2019 Annual Groundwater Monitoring Report Per EPA CCR Rule (CFR § 257.90-.98)

Asbury Generating Station CCR Impoundment
Jasper County, MO

January 2020
REVISED February 2020

Prepared For:
The Empire District Electric Company
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CERTIFICATE OF COMPLIANCE

Annual Groundwater Monitoring Report for Existing CCR Surface Impoundments
EPA CCR Rule Section 40 CFR 257.90 (e)
Empire District Electric Company – Asbury Power Plant
Asbury, Missouri

The following presents the Annual Groundwater Monitoring Report for the Empire District Electric Company's CCR Impoundment at the Asbury Power Plant. This serves as certification that the facility is in compliance with 40 CFR 257.90 (e) of the EPA CCR.

40 CFR 257.90 (e) states:
(e) Annual groundwater monitoring and corrective action report. For existing CCR landfills and existing CCR surface impoundments, no later than January 31, 2018, and annually thereafter, the owner or operator must prepare an annual groundwater monitoring and corrective action report.

CERTIFICATION 257.90 (e)
The undersigned Professional Engineer (P.E.) is familiar with the requirements of 40 CFR Part 257. The above summarizes the status of the Groundwater Monitoring for the Empire District Electric Company's CCR Impoundment at the Asbury Power Plant. I hereby certify that the facility is in compliance with 40 CFR 257.90 (e) and all information has been placed in the Operating Record. Notification of availability of this document should be provided to the State Director as required in section 257.107(h).

Name: Anika Careaga, P.E.

Seal:

Signature: Anika Careaga

Date: 11/23/2020

Registration Number: 2005022085

State: Missouri

Anika Careaga
11/23/2020

Midwest Environmental Consultants

CERTIFICATE OF COMPLIANCE

Alternative Source Demonstration for Existing CCR Surface Impoundments
EPA CCR Rule Section 40 CFR 257.90(e)
Empire District Electric Company – Asbury Power Plant
Asbury, Missouri

The following presents the Alternative Source Demonstration for the Empire District Electric Company's CCR Impoundment at the Asbury Power Plant. This serves as certification that the facility is in compliance with 40 CFR 257.90 (e) of the EPA CCR.

40 CFR 257.94(e)(2) states:
(2) The owner or operator may demonstrate that a source other than the CCR unit caused the statistically significant increase over background levels for a constituent or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. The owner or operator must complete the written demonstration within 90 days of detecting a statistically significant increase over background levels to include obtaining a certification from a qualified professional engineer verifying the accuracy of the information in the report. If a successful demonstration is completed within the 90-day period, the owner or operator of the CCR unit may continue with a detection monitoring program under this section. If a successful demonstration is not completed within the 90-day period, the owner or operator of the CCR unit must initiate an assessment monitoring program as required under § 257.95. The owner or operator must also include the demonstration in the annual groundwater monitoring and corrective action report required by § 257.90(e), in addition to the certification by a qualified professional engineer.

CERTIFICATION 257.90(e)
The undersigned Professional Engineer (P.E.) is familiar with the requirements of 40 CFR Part 257. The above summarizes the status of the Groundwater Monitoring for the Empire District Electric Company's CCR impoundment at the Asbury Power Plant. I hereby certify that the facility is in compliance with 40 CFR 257.90 (e) and all information has been placed in the Operating Record. Notification of availability of this document should be provided to the State Director as required in section 257.107(h).

Name: Anika Careaga, P.E.

Seal:

Signature: Anika Careaga

Date: 2/20/2020

Registration Number: 2005022085

State: Missouri

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1.0 INTRODUCTION

The EPA Coal Combustion Residual Regulations (40 CFR Part 257) (CCR Rule) require groundwater monitoring of CCR impoundment. This Asbury Generating Station CCR impoundment groundwater monitoring sampling report is in accordance with the EPA CCR Rule.

In accordance with the EPA CCR Rule (§ 257.90-.98) the status of the Groundwater Monitoring was placed on-line October 17, 2017, as required by the EPA CCR rule. On November 2, 2017 the facility received approval from Missouri Department of Natural Resources (MDNR) of their groundwater system.

The EPA CCR Rule requires the annual groundwater report completed by January 31st of the following year. The first report was due January 31, 2018. This report serves as the annual groundwater report for the 2019 sampling events that will be completed by January 31, 2020 and posted on-line within 30 days. This report was prepared in general accordance with the EPA CCR Rule for groundwater requirements. These regulations outline groundwater monitoring requirements and data evaluation methods. Empire will notify the MDNR "State Director" via e-mail when this document is posted on-line, as required in the CCR rule.

2.0 BACKGROUND DATA

The purpose of the groundwater monitoring plan is to monitor the groundwater quality surrounding the facility and to evaluate potential impacts and/or releases from facility operations. The groundwater monitoring system for the site consists of the following monitoring wells:

- MW-1 Sidegradient (water level only)
- MW-2 Upgradient
- MW-3 Upgradient
- MW-4 Downgradient
- MW-5 Downgradient
- MW-5A Downgradient
- MW-6 Downgradient
- MW-6A Downgradient
- MW-7 Sidegradient

Background groundwater data was collected from January 2016 to August 2017. After the background data plus the first semi-annual sampling events, a reduced sampling frequency replaced the quarterly events to semi-annual events. This lessened sampling frequency will generally be completed during the months of April/May and October/November. Statistical analysis for EPA Appendix III began after the first semi-annual sampling event was collected on October 4, 2017.

Four more sets of background data were available to add to the background data set for the November 2019 sampling event. The analysis of the additional data for the background data set was conducted and is included in the November 2019 Report in **Appendix B**. No trending was found in the additional four sets of data so they were added to the baseline data set to increase the statistical power of the background data.

3.0 MAY 2019 SAMPLING EVENT

On May 16, 2019, a semi-annual detection monitoring sampling event was conducted per the EPA CCR Rule (§ 257.94). Eight (8) groundwater-monitoring wells were sampled and analyzed for the EPA Appendix III. The constituents listed in Appendix IV were eliminated from the overall semi-annual detection monitoring plan after review of the first semi-annual groundwater sampling event analytical results in January 2018, according to the EPA CCR Rule. For quality assurance and quality control measures, a duplicate sample at MW-7 was taken.

Table 1 – Constituents Identified Above Laboratory Reporting Limits During May 2019 Sampling Event

Constituent	Units	MCL	MW-2 (up)	MW-3 (up)	MW-4 (down)	MW-5 (down)	MW-5A (down)	MW-6 (down)	MW-6A (down)	MW-7 (side)
Appendix III										
Boron	mg/L	NA	0.12	0.076	0.042	0.3	0.56	0.36	0.42	0.27
Calcium	mg/L	NA	33	98	220	93	220	240	160	470
Chloride	mg/L	NA	120	61	97	5.5	39	13	17	46
Fluoride	mg/L	4.0	0.24	0.18	0.26	0.29	0.33	0.25	0.33	0.19
pH	SU	NA	6.35	6.03	7.04	7.73	8.54	8.84	8.22	6.76
Sulfate	mg/L	NA	86	520	800	140	1000	1000	710	1800
Total Dissolved Solids	mg/L	NA	430	920	1700	580	1800	1800	1400	2900

NA = Not Applicable

<x = Less than reporting limit (nondetectable)

J = Trace value seen above minimum detection limit but below reporting limit (trace)

No constituents were detected above the Federal Safe Drinking Water maximum contaminant level (MCL) during the sampling event. The result for Boron (MW-5A) and pH (MW-3(u), MW-5A, MW-6 and MW-6A) indicated an initial intra-well prediction limit exceedance for the listed monitoring well during the May 2019 sampling event. The facility resampled as part of the November 2019 sampling event. **Appendix A** contains the complete report for the May 2019 sampling event.

During the November 2018, the result for Total Dissolved Solids (MW-5A) indicated an initial intra-well prediction limit exceedance. This initial prediction limit exceedances was confirmed during the May 2019 sampling event. However, it should be noted that the power curve for these analyses is not considered strong. A small data set triggers an SSI when there is even a slight increase in concentration. The EPA Unified Guidance Chapter 5.2.4 states "With such a small background sample, it can be difficult to develop an adequately powerful intrawell prediction level or control chart, even when retesting is employed (Chapter 19). Thus, additional background data will be needed to augment compliance well samples".

Minor increases in concentrations did not result in any primary MCLs to be exceeded by any of the prediction limit exceedances during the sampling event, demonstrating that the groundwater has not been contaminated. It was also noted that higher levels of total dissolved solids were seen in the side-gradient well MW-7 demonstrating that a there was likely not a release from the facility. Therefore, the site will continue with the detection monitoring program per the EPA CCR Rule (§ 257.94) on a semi-annual basis at this time.

4.0 NOVEMBER 2019 SAMPLING EVENT

On November 4 and 5, 2019, a semi-annual detection monitoring sampling event was conducted per the EPA CCR Rule (§ 257.94). Eight (8) groundwater-monitoring wells were sampled and analyzed for the EPA Appendix III. For quality assurance and quality control measures, a duplicate sample at MW-7 was taken.

Table 2 – Constituents Identified Above Laboratory Reporting Limits During November 2019 Sampling Event

Constituent	Units	MCL	MW-2 (up)	MW-3 (up)	MW-4 (down)	MW-5 (down)	MW-5A (down)	MW-6 (down)	MW-6A (down)	MW-7 (side)
Appendix III										
Boron	mg/L	NA	0.15	<0.08J	<0.08J	0.22	0.82	0.34	0.4	0.24
Calcium	mg/L	NA	37	93	110	90	240	240	160	450
Chloride	mg/L	NA	120	60	20	3.6	69	10	16	42
Fluoride	mg/L	4.0	0.28	0.13	0.23	0.25	<0.5J	<0.25J	0.23	<0.25J
pH	SU	NA	6.6	5.9	7.6	7.5	7.2	7.3	7.4	6.6
Sulfate	mg/L	NA	62	450	160	93	1200	940	710	1800
Total Dissolved Solids	mg/L	NA	380	830	670	540	2000	1800	1400	2800

NA = Not Applicable
<x = Less than reporting limit (nondetectable)
J = Trace value seen above minimum detection limit but below reporting limit (trace)

No constituents were detected above the Federal Safe Drinking Water maximum contaminant level (MCL) during the sampling event. The result for Chloride (MW-5A), pH (MW-4) and Sulfate (MW-5A) indicated an initial intra-well prediction limit exceedance for the listed monitoring well during the November 2019 sampling event. There is no current primary (health based) MCL for chloride, pH or sulfate. **Appendix B** contains the full report for the November 2019 sampling event.

During the May 2019, the result for Boron (MW-5A) indicated an initial intra-well prediction limit exceedance and Total Dissolved Solids (MW-5A) indicated a confirmed intra-well prediction limit exceedance. There is no current primary (health based) MCL for boron and total dissolved solids. These prediction limit exceedances were confirmed during the November 2019 sampling event. A resample of MW-5A was conducted on December 11, 2019. The results of the resample confirmed the intrawell prediction limit exceedances.

Table 3 – December 2019 Resample Result Comparison

Constituent	Units	MCL	MW-5A	MW-5A Resample
Appendix III				
Boron	mg/L	NA	0.82	1.0
Calcium	mg/L	NA	240	270
Chloride	mg/L	NA	69	82
Fluoride	mg/L	4.0	<0.5J	0.26
pH	SU	NA	7.2	7
Sulfate	mg/L	NA	1200	1300
Total Dissolved Solids	mg/L	NA	2000	2200

5.0 ALTERNATIVE SOURCE DEMONSTRATION

The purpose of the Alternative Source Demonstration is to comply with the EPA CCR Rule 40 CFR 257.94(e)(2) *"The owner or operator may demonstrate that a source other than the CCR unit caused the statistically significant increase over background levels for a constituent or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. The owner or operator must complete the written demonstration within 90 days of detecting a statistically significant increase over background levels to include obtaining a certification from a qualified professional engineer verifying the accuracy of the information in the report. If a successful demonstration is completed within the 90-day period, the owner or operator of the CCR unit may continue with a detection monitoring program under this section as required under § 257.95. The owner or operator must also include the demonstration in the annual groundwater monitoring and corrective action report required by § 257.90(e), in addition to the certification by a qualified professional engineer."*

The November 2019 sampling event report indicated confirmed intrawell prediction limits exceedances. Intrawell prediction limits were utilized per the facility's 2018 Groundwater Statistical Analysis Plan. The Annual Report recommending the site move into assessment monitoring was stamped on January 23, 2020 and submitted to the facility. However, in February MEC received an email from the facility. MDNR had forwarded EPA correspondence requesting that the site change their statistical evaluation method to interwell prediction limits. This report is in response to EPA's requested changes. EPA CCR Rule 40 CFR § 257.94(e)(2) allows at alternative source demonstration to be completed if the statistically significant increases are result of the statistical evaluation rather than from a release from the facility. **Appendix C** contains the full Alternative Source Demonstration report including the MDNR/EPA correspondence.

Prediction interval analyses compare one or more observations to a limit set by background data. Interwell analyses compare observations from background wells, which include upgradient and sidegradient wells per EPA Unified Guidance definitions, and their relation to the observations for the downgradient wells. Intrawell analyses compare background observations to current observations of the same well. In order to appropriately characterize the groundwater beneath the site, the statistical methods utilized at the facility consider the following facts as they relate to site:

- Potential differences in geochemical characteristics of the groundwater caused by the differing lithologies in contact with the screened interval from well to well.
- Potential impacts of surface infiltration into the groundwater environment.

Due to varying geology in the state of Missouri, intrawell analyses had initially been deemed a more appropriate method. Municipal and demolition waste landfills in Missouri typically utilize intrawell prediction limits per MDNR. However, it was noted that the power curve for these analyses was not considered strong yet. The data set consisted of only 13 sampling events from January 2016 to November 2019. EPA Unified Guidance recommends 20 or more sampling events for background data for intrawell prediction limits. A small data set triggers an SSI when there is even a slight increase in concentration. Sanitas also noted on each exceedance *"Insufficient data to test for seasonality: data were not deseasonalized."* Minor increases in concentration noted in the May and November 2019 sampling events did not result in any primary MCLs to be exceeded by any of the prediction limit exceedances during the sampling event, demonstrating that the groundwater has not been contaminated.

The results of the EPA requested interwell prediction limit statistical analysis of the November 2019 sampling event indicate that the site is actually in compliance. Initial interwell prediction exceedances in pH were noted in all the downgradient monitoring wells but have not been confirmed. There is no current primary (health based) Maximum Contamination Level (MCL) for pH. The sample results for pH ranged from 7.2 - 7.6 SU during the November 2019 sampling event. Trending was not found to be significant for pH in any well during the analysis of the background data set.

EPA CCR Rule 40 CFR § 257.94(e)(2) allows at alternative source demonstration to be completed if the statistically significant increases are result of the statistical evaluation rather than from a release from the facility. The change from intrawell to interwell prediction limits per EPA's request resulted in no confirmed statistical significant increases for the November 2019 sampling event. Therefore, the site no longer needs to move into assessment monitoring program and will continue with the detection monitoring program per the EPA CCR Rule (§ 257.94) on a semi-annual basis.

6.0 EXCUTIVE SUMMARY

This report is a summary of the 2019 sampling events and the findings of the statistical analysis of the results of the groundwater monitoring program at the Asbury Generating Station CCR Impoundment. Specific information of each sampling event and the alternative source demonstration can be obtained from the individual reports which are included as appendices and have been placed in the Asbury Operating Record.

EPA CCR Rule 40 CFR § 257.94(e)(2) allows at alternative source demonstration to be completed if the statistically significant increases are result of the statistical evaluation rather than from a release from the facility. The change from intrawell to interwell prediction limits per EPA's request resulted in no confirmed statistical significant increases for the November 2019 sampling event. Therefore, the site no longer needs to move into the assessment monitoring program and will continue with the detection monitoring program per the EPA CCR Rule (§ 257.94) on a semi-annual basis. Future statistical analysis will be completed with interwell prediction limits per EPA's request.

APPENDIX A

May 2019 Sampling Event

2019 Groundwater Monitoring, Sampling & Statistics Per EPA CCR Rule (CFR § 257.90-.98)

May Sampling Event

Asbury Generating Station CCR Impoundment
Jasper County, MO

July 2019

Prepared For:
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1.0 INTRODUCTION

The EPA Coal Combustion Residual Regulations (40 CFR Part 257) (CCR Rule) require groundwater monitoring of CCR impoundment. This Asbury Generating Station CCR impoundment groundwater monitoring sampling report is in accordance with the EPA CCR Rule.

In accordance with the EPA CCR Rule (§ 257.90-.98) the status of the Groundwater Monitoring was placed on-line October 17, 2017, as required by the EPA CCR rule. On November 2, 2017 the facility received approval from Missouri Department of Natural Resources (MDNR) of their groundwater system (included in **Appendix 1**). Empire notified the MDNR "State Director" via e-mail when this document was posted on-line, as required in the CCR rule.

The EPA CCR Rule requires the annual groundwater report be posted on-line by January 31st of the following year. The first report was due January 31, 2018. This report was prepared in general accordance with the EPA CCR Rule for groundwater requirements. These regulations outline groundwater monitoring requirements and data evaluation methods. The annual groundwater report for the 2018 sampling events will be posted on-line by January 31, 2019.

The purpose of the groundwater monitoring plan is to monitor the ground water quality surrounding the facility and to evaluate potential impacts and/or releases from facility operations. Background groundwater data was collected from January 2016 to August 2017. After the background data plus the first semi-annual sampling events, a reduced sampling frequency replaced the quarterly events to semi-annual events. This lessened sampling frequency will generally be completed during the months of May and October. Statistical analysis for EPA Appendix III began after the first semi-annual sampling event was collected on October 4, 2017 to determine if a statistically significant increase (SSI) has occurred. If an SSI is verified, additional evaluation is required to determine if the SSI was caused by the CCR impoundment.

On May 16, 2019, a semi-annual sampling event was conducted per the EPA CCR Rule (§ 257.90-.98). Eight (8) groundwater-monitoring wells were sampled and analyzed for the EPA Appendix III. The constituents listed in Appendix IV were eliminated from the overall semi-annual detection monitoring plan after review of the first semi-annual groundwater sampling event analytical results in January 2018, according to the EPA CCR Rule. For quality assurance and quality control measures, a duplicate sample at MW-7 was taken. These samples were preserved and submitted directly to the laboratory.

This report is a summary of the May 2019 sampling event and the findings of the statistical analysis of the results of the groundwater monitoring program at the Asbury Generating Station CCR Impoundment. Specific information of each sampling event can be obtained from the individual report which is part of the Asbury Operating Record.

2.0 SITE LOCATION

The site occupies the north half of Section 17, Township 30 North, and Range 33 West on the Asbury 7.5-Minute Quadrangle Map as seen in **Figure 1**. The site is located approximately 5.5 miles north-northeast of Asbury, Missouri, about 14 miles north-northwest of Joplin, Missouri. A map showing the locations of the monitoring wells is on **Figure 2**.

2.1 History

In March 1996, five (5) groundwater monitoring wells, MW-1 through MW-5, were installed around the perimeter of the Asbury Generating Station CCR impoundment. Monitoring wells MW-1, MW-2 and MW-3 were installed to a total depth of between 27.0 to 28.5 feet below ground surface (bgs). Monitoring wells MW-4 and MW-5 were installed to a total depth of 48 feet bgs. Each of the five monitoring wells was equipped with 10.0-foot well screens. The five wells were then developed, purged, and sampled in 1996.

In 2003, two (2) additional groundwater monitoring wells were installed and identified as MW-6 and MW-7. Both wells had 2-inch diameter PVC well casings installed to an approximate total depth of 44 feet below ground surface. Both wells were installed with an above ground steel protective cover. No other construction details such as well screen lengths were available for these two (2) wells. In December 2015, two (2) additional groundwater monitoring wells were installed and identified as MW-5A and MW-6A.

All wells are registered with MDNR – Missouri Geological Survey Program.

2.2 Site Geology

Drilling and subsurface investigation activities at the Site and as part of the MDNR approved CCR landfill Detailed Site Investigation (DSI) for the adjacent landfill area identified three (3) primary geologic units at the Site. These geologic units include the surficial soil layer, Warner Sandstone (uppermost aquifer), and Riverton Shale (confining unit). The information presented herein includes the primary elements of a site characterization work plan consistent with the MDNR guidance.

Surficial Soil. Soils at the site consist of a surficial unit of cohesive soils (e.g., CL, SC, ML, and CH) underlain by Pennsylvanian-age bedrock. Soil thickness at the Site ranges from approximately 15-25 feet.

Warner Sandstone. The Warner Sandstone (Sandstone) is the uppermost bedrock unit in south portion of the Site. In the north area of the Site, the Sandstone is overlain by the Riverton Shale (Shale). Based on the DSI information, the Sandstone and Shale can occur as alternating layers. The Sandstone and Shale are gradational in places and transition from shaley sandstone to sandy shale. According to the MDNR publication on the Pennsylvanian Subsystem in Missouri, the Warner Sandstone formation is described as follows: "Generally, the lower part is interbedded, very fine grained sandstone and claystone. The upper part is largely medium-bedded to massive channel fill sandstone. In places, the Warner consists primarily of shale and claystone, with only minor amounts of sandstone" and "ranges in thickness from 0 to 15m (49.2 ft.)."

The Sandstone is more than 25-30 feet thick in places and is generally medium hard and thin to medium bedded with occasional shale partings. The degree of induration of the Sandstone varies and generally increases with depth. Slug tests performed at selected DSI piezometers screened in

the Sandstone exhibited hydraulic conductivities ranging from approximately 1.3x10-4 cm/sec to 5.9x10-6 cm/sec. The slug test results are consistent with values for sandstone and shaley sandstone. The groundwater gradient is towards the east and Blackberry Creek.

Riverton Shale. Layers of the Riverton Shale (Shale) exhibited thicknesses ranging from approximately one foot to more than 10 feet. The Shale is generally dark gray to light gray. The Shale is mainly thin bedded with hardness ranging from soft to hard. Six packer tests were performed during the DSI to assess the hydraulic conductivity of the Shale. The packer test results ranged from approximately $3.2x10^{-6}$ cm/sec to $4.9x10^{-8}$ cm/sec. The packer test data indicates that the Shale is an effective confining unit.

According to the MDNR publication on the Pennsylvanian Subsystem in Missouri, the Riverton Shale formation is described as "dark gray to black, fine-grained, relatively brittle shale and contains as many as three coal beds, each of which is underlain by underclay" and "varies in thickness from a featheredge to more than 90 feet".

Unnamed Coal. The Shale includes coal seams in places that range in thickness from a few inches to approximately 1.5 feet. The coal is generally black to dark gray.

2.3 Groundwater Monitoring Network Design

The groundwater monitoring system for the CCR impoundment consist of nine (9) groundwater monitoring wells. Two (2) wells are considered upgradient. Two (2) wells are considered sidegradient; one is only monitored for groundwater elevation. The remaining five (5) wells are considered downgradient.

The groundwater monitoring wells (MWs) at the Asbury Generating Station are equipped with individual dedicated poly tubing to be connected to a peristaltic pump/controller at the surface. Low-flow, micro-purge and sampling techniques and technology are utilized to collect groundwater samples from the subject wells. The groundwater sampling procedures are discussed in further detail below.

2.4 Groundwater Monitoring Network

The locations of the monitoring wells are shown on **Figure 2**. The groundwater monitoring system for the site consists of the following monitoring wells:

- MW-1 Sidegradient (water level only)
- MW-2 Upgradient
- MW-3 Upgradient
- MW-4 Downgradient
- MW-5 Downgradient
- MW-5A Downgradient
- MW-6 Downgradient
- MW-6A Downgradient
- MW-7 Sidegradient

2.5 Seasonal Variation

Historical groundwater elevation data has been limited. However, adequate lengths of well screen have been utilized during the construction of the wells to accommodate typical seasonal groundwater elevation variations seen in southwest Missouri.

2.6 Groundwater Flow Direction

Historically, the seasonally high potentiometric surface indicated the groundwater flow direction to the east. **Figure 3** is a potentiometric map for this May 2018 sampling event.

Originally MW-7 was thought to be a downgradient well but review of the potentiometric mapping from the eight background sampling events revealed that the well is actually a sidegradient well. Therefore, the designation for MW-7 has been changed from a downgradient to a sidegradient well for compliance monitoring.

3.0 BASELINE GROUNDWATER DATA

3.1 Baseline Data Collection

Per EPA CCR Rule § 257.94(b), the site initiated the detection monitoring program in January 2016 to include obtaining a minimum of eight (8) independent samples for each background and downgradient well. The eight (8) independent groundwater samples were obtained and analyzed as required by the CCR Rule under per the baseline groundwater monitoring plan. Background groundwater data was collected from January 2016 to August 2017.

Groundwater Monitoring Reports were completed for each sampling event and have been placed in the Operating Record. Summary tables of the results from each event are included in **Appendix 2**. A listing of each event is below:

- January 2016
- March 2016
- May 2016
- August 2016
- October 2016
- March 2017
- June 2017
- August 2017

Initial baseline monitoring was required at all monitoring wells. The sampling frequency was quarterly or more frequently for the first two (2) years. After the background data plus the first semi-annual sampling events, a reduced lower sampling frequency replaced the quarterly events to semi-annual events. This lessened sampling frequency will be completed during the months of May and October.

The initial two (2) years of baseline and the first semi-annual detection monitoring included parameters listed in Appendix III and Appendix IV of the EPA CCR Rule. The constituents listed in Appendix IV were eliminated from the overall semi-annual detection monitoring plan after review of the first semi-annual groundwater sampling event analytical results in January 2018, according to the EPA CCR Rule. **Appendix 2** contains the list of constituents.

3.2 Baseline Data Analysis

Sanitas™ for Ground Water Version 9.2.13 was used to run the statistical analyses with settings used as recommended by the Sanitas™ training course and user manual. The background data consisted of eight sampling events between January 2016 and August 2017 for both the Appendix III and IV constituents. Eight background events are needed for statistical analysis. An analysis of the Appendix III background data was conducted and is included in **Appendix 5**.

Trending was found in Boron (MW-3) and Total Dissolved Solids (MW-3). MW-3 is an up-gradient well. Trending was not removed at this time; otherwise the site would be below the minimum of eight background samples needed to run statistics.

4.0 GROUNDWATER SAMPLING EVENT

On May 16, 2019, eight (8) groundwater monitoring wells were sampled by Midwest Environmental Consultants (MEC) for the EPA CCR Rule Appendix III parameters. For quality assurance and quality control measures, a duplicate sample was taken at MW-7. The sampling protocol and methodology was to be conducted in accordance to the facility's Sampling and Analysis Plan. **Table 1** provides a list of the analytical methods employed by the subcontracted laboratory.

Table 1 – Analytical Methods

Method	Description
9056A	Anions, Ion Chromatography
6020A	Metals (ICP/MS)
SM 2540C	Solids, Total Dissolved (TDS)
Field Sampling	Field Sampling

Appendix 3 includes Monitoring Well Field Inspection sheets and field notes. The physical integrity of the wells was good. During sample collection each of the wells was monitored for pump discharge and formation recharge. Initially, a static water level for each well was recorded (**Table 2**). To ensure sufficient recharge while sampling, static water levels were collected during pumping. Prior to sample collection, field parameters for each well were measured with a flow-through meter. When the field parameters stabilized, samples for analytical testing were collected and placed on ice for hand delivery to the laboratory. At the conclusion of sample collection from each well, a final static water level measurement was obtained. The samples were collected in the appropriately pre-preserved sample containers and placed on ice for delivery.

Table 2 - Groundwater Sampling Field Parameters Summary During May 2019 Sampling Event

WELL ID	STATIC WATER LEVEL (ft-BTOC)		PURGE RATE (mL/min)	STABILIZED pH
	Initial	Final		
MW-1*	NT	NA	NA	NA
MW-2	2.36	4.62	200	6.35
MW-3	2.00	4.00	200	6.03
MW-4	5.25	10.68	200	7.04
MW-5	1.62	6.19	200	7.73
MW-5A	8.65	14.50	200	8.54
MW-6	8.16	13.35	200	8.84
MW-6A	7.40	13.45	200	8.22
MW-7	2.85	3.08	200	6.76

* Water Level Only NA – Not Applicable NT – Not Tested (inaccessible)

Appendix 4 includes the initial analytical results for the sampling event. Included with this analytical report are sample information; chain of custody; wet chemistry data; and volatile data.

5.0 DATA VALIDATION PROCEDURES FOR GROUNDWATER MONITORING DATA

Midwest Environmental Consultants receives Data Packages from the analytical laboratory (Test America). The internal quality control/quality assurance case narratives and reported data are then reviewed. Generally the data validation procedures established by the U.S. Environmental Protection Agency *Contract Laboratory Program Functional Guidelines for Organic Data Review* and *Functional Guidelines for Inorganic Data Review* is followed. These guidelines are used to assign data qualifiers to the data. A formal data validation report for the site is not prepared; however, any significant issues are noted in the groundwater monitoring report.

MEC evaluates the data set for precision, accuracy, representativeness, comparability, and completeness (PARCC).

5.1 Precision

Laboratory Precision. Laboratory quality control procedures to measure precision consist of laboratory control sample (LCS) analysis and analysis of matrix spike/matrix spike duplicates (MS/MSD). These analyses are used to define analytical variability.

Field Precision. Analyses of duplicate samples are used to define the total variability (replicability) of the sampling/analytical system as a whole. Field replicates are collected at a rate of one per sampling event.

5.2 Accuracy

Accuracy is determined by calculating the percent recoveries for analyses of surrogate compounds, LCSs, continuing calibration check standards, and matrix spike samples. Acceptable percent recoveries are established for SW-846 and EPA methods. Field and laboratory blank analysis are also used to address measurement bias.

Field Blanks. Field blanks consisted of a trip blank and a field blank. One trip blank per cooler accompanies samples for volatile organic analyses.

Laboratory Blanks. Method blanks, artificial, matrix-less samples, are analyzed to monitor the laboratory analysis system for interferences and contamination from glassware, reagents, etc. Method blanks are taken through the entire sample preparation process. They are included with each batch of extractions or digestions prepared, or with each 20 samples, whichever is more frequent.

5.3 Representativeness

Representativeness expresses the degree to which sample data accurately and precisely reflect site condition. Representativeness of the data is determined by comparing actual sampling procedures to those delineated in the field sampling plan, comparing results from field replicate samples and reviewing the results of field blanks. Field notes are reviewed as part of our data validation process.

5.4 Comparability

Comparability expresses the confidence with which one data set can be compared to another data set measuring the same property. Comparability is ensured by using established and approved sample collection techniques and analytical methods, consistent basis of analysis, consistent reporting units, and analyzing standard reference materials.

5.5 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount expected under controlled laboratory conditions. Completeness is defined as the valid data percentage of the total tests requested. Valid data are defined as those where the sample arrived at the laboratory intact, properly preserved, in sufficient quantity to perform the requested analyses, and accompanied by a completed chain-of-custody form. Furthermore, the sample must have been analyzed within the specified holding time and in such a manner that analytical QC acceptance criteria were met.

6.0 STATISTICAL ANALYSIS

6.1 Sampling Results

The constituents with results above the laboratory reporting limits are included in **Table 3**. The Test America laboratory analytical results are included in **Appendix 4**.

Table 3 – Constituents Identified Above Laboratory Reporting Limits During May 2019 Sampling Event

Constituent	Units	MCL	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6	MW-6A	MW-7
Appendix III										
Boron	mg/L	NA	0.12	0.076	0.042	0.3	0.56	0.36	0.42	0.27
Calcium	mg/L	NA	33	98	220	93	220	240	160	470
Chloride	mg/L	NA	120	61	97	5.5	39	13	17	46
Fluoride	mg/L	4.0	0.24	0.18	0.26	0.29	0.33	0.25	0.33	0.19
pH	SU	NA	6.35	6.03	7.04	7.73	8.54	8.84	8.22	6.76
Sulfate	mg/L	NA	86	520	800	140	1000	1000	710	1800
Total Dissolved Solids	mg/L	NA	430	920	1700	580	1800	1800	1400	2900

NA = Not Applicable

<x = Less than reporting limit (nondetectable)

J = Trace value seen above minimum detection limit but below reporting limit (trace)

No constituents were detected above the Federal Safe Drinking Water maximum contaminant level (MCL) during the sampling event.

6.2 Statistical Analysis

Sanitas™ for Ground Water Version 9.2.13 was used to run the statistical analyses with settings used as recommended by the Sanitas™ training course and user manual. For most downgradient well constituents, non-parametric intrawell prediction intervals were run due to non-detectable levels in more than 50 percent of the samples or if data could not be adequately normalized. The Sanitas™ output is included in **Appendix 5**.

Background data consisted of eight sampling events between January 2016 and August 2017 for both the Appendix III and IV constituents. Eight background events are needed for statistical analysis. An analysis of the Appendix III background data was conducted and is included in **Appendix 5**. Trending was found in Boron (MW-3) and Total Dissolved Solids (MW-3), MW-3 is an up-gradient well. Trending was not removed at this time; otherwise the site would be below the minimum of eight background samples needed to run statistics.

Statistical analysis was then performed on the Appendix III constituents from the May 2019 sampling event compared to the established background dataset. Prediction interval analyses compare one or more observations to a limit set by background data. Inter-well analyses compare observations from upgradient background wells and their relation to the observations for the downgradient wells. Intra-well analyses compare background observations to current observations of the same well. Due to varying geology in the state of Missouri, intra-well analyses have been deemed a more appropriate method.

Statistical analysis results are presented below for those constituents determined to have an exceeded a prediction limit. However, EPA's "Unified Guidance Document: Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities," March 2009, EPA 530/R-09-007 is referenced

multiple times in the preamble of the EPA CCR regulations for groundwater sampling and analysis requirements. According to the EPA Unified Guidance, a prediction limit exceedance is not considered a statistically significant increase (SSI) until it is confirmed through retesting. SSIs generated by non-detectable results or with less than eight background events are considered statistically invalid.

Table 4 lists the parameters with exceedances of prediction limits during the May 2019 sampling event, the associated monitoring wells, if the exceedance is initial versus confirmed, the predicted limit, the measured concentration, and the MCL set forth in the National Drinking Water Regulations. The MCL is the highest level of a contaminant that is allowed in drinking water.

Table 4 – Prediction Limit Exceedances Observed During May 2019 Sampling Event

Constituent	Monitoring Well	Initial vs. Confirmed	Predicted Limit (mg/L)	Measured Concentration (mg/L)	Drinking Water MCLs (mg/L)
Boron	MW-5A (d)	Initial	0.5401	0.56	NA
pH	MW-3 (u)	Initial	5.95	6.03	NA
pH	MW-5A (d)	Initial	8.257	8.54	NA
pH	MW-6 (d)	Initial	7.516	8.84	NA
pH	MW-6A (d)	Initial	8.059	8.22	NA
Total Dissolved Solids	MW-5A (d)	Confirmed	1700	1800	NA

NA = Not Applicable

It should be noted that the power curve for these analyses is not considered strong (see **Appendix 5**). The data set consists of only 12 sampling events from January 2016 to May 2019. A small data set triggers an SSI when there is even a slight increase in concentration. Sanitas added notes to each SSI "Insufficient data to test for seasonality: data were not deseasonalized."

The EPA Unified Guidance Chapter 5.2.3 states "In groundwater data collection and testing, background conditions may not be static over time. Caution should be observed in removing observations which may signal a change in natural groundwater quality. Even when conditions have not changed, an apparently extreme measurement may represent nothing more than a portion of the background distribution that has yet to be observed. This is particularly true if the background data set contains fewer than 20 samples." Chapter 5.2.4 states "With such a small background sample, it can be difficult to develop an adequately powerful intrawell prediction level or control chart, even when retesting is employed (Chapter 19). Thus, additional background data will be needed to augment compliance well samples". Minor increases in concentrations did not result in any primary MCLs to be exceeded by any of the prediction limit exceedances during the sampling event, demonstrating that the groundwater has not been contaminated.

6.3 Results Interpretation

The result for Boron (MW-5A) and pH (MW-3(u), MW-5A, MW-6 and MW-6A) indicated an initial intra-well prediction limit exceedance for the listed monitoring well during the May 2019 sampling event. There is no current primary (health based) MCL boron or pH. The facility plans to resample as part of the November 2019 sampling event.

During the November 2018, the result for Total Dissolved Solids (MW-5A) indicated an initial intra-well prediction limit exceedance. There is no current primary (health based) MCL for total dissolved solids. This initial prediction limit exceedances was confirmed during the May 2019 sampling event. However, it should be noted that the power curve for these analyses is not considered strong. A small data set triggers an SSI when there is even a slight increase in concentration. The EPA Unified Guidance Chapter 5.2.4 states "With such a small background sample, it can be difficult to develop an adequately powerful intrawell prediction level or control chart, even when retesting is employed (Chapter 19). Thus, additional background data will be needed to augment compliance well samples".

Minor increases in concentrations did not result in any primary MCLs to be exceeded by any of the prediction limit exceedances during the sampling event, demonstrating that the groundwater has not been contaminated. It was also noted that higher levels of total dissolved solids were seen in the side-gradient well MW-7 demonstrating that a there was likely not a release from the facility. Therefore, the site will continue with detection monitoring on a semi-annual basis at this time.

Included below is a discussion of the previous results for comparison.

November 2018

The result for Total Dissolved Solids (MW-5A) indicated an initial intra-well prediction limit exceedance for the listed monitoring well during the November 2018 sampling event. There is no current primary (health based) MCL for total dissolved solids. The facility plans to resample MW-5A for Total Dissolved Solids as part of the May 2019 sampling event.

During the May 2018, no intra-well prediction limits were exceeded. Therefore, there were no initial prediction limit exceedances to confirm during the November 2018 sampling event.

May 2018

No intra-well prediction limits were exceeded during the May 2018 sampling event.
The October 2017 results for Total Dissolved Solids (MW-7) indicated an exceedance of the predicted limit for the listed monitoring wells. However, this initial prediction limit exceedance was not confirmed during the May 2018 sampling event.

October 2017

The result for Total Dissolved Solids (MW-7) indicated an initial intra-well prediction limit exceedance for the listed monitoring wells during the October 2017 sampling event. However, the result was below the tolerance limit. There is no current primary (health based) MCL for total dissolved solids.

Review of the Total Dissolved Solids in the duplicate sample taken from the same well (MW-7) shows a result of 3,000 mg/L, which would not be an exceedance of the intra-well prediction limit of 3,069 mg/L. Due to the variances between the sample and the duplicate, the site will re-evaluate MW-7 for Total Dissolved Solids during the next sampling event.

MW-7 is considered a sidegradient well, therefore no further action is needed for exceedances in sidegradient or upgradient wells.

6.4 Proposed Actions

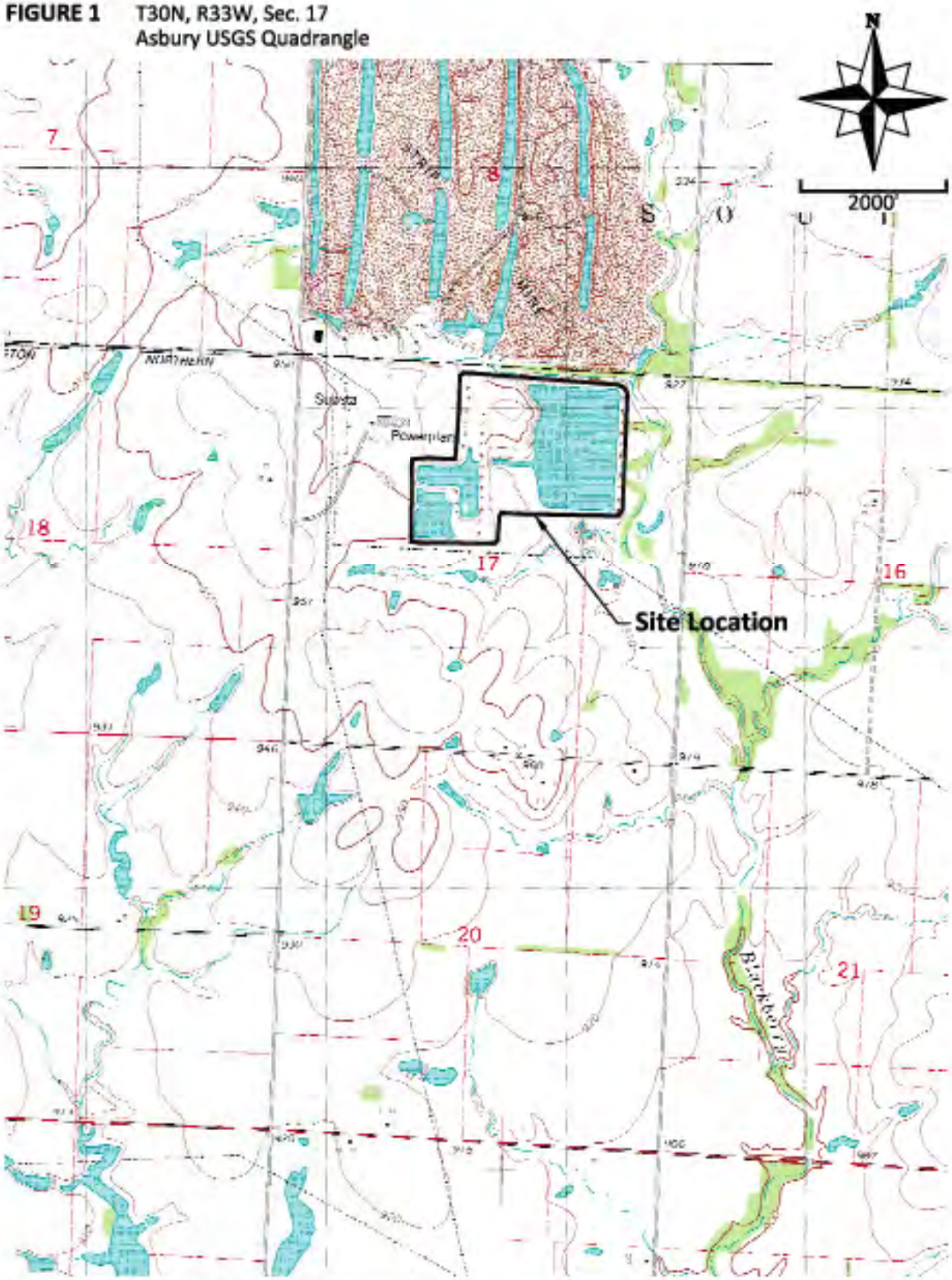
The site will continue with the detection monitoring program on a semi-annual basis. However, the constituents listed in Appendix IV will remain eliminated from the overall semi-annual detection monitoring plan after this review of the semi-annual groundwater sampling event analytical results, according to the EPA CCR Rule.

FIGURES

Midwest Environmental Consultants

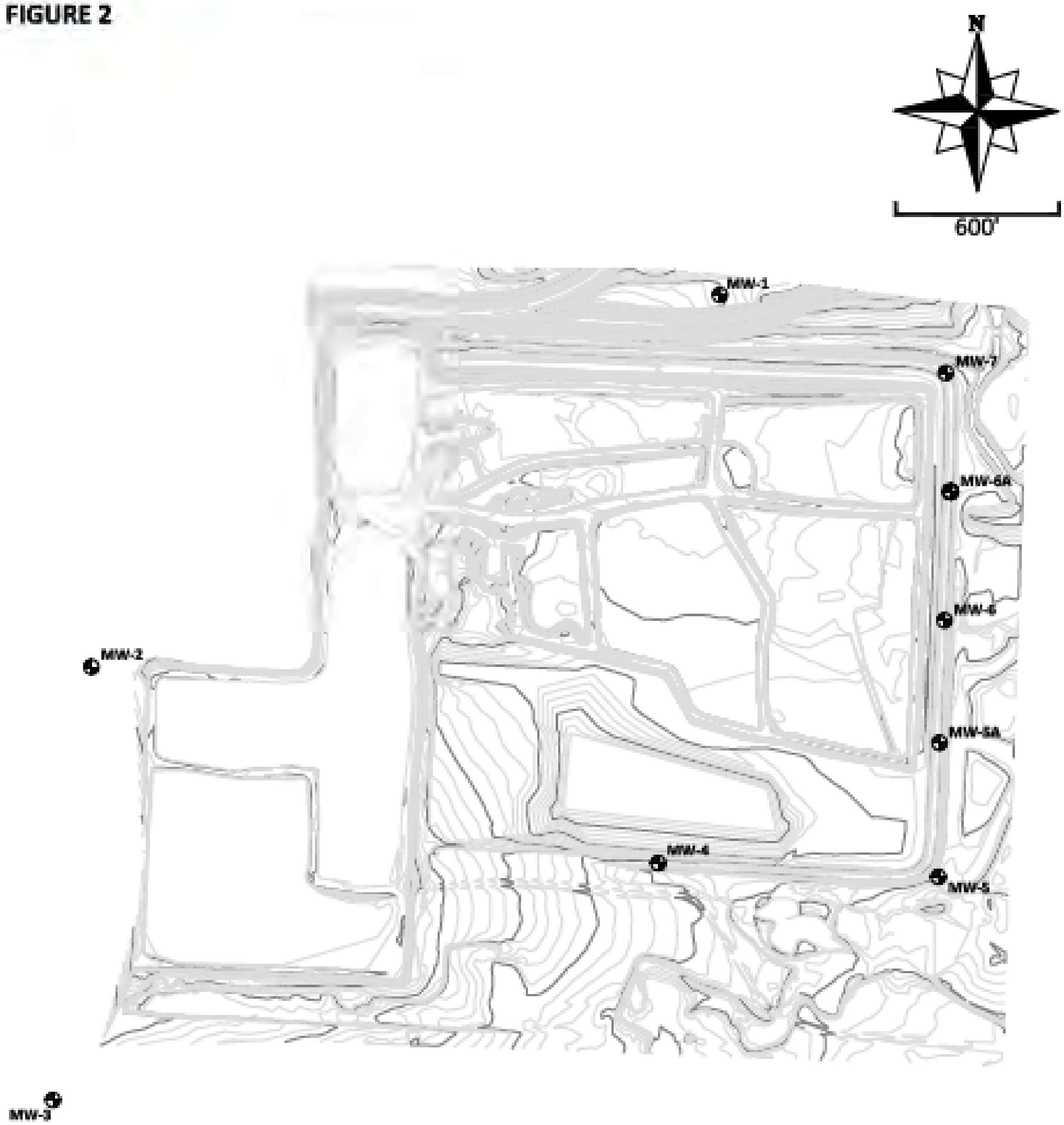
Asbury Generating Station CCR Impoundment
Groundwater Sampling Event - May 2019
Site Location Map

FIGURE 1 T30N, R33W, Sec. 17
Asbury USGS Quadrangle



Asbury Generating Station CCR Impoundment
Groundwater Sampling Event - May 2019
Groundwater Monitoring System

FIGURE 2



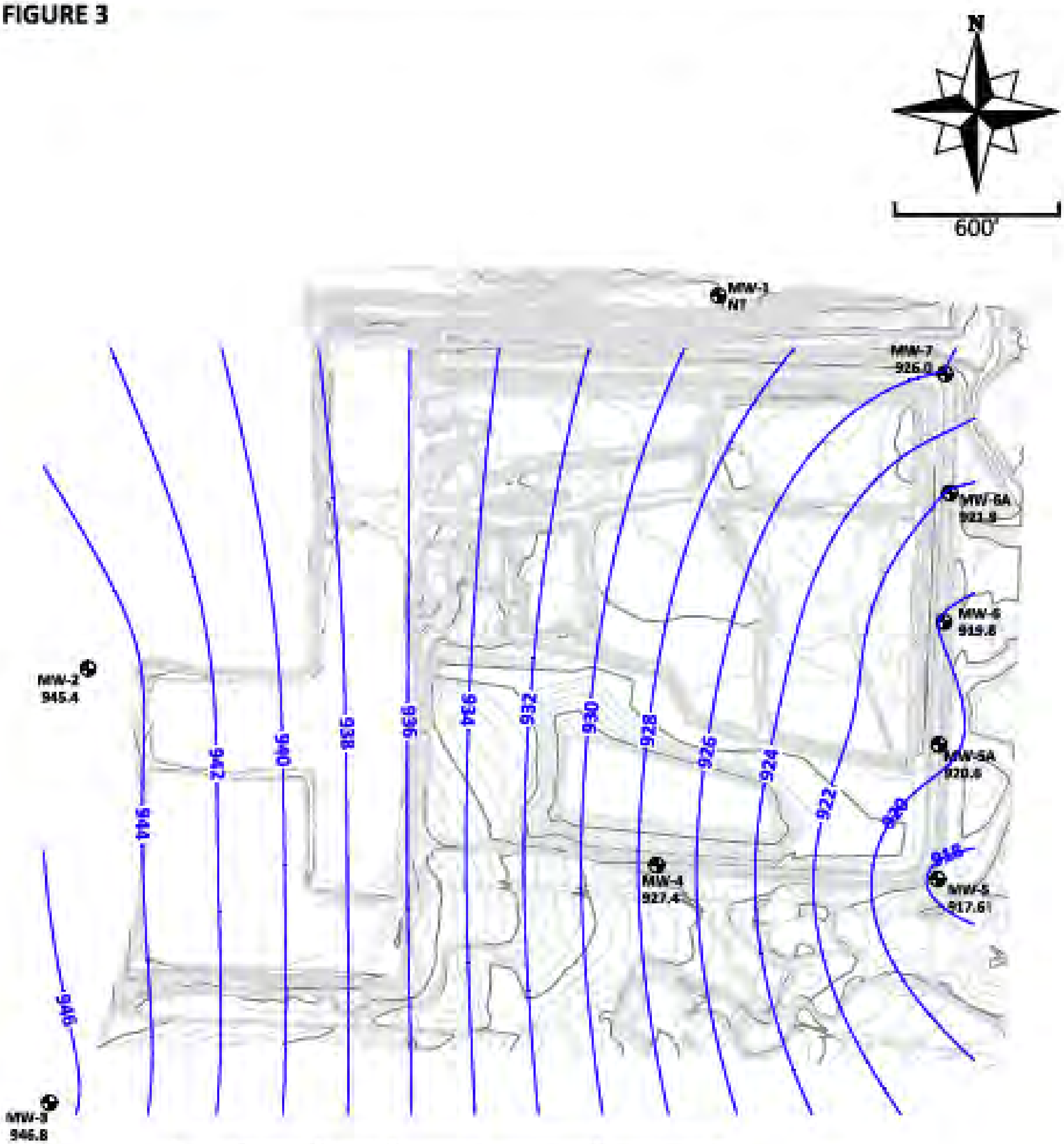
Well ID	Northing	Easting
MW-1	435781.18 *	2765165.16 *
MW-2	434428.48	2761861.27
MW-3	432843.77	2761720.88
MW-4	432709.99	2764038.99
MW-5	432659.27	2765866.23
MW-5A	434158.09	2765869.78
MW-6	434608.46	2765887.98
MW-6A	435071.48	2765730.08
MW-7	435385.42	2765850.33

* Coordinate location is approximate

Legend

Monitoring Well

FIGURE 3



Well ID	Northing	Easting	Top Of Casing	Static Water Level (BTOC)	Static Water Level
MW-1	[illegible]	[illegible]	[illegible]	NT	NT
MW-2	[illegible]	[illegible]	[illegible]	2.4	[illegible]
MW-3	[illegible]	[illegible]	[illegible]	2.0	[illegible]
MW-4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MW-5	[illegible]	[illegible]	[illegible]	1.6	[illegible]
MW-5A	[illegible]	[illegible]	[illegible]	8.7	[illegible]
MW-6	[illegible]	[illegible]	[illegible]	8.2	[illegible]
MW-6A	[illegible]	[illegible]	[illegible]	7.4	[illegible]
MW-7	[illegible]	[illegible]	[illegible]	2.9	[illegible]

Legend

Monitoring Well

APPENDIX 1

MDNR Groundwater System Approval

Missouri Department of NATURAL RESOURCES
dnr.mo.gov
Eric R. Greitens, Governor
Carol S. Comer, Director

NOV 02 2017

Mr. Kavan Stull, Senior Environmental Coordinator
Empire District
602 South Joplin Avenue
Joplin, MO 64802

RE: Site Characterization Workplan

Dear Mr. Stull:

The Missouri Department of Natural Resources has reviewed the document "Site Characterization Workplan" dated May 16, 2017. The site has undergone extensive characterization regarding construction of a coal combustion residual (CCR) landfill near the CCR impoundments. The department's Water Protection Program has determined, through consulting with the Missouri Geological Survey, this characterization is sufficient and may be used in whole to complete the required monitoring of the sub-surface conditions at the site. Additional submittal of site characterization is not necessary, as the previous submittal meets the requirement for special condition 19(b) of the Missouri State Operating Permit MO-0095362. The facility may proceed with the next step laid out in the permit; special condition 19(c). Enclosed is the Missouri Geological Survey concurrence.

If you were adversely affected by this decision, you may be entitled to an appeal before the Administrative Hearing Commission (AHC) pursuant to 10 CSR 20 1.020 and Section 621.250, RSMo. To appeal, you must file a petition with the AHC within 30 days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the AHC. Contact information for the AHC is by mail at Administrative Hearing Commission, United States Post Office Building, Third Floor, 131 West High Street, P.O. Box 1557, Jefferson City, MO 65102, by phone at 573-751-2422, by fax at 573-751-5018, and by website at www.oa.mo.gov/ahc.

If you have any questions, please do not hesitate to contact Ms. Pam Hackler by mail at Department of Natural Resources, Water Protection Program, P.O. Box 176, Jefferson City, MO 65102-0176, by phone at 573-526-3386; or by email at pam.hackler@dnr.mo.gov. Thank you.

Sincerely,

WATER PROTECTION PROGRAM

Michael J. Abbott, Chief
Operating Permits Section

MJA/php

Enclosure

c: Mr. Randall Willoughby, Southwest Regional Office

Missouri Department of NATURAL RESOURCES

dnr.mo.gov

Eric R. Greitens, Governor

Carol S. Comer, Director

MEMORANDUM

SWR18011
Jasper County

DATE: October 18, 2017

TO: Pam Hackler- WPP- Industrial Wastewater Unit

FROM: Fletcher N. Bone, Geologist, Environmental Geology Section, Geological Survey Program, MGS

Fletcher N. Bone

STATE OF MISSOURI
REGISTERED GEOLOGIST

October 18, 2017

SUBJECT: Site characterization for existing CCR impoundments
Asbury Power Plant Site Characterization Work Plan- CCR
37 21 22.66 Latitude, -94 35 4.79 Longitude,
Jasper County, Missouri

The Missouri Geological Survey (MGS) has reviewed the documents titled, 'NPDES Permit MO-0095362 Asbury Power Plant, Jasper County, Missouri, Site Characterization Work Plan', prepared by Empire District Electric Company, dated September 8, 2017 and 'Site Characterization Work Plan, Coal Combustion Residuals Impoundments, Empire Electric Facility - Permit MO-0095362, Jasper County, Missouri, Geotechnology Project No. J021738.03', prepared by Geotechnology Inc., dated May 16, 2017. The MGS offers the following comment.

General Comment:

The MGS agrees that the existing Coal Combustion Residuals (CCR) impoundments (site 1) do not need further site characterization, at this time. The site characterization performed, as described in the Detailed Site Investigation Report (DSI), dated January 21, 2015, at the proposed CCR impoundment (site 2) that is approximately 1,000 feet south of the existing CCR impoundments (site 1), coupled with the geologic and hydrologic data provided that pertains to the existing CCR impoundments (site 1) (1996 to present data), provides adequate characterization of the geology and hydrology of the site 1. The geologic and hydrologic settings of both sites are similar, with geologic boring logs and potentiometric data of both sites being compared. The hydraulic conductivity testing conducted at the proposed CCR site (site 2) has demonstrated that there is a low potential for groundwater contamination for this area.

If you are in need of further assistance from our office or have questions regarding this evaluation please feel free to contact me at (573) 368-2161.

APPENDIX 2

Baseline Sampling Information

EPA CCR Rule

Appendix III to Part 257—Constituents for Detection Monitoring

Boron
Calcium
Chloride
Fluoride
pH
Sulfate
Total Dissolved Solids (TDS)

Appendix IV to Part 257—Constituents for Assessment Monitoring

Antimony
Arsenic
Barium
Beryllium
Cadmium
Chromium
Cobalt
Lead
Lithium
Mercury
Molybdenum
Selenium
Thallium
Radium 226 and 228 combined

1st Baseline Event –
January 2016 Sampling Event

Constituent	Units	MCL	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6	MW-6A	MW-7
Appendix III										
Boron	mg/L	NA	0.33	<0.5 J	<0.05 J	<0.5 J	<0.5 J	<0.5 J	<0.5 J	<0.5 J
Calcium	mg/L	NA	57	74	220	84	200	250	140	570
Chloride	mg/L	NA	140	83	120	4.7	28	10	38	38
Fluoride	mg/L	4	0.43	0.47	0.31	0.28	0.30	0.24	0.35	<0.2 J
pH	SU	NA	6.33	5.81	6.31	7.33	7.09	6.97	7.09	6.51
Sulfate	mg/L	NA	260	360	1100	140	800	1000	600	1800
Total Dissolved Solids	mg/L	NA	690	790	1900	590	1500	1800	1300	2800
Appendix IV										
Antimony	mg/L	0.006	<0.002	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J
Arsenic	mg/L	0.01	<0.002 J	0.01	<0.01 J	<0.02 J	<0.01	<0.01	<0.01	<0.01
Barium	mg/L	2	0.044	0.0099	0.065	0.086	0.036	0.02	0.042	0.011
Beryllium	mg/L	0.004	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Cadmium	mg/L	0.005	0.0012	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	mg/L	0.1	<0.002 J	<0.002 J	<0.01 J	<0.01 J	<0.01 J	<0.01 J	<0.01	<0.01
Cobalt	mg/L	NA	<0.01 J	<0.01 J	0.046	<0.002 J	0.018	0.0022	0.02	0.014
Lead	mg/L	0.015	<0.002 J	<0.002	<0.01 J	<0.002 J	<0.002	<0.002	<0.002	<0.002 J
Lithium	mg/L	NA	0.057	0.15	<0.05 J	<0.5 J	<0.5 J	<0.5 J	<0.5 J	<0.5 J
Mercury	mg/L	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	NA	<0.002	<0.002 J	<0.002 J	<0.002 J	<0.01 J	<0.002	<0.01 J	<0.002
Selenium	mg/L	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thallium	mg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Combined Radium	pCi/L	5	<0.477 J	<0.427 J	<2.08	<0.563 J	<0.392 J	<0.446 J	<0.306 J	<0.279 J

NA = Not Applicable

<x = Less than reporting limit (nondetectable)

J = Trace value seen above minimum detection limit but below reporting limit (trace)

2nd Baseline Event –
March 2016 Sampling Event

Constituent	Units	MCL	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6	MW-6A	MW-7
Appendix III										
Boron	mg/L	NA	0.90	0.060	<0.25	0.29	0.29	0.34	0.34	0.29
Calcium	mg/L	NA	120	92	260	94	190	250	160	620
Chloride	mg/L	NA	180	70	15	4.4	23	9.0	36	34
Fluoride	mg/L	4	0.28	0.28	0.10	0.38	0.31	0.23	0.31	0.16
pH	SU	NA	5.82	5.68	6.72	7.15	6.94	6.79	6.98	6.22
Sulfate	mg/L	NA	570	400	570	140	710	970	550	1800
Total Dissolved Solids	mg/L	NA	1300	840	1600	590	1500	1800	1200	2900
Appendix IV										
Antimony	mg/L	0.006	<0.002	<0.002	<0.002	<0.002	<0.002 J	<0.002	<0.002 J	<0.002
Arsenic	mg/L	0.01	<0.002 J	0.024	0.0038	<0.002 J	0.0038	0.0026	0.0025	0.004
Barium	mg/L	2	0.060	0.012	0.034	0.047	0.042	0.026	0.051	0.0089
Beryllium	mg/L	0.004	<0.002	<0.002 J	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Cadmium	mg/L	0.005	0.0028	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	mg/L	0.1	<0.002	<0.002 J	0.0034	<0.002	<0.002	<0.002	<0.002	<0.002
Cobalt	mg/L	NA	0.017	0.0095	0.021	<0.002 J	0.02	0.0061	0.0063	0.016
Lead	mg/L	0.015	<0.002 J	<0.002 J	<0.002 J	<0.002	<0.002	<0.002	<0.002	<0.002
Lithium	mg/L	NA	0.20	0.15	0.074	0.074	0.14	0.22	0.14	0.30
Mercury	mg/L	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	NA	<0.002	<0.002 J	<0.002	<0.002 J	0.0041	<0.002 J	0.0038	<0.002
Selenium	mg/L	0.05	<0.002	<0.002	<0.002	0.0021	0.0028	0.0031	0.0031	<0.002
Thallium	mg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Combined Radium	pCi/L	5	<0.337 J	<0.389 J	<0.84 J	<0.315 J	<0.336 J	<0.319 J	<0.348 J	<0.329 J

NA = Not Applicable

<x = Less than reporting limit (nondetectable)

J = Trace value seen above minimum detection limit but below reporting limit (trace)

3rd Baseline Event –
May 2016 Sampling Event

Constituent	Units	MCL	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6	MW-6A	MW-7
Appendix III										
Boron	mg/L	NA	0.21	0.044	0.027	0.24	0.26	0.25	0.23	0.29
Calcium	mg/L	NA	130	100	91	5	59	11	90	36
Chloride	mg/L	NA	140	83	120	4.7	28	10	38	38
Fluoride	mg/L	4	0.28	0.27	0.22	0.55	0.35	0.26	0.43	0.18
pH	SU	NA	5.30	4.37	5.97	6.43	6.60	6.51	6.64	5.82
Sulfate	mg/L	NA	160	540	820	150	920	1400	620	2400
Total Dissolved Solids	mg/L	NA	500	800	1700	590	1500	1800	1100	2900
Appendix IV										
Antimony	mg/L	0.006	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J
Arsenic	mg/L	0.01	0.0013	0.027	0.01	0.0043	0.01	0.007	0.0037	0.0082
Barium	mg/L	2	0.021	0.01	0.025	0.045	0.037	0.041	0.04	0.021
Beryllium	mg/L	0.004	<0.001	<0.001 J	<0.001 J	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.005	0.0011	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	mg/L	0.1	<0.002 J	<0.002 J	0.0025	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J
Cobalt	mg/L	NA	0.0072	0.0073	0.0071	<0.0005J	0.00081	0.0035	<0.0005J	0.0037
Lead	mg/L	0.015	<0.001 J	<0.001 J	<0.001 J	<0.001 J	<0.001	<0.001	<0.001 J	<0.001 J
Lithium	mg/L	NA	<0.05 J	0.15	<0.05 J	0.074	0.16	0.31	0.12	0.22
Mercury	mg/L	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	NA	<0.005	<0.005	<0.005	<0.005	<0.005 J	0.0052	<0.005	<0.005
Selenium	mg/L	0.05	<0.005	<0.005	<0.005 J	<0.005	<0.005 J	<0.005 J	<0.005	<0.005
Thallium	mg/L	0.002	<0.001 J	<0.001	<0.001	<0.001	<0.001 J	<0.001 J	<0.001	<0.001
Combined Radium	pCi/L	5	<0.355	<0.427 J	<0.386 J	<0.402 J	<0.377 J	<0.357 J	<0.334 J	<0.333 J

NA = Not Applicable

<x = Less than reporting limit (nondetectable)

J = Trace value seen above minimum detection limit but below reporting limit (trace)

4th Baseline Event –
August 2016 Sampling Event

Constituent	Units	MCL	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6	MW-6A	MW-7
Appendix III										
Boron	mg/L	NA	0.19	0.057	0.067	0.27	0.27	0.29	0.27	0.22
Calcium	mg/L	NA	38	79	110	74	180	220	130	430
Chloride	mg/L	NA	120	77	35	6	35	12	65	49
Fluoride	mg/L	4	0.25	0.15	0.3	0.26	0.31	0.23	0.37	0.22
pH	SU	NA	6.04	5.73	7	7.17	7.04	6.88	7.14	6.29
Sulfate	mg/L	NA	<0.005 J	<0.005 J	<0.005 J	<0.005 J	<0.005 J	<0.005	<0.005 J	<0.005 J
Total Dissolved Solids	mg/L	NA	460	850	730	540	1500	1800	1100	2900
Appendix IV										
Antimony	mg/L	0.006	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J
Arsenic	mg/L	0.01	<0.001 J	0.013	<0.001 J	<0.001 J	0.001	<0.001 J	<0.001 J	<0.001 J
Barium	mg/L	2	0.023	<0.01 J	0.012	0.035	0.031	0.014	0.037	<0.01 J
Beryllium	mg/L	0.004	<0.001	<0.001 J	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.005	<0.001 J	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	mg/L	0.1	<0.002	<0.002	<0.002 J	<0.002	<0.002	<0.002	<0.002	<0.002
Cobalt	mg/L	NA	0.0052	0.0088	0.0038	<0.0005J	0.00075	<0.0005J	<0.0005J	0.015
Lead	mg/L	0.015	<0.001 J	<0.001 J	<0.001 J	<0.001 J	<0.001	<0.001	<0.001 J	<0.001
Lithium	mg/L	NA	<0.05 J	0.16	<0.05 J	0.078	0.16	0.22	0.11	0.34
Mercury	mg/L	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	NA	<0.005	<0.005	<0.005	<0.005	<0.005 J	<0.005	0.0067	<0.005
Selenium	mg/L	0.05	<0.005 J	<0.005 J	<0.005 J	<0.005 J	<0.005 J	<0.005	<0.005 J	<0.005 J
Thallium	mg/L	0.002	<0.001 J	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Combined Radium	pCi/L	5	<0.424 J	<0.465 J	<0.833	<0.441 J	<0.435 J	<0.45 J	<0.484 J	<0.418 J

NA = Not Applicable

<x = Less than reporting limit (nondetectable)

J = Trace value seen above minimum detection limit but below reporting limit (trace)

5th Baseline Event –
October 2016 Sampling Event

Constituent	Units	MCL	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6	MW-6A	MW-7
Appendix III										
Boron	mg/L	NA	0.2	0.053	0.047	0.24	0.33	0.34	0.31	0.26
Calcium	mg/L	NA	43	91	100	94	220	260	130	490
Chloride	mg/L	NA	130	65	74	6	29	13	65	56
Fluoride	mg/L	4	0.28	0.18	0.28	0.31	0.39	0.25	0.41	0.28
pH	SU	NA	6.59	5.95	7.21	7.51	8.00	6.98	7.85	6.75
Sulfate	mg/L	NA	99	470	120	120	1100	1100	570	1400
Total Dissolved Solids	mg/L	NA	460	850	580	570	1500	1700	1100	2800
Appendix IV										
Antimony	mg/L	0.006	<0.002	<0.002	<0.002 J	<0.002	<0.002	<0.002	<0.002 J	<0.002
Arsenic	mg/L	0.01	<0.001	0.014	<0.001 J	<0.001 J	<0.001 J	<0.001	<0.001 J	<0.001 J
Barium	mg/L	2	0.028	<0.01 J	0.02	0.03	0.033	0.013	0.037	<0.01 J
Beryllium	mg/L	0.004	<0.001	<0.001 J	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.005	<0.001 J	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	mg/L	0.1	<0.002	<0.002	<0.002 J	<0.002	<0.002	<0.002	<0.002	<0.002
Cobalt	mg/L	NA	0.0051	0.0095	0.0013	0.00073	0.0072	<0.0005J	<0.0005J	0.014
Lead	mg/L	0.015	<0.001 J	<0.001	<0.001 J	<0.001 J	<0.001	<0.001	<0.001	<0.001
Lithium	mg/L	NA	<0.05 J	0.17	<0.05	0.078	0.17	0.24	0.12	0.32
Mercury	mg/L	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	NA	<0.005	<0.005	<0.005	<0.005	<0.005 J	0.0066	<0.005	<0.005
Selenium	mg/L	0.05	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005J	<0.005
Thallium	mg/L	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Combined Radium	pCi/L	5	<0.436J	<0.478J	<0.535J	<0.503J	<0.498J	<0.464J	<0.453J	<0.424J

NA = Not Applicable

<x = Less than reporting limit (nondetectable)

J = Trace value seen above minimum detection limit but below reporting limit (trace)

6th Baseline Event –
March 2017 Sampling Event

Constituent	Units	MCL	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6	MW-6A	MW-7
Appendix III										
Boron	mg/L	NA	0.22	0.052	0.057	0.23	0.29	0.33	0.36	0.26
Calcium	mg/L	NA	38	93	250	86	200	260	170	500
Chloride	mg/L	NA	130	52	19	5.3	29	11	19	39
Fluoride	mg/L	4	0.21	0.12	<0.1 J	0.29	0.29	0.19	0.3	0.12
pH	SU	NA	6.07	5.84	6.67	7.32	7.38	7.15	7.21	6.40
Sulfate	mg/L	NA	130	540	630	150	1100	1000	720	1900
Total Dissolved Solids	mg/L	NA	500	940	1600	620	1700	1900	1400	3000
Appendix IV										
Antimony	mg/L	0.006	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Arsenic	mg/L	0.01	<0.001	0.037	0.0022	0.0013	0.0014	<0.001 J	0.0043	<0.001 J
Barium	mg/L	2	0.021	0.011	0.021	0.033	0.026	0.015	0.027	<0.01 J
Beryllium	mg/L	0.004	<0.001 J	0.0012	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001 J
Cadmium	mg/L	0.005	0.0012	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	mg/L	0.1	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J
Cobalt	mg/L	NA	0.0071	0.0097	0.0096	<0.0005J	0.0022	0.0024	0.0017	0.014
Lead	mg/L	0.015	<0.001	<0.001	<0.001 J	<0.001 J	<0.001	<0.001	<0.001	<0.001
Lithium	mg/L	NA	<0.05 J	0.17	0.072	0.076	0.16	0.23	0.14	0.32
Mercury	mg/L	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	NA	<0.005 J	<0.005 J	<0.005	<0.005	<0.005 J	<0.005	<0.005 J	<0.005
Selenium	mg/L	0.05	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thallium	mg/L	0.002	<0.001 J	<0.001 J	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Combined Radium	pCi/L	5	0.575	1.63	0.287	1.50	0.803	2.68	1.73	1.62

NA = Not Applicable

<x = Less than reporting limit (nondetectable)

J = Trace value seen above minimum detection limit but below reporting limit (trace)

7th Baseline Event –
June 2017 Sampling Event

Constituent	Units	MCL	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6	MW-6A	MW-7
Appendix III										
Boron	mg/L	NA	<0.08J	<0.08J	0.034	0.27	0.31	0.37	0.36	0.26
Calcium	mg/L	NA	42	100	300	89	200	260	160	470
Chloride	mg/L	NA	130	54	110	5.4	23	12	26	48
Fluoride	mg/L	4	0.43	0.19	0.18	0.35	0.42	0.3	0.42	0.21
pH	SU	NA	6.35	5.78	6.62	7.22	7.04	6.93	7.09	6.41
Sulfate	mg/L	NA	78	650	1400	180	940	1300	780	2400
Total Dissolved Solids	mg/L	NA	450	950	2000	610	1600	1800	1400	2900
Appendix IV										
Antimony	mg/L	0.006	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Arsenic	mg/L	0.01	<0.001J	0.1	0.0032	<0.001J	0.0037	<0.001	0.0018	<0.001
Barium	mg/L	2	0.03	0.016	0.048	0.04	0.026	0.017	0.025	<0.01J
Beryllium	mg/L	0.004	<0.001	0.0031	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.005	<0.001J	<0.001	<0.001J	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	mg/L	0.1	<0.002	<0.002	<0.002J	<0.002	<0.002	<0.002	<0.002	<0.002
Cobalt	mg/L	NA	0.004	0.0088	0.0042	<0.0005J	0.0045	0.00087	0.0059	0.0015
Lead	mg/L	0.015	0.0033	0.001	0.0074	<0.001	<0.001	<0.001	<0.001	<0.001
Lithium	mg/L	NA	<0.05J	0.18	0.053	0.085	0.18	0.25	0.15	0.34
Mercury	mg/L	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	NA	<0.005	<0.005J	<0.005	<0.005	<0.005J	<0.005	<0.005J	<0.005
Selenium	mg/L	0.05	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thallium	mg/L	0.002	<0.001	<0.001	<0.001J	<0.001	<0.001	<0.001	<0.001	<0.001
Combined Radium	pCi/L	5	<0.397J	<0.337J	<0.403	<0.291J	<0.343J	<0.414J	<0.33J	<0.314J

NA = Not Applicable
<x = Less than reporting limit (nondetectable)
J = Trace value seen above minimum detection limit but below reporting limit (trace)

8th Baseline Event –
August 2017 Sampling Event

Constituent	Units	MCL	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6	MW-6A	MW-7
Appendix III										
Boron	mg/L	NA	0.16	<0.08J	<0.08J	0.28	0.33	0.34	0.38	0.27
Calcium	mg/L	NA	43	98	83	57	220	250	180	510
Chloride	mg/L	NA	130	45	8.1	5.3	23	12	26	38
Fluoride	mg/L	4	0.26	0.17	0.32	0.27	0.45	0.25	0.4	0.22
pH	SU	NA	6.2	5.7	6.7	7.3	7.0	7.2	7.1	6.3
Sulfate	mg/L	NA	82	550	63	140	920	1100	730	2200
Total Dissolved Solids	mg/L	NA	450	960	450	530	1600	1800	1400	2900
Appendix IV										
Antimony	mg/L	0.006	<0.002J	<0.002J	<0.002J	<0.002J	<0.002J	<0.002J	<0.002J	<0.002
Arsenic	mg/L	0.01	<0.001J	0.013	<0.001J	0.002	<0.001J	<0.001J	<0.001J	<0.001J
Barium	mg/L	2	0.024	0.01	0.018	0.027	0.023	0.018	0.021	<0.01J
Beryllium	mg/L	0.004	<0.001	<0.001J	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001J
Cadmium	mg/L	0.005	<0.001J	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	mg/L	0.1	<0.002J	<0.002	0.0026	<0.002	<0.002	<0.002	<0.002	<0.002
Cobalt	mg/L	NA	0.0036	0.01	0.00067	<0.0005J	0.0023	<0.0005J	0.0051	0.014
Lead	mg/L	0.015	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lithium	mg/L	NA	<0.05J	0.17	<0.05J	0.073	0.18	0.22	0.15	0.32
Mercury	mg/L	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	NA	<0.005	<0.005J	<0.005	<0.005J	<0.005J	<0.005J	<0.005J	<0.005
Selenium	mg/L	0.05	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thallium	mg/L	0.002	<0.001J	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Combined Radium	pCi/L	5	<0.42J	<0.417J	<0.473	<0.476J	<0.383J	<0.389J	<0.291J	<0.346J

NA = Not Applicable

<x = Less than reporting limit (nondetectable)

J = Trace value seen above minimum detection limit but below reporting limit (trace)

APPENDIX 3

Monitoring Well Field Inspection Sheets and Field Notes

Field Sampling Log

Facility: Asbury CCR (Permit #) Monitoring Well ID: MW- 2

Sample [X] Blind Duplicate [ ] Field Blank [ ]

Purge Information:

Method of Well Purge: **Peristaltic Pump with 3/8 - inch Diameter Tubing**

Actual Purge Volume Removed: 2400 mL with pump calibration.

Date / Time Initiated: 5-16-19 @ 9:06 Date / Time Completed: 5-16-19 @ 9:30

Well Purged To Dryness? Y / (N) Petroleum or Gas Detected? Y / (N)

Purge Data:

Time	Purge Rate (mL/min)	Cumulative Volume (mL)	Temp. (°C)	pH (SU)	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP (MV)		Other (Color, Clarity, Odor)
9:12	200	1200	15.95	6.87	0.651	0.94	-91.5		clear
9:14		1600	15.94	6.59	0.653	0.77	-84.0		"
9:16		2000	15.85	6.43	0.648	0.58	-71.9		"
9:18		2400	15.84	6.35	0.640	0.47	-66.2		"

Time sampled 9:20

Weather Conditions Sunny 70's

Water Level Start 2.36

Water Level Finish 4.62

Name (MEC Field Sampler): Ryan Ortbals and Rick Elgin

Sampler Signature [signature]

Field Inspection	Good	Fair	Poor
Access	(G)	F	P
Pad Condition	(G)	F	P
Casing Condition	G	F	(P)
Locking Cap & Lock no lock	G	(F)	P
Riser Condition	G	F	(P)

Field Inspection	Yes	No	N/A
Well ID Visible	(Y)	N	N/A
Standing Water	Y	(N)	N/A
Clear of Weeds	(Y)	N	N/A
Measuring Point	(Y)	N	N/A
Split sample with MDNR	Y	(N)	N/A
Maintenance Performed	Y	(N)	N/A
Decontamination Normal	(Y)	N	N/A
Equipment Calibration Normal	(Y)	N	N/A
Redevelopment Needed	(Y)	N	N/A
Any deviations from SAP	(Y)	N	N/A
Sediment Thickness Checked	(Y)	N	N/A

Historical Data: Average of sampling events

Constituent	Units	MW-1	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6
pH	S.U.	NO TEST	5.83	5.08	6.30	6.83	6.82	6.72
Specific Conductance	umhos/cm	GW	0.786	1.132	2.083	0.841	1.769	1.900
Total Well Depth	ft	Level						
Average GW Depth	ft	Only	1.24	0.4	5.39	1.32	6.92	7.86
Average GW Drop	ft							
2 System Volumes (Min Purged Amount)	mL	DON'T SAMPLE	800	800	800	800	800	800

✓

Field Sampling Log

Facility: Asbury CCR (Permit #) Monitoring Well ID: MW- 3

Sample ☒ Blind Duplicate ☐ Field Blank ☐

Purge Information:

Method of Well Purge: **Peristaltic Pump with 3/8 - Inch Diameter Tubing**

Actual Purge Volume Removed: 2400 mL with pump calibration.

