.31	No	7	7.456	0.2388	0	None	No	0.0004701	Param 1 of 2
pH, field (SU)	MW-1605S	8.152	6.66	4/9/2019	7.19	No	8	7.406	0.2476	0	None	No	0.0004701	Param 1 of 2
pH, field (SU)	MW-1606D	8.222	6.671	4/8/2019	7.19	No	8	7.446	0.2573	0	None	No	0.0004701	Param 1 of 2
pH, field (SU)	MW-1606S	8.662	5.6	4/8/2019	6.81	No	8	7.131	0.508	0	None	No	0.0004701	Param 1 of 2
pH, field (SU)	MW-1607D	7.77	6.9	4/8/2019	7.39	No	7	n/a	n/a	0	n/a	n/a	0.05531	NP (normality) 1 of 2
pH, field (SU)	MW-1607S	7.831	7.255	4/8/2019	7.23	Yes	7	7.543	0.08577	0	None	No	0.0004701	Param 1 of 2

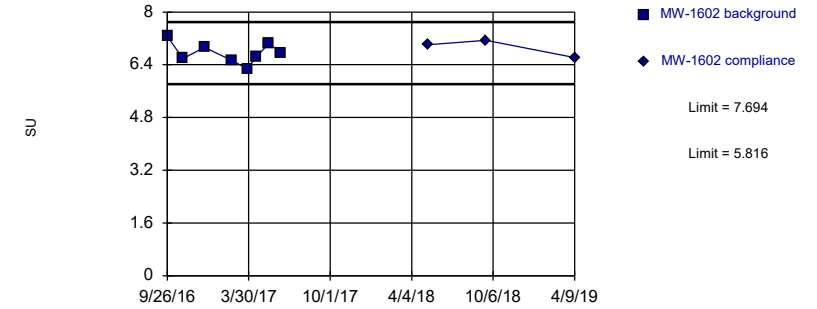
Within Limits Prediction Limit
Intrawell Parametric



Background Data Summary: Mean=7.243, Std. Dev.=0.2615, n=8. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.902, critical = 0.749. Kappa = 3.014 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.0009403.

Constituent: pH, field Analysis Run 6/30/2019 6:31 PM View: PL's - Intrawell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

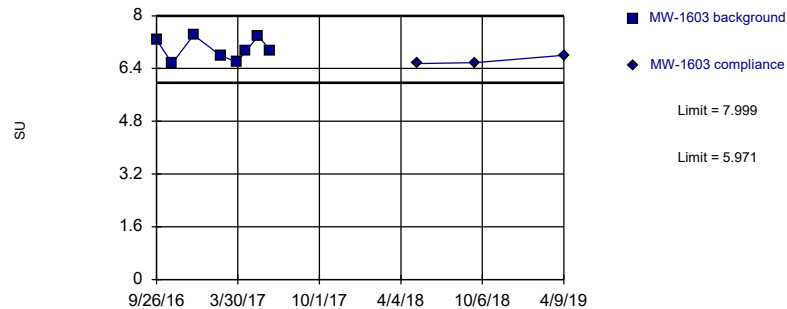
Within Limits Prediction Limit
Intrawell Parametric



Background Data Summary: Mean=6.755, Std. Dev.=0.3115, n=8. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9867, critical = 0.749. Kappa = 3.014 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.0009403.

Constituent: pH, field Analysis Run 6/30/2019 6:31 PM View: PL's - Intrawell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

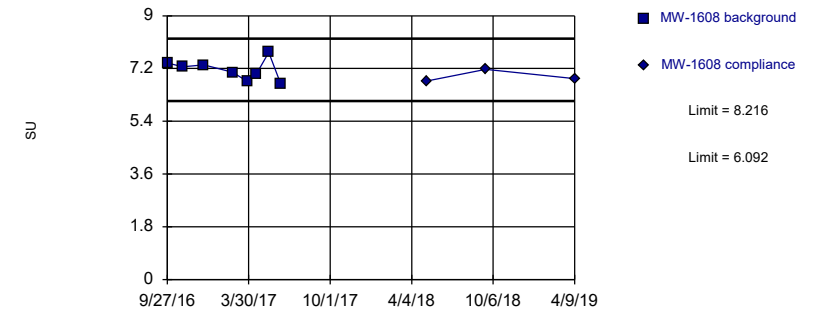
Within Limits Prediction Limit
Intrawell Parametric



Background Data Summary: Mean=6.985, Std. Dev.=0.3366, n=8. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9063, critical = 0.749. Kappa = 3.014 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.0009403.

Constituent: pH, field Analysis Run 6/30/2019 6:32 PM View: PL's - Intrawell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

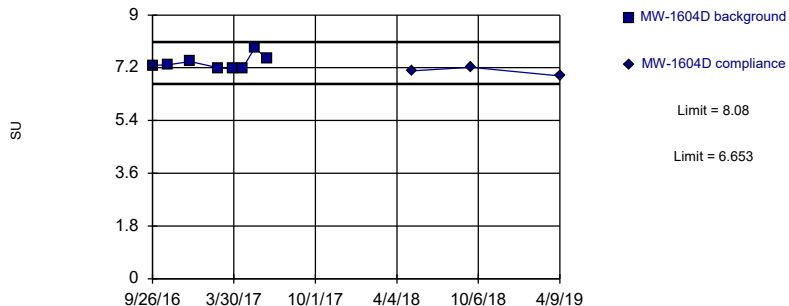
Within Limits Prediction Limit
Intrawell Parametric



Within Limits

Prediction Limit

Intrawell Parametric



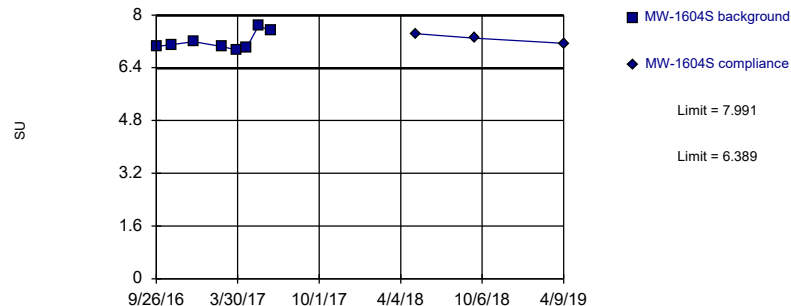
Background Data Summary: Mean=7.366, Std. Dev.=0.2368, n=8. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8333, critical = 0.749. Kappa = 3.014 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.0009403.

Constituent: pH, field Analysis Run 6/30/2019 6:32 PM View: PL's - Intrawell
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Within Limits

Prediction Limit

Intrawell Parametric



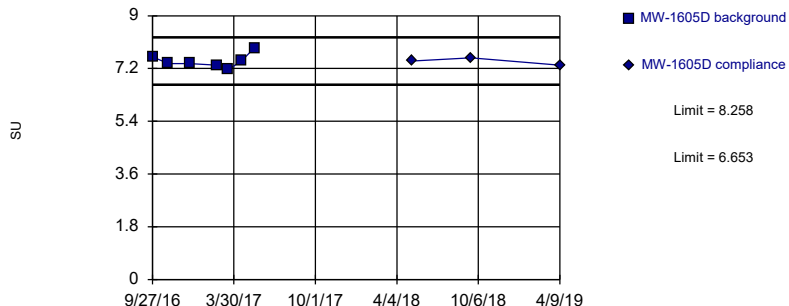
Background Data Summary: Mean=7.19, Std. Dev.=0.2657, n=8. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8184, critical = 0.749. Kappa = 3.014 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.0009403.

Constituent: pH, field Analysis Run 6/30/2019 6:32 PM View: PL's - Intrawell
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Within Limits

Prediction Limit

Intrawell Parametric



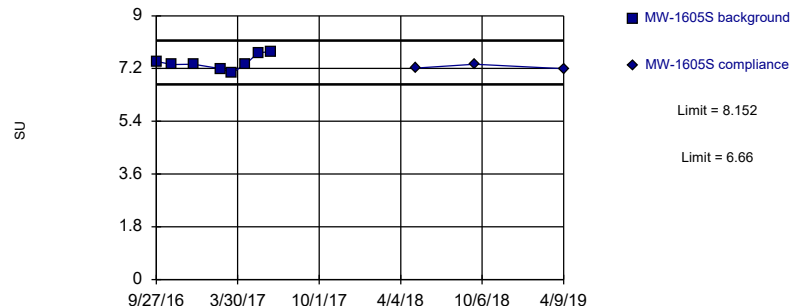
Background Data Summary: Mean=7.456, Std. Dev.=0.2388, n=7. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9315, critical = 0.73. Kappa = 3.361 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.0009403.

Constituent: pH, field Analysis Run 6/30/2019 6:32 PM View: PL's - Intrawell
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Within Limits

Prediction Limit

Intrawell Parametric

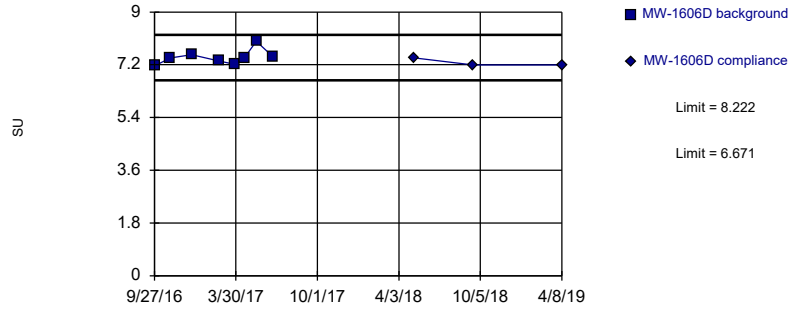


Background Data Summary: Mean=7.406, Std. Dev.=0.2476, n=8. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9237, critical = 0.749. Kappa = 3.014 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.0009403.

Constituent: pH, field Analysis Run 6/30/2019 6:32 PM View: PL's - Intrawell
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Within Limits

Prediction Limit
Intrawell Parametric

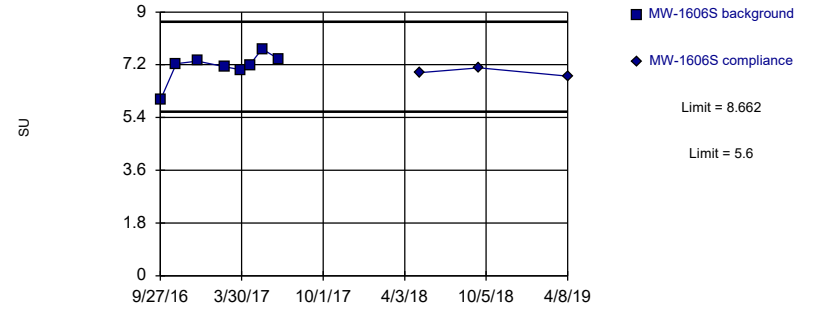


Background Data Summary: Mean=7.446, Std. Dev.=0.2573, n=8. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8686, critical = 0.749. Kappa = 3.014 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.0009403.

Constituent: pH, field Analysis Run 6/30/2019 6:32 PM View: PL's - Intrawell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Within Limits

Prediction Limit
Intrawell Parametric

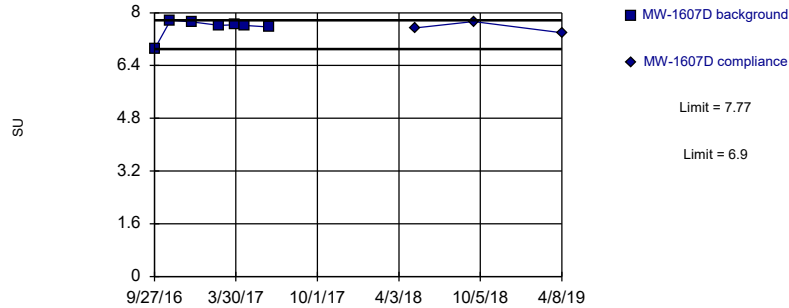


Background Data Summary: Mean=7.131, Std. Dev.=0.508, n=8. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8107, critical = 0.749. Kappa = 3.014 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.0009403.

Constituent: pH, field Analysis Run 6/30/2019 6:32 PM View: PL's - Intrawell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Within Limits

Prediction Limit
Intrawell Non-parametric

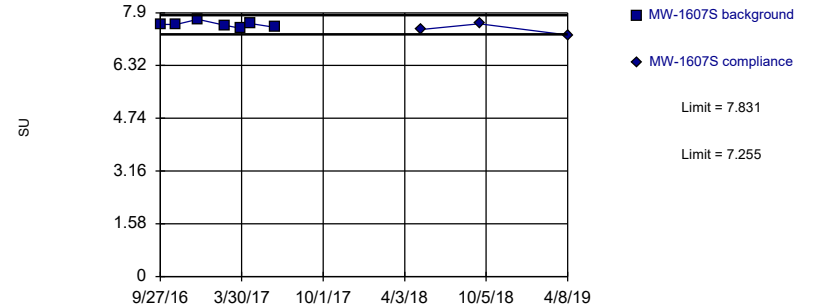


Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limits are highest and lowest of 7 background values. Well-constituent pair annual alpha = 0.1091. Individual comparison alpha = 0.05531 (1 of 2).

Constituent: pH, field Analysis Run 6/30/2019 6:32 PM View: PL's - Intrawell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Exceeds Limits

Prediction Limit
Intrawell Parametric



Background Data Summary: Mean=7.543, Std. Dev.=0.08577, n=7. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9302, critical = 0.73. Kappa = 3.361 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.0009403.

Constituent: pH, field Analysis Run 6/30/2019 6:32 PM View: PL's - Intrawell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Trend Test Summary Table - Significant Results

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 7/3/2019, 10:06 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>
Boron, total (mg/L)	MW-1606D	1.379	31	30	Yes	10	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	MW-1604S	51.83	33	30	Yes	10	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	MW-1607S	19.67	41	30	Yes	10	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	MW-1607S	14.21	35	30	Yes	10	0	n/a	n/a	0.01	NP
Fluoride, total (mg/L)	MW-1602 (bg)	0.03503	42	34	Yes	11	0	n/a	n/a	0.01	NP
Fluoride, total (mg/L)	MW-1608 (bg)	-0.05568	-47	-34	Yes	11	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	MW-1601A (bg)	30	33	30	Yes	10	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	MW-1608 (bg)	102.6	31	30	Yes	10	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	MW-1604S	70.94	31	30	Yes	10	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	MW-1605D	-272.2	-36	-30	Yes	10	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	MW-1601A (bg)	64.87	31	30	Yes	10	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	MW-1602 (bg)	168.9	33	30	Yes	10	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	MW-1605D	-301.9	-39	-30	Yes	10	0	n/a	n/a	0.01	NP

Trend Test Summary Table - All Results

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 7/3/2019, 10:06 AM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Boron, total (mg/L)	MW-1601A (bg)	0.02217	12	30	No	10	0	n/a	n/a	0.01	NP
Boron, total (mg/L)	MW-1602 (bg)	-0.01026	-12	-30	No	10	0	n/a	n/a	0.01	NP
Boron, total (mg/L)	MW-1603 (bg)	0.03203	5	30	No	10	0	n/a	n/a	0.01	NP
Boron, total (mg/L)	MW-1608 (bg)	0.01649	11	30	No	10	0	n/a	n/a	0.01	NP
Boron, total (mg/L)	MW-1604D	-0.2704	-26	-30	No	10	0	n/a	n/a	0.01	NP
Boron, total (mg/L)	MW-1604S	0.6569	15	30	No	10	0	n/a	n/a	0.01	NP
Boron, total (mg/L)	MW-1605D	-1.258	-29	-30	No	10	0	n/a	n/a	0.01	NP
Boron, total (mg/L)	MW-1605S	0.6518	15	30	No	10	0	n/a	n/a	0.01	NP
Boron, total (mg/L)	MW-1606D	1.379	31	30	Yes	10	0	n/a	n/a	0.01	NP
Boron, total (mg/L)	MW-1606S	0.9889	27	30	No	10	0	n/a	n/a	0.01	NP
Boron, total (mg/L)	MW-1607D	0.3718	18	30	No	10	0	n/a	n/a	0.01	NP
Boron, total (mg/L)	MW-1607S	0.4115	27	30	No	10	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	MW-1601A (bg)	12.71	18	30	No	10	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	MW-1602 (bg)	18.9	23	30	No	10	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	MW-1603 (bg)	25.03	27	30	No	10	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	MW-1608 (bg)	14.13	22	30	No	10	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	MW-1604D	-25.93	-17	-30	No	10	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	MW-1604S	51.83	33	30	Yes	10	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	MW-1605D	-55.08	-21	-30	No	10	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	MW-1606D	2.175	5	30	No	10	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	MW-1606S	15.5	20	30	No	10	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	MW-1607D	31.51	21	30	No	10	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	MW-1607S	19.67	41	30	Yes	10	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	MW-1601A (bg)	23.57	25	30	No	10	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	MW-1602 (bg)	3.486	21	30	No	10	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	MW-1603 (bg)	-4.675	-15	-30	No	10	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	MW-1608 (bg)	0.9577	17	30	No	10	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	MW-1604D	-5.903	-12	-30	No	10	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	MW-1604S	20.53	26	30	No	10	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	MW-1605D	0.4345	3	30	No	10	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	MW-1605S	34.76	9	30	No	10	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	MW-1606D	9.463	11	30	No	10	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	MW-1606S	18.7	15	30	No	10	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	MW-1607D	22.04	14	30	No	10	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	MW-1607S	14.21	35	30	Yes	10	0	n/a	n/a	0.01	NP
Fluoride, total (mg/L)	MW-1601A (bg)	-0.0144	-14	-34	No	11	0	n/a	n/a	0.01	NP
Fluoride, total (mg/L)	MW-1602 (bg)	0.03503	42	34	Yes	11	0	n/a	n/a	0.01	NP
Fluoride, total (mg/L)	MW-1603 (bg)	0	15	34	No	11	0	n/a	n/a	0.01	NP
Fluoride, total (mg/L)	MW-1608 (bg)	-0.05568	-47	-34	Yes	11	0	n/a	n/a	0.01	NP
Fluoride, total (mg/L)	MW-1605S	0.03758	31	34	No	11	0	n/a	n/a	0.01	NP
Fluoride, total (mg/L)	MW-1606S	-0.01234	-13	-34	No	11	0	n/a	n/a	0.01	NP
Fluoride, total (mg/L)	MW-1607D	0	-4	-34	No	11	0	n/a	n/a	0.01	NP
pH, field (SU)	MW-1601A (bg)	-0.1544	-16	-34	No	11	0	n/a	n/a	0.01	NP
pH, field (SU)	MW-1602 (bg)	0.05759	5	34	No	11	0	n/a	n/a	0.01	NP
pH, field (SU)	MW-1603 (bg)	-0.07449	-9	-34	No	11	0	n/a	n/a	0.01	NP
pH, field (SU)	MW-1608 (bg)	-0.2395	-19	-34	No	11	0	n/a	n/a	0.01	NP
pH, field (SU)	MW-1607S	-0.09887	-18	-30	No	10	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	MW-1601A (bg)	30	33	30	Yes	10	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	MW-1602 (bg)	93.48	27	30	No	10	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	MW-1603 (bg)	-9.777	-3	-30	No	10	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	MW-1608 (bg)	102.6	31	30	Yes	10	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	MW-1604S	70.94	31	30	Yes	10	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	MW-1605D	-272.2	-36	-30	Yes	10	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	MW-1606D	-51.8	-30	-30	No	10	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	MW-1601A (bg)	64.87	31	30	Yes	10	0	n/a	n/a	0.01	NP

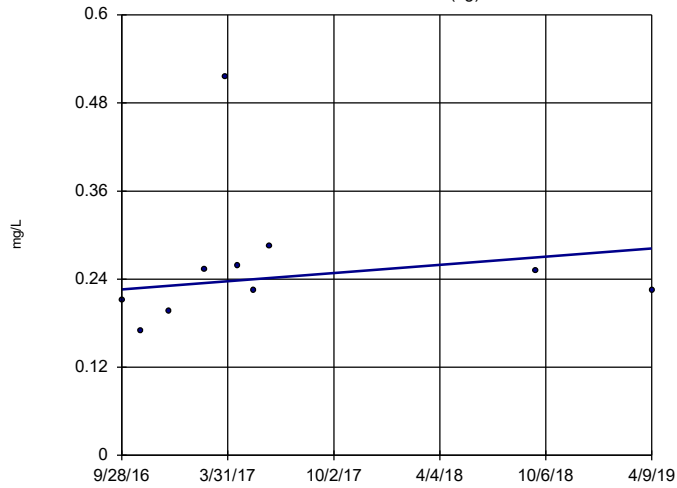
Trend Test Summary Table - All Results

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 7/3/2019, 10:06 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>
Total Dissolved Solids [TDS] (mg/L)	MW-1602 (bg)	168.9	33	30	Yes	10	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	MW-1603 (bg)	7.006	17	30	No	10	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	MW-1608 (bg)	110.5	27	30	No	10	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	MW-1604D	-130.4	-19	-30	No	10	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	MW-1604S	146	30	30	No	10	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	MW-1605D	-301.9	-39	-30	Yes	10	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	MW-1605S	-197.1	-10	-30	No	10	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	MW-1606D	-45.63	-22	-30	No	10	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	MW-1606S	15.11	7	25	No	9	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	MW-1607D	208.6	15	30	No	10	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	MW-1607S	192.1	26	30	No	10	0	n/a	n/a	0.01	NP

Sen's Slope Estimator

MW-1601A (bg)

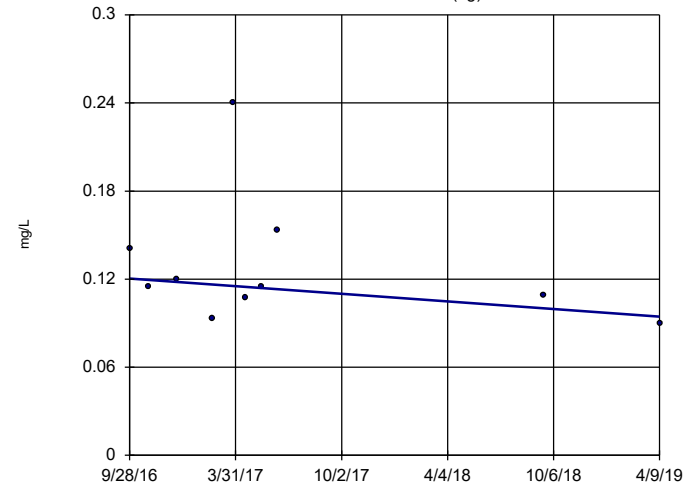


n = 10
 Slope = 0.02217
 units per year.
 Mann-Kendall
 statistic = 12
 critical = 30
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Boron, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1602 (bg)

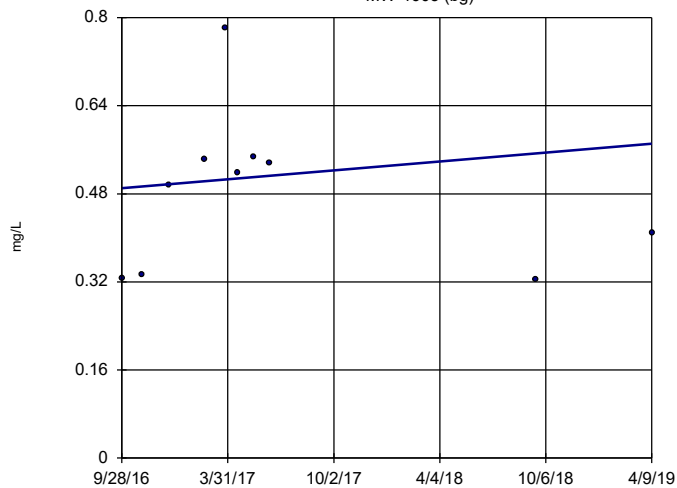


n = 10
 Slope = -0.01026
 units per year.
 Mann-Kendall
 statistic = -12
 critical = -30
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Boron, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1603 (bg)

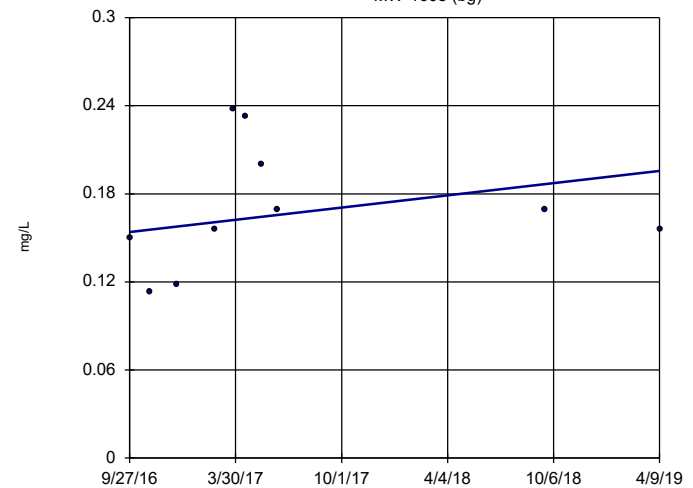


n = 10
 Slope = 0.03203
 units per year.
 Mann-Kendall
 statistic = 5
 critical = 30
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Boron, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1608 (bg)

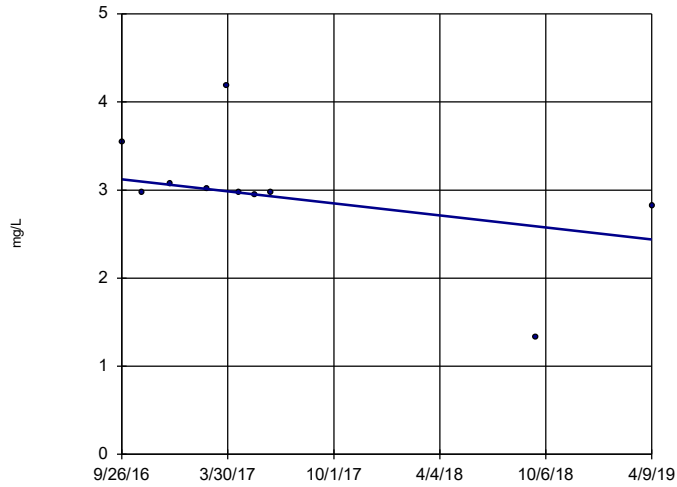


n = 10
 Slope = 0.01649
 units per year.
 Mann-Kendall
 statistic = 11
 critical = 30
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Boron, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

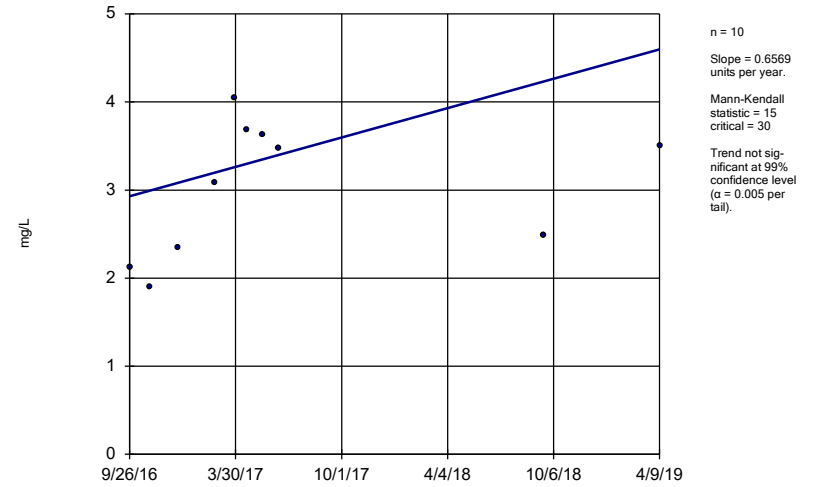
MW-1604D



Constituent: Boron, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

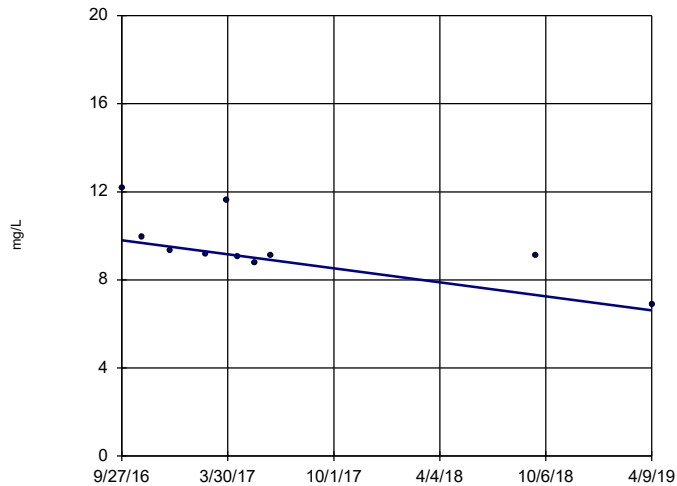
MW-1604S



Constituent: Boron, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

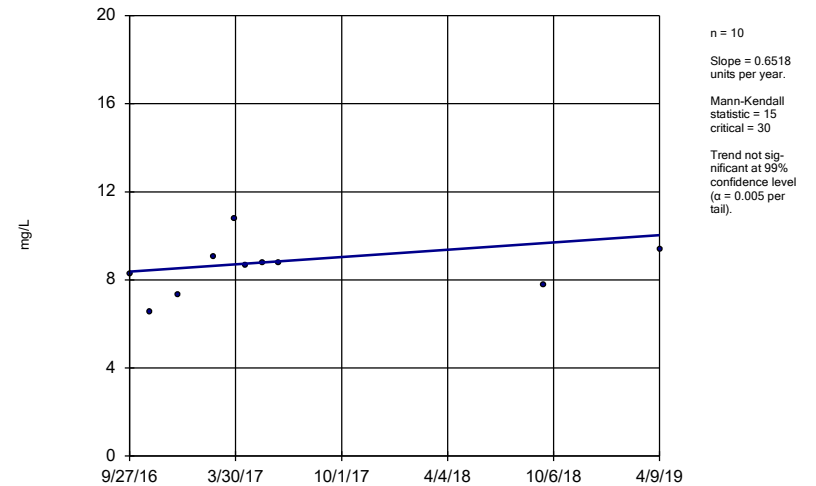
MW-1605D



Constituent: Boron, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

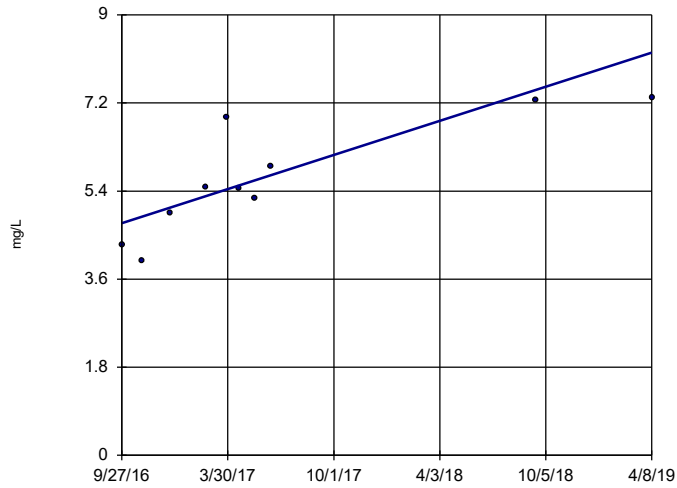
MW-1605S



Constituent: Boron, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1606D

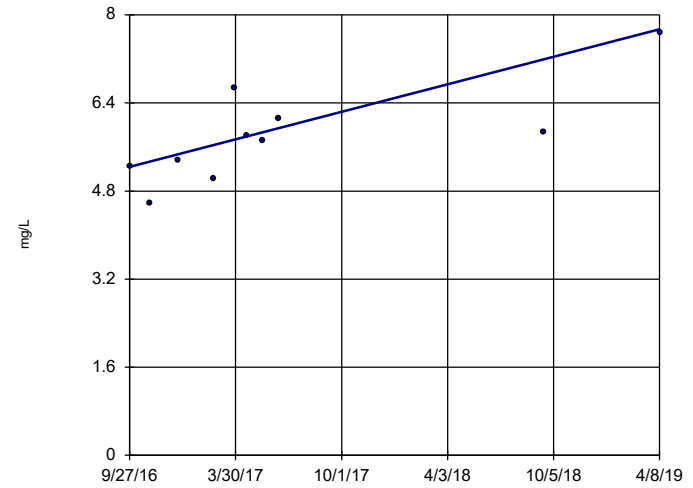


n = 10
 Slope = 1.379
 units per year.
 Mann-Kendall
 statistic = 31
 critical = 30
 Increasing trend
 significant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Boron, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1606S

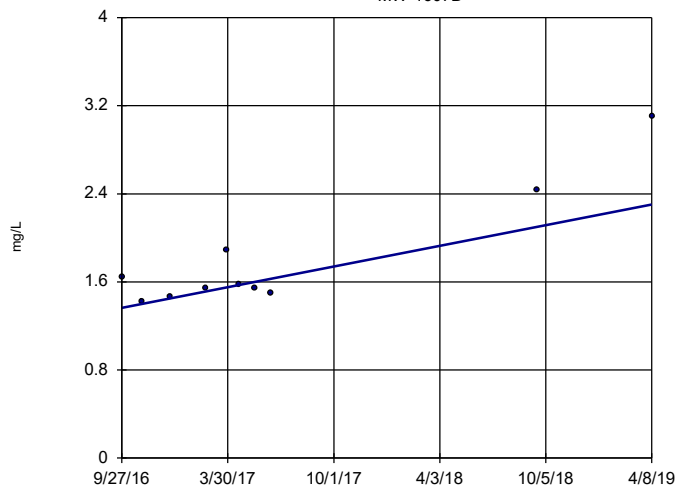


n = 10
 Slope = 0.9889
 units per year.
 Mann-Kendall
 statistic = 27
 critical = 30
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Boron, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1607D

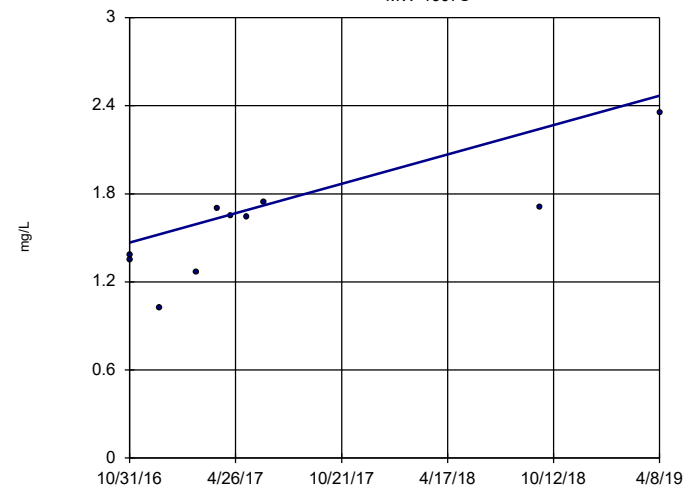


n = 10
 Slope = 0.3718
 units per year.
 Mann-Kendall
 statistic = 18
 critical = 30
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Boron, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1607S

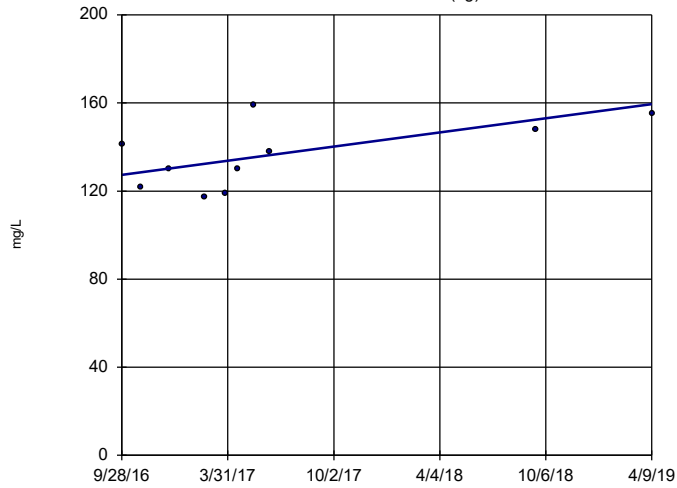


n = 10
 Slope = 0.4115
 units per year.
 Mann-Kendall
 statistic = 27
 critical = 30
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Boron, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1601A (bg)

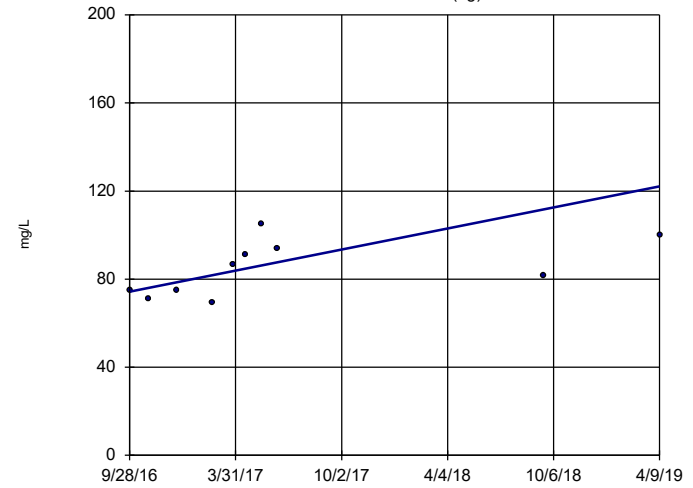


n = 10
 Slope = 12.71
 units per year.
 Mann-Kendall
 statistic = 18
 critical = 30
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Calcium, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1602 (bg)

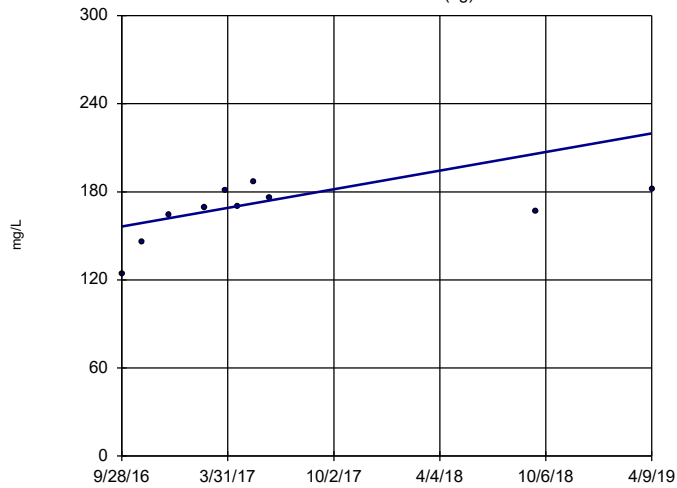


n = 10
 Slope = 18.9
 units per year.
 Mann-Kendall
 statistic = 23
 critical = 30
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Calcium, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1603 (bg)

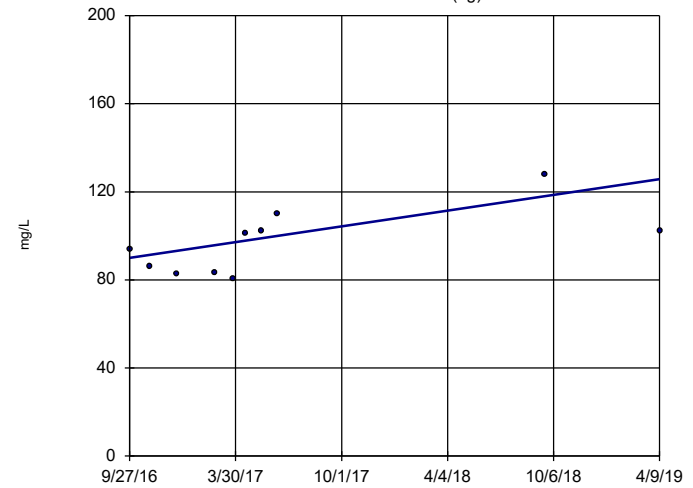


n = 10
 Slope = 25.03
 units per year.
 Mann-Kendall
 statistic = 27
 critical = 30
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Calcium, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1608 (bg)

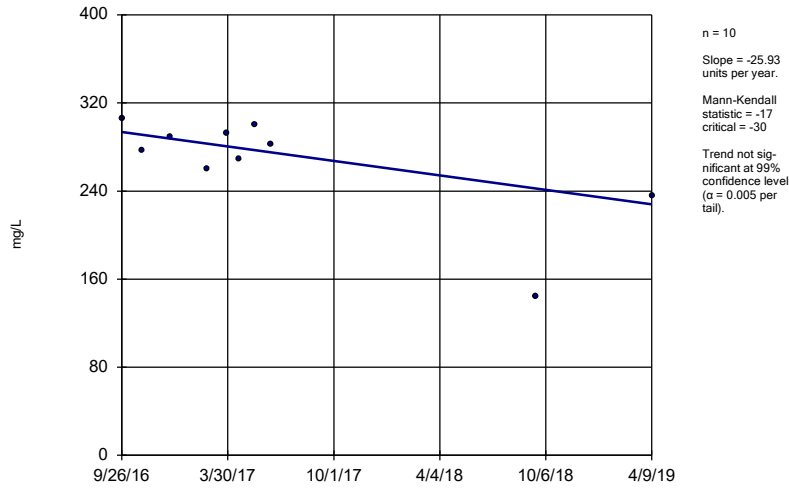


n = 10
 Slope = 14.13
 units per year.
 Mann-Kendall
 statistic = 22
 critical = 30
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Calcium, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

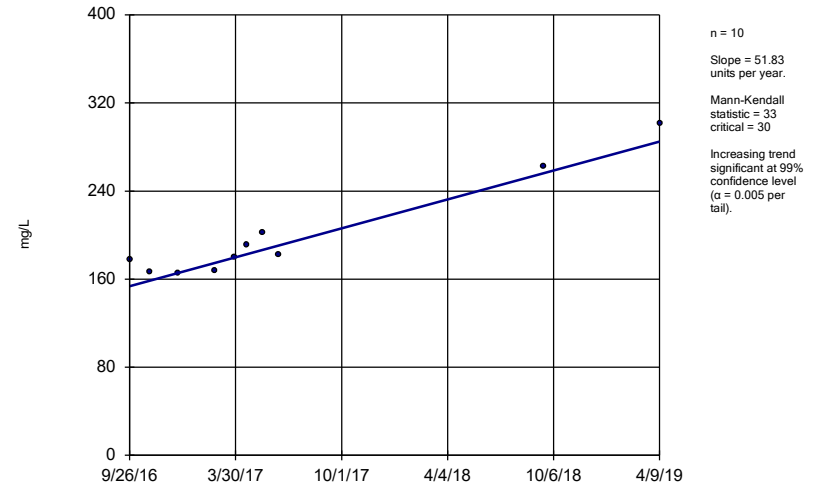
MW-1604D



Constituent: Calcium, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

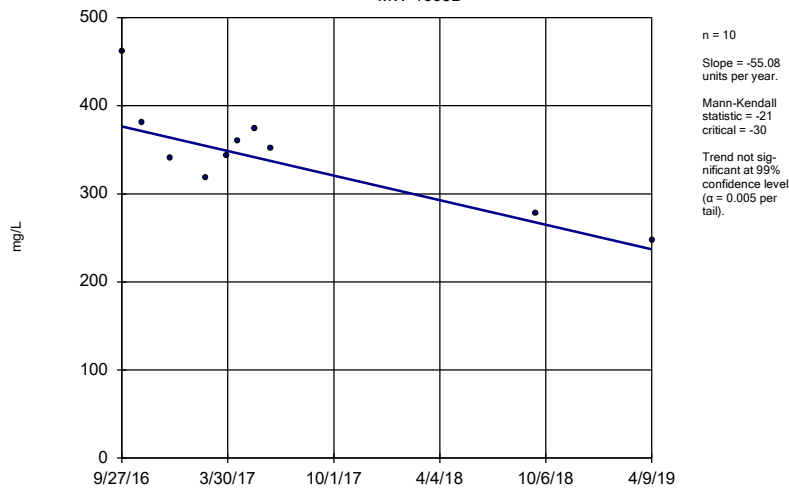
MW-1604S



Constituent: Calcium, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

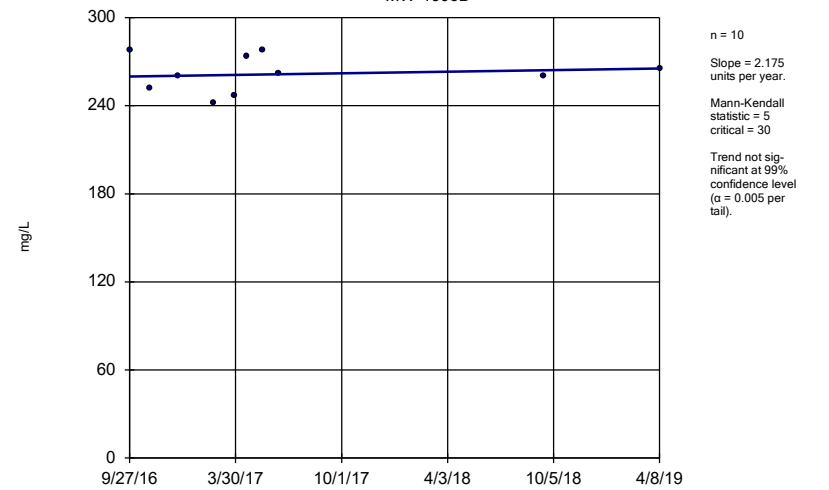
MW-1605D



Constituent: Calcium, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

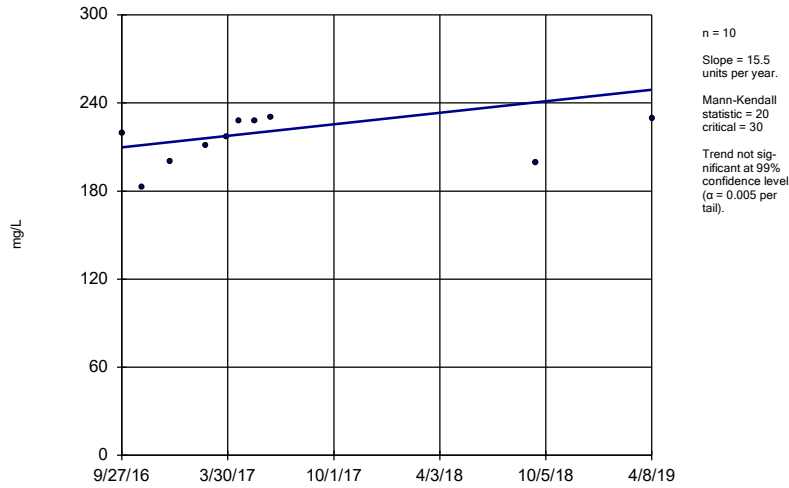
MW-1606D



Constituent: Calcium, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

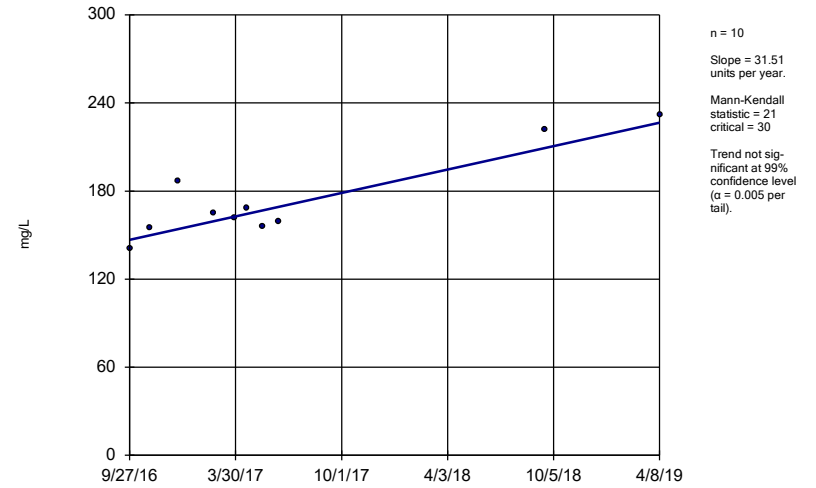
MW-1606S



Constituent: Calcium, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

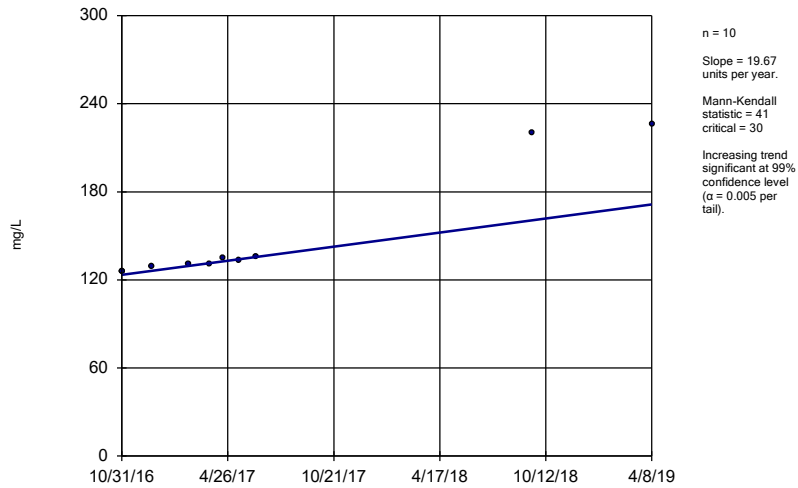
MW-1607D



Constituent: Calcium, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

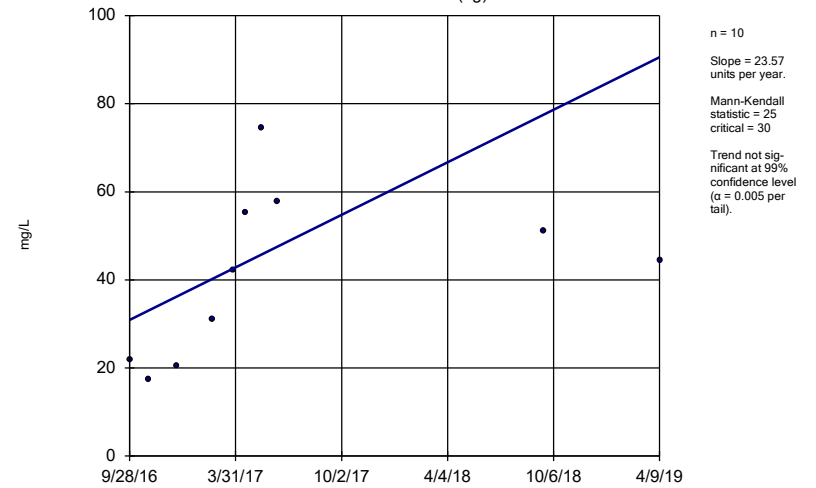
MW-1607S



Constituent: Calcium, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

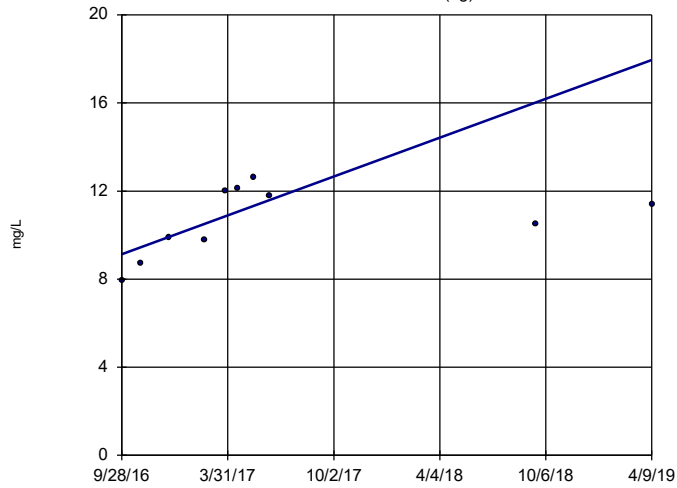
MW-1601A (bg)



Constituent: Chloride, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1602 (bg)

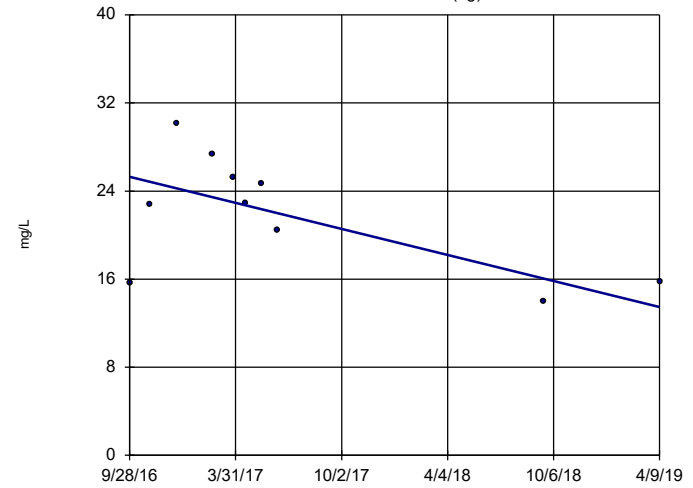


n = 10
 Slope = 3.486
 units per year.
 Mann-Kendall
 statistic = 21
 critical = 30
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Chloride, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1603 (bg)

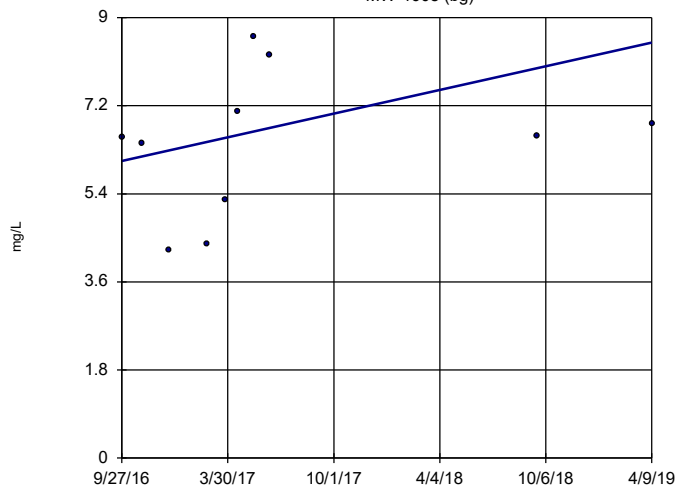


n = 10
 Slope = -4.675
 units per year.
 Mann-Kendall
 statistic = -15
 critical = -30
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Chloride, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1608 (bg)

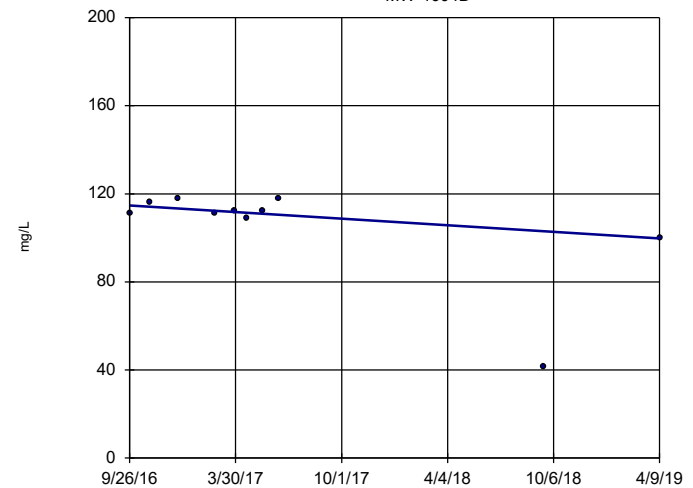


n = 10
 Slope = 0.9577
 units per year.
 Mann-Kendall
 statistic = 17
 critical = 30
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Chloride, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1604D

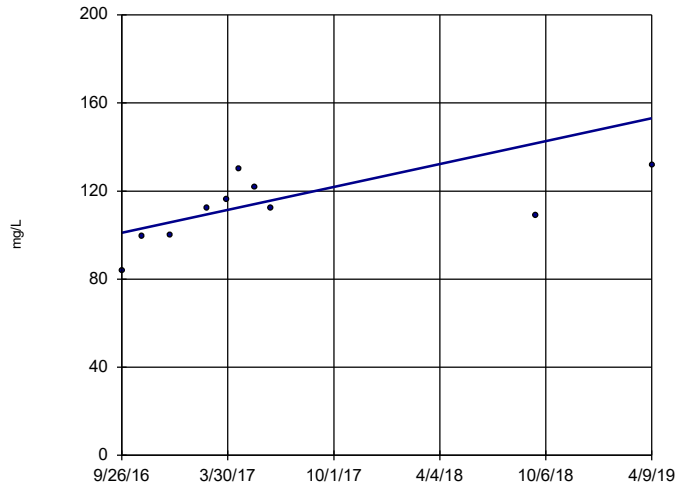


n = 10
 Slope = -5.903
 units per year.
 Mann-Kendall
 statistic = -12
 critical = -30
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Chloride, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1604S

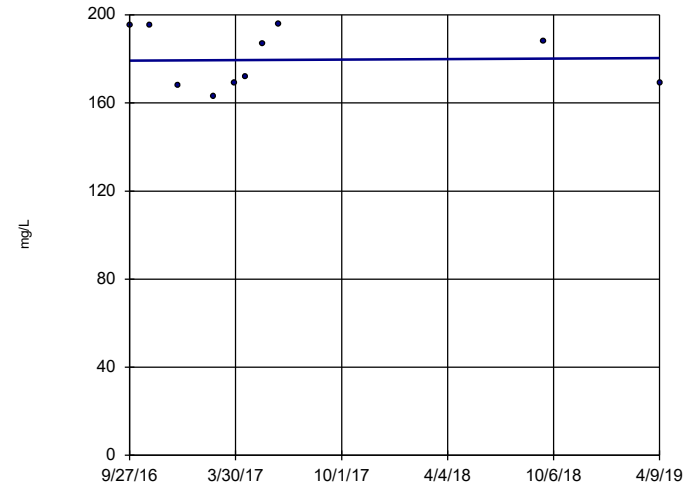


n = 10
 Slope = 20.53 units per year.
 Mann-Kendall statistic = 26
 critical = 30
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Chloride, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1605D

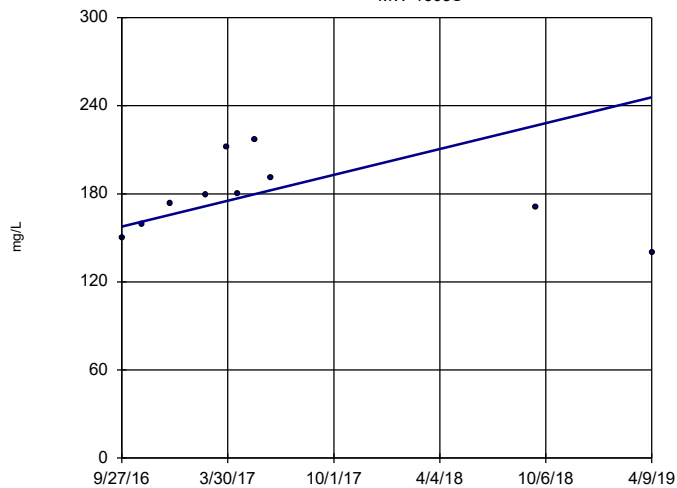


n = 10
 Slope = 0.4345 units per year.
 Mann-Kendall statistic = 3
 critical = 30
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Chloride, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1605S

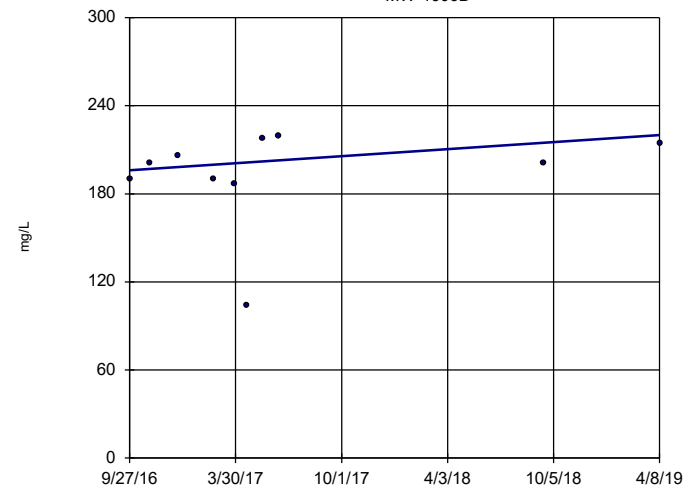


n = 10
 Slope = 34.76 units per year.
 Mann-Kendall statistic = 9
 critical = 30
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Chloride, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1606D

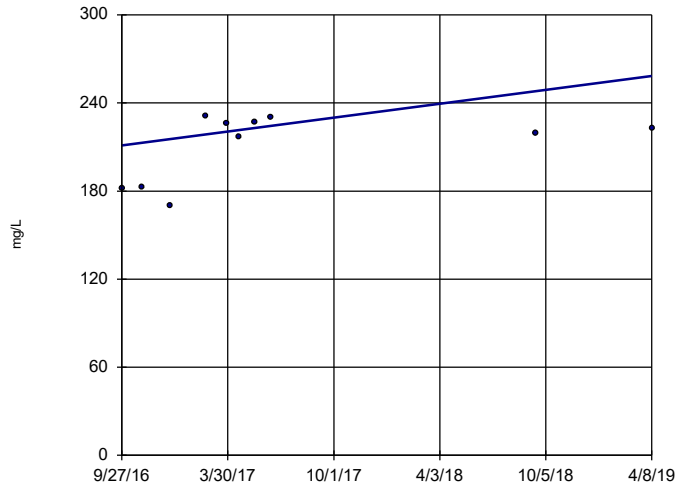


n = 10
 Slope = 9.463 units per year.
 Mann-Kendall statistic = 11
 critical = 30
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Chloride, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1606S

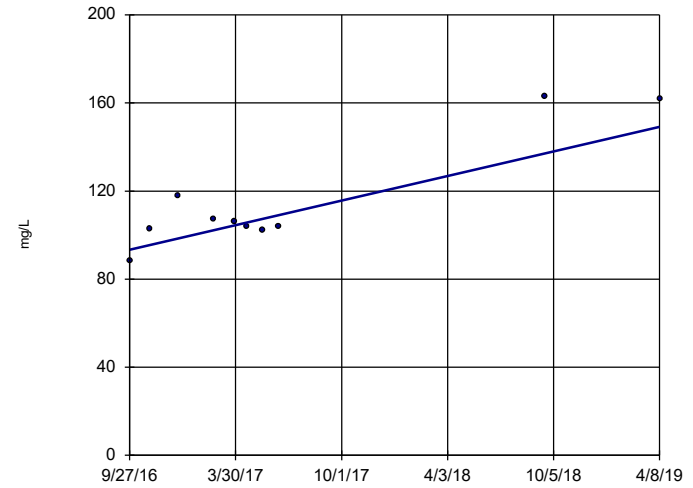


n = 10
 Slope = 18.7 units per year.
 Mann-Kendall statistic = 15
 critical = 30
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Chloride, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1607D

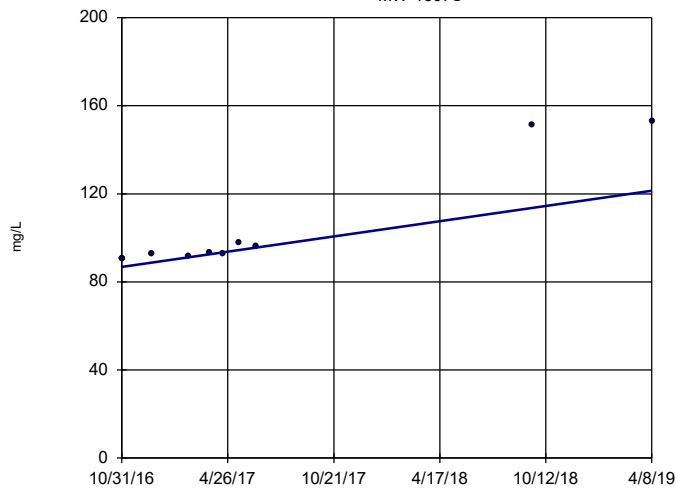


n = 10
 Slope = 22.04 units per year.
 Mann-Kendall statistic = 14
 critical = 30
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Chloride, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1607S

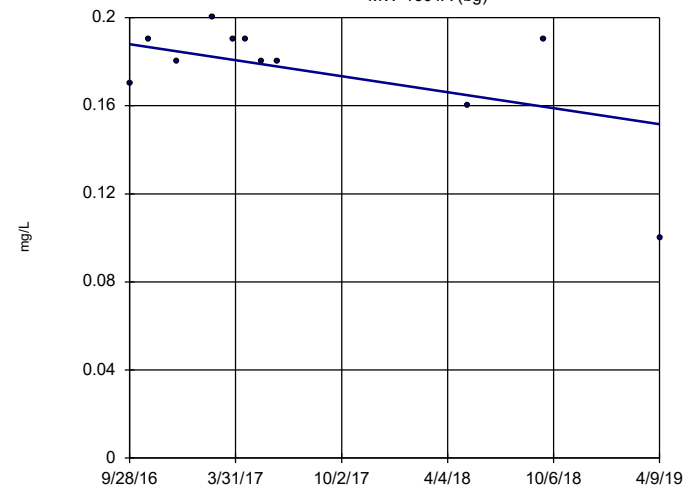


n = 10
 Slope = 14.21 units per year.
 Mann-Kendall statistic = 35
 critical = 30
 Increasing trend significant at 99% confidence level (α = 0.005 per tail).

Constituent: Chloride, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1601A (bg)

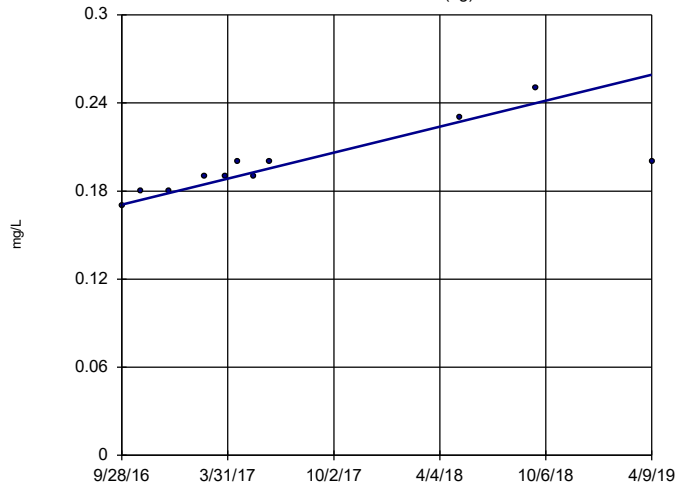


n = 11
 Slope = -0.0144 units per year.
 Mann-Kendall statistic = -14
 critical = -34
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Fluoride, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1602 (bg)

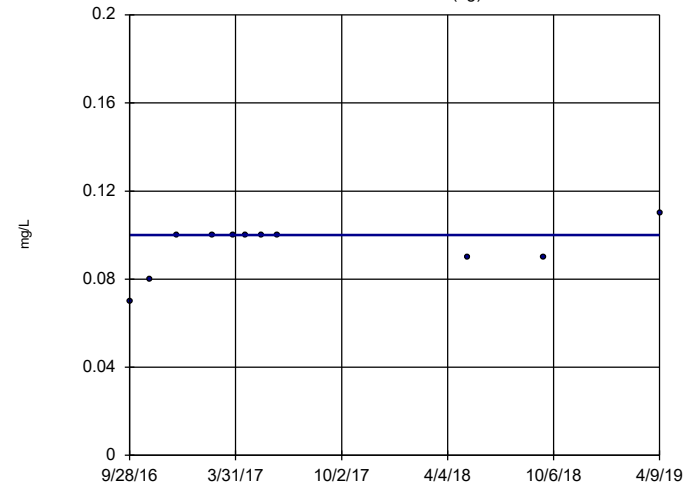


n = 11
 Slope = 0.03503
 units per year.
 Mann-Kendall
 statistic = 42
 critical = 34
 Increasing trend
 significant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Fluoride, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1603 (bg)

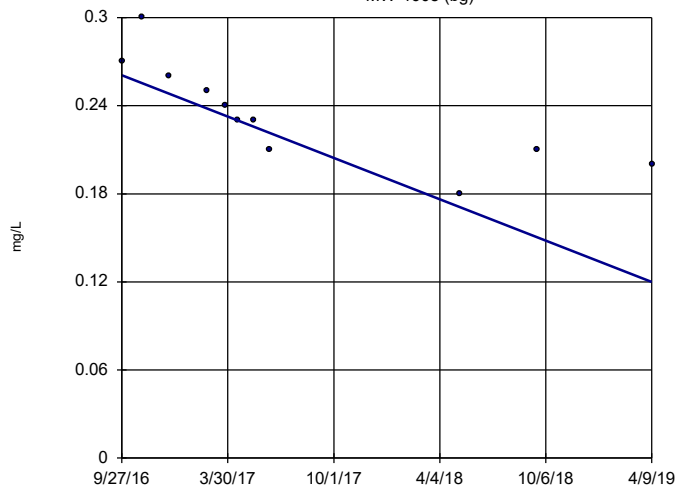


n = 11
 Slope = 0
 units per year.
 Mann-Kendall
 statistic = 15
 critical = 34
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Fluoride, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1608 (bg)

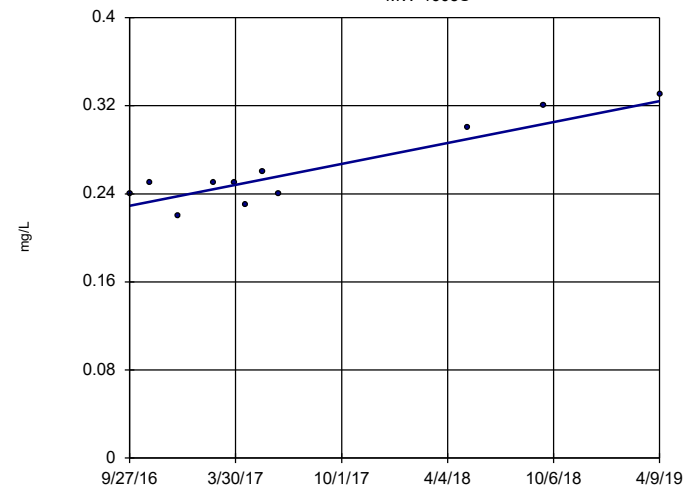


n = 11
 Slope = -0.05568
 units per year.
 Mann-Kendall
 statistic = -47
 critical = -34
 Decreasing trend
 significant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Fluoride, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1605S

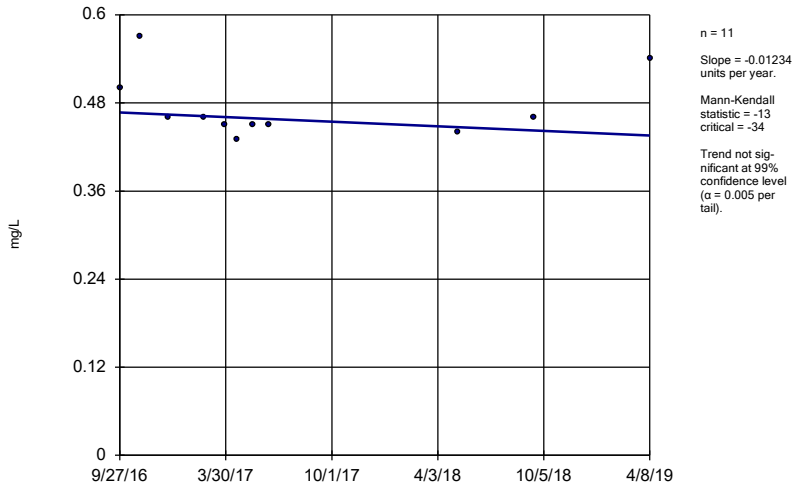


n = 11
 Slope = 0.03758
 units per year.
 Mann-Kendall
 statistic = 31
 critical = 34
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Fluoride, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

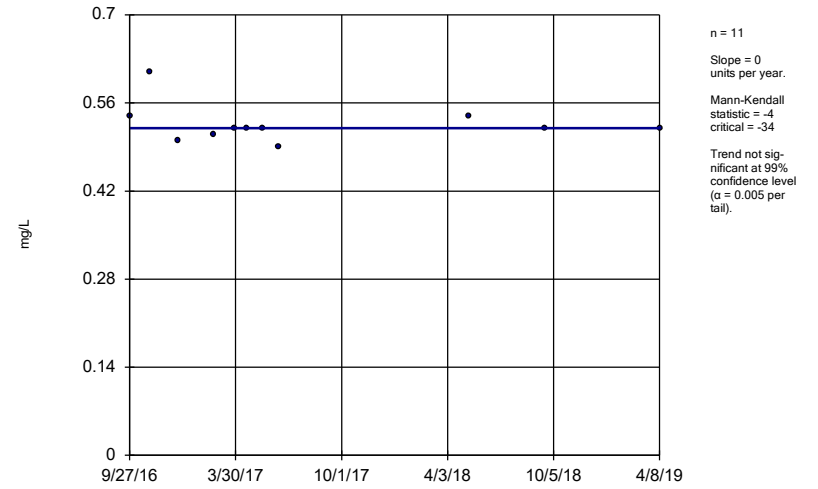
MW-1606S



Constituent: Fluoride, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

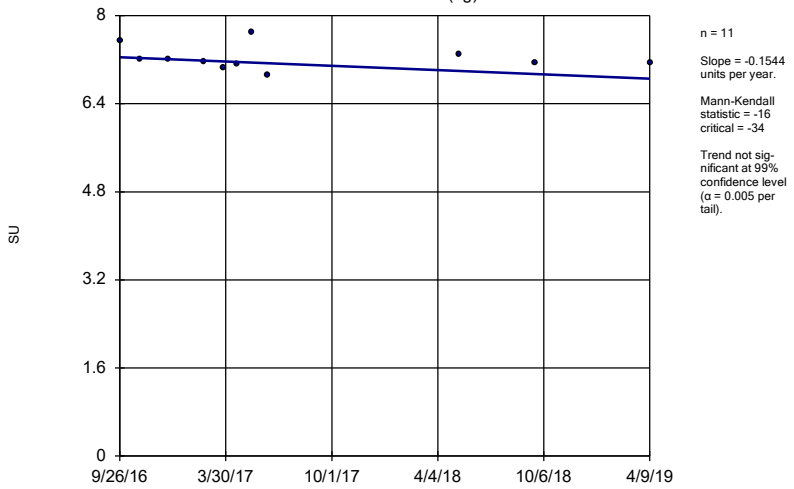
MW-1607D



Constituent: Fluoride, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

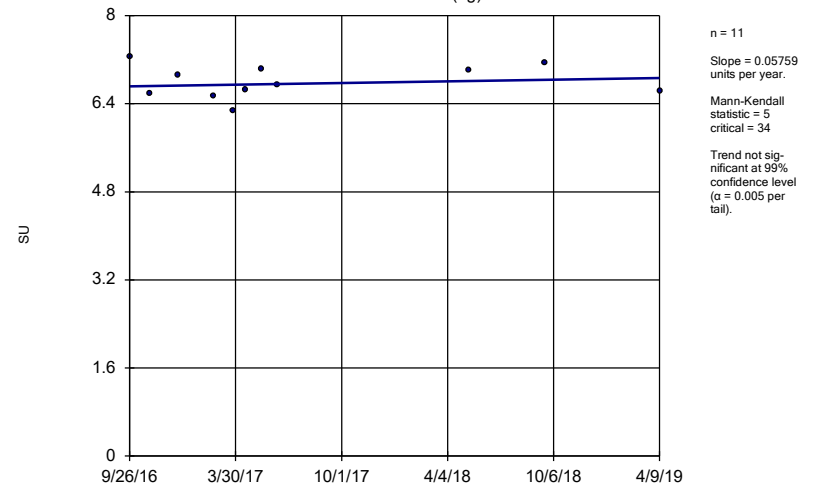
MW-1601A (bg)



Constituent: pH, field Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

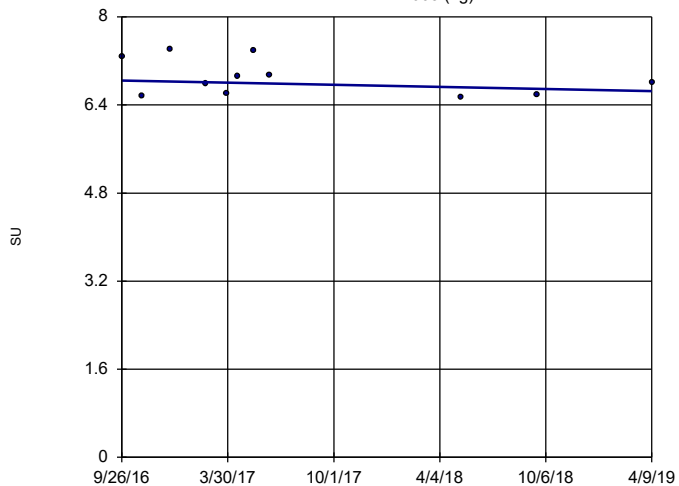
MW-1602 (bg)



Constituent: pH, field Analysis Run 7/3/2019 10:04 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1603 (bg)

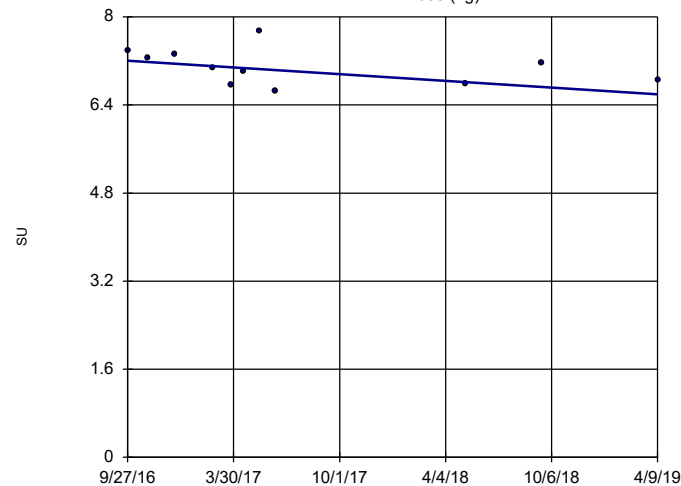


n = 11
Slope = -0.07449
units per year.
Mann-Kendall
statistic = -9
critical = -34
Trend not sig-
nificant at 99%
confidence level
($\alpha = 0.005$ per
tail).

Constituent: pH, field Analysis Run 7/3/2019 10:04 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1608 (bg)

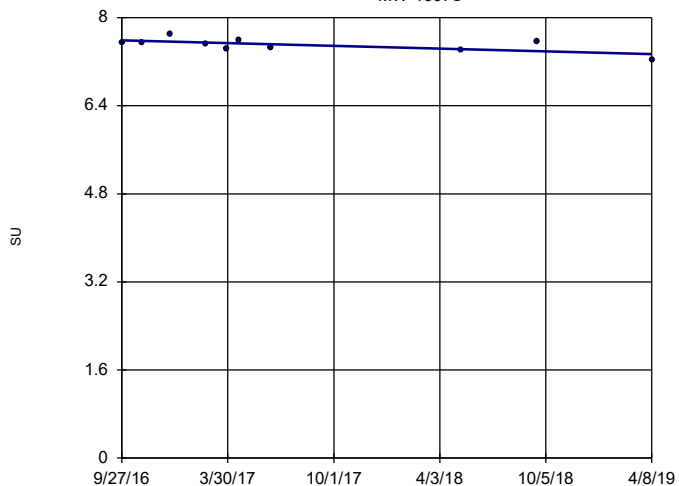


n = 11
Slope = -0.2395
units per year.
Mann-Kendall
statistic = -19
critical = -34
Trend not sig-
nificant at 99%
confidence level
($\alpha = 0.005$ per
tail).

Constituent: pH, field Analysis Run 7/3/2019 10:04 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1607S

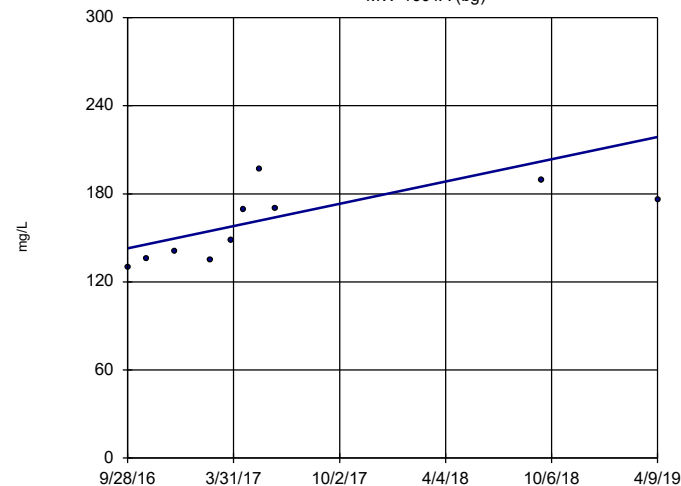


n = 10
Slope = -0.09887
units per year.
Mann-Kendall
statistic = -18
critical = -30
Trend not sig-
nificant at 99%
confidence level
($\alpha = 0.005$ per
tail).

Constituent: pH, field Analysis Run 7/3/2019 10:04 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1601A (bg)

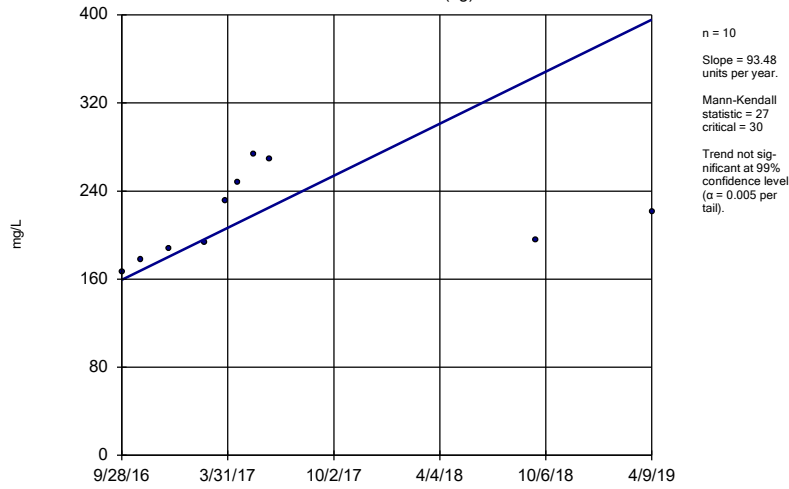


n = 10
Slope = 30
units per year.
Mann-Kendall
statistic = 33
critical = 30
Increasing trend
significant at 99%
confidence level
($\alpha = 0.005$ per
tail).