Date / Time Initiated: 5-16-19 @ 9:36 Date / Time Completed: 5-16-19 @ 9:54

Well Purged To Dryness?: Y / N Petroleum or Gas Detected? Y / N

Purge Data:

Time	Purge Rate (mL/min)	Cumulative Volume (mL)	Temp. (°C)	pH (SU)	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP (MV)		Other (Color, Clarity, Odor)
9:42	200	1200	15.90	6.13	1.097	0.62	-60.0		cloudy
9:44		1600	16.11	6.05	1.061	0.46	-62.6		brown
9:46		2000	16.03	6.04	1.062	0.30	-64.3		
9:48		2400	16.09	6.03	1.063	0.27	-60.5		✓

Time sampled 9:50

Weather Conditions Sunny 70's

Water Level Start 2 inches

Water Level Finish 4 inches

Name (MEC Field Sampler): Ryan Ortbals and Rick Elgin

Sampler Signature [signature]

Field Inspection	Good	Fair	Poor
Access	G	F	P
Pad Condition	G	F	P
Casing Condition	G	F	P
Locking Cap & Lock lid at	G	F	P
Riser Condition	G	F	P

Field Inspection	Yes	No	N/A
Well ID Visible	Y	N	N/A
Standing Water	Y	N	N/A
Clear of Weeds	Y	N	N/A
Measuring Point	Y	N	N/A
Split sample with MDNR	Y	N	N/A
Maintenance Performed	Y	N	N/A
Decontamination Normal	Y	N	N/A
Equipment Calibration Normal	Y	N	N/A
Redevelopment Needed	Y	N	N/A
Any deviations from SAP	Y	N	N/A
Sediment Thickness Checked	Y	N	N/A

Historical Data: Average of sampling events

Constituent	Units	MW- 1	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6
pH	S.U.	NO TEST	5.83	5.08	6.30	6.83	6.82	6.72
Specific Conductance	umhos/cm	GW	0.786	1.132	2.083	0.841	1.769	1.900
Total Well Depth	ft	Level						
Average GW Depth	ft	Only	1.24	0.4	5.39	1.32	6.92	7.86
Average GW Drop	ft							
2 System Volumes (Min Purged Amount)	mL	DON'T SAMPLE	800	800	800	800	800	800

✓

Field Sampling Log

Facility: Asbury CCR (Permit #) Monitoring Well ID: MW- 4

Sample [X] Blind Duplicate [ ] Field Blank [ ]

Purge Information:

Method of Well Purge: Peristaltic Pump with 3/8 - Inch Diameter Tubing

Actual Purge Volume Removed: 2400 mL ~~pass~~ with pump calibration.

Date / Time Initiated: 5-15-19 @ 4:36 Date / Time Completed: 5-15-19 @ 4:54

Well Purged To Dryness? Y / (N) Petroleum or Gas Detected? Y / (N)

Purge Data:

Time	Purge Rate (mL/min)	Cumulative Volume (mL)	Temp. (°C)	pH (SU)	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP (MV)		Other (Color, Clarity, Odor)
4:42	200	1200	16.35	6.93	1.793	2.42	-43.3		Brown
4:44		1600	16.30	6.89	1.793	2.24	-50.8		Murky
4:46		2000	16.32	6.94	1.794	2.21	-62.9		
4:48		2400	16.24	7.04	1.791	2.03	-76.9		

Time sampled 4:50

Weather Conditions Partly Cloudy 70's

Water Level Start 5.25

Water Level Finish 10.66

Name (MEC Field Sampler): Ryan Ortbals and Rick Elgin

Sampler Signature

Field Inspection	Good	Fair	Poor
Access	G	F	P
Pad Condition	G	F	P
Casing Condition	G	F	P
Locking Cap & Lock	G	F	P
Riser Condition	G	F	P

Field Inspection	Yes	No	N/A
Well ID Visible	Y	N	N/A
Standing Water	Y	N	N/A
Clear of Weeds	Y	N	N/A
Measuring Point	Y	N	N/A
Split sample with MDNR	Y	N	N/A
Maintenance Performed	Y	N	N/A
Decontamination Normal	Y	N	N/A
Equipment Calibration Normal	Y	N	N/A
Redevelopment Needed		N	N/A
Any deviations from SAP		N	N/A
Sediment Thickness Checked		N	N/A

Historical Data: Average of sampling events

Constituent	Units	MW- 1	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6
pH	S.U.	NO TEST	5.83	5.08	6.30	6.83	6.82	6.72
Specific Conductance	umhos/cm	GW	0.786	1.132	2.083	0.841	1.769	1.900
Total Well Depth	ft	Level						
Average GW Depth	ft	Only	1.24	0.4	5.39	1.32	6.92	7.86
Average GW Drop	ft							
2 System Volumes (Min Purged Amount)	mL	DON'T SAMPLE	800	800	800	800	800	800

Field Sampling Log

Facility: Asbury CCR (Permit #) Monitoring Well ID: MW- 5

Sample ☑ Blind Duplicate ☐ Field Blank ☐

Purge Information:

Method of Well Purge: **Peristaltic Pump with 3/8 - Inch Diameter Tubing**

Actual Purge Volume Removed: 1800 mL with pump calibration

Date / Time Initiated: 5-15-19 @ 4:14 Date / Time Completed: 5-15-19 @ 4:30

Well Purged To Dryness? Y (N) Petroleum or Gas Detected? Y (N)

Purge Data:

Time	Purge Rate (mL/min)	Cumulative Volume (mL)	Temp. (°C)	pH (SU)	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP (MV)		Other (Color, Clarity, Odor)
4:17	200	600	17.43	9.20	0.414	1.32	-152.9		clear
4:19		1000	17.80	7.94	0.417	0.52	-166.2		
4:21		1400	17.74	7.81	0.419	0.30	-171.8		
4:23		1800	17.65	7.76	0.812	0.26	-175.3		

Time sampled 4:25

Weather Conditions Partly cloudy 70's

Water Level Start 1.62

Water Level Finish 6.19

Name (MEC Field Sampler): Ryan Ortbals and Rick Elgin

Sampler Signature

Field Inspection	Good	Fair	Poor
Access	G	F	P
Pad Condition	G	F	P
Casing Condition	G	F	P
Locking Cap & Lock	G	F	P
Riser Condition	G	F	P

Field Inspection	Yes	No	N/A
Well ID Visible	Y	N	N/A
Standing Water	Y	N	N/A
Clear of Weeds	Y	N	N/A
Measuring Point	Y	N	N/A
Split sample with MDNR	Y	N	N/A
Maintenance Performed	Y	N	N/A
Decontamination Normal	Y	N	N/A
Equipment Calibration Normal	Y	N	N/A
Redevelopment Needed		N	N/A
Any deviations from SAP		N	N/A
Sediment Thickness Checked		N	N/A

Historical Data: Average of sampling events

Constituent	Units	MW- 1	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6
pH	S.U.	NO TEST	5.83	5.08	6.30	6.83	6.82	6.72
Specific Conductance	umhos/cm	GW	0.786	1.132	2.083	0.841	1.769	1.900
Total Well Depth	ft	Level						
Average GW Depth	ft	Only	1.24	0.4	5.39	1.32	6.92	7.86
Average GW Drop	ft							
2 System Volumes (Min Purged Amount)	mL	DON'T SAMPLE	800	800	800	800	800	800

Field Sampling Log

Facility: Asbury CCR (Permit #) Monitoring Well ID: MW- 5A

Sample [X] Blind Duplicate [ ] Field Blank [ ]

Purge Information:

Method of Well Purge: **Peristaltic Pump with 3/8 - inch Diameter Tubing**

Actual Purge Volume Removed: 2200 mL with pump calibration

Date / Time Initiated: 5-15-18 @ 3:48 Date / Time Completed: 5-15-18 @ 4:08

Well Purged To Dryness? Y / (N) Petroleum or Gas Detected? Y / (N)

Purge Data:

Time	Purge Rate (mL/min)	Cumulative Volume (mL)	Temp. (°C)	pH (SU)	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP (MV)		Other (Color, Clarity, Odor)
3:53	200	1000	15.88	9.92	1.897	1.09	-178.9		clear
3:55		1400	17.58	8.59	1.977	1.78	-151.5		"
3:56		1800	16.34	8.55	1.943	0.96	-167.2		"
3:54		2200	16.32	8.54	1.942	0.40	-171.5		"

Time sampled 4:00

Weather Conditions Partly Cloudy 70's

Water Level Start 8.65

Water Level Finish 14.50

Name (MEC Field Sampler): Ryan Ortbals and Rick Elgin

Sampler Signature

Field Inspection	Good	Fair	Poor
Access	(G)	F	P
Pad Condition	(G)	F	P
Casing Condition	(G)	F	P
Locking Cap & Lock No lock	G	(F)	P
Riser Condition	(G)	F	P

Field Inspection	Yes	No	N/A
Well ID Visible	(Y)	N	N/A
Standing Water	(Y)	N	N/A
Clear of Weeds	(Y)	N	N/A
Measuring Point	(Y)	N	N/A
Split sample with MDNR	Y	(N)	N/A
Maintenance Performed	(Y)	N	N/A
Decontamination Normal	(Y)	N	N/A
Equipment Calibration Normal	(Y)	N	N/A
Redevelopment Needed	(Y)	N	N/A
Any deviations from SAP	(Y)	N	N/A
Sediment Thickness Checked	(Y)	N	N/A

Historical Data: Average of sampling events

Constituent	Units	MW-1	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6
pH	S.U.	NO TEST	5.83	5.08	6.30	6.83	6.82	6.72
Specific Conductance	umhos/cm	GW	0.786	1.132	2.083	0.841	1.769	1.900
Total Well Depth	ft	Level						
Average GW Depth	ft	Only	1.24	0.4	5.39	1.32	6.92	7.86
Average GW Drop	ft							
2 System Volumes (Min Purged Amount)	mL	DON'T SAMPLE	800	800	800	800	800	800

Field Sampling Log

Facility: Asbury CCR (Permit #) Monitoring Well ID: MW- 6

Sample [X] Blind Duplicate [ ] Field Blank [ ]

Purge Information:

Method of Well Purge: **Peristaltic Pump with 3/8 - inch Diameter Tubing**

Actual Purge Volume Removed: 2400 mL with post pump calibration.

Date / Time Initiated: 5-15-18 @ 3:26 Date / Time Completed: 5-15-18 @ 3:45

Well Purged To Dryness? Y / (N) Petroleum or Gas Detected? Y (N)

Purge Data:

Time	Purge Rate (mL/min)	Cumulative Volume (mL)	Temp. (°C)	pH (SU)	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP (MV)		Other (Color, Clarity, Odor)
3:32	200	1200	15.56	4.37	1.763	3.75	-124.4		clear
3:34		1600	15.10	8.54	1.744	3.36	-131.5		/
3:36		2000	15.04	8.69	1.740	3.22	-133.2		/
3:38		2400	15.01	8.69	1.736	3.21	-134.4		/

Time sampled 3:40

Weather Conditions Partly Cloudy 70's

Water Level Start 9:16

Water Level Finish 13:35

Name (MEC Field Sampler): Ryan Ortbals and Rick Elgin

Sampler Signature

Field Inspection	Good	Fair	Poor
Access	(G)	F	P
Pad Condition	(G)	F	P
Casing Condition	(G)	F	P
Locking Cap & Lock	G	(F)	(P)
Riser Condition	(G) Not locked	F	P

Field Inspection	Yes	No	N/A
Well ID Visible	(Y)	N	N/A
Standing Water	Y	(N)	N/A
Clear of Weeds	Y	(N)	N/A
Measuring Point	(Y)	N	N/A
Split sample with MDNR	Y	(N)	N/A
Maintenance Performed	(Y)	N	N/A
Decontamination Normal	(Y)	N	N/A
Equipment Calibration Normal	(Y)	N	N/A
Redevelopment Needed	(Y)	N	N/A
Any deviations from SAP	(Y)	N	N/A
Sediment Thickness Checked	(Y)	N	N/A

Historical Data: Average of sampling events

Constituent	Units	MW- 1	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6
pH	S.U.	NO TEST	5.83	5.08	6.30	6.83	6.82	6.72
Specific Conductance	umhos/cm	GW	0.786	1.132	2.083	0.841	1.769	1.900
Total Well Depth	ft	Level						
Average GW Depth	ft	Only	1.24	0.4	5.39	1.32	6.92	7.86
Average GW Drop	ft							
2 System Volumes (Min Purged Amount)	mL	DON'T SAMPLE	800	800	800	800	800	800

Field Sampling Log

Facility: Asbury CCR (Permit #)

Monitoring Well ID: MW- 6A

Sample [✓] Blind Duplicate [ ] Field Blank [X]

Purge Information:

Method of Well Purge: **Peristaltic Pump with 3/8 - inch Diameter Tubing**

Actual Purge Volume Removed: 3200 mL ~~(note~~ with pump calibration.

Date / Time Initiated: 5-15-19 @ 3:~~05~~ 3:10

Date / Time Completed: 5-15-19 @ 3:~~[illegible]~~ 25

Well Purged To Dryness?: Y / (N)

Petroleum or Gas Detected? Y / (N)

Purge Data:

Time	Purge Rate (mL/min)	Cumulative Volume (ml)	Temp. (°C)	pH (SU)	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP (MV)		Other (Color, Clarity, Odor)
3:10	200	~~[illegible]~~2000	15.67	8.20	1.595	4.31	-123.5		Clear Small floating
3:12		2400	15.46	8.21	1.534	3.91	-123.1		floating
3:14		2800	15.37	8.21	1.531	3.56	-123.2		debris
3:16		3200	15.22	8.22	1.521	3.71	-120.9		

Time sampled 3:20

Weather Conditions Partly cloudy 70's

Water Level Start 7.40

Water Level Finish 13.45

Name (MEC Field Sampler): Ryan Ortbals and Rick Elgin

Sampler Signature [signature]

Field Inspection	**Good**	**Fair**	**Poor**
Access	(G)	F	P
Pad Condition	(G)	F	P
Casing Condition	(G)	F	P
Locking Cap & Lock — Not lock	G	(F)	P
Riser Condition	(G)	F	P

Field Inspection	**Yes**	**No**	**N/A**
Well ID Visible	(Y)	N	N/A
Standing Water	Y	(N)	N/A
Clear of Weeds	(Y)	N	N/A
Measuring Point	(Y)	N	N/A
Split sample with MDNR	Y	(N)	N/A
Maintenance Performed	Y	(N)	N/A
Decontamination Normal	(Y)	N	N/A
Equipment Calibration Normal	(Y)	N	N/A
Redevelopment Needed	Y	(N)	N/A
Any deviations from SAP	Y	(N)	N/A
Sediment Thickness Checked	Y	(N)	N/A

Historical Data: Average of sampling events for: 5/16 + 6/17

Constituent	Units	MW- 6A	MW-7					
pH	S.U.	6.87	6.12					
Specific Conductance	umhos/cm	1.601	2.699					
Total Well Depth	ft							
Average GW Depth	ft	7.28	3.04					
Average GW Drop	ft							
2 System Volumes (Min Purged Amount)	mL	800 ✓	800					

Field Sampling Log

Facility: Asbury CCR (Permit #) Monitoring Well ID: MW-7

Sample [X] Blind Duplicate [X] Field Blank [ ]

Purge Information:

Method of Well Purge: **Peristaltic Pump with 3/8 - inch Diameter Tubing**

Actual Purge Volume Removed: 2000 mL with pump calibration

Date / Time Initiated: 4-15-19 @ 2:40 Date / Time Completed: 4-15-19 @ 3:10

Well Purged To Dryness? Y / (N) Petroleum or Gas Detected? Y / (N)

Purge Data:

Time	Purge Rate (mL/min)	Cumulative Volume (ml)	Temp. (°C)	pH (SU)	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP (MV)		Other (Color, Clarity, Odor)
2:44	200	800	17.21	6.83	2.502	0.04	-93.3		brown
2:46		1200	17.29	6.71	2.564	0.51	-92.9		
2:48		1600	17.24	6.73	2.560	0.41	-92.7		
2:50		2000	17.06	6.76	2.555	0.35	-96.5		

Time sampled 2:50

Weather Conditions Partly Cloudy upper 70s

Water Level Start 2.85

Water Level Finish 3.08

Name (MEC Field Sampler): ~~Ryan Ortbals~~ and Rick Elgin

Sampler Signature

Field Inspection	Good	Fair	Poor
Access	G	F	P
Pad Condition	G	F	P
Casing Condition	G	F	P
Locking Cap & Lock No lock	G	F	P
Riser Condition	G	F	P

Field Inspection	Yes	No	N/A
Well ID Visible	Y	N	N/A
Standing Water	Y	N	N/A
Clear of Weeds	Y	N	N/A
Measuring Point	Y	N	N/A
Split sample with MDNR	Y	N	N/A
Maintenance Performed	Y	N	N/A
Decontamination Normal	Y	N	N/A
Equipment Calibration Normal	Y	N	N/A
Redevelopment Needed	Y	N	N/A
Any deviations from SAP	Y	N	N/A
Sediment Thickness Checked	Y	N	N/A

Historical Data: Average of sampling events for: 5/16 + 6/17

Constituent	Units	MW- 6A	MW-7					
pH	S.U.	6.87	6.12					
Specific Conductance	umhos/cm	1.601	2.699					
Total Well Depth	ft							
Average GW Depth	ft	7.28	3.04					
Average GW Drop	ft							
2 System Volumes (Min Purged Amount)	mL	800	800					

APPENDIX 4

Analytical Results from Lab

eurofins | Environment Testing TestAmerica

ANALYTICAL REPORT

Eurofins TestAmerica, Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Tel: (615)726-0177

Laboratory Job ID: 490-174252-1
Client Project/Site: Asbury Ash Pond
Sampling Event: Asbury Ash Pond

For:
Midwest Environmental Consultants
2009 East McCarty Street
Suite 2
Jefferson City, Missouri 65101

Attn: Mr. Rick Elgin

Cathy Gartner

Authorized for release by:
5/30/2019 11:15:14 AM

Cathy Gartner, Project Manager II
(615)301-5041
cathy.gartner@testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Sample Summary

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 490-174252-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
490-174252-1	MW-2	Water	05/16/19 09:20	05/17/19 09:50	
490-174252-2	MW-3	Water	05/16/19 09:50	05/17/19 09:50	
490-174252-3	MW-4	Water	05/15/19 04:50	05/17/19 09:50	
490-174252-4	MW-5	Water	05/15/19 04:25	05/17/19 09:50	
490-174252-5	MW-5A	Water	05/15/19 04:00	05/17/19 09:50	
490-174252-6	MW-6	Water	05/15/19 03:40	05/17/19 09:50	
490-174252-7	MW-6A	Water	05/15/19 03:20	05/17/19 09:50	
490-174252-8	MW-7	Water	05/15/19 02:50	05/17/19 09:50	
490-174252-9	Duplicate	Water	05/15/19 03:05	05/17/19 09:50	
490-174252-10	Field Blank	Water	05/15/19 03:10	05/17/19 09:50	

Job ID: 490-174252-1

Laboratory: Eurofins TestAmerica, Nashville

Narrative

Job Narrative
490-174252-1

Comments
No additional comments.

Receipt
The samples were received on 5/17/2019 9:50 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 4.2° C.

HPLC/IC
Method(s) 9056A: The method blank for analytical batch 490-596531 contained Sulfate above the method detection limit. This target analyte concentration was less than half the reporting limit (1/2RL); therefore, re-extraction and re-analysis of samples was not performed.

Method(s) 9056A: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for 490-596531 were within the acceptance limits for Chloride. However, the sample results exceeded the calibration curve limits. (490-174162-H-1 MS) and (490-174162-H-1 MSD)

Method(s) 9056A: Due to the nature of the sample matrix, a matrix spike / matrix spike duplicate (MS/MSD) was not analyzed with 490-596841. However, the laboratory control sample / laboratory control sample duplicate (LCS/LCSD) recoveries were within the acceptance limits.

Method(s) 9056A: The method blank for analytical batch 490-596841 contained Sulfate above the method detection limit. This target analyte concentration was less than half the reporting limit (1/2RL); therefore, re-extraction and/or re-analysis of samples was not performed.

Method(s) 9056A: The following samples were diluted due to the result exceed calibration curve: MW-2 (490-174252-1), MW-3 (490-174252-2), MW-4 (490-174252-3), MW-5 (490-174252-4), MW-6 (490-174252-6), MW-6A (490-174252-7) and MW-7 (490-174252-8), Duplicate (490-174252-9). Elevated reporting limits (RLs) are provided.

Method(s) 9056A: The method blank for analytical batch 490-596901 contained Sulfate above the method detection limit. This target analyte concentration was less than half the reporting limit (1/2RL); therefore, re-extraction and/or re-analysis of samples was not performed.

Method(s) 9056A: Due to the nature of the sample matrix, a matrix spike / matrix spike duplicate (MS/MSD) was not analyzed with 490-596901. However, the laboratory control sample / laboratory control sample duplicate (LCS/LCSD) recoveries were within the acceptance limits.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Metals
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Qualifiers

HPLC/IC

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
B	Compound was found in the blank and sample.
E	Result exceeded calibration range.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 490-174252-1

Client Sample ID: MW-2

Lab Sample ID: 490-174252-1

Date Collected: 05/16/19 09:20
Date Received: 05/17/19 09:50

Matrix: Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	120		5.0	1.0	mg/L			05/22/19 13:55	5
Fluoride	0.24		0.10	0.010	mg/L			05/21/19 18:38	1
Sulfate	86	B	5.0	0.15	mg/L			05/22/19 13:55	5

Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	33		0.50	0.12	mg/L		05/24/19 12:42	05/29/19 17:20	1
Boron	0.12		0.080	0.030	mg/L		05/24/19 12:42	05/29/19 17:20	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	430		25	7.0	mg/L			05/20/19 14:45	1

Method: Field Sampling - Field Sampling

Analyte	Result	Qualifier	NONE	NONE	Unit	D	Prepared	Analyzed	Dil Fac
Specific Conductance	0.640				umhos/cm			05/16/19 09:20	1
Field pH	6.35				SU			05/16/19 09:20	1

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 490-174252-1

Client Sample ID: MW-3

Date Collected: 05/16/19 09:50
Date Received: 05/17/19 09:50

Lab Sample ID: 490-174252-2

Matrix: Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	61		2.0	0.40	mg/L			05/22/19 14:07	2
Fluoride	0.18		0.10	0.010	mg/L			05/21/19 18:50	1
Sulfate	520	B	20	0.60	mg/L			05/22/19 14:18	20

Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	98		0.50	0.12	mg/L		05/24/19 12:42	05/29/19 17:37	1
Boron	0.076	J	0.080	0.030	mg/L		05/24/19 12:42	05/29/19 17:37	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	920		25	7.0	mg/L			05/20/19 14:45	1

Method: Field Sampling - Field Sampling

Analyte	Result	Qualifier	NONE	NONE	Unit	D	Prepared	Analyzed	Dil Fac
Specific Conductance	1.063				umhos/cm			05/16/19 09:50	1
Field pH	6.03				SU			05/16/19 09:50	1

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 490-174252-1

Client Sample ID: MW-4

Lab Sample ID: 490-174252-3

Date Collected: 05/15/19 04:50
Date Received: 05/17/19 09:50

Matrix: Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	97		5.0	1.0	mg/L			05/22/19 14:42	5
Fluoride	0.26		0.10	0.010	mg/L			05/21/19 19:01	1
Sulfate	800	B	50	1.5	mg/L			05/22/19 14:53	50

Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	220		0.50	0.12	mg/L		05/24/19 12:42	05/29/19 17:40	1
Boron	0.042	J	0.080	0.030	mg/L		05/24/19 12:42	05/29/19 17:40	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	1700		50	14	mg/L			05/20/19 14:45	1

Method: Field Sampling - Field Sampling

Analyte	Result	Qualifier	NONE	NONE	Unit	D	Prepared	Analyzed	Dil Fac
Specific Conductance	1.791				umhos/cm			05/15/19 04:50	1
Field pH	7.04				SU			05/15/19 04:50	1

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 490-174252-1

Client Sample ID: MW-5

Date Collected: 05/15/19 04:25
Date Received: 05/17/19 09:50

Lab Sample ID: 490-174252-4

Matrix: Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	5.5		1.0	0.20	mg/L			05/21/19 19:13	1
Fluoride	0.29		0.10	0.010	mg/L			05/21/19 19:13	1
Sulfate	140	B	10	0.30	mg/L			05/22/19 15:16	10

Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	93		0.50	0.12	mg/L		05/24/19 12:42	05/29/19 17:44	1
Boron	0.30		0.080	0.030	mg/L		05/24/19 12:42	05/29/19 17:44	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	580		25	7.0	mg/L			05/20/19 14:45	1

Method: Field Sampling - Field Sampling

Analyte	Result	Qualifier	NONE	NONE	Unit	D	Prepared	Analyzed	Dil Fac
Specific Conductance	0.812				umhos/cm			05/15/19 04:25	1
Field pH	7.73				SU			05/15/19 04:25	1

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 490-174252-1

Client Sample ID: MW-5A

Lab Sample ID: 490-174252-5

Date Collected: 05/15/19 04:00
Date Received: 05/17/19 09:50

Matrix: Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	39		1.0	0.20	mg/L			05/21/19 19:24	1
Fluoride	0.33		0.10	0.010	mg/L			05/21/19 19:24	1
Sulfate	1000	B	50	1.5	mg/L			05/22/19 15:51	50

Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	220		0.50	0.12	mg/L		05/24/19 12:42	05/29/19 17:47	1
Boron	0.56		0.080	0.030	mg/L		05/24/19 12:42	05/29/19 17:47	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	1800		50	14	mg/L			05/20/19 14:45	1

Method: Field Sampling - Field Sampling

Analyte	Result	Qualifier	NONE	NONE	Unit	D	Prepared	Analyzed	Dil Fac
Specific Conductance	1.942				umhos/cm			05/15/19 04:00	1
Field pH	8.54				SU			05/15/19 04:00	1

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 490-174252-1

Client Sample ID: MW-6

Lab Sample ID: 490-174252-6

Date Collected: 05/15/19 03:40
Date Received: 05/17/19 09:50

Matrix: Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	13		1.0	0.20	mg/L			05/21/19 19:36	1
Fluoride	0.25		0.10	0.010	mg/L			05/21/19 19:36	1
Sulfate	1000	B	50	1.5	mg/L			05/22/19 16:14	50

Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	240		0.50	0.12	mg/L		05/24/19 12:42	05/29/19 17:57	1
Boron	0.36		0.080	0.030	mg/L		05/24/19 12:42	05/29/19 17:57	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	1800		25	7.0	mg/L			05/20/19 14:45	1

Method: Field Sampling - Field Sampling

Analyte	Result	Qualifier	NONE	NONE	Unit	D	Prepared	Analyzed	Dil Fac
Specific Conductance	1.738				umhos/cm			05/15/19 03:40	1
Field pH	8.84				SU			05/15/19 03:40	1

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 490-174252-1

Client Sample ID: MW-6A

Lab Sample ID: 490-174252-7

Date Collected: 05/15/19 03:20
Date Received: 05/17/19 09:50

Matrix: Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	17		1.0	0.20	mg/L			05/21/19 20:11	1
Fluoride	0.33		0.10	0.010	mg/L			05/21/19 20:11	1
Sulfate	710	B	50	1.5	mg/L			05/22/19 16:38	50

Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	160		0.50	0.12	mg/L		05/24/19 12:42	05/29/19 18:00	1
Boron	0.42		0.080	0.030	mg/L		05/24/19 12:42	05/29/19 18:00	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	1400		25	7.0	mg/L			05/20/19 14:45	1

Method: Field Sampling - Field Sampling

Analyte	Result	Qualifier	NONE	NONE	Unit	D	Prepared	Analyzed	Dil Fac
Specific Conductance	1.521				umhos/cm			05/15/19 03:20	1
Field pH	8.22				SU			05/15/19 03:20	1

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 490-174252-1

Client Sample ID: MW-7

Date Collected: 05/15/19 02:50
Date Received: 05/17/19 09:50

Lab Sample ID: 490-174252-8

Matrix: Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	46		2.0	0.40	mg/L			05/22/19 17:01	2
Fluoride	0.19		0.10	0.010	mg/L			05/21/19 20:22	1
Sulfate	1800	B	50	1.5	mg/L			05/22/19 17:12	50

Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	470		0.50	0.12	mg/L		05/24/19 12:42	05/29/19 18:04	1
Boron	0.27		0.080	0.030	mg/L		05/24/19 12:42	05/29/19 18:04	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	2900		50	14	mg/L			05/20/19 14:45	1

Method: Field Sampling - Field Sampling

Analyte	Result	Qualifier	NONE	NONE	Unit	D	Prepared	Analyzed	Dil Fac
Specific Conductance	2.555				umhos/cm			05/15/19 02:50	1
Field pH	6.26				SU			05/15/19 02:50	1

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 490-174252-1

Client Sample ID: Duplicate

Lab Sample ID: 490-174252-9

Date Collected: 05/15/19 03:05
Date Received: 05/17/19 09:50

Matrix: Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	43		2.0	0.40	mg/L			05/22/19 18:57	2
Fluoride	0.20		0.10	0.010	mg/L			05/21/19 20:34	1
Sulfate	1800	B	50	1.5	mg/L			05/22/19 19:08	50

Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	470		0.50	0.12	mg/L		05/24/19 12:42	05/29/19 18:07	1
Boron	0.27		0.080	0.030	mg/L		05/24/19 12:42	05/29/19 18:07	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	2800		50	14	mg/L			05/20/19 14:45	1

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 490-174252-1

Client Sample ID: Field Blank

Lab Sample ID: 490-174252-10

Date Collected: 05/15/19 03:10
Date Received: 05/17/19 09:50

Matrix: Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		1.0	0.20	mg/L			05/21/19 20:45	1
Fluoride	0.022	J	0.10	0.010	mg/L			05/21/19 20:45	1
Sulfate	0.15	J B	1.0	0.030	mg/L			05/21/19 20:45	1

Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	0.46	J	0.50	0.12	mg/L		05/24/19 12:42	05/29/19 18:10	1
Boron	0.097		0.080	0.030	mg/L		05/24/19 12:42	05/29/19 18:10	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	76		25	7.0	mg/L			05/20/19 14:45	1

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 490-596531/3
Matrix: Water
Analysis Batch: 596531

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		1.0	0.20	mg/L			05/21/19 16:54	1
Fluoride	ND		0.10	0.010	mg/L			05/21/19 16:54	1
Sulfate	0.188	J	1.0	0.030	mg/L			05/21/19 16:54	1

Lab Sample ID: LCS 490-596531/4
Matrix: Water
Analysis Batch: 596531

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	10.0	9.74		mg/L		97	80 - 120
Fluoride	1.00	0.992		mg/L		99	80 - 120
Sulfate	10.0	9.78		mg/L		98	80 - 120

Lab Sample ID: LCSD 490-596531/5
Matrix: Water
Analysis Batch: 596531

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	10.0	9.66		mg/L		96	80 - 120	1	20
Fluoride	1.00	1.02		mg/L		102	80 - 120	3	20
Sulfate	10.0	10.0		mg/L		100	80 - 120	3	20

Lab Sample ID: 490-174162-H-1 MS
Matrix: Water
Analysis Batch: 596531

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	44	E	10.0	52.9	E 4	mg/L		90	80 - 120
Fluoride	0.30		1.00	1.29		mg/L		98	80 - 120
Sulfate	4.5	B	10.0	14.4		mg/L		98	80 - 120

Lab Sample ID: 490-174162-H-1 MSD
Matrix: Water
Analysis Batch: 596531

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	44	E	10.0	52.7	E 4	mg/L		89	80 - 120	0	20
Fluoride	0.30		1.00	1.26		mg/L		95	80 - 120	2	20
Sulfate	4.5	B	10.0	14.1		mg/L		96	80 - 120	2	20

Lab Sample ID: MB 490-596841/3
Matrix: Water
Analysis Batch: 596841

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		1.0	0.20	mg/L			05/22/19 12:57	1
Fluoride	ND		0.10	0.010	mg/L			05/22/19 12:57	1
Sulfate	0.164	J	1.0	0.030	mg/L			05/22/19 12:57	1

Method: 9056A - Anions, Ion Chromatography (Continued)

Lab Sample ID: LCS 490-596841/4
Matrix: Water
Analysis Batch: 596841

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	10.0	9.63		mg/L		96	80 - 120
Fluoride	1.00	0.940		mg/L		94	80 - 120
Sulfate	10.0	9.34		mg/L		93	80 - 120

Lab Sample ID: LCSD 490-596841/5
Matrix: Water
Analysis Batch: 596841

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	10.0	9.75		mg/L		97	80 - 120	1	20
Fluoride	1.00	0.954		mg/L		95	80 - 120	1	20
Sulfate	10.0	9.44		mg/L		94	80 - 120	1	20

Lab Sample ID: MB 490-596901/3
Matrix: Water
Analysis Batch: 596901

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		1.0	0.20	mg/L			05/22/19 18:22	1
Fluoride	ND		0.10	0.010	mg/L			05/22/19 18:22	1
Sulfate	0.164	J	1.0	0.030	mg/L			05/22/19 18:22	1

Lab Sample ID: LCS 490-596901/4
Matrix: Water
Analysis Batch: 596901

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	10.0	9.80		mg/L		98	80 - 120
Fluoride	1.00	0.966		mg/L		96	80 - 120
Sulfate	10.0	9.53		mg/L		95	80 - 120

Lab Sample ID: LCSD 490-596901/5
Matrix: Water
Analysis Batch: 596901

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	10.0	9.81		mg/L		98	80 - 120	0	20
Fluoride	1.00	0.981		mg/L		98	80 - 120	2	20
Sulfate	10.0	9.64		mg/L		96	80 - 120	1	20

Method: EPA 6020A - Metals (ICP/MS)

Lab Sample ID: MB 180-279696/1-A
Matrix: Water
Analysis Batch: 280122

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 279696

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	ND		0.50	0.12	mg/L		05/24/19 12:42	05/29/19 17:03	1
Boron	ND		0.080	0.030	mg/L		05/24/19 12:42	05/29/19 17:03	1

Method: EPA 6020A - Metals (ICP/MS) (Continued)

Lab Sample ID: LCS 180-279696/2-A
Matrix: Water
Analysis Batch: 280122

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 279696

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Calcium	25.0	25.5		mg/L		102	80 - 120
Boron	1.25	1.35		mg/L		108	80 - 120

Lab Sample ID: 490-174252-1 MS
Matrix: Water
Analysis Batch: 280122

Client Sample ID: MW-2
Prep Type: Total Recoverable
Prep Batch: 279696

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Calcium	33		25.0	56.8		mg/L		95	75 - 125
Boron	0.12		1.25	1.41		mg/L		103	75 - 125

Lab Sample ID: 490-174252-1 MSD
Matrix: Water
Analysis Batch: 280122

Client Sample ID: MW-2
Prep Type: Total Recoverable
Prep Batch: 279696

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Calcium	33		25.0	55.6		mg/L		90	75 - 125	2	20
Boron	0.12		1.25	1.38		mg/L		101	75 - 125	2	20

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 490-596226/1
Matrix: Water
Analysis Batch: 596226

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		25	7.0	mg/L			05/20/19 14:45	1

Lab Sample ID: LCS 490-596226/2
Matrix: Water
Analysis Batch: 596226

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	100	93.0		mg/L		93	90 - 110

Lab Sample ID: 490-174252-2 DU
Matrix: Water
Analysis Batch: 596226

Client Sample ID: MW-3
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	920		922		mg/L		0.2	20

Lab Sample ID: 490-174302-G-1 DU
Matrix: Water
Analysis Batch: 596226

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	820		831		mg/L		1	20

HPLC/IC

Analysis Batch: 596531

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-174252-1	MW-2	Total/NA	Water	9056A	
490-174252-2	MW-3	Total/NA	Water	9056A	
490-174252-3	MW-4	Total/NA	Water	9056A	
490-174252-4	MW-5	Total/NA	Water	9056A	
490-174252-5	MW-5A	Total/NA	Water	9056A	
490-174252-6	MW-6	Total/NA	Water	9056A	
490-174252-7	MW-6A	Total/NA	Water	9056A	
490-174252-8	MW-7	Total/NA	Water	9056A	
490-174252-9	Duplicate	Total/NA	Water	9056A	
490-174252-10	Field Blank	Total/NA	Water	9056A	
MB 490-596531/3	Method Blank	Total/NA	Water	9056A	
LCS 490-596531/4	Lab Control Sample	Total/NA	Water	9056A	
LCSD 490-596531/5	Lab Control Sample Dup	Total/NA	Water	9056A	
490-174162-H-1 MS	Matrix Spike	Total/NA	Water	9056A	
490-174162-H-1 MSD	Matrix Spike Duplicate	Total/NA	Water	9056A	

Analysis Batch: 596841

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-174252-1	MW-2	Total/NA	Water	9056A	
490-174252-2	MW-3	Total/NA	Water	9056A	
490-174252-2	MW-3	Total/NA	Water	9056A	
490-174252-3	MW-4	Total/NA	Water	9056A	
490-174252-3	MW-4	Total/NA	Water	9056A	
490-174252-4	MW-5	Total/NA	Water	9056A	
490-174252-5	MW-5A	Total/NA	Water	9056A	
490-174252-6	MW-6	Total/NA	Water	9056A	
490-174252-7	MW-6A	Total/NA	Water	9056A	
490-174252-8	MW-7	Total/NA	Water	9056A	
490-174252-8	MW-7	Total/NA	Water	9056A	
MB 490-596841/3	Method Blank	Total/NA	Water	9056A	
LCS 490-596841/4	Lab Control Sample	Total/NA	Water	9056A	
LCSD 490-596841/5	Lab Control Sample Dup	Total/NA	Water	9056A	

Analysis Batch: 596901

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-174252-9	Duplicate	Total/NA	Water	9056A	
490-174252-9	Duplicate	Total/NA	Water	9056A	
MB 490-596901/3	Method Blank	Total/NA	Water	9056A	
LCS 490-596901/4	Lab Control Sample	Total/NA	Water	9056A	
LCSD 490-596901/5	Lab Control Sample Dup	Total/NA	Water	9056A	

Metals

Prep Batch: 279696

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-174252-1	MW-2	Total Recoverable	Water	3005A	
490-174252-2	MW-3	Total Recoverable	Water	3005A	
490-174252-3	MW-4	Total Recoverable	Water	3005A	
490-174252-4	MW-5	Total Recoverable	Water	3005A	
490-174252-5	MW-5A	Total Recoverable	Water	3005A	
490-174252-6	MW-6	Total Recoverable	Water	3005A	

Metals (Continued)

Prep Batch: 279696 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-174252-7	MW-6A	Total Recoverable	Water	3005A	
490-174252-8	MW-7	Total Recoverable	Water	3005A	
490-174252-9	Duplicate	Total Recoverable	Water	3005A	
490-174252-10	Field Blank	Total Recoverable	Water	3005A	
MB 180-279696/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 180-279696/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
490-174252-1 MS	MW-2	Total Recoverable	Water	3005A	
490-174252-1 MSD	MW-2	Total Recoverable	Water	3005A	

Analysis Batch: 280122

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-174252-1	MW-2	Total Recoverable	Water	EPA 6020A	279696
490-174252-2	MW-3	Total Recoverable	Water	EPA 6020A	279696
490-174252-3	MW-4	Total Recoverable	Water	EPA 6020A	279696
490-174252-4	MW-5	Total Recoverable	Water	EPA 6020A	279696
490-174252-5	MW-5A	Total Recoverable	Water	EPA 6020A	279696
490-174252-6	MW-6	Total Recoverable	Water	EPA 6020A	279696
490-174252-7	MW-6A	Total Recoverable	Water	EPA 6020A	279696
490-174252-8	MW-7	Total Recoverable	Water	EPA 6020A	279696
490-174252-9	Duplicate	Total Recoverable	Water	EPA 6020A	279696
490-174252-10	Field Blank	Total Recoverable	Water	EPA 6020A	279696
MB 180-279696/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	279696
LCS 180-279696/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	279696
490-174252-1 MS	MW-2	Total Recoverable	Water	EPA 6020A	279696
490-174252-1 MSD	MW-2	Total Recoverable	Water	EPA 6020A	279696

General Chemistry

Analysis Batch: 596226

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-174252-1	MW-2	Total/NA	Water	SM 2540C	
490-174252-2	MW-3	Total/NA	Water	SM 2540C	
490-174252-3	MW-4	Total/NA	Water	SM 2540C	
490-174252-4	MW-5	Total/NA	Water	SM 2540C	
490-174252-5	MW-5A	Total/NA	Water	SM 2540C	
490-174252-6	MW-6	Total/NA	Water	SM 2540C	
490-174252-7	MW-6A	Total/NA	Water	SM 2540C	
490-174252-8	MW-7	Total/NA	Water	SM 2540C	
490-174252-9	Duplicate	Total/NA	Water	SM 2540C	
490-174252-10	Field Blank	Total/NA	Water	SM 2540C	
MB 490-596226/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 490-596226/2	Lab Control Sample	Total/NA	Water	SM 2540C	
490-174252-2 DU	MW-3	Total/NA	Water	SM 2540C	
490-174302-G-1 DU	Duplicate	Total/NA	Water	SM 2540C	

Field Service / Mobile Lab

Analysis Batch: 596444

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-174252-1	MW-2	Total/NA	Water	Field Sampling	
490-174252-2	MW-3	Total/NA	Water	Field Sampling	
490-174252-3	MW-4	Total/NA	Water	Field Sampling	

Field Service / Mobile Lab (Continued)

Analysis Batch: 596444 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-174252-4	MW-5	Total/NA	Water	Field Sampling	
490-174252-5	MW-5A	Total/NA	Water	Field Sampling	
490-174252-6	MW-6	Total/NA	Water	Field Sampling	
490-174252-7	MW-6A	Total/NA	Water	Field Sampling	
490-174252-8	MW-7	Total/NA	Water	Field Sampling	

Lab Chronicle

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 490-174252-1

Client Sample ID: MW-2

Date Collected: 05/16/19 09:20
Date Received: 05/17/19 09:50

Lab Sample ID: 490-174252-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		1			596531	05/21/19 18:38	SW1	TAL NSH
Total/NA	Analysis	9056A		5			596841	05/22/19 13:55	T1C	TAL NSH
Total Recoverable	Prep	3005A			50 mL	50 mL	279696	05/24/19 12:42	KAK	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			280122	05/29/19 17:20	RSK	TAL PIT
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	596226	05/20/19 14:45	BMC	TAL NSH
Total/NA	Analysis	Field Sampling		1			596444	05/16/19 09:20	CSG	TAL NSH

Client Sample ID: MW-3

Date Collected: 05/16/19 09:50
Date Received: 05/17/19 09:50

Lab Sample ID: 490-174252-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		1			596531	05/21/19 18:50	SW1	TAL NSH
Total/NA	Analysis	9056A		2			596841	05/22/19 14:07	T1C	TAL NSH
Total/NA	Analysis	9056A		20			596841	05/22/19 14:18	T1C	TAL NSH
Total Recoverable	Prep	3005A			50 mL	50 mL	279696	05/24/19 12:42	KAK	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			280122	05/29/19 17:37	RSK	TAL PIT
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	596226	05/20/19 14:45	BMC	TAL NSH
Total/NA	Analysis	Field Sampling		1			596444	05/16/19 09:50	CSG	TAL NSH

Client Sample ID: MW-4

Date Collected: 05/15/19 04:50
Date Received: 05/17/19 09:50

Lab Sample ID: 490-174252-3

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		1			596531	05/21/19 19:01	SW1	TAL NSH
Total/NA	Analysis	9056A		5			596841	05/22/19 14:42	T1C	TAL NSH
Total/NA	Analysis	9056A		50			596841	05/22/19 14:53	T1C	TAL NSH
Total Recoverable	Prep	3005A			50 mL	50 mL	279696	05/24/19 12:42	KAK	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			280122	05/29/19 17:40	RSK	TAL PIT
Total/NA	Analysis	SM 2540C		1	50 mL	100 mL	596226	05/20/19 14:45	BMC	TAL NSH
Total/NA	Analysis	Field Sampling		1			596444	05/15/19 04:50	CSG	TAL NSH

Client Sample ID: MW-5

Date Collected: 05/15/19 04:25
Date Received: 05/17/19 09:50

Lab Sample ID: 490-174252-4

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		1			596531	05/21/19 19:13	SW1	TAL NSH
Total/NA	Analysis	9056A		10			596841	05/22/19 15:16	T1C	TAL NSH
Total Recoverable	Prep	3005A			50 mL	50 mL	279696	05/24/19 12:42	KAK	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			280122	05/29/19 17:44	RSK	TAL PIT
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	596226	05/20/19 14:45	BMC	TAL NSH

Client Sample ID: MW-5

Date Collected: 05/15/19 04:25
Date Received: 05/17/19 09:50

Lab Sample ID: 490-174252-4

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Field Sampling		1			596444	05/15/19 04:25	CSG	TAL NSH

Client Sample ID: MW-5A

Date Collected: 05/15/19 04:00
Date Received: 05/17/19 09:50

Lab Sample ID: 490-174252-5

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		1			596531	05/21/19 19:24	SW1	TAL NSH
Total/NA	Analysis	9056A		50			596841	05/22/19 15:51	T1C	TAL NSH
Total Recoverable	Prep	3005A			50 mL	50 mL	279696	05/24/19 12:42	KAK	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			280122	05/29/19 17:47	RSK	TAL PIT
Total/NA	Analysis	SM 2540C		1	50 mL	100 mL	596226	05/20/19 14:45	BMC	TAL NSH
Total/NA	Analysis	Field Sampling		1			596444	05/15/19 04:00	CSG	TAL NSH

Client Sample ID: MW-6

Date Collected: 05/15/19 03:40
Date Received: 05/17/19 09:50

Lab Sample ID: 490-174252-6

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		1			596531	05/21/19 19:36	SW1	TAL NSH
Total/NA	Analysis	9056A		50			596841	05/22/19 16:14	T1C	TAL NSH
Total Recoverable	Prep	3005A			50 mL	50 mL	279696	05/24/19 12:42	KAK	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			280122	05/29/19 17:57	RSK	TAL PIT
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	596226	05/20/19 14:45	BMC	TAL NSH
Total/NA	Analysis	Field Sampling		1			596444	05/15/19 03:40	CSG	TAL NSH

Client Sample ID: MW-6A

Date Collected: 05/15/19 03:20
Date Received: 05/17/19 09:50

Lab Sample ID: 490-174252-7

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		1			596531	05/21/19 20:11	SW1	TAL NSH
Total/NA	Analysis	9056A		50			596841	05/22/19 16:38	T1C	TAL NSH
Total Recoverable	Prep	3005A			50 mL	50 mL	279696	05/24/19 12:42	KAK	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			280122	05/29/19 18:00	RSK	TAL PIT
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	596226	05/20/19 14:45	BMC	TAL NSH
Total/NA	Analysis	Field Sampling		1			596444	05/15/19 03:20	CSG	TAL NSH

Client Sample ID: MW-7

Date Collected: 05/15/19 02:50
Date Received: 05/17/19 09:50

Lab Sample ID: 490-174252-8

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		1			596531	05/21/19 20:22	SW1	TAL NSH

Lab Chronicle

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 490-174252-1

Client Sample ID: MW-7

Date Collected: 05/15/19 02:50
Date Received: 05/17/19 09:50

Lab Sample ID: 490-174252-8

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		2			596841	05/22/19 17:01	T1C	TAL NSH
Total/NA	Analysis	9056A		50			596841	05/22/19 17:12	T1C	TAL NSH
Total Recoverable	Prep	3005A			50 mL	50 mL	279696	05/24/19 12:42	KAK	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			280122	05/29/19 18:04	RSK	TAL PIT
Total/NA	Analysis	SM 2540C		1	50 mL	100 mL	596226	05/20/19 14:45	BMC	TAL NSH
Total/NA	Analysis	Field Sampling		1			596444	05/15/19 02:50	CSG	TAL NSH

Client Sample ID: Duplicate

Date Collected: 05/15/19 03:05
Date Received: 05/17/19 09:50

Lab Sample ID: 490-174252-9

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		1			596531	05/21/19 20:34	SW1	TAL NSH
Total/NA	Analysis	9056A		2			596901	05/22/19 18:57	T1C	TAL NSH
Total/NA	Analysis	9056A		50			596901	05/22/19 19:08	T1C	TAL NSH
Total Recoverable	Prep	3005A			50 mL	50 mL	279696	05/24/19 12:42	KAK	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			280122	05/29/19 18:07	RSK	TAL PIT
Total/NA	Analysis	SM 2540C		1	50 mL	100 mL	596226	05/20/19 14:45	BMC	TAL NSH

Client Sample ID: Field Blank

Date Collected: 05/15/19 03:10
Date Received: 05/17/19 09:50

Lab Sample ID: 490-174252-10

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		1			596531	05/21/19 20:45	SW1	TAL NSH
Total Recoverable	Prep	3005A			50 mL	50 mL	279696	05/24/19 12:42	KAK	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			280122	05/29/19 18:10	RSK	TAL PIT
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	596226	05/20/19 14:45	BMC	TAL NSH

Laboratory References:

TAL NSH = Eurofins TestAmerica, Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177
TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

Method Summary

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 490-174252-1

Method	Method Description	Protocol	Laboratory
9056A	Anions, Ion Chromatography	SW846	TAL NSH
EPA 6020A	Metals (ICP/MS)	SW846	TAL PIT
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL NSH
Field Sampling	Field Sampling	EPA	TAL NSH
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL PIT

Protocol References:

EPA = US Environmental Protection Agency

SM = "Standard Methods For The Examination Of Water And Wastewater"

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And its Updates.

Laboratory References:

TAL NSH = Eurofins TestAmerica, Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

Accreditation/Certification Summary

Client: Midwest Environmental Consultants
Job ID: 490-174252-1
Project/Site: Asbury Ash Pond

Laboratory: Eurofins TestAmerica, Nashville

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
A2LA	ISO/IEC 17025		0453.07	12-31-19
Alaska (UST)	State Program	10	UST-087	06-30-19
Arizona	State Program	9	AZ0473	05-05-20
Arkansas DEQ	State Program	6	88-0737	04-25-20
California	State Program	9	2938	06-30-19
Connecticut	State Program	1	PH-0220	12-31-19
Florida	NELAP	4	E87358	06-30-19
Georgia	State Program	4	NA: NELAP & A2LA	12-31-19
Illinois	NELAP	5	200010	12-09-19
Iowa	State Program	7	131	04-01-20
Kansas	NELAP	7	E-10229	10-31-19
Kentucky (UST)	State Program	4	19	06-30-19
Kentucky (WW)	State Program	4	90038	12-31-19
Louisiana	NELAP	6	30613	06-30-19
Maine	State Program	1	TN00032	11-03-19
Maryland	State Program	3	316	03-31-20
Massachusetts	State Program	1	M-TN032	06-30-19
Minnesota	NELAP	5	047-999-345	12-31-19
Mississippi	State Program	4	N/A	06-30-19
Nevada	State Program	9	TN00032	07-31-19
New Hampshire	NELAP	1	2963	10-09-19
New Jersey	NELAP	2	TN965	06-30-19
New York	NELAP	2	11342	03-31-20
North Carolina (WW/SW)	State Program	4	387	12-31-19
North Dakota	State Program	8	R-146	06-30-19
Oklahoma	State Program	6	9412	08-31-19
Oregon	NELAP	10	TN200001	04-26-19 *
Pennsylvania	NELAP	3	68-00585	07-31-19
Rhode Island	State Program	1	LAO00268	12-30-19
South Carolina	State Program	4	84009 (001)	02-28-19 *
Tennessee	State Program	4	2006	02-23-20
Texas	NELAP	6	T104704077	08-31-19
USDA	Federal		P330-13-00306	04-10-20
Utah	NELAP	8	TN00032	07-31-19
Virginia	NELAP	3	460152	06-14-19
Washington	State Program	10	C789	07-19-19
West Virginia DEP	State Program	3	219	02-28-20
Wisconsin	State Program	5	998020430	08-31-19
Wyoming (UST)	A2LA	8	453.07	12-31-19

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Accreditation/Certification Summary

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 490-174252-1

Laboratory: Eurofins TestAmerica, Pittsburgh

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Arkansas DEQ	State Program	6	88-0690	06-27-19
California	State Program	9	2891	04-30-20
Connecticut	State Program	1	PH-0688	09-30-20
Florida	NELAP	4	E871008	06-30-19
Illinois	NELAP	5	200005	06-30-19
Kansas	NELAP	7	E-10350	01-31-20
Louisiana	NELAP	6	04041	06-30-19
Nevada	State Program	9	PA00164	07-31-19
New Hampshire	NELAP	1	2030	04-04-20
New Jersey	NELAP	2	PA005	06-30-19
New York	NELAP	2	11182	03-31-20
North Carolina (WW/SW)	State Program	4	434	12-31-19
Oregon	NELAP	10	PA-2151	02-06-20
Pennsylvania	NELAP	3	02-00416	04-30-20
South Carolina	State Program	4	89014	04-30-19 *
Texas	NELAP	6	T104704528-15-2	03-31-20
US Fish & Wildlife	Federal		LE94312A-1	07-31-19
USDA	Federal		P330-16-00211	06-26-19
Utah	NELAP	8	PA001462015-4	05-31-19 *
Virginia	NELAP	3	460189	09-14-19
West Virginia DEP	State Program	3	142	01-31-20
Wisconsin	State Program	5	998027800	08-31-19

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
Nashville, TN

COOLER RECEIPT FORM

490-174252 Chain of Custody

Cooler Received/Opened On 5/17/2019 @ 9:50

Time Samples Removed From Cooler 16:28 Time Samples Placed In Storage 16:32 (2 Hour Window)

1. Tracking # 9734 (last 4 digits, FedEx) Courier: Fedex

IR Gun ID 17610176 pH Strip Lot NA Chlorine Strip Lot NA

2. Temperature of rep. sample or temp blank when opened: 4.2 Degrees Celsius

3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO (NA)

4. Were custody seals on outside of cooler? (YES)...NO...NA

If yes, how many and where: 1 Top

5. Were the seals intact, signed, and dated correctly? (YES)...NO...NA

6. Were custody papers inside cooler? (YES)...NO...NA

I certify that I opened the cooler and answered questions 1-6 (initial) JMV

7. Were custody seals on containers: YES (NO) and intact YES...NO...(NA)

Were these signed and dated correctly? YES...NO...(NA)

8. Packing mat'l used? (Bubblewrap) Plastic bag Peanuts Vermiculite Foam Insert Paper Other None

9. Cooling process: (Ice) Ice-pack Ice (direct contact) Dry ice Other None

10. Did all containers arrive in good condition (unbroken)? (YES)...NO...NA

11. Were all container labels complete (#, date, signed, pres., etc)? (YES)...NO...NA

12. Did all container labels and tags agree with custody papers? (YES)...NO...NA

13a. Were VOA vials received? YES...(NO)...NA

b. Was there any observable headspace present in any VOA vial? YES...NO...(NA)


Larger than this.

14. Was there a Trip Blank in this cooler? YES...(NO)...NA If multiple coolers, sequence #_____

I certify that I unloaded the cooler and answered questions 7-14 (initial) ACE

15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES...NO...(NA)

b. Did the bottle labels indicate that the correct preservatives were used (YES)...NO...NA

16. Was residual chlorine present? YES...NO...(NA)

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial) ACE

17. Were custody papers properly filled out (ink, signed, etc)? (YES)...NO...NA

18. Did you sign the custody papers in the appropriate place? (YES)...NO...NA

19. Were correct containers used for the analysis requested? (YES)...NO...NA

20. Was sufficient amount of sample sent in each container? (YES)...NO...NA

I certify that I entered this project into LIMS and answered questions 17-20 (initial) ACE

I certify that I attached a label with the unique LIMS number to each container (initial) ACE

21. Were there Non-Conformance issues at login? YES...(NO) Was a NCM generated? YES...(NO)...#_____

BIS = Broken in shipment
Cooler Receipt Form.doc

LF-1
End of Form

Revised 8/23/17

TestAmerica Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Phone (615) 726-0177 Fax (615) 726-3404

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: Rick Elgin	Lab PM: Gartner, Cathy	Carrier Tracking No(s):	COC No: 490-98046-27559.1
Client Contact: Mr. Rick Elgin	Phone: 573-636-9454	E-Mail: cathy.gartner@testamericainc.com		Page: Page 1 of 1
Company: Midwest Environmental Consultants				Job #:
Address: 2009 East McCarty Street Suite 2	Due Date Requested:			
City: Jefferson City	TAT Requested (days):			
State, Zip: MO, 65101				
Phone: 573-636-9454(Tel)	PO #: Purchase Order not required			
Email: relgin@mecpc.com	WO #:			
Project Name: Asbury Ash Pond Event Desc: Asbury Ash Pond	Project #: 49010011			
Site: Missouri	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - NaNO3, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (w=water, s=solid, o=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	9056C, 9056A_ORGFM_28D	FieldSampling - [MOD] Custom Field Sampling Analyte List	2540C_Calcd - Total Dissolved Solids	6020A - [MOD] Ca and B	Total Number of containers	Special Instructions/Note:	
			Preservation Code:				N	N	N	D		fld flt	SPEC cond
MW-2	5-16-19	9:26	G	W			X	X	X	X		6.35	.640
MW-3	5-16-19	9:50										6.03	1.063
MW-4	5-15-19	4:50										7.09	1.191
MW-5		4:25										7.23	.012
MW-5A		4:00										8.54	1.942
MW-6		3:40										8.84	1.738
MW-6A		3:20										8.22	1.521
MW-7		2:50										6.26	2.555
DUP		3:05											
Field BLANK		3:10											

Loc: 490
174252

Possible Hazard Identification
[X] Non-Hazard [ ] Flammable [ ] Skin Irritant [ ] Poison B [ ] Unknown [ ] Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
[ ] Return To Client [X] Disposal By Lab [ ] Archive For ____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:		
Relinquished by:	Date/Time: 5-16-19 4:00	Company: mec	Received by: FedEx	Date/Time: 5-16-19 4:00	Company: FedEx
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time: 5/17/19 9:30	Company: TA-NS
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:

Custody Seals Intact: Δ Yes Δ No
Custody Seal No.:
Cooler Temperature(s) °C and Other Remarks: 4.7

Rev: 01/19/2018

Eurofins TestAmerica, Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Phone (615) 726-0177 Fax (615) 726-3404

Chain of Custody Record

eurofins | Environment Testing TestAmerica

Client Information (Sub Contract Lab)

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Gartner, Cathy	Carrier Tracking No(s):	COC No: 490-90697.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: cathy.gartner@testamericainc.com	State of Origin: Missouri	Page: Page 1 of 2
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 490-174252-1
Address: 301 Alpha Drive, RIDC Park,	Due Date Requested: 5/30/2019			
City: Pittsburgh	TAT Requested (days):			
State, Zip: PA, 15238				
Phone: 412-963-7058(Tel) 412-963-2468(Fax)	PO #:			
Email:	WO #:			
Project Name: Asbury Ash Pond	Project #: 49010011			
Site: Midwest Env Consultants - Empire CCR	SSOW#:			

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
Other:

Analysis Requested

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	6020A/3005A (MOD) Ca and B	Total Number of containers	Special Instructions/Note:
			Preservation Code:						
MW-2 (490-174252-1)	5/16/19	09:20 Central		Water			X	1	
MW-3 (490-174252-2)	5/16/19	09:50 Central		Water			X	1	
MW-4 (490-174252-3)	5/15/19	04:50 Central		Water			X	1	
MW-5 (490-174252-4)	5/15/19	04:25 Central		Water			X	1	
MW-5A (490-174252-5)	5/15/19	04:00 Central		Water			X	1	
MW-6 (490-174252-6)	5/15/19	03:40 Central		Water			X	1	
MW-6A (490-174252-7)	5/15/19	03:20 Central		Water			X	1	
MW-7 (490-174252-8)	5/15/19	02:50 Central		Water			X	1	
Duplicate (490-174252-9)	5/15/19	03:05 Central		Water			X	1	

490-174252 Chain of Custody

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to TestAmerica Laboratories, Inc.

Possible Hazard Identification
Unconfirmed

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ____ *Months*

Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2

Special Instructions/QC Requirements:

Empty Kit Relinquished by:		Date:	Time:	Method of Shipment:	
Relinquished by: [signature]	Date/Time: 5-20-19 @ 1445	Company: TANNS	Received by: D Watson	Date/Time: 5-21-19 880	Company: TA Pitt
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:
Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks:		

Ver: 01/16/2019

Eurofins TestAmerica, Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Phone (615) 726-0177 Fax (615) 726-3404

ANTICC

Chain of Custody Record

eurofins | Environment Testing TestAmerica

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Gartner, Cathy	Carrier Tracking No(s):	COC No: 490-90697.2
Client Contact: Shipping/Receiving	Phone:	E-Mail: cathy.gartner@testamericainc.com	State of Origin: Missouri	Page: Page 2 of 2
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 490-174252-1
Address: 301 Alpha Drive, RIDC Park,	Due Date Requested: 5/30/2019	Analysis Requested		Preservation Codes:
City: Pittsburgh	TAT Requested (days):			A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - AmchIor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
State, Zip: PA, 15238				
Phone: 412-963-7058(Tel) 412-963-2468(Fax)	PO #:			Other:
Email:	WO #:			
Project Name: Asbury Ash Pond	Project #: 49010011			
Site: Midwest Env Consultants - Empire CCR	SSOW#:			

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8320A/3935A (MOD) Ca and B	Total Number of containers	Special
			Preservation Code:						
Field Blank (490-174252-10)	5/15/19	03:10 Central		Water			X	1	

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to TestAmerica Laboratories, Inc.

Possible Hazard Identification	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
Unconfirmed	☐ Return To Client ☐ Disposal By Lab ☐ Archive For Months
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
	5/20/19 @ 1445	TAN	D Watson	5-21-19 8:40	TAL-PIT
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: ☐ Yes ☐ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 01/16/2019

5/30/2019

Login Sample Receipt Checklist

Client: Midwest Environmental Consultants

Job Number: 490-174252-1
SDG Number:

Login Number: 174252
List Number: 2
Creator: Watson, Debbie

List Source: Eurofins TestAmerica, Pittsburgh
List Creation: 05/21/19 11:07 AM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

APPENDIX 5

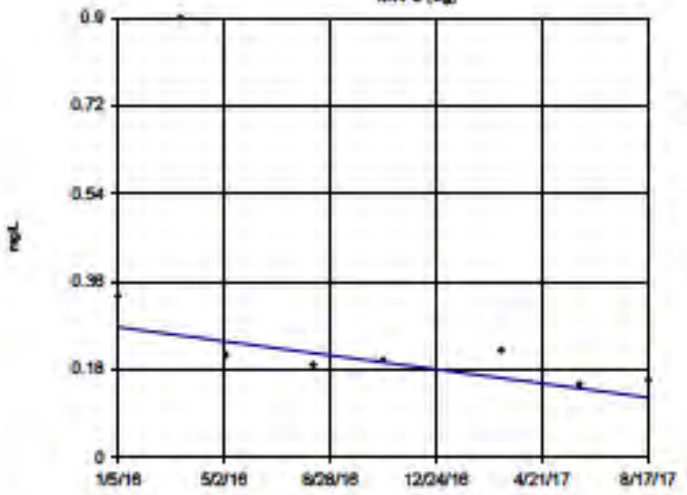
Statistical Analysis

Sanitas™ Output – Background

Trending Analysis

Boron

MW-2 (bg)

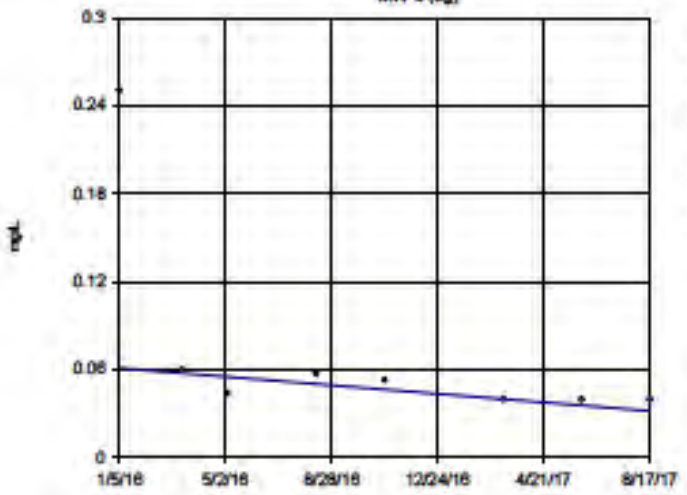


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Boron

MW-3 (bg)

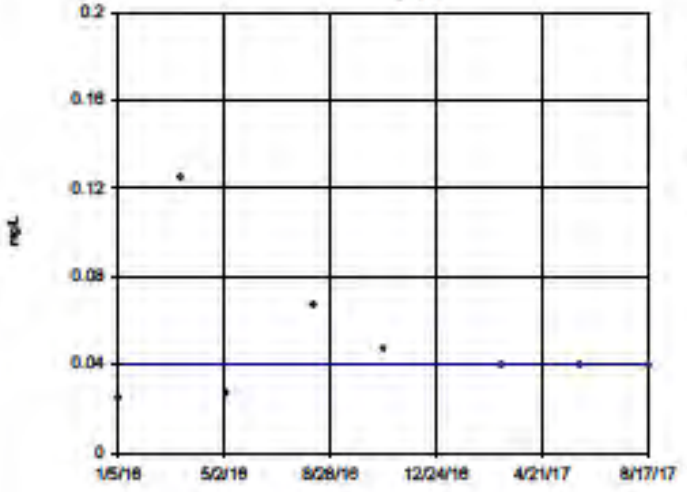


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Boron

MW-4

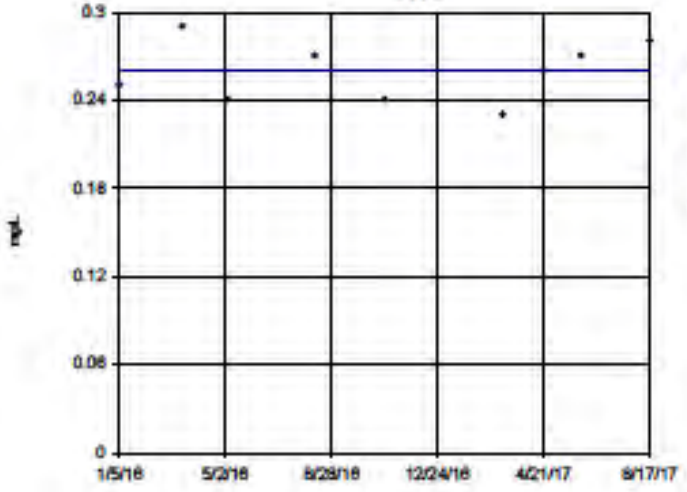


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Boron

MW-5

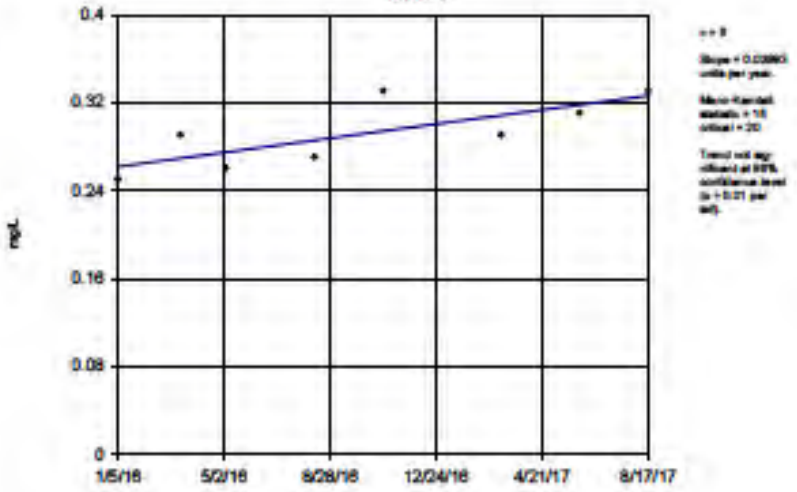


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Boron

MW-5A

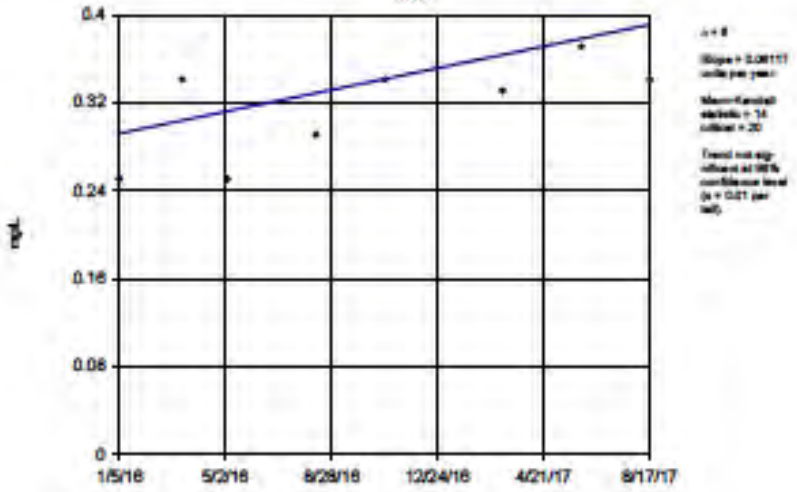


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3

Boron

MW-6

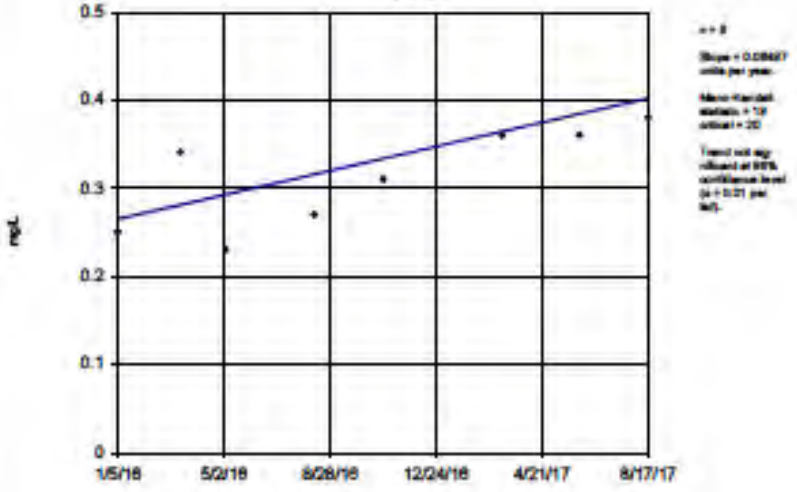


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3

Boron

MW-6A

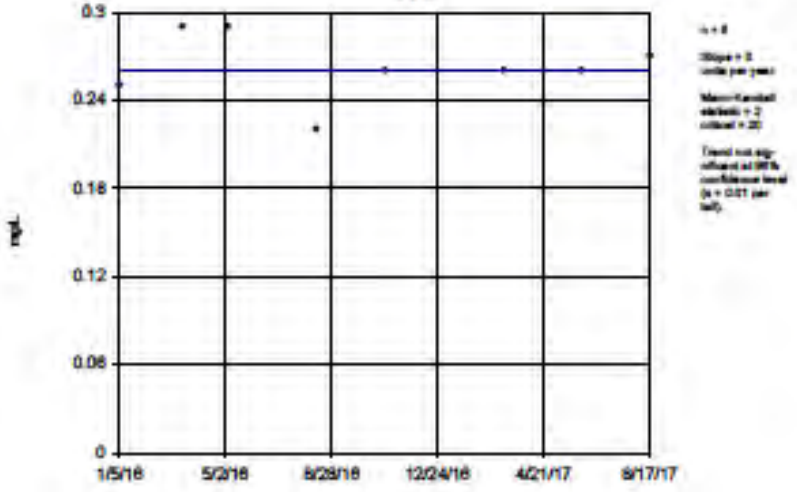


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3

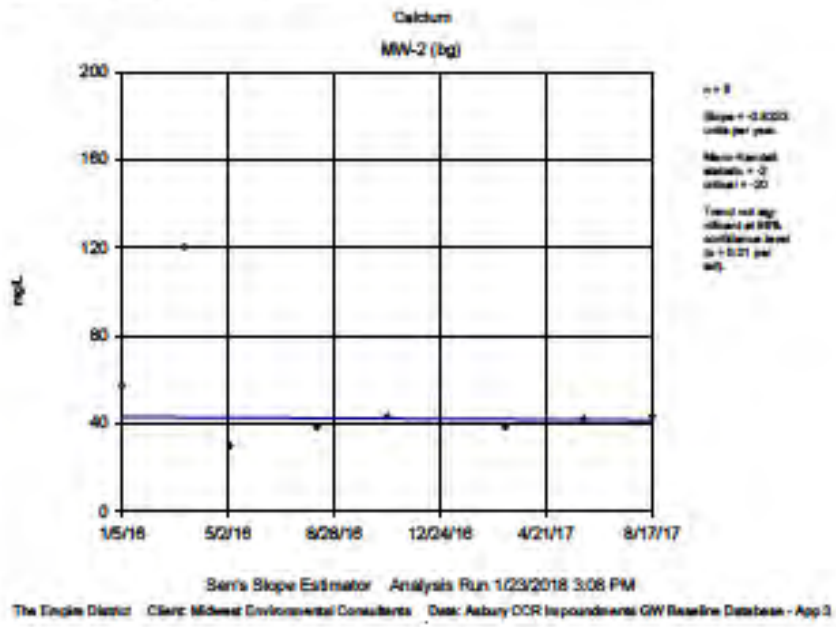
Boron

MW-7



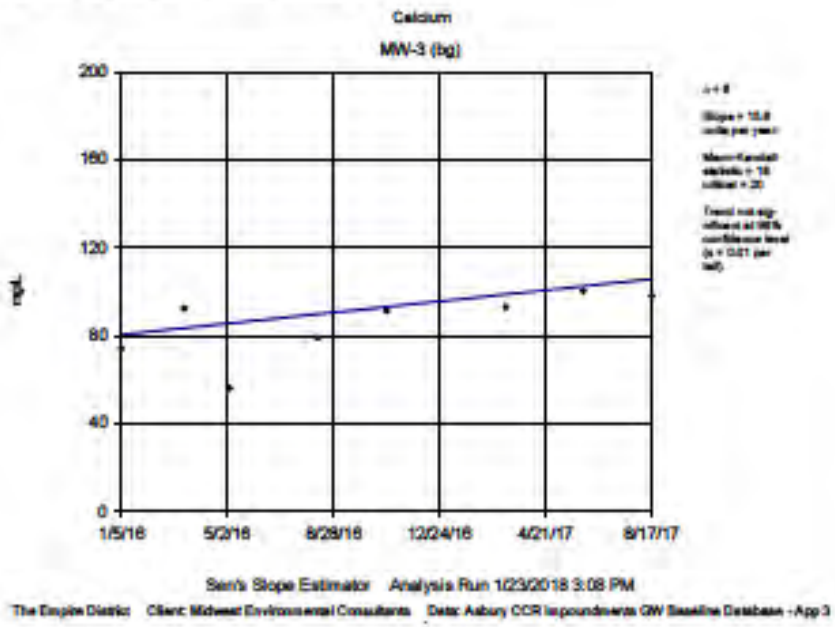
Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3



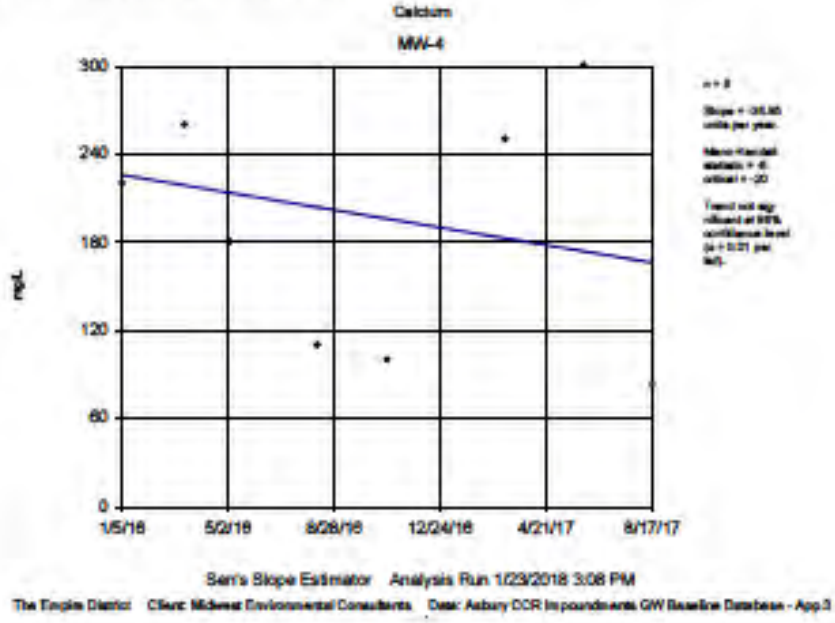
Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3



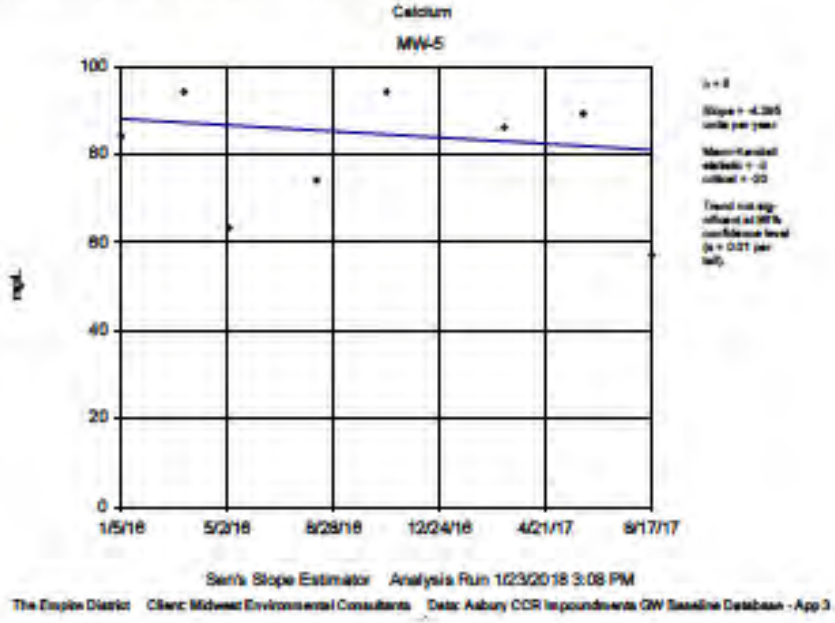
Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3



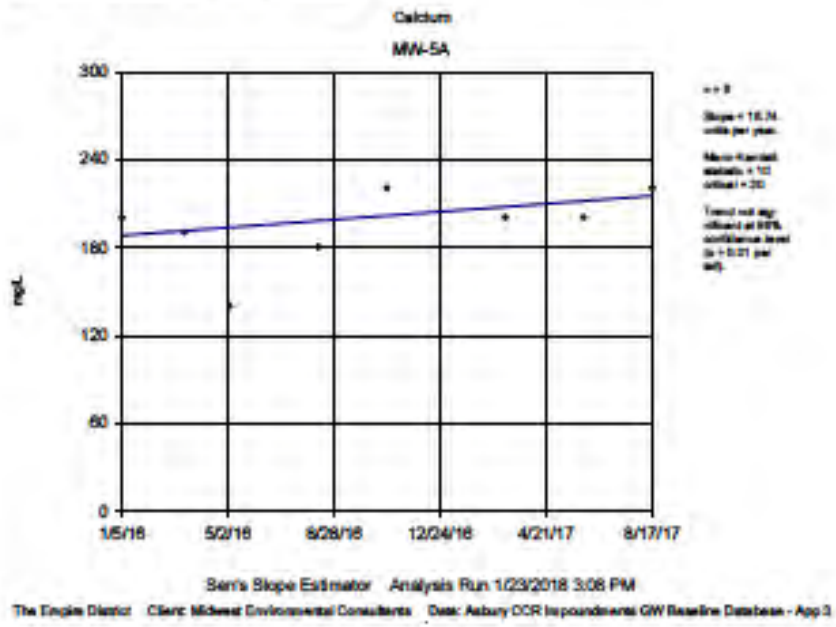
Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3



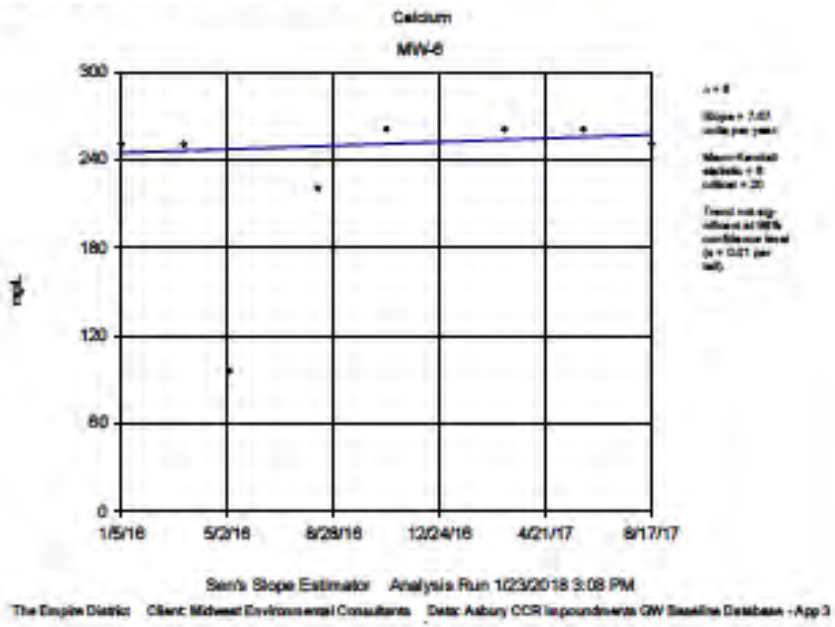
Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3



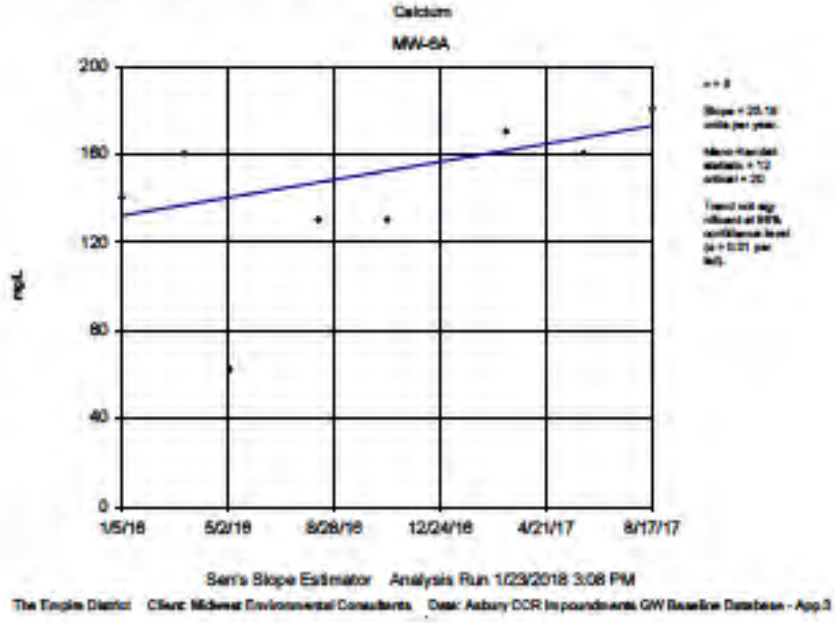
Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3



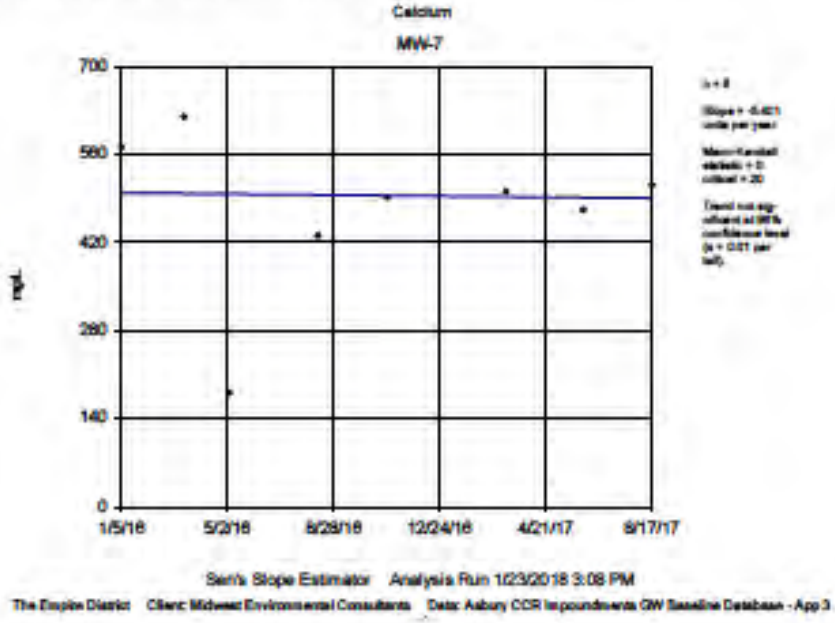
Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3



Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

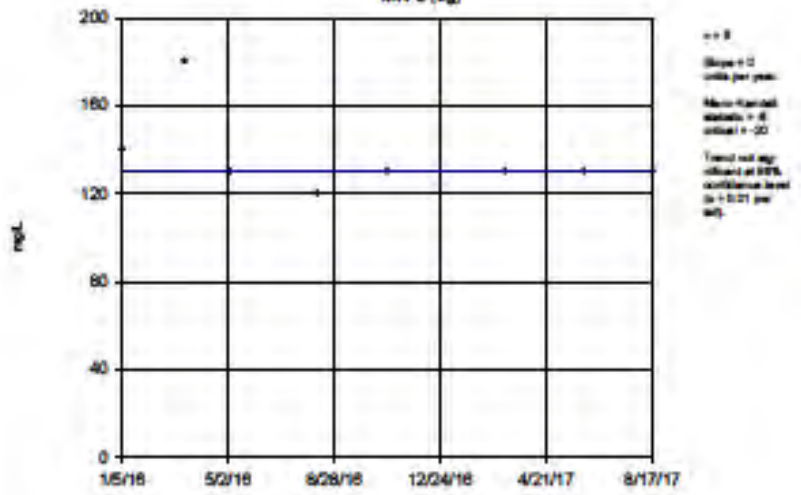


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Chloride

MW-2 (bg)

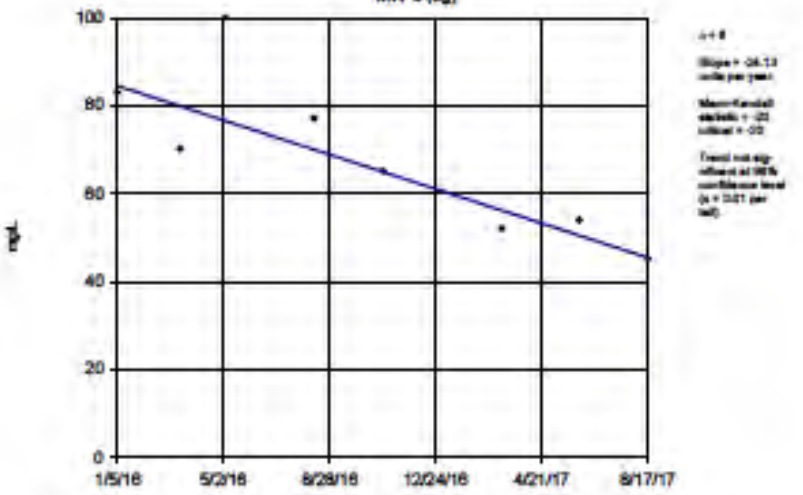


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3

Chloride

MW-3 (bg)

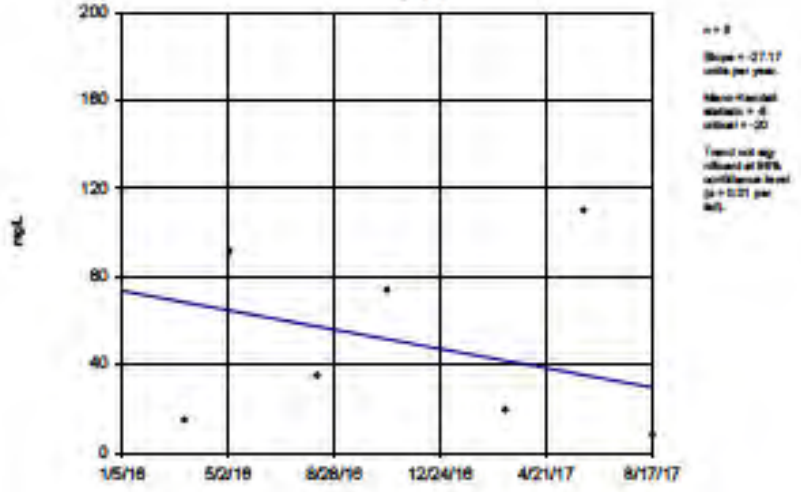


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3

Chloride

MW-4

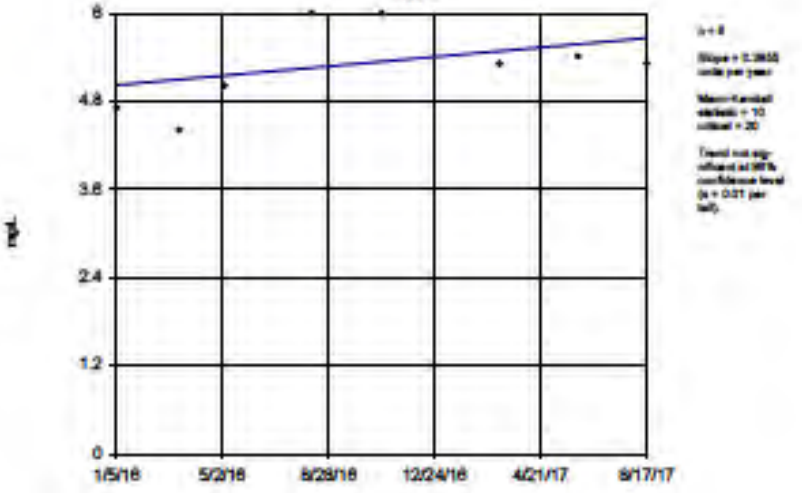


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3

Chloride

MW-5

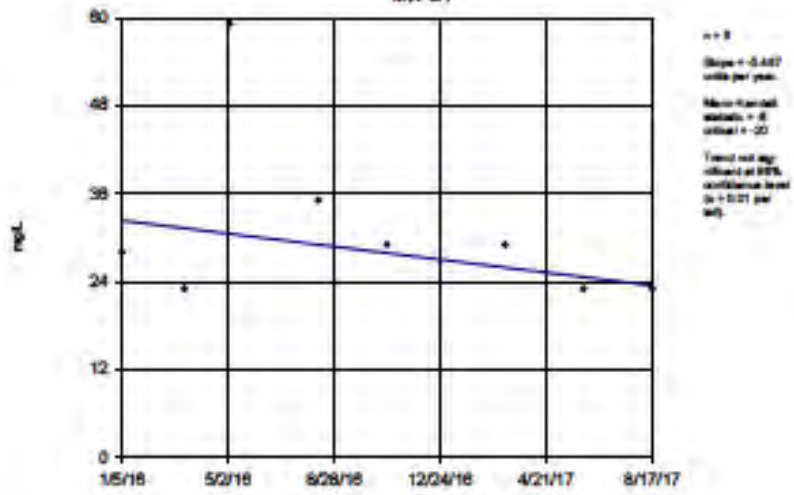


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3

Chloride

MW-5A

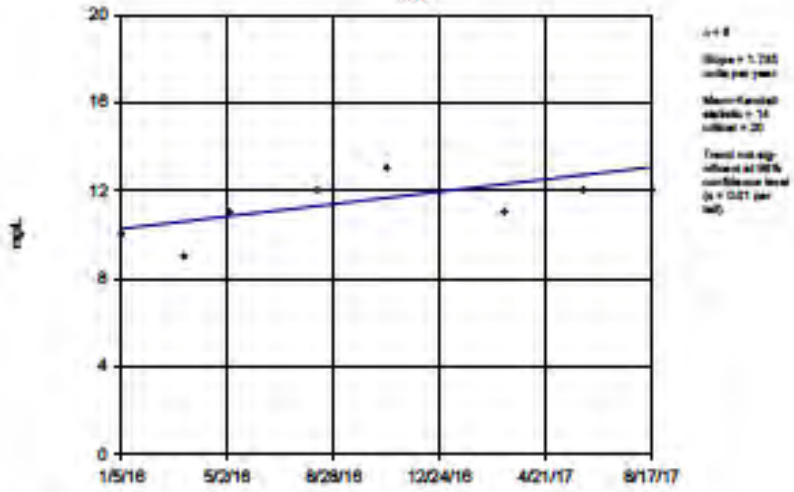


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3

Chloride

MW-6

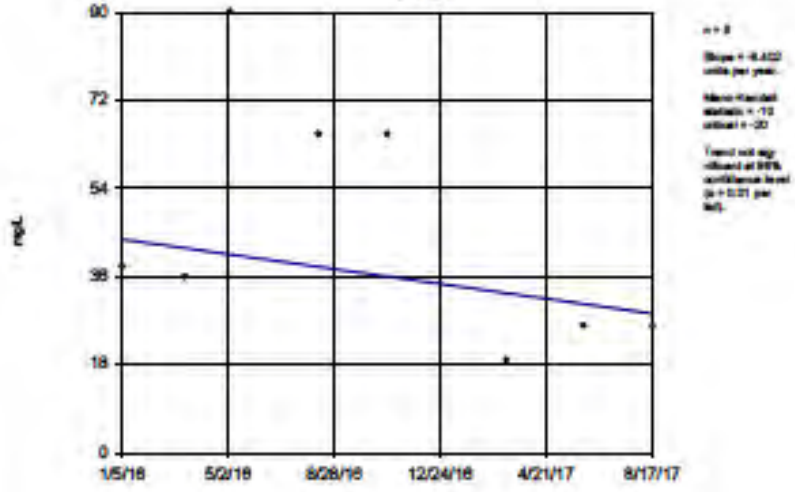


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3

Chloride

MW-6A

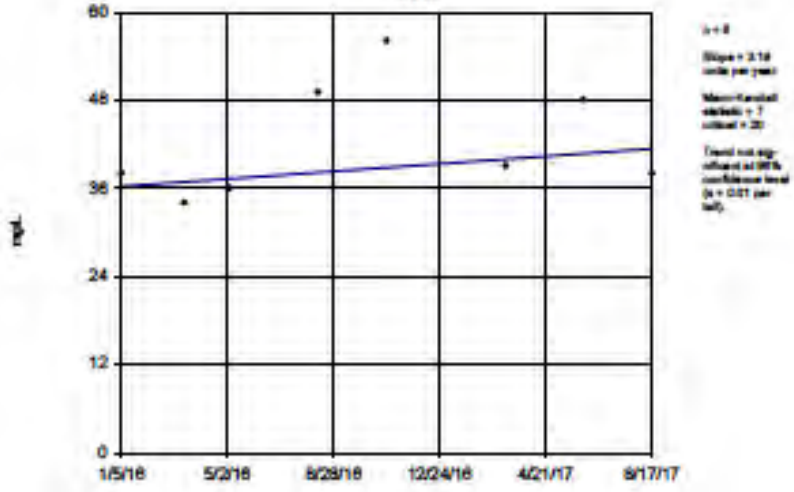


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3

Chloride

MW-7

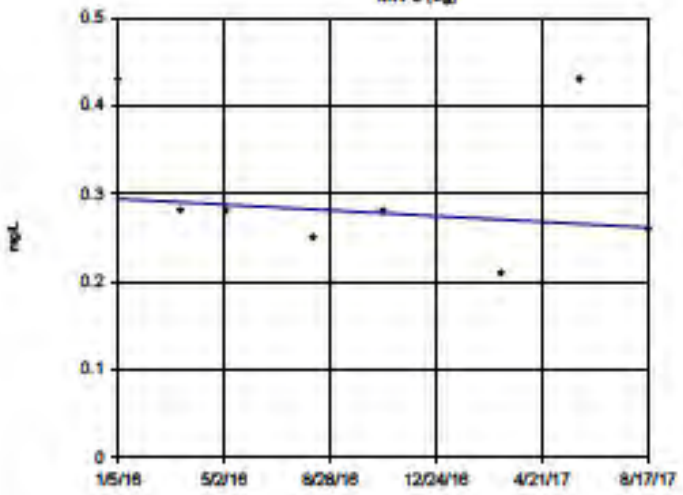


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3

Fluoride

MW-2 (bg)

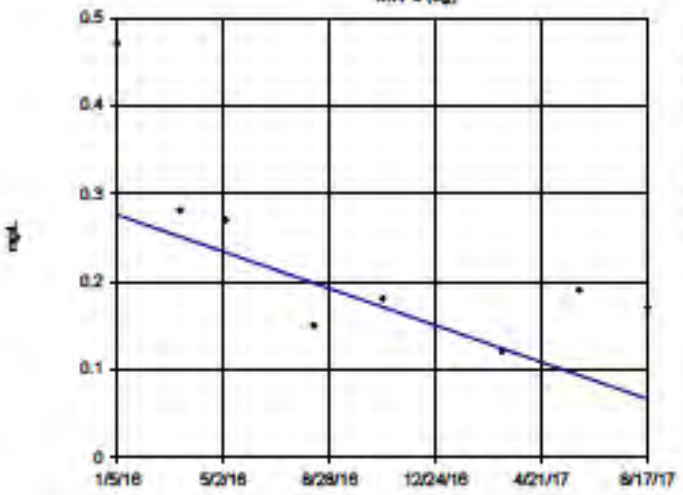


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Fluoride

MW-3 (bg)

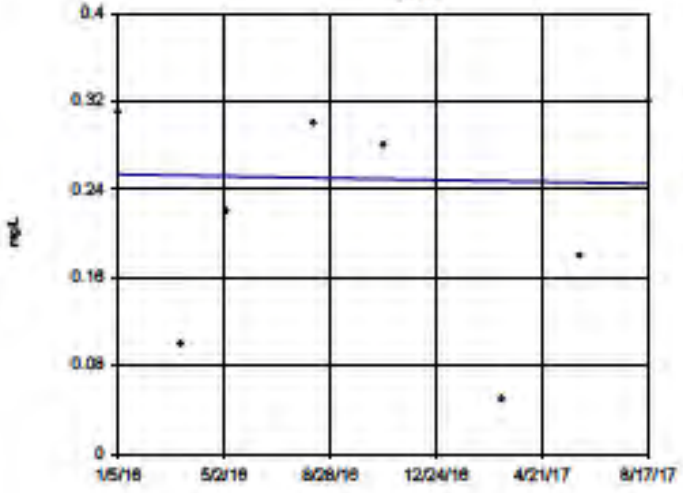


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Fluoride

MW-4

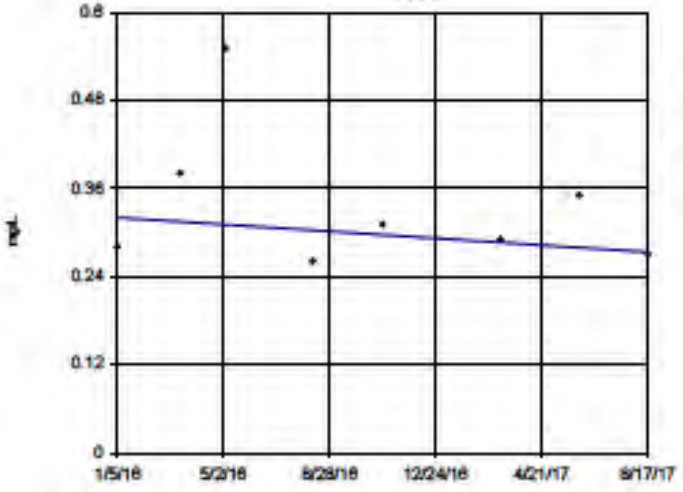


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Fluoride

MW-5

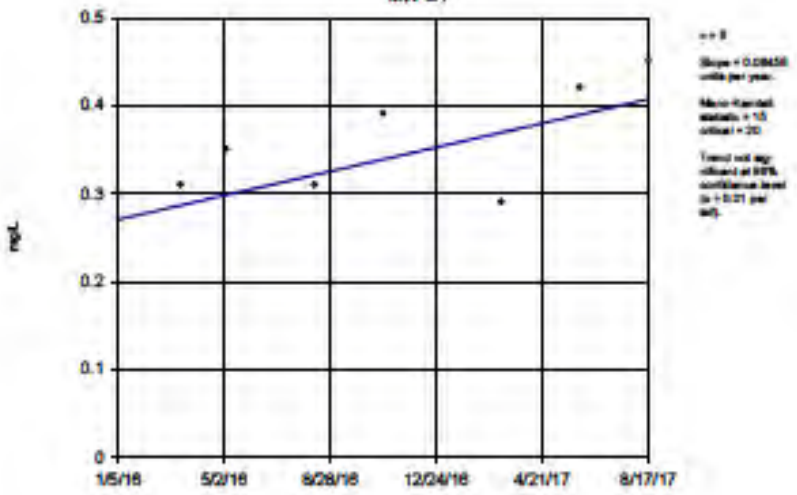


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Fluoride

MW-5A

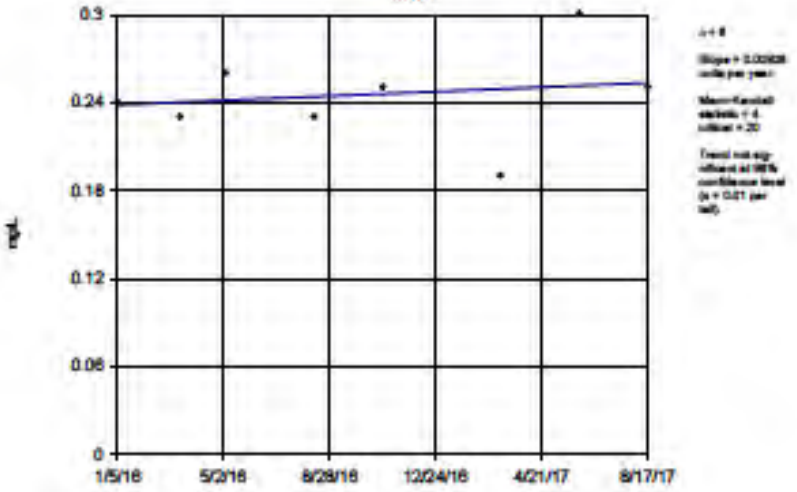


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Fluoride

MW-6

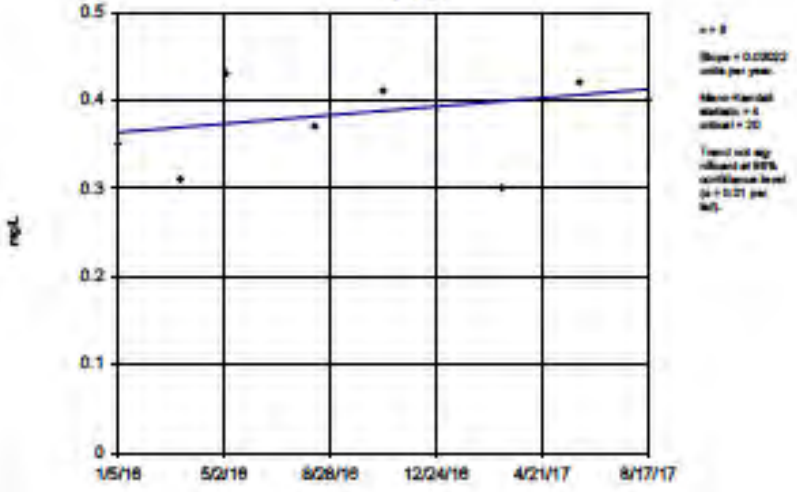


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Fluoride

MW-6A

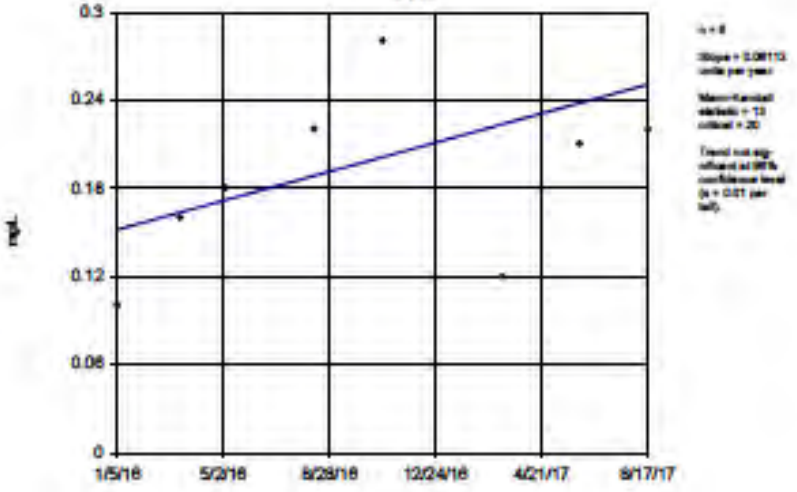


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Fluoride

MW-7



Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

pH

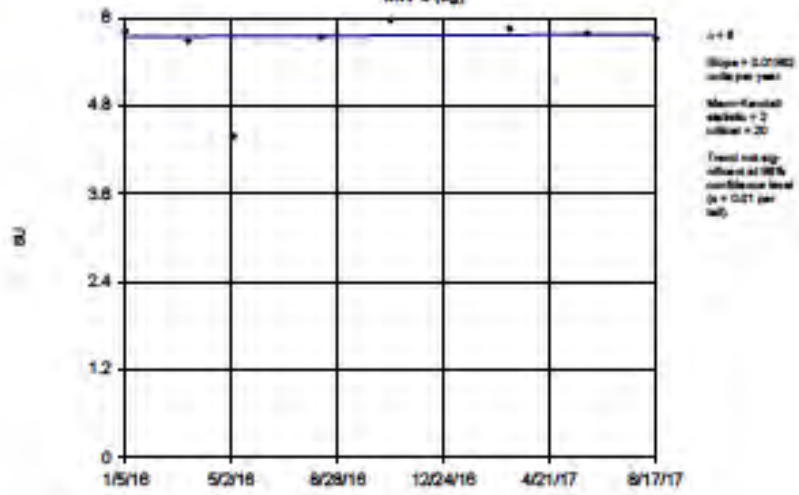
MW-2 (bg)

Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3

pH

MW-3 (bg)

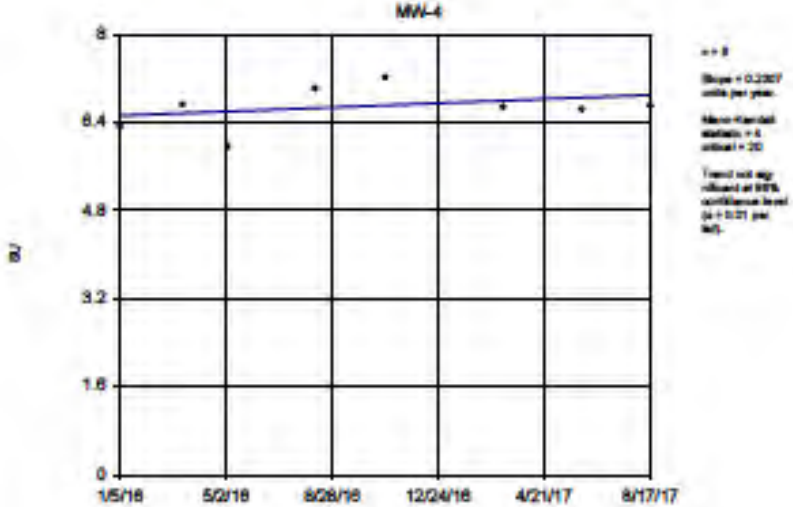


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3

pH

MW-4

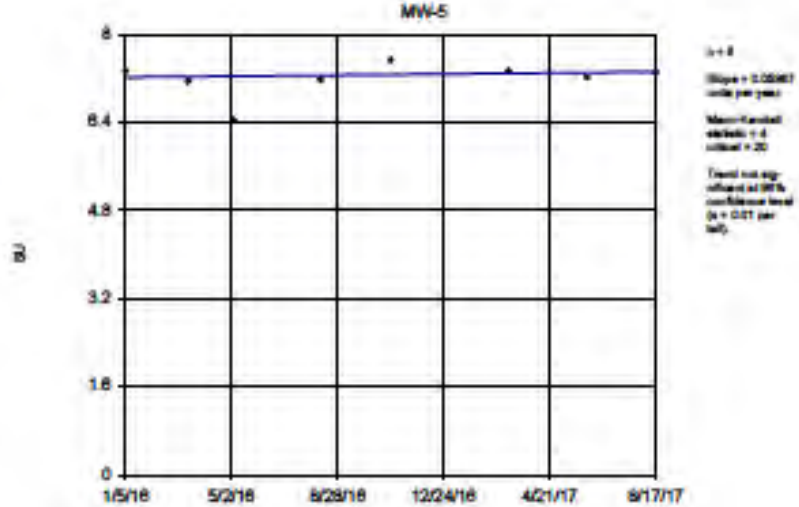


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3

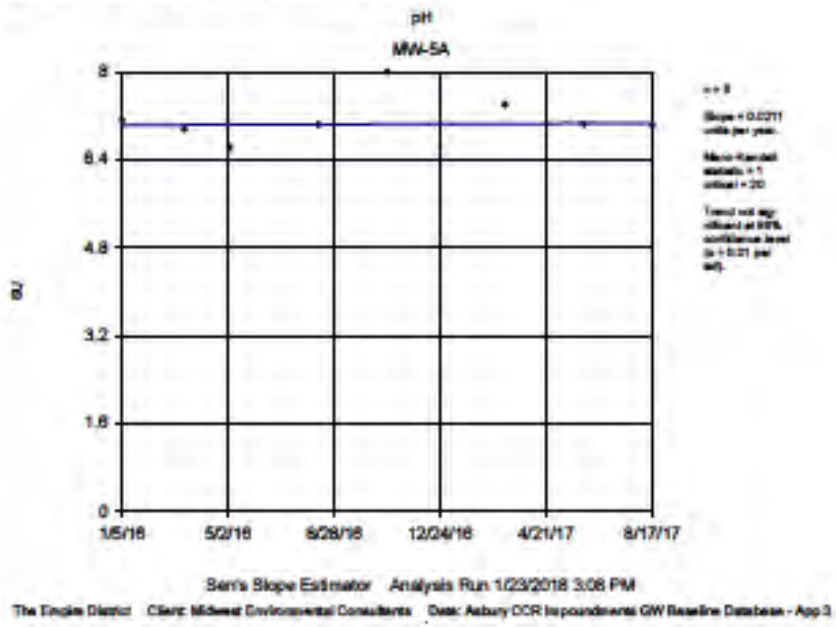
pH

MW-5



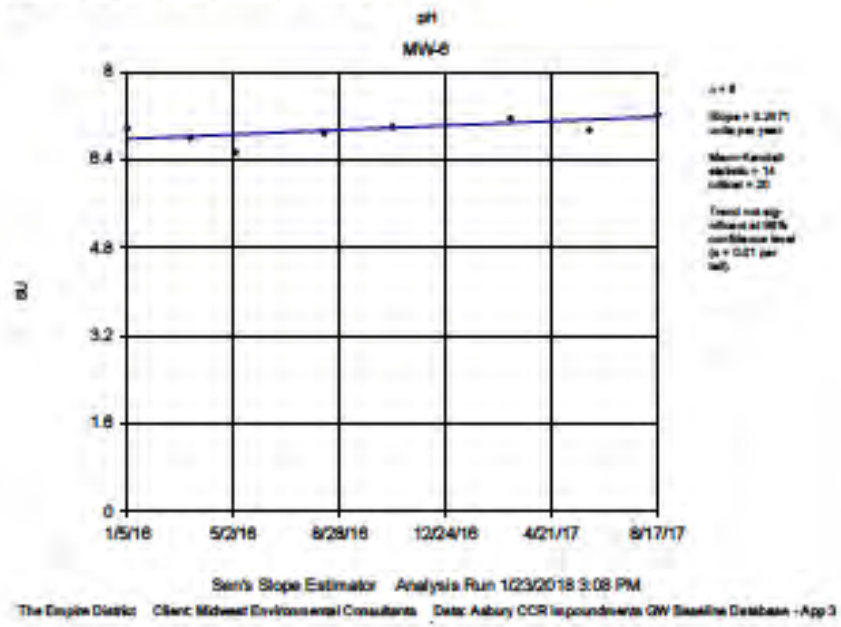
Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3



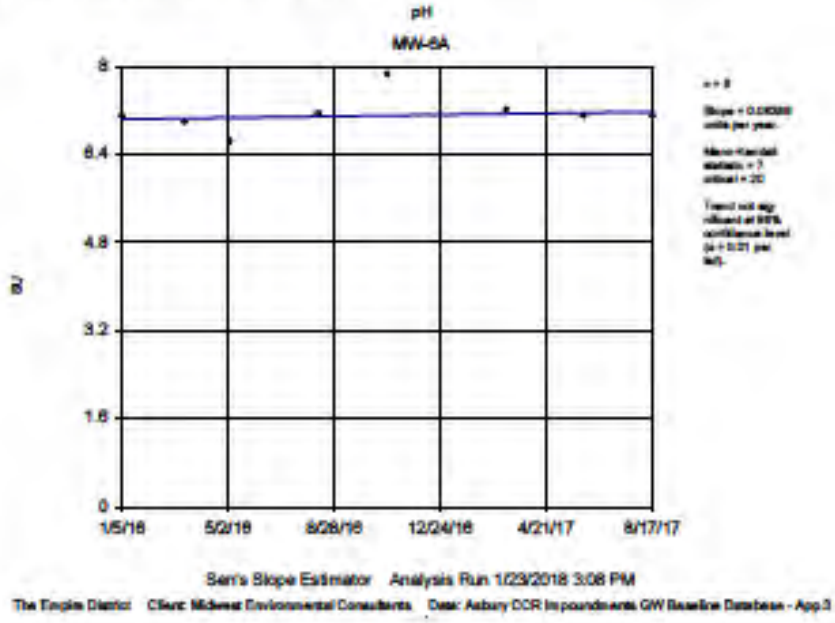
Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3



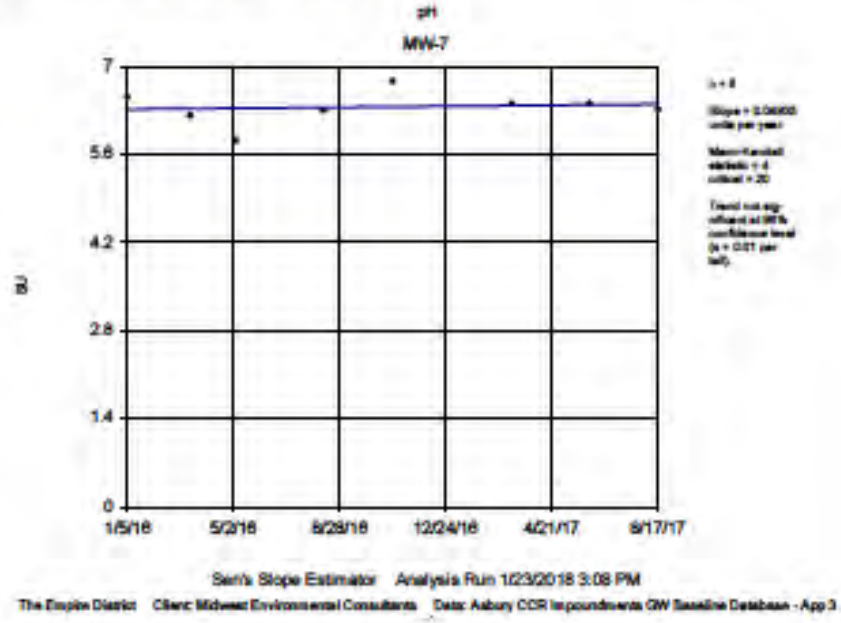
Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3



Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

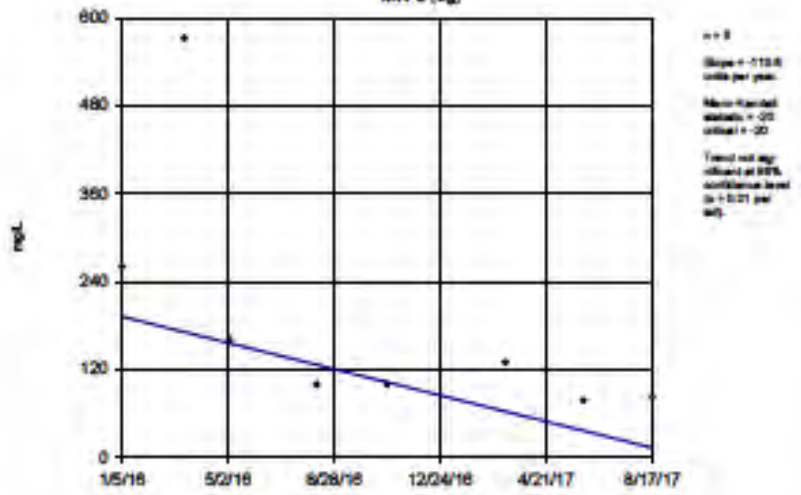


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Sulfate

MW-2 (bg)

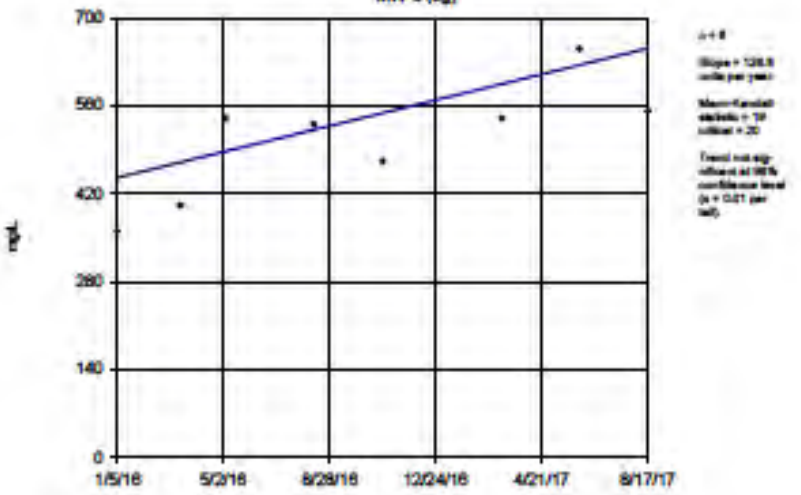


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Sulfate

MW-3 (bg)

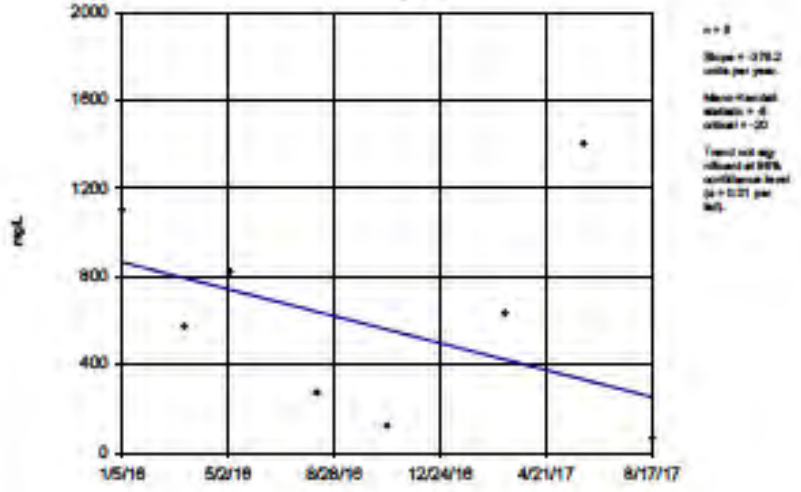


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Sulfate

MW-4

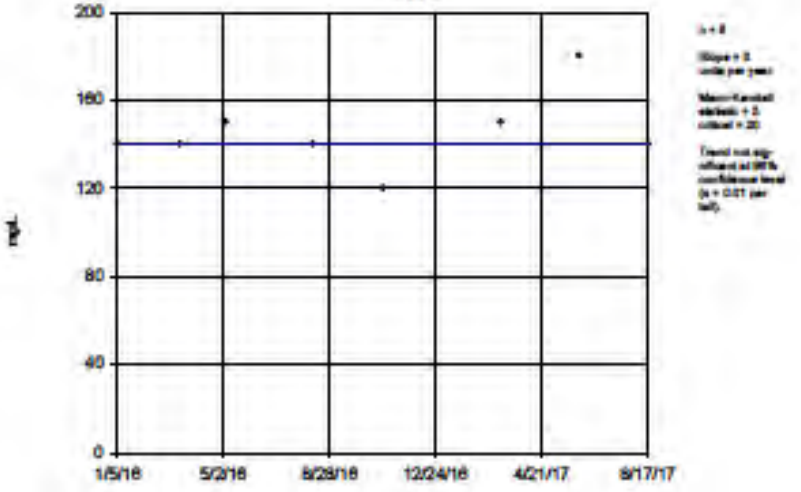


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Sulfate

MW-5

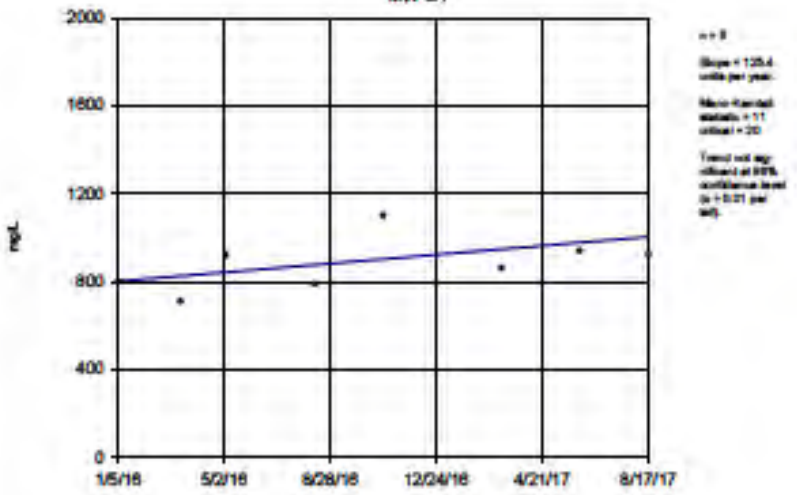


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Sulfate

MW-5A

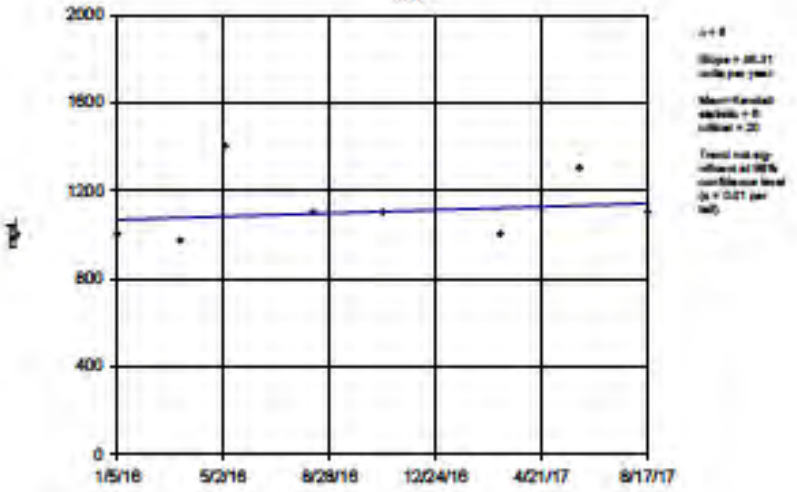


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Sulfate

MW-6

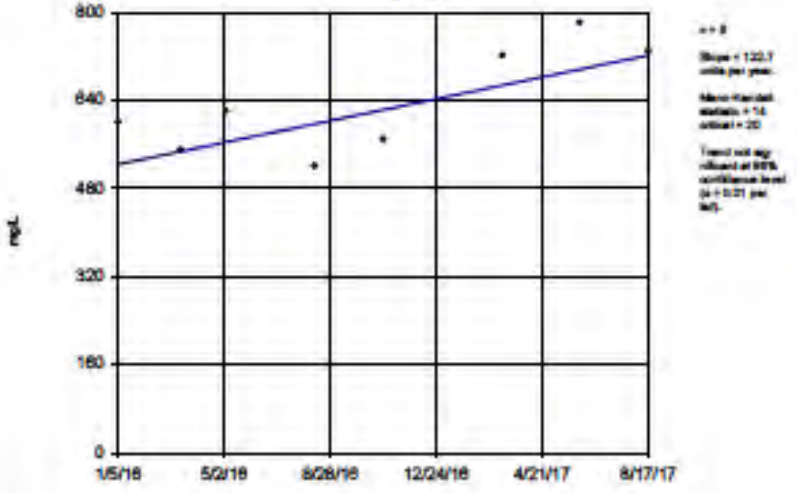


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Sulfate

MW-6A

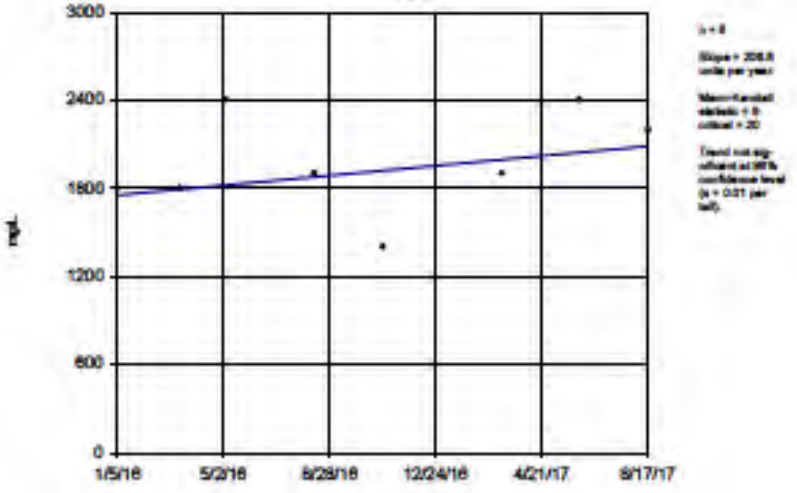


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Sulfate

MW-7

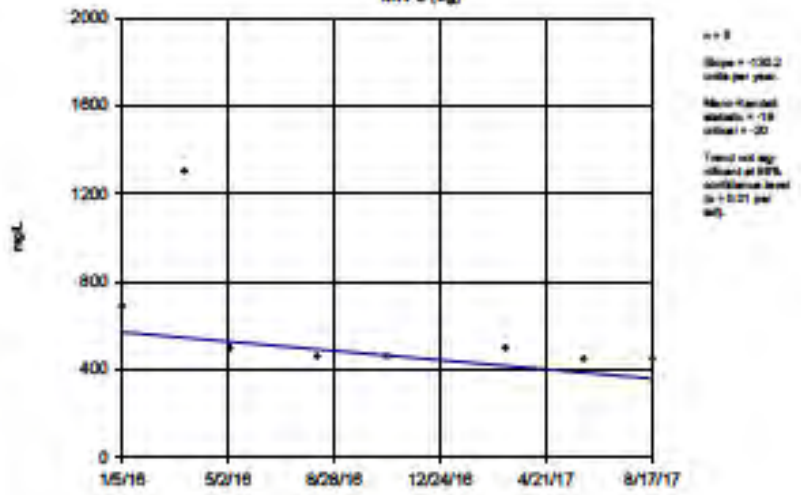


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Total Dissolved Solids

MW-2 (bg)

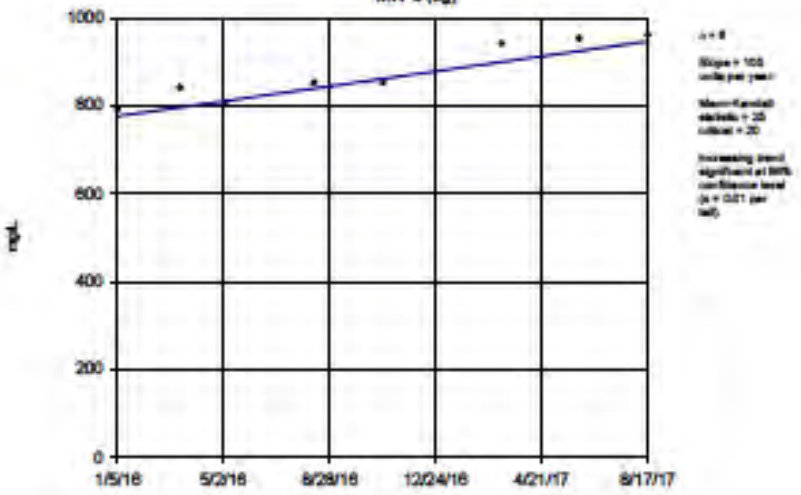


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Total Dissolved Solids

MW-3 (bg)

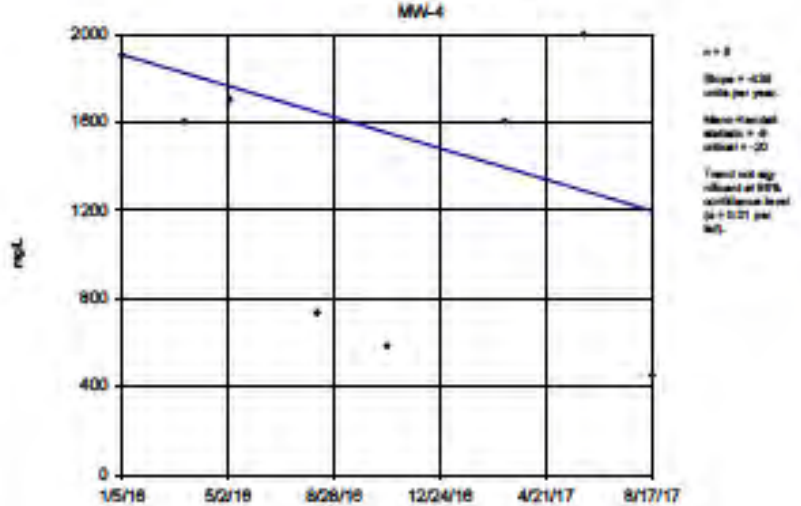


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Total Dissolved Solids

MW-4

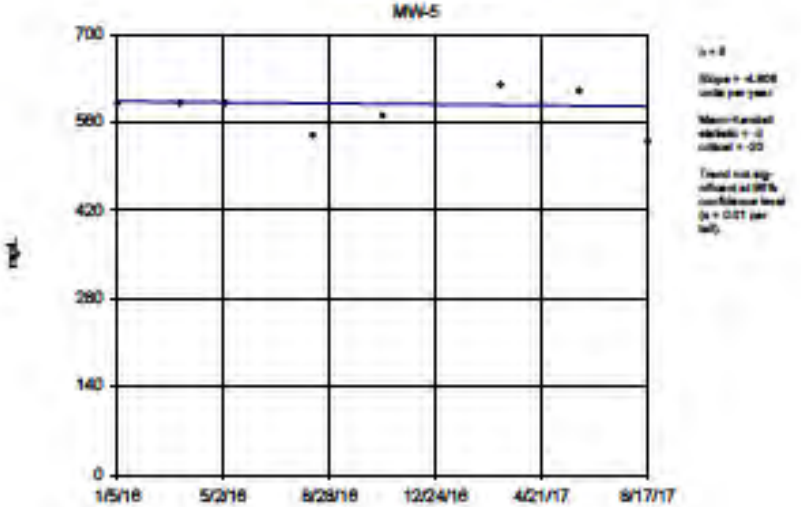


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

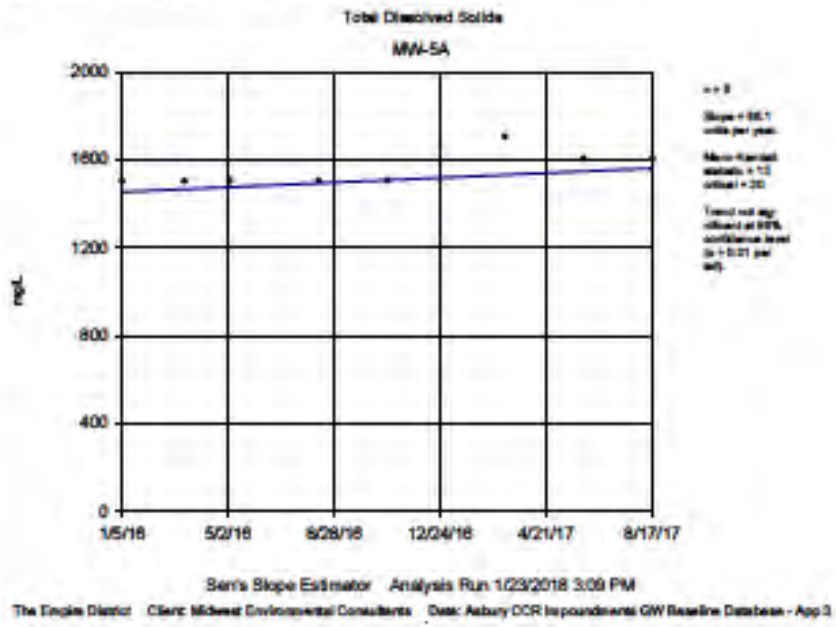
Total Dissolved Solids

MW-5



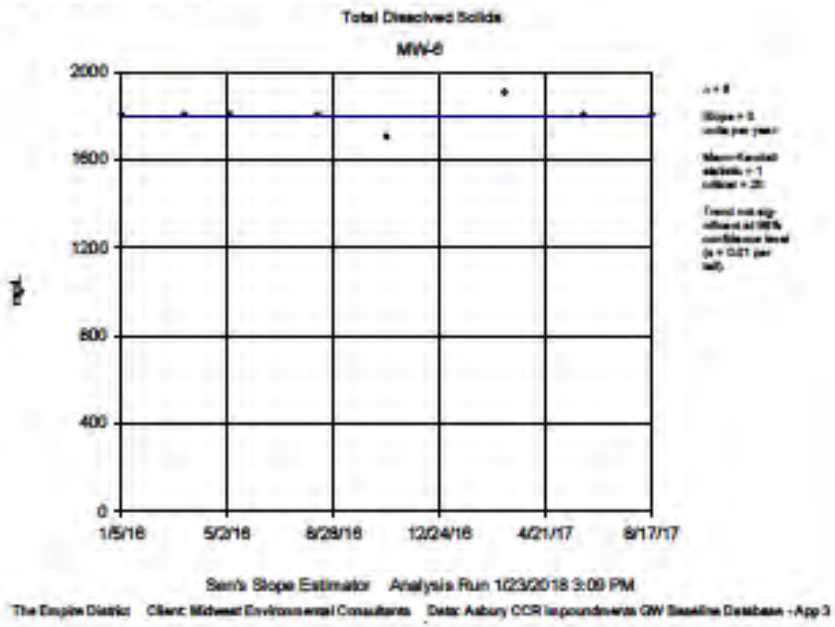
Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3



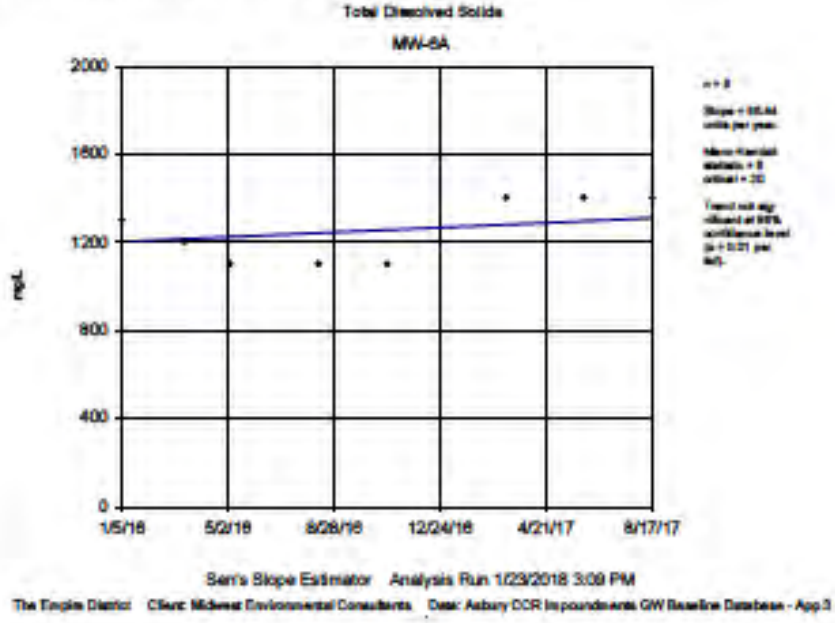
Sen's Slope Estimator Analysis Run 1/23/2018 3:09 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3



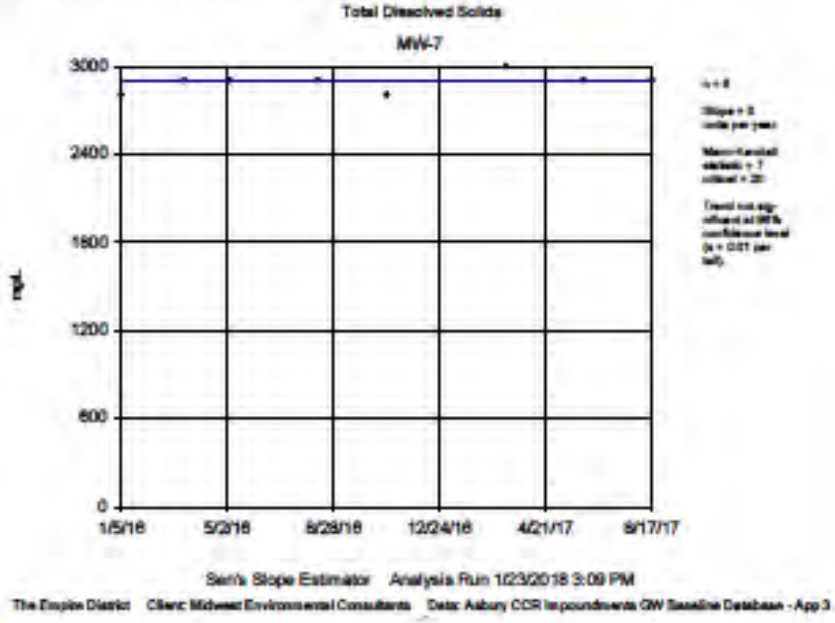
Sen's Slope Estimator Analysis Run 1/23/2018 3:09 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3



Sen's Slope Estimator Analysis Run 1/23/2018 3:09 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3



Sen's Slope Estimator Analysis Run 1/23/2018 3:09 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Trend Test

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3 only Printed 1/23/2018, 3:10 PM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Boron (mg/L)	MW-2 (bg)	-0.08868	-16	-20	No	8	0	n/a	n/a	0.02	NP
Boron (mg/L)	**MW-3 (bg)**	**-0.01787**	**-21**	**-20**	**Yes**	**8**	**50**	**n/a**	**n/a**	**0.02**	**NP**
Boron (mg/L)	MW-4	0	-1	-20	No	8	62.5	n/a	n/a	0.02	NP
Boron (mg/L)	MW-5	0	0	20	No	8	12.5	n/a	n/a	0.02	NP
Boron (mg/L)	MW-5A	0.03993	18	20	No	8	12.5	n/a	n/a	0.02	NP
Boron (mg/L)	MW-6	0.06117	14	20	No	8	12.5	n/a	n/a	0.02	NP
Boron (mg/L)	MW-6A	0.08497	19	20	No	8	12.5	n/a	n/a	0.02	NP
Boron (mg/L)	MW-7	0	2	20	No	8	12.5	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-2 (bg)	-0.8333	-2	-20	No	8	0	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-3 (bg)	15.6	18	20	No	8	0	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-4	-36.95	-6	-20	No	8	0	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-5	-4.395	-3	-20	No	8	0	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-5A	16.74	10	20	No	8	0	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-6	7.67	8	20	No	8	0	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-6A	25.16	12	20	No	8	0	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-7	-5.401	0	20	No	8	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-2 (bg)	0	-8	-20	No	8	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-3 (bg)	-24.13	-20	-20	No	8	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-4	-27.17	-8	-20	No	8	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-5	0.3955	10	20	No	8	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-5A	-5.487	-8	-20	No	8	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-6	1.735	14	20	No	8	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-6A	-9.402	-10	-20	No	8	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-7	3.19	7	20	No	8	0	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-2 (bg)	-0.02016	-8	-20	No	8	0	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-3 (bg)	-0.1295	-16	-20	No	8	0	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-4	-0.00...	0	20	No	8	12.5	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-5	-0.0291	-4	-20	No	8	0	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-5A	0.08456	15	20	No	8	0	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-6	0.00928	4	20	No	8	0	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-6A	0.03022	4	20	No	8	0	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-7	0.06113	13	20	No	8	12.5	n/a	n/a	0.02	NP
pH (SU)	MW-2 (bg)	0.2618	8	20	No	8	0	n/a	n/a	0.02	NP
pH (SU)	MW-3 (bg)	0.01982	2	20	No	8	0	n/a	n/a	0.02	NP
pH (SU)	MW-4	0.2307	4	20	No	8	0	n/a	n/a	0.02	NP
pH (SU)	MW-5	0.05967	4	20	No	8	0	n/a	n/a	0.02	NP
pH (SU)	MW-5A	0.0211	1	20	No	8	0	n/a	n/a	0.02	NP
pH (SU)	MW-6	0.2471	14	20	No	8	0	n/a	n/a	0.02	NP
pH (SU)	MW-6A	0.08386	7	20	No	8	0	n/a	n/a	0.02	NP
pH (SU)	MW-7	0.04935	4	20	No	8	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	MW-2 (bg)	-110.6	-20	-20	No	8	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	MW-3 (bg)	126.8	19	20	No	8	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	MW-4	-379.2	-8	-20	No	8	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	MW-5	0	5	20	No	8	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	MW-5A	125.4	11	20	No	8	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	MW-6	46.31	6	20	No	8	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	MW-6A	122.7	14	20	No	8	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	MW-7	206.6	9	20	No	8	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-2 (bg)	-130.2	-19	-20	No	8	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	**MW-3 (bg)**	**105**	**25**	**20**	**Yes**	**8**	**0**	**n/a**	**n/a**	**0.02**	**NP**

Trend Test

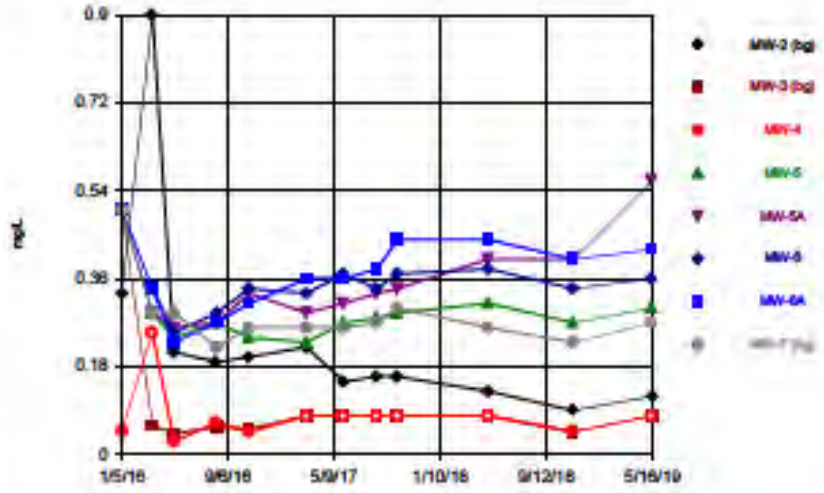
The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3 only Printed 1/23/2018, 3:10 PM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Total Dissolved Solids (mg/L)	MW-4	-439	-9	-20	No	8	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-5	-4.905	-3	-20	No	8	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-5A	66.1	13	20	No	8	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-6	0	1	20	No	8	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-6A	66.44	8	20	No	8	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-7	0	7	20	No	8	0	n/a	n/a	0.02	NP

Sanitas™ Output – Sampling Event

Time Series Analysis

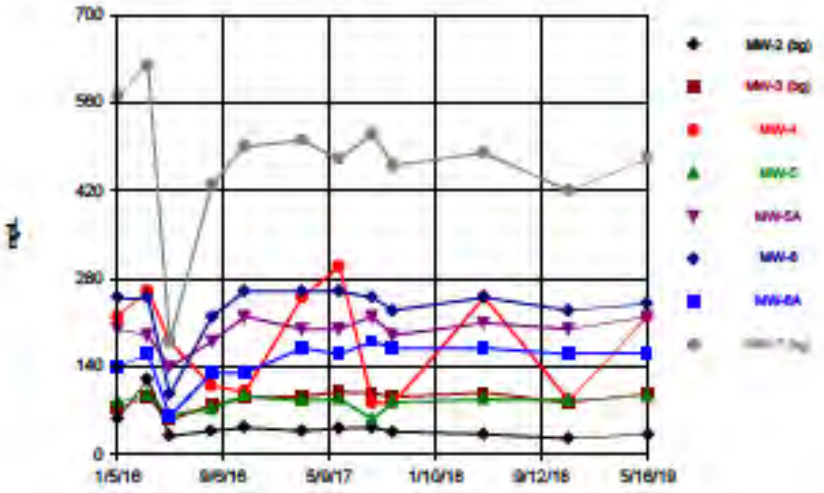
Boron



Time Series Analysis Run 6/13/2019 2:16 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Ashury ponds with background

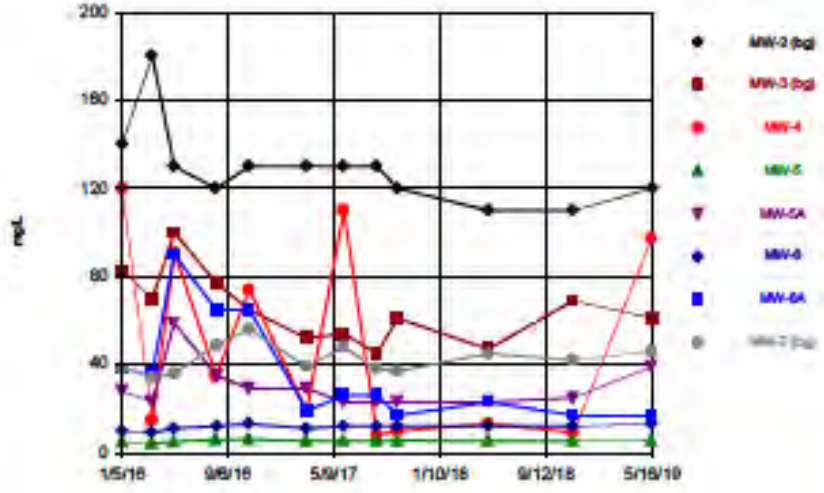
Calcium



Time Series Analysis Run 6/13/2019 2:16 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Ashury ponds with background

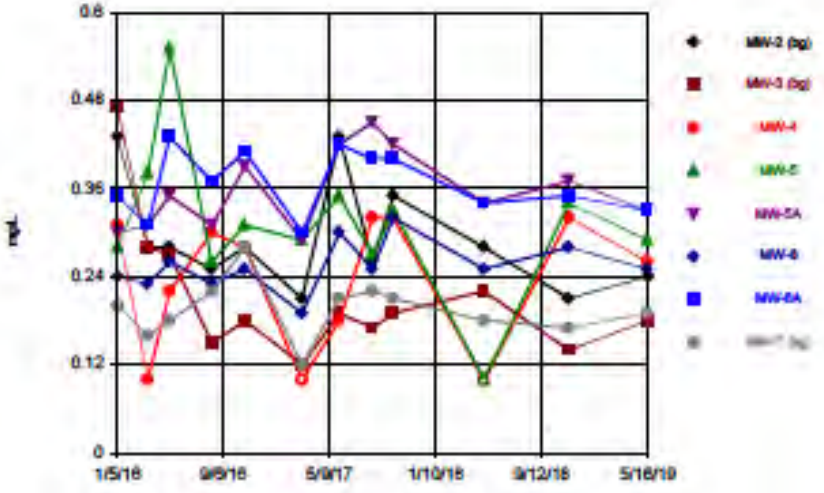
Chloride



Time Series Analysis Run 6/13/2019 2:16 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Ashury ponds with background

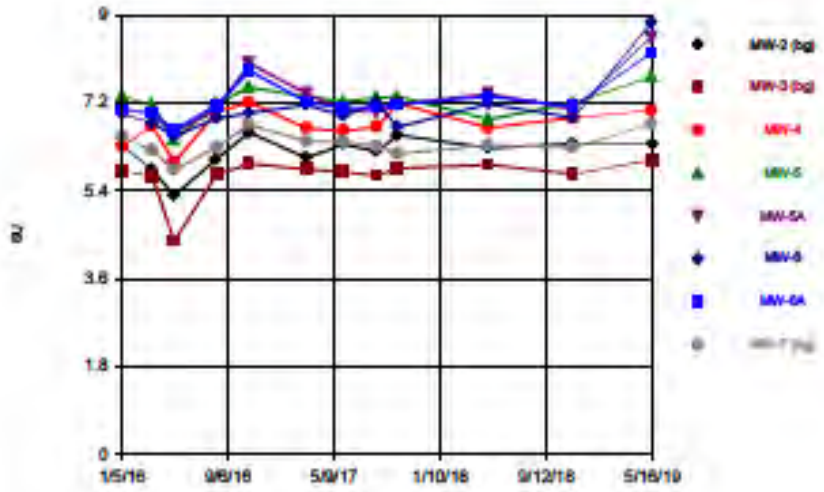
Fluoride



Time Series Analysis Run 6/13/2019 2:16 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Ashury ponds with background

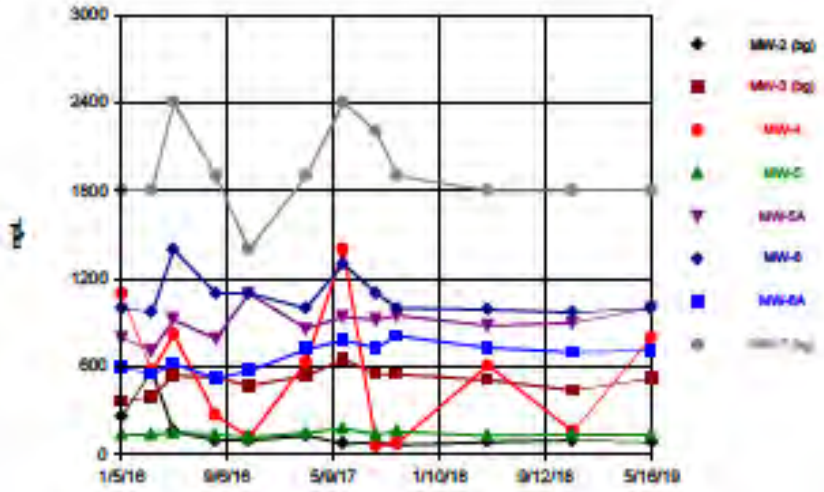
pH



Time Series Analysis Run 6/13/2019 2:16 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Ashury ponds with background

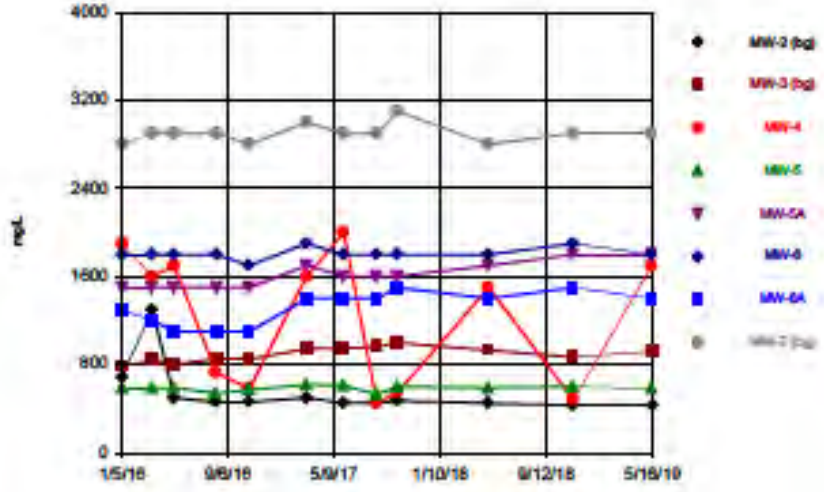
Sulfate



Time Series Analysis Run 6/13/2019 2:16 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Ashury ponds with background

Total Dissolved Solids



Time Series Analysis Run 6/13/2019 2:16 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Ashury ponds with background

Midwest Environmental CONSULTANTS

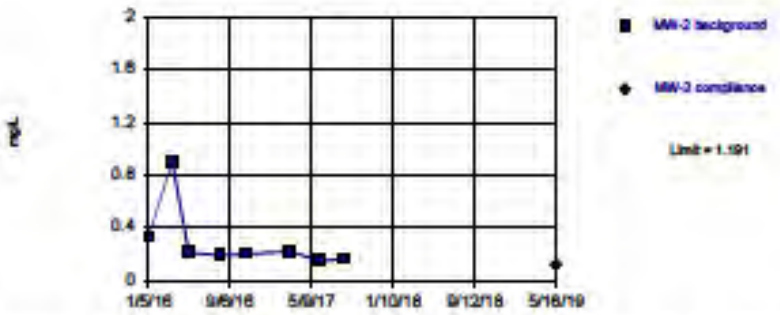
Sanitas™ Output – Sampling Event

Prediction Limits

Within Limit

Boron

Intrawell Parametric



Background Data Summary (based on natural log transformation): Mean=-1.411, Std. Dev.=0.5788, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.7677, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

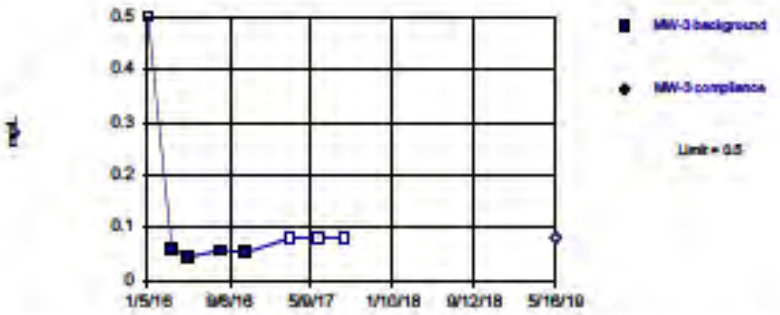
Prediction Limit Analysis Run 6/13/2019 2:19 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Boron

Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 8 background values. 50% NDs. Well-constituent pair annual alpha = 0.04242. Individual comparison alpha = 0.02144 (1 of 2). Insufficient data to test for seasonality or deseasonalize.