Constituent: Sulfate, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

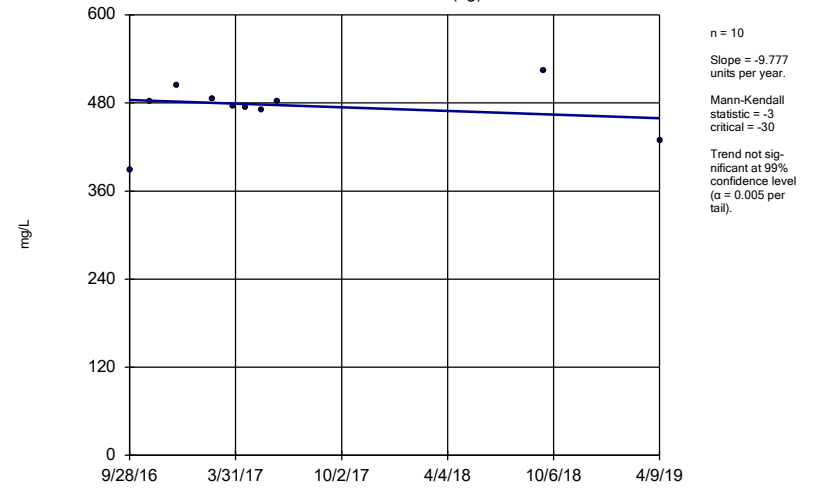
MW-1602 (bg)



Constituent: Sulfate, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

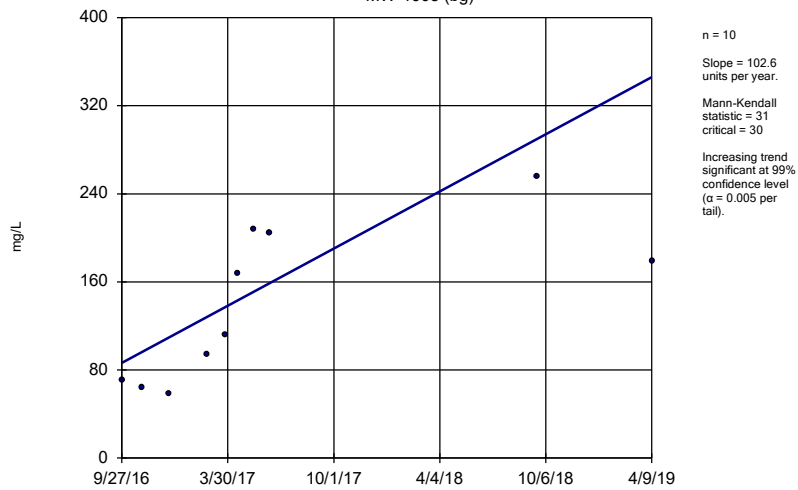
MW-1603 (bg)



Constituent: Sulfate, total Analysis Run 7/3/2019 10:04 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

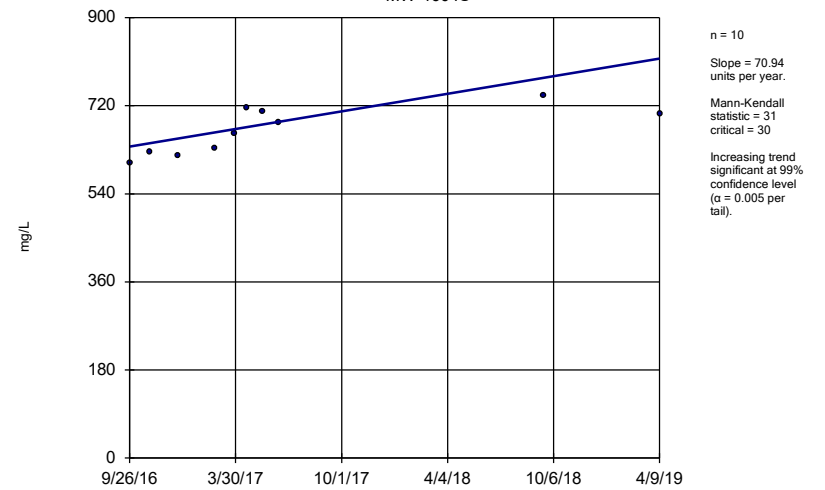
MW-1608 (bg)



Constituent: Sulfate, total Analysis Run 7/3/2019 10:05 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

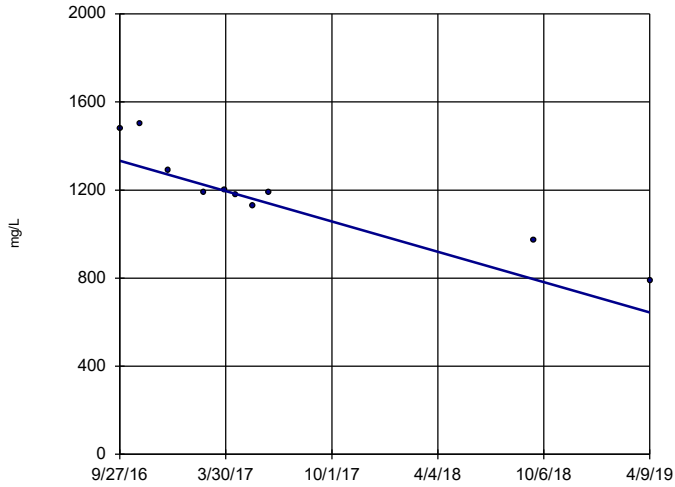
MW-1604S



Constituent: Sulfate, total Analysis Run 7/3/2019 10:05 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1605D

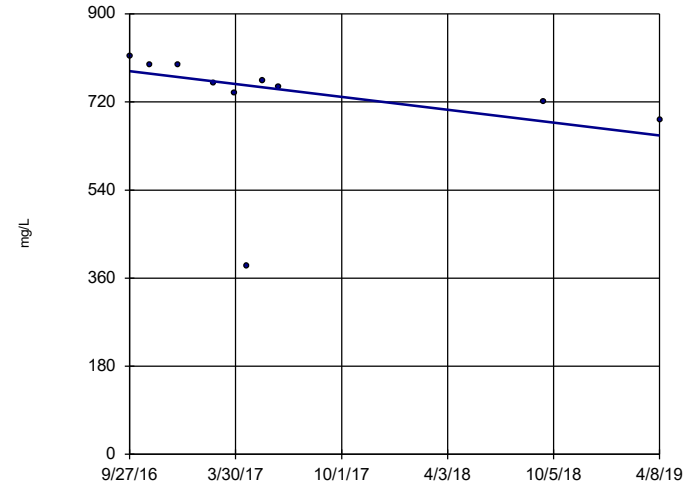


n = 10
 Slope = -272.2
 units per year.
 Mann-Kendall
 statistic = -36
 critical = -30
 Decreasing trend
 significant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Sulfate, total Analysis Run 7/3/2019 10:05 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1606D

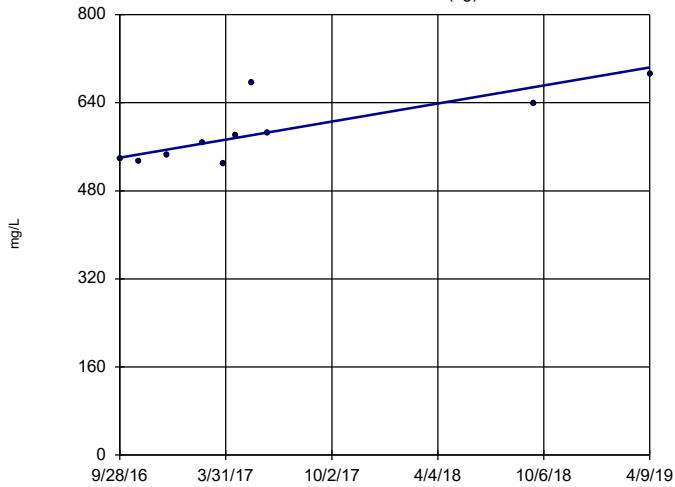


n = 10
 Slope = -51.8
 units per year.
 Mann-Kendall
 statistic = -30
 critical = -30
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Sulfate, total Analysis Run 7/3/2019 10:05 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1601A (bg)

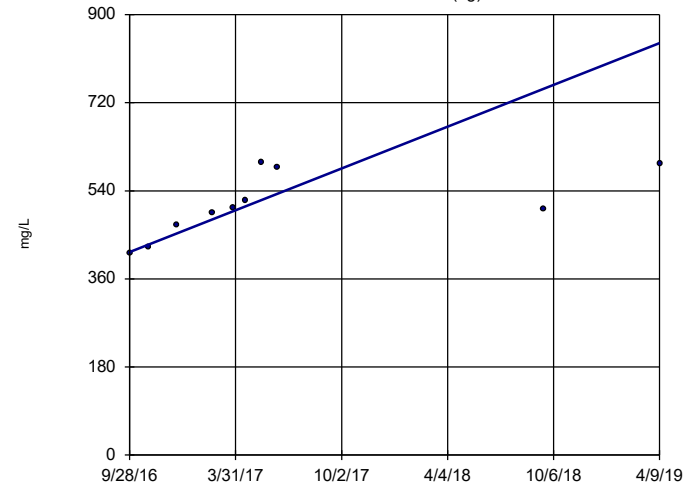


n = 10
 Slope = 64.87
 units per year.
 Mann-Kendall
 statistic = 31
 critical = 30
 Increasing trend
 significant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Total Dissolved Solids [TDS] Analysis Run 7/3/2019 10:05 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1602 (bg)

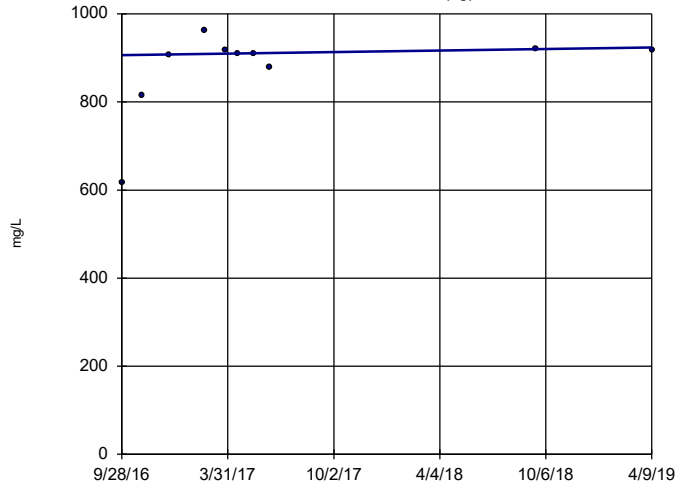


n = 10
 Slope = 168.9
 units per year.
 Mann-Kendall
 statistic = 33
 critical = 30
 Increasing trend
 significant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Total Dissolved Solids [TDS] Analysis Run 7/3/2019 10:05 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1603 (bg)

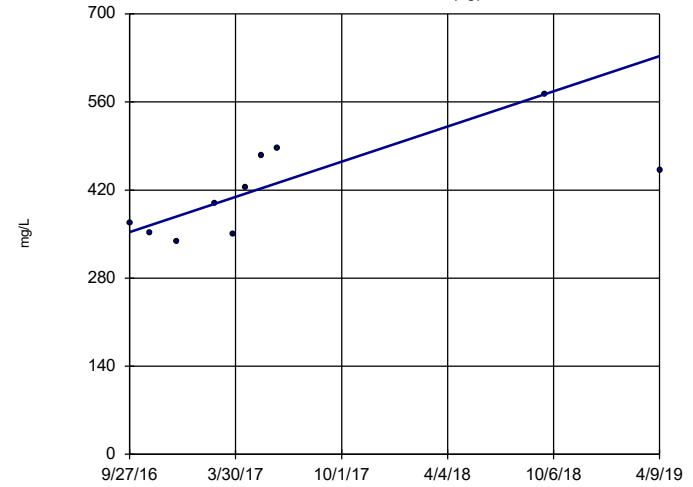


n = 10
 Slope = 7.006 units per year.
 Mann-Kendall statistic = 17
 critical = 30
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Total Dissolved Solids [TDS] Analysis Run 7/3/2019 10:05 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1608 (bg)

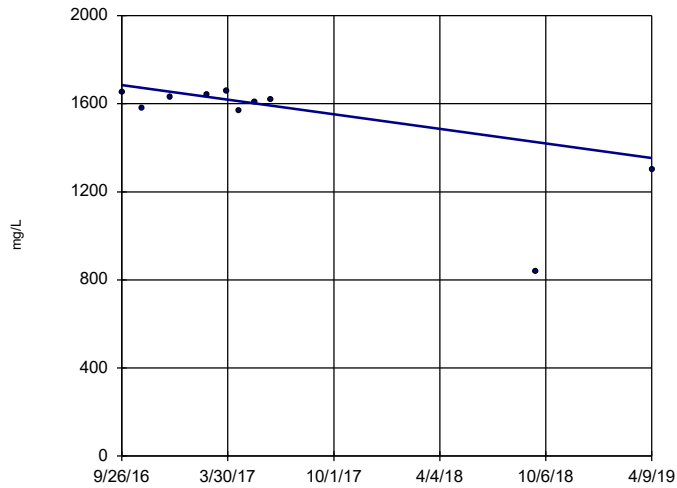


n = 10
 Slope = 110.5 units per year.
 Mann-Kendall statistic = 27
 critical = 30
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Total Dissolved Solids [TDS] Analysis Run 7/3/2019 10:05 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1604D

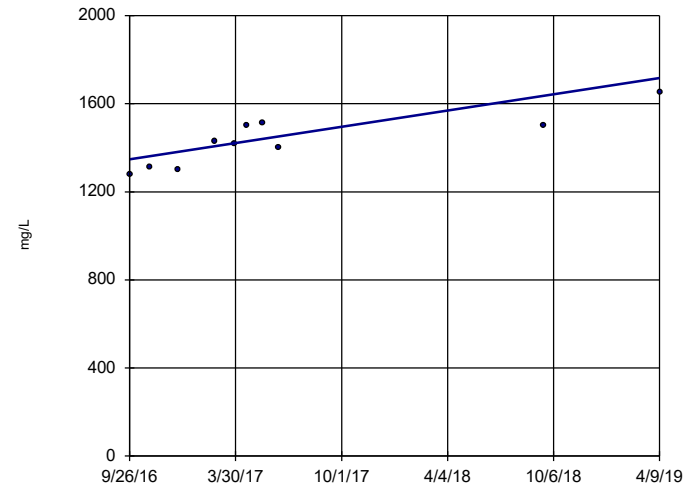


n = 10
 Slope = -130.4 units per year.
 Mann-Kendall statistic = -19
 critical = -30
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Total Dissolved Solids [TDS] Analysis Run 7/3/2019 10:05 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1604S

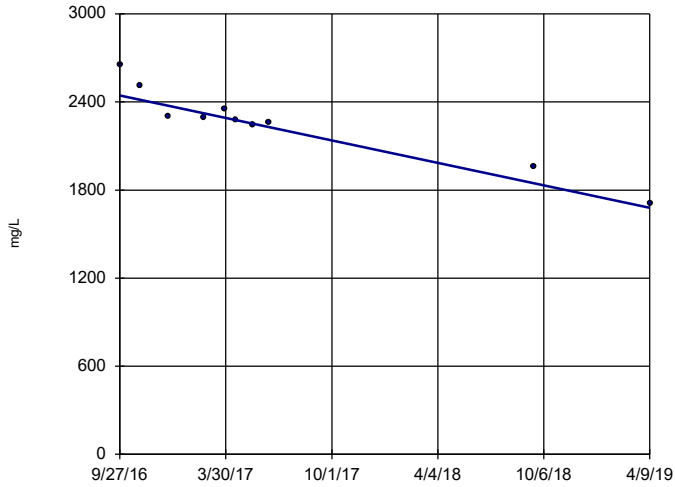


n = 10
 Slope = 146 units per year.
 Mann-Kendall statistic = 30
 critical = 30
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Total Dissolved Solids [TDS] Analysis Run 7/3/2019 10:05 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1605D

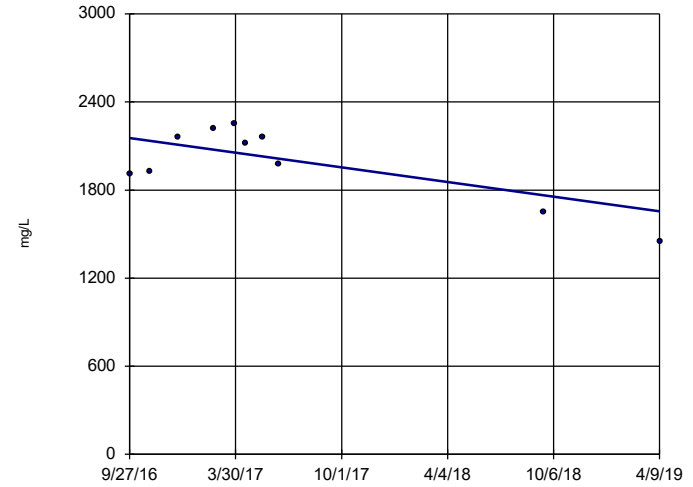


n = 10
 Slope = -301.9
 units per year.
 Mann-Kendall
 statistic = -39
 critical = -30
 Decreasing trend
 significant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Total Dissolved Solids [TDS] Analysis Run 7/3/2019 10:05 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1605S

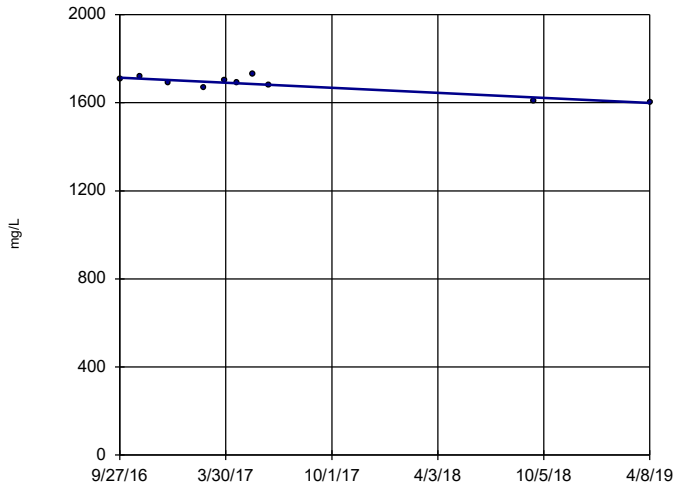


n = 10
 Slope = -197.1
 units per year.
 Mann-Kendall
 statistic = -10
 critical = -30
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Total Dissolved Solids [TDS] Analysis Run 7/3/2019 10:05 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1606D

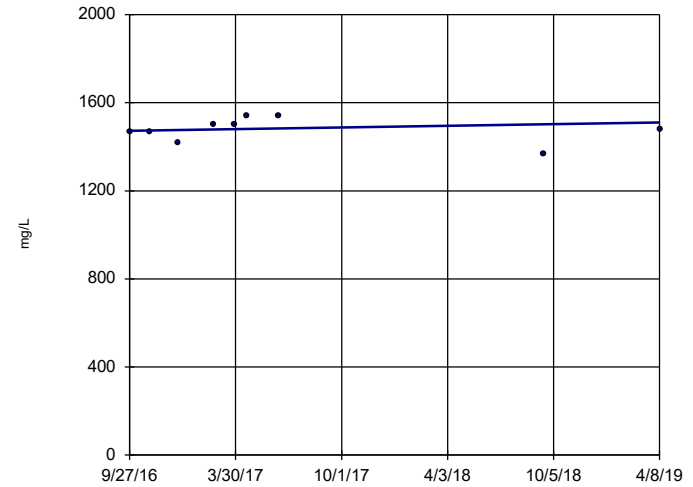


n = 10
 Slope = -45.63
 units per year.
 Mann-Kendall
 statistic = -22
 critical = -30
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Total Dissolved Solids [TDS] Analysis Run 7/3/2019 10:05 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1606S

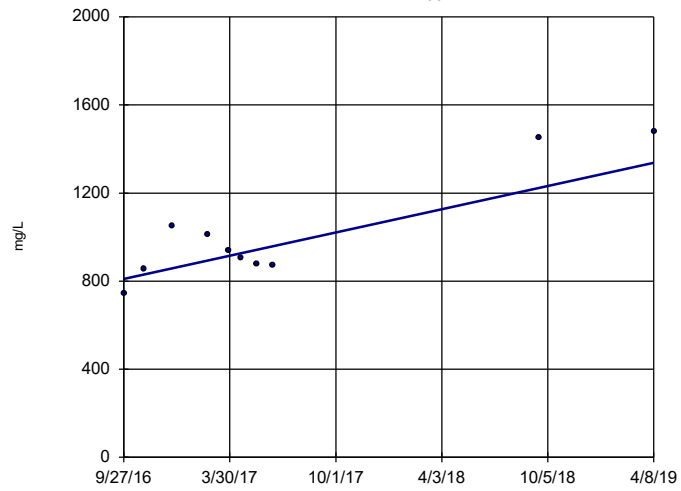


n = 9
 Slope = 15.11
 units per year.
 Mann-Kendall
 statistic = 7
 critical = 25
 Trend not sig-
 nificant at 99%
 confidence level
 ($\alpha = 0.005$ per
 tail).

Constituent: Total Dissolved Solids [TDS] Analysis Run 7/3/2019 10:05 AM View: Trend Tests
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1607D

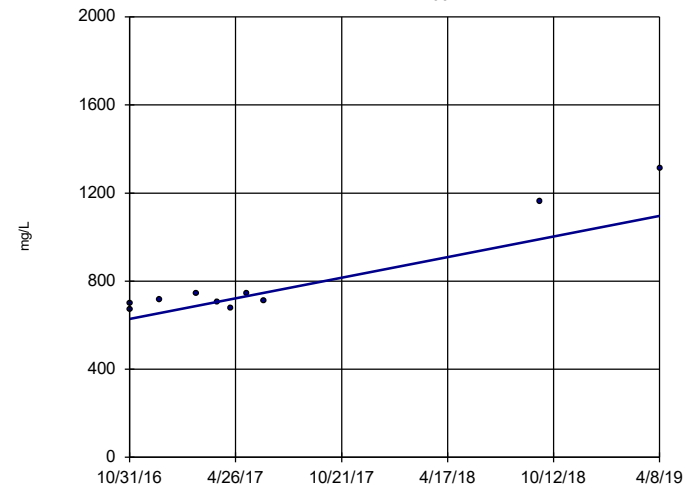


n = 10
Slope = 208.6
units per year.
Mann-Kendall
statistic = 15
critical = 30
Trend not sig-
nificant at 99%
confidence level
($\alpha = 0.005$ per
tail).

Constituent: Total Dissolved Solids [TDS] Analysis Run 7/3/2019 10:05 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1607S



n = 10
Slope = 192.1
units per year.
Mann-Kendall
statistic = 26
critical = 30
Trend not sig-
nificant at 99%
confidence level
($\alpha = 0.005$ per
tail).

Constituent: Total Dissolved Solids [TDS] Analysis Run 7/3/2019 10:05 AM View: Trend Tests
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Upper Tolerance Limits

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 6/17/2019, 1:38 PM

Constituent	Upper Lim.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Antimony, total (mg/L)	0.00025	44	n/a	n/a	9.091	n/a	n/a	0.1047	NP Inter(normality)
Arsenic, total (mg/L)	0.000749	44	0.0004759	0.0001301	0	None	No	0.05	Inter
Barium, total (mg/L)	0.0578	44	-3.308	0.2177	0	None	ln(x)	0.05	Inter
Beryllium, total (mg/L)	0.0001	44	n/a	n/a	86.36	n/a	n/a	0.1047	NP Inter(NDs)
Cadmium, total (mg/L)	0.0001	44	n/a	n/a	6.818	n/a	n/a	0.1047	NP Inter(normality)
Chromium, total (mg/L)	0.001773	44	-8.037	0.8109	2.273	None	ln(x)	0.05	Inter
Cobalt, total (mg/L)	0.0007641	44	-9	0.8687	2.273	None	ln(x)	0.05	Inter
Combined Radium 226 + 228 (pCi/L)	2.448	44	0.8596	0.3359	0	None	sqrt(x)	0.05	Inter
Fluoride, total (mg/L)	0.2755	44	0.03409	0.01991	0	None	x^2	0.05	Inter
Lead, total (mg/L)	0.0005448	44	0.01136	0.005707	4.545	None	sqrt(x)	0.05	Inter
Lithium, total (mg/L)	0.02713	44	0.0109	0.007732	6.818	None	No	0.05	Inter
Mercury, total (mg/L)	0.000005	44	n/a	n/a	90.91	n/a	n/a	0.1047	NP Inter(NDs)
Molybdenum, total (mg/L)	0.004186	44	0.03555	0.01389	4.545	None	sqrt(x)	0.05	Inter
Selenium, total (mg/L)	0.0015	44	n/a	n/a	0	n/a	n/a	0.1047	NP Inter(normality)
Thallium, total (mg/L)	0.00025	44	n/a	n/a	11.36	n/a	n/a	0.1047	NP Inter(normality)

Confidence Intervals - Significant Results

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 6/17/2019, 1:47 PM

<u>Constituent</u>	<u>Well</u>	<u>Upper Lim.</u>	<u>Lower Lim.</u>	<u>Compliance</u>	<u>Sig.</u>	<u>N</u>	<u>%NDs</u>	<u>Transform</u>	<u>Alpha</u>	<u>Method</u>
Lithium, total (mg/L)	MW-1605D	0.08141	0.06641	0.04	Yes	11	0	No	0.01	Param.
Lithium, total (mg/L)	MW-1605S	0.08119	0.06118	0.04	Yes	11	0	No	0.01	Param.
Lithium, total (mg/L)	MW-1606D	0.1271	0.1121	0.04	Yes	11	0	No	0.01	Param.
Lithium, total (mg/L)	MW-1606S	0.1182	0.1036	0.04	Yes	11	0	No	0.01	Param.
Lithium, total (mg/L)	MW-1607D	0.1003	0.07148	0.04	Yes	11	0	No	0.01	Param.
Lithium, total (mg/L)	MW-1607S	0.1166	0.09123	0.04	Yes	11	0	No	0.01	Param.

Confidence Intervals - All Results

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 6/17/2019, 1:47 PM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	%NDs	Transform	Alpha	Method
Antimony, total (mg/L)	MW-1604D	0.0001744	0.00008012	0.006	No	11	9.091	No	0.01	Param.
Antimony, total (mg/L)	MW-1604S	0.00013	0.00003	0.006	No	11	0	No	0.006	NP (normality)
Antimony, total (mg/L)	MW-1605D	0.00004	0.00003	0.006	No	11	0	No	0.006	NP (normality)
Antimony, total (mg/L)	MW-1605S	0.00007935	0.00003793	0.006	No	11	0	ln(x)	0.01	Param.
Antimony, total (mg/L)	MW-1606D	0.00019	0.00015	0.006	No	11	0	No	0.006	NP (normality)
Antimony, total (mg/L)	MW-1606S	0.0001627	0.0001428	0.006	No	11	0	No	0.01	Param.
Antimony, total (mg/L)	MW-1607D	0.00004	0.00003	0.006	No	11	0	No	0.006	NP (normality)
Antimony, total (mg/L)	MW-1607S	0.00055	0.00042	0.006	No	11	0	No	0.006	NP (normality)
Arsenic, total (mg/L)	MW-1604D	0.0005337	0.0003791	0.01	No	11	0	No	0.01	Param.
Arsenic, total (mg/L)	MW-1604S	0.0004757	0.0003625	0.01	No	11	0	No	0.01	Param.
Arsenic, total (mg/L)	MW-1605D	0.002514	0.002123	0.01	No	11	0	No	0.01	Param.
Arsenic, total (mg/L)	MW-1605S	0.0009958	0.0005824	0.01	No	11	0	No	0.01	Param.
Arsenic, total (mg/L)	MW-1606D	0.0008285	0.0004015	0.01	No	11	0	sqrt(x)	0.01	Param.
Arsenic, total (mg/L)	MW-1606S	0.0008883	0.0007463	0.01	No	11	0	No	0.01	Param.
Arsenic, total (mg/L)	MW-1607D	0.001228	0.0009938	0.01	No	11	0	No	0.01	Param.
Arsenic, total (mg/L)	MW-1607S	0.001494	0.000942	0.01	No	10	0	No	0.01	Param.
Barium, total (mg/L)	MW-1604D	0.037	0.0275	2	No	11	0	No	0.006	NP (normality)
Barium, total (mg/L)	MW-1604S	0.03029	0.02711	2	No	11	0	No	0.01	Param.
Barium, total (mg/L)	MW-1605D	0.02922	0.02483	2	No	11	0	No	0.01	Param.
Barium, total (mg/L)	MW-1605S	0.03919	0.02647	2	No	11	0	No	0.01	Param.
Barium, total (mg/L)	MW-1606D	0.06068	0.05083	2	No	11	0	No	0.01	Param.
Barium, total (mg/L)	MW-1606S	0.07652	0.06847	2	No	11	0	No	0.01	Param.
Barium, total (mg/L)	MW-1607D	0.1471	0.09659	2	No	11	0	No	0.01	Param.
Barium, total (mg/L)	MW-1607S	0.07282	0.05948	2	No	10	0	No	0.01	Param.
Beryllium, total (mg/L)	MW-1604D	0.0001	0.0001	0.004	No	11	100	No	0.006	NP (NDs)
Beryllium, total (mg/L)	MW-1604S	0.0001	0.0001	0.004	No	11	90.91	No	0.006	NP (NDs)
Beryllium, total (mg/L)	MW-1605D	0.0001	0.0001	0.004	No	11	100	No	0.006	NP (NDs)
Beryllium, total (mg/L)	MW-1605S	0.0001	0.000009	0.004	No	11	72.73	No	0.006	NP (normality)
Beryllium, total (mg/L)	MW-1606D	0.0001	0.000005	0.004	No	11	63.64	No	0.006	NP (normality)
Beryllium, total (mg/L)	MW-1606S	0.0001	0.0001	0.004	No	11	90.91	No	0.006	NP (NDs)
Beryllium, total (mg/L)	MW-1607D	0.0001	0.0001	0.004	No	11	90.91	No	0.006	NP (NDs)
Beryllium, total (mg/L)	MW-1607S	0.0001	0.00001	0.004	No	11	63.64	No	0.006	NP (normality)
Cadmium, total (mg/L)	MW-1604D	0.0001515	0.00006669	0.005	No	11	0	No	0.01	Param.
Cadmium, total (mg/L)	MW-1604S	0.00015	0.00003	0.005	No	11	0	No	0.006	NP (normality)
Cadmium, total (mg/L)	MW-1605D	0.0000372	0.00001735	0.005	No	11	0	No	0.01	Param.
Cadmium, total (mg/L)	MW-1605S	0.00009148	0.00005802	0.005	No	11	0	ln(x)	0.01	Param.
Cadmium, total (mg/L)	MW-1606D	0.00008	0.00006	0.005	No	11	0	No	0.006	NP (normality)
Cadmium, total (mg/L)	MW-1606S	0.00008026	0.00006519	0.005	No	11	0	No	0.01	Param.
Cadmium, total (mg/L)	MW-1607D	0.000025	0.00002	0.005	No	11	63.64	No	0.006	NP (normality)
Cadmium, total (mg/L)	MW-1607S	0.00006	0.00003	0.005	No	11	0	No	0.006	NP (normality)
Chromium, total (mg/L)	MW-1604D	0.0004916	0.0001552	0.1	No	11	0	No	0.01	Param.
Chromium, total (mg/L)	MW-1604S	0.000537	0.0001141	0.1	No	11	0	ln(x)	0.01	Param.
Chromium, total (mg/L)	MW-1605D	0.0004519	0.00007766	0.1	No	11	0	ln(x)	0.01	Param.
Chromium, total (mg/L)	MW-1605S	0.000915	0.0002181	0.1	No	11	0	ln(x)	0.01	Param.
Chromium, total (mg/L)	MW-1606D	0.0006184	0.0001572	0.1	No	11	0	sqrt(x)	0.01	Param.
Chromium, total (mg/L)	MW-1606S	0.00057	0.0000942	0.1	No	11	0	sqrt(x)	0.01	Param.
Chromium, total (mg/L)	MW-1607D	0.0005194	0.00007628	0.1	No	11	0	ln(x)	0.01	Param.
Chromium, total (mg/L)	MW-1607S	0.0007914	0.0001596	0.1	No	11	0	ln(x)	0.01	Param.
Cobalt, total (mg/L)	MW-1604D	0.001857	0.001312	0.006	No	11	0	x^4	0.01	Param.
Cobalt, total (mg/L)	MW-1604S	0.00188	0.000308	0.006	No	11	0	No	0.006	NP (normality)
Cobalt, total (mg/L)	MW-1605D	0.001836	0.001624	0.006	No	11	0	No	0.01	Param.
Cobalt, total (mg/L)	MW-1605S	0.001276	0.000477	0.006	No	11	0	ln(x)	0.01	Param.
Cobalt, total (mg/L)	MW-1606D	0.0022	0.00117	0.006	No	11	0	No	0.006	NP (normality)
Cobalt, total (mg/L)	MW-1606S	0.0003795	0.0002499	0.006	No	11	0	No	0.01	Param.
Cobalt, total (mg/L)	MW-1607D	0.000778	0.000399	0.006	No	11	0	No	0.006	NP (normality)

Confidence Intervals - All Results

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 6/17/2019, 1:47 PM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	%NDs	Transform	Alpha	Method
Cobalt, total (mg/L)	MW-1607S	0.0026	0.00084	0.006	No	11	0	No	0.006	NP (normality)
Combined Radium 226 + 228 (pCi/L)	MW-1604D	1.793	0.6266	5	No	11	0	sqrt(x)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-1604S	1.516	0.568	5	No	10	0	sqrt(x)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-1605D	1.768	0.5945	5	No	11	0	ln(x)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-1605S	2.692	0.337	5	No	11	0	No	0.006	NP (normality)
Combined Radium 226 + 228 (pCi/L)	MW-1606D	3.369	0.7491	5	No	11	0	x^(1/3)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-1606S	1.555	0.6016	5	No	11	0	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-1607D	2.059	0.9912	5	No	11	0	ln(x)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-1607S	2.207	0.9624	5	No	11	0	No	0.01	Param.
Fluoride, total (mg/L)	MW-1604D	0.2009	0.1718	4	No	11	0	No	0.01	Param.
Fluoride, total (mg/L)	MW-1604S	0.213	0.1943	4	No	11	0	No	0.01	Param.
Fluoride, total (mg/L)	MW-1605D	0.2147	0.1835	4	No	11	0	No	0.01	Param.
Fluoride, total (mg/L)	MW-1605S	0.2935	0.232	4	No	11	0	No	0.01	Param.
Fluoride, total (mg/L)	MW-1606D	0.26	0.24	4	No	11	0	No	0.006	NP (normality)
Fluoride, total (mg/L)	MW-1606S	0.54	0.44	4	No	11	0	No	0.006	NP (normality)
Fluoride, total (mg/L)	MW-1607D	0.54	0.5	4	No	11	0	No	0.006	NP (normality)
Fluoride, total (mg/L)	MW-1607S	0.3102	0.2752	4	No	11	0	No	0.01	Param.
Lead, total (mg/L)	MW-1604D	0.000303	0.00002	0.015	No	11	9.091	No	0.006	NP (normality)
Lead, total (mg/L)	MW-1604S	0.0001417	0.00003197	0.015	No	11	9.091	No	0.01	Param.
Lead, total (mg/L)	MW-1605D	0.00004085	0.00001345	0.015	No	11	0	sqrt(x)	0.01	Param.
Lead, total (mg/L)	MW-1605S	0.0008795	0.0001426	0.015	No	11	0	sqrt(x)	0.01	Param.
Lead, total (mg/L)	MW-1606D	0.0005378	0.00003565	0.015	No	11	0	x^(1/3)	0.01	Param.
Lead, total (mg/L)	MW-1606S	0.0001622	0.00005021	0.015	No	11	0	No	0.01	Param.
Lead, total (mg/L)	MW-1607D	0.000179	0.000041	0.015	No	11	0	No	0.006	NP (normality)
Lead, total (mg/L)	MW-1607S	0.0014	0.000094	0.015	No	11	0	No	0.006	NP (normality)
Lithium, total (mg/L)	MW-1604D	0.0593	0.03415	0.04	No	11	0	No	0.01	Param.
Lithium, total (mg/L)	MW-1604S	0.04926	0.03129	0.04	No	11	0	No	0.01	Param.
Lithium, total (mg/L)	MW-1605D	0.08141	0.06641	0.04	Yes	11	0	No	0.01	Param.
Lithium, total (mg/L)	MW-1605S	0.08119	0.06118	0.04	Yes	11	0	No	0.01	Param.
Lithium, total (mg/L)	MW-1606D	0.1271	0.1121	0.04	Yes	11	0	No	0.01	Param.
Lithium, total (mg/L)	MW-1606S	0.1182	0.1036	0.04	Yes	11	0	No	0.01	Param.
Lithium, total (mg/L)	MW-1607D	0.1003	0.07148	0.04	Yes	11	0	No	0.01	Param.
Lithium, total (mg/L)	MW-1607S	0.1166	0.09123	0.04	Yes	11	0	No	0.01	Param.
Mercury, total (mg/L)	MW-1604D	0.000005	0.000005	0.002	No	11	81.82	No	0.006	NP (NDs)
Mercury, total (mg/L)	MW-1604S	0.000005	0.000005	0.002	No	11	90.91	No	0.006	NP (NDs)
Mercury, total (mg/L)	MW-1605D	0.000005	0.000005	0.002	No	11	90.91	No	0.006	NP (NDs)
Mercury, total (mg/L)	MW-1605S	0.000005	0.000005	0.002	No	11	90.91	No	0.006	NP (NDs)
Mercury, total (mg/L)	MW-1606D	0.000005	0.000005	0.002	No	11	90.91	No	0.006	NP (NDs)
Mercury, total (mg/L)	MW-1606S	0.000005	0.000005	0.002	No	11	90.91	No	0.006	NP (NDs)
Mercury, total (mg/L)	MW-1607D	0.000005	0.000002	0.002	No	11	81.82	No	0.006	NP (NDs)
Mercury, total (mg/L)	MW-1607S	0.000005	0.000003	0.002	No	10	80	No	0.011	NP (NDs)
Molybdenum, total (mg/L)	MW-1604D	0.01959	0.01388	0.1	No	11	9.091	x^4	0.01	Param.
Molybdenum, total (mg/L)	MW-1604S	0.0162	0.00247	0.1	No	10	0	No	0.011	NP (normality)
Molybdenum, total (mg/L)	MW-1605D	0.0515	0.04392	0.1	No	11	0	No	0.01	Param.
Molybdenum, total (mg/L)	MW-1605S	0.02217	0.01589	0.1	No	11	0	No	0.01	Param.
Molybdenum, total (mg/L)	MW-1606D	0.08024	0.07094	0.1	No	11	0	No	0.01	Param.
Molybdenum, total (mg/L)	MW-1606S	0.1034	0.07754	0.1	No	11	0	No	0.01	Param.
Molybdenum, total (mg/L)	MW-1607D	0.09146	0.08279	0.1	No	11	0	No	0.01	Param.
Molybdenum, total (mg/L)	MW-1607S	0.04759	0.04094	0.1	No	11	0	No	0.01	Param.
Selenium, total (mg/L)	MW-1604D	0.001654	0.0006355	0.05	No	11	0	ln(x)	0.01	Param.
Selenium, total (mg/L)	MW-1604S	0.002606	0.001376	0.05	No	11	0	No	0.01	Param.
Selenium, total (mg/L)	MW-1605D	0.0003	0.0002	0.05	No	11	0	No	0.006	NP (normality)
Selenium, total (mg/L)	MW-1605S	0.001858	0.0008189	0.05	No	11	0	sqrt(x)	0.01	Param.
Selenium, total (mg/L)	MW-1606D	0.006248	0.002825	0.05	No	11	0	No	0.01	Param.
Selenium, total (mg/L)	MW-1606S	0.001579	0.0007583	0.05	No	11	0	ln(x)	0.01	Param.

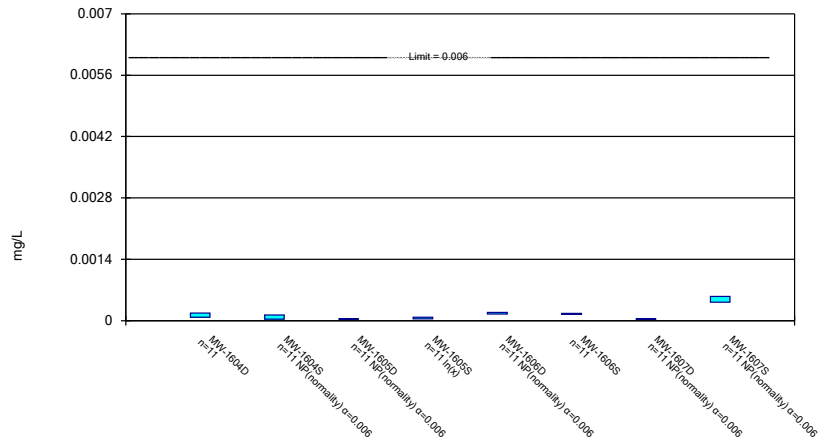
Confidence Intervals - All Results

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 6/17/2019, 1:47 PM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	%NDs	Transform	Alpha	Method
Selenium, total (mg/L)	MW-1607D	0.0001	0.00003	0.05	No	11	18.18	No	0.006	NP (normality)
Selenium, total (mg/L)	MW-1607S	0.009845	0.007664	0.05	No	11	0	No	0.01	Param.
Thallium, total (mg/L)	MW-1604D	0.0002881	0.0001699	0.002	No	11	9.091	x^2	0.01	Param.
Thallium, total (mg/L)	MW-1604S	0.00025	0.00002	0.002	No	11	9.091	No	0.006	NP (normality)
Thallium, total (mg/L)	MW-1605D	0.000138	0.00004	0.002	No	11	9.091	No	0.006	NP (normality)
Thallium, total (mg/L)	MW-1605S	0.000174	0.00004	0.002	No	11	9.091	No	0.006	NP (normality)
Thallium, total (mg/L)	MW-1606D	0.000123	0.00009	0.002	No	11	9.091	No	0.006	NP (normality)
Thallium, total (mg/L)	MW-1606S	0.000112	0.000062	0.002	No	11	9.091	No	0.006	NP (normality)
Thallium, total (mg/L)	MW-1607D	0.000062	0.00002	0.002	No	11	9.091	No	0.006	NP (normality)
Thallium, total (mg/L)	MW-1607S	0.000089	0.00005	0.002	No	10	10	No	0.011	NP (normality)

Parametric and Non-Parametric (NP) Confidence Interval

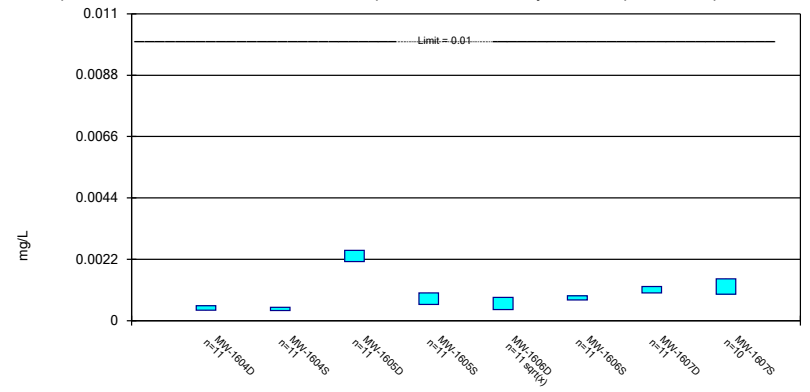
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Antimony, total Analysis Run 6/17/2019 1:44 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric Confidence Interval

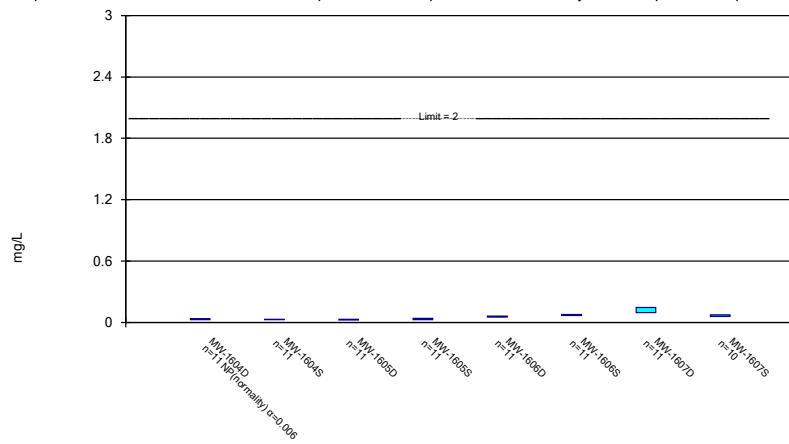
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Arsenic, total Analysis Run 6/17/2019 1:44 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric and Non-Parametric (NP) Confidence Interval

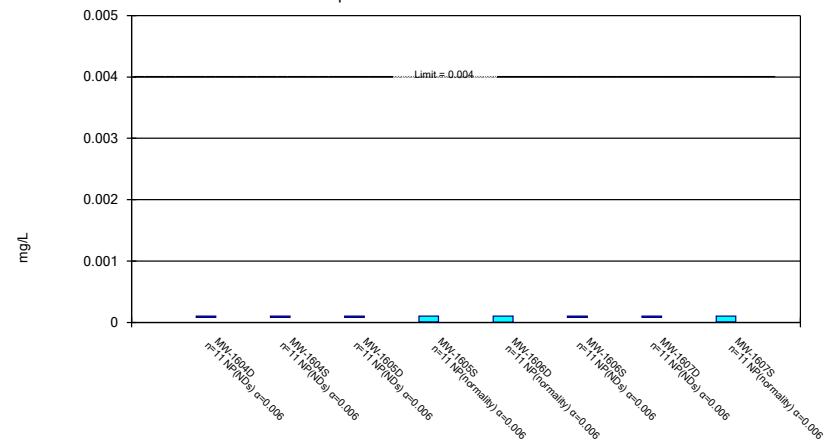
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Barium, total Analysis Run 6/17/2019 1:44 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Non-Parametric Confidence Interval

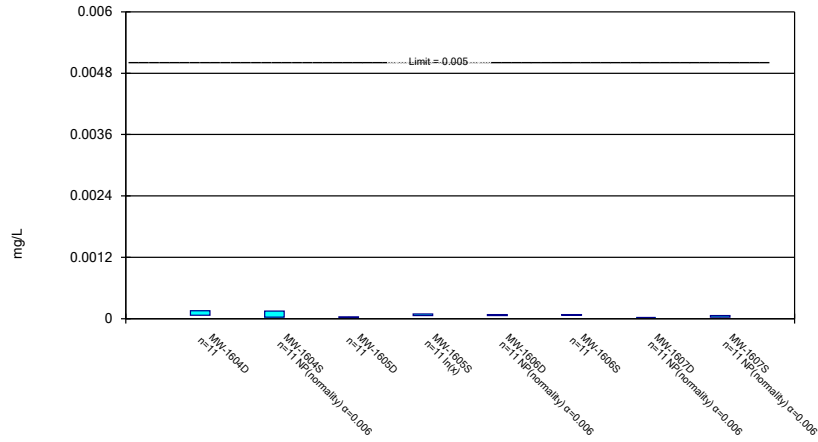
Compliance Limit is not exceeded.



Constituent: Beryllium, total Analysis Run 6/17/2019 1:44 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric and Non-Parametric (NP) Confidence Interval

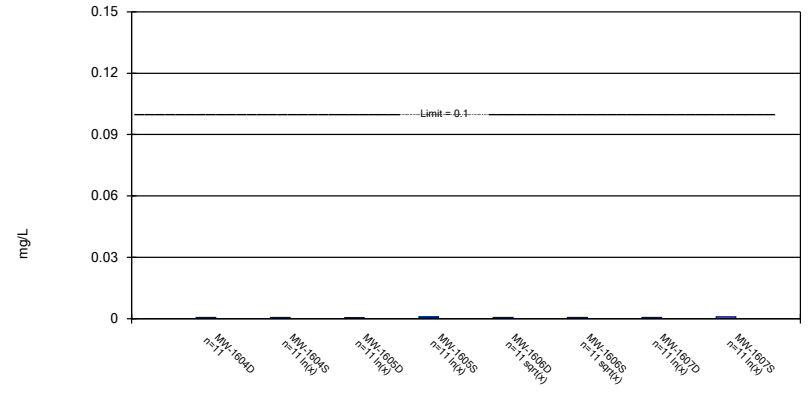
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Cadmium, total Analysis Run 6/17/2019 1:44 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric Confidence Interval

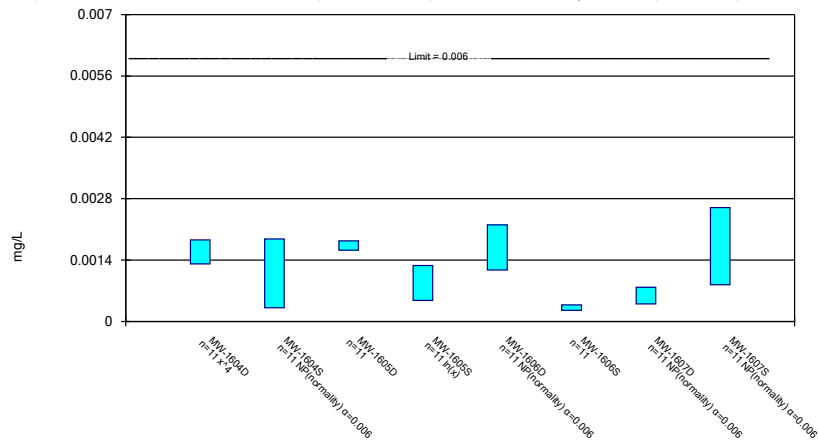
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Chromium, total Analysis Run 6/17/2019 1:44 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric and Non-Parametric (NP) Confidence Interval

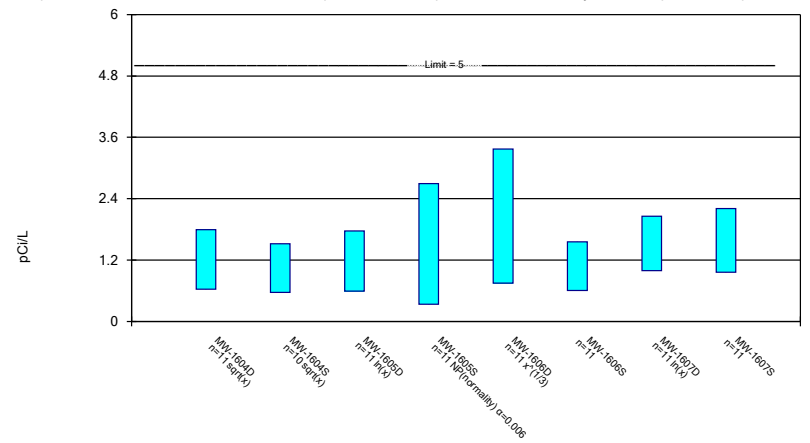
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Cobalt, total Analysis Run 6/17/2019 1:44 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric and Non-Parametric (NP) Confidence Interval

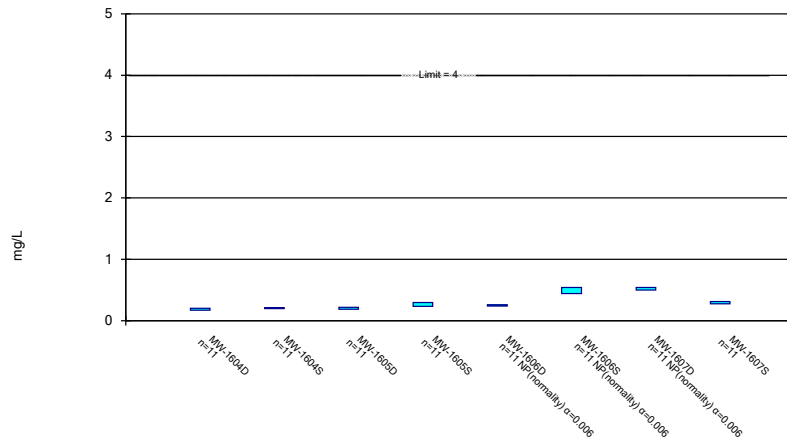
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Combined Radium 226 + 228 Analysis Run 6/17/2019 1:44 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric and Non-Parametric (NP) Confidence Interval

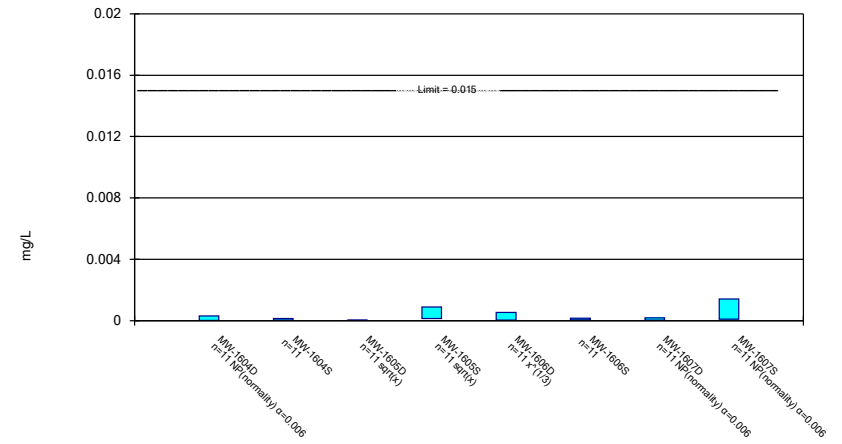
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Fluoride, total Analysis Run 6/17/2019 1:44 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric and Non-Parametric (NP) Confidence Interval

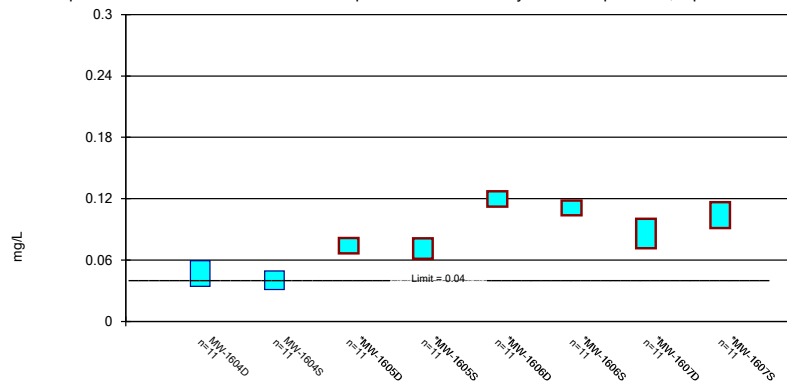
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Lead, total Analysis Run 6/17/2019 1:44 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric Confidence Interval

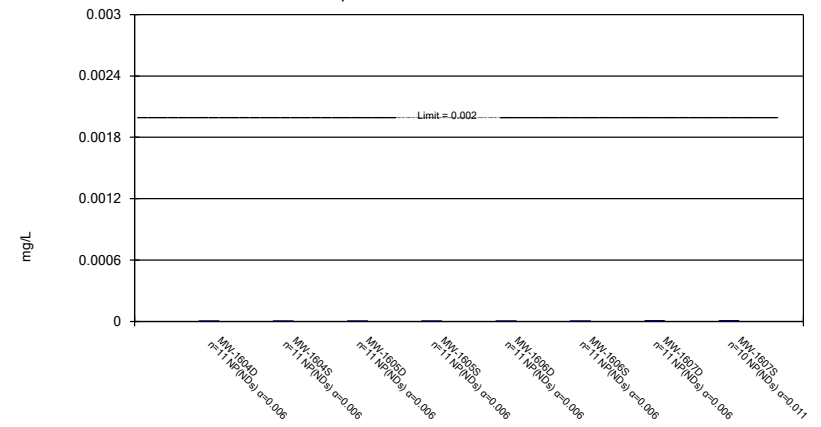
Compliance limit is exceeded.* Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Lithium, total Analysis Run 6/17/2019 1:44 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Non-Parametric Confidence Interval

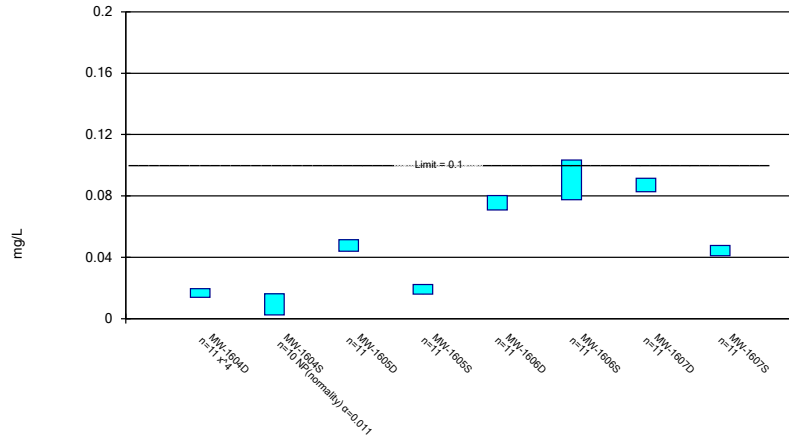
Compliance Limit is not exceeded.



Constituent: Mercury, total Analysis Run 6/17/2019 1:44 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric and Non-Parametric (NP) Confidence Interval

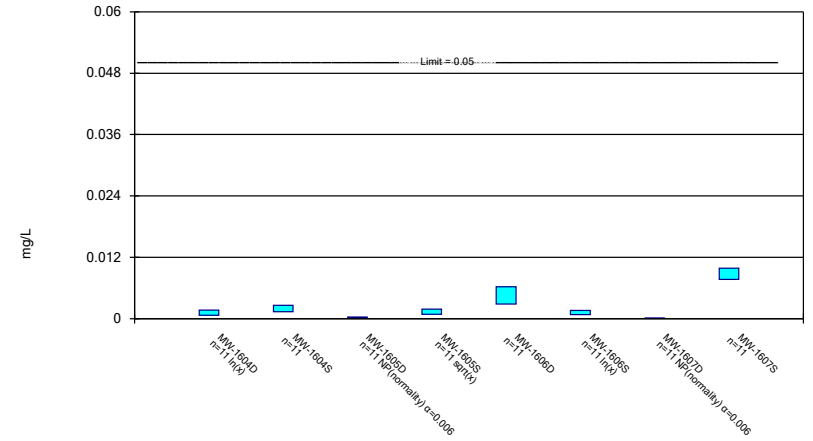
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Molybdenum, total Analysis Run 6/17/2019 1:44 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric and Non-Parametric (NP) Confidence Interval

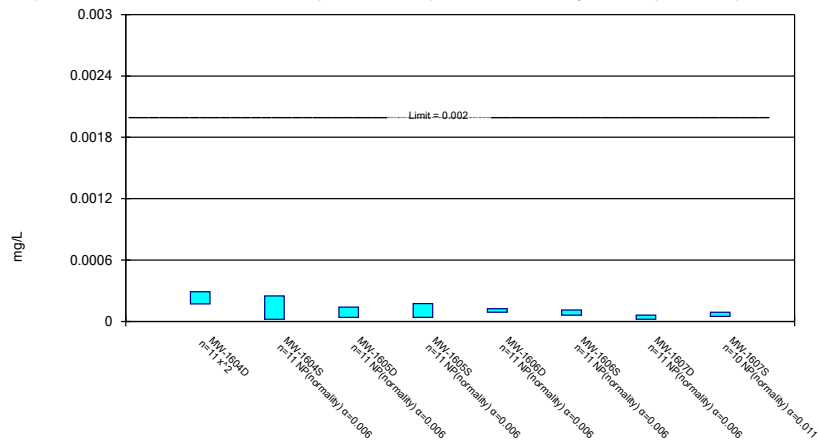
Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Selenium, total Analysis Run 6/17/2019 1:44 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer 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 6/17/2019 1:44 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

STATISTICAL ANALYSIS SUMMARY
BOTTOM ASH POND
Mountaineer Plant
New Haven, West Virginia

Submitted to



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Columbus, Ohio 43215-2372

Submitted by



engineers | scientists | innovators

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December 23, 2019

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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
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 Mountaineer Power Plant located in New Haven, West Virginia.

Based on detection monitoring conducted in 2017 and 2018, statistically significant increases (SSIs) over background were concluded for boron, calcium, chloride, total dissolved solids (TDS), and sulfate at the BAP. An alternative source was not identified at the time, so the BAP initiated assessment monitoring in April 2018. Upon receipt of assessment monitoring data from September 2018, statistical analysis was performed within 90 days. The statistical analysis of this assessment monitoring event determined SSLs for lithium at wells MW-1605D, MW-1605S, MW-1606D, MW-1606S, MW-1607D, and MW-1607S (Geosyntec, 2019a). An ASD was not successful and within 90 days of exceeding the GWPS for lithium, the BAP initiated assessment of corrective measures.

During the first assessment monitoring event of 2019, completed in April 2019, SSLs were identified for lithium at wells MW-1605D, MW-1605S, MW-1606D, MW-1606S, MW-1607D, and MW-1607S, and the unit continued to work on the assessment of corrective measures in accordance with 40 CFR 257.96. Following the April 2019 event, two assessment monitoring events were conducted at the BAP in June and September 2019, in accordance with 40 CFR 257.95. The statistical summary report for the April 2019 assessment monitoring event was completed within 90 days of receiving the laboratory results and is documented under a separate cover (Geosyntec, 2019b). Only the results of the June and September 2019 events are documented in this report.

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

The monitoring data were submitted to Groundwater Stats Consulting, LLC for statistical analysis. 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. SSLs were identified for lithium. Thus, the unit will continue to complete an assessment of corrective measures and continue to monitor the groundwater monitoring network in accordance with the assessment monitoring program per 40 CFR 257.95. 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) (September 2019). Samples from both sampling events were analyzed for the Appendix III and Appendix IV parameters. A summary of data collected during these assessment monitoring events may be found in Table 1.

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

The analytical data were imported into a Microsoft Access database, where checks were completed to assess the accuracy of sample location identification and analyte identification. Where necessary, unit conversions were applied to standardize reported units across all sampling events. Exported data files were created for use with the Sanitas™ v.9.6.23 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 September 2019 were screened for potential outliers. Outliers were identified for antimony at MW-1605D in the June 2019 data; fluoride at MW-1606D and MW-1606S in the June and September 2019 data; and thallium at MW-1606D and MW-1606S in the September 2019 data. However, these values were not removed from the dataset as they either were non-detects or were similar to values reported in neighboring wells. Several chromium values from the December 2016 background monitoring event were removed from the dataset even though they were not identified as outliers by Tukey's Test, as they were not representative of chromium results during later events. Additional information regarding outliers is provided in Attachment B.

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 the CCR Rule 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, barium, cadmium, selenium, and thallium due to apparent non-normal distributions and for beryllium and 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.

The following SSLs were identified at the Mountaineer BAP:

- LCLs for lithium exceeded the GWPS of 0.0400 mg/L at MW-1605D (0.0593 mg/L), MW-1605S (0.0565 mg/L), MW-1606D (0.0998 mg/L), MW-1606S (0.0941 mg/L), MW-1607D (0.0735 mg/L), MW-1607S (0.0894 mg/L).

As a result, the Mountaineer BAP will continue the assessment of corrective measures and continue to monitor the groundwater monitoring network in accordance with the assessment monitoring program per 40 CFR 257.95.

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 pH, whereas interwell tests were used to evaluate potential SSIs for boron, calcium, chloride, fluoride, 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 (September 2016 - June 2017) to the new compliance samples (October 2017 – April 2019) for 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. However, no significant differences were found between the two groups. The complete Mann-Whitney test results and a summary of the significant findings can be found in Attachment B.

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 April 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 pH, whereas interwell tests continued to be used to evaluate potential SSIs for boron, calcium, chloride, fluoride, sulfate, and TDS. The intrawell UPLs were calculated for a one-of-two retesting procedure; i.e., if at least one sample in a series of two does not exceed the UPL, then it can be concluded that an SSI has not occurred. 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

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

Data collected during the June and September 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. The following exceedances of the upper prediction limits (UPLs) were noted:

- Boron concentrations exceeded the interwell UPL of 0.614 mg/L at MW-1604D (1.66 mg/L and 2.18 mg/L), MW-1604S (3.15 mg/L and 3.23 mg/L), MW-1605D (6.57 mg/L and 8.57 mg/L), MW-1605S (7.02 mg/L and 8.05 mg/L), MW-1606D (7.79 mg/L and 6.38 mg/L), MW-1606S (6.08 mg/L and 6.19 mg/L), MW-1607D (3.14 mg/L and 3.65 mg/L), and MW-1607S (2.46 mg/L and 3.21 mg/L).
- Calcium concentrations exceeded the interwell UPL of 200 mg/L at MW-1604D (217 mg/L), MW-1604S (278 mg/L and 267 mg/L), MW-1605D (265 mg/L and 283 mg/L), MW-1606D (281 mg/L for both events), MW-1606S (223 mg/L and 229 mg/L), MW-1607D (234 mg/L and 233 mg/L), and MW-1607S (233 mg/L and 198 mg/L).
- Chloride concentrations exceeded the interwell UPL of 68.5 mg/L at MW-1604D (93.0 mg/L and 82.2 mg/L), MW-1604S (127 mg/L and 128 mg/L), MW-1605D (165 mg/L and 168 mg/L), MW-1605S (140 mg/L and 149 mg/L), MW-1606D (231 mg/L and 244 mg/L), MW-1606S (232 mg/L and 221 mg/L), MW-1607D (167 mg/L and 174 mg/L), and MW-1607S (154 mg/L and 167 mg/L).
- Fluoride concentrations exceeded the interwell UPL of 0.271 mg/L at MW-1606D (0.490 mg/L), MW-1606S (0.280 mg/L), and MW-1607D (0.400 mg/L and 0.560 mg/L).
- Sulfate concentrations exceeded the interwell UPL of 674 mg/L at MW-1604S (741 mg/L and 770 mg/L), MW-1605D (877 mg/L and 974 mg/L), MW-1605S (694 mg/L), MW-1606D (693 mg/L), MW-1606S (705 mg/L), MW-1607D (710 mg/L and 699 mg/L).
- TDS concentrations exceeded the interwell UPL of 1040 mg/L at MW-1604D (1110 mg/L and 1210 mg/L), MW-1604S (1580 mg/L and 1520 mg/L), MW-1605D (1890 mg/L and 2050 mg/L), MW-1605S (1510 mg/L and 1470 mg/L), MW-1606D (1690 mg/L and 1700 mg/L), MW-1606S (1490 mg/L and 1460 mg/L), MW-1607D (1600 mg/L and 1610 mg/L),

Based on these results, concentrations of Appendix III parameters exceeded background levels at compliance wells at the Mountaineer BAP during assessment monitoring.

2.3 Conclusions

A semi-annual assessment monitoring event was conducted in accordance with the CCR Rule. The laboratory and field data were reviewed prior to statistical analysis, with no QA/QC issues identified that impacted data usability. A review of outliers resulted in the removal of several chromium values from the December 2016 background monitoring event, as the reported results were not representative of later sampling events. 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. SSLs

were identified for lithium. Appendix III parameters were compared to recalculated prediction limits, with exceedances identified for boron, calcium, chloride, fluoride, sulfate, and TDS.

Based on this evaluation, the Mountaineer BAP CCR unit will continue with the assessment of corrective measures and continue to monitor the groundwater monitoring network in accordance with the assessment monitoring program per 40 CFR 257.95

SECTION 3

REFERENCES

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

Geosyntec Consultants (Geosyntec). 2018. Statistical Analysis Summary – Bottom Ash Pond, Mountaineer Plant, New Haven, West Virginia. January 15, 2018.

Geosyntec. 2019a. Statistical Analysis Summary – Bottom Ash Pond. Mountaineer Plant, New Haven, West Virginia. January 8, 2019.

Geosyntec. 2019b. Statistical Analysis Summary – Bottom Ash Pond. Mountaineer Plant, New Haven, West Virginia. July 12, 2019.

TABLES

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

Component	Unit	MW-1601A		MW-1602		MW-1603		MW-1604D		MW-1604S		MW-1605D	
		6/20/2019	9/11/2019	6/20/2019	9/11/2019	6/20/2019	9/11/2019	6/19/2019	9/9/2019	6/19/2019	9/9/2019	6/19/2019	9/10/2019
Antimony	µg/L	0.0300 J	0.0300 J	0.0200 J	0.100 U	0.0300 J	0.0300 J	0.0400 J	0.0300 J	0.150	0.140	0.200 U	0.0300 J
Arsenic	µg/L	0.630	0.620	0.330	0.310	0.410	0.350	0.280	0.300	0.330	0.340	2.67	2.78
Barium	µg/L	63.1	65.3	29.5	27.3	30.7	30.9	52.9	55.6	29.0	29.0	28.6	33.1
Beryllium	µg/L	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.200 U	0.100 U
Boron	mg/L	0.160	0.153	0.100 J	0.111	0.299	0.308	1.66	2.18	3.15	3.23	6.57	8.57
Cadmium	µg/L	0.0200 J	0.0200 J	0.0100 J	0.0100 J	0.0100 J	0.0100 J	0.0400 J	0.0300 J	0.210	0.210	0.0200 J	0.0300 J
Calcium	mg/L	165	164	91.2	95.1	162	156	196	217	278	267	265	283
Chloride	mg/L	48.6	45.8	10.7	10.4	10.9	10.0	93.0	82.2	127	128	165	168
Chromium	µg/L	0.314	0.370	0.200 J	0.200 J	0.249	0.205	0.212	0.345	0.0900 J	0.100 J	0.200 J	0.0400 J
Cobalt	µg/L	0.0300 J	0.0300 J	0.0300 J	0.0500 U	0.204	0.112	0.242	0.181	2.16	2.14	1.65	1.69
Combined Radium	pCi/L	0.450	1.17	0.153	0.451	0.297	1.07	0.192	0.464	1.26	1.15	0.831	1.64
Fluoride	mg/L	0.160	0.140	0.230	0.210	0.0900	0.0900	0.140	0.170	0.160	0.200	0.190	0.170
Lead	µg/L	0.0700 J	0.200 U	0.0700 J	0.200 U	0.176	0.100 J	0.0700 J	0.200 U	0.100 U	0.200 U	0.200 U	0.200 U
Lithium	mg/L	0.0300 U	0.00184	0.0100 J	0.00979	0.0300 U	0.0150	0.0300 U	0.0188	0.0320	0.0476	0.0200 J	0.0561
Mercury	µg/L	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U
Molybdenum	µg/L	0.900 J	0.900 J	0.900 J	1.00 J	0.900 J	0.500 J	1.00 J	2.00 J	16.6	16.3	40.0	39.7
Selenium	µg/L	1.30	1.10	0.100 J	0.100 J	0.300	0.200	3.10	3.40	1.00	1.00	0.200 J	0.300
Total Dissolved Solids	mg/L	730	749	606	603	878	853	1110	1210	1580	1520	1890	2050
Sulfate	mg/L	207	221	267	259	434	421	461	551	741	770	877	974
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	0.300 J	0.300 J	1.00 U	0.500 U
pH	SU	7.26	6.96	6.98	6.71	6.97	6.65	7.18	7.04	7.27	7.33	7.48	7.23

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
Mountaineer - Bottom Ash Pond**

Component	Unit	MW-1605S		MW-1606D		MW-1606S		MW-1607D		MW-1607S		MW-1608	
		6/19/2019	9/10/2019	6/19/2019	9/10/2019	6/19/2019	9/10/2019	6/19/2019	9/10/2019	6/19/2019	9/10/2019	6/18/2019	9/10/2019
Antimony	µg/L	0.0400 J	0.0400 J	0.140	0.150	0.150	0.130	0.0300 J	0.0300 J	0.440	0.410	0.0300 J	0.0300 J
Arsenic	µg/L	0.470	0.590	0.370	0.400	0.630	0.670	1.61	1.53	0.960	0.870	0.400	0.520
Barium	µg/L	23.6	29.6	49.4	51.4	67.2	70.4	82.3	79.3	81.0	67.7	32.0	26.8
Beryllium	µg/L	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.0500 J
Boron	mg/L	7.02	8.05	7.79	6.38	6.08	6.19	3.14	3.65	2.46	3.21	0.116	0.124
Cadmium	µg/L	0.0500 J	0.0500 J	0.0900	0.0800	0.0800	0.0700	0.0500 U	0.0100 J	0.0400 J	0.0500 J	0.0100 J	0.0500 U
Calcium	mg/L	156	174	281	281	223	229	234	233	233	198	86.5	92.0
Chloride	mg/L	140	149	231	244	232	221	167	174	154	167	5.06	4.01
Chromium	µg/L	0.100 J	0.237	0.0700 J	0.100 J	0.0800 J	0.0800 J	0.100 J	0.0500 J	0.428	0.357	0.306	0.327
Cobalt	µg/L	0.279	0.379	1.36	1.09	0.171	0.312	0.799	0.848	0.990	0.971	0.0500 J	0.0560
Combined Radium	pCi/L	0.424	0.542	0.933	2.27	1.01	2.68	1.31	1.86	1.12	2.77	0.104	1.35
Fluoride	mg/L	0.230	0.260	0.100 J	0.490	0.250	0.280	0.400	0.560	0.190	0.270	0.160	0.200
Lead	µg/L	0.0800 J	0.202	0.100 U	0.200 U	0.111	0.200 U	0.0700 J	0.200 U	0.108	0.0900 J	0.0600 J	0.0600 J
Lithium	mg/L	0.0400	0.0524	0.0580	0.0835	0.0560	0.0877	0.0720	0.110	0.0750	0.0990	0.0300 U	0.00286
Mercury	µg/L	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U	0.00500 U
Molybdenum	µg/L	13.6	14.2	68.3	68.5	58.9	54.9	81.8	82.1	34.6	35.0	0.800 J	1.00 J
Selenium	µg/L	0.600	0.400	9.60	1.00	1.30	2.70	0.0600 J	0.0900 J	5.60	4.30	0.800	1.00
Total Dissolved Solids	mg/L	1510	1470	1690	1700	1490	1460	1600	1610	1370	1350	416	369
Sulfate	mg/L	649	694	693	588	581	705	710	699	524	465	144	109
Thallium	µg/L	0.500 U	0.500 U	0.100 J	0.500 U	0.100 J	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
pH	SU	7.35	7.16	7.40	7.40	7.19	7.32	7.79	7.71	7.49	7.66	6.24	7.13

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
Mountaineer 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		0.00074
Barium, Total (mg/L)	2		0.065
Beryllium, Total (mg/L)	0.004		0.0001
Cadmium, Total (mg/L)	0.005		0.00003
Chromium, Total (mg/L)	0.1		0.0009
Cobalt, Total (mg/L)	n/a	0.006	0.0007
Combined Radium, Total (pCi/L)	5		2.33
Fluoride, Total (mg/L)	4		0.27
Lead, Total (mg/L)	n/a	0.015	0.00067
Lithium, Total (mg/L)	n/a	0.04	0.026
Mercury, Total (mg/L)	0.002		0.000005
Molybdenum, Total (mg/L)	n/a	0.1	0.0038
Selenium, Total (mg/L)	0.05		0.0015
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: Revised Prediction Limits
Mountaineer Plant - Bottom Ash Pond**

Parameter	Unit	Description	MW-1604D	MW-1604S	MW-1605D	MW-1605S	MW-1606D	MW-1606S	MW-1607D	MW-1607S
Boron	mg/L	Interwell Background Value (UPL)	0.614							
Calcium	mg/L	Interwell Background Value (UPL)	200							
Chloride	mg/L	Interwell Background Value (UPL)	68.5							
Fluoride	mg/L	Interwell Background Value (UPL)	0.271							
pH	SU	Intrawell Background Value (UPL)	7.8	7.8	7.9	7.9	7.9	8.1	8.0	7.8
		Intrawell Background Value (LPL)	6.7	6.6	6.9	6.8	6.9	6.1	7.0	7.2
Sulfate	mg/L	Interwell Background Value (UPL)	674							
Total Dissolved Solids	mg/L	Interwell Background Value (UPL)	1040							

Notes:

UPL: Upper prediction limit

LPL: Lower prediction limit

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

Parameter	Unit	Description	MW-1604D		MW-1604S		MW-1605D		MW-1605S		MW-1606D		MW-1606S		MW-1607D		MW-1607S	
			6/19/2019	9/9/2019	6/19/2019	9/9/2019	6/19/2019	9/10/2019	6/19/2019	9/10/2019	6/19/2019	9/10/2019	6/19/2019	9/10/2019	6/19/2019	9/10/2019	6/19/2019	9/10/2019
Boron	mg/L	Interwell Background Value (UPL)	0.614															
		Detection Monitoring Result	1.66	2.18	3.15	3.23	6.57	8.57	7.02	8.05	7.79	6.38	6.08	6.19	3.14	3.65	2.46	3.21
Calcium	mg/L	Interwell Background Value (UPL)	200															
		Detection Monitoring Result	196	217	278	267	265	283	156	174	281	281	223	229	234	233	233	198
Chloride	mg/L	Interwell Background Value (UPL)	68.5															
		Detection Monitoring Result	93.0	82.2	127	128	165	168	140	149	231	244	232	221	167	174	154	167
Fluoride	mg/L	Interwell Background Value (UPL)	0.271															
		Detection Monitoring Result	0.140	0.170	0.160	0.200	0.190	0.170	0.230	0.260	0.100	0.490	0.250	0.280	0.400	0.560	0.190	0.270
pH	SU	Intrawell Background Value (UPL)	7.8		7.8		7.9		7.9		7.9		8.1		8.0		7.8	
		Intrawell Background Value (LPL)	6.7		6.6		6.9		6.8		6.9		6.1		7.0		7.2	
		Detection Monitoring Result	7.2	7.0	7.3	7.3	7.5	7.2	7.4	7.2	7.4	7.4	7.2	7.3	7.8	7.7	7.5	7.7
Sulfate	mg/L	Interwell Background Value (UPL)	674															
		Detection Monitoring Result	461	551	741	770	877	974	649	694	693	588	581	705	710	699	524	465
Total Dissolved Solids	mg/L	Interwell Background Value (UPL)	1040															
		Detection Monitoring Result	1110	1210	1580	1520	1890	2050	1510	1470	1690	1700	1490	1460	1600	1610	1370	1350

Notes:

UPL: Upper prediction limit

LPL: Lower prediction limit

Bold values exceed the background value.

Background values are shaded gray.

ATTACHMENT A

Certification by Qualified Professional Engineer

Certification by Qualified Professional Engineer

I certify that the selected and above described statistical method is appropriate for evaluating the groundwater monitoring data for the Mountaineer 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

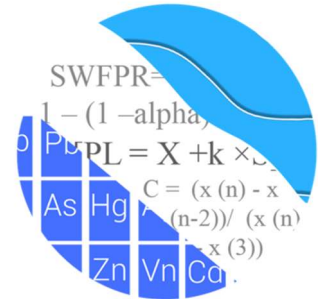
Licensing State

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: Mountaineer BAP – Assessment Monitoring Report & Background Update - 2019

Groundwater Stats Consulting, formerly the statistical consulting division of Sanitas Technologies, is pleased to provide the statistical analysis and background update of 2019 groundwater data for American Electric Power Inc.'s Mountaineer 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:** MW-1601A, MW-1602, MW-1603, MW-1608; and
- **Downgradient wells:** MW-1604D, MW-1604S, MW-1605D, MW-1605S, MW-1606D, MW-1606S, MW-1607D, MW-1607S.

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 are used to evaluate concentrations over time as well as for the purpose of updating statistical limits (Figure A). Additionally, box plots are included for all constituents at upgradient and downgradient wells (Figure B). Values in background which have been flagged as outliers may be seen in a lighter font and as a disconnected symbol on the graph. A summary of these values follows this letter (Figure C). The time series plots are used to initially screen for suspected outliers and trends, while the box plots provide visual representation of variation within individual wells and between all wells.

During the background screening conducted in December 2017 data at all wells were evaluated for the following: 1) outliers; 2) trends; 3) most appropriate statistical method for Appendix III parameters based on site characteristics of groundwater data upgradient of the facility; and 4) eligibility of downgradient wells when intrawell statistical methods are recommended. Power curves were provided to demonstrate that the selected statistical methods for Appendix III parameters comply with the USEPA Unified Guidance recommendations as discussed below.

Summary of Statistical Method:

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

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

- 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.

Historical Summary December 2017 - Evaluation of Appendix III Parameters

Outlier Evaluation

During the previous background screening, visual screening was used to detect potential outliers in all wells for all parameters, while Tukey's outlier test was used for all wells to formally test data in wells for intrawell parameters and for combined upgradient wells for interwell parameters. High values were noted in downgradient wells for pH in wells MW-1607D and MW-1607S; and TDS in MW-1606S. No outliers were noted for upgradient wells. The current assumption is that changes in concentrations are reflective of natural variation upgradient of the facility; however, a separate study and hydrogeological investigation would be required to fully understand the geochemical conditions and expected groundwater quality for the region. That study and assessment is beyond the scope of services provided by Groundwater Stats Consulting.

Statistical Limits

Interwell prediction limits combined with a 1-of-2 verification strategy were constructed for boron, calcium, chloride, fluoride, sulfate and TDS; and intrawell prediction limits combined with a 1-of-2 verification strategy were constructed for pH. 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 were screened for any newly suspected outliers or obvious trending patterns using time series plots. Intrawell

prediction limits utilized the background data set that was originally screened in 2017. As recommended in the EPA Unified Guidance (2009), the set background data 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 several of the downgradient wells for boron, calcium, chloride, fluoride, pH, sulfate and TDS. These results can be found in the previous screening in the Prediction Limit Summary tables.

When a statistically significant increase is identified, the data are further evaluated using the Sen's Slope/Mann Kendall trend test to determine whether concentrations are statistically increasing, decreasing or stable. Upgradient wells are included in the trend analyses to identify whether similar patterns exist upgradient of the site which is an indication of natural variability in groundwater unrelated to practices at the site.

Statistically significant increasing trends were found for several constituents in both upgradient and downgradient wells. For the statistically significant increasing trend noted for calcium in well MW-1607S, with the exception of the most recent sample, historical concentrations are similar and, in some cases, lower than those reported in upgradient wells. Further research beyond the scope of this analysis would be required to identify the cause for any changing groundwater concentrations in downgradient wells (i.e. result of practices at the site, natural variation, or an off-site source). The Trend Test summary table was included in the previous screening.

Appendix III Background Update – November 2019

Prior to updating background data, samples are re-evaluated for all wells for parameters tested with intrawell analyses (pH), and for combined upgradient well data for parameters tested with interwell analyses (boron, calcium, chloride, fluoride, sulfate and TDS) using Tukey's outlier test and visual screening for all historical data through April 2019 samples. When Tukey's outlier test detects an outlier for the most recent sample, it will not be flagged in the event that the data precede a trend that is more

representative of current concentrations. In some cases, Tukey's noted outliers in a given well that were similar to those reported in neighboring wells for the same event and, therefore, those values were not flagged. The fluoride values identified by Tukey's at well MW-1606D was the most recent sample and was not flagged in the database. If future values are significantly lower than the reported value, this will be flagged in the database in the future. None of the fluoride values were flagged as outliers in well MW-1606S since all values were similar to remaining measurements within this well, with the most recent measurements lower than historical measurements. If this decrease in concentrations continues, earlier higher measurements may be deselected in the future.

Tukey's identified outliers for thallium at wells MW-1606D and MW-1606S; however, these were nondetect values and were not flagged in the database. In other cases, Tukey's test did not identify outliers and those values were flagged because they were not representative of the population at that well. For instance, several high values were noted several parameters for the same event early in the record for well MW-1607S. These values were flagged as outliers in the database. As mentioned above, flagged data are displayed in a lighter font and as a disconnected symbol on the time series reports, as well as in a lighter font on the accompanying data pages. An updated summary of Tukey's test results and flagged outliers 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 April 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 any of 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 April 2019, combined with a 1-of-2 resample plan, were constructed for 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). A few statistically significant increasing and decreasing trends were noted; however, the magnitudes of the trends are low relative to

average concentrations within each well. With limited background samples collected to date, all data from upgradient wells were used to construct interwell prediction limits for all Appendix III parameters except pH which is tested using intrawell prediction limits. As more data are collected, all upgradient well data will be re-evaluated for possible deselection of earlier measurements if they no longer represent present-day groundwater quality conditions. A summary of those 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 April 2019 for boron, calcium, chloride, fluoride, sulfate, and TDS (Figure G). Interwell prediction limits pool upgradient well data to establish a background limit for an individual constituent. A summary table of the updated limits may be found following this letter in the Prediction Limit Summary Tables.

Evaluation of Appendix IV Parameters – 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. In some cases, due to the natural log transformation, Tukey's test did not identify outliers for values which were significantly higher than remaining observations in a given well. For instance, during the December 2016 sample event, high values were reported for chromium in several wells (both upgradient and downgradient). These values were flagged in the database as outliers as they did not appear to represent the population at these wells. 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, or ACL 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 confidence interval exceedances were found except for lithium in wells MW-1605D, MW1605S, MW-1606D, MW-1606S, MW-1607D and MW-1607S. 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 Mountaineer BAP. If you have any questions or comments, please feel free to contact us.