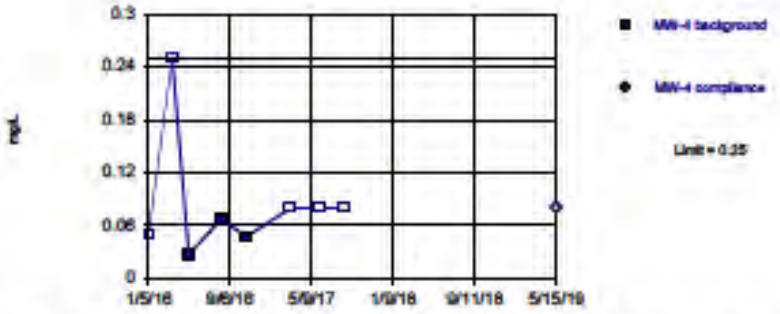
Prediction Limit Analysis Run 6/13/2019 2:19 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Boron

Intrawell Non-parametric



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

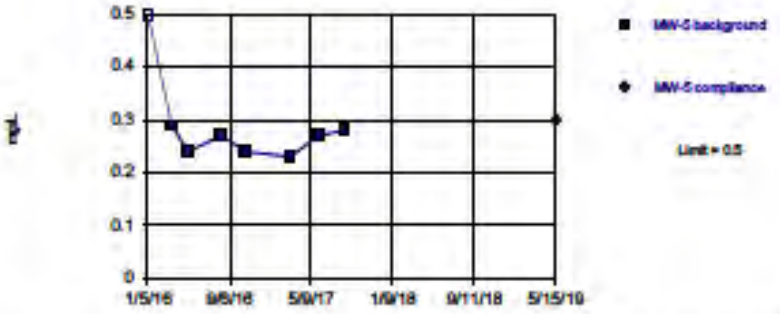
Prediction Limit Analysis Run 6/13/2019 2:19 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Boron

Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 8 background values. 12.5% NDs. Well-constituent pair annual alpha = 0.04242. Individual comparison alpha = 0.02144 (1 of 2). Insufficient data to test for seasonality or deseasonalize.

Prediction Limit Analysis Run 6/13/2019 2:19 PM

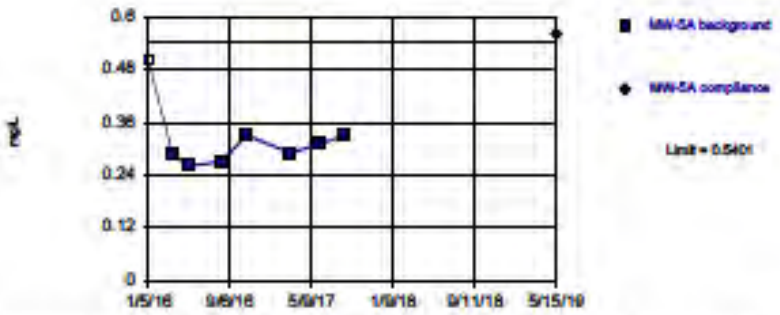
The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Hollow symbols indicate censored values.

Exceeds Limit

Boron

Intrawell Parametric



Background Data Summary (based on square root transformation): Mean=0.5649, Std. Dev.=0.06204, n=8, 12.5% NDs. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.7696, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

Prediction Limit Analysis Run 6/13/2019 2:19 PM

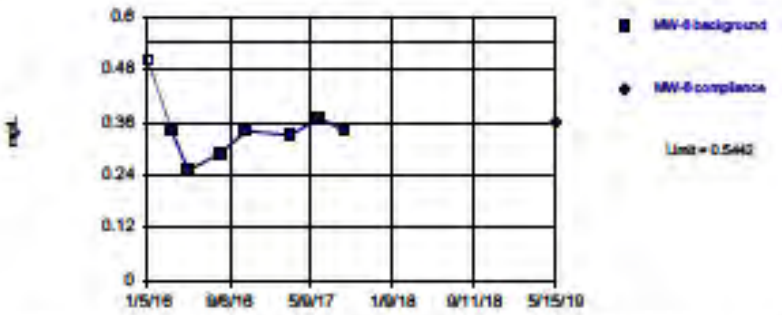
The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Ashury ponds with background

Hollow symbols indicate censored values.

Within Limit

Boron

Intrawell Parametric



Background Data Summary: Mean=0.345, Std. Dev.=0.0727, n=8, 12.5% NDs. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8597, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

Prediction Limit Analysis Run 6/13/2019 2:19 PM

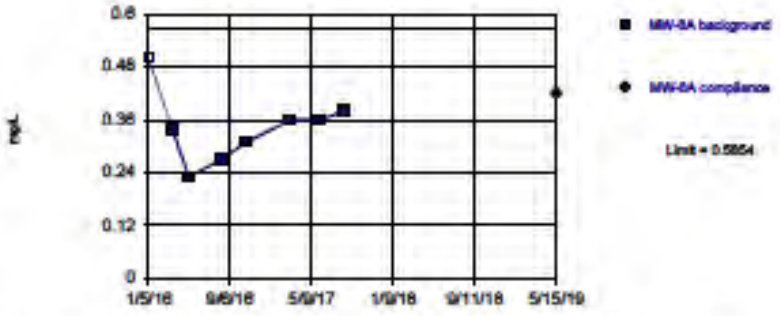
The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Ashury ponds with background

Hollow symbols indicate censored values.

Within Limit

Boron

Intrawell Parametric



Background Data Summary: Mean=0.3438, Std. Dev.=0.08088, n=8, 12.5% NDs. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9453, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

Prediction Limit Analysis Run 6/13/2019 2:19 PM

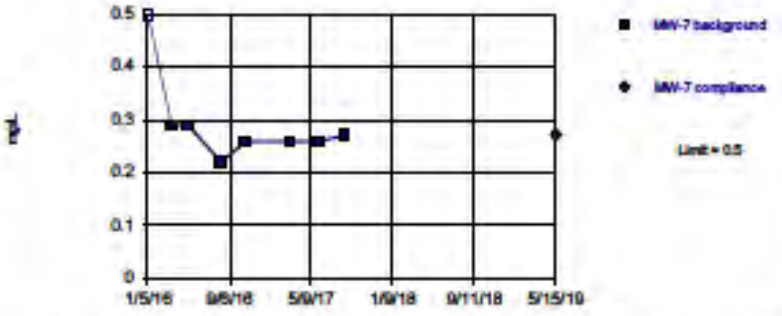
The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Ashury ponds with background

Hollow symbols indicate censored values.

Within Limit

Boron

Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 8 background values. 12.5% NDs. Well-constituent pair annual alpha = 0.04242. Individual comparison alpha = 0.02144 (1 of 2). Insufficient data to test for seasonality or deseasonalize.

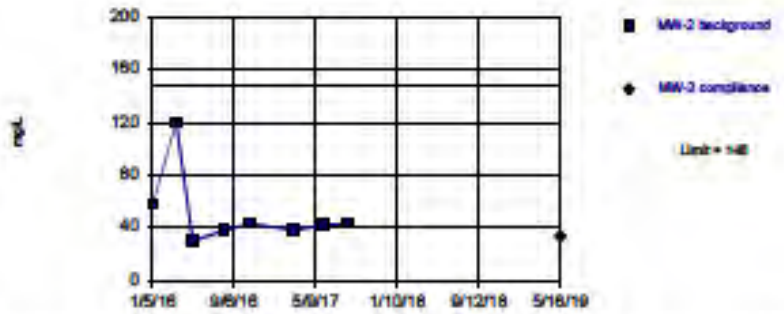
Prediction Limit Analysis Run 6/13/2019 2:19 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Ashury ponds with background

Within Limit

Calcium

Intrawell Parametric



Background Data Summary (based on natural log transformation): Mean=3.846, Std. Dev.=0.4202, n=6. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.7931, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

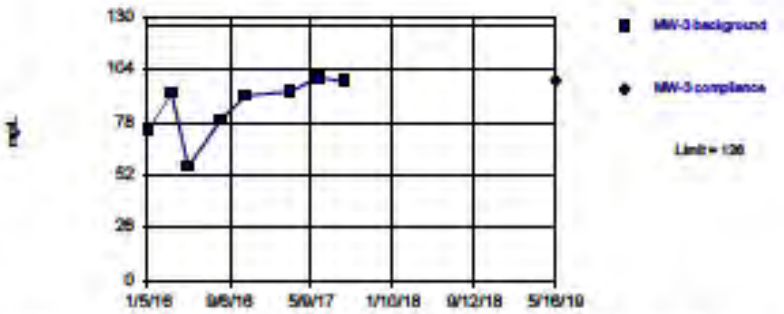
Prediction Limit Analysis Run 6/13/2019 2:19 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Calcium

Intrawell Parametric



Background Data Summary: Mean=65.38, Std. Dev.=14.83, n=6. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8756, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

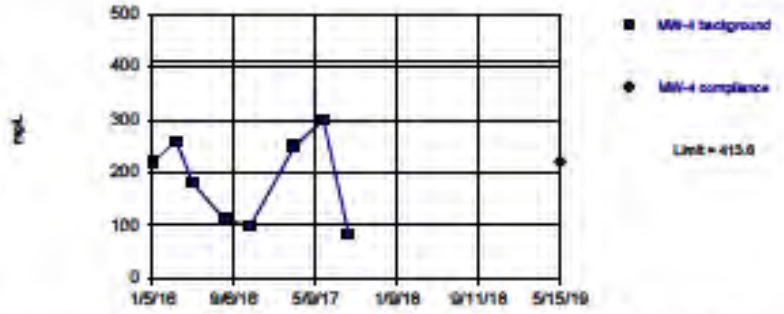
Prediction Limit Analysis Run 6/13/2019 2:19 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Calcium

Intrawell Parametric



Background Data Summary: Mean=187.9, Std. Dev.=82.39, n=6. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9158, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

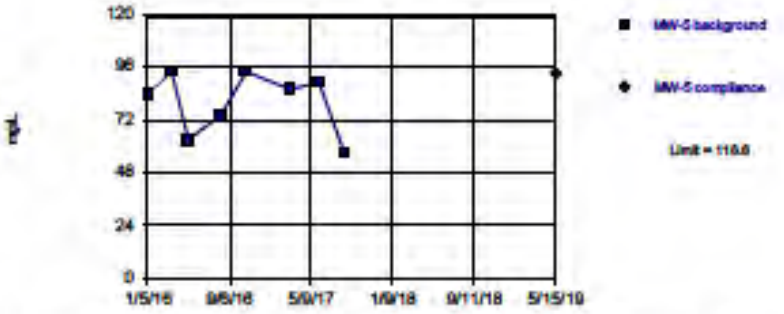
Prediction Limit Analysis Run 6/13/2019 2:19 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Calcium

Intrawell Parametric



Background Data Summary: Mean=60.13, Std. Dev.=14.04, n=6. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8847, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

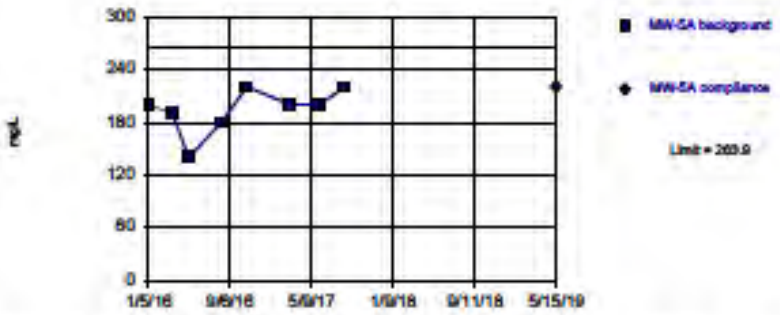
Prediction Limit Analysis Run 6/13/2019 2:19 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Calcium

Intrawell Parametric



Background Data Summary: Mean=193.8, Std. Dev.=25.6, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8601, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

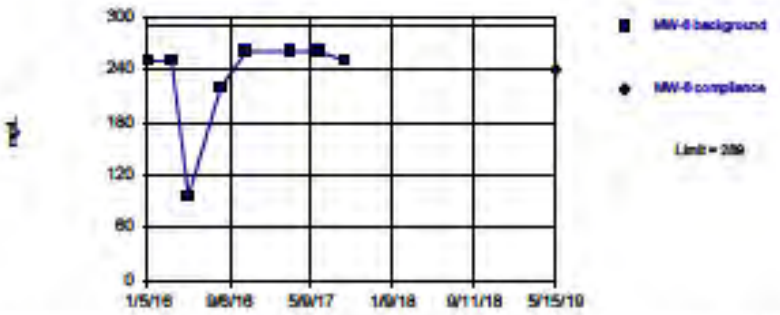
Prediction Limit Analysis Run 6/13/2019 2:19 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Calcium

Intrawell Parametric



Background Data Summary (based on x^5 transformation): Mean=8.8e11, Std. Dev.=4.2e11, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.7705, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

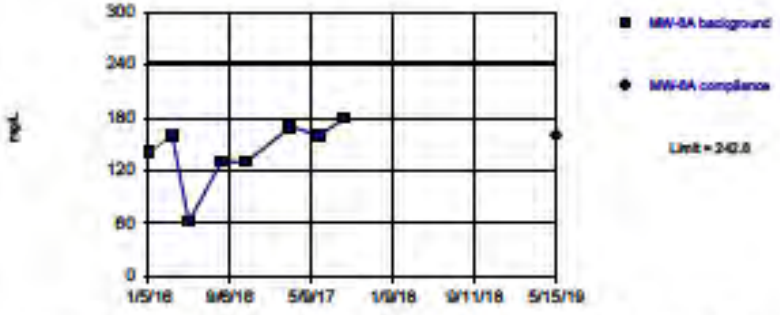
Prediction Limit Analysis Run 6/13/2019 2:19 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Calcium

Intrawell Parametric



Background Data Summary: Mean=141.5, Std. Dev.=36.97, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8547, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

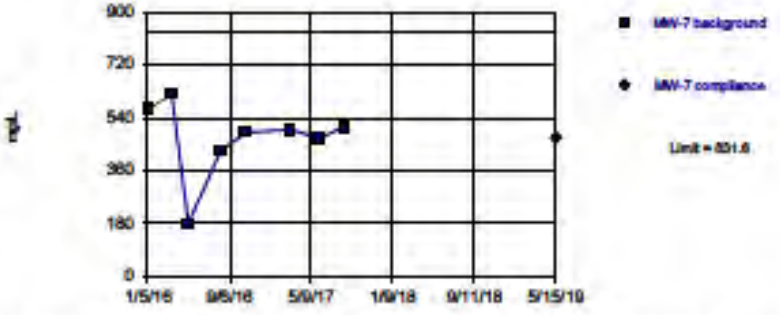
Prediction Limit Analysis Run 6/13/2019 2:19 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Calcium

Intrawell Parametric



Background Data Summary: Mean=471.3, Std. Dev.=131.5, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8357, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

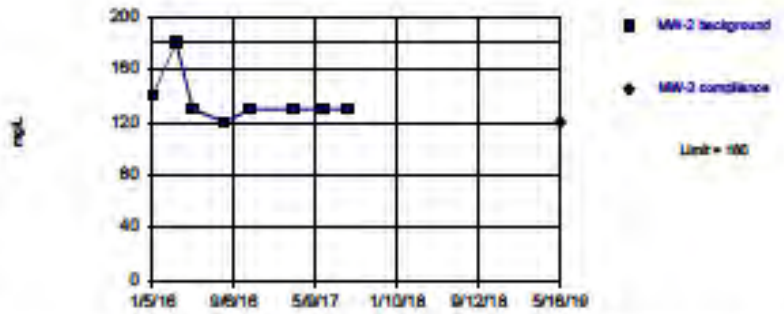
Prediction Limit Analysis Run 6/13/2019 2:19 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Chloride

Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 6 background values. Well-constituent pair annual alpha = 0.04242. Individual comparison alpha = 0.02144 (1 of 2). Insufficient data to test for seasonality or deseasonalize.

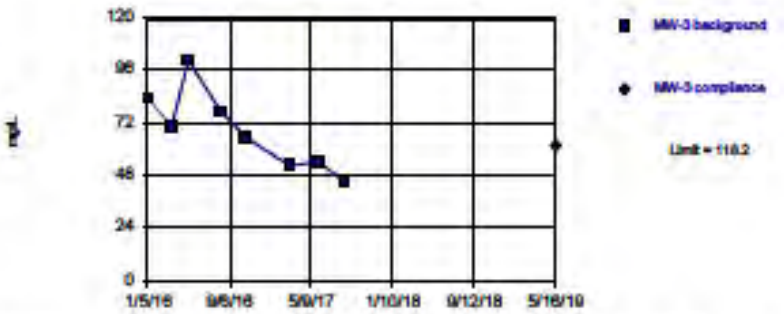
Prediction Limit Analysis Run 6/13/2019 2:19 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Chloride

Intrawell Parametric



Background Data Summary: Mean=68.25, Std. Dev.=18.22, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9693, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

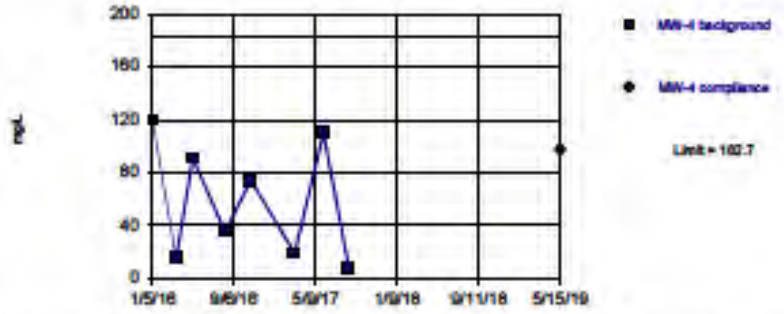
Prediction Limit Analysis Run 6/13/2019 2:19 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Chloride

Intrawell Parametric



Background Data Summary: Mean=59.01, Std. Dev.=45.16, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.887, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

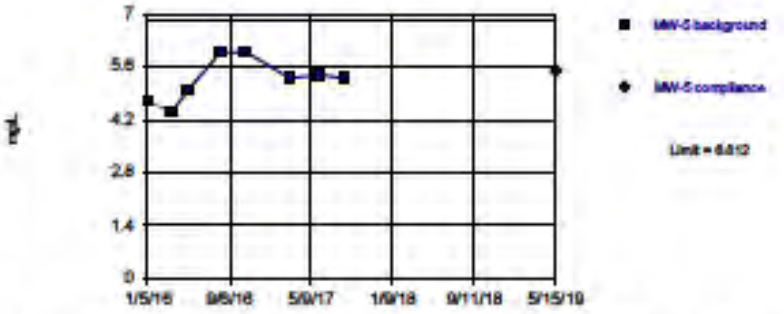
Prediction Limit Analysis Run 6/13/2019 2:19 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Chloride

Intrawell Parametric



Background Data Summary: Mean=5.263, Std. Dev.=0.5656, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9383, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

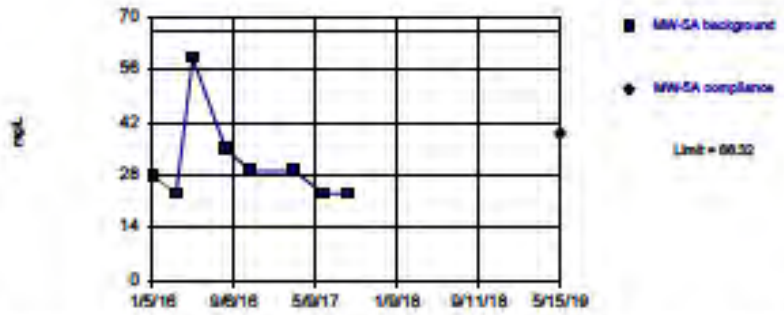
Prediction Limit Analysis Run 6/13/2019 2:19 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Chloride

Intrawell Parametric



Background Data Summary (based on square root transformation): Mean=5.506, Std. Dev.=0.9627, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.7519, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

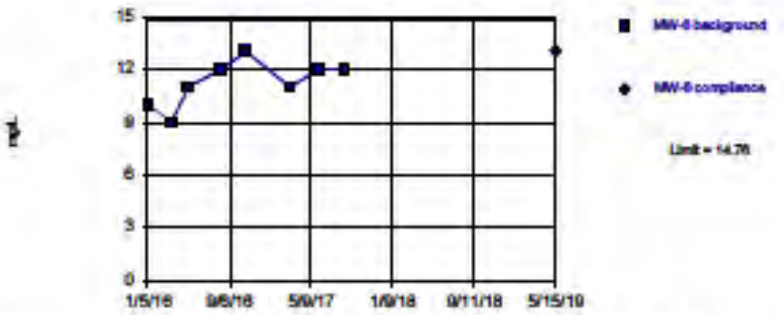
Prediction Limit Analysis Run 6/13/2019 2:19 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Chloride

Intrawell Parametric



Background Data Summary: Mean=11.25, Std. Dev.=1.282, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9378, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

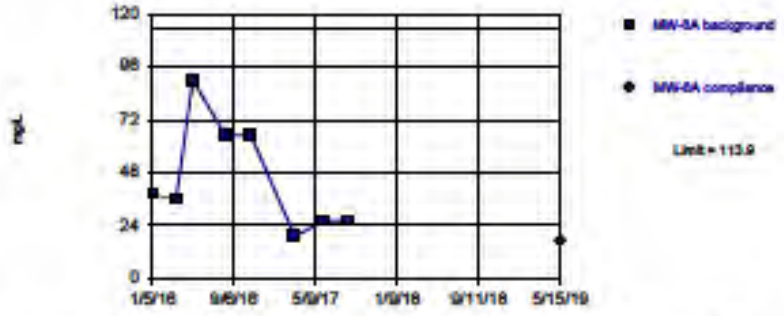
Prediction Limit Analysis Run 6/13/2019 2:19 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Chloride

Intrawell Parametric



Background Data Summary: Mean=45.63, Std. Dev.=24.93, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8899, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

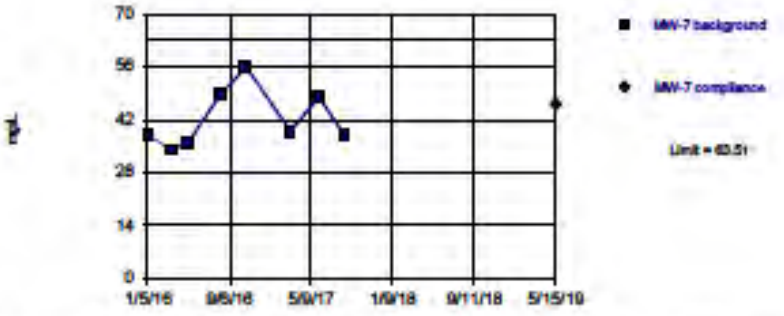
Prediction Limit Analysis Run 6/13/2019 2:19 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Chloride

Intrawell Parametric



Background Data Summary: Mean=42.25, Std. Dev.=7.76, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.877, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

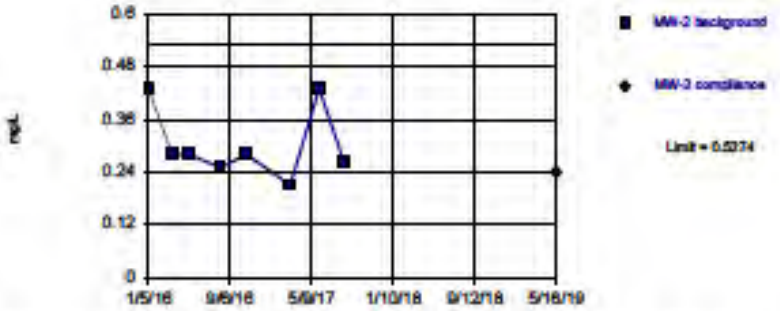
Prediction Limit Analysis Run 6/13/2019 2:19 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Fluoride

Intrawell Parametric



Background Data Summary: Mean=0.3025, Std. Dev.=0.08207, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.7948, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

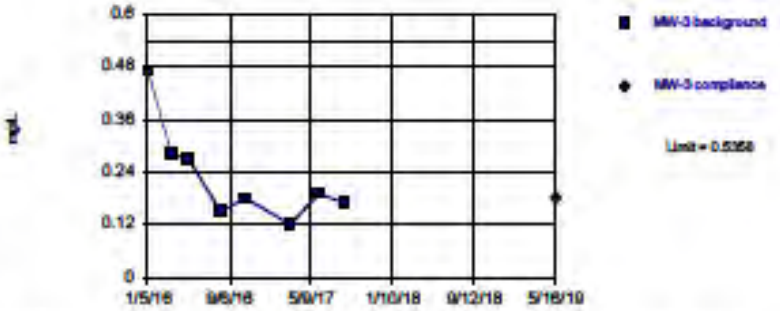
Prediction Limit Analysis Run 6/13/2019 2:19 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Fluoride

Intrawell Parametric



Background Data Summary: Mean=0.2288, Std. Dev.=0.1121, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8383, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

Prediction Limit Analysis Run 6/13/2019 2:19 PM

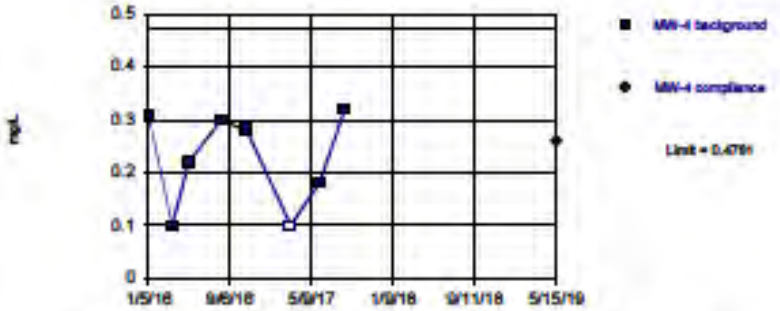
The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Hollow symbols indicate censored values.

Within Limit

Fluoride

Intrawell Parametric



Background Data Summary: Mean=0.2263, Std. Dev.=0.09117, n=8, 12.5% NDs. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8613, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

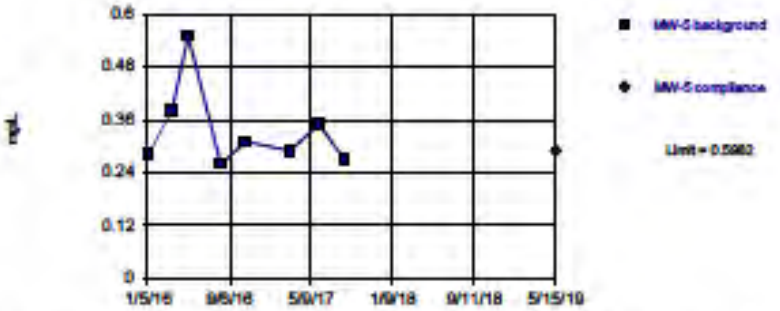
Prediction Limit Analysis Run 6/13/2019 2:19 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Fluoride

Intrawell Parametric



Background Data Summary: Mean=0.3343, Std. Dev.=0.09561, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.7816, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

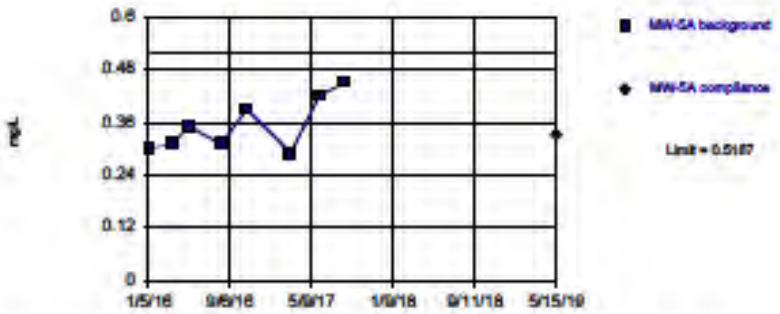
Prediction Limit Analysis Run 6/13/2019 2:19 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Fluoride

Intrawell Parametric



Background Data Summary: Mean=0.3525, Std. Dev.=0.06065, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8853, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

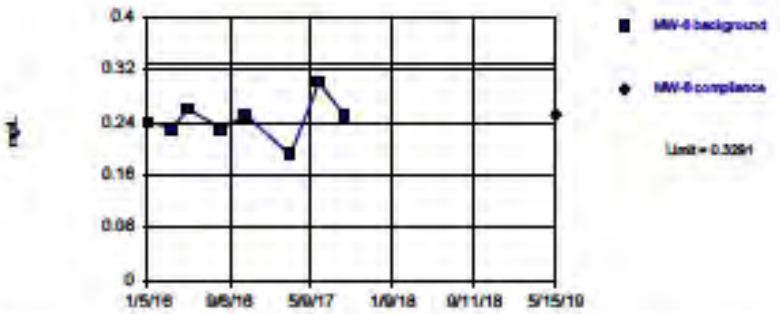
Prediction Limit Analysis Run 6/13/2019 2:19 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Fluoride

Intrawell Parametric



Background Data Summary: Mean=0.2438, Std. Dev.=0.03114, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9485, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

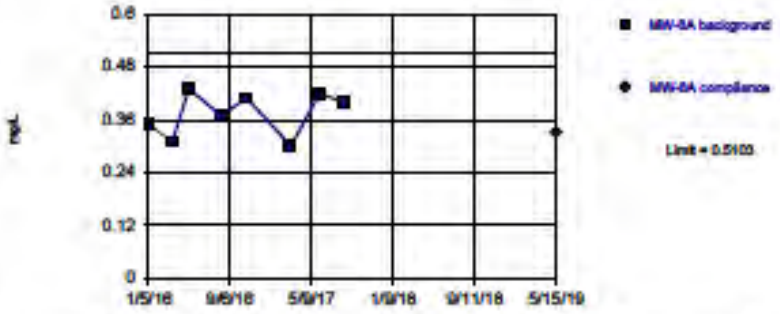
Prediction Limit Analysis Run 6/13/2019 2:20 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Fluoride

Intrawell Parametric



Background Data Summary: Mean=0.3738, Std. Dev.=0.04084, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9076, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

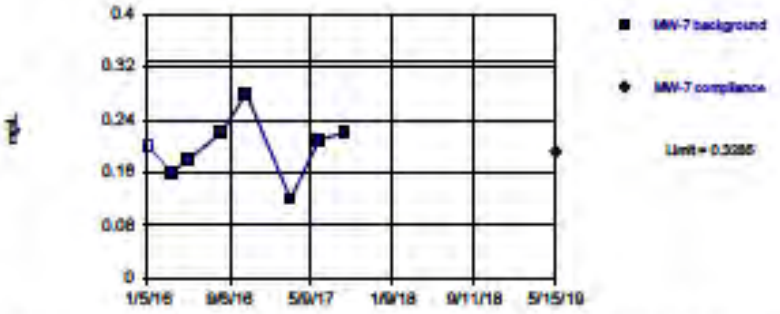
Prediction Limit Analysis Run 6/13/2019 2:20 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Fluoride

Intrawell Parametric



Background Data Summary: Mean=0.1988, Std. Dev.=0.04734, n=8, 12.5% NDs. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9609, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

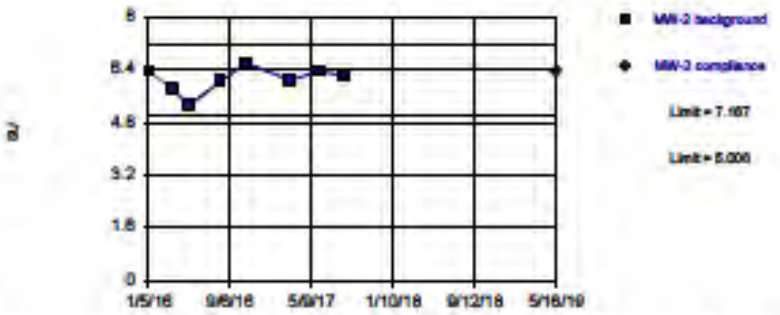
Prediction Limit Analysis Run 6/13/2019 2:20 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limits

pH

Intrawell Parametric



Background Data Summary: Mean=6.088, Std. Dev.=0.3941, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9314, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

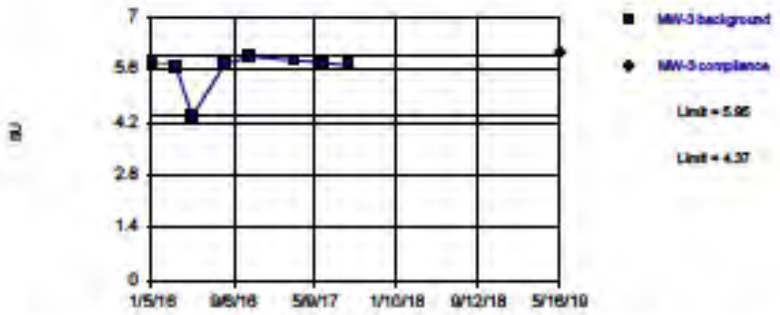
Prediction Limit Analysis Run 6/13/2019 2:20 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Exceeds Limits

pH

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 8 background values. Well-constituent pair annual alpha = 0.08484. Individual comparison alpha = 0.04288 (1 of 2). Insufficient data to test for seasonality or deseasonalize.

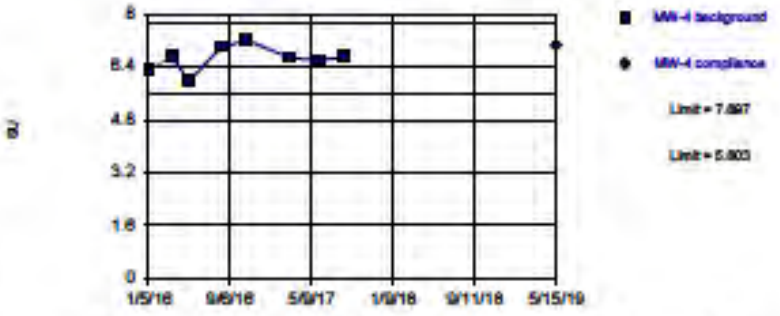
Prediction Limit Analysis Run 6/13/2019 2:20 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limits

pH

Intrawell Parametric



Background Data Summary: Mean=6.65, Std. Dev.=0.3522, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9541, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

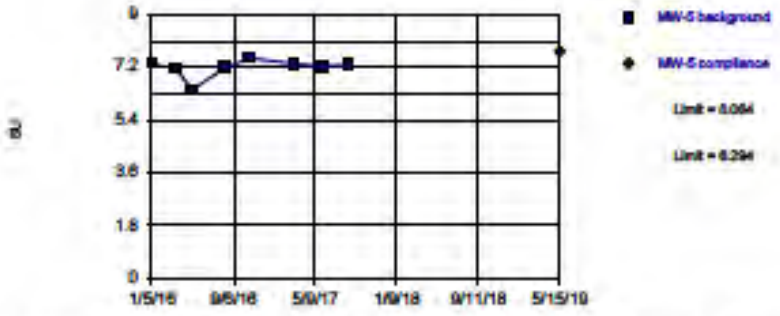
Prediction Limit Analysis Run 6/13/2019 2:20 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limits

pH

Intrawell Parametric



Background Data Summary: Mean=7.179, Std. Dev.=0.323, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.7521, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

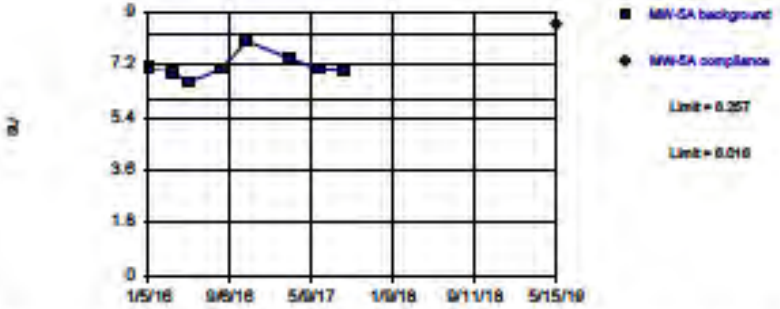
Prediction Limit Analysis Run 6/13/2019 2:20 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Exceeds Limits

pH

Intrawell Parametric



Background Data Summary: Mean=7.136, Std. Dev.=0.409, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8579, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

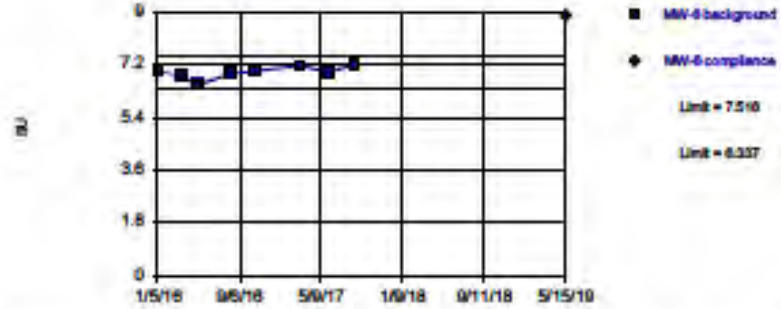
Prediction Limit Analysis Run 6/13/2019 2:20 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Exceeds Limits

pH

Intrawell Parametric



Background Data Summary: Mean=6.926, Std. Dev.=0.2151, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9382, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

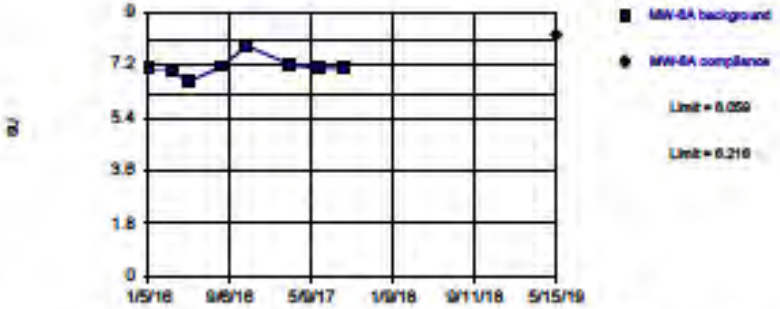
Prediction Limit Analysis Run 6/13/2019 2:20 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Exceeds Limits

pH

Intrawell Parametric



Background Data Summary: Mean=7.138, Std. Dev.=0.3362, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8382, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

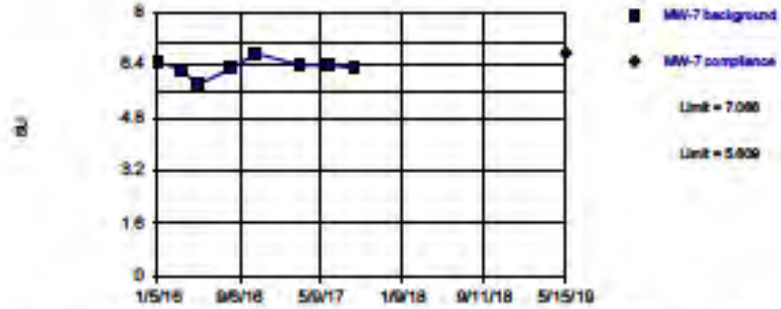
Prediction Limit Analysis Run 6/13/2019 2:20 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limits

pH

Intrawell Parametric



Background Data Summary: Mean=6.338, Std. Dev.=0.2657, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9384, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

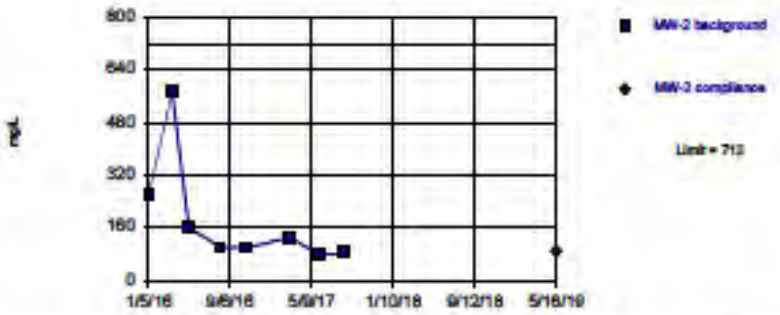
Prediction Limit Analysis Run 6/13/2019 2:20 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Sulfate

Intrawell Parametric



Background Data Summary (based on square root transformation): Mean=12.74, Std. Dev.=5.09, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.7794, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

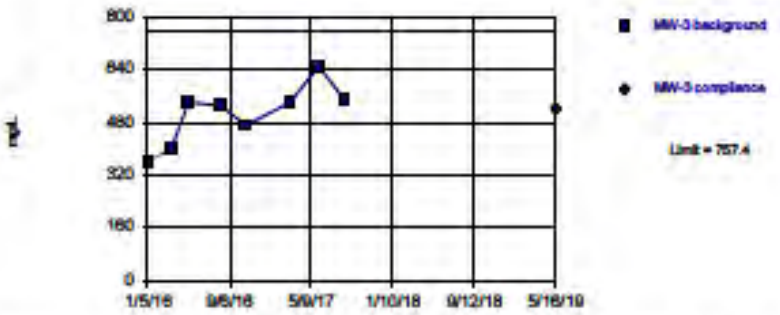
Prediction Limit Analysis Run 6/13/2019 2:20 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Sulfate

Intrawell Parametric



Background Data Summary: Mean=505, Std. Dev.=92.12, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9385, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

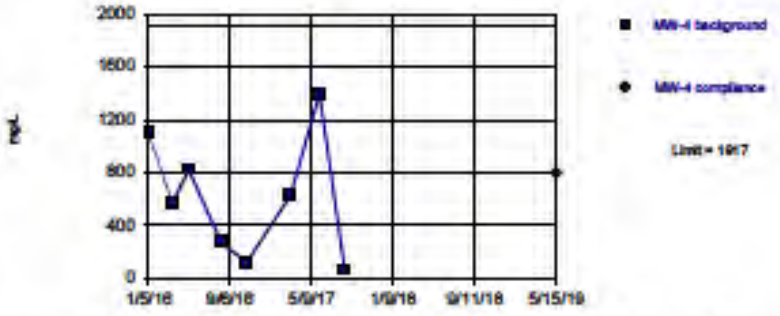
Prediction Limit Analysis Run 6/13/2019 2:20 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Sulfate

Intrawell Parametric



Background Data Summary: Mean=621.6, Std. Dev.=472.7, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8492, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

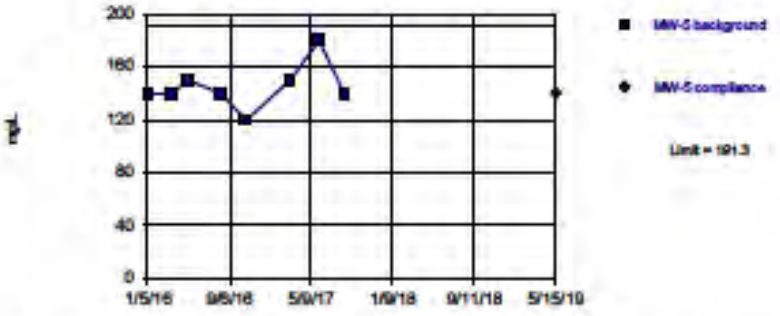
Prediction Limit Analysis Run 6/13/2019 2:20 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Sulfate

Intrawell Parametric



Background Data Summary: Mean=145, Std. Dev.=16.9, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8495, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

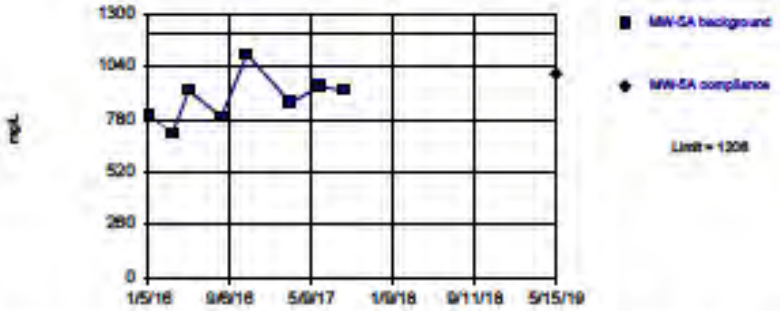
Prediction Limit Analysis Run 6/13/2019 2:20 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Sulfate

Intrawell Parametric



Background Data Summary: Mean=880, Std. Dev.=118.9, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9563, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

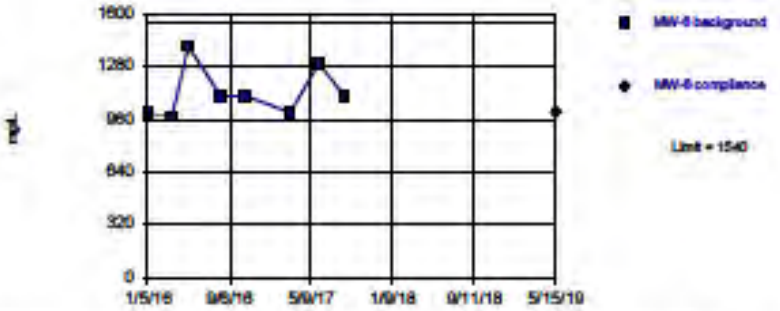
Prediction Limit Analysis Run 6/13/2019 2:20 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Sulfate

Intrawell Parametric



Background Data Summary: Mean=1121, Std. Dev.=152.7, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8502, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

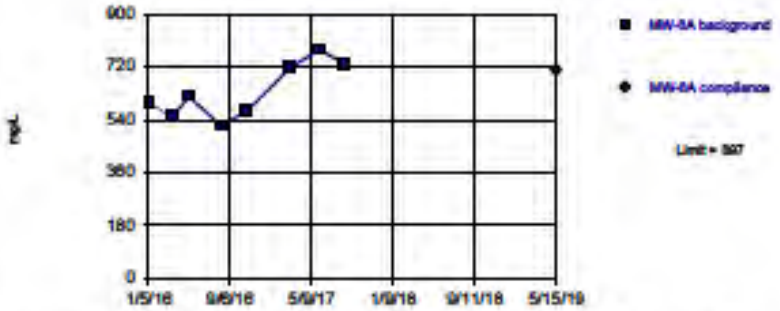
Prediction Limit Analysis Run 6/13/2019 2:20 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Sulfate

Intrawell Parametric



Background Data Summary: Mean=636.3, Std. Dev.=95.16, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9206, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

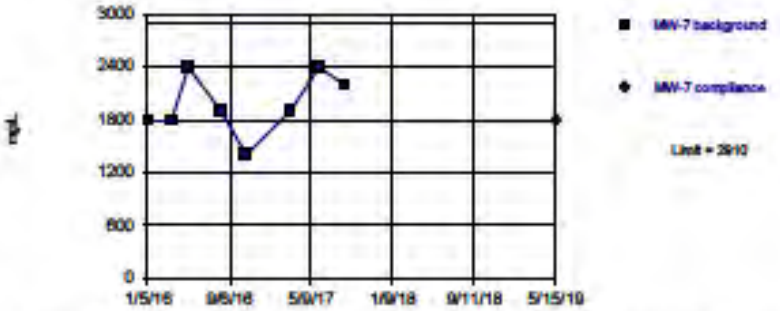
Prediction Limit Analysis Run 6/13/2019 2:20 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Sulfate

Intrawell Parametric



Background Data Summary: Mean=1975, Std. Dev.=341.2, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9176, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

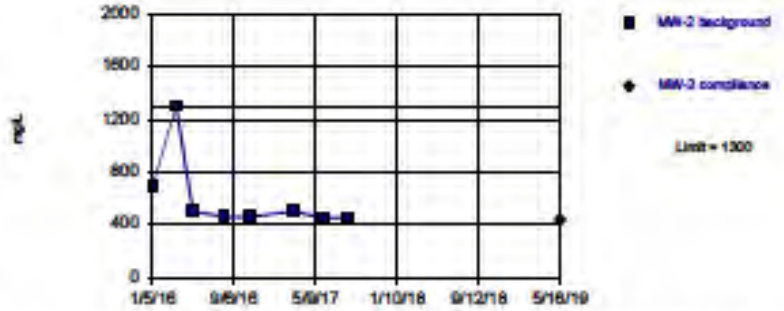
Prediction Limit Analysis Run 6/13/2019 2:20 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Total Dissolved Solids

Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 6 background values. Well-constituent pair annual alpha = 0.04242. Individual comparison alpha = 0.02144 (1 of 2). Insufficient data to test for seasonality or deseasonalize.

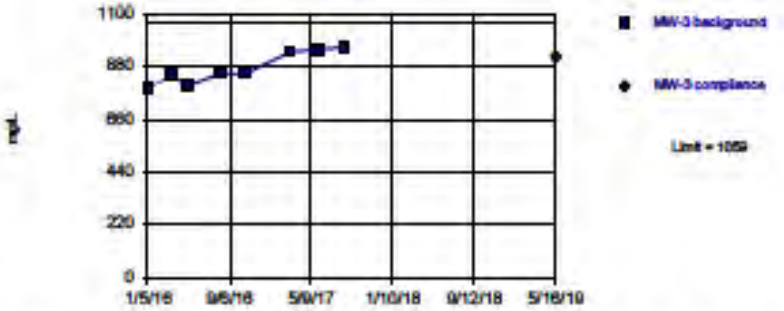
Prediction Limit Analysis Run 6/13/2019 2:20 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Total Dissolved Solids

Intrawell Parametric



Background Data Summary: Mean=672.5, Std. Dev.=67.96, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8701, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

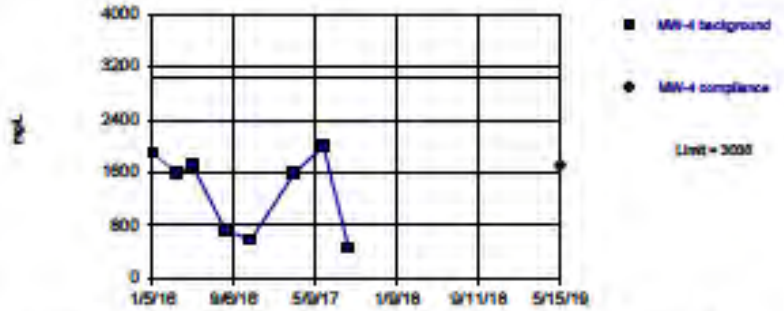
Prediction Limit Analysis Run 6/13/2019 2:20 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Total Dissolved Solids

Intrawell Parametric



Background Data Summary: Mean=1320, Std. Dev.=627.1, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8446, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

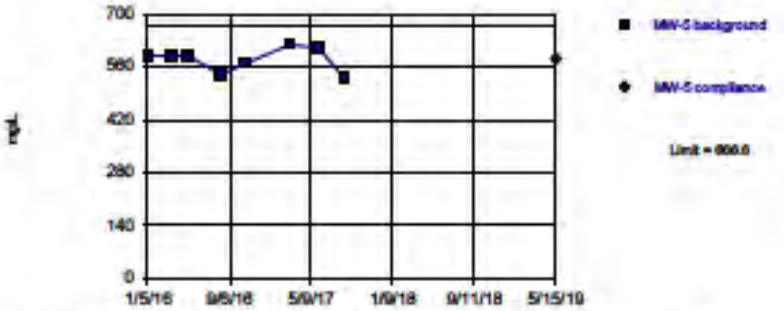
Prediction Limit Analysis Run 6/13/2019 2:20 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Total Dissolved Solids

Intrawell Parametric



Background Data Summary: Mean=580, Std. Dev.=31.62, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9166, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

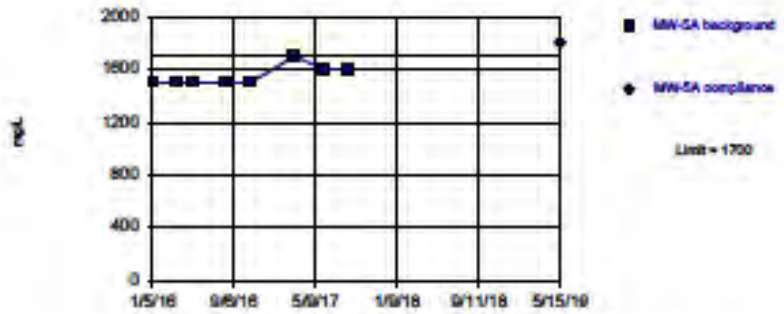
Prediction Limit Analysis Run 6/13/2019 2:20 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Exceeds Limit

Total Dissolved Solids

Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 6 background values. Well-constituent pair annual alpha = 0.04242. Individual comparison alpha = 0.02144 (1 of 2). Insufficient data to test for seasonality or deseasonalize.

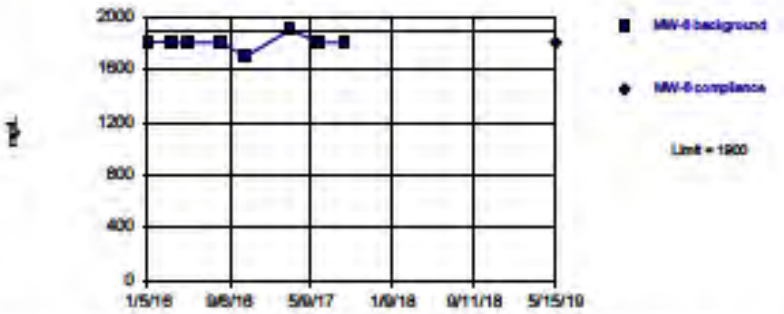
Prediction Limit Analysis Run 6/13/2019 2:20 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Total Dissolved Solids

Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 6 background values. Well-constituent pair annual alpha = 0.04242. Individual comparison alpha = 0.02144 (1 of 2). Insufficient data to test for seasonality or deseasonalize.

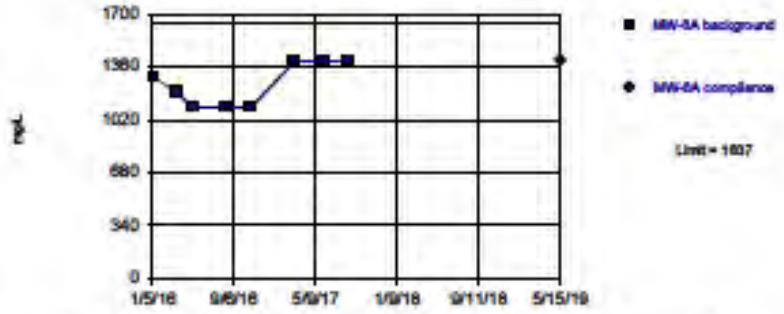
Prediction Limit Analysis Run 6/13/2019 2:20 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Total Dissolved Solids

Intrawell Parametric



Background Data Summary: Mean=1250, Std. Dev.=141.4, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.7986, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

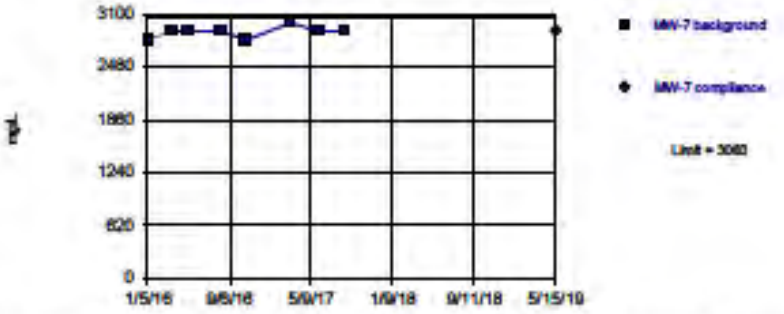
Prediction Limit Analysis Run 6/13/2019 2:20 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Within Limit

Total Dissolved Solids

Intrawell Parametric



Background Data Summary: Mean=2888, Std. Dev.=64.09, n=8. Insufficient data to test for seasonality or deseasonalize. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8108, critical = 0.749. Kappa = 2.74 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

Prediction Limit Analysis Run 6/13/2019 2:20 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

Prediction Limit

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background Printed 6/13/2019, 2:21 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	%NDs	Transform	Alpha	Method
Boron (mg/L)	MW-2	1.191	n/a	5/16/2019	0.12	No	8	0	ln(x)	0.001504	Param Intra 1 of 2
Boron (mg/L)	MW-3	0.5	n/a	5/16/2019	0.08ND	No	8	50	n/a	0.02144	NP Intra (normality) ...
Boron (mg/L)	MW-4	0.25	n/a	5/15/2019	0.08ND	No	8	62.5	n/a	0.02144	NP Intra (NDs) 1 of 2
Boron (mg/L)	MW-5	0.5	n/a	5/15/2019	0.3	No	8	12.5	n/a	0.02144	NP Intra (normality) ...
Boron (mg/L)	**MW-6A**	**0.6401**	**n/a**	**5/16/2019**	**0.68**	**Yes**	**8**	**12.5**	**sqrt(x)**	**0.001504**	**Param Intra 1 of 2**
Boron (mg/L)	MW-6	0.5442	n/a	5/15/2019	0.36	No	8	12.5	No	0.001504	Param Intra 1 of 2
Boron (mg/L)	MW-6A	0.5654	n/a	5/15/2019	0.42	No	8	12.5	No	0.001504	Param Intra 1 of 2
Boron (mg/L)	MW-7	0.5	n/a	5/15/2019	0.27	No	8	12.5	n/a	0.02144	NP Intra (normality) ...
Calcium (mg/L)	MW-2	148	n/a	5/16/2019	33	No	8	0	ln(x)	0.001504	Param Intra 1 of 2
Calcium (mg/L)	MW-3	126	n/a	5/16/2019	98	No	8	0	No	0.001504	Param Intra 1 of 2
Calcium (mg/L)	MW-4	413.6	n/a	5/15/2019	220	No	8	0	No	0.001504	Param Intra 1 of 2
Calcium (mg/L)	MW-5	118.6	n/a	5/15/2019	93	No	8	0	No	0.001504	Param Intra 1 of 2
Calcium (mg/L)	MW-5A	263.9	n/a	5/15/2019	220	No	8	0	No	0.001504	Param Intra 1 of 2
Calcium (mg/L)	MW-6	289	n/a	5/15/2019	240	No	8	0	x^5	0.001504	Param Intra 1 of 2
Calcium (mg/L)	MW-6A	242.8	n/a	5/15/2019	160	No	8	0	No	0.001504	Param Intra 1 of 2
Calcium (mg/L)	MW-7	831.6	n/a	5/15/2019	470	No	8	0	No	0.001504	Param Intra 1 of 2
Chloride (mg/L)	MW-2	180	n/a	5/16/2019	120	No	8	0	n/a	0.02144	NP Intra (normality) ...
Chloride (mg/L)	MW-3	118.2	n/a	5/16/2019	61	No	8	0	No	0.001504	Param Intra 1 of 2
Chloride (mg/L)	MW-4	182.7	n/a	5/15/2019	97	No	8	0	No	0.001504	Param Intra 1 of 2
Chloride (mg/L)	MW-5	6.812	n/a	5/15/2019	5.5	No	8	0	No	0.001504	Param Intra 1 of 2
Chloride (mg/L)	MW-5A	66.32	n/a	5/15/2019	39	No	8	0	sqrt(x)	0.001504	Param Intra 1 of 2
Chloride (mg/L)	MW-6	14.76	n/a	5/15/2019	13	No	8	0	No	0.001504	Param Intra 1 of 2
Chloride (mg/L)	MW-6A	113.9	n/a	5/15/2019	17	No	8	0	No	0.001504	Param Intra 1 of 2
Chloride (mg/L)	MW-7	63.51	n/a	5/15/2019	46	No	8	0	No	0.001504	Param Intra 1 of 2
Fluoride (mg/L)	MW-2	0.5274	n/a	5/16/2019	0.24	No	8	0	No	0.001504	Param Intra 1 of 2
Fluoride (mg/L)	MW-3	0.5358	n/a	5/16/2019	0.18	No	8	0	No	0.001504	Param Intra 1 of 2
Fluoride (mg/L)	MW-4	0.4761	n/a	5/15/2019	0.26	No	8	12.5	No	0.001504	Param Intra 1 of 2
Fluoride (mg/L)	MW-5	0.5982	n/a	5/15/2019	0.29	No	8	0	No	0.001504	Param Intra 1 of 2
Fluoride (mg/L)	MW-5A	0.5187	n/a	5/15/2019	0.33	No	8	0	No	0.001504	Param Intra 1 of 2
Fluoride (mg/L)	MW-6	0.3291	n/a	5/15/2019	0.25	No	8	0	No	0.001504	Param Intra 1 of 2
Fluoride (mg/L)	MW-6A	0.5103	n/a	5/15/2019	0.33	No	8	0	No	0.001504	Param Intra 1 of 2
Fluoride (mg/L)	MW-7	0.3285	n/a	5/15/2019	0.19	No	8	12.5	No	0.001504	Param Intra 1 of 2
pH (SU)	MW-2	7.167	5.008	5/16/2019	6.35	No	8	0	No	0.000752	Param Intra 1 of 2
pH (SU)	**MW-3**	**6.86**	**4.37**	**5/16/2019**	**6.03**	**Yes**	**8**	**0**	**n/a**	**0.04288**	**NP Intra (normality) ...**
pH (SU)	MW-4	7.697	5.603	5/15/2019	7.04	No	8	0	No	0.000752	Param Intra 1 of 2
pH (SU)	MW-5	8.064	6.294	5/15/2019	7.73	No	8	0	No	0.000752	Param Intra 1 of 2
pH (SU)	**MW-5A**	**8.257**	**6.018**	**5/16/2019**	**8.64**	**Yes**	**8**	**0**	**No**	**0.000762**	**Param Intra 1 of 2**
pH (SU)	**MW-6**	**7.618**	**6.337**	**5/16/2019**	**8.84**	**Yes**	**8**	**0**	**No**	**0.000762**	**Param Intra 1 of 2**
pH (SU)	**MW-6A**	**8.068**	**6.218**	**5/16/2019**	**8.22**	**Yes**	**8**	**0**	**No**	**0.000762**	**Param Intra 1 of 2**
pH (SU)	MW-7	7.066	5.609	5/15/2019	6.76	No	8	0	No	0.000752	Param Intra 1 of 2
Sulfate (mg/L)	MW-2	712	n/a	5/16/2019	86	No	8	0	sqrt(x)	0.001504	Param Intra 1 of 2
Sulfate (mg/L)	MW-3	757.4	n/a	5/16/2019	520	No	8	0	No	0.001504	Param Intra 1 of 2
Sulfate (mg/L)	MW-4	1917	n/a	5/15/2019	800	No	8	0	No	0.001504	Param Intra 1 of 2
Sulfate (mg/L)	MW-5	191.3	n/a	5/15/2019	140	No	8	0	No	0.001504	Param Intra 1 of 2
Sulfate (mg/L)	MW-5A	1206	n/a	5/15/2019	1000	No	8	0	No	0.001504	Param Intra 1 of 2
Sulfate (mg/L)	MW-6	1540	n/a	5/15/2019	1000	No	8	0	No	0.001504	Param Intra 1 of 2
Sulfate (mg/L)	MW-6A	897	n/a	5/15/2019	710	No	8	0	No	0.001504	Param Intra 1 of 2
Sulfate (mg/L)	MW-7	2910	n/a	5/15/2019	1800	No	8	0	No	0.001504	Param Intra 1 of 2
Total Dissolved Solids (mg/L)	MW-2	1300	n/a	5/16/2019	430	No	8	0	n/a	0.02144	NP Intra (normality) ...
Total Dissolved Solids (mg/L)	MW-3	1059	n/a	5/16/2019	920	No	8	0	No	0.001504	Param Intra 1 of 2

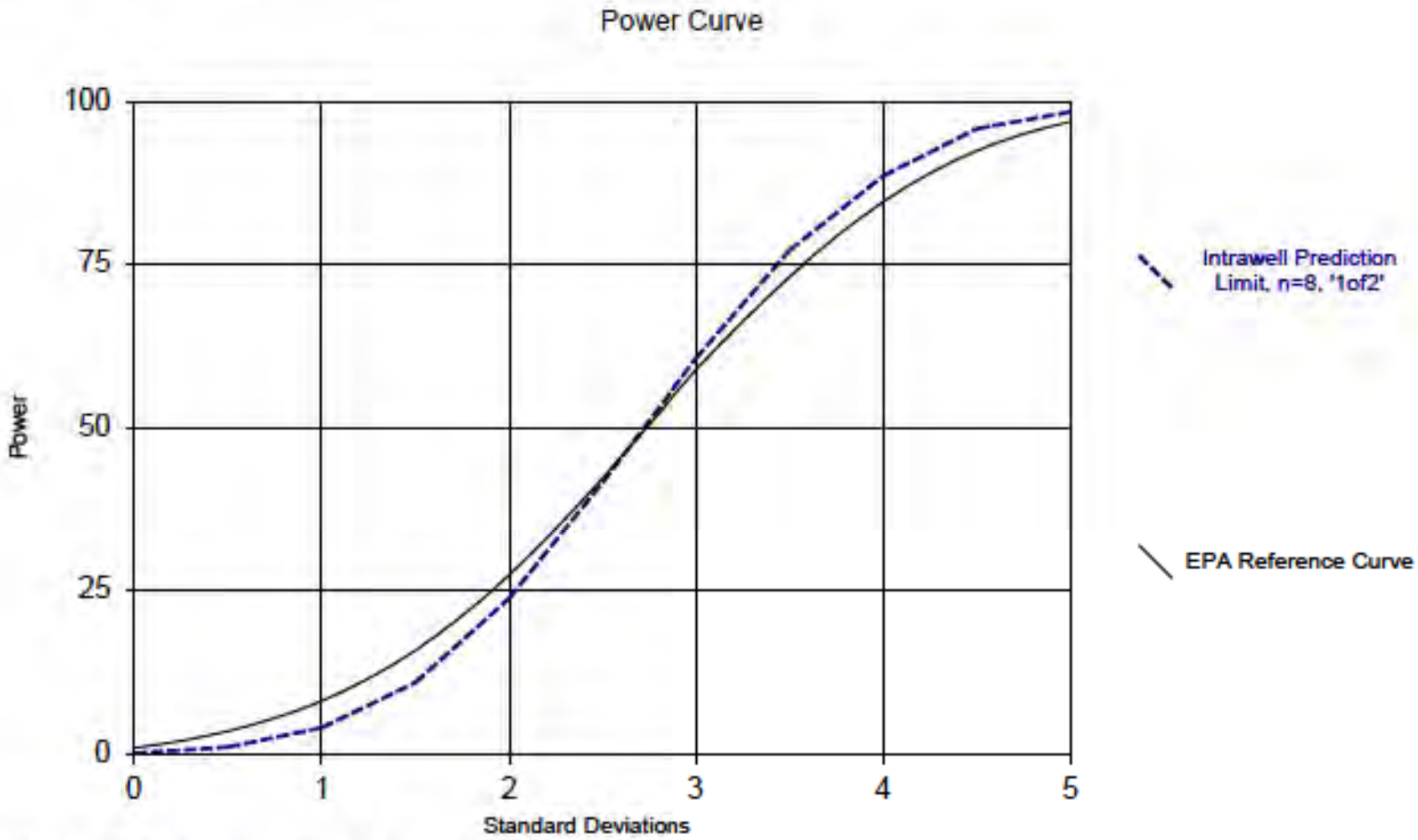
Prediction Limit

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background Printed 6/13/2019, 2:21 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	%NDs	Transform	Alpha	Method
Total Dissolved Solids (mg/L)	MW-4	3038	n/a	5/15/2019	1700	No	8	0	No	0.001504	Param Intra 1 of 2
Total Dissolved Solids (mg/L)	MW-5	666.6	n/a	5/15/2019	580	No	8	0	No	0.001504	Param Intra 1 of 2
Total Dissolved Solids (mg/L)	**MW-6A**	**1700**	**n/a**	**5/16/2019**	**1800**	**Yes**	**8**	**0**	**n/a**	**0.02144**	**NP Intra (normality) ...**
Total Dissolved Solids (mg/L)	MW-6	1900	n/a	5/15/2019	1800	No	8	0	n/a	0.02144	NP Intra (normality) ...
Total Dissolved Solids (mg/L)	MW-6A	1637	n/a	5/15/2019	1400	No	8	0	No	0.001504	Param Intra 1 of 2
Total Dissolved Solids (mg/L)	MW-7	3063	n/a	5/15/2019	2900	No	8	0	No	0.001504	Param Intra 1 of 2

Sanitas™ Output – Sampling Event

Power Curve



Kappa = 2.74, based on 5 compliance wells and 7 constituents, evaluated semi-annually (this report reflects annual total).

Analysis Run 6/13/2019 2:33 PM

The Empire District Client: Midwest Environmental Consultants Data: 5-19 App 3 Asbury ponds with background

APPENDIX B

November 2019 Sampling Event

2019 Groundwater Monitoring, Sampling & Statistics Per EPA CCR Rule (CFR § 257.90-.98)

November Sampling Event

Asbury Generating Station CCR Impoundment
Jasper County, MO

January 2020

Prepared For:
The Empire District Electric Company
602 S. Joplin Avenue
Joplin, Missouri 64801

Midwest Environmental Consultants

2009 E. McCarty St., Ste. 2 Jefferson City, MO 65101 (573) 636-9454 www.mecpc.com

TABLE OF CONTENTS

1.0 INTRODUCTION

The EPA Coal Combustion Residual Regulations (40 CFR Part 257) (CCR Rule) require groundwater monitoring of CCR impoundment. This Asbury Generating Station CCR impoundment groundwater monitoring sampling report is in accordance with the EPA CCR Rule.

In accordance with the EPA CCR Rule (§ 257.90-.98) the status of the Groundwater Monitoring was placed on-line October 17, 2017, as required by the EPA CCR rule. On November 2, 2017 the facility received approval from Missouri Department of Natural Resources (MDNR) of their groundwater system (included in **Appendix 1**). Empire notified the MDNR "State Director" via e-mail when this document was posted on-line, as required in the CCR rule.

The EPA CCR Rule requires the annual groundwater report be posted on-line by January 31st of the following year. The first report was due January 31, 2018. This report was prepared in general accordance with the EPA CCR Rule for groundwater requirements. These regulations outline groundwater monitoring requirements and data evaluation methods. The annual groundwater report for the 2019 sampling events will be posted on-line by January 31, 2020.

The purpose of the groundwater monitoring plan is to monitor the ground water quality surrounding the facility and to evaluate potential impacts and/or releases from facility operations. Background groundwater data was collected from January 2016 to August 2017. After the background data plus the first semi-annual sampling events, a reduced sampling frequency replaced the quarterly events to semi-annual events. This lessened sampling frequency will generally be completed during the months of May and October. Statistical analysis for EPA Appendix III began after the first semi-annual sampling event was collected on October 4, 2017 to determine if a statistically significant increase (SSI) has occurred. If an SSI is verified, additional evaluation is required to determine if the SSI was caused by the CCR impoundment.

On November 4 and 5, 2019, a semi-annual sampling event was conducted per the EPA CCR Rule (§ 257.90-.98). Eight (8) groundwater-monitoring wells were sampled and analyzed for the EPA Appendix III. The constituents listed in Appendix IV were eliminated from the overall semi-annual detection monitoring plan after review of the first semi-annual groundwater sampling event analytical results in January 2018, according to the EPA CCR Rule. For quality assurance and quality control measures, a duplicate sample at MW-7 was taken. These samples were preserved and submitted directly to the laboratory.

This report is a summary of the November 2019 sampling event and the findings of the statistical analysis of the results of the groundwater monitoring program at the Asbury Generating Station CCR Impoundment. Specific information of each sampling event can be obtained from the individual report which is part of the Asbury Operating Record.

2.0 SITE LOCATION

The site occupies the north half of Section 17, Township 30 North, and Range 33 West on the Asbury 7.5-Minute Quadrangle Map as seen in **Figure 1**. The site is located approximately 5.5 miles north-northeast of Asbury, Missouri, about 14 miles north-northwest of Joplin, Missouri. A map showing the locations of the monitoring wells is on **Figure 2**.

2.1 History

In March 1996, five (5) groundwater monitoring wells, MW-1 through MW-5, were installed around the perimeter of the Asbury Generating Station CCR impoundment. Monitoring wells MW-1, MW-2 and MW-3 were installed to a total depth of between 27.0 to 28.5 feet below ground surface (bgs). Monitoring wells MW-4 and MW-5 were installed to a total depth of 48 feet bgs. Each of the five monitoring wells was equipped with 10.0-foot well screens. The five wells were then developed, purged, and sampled in 1996.

In 2003, two (2) additional groundwater monitoring wells were installed and identified as MW-6 and MW-7. Both wells had 2-inch diameter PVC well casings installed to an approximate total depth of 44 feet below ground surface. Both wells were installed with an above ground steel protective cover. No other construction details such as well screen lengths were available for these two (2) wells. In December 2015, two (2) additional groundwater monitoring wells were installed and identified as MW-5A and MW-6A.

All wells are registered with MDNR – Missouri Geological Survey Program.

2.2 Site Geology

Drilling and subsurface investigation activities at the Site and as part of the MDNR approved CCR landfill Detailed Site Investigation (DSI) for the adjacent landfill area identified three (3) primary geologic units at the Site. These geologic units include the surficial soil layer, Warner Sandstone (uppermost aquifer), and Riverton Shale (confining unit). The information presented herein includes the primary elements of a site characterization work plan consistent with the MDNR guidance.

Surficial Soil. Soils at the site consist of a surficial unit of cohesive soils (e.g., CL, SC, ML, and CH) underlain by Pennsylvanian-age bedrock. Soil thickness at the Site ranges from approximately 15-25 feet.