For Groundwater Stats Consulting,



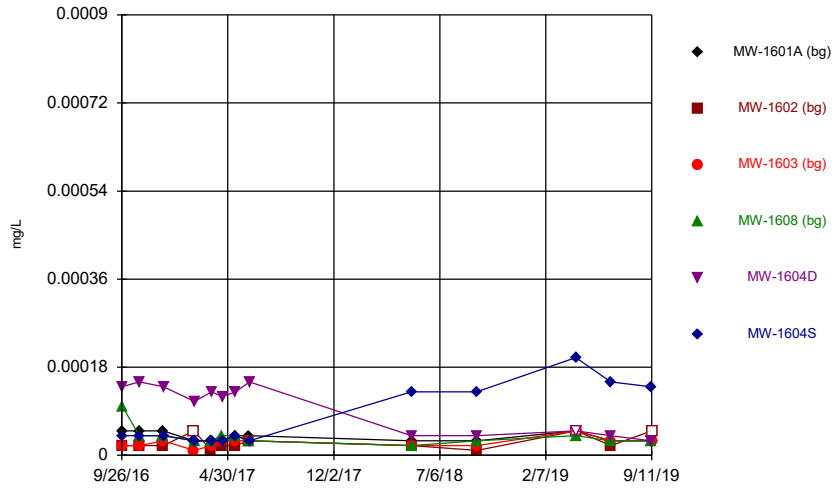
Andrew T. Collins
Groundwater Analyst



Kristina L. Rayner
Groundwater Statistician

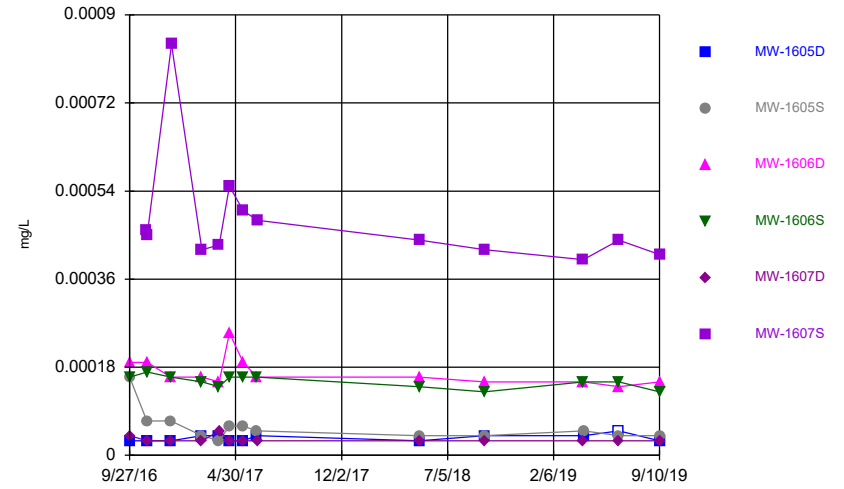
FIGURE A: TIME SERIES

Time Series



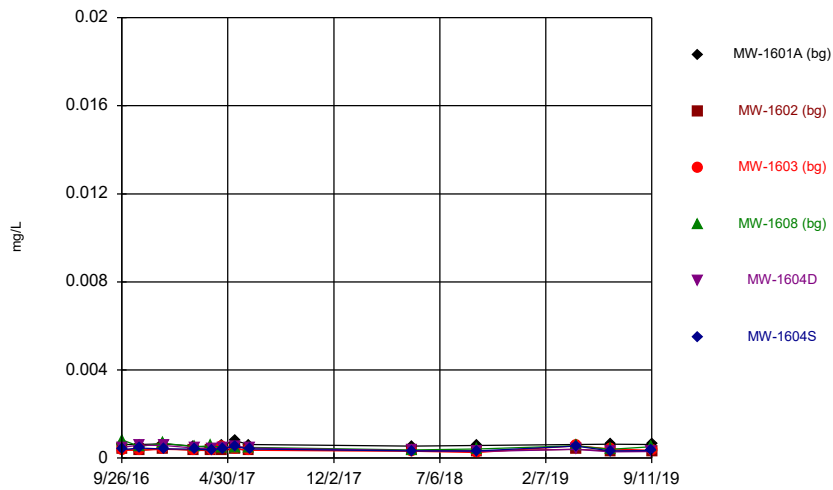
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Time Series



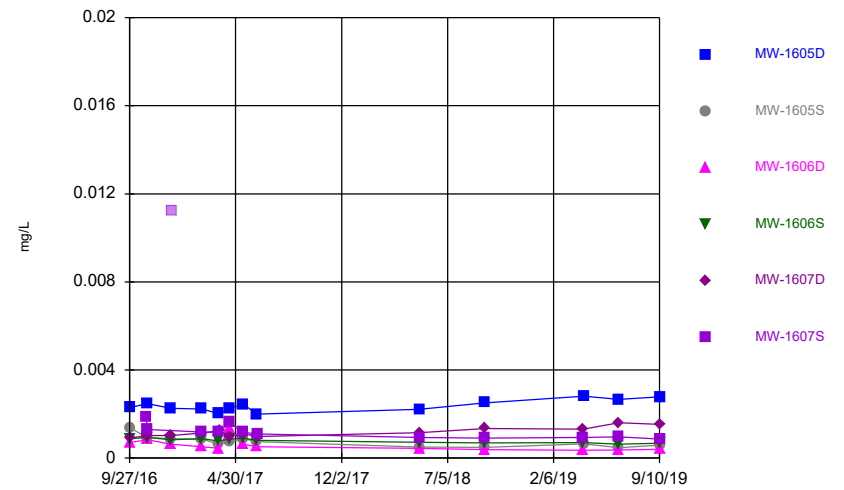
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Time Series



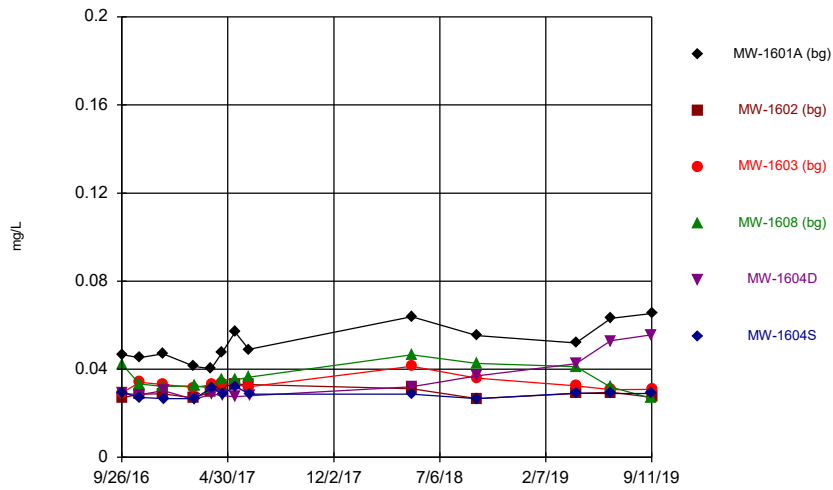
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Time Series



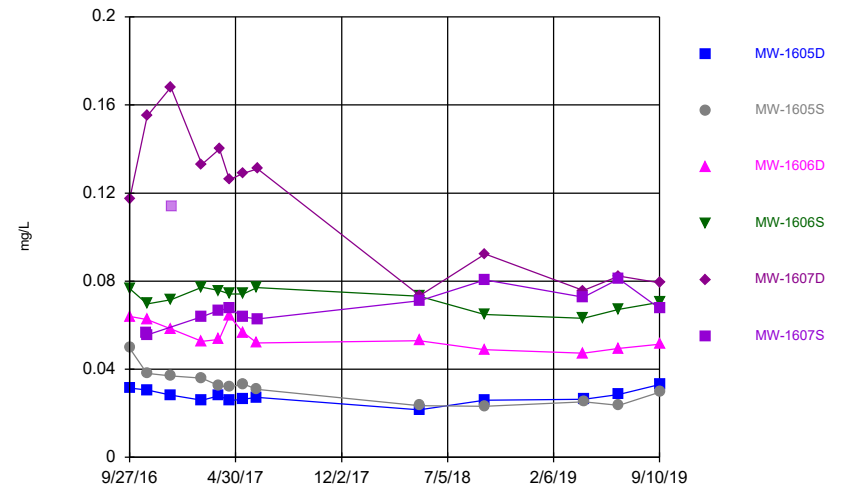
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Time Series



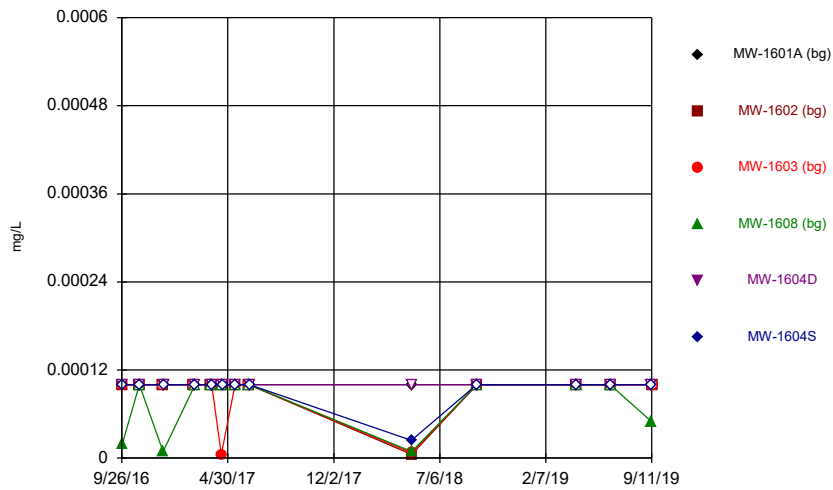
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Time Series



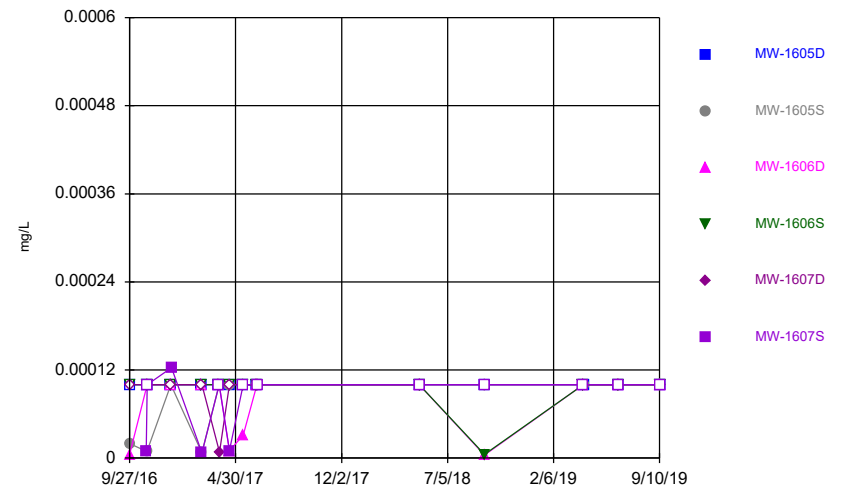
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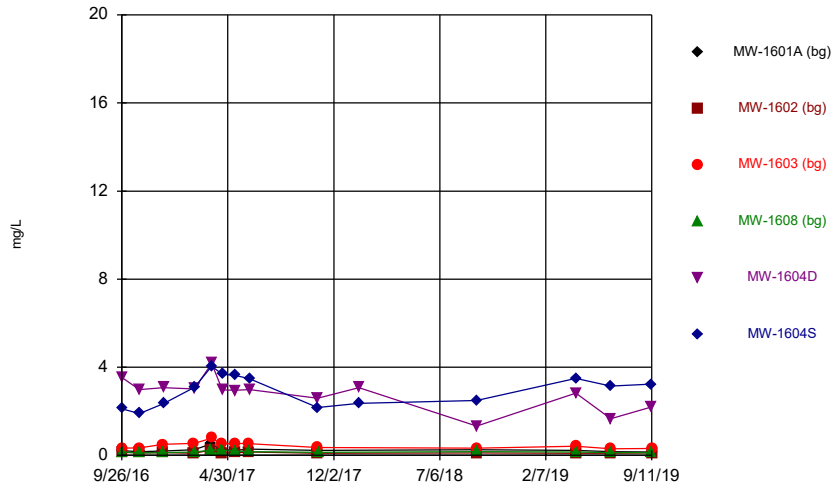
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Time Series



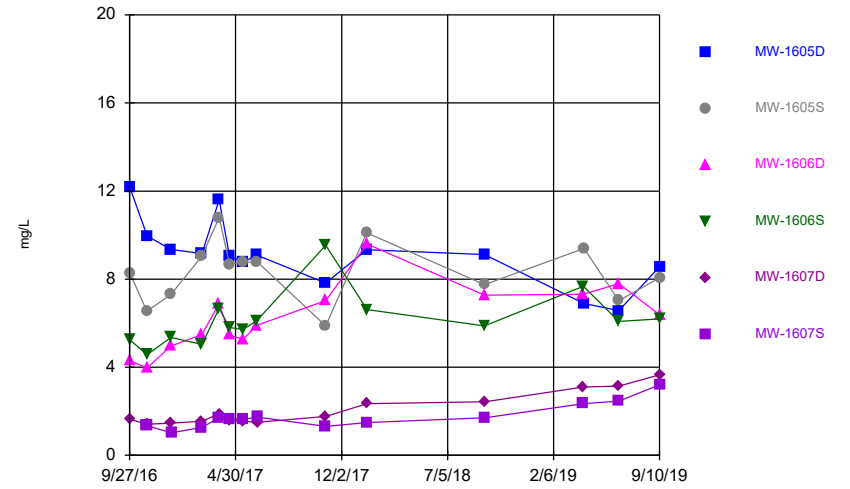
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Time Series



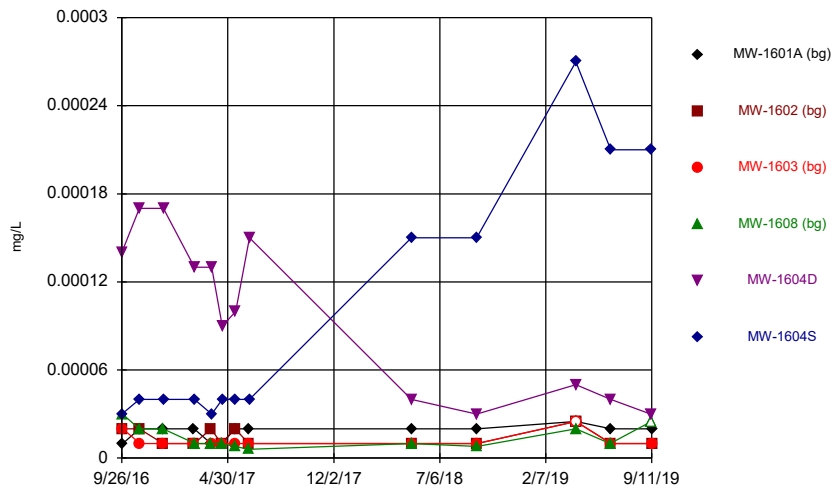
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Time Series



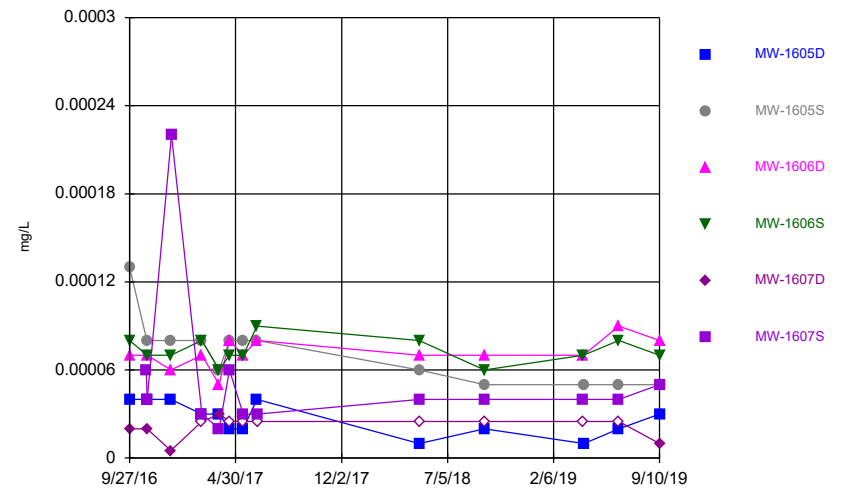
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Time Series



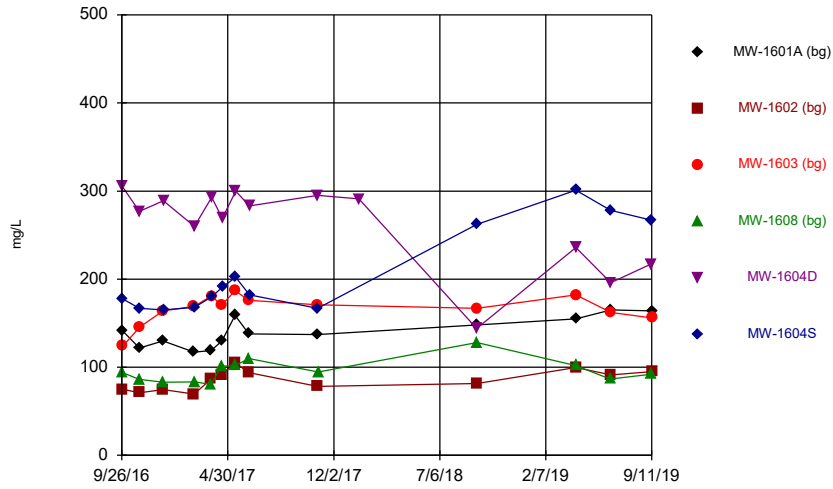
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Time Series



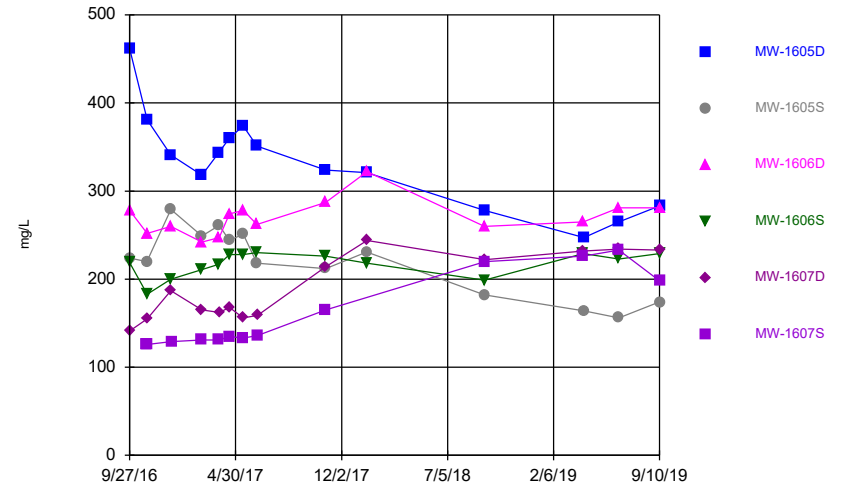
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Time Series



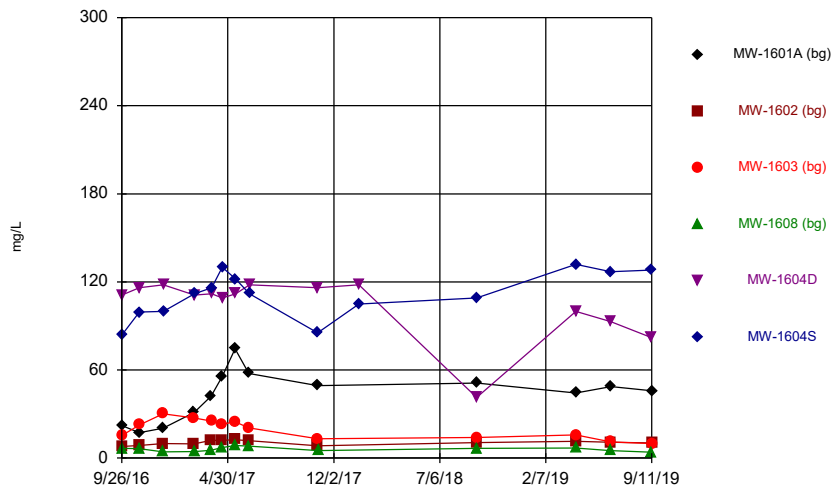
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Time Series



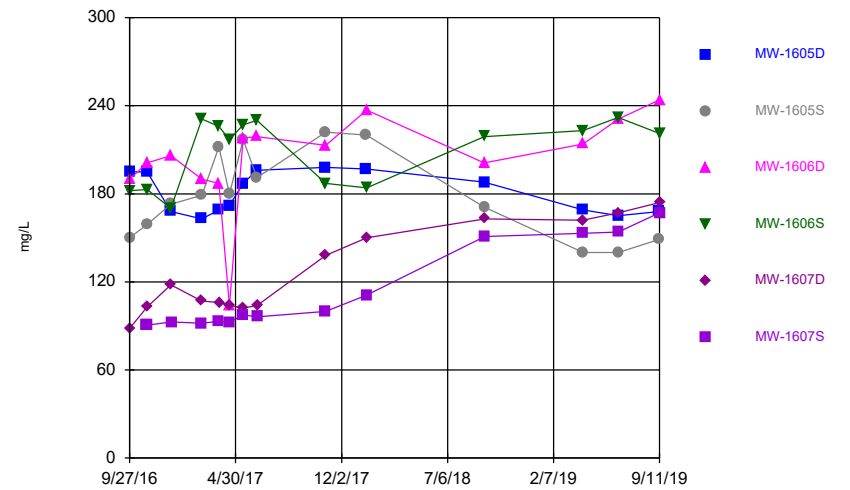
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Time Series



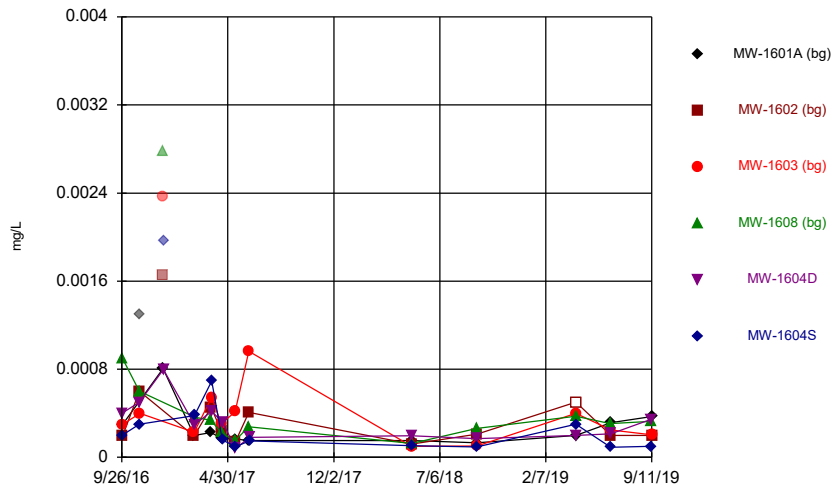
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Time Series



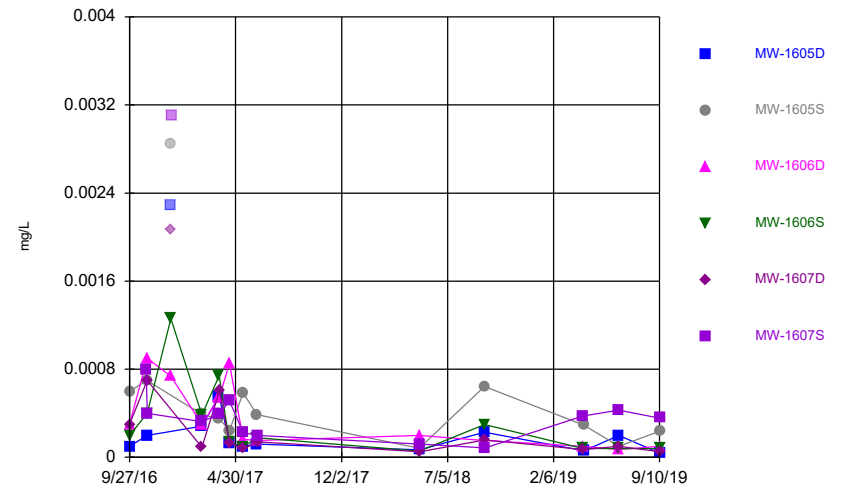
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Time Series



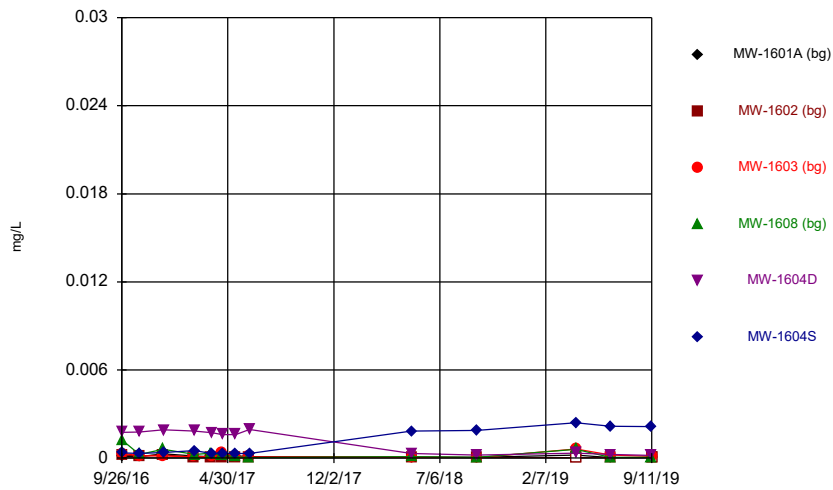
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Time Series



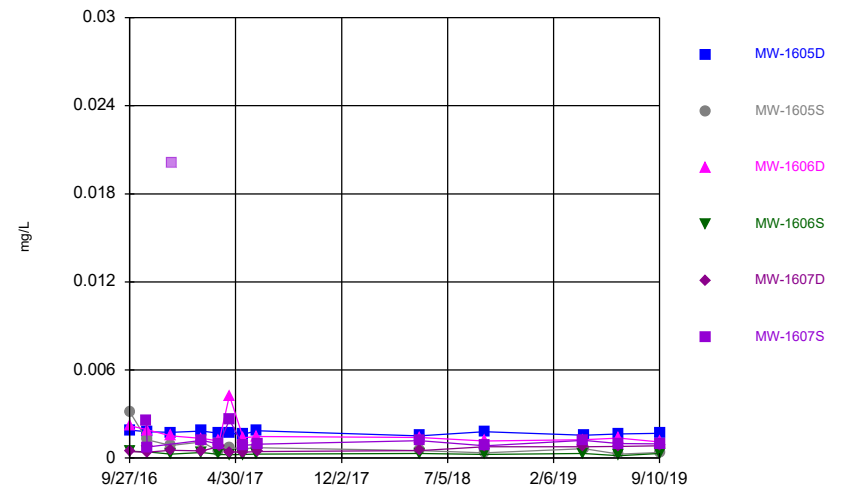
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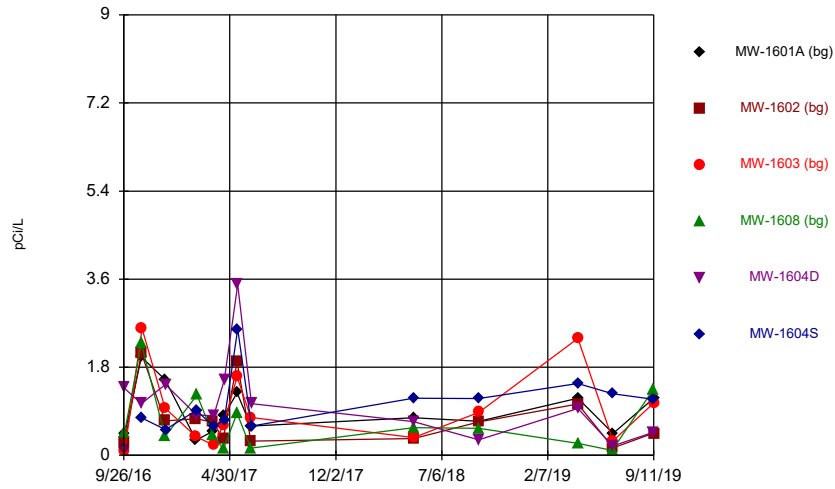
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Time Series



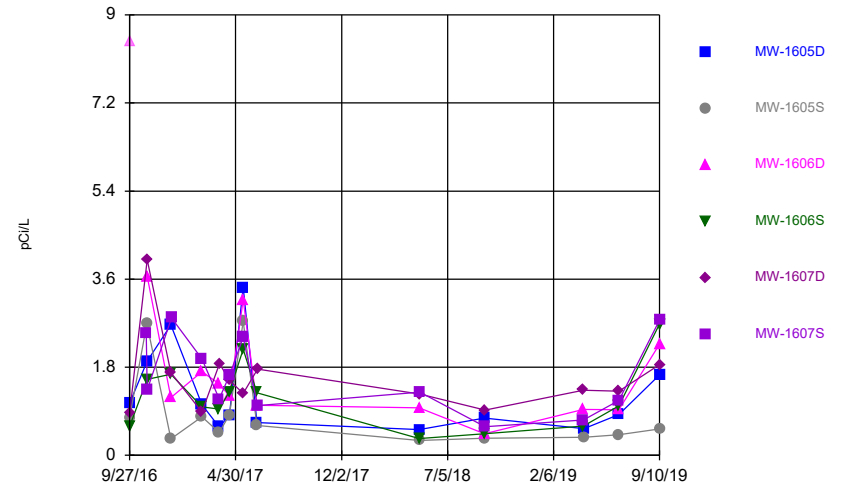
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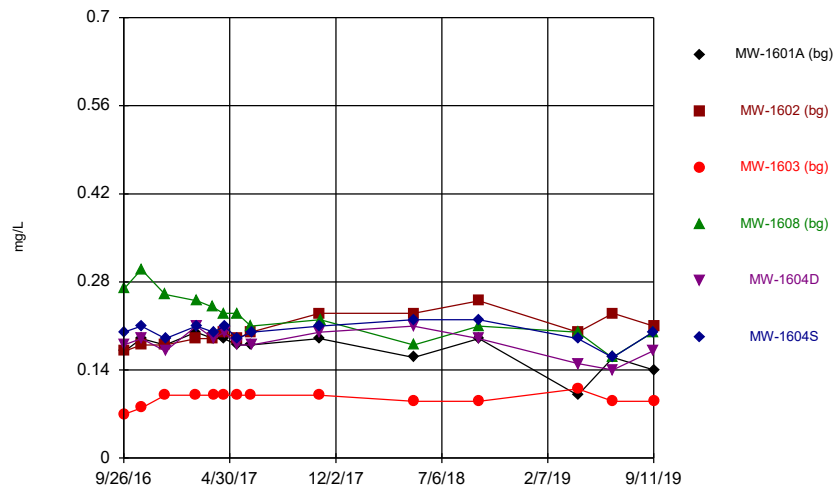
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Time Series



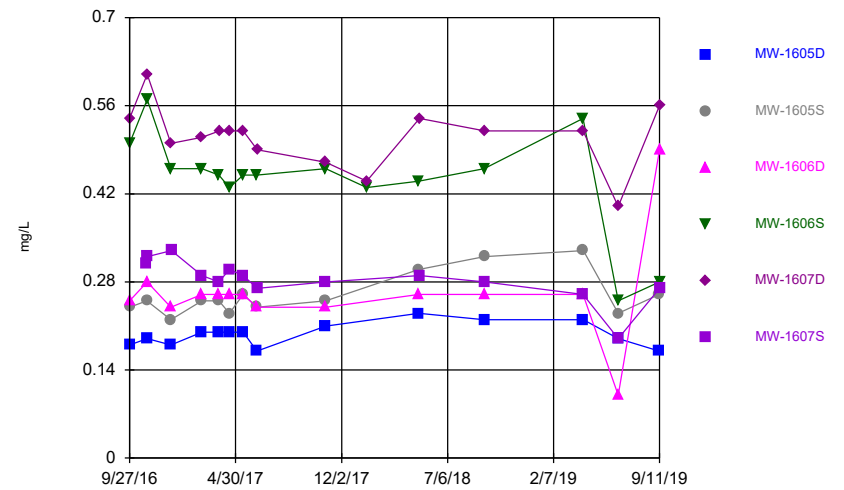
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Time Series



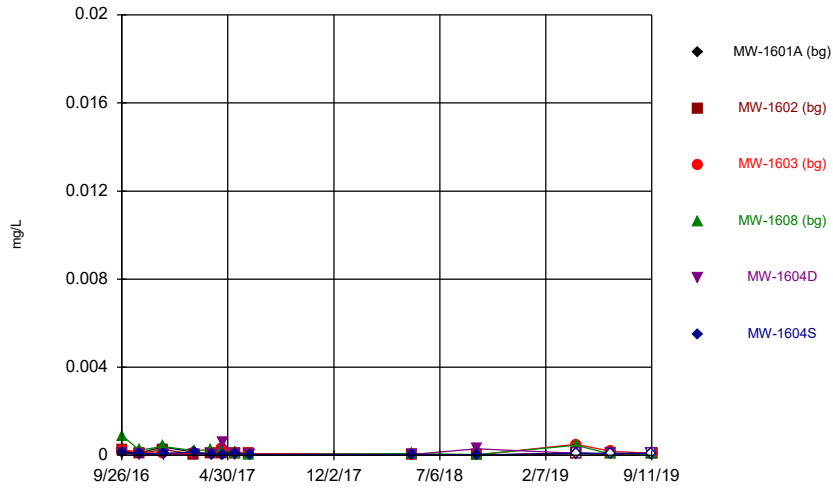
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Time Series



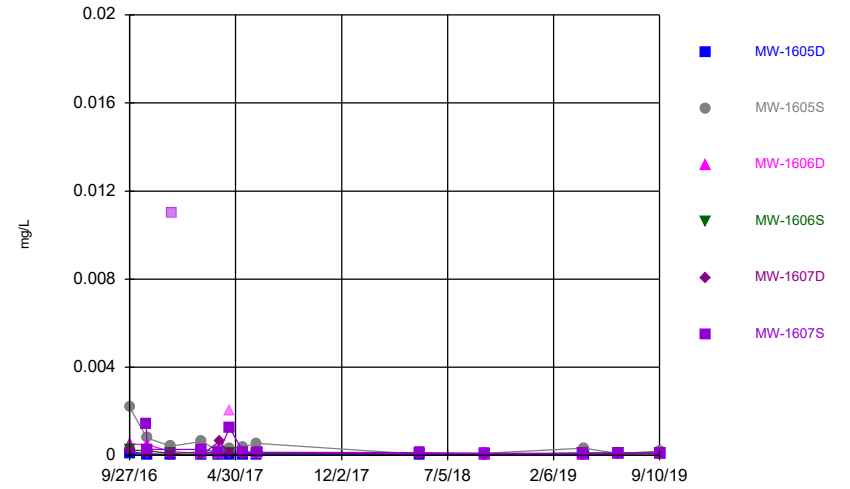
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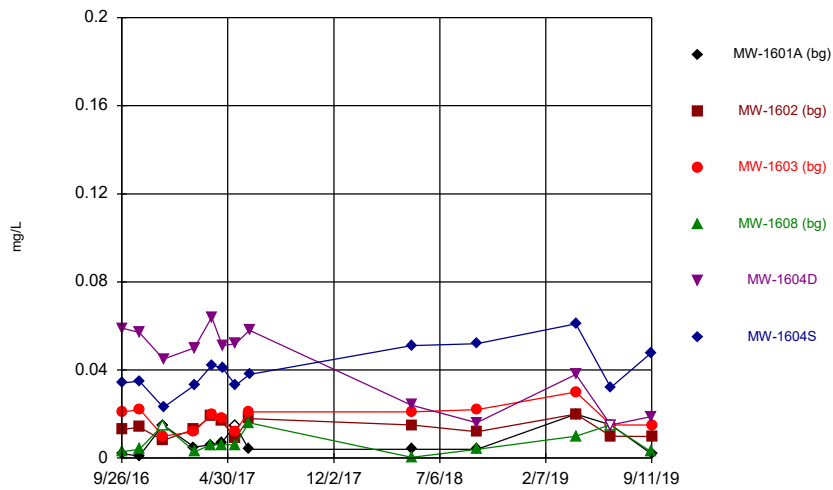
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Time Series



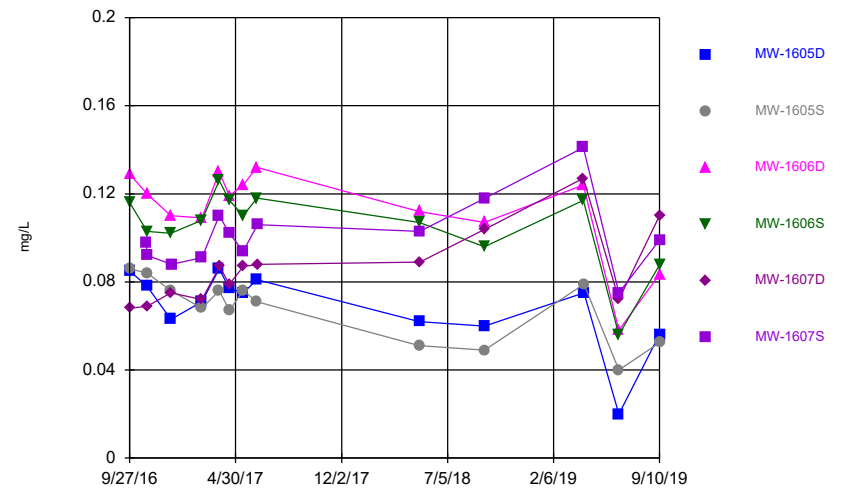
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Time Series



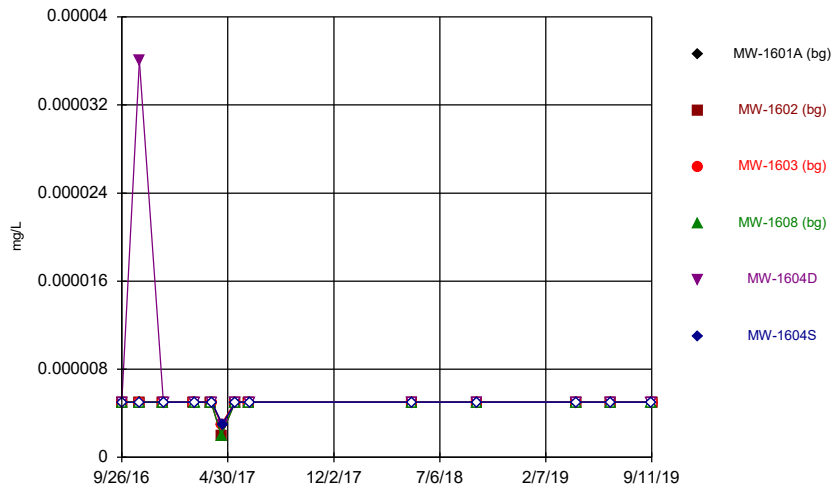
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Time Series



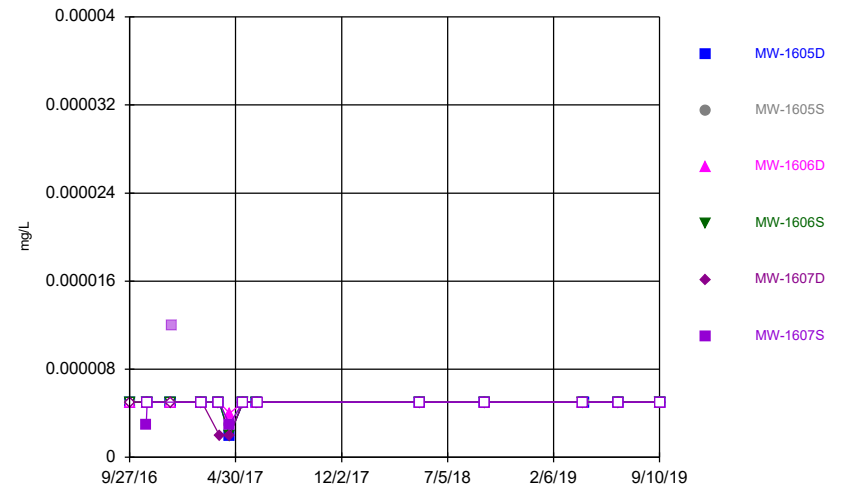
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Time Series



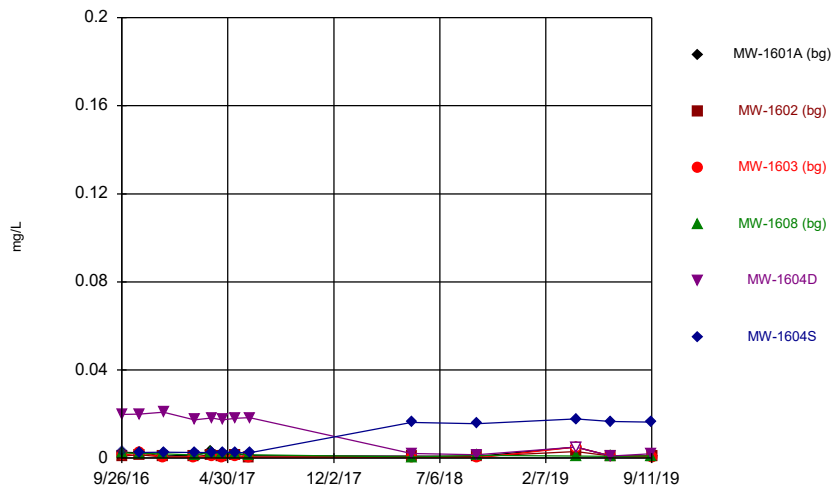
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Time Series



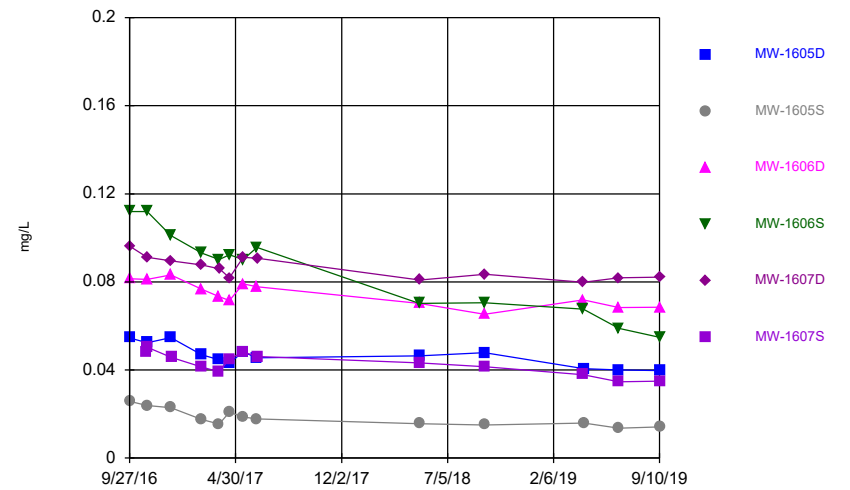
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Time Series



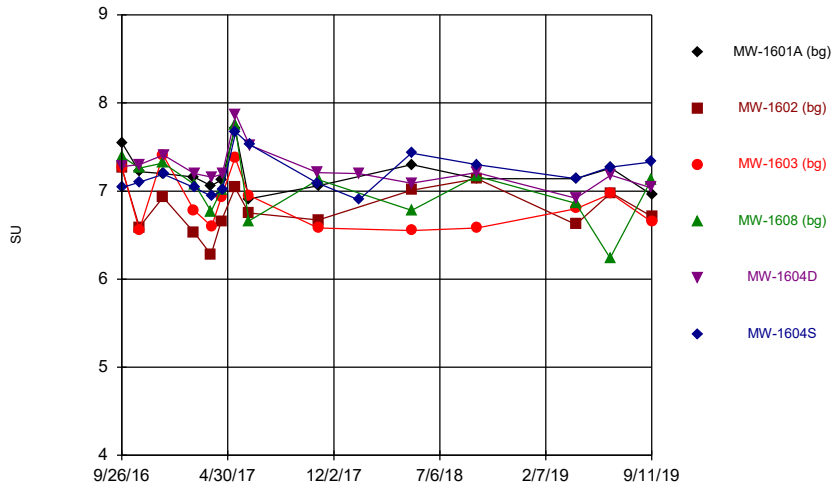
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Time Series



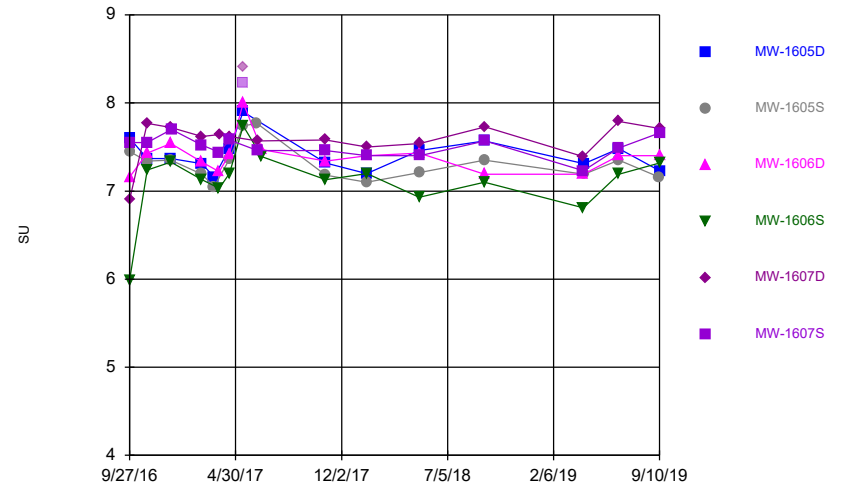
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Time Series



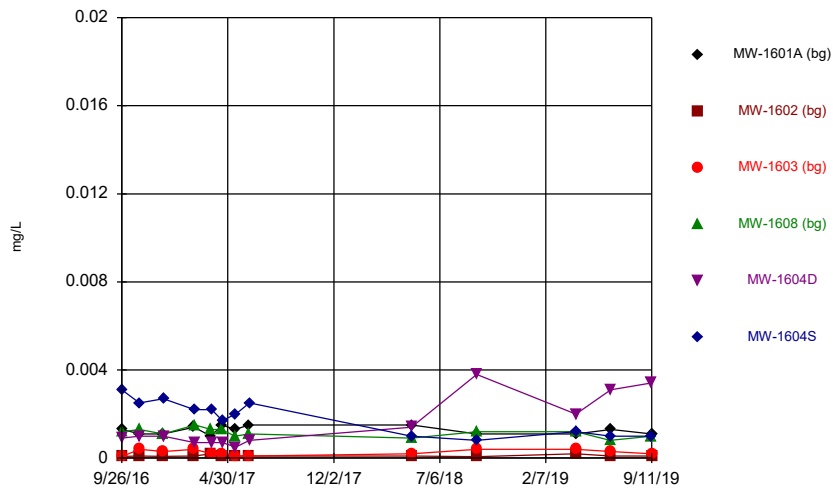
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Time Series



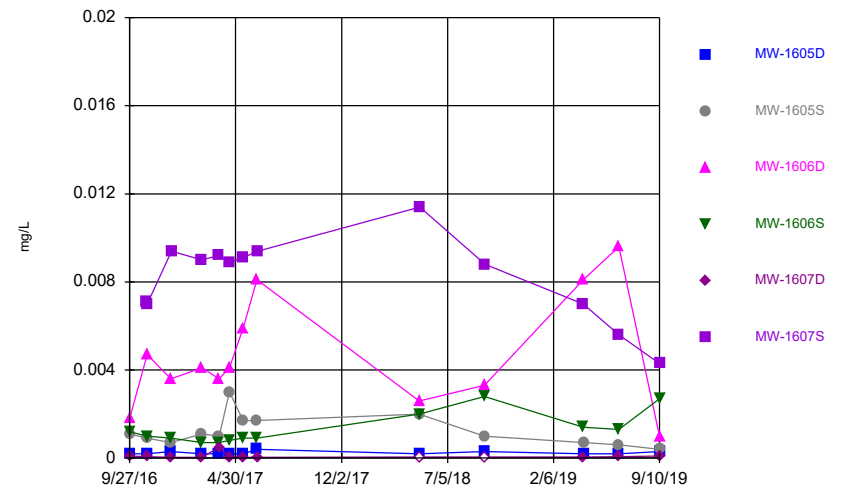
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Time Series



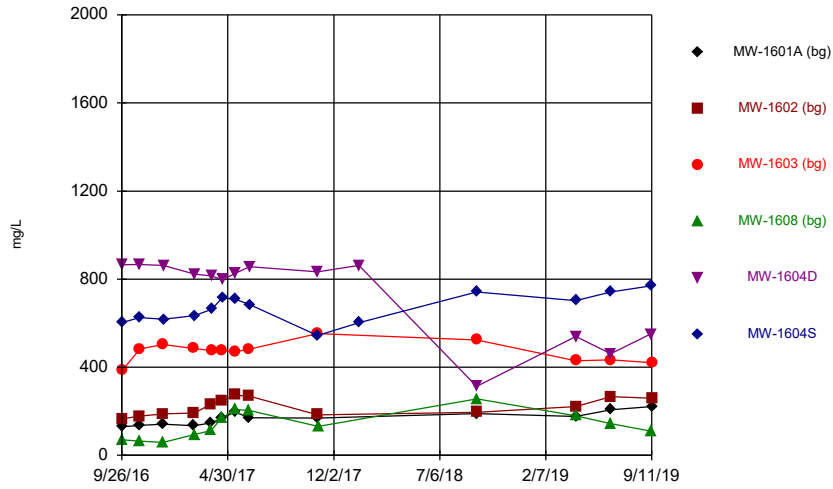
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Time Series



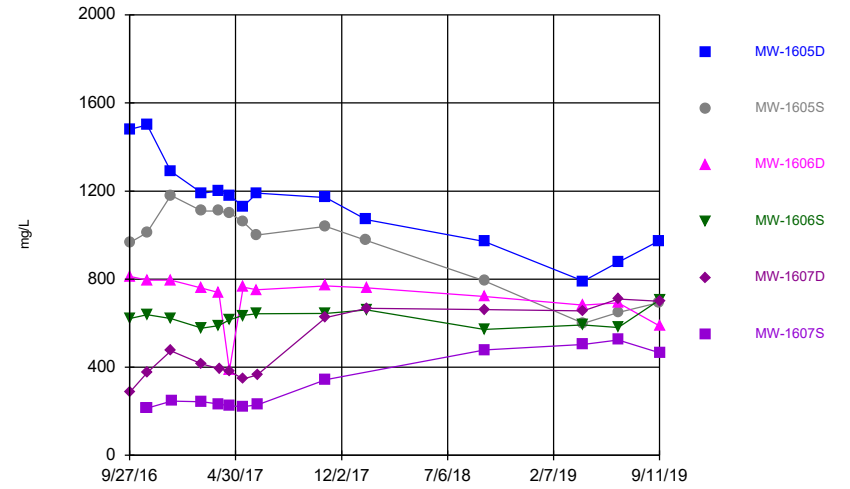
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Time Series



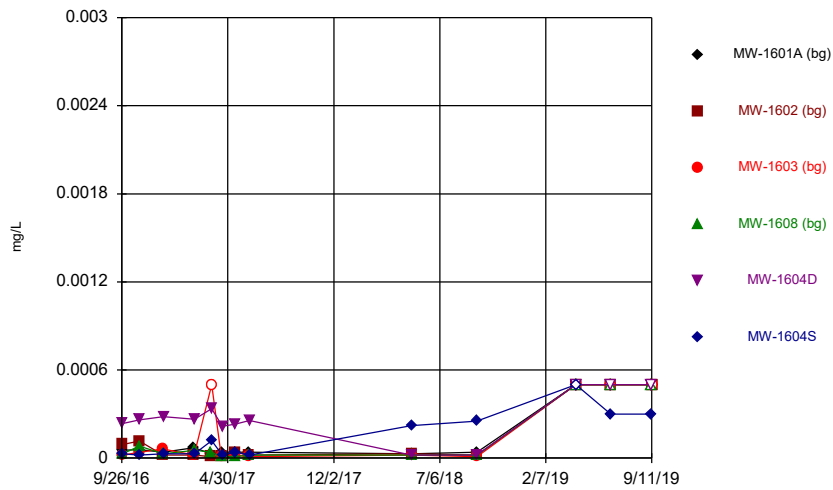
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Time Series



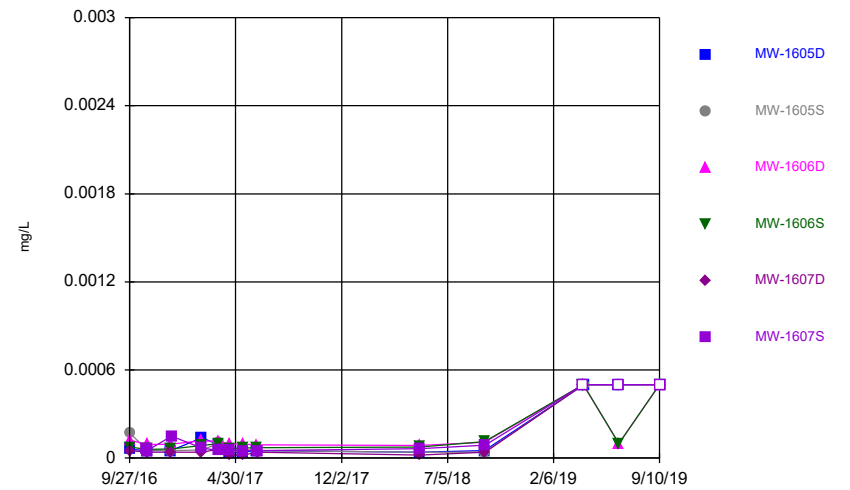
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Time Series



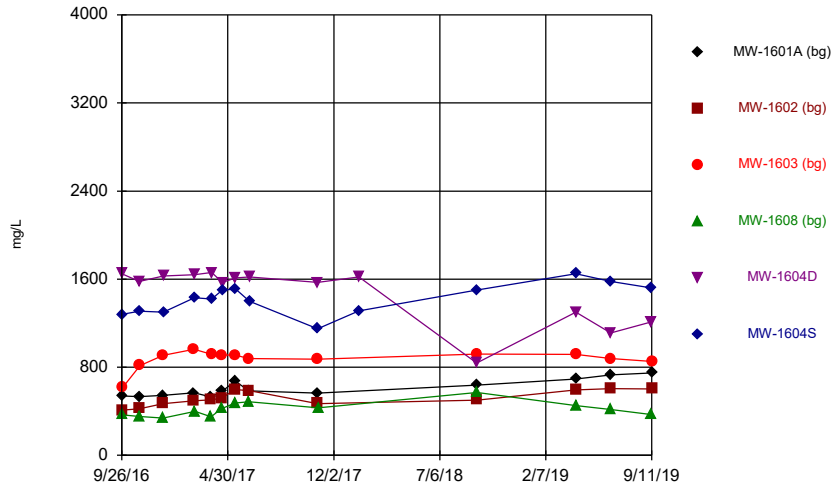
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Time Series



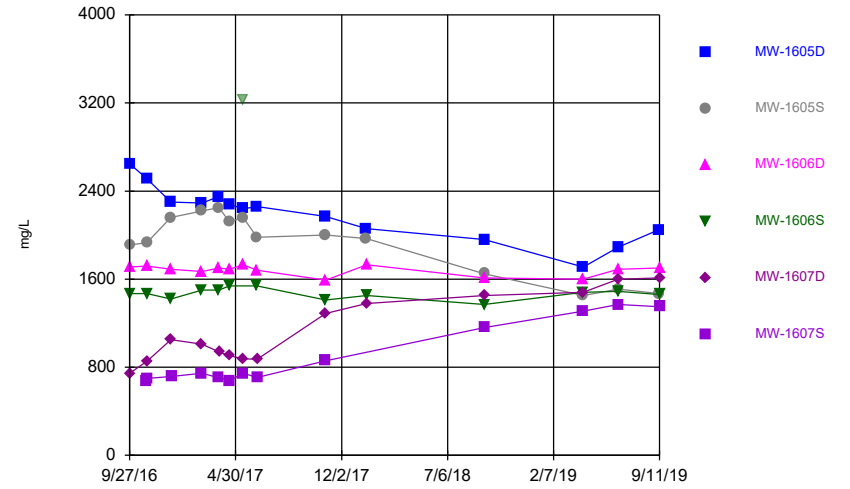
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Time Series



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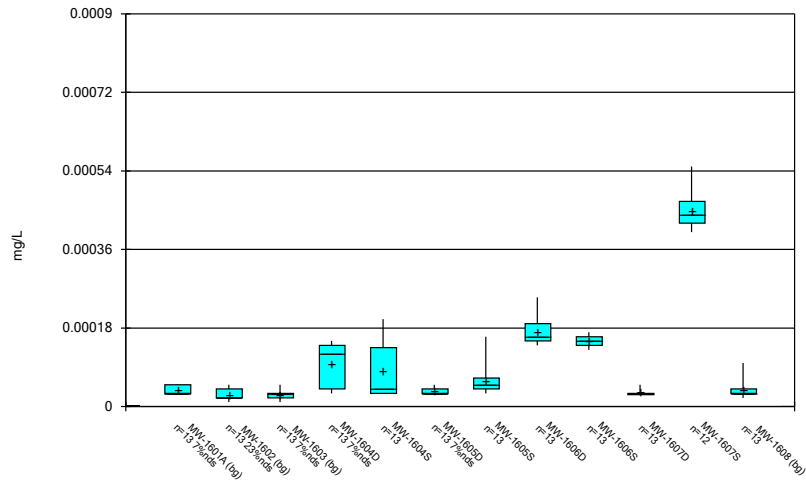
Time Series



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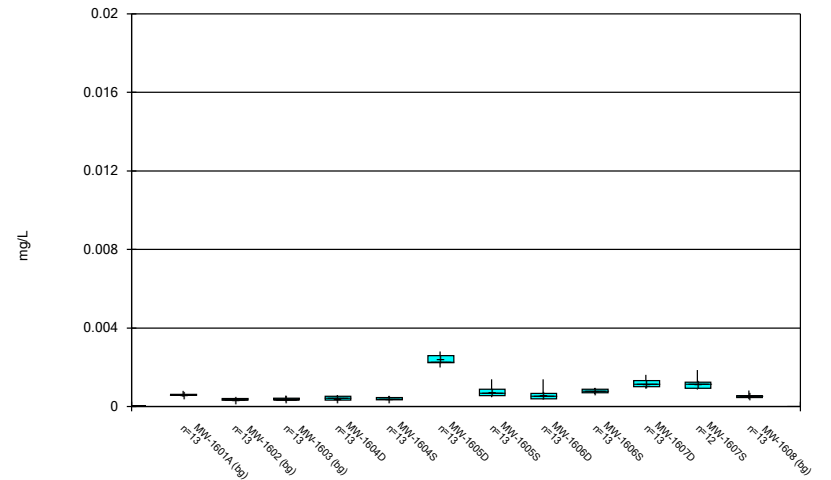
FIGURE B: BOX PLOTS

Box & Whiskers Plot



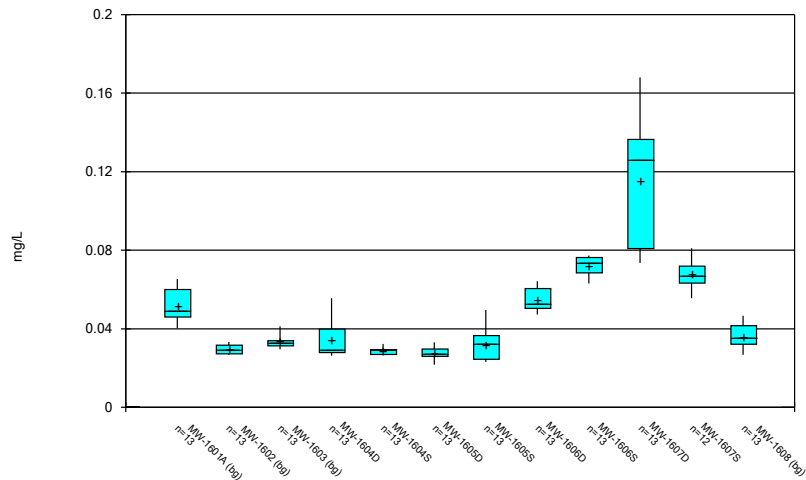
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Box & Whiskers Plot



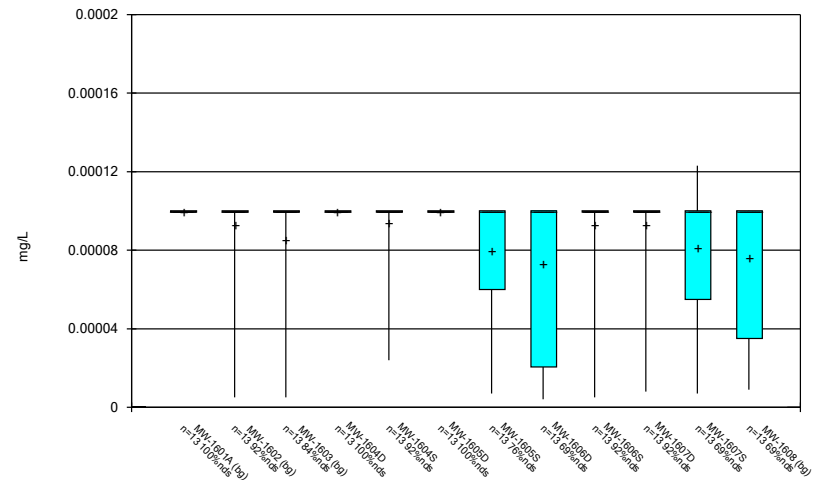
Constituent: Arsenic, total Analysis Run 11/25/2019 1:15 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Box & Whiskers Plot



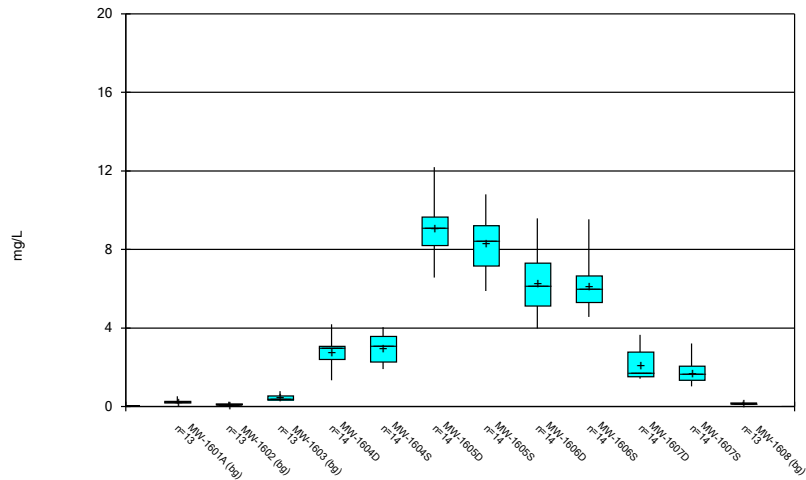
Constituent: Barium, total Analysis Run 11/25/2019 1:15 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Box & Whiskers Plot



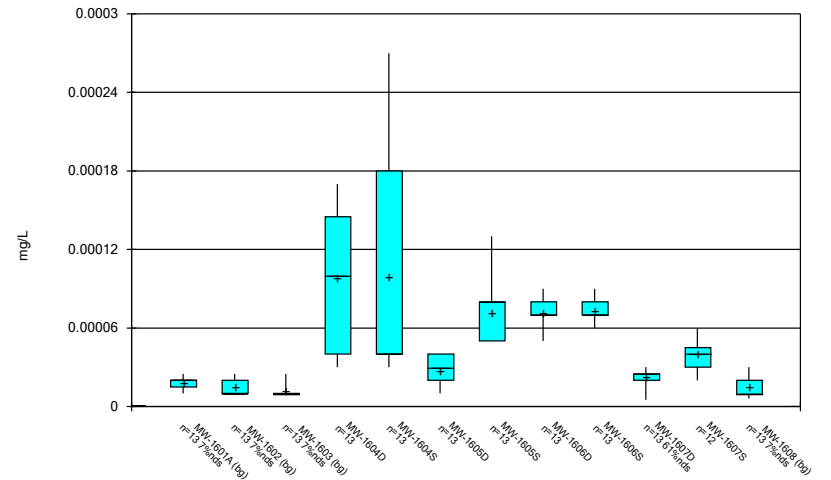
Constituent: Beryllium, total Analysis Run 11/25/2019 1:15 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Box & Whiskers Plot



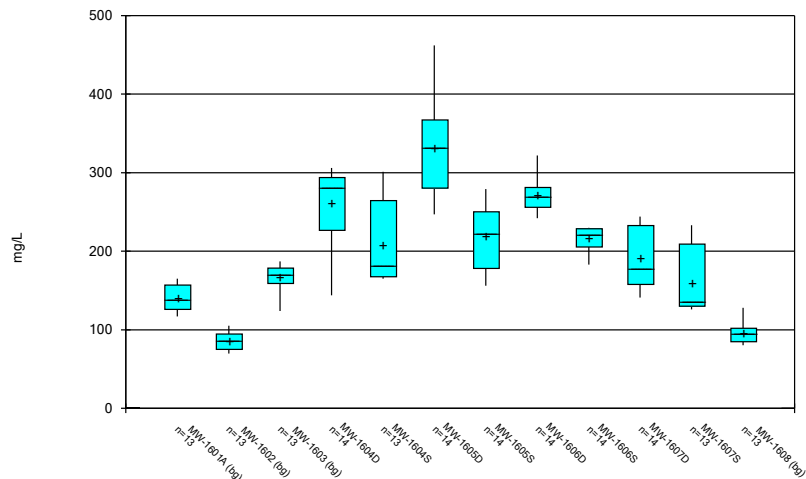
Constituent: Boron, total Analysis Run 11/25/2019 1:15 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Box & Whiskers Plot



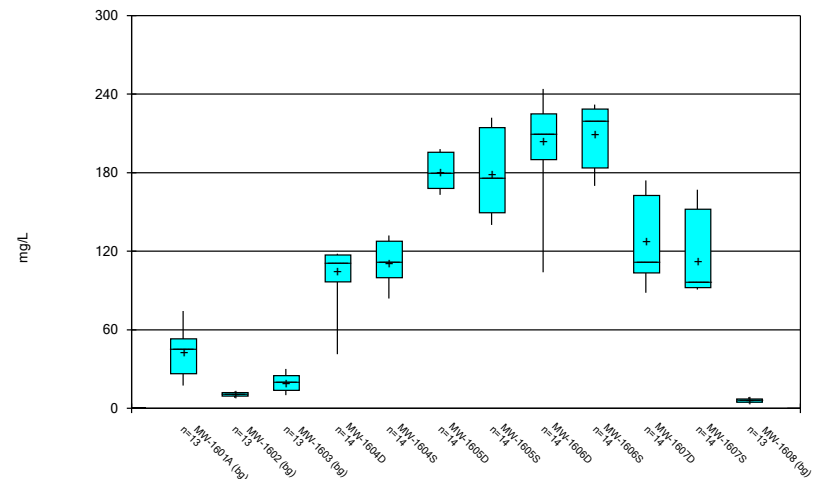
Constituent: Cadmium, total Analysis Run 11/25/2019 1:15 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Box & Whiskers Plot



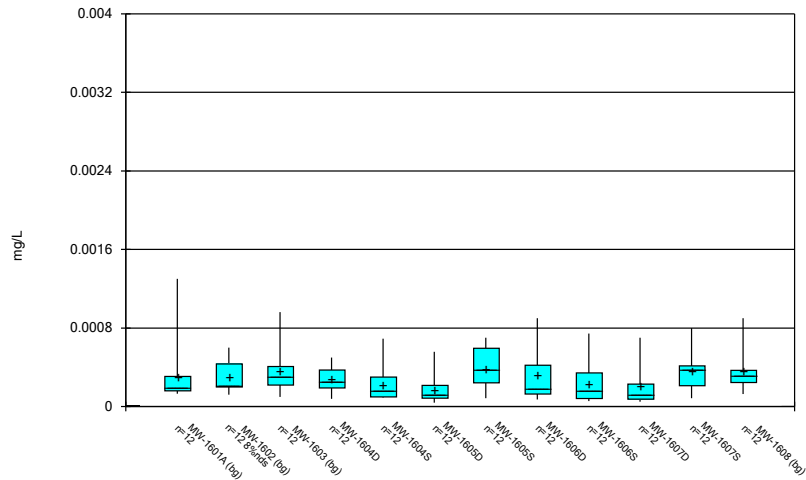
Constituent: Calcium, total Analysis Run 11/25/2019 1:15 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Box & Whiskers Plot



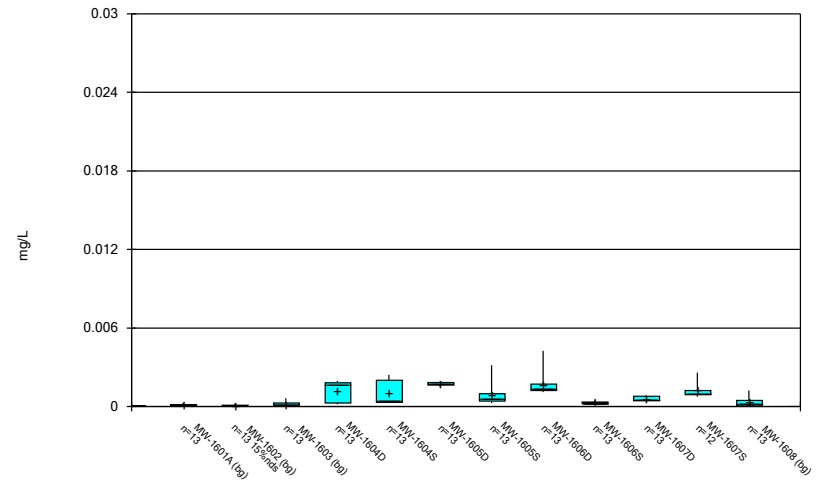
Constituent: Chloride, total Analysis Run 11/25/2019 1:15 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Box & Whiskers Plot



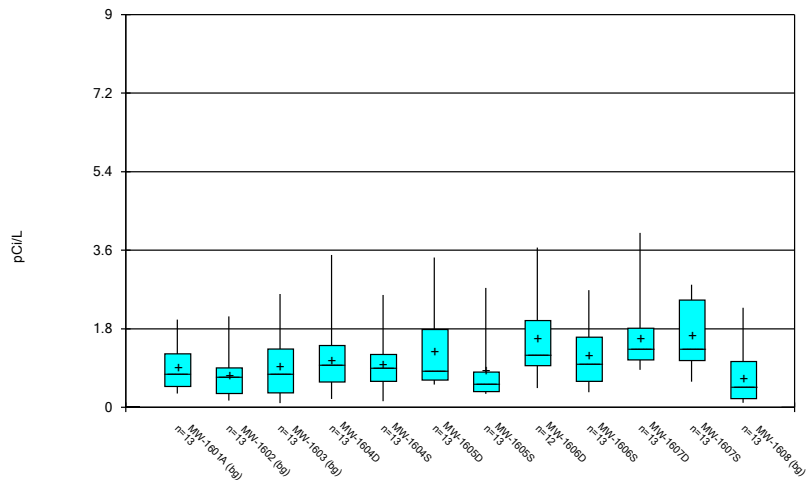
Constituent: Chromium, total Analysis Run 11/25/2019 1:15 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Box & Whiskers Plot



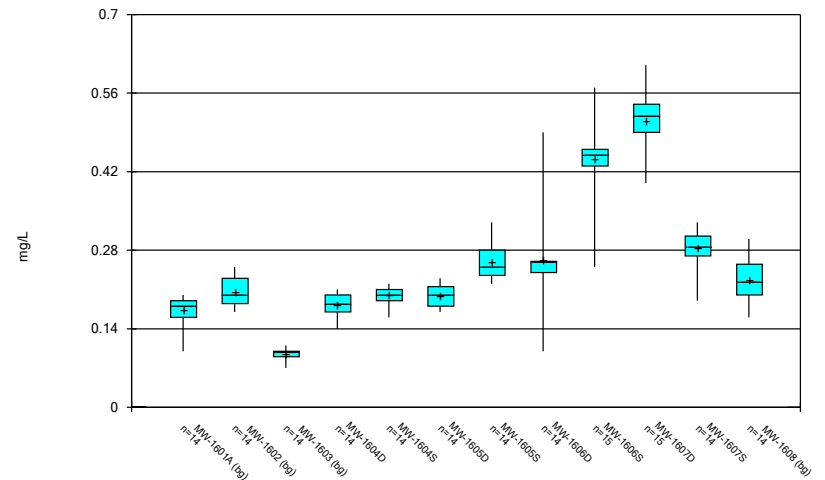
Constituent: Cobalt, total Analysis Run 11/25/2019 1:15 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Box & Whiskers Plot



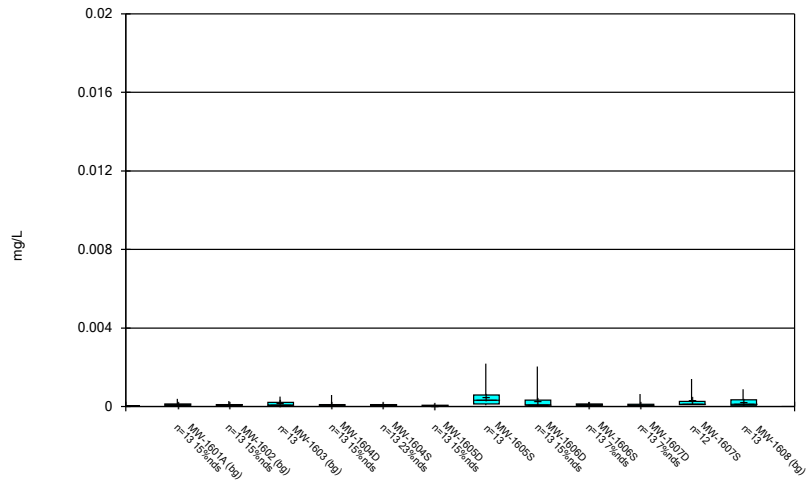
Constituent: Combined Radium 226 + 228 Analysis Run 11/25/2019 1:15 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Box & Whiskers Plot



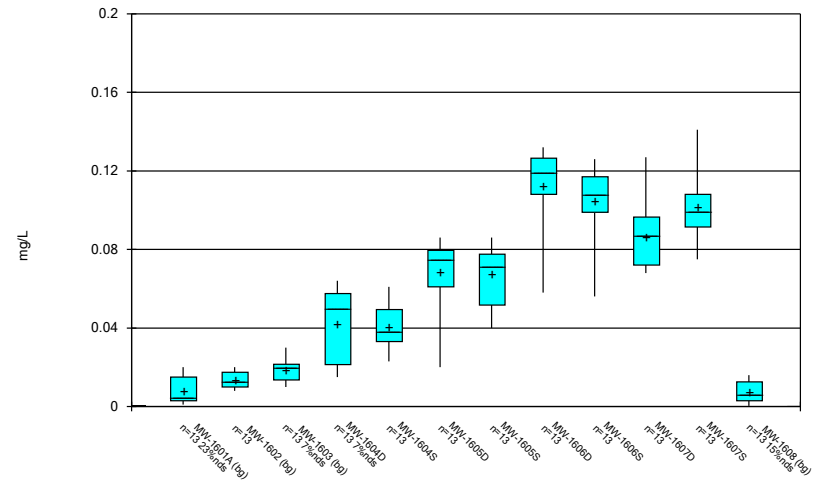
Constituent: Fluoride, total Analysis Run 11/25/2019 1:15 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Box & Whiskers Plot



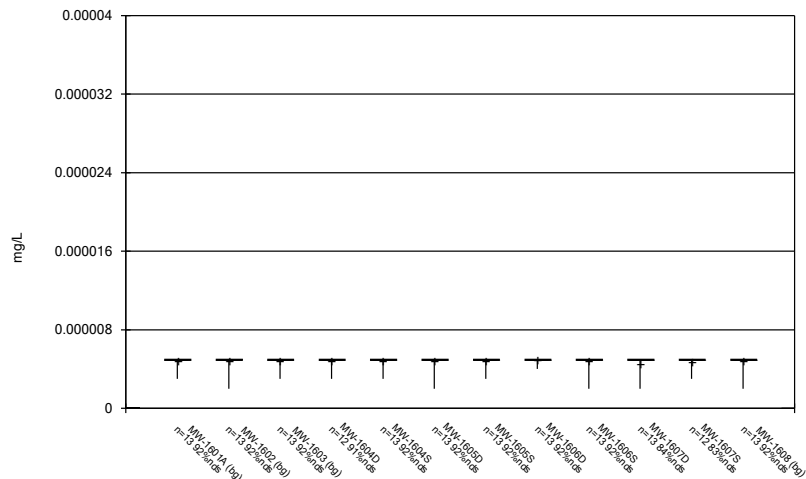
Constituent: Lead, total Analysis Run 11/25/2019 1:15 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Box & Whiskers Plot



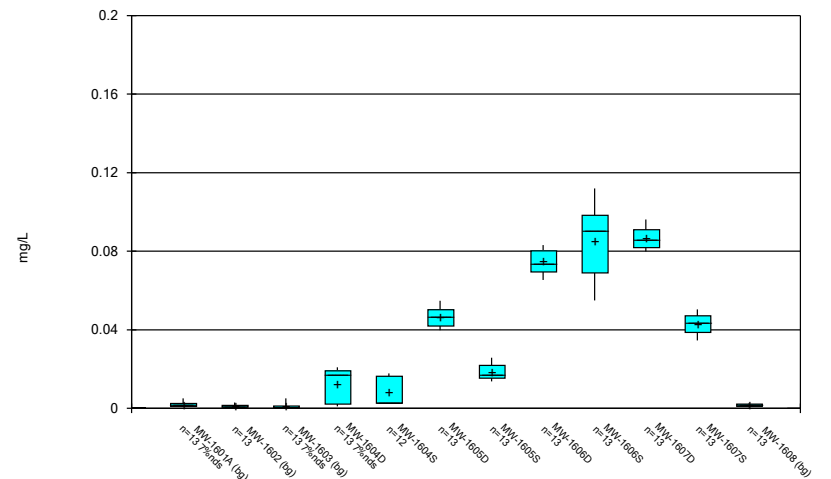
Constituent: Lithium, total Analysis Run 11/25/2019 1:15 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Box & Whiskers Plot



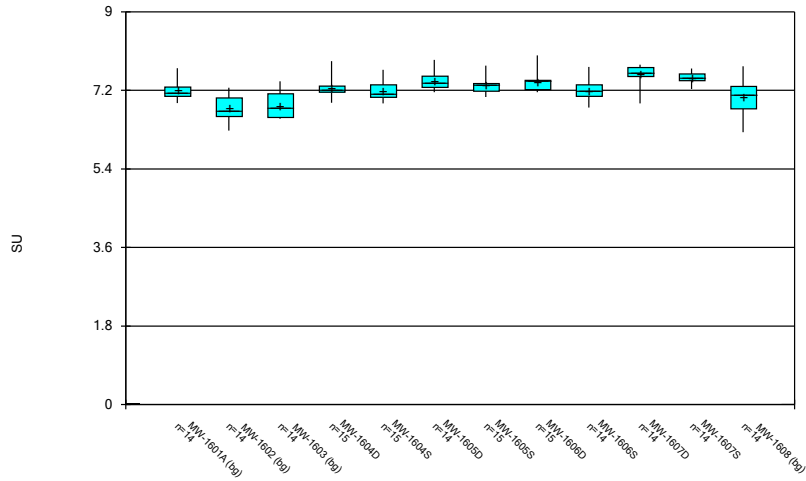
Constituent: Mercury, total Analysis Run 11/25/2019 1:15 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Box & Whiskers Plot



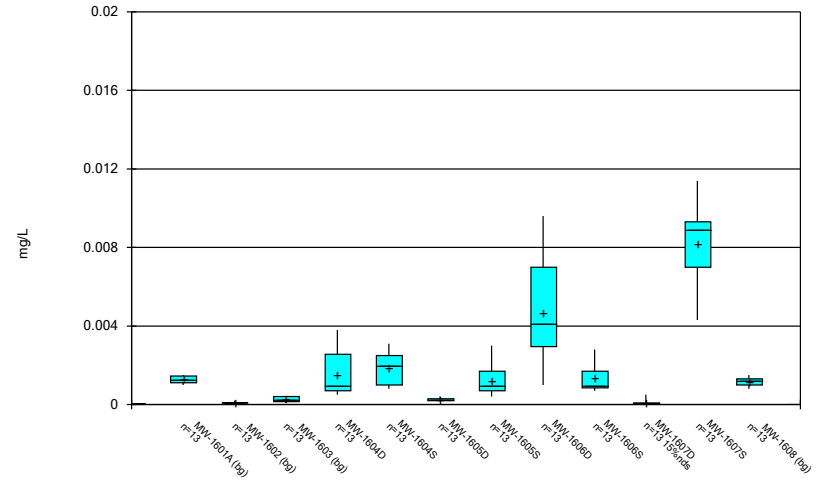
Constituent: Molybdenum, total Analysis Run 11/25/2019 1:15 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Box & Whiskers Plot



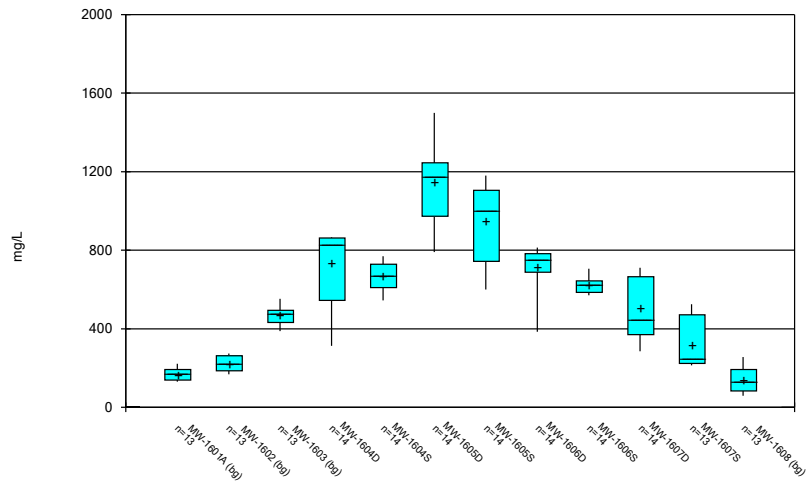
Constituent: pH, field Analysis Run 11/25/2019 1:15 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Box & Whiskers Plot



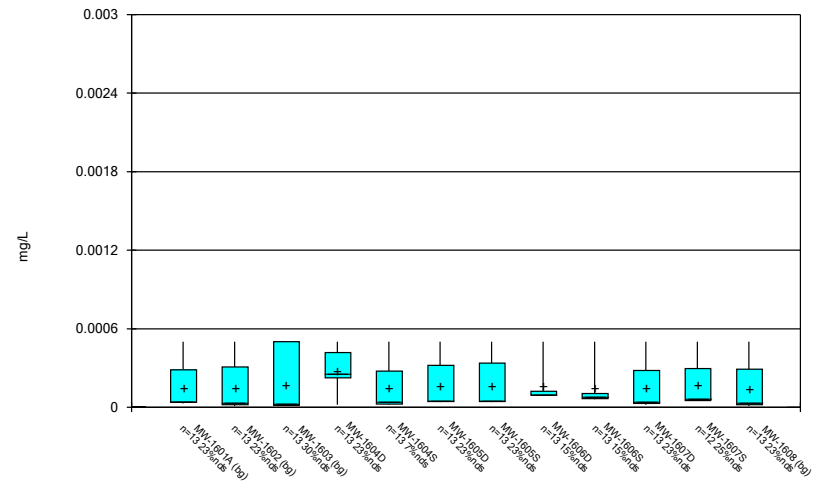
Constituent: Selenium, total Analysis Run 11/25/2019 1:15 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Box & Whiskers Plot



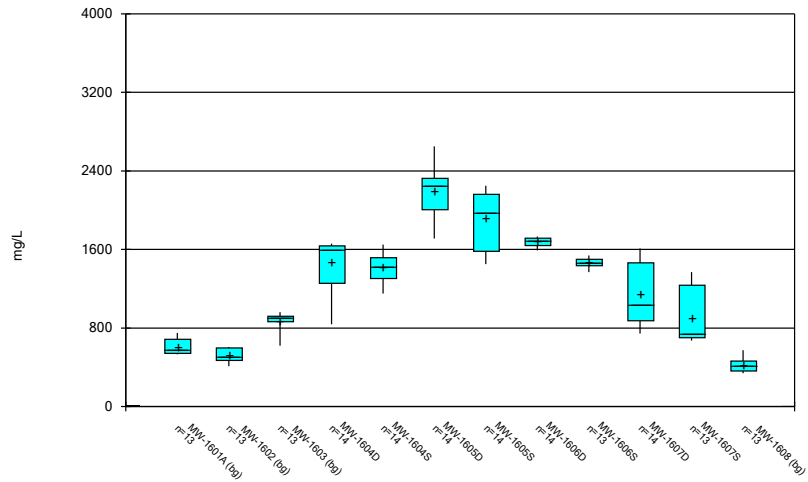
Constituent: Sulfate, total Analysis Run 11/25/2019 1:15 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Box & Whiskers Plot



Constituent: Thallium, total Analysis Run 11/25/2019 1:15 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Box & Whiskers Plot



Constituent: Total Dissolved Solids [TDS] Analysis Run 11/25/2019 1:15 PM

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

FIGURE C: OUTLIER SUMMARY

Outlier Summary

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 12/1/2019, 9:58 AM

MW-1607S Arsenic, total (mg/L)
 MW-1607S Barium, total (mg/L)
 MW-1601A Chromium, total (mg/L)
 MW-1602 Chromium, total (mg/L)
 MW-1603 Chromium, total (mg/L)
 MW-1608 Chromium, total (mg/L)
 MW-1604S Chromium, total (mg/L)
 MW-1605D Chromium, total (mg/L)
 MW-1605S Chromium, total (mg/L)
 MW-1607D Chromium, total (mg/L)

Date	MW-1607S Arsenic, total (mg/L)	MW-1607S Barium, total (mg/L)	MW-1601A Chromium, total (mg/L)	MW-1602 Chromium, total (mg/L)	MW-1603 Chromium, total (mg/L)	MW-1608 Chromium, total (mg/L)	MW-1604S Chromium, total (mg/L)	MW-1605D Chromium, total (mg/L)	MW-1605S Chromium, total (mg/L)	MW-1607D Chromium, total (mg/L)
9/26/2016										
9/27/2016										
11/1/2016			0.0013 (o)							
12/19/2016				0.00165 (o)	0.00237 (o)	0.00278 (o)				
12/20/2016							0.00197 (o)	0.00229 (o)	0.00285 (o)	0.00207 (o)
12/21/2016	0.0112 (o)	0.114 (o)								
4/18/2017										
5/16/2017										

MW-1607S Chromium, total (mg/L)
 MW-1607S Cobalt, total (mg/L)
 MW-1604S Combined Radium 226 + 228 (pCi/L)
 MW-1606D Combined Radium 226 + 228 (pCi/L)
 MW-1606D Lead, total (mg/L)
 MW-1607S Lead, total (mg/L)
 MW-1607S Mercury, total (mg/L)
 MW-1604S Molybdenum, total (mg/L)
 MW-1607D pH, field (SU)
 MW-1607S pH, field (SU)

Date	MW-1607S Chromium, total (mg/L)	MW-1607S Cobalt, total (mg/L)	MW-1604S Combined Radium 226 + 228 (pCi/L)	MW-1606D Combined Radium 226 + 228 (pCi/L)	MW-1606D Lead, total (mg/L)	MW-1607S Lead, total (mg/L)	MW-1607S Mercury, total (mg/L)	MW-1604S Molybdenum, total (mg/L)	MW-1607D pH, field (SU)	MW-1607S pH, field (SU)
9/26/2016										
9/27/2016										
11/1/2016										
12/19/2016										
12/20/2016										
12/21/2016	0.0031 (o)	0.0201 (o)				0.011 (o)	1.2E-05 (o)			
4/18/2017					0.00204 (o)					
5/16/2017								8.41 (o)	8.23 (o)	

MW-1606S Total Dissolved Solids [TDS] (mg/L)

Date	MW-1606S Total Dissolved Solids [TDS] (mg/L)
9/26/2016	
9/27/2016	
11/1/2016	
12/19/2016	
12/20/2016	
12/21/2016	
4/18/2017	
5/16/2017	3230 (o)

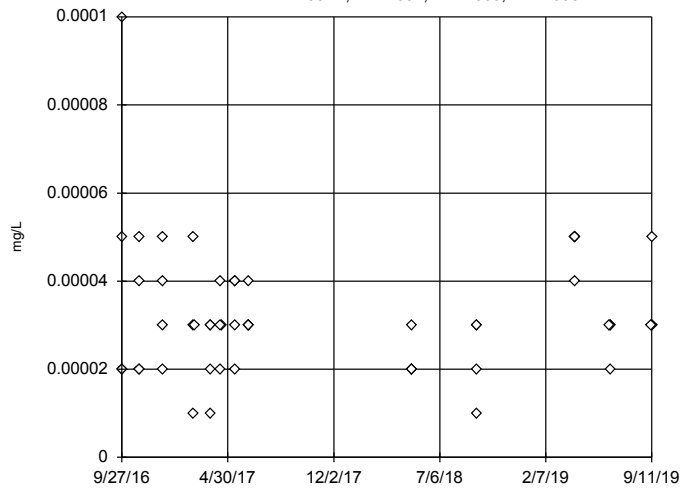
Upgradient Outlier Analysis - All Results (No Significant Results)

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 11/25/2019, 3:35 PM

Constituent	Well	Outlier	Value(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Antimony, total (mg/L)	MW-1601A,MW-1602,...	No	n/a	NP	NaN	52	0.00003212	0.00001473	In(x)	ShapiroFrancia
Arsenic, total (mg/L)	MW-1601A,MW-1602,...	No	n/a	NP	NaN	52	0.0004713	0.000129	In(x)	ShapiroFrancia
Barium, total (mg/L)	MW-1601A,MW-1602,...	No	n/a	NP	NaN	52	0.03761	0.01006	In(x)	ShapiroFrancia
Beryllium, total (mg/L)	MW-1601A,MW-1602,...	n/a	n/a	NP	NaN	52	0.00008856	0.00002982	unknown	ShapiroFrancia
Boron, total (mg/L)	MW-1601A,MW-1602,...	No	n/a	NP	NaN	52	0.2418	0.1525	In(x)	ShapiroFrancia
Cadmium, total (mg/L)	MW-1601A,MW-1602,...	No	n/a	NP	NaN	52	0.00001465	0.0000061	In(x)	ShapiroFrancia
Calcium, total (mg/L)	MW-1601A,MW-1602,...	No	n/a	NP	NaN	52	121.8	35.97	In(x)	ShapiroFrancia
Chloride, total (mg/L)	MW-1601A,MW-1602,...	No	n/a	NP	NaN	52	19.75	16.83	In(x)	ShapiroFrancia
Chromium, total (mg/L)	MW-1601A,MW-1602,...	No	n/a	NP	NaN	52	0.0004463	0.0005233	In(x)	ShapiroFrancia
Cobalt, total (mg/L)	MW-1601A,MW-1602,...	No	n/a	NP	NaN	52	0.0001664	0.0002052	In(x)	ShapiroFrancia
Combined Radium 226 + 228 (pCi/L)	MW-1601A,MW-1602,...	No	n/a	NP	NaN	52	0.8155	0.6349	In(x)	ShapiroFrancia
Fluoride, total (mg/L)	MW-1601A,MW-1602,...	No	n/a	NP	NaN	56	0.1741	0.05624	x^2	ShapiroFrancia
Lead, total (mg/L)	MW-1601A,MW-1602,...	No	n/a	NP	NaN	52	0.0001446	0.0001551	In(x)	ShapiroFrancia
Lithium, total (mg/L)	MW-1601A,MW-1602,...	No	n/a	NP	NaN	52	0.01169	0.006974	sqrt(x)	ShapiroFrancia
Mercury, total (mg/L)	MW-1601A,MW-1602,...	n/a	n/a	NP	NaN	52	0.000004808	6.9e-7	unknown	ShapiroFrancia
Molybdenum, total (mg/L)	MW-1601A,MW-1602,...	No	n/a	NP	NaN	52	0.001362	0.00104	x^(1/3)	ShapiroFrancia
Selenium, total (mg/L)	MW-1601A,MW-1602,...	No	n/a	NP	NaN	52	0.000691	0.0005369	sqrt(x)	ShapiroFrancia
Sulfate, total (mg/L)	MW-1601A,MW-1602,...	No	n/a	NP	NaN	52	249.7	139.5	In(x)	ShapiroFrancia
Thallium, total (mg/L)	MW-1601A,MW-1602,...	No	n/a	NP	NaN	52	0.0001509	0.0002046	In(x)	ShapiroFrancia
Total Dissolved Solids [TDS] (mg/L)	MW-1601A,MW-1602,...	No	n/a	NP	NaN	52	605.8	185.6	In(x)	ShapiroFrancia

Tukey's Outlier Screening, Pooled Background

MW-1601A,MW-1602,MW-1603,MW-1608

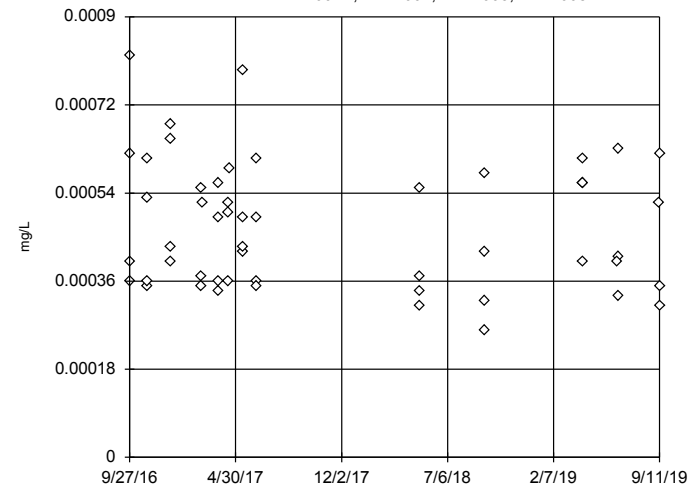


n = 52
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.00032,
 low cutoff = 0.000025,
 based on IQR multiplier of 3.