Warner Sandstone. The Warner Sandstone (Sandstone) is the uppermost bedrock unit in south portion of the Site. In the north area of the Site, the Sandstone is overlain by the Riverton Shale (Shale). Based on the DSI information, the Sandstone and Shale can occur as alternating layers. The Sandstone and Shale are gradational in places and transition from shaley sandstone to sandy shale. According to the MDNR publication on the Pennsylvanian Subsystem in Missouri, the Warner Sandstone formation is described as follows: "Generally, the lower part is interbedded, very fine grained sandstone and claystone. The upper part is largely medium-bedded to massive channel fill sandstone. In places, the Warner consists primarily of shale and claystone, with only minor amounts of sandstone" and "ranges in thickness from 0 to 15m (49.2 ft.)."

The Sandstone is more than 25-30 feet thick in places and is generally medium hard and thin to medium bedded with occasional shale partings. The degree of induration of the Sandstone varies and generally increases with depth. Slug tests performed at selected DSI piezometers screened in

the Sandstone exhibited hydraulic conductivities ranging from approximately 1.3x10-4 cm/sec to 5.9x10-6 cm/sec. The slug test results are consistent with values for sandstone and shaley sandstone. The groundwater gradient is towards the east and Blackberry Creek.

Riverton Shale. Layers of the Riverton Shale (Shale) exhibited thicknesses ranging from approximately one foot to more than 10 feet. The Shale is generally dark gray to light gray. The Shale is mainly thin bedded with hardness ranging from soft to hard. Six packer tests were performed during the DSI to assess the hydraulic conductivity of the Shale. The packer test results ranged from approximately $3.2x10^{-6}$ cm/sec to $4.9x10^{-8}$ cm/sec. The packer test data indicates that the Shale is an effective confining unit.

According to the MDNR publication on the Pennsylvanian Subsystem in Missouri, the Riverton Shale formation is described as "dark gray to black, fine-grained, relatively brittle shale and contains as many as three coal beds, each of which is underlain by underclay" and "varies in thickness from a featheredge to more than 90 feet".

Unnamed Coal. The Shale includes coal seams in places that range in thickness from a few inches to approximately 1.5 feet. The coal is generally black to dark gray.

2.3 Groundwater Monitoring Network Design

The groundwater monitoring system for the CCR impoundment consist of nine (9) groundwater monitoring wells. Two (2) wells are considered upgradient. Two (2) wells are considered sidegradient; one is only monitored for groundwater elevation. The remaining five (5) wells are considered downgradient.

The groundwater monitoring wells (MWs) at the Asbury Generating Station are equipped with individual dedicated poly tubing to be connected to a peristaltic pump/controller at the surface. Low-flow, micro-purge and sampling techniques and technology are utilized to collect groundwater samples from the subject wells. The groundwater sampling procedures are discussed in further detail below.

2.4 Groundwater Monitoring Network

The locations of the monitoring wells are shown on **Figure 2**. The groundwater monitoring system for the site consists of the following monitoring wells:

- MW-1 Sidegradient (water level only)
- MW-2 Upgradient
- MW-3 Upgradient
- MW-4 Downgradient
- MW-5 Downgradient
- MW-5A Downgradient
- MW-6 Downgradient
- MW-6A Downgradient
- MW-7 Sidegradient

2.5 Seasonal Variation

Historical groundwater elevation data has been limited. However, adequate lengths of well screen have been utilized during the construction of the wells to accommodate typical seasonal groundwater elevation variations seen in southwest Missouri.

2.6 Groundwater Flow Direction

Historically, the seasonally high potentiometric surface indicated the groundwater flow direction to the east. **Figure 3** is a potentiometric map for this May 2018 sampling event.

Originally MW-7 was thought to be a downgradient well but review of the potentiometric mapping from the eight background sampling events revealed that the well is actually a sidegradient well. Therefore, the designation for MW-7 has been changed from a downgradient to a sidegradient well for compliance monitoring.

3.0 BASELINE GROUNDWATER DATA

3.1 Baseline Data Collection

Per EPA CCR Rule § 257.94(b), the site initiated the detection monitoring program in January 2016 to include obtaining a minimum of eight (8) independent samples for each background and downgradient well. The eight (8) independent groundwater samples were obtained and analyzed as required by the CCR Rule under per the baseline groundwater monitoring plan. Background groundwater data was collected from January 2016 to August 2017.

Groundwater Monitoring Reports were completed for each sampling event and have been placed in the Operating Record. Summary tables of the results from each event are included in **Appendix 2**. A listing of each event is below:

- January 2016
- March 2016
- May 2016
- August 2016
- October 2016
- March 2017
- June 2017
- August 2017

Initial baseline monitoring was required at all monitoring wells. The sampling frequency was quarterly or more frequently for the first two (2) years. After the background data plus the first semi-annual sampling events, a reduced lower sampling frequency replaced the quarterly events to semi-annual events. This lessened sampling frequency will be completed during the months of May and October.

The initial two (2) years of baseline and the first semi-annual detection monitoring included parameters listed in Appendix III and Appendix IV of the EPA CCR Rule. The constituents listed in Appendix IV were eliminated from the overall semi-annual detection monitoring plan after review of the first semi-annual groundwater sampling event analytical results in January 2018, according to the EPA CCR Rule. **Appendix 2** contains the list of constituents.

3.2 Background Data Analysis

Sanitas™ for Ground Water Version 9.2.13 was used to run the statistical analyses with settings used as recommended by the Sanitas™ training course and user manual. The background data consisted of eight sampling events between January 2016 and August 2017 for both the Appendix III and IV constituents. Eight background events are needed for statistical analysis. An analysis of the Appendix III background data was conducted and is included in **Appendix 5**. Trending was found in Boron (MW-3) and Total Dissolved Solids (MW-3). MW-3 is an up-gradient well. Trending was not removed at that time; otherwise the site would be below the minimum of eight background samples needed to run statistics.

Four more sets of background data were available to add to the background data set for the November 2019 sampling event. The analysis of the additional data for the background data set was conducted and is included in **Appendix 5**. No trending was found in the additional four sets of data so they were added to the baseline data set to increase the statistical power of the background data.

4.0 GROUNDWATER SAMPLING EVENT

On November 4 and 5, 2019, eight (8) groundwater monitoring wells were sampled by Midwest Environmental Consultants (MEC) for the EPA CCR Rule Appendix III parameters. For quality assurance and quality control measures, a duplicate sample was taken at MW-7. The sampling protocol and methodology was to be conducted in accordance to the facility's Sampling and Analysis Plan. **Table 1** provides a list of the analytical methods employed by the subcontracted laboratory.

Table 1 – Analytical Methods

Method	Description
9056A	Anions, Ion Chromatography
6020A	Metals (ICP/MS)
SM 2540C	Solids, Total Dissolved (TDS)
Field Sampling	Field Sampling

Appendix 3 includes Monitoring Well Field Inspection sheets and field notes. The physical integrity of the wells was good. During sample collection each of the wells was monitored for pump discharge and formation recharge. Initially, a static water level for each well was recorded (**Table 2**). To ensure sufficient recharge while sampling, static water levels were collected during pumping. Prior to sample collection, field parameters for each well were measured with a flow-through meter. When the field parameters stabilized, samples for analytical testing were collected and placed on ice for hand delivery to the laboratory. At the conclusion of sample collection from each well, a final static water level measurement was obtained. The samples were collected in the appropriately pre-preserved sample containers and placed on ice for delivery.

Table 2 - Groundwater Sampling Field Parameters Summary During November 2019 Sampling Event

WELL ID	STATIC WATER LEVEL (ft-BTOC)		PURGE RATE (mL/min)	STABILIZED pH
	Initial	Final		
MW-1*	NT	NA	NA	NA
MW-2	2.13	3.77	200	6.44
MW-3	0.0	0.0	200	7.92
MW-4	5.04	9.65	200	7.38
MW-5	0.0	4.85	200	7.39
MW-5A	7.55	14.44	200	7.13
MW-6	7.30	13.02	200	7.16
MW-6A	6.67	12.80	200	7.24
MW-7	3.05	3.31	200	6.50

* Water Level Only NA – Not Applicable NT – Not Tested (inaccessible)

Appendix 4 includes the initial analytical results for the sampling event. Included with this analytical report are sample information; chain of custody; wet chemistry data; and volatile data.

5.0 DATA VALIDATION PROCEDURES FOR GROUNDWATER MONITORING DATA

Midwest Environmental Consultants receives Data Packages from the analytical laboratory (Test America). The internal quality control/quality assurance case narratives and reported data are then reviewed. Generally the data validation procedures established by the U.S. Environmental Protection Agency *Contract Laboratory Program Functional Guidelines for Organic Data Review* and *Functional Guidelines for Inorganic Data Review* is followed. These guidelines are used to assign data qualifiers to the data. A formal data validation report for the site is not prepared; however, any significant issues are noted in the groundwater monitoring report.

MEC evaluates the data set for precision, accuracy, representativeness, comparability, and completeness (PARCC).

5.1 Precision

Laboratory Precision. Laboratory quality control procedures to measure precision consist of laboratory control sample (LCS) analysis and analysis of matrix spike/matrix spike duplicates (MS/MSD). These analyses are used to define analytical variability.

Field Precision. Analyses of duplicate samples are used to define the total variability (replicability) of the sampling/analytical system as a whole. Field replicates are collected at a rate of one per sampling event.

5.2 Accuracy

Accuracy is determined by calculating the percent recoveries for analyses of surrogate compounds, LCSs, continuing calibration check standards, and matrix spike samples. Acceptable percent recoveries are established for SW-846 and EPA methods. Field and laboratory blank analysis are also used to address measurement bias.

Field Blanks. Field blanks consisted of a trip blank and a field blank. One trip blank per cooler accompanies samples for volatile organic analyses.

Laboratory Blanks. Method blanks, artificial, matrix-less samples, are analyzed to monitor the laboratory analysis system for interferences and contamination from glassware, reagents, etc. Method blanks are taken through the entire sample preparation process. They are included with each batch of extractions or digestions prepared, or with each 20 samples, whichever is more frequent.

5.3 Representativeness

Representativeness expresses the degree to which sample data accurately and precisely reflect site condition. Representativeness of the data is determined by comparing actual sampling procedures to those delineated in the field sampling plan, comparing results from field replicate samples and reviewing the results of field blanks. Field notes are reviewed as part of our data validation process.

5.4 Comparability

Comparability expresses the confidence with which one data set can be compared to another data set measuring the same property. Comparability is ensured by using established and approved sample collection techniques and analytical methods, consistent basis of analysis, consistent reporting units, and analyzing standard reference materials.

5.5 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount expected under controlled laboratory conditions. Completeness is defined as the valid data percentage of the total tests requested. Valid data are defined as those where the sample arrived at the laboratory intact, properly preserved, in sufficient quantity to perform the requested analyses, and accompanied by a completed chain-of-custody form. Furthermore, the sample must have been analyzed within the specified holding time and in such a manner that analytical QC acceptance criteria were met.

6.0 STATISTICAL ANALYSIS

6.1 Sampling Results

The constituents with results above the laboratory reporting limits are included in **Table 3**. The Test America laboratory analytical results are included in **Appendix 4**.

Table 3 – Constituents Identified Above Laboratory Reporting Limits During November 2019 Sampling Event

Constituent	Units	MCL	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6	MW-6A	MW-7
Appendix III										
Boron	mg/L	NA	0.15	<0.08J	<0.08J	0.22	0.82	0.34	0.4	0.24
Calcium	mg/L	NA	37	93	110	90	240	240	160	450
Chloride	mg/L	NA	120	60	20	3.6	69	10	16	42
Fluoride	mg/L	4.0	0.28	0.13	0.23	0.25	<0.5J	<0.25J	0.23	<0.25J
pH	SU	NA	6.6	5.9	7.6	7.5	7.2	7.3	7.4	6.6
Sulfate	mg/L	NA	62	450	160	93	1200	940	710	1800
Total Dissolved Solids	mg/L	NA	380	830	670	540	2000	1800	1400	2800

NA = Not Applicable
<x = Less than reporting limit (nondetectable)
J = Trace value seen above minimum detection limit but below reporting limit (trace)

No constituents were detected above the Federal Safe Drinking Water maximum contaminant level (MCL) during the sampling event.

6.2 Statistical Analysis

Sanitas™ for Ground Water Version 9.2.13 was used to run the statistical analyses with settings used as recommended by the Sanitas™ training course and user manual. For most downgradient well constituents, non-parametric intrawell prediction intervals were run due to non-detectable levels in more than 50 percent of the samples or if data could not be adequately normalized. The Sanitas™ output is included in **Appendix 5**.

Background data consisted of eight sampling events between January 2016 and August 2017 for both the Appendix III and IV constituents. Eight background events are needed for statistical analysis. An analysis of the Appendix III background data was conducted and is included in **Appendix 5**. Trending was found in Boron (MW-3) and Total Dissolved Solids (MW-3), MW-3 is an up-gradient well. Trending was not removed at this time; otherwise the site would be below the minimum of eight background samples needed to run statistics.

Four more sets of background data were available to add to the background data set for the November 2019 sampling event. The analysis of the additional data for the background data set was conducted and is included in **Appendix 5**. No trending was found in the additional four sets of data so they were added to the baseline data set to increase the statistical power of the background data.

Statistical analysis was then performed on the Appendix III constituents from the November 2019 sampling event compared to the updated background dataset. Prediction interval analyses compare one or more observations to a limit set by background data. Inter-well analyses compare observations from upgradient background wells and their relation to the observations for the downgradient wells. Intra-well analyses compare background observations to current

observations of the same well. Due to varying geology in the state of Missouri, intra-well analyses have been deemed a more appropriate method.

Statistical analysis results are presented below for those constituents determined to have an exceeded a prediction limit. However, EPA's "Unified Guidance Document: Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities," March 2009, EPA 530/R-09-007 is referenced multiple times in the preamble of the EPA CCR regulations for groundwater sampling and analysis requirements. According to the EPA Unified Guidance, a prediction limit exceedance is not considered a statistically significant increase (SSI) until it is confirmed through retesting. SSIs generated by non-detectable results or with less than eight background events are considered statistically invalid.

Table 4 lists the parameters with exceedances of prediction limits during the November 2019 sampling event, the associated monitoring wells, if the exceedance is initial versus confirmed, the predicted limit, the measured concentration, and the MCL set forth in the National Drinking Water Regulations. The MCL is the highest level of a contaminant that is allowed in drinking water.

Table 4 – Prediction Limit Exceedances Observed During November 2019 Sampling Event

Constituent	Monitoring Well	Initial vs. Confirmed	Predicted Limit (mg/L)	Measured Concentration (mg/L)	Drinking Water MCLs (mg/L)
Boron	MW-5A (d)	Confirmed	0.5728	0.82	NA
Chloride	MW-5A (d)	Initial	59	69	NA
pH	MW-4 (d)	Initial	7.577	7.6	NA
Sulfate	MW-5A (d)	Initial	1135	1200	NA
Total Dissolved Solids	MW-5A (d)	Confirmed	1879	2000	NA

NA = Not Applicable

It should be noted that the power curve for these analyses is not considered strong (see **Appendix 5**). The data set consists of only 13 sampling events from January 2016 to November 2019. A small data set triggers an SSI when there is even a slight increase in concentration. Sanitas added notes to each SSI "Insufficient data to test for seasonality: data were not deseasonalized."

The EPA Unified Guidance Chapter 5.2.3 states "In groundwater data collection and testing, background conditions may not be static over time. Caution should be observed in removing observations which may signal a change in natural groundwater quality. Even when conditions have not changed, an apparently extreme measurement may represent nothing more than a portion of the background distribution that has yet to be observed. This is particularly true if the background data set contains fewer than 20 samples." Chapter 5.2.4 states "With such a small background sample, it can be difficult to develop an adequately powerful intrawell prediction level or control chart, even when retesting is employed (Chapter 19). Thus, additional background data will be needed to augment compliance well samples". Minor increases in concentrations did not result in any primary MCLs to be exceeded by any of the prediction limit exceedances during the sampling event, demonstrating that the groundwater has not been contaminated.

6.3 Results Interpretation

The result for Chloride (MW-5A), pH (MW-4) and Sulfate (MW-5A) indicated an initial intra-well prediction limit exceedance for the listed monitoring well during the November 2019 sampling event. There is no current primary (health based) MCL for chloride, pH or sulfate.

During the May 2019, the result for Boron (MW-5A) indicated an initial intra-well prediction limit exceedance and Total Dissolved Solids (MW-5A) indicated a confirmed intra-well prediction limit exceedance. There is no current primary (health based) MCL for boron and total dissolved solids. These prediction limit exceedances were confirmed during the November 2019 sampling event.

A resample of MW-5A was conducted on December 11, 2019. The results of the resample confirmed the exceedances. The site will move into the assessment monitoring program according to the EPA CCR Rule starting with the May 2020 sampling event.

Table 5 – December 2019 Resample Result Comparison

Constituent	Units	MCL	MW-5A	MW-5A Resample
Appendix III				
Boron	mg/L	NA	0.82	1.0
Calcium	mg/L	NA	240	270
Chloride	mg/L	NA	69	82
Fluoride	mg/L	4.0	<0.5J	0.26
pH	SU	NA	7.2	7
Sulfate	mg/L	NA	1200	1300
Total Dissolved Solids	mg/L	NA	2000	2200

Included below is a discussion of the previous results for comparison.

May 2019

The result for Boron (MW-5A) and pH (MW-3(u), MW-5A, MW-6 and MW-6A) indicated an initial intra-well prediction limit exceedance for the listed monitoring well during the May 2019 sampling event. There is no current primary (health based) MCL boron or pH. The facility plans to resample as part of the November 2019 sampling event.

During the November 2018, the result for Total Dissolved Solids (MW-5A) indicated an initial intra-well prediction limit exceedance. There is no current primary (health based) MCL for total dissolved solids. This initial prediction limit exceedances was confirmed during the May 2019 sampling event. However, it should be noted that the power curve for these analyses is not considered strong. A small data set triggers an SSI when there is even a slight increase in concentration. The EPA Unified Guidance Chapter 5.2.4 states "With such a small background sample, it can be difficult to develop an adequately powerful intrawell prediction level or control chart, even when retesting is employed (Chapter 19). Thus, additional background data will be needed to augment compliance well samples".

Minor increases in concentrations did not result in any primary MCLs to be exceeded by any of the prediction limit exceedances during the sampling event, demonstrating that the groundwater has not been contaminated. It was also noted that higher levels of total dissolved solids were seen in

the side-gradient well MW-7 demonstrating that a there was likely not a release from the facility. Therefore, the site will continue with detection monitoring on a semi-annual basis at this time.

November 2018

The result for Total Dissolved Solids (MW-5A) indicated an initial intra-well prediction limit exceedance for the listed monitoring well during the November 2018 sampling event. There is no current primary (health based) MCL for total dissolved solids. The facility plans to resample MW-5A for Total Dissolved Solids as part of the May 2019 sampling event.

During the May 2018, no intra-well prediction limits were exceeded. Therefore, there were no initial prediction limit exceedances to confirm during the November 2018 sampling event.

May 2018

No intra-well prediction limits were exceeded during the May 2018 sampling event.
The October 2017 results for Total Dissolved Solids (MW-7) indicated an exceedance of the predicted limit for the listed monitoring wells. However, this initial prediction limit exceedance was not confirmed during the May 2018 sampling event.

October 2017

The result for Total Dissolved Solids (MW-7) indicated an initial intra-well prediction limit exceedance for the listed monitoring wells during the October 2017 sampling event. However, the result was below the tolerance limit. There is no current primary (health based) MCL for total dissolved solids.

Review of the Total Dissolved Solids in the duplicate sample taken from the same well (MW-7) shows a result of 3,000 mg/L, which would not be an exceedance of the intra-well prediction limit of 3,069 mg/L. Due to the variances between the sample and the duplicate, the site will re-evaluate MW-7 for Total Dissolved Solids during the next sampling event.

MW-7 is considered a sidegradient well, therefore no further action is needed for exceedances in sidegradient or upgradient wells.

6.4 Proposed Actions

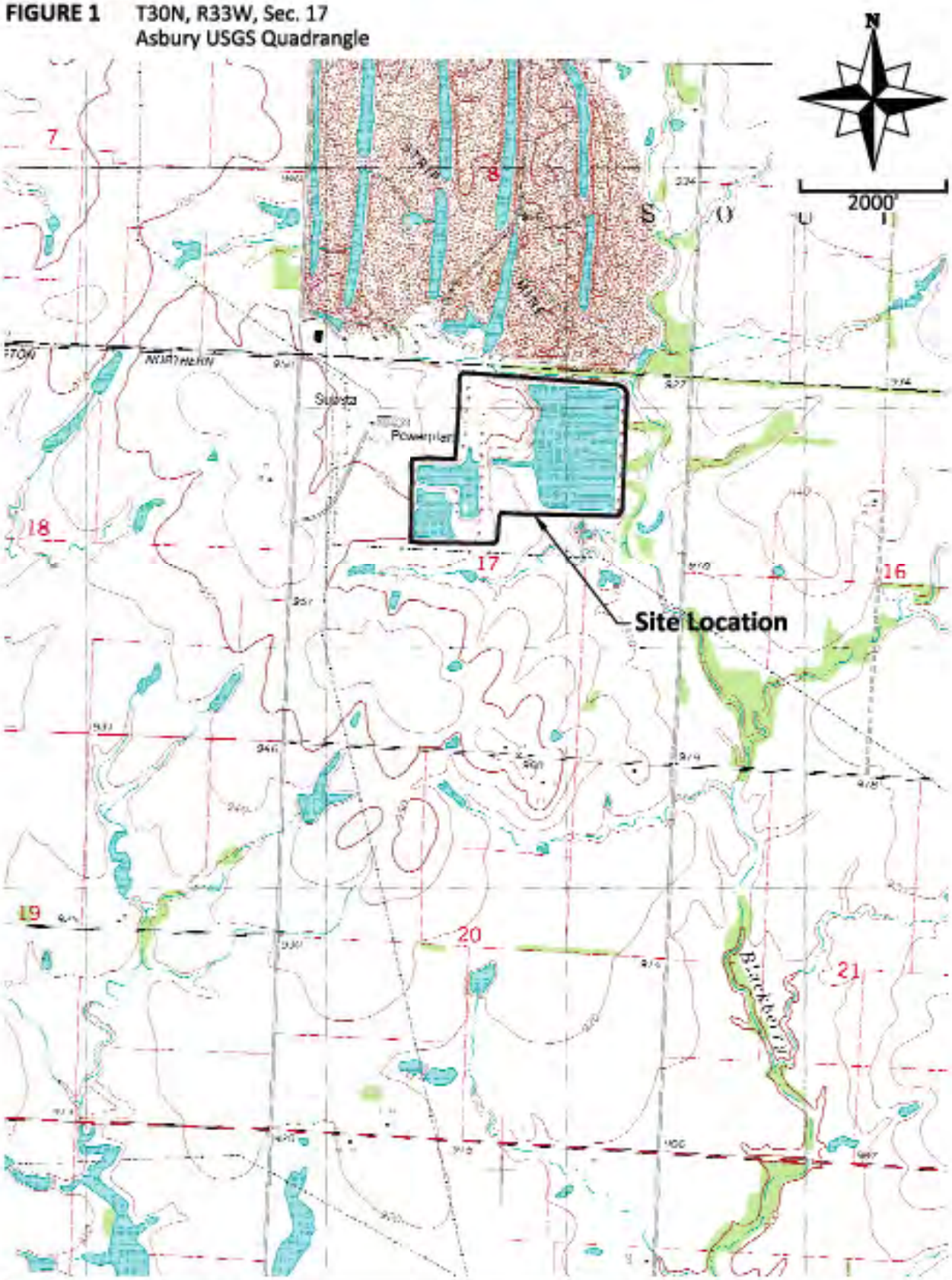
The site will move into the assessment monitoring program according to the EPA CCR Rule starting with the May 2020 sampling event.

FIGURES

Midwest Environmental Consultants

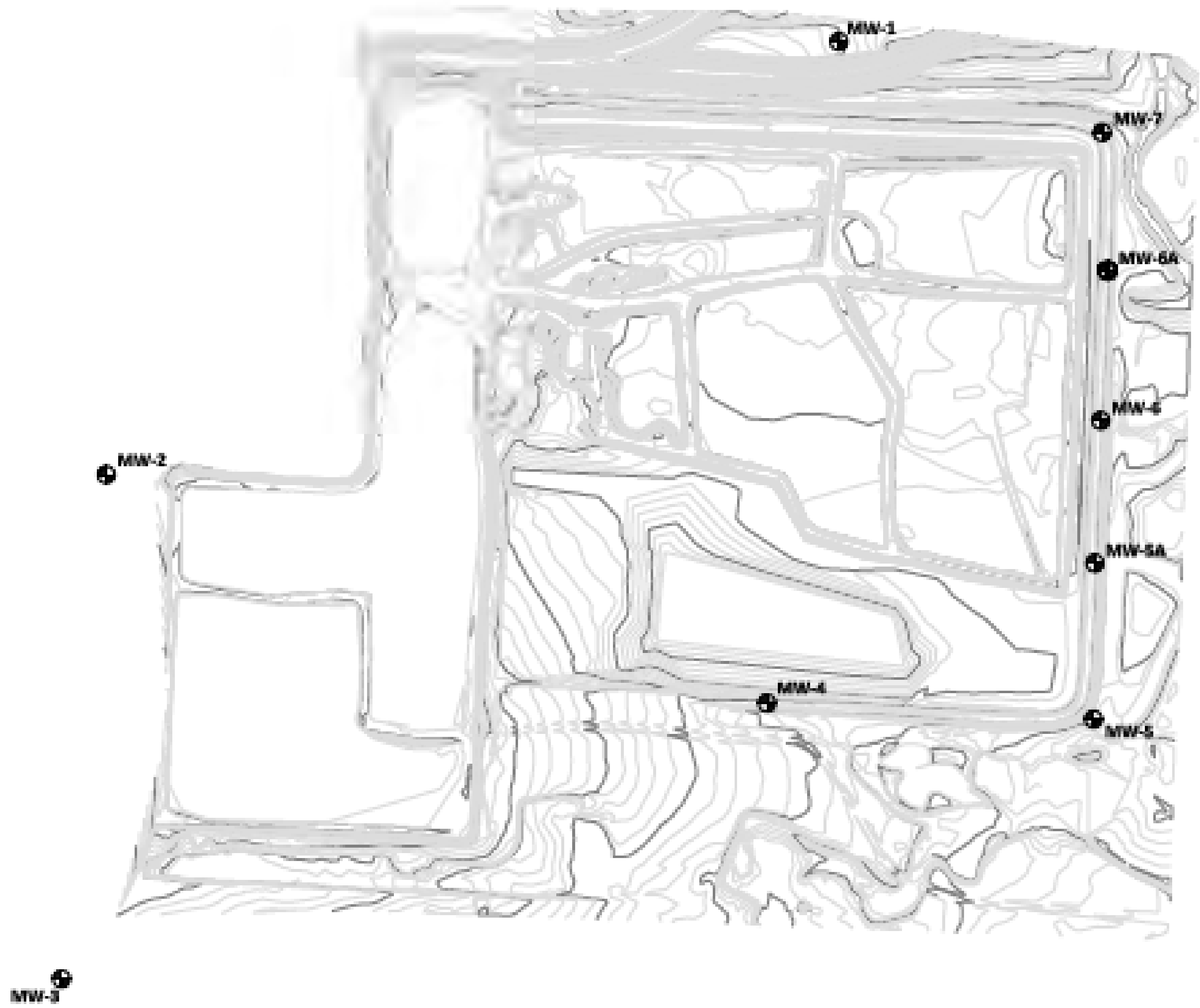
Asbury Generating Station CCR Impoundment
Groundwater Sampling Event - November 2019
Site Location Map

FIGURE 1 T30N, R33W, Sec. 17
Asbury USGS Quadrangle



January 2020

FIGURE 2



Well ID	Northing	Easting
MW-1	435781.18 *	2765155.35 *
MW-2	434428.48	2761981.27
MW-3	432842.77	2761720.86
MW-4	432708.99	2764030.99
MW-5	432658.37	2765969.33
MW-5A	434158.05	2765969.78
MW-6	434830.46	2765987.90
MW-6A	435071.40	2766010.08
MW-7	435535.42	2765983.13

* Coordinate location is approximate

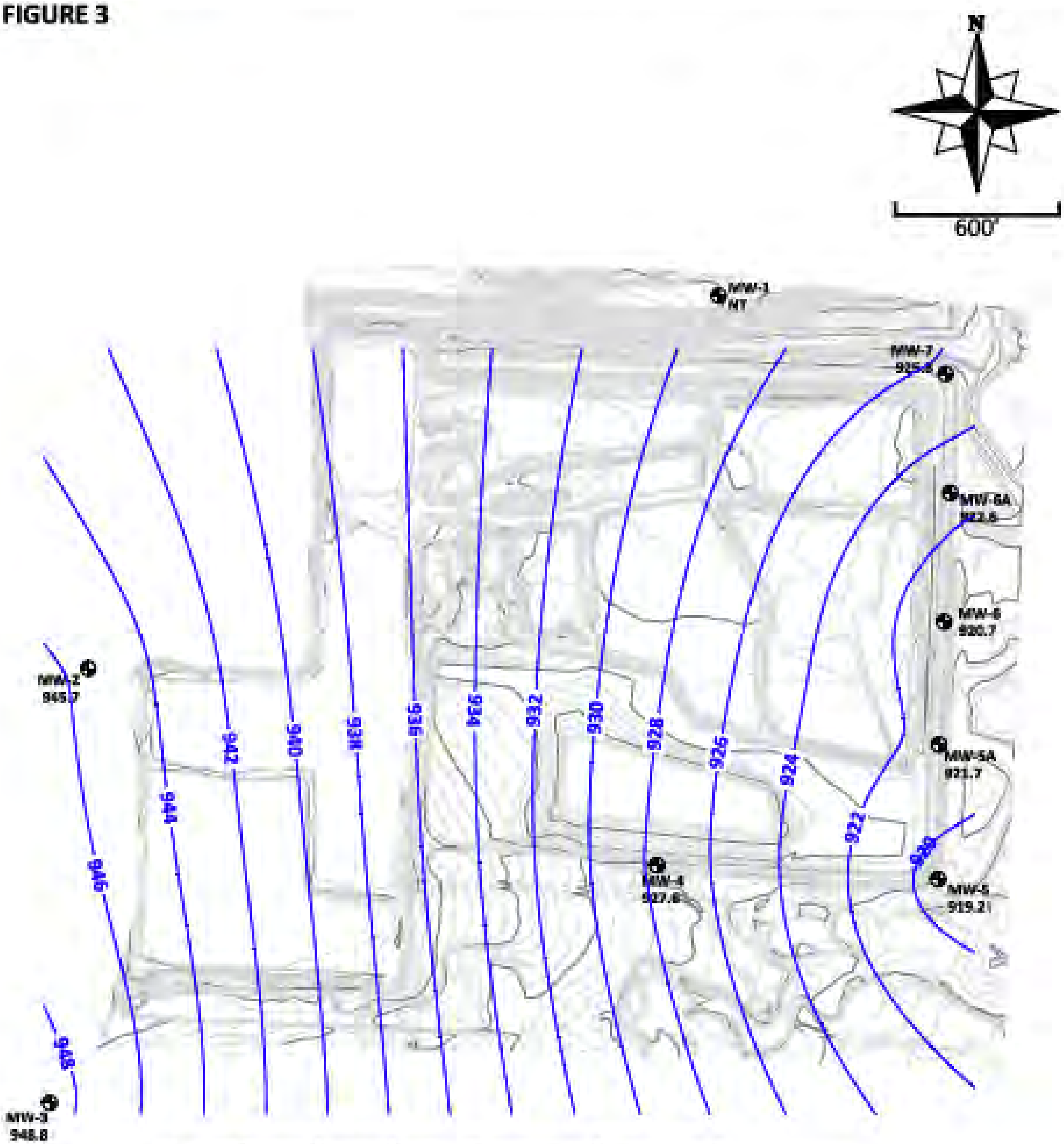
Legend

Monitoring Well

Midwest Environmental Consultants

Asbury Generating Station CCR Impoundment
Groundwater Sampling Event - November 2019
Groundwater Piezometric Surface Map

FIGURE 3



Well ID	Northing	Easting	Top Of Casing	Static Water Level (BTOC)	Static Water Level
MW-1	[illegible]	[illegible]	[illegible]	NT	NT
MW-2	[illegible]	[illegible]	947.8	2.1	945.7
MW-3	[illegible]	[illegible]	[illegible]	6.0	948.8
MW-4	[illegible]	[illegible]	[illegible]	5.0	927.6
MW-5	[illegible]	[illegible]	[illegible]	6.0	919.2
MW-5A	[illegible]	[illegible]	[illegible]	7.6	921.7
MW-6	[illegible]	[illegible]	[illegible]	7.3	920.7
MW-6A	[illegible]	[illegible]	[illegible]	6.7	922.6
MW-7	[illegible]	[illegible]	[illegible]	5.1	925.6

Legend

Monitoring Well

APPENDIX 1

MDNR Groundwater System Approval

Missouri Department of NATURAL RESOURCES
dnr.mo.gov
Eric R. Greitens, Governor
Carol S. Comer, Director

NOV 02 2017

Mr. Kavan Stull, Senior Environmental Coordinator
Empire District
602 South Joplin Avenue
Joplin, MO 64802

RE: Site Characterization Workplan

Dear Mr. Stull:

The Missouri Department of Natural Resources has reviewed the document "Site Characterization Workplan" dated May 16, 2017. The site has undergone extensive characterization regarding construction of a coal combustion residual (CCR) landfill near the CCR impoundments. The department's Water Protection Program has determined, through consulting with the Missouri Geological Survey, this characterization is sufficient and may be used in whole to complete the required monitoring of the sub-surface conditions at the site. Additional submittal of site characterization is not necessary, as the previous submittal meets the requirement for special condition 19(b) of the Missouri State Operating Permit MO-0095362. The facility may proceed with the next step laid out in the permit; special condition 19(c). Enclosed is the Missouri Geological Survey concurrence.

If you were adversely affected by this decision, you may be entitled to an appeal before the Administrative Hearing Commission (AHC) pursuant to 10 CSR 20 1.020 and Section 621.250, RSMo. To appeal, you must file a petition with the AHC within 30 days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the AHC. Contact information for the AHC is by mail at Administrative Hearing Commission, United States Post Office Building, Third Floor, 131 West High Street, P.O. Box 1557, Jefferson City, MO 65102, by phone at 573-751-2422, by fax at 573-751-5018, and by website at www.oa.mo.gov/ahc.

If you have any questions, please do not hesitate to contact Ms. Pam Hackler by mail at Department of Natural Resources, Water Protection Program, P.O. Box 176, Jefferson City, MO 65102-0176, by phone at 573-526-3386; or by email at pam.hackler@dnr.mo.gov. Thank you.

Sincerely,

WATER PROTECTION PROGRAM

Michael J. Abbott, Chief
Operating Permits Section

MJA/php

Enclosure

c: Mr. Randall Willoughby, Southwest Regional Office

Missouri Department of NATURAL RESOURCES

dnr.mo.gov

Eric R. Greitens, Governor

Carol S. Comer, Director

MEMORANDUM

SWR18011
Jasper County

DATE: October 18, 2017

TO: Pam Hackler- WPP- Industrial Wastewater Unit

FROM: Fletcher N. Bone, Geologist, Environmental Geology Section, Geological Survey Program, MGS

Fletcher N. Bone

STATE OF MISSOURI
REGISTERED GEOLOGIST

October 18, 2017

SUBJECT: Site characterization for existing CCR impoundments
Asbury Power Plant Site Characterization Work Plan- CCR
37 21 22.66 Latitude, -94 35 4.79 Longitude,
Jasper County, Missouri

The Missouri Geological Survey (MGS) has reviewed the documents titled, 'NPDES Permit MO-0095362 Asbury Power Plant, Jasper County, Missouri, Site Characterization Work Plan', prepared by Empire District Electric Company, dated September 8, 2017 and 'Site Characterization Work Plan, Coal Combustion Residuals Impoundments, Empire Electric Facility - Permit MO-0095362, Jasper County, Missouri, Geotechnology Project No. J021738.03', prepared by Geotechnology Inc., dated May 16, 2017. The MGS offers the following comment.

General Comment:

The MGS agrees that the existing Coal Combustion Residuals (CCR) impoundments (site 1) do not need further site characterization, at this time. The site characterization performed, as described in the Detailed Site Investigation Report (DSI), dated January 21, 2015, at the proposed CCR impoundment (site 2) that is approximately 1,000 feet south of the existing CCR impoundments (site 1), coupled with the geologic and hydrologic data provided that pertains to the existing CCR impoundments (site 1) (1996 to present data), provides adequate characterization of the geology and hydrology of the site 1. The geologic and hydrologic settings of both sites are similar, with geologic boring logs and potentiometric data of both sites being compared. The hydraulic conductivity testing conducted at the proposed CCR site (site 2) has demonstrated that there is a low potential for groundwater contamination for this area.

If you are in need of further assistance from our office or have questions regarding this evaluation please feel free to contact me at (573) 368-2161.

APPENDIX 2

Baseline Sampling Information

EPA CCR Rule

Appendix III to Part 257—Constituents for Detection Monitoring

Boron
Calcium
Chloride
Fluoride
pH
Sulfate
Total Dissolved Solids (TDS)

Appendix IV to Part 257—Constituents for Assessment Monitoring

Antimony
Arsenic
Barium
Beryllium
Cadmium
Chromium
Cobalt
Lead
Lithium
Mercury
Molybdenum
Selenium
Thallium
Radium 226 and 228 combined

1st Baseline Event –
January 2016 Sampling Event

Constituent	Units	MCL	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6	MW-6A	MW-7
Appendix III										
Boron	mg/L	NA	0.33	<0.5 J	<0.05 J	<0.5 J	<0.5 J	<0.5 J	<0.5 J	<0.5 J
Calcium	mg/L	NA	57	74	220	84	200	250	140	570
Chloride	mg/L	NA	140	83	120	4.7	28	10	38	38
Fluoride	mg/L	4	0.43	0.47	0.31	0.28	0.30	0.24	0.35	<0.2 J
pH	SU	NA	6.33	5.81	6.31	7.33	7.09	6.97	7.09	6.51
Sulfate	mg/L	NA	260	360	1100	140	800	1000	600	1800
Total Dissolved Solids	mg/L	NA	690	790	1900	590	1500	1800	1300	2800
Appendix IV										
Antimony	mg/L	0.006	<0.002	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J
Arsenic	mg/L	0.01	<0.002 J	0.01	<0.01 J	<0.02 J	<0.01	<0.01	<0.01	<0.01
Barium	mg/L	2	0.044	0.0099	0.065	0.086	0.036	0.02	0.042	0.011
Beryllium	mg/L	0.004	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Cadmium	mg/L	0.005	0.0012	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	mg/L	0.1	<0.002 J	<0.002 J	<0.01 J	<0.01 J	<0.01 J	<0.01 J	<0.01	<0.01
Cobalt	mg/L	NA	<0.01 J	<0.01 J	0.046	<0.002 J	0.018	0.0022	0.02	0.014
Lead	mg/L	0.015	<0.002 J	<0.002	<0.01 J	<0.002 J	<0.002	<0.002	<0.002	<0.002 J
Lithium	mg/L	NA	0.057	0.15	<0.05 J	<0.5 J	<0.5 J	<0.5 J	<0.5 J	<0.5 J
Mercury	mg/L	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	NA	<0.002	<0.002 J	<0.002 J	<0.002 J	<0.01 J	<0.002	<0.01 J	<0.002
Selenium	mg/L	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thallium	mg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Combined Radium	pCi/L	5	<0.477 J	<0.427 J	<2.08	<0.563 J	<0.392 J	<0.446 J	<0.306 J	<0.279 J

NA = Not Applicable

<x = Less than reporting limit (nondetectable)

J = Trace value seen above minimum detection limit but below reporting limit (trace)

2nd Baseline Event –
March 2016 Sampling Event

Constituent	Units	MCL	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6	MW-6A	MW-7
Appendix III										
Boron	mg/L	NA	0.90	0.060	<0.25	0.29	0.29	0.34	0.34	0.29
Calcium	mg/L	NA	120	92	260	94	190	250	160	620
Chloride	mg/L	NA	180	70	15	4.4	23	9.0	36	34
Fluoride	mg/L	4	0.28	0.28	0.10	0.38	0.31	0.23	0.31	0.16
pH	SU	NA	5.82	5.68	6.72	7.15	6.94	6.79	6.98	6.22
Sulfate	mg/L	NA	570	400	570	140	710	970	550	1800
Total Dissolved Solids	mg/L	NA	1300	840	1600	590	1500	1800	1200	2900
Appendix IV										
Antimony	mg/L	0.006	<0.002	<0.002	<0.002	<0.002	<0.002 J	<0.002	<0.002 J	<0.002
Arsenic	mg/L	0.01	<0.002 J	0.024	0.0038	<0.002 J	0.0038	0.0026	0.0025	0.004
Barium	mg/L	2	0.060	0.012	0.034	0.047	0.042	0.026	0.051	0.0089
Beryllium	mg/L	0.004	<0.002	<0.002 J	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Cadmium	mg/L	0.005	0.0028	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	mg/L	0.1	<0.002	<0.002 J	0.0034	<0.002	<0.002	<0.002	<0.002	<0.002
Cobalt	mg/L	NA	0.017	0.0095	0.021	<0.002 J	0.02	0.0061	0.0063	0.016
Lead	mg/L	0.015	<0.002 J	<0.002 J	<0.002 J	<0.002	<0.002	<0.002	<0.002	<0.002
Lithium	mg/L	NA	0.20	0.15	0.074	0.074	0.14	0.22	0.14	0.30
Mercury	mg/L	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	NA	<0.002	<0.002 J	<0.002	<0.002 J	0.0041	<0.002 J	0.0038	<0.002
Selenium	mg/L	0.05	<0.002	<0.002	<0.002	0.0021	0.0028	0.0031	0.0031	<0.002
Thallium	mg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Combined Radium	pCi/L	5	<0.337 J	<0.389 J	<0.84 J	<0.315 J	<0.336 J	<0.319 J	<0.348 J	<0.329 J

NA = Not Applicable

<x = Less than reporting limit (nondetectable)

J = Trace value seen above minimum detection limit but below reporting limit (trace)

3rd Baseline Event –
May 2016 Sampling Event

Constituent	Units	MCL	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6	MW-6A	MW-7
Appendix III										
Boron	mg/L	NA	0.21	0.044	0.027	0.24	0.26	0.25	0.23	0.29
Calcium	mg/L	NA	130	100	91	5	59	11	90	36
Chloride	mg/L	NA	140	83	120	4.7	28	10	38	38
Fluoride	mg/L	4	0.28	0.27	0.22	0.55	0.35	0.26	0.43	0.18
pH	SU	NA	5.30	4.37	5.97	6.43	6.60	6.51	6.64	5.82
Sulfate	mg/L	NA	160	540	820	150	920	1400	620	2400
Total Dissolved Solids	mg/L	NA	500	800	1700	590	1500	1800	1100	2900
Appendix IV										
Antimony	mg/L	0.006	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J
Arsenic	mg/L	0.01	0.0013	0.027	0.01	0.0043	0.01	0.007	0.0037	0.0082
Barium	mg/L	2	0.021	0.01	0.025	0.045	0.037	0.041	0.04	0.021
Beryllium	mg/L	0.004	<0.001	<0.001 J	<0.001 J	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.005	0.0011	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	mg/L	0.1	<0.002 J	<0.002 J	0.0025	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J
Cobalt	mg/L	NA	0.0072	0.0073	0.0071	<0.0005J	0.00081	0.0035	<0.0005J	0.0037
Lead	mg/L	0.015	<0.001 J	<0.001 J	<0.001 J	<0.001 J	<0.001	<0.001	<0.001 J	<0.001 J
Lithium	mg/L	NA	<0.05 J	0.15	<0.05 J	0.074	0.16	0.31	0.12	0.22
Mercury	mg/L	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	NA	<0.005	<0.005	<0.005	<0.005	<0.005 J	0.0052	<0.005	<0.005
Selenium	mg/L	0.05	<0.005	<0.005	<0.005 J	<0.005	<0.005 J	<0.005 J	<0.005	<0.005
Thallium	mg/L	0.002	<0.001 J	<0.001	<0.001	<0.001	<0.001 J	<0.001 J	<0.001	<0.001
Combined Radium	pCi/L	5	<0.355	<0.427 J	<0.386 J	<0.402 J	<0.377 J	<0.357 J	<0.334 J	<0.333 J

NA = Not Applicable

<x = Less than reporting limit (nondetectable)

J = Trace value seen above minimum detection limit but below reporting limit (trace)

4th Baseline Event –
August 2016 Sampling Event

Constituent	Units	MCL	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6	MW-6A	MW-7
Appendix III										
Boron	mg/L	NA	0.19	0.057	0.067	0.27	0.27	0.29	0.27	0.22
Calcium	mg/L	NA	38	79	110	74	180	220	130	430
Chloride	mg/L	NA	120	77	35	6	35	12	65	49
Fluoride	mg/L	4	0.25	0.15	0.3	0.26	0.31	0.23	0.37	0.22
pH	SU	NA	6.04	5.73	7	7.17	7.04	6.88	7.14	6.29
Sulfate	mg/L	NA	<0.005 J	<0.005 J	<0.005 J	<0.005 J	<0.005 J	<0.005	<0.005 J	<0.005 J
Total Dissolved Solids	mg/L	NA	460	850	730	540	1500	1800	1100	2900
Appendix IV										
Antimony	mg/L	0.006	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J
Arsenic	mg/L	0.01	<0.001 J	0.013	<0.001 J	<0.001 J	0.001	<0.001 J	<0.001 J	<0.001 J
Barium	mg/L	2	0.023	<0.01 J	0.012	0.035	0.031	0.014	0.037	<0.01 J
Beryllium	mg/L	0.004	<0.001	<0.001 J	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.005	<0.001 J	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	mg/L	0.1	<0.002	<0.002	<0.002 J	<0.002	<0.002	<0.002	<0.002	<0.002
Cobalt	mg/L	NA	0.0052	0.0088	0.0038	<0.0005J	0.00075	<0.0005J	<0.0005J	0.015
Lead	mg/L	0.015	<0.001 J	<0.001 J	<0.001 J	<0.001 J	<0.001	<0.001	<0.001 J	<0.001
Lithium	mg/L	NA	<0.05 J	0.16	<0.05 J	0.078	0.16	0.22	0.11	0.34
Mercury	mg/L	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	NA	<0.005	<0.005	<0.005	<0.005	<0.005 J	<0.005	0.0067	<0.005
Selenium	mg/L	0.05	<0.005 J	<0.005 J	<0.005 J	<0.005 J	<0.005 J	<0.005	<0.005 J	<0.005 J
Thallium	mg/L	0.002	<0.001 J	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Combined Radium	pCi/L	5	<0.424 J	<0.465 J	<0.833	<0.441 J	<0.435 J	<0.45 J	<0.484 J	<0.418 J

NA = Not Applicable

<x = Less than reporting limit (nondetectable)

J = Trace value seen above minimum detection limit but below reporting limit (trace)

5th Baseline Event –
October 2016 Sampling Event

Constituent	Units	MCL	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6	MW-6A	MW-7
Appendix III										
Boron	mg/L	NA	0.2	0.053	0.047	0.24	0.33	0.34	0.31	0.26
Calcium	mg/L	NA	43	91	100	94	220	260	130	490
Chloride	mg/L	NA	130	65	74	6	29	13	65	56
Fluoride	mg/L	4	0.28	0.18	0.28	0.31	0.39	0.25	0.41	0.28
pH	SU	NA	6.59	5.95	7.21	7.51	8.00	6.98	7.85	6.75
Sulfate	mg/L	NA	99	470	120	120	1100	1100	570	1400
Total Dissolved Solids	mg/L	NA	460	850	580	570	1500	1700	1100	2800
Appendix IV										
Antimony	mg/L	0.006	<0.002	<0.002	<0.002 J	<0.002	<0.002	<0.002	<0.002 J	<0.002
Arsenic	mg/L	0.01	<0.001	0.014	<0.001 J	<0.001 J	<0.001 J	<0.001	<0.001 J	<0.001 J
Barium	mg/L	2	0.028	<0.01 J	0.02	0.03	0.033	0.013	0.037	<0.01 J
Beryllium	mg/L	0.004	<0.001	<0.001 J	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.005	<0.001 J	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	mg/L	0.1	<0.002	<0.002	<0.002 J	<0.002	<0.002	<0.002	<0.002	<0.002
Cobalt	mg/L	NA	0.0051	0.0095	0.0013	0.00073	0.0072	<0.0005J	<0.0005J	0.014
Lead	mg/L	0.015	<0.001 J	<0.001	<0.001 J	<0.001 J	<0.001	<0.001	<0.001	<0.001
Lithium	mg/L	NA	<0.05 J	0.17	<0.05	0.078	0.17	0.24	0.12	0.32
Mercury	mg/L	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	NA	<0.005	<0.005	<0.005	<0.005	<0.005 J	0.0066	<0.005	<0.005
Selenium	mg/L	0.05	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005J	<0.005
Thallium	mg/L	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Combined Radium	pCi/L	5	<0.436J	<0.478J	<0.535J	<0.503J	<0.498J	<0.464J	<0.453J	<0.424J

NA = Not Applicable

<x = Less than reporting limit (nondetectable)

J = Trace value seen above minimum detection limit but below reporting limit (trace)

6th Baseline Event –
March 2017 Sampling Event

Constituent	Units	MCL	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6	MW-6A	MW-7
Appendix III										
Boron	mg/L	NA	0.22	0.052	0.057	0.23	0.29	0.33	0.36	0.26
Calcium	mg/L	NA	38	93	250	86	200	260	170	500
Chloride	mg/L	NA	130	52	19	5.3	29	11	19	39
Fluoride	mg/L	4	0.21	0.12	<0.1 J	0.29	0.29	0.19	0.3	0.12
pH	SU	NA	6.07	5.84	6.67	7.32	7.38	7.15	7.21	6.40
Sulfate	mg/L	NA	130	540	630	150	1100	1000	720	1900
Total Dissolved Solids	mg/L	NA	500	940	1600	620	1700	1900	1400	3000
Appendix IV										
Antimony	mg/L	0.006	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Arsenic	mg/L	0.01	<0.001	0.037	0.0022	0.0013	0.0014	<0.001 J	0.0043	<0.001 J
Barium	mg/L	2	0.021	0.011	0.021	0.033	0.026	0.015	0.027	<0.01 J
Beryllium	mg/L	0.004	<0.001 J	0.0012	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001 J
Cadmium	mg/L	0.005	0.0012	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	mg/L	0.1	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J	<0.002 J
Cobalt	mg/L	NA	0.0071	0.0097	0.0096	<0.0005J	0.0022	0.0024	0.0017	0.014
Lead	mg/L	0.015	<0.001	<0.001	<0.001 J	<0.001 J	<0.001	<0.001	<0.001	<0.001
Lithium	mg/L	NA	<0.05 J	0.17	0.072	0.076	0.16	0.23	0.14	0.32
Mercury	mg/L	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	NA	<0.005 J	<0.005 J	<0.005	<0.005	<0.005 J	<0.005	<0.005 J	<0.005
Selenium	mg/L	0.05	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thallium	mg/L	0.002	<0.001 J	<0.001 J	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Combined Radium	pCi/L	5	0.575	1.63	0.287	1.50	0.803	2.68	1.73	1.62

NA = Not Applicable

<x = Less than reporting limit (nondetectable)

J = Trace value seen above minimum detection limit but below reporting limit (trace)

7th Baseline Event –
June 2017 Sampling Event

Constituent	Units	MCL	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6	MW-6A	MW-7
Appendix III										
Boron	mg/L	NA	<0.08J	<0.08J	0.034	0.27	0.31	0.37	0.36	0.26
Calcium	mg/L	NA	42	100	300	89	200	260	160	470
Chloride	mg/L	NA	130	54	110	5.4	23	12	26	48
Fluoride	mg/L	4	0.43	0.19	0.18	0.35	0.42	0.3	0.42	0.21
pH	SU	NA	6.35	5.78	6.62	7.22	7.04	6.93	7.09	6.41
Sulfate	mg/L	NA	78	650	1400	180	940	1300	780	2400
Total Dissolved Solids	mg/L	NA	450	950	2000	610	1600	1800	1400	2900
Appendix IV										
Antimony	mg/L	0.006	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Arsenic	mg/L	0.01	<0.001J	0.1	0.0032	<0.001J	0.0037	<0.001	0.0018	<0.001
Barium	mg/L	2	0.03	0.016	0.048	0.04	0.026	0.017	0.025	<0.01J
Beryllium	mg/L	0.004	<0.001	0.0031	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.005	<0.001J	<0.001	<0.001J	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	mg/L	0.1	<0.002	<0.002	<0.002J	<0.002	<0.002	<0.002	<0.002	<0.002
Cobalt	mg/L	NA	0.004	0.0088	0.0042	<0.0005J	0.0045	0.00087	0.0059	0.0015
Lead	mg/L	0.015	0.0033	0.001	0.0074	<0.001	<0.001	<0.001	<0.001	<0.001
Lithium	mg/L	NA	<0.05J	0.18	0.053	0.085	0.18	0.25	0.15	0.34
Mercury	mg/L	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	NA	<0.005	<0.005J	<0.005	<0.005	<0.005J	<0.005	<0.005J	<0.005
Selenium	mg/L	0.05	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thallium	mg/L	0.002	<0.001	<0.001	<0.001J	<0.001	<0.001	<0.001	<0.001	<0.001
Combined Radium	pCi/L	5	<0.397J	<0.337J	<0.403	<0.291J	<0.343J	<0.414J	<0.33J	<0.314J

NA = Not Applicable

<x = Less than reporting limit (nondetectable)

J = Trace value seen above minimum detection limit but below reporting limit (trace)

8th Baseline Event –
August 2017 Sampling Event

Constituent	Units	MCL	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6	MW-6A	MW-7
Appendix III										
Boron	mg/L	NA	0.16	<0.08J	<0.08J	0.28	0.33	0.34	0.38	0.27
Calcium	mg/L	NA	43	98	83	57	220	250	180	510
Chloride	mg/L	NA	130	45	8.1	5.3	23	12	26	38
Fluoride	mg/L	4	0.26	0.17	0.32	0.27	0.45	0.25	0.4	0.22
pH	SU	NA	6.2	5.7	6.7	7.3	7.0	7.2	7.1	6.3
Sulfate	mg/L	NA	82	550	63	140	920	1100	730	2200
Total Dissolved Solids	mg/L	NA	450	960	450	530	1600	1800	1400	2900
Appendix IV										
Antimony	mg/L	0.006	<0.002J	<0.002J	<0.002J	<0.002J	<0.002J	<0.002J	<0.002J	<0.002
Arsenic	mg/L	0.01	<0.001J	0.013	<0.001J	0.002	<0.001J	<0.001J	<0.001J	<0.001J
Barium	mg/L	2	0.024	0.01	0.018	0.027	0.023	0.018	0.021	<0.01J
Beryllium	mg/L	0.004	<0.001	<0.001J	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001J
Cadmium	mg/L	0.005	<0.001J	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	mg/L	0.1	<0.002J	<0.002	0.0026	<0.002	<0.002	<0.002	<0.002	<0.002
Cobalt	mg/L	NA	0.0036	0.01	0.00067	<0.0005J	0.0023	<0.0005J	0.0051	0.014
Lead	mg/L	0.015	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lithium	mg/L	NA	<0.05J	0.17	<0.05J	0.073	0.18	0.22	0.15	0.32
Mercury	mg/L	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	NA	<0.005	<0.005J	<0.005	<0.005J	<0.005J	<0.005J	<0.005J	<0.005
Selenium	mg/L	0.05	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thallium	mg/L	0.002	<0.001J	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Combined Radium	pCi/L	5	<0.42J	<0.417J	<0.473	<0.476J	<0.383J	<0.389J	<0.291J	<0.346J

NA = Not Applicable

<x = Less than reporting limit (nondetectable)

J = Trace value seen above minimum detection limit but below reporting limit (trace)

APPENDIX 3

Monitoring Well Field Inspection Sheets and Field Notes

Field Sampling Log

Facility: Asbury CCR (Permit #) Monitoring Well ID: MW- 2

Sample [X] Blind Duplicate [ ] Field Blank [ ]

Purge Information:

Method of Well Purge: **Peristaltic Pump with 3/8 - inch Diameter Tubing**

Actual Purge Volume Removed: mL post pump calibration.

Date / Time Initiated: 11 – 5 -19 @ 9:04 Date / Time Completed: 11 – -19 @

Well Purged To Dryness?: Y (N) Petroleum or Gas Detected? Y (N)

Purge Data:

Time	Purge Rate (mL/min)	Cumulative Volume (mL)	Temp. (°C)	pH (SU)	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP (MV)		Other (Color, Clarity, Odor)
9:08	200		15.74	9.58	0.787	2.08	44.2		Clear
:10	↓		15.75	9.73	0.785	1.23	41.8		↓
:12			15.78	9.76	0.786	0.84	39.4		
:14			15.83	9.77	0.787	0.72	38.1		
:16	↓		15.87	9.76	0.789	0.64	36.3		↓

Time sampled 9:20

Weather Conditions Sunny, 50°F

Water Level Start 2.13'

Water Level Finish 3.77'

Name (MEC Field Sampler): Ryan Ortbals and Rick Elgin

Sampler Signature

Field Inspection	Good	Fair	Poor	
Access	(G)	F	P	
Pad Condition	(G)	F	P	Broken Lid
Casing Condition	G	(F)	P	
Locking Cap & Lock	G	(F)	P	No Lock
Riser Condition	G	(F)	P	

Field Inspection	Yes	No	N/A
Well ID Visible	(Y)	N	N/A
Standing Water	Y	(N)	N/A
Clear of Weeds	(Y)	N	N/A
Measuring Point	(Y)	N	N/A
Split sample with MDNR	Y	(N)	N/A
Maintenance Performed	Y	(N)	N/A
Decontamination Normal	(Y)	N	N/A
Equipment Calibration Normal	Y	(N)	N/A
Redevelopment Needed	Y	(N)	N/A
Any deviations from SAP	Y	(N)	N/A
Sediment Thickness Checked	Y	(N)	N/A

Historical Data: Average of sampling events

pH meter reading high

Constituent	Units	MW- 1	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6
pH	S.U.	NO TEST	5.83	5.08	6.30	6.83	6.82	6.72
Specific Conductance	umhos/cm	GW	0.786	1.132	2.083	0.841	1.769	1.900
Total Well Depth	ft	Level						
Average GW Depth	ft	Only	1.24	0.4	5.39	1.32	6.92	7.86
Average GW Drop	ft							
2 System Volumes (Min Purged Amount)	mL	DON'T SAMPLE	800	800	800	800	800	800

Lab test- Meter
7.95 → 7.92

Field Sampling Log

Facility: Asbury CCR (Permit #) Monitoring Well ID: MW-3

Sample [X] Blind Duplicate [ ] Field Blank [ ]

Purge Information:

Method of Well Purge: **Peristaltic Pump with 3/8 - inch Diameter Tubing**

Actual Purge Volume Removed: mL post pump calibration.

Date / Time Initiated: 11 – 5 -19 @ 10:35 Date / Time Completed: 11 – -19 @

Well Purged To Dryness?: Y (N) Petroleum or Gas Detected? Y (N)

Purge Data: 2nd pH

Time	Purge Rate (mL/min)	Cumulative Volume (mL)	Temp. (°C)	pH (SU)	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP (MV)		Other (Color, Clarity, Odor)
10:40	200	6.04	14.56	9.36	1.145	1.15	80.3		Product/
:42		6.14	14.57	9.38	1.146	0.9	21.0		
:44		6.12	14.58	9.60	1.145	0.77	91.7		
:46		6.09	14.54	9.69	1.143	0.67	22.1		
:48	↓	6.04	14.56	13.22	1.140	0.54	23.4		clear

Time sampled 10:50

Weather Conditions Sunny 50°F

Water Level Start 0.0'

Water Level Finish 0.0'

Name (MEC Field Sampler): Ryan Ortbals and Rick Flein

Sampler Signature

Field Inspection	Good	Fair	Poor	
Access	(G)	F	P	
Pad Condition	(G)	F	P	Broken Lock
Casing Condition	G	(F)	P	
Locking Cap & Lock	G	(F)	P	No lock
Riser Condition	G	(F)	P	

Field Inspection	Yes	No	N/A
Well ID Visible	(Y)	N	N/A
Standing Water	Y	(N)	N/A
Clear of Weeds	(Y)	N	N/A
Measuring Point	(Y)	N	N/A
Split sample with MDNR	Y	(N)	N/A
Maintenance Performed	Y	(N)	N/A
Decontamination Normal	(Y)	N	N/A
Equipment Calibration Normal	(Y)	N	N/A
Redevelopment Needed	Y	(N)	N/A
Any deviations from SAP	Y	(N)	N/A
Sediment Thickness Checked	Y	(N)	N/A

Historical Data: Average of sampling events

Using second pH meter

Constituent	Units	MW-1	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6
pH	S.U.	NO TEST	5.83	5.08	6.30	6.83	6.82	6.72
Specific Conductance	umhos/cm	GW	0.786	1.132	2.083	0.841	1.769	1.900
Total Well Depth	ft	Level						
Average GW Depth	ft	Only	1.24	0.4	5.39	1.32	6.92	7.86
Average GW Drop	ft							
2 System Volumes (Min Purged Amount)	mL	DON'T SAMPLE	800	800	800	800	800	800

Field Sampling Log

Facility: Asbury CCR (Permit #) Monitoring Well ID: MW- 4

Sample [X] Blind Duplicate [ ] Field Blank [ ]

Purge Information:

Method of Well Purge: **Peristaltic Pump with 3/8 - inch Diameter Tubing**

Actual Purge Volume Removed: mL post pump calibration.

Date / Time Initiated: 11 – 5 -19 @ 9:34 Date / Time Completed: 11 – -19 @

Well Purged To Dryness?: Y (N) Petroleum or Gas Detected? Y (N)

Purge Data:

Time	Purge Rate (mL/min)	Cumulative Volume (mL)	Temp. (°C)	pH (SU)	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP (MV)		Other (Color, Clarity, Odor)
9:39	200		15.38	13.30	1.028	1.01	-8.3		Clear
:41			15.47	12.18	1.027	0.87	-7.5		
:43			15.58	11.87	1.028	0.70	-5.4		
:45			15.74	11.45	1.031	0.56	-3.9		
:47			15.64	11.28	1.028	0.53	-5.2		

Time sampled 9:50

Weather Conditions Sunny, 45°F

Water Level Start 5.04'

Water Level Finish 9.65'

Name (MEC Field Sampler): Ryan Ortbals and Rick Elgin

Sampler Signature

Field Inspection	Good	Fair	Poor	
Access	(G)	F	P	
Pad Condition	(G)	F	P	
Casing Condition	(G)	F	P	
Locking Cap & Lock	(G)	F	P	No Lock
Riser Condition	(G)	F	P	

Field Inspection	Yes	No	N/A
Well ID Visible	(Y)	N	N/A
Standing Water	Y	(N)	N/A
Clear of Weeds	(Y)	N	N/A
Measuring Point	(Y)	N	N/A
Split sample with MDNR	Y	(N)	N/A
Maintenance Performed	Y	(N)	N/A
Decontamination Normal	(Y)	N	N/A
Equipment Calibration Normal	Y	(N)	N/A
Redevelopment Needed	Y	(N)	N/A
Any deviations from SAP	Y	(N)	N/A
Sediment Thickness Checked	Y	(N)	N/A

pH reading not calibrated

Historical Data: Average of sampling events

Constituent	Units	MW- 1	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6
pH	S.U.	NO TEST	5.83	5.08	6.30	6.83	6.82	6.72
Specific Conductance	umhos/cm	GW	0.786	1.132	2.083	0.841	1.769	1.900
Total Well Depth	ft	Level						
Average GW Depth	ft	Only	1.24	0.4	5.39	1.32	6.92	7.86
Average GW Drop	ft							
2 System Volumes (Min Purged Amount)	mL	DON'T SAMPLE	800	800	800	800	800	800

417-626-5970

Field Sampling Log

Facility: Asbury CCR (Permit # 1

Monitoring Well ID: MW- [illegible]

Sample [X] Blind Duplicate [ ] Field Blank [ ]

Purge Information:

Method of Well Purge: **Peristaltic Pump with 3/8 - inch Diameter Tubing**

Actual Purge Volume Removed: ______ mL post pump calibration

Date / Time Initiated: 11 – 5 -19 @ [illegible] Date / Time Completed: 11 – 5 -19 @

Well Purged To Dryness?: Y (N) Petroleum or Gas Detected? Y (N)

Purge Data:

Time	Purge Rate (mL/min)	Cumulative Volume (mL)	Temp. (°C)	pH (SU)	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP (MV)		Other (Color, Clarity, Odor)
5:10	200		13.65	10.05	0.879	1.27	30.5		Clear
:12	↓		13.34	10.42	0.573	1.06	30.0		↓
:14			13.35	10.73	0.873	0.55	26.7		
:16			13.55	10.81	0.873	0.79	23.9		
:18	↓		13.65	10.90	0.573	0.64	20.9		↓

Time sampled 5:20

Weather Conditions sunny, [illegible] °F

Water Level Start [illegible]

Water Level Finish 4.85

Name (MEC Field Sampler): Ryan Ortbals and Rick Elgin

Sampler Signature [signature]

Field Inspection	Good	Fair	Poor
Access	(G)	F	P
Pad Condition	(G)	F	P
Casing Condition	(G)	F	P
Locking Cap & Lock	(G)	F	P [illegible]
Riser Condition	(G)	F	P

Field Inspection	Yes	No	N/A
Well ID Visible	(Y)	N	N/A
Standing Water	Y	(N)	N/A
Clear of Weeds	(Y)	N	N/A
Measuring Point	(Y)	N	N/A
Split sample with MDNR	Y	(N)	N/A
Maintenance Performed	Y	(N)	N/A
Decontamination Normal	(Y)	N	N/A
Equipment Calibration Normal	Y	(N)	N/A
Redevelopment Needed	Y	(N)	N/A
Any deviations from SAP	Y	(N)	N/A
Sediment Thickness Checked	Y	(N)	N/A

Calibrated meter, pH still reading high

Historical Data: Average of sampling events

Constituent	Units	MW- 1	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6
pH	S.U.	**NO TEST**	5.83	5.08	6.30	6.83	6.82	6.72
Specific Conductance	umhos/cm	**GW**	0.786	1.132	2.083	0.841	1.769	1.900
Total Well Depth	ft	**Level**						
Average GW Depth	ft	**Only**	1.24	8.4	5.39	1.32	6.92	7.86
Average GW Drop	ft							
2 System Volumes (Min Purged Amount)	mL	**DON'T SAMPLE**	800	800	800	800	800	800

Field Sampling Log

Facility: Asbury CCR (Permit #) Monitoring Well ID: MW- 5A

Sample [X] Blind Duplicate [ ] Field Blank [X]

Purge Information:

Method of Well Purge: **Peristaltic Pump with 3/8 - inch Diameter Tubing**

Actual Purge Volume Removed: mL post pump calibration

Date / Time Initiated: 11 - 4 -19 @ 3:54 Date / Time Completed: 11 - 4 -19 @

Well Purged To Dryness?: Y / N Petroleum or Gas Detected? Y / N

Purge Data:

Time	Purge Rate (mL/min)	Cumulative Volume (mL)	Temp. (°C)	pH (SU)	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP (MV)		Other (Color, Clarity, Odor)
3:59	200		15.50	13.47	3.671	2.11	13.3		clear
4:54			15.53	13.67	2.663	1.57	11.7		
4:01			15.46	13.67	2.665	1.04	11.0		
4:03			15.36	13.65	2.654	0.84	10.2		
4:04	↓		15.31	13.69	2.650	0.76	10.1		↓

Time sampled 4:10 / 4:15

Weather Conditions Cloudy, 55°F

Water Level Start 7.55'

Water Level Finish 14.44'

Name (MEC Field Sampler): Ryan Ortbals and Rick Elgin

Sampler Signature

Field Inspection	Good	Fair	Poor
Access	G	F	P
Pad Condition	G	F	P
Casing Condition	G	F	P
Locking Cap & Lock	G	F	P N/A Lock
Riser Condition	G	F	P

Field Inspection	Yes	No	N/A
Well ID Visible	Y	N	N/A
Standing Water	Y	N	N/A
Clear of Weeds	Y	N	N/A
Measuring Point	Y	N	N/A
Split sample with MDNR	Y	N	N/A
Maintenance Performed	Y	N	N/A
Decontamination Normal	Y	N	N/A
Equipment Calibration Normal	Y	N	N/A
Redevelopment Needed	Y	N	N/A
Any deviations from SAP	Y	N	N/A
Sediment Thickness Checked	Y	N	N/A

Historical Data: Average of sampling events

pH probe not calibrated

Constituent	Units	MW-1	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6
pH	S.U.	NO TEST	5.83	5.08	6.30	6.83	6.82	6.72
Specific Conductance	umhos/cm	GW	0.786	1.132	2.083	0.841	1.769	1.900
Total Well Depth	ft	Level						
Average GW Depth	ft	Only	1.24	0.4	5.39	1.32	6.92	7.86
Average GW Drop	ft							
2 System Volumes (Min Purged Amount)	mL	DON'T SAMPLE	800	800	800	800	800	800

Field Sampling Log

Facility: Asbury CCR (Permit #) Monitoring Well ID: MW- 6

Sample [X] Blind Duplicate [ ] Field Blank [ ]

Purge Information:

Method of Well Purge: **Peristaltic Pump with 3/8 - inch Diameter Tubing**

Actual Purge Volume Removed: mL post pump calibration.

Date / Time Initiated: 11- 4 -19 @ 3:25 Date / Time Completed: 11- 4 -19 @ 3:44

Well Purged To Dryness?: Y / N Petroleum or Gas Detected? Y / N

Purge Data:

Time	Purge Rate (mL/min)	Cumulative Volume (mL)	Temp. (°C)	pH (SU)	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP (MV)		Other (Color, Clarity, Odor)
3:31	200		13.42	13.65	2051	1.29	17.7		clear
:33			15.55	13.68	2.046	0.96	17.3		
:35			15.69	13.66	2.041	0.70	16.3		
:37			15.71	13.67	2.037	0.58	14.4		
:39			15.78	13.66	2.034	0.54	14.3		

Time sampled 3:40

Weather Conditions Sunny, 55°F

Water Level Start 7.30'

Water Level Finish 13.02

Name (MEC Field Sampler): Ryan Ortbals and Rick Elgin

Sampler Signature

Field Inspection	Good	Fair	Poor
Access	G	F	P
Pad Condition	G	F	P
Casing Condition	G	F	P
Locking Cap & Lock	G	F	P No lock
Riser Condition	G	F	P

Field Inspection	Yes	No	N/A
Well ID Visible	Y	N	N/A
Standing Water	Y	N	N/A
Clear of Weeds	Y	N	N/A
Measuring Point	Y	N	N/A
Split sample with MDNR	Y	N	N/A
Maintenance Performed	Y	N	N/A
Decontamination Normal	Y	N	N/A
Equipment Calibration Normal	Y	N	N/A
Redevelopment Needed	Y	N	N/A
Any deviations from SAP	Y	N	N/A
Sediment Thickness Checked	Y	N	N/A

pH probe not calibrated

Historical Data: Average of sampling events

Constituent	Units	MW-1	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6
pH	S.U.	NO TEST	5.83	5.08	6.30	6.83	6.82	6.72
Specific Conductance	umhos/cm	GW	0.786	1.132	2.083	0.841	1.769	1.900
Total Well Depth	ft	Level						
Average GW Depth	ft	Only	1.24	0.4	5.39	1.32	6.92	7.86
Average GW Drop	ft							
2 System Volumes (Min Purged Amount)	mL	DON'T SAMPLE	800	800	800	800	800	800

Field Sampling Log

Facility: Asbury CCR (Permit #) Monitoring Well ID: MW- 6A

Sample [X] Blind Duplicate [ ] Field Blank [ ]

Purge Information:

Method of Well Purge: **Peristaltic Pump with 3/8 - inch Diameter Tubing**

Actual Purge Volume Removed: mL post pump calibration

Date / Time Initiated: 11 - 4 -19 @ 3:00 Date / Time Completed: 11 - 4 -19 @ 3:17

Well Purged To Dryness?: Y / N Petroleum or Gas Detected? Y / N

Purge Data:

Time	Purge Rate (mL/min)	Cumulative Volume (ml)	Temp. (°C)	pH (SU)	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP (MV)		Other (Color, Clarity, Odor)
3:00	200		16.39	13.76	1.420	0.91	30.3		Clear
:06			16.40	13.71	1.514	0.58	31.4		
:08			16.40	13.71	1.500	0.51	30.9		
:10			16.39	13.72	1.501	0.44	29.5		
:12	"		16.41	13.69	1.500	0.44	25.1		"

Time sampled 3:15

Weather Conditions Sunny, 60°F

Water Level Start 6.67

Water Level Finish 13.42

Name (MEC Field Sampler): Ryan Ortbals and Rick Elgin

Sampler Signature

Field Inspection	Good	Fair	Poor
Access	G	F	P
Pad Condition	G	F	P
Casing Condition	G	F	P
Locking Cap & Lock	G	F	P N. Lock
Riser Condition	G	F	P

Field Inspection	Yes	No	N/A
Well ID Visible	Y	N	N/A
Standing Water	Y	N	N/A
Clear of Weeds	Y	N	N/A
Measuring Point	Y	N	N/A
Split sample with MDNR	Y	N	N/A
Maintenance Performed	Y	N	N/A
Decontamination Normal	Y	N	N/A
Equipment Calibration Normal	Y	N	N/A
Redevelopment Needed	Y	N	N/A
Any deviations from SAP	Y	N	N/A
Sediment Thickness Checked	Y	N	N/A

pH probe not calibrated

Historical Data: Average of sampling events for: 5/16 + 6/17

Constituent	Units	MW- 6A	MW-7					
pH	S.U.	6.87	6.12					
Specific Conductance	umhos/cm	1.601	2.699					
Total Well Depth	ft							
Average GW Depth	ft	7.28	3.04					
Average GW Drop	ft							
2 System Volumes (Min Purged Amount)	mL	800	800					

Field Sampling Log

Facility: Asbury CCR (Permit #) Monitoring Well ID: MW- 7

Sample [X] Blind Duplicate [X] Field Blank [ ]

Purge Information:

Method of Well Purge: **Peristaltic Pump with 3/8 - Inch Diameter Tubing**

Actual Purge Volume Removed: ml post pump calibration.

Date / Time Initiated: 11 – 4 -19 @ 2140 Date / Time Completed: 11 – 4 -19- @ 2152

Well Purged To Dryness?: Y / N Petroleum or Gas Detected? Y / N

Purge Data:

Time	Purge Rate (mL/min)	Cumulative Volume (ml)	Temp. (°C)	pH (SU)	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP (MV)		Other (Color, Clarity, Odor)
2:34	200		15.98	14.13	3.071	0.94	33.9		Clear
:36	↓		15.89	14.15	3.067	0.76	31.7		↓
:38			15.93	14.21	3.058	0.67	31.3		
:40			15.57	14.21	3.053	0.54	29.5		
:42	↓		15.77	14.14	3.045	0.50	28.1		↓

Field Inspection	Good	Fair	Poor
Access	G	F	P
Pad Condition	G	F	P
Casing Condition	G	F	P
Locking Cap & Lock	G	F	P No Lock
Riser Condition	G	F	P

Field Inspection	Yes	No	N/A
Well ID Visible	Y	N	N/A
Standing Water	Y	N	N/A
Clear of Weeds	Y	N	N/A
Measuring Point	Y	N	N/A
Split sample with MDNR	Y	N	N/A
Maintenance Performed	Y	N	N/A
Decontamination Normal	Y	N	N/A
Equipment Calibration Normal	Y	N	N/A
Redevelopment Needed	Y	N	N/A
Any deviations from SAP	Y	N	N/A
Sediment Thickness Checked	Y	N	N/A

Time sampled 2:45 / 2:50

Weather Conditions Sunny 50°F

Water Level Start 3.05'

Water Level Finish 3.31'

Name (MEC Field Sampler): Ryan Ortbals and Rick Elgin

Sampler Signature

Historical Data: Average of sampling events for: 5/16 + 6/17

Constituent	Units	MW- 6A	MW-7					
pH	S.U.	6.87	6.12					
Specific Conductance	umhos/cm	1.601	2.699					
Total Well Depth	ft							
Average GW Depth	ft	7.28	3.04					
Average GW Drop	ft							
2 System Volumes (Min Purged Amount)	mL	800	800					

MW-2	6.44
MW-4	7.38
MW-5	7.39
MW-5A	7.13
MW-6	7.16
MW-6A	7.24
MW-7	6.50

Re-Sampled

Field Sampling Log

Facility: Asbury CCR (Permit #)

Monitoring Well ID: MW-5A

Sample [X] Blind Duplicate [ ] Field Blank [ ]

Purge Information:

Method of Well Purge: **Peristaltic Pump with 3/8 - inch Diameter Tubing**

Actual Purge Volume Removed: ______ mL post pump calibration.