Constituent: Antimony, total Analysis Run 11/25/2019 3:33 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening, Pooled Background

MW-1601A,MW-1602,MW-1603,MW-1608

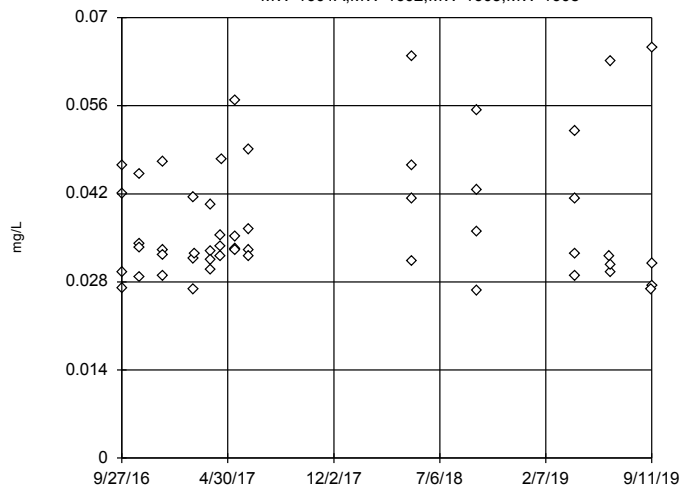


n = 52
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.002108,
 low cutoff = 0.00009564,
 based on IQR multiplier of 3.

Constituent: Arsenic, total Analysis Run 11/25/2019 3:33 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening, Pooled Background

MW-1601A,MW-1602,MW-1603,MW-1608

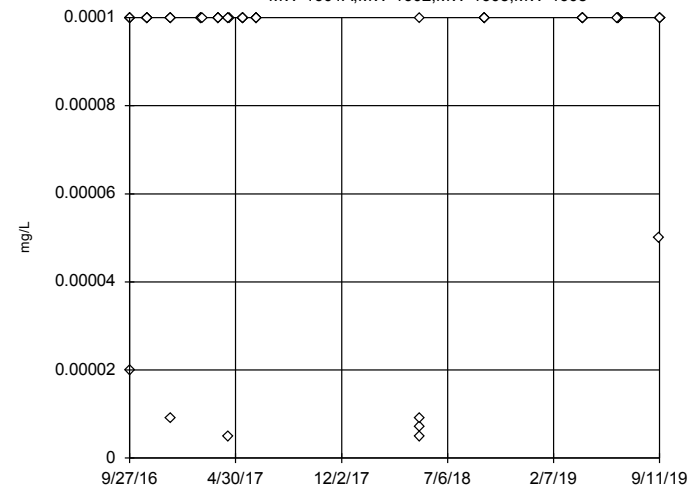


n = 52
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.1069,
 low cutoff = 0.01228,
 based on IQR multiplier of 3.

Constituent: Barium, total Analysis Run 11/25/2019 3:33 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening, Pooled Background

MW-1601A,MW-1602,MW-1603,MW-1608

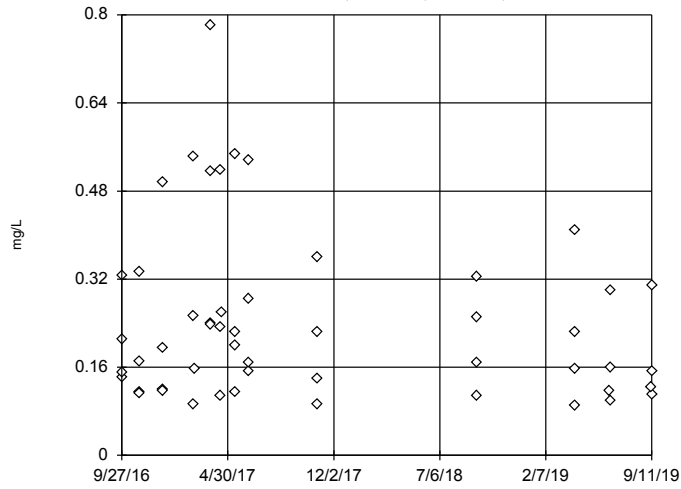


n = 52
 No outliers found.
 Tukey's method selected by user.
 Ladder of Powers transformations did not improve normality, analysis run on raw data.
 The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Beryllium, total Analysis Run 11/25/2019 3:33 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening, Pooled Background

MW-1601A,MW-1602,MW-1603,MW-1608

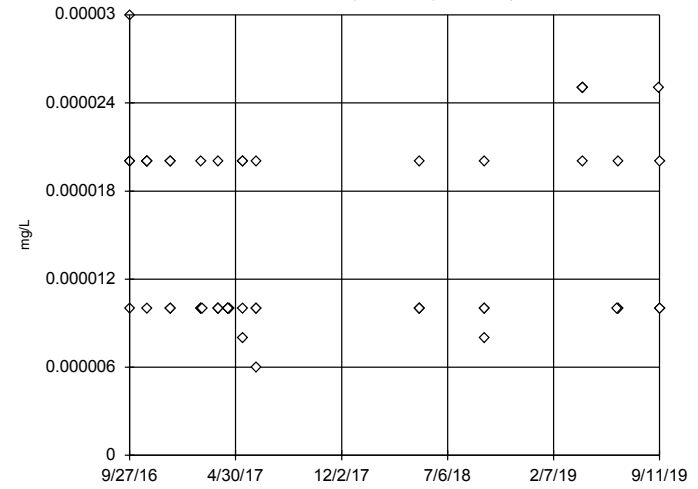


n = 52
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 4.672, low cutoff = 0.007923, based on IQR multiplier of 3.

Constituent: Boron, total Analysis Run 11/25/2019 3:33 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening, Pooled Background

MW-1601A,MW-1602,MW-1603,MW-1608

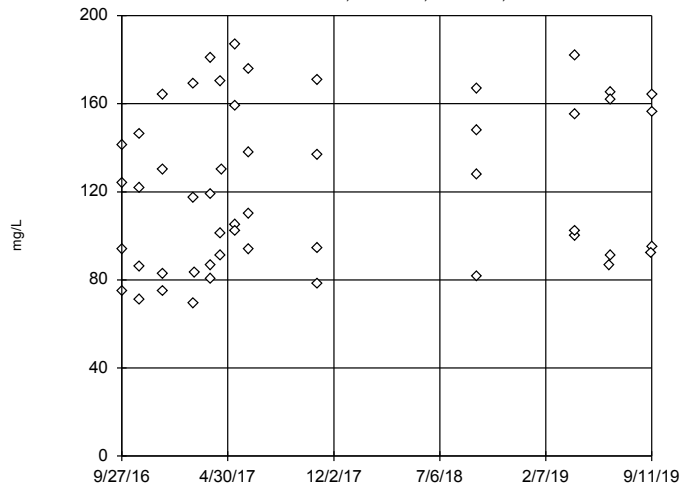


n = 52
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.00016, low cutoff = 0.00000125, based on IQR multiplier of 3.

Constituent: Cadmium, total Analysis Run 11/25/2019 3:33 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening, Pooled Background

MW-1601A,MW-1602,MW-1603,MW-1608

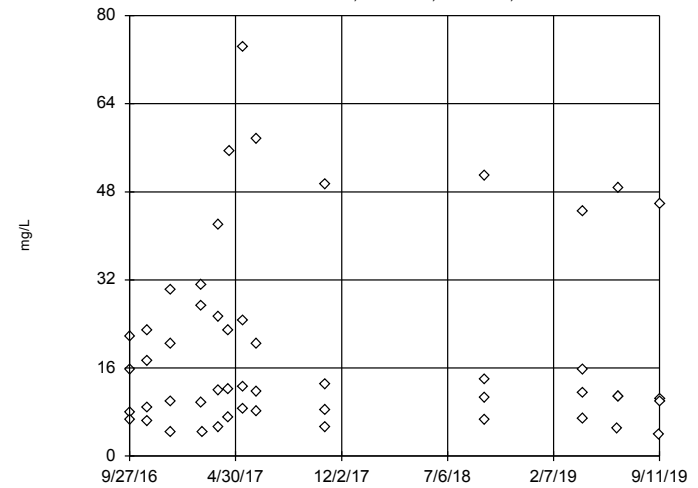


n = 52
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 812.4, low cutoff = 17.67, based on IQR multiplier of 3.

Constituent: Calcium, total Analysis Run 11/25/2019 3:33 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening, Pooled Background

MW-1601A,MW-1602,MW-1603,MW-1608

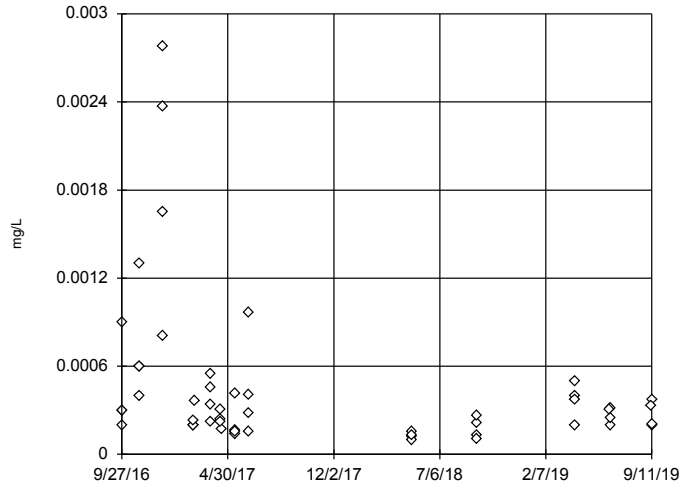


n = 52
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 672.8, low cutoff = 0.3085, based on IQR multiplier of 3.

Constituent: Chloride, total Analysis Run 11/25/2019 3:33 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening, Pooled Background

MW-1601A,MW-1602,MW-1603,MW-1608

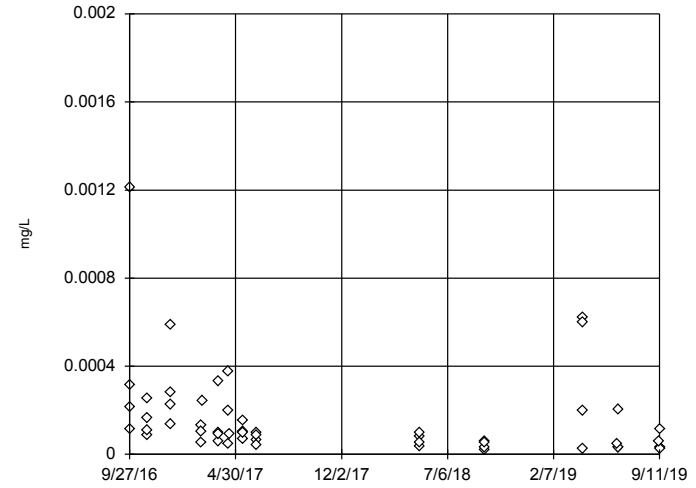


n = 52
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.003638, low cutoff = 0.0002251, based on IQR multiplier of 3.

Constituent: Chromium, total Analysis Run 11/25/2019 3:33 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening, Pooled Background

MW-1601A,MW-1602,MW-1603,MW-1608

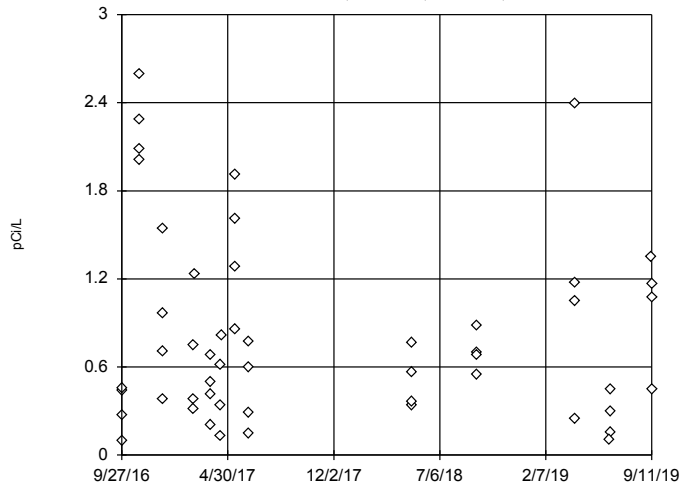


n = 52
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.01119, low cutoff = 9.6e-7, based on IQR multiplier of 3.

Constituent: Cobalt, total Analysis Run 11/25/2019 3:33 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening, Pooled Background

MW-1601A,MW-1602,MW-1603,MW-1608

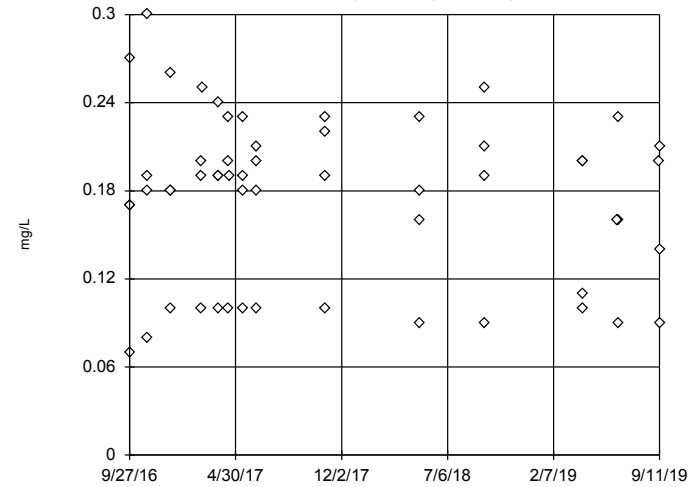


n = 52
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 35.71, low cutoff = 0.01103, based on IQR multiplier of 3.

Constituent: Combined Radium 226 + 228 Analysis Run 11/25/2019 3:33 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening, Pooled Background

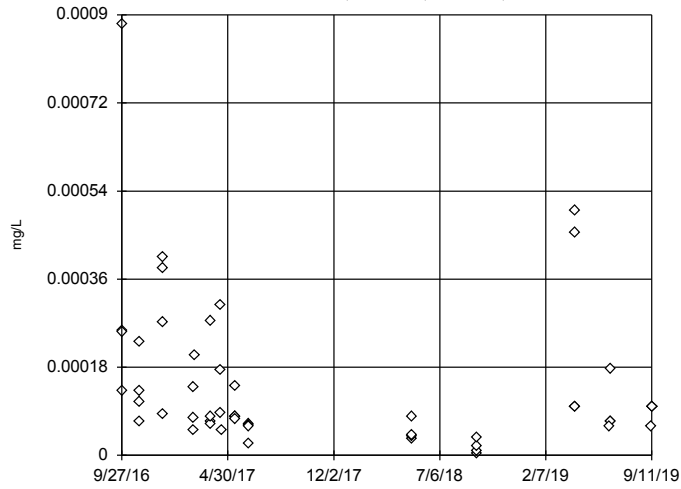
MW-1601A,MW-1602,MW-1603,MW-1608



n = 56
 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 = 0.3785, low cutoff = -0.2968, based on IQR multiplier of 3.

Constituent: Fluoride, total Analysis Run 11/25/2019 3:33 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

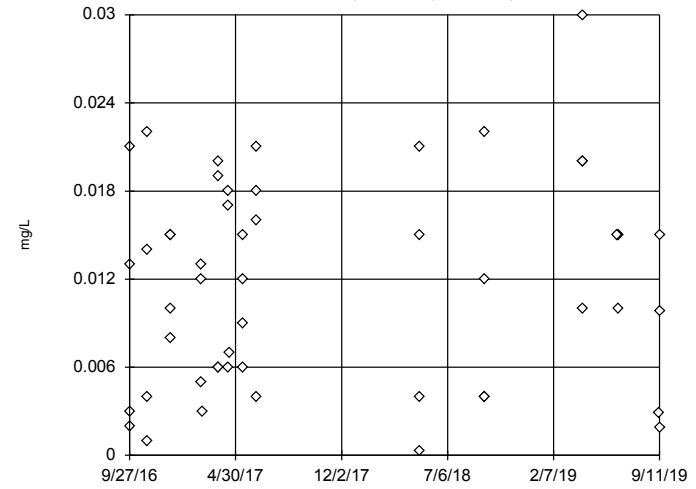
Tukey's Outlier Screening, Pooled Background MW-1601A,MW-1602,MW-1603,MW-1608



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 = 0.004187,
 low cutoff = 0.00002521,
 based on IQR multiplier of 3.

Constituent: Lead, total Analysis Run 11/25/2019 3:33 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

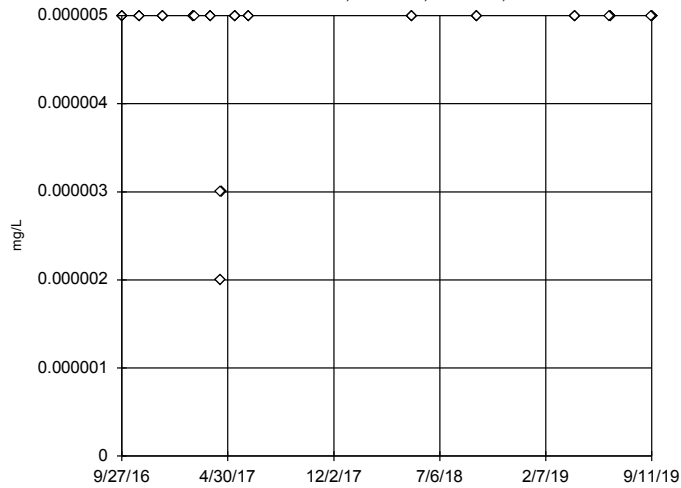
Tukey's Outlier Screening, Pooled Background MW-1601A,MW-1602,MW-1603,MW-1608



n = 52
 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 = 0.08497,
 low cutoff = -0.007916,
 based on IQR multiplier of 3.

Constituent: Lithium, total Analysis Run 11/25/2019 3:33 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

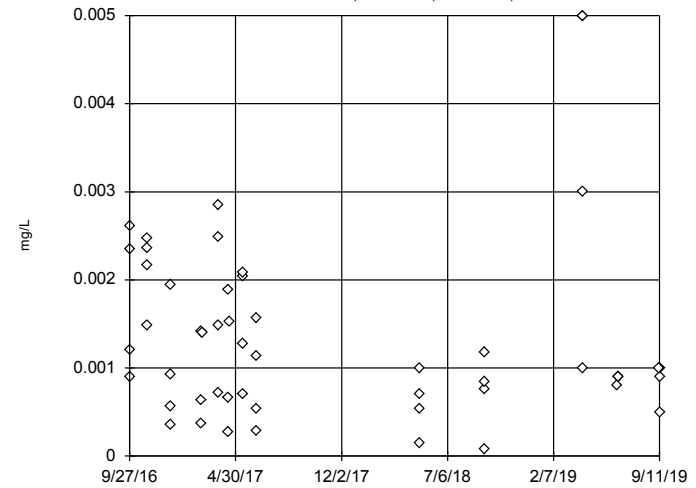
Tukey's Outlier Screening, Pooled Background MW-1601A,MW-1602,MW-1603,MW-1608



n = 52
 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 11/25/2019 3:33 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening, Pooled Background MW-1601A,MW-1602,MW-1603,MW-1608

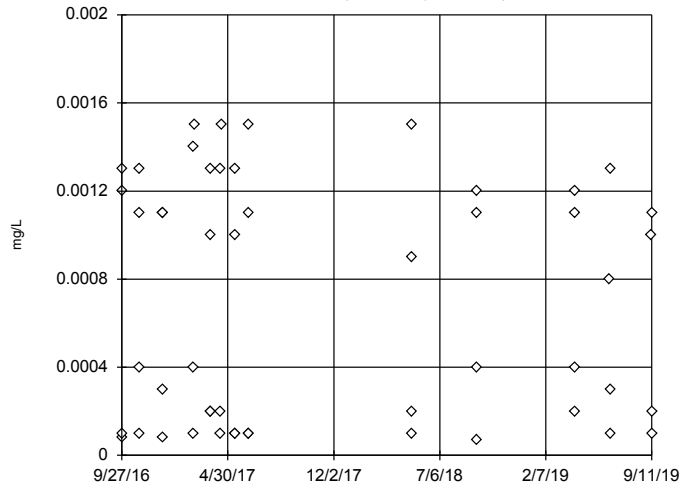


n = 52
 No outliers found.
 Tukey's method selected by user.
 Data were cube root transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.01202,
 low cutoff = -0.00003864,
 based on IQR multiplier of 3.

Constituent: Molybdenum, total Analysis Run 11/25/2019 3:33 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening, Pooled Background

MW-1601A,MW-1602,MW-1603,MW-1608

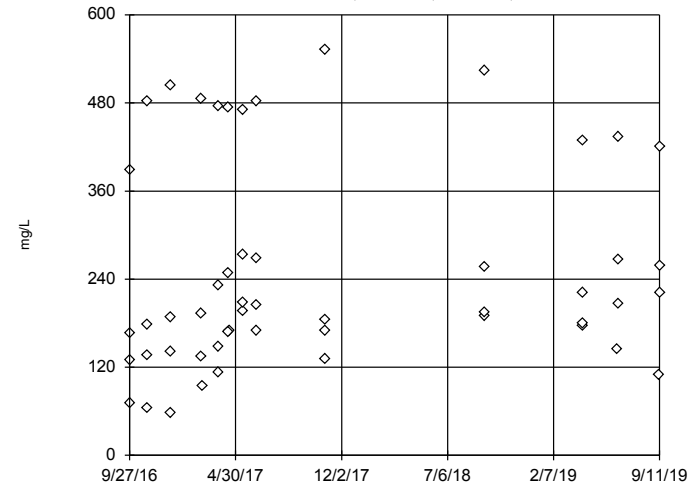


n = 52
 No outliers found.
 Tukey's method selected by user.
 Data were square root transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.01179, low cutoff = -0.004086, based on IQR multiplier of 3.

Constituent: Selenium, total Analysis Run 11/25/2019 3:33 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening, Pooled Background

MW-1601A,MW-1602,MW-1603,MW-1608

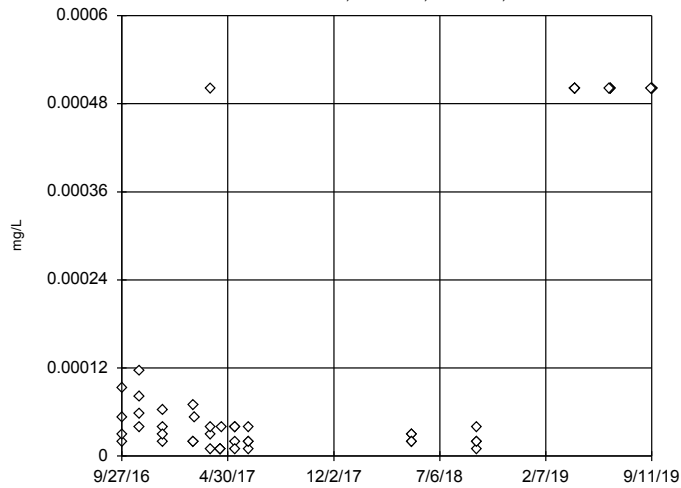


n = 52
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 2887, low cutoff = 17.72, based on IQR multiplier of 3.

Constituent: Sulfate, total Analysis Run 11/25/2019 3:33 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening, Pooled Background

MW-1601A,MW-1602,MW-1603,MW-1608

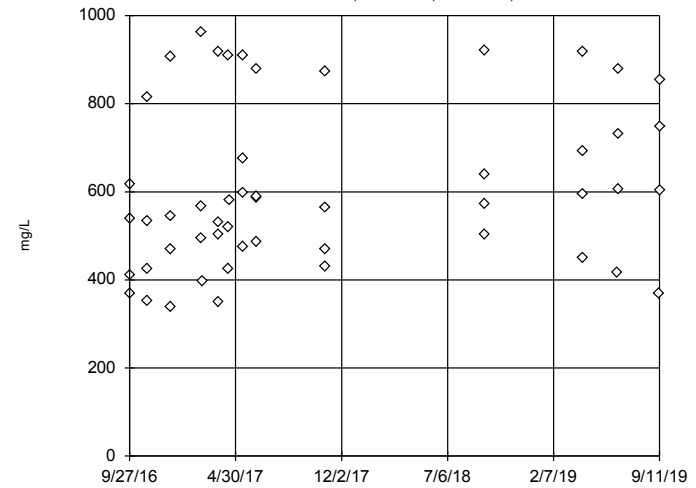


n = 52
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.4205, low cutoff = 1.1e-8, based on IQR multiplier of 3.

Constituent: Thallium, total Analysis Run 11/25/2019 3:33 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening, Pooled Background

MW-1601A,MW-1602,MW-1603,MW-1608



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 = 2898, low cutoff = 119.7, based on IQR multiplier of 3.

Constituent: Total Dissolved Solids [TDS] Analysis Run 11/25/2019 3:33 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Outlier Analysis - Significant Results

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 11/25/2019, 3:32 PM

Constituent	Well	Outlier	Value(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Antimony, total (mg/L)	MW-1605D	Yes	0.0001	NP	NaN	13	0.00003923	0.00001891	ln(x)	ShapiroWilk
Antimony, total (mg/L)	MW-1607S	Yes	0.00084	NP	NaN	13	0.00048	0.0001156	ln(x)	ShapiroWilk
Arsenic, total (mg/L)	MW-1607S	Yes	0.0112	NP	NaN	13	0.001939	0.002798	ln(x)	ShapiroWilk
Cobalt, total (mg/L)	MW-1607S	Yes	0.0201	NP	NaN	13	0.002706	0.005262	ln(x)	ShapiroWilk
Fluoride, total (mg/L)	MW-1606D	Yes	0.1,0.49	NP	NaN	14	0.2614	0.07853	sqrt(x)	ShapiroWilk
Fluoride, total (mg/L)	MW-1606S	Yes	0.57,0.54,0.25,0.28	NP	NaN	15	0.442	0.08205	x^3	ShapiroWilk
pH, field (SU)	MW-1604D	Yes	7.87	NP	NaN	15	7.252	0.2219	ln(x)	ShapiroWilk
pH, field (SU)	MW-1607D	Yes	6.9,8.41	NP	NaN	15	7.633	0.3047	x^(1/3)	ShapiroWilk
pH, field (SU)	MW-1607S	Yes	8.23	NP	NaN	15	7.549	0.2201	ln(x)	ShapiroWilk
Thallium, total (mg/L)	MW-1606D	Yes	0.0005,0.0005	NP	NaN	13	0.0001628	0.0001501	ln(x)	ShapiroWilk
Thallium, total (mg/L)	MW-1606S	Yes	0.0005,0.0005	NP	NaN	13	0.000144	0.0001588	ln(x)	ShapiroWilk

Outlier Analysis - All Results

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 11/25/2019, 3:32 PM

Constituent	Well	Outlier	Value(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Antimony, total (mg/L)	MW-1604D	No	n/a	NP	NaN	13	0.0001131	0.00006223	normal	ShapiroWilk
Antimony, total (mg/L)	MW-1604S	No	n/a	NP	NaN	13	0.00007923	0.00006075	ln(x)	ShapiroWilk
Antimony, total (mg/L)	MW-1605D	Yes	0.0001	NP	NaN	13	0.00003923	0.00001891	ln(x)	ShapiroWilk
Antimony, total (mg/L)	MW-1605S	No	n/a	NP	NaN	13	0.00005769	0.0000332	ln(x)	ShapiroWilk
Antimony, total (mg/L)	MW-1606D	No	n/a	NP	NaN	13	0.0001692	0.00002957	ln(x)	ShapiroWilk
Antimony, total (mg/L)	MW-1606S	No	n/a	NP	NaN	13	0.0001508	0.00001256	x^4	ShapiroWilk
Antimony, total (mg/L)	MW-1607D	n/a	n/a	NP	NaN	13	0.00003231	0.000005991	unknown	ShapiroWilk
Antimony, total (mg/L)	MW-1607S	Yes	0.00084	NP	NaN	13	0.00048	0.0001156	ln(x)	ShapiroWilk
Arsenic, total (mg/L)	MW-1604D	No	n/a	NP	NaN	13	0.0004308	0.0001053	normal	ShapiroWilk
Arsenic, total (mg/L)	MW-1604S	No	n/a	NP	NaN	13	0.0004062	0.00006959	ln(x)	ShapiroWilk
Arsenic, total (mg/L)	MW-1605D	No	n/a	NP	NaN	13	0.002381	0.0002641	ln(x)	ShapiroWilk
Arsenic, total (mg/L)	MW-1605S	No	n/a	NP	NaN	13	0.0007492	0.0002476	ln(x)	ShapiroWilk
Arsenic, total (mg/L)	MW-1606D	No	n/a	NP	NaN	13	0.0005846	0.0002808	ln(x)	ShapiroWilk
Arsenic, total (mg/L)	MW-1606S	No	n/a	NP	NaN	13	0.0007915	0.0001003	x^2	ShapiroWilk
Arsenic, total (mg/L)	MW-1607D	No	n/a	NP	NaN	13	0.001182	0.0002155	ln(x)	ShapiroWilk
Arsenic, total (mg/L)	MW-1607S	Yes	0.0112	NP	NaN	13	0.001939	0.002798	ln(x)	ShapiroWilk
Barium, total (mg/L)	MW-1604D	No	n/a	NP	NaN	13	0.03432	0.009917	ln(x)	ShapiroWilk
Barium, total (mg/L)	MW-1604S	No	n/a	NP	NaN	13	0.02875	0.001746	ln(x)	ShapiroWilk
Barium, total (mg/L)	MW-1605D	No	n/a	NP	NaN	13	0.02762	0.002947	normal	ShapiroWilk
Barium, total (mg/L)	MW-1605S	No	n/a	NP	NaN	13	0.03187	0.007452	ln(x)	ShapiroWilk
Barium, total (mg/L)	MW-1606D	No	n/a	NP	NaN	13	0.05493	0.005769	ln(x)	ShapiroWilk
Barium, total (mg/L)	MW-1606S	No	n/a	NP	NaN	13	0.07192	0.004669	x^6	ShapiroWilk
Barium, total (mg/L)	MW-1607D	No	n/a	NP	NaN	13	0.1155	0.0317	x^2	ShapiroWilk
Barium, total (mg/L)	MW-1607S	No	n/a	NP	NaN	13	0.07109	0.01499	ln(x)	ShapiroWilk
Beryllium, total (mg/L)	MW-1604D	n/a	n/a	NP	NaN	13	0.0001	0	unknown	ShapiroWilk
Beryllium, total (mg/L)	MW-1604S	n/a	n/a	NP	NaN	13	0.00009415	0.00002108	unknown	ShapiroWilk
Beryllium, total (mg/L)	MW-1605D	n/a	n/a	NP	NaN	13	0.0001	0	unknown	ShapiroWilk
Beryllium, total (mg/L)	MW-1605S	No	n/a	NP	NaN	13	0.00007969	0.0000387	ln(x)	ShapiroWilk
Beryllium, total (mg/L)	MW-1606D	No	n/a	NP	NaN	13	0.00007308	0.0000425	ln(x)	ShapiroWilk
Beryllium, total (mg/L)	MW-1606S	n/a	n/a	NP	NaN	13	0.00009269	0.00002635	unknown	ShapiroWilk
Beryllium, total (mg/L)	MW-1607D	n/a	n/a	NP	NaN	13	0.00009292	0.00002552	unknown	ShapiroWilk
Beryllium, total (mg/L)	MW-1607S	n/a	n/a	NP	NaN	13	0.00008077	0.0000414	unknown	ShapiroWilk
Cadmium, total (mg/L)	MW-1604D	No	n/a	NP	NaN	13	0.00009769	0.00005418	normal	ShapiroWilk
Cadmium, total (mg/L)	MW-1604S	No	n/a	NP	NaN	13	0.00009923	0.00008636	ln(x)	ShapiroWilk
Cadmium, total (mg/L)	MW-1605D	No	n/a	NP	NaN	13	0.00002692	0.00001109	normal	ShapiroWilk
Cadmium, total (mg/L)	MW-1605S	No	n/a	NP	NaN	13	0.00007154	0.0000223	ln(x)	ShapiroWilk
Cadmium, total (mg/L)	MW-1606D	No	n/a	NP	NaN	13	0.00007154	0.000009871	x^2	ShapiroWilk
Cadmium, total (mg/L)	MW-1606S	No	n/a	NP	NaN	13	0.00007308	0.000008549	sqrt(x)	ShapiroWilk
Cadmium, total (mg/L)	MW-1607D	n/a	n/a	NP	NaN	13	0.00002192	0.000006934	unknown	ShapiroWilk
Cadmium, total (mg/L)	MW-1607S	No	n/a	NP	NaN	13	0.00005385	0.00005124	ln(x)	ShapiroWilk
Chromium, total (mg/L)	MW-1604D	No	n/a	NP	NaN	13	0.0003165	0.000187	ln(x)	ShapiroWilk
Chromium, total (mg/L)	MW-1604S	No	n/a	NP	NaN	13	0.0003566	0.0005136	ln(x)	ShapiroWilk
Chromium, total (mg/L)	MW-1605D	No	n/a	NP	NaN	13	0.0003362	0.0006025	ln(x)	ShapiroWilk
Chromium, total (mg/L)	MW-1605S	No	n/a	NP	NaN	13	0.0005741	0.0007123	ln(x)	ShapiroWilk
Chromium, total (mg/L)	MW-1606D	No	n/a	NP	NaN	13	0.0003512	0.0003008	ln(x)	ShapiroWilk
Chromium, total (mg/L)	MW-1606S	No	n/a	NP	NaN	13	0.0003065	0.0003456	ln(x)	ShapiroWilk
Chromium, total (mg/L)	MW-1607D	No	n/a	NP	NaN	13	0.0003495	0.000558	ln(x)	ShapiroWilk
Chromium, total (mg/L)	MW-1607S	No	n/a	NP	NaN	13	0.0005633	0.0007838	ln(x)	ShapiroWilk
Cobalt, total (mg/L)	MW-1604D	No	n/a	NP	NaN	13	0.001191	0.0007762	x^6	ShapiroWilk
Cobalt, total (mg/L)	MW-1604S	No	n/a	NP	NaN	13	0.001017	0.0008896	ln(x)	ShapiroWilk
Cobalt, total (mg/L)	MW-1605D	No	n/a	NP	NaN	13	0.001721	0.0001182	x^2	ShapiroWilk
Cobalt, total (mg/L)	MW-1605S	No	n/a	NP	NaN	13	0.0008512	0.0007502	ln(x)	ShapiroWilk
Cobalt, total (mg/L)	MW-1606D	No	n/a	NP	NaN	13	0.001655	0.0008412	ln(x)	ShapiroWilk
Cobalt, total (mg/L)	MW-1606S	No	n/a	NP	NaN	13	0.0003035	0.00008138	ln(x)	ShapiroWilk
Cobalt, total (mg/L)	MW-1607D	No	n/a	NP	NaN	13	0.0005857	0.0001814	ln(x)	ShapiroWilk

Outlier Analysis - All Results

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 11/25/2019, 3:32 PM

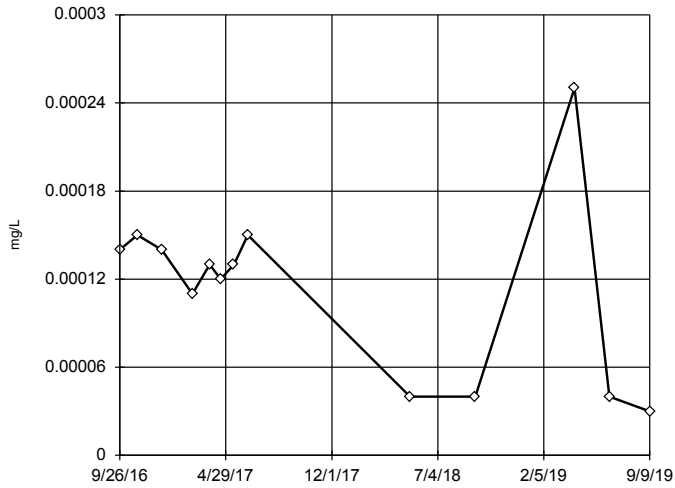
Constituent	Well	Outlier	Value(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Cobalt, total (mg/L)	MW-1607S	Yes	0.0201	NP	NaN	13	0.002706	0.005262	ln(x)	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	MW-1604D	No	n/a	NP	NaN	13	1.094	0.8316	ln(x)	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	MW-1604S	No	n/a	NP	NaN	13	1.003	0.5981	sqrt(x)	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	MW-1605D	No	n/a	NP	NaN	13	1.267	0.9067	ln(x)	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	MW-1605S	No	n/a	NP	NaN	13	0.8627	0.8402	ln(x)	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	MW-1606D	No	n/a	NP	NaN	13	2.111	2.124	ln(x)	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	MW-1606S	No	n/a	NP	NaN	13	1.197	0.6873	x^(1/3)	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	MW-1607D	No	n/a	NP	NaN	13	1.58	0.8076	ln(x)	ShapiroWilk
Combined Radium 226 + 228 (pCi/L)	MW-1607S	No	n/a	NP	NaN	13	1.64	0.7717	ln(x)	ShapiroWilk
Fluoride, total (mg/L)	MW-1604D	No	n/a	NP	NaN	14	0.1829	0.02054	x^4	ShapiroWilk
Fluoride, total (mg/L)	MW-1604S	No	n/a	NP	NaN	14	0.2007	0.01542	x^6	ShapiroWilk
Fluoride, total (mg/L)	MW-1605D	No	n/a	NP	NaN	14	0.1971	0.01858	sqrt(x)	ShapiroWilk
Fluoride, total (mg/L)	MW-1605S	No	n/a	NP	NaN	14	0.2593	0.03362	ln(x)	ShapiroWilk
Fluoride, total (mg/L)	MW-1606D	Yes	0.1,0.49	NP	NaN	14	0.2614	0.07853	sqrt(x)	ShapiroWilk
Fluoride, total (mg/L)	MW-1606S	Yes	0.57,0.54,0.25,0.28	NP	NaN	15	0.442	0.08205	x^3	ShapiroWilk
Fluoride, total (mg/L)	MW-1607D	No	n/a	NP	NaN	15	0.5107	0.0492	x^2	ShapiroWilk
Fluoride, total (mg/L)	MW-1607S	No	n/a	NP	NaN	14	0.2829	0.03315	x^4	ShapiroWilk
Lead, total (mg/L)	MW-1604D	No	n/a	NP	NaN	13	0.000112	0.0001611	ln(x)	ShapiroWilk
Lead, total (mg/L)	MW-1604S	No	n/a	NP	NaN	13	0.00007731	0.00003657	normal	ShapiroWilk
Lead, total (mg/L)	MW-1605D	No	n/a	NP	NaN	13	0.00003885	0.00003261	ln(x)	ShapiroWilk
Lead, total (mg/L)	MW-1605S	No	n/a	NP	NaN	13	0.0004746	0.0005588	ln(x)	ShapiroWilk
Lead, total (mg/L)	MW-1606D	No	n/a	NP	NaN	13	0.0003067	0.0005448	ln(x)	ShapiroWilk
Lead, total (mg/L)	MW-1606S	No	n/a	NP	NaN	13	0.0001061	0.00006136	x^(1/3)	ShapiroWilk
Lead, total (mg/L)	MW-1607D	No	n/a	NP	NaN	13	0.0001143	0.0001597	ln(x)	ShapiroWilk
Lead, total (mg/L)	MW-1607S	No	n/a	NP	NaN	13	0.001163	0.002989	ln(x)	ShapiroWilk
Lithium, total (mg/L)	MW-1604D	No	n/a	NP	NaN	13	0.04214	0.01777	x^3	ShapiroWilk
Lithium, total (mg/L)	MW-1604S	No	n/a	NP	NaN	13	0.0402	0.01035	x^(1/3)	ShapiroWilk
Lithium, total (mg/L)	MW-1605D	No	n/a	NP	NaN	13	0.06839	0.01741	x^4	ShapiroWilk
Lithium, total (mg/L)	MW-1605S	No	n/a	NP	NaN	13	0.06734	0.01465	x^3	ShapiroWilk
Lithium, total (mg/L)	MW-1606D	No	n/a	NP	NaN	13	0.1121	0.02078	x^6	ShapiroWilk
Lithium, total (mg/L)	MW-1606S	No	n/a	NP	NaN	13	0.1049	0.01791	x^5	ShapiroWilk
Lithium, total (mg/L)	MW-1607D	No	n/a	NP	NaN	13	0.08669	0.01771	ln(x)	ShapiroWilk
Lithium, total (mg/L)	MW-1607S	No	n/a	NP	NaN	13	0.1013	0.01604	ln(x)	ShapiroWilk
Mercury, total (mg/L)	MW-1604D	n/a	n/a	NP	NaN	13	0.000007231	0.000008662	unknown	ShapiroWilk
Mercury, total (mg/L)	MW-1604S	n/a	n/a	NP	NaN	13	0.000004846	5.5e-7	unknown	ShapiroWilk
Mercury, total (mg/L)	MW-1605D	n/a	n/a	NP	NaN	13	0.000004769	8.3e-7	unknown	ShapiroWilk
Mercury, total (mg/L)	MW-1605S	n/a	n/a	NP	NaN	13	0.000004846	5.5e-7	unknown	ShapiroWilk
Mercury, total (mg/L)	MW-1606D	n/a	n/a	NP	NaN	13	0.000004923	2.8e-7	unknown	ShapiroWilk
Mercury, total (mg/L)	MW-1606S	n/a	n/a	NP	NaN	13	0.000004769	8.3e-7	unknown	ShapiroWilk
Mercury, total (mg/L)	MW-1607D	n/a	n/a	NP	NaN	13	0.000004538	0.000001127	unknown	ShapiroWilk
Mercury, total (mg/L)	MW-1607S	n/a	n/a	NP	NaN	13	0.000005231	0.000002166	unknown	ShapiroWilk
Molybdenum, total (mg/L)	MW-1604D	No	n/a	NP	NaN	13	0.01243	0.008423	x^6	ShapiroWilk
Molybdenum, total (mg/L)	MW-1604S	No	n/a	NP	NaN	13	0.007955	0.00705	x^6	ShapiroWilk
Molybdenum, total (mg/L)	MW-1605D	No	n/a	NP	NaN	13	0.0465	0.005091	ln(x)	ShapiroWilk
Molybdenum, total (mg/L)	MW-1605S	No	n/a	NP	NaN	13	0.01824	0.003943	ln(x)	ShapiroWilk
Molybdenum, total (mg/L)	MW-1606D	No	n/a	NP	NaN	13	0.07448	0.005767	ln(x)	ShapiroWilk
Molybdenum, total (mg/L)	MW-1606S	No	n/a	NP	NaN	13	0.08529	0.01896	x^2	ShapiroWilk
Molybdenum, total (mg/L)	MW-1607D	No	n/a	NP	NaN	13	0.08633	0.005134	ln(x)	ShapiroWilk
Molybdenum, total (mg/L)	MW-1607S	No	n/a	NP	NaN	13	0.04281	0.00509	x^3	ShapiroWilk
pH, field (SU)	MW-1601A (bg)	No	n/a	NP	NaN	14	7.2	0.2133	ln(x)	ShapiroWilk
pH, field (SU)	MW-1602 (bg)	No	n/a	NP	NaN	14	6.798	0.2696	normal	ShapiroWilk
pH, field (SU)	MW-1603 (bg)	No	n/a	NP	NaN	14	6.858	0.3077	ln(x)	ShapiroWilk
pH, field (SU)	MW-1604D	Yes	7.87	NP	NaN	15	7.252	0.2219	ln(x)	ShapiroWilk
pH, field (SU)	MW-1604S	No	n/a	NP	NaN	15	7.199	0.2212	ln(x)	ShapiroWilk
pH, field (SU)	MW-1605D	No	n/a	NP	NaN	14	7.411	0.193	ln(x)	ShapiroWilk

Outlier Analysis - All Results

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 11/25/2019, 3:32 PM

Constituent	Well	Outlier	Value(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
pH, field (SU)	MW-1605S	No	n/a	NP	NaN	15	7.319	0.2092	ln(x)	ShapiroWilk
pH, field (SU)	MW-1606D	No	n/a	NP	NaN	15	7.395	0.2023	ln(x)	ShapiroWilk
pH, field (SU)	MW-1606S	No	n/a	NP	NaN	15	7.115	0.3771	x^6	ShapiroWilk
pH, field (SU)	MW-1607D	Yes	6.9,8.41	NP	NaN	15	7.633	0.3047	x^(1/3)	ShapiroWilk
pH, field (SU)	MW-1607S	Yes	8.23	NP	NaN	15	7.549	0.2201	ln(x)	ShapiroWilk
pH, field (SU)	MW-1608 (bg)	No	n/a	NP	NaN	14	7.039	0.3664	x^3	ShapiroWilk
Selenium, total (mg/L)	MW-1604D	No	n/a	NP	NaN	13	0.001538	0.001154	ln(x)	ShapiroWilk
Selenium, total (mg/L)	MW-1604S	No	n/a	NP	NaN	13	0.001838	0.0007698	normal	ShapiroWilk
Selenium, total (mg/L)	MW-1605D	No	n/a	NP	NaN	13	0.0002385	0.00006504	ln(x)	ShapiroWilk
Selenium, total (mg/L)	MW-1605S	No	n/a	NP	NaN	13	0.001223	0.0007108	ln(x)	ShapiroWilk
Selenium, total (mg/L)	MW-1606D	No	n/a	NP	NaN	13	0.004654	0.002584	x^(1/3)	ShapiroWilk
Selenium, total (mg/L)	MW-1606S	No	n/a	NP	NaN	13	0.001331	0.0007216	ln(x)	ShapiroWilk
Selenium, total (mg/L)	MW-1607D	No	n/a	NP	NaN	13	0.00008846	0.0001256	ln(x)	ShapiroWilk
Selenium, total (mg/L)	MW-1607S	No	n/a	NP	NaN	13	0.008169	0.001881	x^2	ShapiroWilk
Thallium, total (mg/L)	MW-1604D	No	n/a	NP	NaN	13	0.0002787	0.0001563	normal	ShapiroWilk
Thallium, total (mg/L)	MW-1604S	No	n/a	NP	NaN	13	0.00026	0.0005348	ln(x)	ShapiroWilk
Thallium, total (mg/L)	MW-1605D	No	n/a	NP	NaN	13	0.0001622	0.0001944	ln(x)	ShapiroWilk
Thallium, total (mg/L)	MW-1605S	No	n/a	NP	NaN	13	0.0001666	0.0001935	ln(x)	ShapiroWilk
Thallium, total (mg/L)	MW-1606D	Yes	0.0005,0.0005	NP	NaN	13	0.0001628	0.0001501	ln(x)	ShapiroWilk
Thallium, total (mg/L)	MW-1606S	Yes	0.0005,0.0005	NP	NaN	13	0.000144	0.0001588	ln(x)	ShapiroWilk
Thallium, total (mg/L)	MW-1607D	No	n/a	NP	NaN	13	0.000144	0.0002033	ln(x)	ShapiroWilk
Thallium, total (mg/L)	MW-1607S	No	n/a	NP	NaN	13	0.0001686	0.0001908	ln(x)	ShapiroWilk

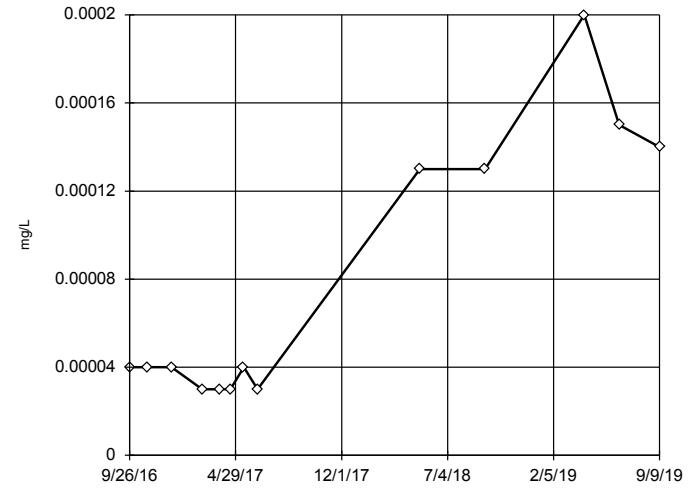
Tukey's Outlier Screening
MW-1604D



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 = 0.00046, low cutoff = -0.000275, based on IQR multiplier of 3.

Constituent: Antimony, total Analysis Run 11/25/2019 3:29 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

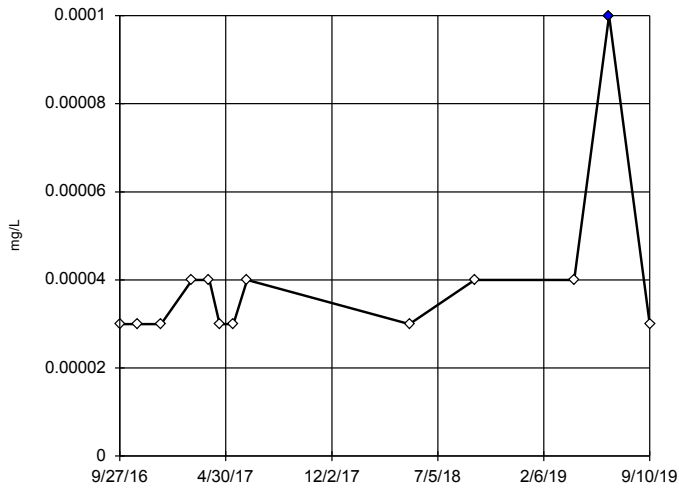
Tukey's Outlier Screening
MW-1604S



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 = 0.01227, low cutoff = 3.3e-7, based on IQR multiplier of 3.

Constituent: Antimony, total Analysis Run 11/25/2019 3:29 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

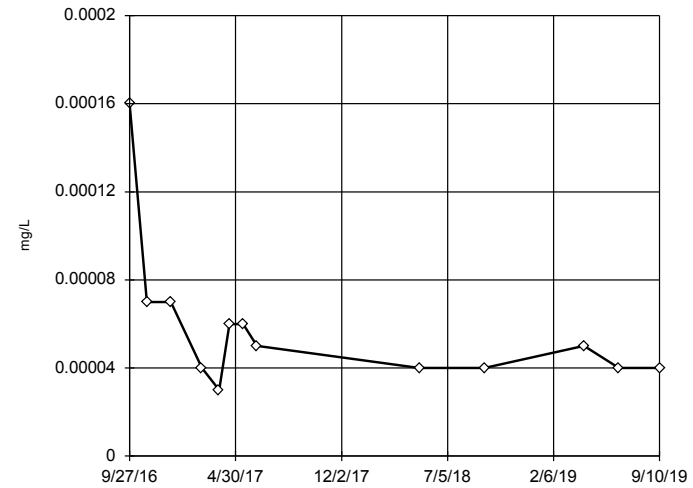
Tukey's Outlier Screening
MW-1605D



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 = 0.00009481, low cutoff = 0.00001286, based on IQR multiplier of 3.

Constituent: Antimony, total Analysis Run 11/25/2019 3:29 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

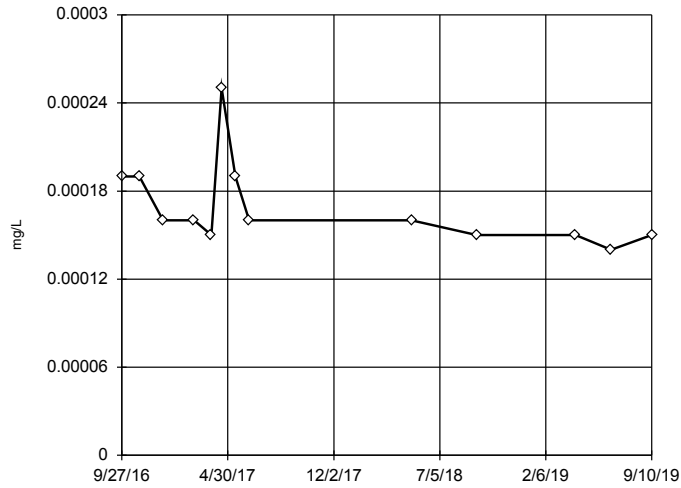
Tukey's Outlier Screening
MW-1605S



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 = 0.0002756, low cutoff = 0.000009405, based on IQR multiplier of 3.

Constituent: Antimony, total Analysis Run 11/25/2019 3:29 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

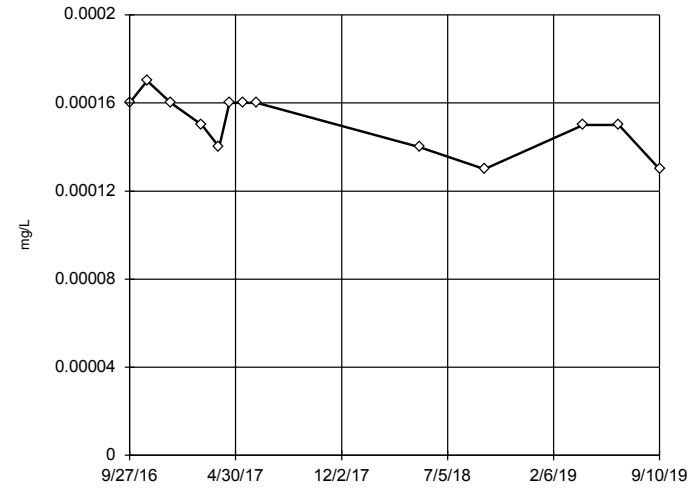
Tukey's Outlier Screening
MW-1606D



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 = 0.0003861, low cutoff = 0.00007381, based on IQR multiplier of 3.

Constituent: Antimony, total Analysis Run 11/25/2019 3:29 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

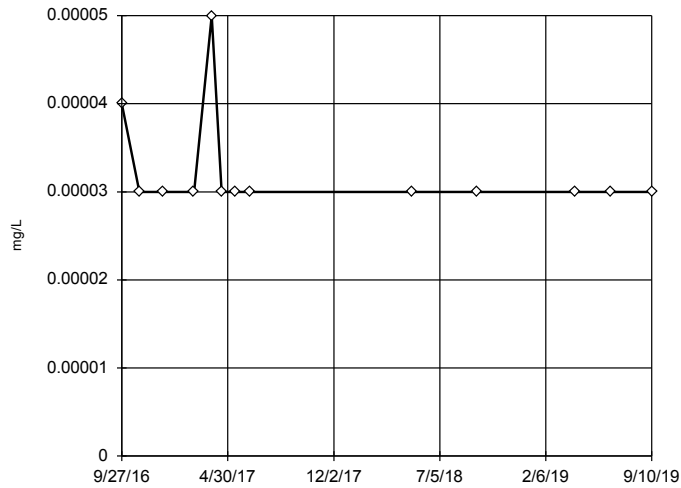
Tukey's Outlier Screening
MW-1606S



n = 13
No outliers found.
Tukey's method selected by user.
Data were x⁴ transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.0001958, low cutoff = -0.000144, based on IQR multiplier of 3.

Constituent: Antimony, total Analysis Run 11/25/2019 3:29 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

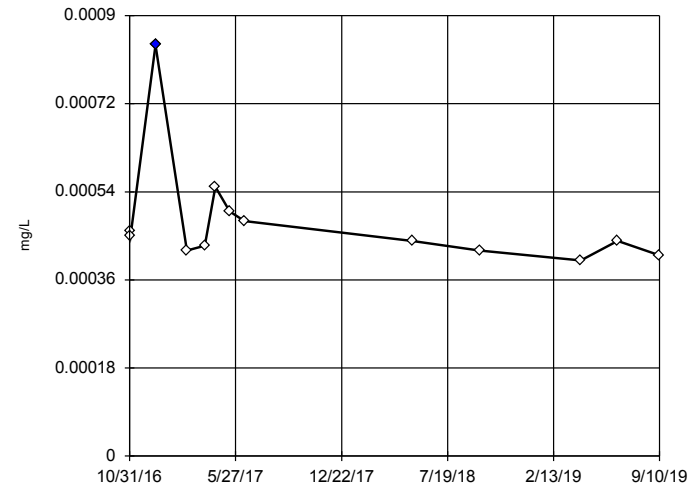
Tukey's Outlier Screening
MW-1607D



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

Constituent: Antimony, total Analysis Run 11/25/2019 3:29 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening
MW-1607S

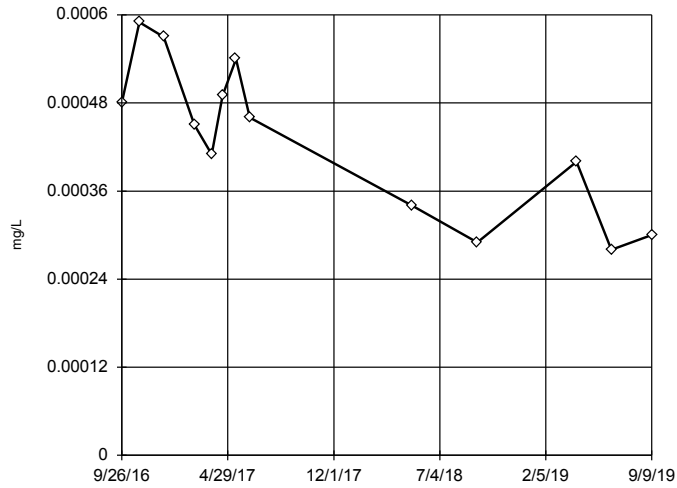


n = 13
Outlier is drawn as solid.
Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.0007775, low cutoff = 0.0002647, based on IQR multiplier of 3.

Constituent: Antimony, total Analysis Run 11/25/2019 3:29 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

MW-1604D

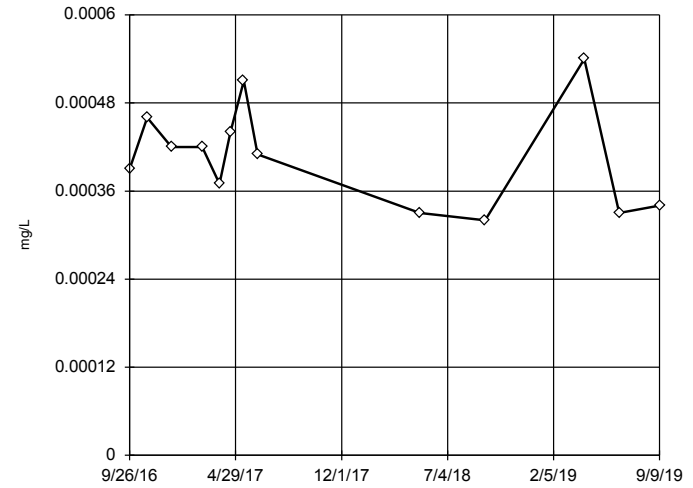


n = 13
 No outliers found.
 Tukey's method selected by user.
 Ladder of Powers transformations did not improve normality; analysis run on raw data.
 High cutoff = 0.0011,
 low cutoff = -0.000265,
 based on IQR multiplier of 3.

Constituent: Arsenic, total Analysis Run 11/25/2019 3:29 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

MW-1604S

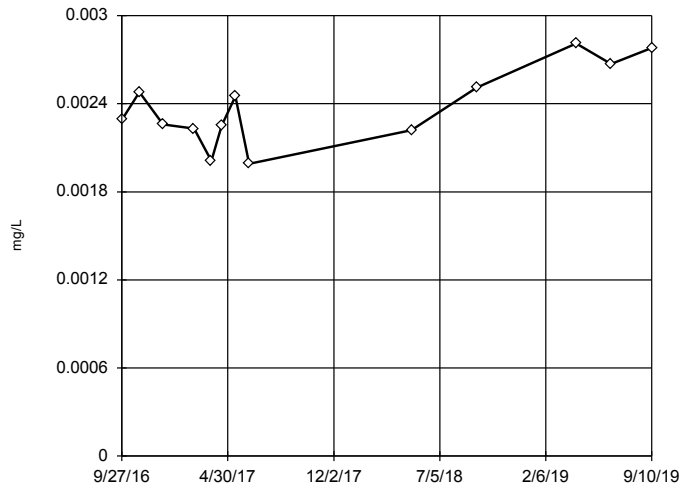


n = 13
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.00109,
 low cutoff = 0.0001383,
 based on IQR multiplier of 3.

Constituent: Arsenic, total Analysis Run 11/25/2019 3:29 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

MW-1605D

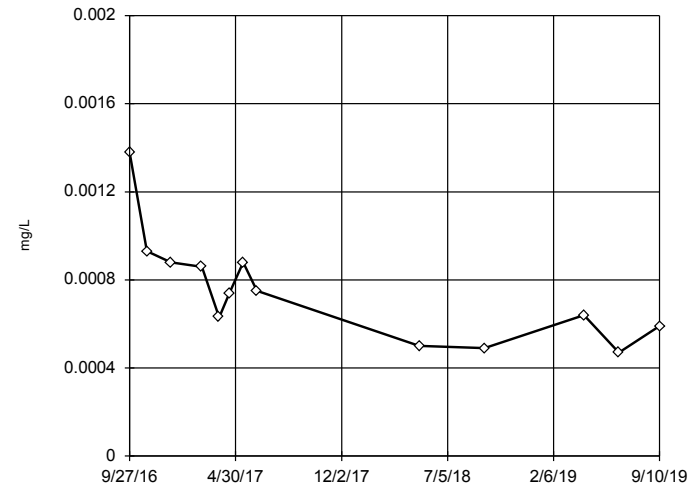


n = 13
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.004077,
 low cutoff = 0.001413,
 based on IQR multiplier of 3.

Constituent: Arsenic, total Analysis Run 11/25/2019 3:29 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

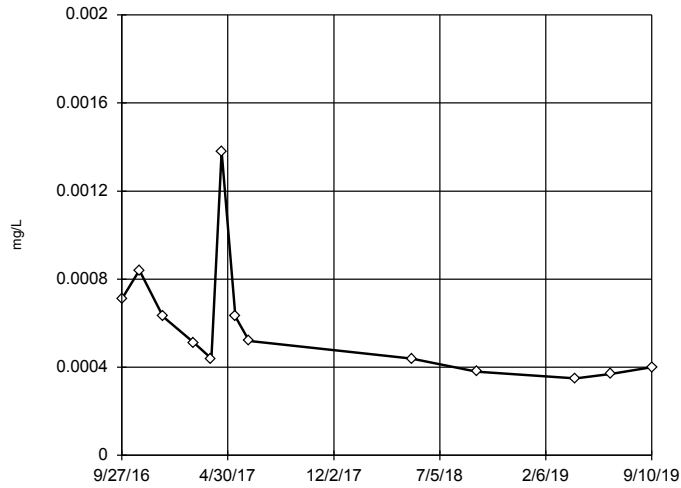
MW-1605S



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 = 0.003743,
 low cutoff = 0.0001277,
 based on IQR multiplier of 3.

Constituent: Arsenic, total Analysis Run 11/25/2019 3:29 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

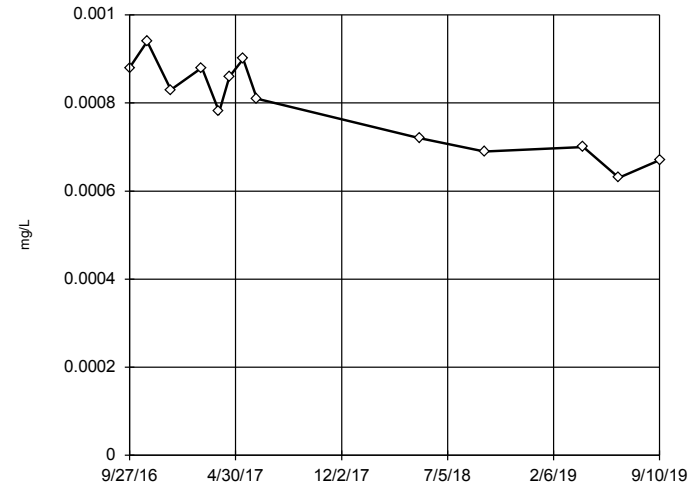
Tukey's Outlier Screening
MW-1606D



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 = 0.003376, low cutoff = 0.0007723, based on IQR multiplier of 3.

Constituent: Arsenic, total Analysis Run 11/25/2019 3:29 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

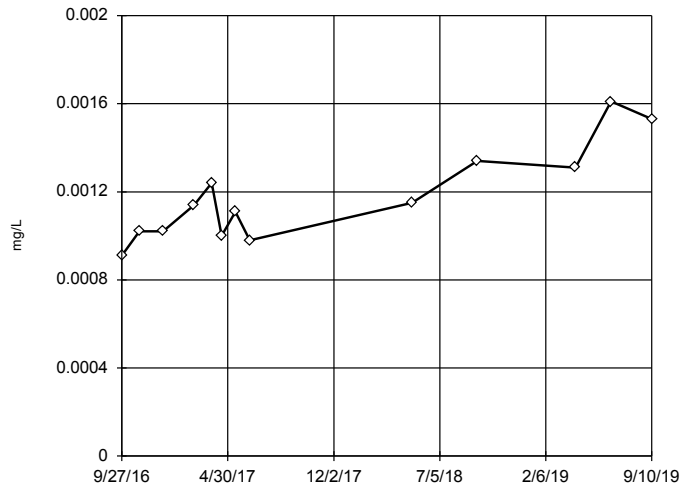
Tukey's Outlier Screening
MW-1606S



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 = 0.001284, low cutoff = -0.0006253, based on IQR multiplier of 3.

Constituent: Arsenic, total Analysis Run 11/25/2019 3:29 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

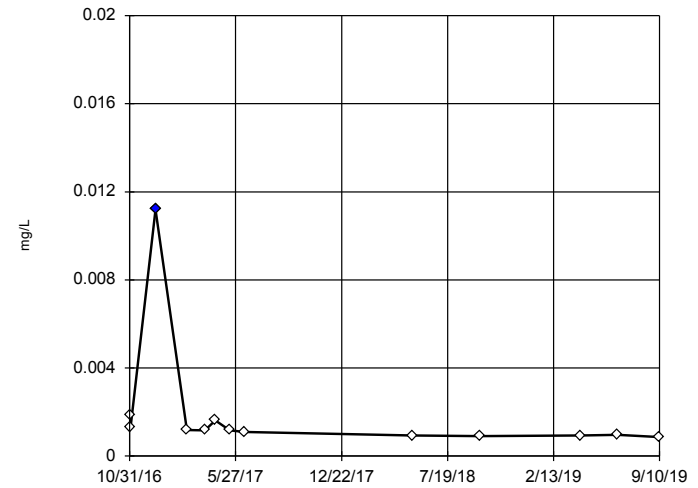
Tukey's Outlier Screening
MW-1607D



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 = 0.002991, low cutoff = 0.0004473, based on IQR multiplier of 3.

Constituent: Arsenic, total Analysis Run 11/25/2019 3:29 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

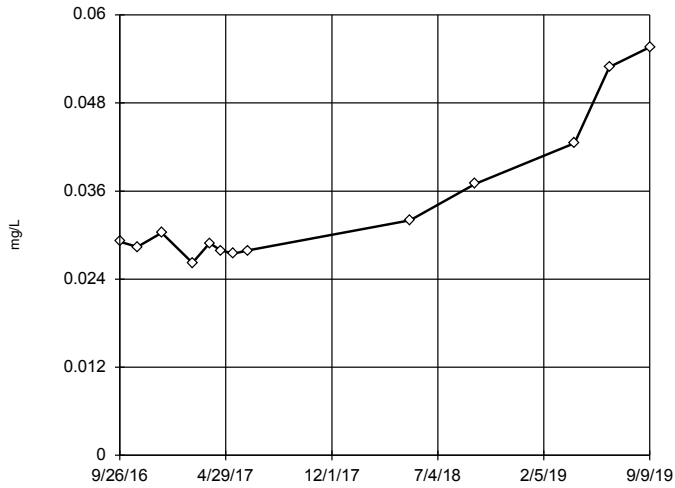
Tukey's Outlier Screening
MW-1607S



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 = 0.005426, low cutoff = 0.0002501, based on IQR multiplier of 3.

Constituent: Arsenic, total Analysis Run 11/25/2019 3:29 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

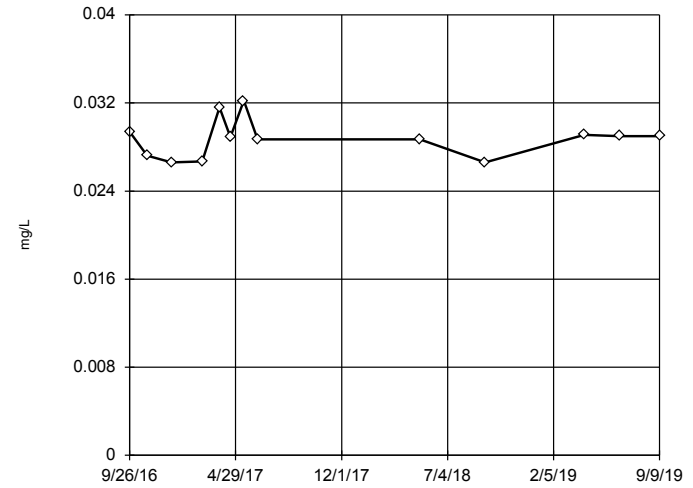
Tukey's Outlier Screening MW-1604D



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 = 0.1139,
 low cutoff = 0.009717,
 based on IQR multiplier of 3.

Constituent: Barium, total Analysis Run 11/25/2019 3:29 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

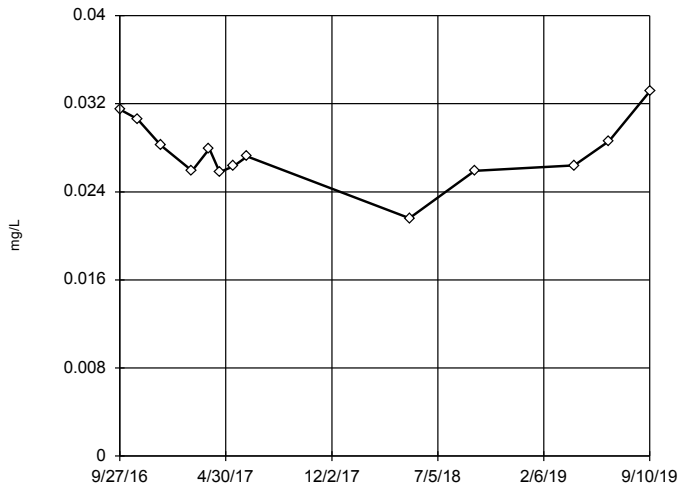
Tukey's Outlier Screening MW-1604S



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 = 0.0374,
 low cutoff = 0.02108,
 based on IQR multiplier of 3.

Constituent: Barium, total Analysis Run 11/25/2019 3:29 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

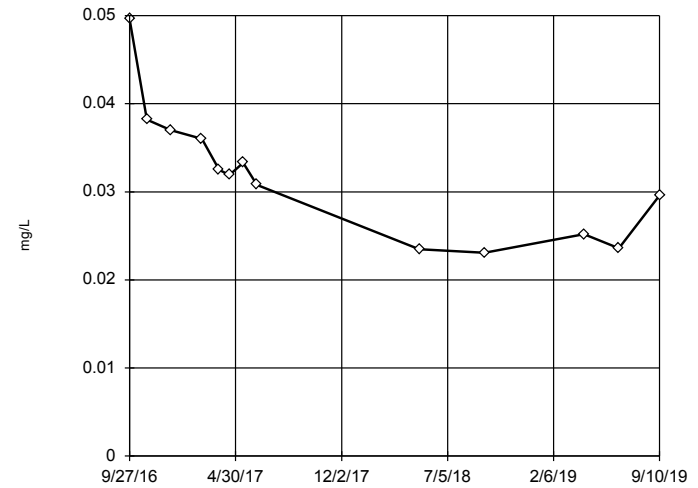
Tukey's Outlier Screening MW-1605D



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 = 0.0407,
 low cutoff = 0.0148,
 based on IQR multiplier of 3.

Constituent: Barium, total Analysis Run 11/25/2019 3:29 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening MW-1605S

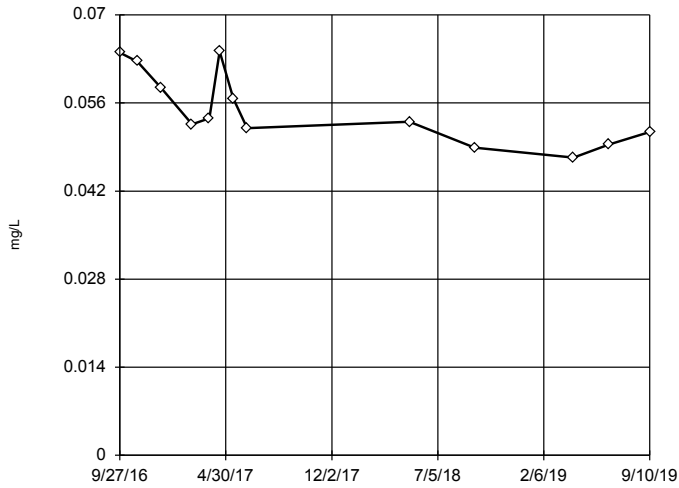


n = 13
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.1223,
 low cutoff = 0.007276,
 based on IQR multiplier of 3.

Constituent: Barium, total Analysis Run 11/25/2019 3:29 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

MW-1606D

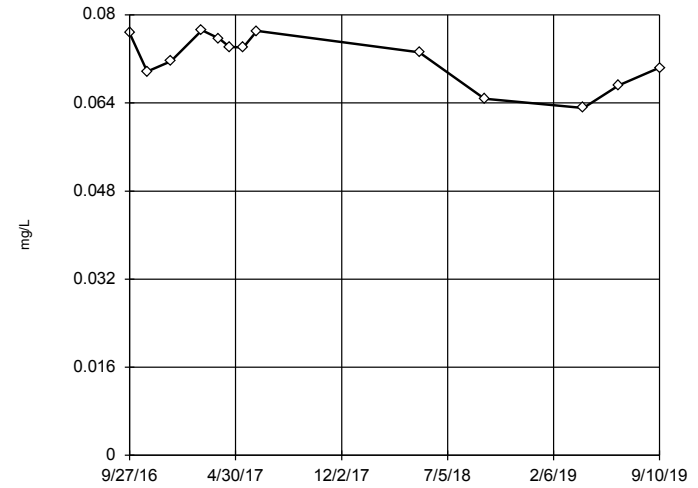


n = 13
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.1045, low cutoff = 0.02917, based on IQR multiplier of 3.

Constituent: Barium, total Analysis Run 11/25/2019 3:29 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

MW-1606S

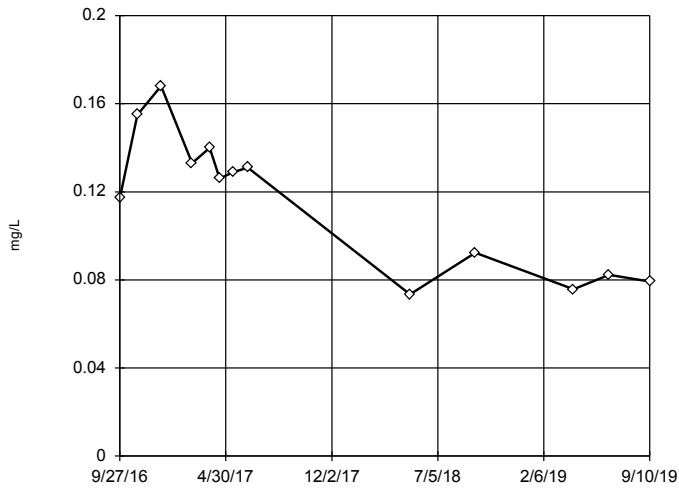


n = 13
No outliers found. Tukey's method selected by user.
Data were x⁶ transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.08828, low cutoff = -0.07473, based on IQR multiplier of 3.

Constituent: Barium, total Analysis Run 11/25/2019 3:29 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

MW-1607D

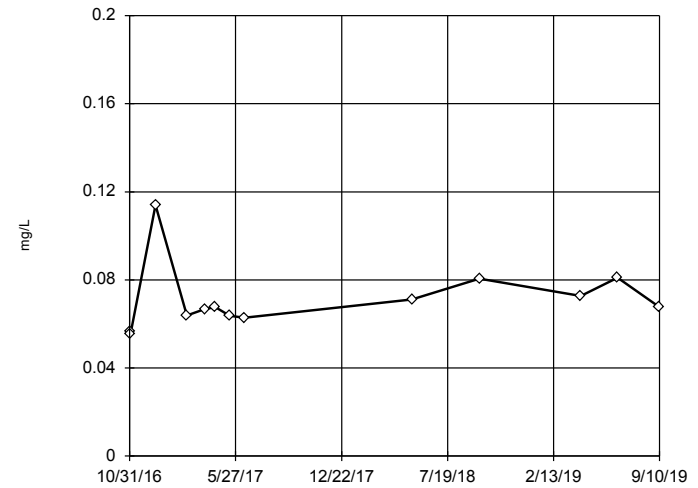


n = 13
No outliers found. Tukey's method selected by user.
Data were square transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.2345, low cutoff = -0.1727, based on IQR multiplier of 3.

Constituent: Barium, total Analysis Run 11/25/2019 3:29 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

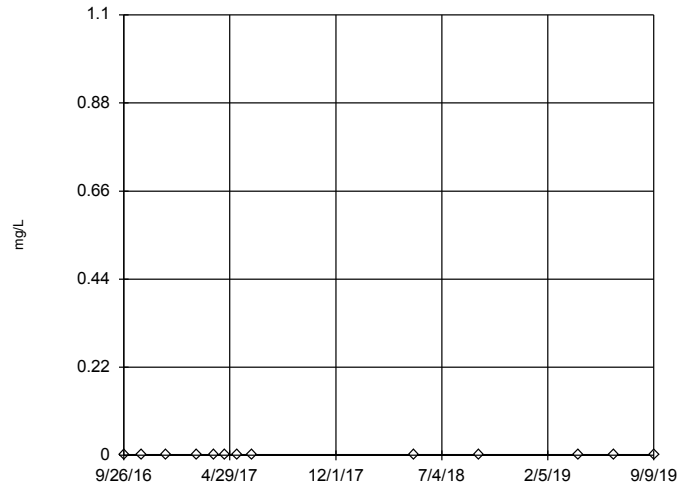
MW-1607S



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 = 0.1354, low cutoff = 0.03579, based on IQR multiplier of 3.

Constituent: Barium, total Analysis Run 11/25/2019 3:29 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

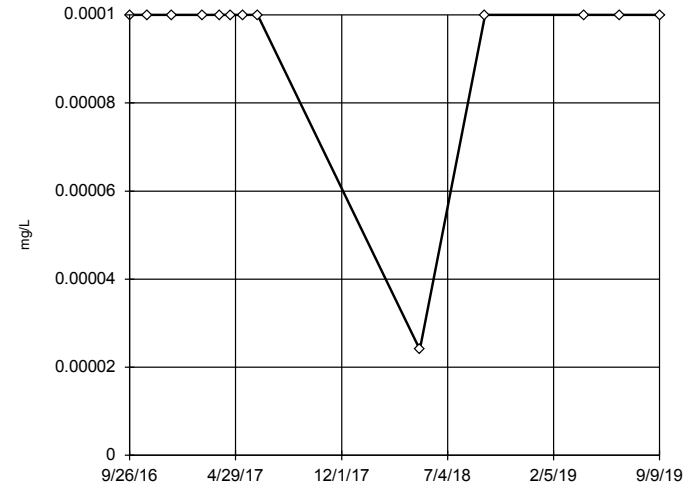
Tukey's Outlier Screening MW-1604D



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

Constituent: Beryllium, total Analysis Run 11/25/2019 3:29 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

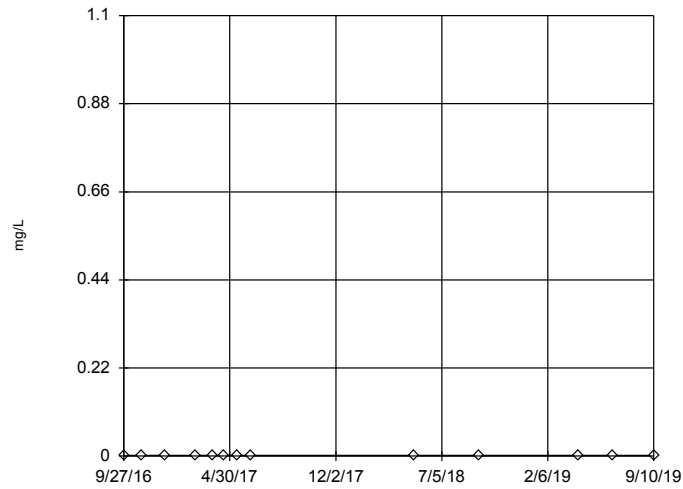
Tukey's Outlier Screening MW-1604S



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: Beryllium, total Analysis Run 11/25/2019 3:29 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

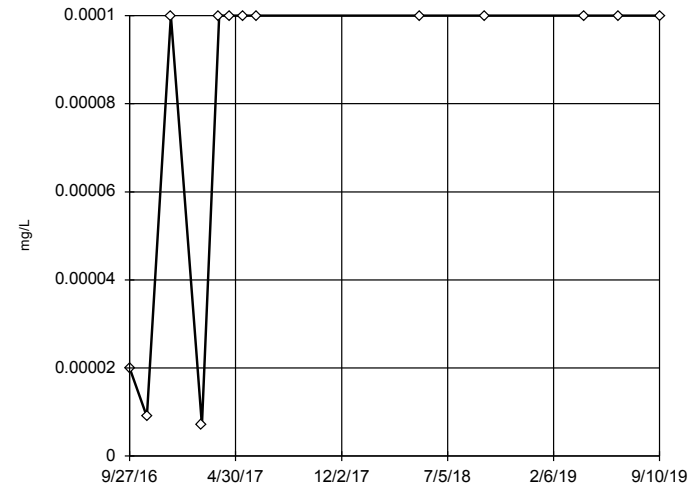
Tukey's Outlier Screening MW-1605D



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

Constituent: Beryllium, total Analysis Run 11/25/2019 3:29 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening MW-1605S

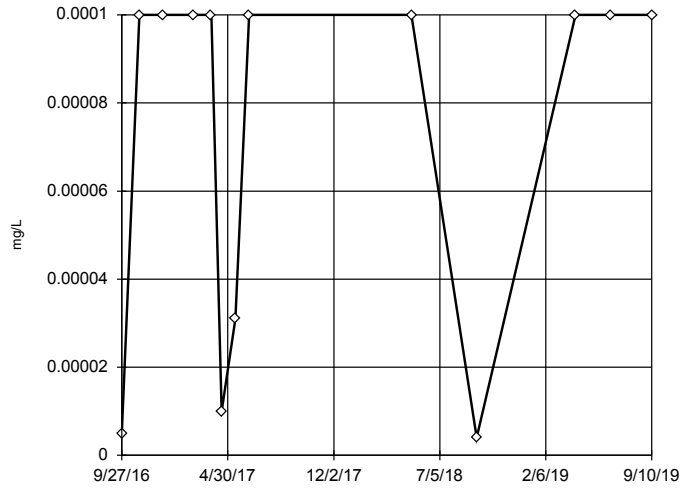


n = 13
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.001118, low cutoff = 0.000004, based on IQR multiplier of 3.

Constituent: Beryllium, total Analysis Run 11/25/2019 3:29 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

MW-1606D

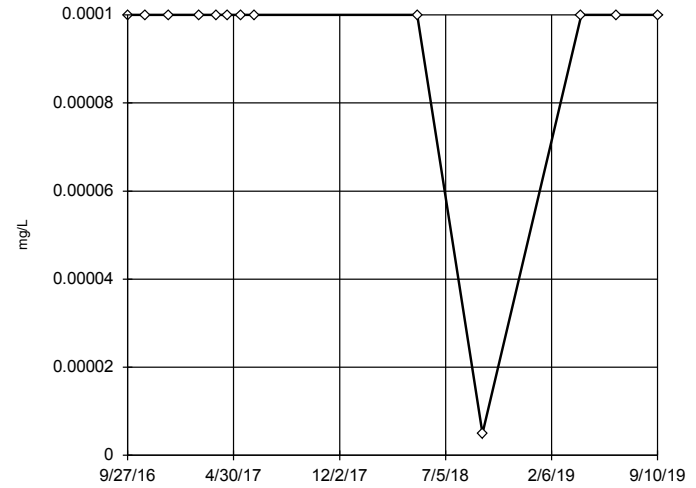


n = 13
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.01832,
 low cutoff = 9.6e-8, based on IQR multiplier of 3.

Constituent: Beryllium, total Analysis Run 11/25/2019 3:29 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

MW-1606S

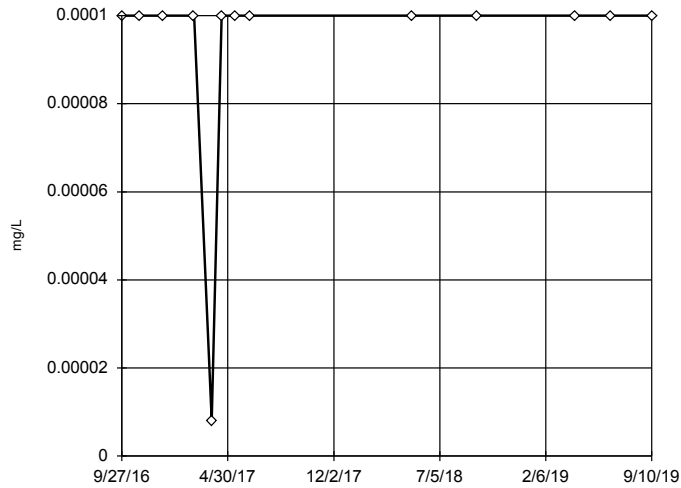


n = 13
 No outliers found.
 Tukey's method selected by user.
 Ladder of Powers transformations did not improve normality; analysis run on raw data.
 The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Beryllium, total Analysis Run 11/25/2019 3:29 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

MW-1607D

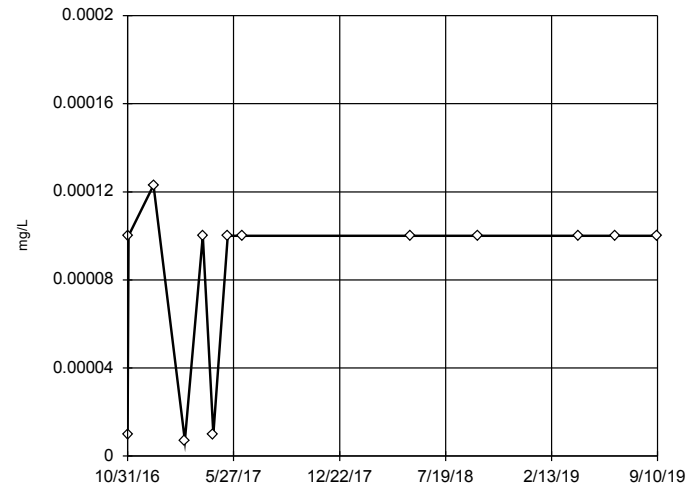


n = 13
 No outliers found.
 Tukey's method selected by user.
 Data were square root transformed to achieve best W statistic (graph shown in original units).
 The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Beryllium, total Analysis Run 11/25/2019 3:29 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

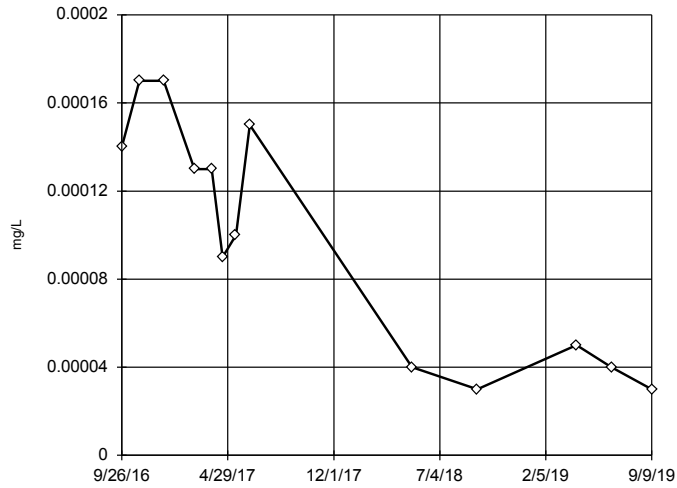
MW-1607S



n = 13
 No outliers found.
 Tukey's method selected by user.
 Data were x^4 transformed to achieve best W statistic (graph shown in original units).
 The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Beryllium, total Analysis Run 11/25/2019 3:29 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

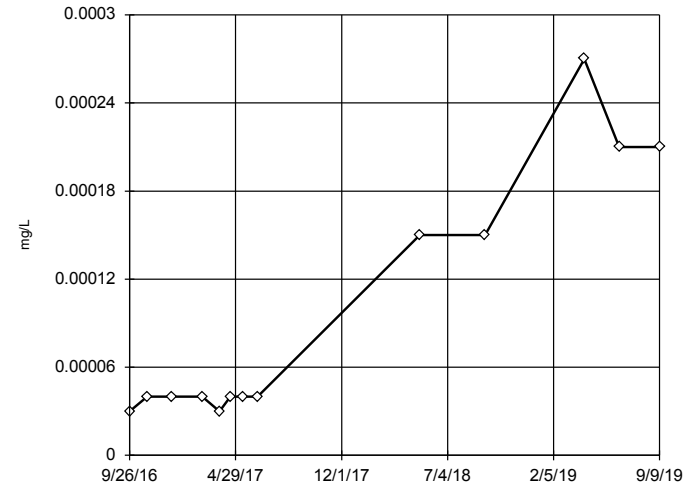
Tukey's Outlier Screening
MW-1604D



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 = 0.00046, low cutoff = -0.000275, based on IQR multiplier of 3.