Date / Time Initiated: 12 - 11 -19 @ 9:12

Date / Time Completed: 12 - 11 -19 @ ______

Well Purged To Dryness?: Y / (N)

Petroleum or Gas Detected? Y / (N)

Purge Data:

Time	Purge Rate (mL/min)	Cumulative Volume (mL)	Temp. (°C)	pH (SU)	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP (MV)		Other (Color, Clarity, Odor)
9:15	200	600	14.08	6.84	2553	10.58	-13.3		Clear
17		1000	14.13	6.85	2554	6.88	-15.3		
19		1400	14.31	6.85	2556	5.28	-16.3		
21		1800	14.26	6.85	2528	4.51	-15.5		

Clock on meter

Time sampled 9:25

Weather Conditions Clear, breezy 30°F

Water Level Start 7.62

Water Level Finish 12.84

Name (MEC Field Sampler): Ryan Orthel and Rick Elgin

Sampler Signature [signature]

Field Inspection	Good	Fair	Poor
Access	(G)	F	P
Pad Condition	(G)	F	P
Casing Condition	(G)	F	P
Locking Cap & Lock	(G)	F	P
Riser Condition	(G)	F	P

Field Inspection	Yes	No	N/A
Well ID Visible	(Y)	N	N/A
Standing Water	(Y)	N	N/A
Clear of Weeds	(Y)	N	N/A
Measuring Point	(Y)	N	N/A
Split sample with MDNR	Y	(N)	N/A
Maintenance Performed	Y	(N)	N/A
Decontamination Normal	(Y)	N	N/A
Equipment Calibration Normal	(Y)	N	N/A
Redevelopment Needed	Y	(N)	N/A
Any deviations from SAP	Y	(N)	N/A
Sediment Thickness Checked	Y	(N)	N/A

Historical Data: Average of sampling events

Constituent	Units	MW-1	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6
pH	S.U.	**NO TEST**	5.83	5.08	6.30	6.83	6.82	6.72
Specific Conductance	umhos/cm	**GW**	0.786	1.132	2.083	0.841	1.769	1.900
Total Well Depth	ft	**Level**						
Average GW Depth	ft	**Only**	1.24	0.4	5.39	1.32	6.92	7.86
Average GW Drop	ft							
2 System Volumes (Min Purged Amount)	mL	**DON'T SAMPLE**	800	800	800	800	800	800

X

APPENDIX 4

Analytical Results from Lab

eurofins | Environment Testing TestAmerica

ANALYTICAL REPORT

Eurofins TestAmerica, Pittsburgh
301 Alpha Drive
RIDC Park
Pittsburgh, PA 15238
Tel: (412)963-7058

Laboratory Job ID: 180-98289-1
Client Project/Site: Asbury Ash Pond
Sampling Event: Asbury Ash Pond

For:
Midwest Environmental Consultants
2009 East McCarty Street
Suite 2
Jefferson City, Missouri 65101

Attn: Mr. Rick Elgin

CathyGartner

Authorized for release by:
12/3/2019 1:43:05 PM

Cathy Gartner, Project Manager II
(615)301-5041
cathy.gartner@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

PA Lab ID: 02-00416

Table of Contents

Job ID: 180-98289-1

Laboratory: Eurofins TestAmerica, Pittsburgh

Narrative

Job Narrative
180-98289-1

Comments
No additional comments.

Receipt
The samples were received on 11/6/2019 9:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 1.4° C and 1.6° C.

GC Semi VOA
Method 9056A: The continuing calibration verification (CCV) associated with batch 180-298789 recovered above the upper control limit for Fluoride. The sample associated with this CCV was an estimated value (J) for the affected analyte; therefore, the data have been reported. The following samples are impacted: Dup (MW-7) (180-98289-1) and (CCV 180-298789/28).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Metals
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 180-98289-1

Qualifiers

HPLC/IC

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Metals

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

General Chemistry

Qualifier	Qualifier Description
HF	Field parameter with a holding time of 15 minutes. Test performed by laboratory at client's request.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Accreditation/Certification Summary

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 180-98289-1

Laboratory: Eurofins TestAmerica, Pittsburgh

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	06-27-20
California	State	2891	04-30-20
Connecticut	State	PH-0688	09-30-20
Florida	NELAP	E871008	06-30-20
Georgia	State	PA 02-00416	04-30-20
Illinois	NELAP	004375	06-30-20
Kansas	NELAP	E-10350	03-31-20
Kentucky (UST)	State	162013	04-30-20
Kentucky (WW)	State	KY98043	12-31-19
Louisiana	NELAP	04041	06-30-20
Minnesota	NELAP	042-999-482	12-31-19
Nevada	State	PA00164	07-31-20
New Hampshire	NELAP	2030	04-04-20
New Jersey	NELAP	PA005	06-30-20
New York	NELAP	11182	04-01-20
North Carolina (WW/SW)	State	434	12-31-19
North Dakota	State	R-227	04-30-20
Oregon	NELAP	PA-2151	02-06-20
Pennsylvania	NELAP	02-00416	04-30-20
Rhode Island	State	LAO00362	12-30-19
South Carolina	State	89014	04-30-20
Texas	NELAP	T104704528	03-31-20
US Fish & Wildlife	US Federal Programs	058448	07-31-20
USDA	Federal	P-Soil-01	06-26-22
USDA	US Federal Programs	P330-16-00211	06-26-22
Utah	NELAP	PA001462019-8	05-31-20
Virginia	NELAP	10043	09-15-20
West Virginia DEP	State	142	01-31-20
Wisconsin	State	998027800	08-31-20

Laboratory: Eurofins TestAmerica, Nashville

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
A2LA	ISO/IEC 17025	0453.07	12-31-19
Arizona	State Program	AZ0473	05-05-14 *
Georgia	State Program	NA: NELAP & A2LA	12-31-19

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Sample Summary

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 180-98289-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
180-98289-1	Dup (MW-7)	Water	11/04/19 02:50	11/06/19 09:00	
180-98289-2	Blank	Water	11/04/19 04:15	11/06/19 09:00	
180-98289-3	MW-2	Water	11/05/19 09:20	11/06/19 09:00	
180-98289-4	MW-3	Water	11/05/19 10:50	11/06/19 09:00	
180-98289-5	MW-4	Water	11/05/19 08:50	11/06/19 09:00	
180-98289-6	MW-5	Water	11/05/19 08:20	11/06/19 09:00	
180-98289-7	MW-5A	Water	11/04/19 04:10	11/06/19 09:00	
180-98289-8	MW-6	Water	11/04/19 03:40	11/06/19 09:00	
180-98289-9	MW-6A	Water	11/04/19 03:15	11/06/19 09:00	
180-98289-10	MW-7	Water	11/04/19 02:44	11/06/19 09:00	

Method Summary

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 180-98289-1

Method	Method Description	Protocol	Laboratory
EPA 9056A	Anions, Ion Chromatography	SW846	TAL PIT
EPA 6020A	Metals (ICP/MS)	SW846	TAL PIT
EPA 9040C	pH	SW846	TAL PIT
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL PIT
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL PIT

Protocol References:

SM = "Standard Methods For The Examination Of Water And Wastewater"

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

Client Sample ID: Dup (MW-7)

Lab Sample ID: 180-98289-1

Date Collected: 11/04/19 02:50

Matrix: Water

Date Received: 11/06/19 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		5			296789	11/20/19 10:32	MJH	TAL PIT
	Instrument ID: CHICS2000									
Total/NA	Analysis	EPA 9056A		50			296789	11/20/19 10:47	MJH	TAL PIT
	Instrument ID: CHICS2000									
Total Recoverable	Prep	3005A			50 mL	50 mL	296110	11/13/19 13:02	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			296441	11/15/19 17:27	RSK	TAL PIT
	Instrument ID: A									
Total/NA	Analysis	EPA 9040C		1			296554	11/18/19 16:35	PM	TAL PIT
	Instrument ID: NOEQUIP									
Total/NA	Analysis	SM 2540C		1	50 mL	100 mL	297407	11/07/19 10:21	AVS	TAL PIT
	Instrument ID: NOEQUIP									

Client Sample ID: Blank

Lab Sample ID: 180-98289-2

Date Collected: 11/04/19 04:15

Matrix: Water

Date Received: 11/06/19 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		1			299245	11/23/19 16:34	MJH	TAL PIT
	Instrument ID: CHICS2000									
Total Recoverable	Prep	3005A			50 mL	50 mL	296110	11/13/19 13:02	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			296441	11/15/19 17:31	RSK	TAL PIT
	Instrument ID: A									
Total/NA	Analysis	EPA 9040C		1			296554	11/18/19 16:37	PM	TAL PIT
	Instrument ID: NOEQUIP									
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	297407	11/07/19 10:21	AVS	TAL PIT
	Instrument ID: NOEQUIP									

Client Sample ID: MW-2

Lab Sample ID: 180-98289-3

Date Collected: 11/05/19 09:20

Matrix: Water

Date Received: 11/06/19 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		1			296789	11/20/19 11:02	MJH	TAL PIT
	Instrument ID: CHICS2000									
Total/NA	Analysis	EPA 9056A		10			296789	11/20/19 11:17	MJH	TAL PIT
	Instrument ID: CHICS2000									
Total/NA	Analysis	EPA 9056A		1			299245	11/23/19 14:35	MJH	TAL PIT
	Instrument ID: CHICS2000									
Total Recoverable	Prep	3005A			50 mL	50 mL	296110	11/13/19 13:02	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			296441	11/15/19 17:34	RSK	TAL PIT
	Instrument ID: A									
Total/NA	Analysis	EPA 9040C		1			296554	11/18/19 16:39	PM	TAL PIT
	Instrument ID: NOEQUIP									
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	297411	11/07/19 10:40	AVS	TAL PIT
	Instrument ID: NOEQUIP									

Client Sample ID: MW-3

Lab Sample ID: 180-98289-4

Date Collected: 11/05/19 10:50

Matrix: Water

Date Received: 11/06/19 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		1			298789	11/20/19 11:32	MJH	TAL PIT
	Instrument ID: CHICS2000									
Total/NA	Analysis	EPA 9056A		10			298789	11/20/19 11:47	MJH	TAL PIT
	Instrument ID: CHICS2000									
Total/NA	Analysis	EPA 9056A		1			299245	11/23/19 14:50	MJH	TAL PIT
	Instrument ID: CHICS2000									
Total Recoverable	Prep	3005A			50 mL	50 mL	298110	11/13/19 13:02	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			298441	11/15/19 17:38	RSK	TAL PIT
	Instrument ID: A									
Total/NA	Analysis	EPA 9040C		1			298554	11/18/19 16:41	PM	TAL PIT
	Instrument ID: NOEQUIP									
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	297407	11/07/19 10:21	AVS	TAL PIT
	Instrument ID: NOEQUIP									

Client Sample ID: MW-4

Lab Sample ID: 180-98289-5

Date Collected: 11/05/19 08:50

Matrix: Water

Date Received: 11/06/19 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		1			298789	11/20/19 12:02	MJH	TAL PIT
	Instrument ID: CHICS2000									
Total/NA	Analysis	EPA 9056A		10			298789	11/20/19 12:17	MJH	TAL PIT
	Instrument ID: CHICS2000									
Total/NA	Analysis	EPA 9056A		1			299245	11/23/19 15:04	MJH	TAL PIT
	Instrument ID: CHICS2000									
Total Recoverable	Prep	3005A			50 mL	50 mL	298110	11/13/19 13:02	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			298441	11/15/19 17:48	RSK	TAL PIT
	Instrument ID: A									
Total/NA	Analysis	EPA 9040C		1			298554	11/18/19 16:43	PM	TAL PIT
	Instrument ID: NOEQUIP									
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	297411	11/07/19 10:40	AVS	TAL PIT
	Instrument ID: NOEQUIP									

Client Sample ID: MW-5

Lab Sample ID: 180-98289-6

Date Collected: 11/05/19 08:20

Matrix: Water

Date Received: 11/06/19 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		1			298789	11/20/19 12:32	MJH	TAL PIT
	Instrument ID: CHICS2000									
Total/NA	Analysis	EPA 9056A		10			298789	11/20/19 12:47	MJH	TAL PIT
	Instrument ID: CHICS2000									
Total/NA	Analysis	EPA 9056A		1			299245	11/23/19 15:19	MJH	TAL PIT
	Instrument ID: CHICS2000									

Client Sample ID: MW-5

Lab Sample ID: 180-98289-6

Date Collected: 11/05/19 08:20

Matrix: Water

Date Received: 11/06/19 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	297820	11/11/19 12:47	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			298441	11/15/19 15:04	RSK	TAL PIT
	Instrument ID: A									
Total/NA	Analysis	EPA 9040C		1			298554	11/18/19 16:45	PM	TAL PIT
	Instrument ID: NOEQUIP									
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	297411	11/07/19 10:40	AVS	TAL PIT
	Instrument ID: NOEQUIP									

Client Sample ID: MW-5A

Lab Sample ID: 180-98289-7

Date Collected: 11/04/19 04:10

Matrix: Water

Date Received: 11/06/19 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		5			299245	11/23/19 15:34	MJH	TAL PIT
	Instrument ID: CHICS2000									
Total/NA	Analysis	EPA 9056A		10			299961	12/02/19 11:08	MJH	TAL PIT
	Instrument ID: CHICS2100B									
Total Recoverable	Prep	3005A			50 mL	50 mL	297820	11/11/19 12:47	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			298441	11/15/19 15:21	RSK	TAL PIT
	Instrument ID: A									
Total/NA	Analysis	EPA 9040C		1			298554	11/18/19 16:46	PM	TAL PIT
	Instrument ID: NOEQUIP									
Total/NA	Analysis	SM 2540C		1	50 mL	100 mL	297407	11/07/19 10:21	AVS	TAL PIT
	Instrument ID: NOEQUIP									

Client Sample ID: MW-6

Lab Sample ID: 180-98289-8

Date Collected: 11/04/19 03:40

Matrix: Water

Date Received: 11/06/19 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		2.5			299245	11/23/19 16:04	MJH	TAL PIT
	Instrument ID: CHICS2000									
Total/NA	Analysis	EPA 9056A		25			299245	11/23/19 16:19	MJH	TAL PIT
	Instrument ID: CHICS2000									
Total Recoverable	Prep	3005A			50 mL	50 mL	297820	11/11/19 12:47	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			298441	11/15/19 15:24	RSK	TAL PIT
	Instrument ID: A									
Total/NA	Analysis	EPA 9040C		1			298554	11/18/19 16:48	PM	TAL PIT
	Instrument ID: NOEQUIP									
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	297407	11/07/19 10:21	AVS	TAL PIT
	Instrument ID: NOEQUIP									

Lab Chronicle

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 180-98289-1

Client Sample ID: MW-6A

Date Collected: 11/04/19 03:15
Date Received: 11/06/19 09:00

Lab Sample ID: 180-98289-9
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		2.5			299245	11/23/19 17:19	MJH	TAL PIT
	Instrument ID: CHICS2000									
Total/NA	Analysis	EPA 9056A		25			299245	11/23/19 17:34	MJH	TAL PIT
	Instrument ID: CHICS2000									
Total/NA	Analysis	EPA 9056A		1			299961	12/02/19 11:24	MJH	TAL PIT
	Instrument ID: CHICS2100B									
Total Recoverable	Prep	3005A			50 mL	50 mL	297820	11/11/19 12:47	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			298441	11/15/19 15:27	RSK	TAL PIT
	Instrument ID: A									
Total/NA	Analysis	EPA 9040C		1			298554	11/18/19 16:52	PM	TAL PIT
	Instrument ID: NOEQUIP									
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	297407	11/07/19 10:21	AVS	TAL PIT
	Instrument ID: NOEQUIP									

Client Sample ID: MW-7

Date Collected: 11/04/19 02:44
Date Received: 11/06/19 09:00

Lab Sample ID: 180-98289-10
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		2.5			299961	12/02/19 11:40	MJH	TAL PIT
	Instrument ID: CHICS2100B									
Total/NA	Analysis	EPA 9056A		25			299961	12/02/19 11:56	MJH	TAL PIT
	Instrument ID: CHICS2100B									
Total Recoverable	Prep	3005A			50 mL	50 mL	297820	11/11/19 12:47	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			298441	11/15/19 15:37	RSK	TAL PIT
	Instrument ID: A									
Total/NA	Analysis	EPA 9040C		1			298554	11/18/19 16:56	PM	TAL PIT
	Instrument ID: NOEQUIP									
Total/NA	Analysis	SM 2540C		1	50 mL	100 mL	297407	11/07/19 10:21	AVS	TAL PIT
	Instrument ID: NOEQUIP									

Laboratory References:
TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

Analyst References:
Lab: TAL PIT
Batch Type: Prep
JL = James Lyu
Batch Type: Analysis
AVS = Abbey Smith
MJH = Matthew Hartman
PM = Paloma Hoelzle
RSK = Robert Kurtz

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 180-98289-1

Client Sample ID: Dup (MW-7)

Lab Sample ID: 180-98289-1

Date Collected: 11/04/19 02:50
Date Received: 11/06/19 09:00

Matrix: Water

Method: EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	40		5.0	1.6	mg/L			11/20/19 10:32	5
Fluoride	0.19	J	0.50	0.13	mg/L			11/20/19 10:32	5
Sulfate	1700		50	19	mg/L			11/20/19 10:47	50

Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	450		0.50	0.13	mg/L		11/13/19 13:02	11/15/19 17:27	1
Boron	0.25		0.080	0.039	mg/L		11/13/19 13:02	11/15/19 17:27	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	2700		20	20	mg/L			11/07/19 10:21	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	6.6	HF	0.1	0.1	SU			11/18/19 16:35	1

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 180-98289-1

Client Sample ID: Blank

Lab Sample ID: 180-98289-2

Date Collected: 11/04/19 04:15
Date Received: 11/06/19 09:00

Matrix: Water

Method: EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	0.32	J	1.0	0.32	mg/L			11/23/19 16:34	1
Fluoride	0.077	J	0.10	0.026	mg/L			11/23/19 16:34	1
Sulfate	ND		1.0	0.38	mg/L			11/23/19 16:34	1

Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	ND		0.50	0.13	mg/L		11/13/19 13:02	11/15/19 17:31	1
Boron	0.046	J	0.080	0.039	mg/L		11/13/19 13:02	11/15/19 17:31	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		10	10	mg/L			11/07/19 10:21	1
Analyte	**Result**	**Qualifier**	**RL**	**RL**	**Unit**	**D**	**Prepared**	**Analyzed**	**Dil Fac**
pH	5.3	HF	0.1	0.1	SU			11/18/19 16:37	1

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 180-98289-1

Client Sample ID: MW-2

Lab Sample ID: 180-98289-3

Date Collected: 11/05/19 09:20
Date Received: 11/06/19 09:00

Matrix: Water

Method: EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	120		10	3.2	mg/L			11/20/19 11:17	10
Fluoride	0.28		0.10	0.026	mg/L			11/23/19 14:35	1
Sulfate	62		1.0	0.38	mg/L			11/20/19 11:02	1

Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	37		0.50	0.13	mg/L		11/13/19 13:02	11/15/19 17:34	1
Boron	0.15		0.080	0.039	mg/L		11/13/19 13:02	11/15/19 17:34	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	380		10	10	mg/L			11/07/19 10:40	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	6.6	HF	0.1	0.1	SU			11/18/19 16:39	1

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 180-98289-1

Client Sample ID: MW-3

Lab Sample ID: 180-98289-4

Date Collected: 11/05/19 10:50
Date Received: 11/06/19 09:00

Matrix: Water

Method: EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	60		1.0	0.32	mg/L			11/20/19 11:32	1
Fluoride	0.13		0.10	0.026	mg/L			11/23/19 14:50	1
Sulfate	450		10	3.8	mg/L			11/20/19 11:47	10

Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	93		0.50	0.13	mg/L		11/13/19 13:02	11/15/19 17:38	1
Boron	0.064	J	0.080	0.039	mg/L		11/13/19 13:02	11/15/19 17:38	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	830		10	10	mg/L			11/07/19 10:21	1
Analyte	**Result**	**Qualifier**	**RL**	**RL**	**Unit**	**D**	**Prepared**	**Analyzed**	**Dil Fac**
pH	5.9	HF	0.1	0.1	SU			11/18/19 16:41	1

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 180-98289-1

Client Sample ID: MW-4

Lab Sample ID: 180-98289-5

Date Collected: 11/05/19 08:50
Date Received: 11/06/19 09:00

Matrix: Water

Method: EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	20		1.0	0.32	mg/L			11/20/19 12:02	1
Fluoride	0.23		0.10	0.026	mg/L			11/23/19 15:04	1
Sulfate	160		10	3.8	mg/L			11/20/19 12:17	10

Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	110		0.50	0.13	mg/L		11/13/19 13:02	11/15/19 17:48	1
Boron	0.042	J	0.080	0.039	mg/L		11/13/19 13:02	11/15/19 17:48	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	670		10	10	mg/L			11/07/19 10:40	1
Analyte	**Result**	**Qualifier**	**RL**	**RL**	**Unit**	**D**	**Prepared**	**Analyzed**	**Dil Fac**
pH	7.6	HF	0.1	0.1	SU			11/18/19 16:43	1

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 180-98289-1

Client Sample ID: MW-5

Lab Sample ID: 180-98289-6

Date Collected: 11/05/19 08:20
Date Received: 11/06/19 09:00

Matrix: Water

Method: EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	3.6		1.0	0.32	mg/L			11/20/19 12:32	1
Fluoride	0.25		0.10	0.026	mg/L			11/23/19 15:19	1
Sulfate	93		10	3.8	mg/L			11/20/19 12:47	10

Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	90		0.50	0.13	mg/L		11/11/19 12:47	11/15/19 15:04	1
Boron	0.22		0.080	0.039	mg/L		11/11/19 12:47	11/15/19 15:04	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	540		10	10	mg/L			11/07/19 10:40	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.5	HF	0.1	0.1	SU			11/18/19 16:45	1

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 180-98289-1

Client Sample ID: MW-5A

Lab Sample ID: 180-98289-7

Date Collected: 11/04/19 04:10
Date Received: 11/06/19 09:00

Matrix: Water

Method: EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	69		5.0	1.6	mg/L			11/23/19 15:34	5
Fluoride	0.32	J	0.50	0.13	mg/L			11/23/19 15:34	5
Sulfate	1200		10	3.8	mg/L			12/02/19 11:08	10

Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	240		0.50	0.13	mg/L		11/11/19 12:47	11/15/19 15:21	1
Boron	0.82		0.080	0.039	mg/L		11/11/19 12:47	11/15/19 15:21	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	2000		20	20	mg/L			11/07/19 10:21	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.2	HF	0.1	0.1	SU			11/18/19 16:46	1

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 180-98289-1

Client Sample ID: MW-6

Lab Sample ID: 180-98289-8

Date Collected: 11/04/19 03:40
Date Received: 11/06/19 09:00

Matrix: Water

Method: EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	10		2.5	0.80	mg/L			11/23/19 16:04	2.5
Fluoride	0.22	J	0.25	0.066	mg/L			11/23/19 16:04	2.5
Sulfate	940		25	9.5	mg/L			11/23/19 16:19	25

Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	240		0.50	0.13	mg/L		11/11/19 12:47	11/15/19 15:24	1
Boron	0.34		0.080	0.039	mg/L		11/11/19 12:47	11/15/19 15:24	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	1800		10	10	mg/L			11/07/19 10:21	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.3	HF	0.1	0.1	SU			11/18/19 16:48	1

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 180-98289-1

Client Sample ID: MW-6A

Lab Sample ID: 180-98289-9

Date Collected: 11/04/19 03:15
Date Received: 11/06/19 09:00

Matrix: Water

Method: EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	16		2.5	0.80	mg/L			11/23/19 17:19	2.5
Fluoride	0.23		0.10	0.026	mg/L			12/02/19 11:24	1
Sulfate	710		25	9.5	mg/L			11/23/19 17:34	25

Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	160		0.50	0.13	mg/L		11/11/19 12:47	11/15/19 15:27	1
Boron	0.40		0.080	0.039	mg/L		11/11/19 12:47	11/15/19 15:27	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	1400		10	10	mg/L			11/07/19 10:21	1
Analyte	**Result**	**Qualifier**	**RL**	**RL**	**Unit**	**D**	**Prepared**	**Analyzed**	**Dil Fac**
pH	7.4	HF	0.1	0.1	SU			11/18/19 16:52	1

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 180-98289-1

Client Sample ID: MW-7

Lab Sample ID: 180-98289-10

Date Collected: 11/04/19 02:44

Matrix: Water

Date Received: 11/06/19 09:00

Method: EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	42		2.5	0.80	mg/L			12/02/19 11:40	2.5
Fluoride	0.16	J	0.25	0.066	mg/L			12/02/19 11:40	2.5
Sulfate	1800		25	9.5	mg/L			12/02/19 11:56	25

Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	450		0.50	0.13	mg/L		11/11/19 12:47	11/15/19 15:37	1
Boron	0.24		0.080	0.039	mg/L		11/11/19 12:47	11/15/19 15:37	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	2800		20	20	mg/L			11/07/19 10:21	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	6.6	HF	0.1	0.1	SU			11/18/19 16:56	1

Method: EPA 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 180-298789/6
Matrix: Water
Analysis Batch: 298789

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		1.0	0.32	mg/L			11/20/19 05:34	1
Fluoride	ND		0.10	0.026	mg/L			11/20/19 05:34	1
Sulfate	ND		1.0	0.38	mg/L			11/20/19 05:34	1

Lab Sample ID: LCS 180-298789/5
Matrix: Water
Analysis Batch: 298789

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	25.0	26.6		mg/L		107	80 - 120
Fluoride	1.25	1.14		mg/L		91	80 - 120
Sulfate	25.0	21.3		mg/L		85	80 - 120

Lab Sample ID: MB 180-299245/6
Matrix: Water
Analysis Batch: 299245

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		1.0	0.32	mg/L			11/23/19 10:34	1
Fluoride	ND		0.10	0.026	mg/L			11/23/19 10:34	1
Sulfate	ND		1.0	0.38	mg/L			11/23/19 10:34	1

Lab Sample ID: LCS 180-299245/5
Matrix: Water
Analysis Batch: 299245

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	51.8		mg/L		104	80 - 120
Fluoride	2.50	2.36		mg/L		94	80 - 120
Sulfate	50.0	47.1		mg/L		94	80 - 120

Lab Sample ID: MB 180-299961/6
Matrix: Water
Analysis Batch: 299961

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		1.0	0.32	mg/L			12/02/19 04:25	1
Fluoride	ND		0.10	0.026	mg/L			12/02/19 04:25	1
Sulfate	ND		1.0	0.38	mg/L			12/02/19 04:25	1

Lab Sample ID: LCS 180-299961/5
Matrix: Water
Analysis Batch: 299961

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	53.8		mg/L		108	80 - 120
Fluoride	2.50	2.65		mg/L		106	80 - 120
Sulfate	50.0	54.2		mg/L		108	80 - 120

Method: EPA 9056A - Anions, Ion Chromatography (Continued)

Lab Sample ID: 180-98324-B-11 MS
Matrix: Water
Analysis Batch: 299961

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	7.2		25.0	32.0		mg/L		99	80 - 120
Fluoride	0.074	J	1.25	1.28		mg/L		97	80 - 120
Sulfate	66		25.0	93.0		mg/L		107	80 - 120

Lab Sample ID: 180-98324-B-11 MSD
Matrix: Water
Analysis Batch: 299961

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	7.2		25.0	32.1		mg/L		99	80 - 120	0	15
Fluoride	0.074	J	1.25	1.30		mg/L		98	80 - 120	1	15
Sulfate	66		25.0	93.4		mg/L		108	80 - 120	0	15

Method: EPA 6020A - Metals (ICP/MS)

Lab Sample ID: MB 180-297820/1-A
Matrix: Water
Analysis Batch: 298441

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 297820

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	ND		0.50	0.13	mg/L		11/11/19 12:47	11/15/19 14:34	1
Boron	ND		0.080	0.039	mg/L		11/11/19 12:47	11/15/19 14:34	1

Lab Sample ID: LCS 180-297820/2-A
Matrix: Water
Analysis Batch: 298441

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 297820

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Calcium	25.0	26.6		mg/L		106	80 - 120
Boron	1.25	1.19		mg/L		95	80 - 120

Lab Sample ID: 180-98289-6 MS
Matrix: Water
Analysis Batch: 298441

Client Sample ID: MW-5
Prep Type: Total Recoverable
Prep Batch: 297820

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Calcium	90		25.0	117		mg/L		110	75 - 125
Boron	0.22		1.25	1.43		mg/L		97	75 - 125

Lab Sample ID: 180-98289-6 MSD
Matrix: Water
Analysis Batch: 298441

Client Sample ID: MW-5
Prep Type: Total Recoverable
Prep Batch: 297820

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Calcium	90		25.0	117		mg/L		110	75 - 125	0	20
Boron	0.22		1.25	1.41		mg/L		95	75 - 125	1	20

Method: EPA 6020A - Metals (ICP/MS) (Continued)

Lab Sample ID: MB 180-298110/1-A
Matrix: Water
Analysis Batch: 298441

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 298110

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	ND		0.50	0.13	mg/L		11/13/19 13:02	11/15/19 16:07	1
Boron	ND		0.080	0.039	mg/L		11/13/19 13:02	11/15/19 16:07	1

Lab Sample ID: LCS 180-298110/2-A
Matrix: Water
Analysis Batch: 298441

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 298110

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Calcium	25.0	26.8		mg/L		107	80 - 120
Boron	1.25	1.16		mg/L		93	80 - 120

Lab Sample ID: 180-98385-B-2-C MS
Matrix: Water
Analysis Batch: 298441

Client Sample ID: Matrix Spike
Prep Type: Total Recoverable
Prep Batch: 298110

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Calcium	340		25.0	356	4	mg/L		67	75 - 125
Boron	1.1		1.25	2.31		mg/L		99	75 - 125

Lab Sample ID: 180-98385-B-2-D MSD
Matrix: Water
Analysis Batch: 298441

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total Recoverable
Prep Batch: 298110

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Calcium	340		25.0	365	4	mg/L		104	75 - 125	3	20
Boron	1.1		1.25	2.27		mg/L		96	75 - 125	1	20

Method: EPA 9040C - pH

Lab Sample ID: LCS 180-298554/1
Matrix: Water
Analysis Batch: 298554

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		100	99 - 101

Lab Sample ID: 180-98289-9 DU
Matrix: Water
Analysis Batch: 298554

Client Sample ID: MW-6A
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
pH	7.4	HF	7.4		SU		0.1	2

Lab Sample ID: 180-98808-D-1 DU
Matrix: Water
Analysis Batch: 298554

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
pH	7.6		7.6		SU		0.1	2

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 180-297407/2
Matrix: Water
Analysis Batch: 297407

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		10	10	mg/L			11/07/19 10:21	1

Lab Sample ID: LCS 180-297407/1
Matrix: Water
Analysis Batch: 297407

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Total Dissolved Solids			188	172		mg/L		91	80 - 120		

Lab Sample ID: 180-98262-A-3 DU
Matrix: Water
Analysis Batch: 297407

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Total Dissolved Solids	270			266		mg/L				1	10

Lab Sample ID: 180-98264-C-3 DU
Matrix: Water
Analysis Batch: 297407

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Total Dissolved Solids	370			363		mg/L				2	10

Lab Sample ID: MB 180-297411/2
Matrix: Water
Analysis Batch: 297411

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		10	10	mg/L			11/07/19 10:40	1

Lab Sample ID: LCS 180-297411/1
Matrix: Water
Analysis Batch: 297411

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Total Dissolved Solids			263	250		mg/L		95	80 - 120		

Lab Sample ID: 180-98289-6 DU
Matrix: Water
Analysis Batch: 297411

Client Sample ID: MW-5
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Total Dissolved Solids	540			531		mg/L				2	10

HPLC/IC

Analysis Batch: 298789

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-98289-1	Dup (MW-7)	Total/NA	Water	EPA 9056A	
180-98289-1	Dup (MW-7)	Total/NA	Water	EPA 9056A	
180-98289-3	MW-2	Total/NA	Water	EPA 9056A	
180-98289-3	MW-2	Total/NA	Water	EPA 9056A	
180-98289-4	MW-3	Total/NA	Water	EPA 9056A	
180-98289-4	MW-3	Total/NA	Water	EPA 9056A	
180-98289-5	MW-4	Total/NA	Water	EPA 9056A	
180-98289-5	MW-4	Total/NA	Water	EPA 9056A	
180-98289-6	MW-5	Total/NA	Water	EPA 9056A	
180-98289-6	MW-5	Total/NA	Water	EPA 9056A	
MB 180-298789/6	Method Blank	Total/NA	Water	EPA 9056A	
LCS 180-298789/5	Lab Control Sample	Total/NA	Water	EPA 9056A	

Analysis Batch: 299245

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-98289-2	Blank	Total/NA	Water	EPA 9056A	
180-98289-3	MW-2	Total/NA	Water	EPA 9056A	
180-98289-4	MW-3	Total/NA	Water	EPA 9056A	
180-98289-5	MW-4	Total/NA	Water	EPA 9056A	
180-98289-6	MW-5	Total/NA	Water	EPA 9056A	
180-98289-7	MW-5A	Total/NA	Water	EPA 9056A	
180-98289-8	MW-6	Total/NA	Water	EPA 9056A	
180-98289-8	MW-6	Total/NA	Water	EPA 9056A	
180-98289-9	MW-6A	Total/NA	Water	EPA 9056A	
180-98289-9	MW-6A	Total/NA	Water	EPA 9056A	
MB 180-299245/6	Method Blank	Total/NA	Water	EPA 9056A	
LCS 180-299245/5	Lab Control Sample	Total/NA	Water	EPA 9056A	

Analysis Batch: 299961

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-98289-7	MW-5A	Total/NA	Water	EPA 9056A	
180-98289-9	MW-6A	Total/NA	Water	EPA 9056A	
180-98289-10	MW-7	Total/NA	Water	EPA 9056A	
180-98289-10	MW-7	Total/NA	Water	EPA 9056A	
MB 180-299961/6	Method Blank	Total/NA	Water	EPA 9056A	
LCS 180-299961/5	Lab Control Sample	Total/NA	Water	EPA 9056A	
180-98324-B-11 MS	Matrix Spike	Total/NA	Water	EPA 9056A	
180-98324-B-11 MSD	Matrix Spike Duplicate	Total/NA	Water	EPA 9056A	

Metals

Prep Batch: 297820

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-98289-6	MW-5	Total Recoverable	Water	3005A	
180-98289-7	MW-5A	Total Recoverable	Water	3005A	
180-98289-8	MW-6	Total Recoverable	Water	3005A	
180-98289-9	MW-6A	Total Recoverable	Water	3005A	
180-98289-10	MW-7	Total Recoverable	Water	3005A	
MB 180-297820/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 180-297820/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
180-98289-6 MS	MW-5	Total Recoverable	Water	3005A	

Metals (Continued)

Prep Batch: 297820 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-98289-6 MSD	MW-5	Total Recoverable	Water	3005A	

Prep Batch: 298110

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-98289-1	Dup (MW-7)	Total Recoverable	Water	3005A	
180-98289-2	Blank	Total Recoverable	Water	3005A	
180-98289-3	MW-2	Total Recoverable	Water	3005A	
180-98289-4	MW-3	Total Recoverable	Water	3005A	
180-98289-5	MW-4	Total Recoverable	Water	3005A	
MB 180-298110/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 180-298110/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
180-98385-B-2-C MS	Matrix Spike	Total Recoverable	Water	3005A	
180-98385-B-2-D MSD	Matrix Spike Duplicate	Total Recoverable	Water	3005A	

Analysis Batch: 298441

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-98289-1	Dup (MW-7)	Total Recoverable	Water	EPA 6020A	298110
180-98289-2	Blank	Total Recoverable	Water	EPA 6020A	298110
180-98289-3	MW-2	Total Recoverable	Water	EPA 6020A	298110
180-98289-4	MW-3	Total Recoverable	Water	EPA 6020A	298110
180-98289-5	MW-4	Total Recoverable	Water	EPA 6020A	298110
180-98289-6	MW-5	Total Recoverable	Water	EPA 6020A	297820
180-98289-7	MW-5A	Total Recoverable	Water	EPA 6020A	297820
180-98289-8	MW-6	Total Recoverable	Water	EPA 6020A	297820
180-98289-9	MW-6A	Total Recoverable	Water	EPA 6020A	297820
180-98289-10	MW-7	Total Recoverable	Water	EPA 6020A	297820
MB 180-297820/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	297820
MB 180-298110/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	298110
LCS 180-297820/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	297820
LCS 180-298110/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	298110
180-98289-6 MS	MW-5	Total Recoverable	Water	EPA 6020A	297820
180-98289-6 MSD	MW-5	Total Recoverable	Water	EPA 6020A	297820
180-98385-B-2-C MS	Matrix Spike	Total Recoverable	Water	EPA 6020A	298110
180-98385-B-2-D MSD	Matrix Spike Duplicate	Total Recoverable	Water	EPA 6020A	298110

General Chemistry

Analysis Batch: 297407

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-98289-1	Dup (MW-7)	Total/NA	Water	SM 2540C	
180-98289-2	Blank	Total/NA	Water	SM 2540C	
180-98289-4	MW-3	Total/NA	Water	SM 2540C	
180-98289-7	MW-5A	Total/NA	Water	SM 2540C	
180-98289-8	MW-6	Total/NA	Water	SM 2540C	
180-98289-9	MW-6A	Total/NA	Water	SM 2540C	
180-98289-10	MW-7	Total/NA	Water	SM 2540C	
MB 180-297407/2	Method Blank	Total/NA	Water	SM 2540C	
LCS 180-297407/1	Lab Control Sample	Total/NA	Water	SM 2540C	
180-98262-A-3 DU	Duplicate	Total/NA	Water	SM 2540C	
180-98264-C-3 DU	Duplicate	Total/NA	Water	SM 2540C	

General Chemistry

Analysis Batch: 297411

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-98289-3	MW-2	Total/NA	Water	SM 2540C	
180-98289-5	MW-4	Total/NA	Water	SM 2540C	
180-98289-6	MW-5	Total/NA	Water	SM 2540C	
MB 180-297411/2	Method Blank	Total/NA	Water	SM 2540C	
LCS 180-297411/1	Lab Control Sample	Total/NA	Water	SM 2540C	
180-98289-6 DU	MW-5	Total/NA	Water	SM 2540C	

Analysis Batch: 298554

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-98289-1	Dup (MW-7)	Total/NA	Water	EPA 9040C	
180-98289-2	Blank	Total/NA	Water	EPA 9040C	
180-98289-3	MW-2	Total/NA	Water	EPA 9040C	
180-98289-4	MW-3	Total/NA	Water	EPA 9040C	
180-98289-5	MW-4	Total/NA	Water	EPA 9040C	
180-98289-6	MW-5	Total/NA	Water	EPA 9040C	
180-98289-7	MW-5A	Total/NA	Water	EPA 9040C	
180-98289-8	MW-6	Total/NA	Water	EPA 9040C	
180-98289-9	MW-6A	Total/NA	Water	EPA 9040C	
180-98289-10	MW-7	Total/NA	Water	EPA 9040C	
LCS 180-296554/1	Lab Control Sample	Total/NA	Water	EPA 9040C	
180-98289-9 DU	MW-6A	Total/NA	Water	EPA 9040C	
180-98808-D-1 DU	Duplicate	Total/NA	Water	EPA 9040C	

Chain of Custody Record

160-98289 Chain of Custody

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: Rory Schmutzler	Lab PM: Gartner, Cathy	COC No: 490-52767-15725.1
Client Contact: Mr. Rick Elgin	Phone: 573-636-9454	E-Mail: cathy.gartner@testamericainc.com	Page: Page 1 of 1
Company: Midwest Environmental Consultants		Analysis Requested	Job #:
Address: 2009 East McCarty Street Suite 2	Due Date Requested:		Preservation Codes:
City: Jefferson City	TAT Requested (days):		A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
State, Zip: MO, 65101			
Phone: 573-636-9454(Tel)	PO #: Purchase Order not required		Other:
Email: relgin@mecpc.com	WO #:		
Project Name: Asbury Ash Pond	Project #: 49010011		
Site:	SSOW#:		

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	9056 Chloride, Fluoride, Sulfate	2540C_Calcd - Total Dissolved Solids	6020 Metals - Ca and Boron	pH	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	D			
MW-2	11-5-19	9:20	G	GW			X	X	X	X		Field pH: 6.44
MW-3	11-5-19	10:50										Field pH: 6.04
MW-4	11-5-19	8:50										Field pH: 7.38
MW-5	11-5-19	9:20										Field pH: 7.39
MW-5A	11-4-19	4:10										Field pH: 7.13
MW-6	11-4-19	3:40										Field pH: 7.16
MW-6A	11-4-19	3:15										Field pH: 7.24
MW-7	11-4-19	2:45										Field pH: 6.50
DUP (MW-7)	11-4-19	2:50										Field pH:
BLANK	11-4-19	4:15		-								Field pH:
												Field pH:

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For ___ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements: 6020A/6010C - Sb,As,Ba,Be,B,Cd,Ca,Cr,Co,Pb,,Mo, Li

Empty Kit Relinquished by: | Date: | Time: | Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Rory Schmutzler	11-5-19/4:30	MEC	FedEx	11-5-19/4:30	FedEx
Relinquished by:	Date/Time:	Company	Received by: Allyson Sciumbato	11/6/19 9:00 AM	Company TA Pitt
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: △ Yes △ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks:

Login Sample Receipt Checklist

Client: Midwest Environmental Consultants

Job Number: 180-98289-1

Login Number: 98289
List Number: 1
Creator: Sciomacco, Alyson E

List Source: Eurofins TestAmerica, Pittsburgh

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

eurofins | Environment Testing TestAmerica

ANALYTICAL REPORT

Eurofins TestAmerica, Pittsburgh
301 Alpha Drive
RIDC Park
Pittsburgh, PA 15238
Tel: (412)963-7058

Laboratory Job ID: 180-99874-1
Client Project/Site: Asbury Ash Pond
Sampling Event: Asbury Ash Pond

For:
Midwest Environmental Consultants
2009 East McCarty Street
Suite 2
Jefferson City, Missouri 65101

Attn: Mr. Rick Elgin

Cathy Gartner

Authorized for release by:
12/26/2019 10:49:45 AM

Cathy Gartner, Project Manager II
(615)301-5041
cathy.gartner@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

PA Lab ID: 02-00416

Table of Contents

Job ID: 180-99874-1

Laboratory: Eurofins TestAmerica, Pittsburgh

Narrative

Job Narrative
180-99874-1

Comments
No additional comments.

Receipt
The sample was received on 12/12/2019 9:30 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.1° C.

GC Semi VOA
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Metals
Methods 6020A: The continuing calibration blank (CCB) associated with batch 180-301437 recovered above the upper control limit for sodium. The samples associated with this CCB were 10 times the RL for the affected analytes; therefore, the data have been reported.

Methods 6020A: The low level continuing calibration verification (CCVL) associated with batch 180-301437 recovered above the upper control limit for sodium. The samples associated with this CCVL were 10 times the RL for the affected analytes; therefore, the data have been reported.

Methods 6020A: The continuing calibration verification (CCV) associated with batch 180-301629 recovered above the upper control limit for beryllium. The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Qualifiers

HPLC/IC

Qualifier	Qualifier Description
F1	MS and/or MSD Recovery is outside acceptance limits.

Metals

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
F1	MS and/or MSD Recovery is outside acceptance limits.

General Chemistry

Qualifier	Qualifier Description
HF	Field parameter with a holding time of 15 minutes. Test performed by laboratory at client's request.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Accreditation/Certification Summary

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 180-99874-1

Laboratory: Eurofins TestAmerica, Pittsburgh

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	06-27-20
California	State	2891	04-30-20
Connecticut	State	PH-0688	09-30-20
Florida	NELAP	E871008	06-30-20
Georgia	State	PA 02-00416	04-30-20
Illinois	NELAP	004375	06-30-20
Kansas	NELAP	E-10350	03-31-20
Kentucky (UST)	State	162013	04-30-20
Kentucky (WW)	State	KY98043	12-31-19
Louisiana	NELAP	04041	06-30-20
Minnesota	NELAP	042-999-482	12-31-19
Nevada	State	PA00164	07-31-20
New Hampshire	NELAP	2030	04-04-20
New Jersey	NELAP	PA005	06-30-20
New York	NELAP	11182	04-01-20
North Carolina (WW/SW)	State	434	12-31-19
North Dakota	State	R-227	04-30-20
Oregon	NELAP	PA-2151	02-06-20
Pennsylvania	NELAP	02-00416	04-30-20
Rhode Island	State	LAO00362	12-30-19
South Carolina	State	89014	04-30-20
Texas	NELAP	T104704528	03-31-20
US Fish & Wildlife	US Federal Programs	058448	07-31-20
USDA	Federal	P-Soil-01	06-26-22
USDA	US Federal Programs	P330-16-00211	06-26-22
Utah	NELAP	PA001462019-8	05-31-20
Virginia	NELAP	10043	09-15-20
West Virginia DEP	State	142	01-31-20
Wisconsin	State	998027800	08-31-20

Laboratory: Eurofins TestAmerica, Nashville

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
A2LA	ISO/IEC 17025	0453.07	12-31-19
Arizona	State Program	AZ0473	05-05-14 *
Georgia	State Program	NA: NELAP & A2LA	12-31-19

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Sample Summary

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 180-99874-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
180-99874-1	MW-5A	Water	12/11/19 09:25	12/12/19 09:30	

Method Summary

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 180-99874-1

Method	Method Description	Protocol	Laboratory
EPA 9056A	Anions, Ion Chromatography	SW846	TAL PIT
EPA 6020A	Metals (ICP/MS)	SW846	TAL PIT
EPA 9040C	pH	SW846	TAL PIT
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL PIT
Field Sampling	Field Sampling	EPA	TAL PIT
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL PIT

Protocol References:

EPA = US Environmental Protection Agency

SM = "Standard Methods For The Examination Of Water And Wastewater"

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 180-99874-1

Client Sample ID: MW-5A

Date Collected: 12/11/19 09:25
Date Received: 12/12/19 09:30

Lab Sample ID: 180-99874-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		1			302269	12/23/19 08:55	MJH	TAL PIT
	Instrument ID: CHICS2100B									
Total/NA	Analysis	EPA 9056A		10			302269	12/23/19 09:11	MJH	TAL PIT
	Instrument ID: CHICS2100B									
Total Recoverable	Prep	3005A			50 mL	50 mL	301278	12/12/19 19:44	MWW	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			301437	12/13/19 16:50	RSK	TAL PIT
	Instrument ID: A									
Total/NA	Analysis	EPA 9040C		1			301702	12/17/19 18:04	PM	TAL PIT
	Instrument ID: NOEQUIP									
Total/NA	Analysis	SM 2540C		1	50 mL	100 mL	301338	12/13/19 10:04	AVS	TAL PIT
	Instrument ID: NOEQUIP									
Total/NA	Analysis	Field Sampling		1			301409	12/11/19 10:25	FDS	TAL PIT
	Instrument ID: NOEQUIP									

Laboratory References:

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

Analyst References:

Lab: TAL PIT

Batch Type: Prep

MWW = Margaret Wanyolke

Batch Type: Analysis

AVS = Abbey Smith
FDS = Sampler Field
MJH = Matthew Hartman
PM = Paloma Hoelzle
RSK = Robert Kurtz

Client: Midwest Environmental Consultants
Project/Site: Asbury Ash Pond

Job ID: 180-99874-1

Client Sample ID: MW-5A

Lab Sample ID: 180-99874-1

Date Collected: 12/11/19 09:25
Date Received: 12/12/19 09:30

Matrix: Water

Method: EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	82		1.0	0.32	mg/L			12/23/19 08:55	1
Fluoride	0.26		0.10	0.026	mg/L			12/23/19 08:55	1
Sulfate	1300		10	3.8	mg/L			12/23/19 09:11	10

Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	270		0.50	0.13	mg/L		12/12/19 19:44	12/13/19 16:50	1
Boron	1.0		0.080	0.039	mg/L		12/12/19 19:44	12/13/19 16:50	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	2200		20	20	mg/L			12/13/19 10:04	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.0	HF	0.1	0.1	SU			12/17/19 18:04	1

Method: Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	NONE	Unit	D	Prepared	Analyzed	Dil Fac
pH	6.85				SU			12/11/19 10:25	1

Method: EPA 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 180-302269/6
Matrix: Water
Analysis Batch: 302269

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		1.0	0.32	mg/L			12/23/19 04:55	1
Fluoride	ND		0.10	0.026	mg/L			12/23/19 04:55	1
Sulfate	ND		1.0	0.38	mg/L			12/23/19 04:55	1

Lab Sample ID: LCS 180-302269/5
Matrix: Water
Analysis Batch: 302269

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	53.9		mg/L		108	80 - 120
Fluoride	2.50	2.71		mg/L		108	80 - 120
Sulfate	50.0	54.0		mg/L		108	80 - 120

Lab Sample ID: 180-99714-A-14 MS
Matrix: Water
Analysis Batch: 302269

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	76		250	312		mg/L		94	80 - 120
Fluoride	ND		12.5	12.4		mg/L		99	80 - 120
Sulfate	570	F1	250	734	F1	mg/L		64	80 - 120

Lab Sample ID: 180-99714-A-14 MSD
Matrix: Water
Analysis Batch: 302269

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	76		250	326		mg/L		100	80 - 120	4	15
Fluoride	ND		12.5	13.3		mg/L		106	80 - 120	6	15
Sulfate	570	F1	250	741	F1	mg/L		67	80 - 120	1	15

Method: EPA 6020A - Metals (ICP/MS)

Lab Sample ID: MB 180-301278/1-A
Matrix: Water
Analysis Batch: 301437

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 301278

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	ND		0.50	0.13	mg/L		12/12/19 19:44	12/13/19 16:33	1
Boron	ND		0.080	0.039	mg/L		12/12/19 19:44	12/13/19 16:33	1

Lab Sample ID: LCS 180-301278/2-A
Matrix: Water
Analysis Batch: 301437

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 301278

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Calcium	25.0	28.0		mg/L		112	80 - 120
Boron	1.25	1.44		mg/L		115	80 - 120

Method: EPA 6020A - Metals (ICP/MS) (Continued)

Lab Sample ID: 180-99884-H-1-E MS
Matrix: Water
Analysis Batch: 301437

Client Sample ID: Matrix Spike
Prep Type: Dissolved
Prep Batch: 301278

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Calcium	190		25.0	227	4	mg/L		134	75 - 125
Boron	2.4	F1	1.25	4.28	F1	mg/L		151	75 - 125

Lab Sample ID: 180-99884-H-1-F MSD
Matrix: Water
Analysis Batch: 301437

Client Sample ID: Matrix Spike Duplicate
Prep Type: Dissolved
Prep Batch: 301278

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Calcium	190		25.0	221	4	mg/L		111	75 - 125	3	20
Boron	2.4	F1	1.25	4.18	F1	mg/L		143	75 - 125	2	20

Method: EPA 9040C - pH

Lab Sample ID: LCS 180-301702/1
Matrix: Water
Analysis Batch: 301702

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		100	99 - 101

Lab Sample ID: 180-99736-C-4 DU
Matrix: Water
Analysis Batch: 301702

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
pH	5.0		5.0		SU		0	2

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 180-301338/2
Matrix: Water
Analysis Batch: 301338

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		10	10	mg/L			12/13/19 10:04	1

Lab Sample ID: LCS 180-301338/1
Matrix: Water
Analysis Batch: 301338

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	188	156		mg/L		83	80 - 120

Lab Sample ID: 180-99926-B-1 DU
Matrix: Water
Analysis Batch: 301338

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	470		452		mg/L		3	10

HPLC/IC

Analysis Batch: 302269

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-99874-1	MW-5A	Total/NA	Water	EPA 9056A	
180-99874-1	MW-5A	Total/NA	Water	EPA 9056A	
MB 180-302269/6	Method Blank	Total/NA	Water	EPA 9056A	
LCS 180-302269/5	Lab Control Sample	Total/NA	Water	EPA 9056A	
180-99714-A-14 MS	Matrix Spike	Total/NA	Water	EPA 9056A	
180-99714-A-14 MSD	Matrix Spike Duplicate	Total/NA	Water	EPA 9056A	

Metals

Prep Batch: 301278

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-99874-1	MW-5A	Total Recoverable	Water	3005A	
MB 180-301278/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 180-301278/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
180-99884-H-1-E MS	Matrix Spike	Dissolved	Water	3005A	
180-99884-H-1-F MSD	Matrix Spike Duplicate	Dissolved	Water	3005A	

Analysis Batch: 301437

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-99874-1	MW-5A	Total Recoverable	Water	EPA 6020A	301278
MB 180-301278/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	301278
LCS 180-301278/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	301278
180-99884-H-1-E MS	Matrix Spike	Dissolved	Water	EPA 6020A	301278
180-99884-H-1-F MSD	Matrix Spike Duplicate	Dissolved	Water	EPA 6020A	301278

General Chemistry

Analysis Batch: 301338

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-99874-1	MW-5A	Total/NA	Water	SM 2540C	
MB 180-301338/2	Method Blank	Total/NA	Water	SM 2540C	
LCS 180-301338/1	Lab Control Sample	Total/NA	Water	SM 2540C	
180-99926-B-1 DU	Duplicate	Total/NA	Water	SM 2540C	

Analysis Batch: 301702

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-99874-1	MW-5A	Total/NA	Water	EPA 9040C	
LCS 180-301702/1	Lab Control Sample	Total/NA	Water	EPA 9040C	
180-99736-C-4 DU	Duplicate	Total/NA	Water	EPA 9040C	

Field Service / Mobile Lab

Analysis Batch: 301409

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-99874-1	MW-5A	Total/NA	Water	Field Sampling	

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: RYAN O'RICE	Lab PM: Gartner, Cathy	Carrier Tracking No(s):	COC No: 490-52767-15725.1
Client Contact: Mr. Rick Elgin	Phone: 573-636-9494	E-Mail: cathy.gartner@testamericainc.com		Page: Page 1 of 1
Company: Midwest Environmental Consultants		Analysis Requested		Job #:
Address: 2009 East McCarty Street Suite 2	Due Date Requested:			Preservation Codes:
City: Jefferson City	TAT Requested (days):			A - HCL; B - NaOH; C - Zn Acetate; D - Nitric Acid; E - NaHSO4; F - MeOH; G - Amchlor; H - Ascorbic Acid; I - Ice; J - DI Water; K - EDTA; L - EDA; M - Hexane; N - None; O - AsNaO2; P - Na2O4S; Q - Na2SO3; R - Na2S2O3; S - H2SO4; T - TSP Dodecahydrate; U - Acetone; V - MCAA; W - ph 4-5; Z - other (specify); Other:
State, Zip: MO, 65101				
Phone: 573-636-9454(Tel)	PO #: Purchase Order not required			
Email: relgin@mecpc.com	WO #:			
Project Name: Asbury Ash Pond	Project #: 49010011			
Site:	SSOW#:			

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (Water, Solid, Oil/waste, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	9056 Chloride, Fluoride, Sulfate	2540C_Calcd - Total Dissolved Solids	6020 Metals - Ca and Boron	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	D		
											Field pH:
MW-5A	12-11-19	9:25	G	GW			1	1	1		Field pH: 6.85
											Field pH:
											Field pH:
											Field pH:
											Field pH:
											Field pH:
											Field pH:
											Field pH:
											Field pH:
											Field pH:

180-69874 Chain of Custody

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For ____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements: 6020A/6010C - Sb,As,Ba,Be,B,Cd,Ca,Cr,Co,Pb,Mo,Li

Empty Kit Relinquished by: | Date: | Time: | Method of Shipment:

Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:
	12-4-19 12:30	MEC	Feddy	12-11-19 12:30	TAS
Relinquished by:	Date/Time:	Company:	Received by: Delilah Watson	Date/Time: 12-12-19 9:30	Company: AFIT
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:

Custody Seals Intact: △ Yes △ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks:

Login Sample Receipt Checklist

Client: Midwest Environmental Consultants

Job Number: 180-99874-1
SDG Number:

Login Number: 99874
List Number: 1
Creator: Watson, Debbie

List Source: Eurofins TestAmerica, Pittsburgh

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

APPENDIX 5

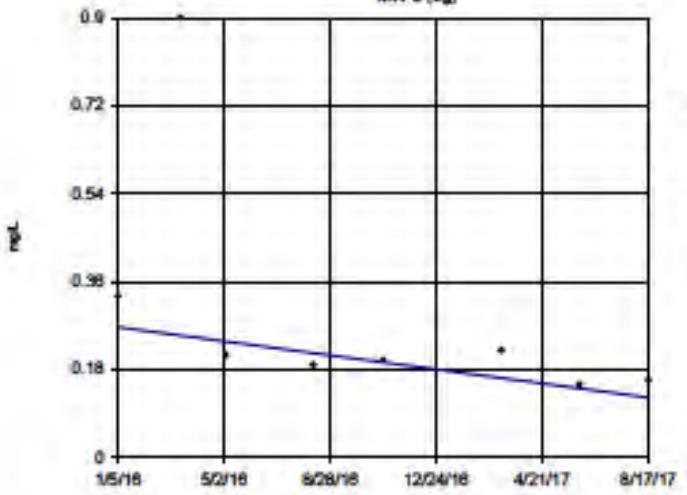
Statistical Analysis

Sanitas™ Output – Background

Trending Analysis

Boron

MW-2 (bg)

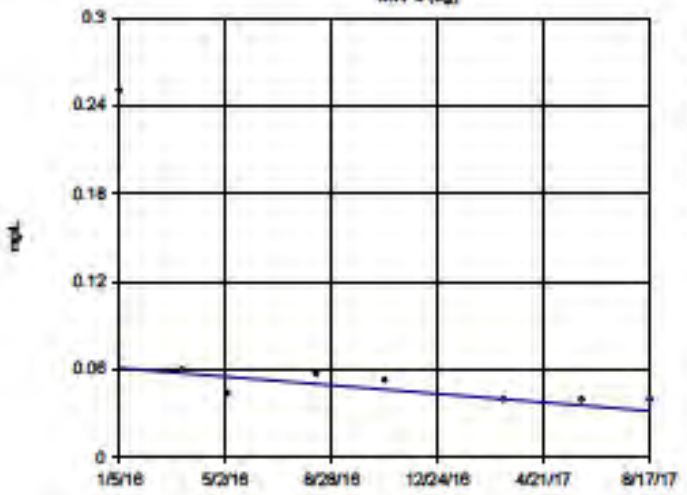


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Boron

MW-3 (bg)

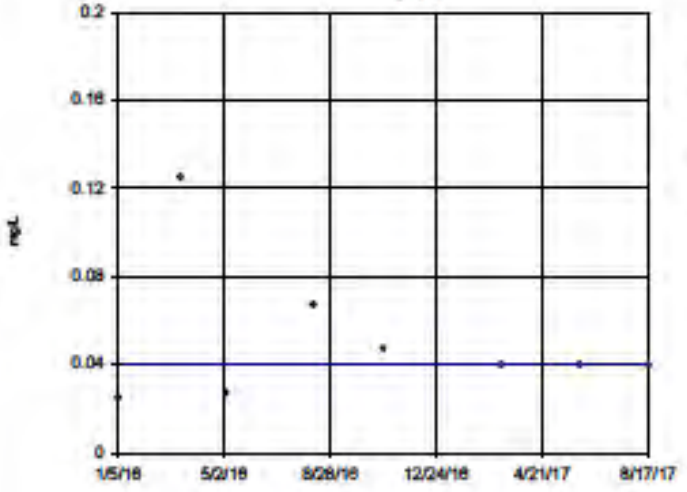


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Boron

MW-4

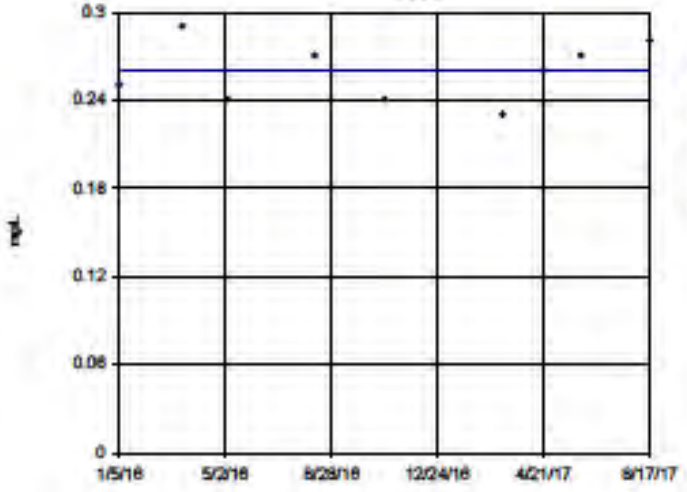


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Boron

MW-5

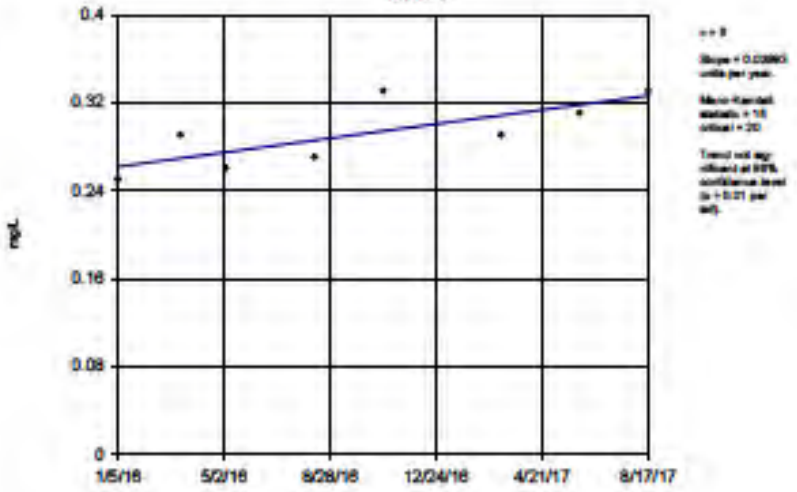


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Boron

MW-5A

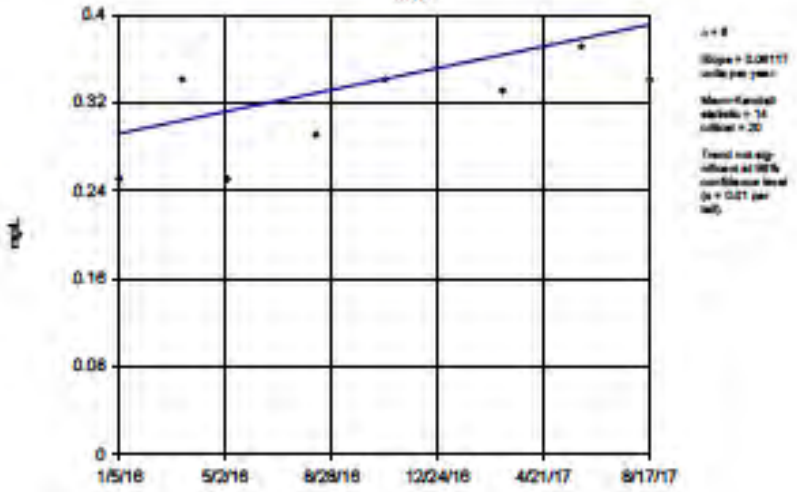


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3

Boron

MW-6

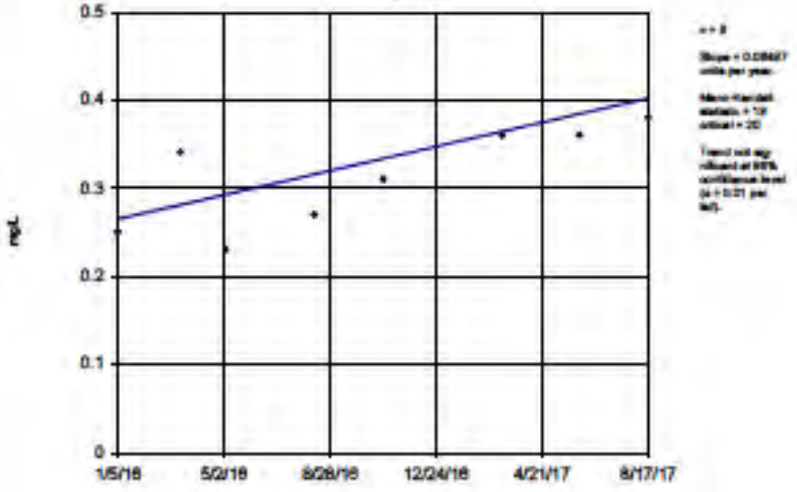


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3

Boron

MW-6A

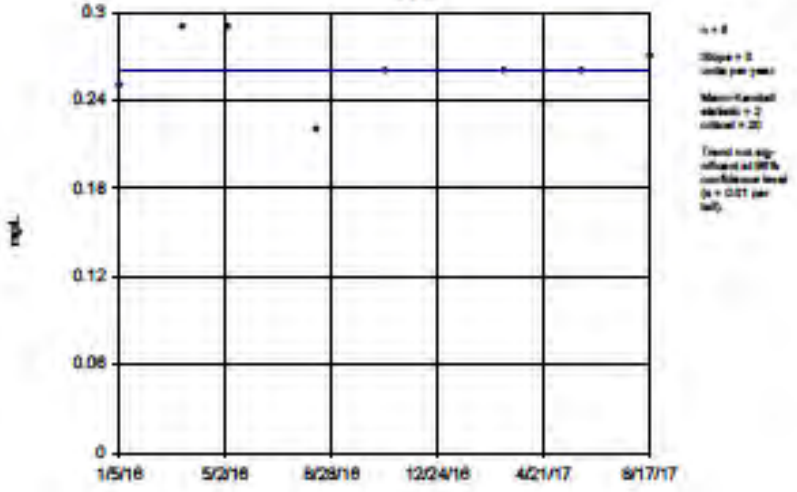


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3

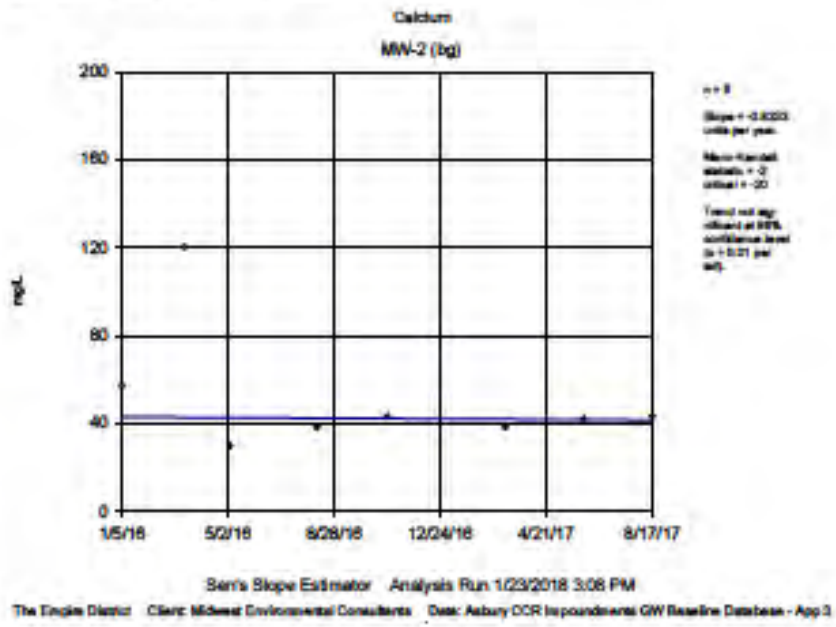
Boron

MW-7



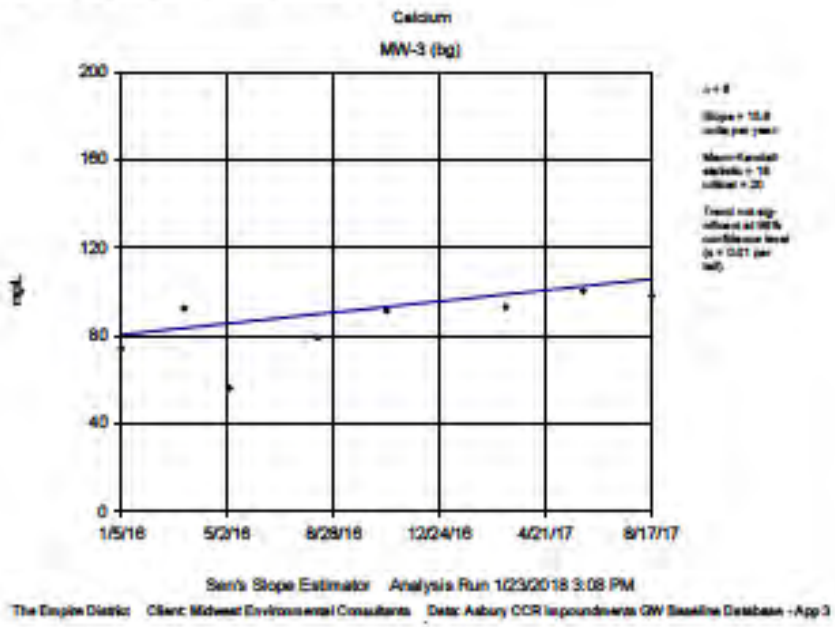
Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3



Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3



Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

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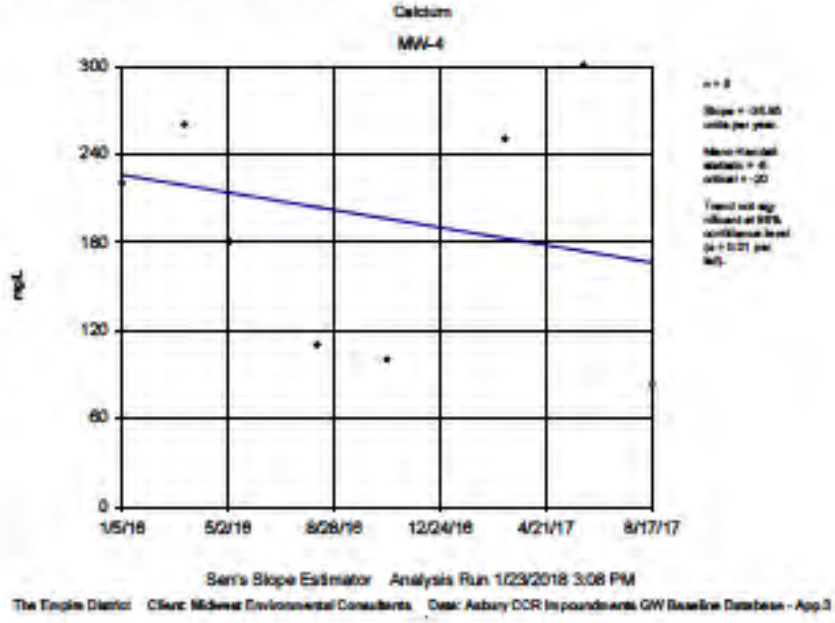

Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

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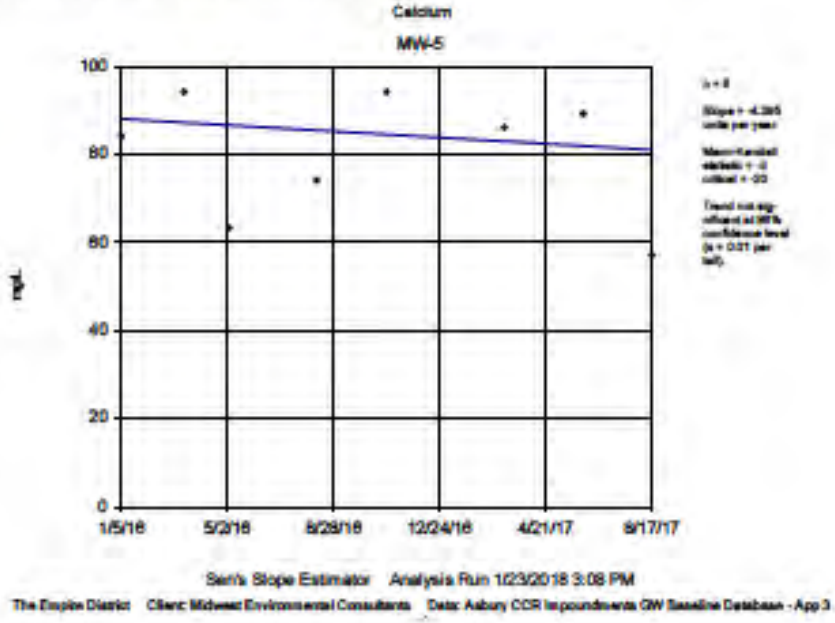
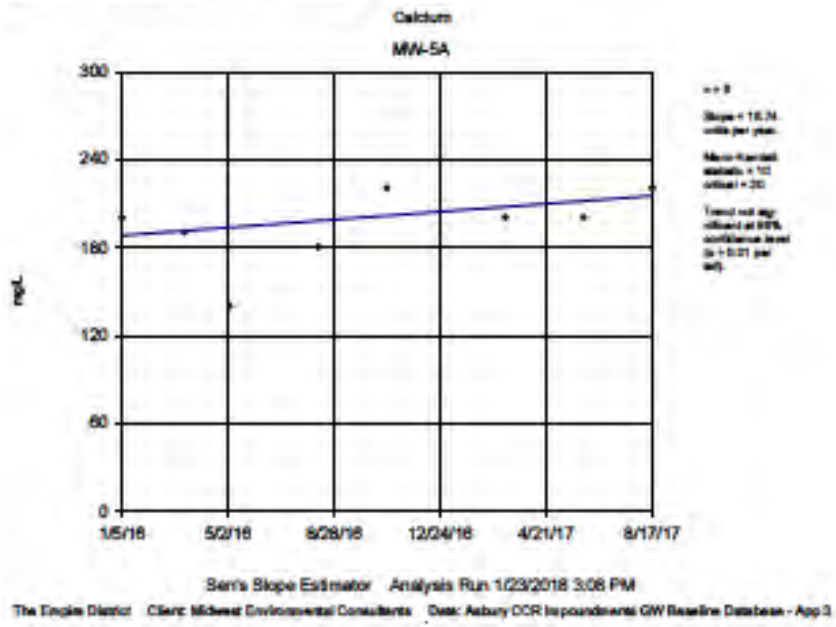


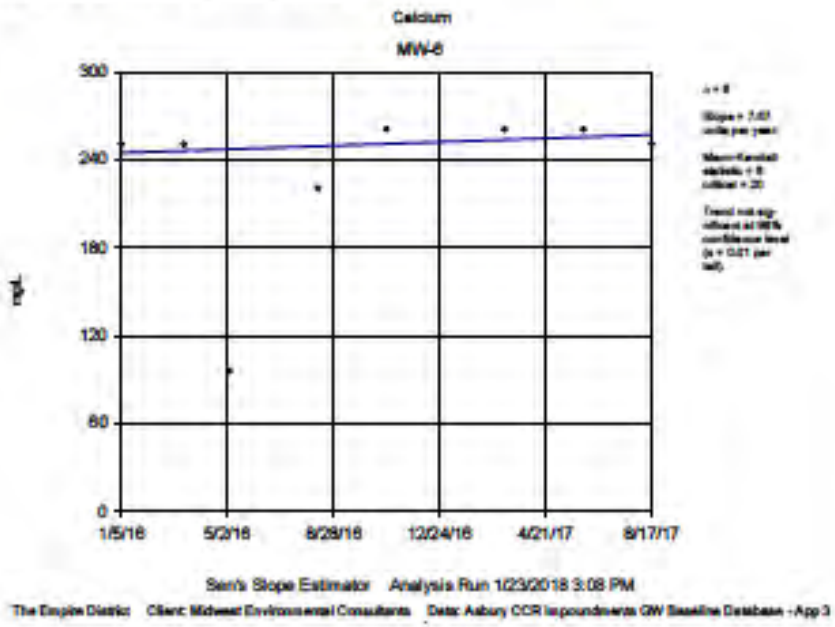
Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3