Constituent: Cadmium, total Analysis Run 11/25/2019 3:29 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

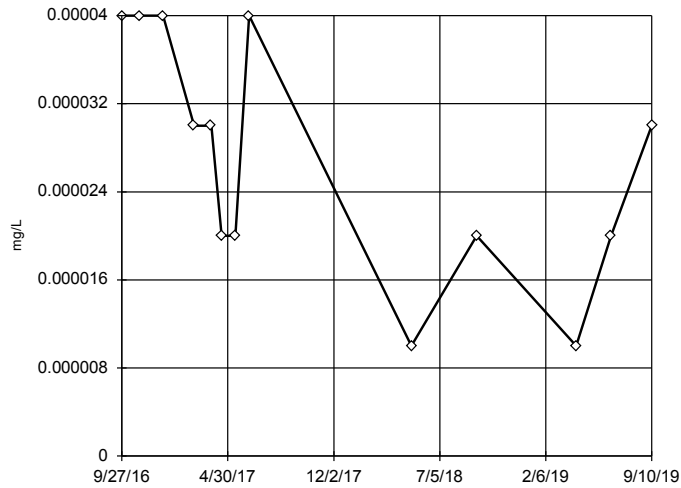
Tukey's Outlier Screening
MW-1604S



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 = 4.6e-7, based on IQR multiplier of 3.

Constituent: Cadmium, total Analysis Run 11/25/2019 3:29 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

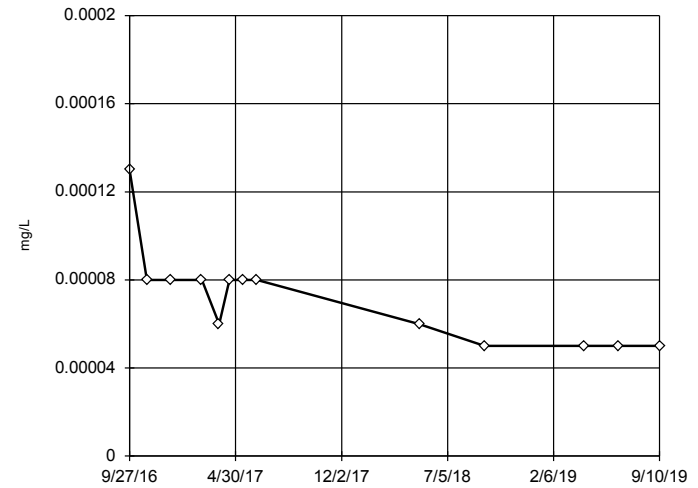
Tukey's Outlier Screening
MW-1605D



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 = 0.00001, low cutoff = -0.00004, based on IQR multiplier of 3.

Constituent: Cadmium, total Analysis Run 11/25/2019 3:29 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening
MW-1605S

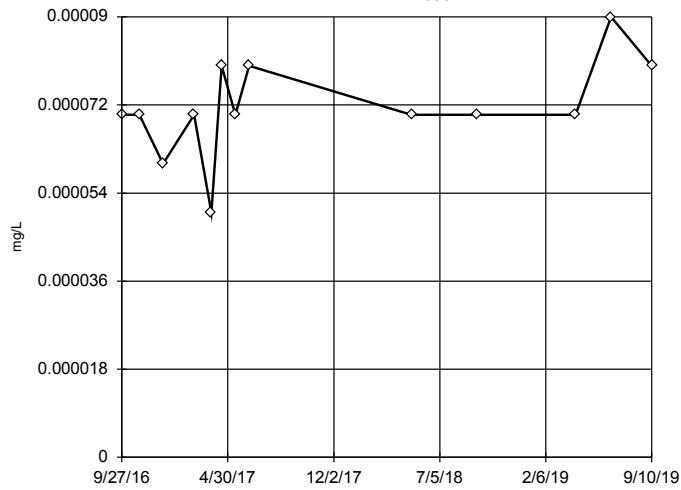


n = 13
No outliers found. Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.0003277, low cutoff = 0.00001221, based on IQR multiplier of 3.

Constituent: Cadmium, total Analysis Run 11/25/2019 3:29 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

MW-1606D

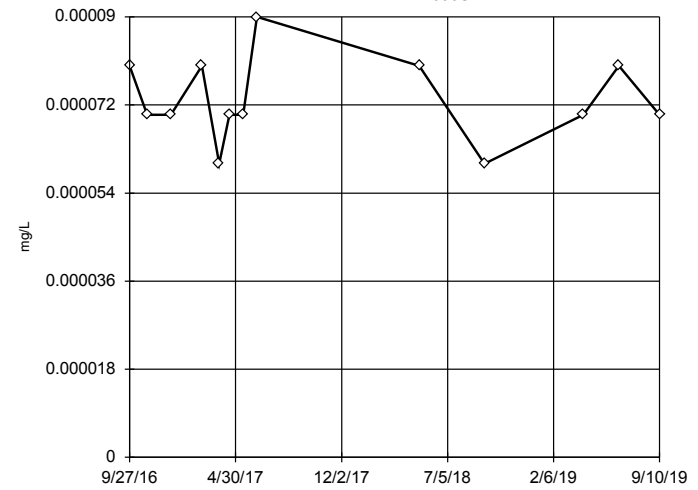


n = 13
 No outliers found.
 Tukey's method selected by user.
 Data were square root transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.0001044, low cutoff = 0.00002, based on IQR multiplier of 3.

Constituent: Cadmium, total Analysis Run 11/25/2019 3:29 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

MW-1606S

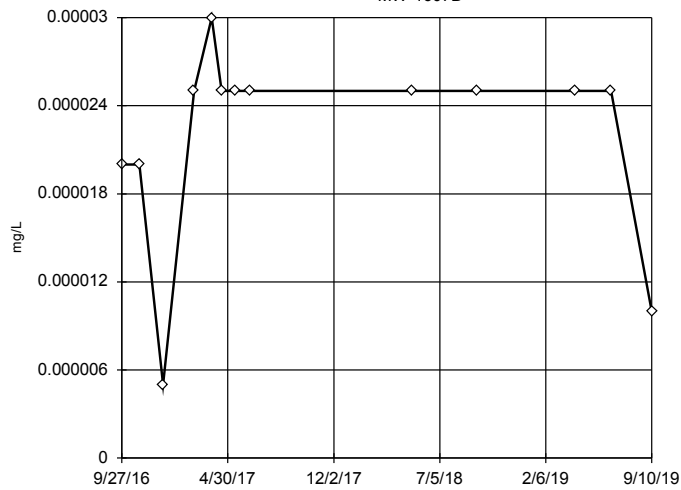


n = 13
 No outliers found.
 Tukey's method selected by user.
 Data were square root transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.000114, low cutoff = 0.000044, based on IQR multiplier of 3.

Constituent: Cadmium, total Analysis Run 11/25/2019 3:29 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

MW-1607D

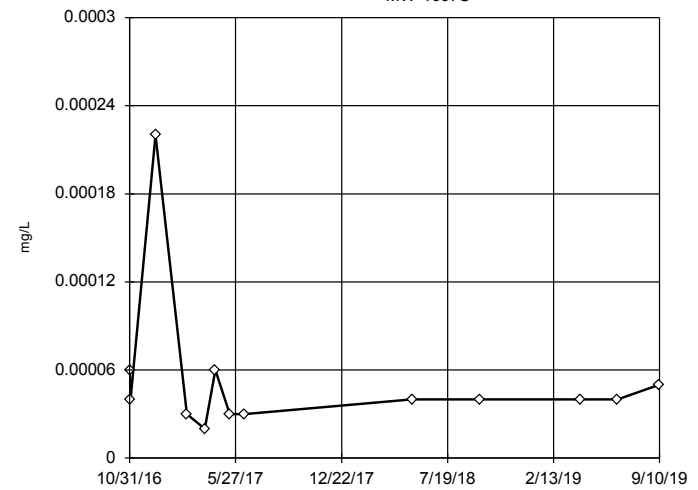


n = 13
 No outliers found.
 Tukey's method selected by user.
 Data were cube transformed to achieve best W statistic (graph shown in original units).
 The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Cadmium, total Analysis Run 11/25/2019 3:29 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

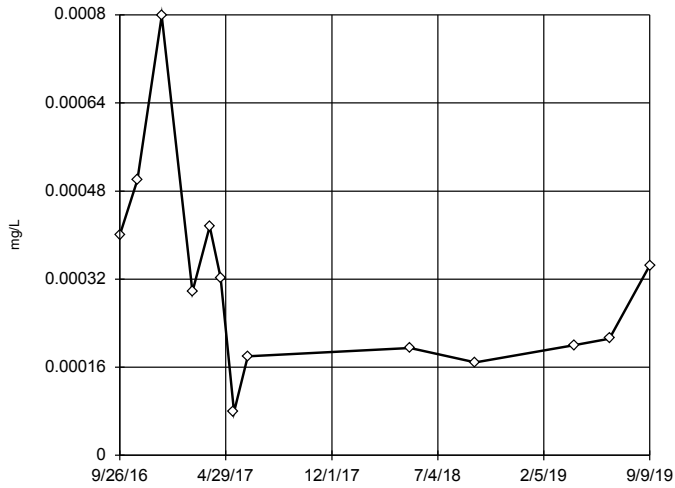
MW-1607S



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 = 0.0003333, low cutoff = 0.0000493, based on IQR multiplier of 3.

Constituent: Cadmium, total Analysis Run 11/25/2019 3:29 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

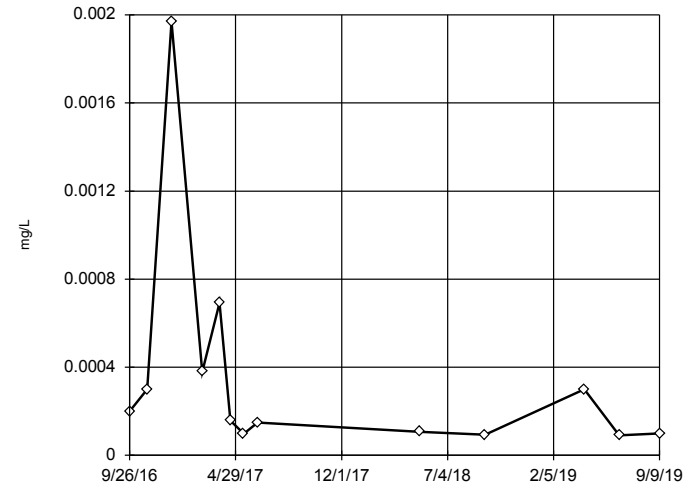
Tukey's Outlier Screening
MW-1604D



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 = 0.004211, low cutoff = 0.0001815, based on IQR multiplier of 3.

Constituent: Chromium, total Analysis Run 11/25/2019 3:29 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

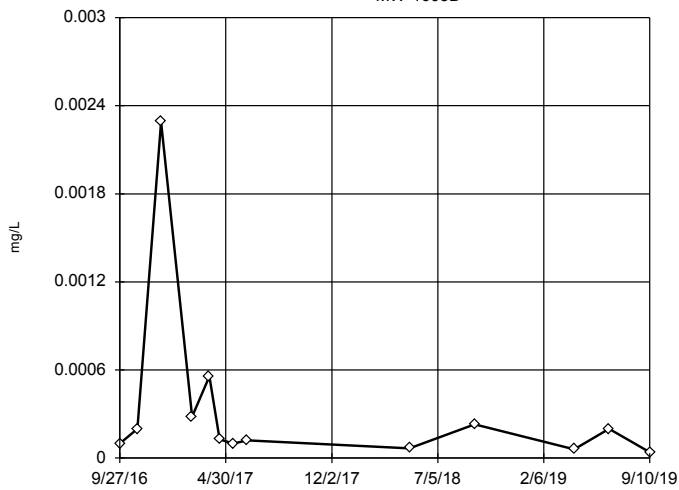
Tukey's Outlier Screening
MW-1604S



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 = 0.01333, low cutoff = 0.00002505, based on IQR multiplier of 3.

Constituent: Chromium, total Analysis Run 11/25/2019 3:29 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

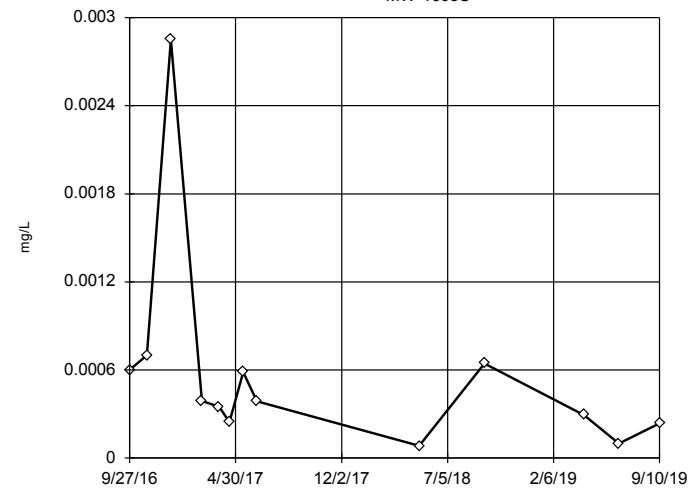
Tukey's Outlier Screening
MW-1605D



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 = 0.00772, low cutoff = 0.00002881, based on IQR multiplier of 3.

Constituent: Chromium, total Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

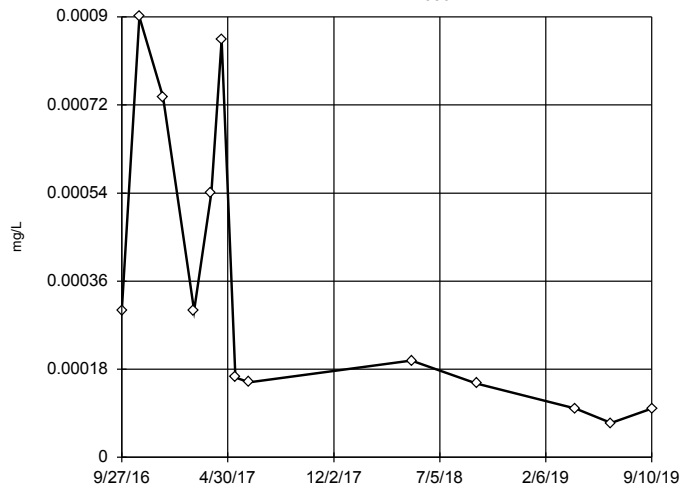
Tukey's Outlier Screening
MW-1605S



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 = 0.01067, low cutoff = 0.00001404, based on IQR multiplier of 3.

Constituent: Chromium, total Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

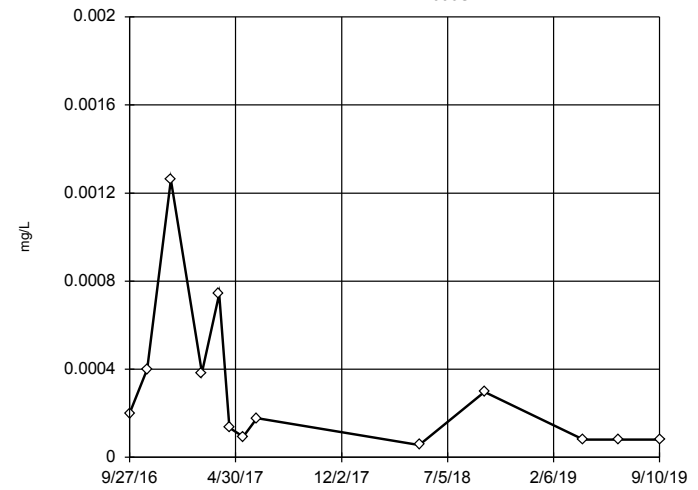
Tukey's Outlier Screening
MW-1606D



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 = 0.08544, low cutoff = 9.1e-7, based on IQR multiplier of 3.

Constituent: Chromium, total Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

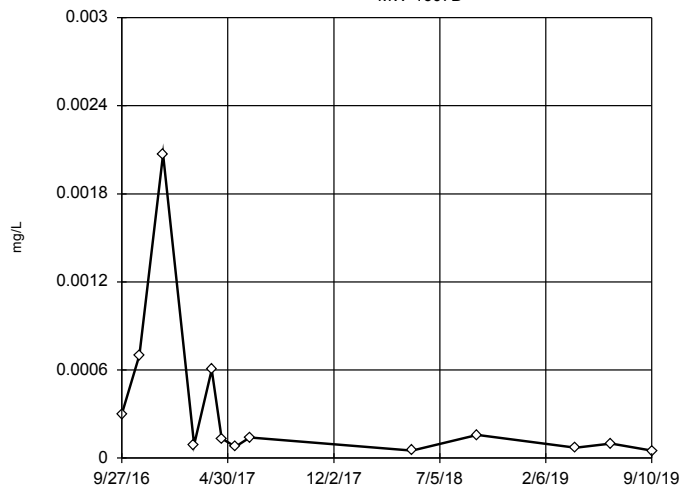
Tukey's Outlier Screening
MW-1606S



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 = 0.04608, low cutoff = 6.8e-7, based on IQR multiplier of 3.

Constituent: Chromium, total Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

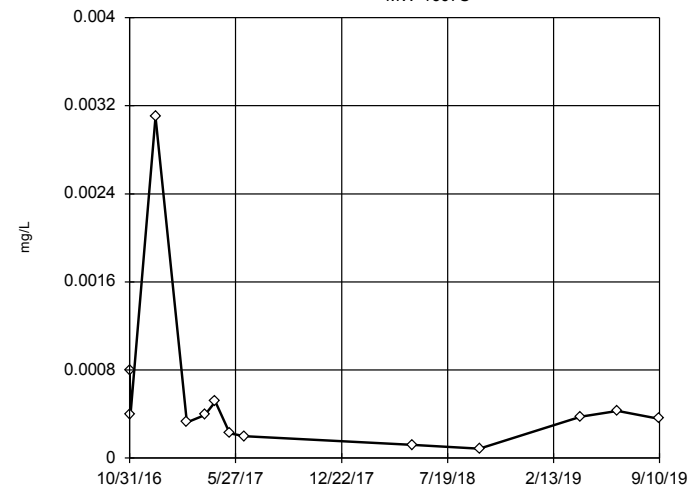
Tukey's Outlier Screening
MW-1607D



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 = 0.08084, low cutoff = 3.9e-7, based on IQR multiplier of 3.

Constituent: Chromium, total Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

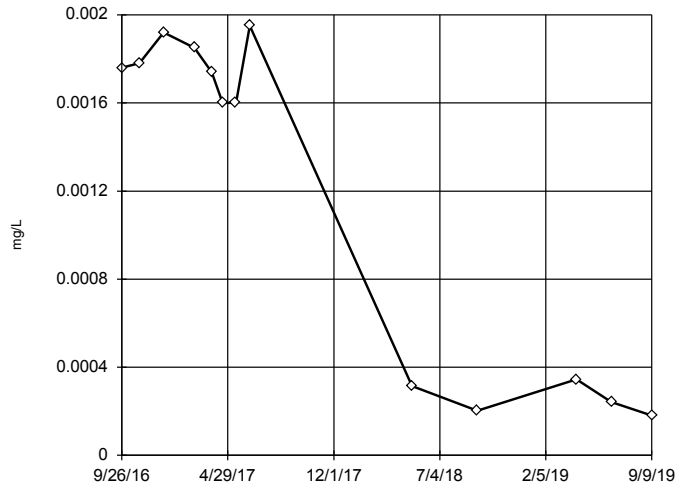
Tukey's Outlier Screening
MW-1607S



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 = 0.005036, low cutoff = 0.0000198, based on IQR multiplier of 3.

Constituent: Chromium, total Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

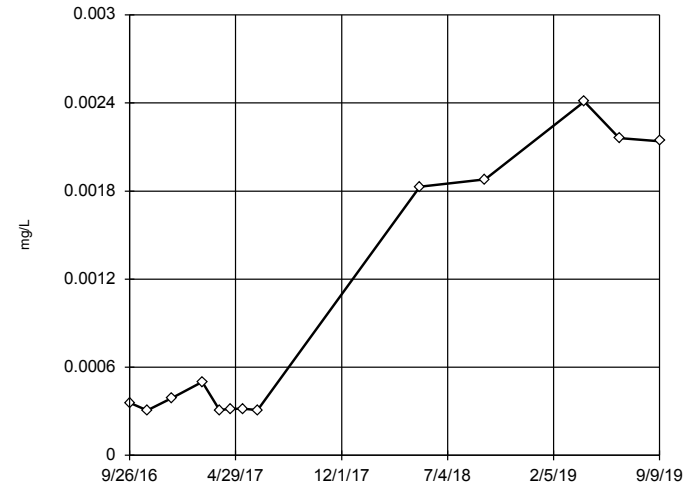
Tukey's Outlier Screening
MW-1604D



n = 13
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 = 0.002289,
low cutoff = -0.002182,
based on IQR multiplier of 3.

Constituent: Cobalt, total Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

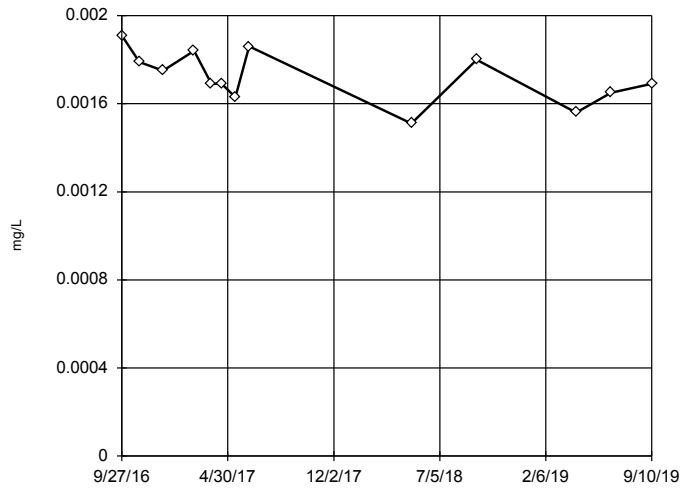
Tukey's Outlier Screening
MW-1604S



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 = 0.5306,
low cutoff = 0.00001181,
based on IQR multiplier of 3.

Constituent: Cobalt, total Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

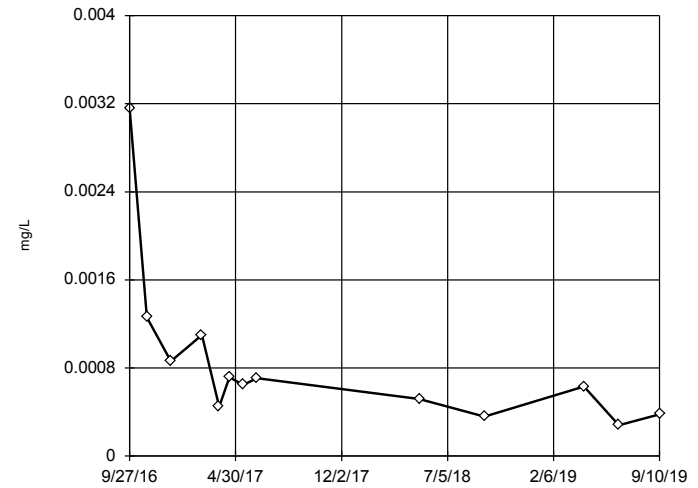
Tukey's Outlier Screening
MW-1605D



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 = 0.002276,
low cutoff = 0.0009058,
based on IQR multiplier of 3.

Constituent: Cobalt, total Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

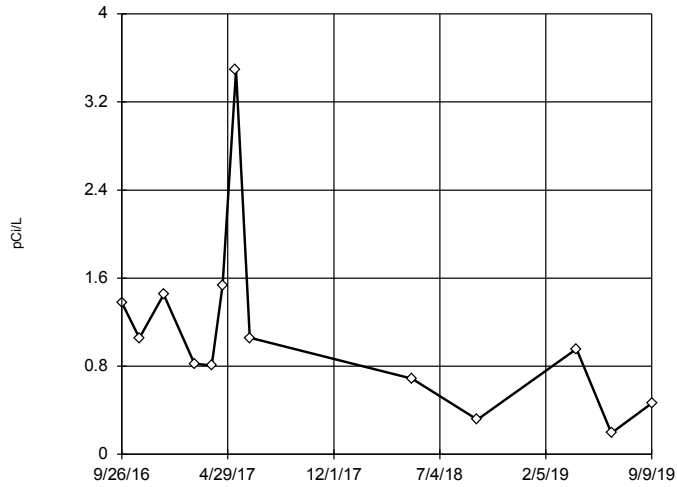
Tukey's Outlier Screening
MW-1605S



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 = 0.01282,
low cutoff = 0.00003128,
based on IQR multiplier of 3.

Constituent: Cobalt, total Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

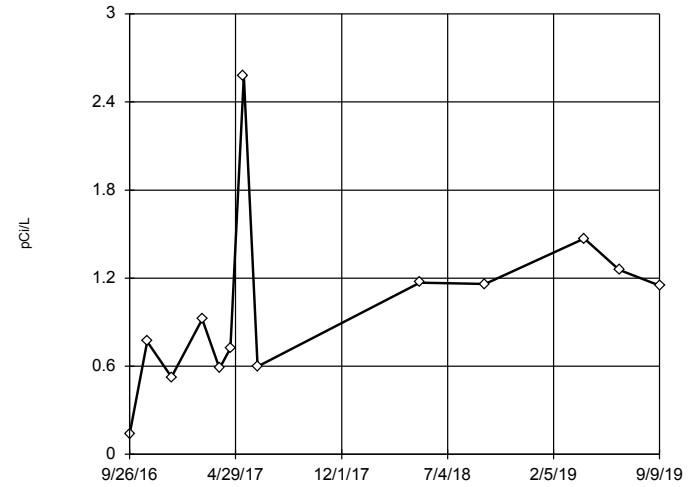
Tukey's Outlier Screening MW-1604D



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 = 22.25, low cutoff = 0.0359, based on IQR multiplier of 3.

Constituent: Combined Radium 226 + 228 Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

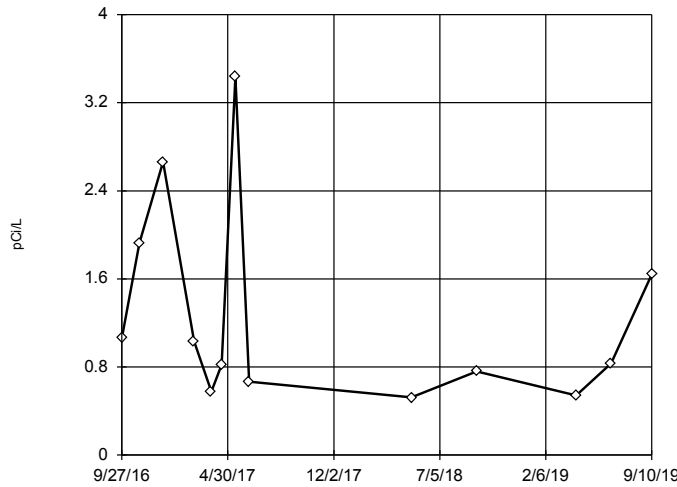
Tukey's Outlier Screening MW-1604S



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 = 4.4, low cutoff = -0.05164, based on IQR multiplier of 3.

Constituent: Combined Radium 226 + 228 Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

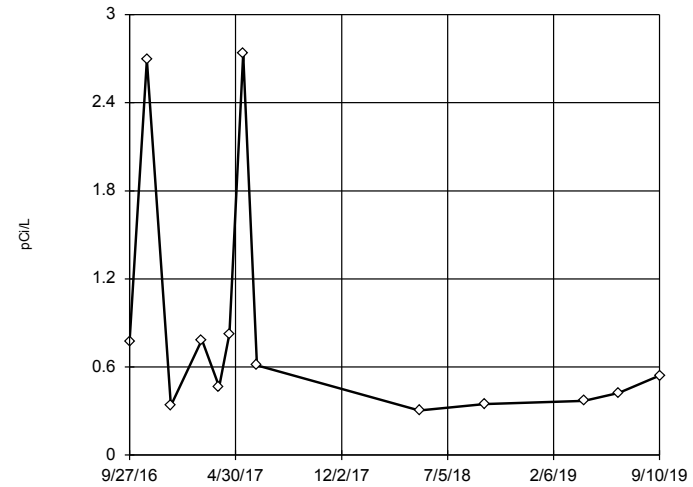
Tukey's Outlier Screening MW-1605D



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 = 41.59, low cutoff = 0.02655, based on IQR multiplier of 3.

Constituent: Combined Radium 226 + 228 Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

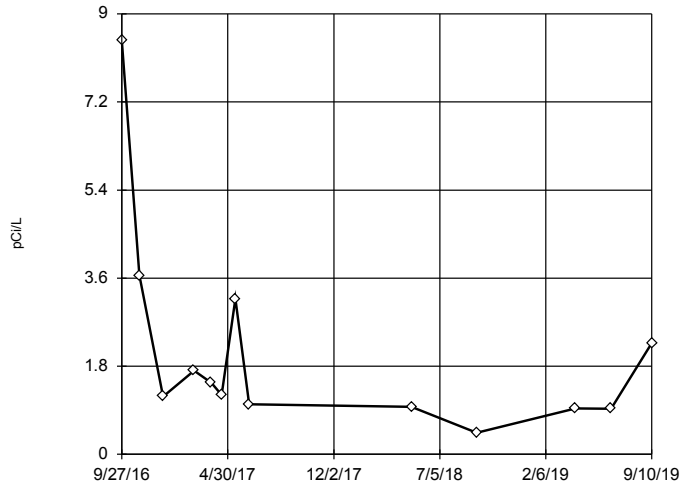
Tukey's Outlier Screening MW-1605S



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 = 9.198, low cutoff = 0.03134, based on IQR multiplier of 3.

Constituent: Combined Radium 226 + 228 Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

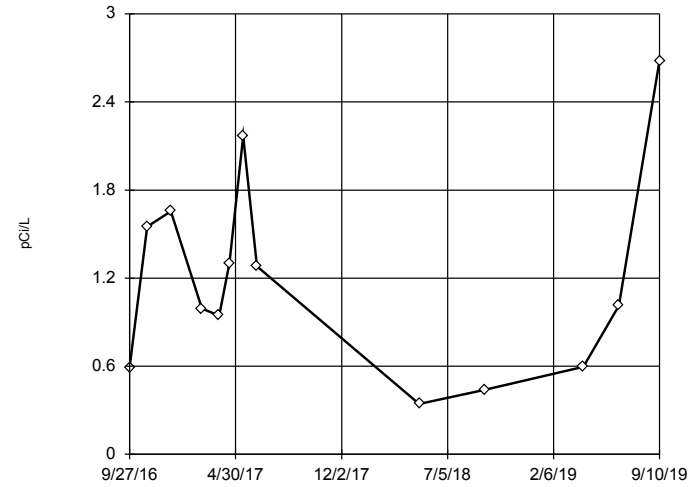
Tukey's Outlier Screening
MW-1606D



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 = 59.74, low cutoff = 0.043, based on IQR multiplier of 3.

Constituent: Combined Radium 226 + 228 Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

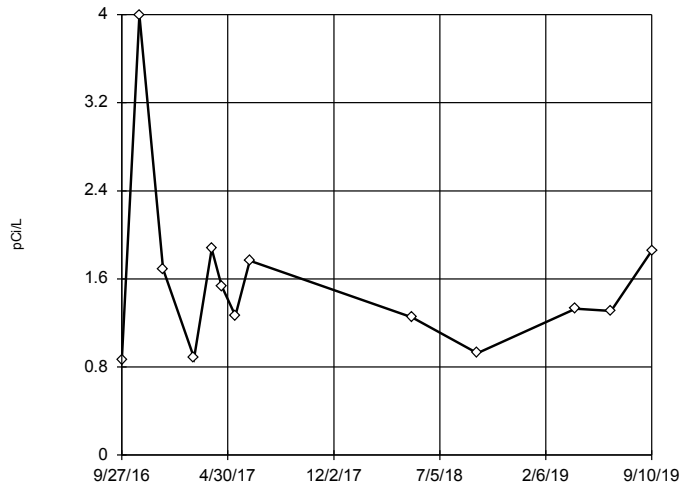
Tukey's Outlier Screening
MW-1606S



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 = 10.07, low cutoff = -0.003314, based on IQR multiplier of 3.

Constituent: Combined Radium 226 + 228 Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

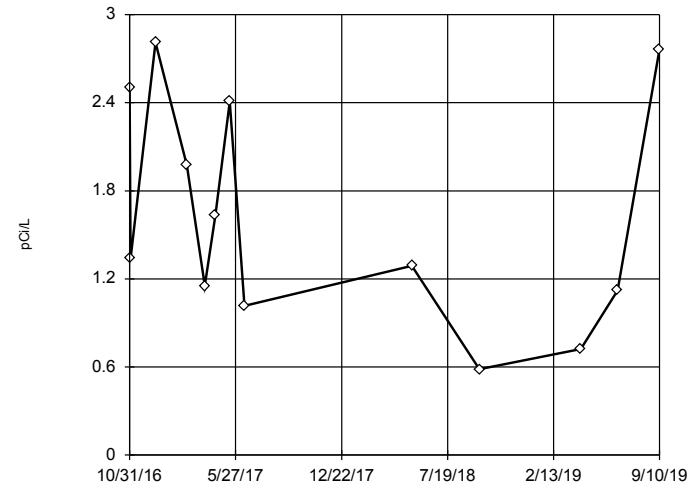
Tukey's Outlier Screening
MW-1607D



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 = 8.598, low cutoff = 0.2263, based on IQR multiplier of 3.

Constituent: Combined Radium 226 + 228 Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

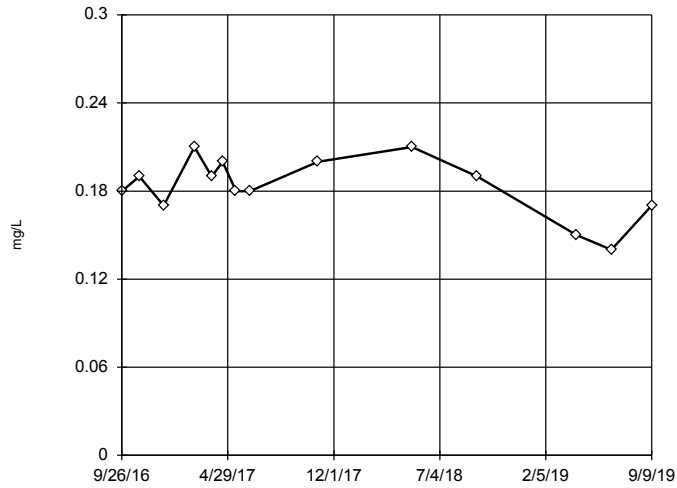
Tukey's Outlier Screening
MW-1607S



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 = 29.87, low cutoff = 0.08778, based on IQR multiplier of 3.

Constituent: Combined Radium 226 + 228 Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

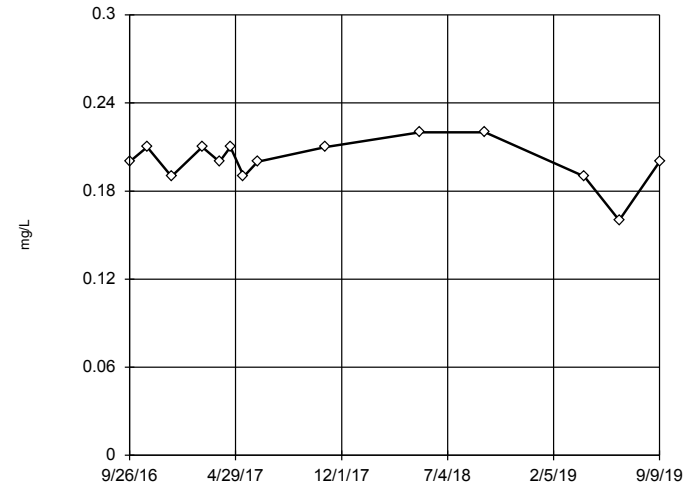
Tukey's Outlier Screening MW-1604D



n = 14
 No outliers found.
 Tukey's method selected by user.
 Data were x⁴ transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.2498,
 low cutoff = -0.1954,
 based on IQR multiplier of 3.

Constituent: Fluoride, total Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

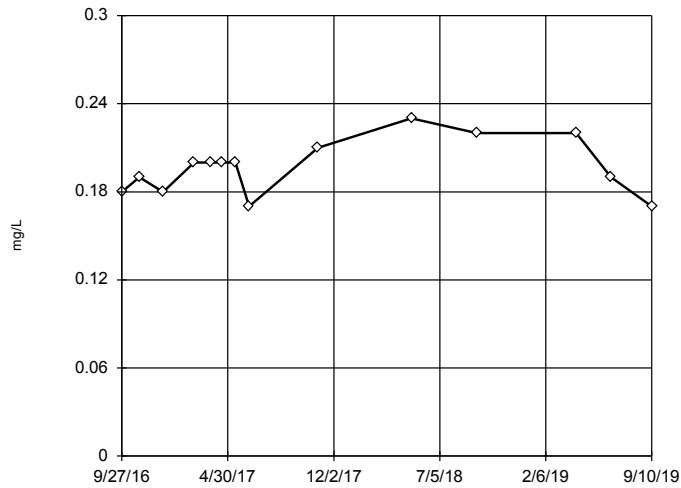
Tukey's Outlier Screening MW-1604S



n = 14
 No outliers found.
 Tukey's method selected by user.
 Data were x⁶ transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.2422,
 low cutoff = -0.2026,
 based on IQR multiplier of 3.

Constituent: Fluoride, total Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

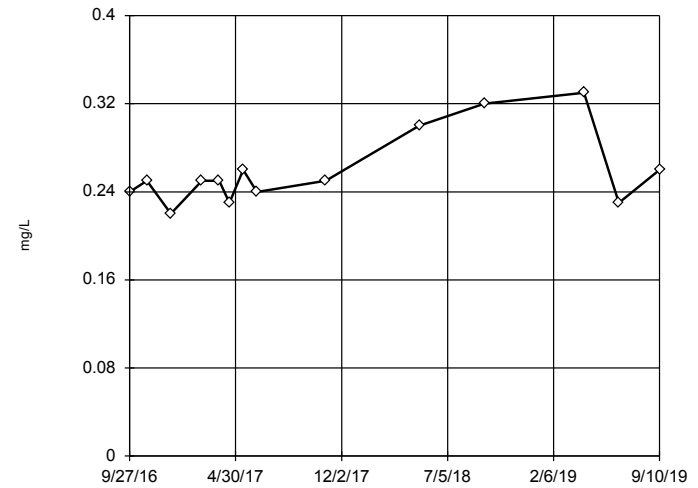
Tukey's Outlier Screening MW-1605D



n = 14
 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 = 0.3385,
 low cutoff = 0.0937, based on IQR multiplier of 3.

Constituent: Fluoride, total Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

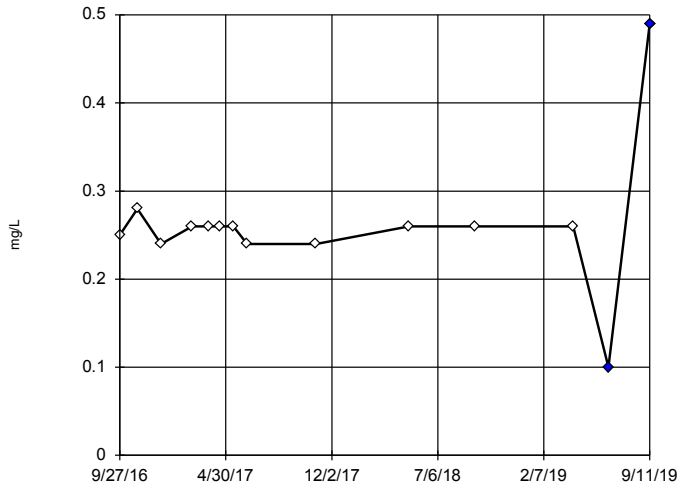
Tukey's Outlier Screening MW-1605S



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 = 0.4691,
 low cutoff = 0.1399, based on IQR multiplier of 3.

Constituent: Fluoride, total Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

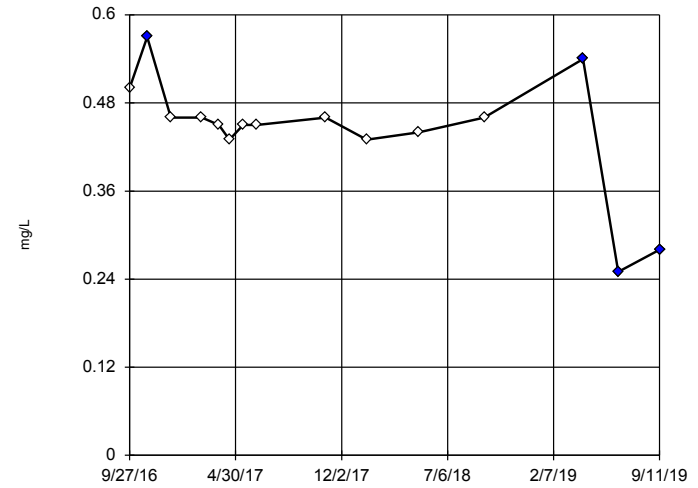
Tukey's Outlier Screening
MW-1606D



n = 14
 Outliers are drawn as solid.
 Tukey's method selected by user.
 Data were square root transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.3248, low cutoff = 0.1848, based on IQR multiplier of 3.

Constituent: Fluoride, total Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

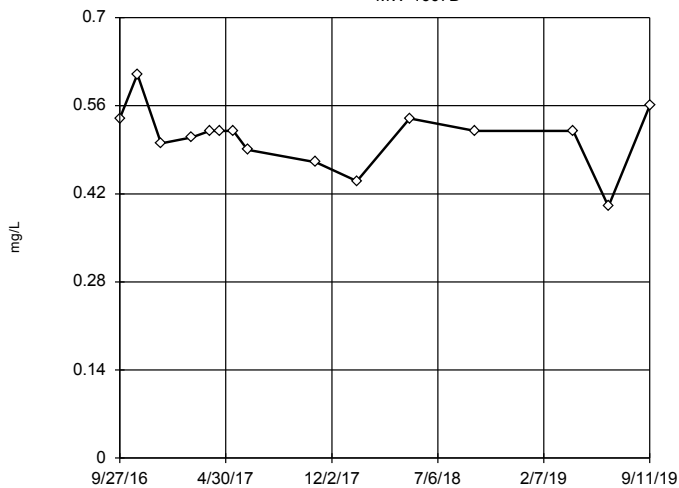
Tukey's Outlier Screening
MW-1606S



n = 15
 Outliers are drawn as solid.
 Tukey's method selected by user.
 Data were cube transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.5323, low cutoff = 0.2963, based on IQR multiplier of 3.

Constituent: Fluoride, total Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

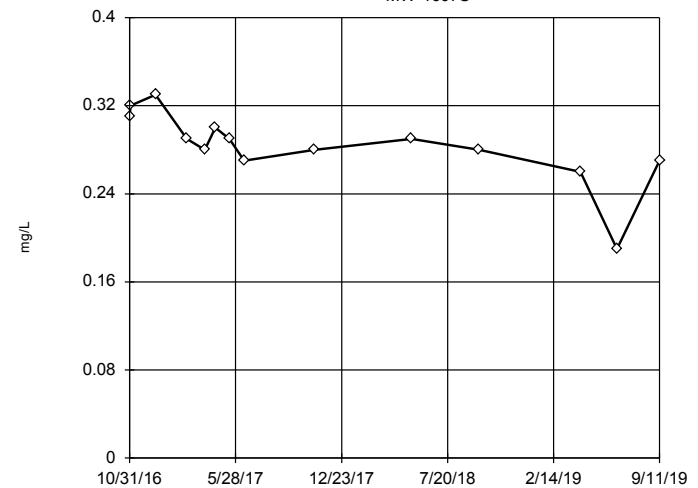
Tukey's Outlier Screening
MW-1607D



n = 15
 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 = 0.6679, low cutoff = 0.2926, based on IQR multiplier of 3.

Constituent: Fluoride, total Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

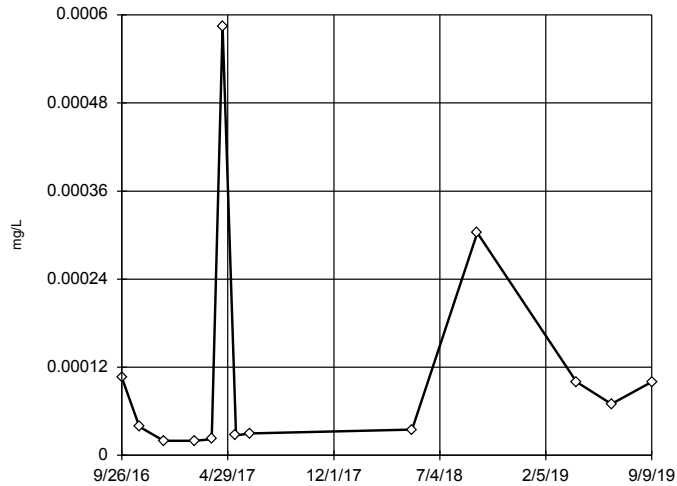
Tukey's Outlier Screening
MW-1607S



n = 14
 No outliers found.
 Tukey's method selected by user.
 Data were x^4 transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.3699, low cutoff = -0.2625, based on IQR multiplier of 3.

Constituent: Fluoride, total Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

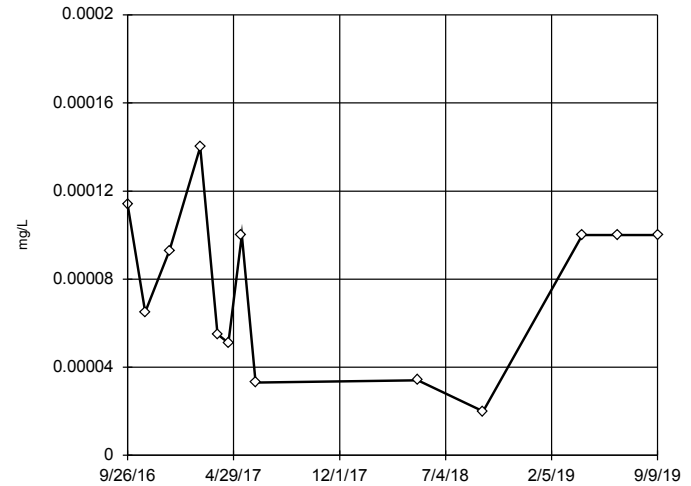
Tukey's Outlier Screening MW-1604D



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 = 0.007761, low cutoff = 3.2e-7, based on IQR multiplier of 3.

Constituent: Lead, total Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

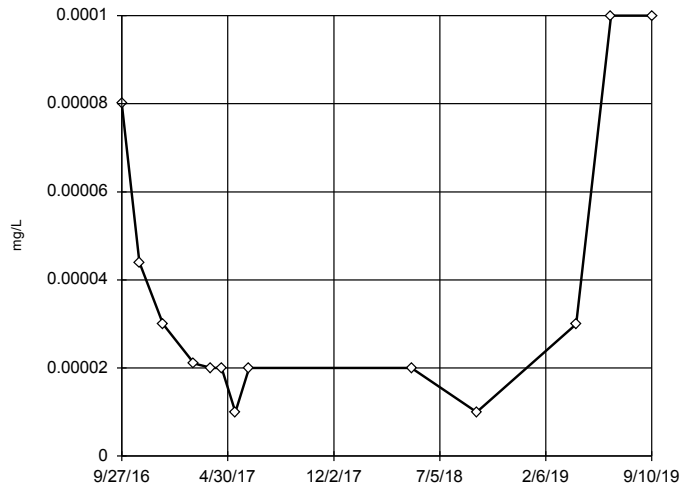
Tukey's Outlier Screening MW-1604S



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 = 0.0002725, low cutoff = -0.00013, based on IQR multiplier of 3.

Constituent: Lead, total Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

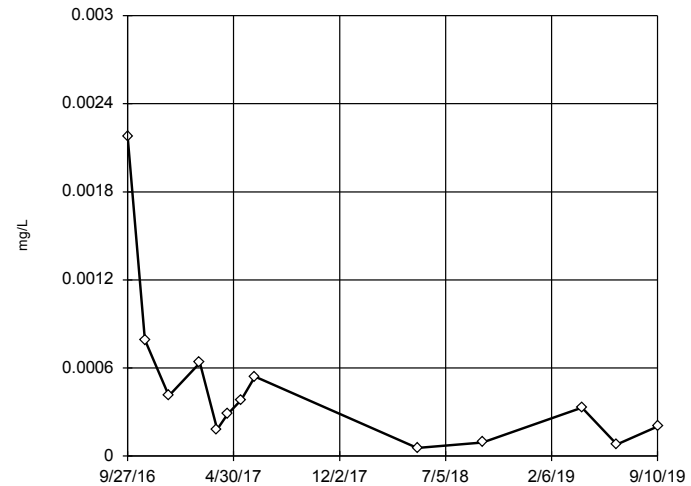
Tukey's Outlier Screening MW-1605D



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 = 0.001549, low cutoff = 7.7e-7, based on IQR multiplier of 3.

Constituent: Lead, total Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening MW-1605S

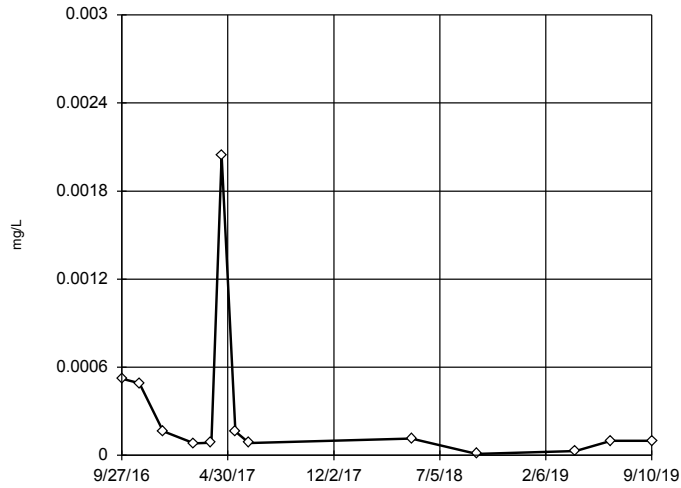


n = 13
No outliers found.
Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.05421, low cutoff = 0.000001404, based on IQR multiplier of 3.

Constituent: Lead, total Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

MW-1606D

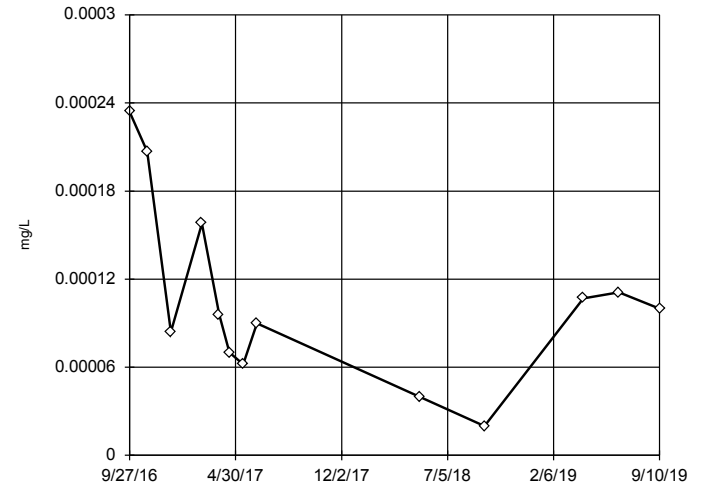


n = 13
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.01134,
 low cutoff = 0.00002076,
 based on IQR multiplier of 3.

Constituent: Lead, total Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

MW-1606S

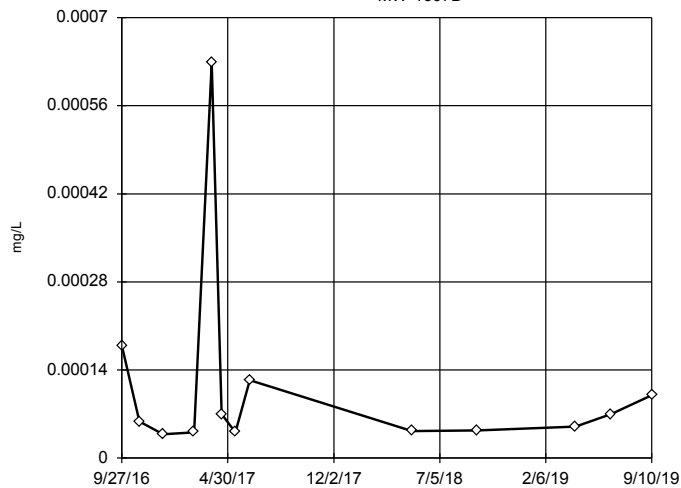


n = 13
 No outliers found.
 Tukey's method selected by user.
 Data were cube root transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.0005729,
 low cutoff = 5.9e-7,
 based on IQR multiplier of 3.

Constituent: Lead, total Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

MW-1607D

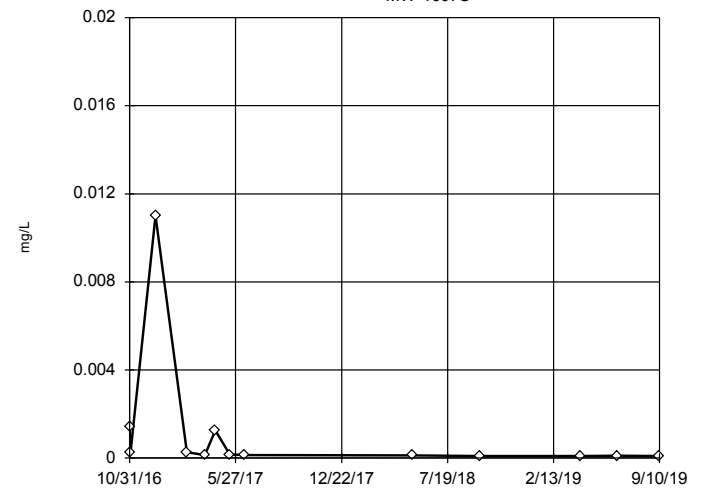


n = 13
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.002077,
 low cutoff = 0.00002251,
 based on IQR multiplier of 3.

Constituent: Lead, total Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

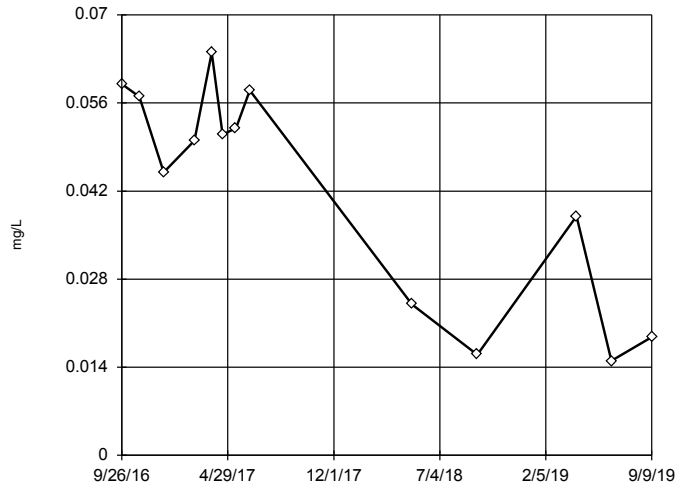
MW-1607S



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 = 0.1089,
 low cutoff = 5.3e-7,
 based on IQR multiplier of 3.

Constituent: Lead, total Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

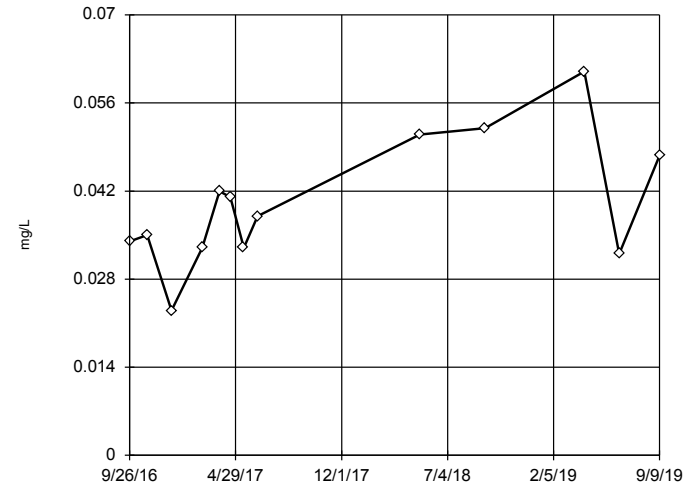
Tukey's Outlier Screening
MW-1604D



n = 13
No outliers found. Tukey's method selected by user.
Data were cube transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.09004, low cutoff = -0.0809, based on IQR multiplier of 3.

Constituent: Lithium, total Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

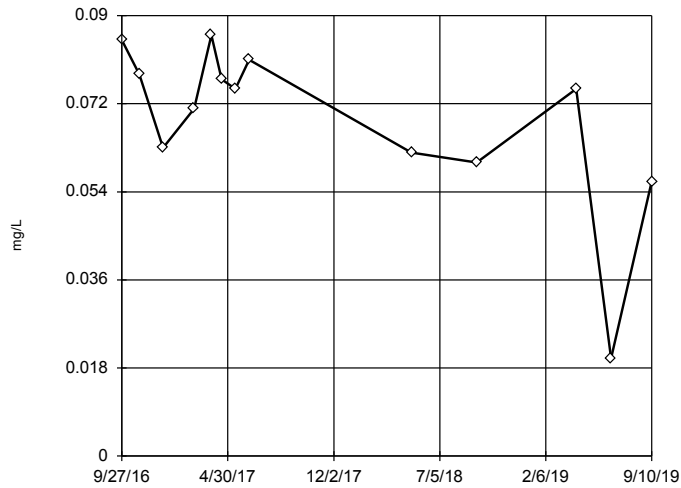
Tukey's Outlier Screening
MW-1604S



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 = 0.1282, low cutoff = 0.006142, based on IQR multiplier of 3.

Constituent: Lithium, total Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

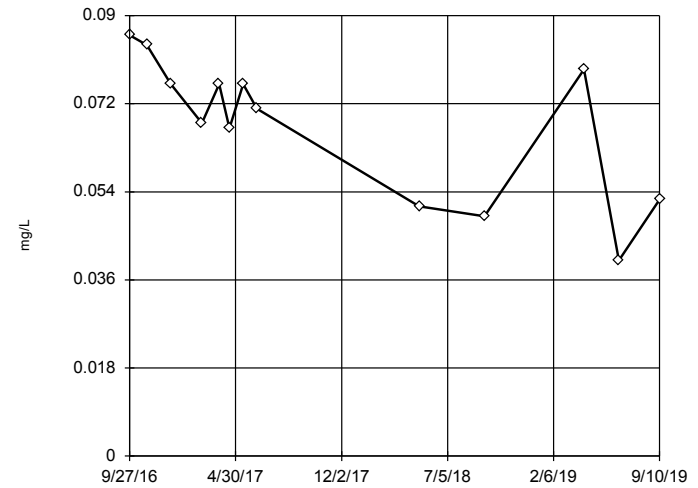
Tukey's Outlier Screening
MW-1605D



n = 13
No outliers found. Tukey's method selected by user.
Data were x^4 transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.1043, low cutoff = -0.08966, based on IQR multiplier of 3.

Constituent: Lithium, total Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening
MW-1605S

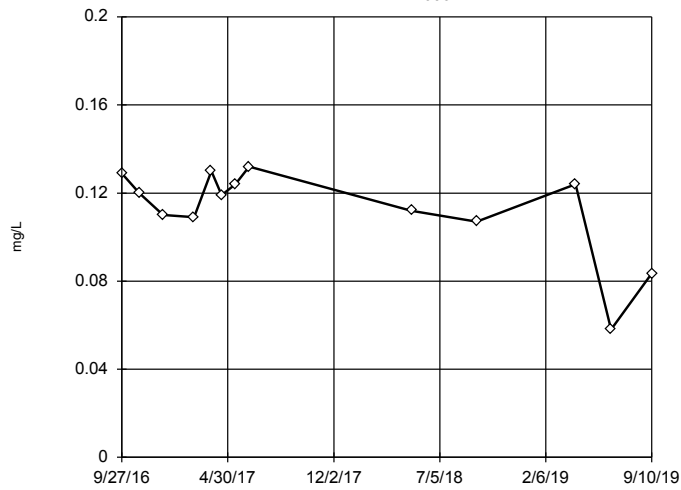


n = 13
No outliers found. Tukey's method selected by user.
Data were cube transformed to achieve best W statistic (graph shown in original units).
High cutoff = 0.1132, low cutoff = -0.09454, based on IQR multiplier of 3.

Constituent: Lithium, total Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

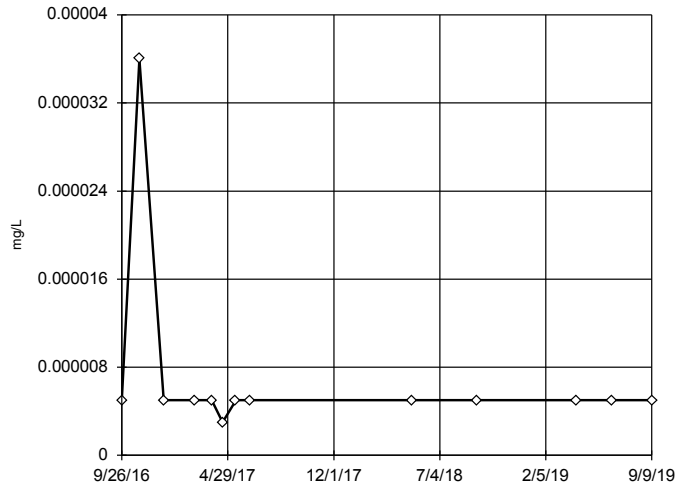
Tukey's Outlier Screening

MW-1606D



Tukey's Outlier Screening

MW-1604D

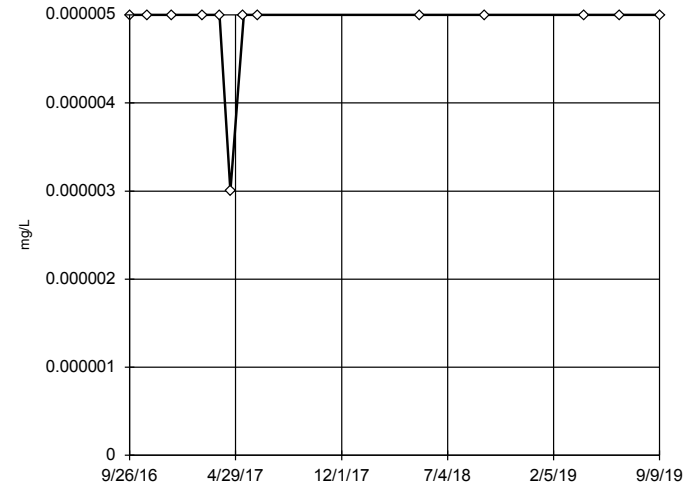


n = 13
 No outliers found. Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Mercury, total Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

MW-1604S

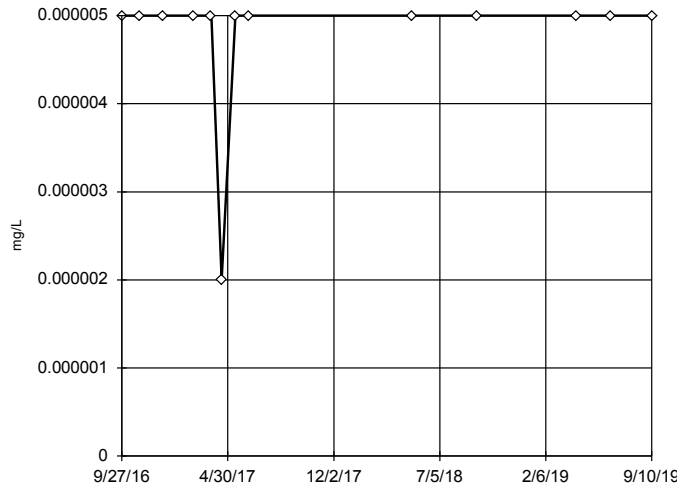


n = 13
 No outliers found. Tukey's method selected by user.
 Data were cube transformed to achieve best W statistic (graph shown in original units).
 The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Mercury, total Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

MW-1605D

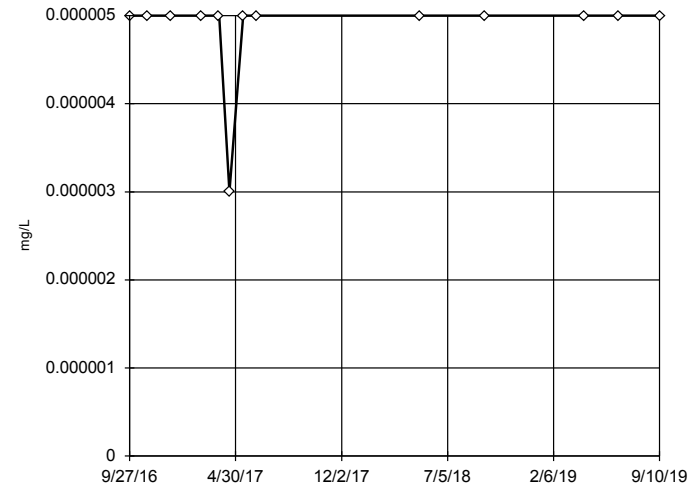


n = 13
 No outliers found. Tukey's method selected by user.
 Data were cube root transformed to achieve best W statistic (graph shown in original units).
 The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Mercury, total Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

MW-1605S

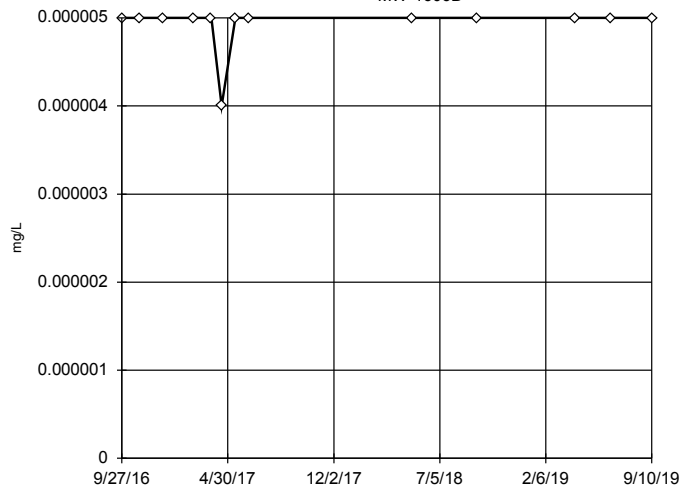


n = 13
 No outliers found. Tukey's method selected by user.
 Data were cube transformed to achieve best W statistic (graph shown in original units).
 The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Mercury, total Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

MW-1606D

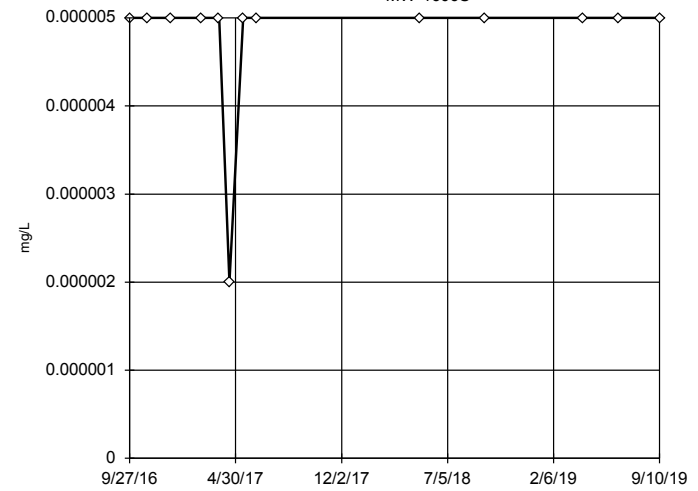


n = 13
 No outliers found.
 Tukey's method selected by user.
 Data were square transformed to achieve best W statistic (graph shown in original units).
 The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Mercury, total Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

MW-1606S

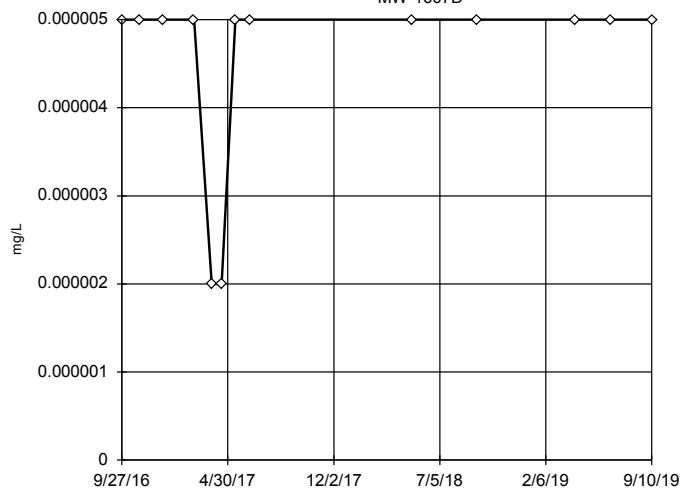


n = 13
 No outliers found.
 Tukey's method selected by user.
 Data were cube root transformed to achieve best W statistic (graph shown in original units).
 The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Mercury, total Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

MW-1607D

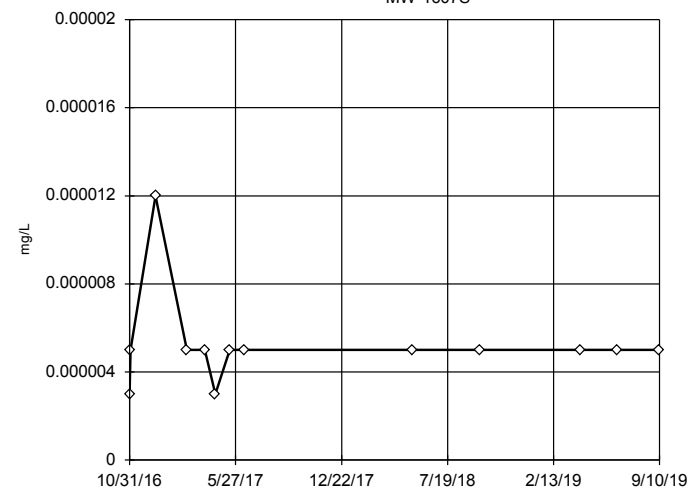


n = 13
 No outliers found.
 Tukey's method selected by user.
 Ladder of Powers transformations did not improve normality, analysis run on raw data.
 The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Mercury, total Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

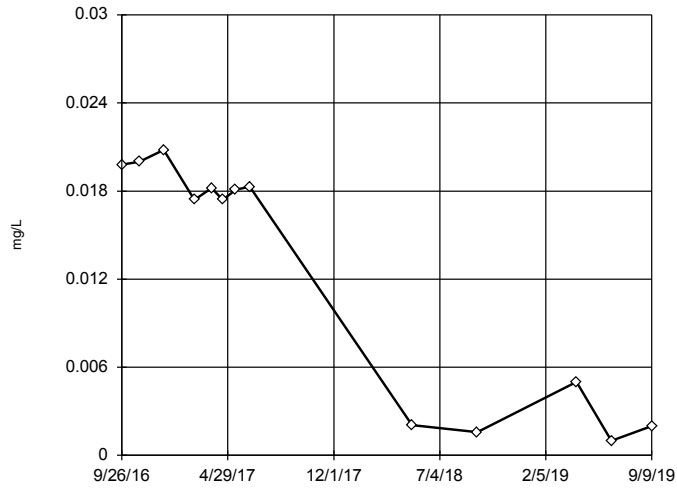
MW-1607S



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

Constituent: Mercury, total Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

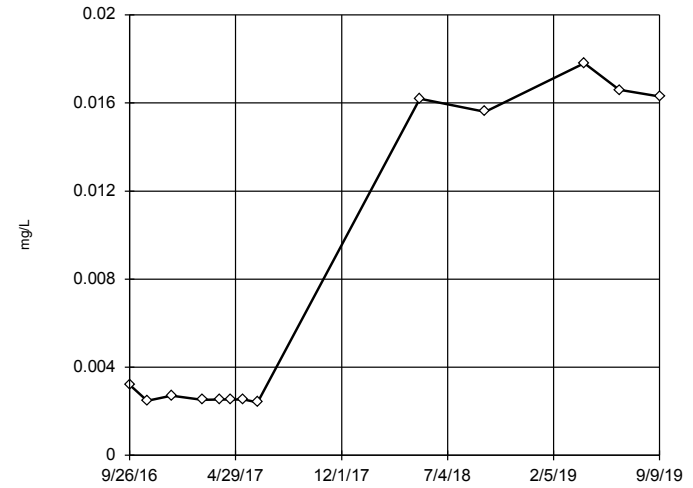
Tukey's Outlier Screening
MW-1604D



n = 13
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 = 0.02409, low cutoff = -0.02297, based on IQR multiplier of 3.

Constituent: Molybdenum, total Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

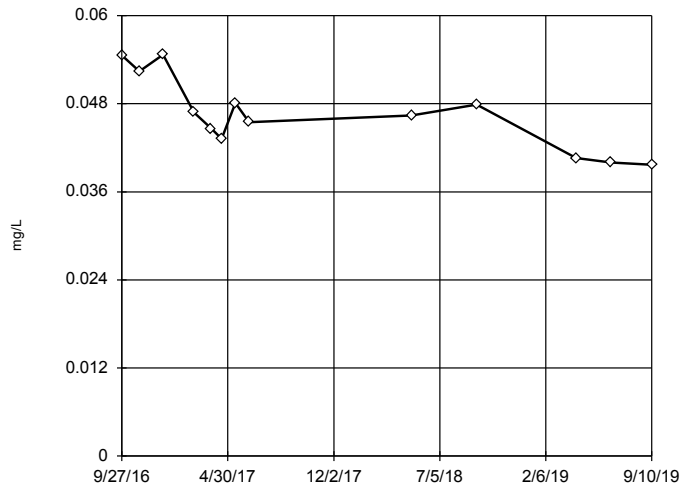
Tukey's Outlier Screening
MW-1604S



n = 13
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 = 0.02047, low cutoff = -0.01952, based on IQR multiplier of 3.

Constituent: Molybdenum, total Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

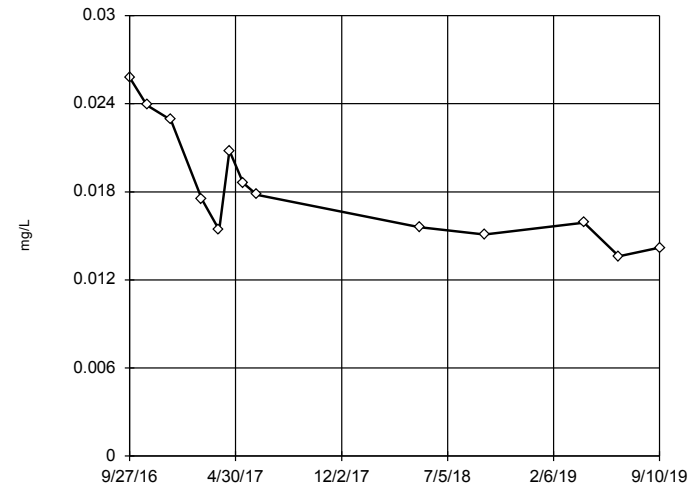
Tukey's Outlier Screening
MW-1605D



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 = 0.08648, low cutoff = 0.02431, based on IQR multiplier of 3.

Constituent: Molybdenum, total Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

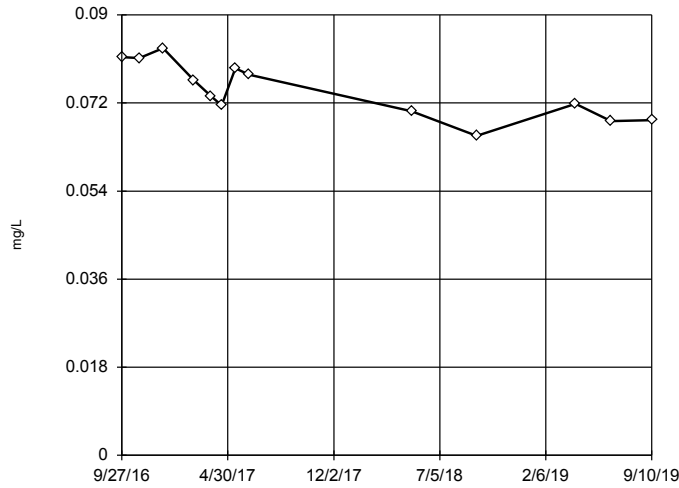
Tukey's Outlier Screening
MW-1605S



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 = 0.06398, low cutoff = 0.005202, based on IQR multiplier of 3.

Constituent: Molybdenum, total Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

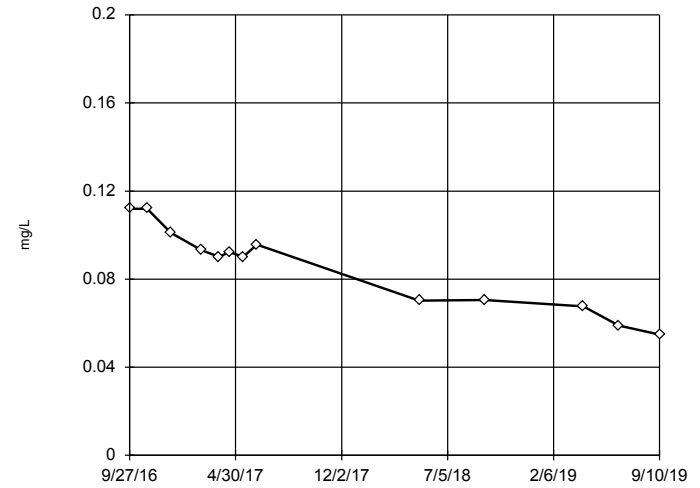
Tukey's Outlier Screening MW-1606D



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 = 0.1235, low cutoff = 0.04505, based on IQR multiplier of 3.

Constituent: Molybdenum, total Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

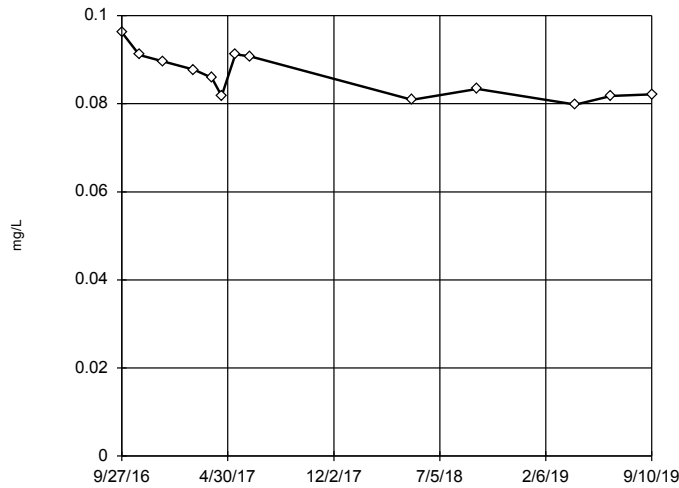
Tukey's Outlier Screening MW-1606S



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 = 0.1564, low cutoff = -0.1001, based on IQR multiplier of 3.

Constituent: Molybdenum, total Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

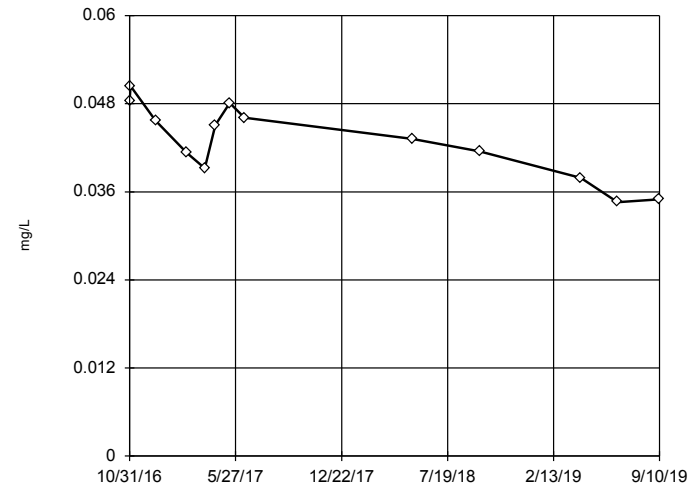
Tukey's Outlier Screening MW-1607D



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 = 0.125, low cutoff = 0.05951, based on IQR multiplier of 3.

Constituent: Molybdenum, total Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

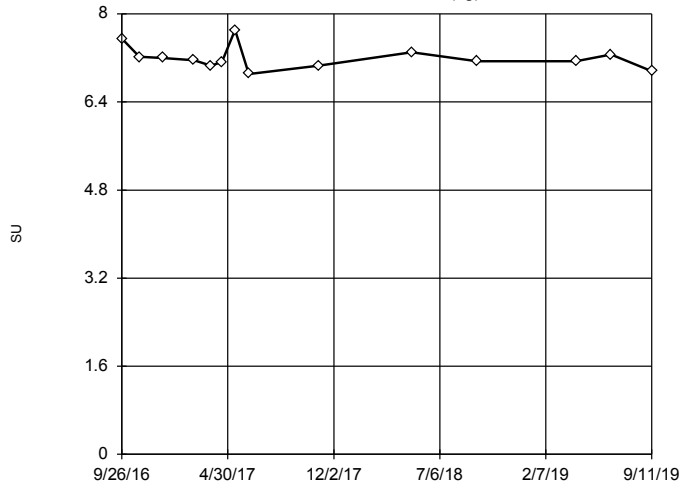
Tukey's Outlier Screening MW-1607S



n = 13
 No outliers found.
 Tukey's method selected by user.
 Data were cube transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.0627, low cutoff = -0.04389, based on IQR multiplier of 3.

Constituent: Molybdenum, total Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

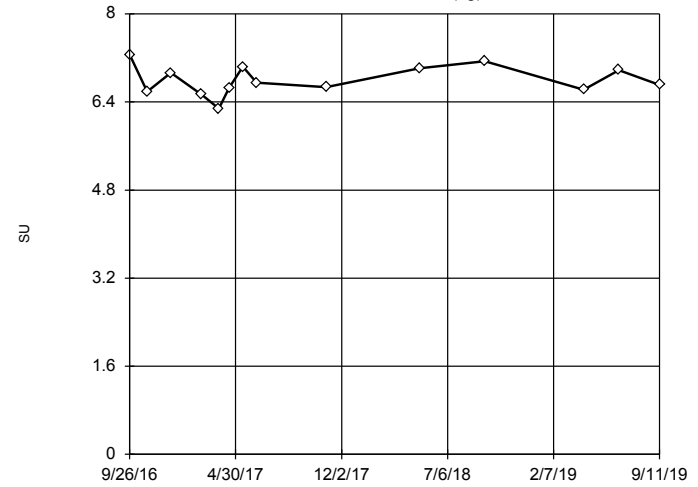
Tukey's Outlier Screening
MW-1601A (bg)



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 = 7.982, low cutoff = 6.439, based on IQR multiplier of 3.

Constituent: pH, field Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

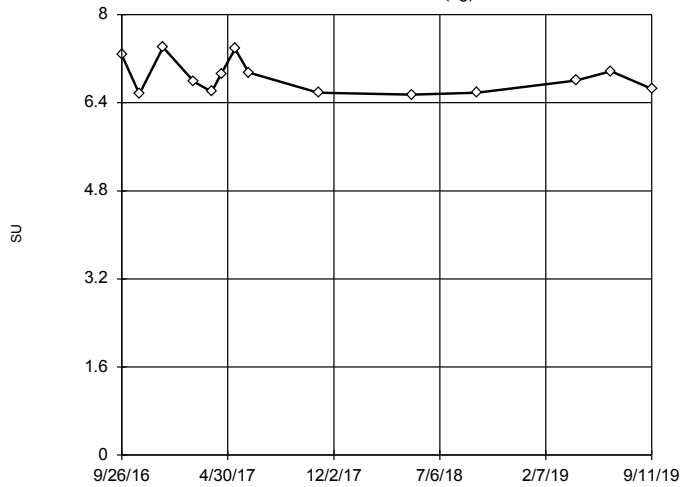
Tukey's Outlier Screening
MW-1602 (bg)



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 = 8.285, low cutoff = 5.345, based on IQR multiplier of 3.

Constituent: pH, field Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

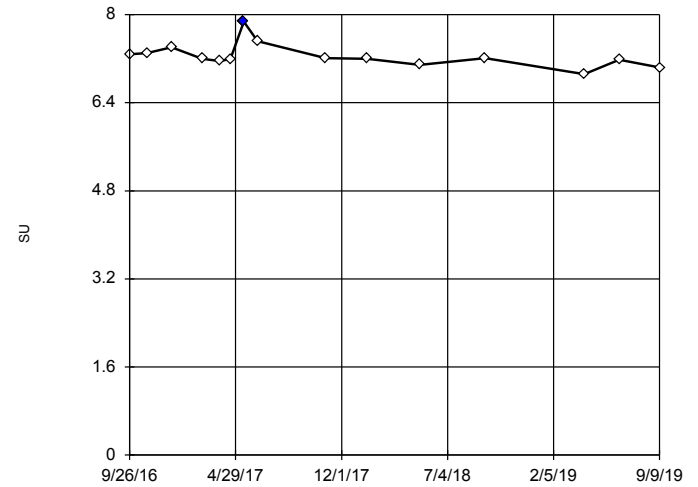
Tukey's Outlier Screening
MW-1603 (bg)



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 = 9.013, low cutoff = 5.197, based on IQR multiplier of 3.

Constituent: pH, field Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening
MW-1604D

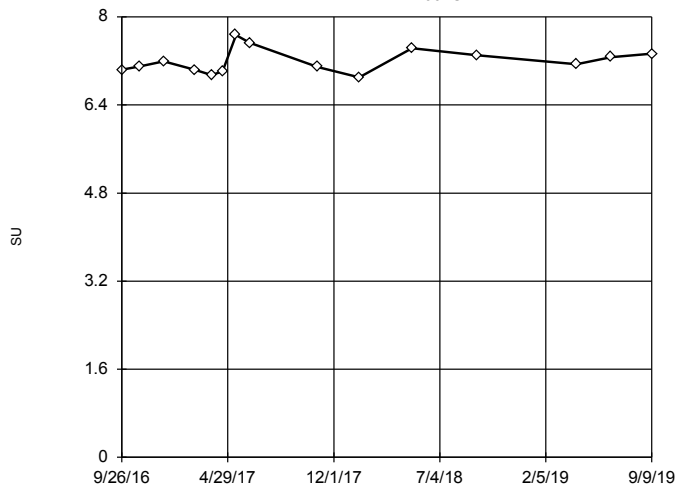


n = 15
Outlier is drawn as solid.
Tukey's method selected by user.
Data were natural log transformed to achieve best W statistic (graph shown in original units).
High cutoff = 7.737, low cutoff = 6.756, based on IQR multiplier of 3.

Constituent: pH, field Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

MW-1604S

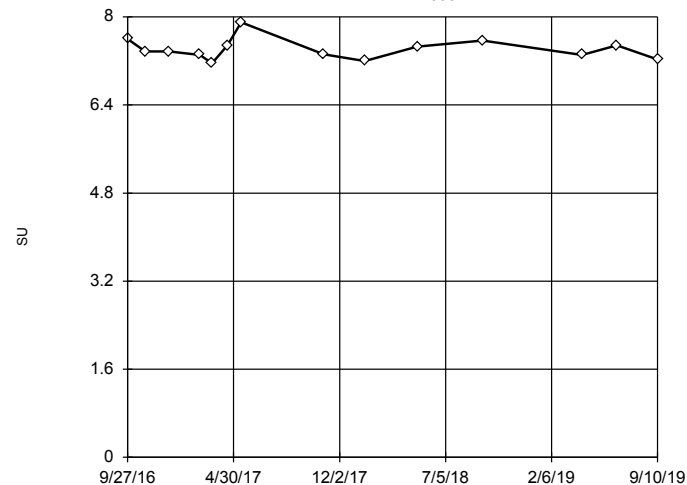


n = 15
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 8.274, low cutoff = 6.237, based on IQR multiplier of 3.

Constituent: pH, field Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

MW-1605D

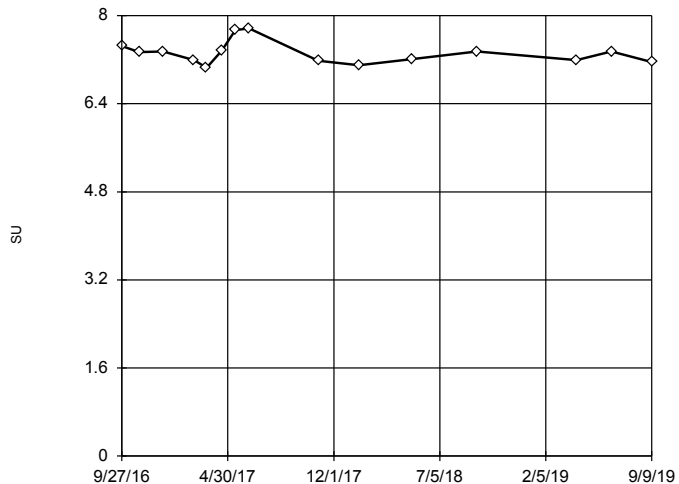


n = 14
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 8.345, low cutoff = 6.556, based on IQR multiplier of 3.

Constituent: pH, field Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

MW-1605S

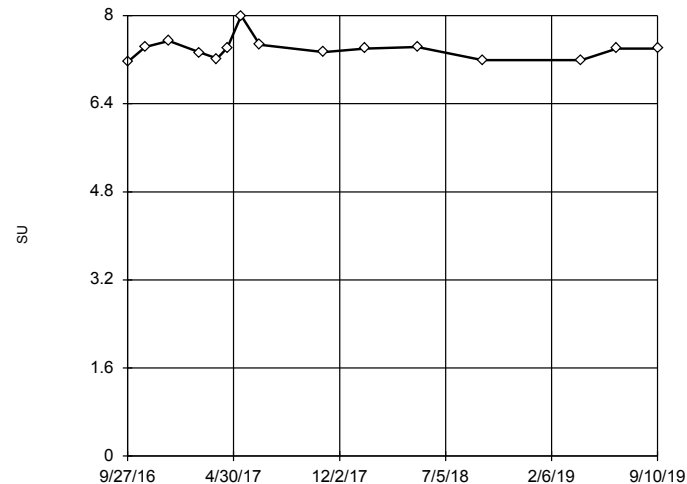


n = 15
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 7.928, low cutoff = 6.666, based on IQR multiplier of 3.

Constituent: pH, field Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

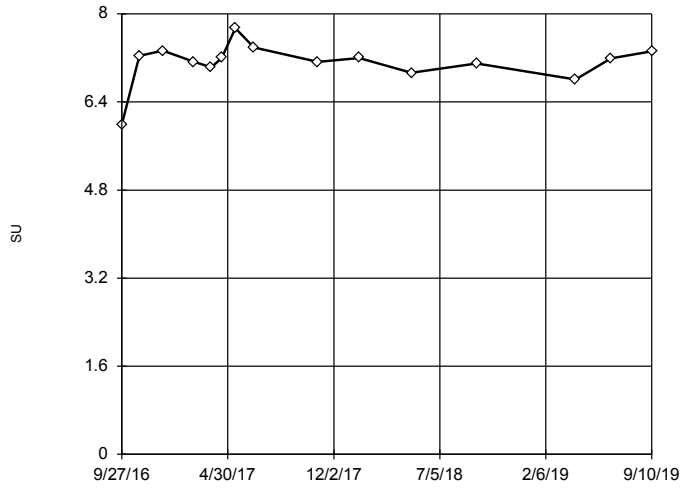
MW-1606D



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 = 8.097, low cutoff = 6.625, based on IQR multiplier of 3.

Constituent: pH, field Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

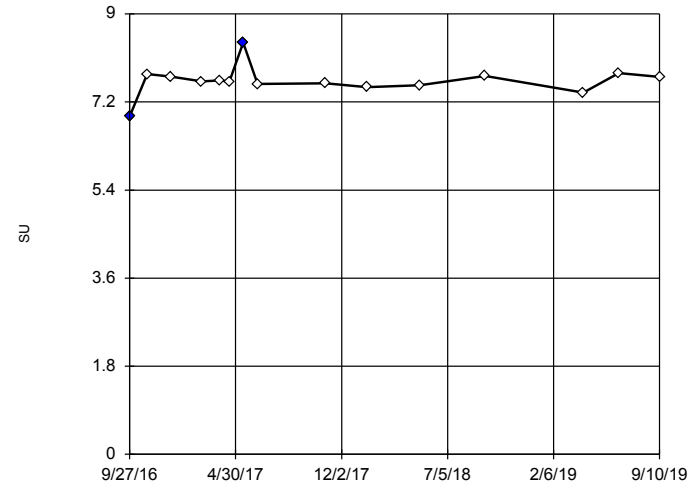
Tukey's Outlier Screening MW-1606S



n = 15
No outliers found.
Tukey's method selected by user.
Data were x⁶ transformed to achieve best W statistic (graph shown in original units).
High cutoff = 7.954, low cutoff = 5.265, based on IQR multiplier of 3.

Constituent: pH, field Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

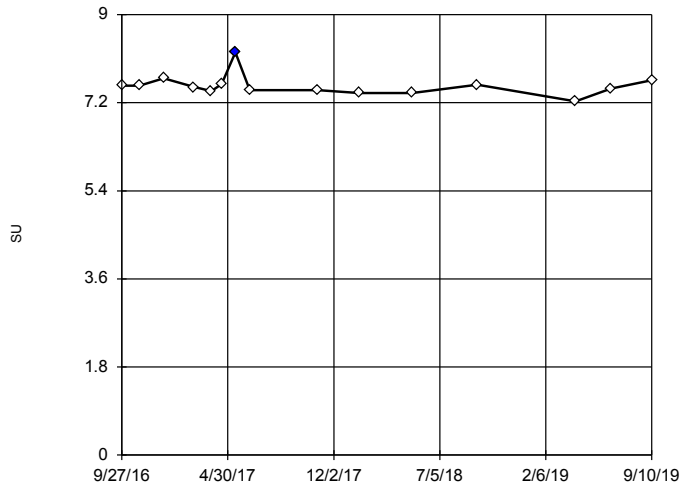
Tukey's Outlier Screening MW-1607D



n = 15
Outliers are drawn as solid.
Tukey's method selected by user.
Data were cube root transformed to achieve best W statistic (graph shown in original units).
High cutoff = 8.319, low cutoff = 6.989, based on IQR multiplier of 3.

Constituent: pH, field Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

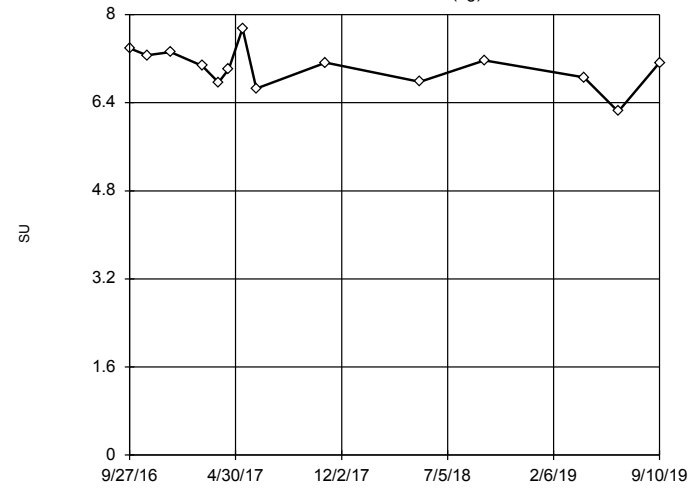
Tukey's Outlier Screening MW-1607S



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 = 8.016, low cutoff = 7.035, based on IQR multiplier of 3.

Constituent: pH, field Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening MW-1608 (bg)

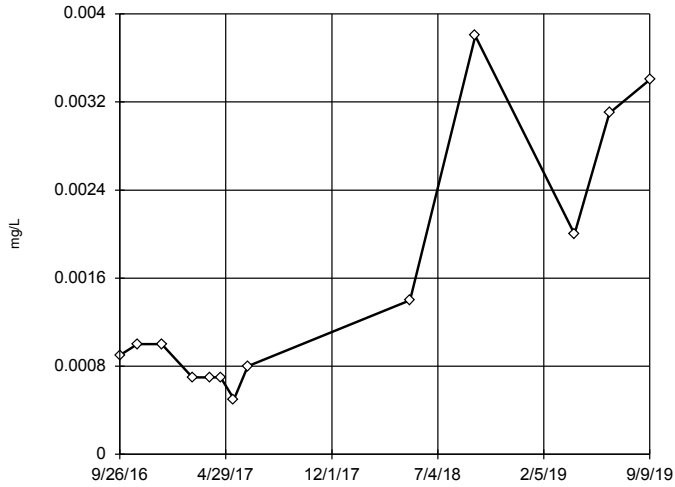


n = 14
No outliers found.
Tukey's method selected by user.
Data were cube transformed to achieve best W statistic (graph shown in original units).
High cutoff = 8.512, low cutoff = 4.337, based on IQR multiplier of 3.

Constituent: pH, field Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

MW-1604D

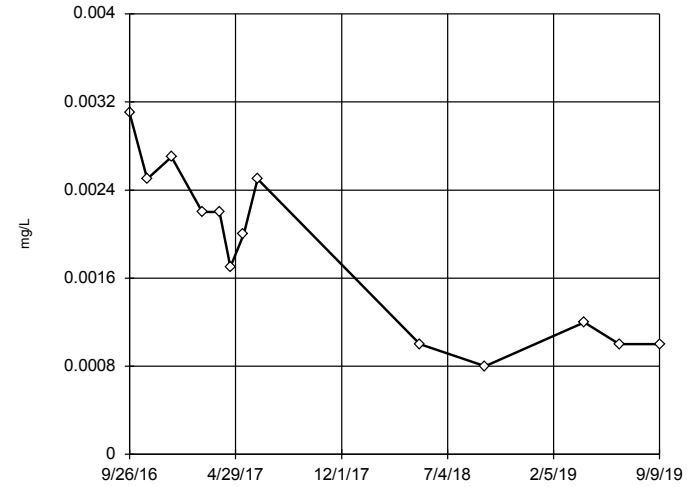


n = 13
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.1121,
 low cutoff = 0.00001555,
 based on IQR multiplier of 3.

Constituent: Selenium, total Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

MW-1604S

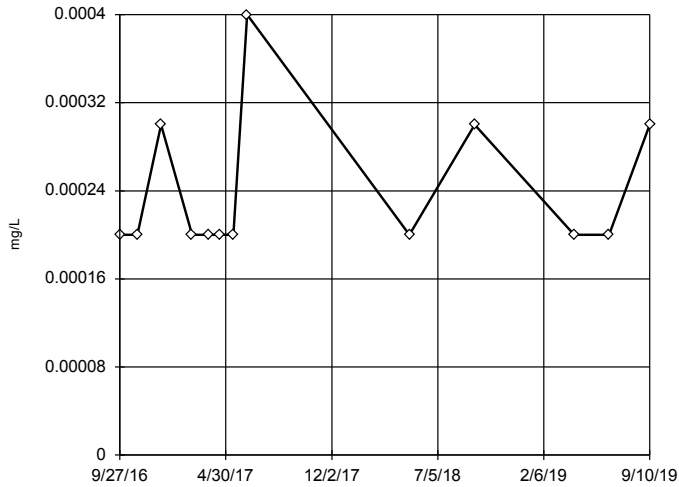


n = 13
 No outliers found.
 Tukey's method selected by user.
 Ladder of Powers transformations did not improve normality; analysis run on raw data.
 High cutoff = 0.007, low cutoff = -0.0035,
 based on IQR multiplier of 3.

Constituent: Selenium, total Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

MW-1605D

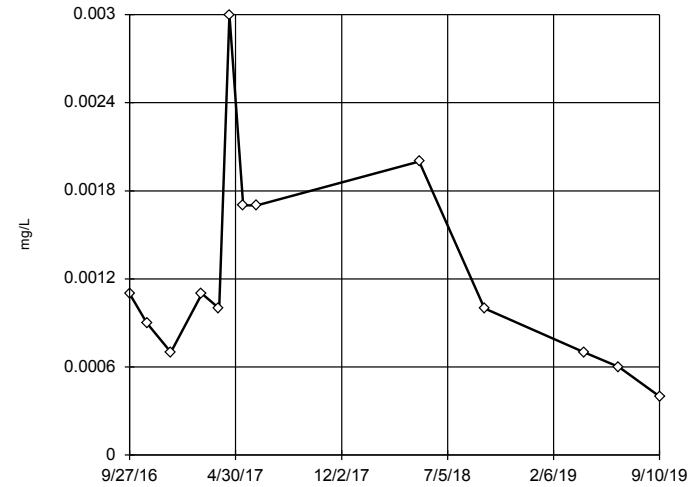


n = 13
 No outliers found.
 Tukey's method selected by user.
 Data were natural log transformed to achieve best W statistic (graph shown in original units).
 High cutoff = 0.001013,
 low cutoff = 0.00005926,
 based on IQR multiplier of 3.

Constituent: Selenium, total Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening

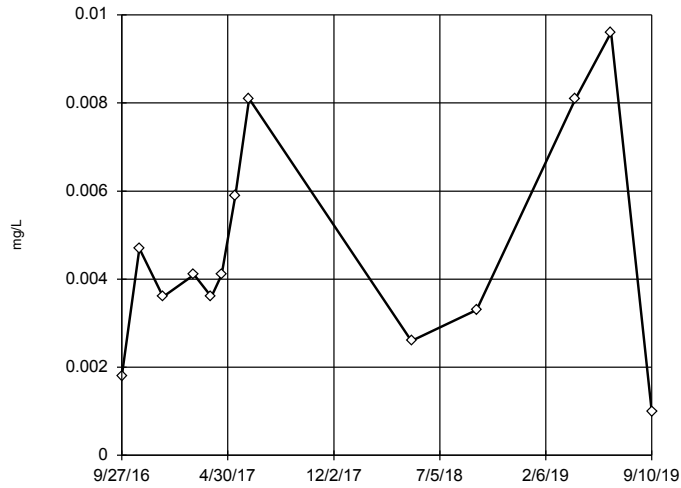
MW-1605S



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 = 0.02435,
 low cutoff = 0.00004887,
 based on IQR multiplier of 3.

Constituent: Selenium, total Analysis Run 11/25/2019 3:30 PM
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

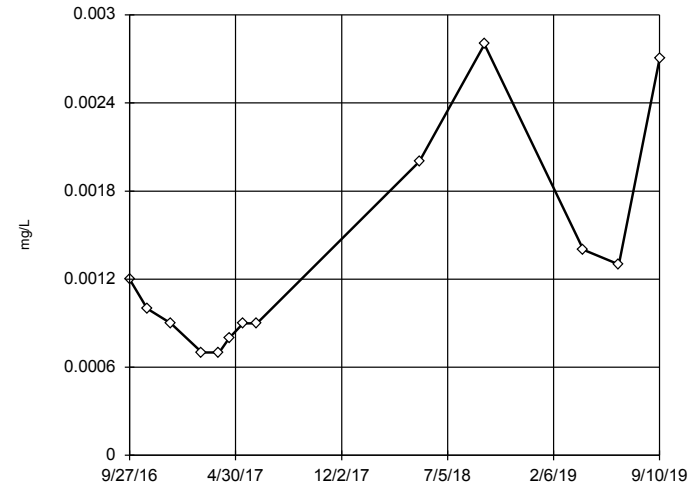
Tukey's Outlier Screening
MW-1606D



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 = 0.03708, low cutoff = 1.1e-10, based on IQR multiplier of 3.

Constituent: Selenium, total Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

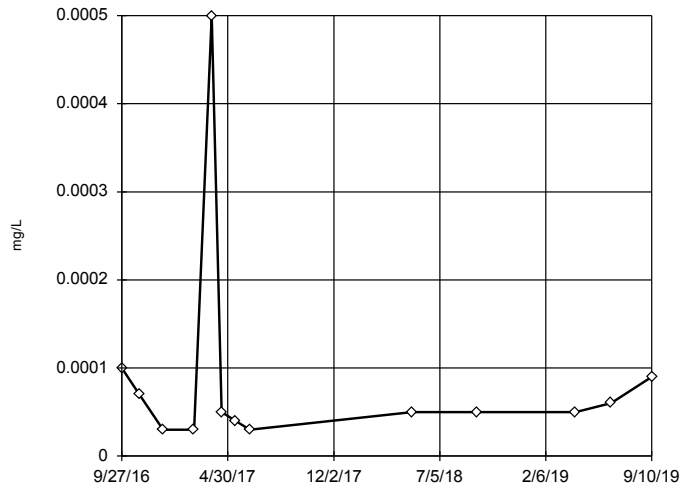
Tukey's Outlier Screening
MW-1606S



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 = 0.01283, low cutoff = 0.0001106, based on IQR multiplier of 3.

Constituent: Selenium, total Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

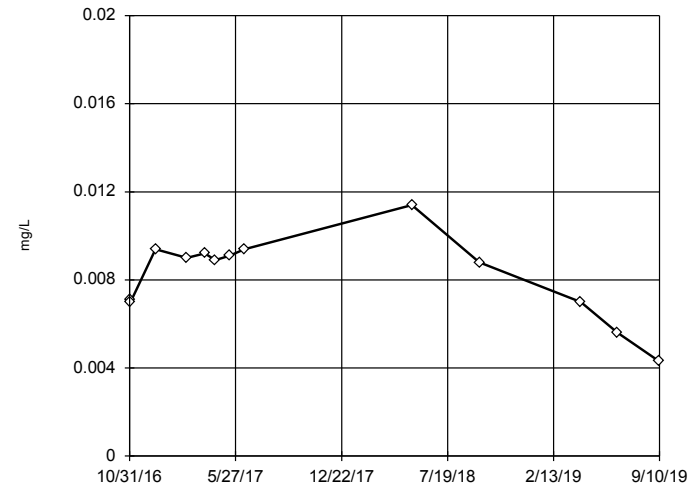
Tukey's Outlier Screening
MW-1607D



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 = 0.0009548, low cutoff = 0.00000288, based on IQR multiplier of 3.

Constituent: Selenium, total Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening
MW-1607S



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 = 0.01411, low cutoff = -0.007969, based on IQR multiplier of 3.

Constituent: Selenium, total Analysis Run 11/25/2019 3:30 PM
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Tukey's Outlier Screening
MW-1604D

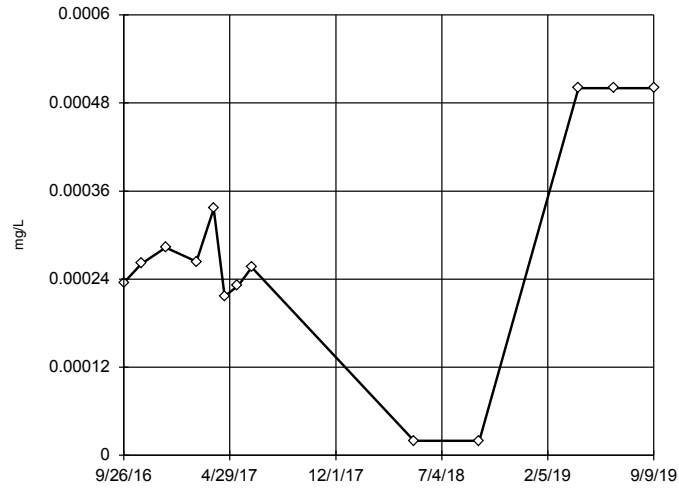


FIGURE D: MANN-WHITNEY ANALYSIS

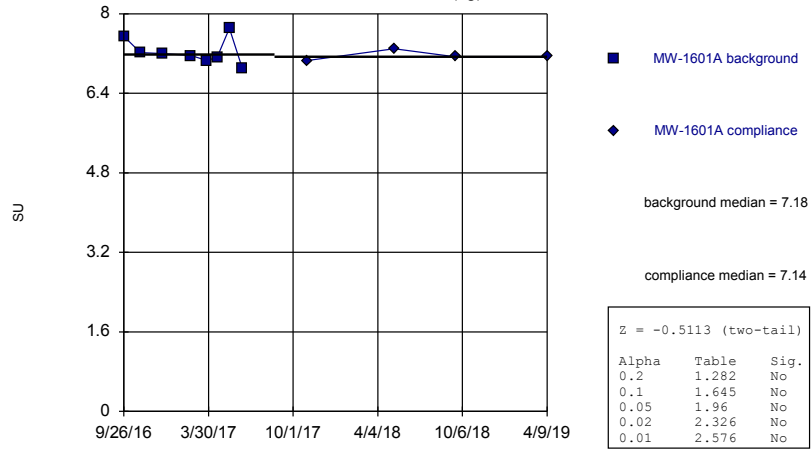
Welch's t-test/Mann-Whitney - All Results (No Significant Results)

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 12/9/2019, 8:34 AM

<u>Constituent</u>	<u>Well</u>	<u>Calc.</u>	<u>0.01</u>	<u>Method</u>
pH, field (SU)	MW-1601A (bg)	-0.5113	No	Mann-W
pH, field (SU)	MW-1602 (bg)	0.5944	No	Mann-W
pH, field (SU)	MW-1603 (bg)	-1.957	No	Mann-W
pH, field (SU)	MW-1604D	-1.761	No	Mann-W
pH, field (SU)	MW-1604S	0.07329	No	Mann-W
pH, field (SU)	MW-1605D	-0.7334	No	Mann-W
pH, field (SU)	MW-1605S	-1.688	No	Mann-W
pH, field (SU)	MW-1606D	-1.174	No	Mann-W
pH, field (SU)	MW-1606S	-1.541	No	Mann-W
pH, field (SU)	MW-1607D	-1.139	No	Mann-W
pH, field (SU)	MW-1607S	-1.877	No	Mann-W
pH, field (SU)	MW-1608 (bg)	-0.7643	No	Mann-W

Mann-Whitney (Wilcoxon Rank Sum)

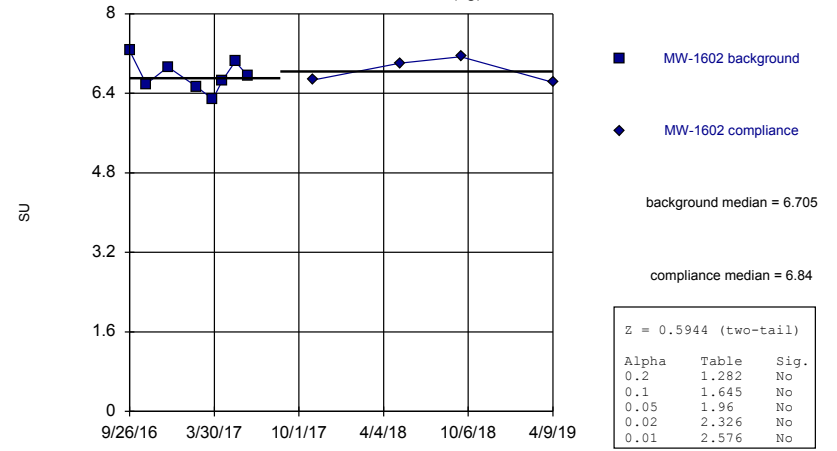
MW-1601A (bg)



Constituent: pH, field Analysis Run 12/9/2019 8:33 AM View: Intrawell
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Mann-Whitney (Wilcoxon Rank Sum)

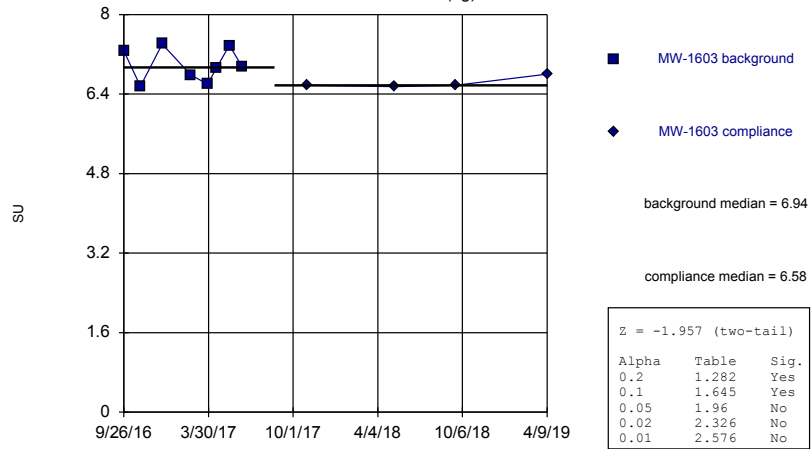
MW-1602 (bg)



Constituent: pH, field Analysis Run 12/9/2019 8:33 AM View: Intrawell
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Mann-Whitney (Wilcoxon Rank Sum)

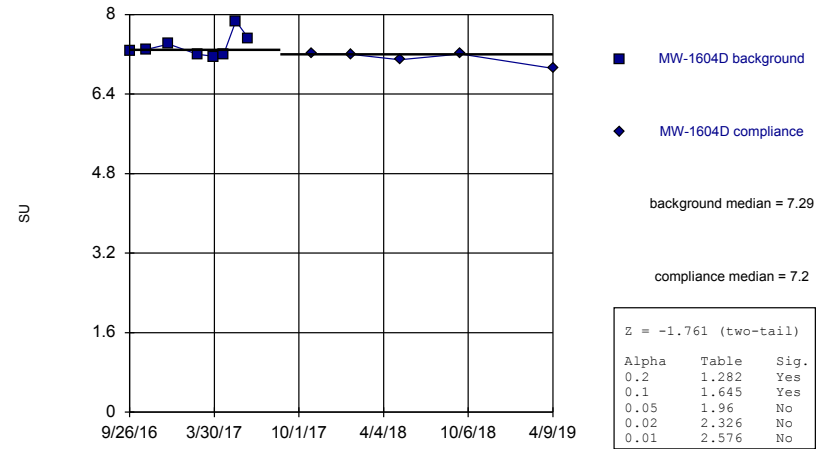
MW-1603 (bg)



Constituent: pH, field Analysis Run 12/9/2019 8:33 AM View: Intrawell
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Mann-Whitney (Wilcoxon Rank Sum)

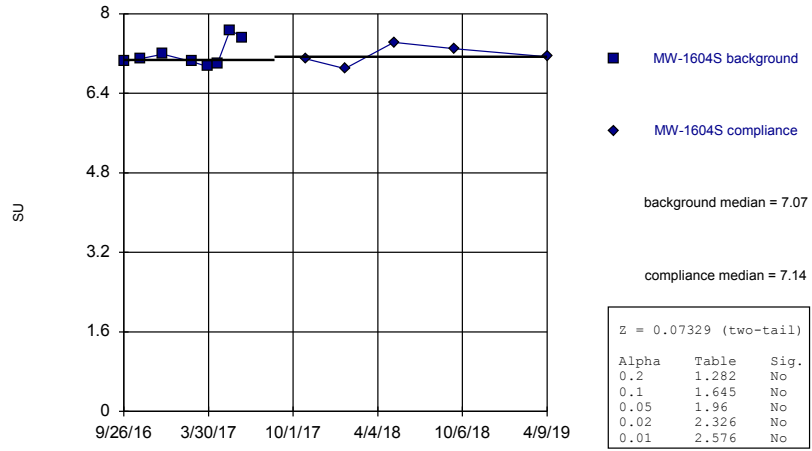
MW-1604D



Constituent: pH, field Analysis Run 12/9/2019 8:33 AM View: Intrawell
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Mann-Whitney (Wilcoxon Rank Sum)

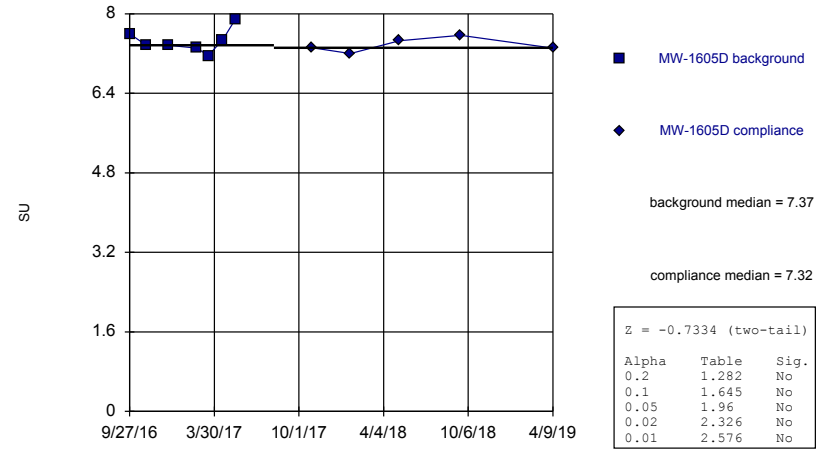
MW-1604S



Constituent: pH, field Analysis Run 12/9/2019 8:33 AM View: Intrawell
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Mann-Whitney (Wilcoxon Rank Sum)

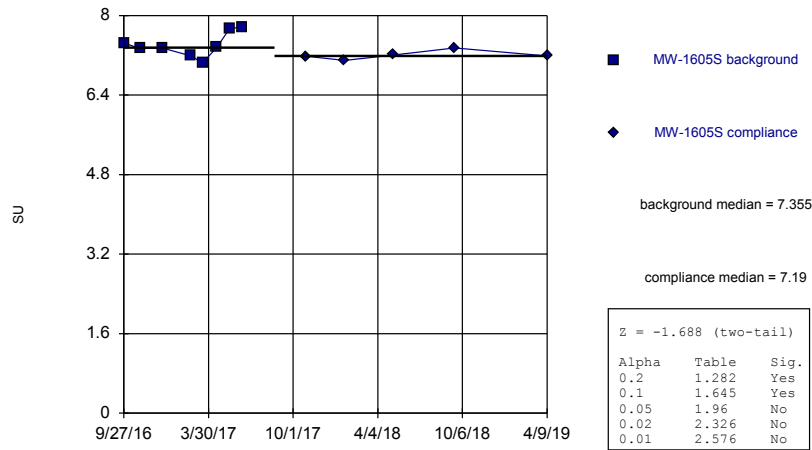
MW-1605D



Constituent: pH, field Analysis Run 12/9/2019 8:33 AM View: Intrawell
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Mann-Whitney (Wilcoxon Rank Sum)

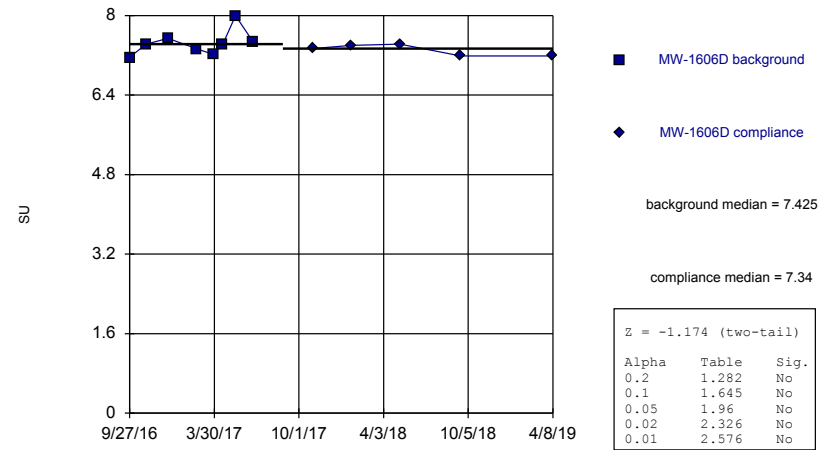
MW-1605S



Constituent: pH, field Analysis Run 12/9/2019 8:33 AM View: Intrawell
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Mann-Whitney (Wilcoxon Rank Sum)

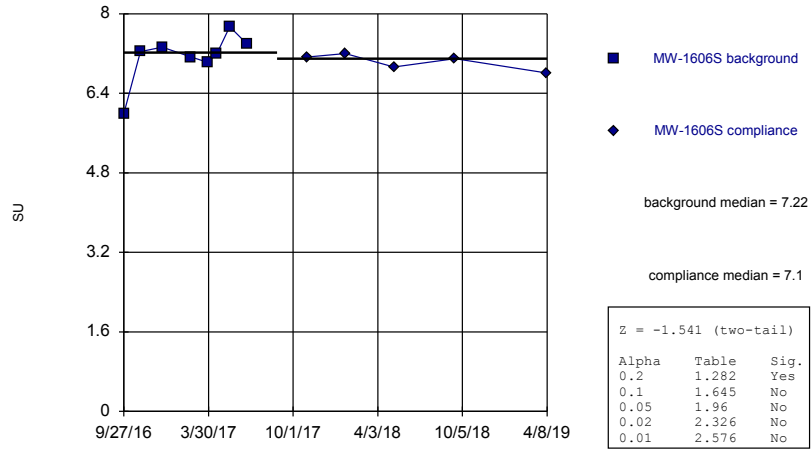
MW-1606D



Constituent: pH, field Analysis Run 12/9/2019 8:33 AM View: Intrawell
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Mann-Whitney (Wilcoxon Rank Sum)

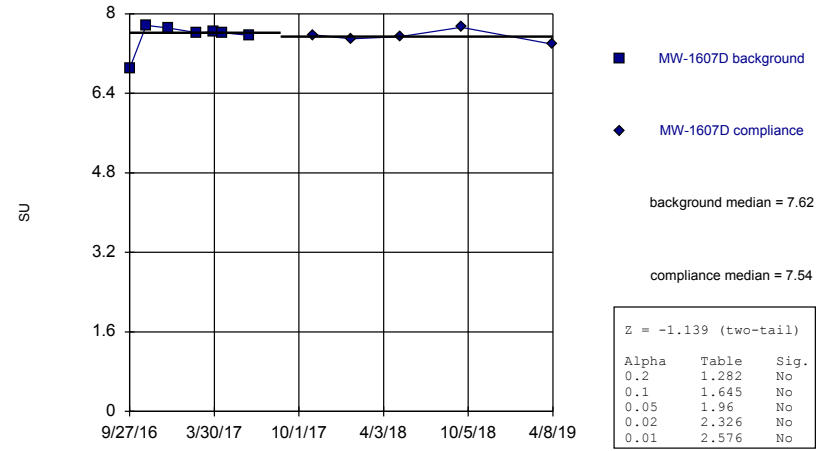
MW-1606S



Constituent: pH, field Analysis Run 12/9/2019 8:33 AM View: Intrawell
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Mann-Whitney (Wilcoxon Rank Sum)

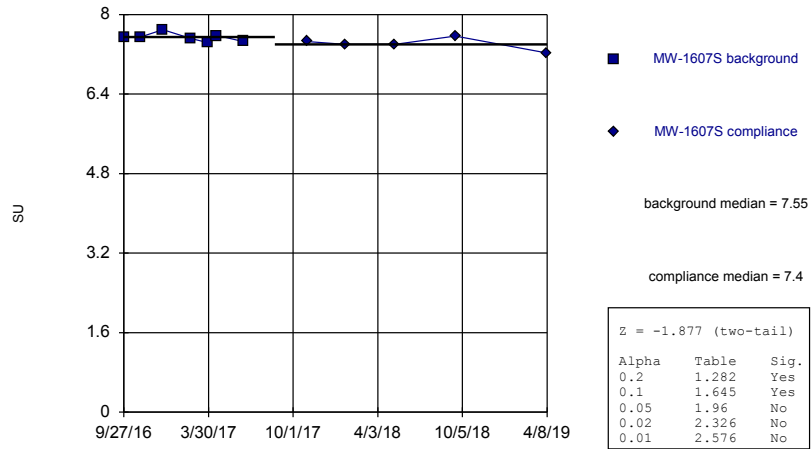
MW-1607D



Constituent: pH, field Analysis Run 12/9/2019 8:33 AM View: Intrawell
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Mann-Whitney (Wilcoxon Rank Sum)

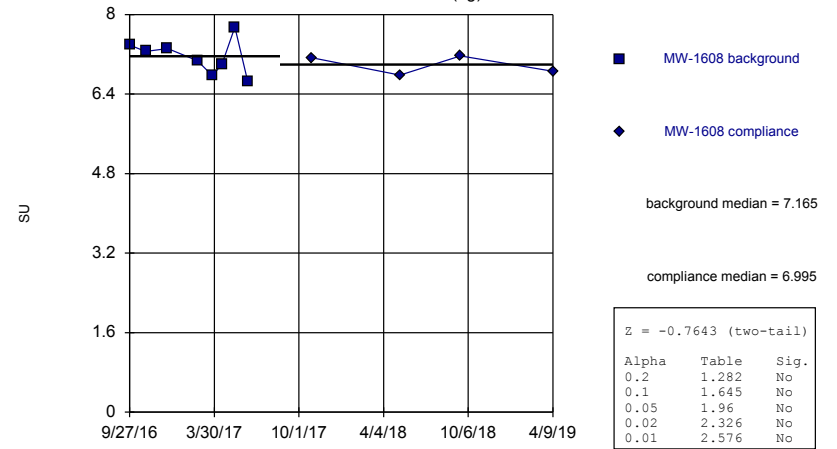
MW-1607S



Constituent: pH, field Analysis Run 12/9/2019 8:33 AM View: Intrawell
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Mann-Whitney (Wilcoxon Rank Sum)

MW-1608 (bg)



Constituent: pH, field Analysis Run 12/9/2019 8:33 AM View: Intrawell
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

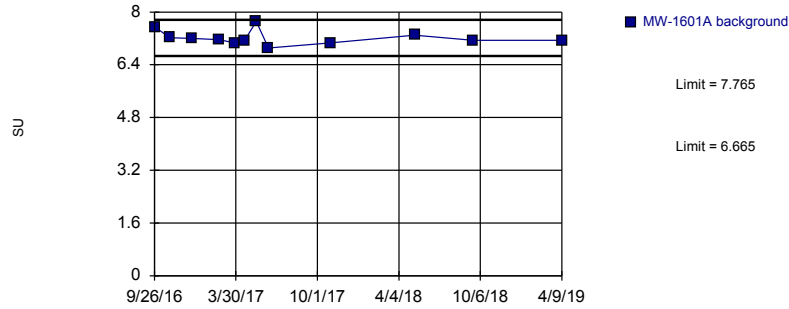
FIGURE E: INTRAWELL PREDICTION LIMITS

Intrawell Prediction Limit Summary Table - All Results

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 12/9/2019, 8:35 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)	MW-1601A	7.765	6.665	n/a	1 future	n/a	12	7.215	0.2189	0	None	No	0.0004701	Param Intra 1 of 2
pH, field (SU)	MW-1602	7.51	6.07	n/a	1 future	n/a	12	6.79	0.2866	0	None	No	0.0004701	Param Intra 1 of 2
pH, field (SU)	MW-1603	7.687	6.045	n/a	1 future	n/a	12	6.866	0.3267	0	None	No	0.0004701	Param Intra 1 of 2
pH, field (SU)	MW-1604D	7.84	6.708	n/a	1 future	n/a	13	7.274	0.2297	0	None	No	0.0004701	Param Intra 1 of 2
pH, field (SU)	MW-1604S	7.761	6.606	n/a	1 future	n/a	13	7.183	0.2345	0	None	No	0.0004701	Param Intra 1 of 2
pH, field (SU)	MW-1605D	7.926	6.915	n/a	1 future	n/a	12	7.421	0.2013	0	None	No	0.0004701	Param Intra 1 of 2
pH, field (SU)	MW-1605S	7.873	6.785	n/a	1 future	n/a	13	7.329	0.2208	0	None	No	0.0004701	Param Intra 1 of 2
pH, field (SU)	MW-1606D	7.932	6.856	n/a	1 future	n/a	13	7.394	0.2185	0	None	No	0.0004701	Param Intra 1 of 2
pH, field (SU)	MW-1606S	8.084	6.104	n/a	1 future	n/a	13	7.094	0.4018	0	None	No	0.0004701	Param Intra 1 of 2
pH, field (SU)	MW-1607D	8.016	6.957	n/a	1 future	n/a	12	24701	3344	0	None	x^5	0.0004701	Param Intra 1 of 2
pH, field (SU)	MW-1607S	7.786	7.19	n/a	1 future	n/a	12	7.488	0.1186	0	None	No	0.0004701	Param Intra 1 of 2
pH, field (SU)	MW-1608	7.876	6.319	n/a	1 future	n/a	12	7.098	0.3101	0	None	No	0.0004701	Param Intra 1 of 2

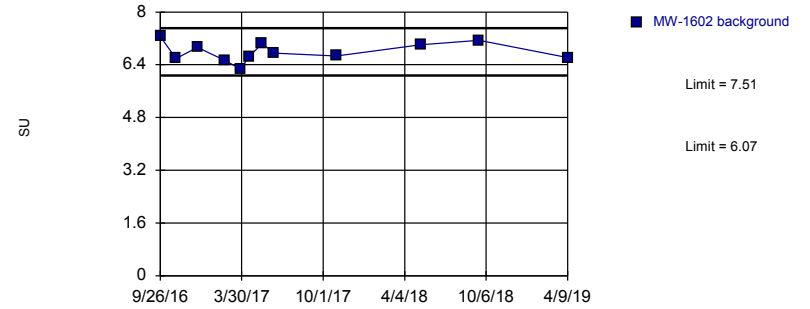
Prediction Limit
Intrawell Parametric, MW-1601A (bg)



Background Data Summary: Mean=7.215, Std. Dev.=0.2189, n=12. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8709, critical = 0.805. Kappa = 2.512 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.0009403. Assumes 1 future value.

Constituent: pH, field Analysis Run 12/9/2019 8:34 AM View: Intrawell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

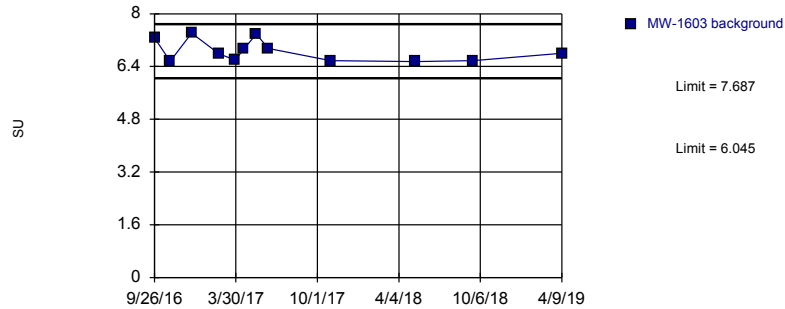
Prediction Limit
Intrawell Parametric, MW-1602 (bg)



Background Data Summary: Mean=6.79, Std. Dev.=0.2866, n=12. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.966, critical = 0.805. Kappa = 2.512 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.0009403. Assumes 1 future value.

Constituent: pH, field Analysis Run 12/9/2019 8:34 AM View: Intrawell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

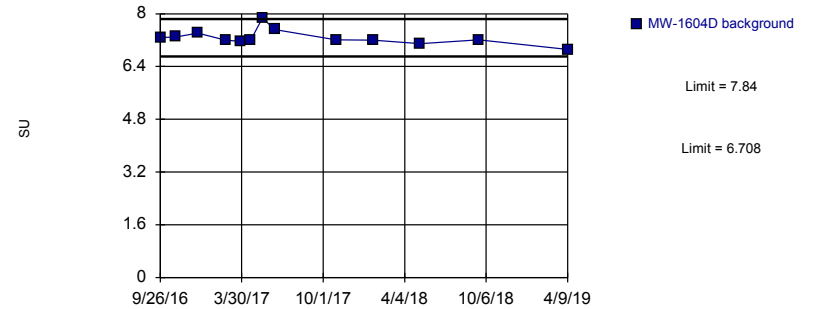
Prediction Limit
Intrawell Parametric, MW-1603 (bg)



Background Data Summary: Mean=6.866, Std. Dev.=0.3267, n=12. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8435, critical = 0.805. Kappa = 2.512 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.0009403. Assumes 1 future value.

Constituent: pH, field Analysis Run 12/9/2019 8:34 AM View: Intrawell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

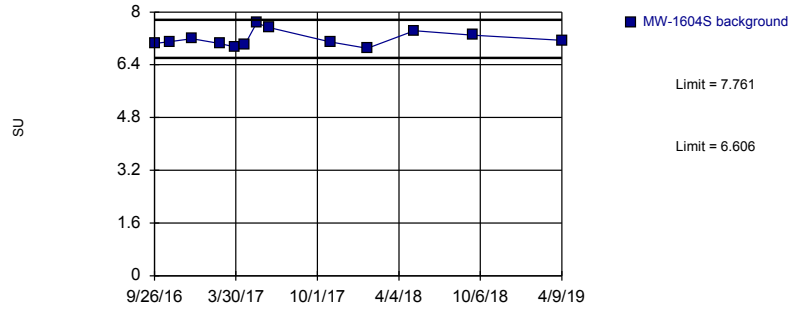
Prediction Limit
Intrawell Parametric, MW-1604D



Background Data Summary: Mean=7.274, Std. Dev.=0.2297, n=13. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8658, critical = 0.814. Kappa = 2.463 (c=7, w=8, 1 of 2, event alpha = 0.05132). Report alpha = 0.0009403. Assumes 1 future value.

Constituent: pH, field Analysis Run 12/9/2019 8:34 AM View: Intrawell
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Prediction Limit
Intrawell Parametric, MW-1604S



Prediction Limit
Intrawell Parametric, MW-1606S

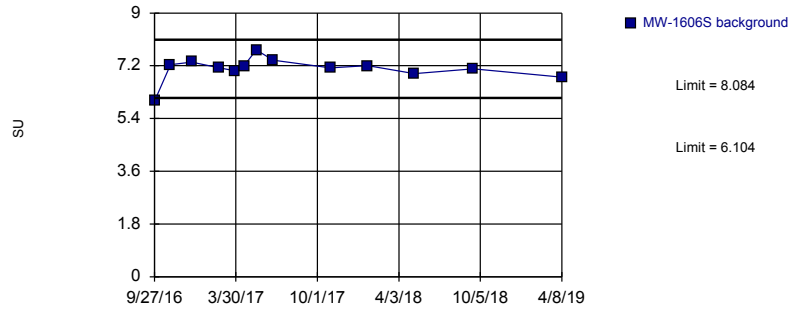


FIGURE F: TREND TESTS

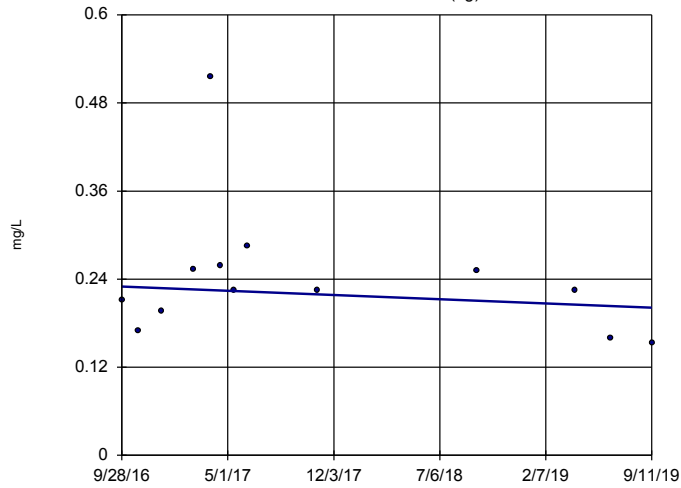
Trend Tests Summary Table - Upgradient Wells

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 11/25/2019, 3:20 PM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Boron, total (mg/L)	MW-1601A (bg)	-0.009774	-11	-43	No	13	0	n/a	n/a	0.01	NP
Boron, total (mg/L)	MW-1602 (bg)	-0.007572	-24	-43	No	13	0	n/a	n/a	0.01	NP
Boron, total (mg/L)	MW-1603 (bg)	-0.03533	-20	-43	No	13	0	n/a	n/a	0.01	NP
Boron, total (mg/L)	MW-1608 (bg)	-0.007863	-6	-43	No	13	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	MW-1601A (bg)	13.67	43	43	No	13	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	MW-1602 (bg)	7.533	38	43	No	13	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	MW-1603 (bg)	6.075	14	43	No	13	0	n/a	n/a	0.01	NP
Calcium, total (mg/L)	MW-1608 (bg)	3.358	21	43	No	13	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	MW-1601A (bg)	10.19	28	43	No	13	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	MW-1602 (bg)	0.5312	16	43	No	13	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	MW-1603 (bg)	-5.236	-44	-43	Yes	13	0	n/a	n/a	0.01	NP
Chloride, total (mg/L)	MW-1608 (bg)	-0.09116	-4	-43	No	13	0	n/a	n/a	0.01	NP
Fluoride, total (mg/L)	MW-1601A (bg)	-0.01381	-33	-48	No	14	0	n/a	n/a	0.01	NP
Fluoride, total (mg/L)	MW-1602 (bg)	0.025	63	48	Yes	14	0	n/a	n/a	0.01	NP
Fluoride, total (mg/L)	MW-1603 (bg)	0	4	48	No	14	0	n/a	n/a	0.01	NP
Fluoride, total (mg/L)	MW-1608 (bg)	-0.03883	-76	-48	Yes	14	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	MW-1601A (bg)	28.78	61	43	Yes	13	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	MW-1602 (bg)	28.64	38	43	No	13	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	MW-1603 (bg)	-18.84	-14	-43	No	13	0	n/a	n/a	0.01	NP
Sulfate, total (mg/L)	MW-1608 (bg)	40.3	32	43	No	13	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	MW-1601A (bg)	71.01	56	43	Yes	13	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	MW-1602 (bg)	59.17	52	43	Yes	13	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	MW-1603 (bg)	0.6747	3	43	No	13	0	n/a	n/a	0.01	NP
Total Dissolved Solids [TDS] (mg/L)	MW-1608 (bg)	36.72	28	43	No	13	0	n/a	n/a	0.01	NP

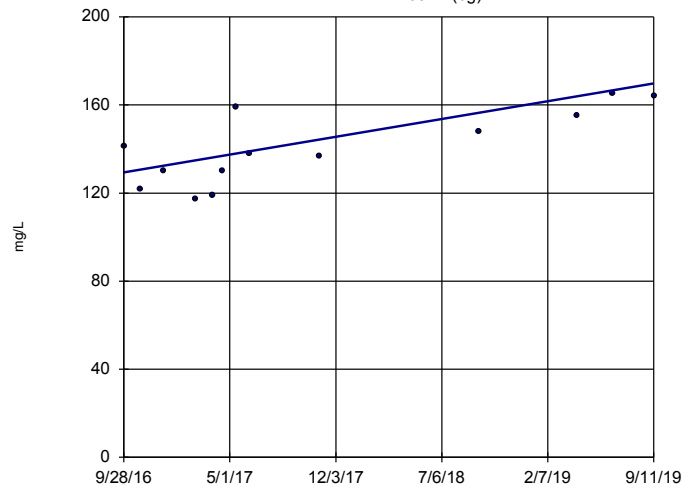
Sen's Slope Estimator

MW-1601A (bg)



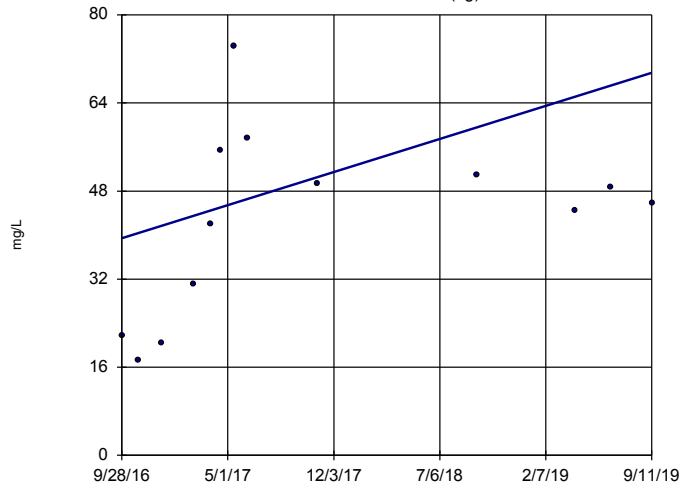
Sen's Slope Estimator

MW-1601A (bg)



Sen's Slope Estimator

MW-1601A (bg)

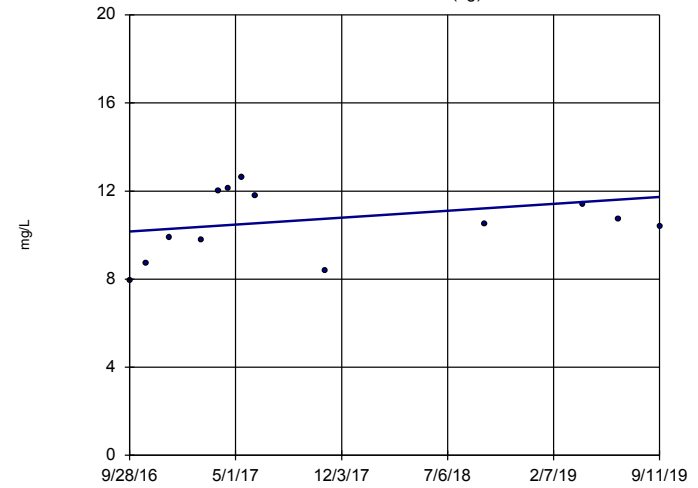


n = 13
 Slope = 10.19 units per year.
 Mann-Kendall statistic = 28
 critical = 43
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Chloride, total Analysis Run 11/25/2019 3:19 PM View: Interwell
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1602 (bg)

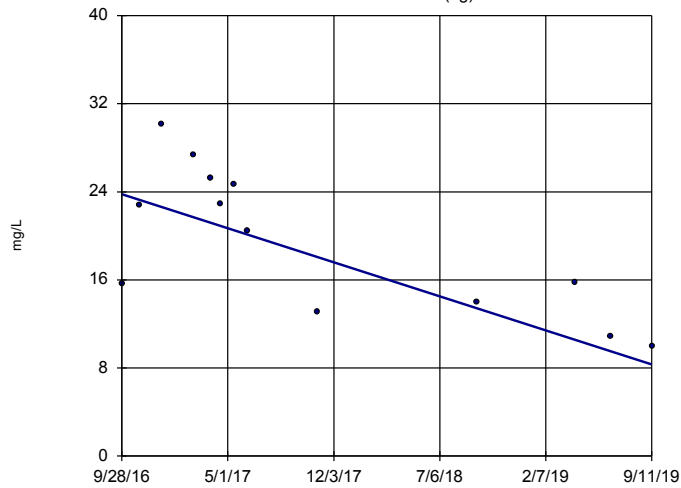


n = 13
 Slope = 0.5312 units per year.
 Mann-Kendall statistic = 16
 critical = 43
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Chloride, total Analysis Run 11/25/2019 3:19 PM View: Interwell
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1603 (bg)

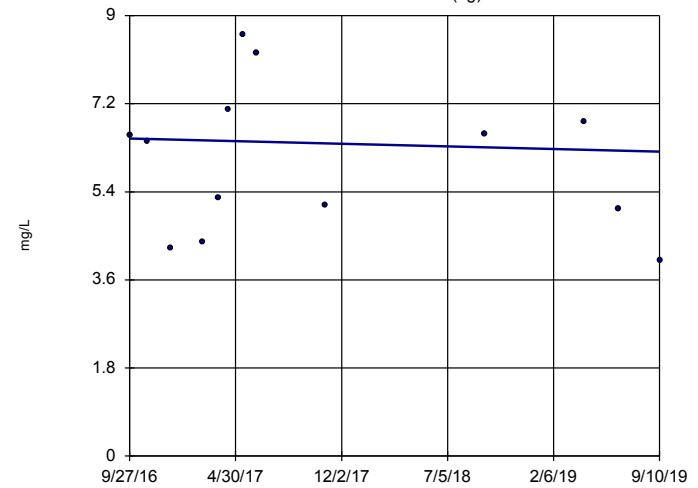


n = 13
 Slope = -5.236 units per year.
 Mann-Kendall statistic = -44
 critical = -43
 Decreasing trend significant at 99% confidence level (α = 0.005 per tail).

Constituent: Chloride, total Analysis Run 11/25/2019 3:19 PM View: Interwell
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1608 (bg)

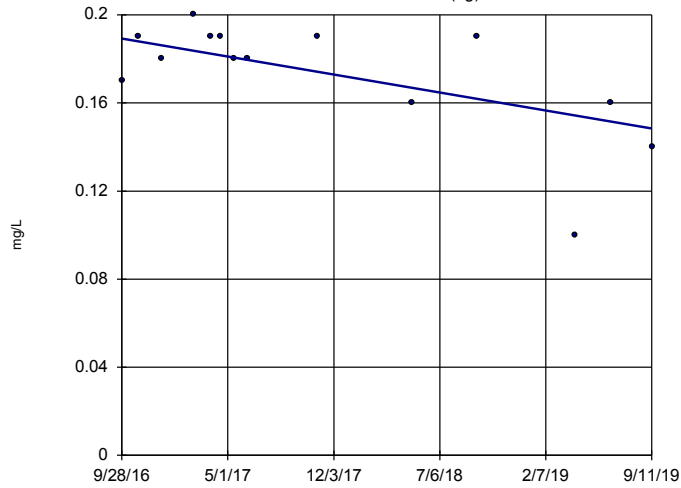


n = 13
 Slope = -0.09116 units per year.
 Mann-Kendall statistic = -4
 critical = -43
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Chloride, total Analysis Run 11/25/2019 3:19 PM View: Interwell
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

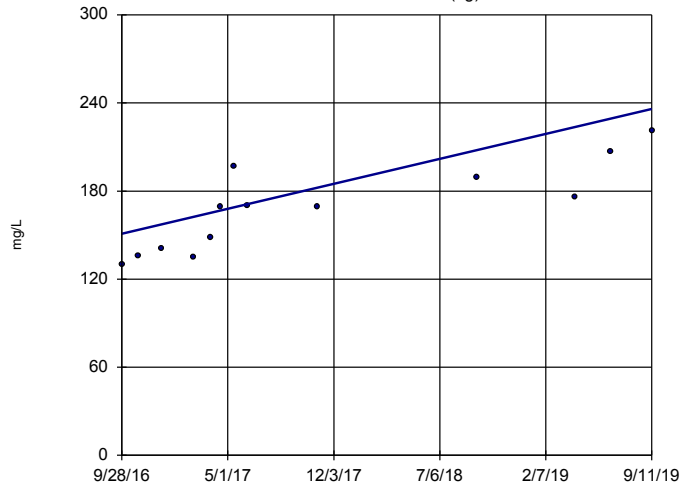
Sen's Slope Estimator

MW-1601A (bg)



Sen's Slope Estimator

MW-1601A (bg)

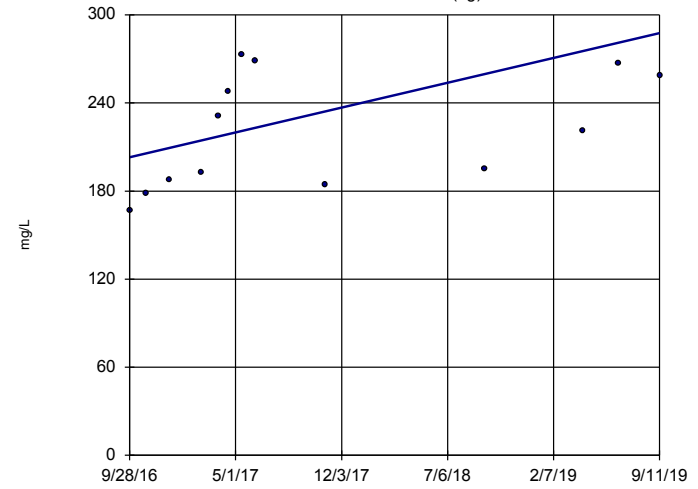


n = 13
 Slope = 28.78 units per year.
 Mann-Kendall statistic = 61
 critical = 43
 Increasing trend significant at 99% confidence level (α = 0.005 per tail).

Constituent: Sulfate, total Analysis Run 11/25/2019 3:19 PM View: Interwell
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1602 (bg)

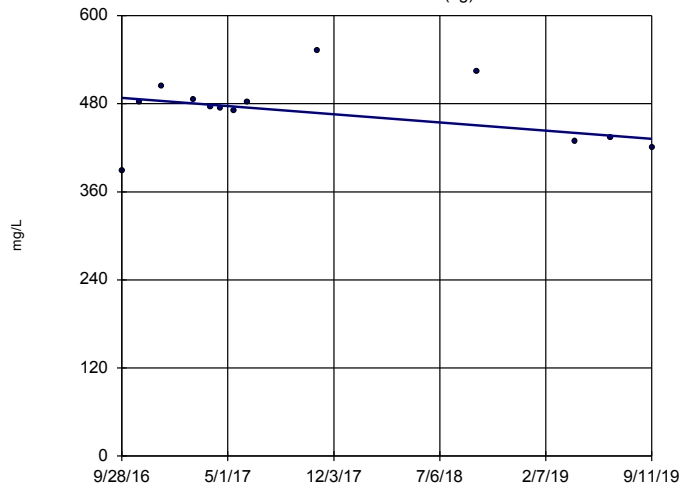


n = 13
 Slope = 28.64 units per year.
 Mann-Kendall statistic = 38
 critical = 43
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Sulfate, total Analysis Run 11/25/2019 3:19 PM View: Interwell
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1603 (bg)

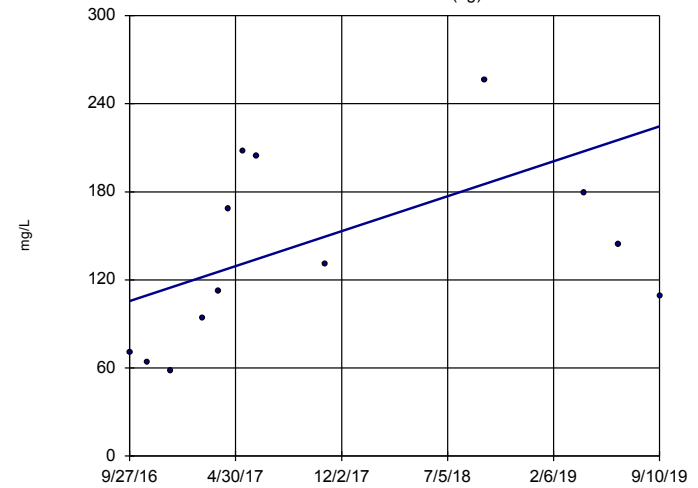


n = 13
 Slope = -18.84 units per year.
 Mann-Kendall statistic = -14
 critical = -43
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Sulfate, total Analysis Run 11/25/2019 3:19 PM View: Interwell
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1608 (bg)

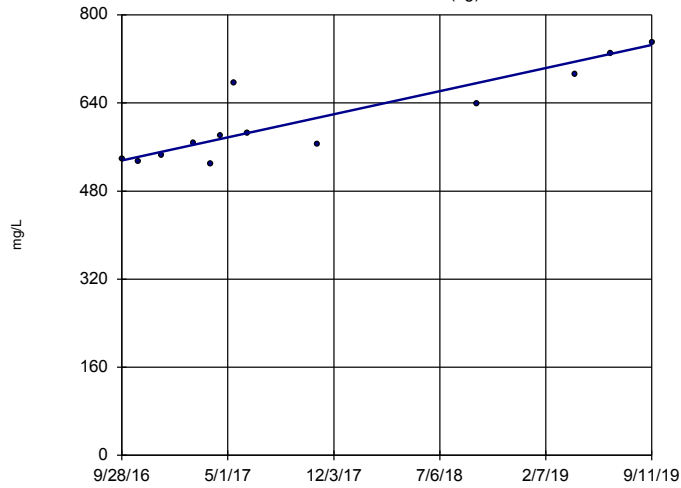


n = 13
 Slope = 40.3 units per year.
 Mann-Kendall statistic = 32
 critical = 43
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Sulfate, total Analysis Run 11/25/2019 3:19 PM View: Interwell
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1601A (bg)

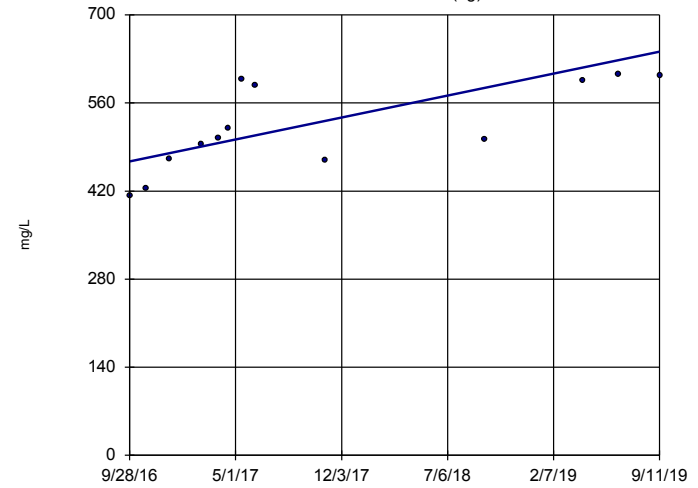


n = 13
 Slope = 71.01 units per year.
 Mann-Kendall statistic = 56
 critical = 43
 Increasing trend significant at 99% confidence level (α = 0.005 per tail).

Constituent: Total Dissolved Solids [TDS] Analysis Run 11/25/2019 3:19 PM View: Interwell
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1602 (bg)

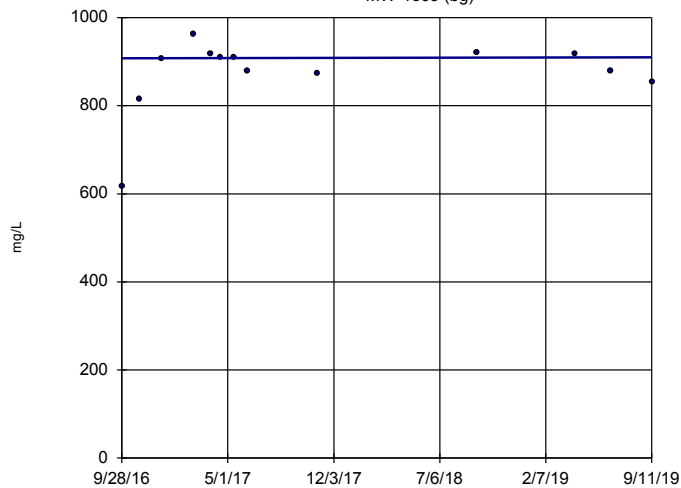


n = 13
 Slope = 59.17 units per year.
 Mann-Kendall statistic = 52
 critical = 43
 Increasing trend significant at 99% confidence level (α = 0.005 per tail).

Constituent: Total Dissolved Solids [TDS] Analysis Run 11/25/2019 3:19 PM View: Interwell
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1603 (bg)

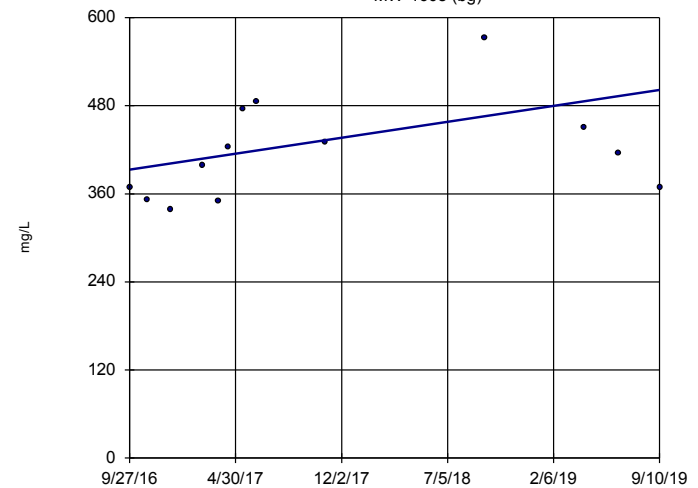


n = 13
 Slope = 0.6747 units per year.
 Mann-Kendall statistic = 3
 critical = 43
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Total Dissolved Solids [TDS] Analysis Run 11/25/2019 3:19 PM View: Interwell
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Sen's Slope Estimator

MW-1608 (bg)



n = 13
 Slope = 36.72 units per year.
 Mann-Kendall statistic = 28
 critical = 43
 Trend not significant at 99% confidence level (α = 0.005 per tail).

Constituent: Total Dissolved Solids [TDS] Analysis Run 11/25/2019 3:19 PM View: Interwell
 Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

FIGURE G: INTERWELL PREDICTION LIMITS

Interwell Prediction Limit Summary Table - All Results

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 12/9/2019, 8:37 AM

<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 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>
Boron, total (mg/L)	n/a	0.6142	n/a	n/a	8 future	n/a	44	0.6107	0.1197	0	None	x^(1/3)	0.0009403	Param Inter 1 of 2
Calcium, total (mg/L)	n/a	200.1	n/a	n/a	8 future	n/a	44	10.88	1.633	0	None	sqrt(x)	0.0009403	Param Inter 1 of 2
Chloride, total (mg/L)	n/a	68.45	n/a	n/a	8 future	n/a	44	2.704	0.7615	0	None	ln(x)	0.0009403	Param Inter 1 of 2
Fluoride, total (mg/L)	n/a	0.271	n/a	n/a	8 future	n/a	48	0.03432	0.01967	0	None	x^2	0.0009403	Param Inter 1 of 2
Sulfate, total (mg/L)	n/a	673.9	n/a	n/a	8 future	n/a	44	5.353	0.58	0	None	ln(x)	0.0009403	Param Inter 1 of 2
Total Dissolved Solids [TDS] (mg/L)	n/a	1042	n/a	n/a	8 future	n/a	44	6.348	0.3006	0	None	ln(x)	0.0009403	Param Inter 1 of 2

FIGURE H: TOLERANCE LIMITS

Upper Tolerance Limits - App IV

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 11/26/2019, 1:34 PM

<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)	0.0001	52	n/a	n/a	9.615	n/a	n/a	0.06944	NP Inter(normality)
Arsenic, total (mg/L)	0.0007362	52	0.0004713	0.000129	0	None	No	0.05	Inter
Barium, total (mg/L)	0.0653	52	n/a	n/a	0	n/a	n/a	0.06944	NP Inter(normality)
Beryllium, total (mg/L)	0.0001	52	n/a	n/a	86.54	n/a	n/a	0.06944	NP Inter(NDs)
Cadmium, total (mg/L)	0.00003	52	n/a	n/a	7.692	n/a	n/a	0.06944	NP Inter(normality)
Chromium, total (mg/L)	0.0008959	48	-8.21	0.5744	2.083	None	ln(x)	0.05	Inter
Cobalt, total (mg/L)	0.0007027	52	-9.164	0.9269	3.846	None	ln(x)	0.05	Inter
Combined Radium 226 + 228 (pCi/L)	2.328	52	0.8404	0.3337	0	None	sqrt(x)	0.05	Inter
Fluoride, total (mg/L)	0.2693	56	0.03342	0.01924	0	None	x^2	0.05	Inter
Lead, total (mg/L)	0.0006734	52	-9.264	0.9549	7.692	None	ln(x)	0.05	Inter
Lithium, total (mg/L)	0.02601	52	0.01169	0.006974	11.54	None	No	0.05	Inter
Mercury, total (mg/L)	0.000005	52	n/a	n/a	92.31	n/a	n/a	0.06944	NP Inter(NDs)
Molybdenum, total (mg/L)	0.003756	52	0.03458	0.01301	3.846	None	sqrt(x)	0.05	Inter
Selenium, total (mg/L)	0.0015	52	n/a	n/a	0	n/a	n/a	0.06944	NP Inter(normality)
Thallium, total (mg/L)	0.0005	52	n/a	n/a	25	n/a	n/a	0.06944	NP Inter(normality)

FIGURE I: GROUNDWATER PROTECTION STANDARDS

MOUNTAINEER BAP GWPS				
Constituent Name	MCL	CCR Rule-Specified	Background Limit	GWPS
Antimony, Total (mg/L)	0.006		0.0001	0.006
Arsenic, Total (mg/L)	0.01		0.00074	0.01
Barium, Total (mg/L)	2		0.065	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		0.0009	0.1
Cobalt, Total (mg/L)	n/a	0.006	0.0007	0.006
Combined Radium, Total (pCi/L)	5		2.33	5
Fluoride, Total (mg/L)	4		0.27	4
Lead, Total (mg/L)	0.015		0.00067	0.015
Lithium, Total (mg/L)	n/a	0.04	0.026	0.04
Mercury, Total (mg/L)	0.002		0.000005	0.002
Molybdenum, Total (mg/L)	n/a	0.1	0.0038	0.1
Selenium, Total (mg/L)	0.05		0.0015	0.05
Thallium, Total (mg/L)	0.002		0.0005	0.002

**Grey cell indicates ACL is higher than MCL.*

**MCL = Maximum Contaminant Level*

**RSL = Regional Screening Level*

FIGURE J: CONFIDENCE INTERVALS

Confidence Interval Summary Table - Significant Results

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 12/1/2019, 11:08 AM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig. N	Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Lithium, total (mg/L)	MW-1605D	0.07997	0.05932	0.04	Yes 13	0.06839	0.01741	0	None	x^2	0.01	Param.
Lithium, total (mg/L)	MW-1605S	0.07823	0.05645	0.04	Yes 13	0.06734	0.01465	0	None	No	0.01	Param.
Lithium, total (mg/L)	MW-1606D	0.1264	0.0998	0.04	Yes 13	0.1121	0.02078	0	None	x^2	0.01	Param.
Lithium, total (mg/L)	MW-1606S	0.1172	0.09409	0.04	Yes 13	0.1049	0.01791	0	None	x^2	0.01	Param.
Lithium, total (mg/L)	MW-1607D	0.09986	0.07352	0.04	Yes 13	0.08669	0.01771	0	None	No	0.01	Param.
Lithium, total (mg/L)	MW-1607S	0.1132	0.08938	0.04	Yes 13	0.1013	0.01604	0	None	No	0.01	Param.

Confidence Interval Summary Table - All Results

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 12/1/2019, 11:08 AM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Antimony, total (mg/L)	MW-1604D	0.0001368	0.000086950	0.006	No	13	0.0001015	0.0000467	7.692	None	x^3	0.01	Param.
Antimony, total (mg/L)	MW-1604S	0.00015	0.00003	0.006	No	13	0.00007923	0.00006075	0	None	No	0.01	NP (normality)
Antimony, total (mg/L)	MW-1605D	0.0001	0.00003	0.006	No	13	0.00003923	0.00001891	7.692	None	No	0.01	NP (normality)
Antimony, total (mg/L)	MW-1605S	0.00007	0.00003	0.006	No	13	0.00005769	0.0000332	0	None	No	0.01	NP (normality)
Antimony, total (mg/L)	MW-1606D	0.00019	0.00015	0.006	No	13	0.0001692	0.00002957	0	None	No	0.01	NP (normality)
Antimony, total (mg/L)	MW-1606S	0.0001601	0.0001414	0.006	No	13	0.0001508	0.00001256	0	None	No	0.01	Param.
Antimony, total (mg/L)	MW-1607D	0.00004	0.00003	0.006	No	13	0.00003231	0.000005991	0	None	No	0.01	NP (normality)
Antimony, total (mg/L)	MW-1607S	0.00055	0.00041	0.006	No	13	0.00048	0.0001156	0	None	No	0.01	NP (normality)
Arsenic, total (mg/L)	MW-1604D	0.0005091	0.0003525	0.01	No	13	0.0004308	0.0001053	0	None	No	0.01	Param.
Arsenic, total (mg/L)	MW-1604S	0.0004579	0.0003544	0.01	No	13	0.0004062	0.00006959	0	None	No	0.01	Param.
Arsenic, total (mg/L)	MW-1605D	0.002577	0.002184	0.01	No	13	0.002381	0.0002641	0	None	No	0.01	Param.
Arsenic, total (mg/L)	MW-1605S	0.0009334	0.0005651	0.01	No	13	0.0007492	0.0002476	0	None	No	0.01	Param.
Arsenic, total (mg/L)	MW-1606D	0.0007217	0.0004037	0.01	No	13	0.0005846	0.0002808	0	None	ln(x)	0.01	Param.
Arsenic, total (mg/L)	MW-1606S	0.0008661	0.0007169	0.01	No	13	0.0007915	0.0001003	0	None	No	0.01	Param.
Arsenic, total (mg/L)	MW-1607D	0.001342	0.001021	0.01	No	13	0.001182	0.0002155	0	None	No	0.01	Param.
Arsenic, total (mg/L)	MW-1607S	0.001387	0.0009372	0.01	No	12	0.001168	0.0003042	0	None	sqrt(x)	0.01	Param.
Barium, total (mg/L)	MW-1604D	0.0529	0.0275	2	No	13	0.03432	0.009917	0	None	No	0.01	NP (normality)
Barium, total (mg/L)	MW-1604S	0.03004	0.02745	2	No	13	0.02875	0.001746	0	None	No	0.01	Param.
Barium, total (mg/L)	MW-1605D	0.02981	0.02542	2	No	13	0.02762	0.002947	0	None	No	0.01	Param.
Barium, total (mg/L)	MW-1605S	0.03741	0.02633	2	No	13	0.03187	0.007452	0	None	No	0.01	Param.
Barium, total (mg/L)	MW-1606D	0.05922	0.05064	2	No	13	0.05493	0.005769	0	None	No	0.01	Param.
Barium, total (mg/L)	MW-1606S	0.07539	0.06845	2	No	13	0.07192	0.004669	0	None	No	0.01	Param.
Barium, total (mg/L)	MW-1607D	0.1391	0.09198	2	No	13	0.1155	0.0317	0	None	No	0.01	Param.
Barium, total (mg/L)	MW-1607S	0.07379	0.06124	2	No	12	0.06752	0.007998	0	None	No	0.01	Param.
Beryllium, total (mg/L)	MW-1604D	0.0001	0.0001	0.004	No	13	0.0001	0	100	None	No	0.01	NP (NDs)
Beryllium, total (mg/L)	MW-1604S	0.0001	0.000024	0.004	No	13	0.00009415	0.00002108	92.31	None	No	0.01	NP (NDs)
Beryllium, total (mg/L)	MW-1605D	0.0001	0.0001	0.004	No	13	0.0001	0	100	None	No	0.01	NP (NDs)
Beryllium, total (mg/L)	MW-1605S	0.0001	0.000009	0.004	No	13	0.00007969	0.0000387	76.92	None	No	0.01	NP (NDs)
Beryllium, total (mg/L)	MW-1606D	0.0001	0.000005	0.004	No	13	0.00007308	0.0000425	69.23	None	No	0.01	NP (normality)
Beryllium, total (mg/L)	MW-1606S	0.0001	0.000005	0.004	No	13	0.00009269	0.00002635	92.31	None	No	0.01	NP (NDs)
Beryllium, total (mg/L)	MW-1607D	0.0001	0.000008	0.004	No	13	0.00009292	0.00002552	92.31	None	No	0.01	NP (NDs)
Beryllium, total (mg/L)	MW-1607S	0.000123	0.00001	0.004	No	13	0.00008077	0.0000414	69.23	None	No	0.01	NP (normality)
Cadmium, total (mg/L)	MW-1604D	0.000138	0.0000574	0.005	No	13	0.00009769	0.00005418	0	None	No	0.01	Param.
Cadmium, total (mg/L)	MW-1604S	0.00021	0.00003	0.005	No	13	0.00009923	0.00008636	0	None	No	0.01	NP (normality)
Cadmium, total (mg/L)	MW-1605D	0.000035170	0.000018670	0.005	No	13	0.00002692	0.00001109	0	None	No	0.01	Param.
Cadmium, total (mg/L)	MW-1605S	0.00013	0.00005	0.005	No	13	0.00007154	0.0000223	0	None	No	0.01	NP (normality)
Cadmium, total (mg/L)	MW-1606D	0.000078880	0.0000642	0.005	No	13	0.00007154	0.000009871	0	None	No	0.01	Param.
Cadmium, total (mg/L)	MW-1606S	0.000079430	0.000066720	0.005	No	13	0.00007308	0.000008549	0	None	No	0.01	Param.
Cadmium, total (mg/L)	MW-1607D	0.00003	0.00001	0.005	No	13	0.00002192	0.000006934	61.54	None	No	0.01	NP (normality)
Cadmium, total (mg/L)	MW-1607S	0.00006	0.00003	0.005	No	13	0.00005385	0.00005124	0	None	No	0.01	NP (normality)
Chromium, total (mg/L)	MW-1604D	0.0004555	0.0001774	0.1	No	13	0.0003165	0.000187	0	None	No	0.01	Param.
Chromium, total (mg/L)	MW-1604S	0.0003179	0.0001026	0.1	No	12	0.0002222	0.0001771	0	None	x^(1/3)	0.01	Param.
Chromium, total (mg/L)	MW-1605D	0.0002588	0.000074240	0.1	No	12	0.0001733	0.0001416	0	None	sqrt(x)	0.01	Param.
Chromium, total (mg/L)	MW-1605S	0.0005477	0.0002212	0.1	No	12	0.0003844	0.0002081	0	None	No	0.01	Param.
Chromium, total (mg/L)	MW-1606D	0.0005256	0.0001334	0.1	No	13	0.0003512	0.0003008	0	None	sqrt(x)	0.01	Param.
Chromium, total (mg/L)	MW-1606S	0.0004454	0.0000925	0.1	No	13	0.0003065	0.0003456	0	None	x^(1/3)	0.01	Param.
Chromium, total (mg/L)	MW-1607D	0.000275	0.000069080	0.1	No	12	0.0002061	0.0002194	0	None	ln(x)	0.01	Param.
Chromium, total (mg/L)	MW-1607S	0.0005017	0.0002021	0.1	No	12	0.0003519	0.0001909	0	None	No	0.01	Param.
Cobalt, total (mg/L)	MW-1604D	0.001806	0.001283	0.006	No	13	0.001191	0.0007762	0	None	x^5	0.01	Param.
Cobalt, total (mg/L)	MW-1604S	0.00216	0.000308	0.006	No	13	0.001017	0.0008896	0	None	No	0.01	NP (normality)
Cobalt, total (mg/L)	MW-1605D	0.001809	0.001633	0.006	No	13	0.001721	0.0001182	0	None	No	0.01	Param.
Cobalt, total (mg/L)	MW-1605S	0.001093	0.0004255	0.006	No	13	0.0008512	0.0007502	0	None	ln(x)	0.01	Param.
Cobalt, total (mg/L)	MW-1606D	0.0022	0.00117	0.006	No	13	0.001655	0.0008412	0	None	No	0.01	NP (normality)
Cobalt, total (mg/L)	MW-1606S	0.000364	0.0002429	0.006	No	13	0.0003035	0.00008138	0	None	No	0.01	Param.
Cobalt, total (mg/L)	MW-1607D	0.000805	0.000399	0.006	No	13	0.0005857	0.0001814	0	None	No	0.01	NP (normality)

Confidence Interval Summary Table - All Results

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 12/1/2019, 11:08 AM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Cobalt, total (mg/L)	MW-1607S	0.00259	0.00084	0.006	No	12	0.001256	0.0006424	0	None	No	0.01	NP (normality)
Combined Radium 226 + 228 (pCi/L)	MW-1604D	1.572	0.52	5	No	13	1.094	0.8316	0	None	sqrt(x)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-1604S	1.447	0.6675	5	No	12	1.075	0.5623	0	None	sqrt(x)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-1605D	1.745	0.6532	5	No	13	1.267	0.9067	0	None	x^(1/3)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-1605S	2.692	0.337	5	No	13	0.8627	0.8402	0	None	No	0.01	NP (normality)
Combined Radium 226 + 228 (pCi/L)	MW-1606D	2.231	0.8522	5	No	12	1.582	0.9769	0	None	sqrt(x)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-1606S	1.708	0.6857	5	No	13	1.197	0.6873	0	None	No	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-1607D	1.961	1.069	5	No	13	1.58	0.8076	0	None	ln(x)	0.01	Param.
Combined Radium 226 + 228 (pCi/L)	MW-1607S	2.214	1.066	5	No	13	1.64	0.7717	0	None	No	0.01	Param.
Fluoride, total (mg/L)	MW-1604D	0.1974	0.1683	4	No	14	0.1829	0.02054	0	None	No	0.01	Param.
Fluoride, total (mg/L)	MW-1604S	0.2114	0.1905	4	No	14	0.2007	0.01542	0	None	x^2	0.01	Param.
Fluoride, total (mg/L)	MW-1605D	0.2103	0.184	4	No	14	0.1971	0.01858	0	None	No	0.01	Param.
Fluoride, total (mg/L)	MW-1605S	0.3	0.23	4	No	14	0.2593	0.03362	0	None	No	0.01	NP (normality)
Fluoride, total (mg/L)	MW-1606D	0.28	0.24	4	No	14	0.2614	0.07853	0	None	No	0.01	NP (normality)
Fluoride, total (mg/L)	MW-1606S	0.4972	0.4029	4	No	15	0.442	0.08205	0	None	x^3	0.01	Param.
Fluoride, total (mg/L)	MW-1607D	0.544	0.4773	4	No	15	0.5107	0.0492	0	None	No	0.01	Param.
Fluoride, total (mg/L)	MW-1607S	0.3055	0.2622	4	No	14	0.2829	0.03315	0	None	x^2	0.01	Param.
Lead, total (mg/L)	MW-1604D	0.000303	0.000022	0.015	No	13	0.000112	0.0001611	15.38	None	No	0.01	NP (Cohens/xfrm)
Lead, total (mg/L)	MW-1604S	0.0001707	0.000049250	0.015	No	13	0.00007731	0.00003657	23.08	Cohen's d	No	0.01	Param.
Lead, total (mg/L)	MW-1605D	0.00008	0.00001	0.015	No	13	0.00003885	0.00003261	15.38	None	No	0.01	NP (Cohens/xfrm)
Lead, total (mg/L)	MW-1605S	0.0007334	0.0001364	0.015	No	13	0.0004746	0.0005588	0	None	sqrt(x)	0.01	Param.
Lead, total (mg/L)	MW-1606D	0.000491	0.00003	0.015	No	12	0.0001622	0.0001669	16.67	None	No	0.01	NP (Cohens/xfrm)
Lead, total (mg/L)	MW-1606S	0.0001517	0.000060450	0.015	No	13	0.0001061	0.00006136	7.692	None	No	0.01	Param.
Lead, total (mg/L)	MW-1607D	0.000179	0.000041	0.015	No	13	0.0001143	0.0001597	7.692	None	No	0.01	NP (normality)
Lead, total (mg/L)	MW-1607S	0.00125	0.00009	0.015	No	12	0.0003435	0.0004635	0	None	No	0.01	NP (normality)
Lithium, total (mg/L)	MW-1604D	0.05535	0.02892	0.04	No	13	0.04214	0.01777	7.692	None	No	0.01	Param.
Lithium, total (mg/L)	MW-1604S	0.04789	0.03251	0.04	No	13	0.0402	0.01035	0	None	No	0.01	Param.
Lithium, total (mg/L)	MW-1605D	0.07997	0.05932	0.04	Yes	13	0.06839	0.01741	0	None	x^2	0.01	Param.
Lithium, total (mg/L)	MW-1605S	0.07823	0.05645	0.04	Yes	13	0.06734	0.01465	0	None	No	0.01	Param.
Lithium, total (mg/L)	MW-1606D	0.1264	0.0998	0.04	Yes	13	0.1121	0.02078	0	None	x^2	0.01	Param.
Lithium, total (mg/L)	MW-1606S	0.1172	0.09409	0.04	Yes	13	0.1049	0.01791	0	None	x^2	0.01	Param.
Lithium, total (mg/L)	MW-1607D	0.09986	0.07352	0.04	Yes	13	0.08669	0.01771	0	None	No	0.01	Param.
Lithium, total (mg/L)	MW-1607S	0.1132	0.08938	0.04	Yes	13	0.1013	0.01604	0	None	No	0.01	Param.
Mercury, total (mg/L)	MW-1604D	0.000036	0.000003	0.002	No	13	0.000007231	0.000008662	84.62	None	No	0.01	NP (NDs)
Mercury, total (mg/L)	MW-1604S	0.000005	0.000003	0.002	No	13	0.000004846	5.5e-7	92.31	None	No	0.01	NP (NDs)
Mercury, total (mg/L)	MW-1605D	0.000005	0.000002	0.002	No	13	0.000004769	8.3e-7	92.31	None	No	0.01	NP (NDs)
Mercury, total (mg/L)	MW-1605S	0.000005	0.000003	0.002	No	13	0.000004846	5.5e-7	92.31	None	No	0.01	NP (NDs)
Mercury, total (mg/L)	MW-1606D	0.000005	0.000004	0.002	No	13	0.000004923	2.8e-7	92.31	None	No	0.01	NP (NDs)
Mercury, total (mg/L)	MW-1606S	0.000005	0.000002	0.002	No	13	0.000004769	8.3e-7	92.31	None	No	0.01	NP (NDs)
Mercury, total (mg/L)	MW-1607D	0.000005	0.000002	0.002	No	13	0.000004538	0.000001127	84.62	None	No	0.01	NP (NDs)
Mercury, total (mg/L)	MW-1607S	0.000005	0.000003	0.002	No	12	0.000004667	7.8e-7	83.33	None	No	0.01	NP (NDs)
Molybdenum, total (mg/L)	MW-1604D	0.01906	0.01355	0.1	No	13	0.01243	0.008423	7.692	None	x^5	0.01	Param.
Molybdenum, total (mg/L)	MW-1604S	0.0166	0.00247	0.1	No	12	0.008351	0.007211	0	None	No	0.01	NP (normality)
Molybdenum, total (mg/L)	MW-1605D	0.05029	0.04271	0.1	No	13	0.0465	0.005091	0	None	No	0.01	Param.
Molybdenum, total (mg/L)	MW-1605S	0.02117	0.01531	0.1	No	13	0.01824	0.003943	0	None	No	0.01	Param.
Molybdenum, total (mg/L)	MW-1606D	0.07877	0.0702	0.1	No	13	0.07448	0.005767	0	None	No	0.01	Param.
Molybdenum, total (mg/L)	MW-1606S	0.09939	0.07119	0.1	No	13	0.08529	0.01896	0	None	No	0.01	Param.
Molybdenum, total (mg/L)	MW-1607D	0.09015	0.08251	0.1	No	13	0.08633	0.005134	0	None	No	0.01	Param.
Molybdenum, total (mg/L)	MW-1607S	0.04659	0.03902	0.1	No	13	0.04281	0.00509	0	None	No	0.01	Param.
Selenium, total (mg/L)	MW-1604D	0.002029	0.0007384	0.05	No	13	0.001538	0.001154	0	None	ln(x)	0.01	Param.
Selenium, total (mg/L)	MW-1604S	0.002411	0.001266	0.05	No	13	0.001838	0.0007698	0	None	No	0.01	Param.
Selenium, total (mg/L)	MW-1605D	0.0003	0.0002	0.05	No	13	0.0002385	0.00006504	0	None	No	0.01	NP (normality)
Selenium, total (mg/L)	MW-1605S	0.001752	0.0006945	0.05	No	13	0.001223	0.0007108	0	None	No	0.01	Param.
Selenium, total (mg/L)	MW-1606D	0.006576	0.002732	0.05	No	13	0.004654	0.002584	0	None	No	0.01	Param.
Selenium, total (mg/L)	MW-1606S	0.00169	0.0008356	0.05	No	13	0.001331	0.0007216	0	None	ln(x)	0.01	Param.