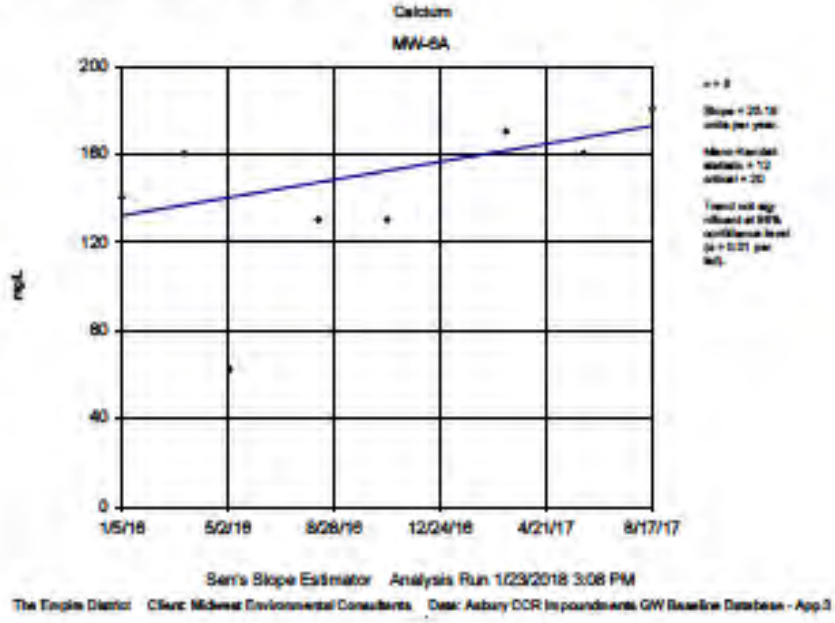
Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3



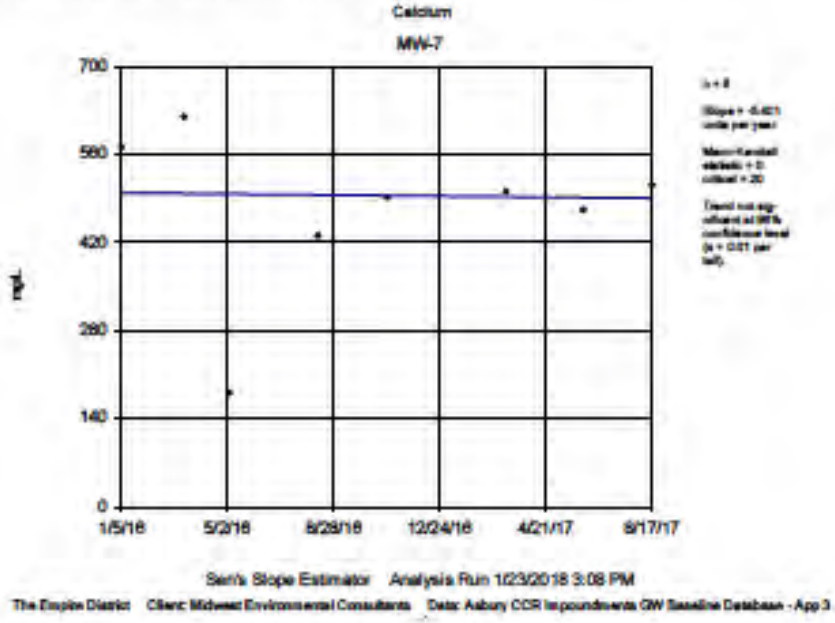
Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3



Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

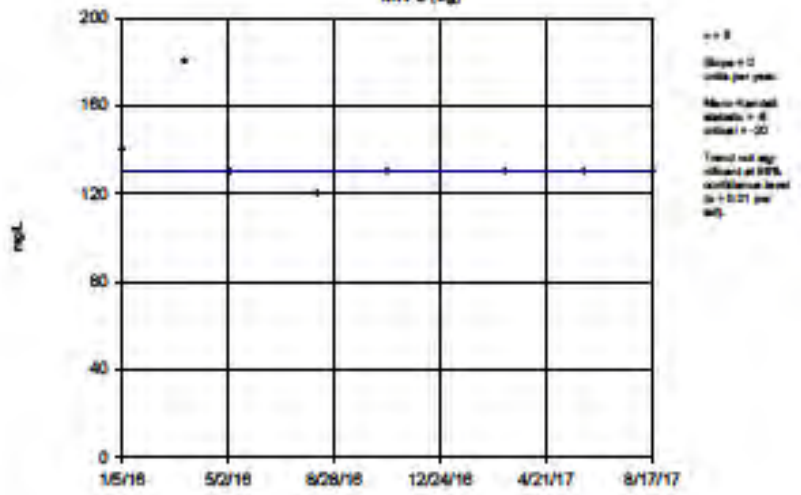


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Chloride

MW-2 (bg)

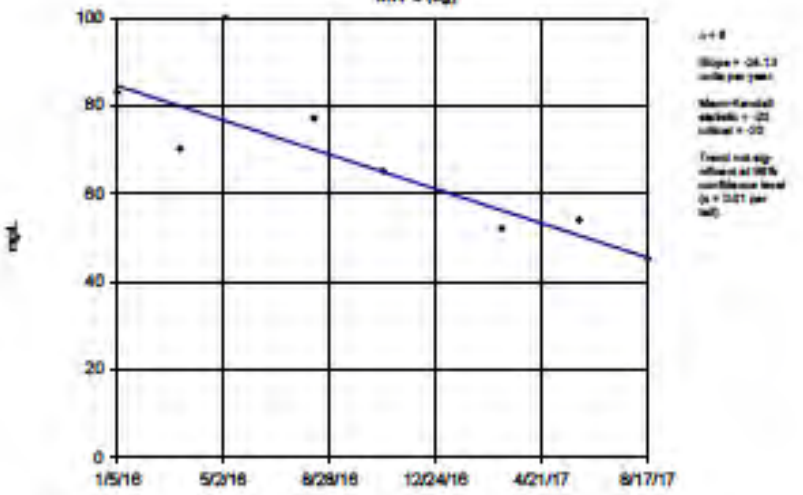


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3

Chloride

MW-3 (bg)

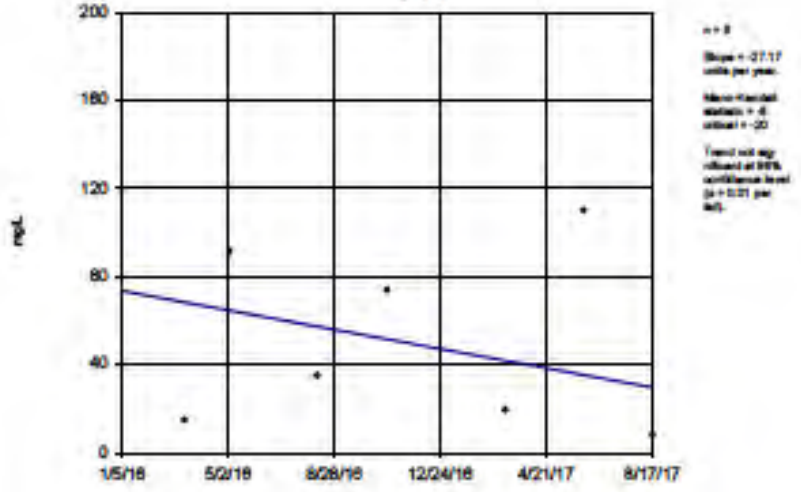


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3

Chloride

MW-4

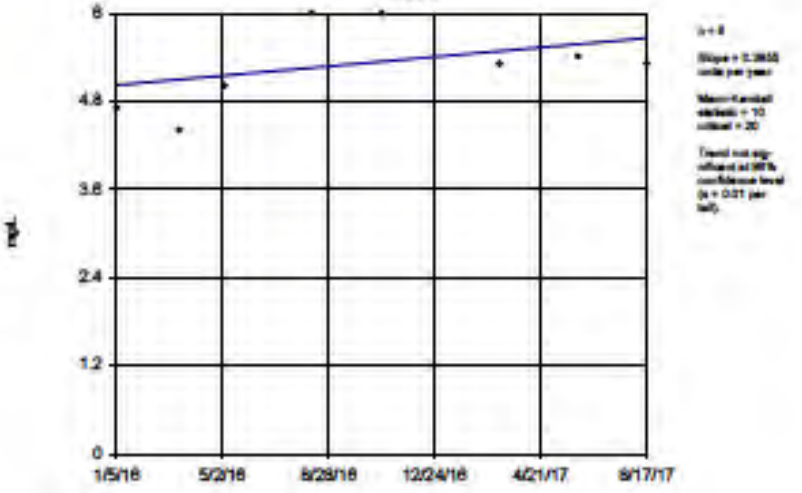


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3

Chloride

MW-5

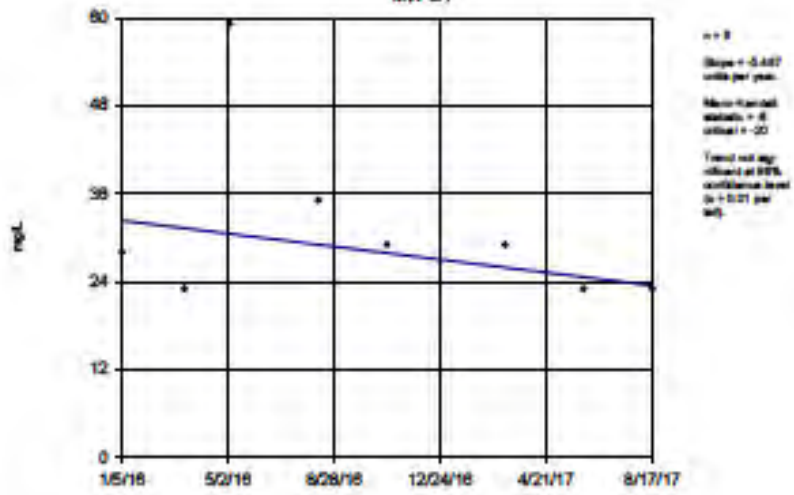


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3

Chloride

MW-5A

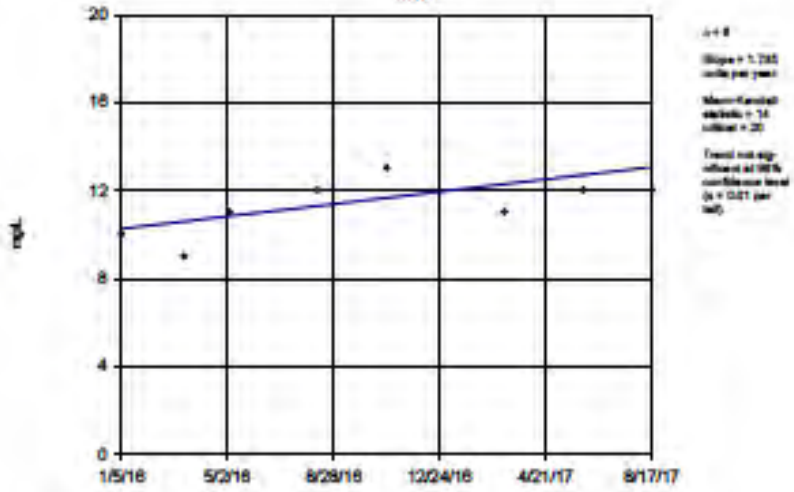


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3

Chloride

MW-6

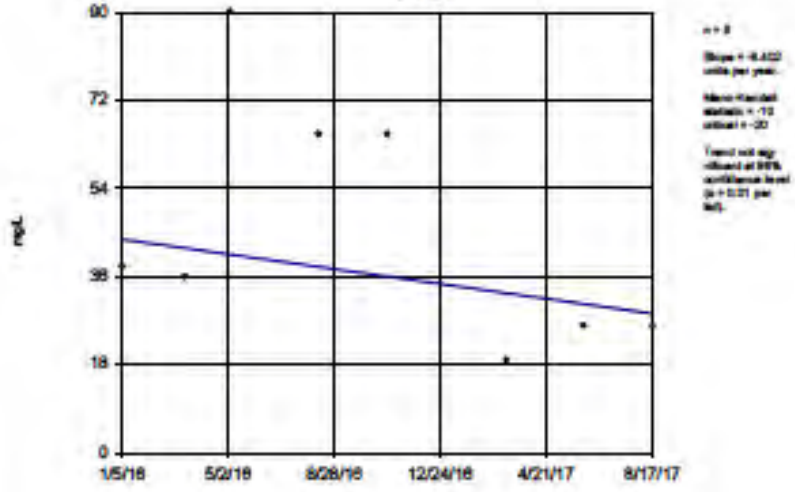


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3

Chloride

MW-6A

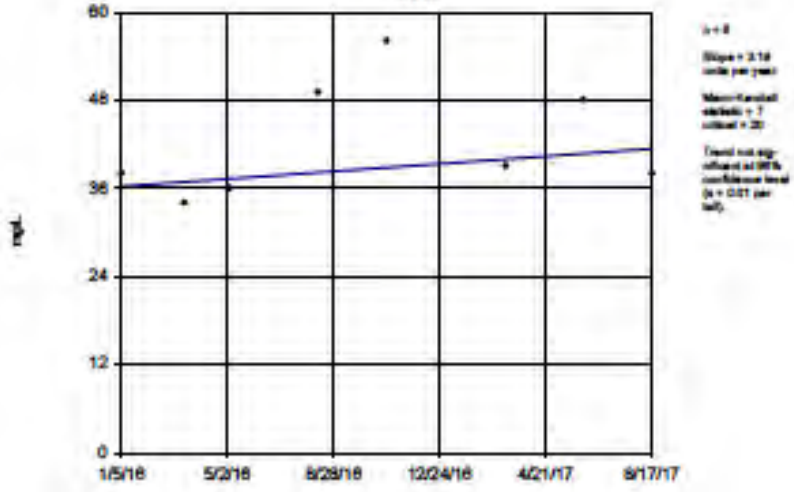


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3

Chloride

MW-7

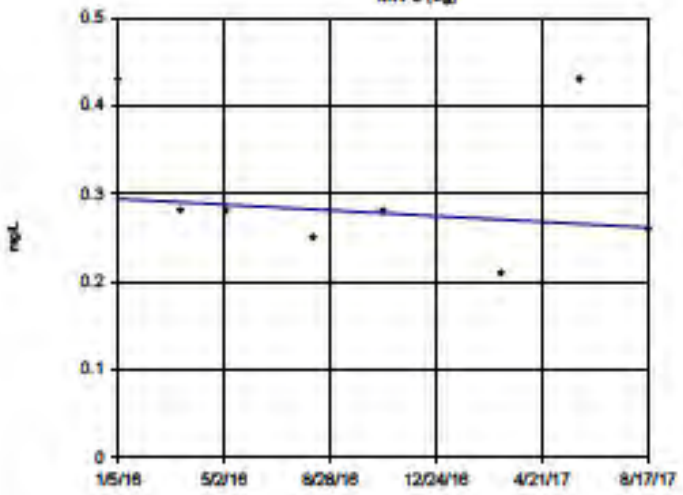


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3

Fluoride

MW-2 (bg)

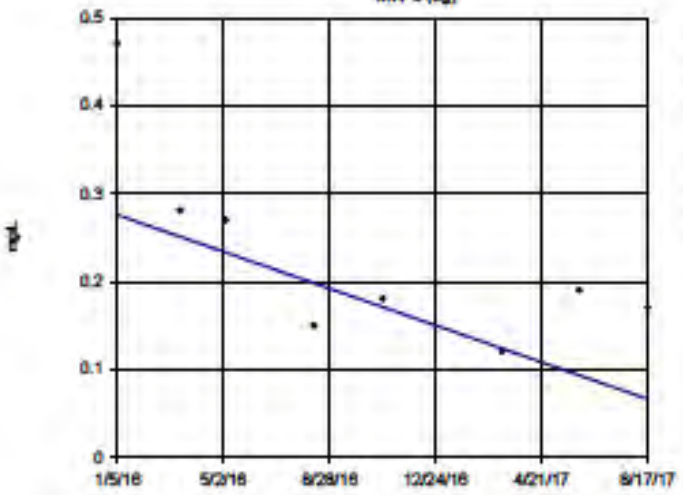


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Fluoride

MW-3 (bg)

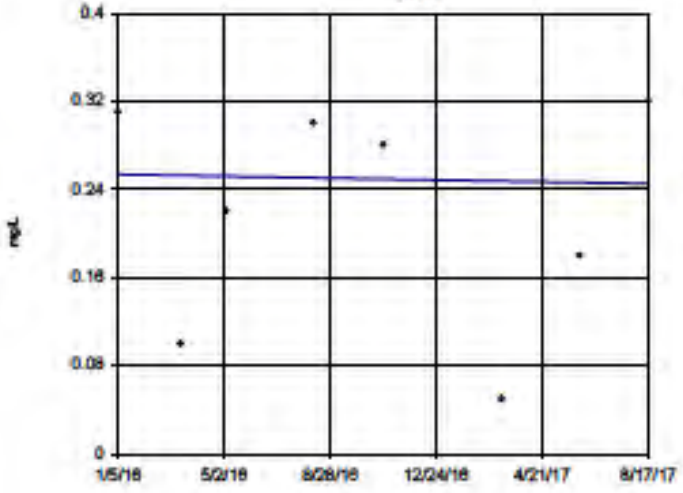


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Fluoride

MW-4

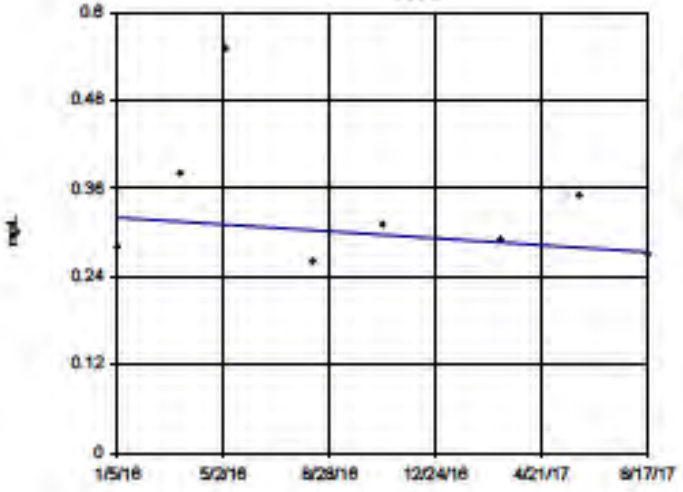


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Fluoride

MW-5

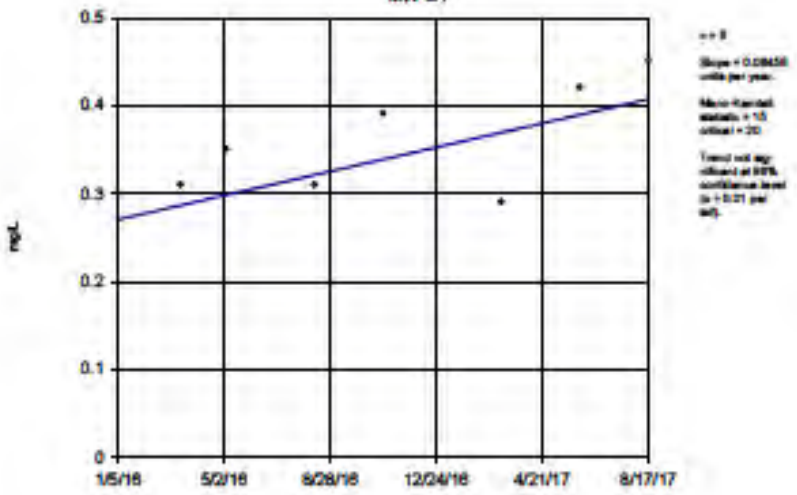


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Fluoride

MW-5A

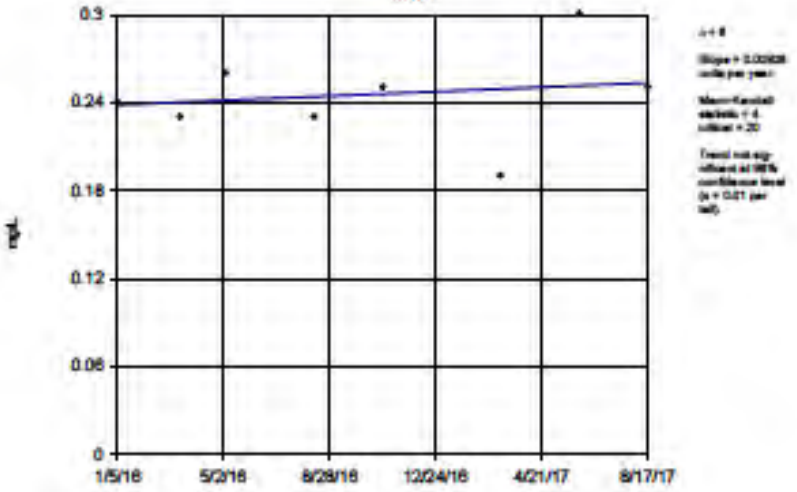


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Fluoride

MW-6

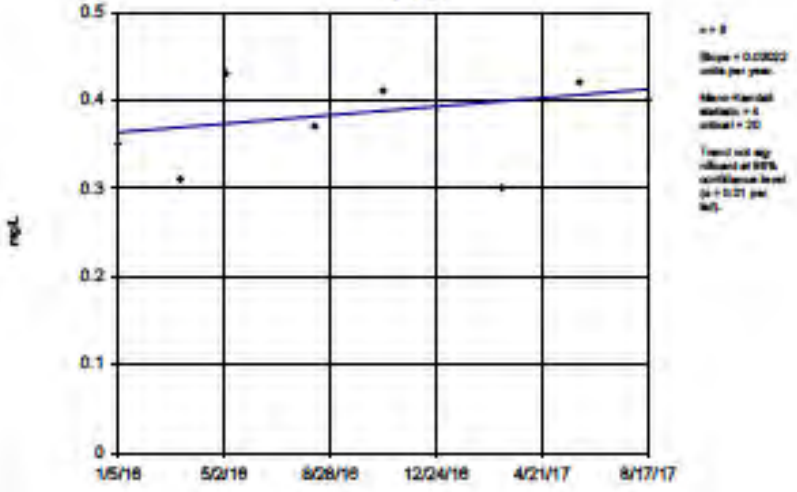


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Fluoride

MW-6A

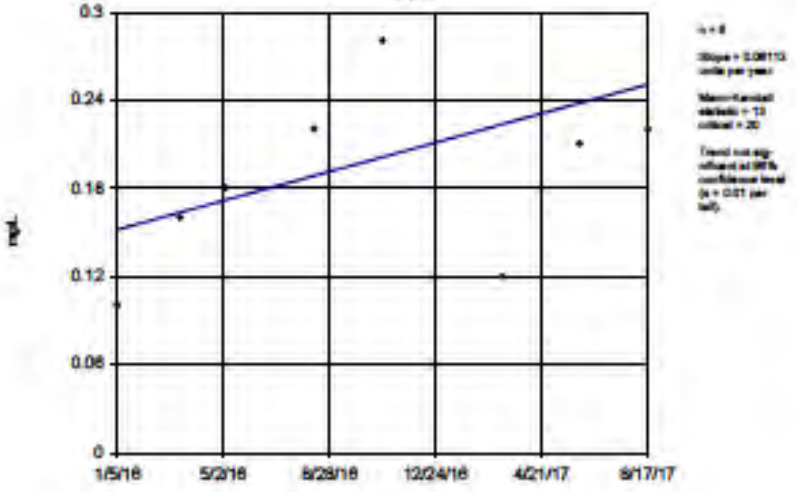


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Fluoride

MW-7



Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

pH

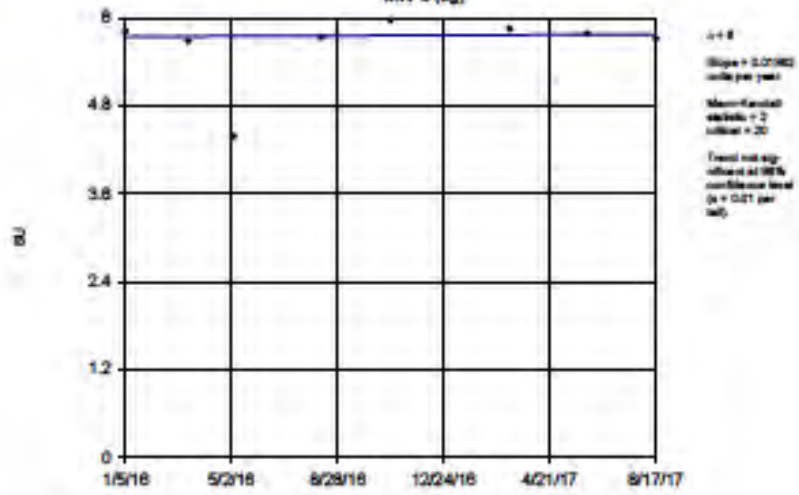
MW-2 (bg)

Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3

pH

MW-3 (bg)

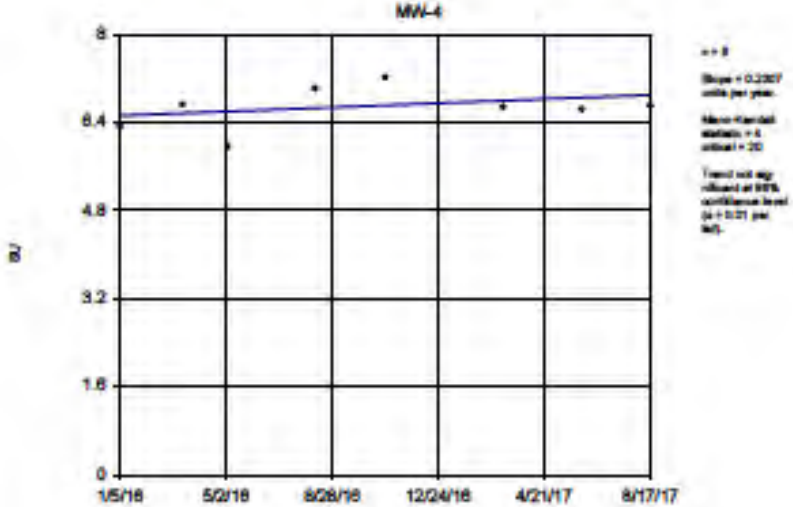


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3

pH

MW-4

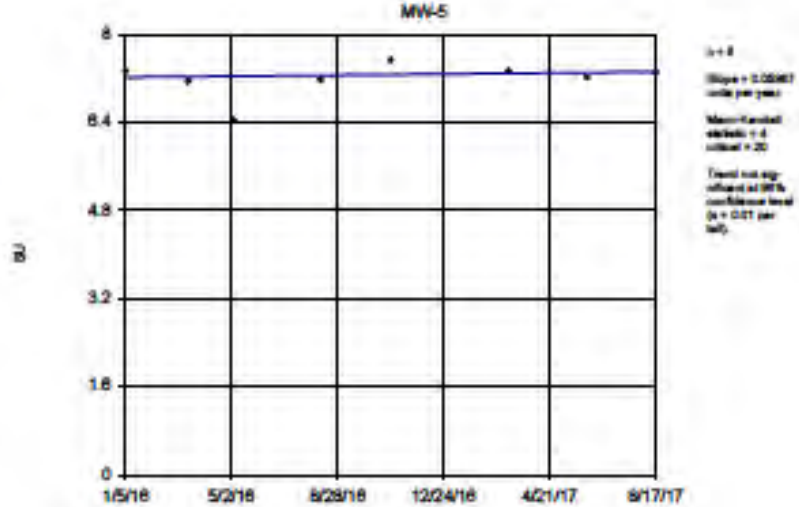


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3

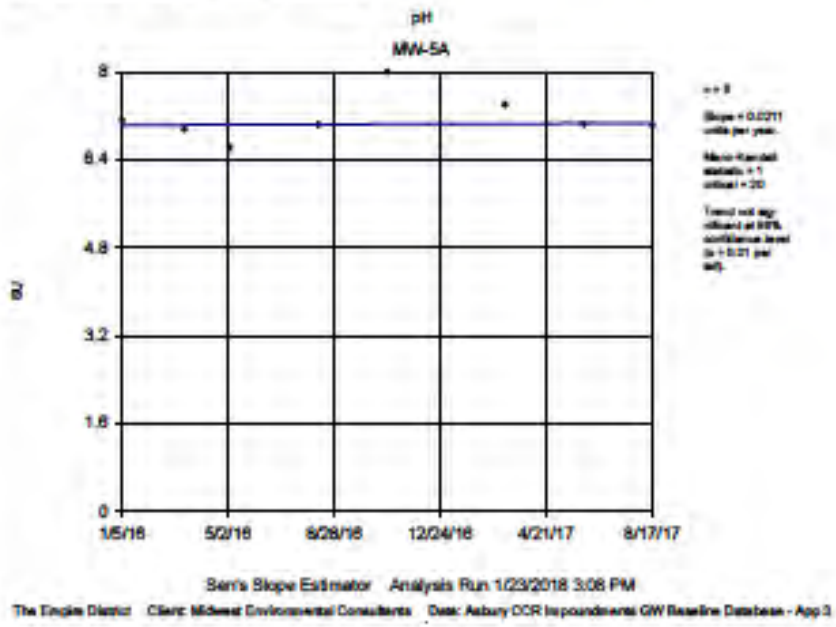
pH

MW-5



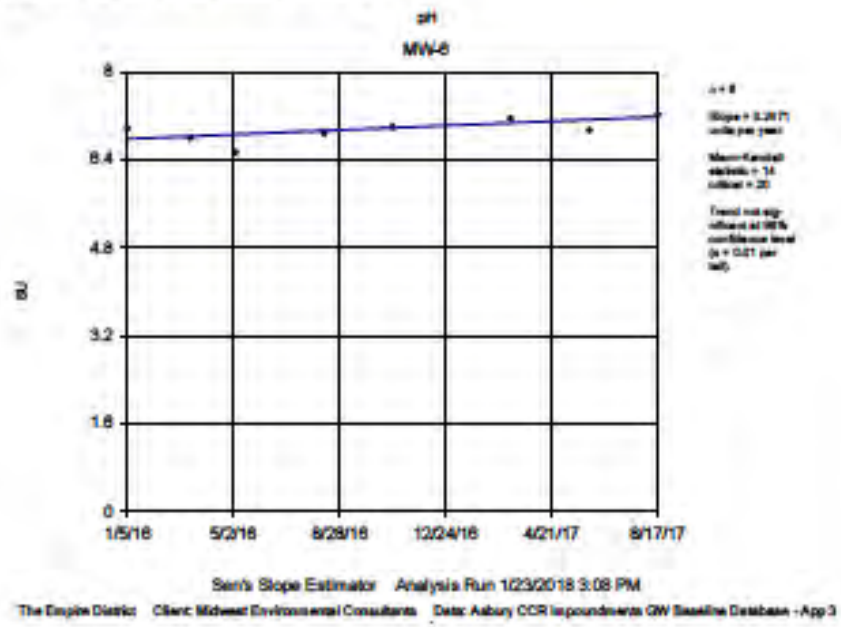
Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3



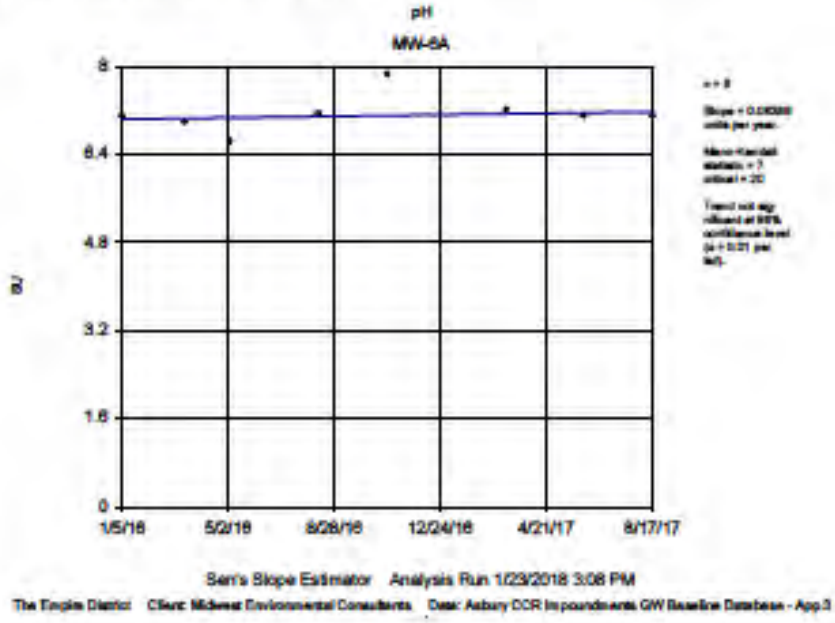
Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3



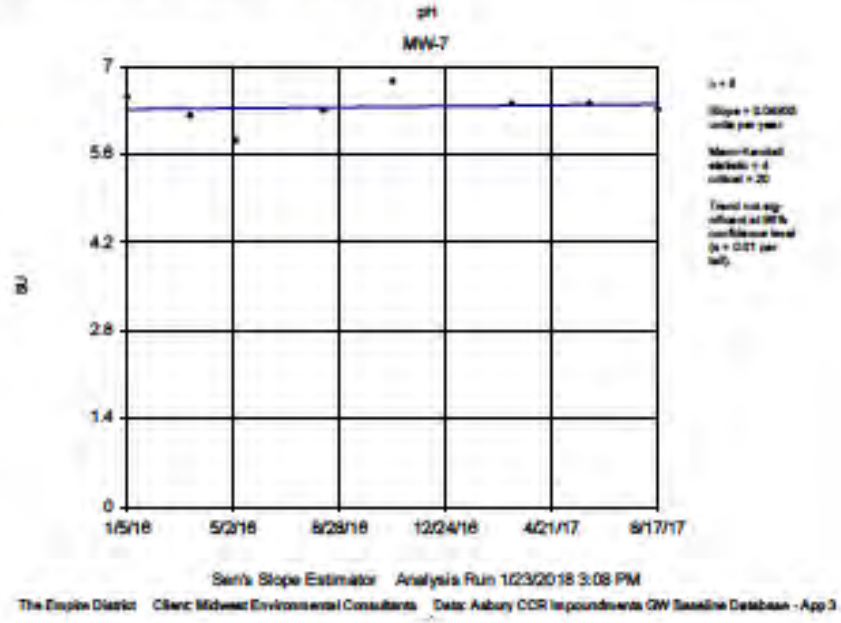
Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3



Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

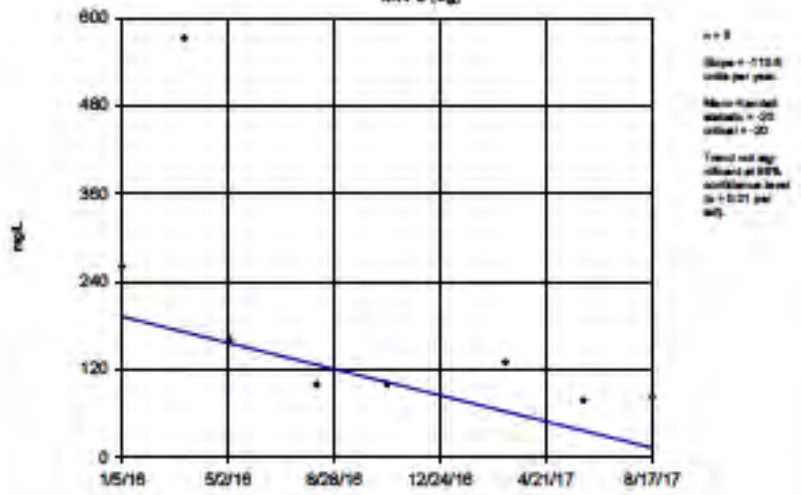


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Sulfate

MW-2 (bg)

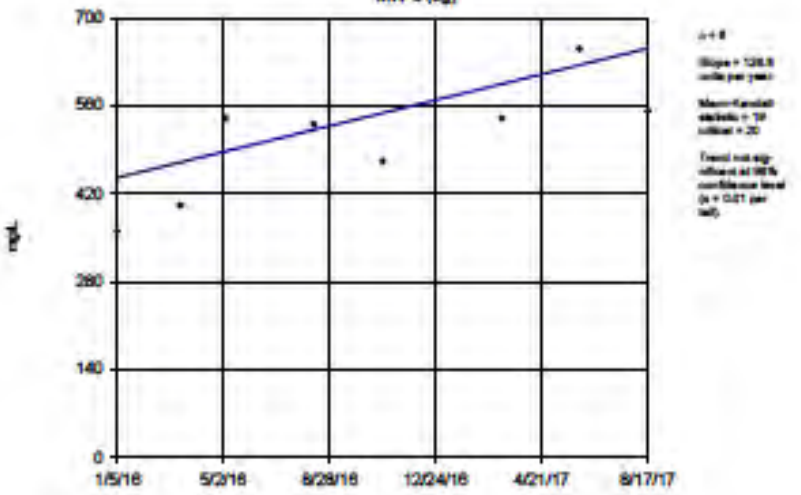


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Sulfate

MW-3 (bg)

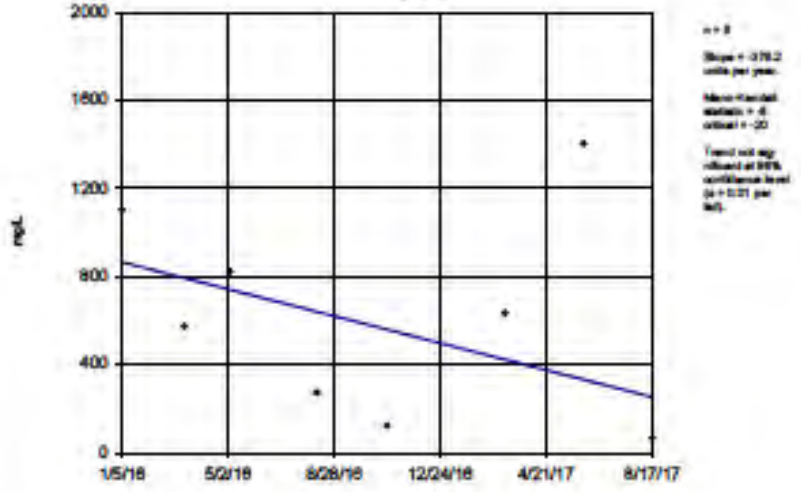


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Sulfate

MW-4

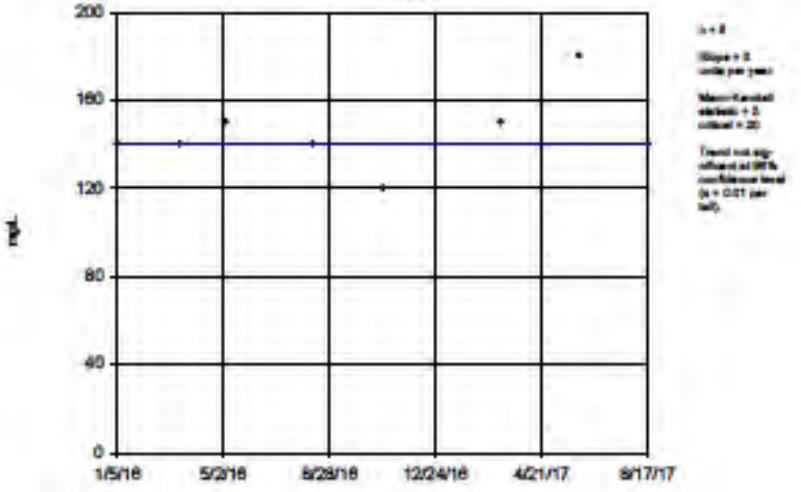


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Sulfate

MW-5

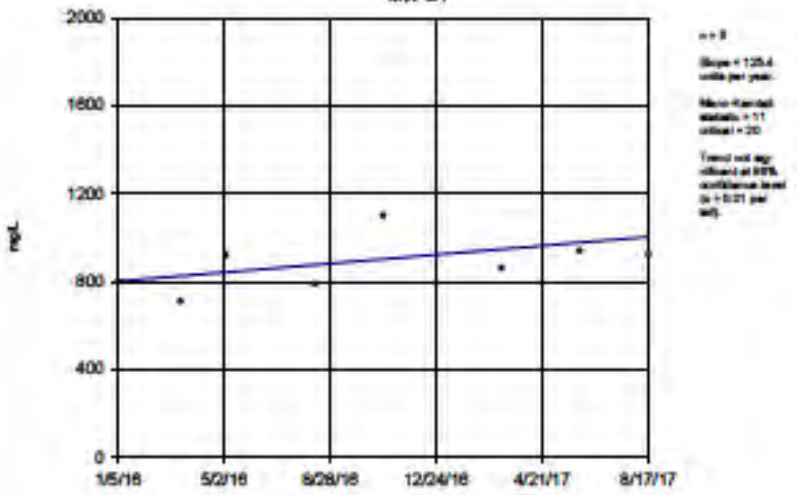


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Sulfate

MW-5A

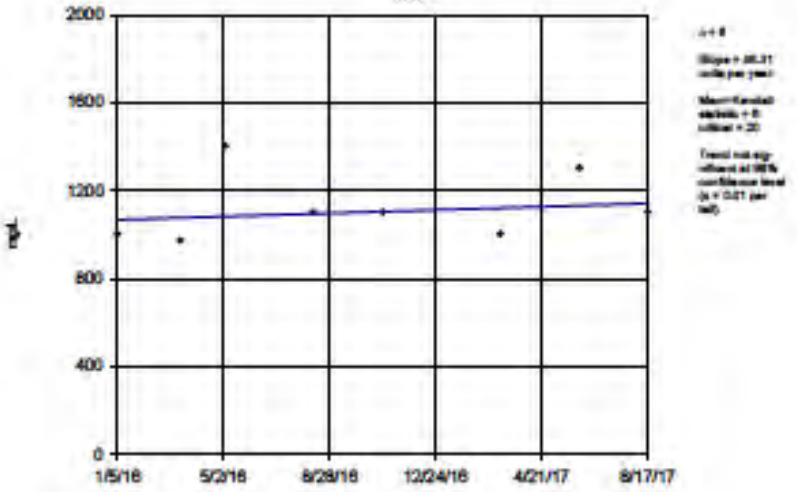


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Sulfate

MW-6

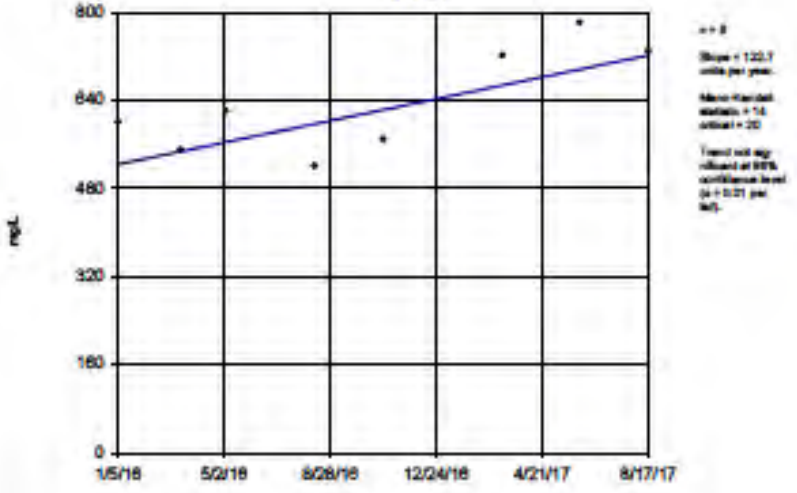


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Sulfate

MW-6A

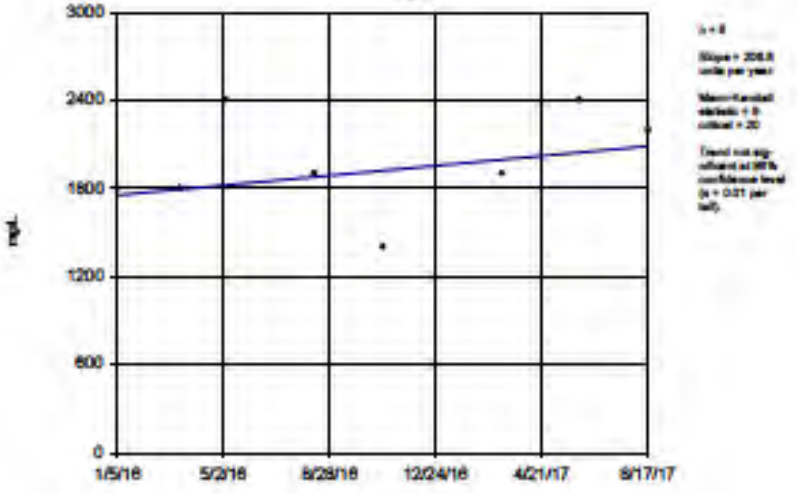


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Sulfate

MW-7

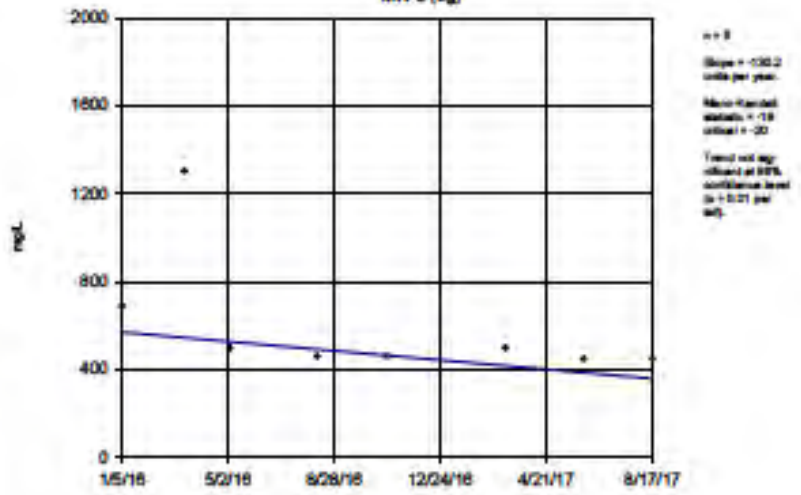


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Total Dissolved Solids

MW-2 (bg)

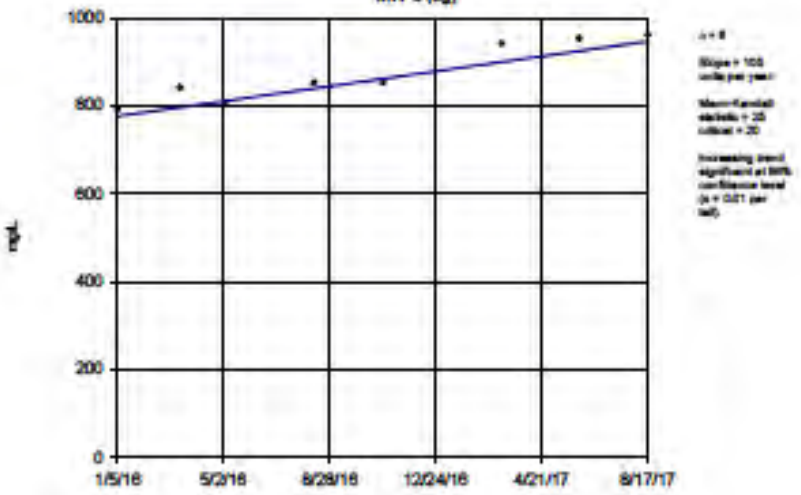


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Total Dissolved Solids

MW-3 (bg)

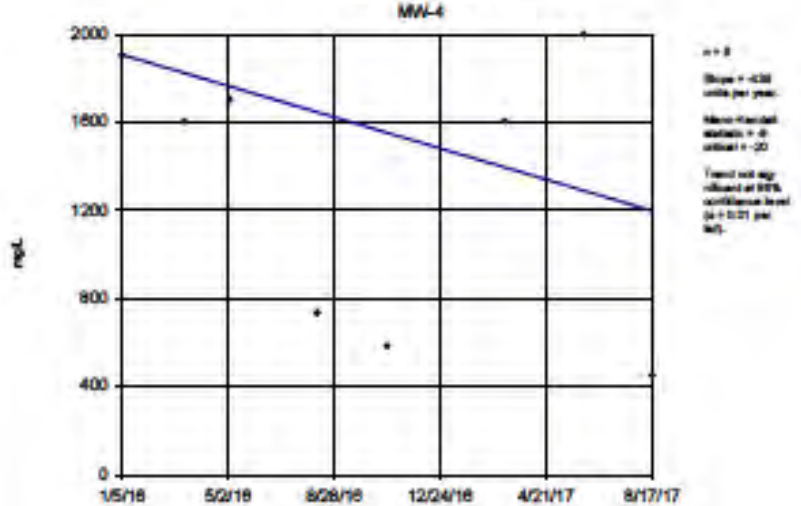


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Total Dissolved Solids

MW-4

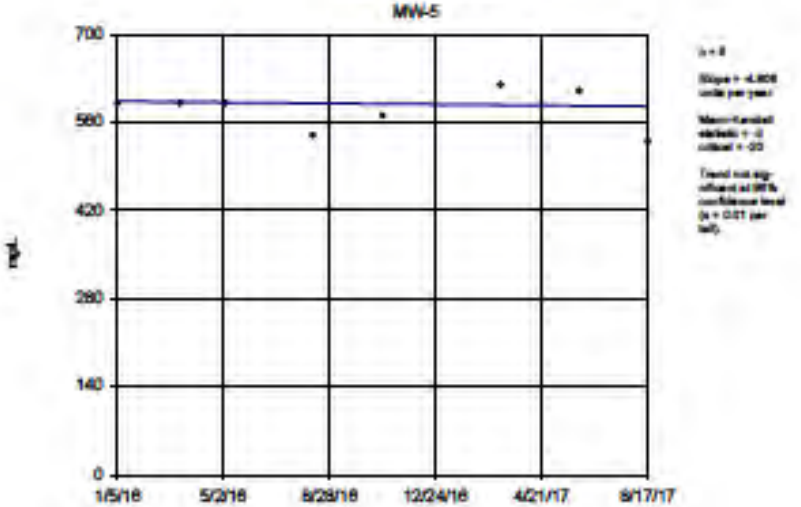


Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

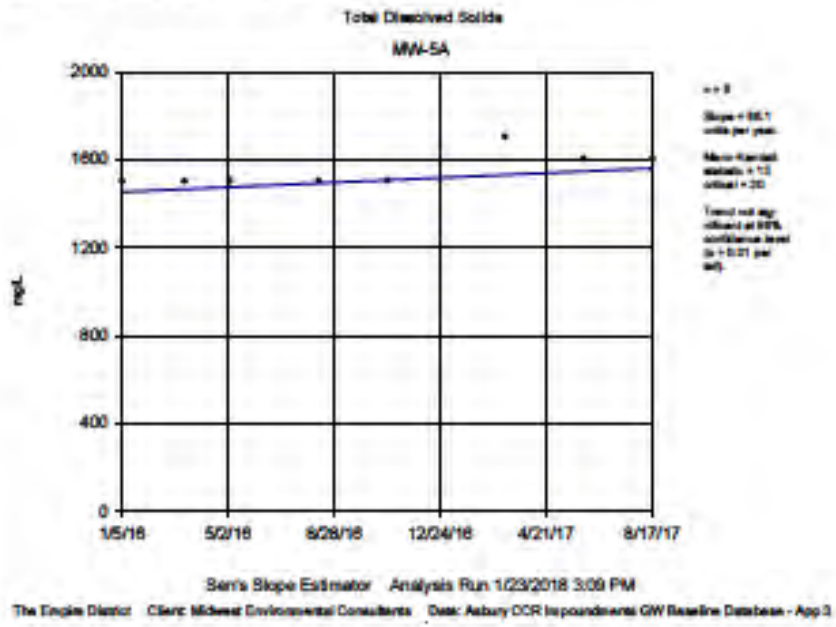
Total Dissolved Solids

MW-5



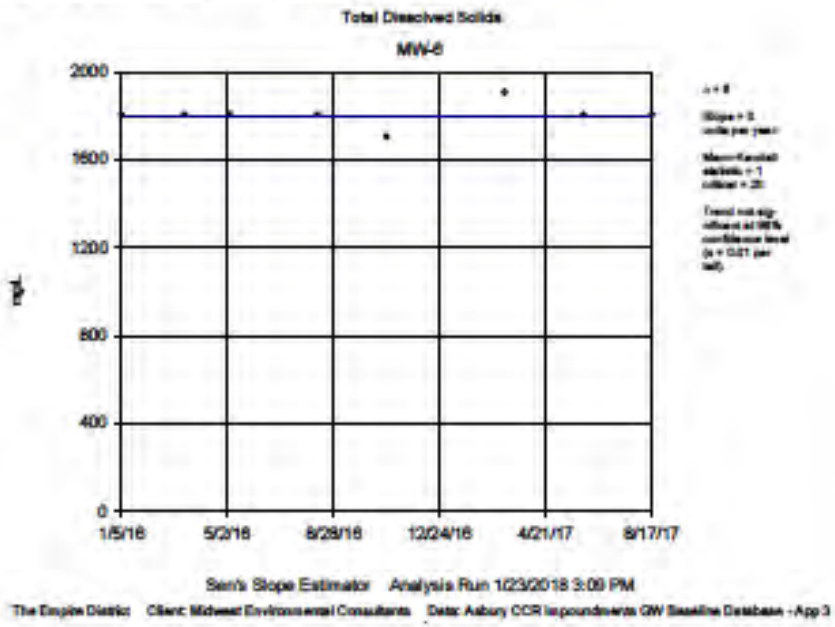
Sen's Slope Estimator Analysis Run 1/23/2018 3:08 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3



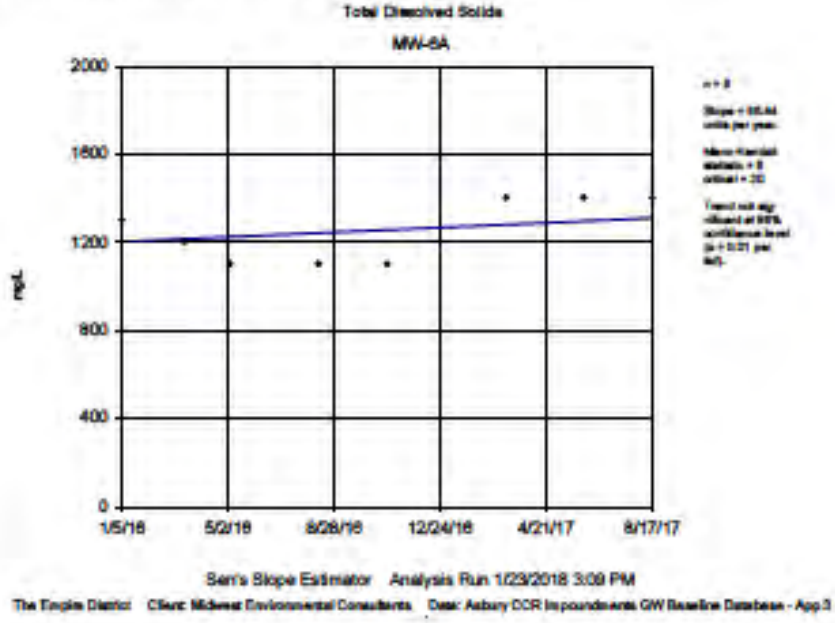
Sen's Slope Estimator Analysis Run 1/23/2018 3:09 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3



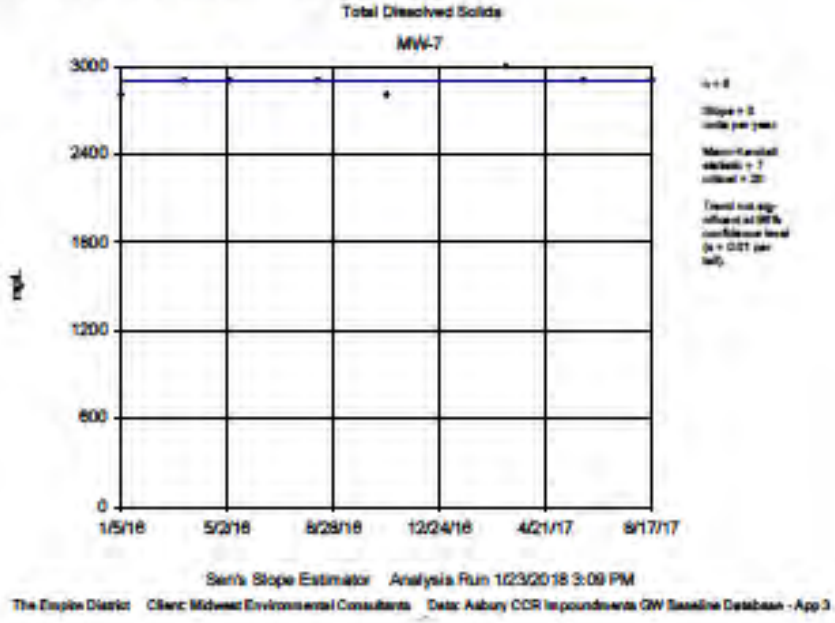
Sen's Slope Estimator Analysis Run 1/23/2018 3:09 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3



Sen's Slope Estimator Analysis Run 1/23/2018 3:09 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3



Sen's Slope Estimator Analysis Run 1/23/2018 3:09 PM

The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App.3

Trend Test

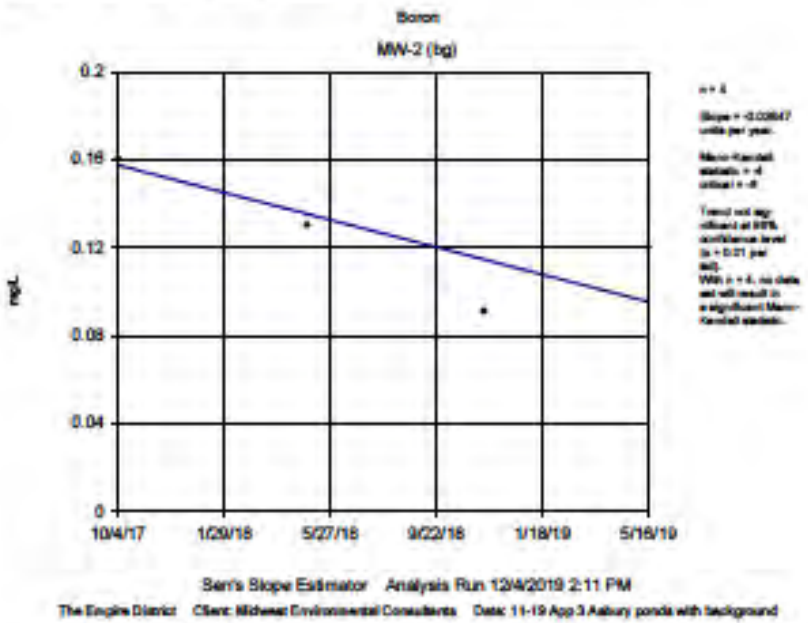
The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3 only Printed 1/23/2018, 3:10 PM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Boron (mg/L)	MW-2 (bg)	-0.08868	-16	-20	No	8	0	n/a	n/a	0.02	NP
Boron (mg/L)	**MW-3 (bg)**	**-0.01787**	**-21**	**-20**	**Yes**	**8**	**50**	**n/a**	**n/a**	**0.02**	**NP**
Boron (mg/L)	MW-4	0	-1	-20	No	8	62.5	n/a	n/a	0.02	NP
Boron (mg/L)	MW-5	0	0	20	No	8	12.5	n/a	n/a	0.02	NP
Boron (mg/L)	MW-5A	0.03993	18	20	No	8	12.5	n/a	n/a	0.02	NP
Boron (mg/L)	MW-6	0.06117	14	20	No	8	12.5	n/a	n/a	0.02	NP
Boron (mg/L)	MW-6A	0.08497	19	20	No	8	12.5	n/a	n/a	0.02	NP
Boron (mg/L)	MW-7	0	2	20	No	8	12.5	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-2 (bg)	-0.8333	-2	-20	No	8	0	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-3 (bg)	15.6	18	20	No	8	0	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-4	-36.95	-6	-20	No	8	0	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-5	-4.395	-3	-20	No	8	0	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-5A	16.74	10	20	No	8	0	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-6	7.67	8	20	No	8	0	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-6A	25.16	12	20	No	8	0	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-7	-5.401	0	20	No	8	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-2 (bg)	0	-8	-20	No	8	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-3 (bg)	-24.13	-20	-20	No	8	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-4	-27.17	-8	-20	No	8	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-5	0.3955	10	20	No	8	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-5A	-5.487	-8	-20	No	8	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-6	1.735	14	20	No	8	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-6A	-9.402	-10	-20	No	8	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-7	3.19	7	20	No	8	0	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-2 (bg)	-0.02016	-8	-20	No	8	0	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-3 (bg)	-0.1295	-16	-20	No	8	0	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-4	-0.00...	0	20	No	8	12.5	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-5	-0.0291	-4	-20	No	8	0	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-5A	0.08456	15	20	No	8	0	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-6	0.00928	4	20	No	8	0	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-6A	0.03022	4	20	No	8	0	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-7	0.06113	13	20	No	8	12.5	n/a	n/a	0.02	NP
pH (SU)	MW-2 (bg)	0.2618	8	20	No	8	0	n/a	n/a	0.02	NP
pH (SU)	MW-3 (bg)	0.01982	2	20	No	8	0	n/a	n/a	0.02	NP
pH (SU)	MW-4	0.2307	4	20	No	8	0	n/a	n/a	0.02	NP
pH (SU)	MW-5	0.05967	4	20	No	8	0	n/a	n/a	0.02	NP
pH (SU)	MW-5A	0.0211	1	20	No	8	0	n/a	n/a	0.02	NP
pH (SU)	MW-6	0.2471	14	20	No	8	0	n/a	n/a	0.02	NP
pH (SU)	MW-6A	0.08386	7	20	No	8	0	n/a	n/a	0.02	NP
pH (SU)	MW-7	0.04935	4	20	No	8	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	MW-2 (bg)	-110.6	-20	-20	No	8	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	MW-3 (bg)	126.8	19	20	No	8	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	MW-4	-379.2	-8	-20	No	8	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	MW-5	0	5	20	No	8	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	MW-5A	125.4	11	20	No	8	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	MW-6	46.31	6	20	No	8	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	MW-6A	122.7	14	20	No	8	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	MW-7	206.6	9	20	No	8	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-2 (bg)	-130.2	-19	-20	No	8	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	**MW-3 (bg)**	**105**	**25**	**20**	**Yes**	**8**	**0**	**n/a**	**n/a**	**0.02**	**NP**

Trend Test

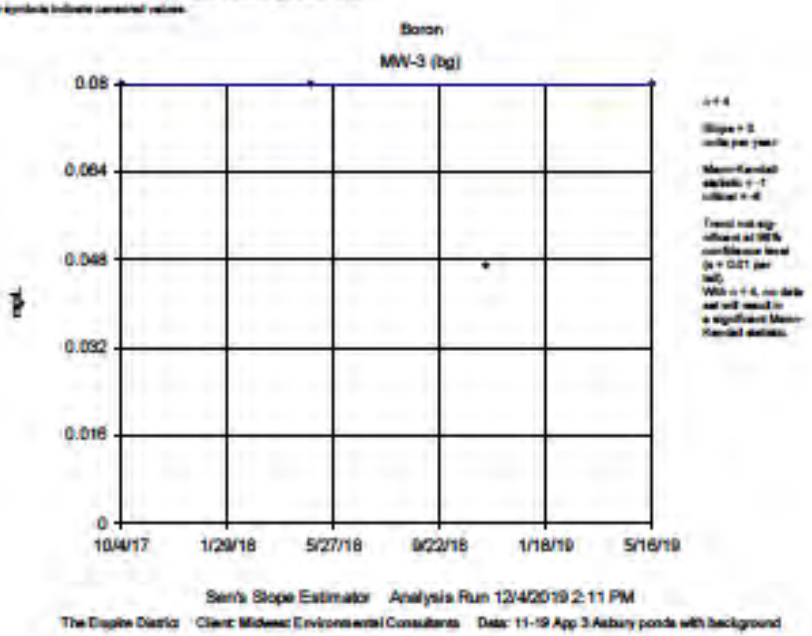
The Empire District Client: Midwest Environmental Consultants Data: Asbury CCR Impoundments GW Baseline Database - App 3 only Printed 1/23/2018, 3:10 PM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Total Dissolved Solids (mg/L)	MW-4	-439	-9	-20	No	8	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-5	-4.905	-3	-20	No	8	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-5A	66.1	13	20	No	8	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-6	0	1	20	No	8	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-6A	66.44	8	20	No	8	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-7	0	7	20	No	8	0	n/a	n/a	0.02	NP



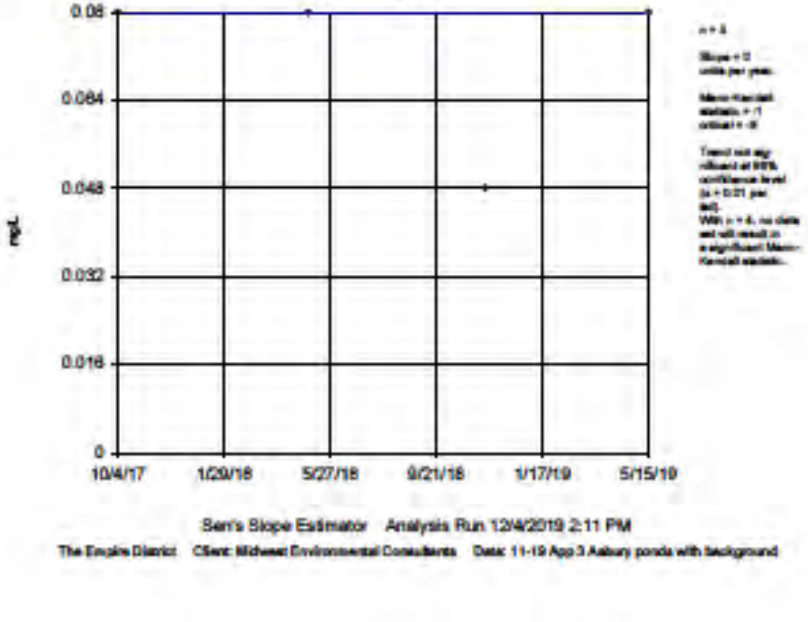
Sen's Slope Estimator Analysis Run 12/4/2019 2:11 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background



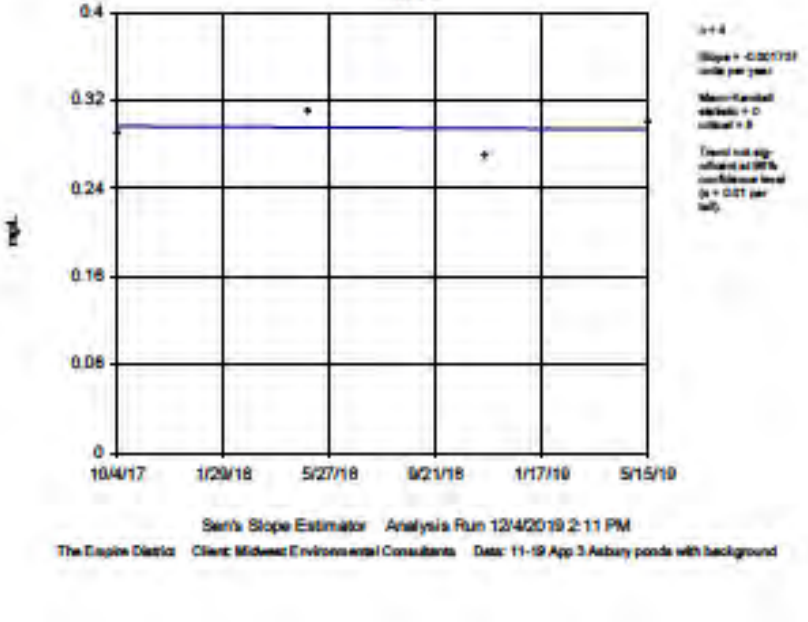
Sen's Slope Estimator Analysis Run 12/4/2019 2:11 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background



Sen's Slope Estimator Analysis Run 12/4/2019 2:11 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

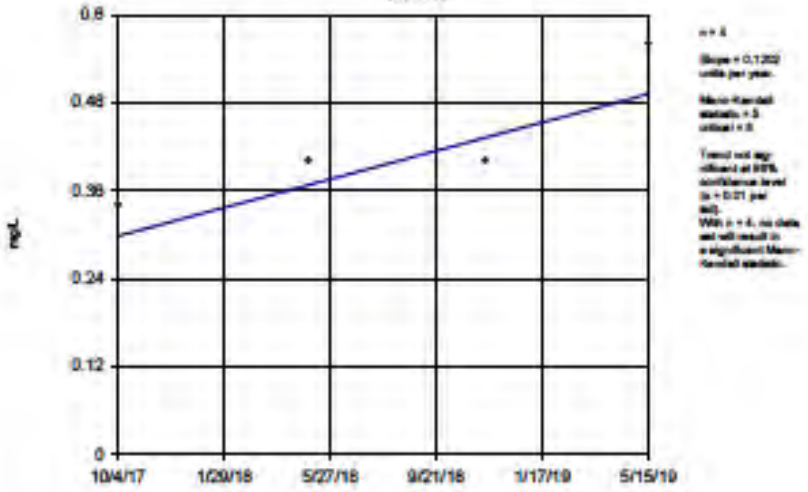


Sen's Slope Estimator Analysis Run 12/4/2019 2:11 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Boron

MW-5A

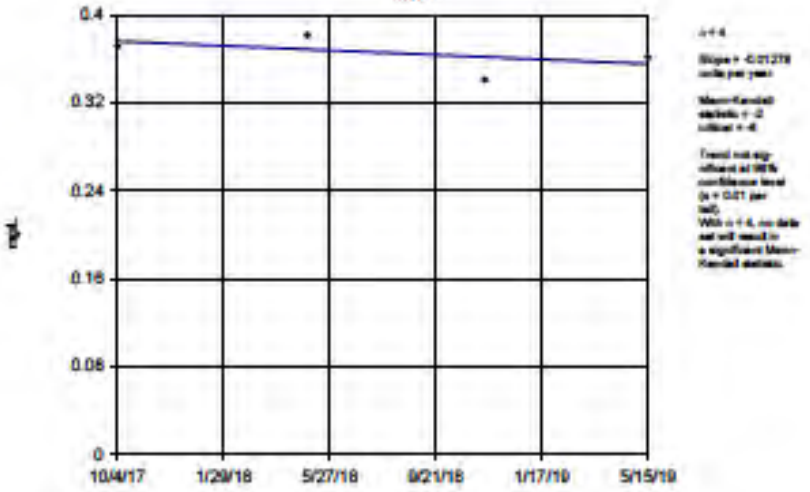


Sen's Slope Estimator Analysis Run 12/4/2019 2:11 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Boron

MW-6

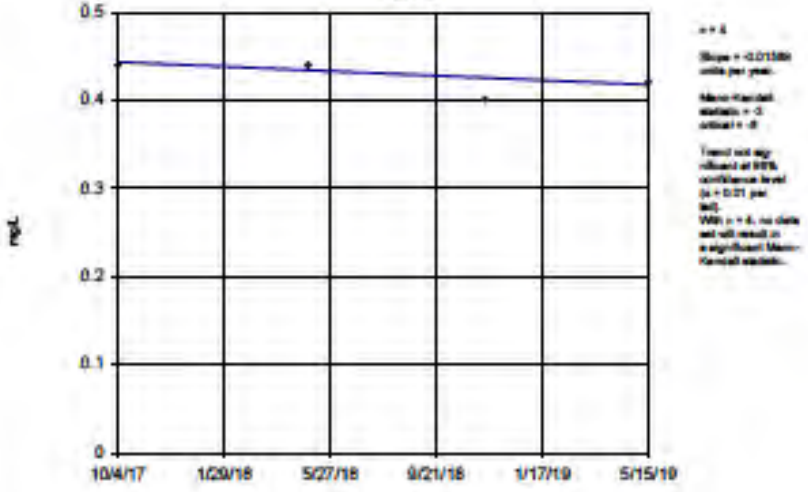


Sen's Slope Estimator Analysis Run 12/4/2019 2:11 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Boron

MW-8A

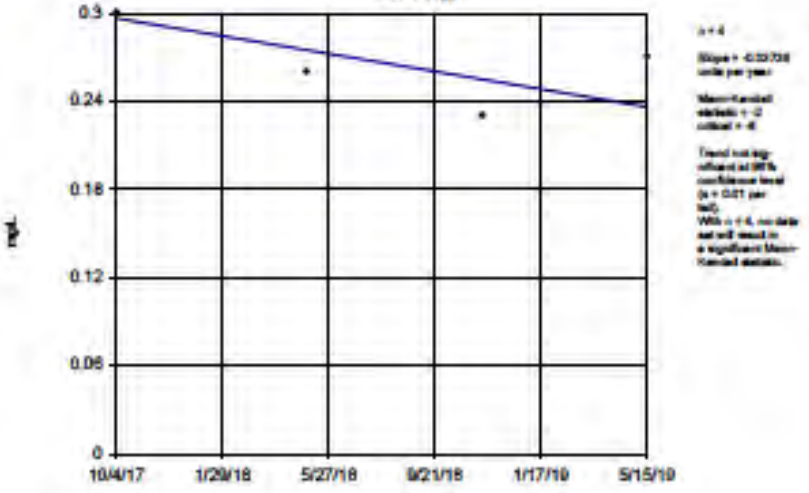


Sen's Slope Estimator Analysis Run 12/4/2019 2:11 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Boron

MW-7 (bg)

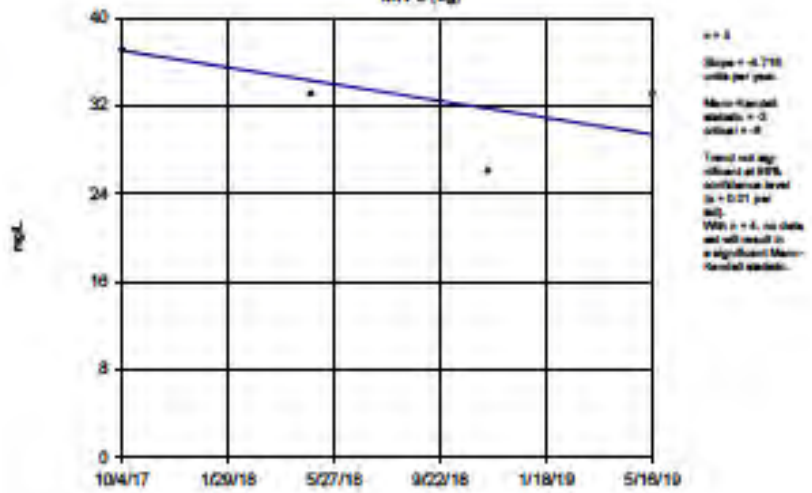


Sen's Slope Estimator Analysis Run 12/4/2019 2:11 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Calcium

MW-2 (bg)

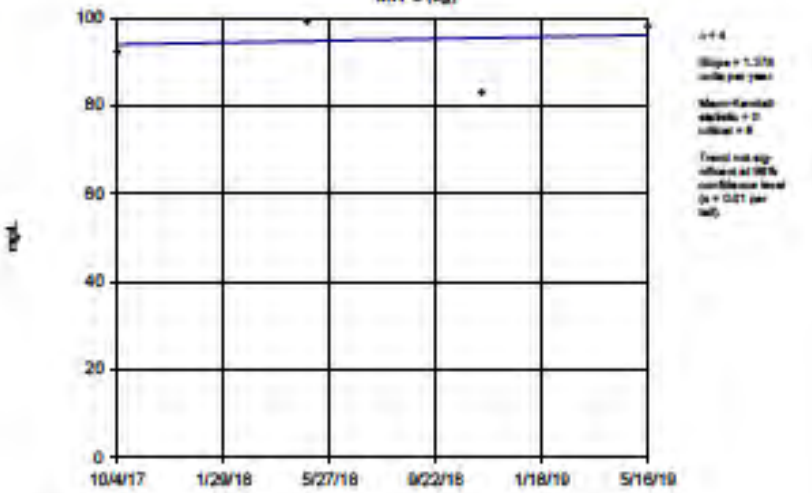


Sen's Slope Estimator Analysis Run 12/4/2019 2:11 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Calcium

MW-3 (bg)