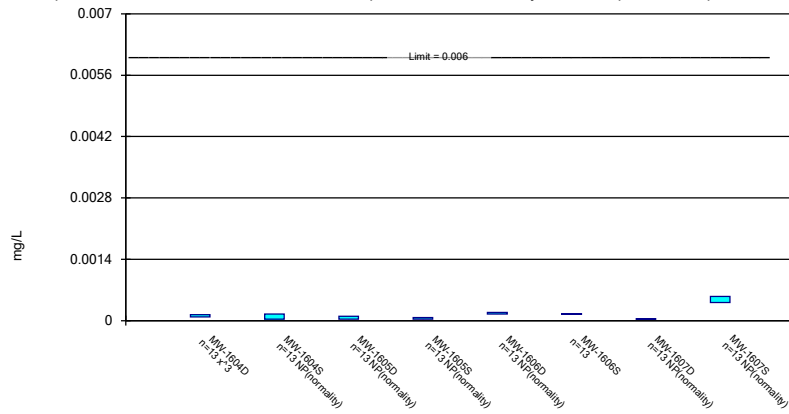
Confidence Interval Summary Table - All Results

Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP Printed 12/1/2019, 11:08 AM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Selenium, total (mg/L)	MW-1607D	0.0001	0.00003	0.05	No	13	0.00008846	0.0001256	15.38	None	No	0.01	NP (normality)
Selenium, total (mg/L)	MW-1607S	0.009568	0.00677	0.05	No	13	0.008169	0.001881	0	None	No	0.01	Param.
Thallium, total (mg/L)	MW-1604D	0.0004453	0.0001587	0.002	No	13	0.0002787	0.0001563	23.08	Cohen's d	No	0.01	Param.
Thallium, total (mg/L)	MW-1604S	0.0003	0.00002	0.002	No	13	0.0001446	0.0001552	7.692	None	No	0.01	NP (normality)
Thallium, total (mg/L)	MW-1605D	0.0005	0.00004	0.002	No	13	0.0001622	0.0001944	23.08	None	No	0.01	NP (normality)
Thallium, total (mg/L)	MW-1605S	0.0005	0.00004	0.002	No	13	0.0001666	0.0001935	23.08	None	No	0.01	NP (normality)
Thallium, total (mg/L)	MW-1606D	0.000123	0.00009	0.002	No	13	0.0001628	0.0001501	15.38	None	No	0.01	NP (normality)
Thallium, total (mg/L)	MW-1606S	0.000112	0.000062	0.002	No	13	0.000144	0.0001588	15.38	None	No	0.01	NP (normality)
Thallium, total (mg/L)	MW-1607D	0.0005	0.00002	0.002	No	13	0.000144	0.0002033	23.08	None	No	0.01	NP (normality)
Thallium, total (mg/L)	MW-1607S	0.0005	0.00005	0.002	No	13	0.0001686	0.0001908	23.08	None	No	0.01	NP (normality)

Parametric and Non-Parametric (NP) Confidence Interval

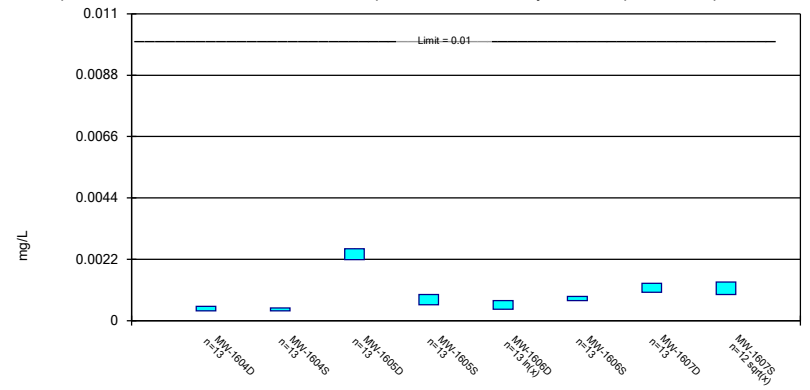
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Antimony, total Analysis Run 12/1/2019 11:05 AM View: Confidence Intervals - App IV
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric Confidence Interval

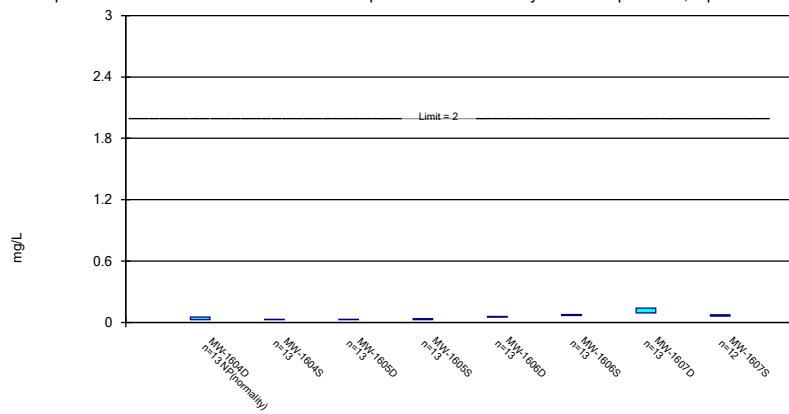
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Arsenic, total Analysis Run 12/1/2019 11:05 AM View: Confidence Intervals - App IV
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric and Non-Parametric (NP) Confidence Interval

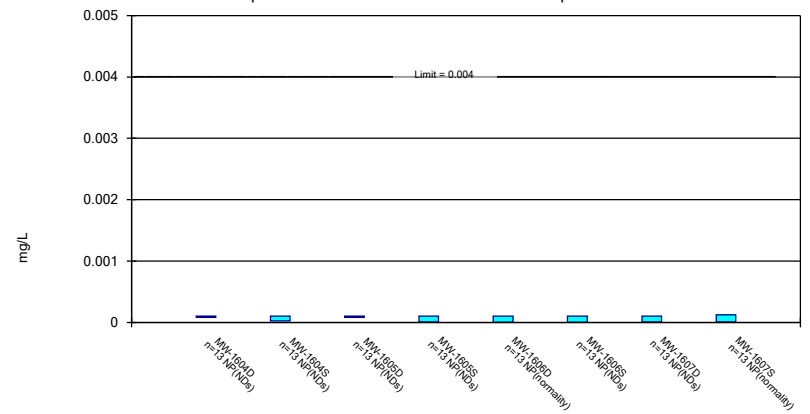
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Barium, total Analysis Run 12/1/2019 11:05 AM View: Confidence Intervals - App IV
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Non-Parametric Confidence Interval

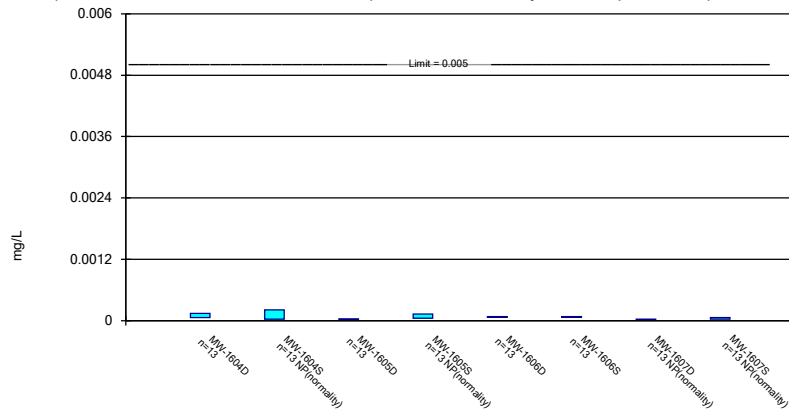
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Beryllium, total Analysis Run 12/1/2019 11:05 AM View: Confidence Intervals - App IV
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric and Non-Parametric (NP) Confidence Interval

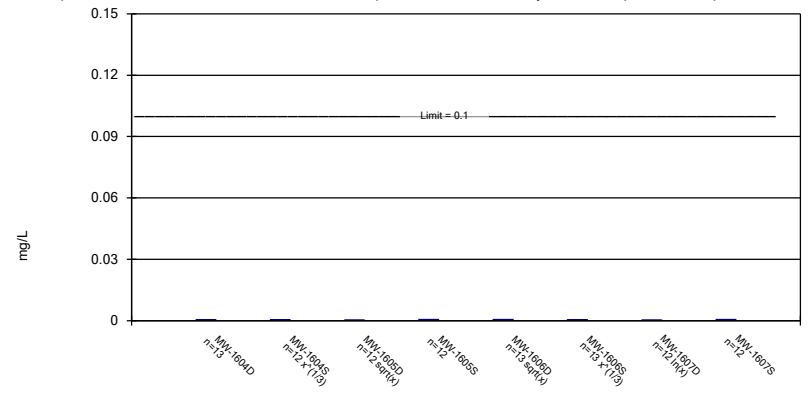
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Cadmium, total Analysis Run 12/1/2019 11:05 AM View: Confidence Intervals - App IV
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric Confidence Interval

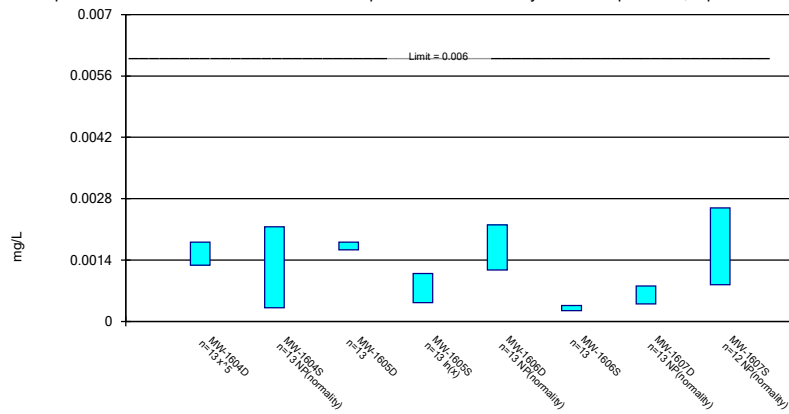
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Chromium, total Analysis Run 12/1/2019 11:05 AM View: Confidence Intervals - App IV
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric and Non-Parametric (NP) Confidence Interval

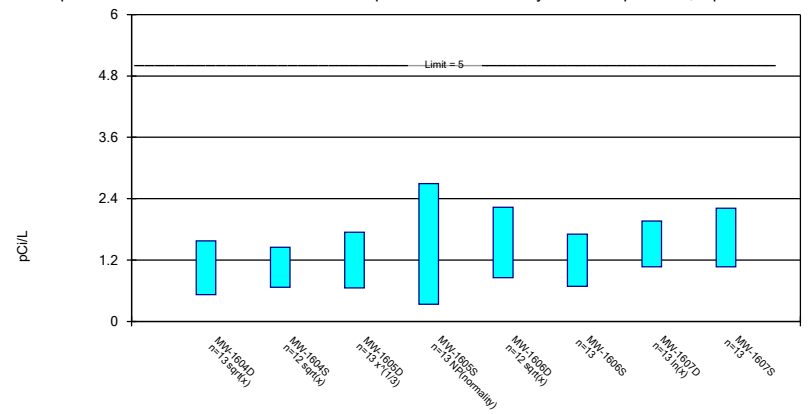
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Cobalt, total Analysis Run 12/1/2019 11:05 AM View: Confidence Intervals - App IV
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric and Non-Parametric (NP) Confidence Interval

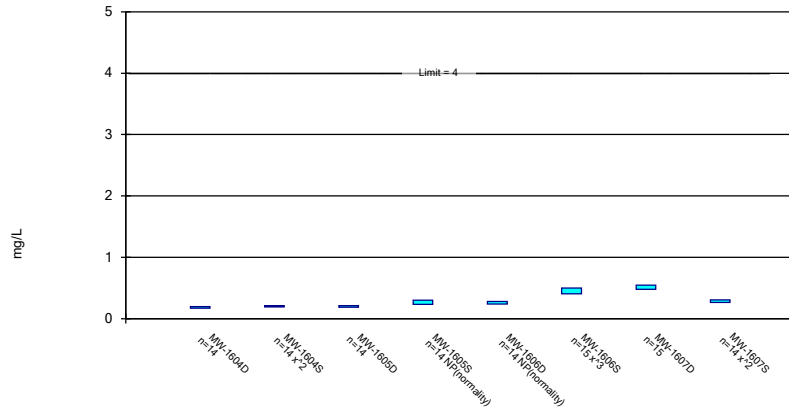
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Combined Radium 226 + 228 Analysis Run 12/1/2019 11:05 AM View: Confidence Intervals -
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric and Non-Parametric (NP) Confidence Interval

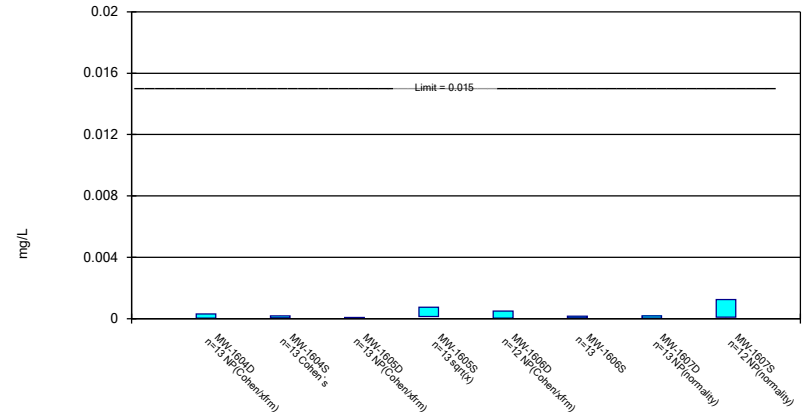
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Fluoride, total Analysis Run 12/1/2019 11:05 AM View: Confidence Intervals - App IV
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric and Non-Parametric (NP) Confidence Interval

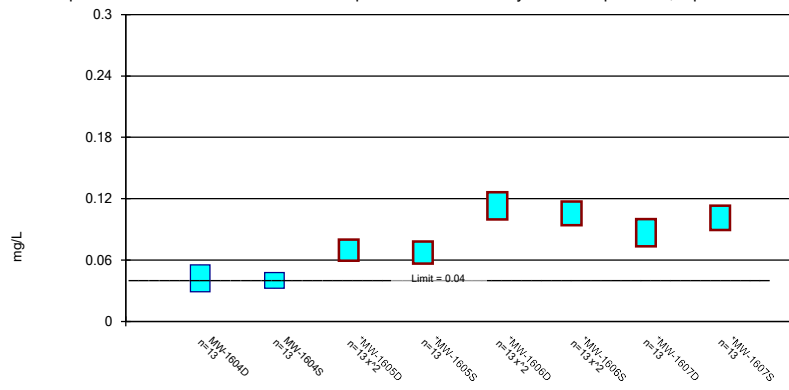
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Lead, total Analysis Run 12/1/2019 11:05 AM View: Confidence Intervals - App IV
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric Confidence Interval

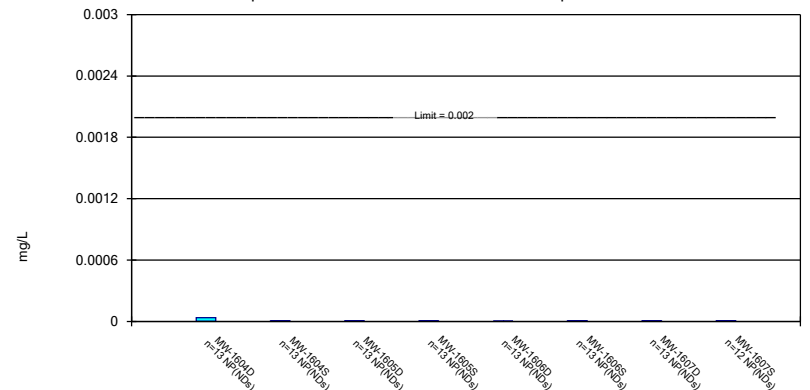
Compliance limit is exceeded.* Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Lithium, total Analysis Run 12/1/2019 11:05 AM View: Confidence Intervals - App IV
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Non-Parametric Confidence Interval

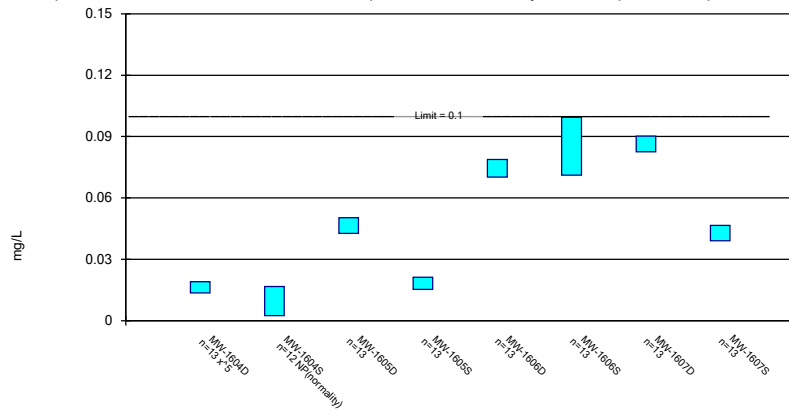
Compliance Limit is not exceeded. Per-well alpha = 0.01.



Constituent: Mercury, total Analysis Run 12/1/2019 11:05 AM View: Confidence Intervals - App IV
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric and Non-Parametric (NP) Confidence Interval

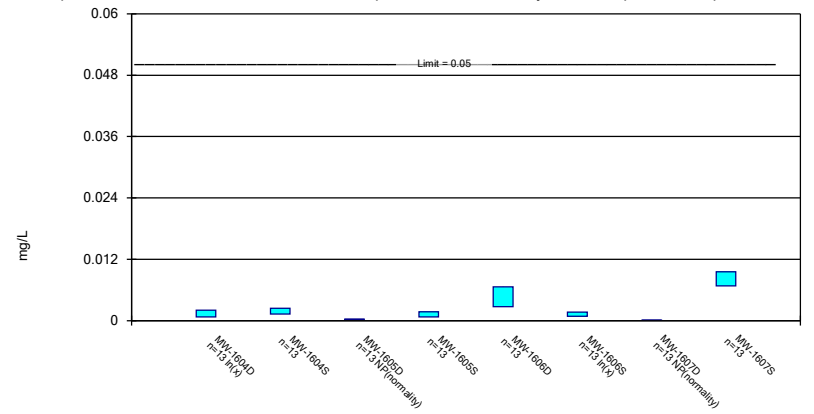
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Molybdenum, total Analysis Run 12/1/2019 11:06 AM View: Confidence Intervals - App IV
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Parametric and Non-Parametric (NP) Confidence Interval

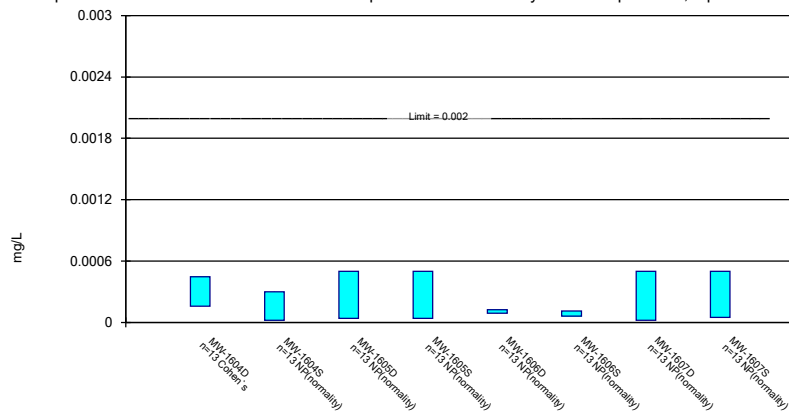
Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Selenium, total Analysis Run 12/1/2019 11:06 AM View: Confidence Intervals - App IV
Mountaineer BAP Client: Geosyntec Data: Mountaineer 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: Thallium, total Analysis Run 12/1/2019 11:06 AM View: Confidence Intervals - App IV
Mountaineer BAP Client: Geosyntec Data: Mountaineer BAP

Appendix 3

No alternative source demonstrations were completed in 2019.

Appendix 4

The notifications of an SSL above a GWPS, as determined by statistical analysis following each assessment monitoring event in 2019, and the notice of initiation of Assessment of Corrective Measures follow.

Mountaineer Plant

Notice of Statistically Significant Levels (SSLs) above the Groundwater Protection Standard (GWPS)

CCR Unit – Bottom Ash Pond

As required by 40 CFR 257.95(g), this is a notification that on January 8, 2019 lithium was detected at SSLs above the GWPSs. This notification is being placed in the operating record, as required by 40 CRF 257.105(h)(8).

Mountaineer Plant

Notice for Initiating an Assessment of Corrective Measures

CCR Unit – Bottom Ash Pond

This notice is being provided, as required by 40 CFR 257.95(g)(5), that an Assessment of Corrective Measures was initiated on March 26, 2019 for Mountaineer Plant's Bottom Ash Pond due to the statistically significant concentrations detected above the established groundwater protection standard for lithium.

Mountaineer Plant

Notice of Statistically Significant Levels (SSLs) above the Groundwater Protection Standard (GWPS)

CCR Unit – Bottom Ash Pond

As required by 40 CFR 257.95(g), this is a notification that on July 12, 2019 lithium was detected at SSLs above the GWPSs. This notification is being placed in the operating record, as required by 40 CRF 257.105(h)(8).

Mountaineer Plant

Notice of Statistically Significant Levels (SSLs) above the Groundwater Protection Standard (GWPS)

CCR Unit – Bottom Ash Pond

As required by 40 CFR 257.95(g), this is a notification that on December 23, 2019 lithium was detected at SSLs above the GWPSs. This notification is being placed in the operating record, as required by 40 CFR 257.105(h)(8).

Appendix 5

Monitoring well installation boring logs and well construction reports follow.

PROJECT AEP IGCC Mountaineer Plant - Bechtel Borings

BORING NO. S-107

ELEVATION 585.8' GWL 0 HRS

PROJECT NO C050299.33

HRS

DATE Aug. 23-25, 2006

CLASSIFIED BY Richard M. Ruffolo

PAGE 1 of 4

DEPTH (FT.)	BLOWS PER SIX INCHES OR CORE RECOVERY/RUN	CORE RECOVERY/RUN SAMPLE NO., TYPE & RECOVERY OR % ROCK RECOVERY	RQD (%) OR TORVANE	DESCRIPTION				USCS OR ROCK BROKENNESS	REMARKS
				PROFILE	SOIL DENSITY - CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION		
1	2	3	4	5	6	7	8	9	10
	7	10	○ S-1 1.4	0.5		Brn	Topsoil	ml	
1.5		10			V. Stiff	D. Brn	Sandy lean clay, some rock fragments and		*3.0, dry
2.5		12			↓		gravel -- 2.0" ⌀, Fill	cl	
4.0	13	13	○ S-2 1.5		Hard				*>4.0, dry
5.0					↓				
6.5	5	7	○ S-3 1.4		V. Stiff			CL	*3.0, dry
7.5		11			↓				
9.0	7	9	○ S-4 1.3	7.5	Stiff	D. Gray	Fly ash and silt mix, some rock and coal frags,	ml	*2.0, moist
10.0		12			↓		Fill		
11.5	2	2	○ S-5 0.7		M. Stiff	Brn	Lean clay w/sand, trace rock frags and gravel,	CL	*1.0, moist
12.5		3					Fill		
14.0	2	3	○ S-6 1.5						Shelby tube 12.0-14.0'
15.0									*1.0, moist
16.5	3	2	○ S-7 1.0						*1.0, moist
17.5		2							
19.0	2	4	○ S-8 1.5						*1.0, moist
20.0									
21.5	2	3	○ S-9 0.8						*1.0, moist
22.5								CL-ML	Shelby tube 20.0-22.0'
24.0	2	2	○ S-10 1.0		Stiff				*1.5, moist
25.0				25.0	↓				
26.5	3	5	○ S-11 1.2		Stiff	Brn	Silty clay, laminated, trace root frags, alluvial	cl	*1.5, moist
		7							
				30.0	↓				

REMARKS ** 4-1/4" I.D. Hollow Stem Augers 0.0-6.5', 6.5-81.2' Mud rotary drilling with 3-7/8" Tri-Cone Roller Bit

w/SPT; 5-1/4" PVC casing 0.0-7.0'; NQ conventional rock core, CME 85 truck mount drill rig, Tim Caudill - Driller - FMSM

* POCKET PENETROMETER READINGS (TSF)

BORING S-107

** METHOD OF ADVANCING AND CLEANING BORING

PROJECT AEP IGCC Mountaineer Plant - Bechtel Borings BORING NO. S-107
 ELEVATION 585.8' GWL 0 HRS PROJECT NO. C050299.33
 HRS _____
 DATE Aug. 23-25, 2006 CLASSIFIED BY Richard M. Ruffolo PAGE 2 of 4

DEPTH (FT.)	BLOWS PER SIX INCHES OR CORE RECOVERY/RUN	CORE RECOVERY/RUN SAMPLE NO., TYPE & RECOVERY OR % ROCK RECOVERY	ROD (%) OR TORVANE	DESCRIPTION				USCS OR ROCK BROKENNESS	REMARKS
				PROFILE	SOIL DENSITY - CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION		
1	2	3	4	5	6	7	8	9	10
31.5	3	4	4		M. Stiff	Brn	Gravelly clay, <1.0" ϕ gravel, alluvial	cl	*1.0, wet
35.0				35.0					
36.5	4	5	5		M. Stiff	D. Gray	Lean clay w/sand, homogeneous, organic decomposing odor, trace leaf and root fragments, alluvial	cl	*0.5, wet
40.0									
41.5	3	3	5			D. Gray/Blk			*1.0, wet-moist
45.0				45.0					
46.5	9	22	13		Dense	Brn	Silty gravel (<2.0" ϕ) with sand (med-coarse gr) alluvial	gm	Wet
50.0				50.0					
51.5	4	4	3		Loose	Brn	Sand, alluvial	SP	Wet
55.0									
56.5	2	5	6		M. Dense				

REMARKS ** 4-1/4" I.D. Hollow Stem Augers 0.0-6.5', 6.5-81.2' Mud rotary drilling with 3-7/8" ϕ Tri-Cone Roller Bit
w/SPT; 5-1/4" ϕ PVC casing 0.0-7.0'; NQ conventional rock core, CME 85 truck mount drill rig, Tim Caudill - Driller - FMSM

* POCKET PENETROMETER READINGS (TSF)
 ** METHOD OF ADVANCING AND CLEANING BORING

PROJECT AEP IGCC Mountaineer Plant - Bechtel Borings

 BORING NO. S-107

 ELEVATION 585.8' GWL 0 HRS _____

 PROJECT NO C050299.33

HRS _____

 DATE Aug. 23-25, 2006

 CLASSIFIED BY Richard M. Ruffolo

 PAGE 3 of 4

DEPTH (FT.)	BLOWS PER SIX INCHES OR CORE RECOVERY/RUN	SAMPLE NO., TYPE & RECOVERY OR % ROCK RECOVERY	RQD (%) OR TORVANE	DESCRIPTION				USCS OR ROCK BROKENNESS	REMARKS
				PROFILE	SOIL DENSITY - CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION		
1	2	3	4	5	6	7	8	9	10
61.5	11 9	○ S-18 0.8			M. Dense	D. Brn	Sand w/gravel, alluvial	SP	Wet
65.0	8								
66.5	8 9	○ S-19 0.6							
70.0				70.0					
71.5	14 14	○ S-20 1.4			Dense	L. Brn	Silty sand (fine-med. gr.), alluvial	sm	Wet
75.0				75.0					
76.5	6 11	○ S-21 1.5			M. Dense	Brn	Sand, well graded w/fine gravel	sw	Wet
80.0									
81.2	11 15	○ S-22 1.2		81.0					
82.2				81.2	V. Dense	Tan	Decomposed sandstone	gp	T.O.R. @ 504.6"
83.7	1.35				M. Soft	Gray	Sandstone (med. gr)	V. BR	
					M. Hard			BL	
							-85.0-85.2' clay seam		
							-87.2-.3' clay seam		
							89.5 becomes coarse grained		
							89.4-89.8 very broken zone		
	10.0							V.BR	89.9 Lose Water

 REMARKS ** 4-1/4" I.D. Hollow Stem Augers 0.0-6.5', 6.5-81.2' Mud rotary drilling with 3-7/8" Tri-Cone Roller Bit
w/SPT; 5-1/4" PVC casing 0.0-7.0'; NQ conventional rock core, CME 85 truck mount drill rig, Tim Caudill - Driller - FMSM

* POCKET PENETROMETER READINGS (TSF)

 BORING S-107

** METHOD OF ADVANCING AND CLEANING BORING

PROJECT AEP IGCC Mountaineer Plant - Bechtel Borings BORING NO. S-112
 ELEVATION 583.4' GWL 0 HRS PROJECT NO. C050299.33
 HRS _____
 DATE Aug. 28-29, 2006 CLASSIFIED BY Richard M. Ruffolo PAGE 1 of 3

DEPTH (FT.)	BLOWS PER SIX INCHES OR CORE RECOVERY/RUN	SAMPLE NO., TYPE & RECOVERY OR % ROCK RECOVERY	RQD (%) OR TORVANE	DESCRIPTION				USCS OR ROCK BROKENNESS	REMARKS	
				PROFILE	SOIL DENSITY - CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION			
1	2	3	4	5	6	7	8	9	10	
1.5	12 32	○ S-1 1.5		2.5	V. Dense	Brn	Sand w/silt and gravel rock fragments, Fill	sp-sm	Dry	
2.5	31									
4.0	19	○ S-2 1.3		5.0	Dense	Brn	Sand w/silt and gravel, Fill	sp-sm	Moist	
5.0	20									
6.5	2	○ S-3 0.5		10.0	Stiff	L. Brn	Lean clay, homogeneous, alluvial	CL	*2.0, moist	
7.5	3		6.5 ST-5						*2.0 bottom of Shelby tube	
9.0	3	○ S-4 1.3	Rec. 1.8 8.5 E					- with fine sand	*2.0, moist	
10.0	4									
11.5	3	○ S-5 1.0		20.0	V. Stiff	Brn	Lean clay, mottled, alluvial	CL	*3.0, moist	
12.5	6							- trace root fragments		
14.0	6	○ S-6 1.1							*2.5, moist	
15.0	8									
16.5	4	○ S-7 1.3							*2.5, moist	
17.5	8									
19.0	3	○ S-8 1.3	17.5 ST-6	20.0					*2.5, moist	
20.0	6		Rec. 2.0 19.5						*2.0 bottom of Shelby tube	
21.5	1	○ S-9 1.5		22.5	M. Stiff	Brn	Sandy lean clay, homogeneous, alluvial	cl	*1.0, wet	
22.5	3									
24.0	5	○ S-10 1.2				Loose	Brn	Silty sand (fine gr), alluvial	sm	Moist
25.0	5									
26.5	4	○ S-11 1.0		30.0					Moist	
	5									

REMARKS ** 4-1/4" I.D. Hollow Stem Augers 0.0-9.0 w/SPT, 0.9-79.1' Mud Rotary drilling w/Tricone roller bit w/Revert mud, NQ

conventional rock core; Tim Caudill, Driller - FMSM; CME 85 Truck Mount Rig; 3-1/4" I.D. PVC casing 0.0-7.0'

* POCKET PENETROMETER READINGS (TSF)

BORING S-112

** METHOD OF ADVANCING AND CLEANING BORING

PROJECT AEP IGCC Mountaineer Plant - Bechtel Borings BORING NO. S-112
 ELEVATION 583.4' GWL 0 HRS PROJECT NO C050299.33
 HRS _____
 DATE Aug. 28-29, 2006 CLASSIFIED BY Richard M. Ruffolo PAGE 2 of 3

DEPTH (FT.)	BLOWS PER SIX INCHES OR CORE RECOVERY/RUN	SAMPLE NO., TYPE & RECOVERY OR % ROCK RECOVERY	RQD (%) OR TORVANE	DESCRIPTION				USCS OR ROCK BROKENNESS	REMARKS
				PROFILE	SOIL DENSITY - CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION		
1	2	3	4	5	6	7	8	9	10
31.5	5 4 12	○ S-12 1.1			M. Dense	Brn	Sitty sand w/gravel, alluvial	sm	Moist
35.0					↓				
36.5	15 19 15	○ S-13 1.2			Dense				Wet
40.0									
41.5	11 19 26	○ S-14 1.0							Wet
45.0									
46.5	11 14 7	○ S-15 1.1			M. Dense		- coarse gravel and interbedded fines		Wet
50.0									
51.5	5 19 27	○ S-16 1.2			Dense	Brn	Sand w/silt and gravel	sp-sm	Wet
55.0				55.0					
56.5	14 8 8	○ S-17 1.0			M. Dense	Brn	Sand (med-coarse gr.), w/fine gravel, trace silt, alluvial	sp	Wet

REMARKS ** 4-1/4" I.D. Hollow Stem Augers 0.0-9.0 w/SPT, 0.9-79.1' Mud Rotary drilling w/Tricone roller bit w/Revert mud, NQ conventional rock core; Tim Caudill, Driller - FSM; CME 85 Truck Mount Rig; 3-1/4" I.D. PVC casing 0.0-7.0'

PROJECT AEP IGCC Mountaineer Plant - Bechtel Borings

 BORING NO. S-112

 ELEVATION 583.4' GWL 0 HRS _____

 PROJECT NO. C050299.33

HRS _____

 DATE Aug. 28-29, 2006

 CLASSIFIED BY Richard M. Ruffolo

 PAGE 3 of 3

DEPTH (FT.)	BLOWS PER SIX INCHES OR CORE RECOVERY/RUN	SAMPLE NO., TYPE & RECOVERY OR % ROCK RECOVERY	RQD (%) OR TORVANE	DESCRIPTION				USCS OR ROCK BROKENNESS	REMARKS
				PROFILE	SOIL DENSITY - CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION		
1	2	3	4	5	6	7	8	9	10
61.5	4 4	○ S-18 1.3							Wet
65.0	5			65.0					
66.5	5 4 6	○ S-19 1.0			Loose	Brn	Silty sand, fine gr., homogeneous, alluvial	sm	Wet
70.0	10 12	○ S-20 1.0			M. Dense	Brn	Sand w/silt, alluvial	sw-sm	Wet
75.0	9 8	○ S-21 0.8							Wet
76.5	12								
79.0				79.0	V. Dense	Gray	Decomposed sandstone	gp	78.3-79.0 difficult drilling Wet, 79.0 roller bit refusal
79.1	50/0.1	○ S-22 0.1		79.1					T.O.R. Elev 504.3'
					M. Hard	Gray	Sandstone, med. gr., few ~20° x-beds	br bl	
	10.0 10.0	R-1	100	95					
89.1		△		89.1			End of boring		

 REMARKS ** 4-1/4" I.D. Hollow Stem Augers 0.0-9.0 w/SPT, 0.9-79.1' Mud Rotary drilling w/Tricone roller bit w/Revert mud, NQ
conventional rock core; Tim Caudill, Driller - FMSM; CME 85 Truck Mount Rig; 3-1/4" I.D. PVC casing 0.0-7.0'

* POCKET PENETROMETER READINGS (TSF)

 BORING S-112

** METHOD OF ADVANCING AND CLEANING BORING

PROJECT AEP IGCC Mountaineer Plant - Bechtel Borings

 BORING NO. S-203

 ELEVATION 587.1' GWL 0 HRS

 PROJECT NO. C050299.33

 HRS

 DATE Sept. 6-8, 2006

 CLASSIFIED BY Richard M. Ruffolo

 PAGE 1 of 3

DEPTH (FT.)	BLOWS PER SIX INCHES OR CORE RECOVERY/RUN	SAMPLE NO., TYPE & RECOVERY OR % ROCK RECOVERY	RQD (%) OR TORVANE	DESCRIPTION				USCS OR ROCK BROKENNESS	REMARKS
				PROFILE	SOIL DENSITY - CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION		
1	2	3	4	5	6	7	8	9	10
	2	5	○ S-1 1.5	0.3	Hard	Brn	Lean clay, fill	CL	0.3' of topsoil
1.5		6			↓				*>4.0, dry
2.5									
4.0	3	5	○ S-2 1.5		Stiff				*2.0, Moist
5.0									
6.5	1	2	○ S-3 1.5		↓				*2.0, Moist
7.5		4		6.5					
7.5	3				Stiff	Brn	Silt w/fine sand, laminated, alluvial	ML	
9.0	1	3	○ S-4 1.5	ST-15 Rec. 2.0					*1.0, Moist
10.0				9.5					*2.0 bottom of Shelby tube
	3	3	○ S-5 1.5	ST-16 Rec. 2.0					*1.0, Moist
11.5		5		11.5					*1.0 bottom of Shelby tube
12.5									
14.0	2	1	○ S-6 1.5				- interbedded fine sand		*1.0, Moist
15.0									
16.5	1	1	○ S-7 1.5						*1.0, Moist
17.5		2			↓				
17.5	7			17.5					
19.0	13	12	○ S-8 0.9		M. Dense	Brn	Sand w/silt and gravel, alluvial	sp-sm	Moist
20.0									
21.5	6	10	○ S-9 0.9						Moist
22.5		17							
22.5	22				↓				
24.0	20	30	○ S-10 1.5		Dense				Moist
25.0									
26.5	22	16	○ S-11 1.0						Moist
		30							End 9/6

 REMARKS ** 4-1/4" I.D. Hollow Stem Augers 0.0-6.5' and Mud Rotary Drilling w 4-1/4" Tri-Cone Roller bit in conjunction w/SPT
Install 5-1/4" PVC pipe; 0.0-7.0'; NQ conventional rock core; CME 55 Truck Mount Drill Rig, Mark Martin, driller - FMSM

* POCKET PENETROMETER READINGS (TSF)

 BORING S-203

** METHOD OF ADVANCING AND CLEANING BORING

PROJECT AEP IGCC Mountaineer Plant - Bechtel Borings BORING NO. S-203
 ELEVATION 587.1' GWL 0 HRS PROJECT NO. C050299.33
 HRS _____
 DATE Sept. 6-8, 2006 CLASSIFIED BY Richard M. Ruffolo PAGE 2 of 3

DEPTH (FT.)	BLOWS PER SIX INCHES OR CORE RECOVERY/RUN	CORE RECOVERY/RUN SAMPLE NO., TYPE & RECOVERY OR % ROCK RECOVERY	ROD (%) OR TORVANE	DESCRIPTION				USCS OR ROCK BROKENNESS	REMARKS
				PROFILE	SOIL DENSITY - CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION		
1	2	3	4	5	6	7	8	9	10
18	12	○ S-12 0.4							Moist
31.5	29								
35.0									
36.5	15 12	○ S-13 1.0			M. Dense				Wet
40.0									
41.5	10 8	○ S-14 1.0							Wet
45.0				45.0					
46.5	4 3	○ S-15 0.6			Loose	Brn	Sand (med. Gr) trace silt and gravel, alluvial	sp	Wet
50.0									
51.5	7 7	○ S-16 1.5			M. Dense				Wet
55.0				55.0					
56.5	13 11	○ S-17 1.0			M. Dense	Brn	Sand (fine-coarse gr), trace fine gravel, alluvial	sw	Wet

REMARKS ** 4-1/4" I.D. Hollow Stem Augers 0.0-6.5' and Mud Rotary Drilling w 4-1/4" Tri-Cone Roller bit in conjunction w/SPT

Install 5-1/4" PVC pipe; 0.0-7.0'; NQ conventional rock core; CME 55 Truck Mount Drill Rig, Mark Martin, driller - FMSM

* POCKET PENETROMETER READINGS (TSF)

BORING S-203

** METHOD OF ADVANCING AND CLEANING BORING

PROJECT AEP IGCC Mountaineer Plant - Bechtel Borings

 BORING NO. S-203

 ELEVATION 587.1' GWL 0 HRS

 PROJECT NO. C050299.33

HRS

 DATE Sept. 6-8, 2006

 CLASSIFIED BY Richard M. Ruffolo

 PAGE 3 of 3

DEPTH (FT.)	BLOWS PER SIX INCHES OR CORE RECOVERY/RUN	SAMPLE NO., TYPE & RECOVERY OR % ROCK RECOVERY	RQD (%) OR TORVANE	DESCRIPTION				USCS OR ROCK BROKENNESS	REMARKS
				PROFILE	SOIL DENSITY - CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION		
1	2	3	4	5	6	7	8	9	10
61.5	17 17	○ S-18 1.5			Dense	Bm	Sand w/silt and gravel, alluvial	sp-sm	Wet
65.0									
66.5	14 16	○ S-19 1.0			M. Dense				Wet
70.0				70.0					
71.5	19 17	○ S-20 1.5			Dense	Bm	Sand w/silt, alluvial	sw-sm	Wet
75.0									
76.5	17 18	○ S-21 0.8							Wet
80.0				80.0					
81.5	11 11	○ S-22 0.9			M. Dense	Bm	Gravel w/sand, 80% coarse gravel, 20% sand	gp	Wet, end 9/7
81.8				81.8			alluvial		81.7' Roller bit refusal
					M. Hard	Gray	Sandstone, med-coarse gr., few ~20°	V. Br.	81.8' seat casing
							x-beds	BR	T.O.R. elev 505.3'
	7.8	8.0	R-1	98	81		83.0-83.2' ~45° fractures	M	
							83.4-83.6' horizontal Fe stain fracture		
89.8				89.8			88.2-88.3' horizontal Fe stain fracture	Br	88.5' Lose water
							End of boring		

REMARKS ** 4-1/4" I.D. Hollow Stem Augers 0.0-6.5' and Mud Rotary Drilling w 4-1/4" Tri-Cone Roller bit in conjunction w/SPT

Install 5-1/4" PVC pipe; 0.0-7.0'; NQ conventional rock core; CME 55 Truck Mount Drill Rig, Mark Martin, driller - FMSM

* POCKET PENETROMETER READINGS (TSF)

 BORING S-203

** METHOD OF ADVANCING AND CLEANING BORING



Project: AEP Mountaineer
 Location: New Haven, WV
 Project No.: 4345.00

Log of Boring SB-1805

Ground Elevation: Not Available

Sanborn, Head & Associates, Inc.

Drilling Method: HWT Casing with advancer, 3 1/4" ID HSA, PWL Coring

Sampling Method: 2" O.D and 3" O.D. Split Spoon with automatic hammer; 2" OD Shelby tube; NQ2 5-ft long core barrel

Drilling Company: Terracon Consultants, Inc.

Foreman: N. Francis/K. Fowler

Date Started: 06/18/18

Date Finished: 06/21/18

Logged By: L. Corenthal

Checked By: A. Ashton

Groundwater Readings

Date	Time	Depth to Water	Ref. Pt.	Depth of Casing	Depth of Hole	Stab. Time
06/22/18	07:00	38.7'	Ground Surface	0'	133.8'	~ 14 hours

BORING LOG P:\4300S\4345.00\WORK\LOGS\4345.00 LOGS.GPJ 2017 SANBORN HEAD V1.GLB 2017 SANBORN HEAD V1.GDT 12/7/18

Depth (ft)	Drill Rate (min/ft)	Sample Information				Field Testing Data	Stratum		Geologic Description	Remarks
		Sample No.	Depth (ft)	Spoon Blows per 6 in	Pen/Rec (in)		Log	Description		
0							----	0'----		
2										
4										
6		S-01	5 - 6.5	2 2 3	18/18	PID: NM		SILT & CLAY	S-01 (5 to 6.5'): Medium stiff, reddish brown, SILT & CLAY, seam of fine Sand. Moist.	
8										
10		S-02	10 - 11.5	2 2 4	18/18	PID: NM		CLAYEY SILT	S-02A (10 to 11'): Medium stiff, reddish brown, Clayey SILT. Moist.	
12									S-02B (11 to 11.5'): Loose, reddish brown, fine to coarse SAND, some Silt. Moist.	
14										
16		S-03	15 - 16.5	2 2 2	18/14	PID: NM			S-03 (15 to 16.5'): Very loose, brown, fine SAND, little Silt. Moist. Stratified at approximately 16 feet.	
18								FINE TO COARSE SAND		
20		S-04	20 - 21.5	8 12 12	18/12	PID: NM			S-04 (20 to 21.5'): Medium dense, brown, fine to coarse SAND, trace Gravel, trace Silt. Moist.	
22										
24										



Project: AEP Mountaineer
 Location: New Haven, WV
 Project No.: 4345.00

Log of Boring SB-1805

Ground Elevation: Not Available

Sanborn, Head & Associates, Inc.

Drilling Method: HWT Casing with advancer, 3 1/4" ID HSA, PWL Coring

Sampling Method: 2" O.D and 3" O.D. Split Spoon with automatic hammer; 2" OD Shelby tube; NQ2 5-ft long core barrel

Drilling Company: Terracon Consultants, Inc.

Foreman: N. Francis/K. Fowler

Date Started: 06/18/18

Date Finished: 06/21/18

Logged By: L. Corenthal

Checked By: A. Ashton

Groundwater Readings

Date	Time	Depth to Water	Ref. Pt.	Depth of Casing	Depth of Hole	Stab. Time
06/22/18	07:00	38.7'	Ground Surface	0'	133.8'	~ 14 hours

BORING LOG P:\4300S\4345.00\WORK\LOGS\4345.00 LOGS.GPJ 2017 SANBORN HEAD V1.GLB 2017 SANBORN HEAD V1.GDT 12/7/18

Depth (ft)	Drill Rate (min/ft)	Sample Information				Stratum		Geologic Description	Remarks
		Sample No.	Depth (ft)	Spoon Blows per 6 in	Pen/Rec (in)	Field Testing Data	Log Description		
26		S-05	25 - 26.5	4 7 8	18/10	PID: NM		S-05 (25 to 26.5'): Medium dense, brown, fine to coarse SAND, little Gravel, trace Silt. Moist.	
30		S-06	30 - 31.5	4 15 10	18/11	PID: NM		S-06 (30 to 31.5'): Medium dense, brown, fine to coarse SAND, trace Gravel, trace Silt. Moist.	
36		S-07	35 - 36.5	4 4 7	18/9	PID: NM		S-07 (35 to 36.5'): Medium dense, brown, fine to coarse SAND, trace Gravel, trace Silt. Moist.	
38		S-08	36.5 - 38.5	4 6 8 8	24/11	PID: NM	FINE TO COARSE SAND	S-08 (36.5 to 38.5'): Medium dense, brown/black, fine to coarse SAND, trace Silt. Moist.	
40		S-09	38.5 - 40.5	3 5 5 7	24/12	PID: NM		S-09 (38.5 to 40.5'): Loose, brown/black, fine to coarse SAND, trace Gravel, trace Silt. Moist.	
42		S-10	40.5 - 42.5	3 6 5 7	24/13	PID: NM		S-10 (40.5 to 42.5'): Medium dense, brown/black, fine to coarse SAND, trace Gravel, trace Silt. Moist.	
44		S-11	42.5 - 44.5	3 4 8 7	24/0	PID: NM		S-11 (42.5 to 44.5'): No recovery.	
46		S-12	44.5 - 46.5	7 6 3 8	24/4	PID: NM		S-12 (44.5 to 46.5'): Loose, brown, fine to medium SAND, trace Silt. Wet.	
48		S-13	46.5 - 48.5	2 3 6 8	24/11	PID: NM		S-13 (46.5 to 48.5'): Loose, brown, fine to coarse SAND, trace Silt. Wet.	
50		S-14	48.5 - 50.5	1 3 5 7	24/11	PID: NM		S-14 (48.5 to 50.5'): Loose, brown, fine to medium SAND, trace Silt. Wet.	



Project: AEP Mountaineer
 Location: New Haven, WV
 Project No.: 4345.00

Log of Boring SB-1805

Ground Elevation: Not Available

Sanborn, Head & Associates, Inc.

Drilling Method: HWT Casing with advancer, 3 1/4" ID HSA, PWL Coring

Sampling Method: 2" O.D and 3" O.D. Split Spoon with automatic hammer; 2" OD Shelby tube; NQ2 5-ft long core barrel

Drilling Company: Terracon Consultants, Inc.

Foreman: N. Francis/K. Fowler

Date Started: 06/18/18

Date Finished: 06/21/18

Logged By: L. Coenthal

Checked By: A. Ashton

Groundwater Readings

Date	Time	Depth to Water	Ref. Pt.	Depth of Casing	Depth of Hole	Stab. Time
06/22/18	07:00	38.7'	Ground Surface	0'	133.8'	~ 14 hours

BORING LOG P:\4300S\4345.00\WORK\LOGS\4345.00 LOGS.GPJ 2017 SANBORN HEAD V1.GLB 2017 SANBORN HEAD V1.GDT 12/7/18

Depth (ft)	Drill Rate (min/ft)	Sample Information					Stratum		Geologic Description	Remarks
		Sample No.	Depth (ft)	Spoon Blows per 6 in	Pen/Rec (in)	Field Testing Data	Log	Description		
50		S-15	50.5 - 52	3 5 7	18/9	PID: NM	FINE TO COARSE SAND	S-15 (50.5 to 52'): Medium dense, brown, fine to coarse SAND, little Silt. Wet.	At S-15 switch to 3 inch split spoon (18 inches long) from 2 inch split spoon (24 inches long) to increase sample volume.	
52		S-16	52 - 53.5	1 3 5	18/0	PID: NM		S-16 (52 to 53.5'): No recovery.		
54		S-17	53.5 - 55	1 6 10	18/6	PID: NM		S-17 (53.5 to 55'): Medium dense, brown, fine to coarse SAND, trace Silt. Wet.		
56		S-18	55 - 56.5	2 4 7	18/7	PID: NM		S-18 (55 to 56.5'): Medium dense, grayish brown, fine to coarse SAND, trace Silt. Wet.		
58		S-19	56.5 - 58	1 3 7	18/0	PID: NM		S-19 (56.5 to 58'): No recovery.		
60		S-20	58 - 59	NM	12/18	PID: NM		S-20 (58 to 59'): Brown, fine to coarse SAND, little Silt, trace Gravel. Wet.		S-20 sampled by Shelby tube, no recovery and refusal after 1 foot. Then collected with 2 inch split spoon and switch to 2 inch split spoon after S-20.
62		S-21	59 - 60.5	3 8 6	18/14	PID: NM		S-21 (59 to 60.5'): Medium dense, brown, fine to coarse SAND, little Silt, trace Gravel. Wet. Seam black fine to medium SAND at 60 feet.		
64		S-22	60.5 - 62	6 7 11	18/22	PID: NM		S-22 (60.5 to 62'): Medium dense, brown, fine to coarse SAND, little Silt, trace Gravel. Wet.		
66		S-23	62 - 63.5	2 6 9	18/13	PID: NM		S-23 (62 to 63.5'): Medium dense, brown, fine to coarse SAND, trace Silt, trace Gravel. Wet.		
68		S-24	63.5 - 65	3 5 7	18/12	PID: NM		S-24 (63.5 to 65'): Medium dense, brown, fine to coarse SAND, some Silt. Wet.		
70		S-25	65 - 66.5	3 6 7	18/18	PID: NM		S-25 (65 to 66.5'): Medium dense, brown, fine to medium SAND, little Silt. Wet.		Start introducing Bentonite/water mix due to heaving sands.
72		S-26	66.5 - 68	8 11 9	18/18	PID: NM		S-26 (66.5 to 68'): Medium dense, gray/brown, fine to coarse SAND, little Silt, trace Gravel. Wet.		
74		S-27	68 - 69.5	3 6 9	18/14	PID: NM		S-27 (68 to 69.5'): Medium dense, gray, fine to coarse SAND, little Silt, trace Gravel. Wet.		
76		S-28	69.5 - 71	10 11 15	18/15	PID: NM		S-28 (69.5 to 71'): Medium dense, gray, fine to coarse SAND, little Gravel, trace Silt. Wet.		
78		S-29	71 - 72.5	10 13 19	18/11	PID: NM		S-29 (71 to 72.5'): Medium dense, gray, fine to coarse SAND, little Gravel, trace Silt. Wet.		
80		S-30	72.5 - 74	8 12 10	18/11	PID: NM		S-30 (72.5 to 74'): Medium dense, gray, fine to coarse SAND, trace Gravel, trace Silt. Wet.		
82		S-31	74 - 75.5	11 13 14	18/10	PID: NM		S-31 (74 to 75.5'): Medium dense, gray, fine to coarse SAND, little Gravel, trace Silt. Wet.		



Project: AEP Mountaineer
 Location: New Haven, WV
 Project No.: 4345.00

Log of Boring SB-1805

Ground Elevation: Not Available

Sanborn, Head & Associates, Inc.

Drilling Method: HWT Casing with advancer, 3 1/4" ID HSA, PWL Coring

Sampling Method: 2" O.D and 3" O.D. Split Spoon with automatic hammer; 2" OD Shelby tube; NQ2 5-ft long core barrel

Drilling Company: Terracon Consultants, Inc.

Foreman: N. Francis/K. Fowler

Date Started: 06/18/18

Date Finished: 06/21/18

Logged By: L. Corenthal

Checked By: A. Ashton

Groundwater Readings

Date	Time	Depth to Water	Ref. Pt.	Depth of Casing	Depth of Hole	Stab. Time
06/22/18	07:00	38.7'	Ground Surface	0'	133.8'	~ 14 hours

BORING LOG P:\4300S\4345.00\WORK\LOGS\4345.00.LOBS.GPJ 2017 SANBORN HEAD V1.GLB 2017 SANBORN HEAD V1.GDT 12/7/18

Depth (ft)	Drill Rate (min/ft)	Sample Information					Stratum		Geologic Description	Remarks
		Sample No.	Depth (ft)	Spoon Blows per 6 in	Pen/Rec (in)	Field Testing Data	Log	Description		
76		S-32	75.5 - 77	8 12 15	18/13	PID: NM			S-32 (75.5 to 77'): Medium dense, gray/brown, fine to coarse SAND, trace Gravel, trace Silt. Wet.	
78		S-33	77 - 78.5	7 10 14	18/11	PID: NM			S-33 (77 to 78.5'): Medium dense, gray/brown, fine to coarse SAND, trace Gravel, trace Silt. Wet.	
80		S-34	78.5 - 80	7 9 10	18/0	PID: NM			S-34 (78.5 to 80'): No recovery.	
82		S-35	80 - 81.5	4 5 12	18/0	PID: NM		FINE TO COARSE SAND	S-35 (80 to 81.5'): No recovery.	
84		S-36	81.5 - 83	19 18 17	18/10	PID: NM			S-36 (81.5 to 83'): Dense, brown, fine to coarse SAND, some Gravel, trace Silt. Wet.	
86		S-37	83 - 83.9	17 50/5"	11/10	PID: NM			S-37 (83 to 83.9'): Very dense, brown, fine to coarse SAND, some Gravel, little Silt. Wet. Sandstone in tip.	
88		S-38 C-01	84.5 - 84.7 - 89.3	50/2"	2/7 55/39	PID: NM			S-38 (84.5 to 84.7'): Very dense, gray, fine to medium SAND. Wet.	Auger refusal at 84.7 ft. Begin PWL coring.
90	8	C-02	89.3 - 94.3		60/27				C-01 (84.7 to 89.3'): Medium hard, medium gray, fine to medium-grained, slightly micaceous Sandstone, with very thin to thin horizontal partings spaced 2 to 3 inches apart. Thin horizontal black lenses fine to medium grained carbonaceous Sandstone between 86 and 86.4 feet. Brown fine grained sandstone cobble in upper 0.2 feet.. Moderately fractured. REC=71%. RQD=0%.	
92								SANDSTONE	C-02 (89.3 to 94.3'): Medium hard to very soft, medium gray, fine to medium-grained, slightly micaceous Sandstone, with very thin to thin horizontal partings spaced 2 to 3 inches apart. Very soft, medium spaced Sandstone layers are 2 to 4 inches. Soft, medium spaced horizontal Silty Clay inclusions. Extremely fractured to sound. REC=45%. RQD=45%.	
94	7	C-03	94.3 - 99.3		60/60				C-03 (94.3 to 99.3'): Medium hard to very soft, medium gray, fine to medium-grained, slightly micaceous Sandstone, with thin to medium partings spaced 1 inch to 13 inches apart. Thin horizontal layers of very soft fine to medium grained Sandstone from 94.3 to 96.9 feet. Moderately fractured. REC=100%. RQD=62%.	
96										
98										
100	6	C-04	99.3 - 104.3		60/60				C-04 (99.3 to 104.3'): Medium hard to very soft, gray, fine to medium-grained,	



Project: AEP Mountaineer
 Location: New Haven, WV
 Project No.: 4345.00

Log of Boring SB-1805

Ground Elevation: Not Available

Sanborn, Head & Associates, Inc.

Drilling Method: HWT Casing with advancer, 3 1/4" ID HSA, PWL Coring

Sampling Method: 2" O.D and 3" O.D. Split Spoon with automatic hammer; 2" OD Shelby tube; NQ2 5-ft long core barrel

Drilling Company: Terracon Consultants, Inc.

Foreman: N. Francis/K. Fowler

Date Started: 06/18/18

Date Finished: 06/21/18

Logged By: L. Corenthal

Checked By: A. Ashton

Groundwater Readings

Date	Time	Depth to Water	Ref. Pt.	Depth of Casing	Depth of Hole	Stab. Time
06/22/18	07:00	38.7'	Ground Surface	0'	133.8'	~ 14 hours

BORING LOG P:\4300S\4345.00\WORK\LOGS\4345.00 LOGS.GPJ 2017 SANBORN HEAD V1.GLB 2017 SANBORN HEAD V1.GDT 12/7/18

Depth (ft)	Drill Rate (min/ft)	Sample Information				Stratum		Geologic Description	Remarks
		Sample No.	Depth (ft)	Spoon Blows per 6 in	Pen/Rec (in)	Field Testing Data	Log Description		
100								SANDSTONE, with very thin to thin partings spaced 1 inch to 11 inches apart. Thin horizontal layers of very soft fine to medium grained Sandstone between 100.5 and 101.5 feet.. Extremely fractured to sound. REC=100%. RQD=38%.	
102									
104	3	C-05	104.3 - 109.3		60/60			C-05 (104.3 to 109.3'): Medium hard to hard, gray, very fine to fine-grained, SANDSTONE, Medium spaced moderately dipping to low angle to low angle black fine grained Sandstone lenses from 104.3 to 108.3 feet. Very soft gray fine to medium-grained very thin to thin horizontal partings spaced 2 to 4 inches apart from 108.3 to 109.3 feet. Broken platy dark gray zone at 108.3 feet. Moderately fractured to sound. REC=100%. RQD=80%.	
106									
108									
110	NM	C-06	109.3 - 114.3		60/60		SANDSTONE	C-06 (109.3 to 114.3'): Medium hard to soft, gray, very fine to medium-grained, SANDSTONE, very thin to thin horizontal low angle partings spaced less than 1 inch to 3 inches apart. Black fine to medium-grained very thinly spaced Sandstone lenses from 109.3 to 109.9.. Extremely fractured. REC=100%. RQD=0%.	
112									
114	5	C-07	114.3 - 119.3		60/60			C-07 (114.3 to 119.3'): Medium hard to soft, light medium gray, very fine to medium-grained, SANDSTONE, very thin to medium horizontal partings spaced 1 to 6 inches apart. Black fine to medium-grained very thin to medium spaced sandstone lenses from 114.3 to 117 feet. Extremely fractured to sound. REC=100%. RQD=52%.	
116									
118									
120	4	C-08	119.3 - 124.3		60/60		SHALE	C-08 (119.3 to 124.3'): Medium hard to soft, light gray, very fine to medium-grained, SANDSTONE, with thin horizontal partings spaced 2 to 5 inches apart and very thinly spaced clack horizontal lenses. Bed of very soft to soft, dark gray, very fine grained Silty clay Shale with very thin to thin partings spaced less than 1 inch to 5 inches apart. Shale from 119.6 to 122.3 feet.. Extremely fractured to slightly fractured. REC=100%. RQD=38%.	
122							SANDSTONE		
124	8	C-09	124.3 - 129.3		60/53			C-09A (124.3 to 125.3'): Medium hard, light gray, very fine to medium-grained,	



Project: AEP Mountaineer
 Location: New Haven, WV
 Project No.: 4345.00

Log of Boring SB-1805

Ground Elevation: Not Available

Sanborn, Head & Associates, Inc.

Drilling Method: HWT Casing with advancer, 3 1/4" ID HSA, PWL Coring

Sampling Method: 2" O.D and 3" O.D. Split Spoon with automatic hammer; 2" OD Shelby tube; NQ2 5-ft long core barrel

Drilling Company: Terracon Consultants, Inc.

Foreman: N. Francis/K. Fowler

Date Started: 06/18/18

Date Finished: 06/21/18

Logged By: L. Corenthal

Checked By: A. Ashton

Groundwater Readings

Date	Time	Depth to Water	Ref. Pt.	Depth of Casing	Depth of Hole	Stab. Time
06/22/18	07:00	38.7'	Ground Surface	0'	133.8'	~ 14 hours

BORING LOG P:\4300S\4345.00\WORK\LOGS\4345.00 LOGS.GPJ 2017 SANBORN HEAD V1.GLB 2017 SANBORN HEAD V1.GDT 12/7/18

Depth (ft)	Drill Rate (min/ft)	Sample Information				Field Testing Data	Stratum		Geologic Description	Remarks
		Sample No.	Depth (ft)	Spoon Blows per 6 in	Pen/Rec (in)		Log	Description		
126							SANDSTONE	SANDSTONE, with very thin to thin black lenses. Sound. REC=88%. RQD=65%.		
128							COAL	C-09B (125.3 to 129.3'): Very soft to soft, black, very fine grained, COAL, with thinly spaced horizontal partings, very soft gray very fine grained horizontal Clay-rich zone from 125.5 to 125.8 feet, very thin to thin Clay lenses with Pyrite throughout. Vertical crack with calcite mineralization from 127.6 to 129.8 feet. Extremely to moderately fractured.		
130	NM	C-10	129.3 - 131.8		30/30			C-10A (129.3 to 130.4'): Very soft to soft, black, very fine grained, COAL, with thin to very thin horizontal partings. Vertical cracks with calcite mineralization from 129.2 to 129.8 feet and 130.0 to 130.3 feet. Extremely to moderately fractured.		
132	NM	C-11	131.8 - 133.8		24/20		SHALE	C-10B (130.4 to 131.8'): Very soft to medium hard, dark gray, very fine grained, SILTY CLAY SHALE, with very thin to thin horizontal partings. Clay rich zone from 130.4 to 130.8 feet. Slight Organic sheen. Extremely fractured. C-11 (131.8 to 133.8'): Very soft to medium hard, dark gray, very fine grained, SILTY CLAY SHALE, with very thin horizontal, bedding. slight Organic sheen. Extremely to moderately fractured. REC=83%. RQD=0%.		
134								Boring terminated at 133.8 feet. No refusal encountered.		
136								NOTES:		
138								1. Approximately 5200 gallons of potable water was introduced during drilling upon completion of coring (approximately 3,200 gallons was used to advance to top of bedrock from a combination of potable wells and the plant fire suppression system; approximately 2,000 gallons of water from the plant fire suppression system was used during bedrock coring).		
140								2. Continuous sampling started approximately 5 ft above the water table based on a water level measurement collected by Sanborn Head on 6/18/2018 at 15:20 at MW-1605S of 44.84 ft below Top of PVC Riser and at 15:34 at MW-1604S of 51.99 ft below Top of PVC Riser.		
142								3. Advanced HWT casing to 29 ft bgs. Due to damage to casing advancer at 29 ft, advanced 3 1/4" ID hollow stem augers to 30 ft bgs to auger refusal at 84.7 ft bgs. Advanced HWT casing with roller bit advancer to 84.7 ft and began PWL coring at 84.7 ft.		
144								4. Approximately 1 week following completion of sample collection, the borehole was completed as a monitoring well by Terracon Consultants, Inc. Monitoring well installation was not observed by Sanborn Head personnel.		
146										
148										
150										

Drilling Start Date: 1/22/2019	Boring Depth (ft): 91.3	Well Depth (ft): 87.5
Drilling End Date: 1/24/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Truck-mounted rotary	Ground Surface Elev. (ft): 595.639	Screen Material: Sch 40 PVC Slotted
Driller: ZR/BH	Top of Casing Elev. (ft): 598.659	Seal Material(s): Grout, Bentonite
Logged By: C. Christenson	Location (X,Y): 1,703,415.81, 721,382.16	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT					SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)
				Sample Type	Date & Time	Blow Counts	Recovery (ft)	N Value RQD (%)			
0									(0') Medium dense, light brown to red, CLAYEY SILT (ML); dry, low to medium plasticity, cohesive, trace fine gravel and coal fragments, fill.		0.0
				SS01			2	1.0			
				SS02			4	1.4			
				SS03			2	1.3			
				SS04			8	1.4			
				SS05			7	1.5			
				SS06			3	1.5			
				SS07			5	1.5			
				SS08			6	1.5			
				SS09			13	1.0	(12') Brown SAND (SP); saturated, fine to medium, rounded gravel inclusions >30%.	Soil becomes wet at ~12'	
				SS10			2	1.2			
				SS11			8	0.9	(15') GRAVEL with sand (GP); rounded to sub rounded coarse to fine gravel, fine to medium sand.		
				SS12			3	1.2			
				SS13			3	1.4			
				SS14			10	1.2			
							8	1.4			
							7	1.2			
20							2	1.2			20.0

NOTES: Boring sampled with 2 in OD split spoon.
Well was constructed with approximately 3ft of casing stick up and well cover.

Drilling Start Date: 1/22/2019	Boring Depth (ft): 91.3	Well Depth (ft): 87.5
Drilling End Date: 1/24/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Truck-mounted rotary	Ground Surface Elev. (ft): 595.639	Screen Material: Sch 40 PVC Slotted
Driller: ZR/BH	Top of Casing Elev. (ft): 598.659	Seal Material(s): Grout, Bentonite
Logged By: C. Christenson	Location (X,Y): 1,703,415.81, 721,382.16	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)
				Sample Type	Date & Time	Blow Counts	Recovery (ft)			
20				SS14		4	1.2			20.0
				SS15		13	1.2	(20.5') Gray, SILTY CLAY (CL); moist, medium plasticity, cohesive.		
				SS16		9	1.2	(21.2') SAND (SP); saturated, some rounded gravel inclusions.		
				SS17		15	1.3	(21.8') Gray/tan, CLAYEY SILT (ML); dry, low plasticity, noncohesive.		
				SS18		8	1.5	(22.5') SAND (SP); saturated, fine-grained, grades to medium gravel.		
				SS19		3	1.5	(23.2') Tan to brown gray, SILTY CLAY (CL); damp, medium to high plasticity, cohesive, some rounded gravel inclusions.		
				SS20		5	1.9	(25.5') Gray, CLAY (CL); damp, medium plasticity, cohesive, with brown/orange mottles 1/2 inch to 1 inch.		
				SS21		6	1.8	(27.5') Gray, CLAY (CL); dry, medium plasticity, cohesive, with brown large mottles and silt.		
				SS22		3	1.5	(28.3') Red, SILTY CLAY (CL); damp, medium to high plasticity, cohesive.		
				SS23		6	1.8	(30.8') Red, CLAYEY SILT (ML); dry to damp, medium to low plasticity.		
				SS24		7	2.0	(35') Red, SANDY SILT (ML); wet, nonplastic, noncohesive, fine-grained.		
				SS25		4	1.7	(37') Red-brown SAND (SP); saturated, medium- to fine-grained with some medium to coarse gravel inclusions, nonuniform.		
				SS26		3	1.0			
				SS27		15	0.8			
40						16				40.0

NOTES: Boring sampled with 2 in OD split spoon.
Well was constructed with approximately 3ft of casing stick up and well cover.

Drilling Start Date: 1/22/2019	Boring Depth (ft): 91.3	Well Depth (ft): 87.5
Drilling End Date: 1/24/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Truck-mounted rotary	Ground Surface Elev. (ft): 595.639	Screen Material: Sch 40 PVC Slotted
Driller: ZR/BH	Top of Casing Elev. (ft): 598.659	Seal Material(s): Grout, Bentonite
Logged By: C. Christenson	Location (X,Y): 1,703,415.81, 721,382.16	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)
				Sample Type	Date & Time	Blow Counts	Recovery (ft)			
40				SS27		21	0.8			40.0
				SS28		19	1.0			
				SS29		5				
				SS30		6				
				SS31		12				
				SS32		16	0.9			
				SS33		23				
				SS34		2				
45				SS35		17	0.9			45.0
				SS36		19				
				SS37		15				
				SS38		32	1.3	(45') Medium dense, brown GRAVEL with sand (GP); saturated, fine-grained gravel and medium- to coarse-grained sand, trace coarse gravel and fine sand, nonuniform.		45.0
				SS39		31				
				SS40		27				
						25	1.1			
						24				
						15				
						15	1.0			
						15				
						13				
						21	0.9			50.0
						20				
						11				
						13	0.8			
						17				
						16				
						12	0.8			
						8				
						8				
						10	0.7			55.0
						11				
						17				
						9	1.0			
						11				
						7				
						9	0.5			
						11				
						7				
						8	1.3	(59') 2 inch crumbly organic seem at 59.0 feet.		
						8				
60						8				60.0

NOTES: Boring sampled with 2 in OD split spoon.
Well was constructed with approximately 3ft of casing stick up and well cover.

Drilling Start Date: 1/22/2019	Boring Depth (ft): 91.3	Well Depth (ft): 87.5
Drilling End Date: 1/24/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Truck-mounted rotary	Ground Surface Elev. (ft): 595.639	Screen Material: Sch 40 PVC Slotted
Driller: ZR/BH	Top of Casing Elev. (ft): 598.659	Seal Material(s): Grout, Bentonite
Logged By: C. Christenson	Location (X,Y): 1,703,415.81, 721,382.16	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)
				Sample Type	Date & Time	Blow Counts	Recovery (ft)			
60	[Yellow dotted lithology pattern]	[Water level indicator]	[Well completion pattern]	SS41		6			(59.2') Loose, brown SAND (SP); saturated, fine- to medium-grained, few coarse sand and fine gravel, trace silt.	60.0
					5	0.8				
					12					
					10	1.1				
					11					
					9	1.3				
					9					
					10	1.3				
65					13					
					8	1.3				
					9					
					8	1.5				
					11					
					8	1.5				
		18								
		13	1.5							
		8								
		9	1.5							
70		10								
		7	1.0							
		11								
		14	1.0							
		7								
		9	1.0							
		11								
		9	1.4							
75		18								
		25	1.1							
		14								
		19	1.1							
		23								
		14	1.0							
		23								
		14	1.3							
		14								
		19	1.1							
80		16								

NOTES: Boring sampled with 2 in OD split spoon.
Well was constructed with approximately 3ft of casing stick up and well cover.

Drilling Start Date: 1/22/2019	Boring Depth (ft): 91.3	Well Depth (ft): 87.5
Drilling End Date: 1/24/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Truck-mounted rotary	Ground Surface Elev. (ft): 595.639	Screen Material: Sch 40 PVC Slotted
Driller: ZR/BH	Top of Casing Elev. (ft): 598.659	Seal Material(s): Grout, Bentonite
Logged By: C. Christenson	Location (X,Y): 1,703,415.81, 721,382.16	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)
				Sample Type	Date & Time	Blow Counts	Recovery (ft)			
80				SS54		20	1.1		(81') Medium dense, brown SAND with gravel (SP); saturated, coarse-grained sand and fine-grained gravel with few coarse gravel and medium sand, nonuniform.	80.0
				SS55		29	1.1			
				SS56		17	1.1			
				SS57		20	1.1			
				SS58		17	1.1			
				SS59		14	1.1			
				SS60		19	1.2			
				SS61		17	1.3			
						21	1.4			
						23	0.6			
						22	0.6			
85			17				(87') Lens of fine loose sand at 87.0-87.5 feet.	85.0		
			19							
			27							
			16							
			35							
			50/2							
			50/3							
90							(91.3') Boring terminated.	90.0		
95								95.0		

NOTES: Boring sampled with 2 in OD split spoon.
Well was constructed with approximately 3ft of casing stick up and well cover.

Drilling Start Date: 1/28/2019	Boring Depth (ft): 114.2	Well Depth (ft): 83.5
Drilling End Date: 1/29/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT; Core Barrel	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Truck-mounted rotary	Ground Surface Elev. (ft): 591.006	Screen Material: Sch 40 PVC Slotted
Driller: ZR/BH	Top of Casing Elev. (ft): 594.016	Seal Material(s): Grout, Bentonite
Logged By: C. Christenson	Location (X,Y): 1,701,767.67, 720,390.93	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)
				Sample Type	Date & Time	Blow Counts	Recovery (ft)			
0								(0') Large stones.	Advanced hollow stem auger	0.0
4				SS01			1.3	(1') Medium stiff to stiff, gray, CLAYEY SILT (ML); dry, low plasticity, few fine gravel, nonuniform.		
7								(2.5') Changes to dense and red-brown.		
8										
6.5				SS02			1.3	(6.5') Changes to damp, cohesive, trace fine sand.		
2										
3										
4										
11.5				SS03			0.8	(11.5') Loose, red-brown, SANDY SILT (ML); damp, nonplastic, noncohesive, trace clay, uniform.		
2										
4										
4										
16.5				SS04			1.2	(16.5') Loose to medium dense, red-brown, SANDY SILT (ML); damp, low plasticity, cohesive, with some clay, uniform.		
2										
2										
2										

NOTES: Boring sampled with 2 in OD split spoon to 85 ft and wireline NQ to 115 ft.
Well was constructed with approximately 3ft of casing stick up and well cover.

Drilling Start Date: 1/28/2019	Boring Depth (ft): 114.2	Well Depth (ft): 83.5
Drilling End Date: 1/29/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT; Core Barrel	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Truck-mounted rotary	Ground Surface Elev. (ft): 591.006	Screen Material: Sch 40 PVC Slotted
Driller: ZR/BH	Top of Casing Elev. (ft): 594.016	Seal Material(s): Grout, Bentonite
Logged By: C. Christenson	Location (X,Y): 1,701,767.67, 720,390.93	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)	
				Sample Type	Date & Time	Blow Counts	Recovery (ft)				N Value
20										20.0	
				SS05			3 10 13	0.9	(21.5') Loose, brown SAND (SP); medium- to fine-grained, with trace coarse sand & gravel.		
25										25.0	
				SS06			7 9 12	1.3	(26.5') Medium dense, gray-brown, CLAYEY SILT (ML); lens. (27') Loose, brown SAND (SP); damp, noncohesive, medium-grained sand, with few coarse sand and trace fine gravel.		
30										30.0	
				SS07			5 6 7	0.3	(31.5') Loose, dark brown, SILTY and CLAYEY SAND (SM); damp, noncohesive, medium-grained sand with some fine rounded gravel, nonuniform.		
35										35.0	
				SS08			4 5 8	1.3	(36.5') Loose, brown, SILTY CLAY (CL); damp, low plasticity, cohesive, lens. (37') Loose, brown SAND (SP); damp, noncohesive, medium-grained sand with few fine sand and gravel.		
40										40.0	

NOTES: Boring sampled with 2 in OD split spoon to 85 ft and wireline NQ to 115 ft.
Well was constructed with approximately 3ft of casing stick up and well cover.

Drilling Start Date: 1/28/2019	Boring Depth (ft): 114.2	Well Depth (ft): 83.5
Drilling End Date: 1/29/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT; Core Barrel	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Truck-mounted rotary	Ground Surface Elev. (ft): 591.006	Screen Material: Sch 40 PVC Slotted
Driller: ZR/BH	Top of Casing Elev. (ft): 594.016	Seal Material(s): Grout, Bentonite
Logged By: C. Christenson	Location (X,Y): 1,701,767.67, 720,390.93	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)
				Sample Type	Date & Time	Blow Counts	Recovery (ft)			
40										40.0
41.5				SS09			4		(41.5') Loose, brown, SILTY CLAY (CL); damp, low plasticity, cohesive, trace sand.	
42							5	1.3		
42							8		(42') Loose, brown SAND (SP); damp, nonplastic, noncohesive, fine- to medium-grained sand, uniform.	
45										45.0
46.5				SS10			4		(46.5') Changes to wet with few coarse sand and trace fine gravel.	
46.5							6	1.5		
46.5							7			
46.5				SS11			6		(48.5') 2 inch dark gray clay lens at 48.5 feet.	
46.5							9	1.3		
46.5							8			
49.5				SS12			9		(49.5') Medium dense, brown SAND (SP); wet, nonplastic, noncohesive, medium- to fine-grained, uniform, with black partings throughout.	
49.5							9	1.5		
49.5							10			
49.5				SS13			4			
49.5							6	1.3		
49.5							9			
49.5				SS14			4		(52.5') With few fine to coarse gravel.	
49.5							7	1.2		
49.5							8			
49.5							3			
49.5				SS15			5			
49.5							5	1.1		
49.5							10			
49.5							6			
49.5				SS16			8			
49.5							8	0.9		
49.5							9			
49.5							4			
49.5				SS17			7			
49.5							7	1.0		
49.5							8			
49.5							4			
49.5				SS18			5			
49.5							5	1.0		
49.5							4			
60							4			60.0

NOTES: Boring sampled with 2 in OD split spoon to 85 ft and wireline NQ to 115 ft.
Well was constructed with approximately 3ft of casing stick up and well cover.

Drilling Start Date: 1/28/2019	Boring Depth (ft): 114.2	Well Depth (ft): 83.5
Drilling End Date: 1/29/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT; Core Barrel	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Truck-mounted rotary	Ground Surface Elev. (ft): 591.006	Screen Material: Sch 40 PVC Slotted
Driller: ZR/BH	Top of Casing Elev. (ft): 594.016	Seal Material(s): Grout, Bentonite
Logged By: C. Christenson	Location (X,Y): 1,701,767.67, 720,390.93	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)		
				Sample Type	Date & Time	Blow Counts	Recovery (ft)				N Value	RQD (%)
60				SS19		8	0.9	(60') Loose to medium dense, brown SAND (SP); wet, some coarse sand, uniform.		60.0		
13				SS20		8			(61.5') Loose, gray-brown SAND (SP); wet, medium- to coarse-grained with few fine rounded gravel, nonuniform.			
16						12	1.1					
24						13						
32						8				(63') Medium dense, gray-brown, SANDY SILT (ML); wet.		
40						12	1.3					
48						14				(63.3') Medium dense, tan gray SAND (SP); wet, fine- to medium-grained, with some coarse sand, several black partings.		
56						8						
64						13	0.8					
72						18						
80						6						
88						7	1.2					
96						10						
104						8				(67.5') Trace fine gravel.		
112						11	1.1					
120						16						
128						12						
136						13	1.0					
144						15						
152						7						
160						16	1.1					
168						22						
176						13						
184						14	0.9					
192						14						
200						11						
208						13	1.1					
216						20						
224						20				(75') Some medium sand.		
232						24	1.2					
240						25						
248						12						
256			11	1.2			(77') Medium dense, gray SAND (SP); wet, nonplastic, noncohesive, uniform.					
264			13									
272			10									
280			13	1.1								
288			15									
296			20	1.3								
304												
312												
320												
328												
336												
344												
352												
360												
368												
376												
384												
392												
400												
408												
416												
424												
432												
440												
448												
456												
464												
472												
480												
488												
496												
504												
512												
520												
528												
536												
544												
552												
560												
568												
576												
584												
592												
600												
608												
616												
624												
632												
640												
648												
656												
664												
672												
680												
688												
696												
704												
712												
720												
728												
736												
744												
752												
760												
768												
776												
784												
792												
800												
808												
816												
824												
832												
840												
848												
856												
864												
872												
880												
888												
896												
904												
912												
920												
928												
936												
944												
952												
960												
968												
976												
984												
992												
1000												

NOTES: Boring sampled with 2 in OD split spoon to 85 ft and wireline NQ to 115 ft.
Well was constructed with approximately 3ft of casing stick up and well cover.

Drilling Start Date: 1/28/2019	Boring Depth (ft): 114.2	Well Depth (ft): 83.5
Drilling End Date: 1/29/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT; Core Barrel	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Truck-mounted rotary	Ground Surface Elev. (ft): 591.006	Screen Material: Sch 40 PVC Slotted
Driller: ZR/BH	Top of Casing Elev. (ft): 594.016	Seal Material(s): Grout, Bentonite
Logged By: C. Christenson	Location (X,Y): 1,701,767.67, 720,390.93	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)
				Sample Type	Date & Time	Blow Counts	Recovery (ft)			
80				SS32		18	1.3	(80') Medium dense, gray SAND with gravel (SP); wet, noncohesive, coarse-grained sand and fine-grained gravel with some coarse gravel and medium sand, nonuniform.	Advanced using water rotary drilling	80.0
				SS33		14	1.0			
				SS34		12				
				SS34		19				
				SS34		24				
85				SS35		38	1.1	(82.5') Dense, gray GRAVEL with sand (GP); wet, noncohesive, some coarse gravel and coarse sand and few medium sand, nonuniform.		
				SS35		25		(84') Medium dense, brown gray GRAVEL with sand (GP); wet, fine-grained gravel and coarse-grained sand with some coarse gravel and clay lens at 84.0 feet.		
						20	1.0	(85.5') Auger refusal at 85.0 feet.		
						50/5		(86') Moderately hard, fine- to medium-grained, light gray SANDSTONE with thin dark gray partings less than 1 inch apart, moderately fractured and fine-grained between 86.0-88.0 feet.		
90				CB 1			8.2	91	(88') Sound and medium-grained below 88.0 feet.	90.0
95				CB 2			9.6	98	(94.2') Moderately hard to moderately soft, light to medium gray, fine- to medium-grained SANDSTONE (very thin); dark gray, horizontal partings approximately 12 to 14 inches apart, lightly fractured to sound.	95.0
100										100.0

NOTES: Boring sampled with 2 in OD split spoon to 85 ft and wireline NQ to 115 ft.
Well was constructed with approximately 3ft of casing stick up and well cover.

Drilling Start Date: 1/28/2019	Boring Depth (ft): 114.2	Well Depth (ft): 83.5
Drilling End Date: 1/29/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT; Core Barrel	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Truck-mounted rotary	Ground Surface Elev. (ft): 591.006	Screen Material: Sch 40 PVC Slotted
Driller: ZR/BH	Top of Casing Elev. (ft): 594.016	Seal Material(s): Grout, Bentonite
Logged By: C. Christenson	Location (X,Y): 1,701,767.67, 720,390.93	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)
				Sample Type	Date & Time	Blow Counts	Recovery (ft)			
100	[Yellow brick pattern]			CB 2			9.6	98	(104.2') Moderately hard to moderately soft, medium gray, medium- to fine-grained SANDSTONE (thin to horizontal); dark gray partings every 4 to 6 inches, lightly fractured, sound.	100.0
105		CB 3			9.8	100	105.0			
110										110.0
115								(114.2') Boring terminated.	115.0	

NOTES: Boring sampled with 2 in OD split spoon to 85 ft and wireline NQ to 115 ft.
Well was constructed with approximately 3ft of casing stick up and well cover.

Drilling Start Date: 2/8/2019	Boring Depth (ft): 70	Well Depth (ft): 65.5
Drilling End Date: 2/8/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Truck-mounted rotary	Ground Surface Elev. (ft): 591.012	Screen Material: Sch 40 PVC Slotted
Driller: ZR/BH	Top of Casing Elev. (ft): 593.972	Seal Material(s): Grout, Bentonite
Logged By: C. Christenson	Location (X,Y): 1,703,107.28, 722,110.27	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)
				Sample Type	Date & Time	Blow Counts	Recovery (ft)			
0								(0') Concrete. (0.5') Hydroexcavate from 0.5-11.5 ft.	No samples collected. No subsurface utilities encountered.	0.0
7				SS01			7			
8							8	1.5	(11.5') Soft to medium stiff, red-brown, CLAYEY SILT (ML); damp, low plasticity, cohesive, with few fine sand, uniform.	
11							11			
15										
16				SS02			5	0.9		
17							5			
18							12			
20										20.0

NOTES: Boring sampled with 2 in OD split spoon.
Well was constructed with approximately 3ft of casing stick up and well cover.

Drilling Start Date: 2/8/2019	Boring Depth (ft): 70	Well Depth (ft): 65.5
Drilling End Date: 2/8/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Truck-mounted rotary	Ground Surface Elev. (ft): 591.012	Screen Material: Sch 40 PVC Slotted
Driller: ZR/BH	Top of Casing Elev. (ft): 593.972	Seal Material(s): Grout, Bentonite
Logged By: C. Christenson	Location (X,Y): 1,703,107.28, 722,110.27	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)
				Sample Type	Date & Time	Blow Counts	Recovery (ft)			
20										20.0
				SS03			4 5 8	1.5		
				SS04			2 4 6	1.3		
				SS05			12 17 20	1.5	(32') Loose, red-brown SAND with gravel (SP); dry, noncohesive, fine- to medium-grained sand with some coarse gravel, nonuniform.	
				SS06			9 13 15	1.5	(36.5') Loose to medium dense, red-brown, CLAYEY SILT (ML); wet, medium plasticity, cohesive, with fine sand. (37') Loose to medium dense, brown SAND (SP); damp, nonplastic, noncohesive, fine- to medium-grained sand with some fine to coarse gravel, nonuniform.	
40										40.0

NOTES: Boring sampled with 2 in OD split spoon.
Well was constructed with approximately 3ft of casing stick up and well cover.

Drilling Start Date: 2/8/2019	Boring Depth (ft): 70	Well Depth (ft): 65.5
Drilling End Date: 2/8/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Truck-mounted rotary	Ground Surface Elev. (ft): 591.012	Screen Material: Sch 40 PVC Slotted
Driller: ZR/BH	Top of Casing Elev. (ft): 593.972	Seal Material(s): Grout, Bentonite
Logged By: C. Christenson	Location (X,Y): 1,703,107.28, 722,110.27	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)		
				Sample Type	Date & Time	Blow Counts	Recovery (ft)				N Value	RQD (%)
40	[Yellow dotted pattern]	[Grey vertical line]	[Grey vertical line]							40.0		
				SS07		10 15 21	1.3					
				SS08		5 10 10	1.1					
				SS09		4 9 14	2.0					
				SS10		11 12 19	1.1			(56.5') Changes to wet, cohesive clay layers at approximately 6-inch intervals from 56.5-58 ft.		
				SS11		8 10 14	1.5					
				SS12		8	1.3					
60												60.0

NOTES: Boring sampled with 2 in OD split spoon.
Well was constructed with approximately 3ft of casing stick up and well cover.

Drilling Start Date: 2/8/2019	Boring Depth (ft): 70	Well Depth (ft): 65.5
Drilling End Date: 2/8/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Truck-mounted rotary	Ground Surface Elev. (ft): 591.012	Screen Material: Sch 40 PVC Slotted
Driller: ZR/BH	Top of Casing Elev. (ft): 593.972	Seal Material(s): Grout, Bentonite
Logged By: C. Christenson	Location (X,Y): 1,703,107.28, 722,110.27	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)		
				Sample Type	Date & Time	Blow Counts	Recovery (ft)				N Value	RQD (%)
60				SS12		11	1.3			60.0		
					13							
					8							
					13	1.2					(61') Changes to medium- to coarse-grained sand.	
					12							
					7							
					8	1.0						
					10							
					14							
					18	1.2					(64') Changes to dense.	
65					19							65.0
					10							
					12	1.1						
					21							
					10							
					21	0.5						
					22							
					18							
		20	1.1				(68.5') Changes to coarse-grained sand.					
70		21						70.0				
							(70') Boring terminated.					
75								75.0				

NOTES: Boring sampled with 2 in OD split spoon.
Well was constructed with approximately 3ft of casing stick up and well cover.

Drilling Start Date: 2/7/2019	Boring Depth (ft): 71	Well Depth (ft): 70.7
Drilling End Date: 2/12/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT (2 in ID)	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Hollow Stem Auger	Ground Surface Elev. (ft): 586.072	Screen Material: Sch 40 PVC Slotted
Driller: ZR/RB	Top of Casing Elev. (ft): 585.922	Seal Material(s): Grout, Bentonite
Logged By: K. Villars	Location (X,Y): 1,702,779.26, 721,897.95	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)
				Sample Type	Date & Time	Blow Counts	Recovery (ft)			
0								(0') CONCRETE.		0.0
								(0.5') Hydroexcavate 0.5 feet to approximately 12 feet bgs on 2/8/2019.		
12.5				SS01		3 3 3	0.6	(12') Loose, gray SAND (SP); moist, noncohesive, fine-grained with few medium and trace coarse grained sand.		15.0
16.5				SS02		4 5 8	1.4	(16.5') Very loose, red brown, WELL-GRADED SAND with silt (SW-SM); moist, low plasticity, fine-grained.		20.0
21.5				SS03		10 9 14	1.2	(21.5') Medium dense to dense, brown, SAND (SP); noncohesive, little to some gravel.		25.0

NOTES:

Drilling Start Date: 2/7/2019	Boring Depth (ft): 71	Well Depth (ft): 70.7
Drilling End Date: 2/12/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT (2 in ID)	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Hollow Stem Auger	Ground Surface Elev. (ft): 586.072	Screen Material: Sch 40 PVC Slotted
Driller: ZR/RB	Top of Casing Elev. (ft): 585.922	Seal Material(s): Grout, Bentonite
Logged By: K. Villars	Location (X,Y): 1,702,779.26, 721,897.95	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)	
				Sample Type	Date & Time	Blow Counts	Recovery (ft)				N Value
25										25.0	
				SS04			10 12 17	1.2			
				SS05			10 14 16	1.2			
				SS06			11 12 15	1.4		Stop advancing on 2/11/2019 - resume advancing on 2/12/2019	
				SS07			13 13 11	1.3	(41.5') Grading change to sand with gravel.		
				SS08			4 7 13	1.6	(46.5') Medium, dark gray, WELL-GRADED SAND (SP); very moist, unconsolidated, trace coarse sand and silt with some medium sand, some black staining in top 0.5 feet.	Begin using Quick Gel to hold boring open and prevent heaving	
50										50.0	

NOTES:

Drilling Start Date: 2/7/2019	Boring Depth (ft): 71	Well Depth (ft): 70.7
Drilling End Date: 2/12/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT (2 in ID)	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Hollow Stem Auger	Ground Surface Elev. (ft): 586.072	Screen Material: Sch 40 PVC Slotted
Driller: ZR/RB	Top of Casing Elev. (ft): 585.922	Seal Material(s): Grout, Bentonite
Logged By: K. Villars	Location (X,Y): 1,702,779.26, 721,897.95	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)
				Sample Type	Date & Time	Blow Counts	Recovery (ft)			
50										50.0
				SS09		5	1.2	(51.5') Loose to medium dense, tan SAND (SP); wet, noncohesive, trace fine gravel.	Below water table	
				SS10		7	1.5	(54') Black staining/coal.		
55				SS11		15	1.5	(54.5') Medium dense, black to dark brown silty clay lens.		55.0
				SS12		7	1.2	(56.9') Fractured rock lens.		
				SS13		16	1.2			
				SS14		11	1.1			
60				SS15		16	1.1	(60.5') Medium to dense, light brown to gray brown, SAND (SP); wet, noncohesive, some fine sand and fine gravel, top 2 inches with black staining.		60.0
				SS16		5	1.1			
				SS17		9	1.2			
65				SS18		13	1			65.0
				SS19		10	1.2			
				SS20		17	1.1			
				SS21		10	1.1			
70						12	1.1	(71') Boring terminated.		70.0
						18				
75										75.0

NOTES:

Drilling Start Date: 2/13/2019	Boring Depth (ft): 59.5	Well Depth (ft): 58.5
Drilling End Date: 2/15/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT (2 in ID)	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Hollow Stem Auger	Ground Surface Elev. (ft): 586.101	Screen Material: Sch 40 PVC Slotted
Driller: ZR/RB	Top of Casing Elev. (ft): 588.991	Seal Material(s): Grout, Bentonite
Logged By: K. Villars	Location (X,Y): 1,702,277.23, 720,908.19	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)
				Sample Type	Date & Time	Blow Counts	Recovery (ft)			
0	(0' to 12.8') CL, CLC							(0') TOPSOIL; with limestone cobble. (0.3') Stiff, light brown, LEAN CLAY (CL); moist, medium plasticity.		0.0
				SS01		7 12 14	1.3			
				SS02		4 4 5	0			
				SS03		5 11 15	1.2	(12') Loose to medium dense, light brown, SAND (SP); moist, noncohesive, fine-grained with some gravel.	SS-03-1 SS-03-2	
				SS04		6 11 23	1.3			
				SS05		11 21 30	0.9	(22.8') Narrow lens of black coal less than 0.1-inch thick.		
25										25.0

NOTES:

Drilling Start Date: 2/13/2019	Boring Depth (ft): 59.5	Well Depth (ft): 58.5
Drilling End Date: 2/15/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT (2 in ID)	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Hollow Stem Auger	Ground Surface Elev. (ft): 586.101	Screen Material: Sch 40 PVC Slotted
Driller: ZR/RB	Top of Casing Elev. (ft): 588.991	Seal Material(s): Grout, Bentonite
Logged By: K. Villars	Location (X,Y): 1,702,277.23, 720,908.19	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)
				Sample Type	Date & Time	Blow Counts	Recovery (ft)			
25										25.0
				SS06		6 13 21	0.9			
				SS07		17 27 29	1.3			
				SS08		5 10 10	0.8	(37') Grading to less gravel and wet. (37.6') Thin black coal lens.		
				SS09		3 5 7	1.4	(41.5') Loose, light brown SAND (SP); wet, noncohesive, fine-grained trace coarse sand.	Fully saturated, below water table	
				SS10		4 4 4	1.2			
				SS11		6 8 4	1			
				SS12		7 7 3	1.2	(47') Trace silt.		
				SS13		6 6 4	1.2			
				SS14		4 6	1.3			
50										50.0

NOTES:

Drilling Start Date: 2/13/2019	Boring Depth (ft): 59.5	Well Depth (ft): 58.5
Drilling End Date: 2/15/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT (2 in ID)	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Hollow Stem Auger	Ground Surface Elev. (ft): 586.101	Screen Material: Sch 40 PVC Slotted
Driller: ZR/RB	Top of Casing Elev. (ft): 588.991	Seal Material(s): Grout, Bentonite
Logged By: K. Villars	Location (X,Y): 1,702,277.23, 720,908.19	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)
				Sample Type	Date & Time	Blow Counts	Recovery (ft)			
50				SS14		6	1.3			50.0
				SS15		5	1.3			
				SS16		8	1.3	(52') Loose, gray brown, WELL-GRADED SAND (SW); wet, noncohesive, fine- to medium-grained.		
				SS17		9	1.3			
				SS18		5	1.3			
				SS19		8	1.3			
				SS20		7	1.4			
55						13	1.7	(55') Medium dense, light brown, WELL-GRADED SAND (SW); wet, noncohesive, fine-grained with few medium-grained sand and silt.	56.5-57.2 collected	55.0
						7	1.2	(56') 2-inch coal seam.		
						13	1.1	(56.5') Medium dense, black, WELL-GRADED SAND (SW); wet, noncohesive, few coarse sand.		
						18		(57.2') Medium dense, light brown, WELL-GRADED SAND (SW); wet, noncohesive, medium-grained with few coarse sand and trace fine gravel.		
						13		(58') Loose, gray brown, WELL-GRADED SAND (SW); wet, noncohesive, medium-grained with some fine sand and trace fine gravel, black to dark green in top half of interval.		
						22		(59.5') Boring terminated.		
						7				
						11				
60						11				60.0

NOTES:

Drilling Start Date: 2/15/2019	Boring Depth (ft): 65	Well Depth (ft): 63.5
Drilling End Date: 2/18/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT (2 in ID)	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Hollow Stem Auger	Ground Surface Elev. (ft): 597.783	Screen Material: Sch 40 PVC Slotted
Driller: ZR/RB	Top of Casing Elev. (ft): 600.723	Seal Material(s): Grout, Bentonite
Logged By: K. Villars	Location (X,Y): 1,703,841.94, 718,333.14	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)
				Sample Type	Date & Time	Blow Counts	Recovery (ft)			
0								(0') Hydroexcavated on 2/15/2019.		0.0
13				SS01		13	1	(2.8') Loose, red brown, SILTY SAND (SM); moist, cohesive, trace gravel.		5.0
18				SS02		2	1.3	(6.5') Loose, dark gray brown, WELL-GRADED SAND with gravel (SW); moist, noncohesive, fine-grained sand.		5.0
22				SS03		2	1.3	(7.2') Medium, light yellow brown, CLAY (CL); dry to moist, medium plasticity, few sand and trace fine gravel.		10.0
24				SS04		2	1.3	(12') Very loose to loose, light brown, WELL-GRADED SAND (SW); moist, noncohesive, some gravel.		15.0
26				SS05		2	1.3	(16.5') Changes to trace gravel.		20.0
28						3	1.3			25.0

NOTES:

Drilling Start Date: 2/15/2019	Boring Depth (ft): 65	Well Depth (ft): 63.5
Drilling End Date: 2/18/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT (2 in ID)	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Hollow Stem Auger	Ground Surface Elev. (ft): 597.783	Screen Material: Sch 40 PVC Slotted
Driller: ZR/RB	Top of Casing Elev. (ft): 600.723	Seal Material(s): Grout, Bentonite
Logged By: K. Villars	Location (X,Y): 1,703,841.94, 718,333.14	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)
				Sample Type	Date & Time	Blow Counts	Recovery (ft)			
25										25.0
				SS06		5 8 8	1.3			
				SS07		8 9 10	1.2	(31.5') Changes to poorly graded. (32') With black material.		
				SS08		3 7 7	1.2	(36.5') Changes to without gravel.		
				SS09		11 12 14	1.5	(41.5') Changes to medium dense and well-graded. (42.5') <0.1-inch black layer.	Resume on 2/18/2019	
				SS10		6 12 12	1.3			
50										50.0

NOTES:

Drilling Start Date: 2/19/2019	Boring Depth (ft): 71	Well Depth (ft): 50.0
Drilling End Date: 2/20/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT (2 in ID)	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Hollow Stem Auger	Ground Surface Elev. (ft): 593.737	Screen Material: Sch 40 PVC Slotted
Driller: ZR/RB	Top of Casing Elev. (ft): 596.737	Seal Material(s): Grout, Bentonite
Logged By: K. Villars	Location (X,Y): 1,700,372.74, 721,535.11	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)
				Sample Type	Date & Time	Blow Counts	Recovery (ft)			
0								(0') No recovery.		0.0
1.5				SS01		7 13 17		(1.5') Soft to medium dense, light brown SAND (SP); moist, noncohesive, fine-grained with trace medium to coarse sand and silt.		
6.5				SS02		2 2 5	1.8	(6.5') Organic staining in upper few inches.		
11.5				SS03		2 4 5	1.5			
16.5				SS04		3 6 6	1.2			
21.5				SS05		8 11 13	1.2	(21.5') Loose, light brown, WELL-GRADED SAND (SW); moist, noncohesive, some gravel.		
25										25.0

NOTES:

Drilling Start Date: 2/19/2019	Boring Depth (ft): 71	Well Depth (ft): 50.0
Drilling End Date: 2/20/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT (2 in ID)	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Hollow Stem Auger	Ground Surface Elev. (ft): 593.737	Screen Material: Sch 40 PVC Slotted
Driller: ZR/RB	Top of Casing Elev. (ft): 596.737	Seal Material(s): Grout, Bentonite
Logged By: K. Villars	Location (X,Y): 1,700,372.74, 721,535.11	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)	
				Sample Type	Date & Time	Blow Counts	Recovery (ft)				N Value
25										25.0	
				SS06			9 11 13	1.1			
				SS07			9 10 13	1.2	(32') Coal-like black large gravel-sized particle.		
				SS08			5 6 6	1.2	(37') Layered coal from 37.0-37.2 feet.		
				SS09			9 12 18	1.5	(41.5') Loose to medium dense, brown, SAND (SP); dry, fine-grained.		
				SS10			7 7 7	1.3	(46.5') Black staining from 46.5-46.6 feet. (47') Changes to well-graded and wet.		
50									Stop advancing at 1630 on 2/19/2019	50.0	

NOTES:

Drilling Start Date: 2/19/2019	Boring Depth (ft): 71	Well Depth (ft): 50.0
Drilling End Date: 2/20/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT (2 in ID)	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Hollow Stem Auger	Ground Surface Elev. (ft): 593.737	Screen Material: Sch 40 PVC Slotted
Driller: ZR/RB	Top of Casing Elev. (ft): 596.737	Seal Material(s): Grout, Bentonite
Logged By: K. Villars	Location (X,Y): 1,700,372.74, 721,535.11	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)
				Sample Type	Date & Time	Blow Counts	Recovery (ft)			
50										50.0
				SS11			4	1.2	(52.3') Black staining.	
				SS12			4	1.1	(52.8') Black fragments.	Introduce Quick Gel
				SS13			4			
				SS14			3	1.1		
55				SS15			6	1.2	(56') Changes to poorly graded.	
				SS16			5			
				SS17			6	1.3		
				SS18			11			
				SS19			6	1.3		
				SS20			10			
				SS21			17	1.3		
				SS22			9			
				SS23			11	1.3		
							16			
							8			
							11	1.3		
							16			
							7			
							13	1.2	(63') Faint black.	
							22			
							11	1.1	(63.5') Medium dense, light brown, WELL-GRADED SAND (SW); wet, noncohesive, fine- to medium-grained with few gravel.	
							11			
							12			
							11	1		
							17			
							12	1.2		
							15			
							16			
							14	1.2		
							11			
							14			
							12			
							18	1.2		
							26			
									(71') Boring terminated.	
75										75.0

NOTES:

Drilling Start Date: 2/21/2019	Boring Depth (ft): 100.2	Well Depth (ft): 99.5
Drilling End Date: 2/25/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT (2 in ID)	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Hollow Stem Auger	Ground Surface Elev. (ft): 646.848	Screen Material: Sch 40 PVC Slotted
Driller: ZR/RB	Top of Casing Elev. (ft): 649.668	Seal Material(s): Grout, Bentonite
Logged By: K. Villars	Location (X,Y): 1,701,131.62, 718,577.76	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)
				Sample Type	Date & Time	Blow Counts	Recovery (ft)			
0								(0') No recovery.		0.0
5				SS01		5 11 12	1.1	(1.5') Medium dense, yellow, red, brown, and gray FILL (FILL); little coarse angular gravel, with clay shale and lean clay (MINE SPOIL).		5.0
				SS02		6 9 14	1			
				SS03		16 9 9	1.1			
				SS04		6 9 9	1.2			
				SS05		6 8 8	1.2			
25								(22') Soft to medium dense, red brown CLAY (CL); moist, medium plasticity, some coarse sand, few fractured sandstone.		25.0

NOTES:

Drilling Start Date: 2/21/2019	Boring Depth (ft): 100.2	Well Depth (ft): 99.5
Drilling End Date: 2/25/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT (2 in ID)	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Hollow Stem Auger	Ground Surface Elev. (ft): 646.848	Screen Material: Sch 40 PVC Slotted
Driller: ZR/RB	Top of Casing Elev. (ft): 649.668	Seal Material(s): Grout, Bentonite
Logged By: K. Villars	Location (X,Y): 1,701,131.62, 718,577.76	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)	
				Sample Type	Date & Time	Blow Counts	Recovery (ft)				N Value
25										25.0	
				SS06			15 3 4	0.9			
				SS07			10 5 7	0.6		Little recovery due to limestone rock in cutting shoe	
				SS08			17 12 18	0.5	(37') LIMESTONE and SANDSTONE; dry, noncohesive, fractured.	Red Clay (as in SS07) over fractured rock	
				SS09			7 14 16	1.7		Augers bring up wood fragments	
				SS10			7 9 10	1.2	(46.5') Changes to moist.		
50										50.0	

NOTES:

Drilling Start Date: 2/21/2019	Boring Depth (ft): 100.2	Well Depth (ft): 99.5
Drilling End Date: 2/25/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT (2 in ID)	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Hollow Stem Auger	Ground Surface Elev. (ft): 646.848	Screen Material: Sch 40 PVC Slotted
Driller: ZR/RB	Top of Casing Elev. (ft): 649.668	Seal Material(s): Grout, Bentonite
Logged By: K. Villars	Location (X,Y): 1,701,131.62, 718,577.76	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)	
				Sample Type	Date & Time	Blow Counts	Recovery (ft)				N Value
50										50.0	
				SS11			6 7 11	1.8	(51.5') Medium dense, red, yellow, and black SILT (ML); moist, non-plastic, cohesive, with some fine gravel and sand.		
				SS12			3 6 8	2.1	(56.5') Soft, light and red brown, highly plastic clay, moist.	Top 0.5 feet may be plug	
				SS13			8 10 12	1.3	(61.5') Medium dense, light brown, POORLY GRADED SAND (SP); moist, noncohesive, fine-grained with few coarse sand.		
				SS14			4 7 11	1.4	(66.5') Loose, gray brown, POORLY GRADED SAND (SP); moist to wet, noncohesive, medium- to fine-grained with trace fine gravel. (67.4') Black lenses at 67.4 and 67.6 feet.		
				SS15			3 1 3 1	1.8	(71.5') Very loose, gray brown, POORLY GRADED SAND (SP); wet, noncohesive, fine-grained with few silt and layer of medium black sand.		
				SS16			2		(72.5') Layer of medium black sand.	Attempt static water level reading, not yet at water table	
				SS17			25				
75							11	1.5			75.0

NOTES:

Drilling Start Date: 2/21/2019	Boring Depth (ft): 100.2	Well Depth (ft): 99.5
Drilling End Date: 2/25/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT (2 in ID)	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Hollow Stem Auger	Ground Surface Elev. (ft): 646.848	Screen Material: Sch 40 PVC Slotted
Driller: ZR/RB	Top of Casing Elev. (ft): 649.668	Seal Material(s): Grout, Bentonite
Logged By: K. Villars	Location (X,Y): 1,701,131.62, 718,577.76	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)	
				Sample Type	Date & Time	Blow Counts	Recovery (ft)				N Value
75				SS17			12		(73.7') Black seam.	Transition zone	75.0
				SS18			10	1.5	(74') Medium dense, red brown, CLAYEY SAND with gravel (SC); wet, noncohesive.		
				SS19			8		(74.5') Medium to loose, gray brown, SILTY SAND (SM); wet, noncohesive.	Dry	
				SS20			17	1.2	(75.2') Medium dense, red brown, WELL-GRADED GRAVEL with clay and sand (GW-GC); wet, noncohesive.		
				SS21			16	1	(76') Medium dense, brown to light brown, SILTY SAND (SM); dry, well-graded, noncohesive, trace gravel.	Dry	
				SS22			16		(80.2') Changes to moist.		
				SS23			14	1	(81') Changes to wet.	Dry	
				SS24			15		(83.2') Black seam.		
				SS25			9	1.1		Dry	
				SS26			12				
				SS27			16	1		Dry	
				SS28			10				
				SS29			17	1.2		Dry	
				SS30			23				
				SS31			11	1.1		Thin woody debris	
				SS32			21	1.7			
				SS33			28			Drillers replace mud due to sand binding ??? SS 32 on 2/25/2019 at 1235???	
							9	1.1			
							16			(98.5') Dense, light brown, WELL-GRADED GRAVEL with silt and sand (GW-GM); wet,	
							22	1.1			
							18			100.0	
							20	1.2			
							28				
							12				
							19	1.1			
							18				
							23				
							31	1.1			
100							50/3		(98.5') Dense, light brown, WELL-GRADED GRAVEL with silt and sand (GW-GM); wet,		100.0

NOTES:

Drilling Start Date: 2/21/2019	Boring Depth (ft): 100.2	Well Depth (ft): 99.5
Drilling End Date: 2/25/2019	Boring Diameter (in): 8.25	Well Diameter (in): 2
Drilling Company: AEP	Sampling Method(s): SPT (2 in ID)	Screen Slot (in): 0.010
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material: Sch 40 PVC
Drilling Equipment: Hollow Stem Auger	Ground Surface Elev. (ft): 646.848	Screen Material: Sch 40 PVC Slotted
Driller: ZR/RB	Top of Casing Elev. (ft): 649.668	Seal Material(s): Grout, Bentonite
Logged By: K. Villars	Location (X,Y): 1,701,131.62, 718,577.76	Filter Pack: #5 Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)
				Sample Type	Date & Time	Blow Counts	Recovery (ft)			
100				SS34		50/2	0.2	noncohesive, medium- to coarse-grained gravel with coarse sand. (99.5') Dense, light brown, WELL-GRADED GRAVEL with silt (GW-GM); dry, coarse-grained. (100') SANDSTONE; dry, micaceous, weathered. (100.2') Boring terminated.		100.0
105										105.0

NOTES:

Drilling Start Date: 3/19/2019	Boring Depth (ft): 78.3	Well Depth (ft):
Drilling End Date: 3/19/2019	Boring Diameter (in): 8.25	Well Diameter (in):
Drilling Company: AEP	Sampling Method(s): SPT (2 in ID)	Screen Slot (in):
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material:
Drilling Equipment: Hollow Stem Auger	Ground Surface Elev. (ft): 581.655	Screen Material:
Driller: ZR	Top of Casing Elev. (ft): 584.635	Seal Material(s):
Logged By: J. Bannantine	Location (X,Y): 1,699,808.45, 725,147.52	Filter Pack:

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)
				Sample Type	Date & Time	Blow Counts	Recovery (ft)			
0								(0') Medium stiff, orange brown SILT with sand (ML); damp.	Split spoon samples every 5 feet until water table	0
				SS01		3 3 5	17/18			
								(6.5') Some thin sand.		
				SS02		2 2 4	17/18			
								(11.5') Medium-grained sand from 12.8-13.0 feet.		
				SS03		2 2 3	17/18			
								(16.5') Very stiff, orange brown SAND (SP); damp, medium-grained with few coarse sand and trace gravel.		
				SS04		8 12 14	16/18			
				SS05		8 12 15	16/18			
25										25

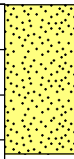
NOTES:

Drilling Start Date: 3/19/2019	Boring Depth (ft): 78.3	Well Depth (ft):
Drilling End Date: 3/19/2019	Boring Diameter (in): 8.25	Well Diameter (in):
Drilling Company: AEP	Sampling Method(s): SPT (2 in ID)	Screen Slot (in):
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material:
Drilling Equipment: Hollow Stem Auger	Ground Surface Elev. (ft): 581.655	Screen Material:
Driller: ZR	Top of Casing Elev. (ft): 584.635	Seal Material(s):
Logged By: J. Bannantine	Location (X,Y): 1,699,808.45, 725,147.52	Filter Pack:

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)	
				Sample Type	Date & Time	Blow Counts	Recovery (ft)				N Value
25										25	
					SS06		12	15/18	(26.5') Hard, increasing gravels.		
							17				
							17				
30											30
							12	14/18	(31.5') Brown SAND (SP); medium- to coarse-grained with trace gravel, subrounded to subangular.		
							16				
							18				
35											35
							5	16/18	(36.5') Stiff, brown SAND with gravel (SP); wet, medium- to coarse-grained, gravel is subangular to angular.	SS-8 is wet; switch to continuous sampling	
							8				
							5	16/18		After SS-9 mud added to borehole	
							6				
							9				
40							10	13/18	(39.5') Very stiff, without gravel.		40
							7				
						4	16/18	(41') Stiff SAND (SP); medium-grained with trace coarse sand, grades from overlying layer.			
						4					
						8					
						4	10/18	(42.5') Trace gravel.			
						4					
45						5	11/18			45	
						5					
						4	7/18				
						5					
						3					
						3	14/18				
						5					
						6					
50						6	14/18			50	
						7					

NOTES:

Drilling Start Date: 3/19/2019	Boring Depth (ft): 78.3	Well Depth (ft):
Drilling End Date: 3/19/2019	Boring Diameter (in): 8.25	Well Diameter (in):
Drilling Company: AEP	Sampling Method(s): SPT (2 in ID)	Screen Slot (in):
Drilling Method: Hollow Stem Auger	DTW After Drilling (ft):	Riser Material:
Drilling Equipment: Hollow Stem Auger	Ground Surface Elev. (ft): 581.655	Screen Material:
Driller: ZR	Top of Casing Elev. (ft): 584.635	Seal Material(s):
Logged By: J. Bannantine	Location (X,Y): 1,699,808.45, 725,147.52	Filter Pack:

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT				SOIL/ROCK VISUAL DESCRIPTION	REMARKS	DEPTH (ft)
				Sample Type	Date & Time	Blow Counts	Recovery (ft)			
75				SS33		11	15/18	coarse-grained with trace gravel.		75
		SS34		11	16/18					
		SS35		11						
80						20	15/16	(78.3') Boring terminated. Refusal on bedrock.	Borehole abandoned with bentonite grout. MW-1929 installed.	80

NOTES:

MONITORING WELL CONSTRUCTION DIAGRAM
MW - 107
 (Not to Scale)

Project: AEP IGCC Mountaineer Plant - Bechtel Borings

Project No. : C050299.33

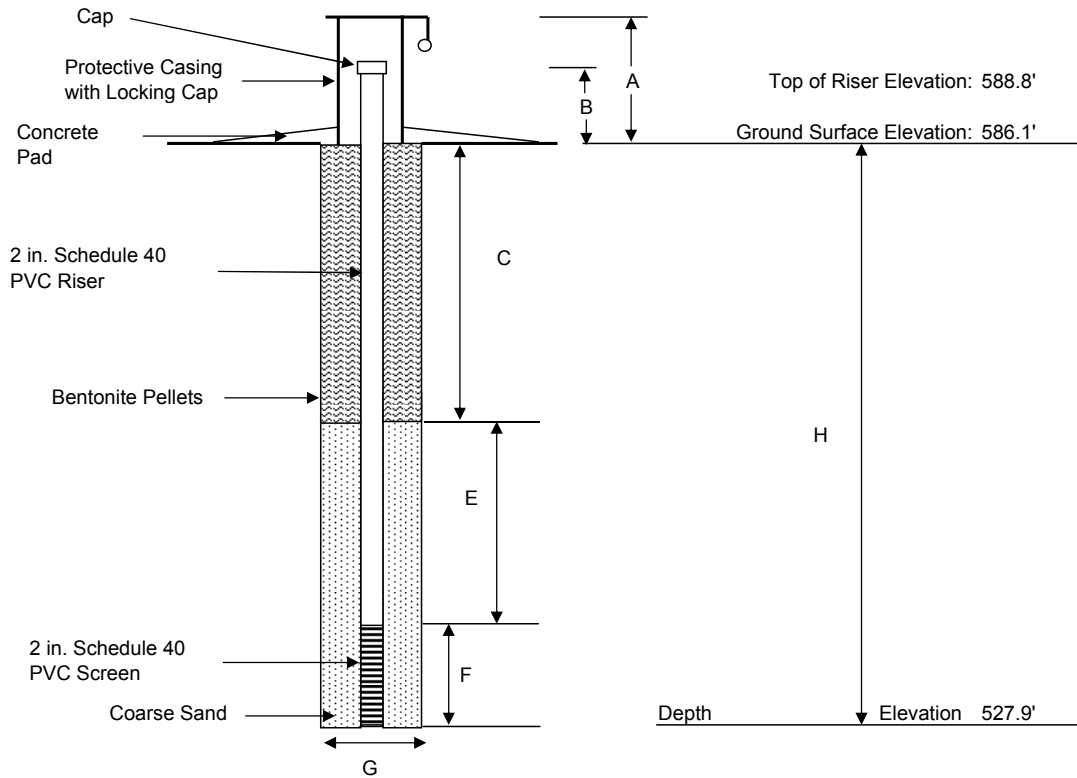
Date : Aug. 28, 2006

Engineer/Geologist: RMR

Well No. : MW-107

Drilling Company: FMSM

Driller: Tim Caudill



STANDPIPE PIEZOMETER INSTALLATION SKETCH

DIMENSIONS (Feet)					
A	B	C	D	E	F
~3.0	2.7	25.0		3.2	30.0
G	H	I	J	K	L
0.7	58.2				

Remarks: Developed well Sept. 7, 2006

MONITORING WELL CONSTRUCTION DIAGRAM
MW - 112
 (Not to Scale)

Project: AEP IGCC Mountaineer Plant - Bechtel Borings

Project No. : C050299.33

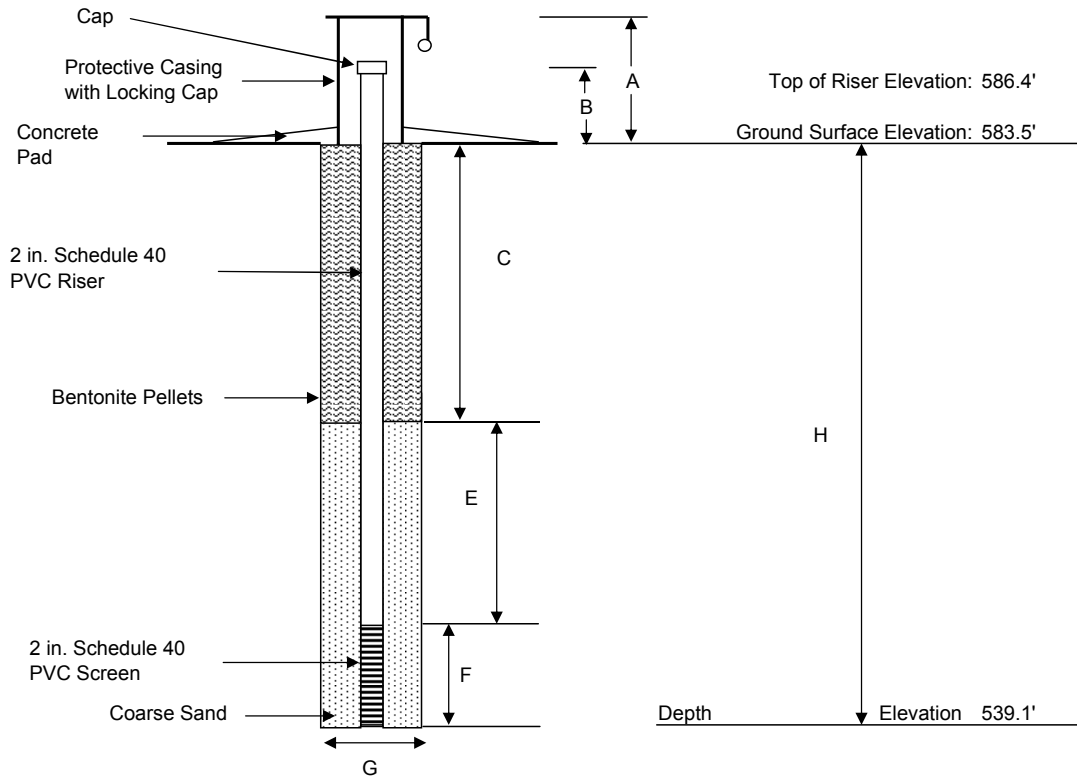
Date : Aug. 31, 2006

Engineer/Geologist: RMR

Well No. : MW-112

Drilling Company: FMSM

Driller: Tim Caudill



STANDPIPE PIEZOMETER INSTALLATION SKETCH

DIMENSIONS (Feet)					
A	B	C	D	E	F
~3.5	2.9	30.0		4.4	10.0
G	H	I	J	K	L
0.7	44.4				

Remarks: Developed well Sept. 7, 2006

MONITORING WELL CONSTRUCTION DIAGRAM
MW - 203
 (Not to Scale)

Project: AEP IGCC Mountaineer Plant - Bechtel Borings

Project No. : C050299.33

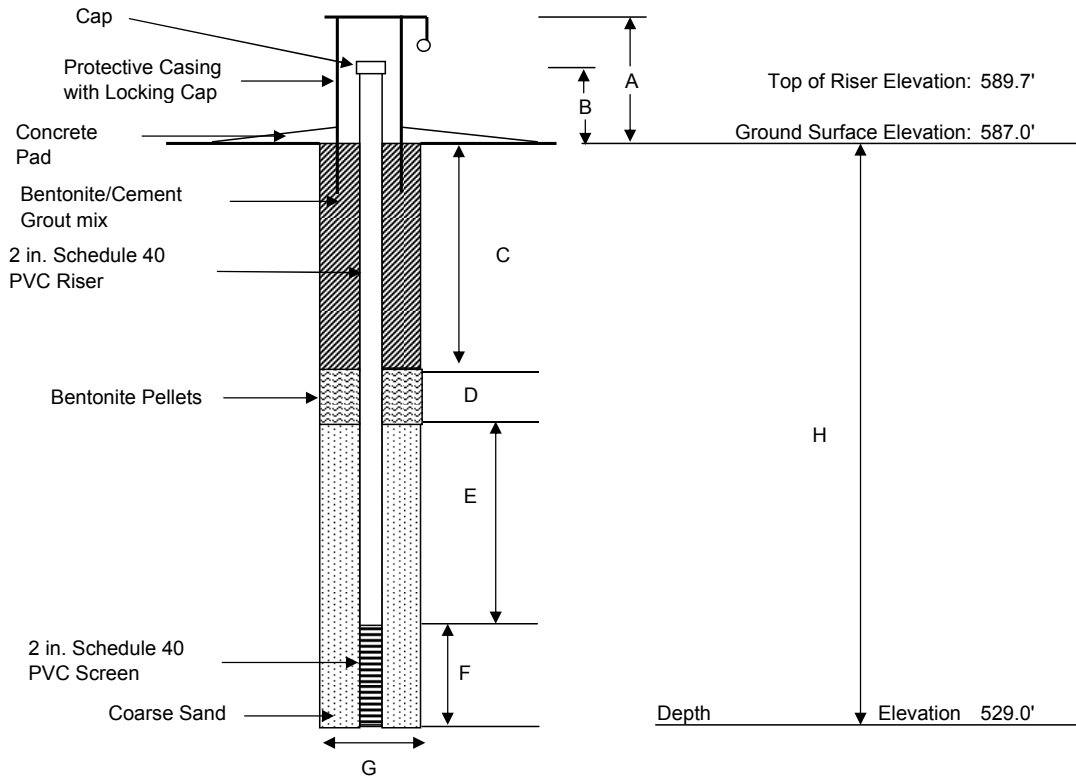
Date : Sept. 27, 2006

Engineer/Geologist: RMR

Well No. : MW-203

Drilling Company: FMSM

Driller: Mike Muncy



STANDPIPE PIEZOMETER INSTALLATION SKETCH

DIMENSIONS (Feet)					
A	B	C	D	E	F
~3.0	2.7	14.0	6.0	28.0	10.0
G	H	I	J	K	L
0.8	58.0				

Remarks Developed well Sept. 28, 2006

**State of West Virginia
Department of Environmental Protection**

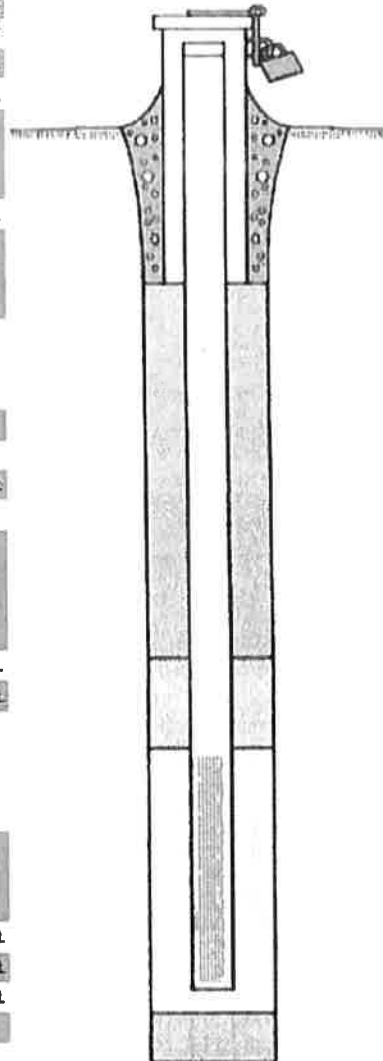
**Monitoring Well Construction
Well Number: WV00540-1805-18
Approved**

Site Name/Physical Address: Site: AEP Mountaineer Plant Line 1: 1347 Graham Station Road Line 2: City: Letart State: WV Zip: 25253- County: Mason	Well Registration No. WV00540-1805-18 Grid Location: a. Latitude: 38 58 29 .0 b. Longitude: 81 58 18 .0 c. Method Used: Computer Mapped/Generated Coordinates Company/Project Well No.: MW-1805	Purpose of Monitoring Well: to monitor the hydrologic conditions of a coal seam.
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Well Owner (Name, Firm, Address): Owner: Randall Brown Line 1: American Electric Power - Mountaineer Plant Line 2: 1347 Graham Station Road City: Letart State: WV Zip: 25253- Phone: 304-882-4024	Installed By (Name, Firm, Address): Installer: Kenn Fowler Line 1: Terracon Consultants, Inc. Line 2: 912 Morris Street City: Charleston State: WV Zip: 25301- Phone: 304-344-0821	Date Well Installed: 07/09/2018 Driller's WY Cert No. WV00540
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Section B: (all number fields must be in decimal format)

1. Gap and Lock:	YES
2. Protective Cover:	Protective Cover Pipe
3. Monitoring Well Reference Point:	591 ft.
4. Borehole Diameter:	5 inches.
5. Ground Surface Seal:	
a. Material: concrete	
b. Installation Procedure: ASTM D5082	
6. Surface Seal Bottom/Annular Space Top:	3 ft.
7. Well Riser: a. OD Well Riser: 2.38 inches. b. ID Well Riser: 2.05 inches.	
c. Material: PVC	
d. Installation Procedure: ASTM D5002	
8. Annular Space Seal:	
a. Material: high solids grout -	
b. Installation Procedure: tremie pipe-pumped	
9. Well Development Procedure: overpump -	
10. Drilling Method Used: mud rotary -	
11. Annular Space Seal Bottom/Filter Seal Top:	117.5 ft.
12. Drilling Fluid Used: Yes Source: Mud	
13. Filter Pack Seal:	
a. Material: bentonite pellet	
b. Installation Procedure: Gravity Fed	
c. Volume Added: 0.24 cubic feet	
14. Bottom of Bentonite Seal/Filter Pack Top:	120.6 ft.
15. Depth to Top of Screen:	123.6 ft.
16. Screen:	
a. Material: PVC	
b. Installation Procedure: ASTM D5092	
c. Slot Size: 0.01 inches. d. Screen Length: 10 ft.	
17. Filter Pack:	
a. Material: medium sand	
b. Installation Procedure: gravity fed	
18. Well Depth:	133.5 ft.
19. Bottom of Filter Pack:	134 ft.
20. Bottom of Borehole:	134 ft.
21. Backfill Material (below filter pack): medium sand	
22. Decontamination Procedures: water	
23. Special Circumstances and Exceptions: No Variance Number:	
24. WV Contractor License No.	



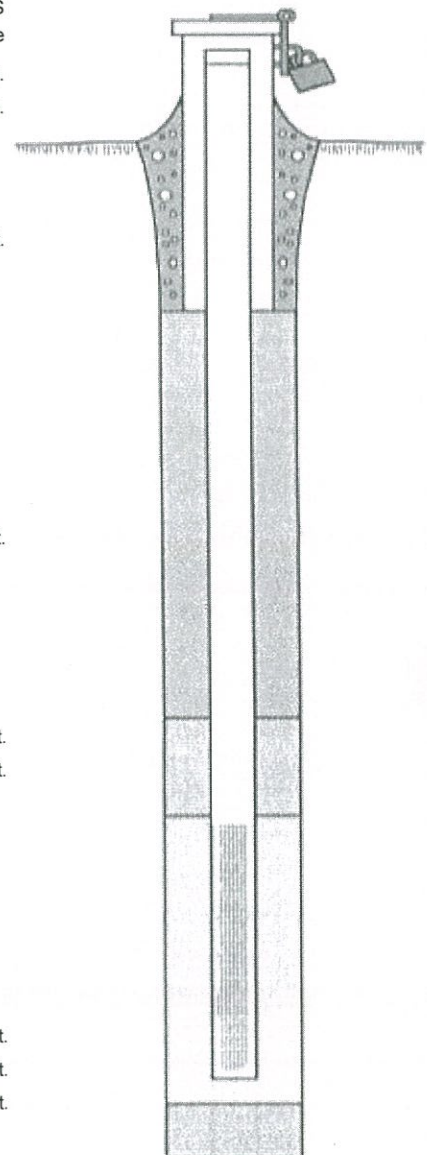
**State of West Virginia
Department of Environmental Protection**

Monitoring Well Construction
Well Number: WV00528-0002-19
Approved

Site Name/Physical Address: Site: AEP/Mountaineer Plant Line 1: 1347 Graham Station Road Line 2: City: New Haven State: WV Zip: 25265- County: Mason	Well Registration No. WV00528-0002-19 Grid Location: a. Latitude: 38 58 38 .0 b. Longitude: 81 55 57 .0 c. Method Used: GPS	Purpose of Monitoring Well: Assessment
Well Owner (Name, Firm, Address): Owner: AEP/Mountaineer Plant Line 1: 1347 Graham Station Road Line 2: City: New Haven State: WV Zip: 25265- Phone: 304-882-4000	Company/Project Well No.: MW-1921 Installed By (Name, Firm, Address): Installer: AEP/Dolan Lab Line 1: 4001 Bixby Road Line 2: City: Groveport State: OH Zip: 43125- Phone: 614-836-4200	Date Well Installed: 04/01/2019 Driller's WV Cert No. WV00528

Section B: (all number fields must be in decimal format)

- 1.Cap and Lock: YES
- 2.Protective Cover: Protective Cover Pipe
- 3.Monitoring Well Reference Point: 0 ft.
- 4.Borehole Diameter: 8 inches.
- 5.Ground Surface Seal:
a.Material: bentonite-cement grout
b.Installation Procedure: tremie pipe
- 6.Surface Seal Bottom/Annular Space Top: 3 ft.
- 7.Well Riser: a.OD Well Riser: 2 inches. b.ID Well Riser: 1.98 inches.
c.Material: PVC
d.Installation Procedure: hand set
- 8.Annular Space Seal:
a.Material: high solids grout -
b.Installation Procedure: tremie pipe-pumped
- 9.Well Development Procedure: airlift -
- 10.Drilling Method Used: hollow stem auger -
- 11.Annular Space Seal Bottom/Filter Seal Top: 68 ft.
- 12.Drilling Fluid Used: No Source:
- 13.Filter Pack Seal:
a.Material: bentonite pellet
b.Installation Procedure: Gravity Fed
c.Volume Added: 150 pounds
- 14.Bottom of Bentonite Seal/Filter Pack Top: 74 ft.
- 15.Depth to Top of Screen: 77.4 ft.
- 16.Screen:
a.Material: PVC
b.Installation Procedure: hand set
c.Slot Size: 0.01 inches. d.Screen Length: 9.6 ft.
- 17.Filter Pack:
a.Material: fine sand
b.Installation Procedure: gravity
- 18.Well Depth: 87.5 ft.
- 19.Bottom of Filter Pack: 88.5 ft.
- 20.Bottom of Borehole: 91.3 ft.
- 21.Backfill Material (below filter pack): none
- 22.Decontamination Procedures: high pressure wash
- 23.Special Circumstances and Exceptions: No Variance Number:
- 24.WV Contractor License No.



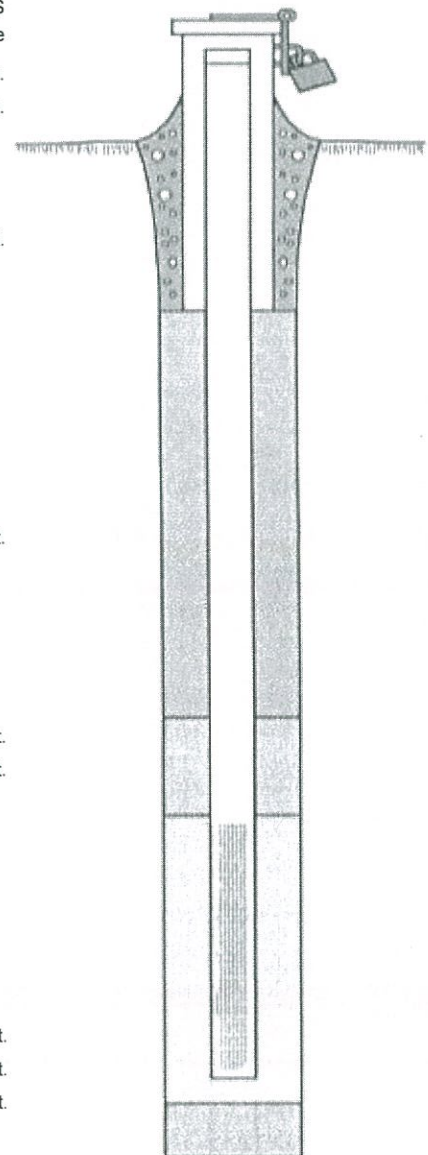
**State of West Virginia
Department of Environmental Protection**

Monitoring Well Construction
Well Number: WV00528-0003-19
Approved

Site Name/Physical Address: Site: AEP/Mountaineer Plant Line 1: 1347 Graham Station Road Line 2: City: New Haven State: WV Zip: 25265- County: Mason	Well Registration No. WV00528-0003-19 Grid Location: a. Latitude: 38 58 28 .0 b. Longitude: 81 56 17 .0 c. Method Used: GPS	Purpose of Monitoring Well: Assessment
Well Owner (Name, Firm, Address): Owner: AEP/Mountaineer Plant Line 1: 1347 Graham Station Road Line 2: City: New Haven State: WV Zip: 25265- Phone: 304-882-4000	Company/Project Well No.: MW-1922D Installed By (Name, Firm, Address): Installer: AEP/Dolan Lab Line 1: 4001 Bixby Road Line 2: City: Groveport State: OH Zip: 43125- Phone: 614-836-4200	Date Well Installed: 04/01/2019 Driller's WV Cert No. WV00528

Section B: (all number fields must be in decimal format)

- 1. Cap and Lock: YES
- 2. Protective Cover: Protective Cover Pipe
- 3. Monitoring Well Reference Point: 0 ft.
- 4. Borehole Diameter: 4 inches.
- 5. Ground Surface Seal:
a. Material: bentonite-cement grout
b. Installation Procedure: tremie pipe
- 6. Surface Seal Bottom/Annular Space Top: 3 ft.
- 7. Well Riser: a. OD Well Riser: 2 inches. b. ID Well Riser: 1.98 inches.
c. Material: PVC
d. Installation Procedure: hand set
- 8. Annular Space Seal:
a. Material: high solids grout -
b. Installation Procedure: tremie pipe-pumped
- 9. Well Development Procedure: airlift -
- 10. Drilling Method Used: hollow stem auger -
- 11. Annular Space Seal Bottom/Filter Seal Top: 93.4 ft.
- 12. Drilling Fluid Used: No Source:
- 13. Filter Pack Seal:
a. Material: bentonite pellet
b. Installation Procedure: Gravity Fed
c. Volume Added: 100 pounds
- 14. Bottom of Bentonite Seal/Filter Pack Top: 101 ft.
- 15. Depth to Top of Screen: 103.4 ft.
- 16. Screen:
a. Material: PVC
b. Installation Procedure: hand set
c. Slot Size: 0.01 inches. d. Screen Length: 9.6 ft.
- 17. Filter Pack:
a. Material: fine sand
b. Installation Procedure: gravity
- 18. Well Depth: 113.5 ft.
- 19. Bottom of Filter Pack: 114.8 ft.
- 20. Bottom of Borehole: 114.8 ft.
- 21. Backfill Material (below filter pack): none
- 22. Decontamination Procedures: high pressure wash
- 23. Special Circumstances and Exceptions: No Variance Number:
- 24. WV Contractor License No.



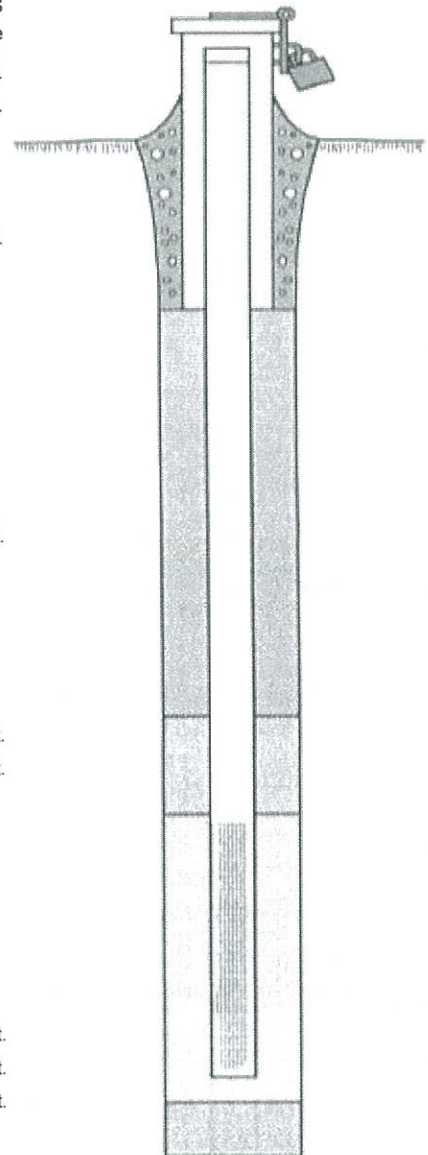
**State of West Virginia
Department of Environmental Protection**

Monitoring Well Construction
Well Number: WV00528-0004-19
Approved

Site Name/Physical Address: Site: AEP/Mountaineer Plant Line 1: 1347 Graham Stat Line 2: City: New Haven State: WV Zip: 25265- County: Mason	Well Registration No. WV00528-0004-19 Grid Location: a. Latitude: 38 58 28 .0 b. Longitude: 81 56 17 .0 c. Method Used: GPS	Purpose of Monitoring Well: Assessment
Well Owner (Name, Firm, Address): Owner: AEP/Mountaineer Plant Line 1: 1347 Graham Station Road Line 2: City: New Haven State: WV Zip: 25265- Phone: 304-882-4000	Company/Project Well No.: MW-1922S Installed By (Name, Firm, Address): Installer: AEP/Dolan Lab Line 1: 4001 Bixby Road Line 2: City: Groveport State: OH Zip: 43125- Phone: 614-836-4200	Date Well Installed: 04/01/2019 Driller's WV Cert No. WV00528

Section B: (all number fields must be in decimal format)

- | | |
|---|-----------------------|
| 1.Cap and Lock: | YES |
| 2.Protective Cover: | Protective Cover Pipe |
| 3.Monitoring Well Reference Point: | 0 ft. |
| 4.Borehole Diameter: | 8 inches. |
| 5.Ground Surface Seal:
a.Material: bentonite-cement grout
b.Installation Procedure: tremie pipe | |
| 6.Surface Seal Bottom/Annular Space Top: | 3 ft. |
| 7.Well Riser: a.OD Well Riser: 2 inches. b.ID Well Riser: 1.98 inches.
c.Material: PVC
d.Installation Procedure: hand set | |
| 8.Annular Space Seal:
a.Material: high solids grout -
b.Installation Procedure: tremie pipe-pumped | |
| 9.Well Development Procedure: airlift - | |
| 10.Drilling Method Used: hollow stem auger - | |
| 11.Annular Space Seal Bottom/Filter Seal Top: | 62.3 ft. |
| 12.Drilling Fluid Used: No Source: | |
| 13.Filter Pack Seal:
a.Material: bentonite pellet
b.Installation Procedure: Gravity Fed
c.Volume Added: 150 pounds | |
| 14.Bottom of Bentonite Seal/Filter Pack Top: | 70.7 ft. |
| 15.Depth to Top of Screen: | 73.4 ft. |
| 16.Screen:
a.Material: PVC
b.Installation Procedure: hand set
c.Slot Size: 0.01 inches. d.Screen Length: 9.6 ft. | |
| 17.Filter Pack:
a.Material: fine sand
b.Installation Procedure: gravity | |
| 18.Well Depth: | 83.5 ft. |
| 19.Bottom of Filter Pack: | 84.2 ft. |
| 20.Bottom of Borehole: | 84.2 ft. |
| 21.Backfill Material (below filter pack): none | |
| 22.Decontamination Procedures: high pressure wash | |
| 23.Special Circumstances and Exceptions: No Variance Number: | |
| 24.WV Contractor License No. | |



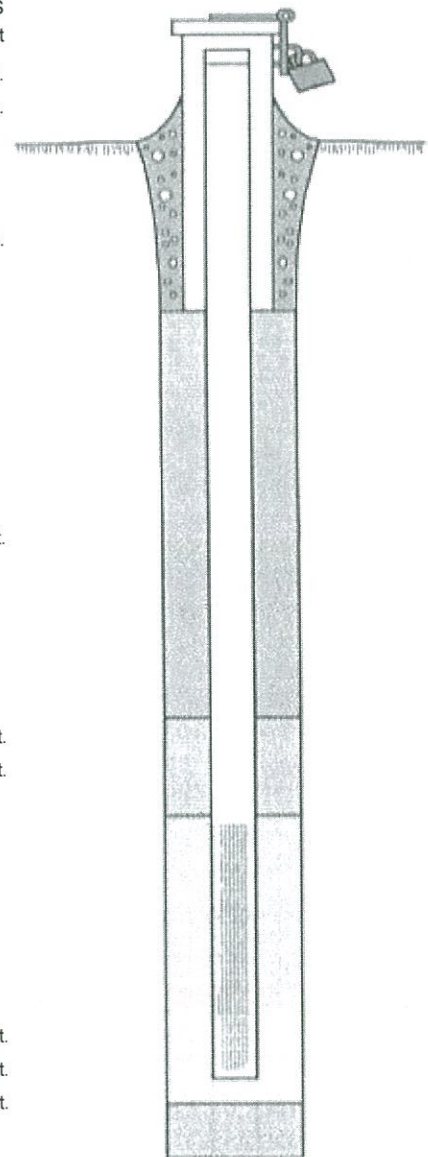
**State of West Virginia
Department of Environmental Protection**

Monitoring Well Construction
Well Number: WV00528-0005-19
Approved

Site Name/Physical Address: Site: AEP/Mountaineer Plant Line 1: 1347 Graham Station Road Line 2: City: New Haven State: WV Zip: 25265- County: Mason	Well Registration No. WV00528-0005-19 Grid Location: a. Latitude: 38 58 45 .0 b. Longitude: 81 56 1 .0 c. Method Used: GPS	Purpose of Monitoring Well: Assessment
Well Owner (Name, Firm, Address): Owner: AEP/Mountaineer Plant Line 1: 1347 Graham Station Road Line 2: City: New Haven State: WV Zip: 25265- Phone: 304-882-4000	Company/Project Well No.: MW-1923 Installed By (Name, Firm, Address): Installer: AEP/Dolan Lab Line 1: 4001 Bixby Road Line 2: City: Groveport State: OH Zip: 43125- Phone: 614-836-4200	Date Well Installed: 04/01/2019 Driller's WV Cert No.: WV00528

Section B: (all number fields must be in decimal format)

- 1.Cap and Lock: YES
- 2.Protective Cover: Flush Mount
- 3.Monitoring Well Reference Point: 0.6 ft.
- 4.Borehole Diameter: 8 inches.
- 5.Ground Surface Seal:
a.Material: bentonite-cement grout
b.Installation Procedure: tremie pipe
- 6.Surface Seal Bottom/Annular Space Top: 3 ft.
- 7.Well Riser: a.OD Well Riser: 2 inches. b.ID Well Riser: 1.98 inches.
c.Material: PVC
d.Installation Procedure: hand set
- 8.Annular Space Seal:
a.Material: high solids grout -
b.Installation Procedure: tremie pipe-pumped
- 9.Well Development Procedure: airlift -
- 10.Drilling Method Used: hollow stem auger -
- 11.Annular Space Seal Bottom/Filter Seal Top: 46 ft.
- 12.Drilling Fluid Used: No Source:
- 13.Filter Pack Seal:
a.Material: bentonite pellet
b.Installation Procedure: Gravity Fed
c.Volume Added: 150 pounds
- 14.Bottom of Bentonite Seal/Filter Pack Top: 74 ft.
- 15.Depth to Top of Screen: 55.4 ft.
- 16.Screen:
a.Material: PVC
b.Installation Procedure: hand set
c.Slot Size: 0.01 inches. d.Screen Length: 9.6 ft.
- 17.Filter Pack:
a.Material: fine sand
b.Installation Procedure: gravity
- 18.Well Depth: 65.5 ft.
- 19.Bottom of Filter Pack: 70 ft.
- 20.Bottom of Borehole: 70 ft.
- 21.Backfill Material (below filter pack): none
- 22.Decontamination Procedures: high pressure wash
- 23.Special Circumstances and Exceptions: No Variance Number:
- 24.WV Contractor License No.



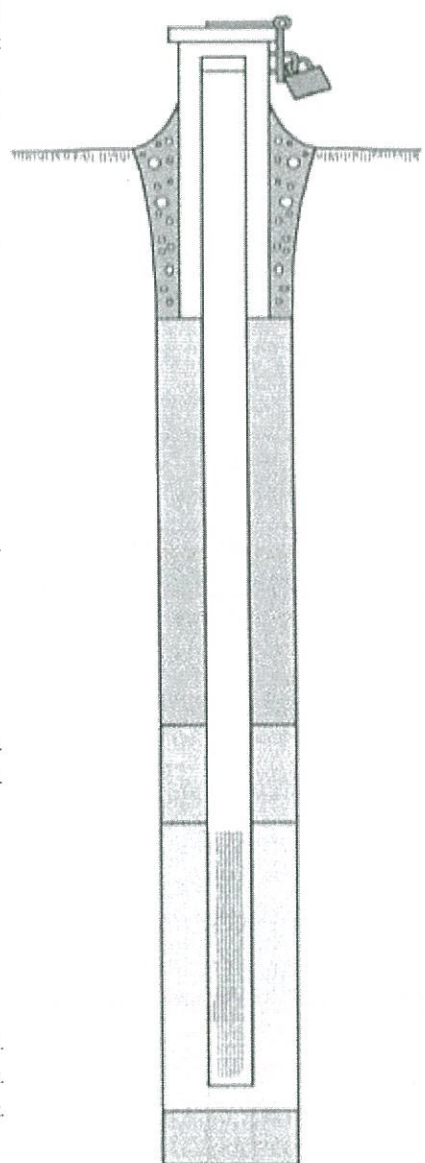
**State of West Virginia
Department of Environmental Protection**

Monitoring Well Construction
Well Number: WV00528-0006-19
Approved

Site Name/Physical Address: Site: AEP/Mountaineer Plant Line 1: 1347 Graham Station Road Line 2: City: New Haven State: WV Zip: 25265- County: Mason	Well Registration No. WV00528-0006-19 Grid Location: a. Latitude: 38 58 43 .0 b. Longitude: 81 56 5 .0 c. Method Used: GPS	Purpose of Monitoring Well: Assessment
Well Owner (Name, Firm, Address): Owner: AEP/Mountaineer Plant Line 1: 1347 Graham Station Road Line 2: City: New Haven State: WV Zip: 25265- Phone: 304-882-4000	Company/Project Well No.: MW-1924 Installed By (Name, Firm, Address): Installer: AEP/Dolan Lab Line 1: 4001 Bixby Road Line 2: City: Groveport State: OH Zip: 43125- Phone: 614-836-4200	Date Well Installed: 04/01/2019 Driller's WV Cert No. WV00528

Section B: (all number fields must be in decimal format)

- 1. Cap and Lock: YES
- 2. Protective Cover: Flush Mount
- 3. Monitoring Well Reference Point: 0.6 ft.
- 4. Borehole Diameter: 8 inches.
- 5. Ground Surface Seal:
a. Material: bentonite-cement grout
b. Installation Procedure: tremie pipe
- 6. Surface Seal Bottom/Annular Space Top: 3 ft.
- 7. Well Riser: a. OD Well Riser: 2 inches. b. ID Well Riser: 1.98 inches.
c. Material: PVC
d. Installation Procedure: hand set
- 8. Annular Space Seal:
a. Material: high solids grout -
b. Installation Procedure: tremie pipe-pumped
- 9. Well Development Procedure: airlift -
- 10. Drilling Method Used: hollow stem auger -
- 11. Annular Space Seal Bottom/Filter Seal Top: 51.4 ft.
- 12. Drilling Fluid Used: No Source:
- 13. Filter Pack Seal:
a. Material: bentonite pellet
b. Installation Procedure: Gravity Fed
c. Volume Added: 150 pounds
- 14. Bottom of Bentonite Seal/Filter Pack Top: 57.8 ft.
- 15. Depth to Top of Screen: 60.6 ft.
- 16. Screen:
a. Material: PVC
b. Installation Procedure: hand set
c. Slot Size: 0.01 inches. d. Screen Length: 9.6 ft.
- 17. Filter Pack:
a. Material: fine sand
b. Installation Procedure: gravity
- 18. Well Depth: 70.7 ft.
- 19. Bottom of Filter Pack: 71.2 ft.
- 20. Bottom of Borehole: 71.2 ft.
- 21. Backfill Material (below filter pack): none
- 22. Decontamination Procedures: high pressure wash
- 23. Special Circumstances and Exceptions: No Variance Number:
- 24. WV Contractor License No.



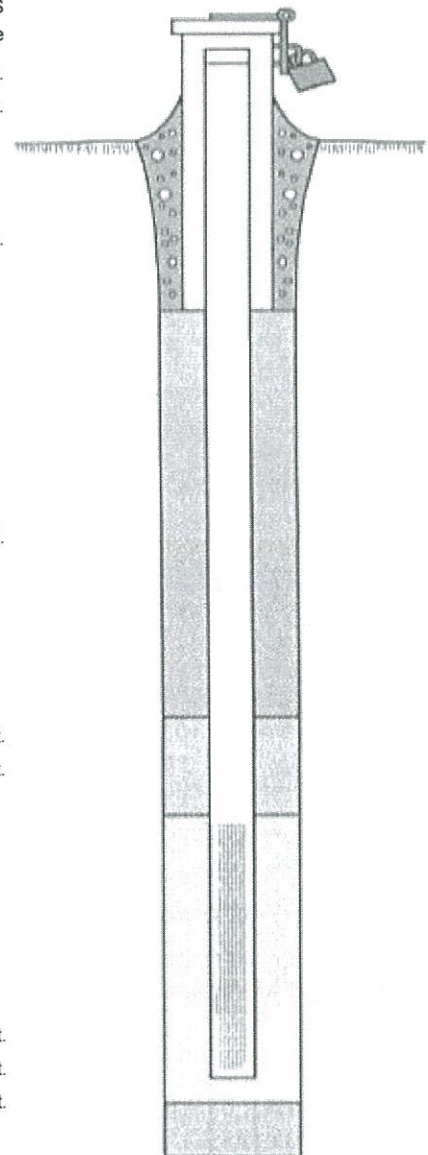
**State of West Virginia
Department of Environmental Protection**

Monitoring Well Construction
Well Number: WV00528-0007-19
Approved

Site Name/Physical Address: Site: AEP/Mountaineer Plant Line 1: 1347 Graham Station Road Line 2: City: New Haven State: WV Zip: 25265- County: Mason	Well Registration No. WV00528-0007-19 Grid Location: a. Latitude: 38 58 33 .0 b. Longitude: 81 56 11 .0 c. Method Used: GPS	Purpose of Monitoring Well: Assessment
Well Owner (Name, Firm, Address): Owner: AEP/Mountaineer Plant Line 1: 1347 Graham Station Road Line 2: City: New Haven State: WV Zip: 25265- Phone: 304-882-4000	Company/Project Well No.: MW-1925 Installed By (Name, Firm, Address): Installer: AEP/Dolan Lab Line 1: 4001 Bixby Road Line 2: City: Groveport State: OH Zip: 43125- Phone: 614-836-4200	Date Well Installed: 04/01/2019 Driller's WV Cert No.: WV00528

Section B: (all number fields must be in decimal format)

- 1.Cap and Lock: YES
- 2.Protective Cover: Protective Cover Pipe
- 3.Monitoring Well Reference Point: 0 ft.
- 4.Borehole Diameter: 8 inches.
- 5.Ground Surface Seal:
a.Material: bentonite-cement grout
b.Installation Procedure: tremie pipe
- 6.Surface Seal Bottom/Annular Space Top: 3 ft.
- 7.Well Riser: a.OD Well Riser: 2 inches. b.ID Well Riser: 1.98 inches.
c.Material: PVC
d.Installation Procedure: hand set
- 8.Annular Space Seal:
a.Material: high solids grout -
b.Installation Procedure: tremie pipe-pumped
- 9.Well Development Procedure: airlift -
- 10.Drilling Method Used: hollow stem auger -
- 11.Annular Space Seal Bottom/Filter Seal Top: 38.5 ft.
- 12.Drilling Fluid Used: No Source:
- 13.Filter Pack Seal:
a.Material: bentonite pellet
b.Installation Procedure: Gravity Fed
c.Volume Added: 150 pounds
- 14.Bottom of Bentonite Seal/Filter Pack Top: 45.7 ft.
- 15.Depth to Top of Screen: 48.4 ft.
- 16.Screen:
a.Material: PVC
b.Installation Procedure: hand set
c.Slot Size: 0.01 inches. d.Screen Length: 9.6 ft.
- 17.Filter Pack:
a.Material: fine sand
b.Installation Procedure: gravity
- 18.Well Depth: 58.5 ft.
- 19.Bottom of Filter Pack: 59.5 ft.
- 20.Bottom of Borehole: 59.5 ft.
- 21.Backfill Material (below filter pack): none
- 22.Decontamination Procedures: high pressure wash
- 23.Special Circumstances and Exceptions: No Variance Number:
- 24.WV Contractor License No.



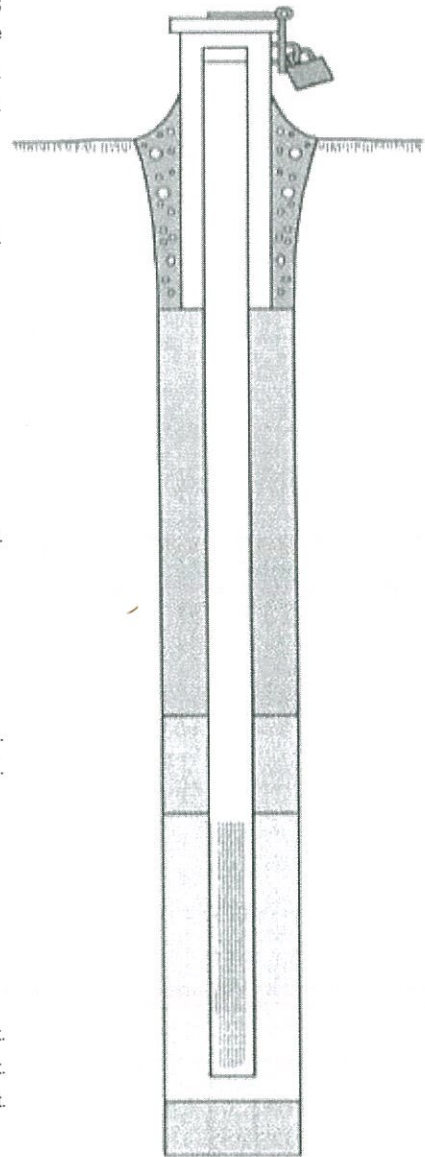
**State of West Virginia
Department of Environmental Protection**

Monitoring Well Construction
Well Number: WV00528-0008-19
Approved

Site Name/Physical Address: Site: AEP/Mountaineer Plant Line 1: 1347 Graham Station Road Line 2: City: New Haven State: WV Zip: 25265- County: Mason	Well Registration No. WV00528-0008-19 Grid Location: a. Latitude: 38 58 8 .0 b. Longitude: 81 55 51 .0 c. Method Used: GPS	Purpose of Monitoring Well: Assessment
Well Owner (Name, Firm, Address): Owner: AEP/Mountaineer Plant Line 1: 1347 Graham Station Road Line 2: City: New Haven State: WV Zip: 25265- Phone: 304-882-4000	Company/Project Well No.: MW-1926 Installed By (Name, Firm, Address): Installer: AEP/Dolan Lab Line 1: 4001 Bixby Road Line 2: City: Groveport State: OH Zip: 43125- Phone: 614-836-4200	Date Well Installed: 04/01/2019 Driller's WV Cert No. WV00528

Section B: (all number fields must be in decimal format)

- 1.Cap and Lock: YES
- 2.Protective Cover: Protective Cover Pipe
- 3.Monitoring Well Reference Point: 0 ft.
- 4.Borehole Diameter: 8 inches.
- 5.Ground Surface Seal:
a.Material: bentonite-cement grout
b.Installation Procedure: tremie pipe
- 6.Surface Seal Bottom/Annular Space Top: 3 ft.
- 7.Well Riser: a.OD Well Riser: 2 inches. b.ID Well Riser: 1.98 inches.
c.Material: PVC
d.Installation Procedure: hand set
- 8.Annular Space Seal:
a.Material: high solids grout -
b.Installation Procedure: tremie pipe-pumped
- 9.Well Development Procedure: airlift -
- 10.Drilling Method Used: hollow stem auger -
- 11.Annular Space Seal Bottom/Filter Seal Top: 44.5 ft.
- 12.Drilling Fluid Used: No Source:
- 13.Filter Pack Seal:
a.Material: bentonite pellet
b.Installation Procedure: Gravity Fed
c.Volume Added: 150 pounds
- 14.Bottom of Bentonite Seal/Filter Pack Top: 50.7 ft.
- 15.Depth to Top of Screen: 53.4 ft.
- 16.Screen:
a.Material: PVC
b.Installation Procedure: hand set
c.Slot Size: 0.01 inches. d.Screen Length: 9.6 ft.
- 17.Filter Pack:
a.Material: fine sand
b.Installation Procedure: gravity
- 18.Well Depth: 63.5 ft.
- 19.Bottom of Filter Pack: 65 ft.
- 20.Bottom of Borehole: 65 ft.
- 21.Backfill Material (below filter pack): none
- 22.Decontamination Procedures: high pressure wash
- 23.Special Circumstances and Exceptions: No Variance Number:
- 24.WV Contractor License No.



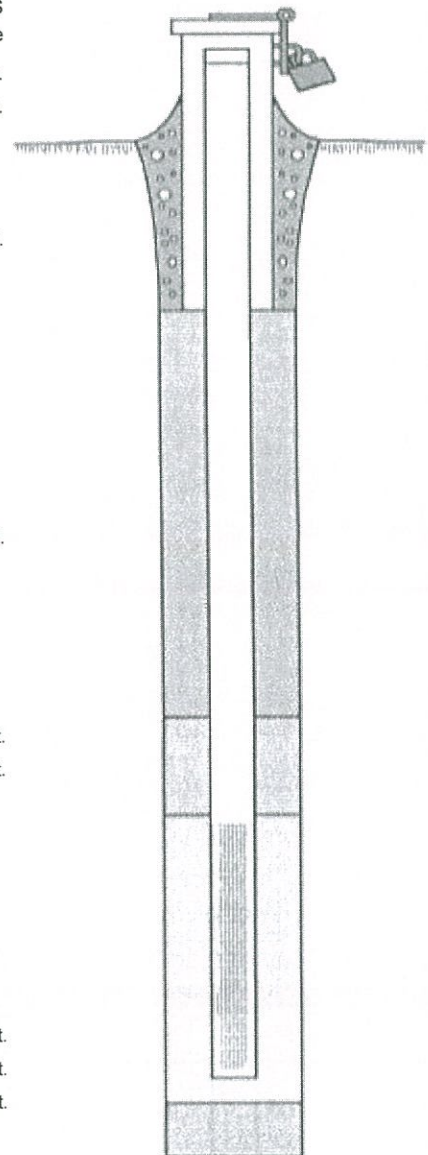
**State of West Virginia
Department of Environmental Protection**

Monitoring Well Construction
Well Number: WV00528-0009-19
Approved

Site Name/Physical Address: Site: AEP/Mountaineer Plant Line 1: 1347 Graham Station Road Line 2: City: New Haven State: WV Zip: 25265- County: Mason	Well Registration No. WV00528-0009-19 Grid Location: a. Latitude: 38 58 39 .0 b. Longitude: 81 56 35 .0 c. Method Used: GPS	Purpose of Monitoring Well: Assessment
Well Owner (Name, Firm, Address): Owner: AEP/Mountaineer Plant Line 1: 1347 Graham Station Road Line 2: City: New Haven State: WV Zip: 25265- Phone: 304-882-4000	Company/Project Well No.: MW-1927 Installed By (Name, Firm, Address): Installer: AEP/Dolan Lab Line 1: 4001 Bixby Road Line 2: City: Groveport State: OH Zip: 43125- Phone: 614-836-4200	Date Well Installed: 04/01/2019 Driller's WV Cert No. WV00528

Section B: (all number fields must be in decimal format)

- 1. Cap and Lock: YES
- 2. Protective Cover: Protective Cover Pipe
- 3. Monitoring Well Reference Point: 0 ft.
- 4. Borehole Diameter: 8 inches.
- 5. Ground Surface Seal:
a. Material: bentonite-cement grout
b. Installation Procedure: tremie pipe
- 6. Surface Seal Bottom/Annular Space Top: 3 ft.
- 7. Well Riser: a. OD Well Riser: 2 inches. b. ID Well Riser: 1.98 inches.
c. Material: PVC
d. Installation Procedure: hand set
- 8. Annular Space Seal:
a. Material: high solids grout -
b. Installation Procedure: tremie pipe-pumped
- 9. Well Development Procedure: airlift -
- 10. Drilling Method Used: hollow stem auger -
- 11. Annular Space Seal Bottom/Filter Seal Top: 50 ft.
- 12. Drilling Fluid Used: No Source:
- 13. Filter Pack Seal:
a. Material: bentonite pellet
b. Installation Procedure: Gravity Fed
c. Volume Added: 150 pounds
- 14. Bottom of Bentonite Seal/Filter Pack Top: 56 ft.
- 15. Depth to Top of Screen: 58.4 ft.
- 16. Screen:
a. Material: PVC
b. Installation Procedure: hand set
c. Slot Size: 0.01 inches. d. Screen Length: 9.6 ft.
- 17. Filter Pack:
a. Material: fine sand
b. Installation Procedure: gravity
- 18. Well Depth: 68.5 ft.
- 19. Bottom of Filter Pack: 71 ft.
- 20. Bottom of Borehole: 71 ft.
- 21. Backfill Material (below filter pack): none
- 22. Decontamination Procedures: high pressure wash
- 23. Special Circumstances and Exceptions: No Variance Number:
- 24. WV Contractor License No.



State of West Virginia		Monitoring Well Construction
Department of Environmental Protection		Well Number: WV00528-0010-19
		Approved
Site Name/Physical Address:	Well Registration No. WV00528-0010-19	Purpose of Monitoring Well:
Site: AEP/Mountaineer Plant	Grid Location:	Assessment
Line 1: 1347 Graham Station Road	a. Latitude: 38 58 10 .0	
Line 2:	b. Longitude: 81 56 25 .0	
City: New Haven	c. Method Used: GPS	
State: WV		
Zip: 25265-	Company/Project Well No.:	
County: Mason	MW-1928	
Well Owner (Name, Firm, Address):	Installed By (Name, Firm, Address):	Date Well Installed:
Owner: AEP/Mountaineer Plant	Installer: AEP/Dolan Lab	04/01/2019
Line 1: 1347 Graham Station Road	Line 1: 4001 Bixby Road	
Line 2:	Line 2:	
City: New Haven	City: Groveport	Driller's WV Cert No.:
State: WV	State: OH	WV00528
Zip: 25265-	Zip: 43125-	
Phone: 304-882-4000	Phone: 614-836-4200	

Section B: (all number fields must be in decimal format)

1. Cap and Lock:	YES	
2. Protective Cover:	Protective Cover Pipe	
3. Monitoring Well Reference Point:	0 ft.	
4. Borehole Diameter:	8 inches.	
5. Ground Surface Seal:		
a. Material: bentonite-cement grout		
b. Installation Procedure: tremie pipe		
6. Surface Seal Bottom/Annular Space Top:	3 ft.	
7. Well Riser: a. OD Well Riser: 2 inches. b. ID Well Riser: 1.98 inches.		
c. Material: PVC		
d. Installation Procedure: hand set		
8. Annular Space Seal:		
a. Material: high solids grout -		
b. Installation Procedure: tremie pipe-pumped		
9. Well Development Procedure: airlift -		
10. Drilling Method Used: hollow stem auger -		
11. Annular Space Seal Bottom/Filter Seal Top:	79.3 ft.	
12. Drilling Fluid Used: No Source:		
13. Filter Pack Seal:		
a. Material: bentonite pellet		
b. Installation Procedure: Gravity Fed		
c. Volume Added: 150 pounds		
14. Bottom of Bentonite Seal/Filter Pack Top:	86.6 ft.	
15. Depth to Top of Screen:	89.4 ft.	
16. Screen:		
a. Material: PVC		
b. Installation Procedure: hand set		
c. Slot Size: 0.01 inches. d. Screen Length: 9.6 ft.		
17. Filter Pack:		
a. Material: fine sand		
b. Installation Procedure: gravity		
18. Well Depth:	99.5 ft.	
19. Bottom of Filter Pack:	100.2 ft.	
20. Bottom of Borehole:	100.2 ft.	
21. Backfill Material (below filter pack): none		
22. Decontamination Procedures: high pressure wash		
23. Special Circumstances and Exceptions: No Variance Number:		
24. WV Contractor License No.		

**State of West Virginia
Department of Environmental Protection**

Monitoring Well Construction
Well Number: WV00528-0011-19
Approved

Site Name/Physical Address: Site: AEP/Mountaineer Plant Line 1: 1347 Graham Station Road Line 2: City: New Haven State: WV Zip: 25265- County: Mason	Well Registration No. WV00528-0011-19 Grid Location: a. Latitude: 38 59 15 .0 b. Longitude: 81 56 43 .0 c. Method Used: GPS	Purpose of Monitoring Well: Assessment
Well Owner (Name, Firm, Address): Owner: AEP/Mountaineer Plant Line 1: 1347 Graham Station Road Line 2: City: New Haven State: WV Zip: 25265- Phone: 304-882-4000	Company/Project Well No.: MW-1929 Installed By (Name, Firm, Address): Installer: AEP/Dolan Lab Line 1: 4001 Bixby Road Line 2: City: Groveport State: OH Zip: 43125- Phone: 614-836-4200	Date Well Installed: 04/08/2019 Driller's WV Cert No. WV00528

Section B: (all number fields must be in decimal format)

- 1.Cap and Lock: YES
- 2.Protective Cover: Protective Cover Pipe
- 3.Monitoring Well Reference Point: 0 ft.
- 4.Borehole Diameter: 8 inches.
- 5.Ground Surface Seal:
a.Material: bentonite-cement grout
b.Installation Procedure: tremie pipe
- 6.Surface Seal Bottom/Annular Space Top: 3 ft.
- 7.Well Riser: a.OD Well Riser: 2 inches. b.ID Well Riser: 1.98 inches.
c.Material: PVC
d.Installation Procedure: hand set
- 8.Annular Space Seal:
a.Material: high solids grout -
b.Installation Procedure: tremie pipe-pumped
- 9.Well Development Procedure: airlift -
- 10.Drilling Method Used: hollow stem auger -
- 11.Annular Space Seal Bottom/Filter Seal Top: 30.9 ft.
- 12.Drilling Fluid Used: No Source:
- 13.Filter Pack Seal:
a.Material: bentonite pellet
b.Installation Procedure: Gravity Fed
c.Volume Added: 150 pounds
- 14.Bottom of Bentonite Seal/Filter Pack Top: 42.7 ft.
- 15.Depth to Top of Screen: 45.4 ft.
- 16.Screen:
a.Material: PVC
b.Installation Procedure: hand set
c.Slot Size: 0.01 inches. d.Screen Length: 9.6 ft.
- 17.Filter Pack:
a.Material: fine sand
b.Installation Procedure: gravity
- 18.Well Depth: 55.5 ft.
- 19.Bottom of Filter Pack: 56.8 ft.
- 20.Bottom of Borehole: 56.8 ft.
- 21.Backfill Material (below filter pack): none
- 22.Decontamination Procedures: high pressure wash
- 23.Special Circumstances and Exceptions: No Variance Number:
- 24.WV Contractor License No.