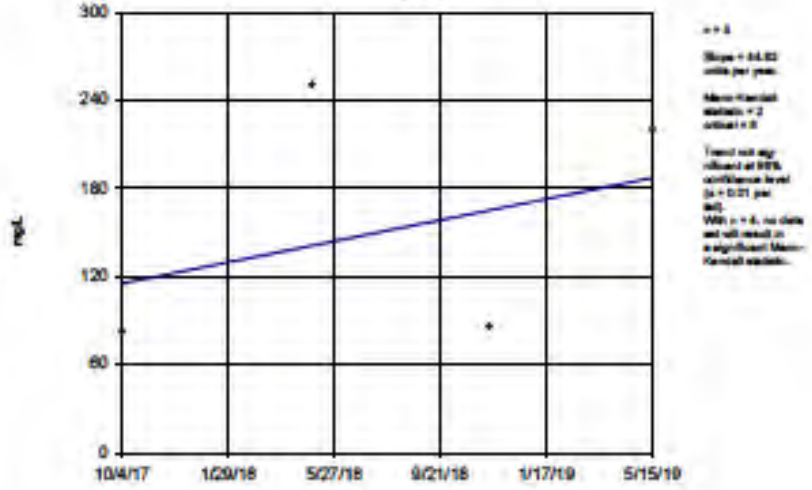


Sen's Slope Estimator Analysis Run 12/4/2019 2:11 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Calcium

MW-4

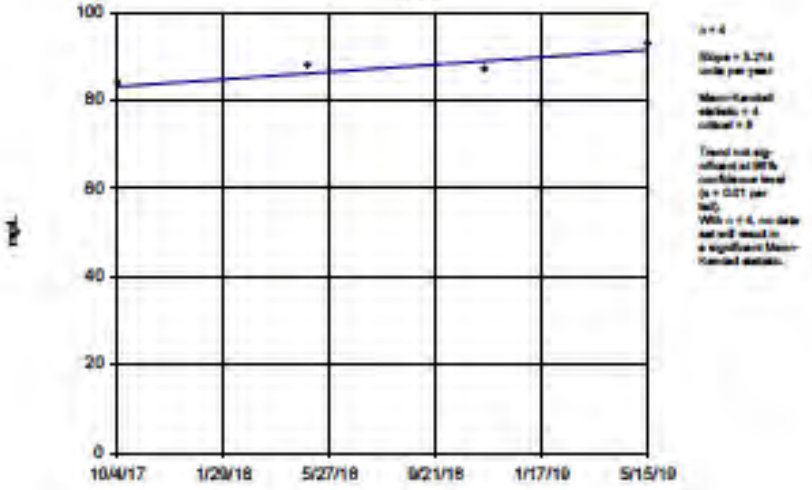


Sen's Slope Estimator Analysis Run 12/4/2019 2:11 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Calcium

MW-5

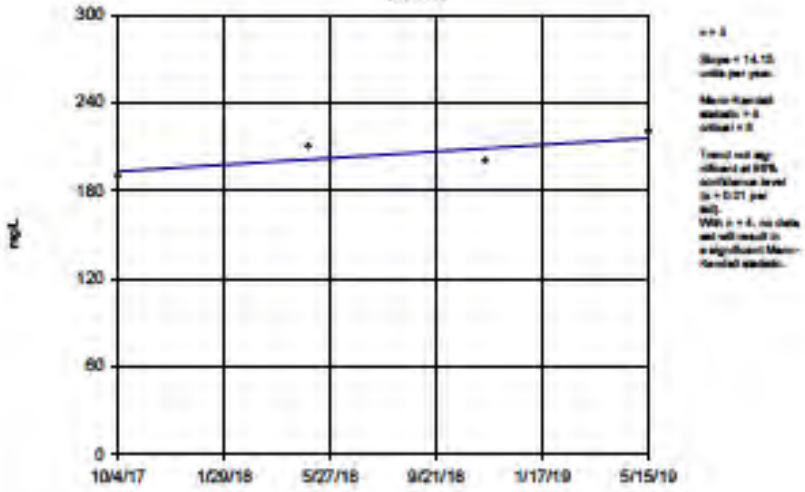


Sen's Slope Estimator Analysis Run 12/4/2019 2:11 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Calcium

MW-5A

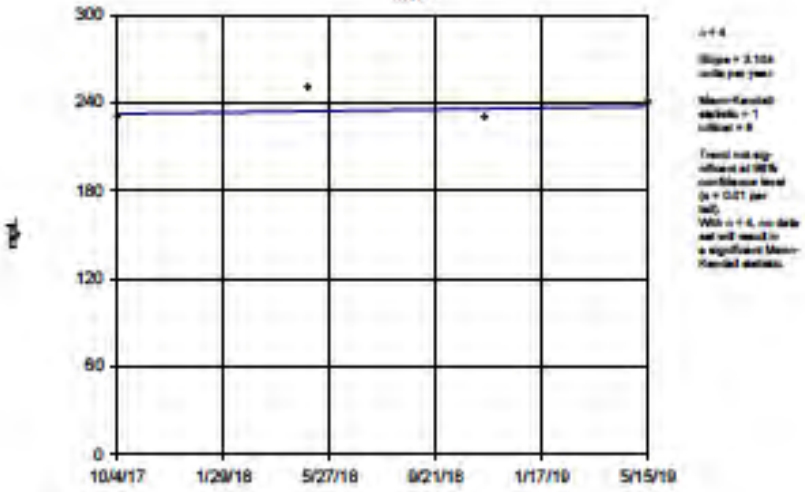


Sen's Slope Estimator Analysis Run 12/4/2019 2:11 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Calcium

MW-6

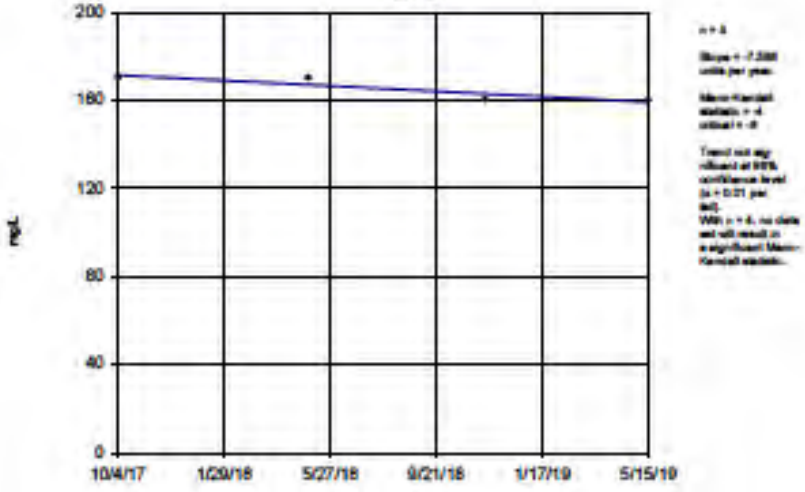


Sen's Slope Estimator Analysis Run 12/4/2019 2:11 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Calcium

MW-8A

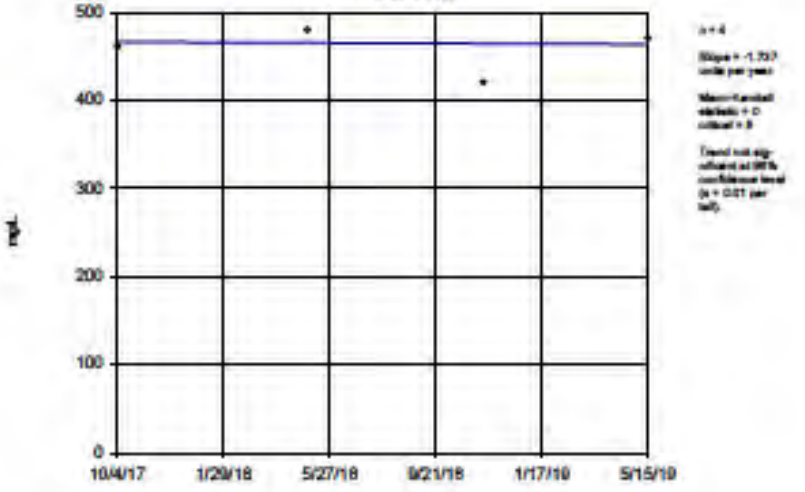


Sen's Slope Estimator Analysis Run 12/4/2019 2:11 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Calcium

MW-7 (bg)

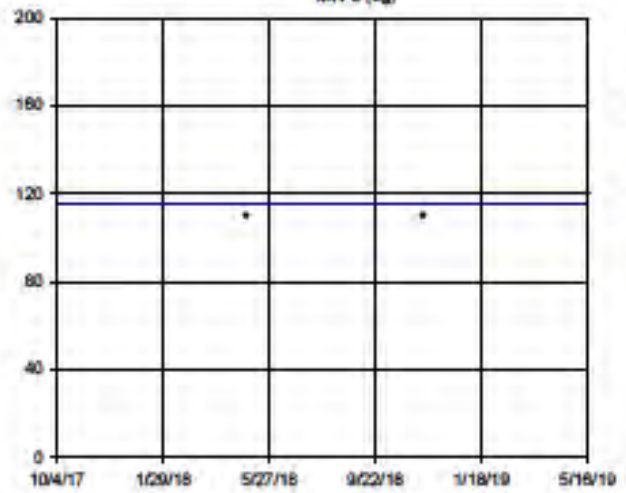


Sen's Slope Estimator Analysis Run 12/4/2019 2:11 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Chloride

MW-2 (bg)

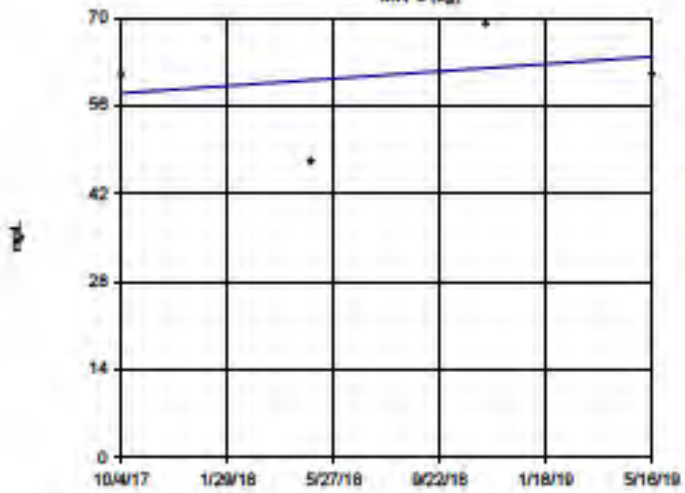


Sen's Slope Estimator Analysis Run 12/4/2019 2:11 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Chloride

MW-3 (bg)

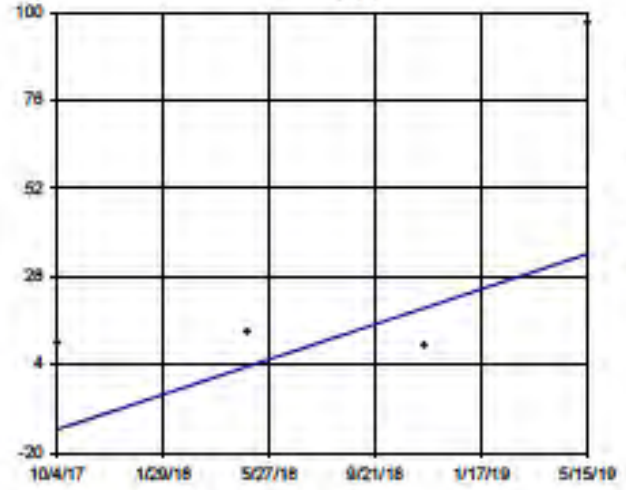


Sen's Slope Estimator Analysis Run 12/4/2019 2:11 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Chloride

MW-4

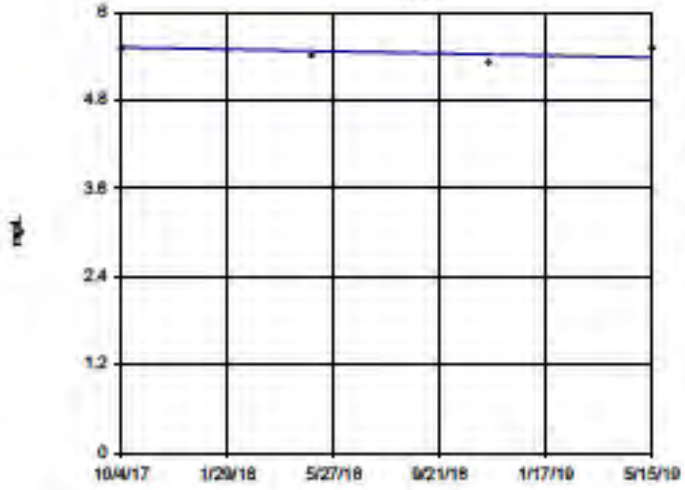


Sen's Slope Estimator Analysis Run 12/4/2019 2:11 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Chloride

MW-5

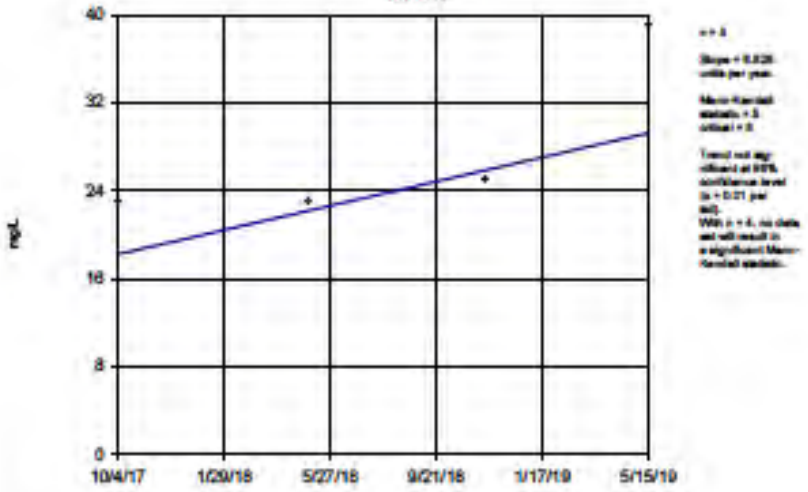


Sen's Slope Estimator Analysis Run 12/4/2019 2:11 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Chloride

MW-5A

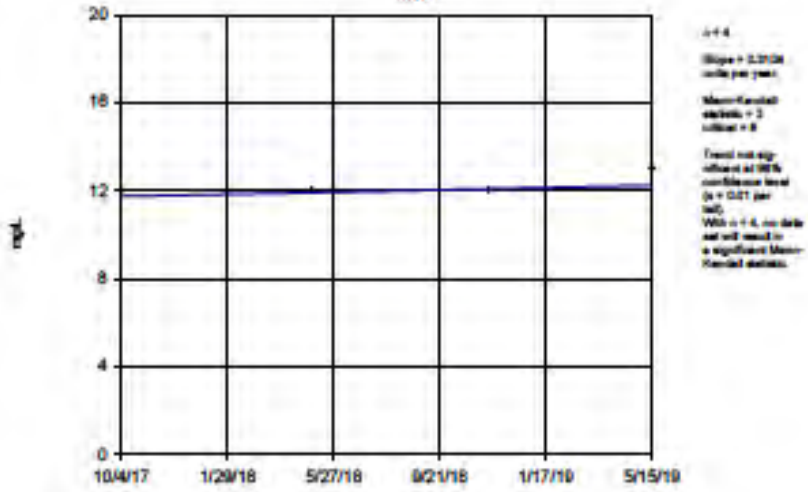


Sen's Slope Estimator Analysis Run 12/4/2019 2:11 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Chloride

MW-6

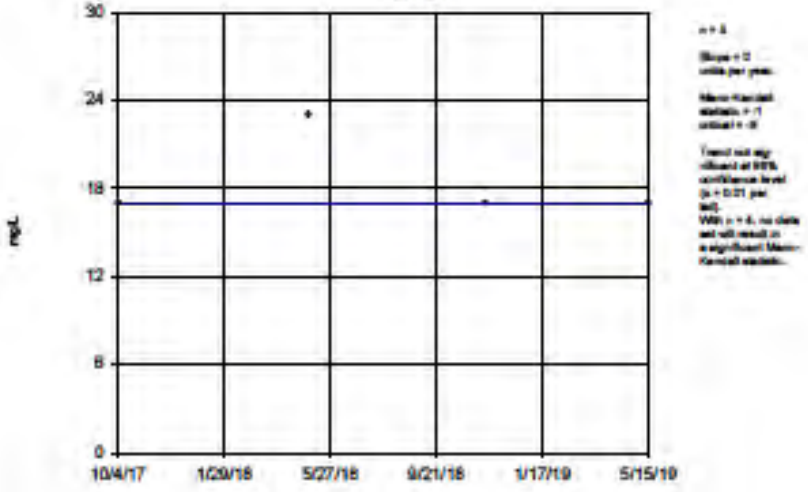


Sen's Slope Estimator Analysis Run 12/4/2019 2:11 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Chloride

MW-8A

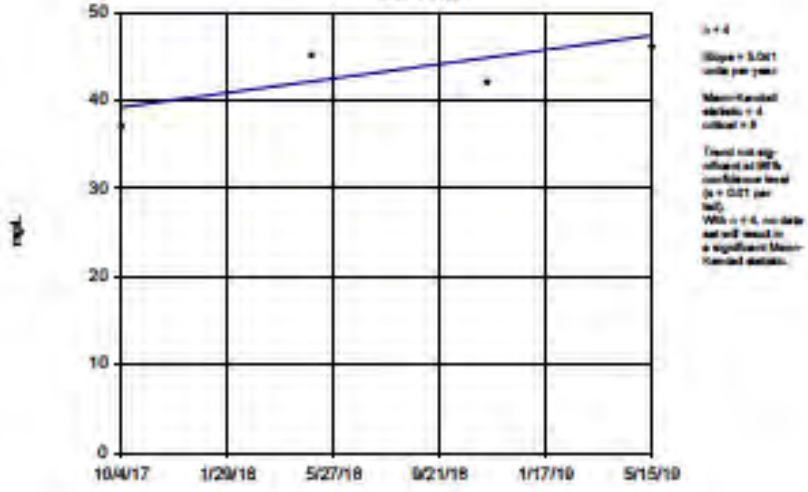


Sen's Slope Estimator Analysis Run 12/4/2019 2:11 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

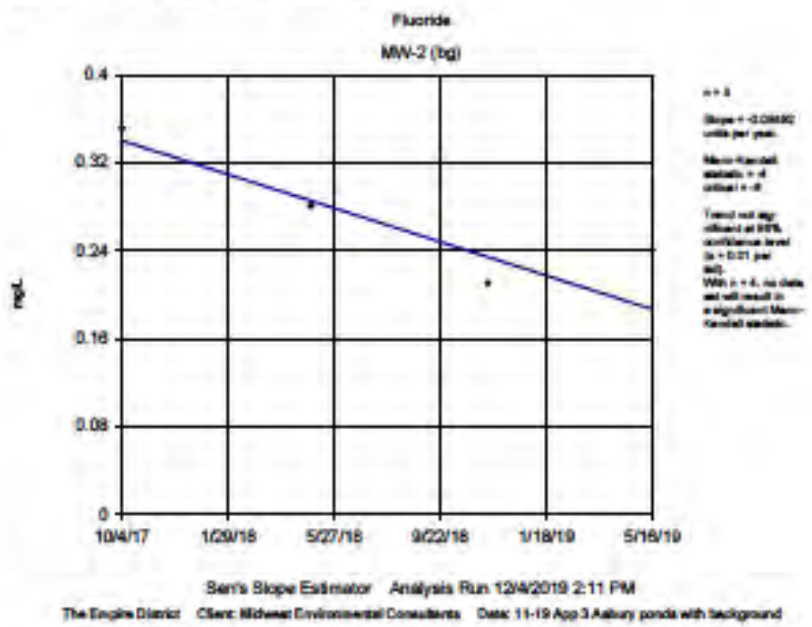
Chloride

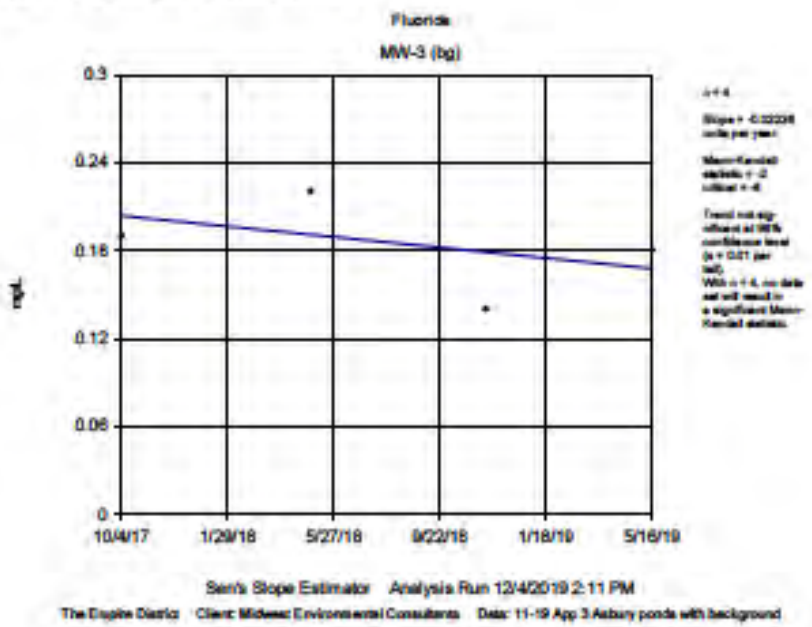
MW-7 (bg)

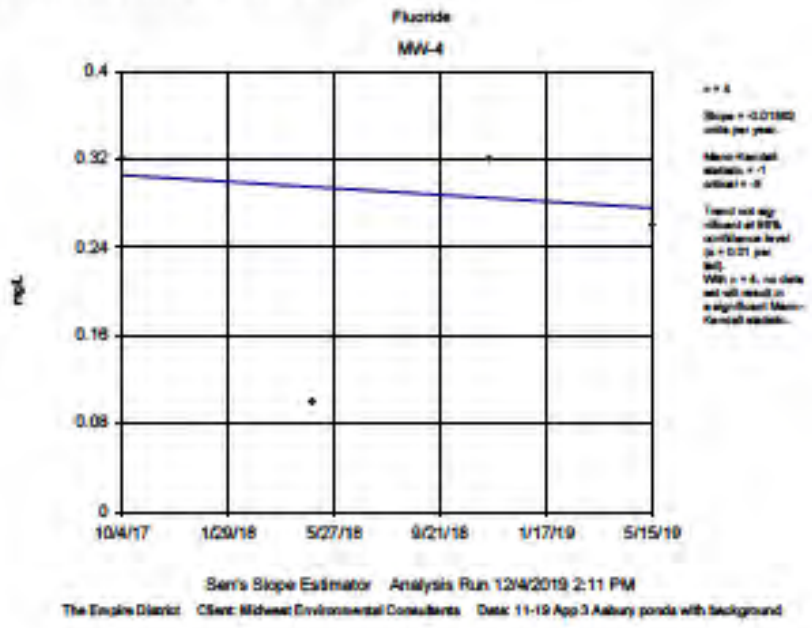


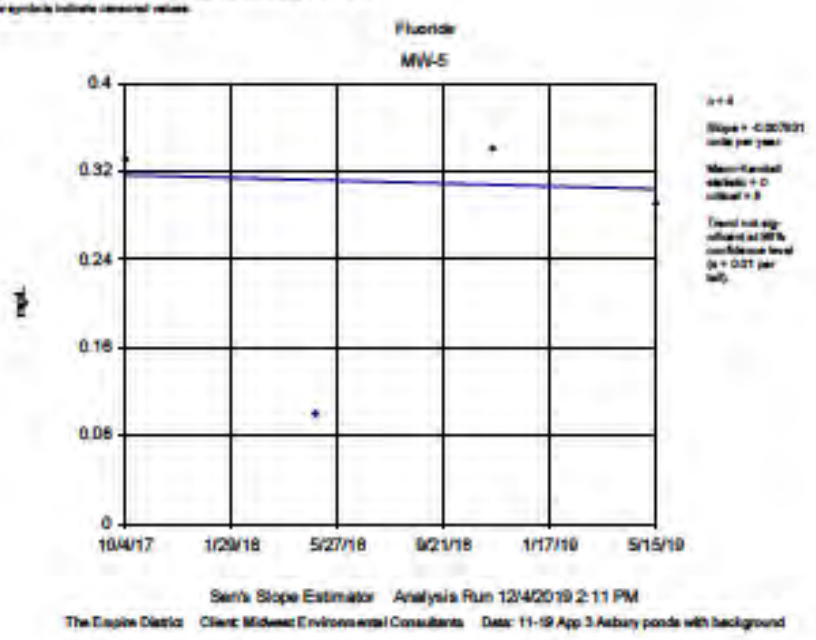
Sen's Slope Estimator Analysis Run 12/4/2019 2:11 PM

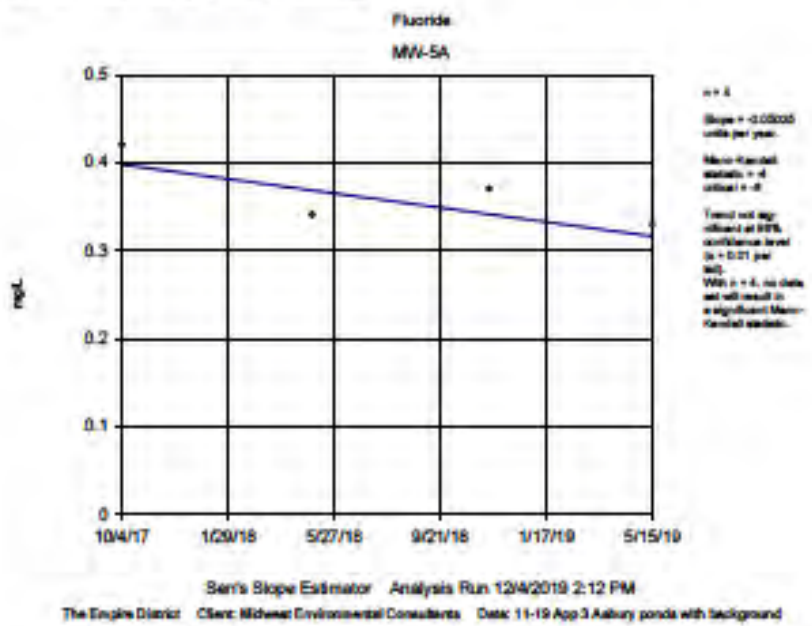
The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background


Fluoride
MW-2 (bg)
mg/L
0.4
0.32
0.24
0.16
0.08
0
10/4/17
1/29/18
5/27/18
9/22/18
1/18/19
5/16/19
Sen's Slope Estimator Analysis Run 12/4/2019 2:11 PM
The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background


Fluoride
MW-3 (bg)
mg/L
0.3
0.24
0.18
0.12
0.06
0
10/4/17
1/29/18
5/27/18
9/22/18
1/18/19
5/16/19
Sen's Slope Estimator Analysis Run 12/4/2019 2:11 PM
The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

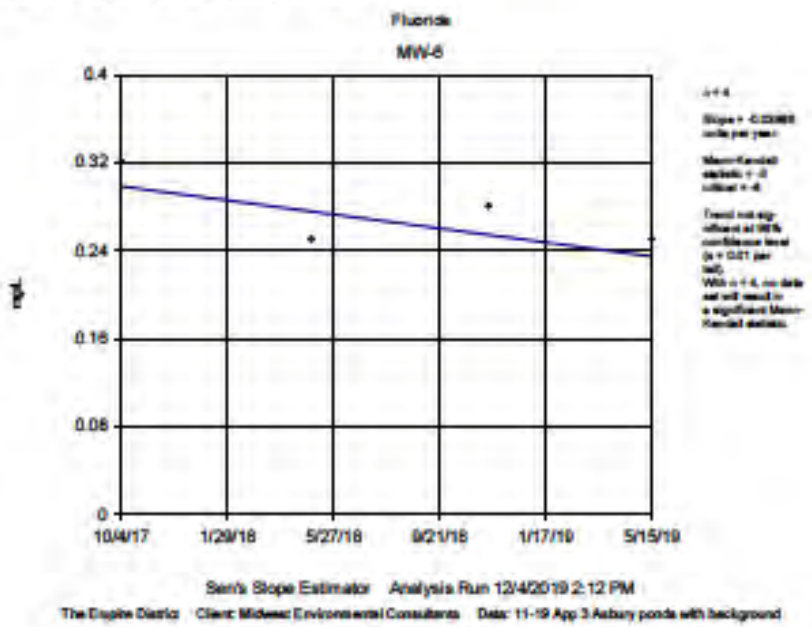

Fluoride
MW-4
mg/L
0.4
0.32
0.24
0.16
0.08
0
10/4/17
1/29/18
5/27/18
9/21/18
1/17/19
5/15/19
Sen's Slope Estimator Analysis Run 12/4/2019 2:11 PM
The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background


Fluoride
MW-5
mg/L
0.4
0.32
0.24
0.16
0.08
0
10/4/17
1/29/18
5/27/18
9/21/18
1/17/19
5/15/19
Sen's Slope Estimator Analysis Run 12/4/2019 2:11 PM
The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background



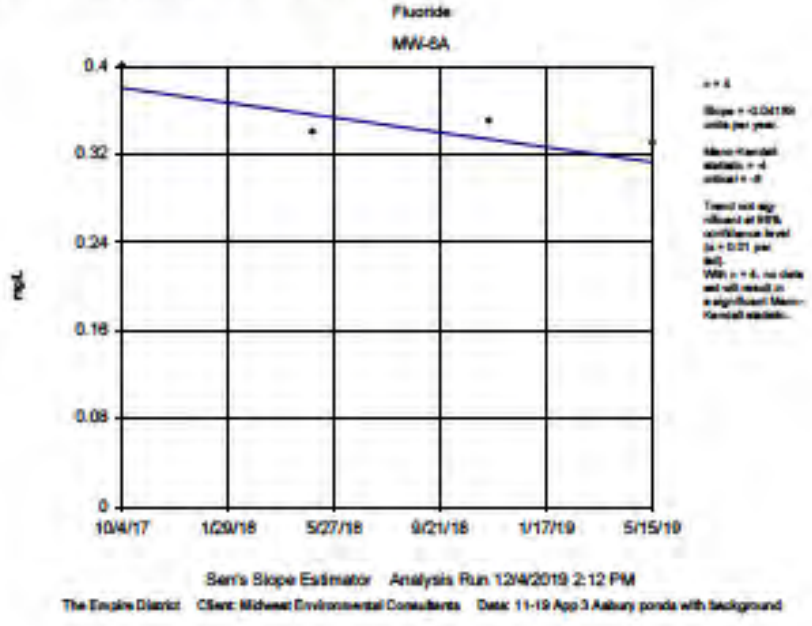
Sen's Slope Estimator Analysis Run 12/4/2019 2:12 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background



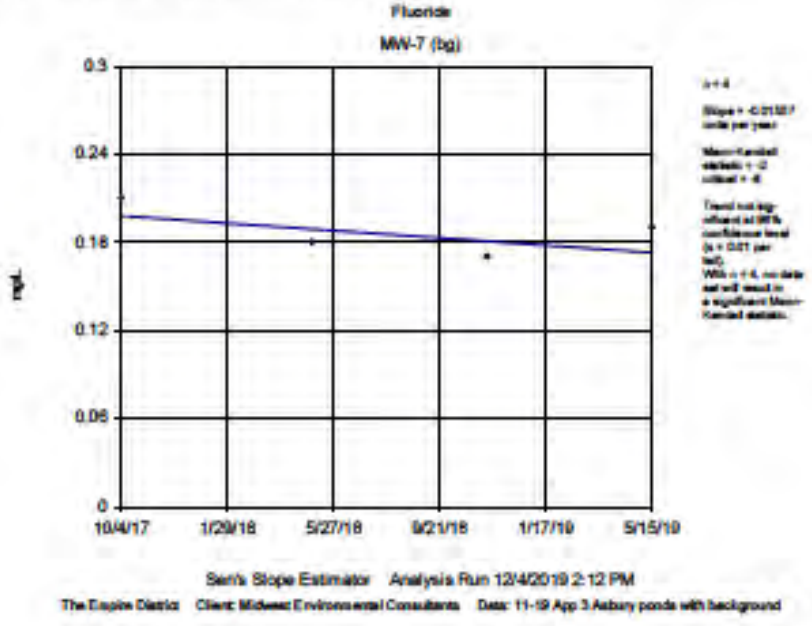
Sen's Slope Estimator Analysis Run 12/4/2019 2:12 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background



Sen's Slope Estimator Analysis Run 12/4/2019 2:12 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

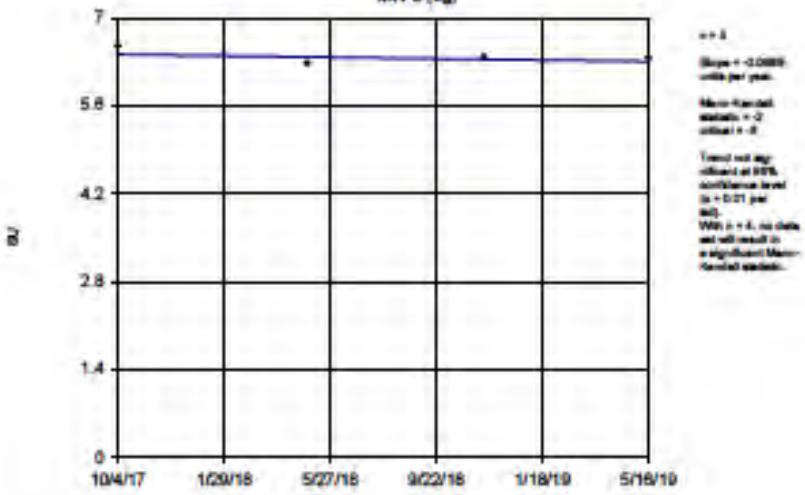


Sen's Slope Estimator Analysis Run 12/4/2019 2:12 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

pH

MW-2 (bg)

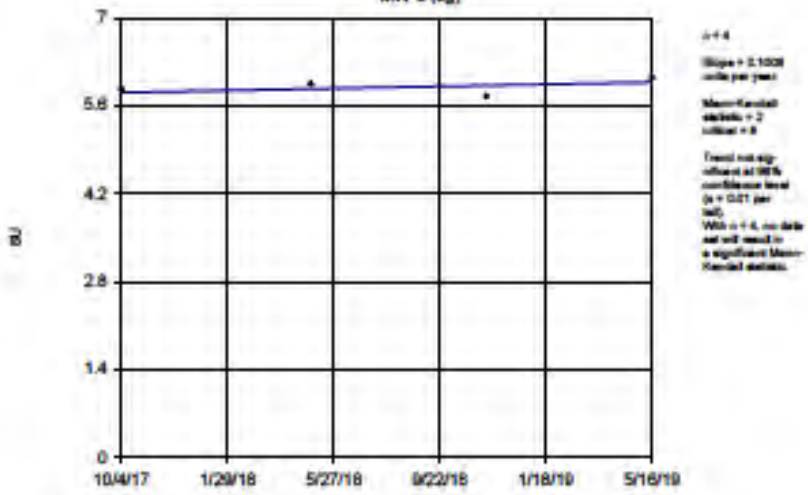


Sen's Slope Estimator Analysis Run 12/4/2019 2:12 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

pH

MW-3 (bg)

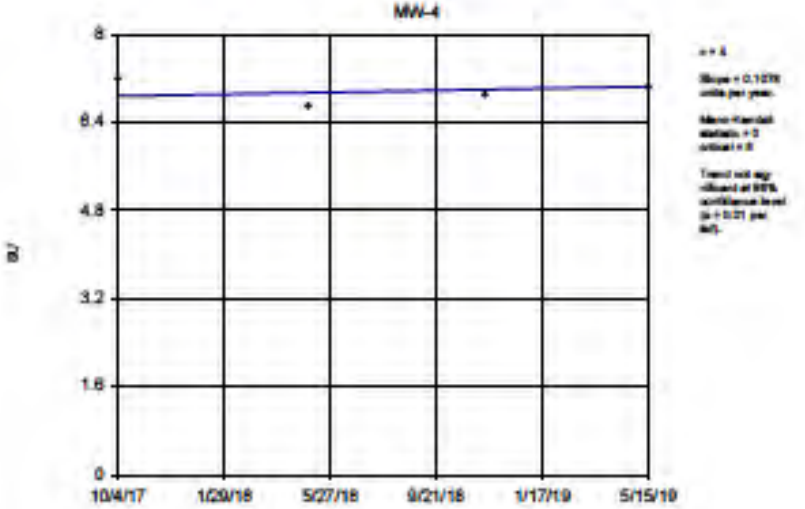


Sen's Slope Estimator Analysis Run 12/4/2019 2:12 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

pH

MW-4

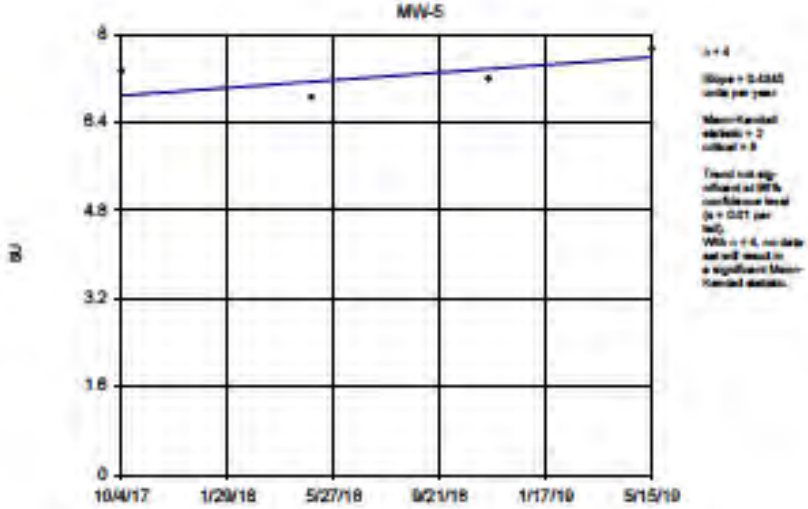


Sen's Slope Estimator Analysis Run 12/4/2019 2:12 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

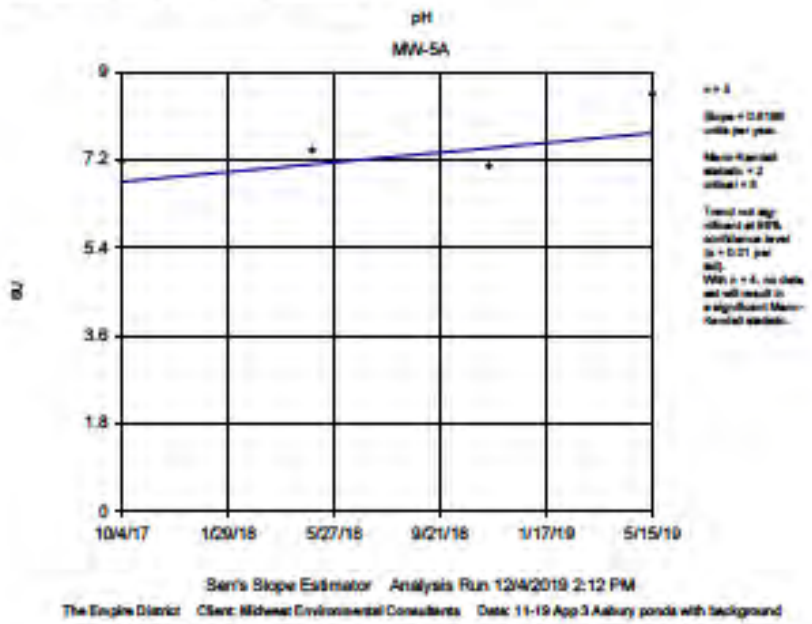
pH

MW-5



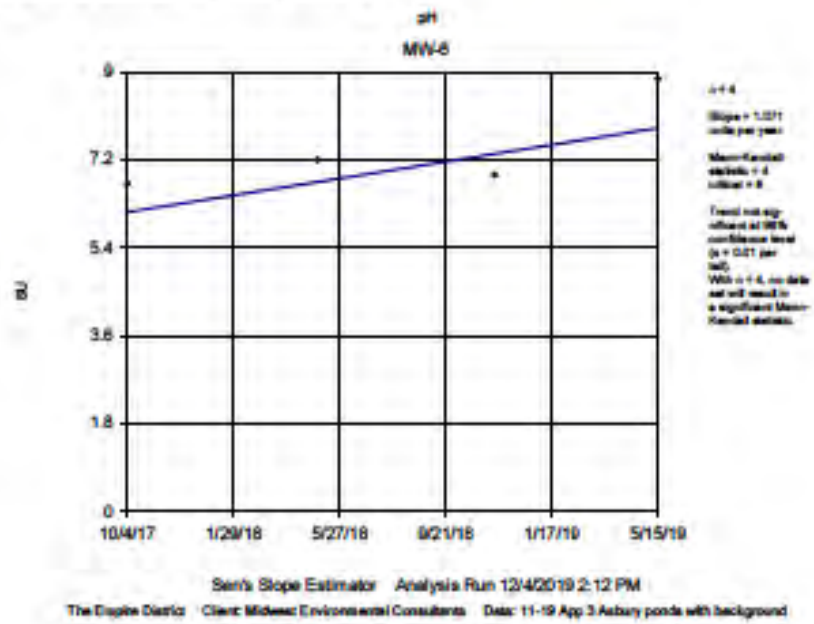
Sen's Slope Estimator Analysis Run 12/4/2019 2:12 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background



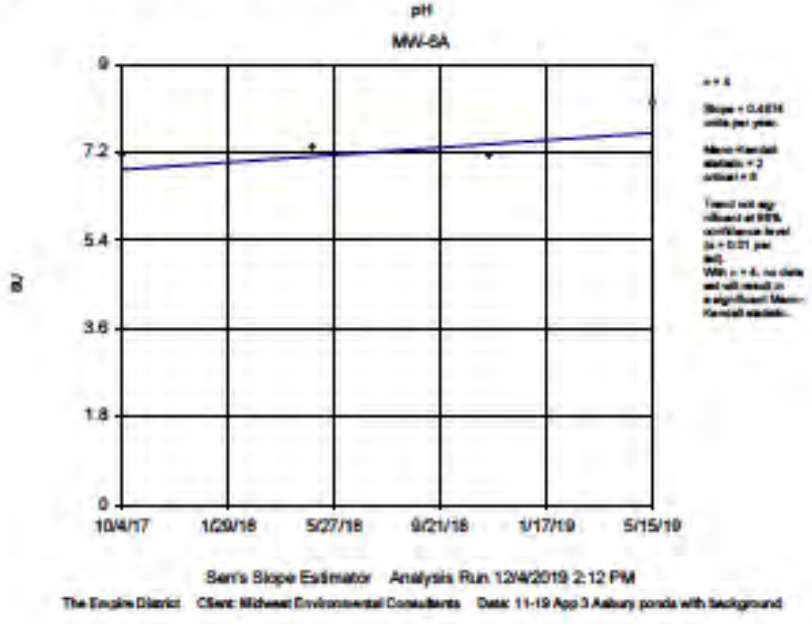
Sen's Slope Estimator Analysis Run 12/4/2019 2:12 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background



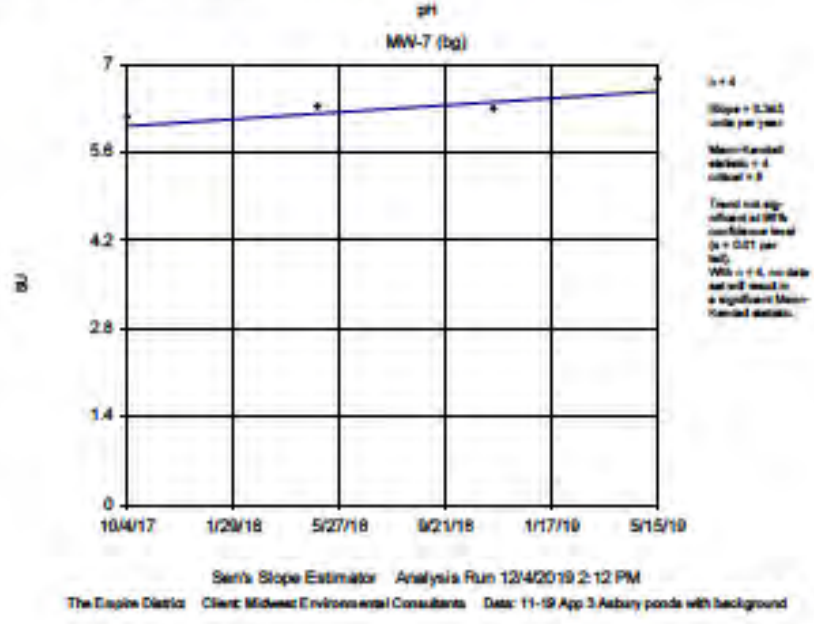
Sen's Slope Estimator Analysis Run 12/4/2019 2:12 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background



Sen's Slope Estimator Analysis Run 12/4/2019 2:12 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

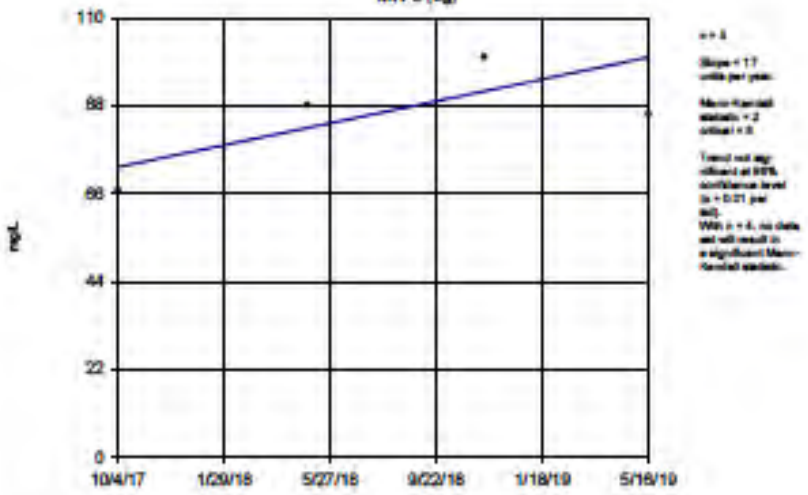


Sen's Slope Estimator Analysis Run 12/4/2019 2:12 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Sulfate

MW-2 (bg)

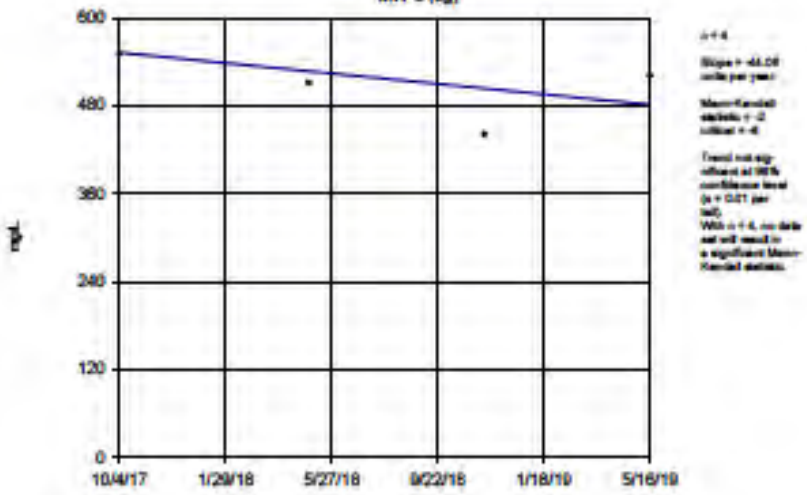


Sen's Slope Estimator Analysis Run 12/4/2019 2:12 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Sulfate

MW-3 (bg)

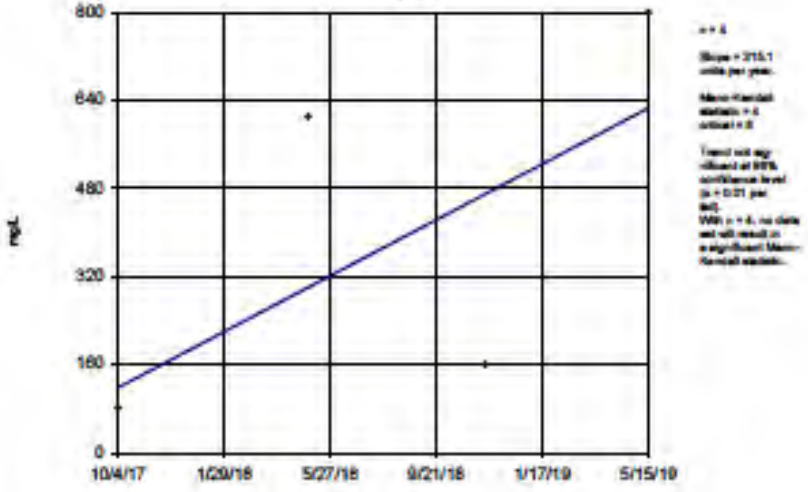


Sen's Slope Estimator Analysis Run 12/4/2019 2:12 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Sulfate

MW-4

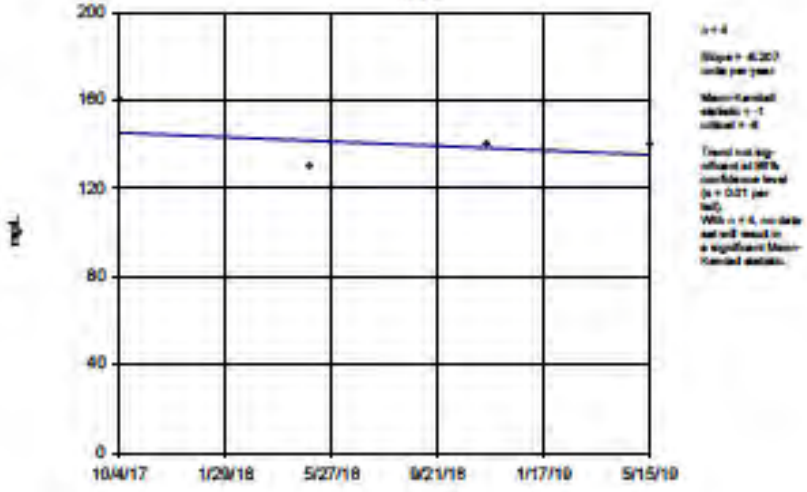


Sen's Slope Estimator Analysis Run 12/4/2019 2:12 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

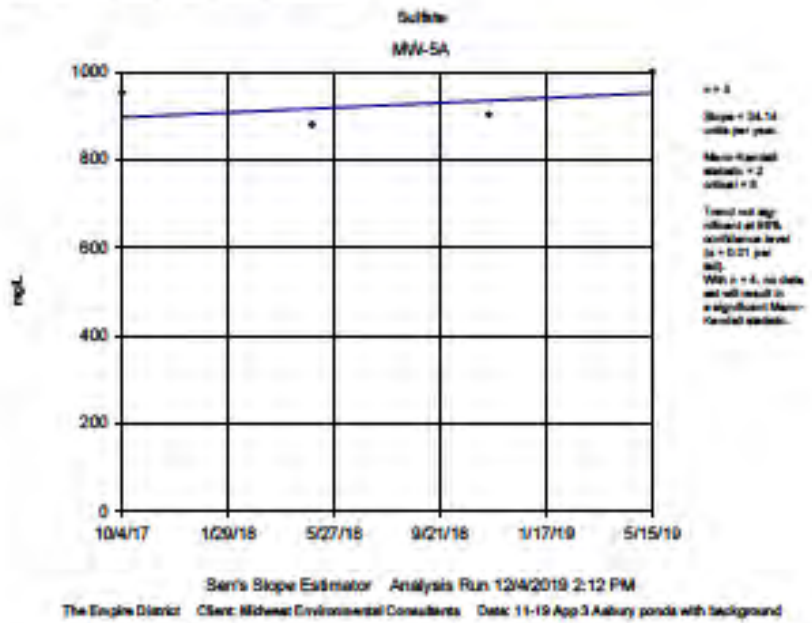
Sulfate

MW-5



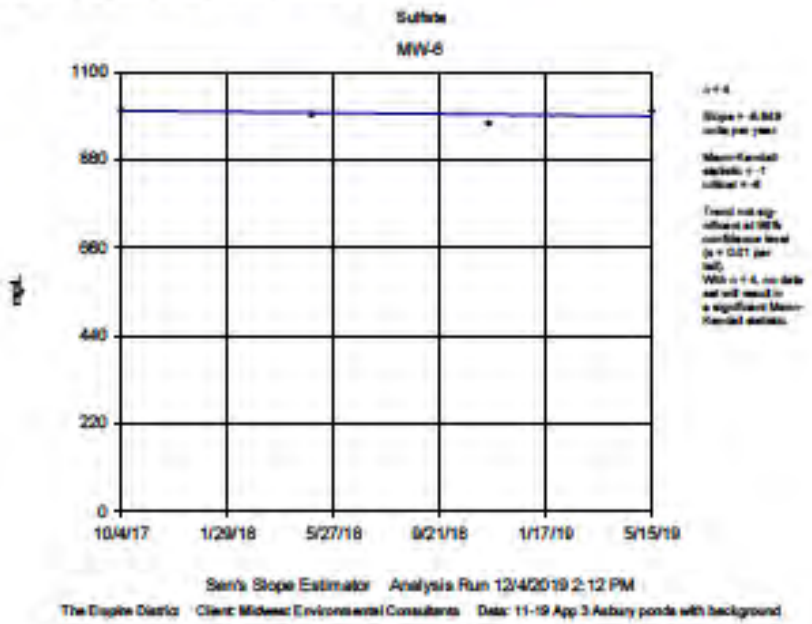
Sen's Slope Estimator Analysis Run 12/4/2019 2:12 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background



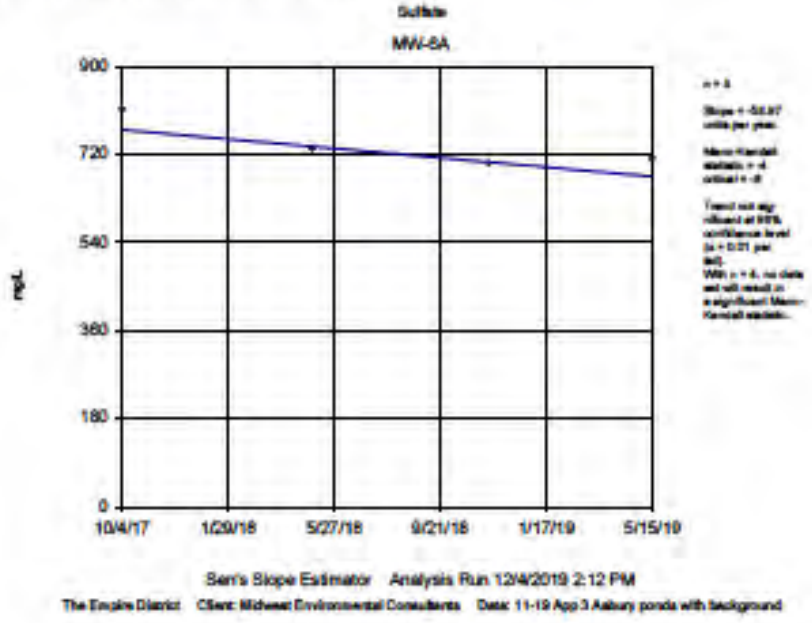
Sen's Slope Estimator Analysis Run 12/4/2019 2:12 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background



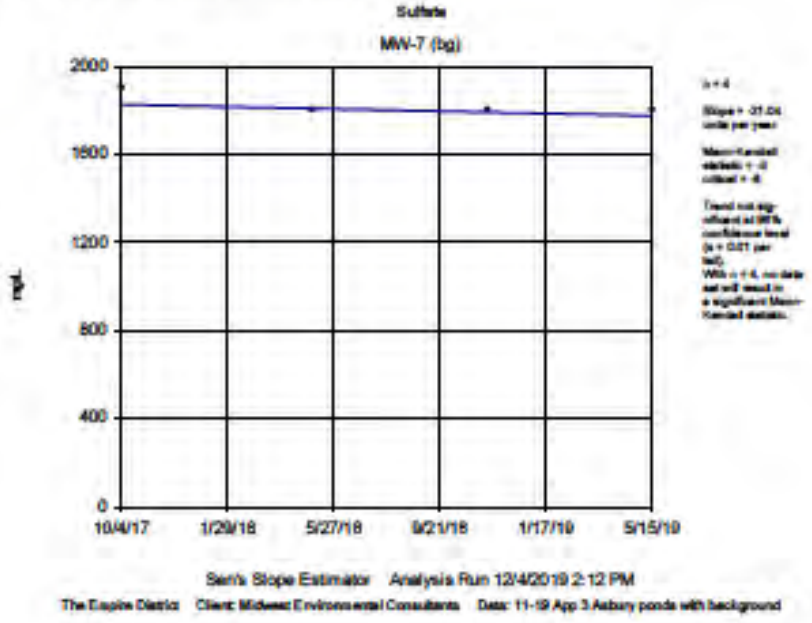
Sen's Slope Estimator Analysis Run 12/4/2019 2:12 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background



Sen's Slope Estimator Analysis Run 12/4/2019 2:12 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

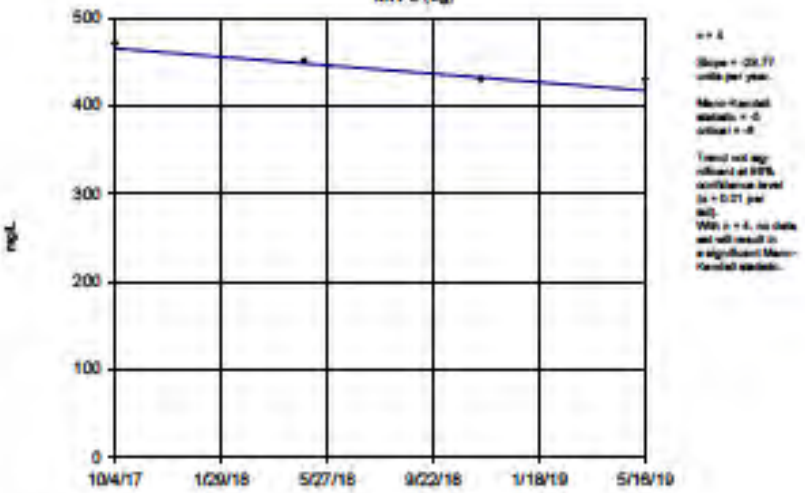


Sen's Slope Estimator Analysis Run 12/4/2019 2:12 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Total Dissolved Solids

MW-2 (bg)



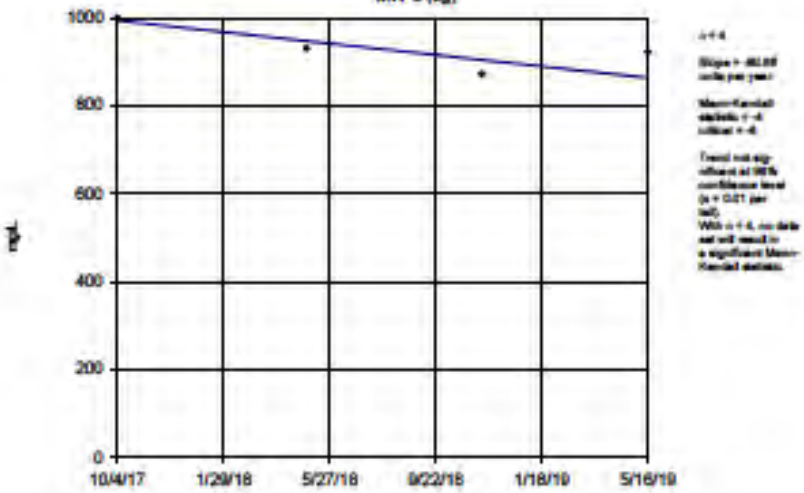
n = 6

Sen's Slope Estimator Analysis Run 12/4/2019 2:12 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Total Dissolved Solids

MW-3 (bg)



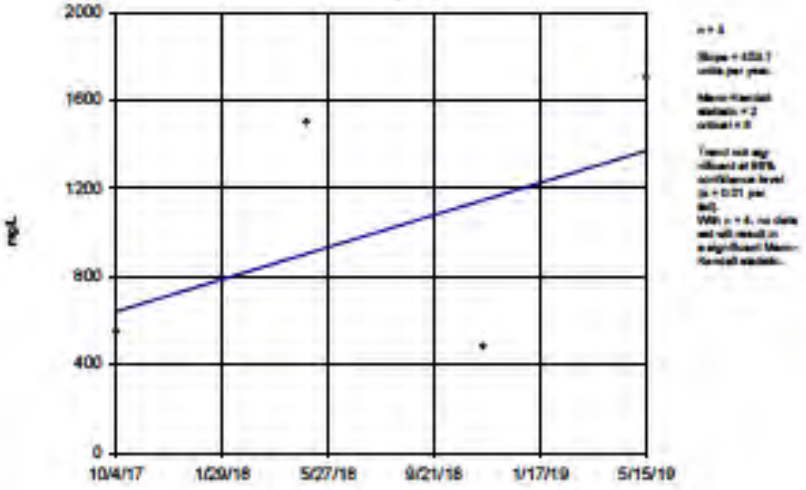
n = 6

Sen's Slope Estimator Analysis Run 12/4/2019 2:12 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Total Dissolved Solids

MW-4



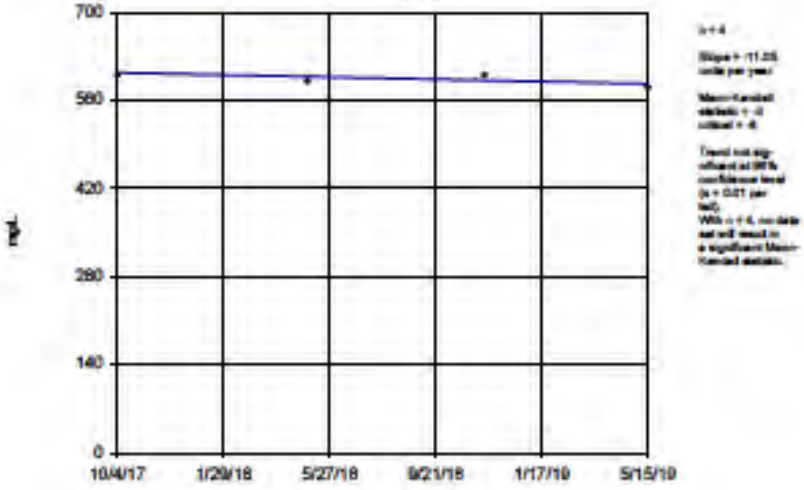
n = 6

Sen's Slope Estimator Analysis Run 12/4/2019 2:12 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Total Dissolved Solids

MW-5



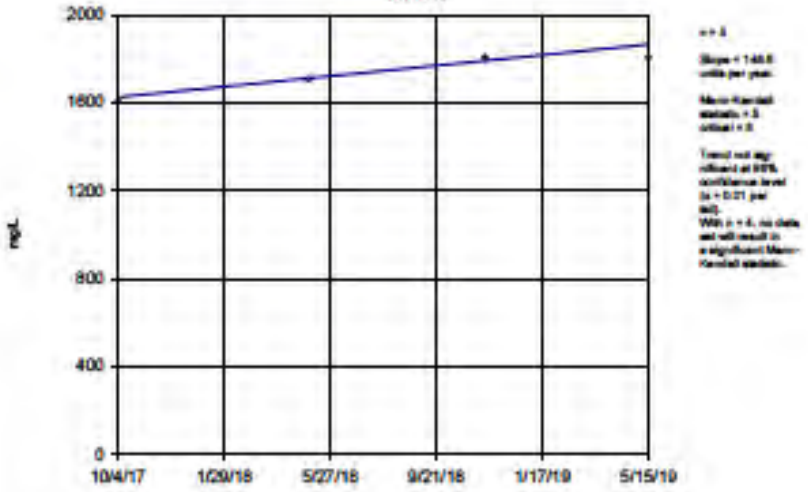
n = 6

Sen's Slope Estimator Analysis Run 12/4/2019 2:12 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Total Dissolved Solids

MW-5A

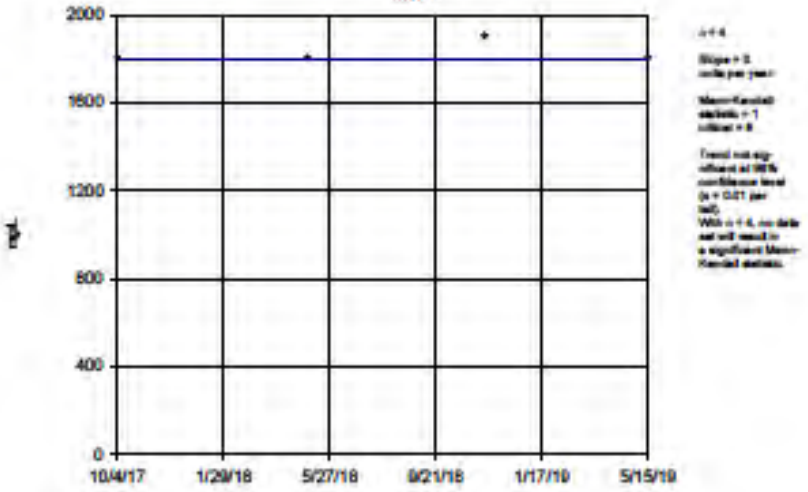


Sen's Slope Estimator Analysis Run 12/4/2019 2:12 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Total Dissolved Solids

MW-6

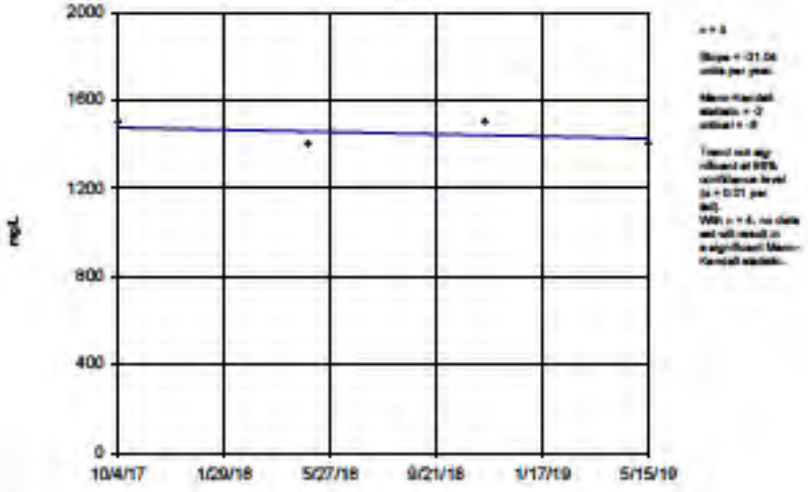


Sen's Slope Estimator Analysis Run 12/4/2019 2:12 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Total Dissolved Solids

MW-8A

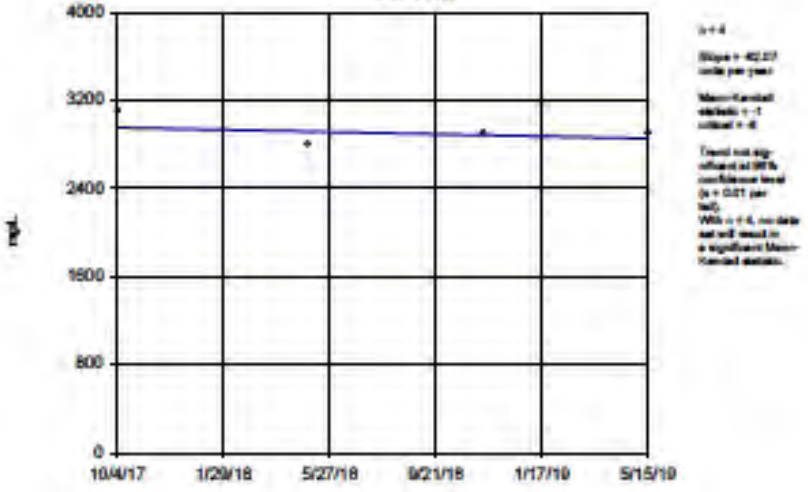


Sen's Slope Estimator Analysis Run 12/4/2019 2:12 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Total Dissolved Solids

MW-7 (bg)



Sen's Slope Estimator Analysis Run 12/4/2019 2:12 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Trend Test

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background Printed 12/4/2019, 2:13 PM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Boron (mg/L)	MW-2 (bg)	-0.03847	-4	-8	No	4	0	n/a	n/a	0.02	NP
Boron (mg/L)	MW-3 (bg)	0	-1	-8	No	4	75	n/a	n/a	0.02	NP
Boron (mg/L)	MW-4	0	-1	-8	No	4	75	n/a	n/a	0.02	NP
Boron (mg/L)	MW-5	-0.00...	0	8	No	4	0	n/a	n/a	0.02	NP
Boron (mg/L)	MW-5A	0.1202	5	8	No	4	0	n/a	n/a	0.02	NP
Boron (mg/L)	MW-6	-0.01279	-2	-8	No	4	0	n/a	n/a	0.02	NP
Boron (mg/L)	MW-6A	-0.01589	-3	-8	No	4	0	n/a	n/a	0.02	NP
Boron (mg/L)	MW-7 (bg)	-0.03739	-2	-8	No	4	0	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-2 (bg)	-4.716	-3	-8	No	4	0	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-3 (bg)	1.378	0	8	No	4	0	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-4	44.63	2	8	No	4	0	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-5	5.214	4	8	No	4	0	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-5A	14.15	4	8	No	4	0	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-6	3.104	1	8	No	4	0	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-6A	-7.588	-4	-8	No	4	0	n/a	n/a	0.02	NP
Calcium (mg/L)	MW-7 (bg)	-1.737	0	8	No	4	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-2 (bg)	0	0	8	No	4	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-3 (bg)	3.596	1	8	No	4	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-4	29.71	2	8	No	4	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-5	-0.08649	-1	-8	No	4	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-5A	6.828	5	8	No	4	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-6	0.3104	3	8	No	4	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-6A	0	-1	-8	No	4	0	n/a	n/a	0.02	NP
Chloride (mg/L)	MW-7 (bg)	5.041	4	8	No	4	0	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-2 (bg)	-0.09492	-4	-8	No	4	0	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-3 (bg)	-0.02236	-2	-8	No	4	0	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-4	-0.01862	-1	-8	No	4	0	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-5	-0.00...	0	8	No	4	25	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-5A	-0.05035	-4	-8	No	4	0	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-6	-0.03966	-3	-8	No	4	0	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-6A	-0.04189	-4	-8	No	4	0	n/a	n/a	0.02	NP
Fluoride (mg/L)	MW-7 (bg)	-0.01557	-2	-8	No	4	0	n/a	n/a	0.02	NP
pH (SU)	MW-2 (bg)	-0.0689	-2	-8	No	4	0	n/a	n/a	0.02	NP
pH (SU)	MW-3 (bg)	0.1008	2	8	No	4	0	n/a	n/a	0.02	NP
pH (SU)	MW-4	0.1078	0	8	No	4	0	n/a	n/a	0.02	NP
pH (SU)	MW-5	0.4345	2	8	No	4	0	n/a	n/a	0.02	NP
pH (SU)	MW-5A	0.6186	2	8	No	4	0	n/a	n/a	0.02	NP
pH (SU)	MW-6	1.071	4	8	No	4	0	n/a	n/a	0.02	NP
pH (SU)	MW-6A	0.4674	2	8	No	4	0	n/a	n/a	0.02	NP
pH (SU)	MW-7 (bg)	0.345	4	8	No	4	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	MW-2 (bg)	17	2	8	No	4	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	MW-3 (bg)	-44.06	-2	-8	No	4	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	MW-4	315.1	4	8	No	4	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	MW-5	-6.207	-1	-8	No	4	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	MW-5A	34.14	2	8	No	4	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	MW-6	-8.649	-1	-8	No	4	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	MW-6A	-58.97	-4	-8	No	4	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	MW-7 (bg)	-31.04	-3	-8	No	4	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-2 (bg)	-29.77	-5	-8	No	4	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-3 (bg)	-80.66	-4	-8	No	4	0	n/a	n/a	0.02	NP

Trend Test

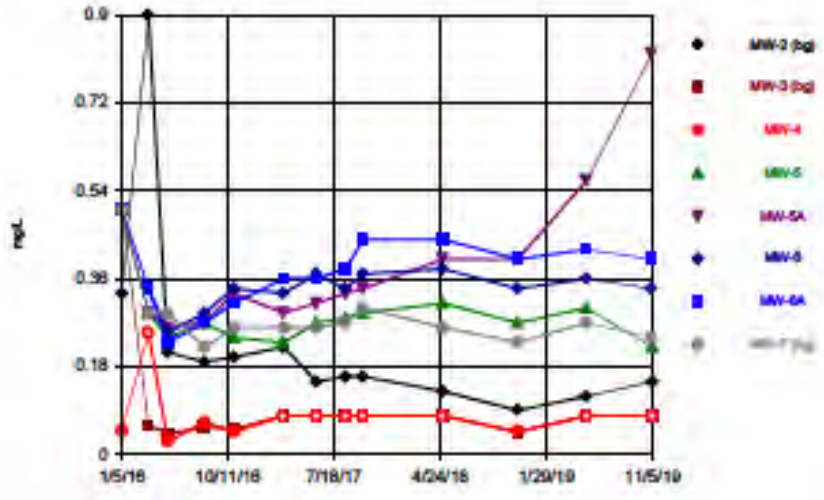
The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background Printed 12/4/2019, 2:13 PM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Total Dissolved Solids (mg/L)	MW-4	453.7	2	8	No	4	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-5	-11.05	-3	-8	No	4	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-5A	148.6	5	8	No	4	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-6	0	1	8	No	4	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-6A	-31.04	-2	-8	No	4	0	n/a	n/a	0.02	NP
Total Dissolved Solids (mg/L)	MW-7 (bg)	-62.07	-1	-8	No	4	0	n/a	n/a	0.02	NP

Sanitas™ Output – Sampling Event

Time Series Analysis

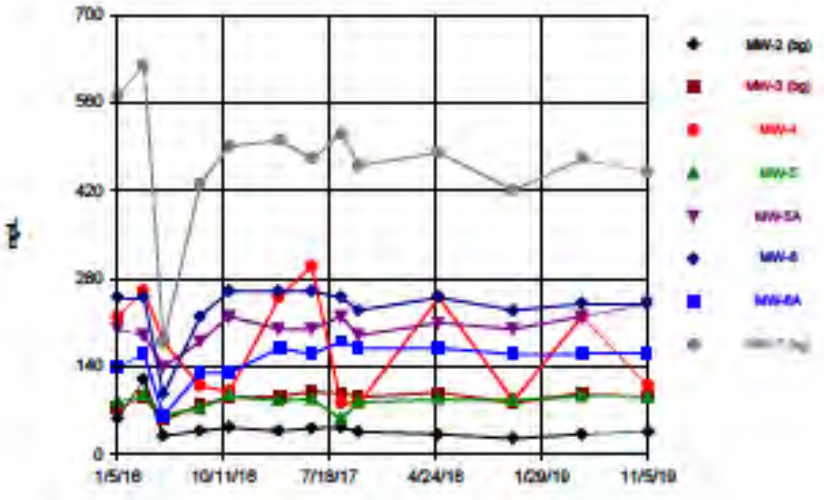
Boron



Time Series Analysis Run 12/4/2019 2:28 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

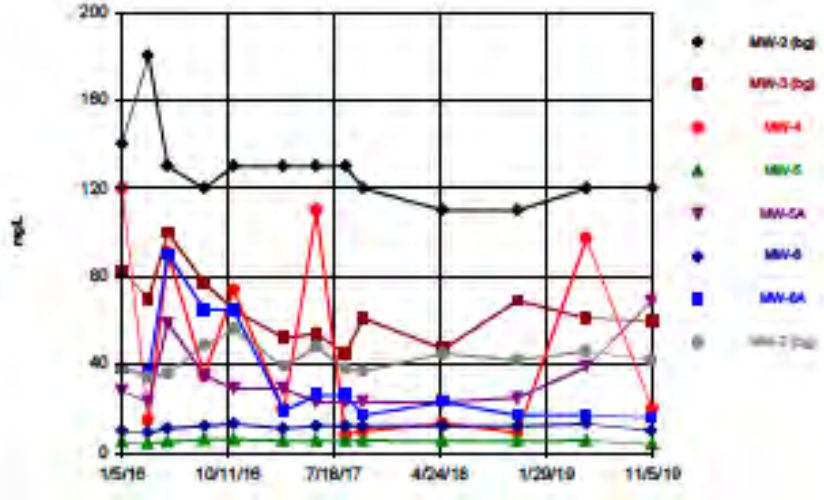
Calcium



Time Series Analysis Run 12/4/2019 2:28 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

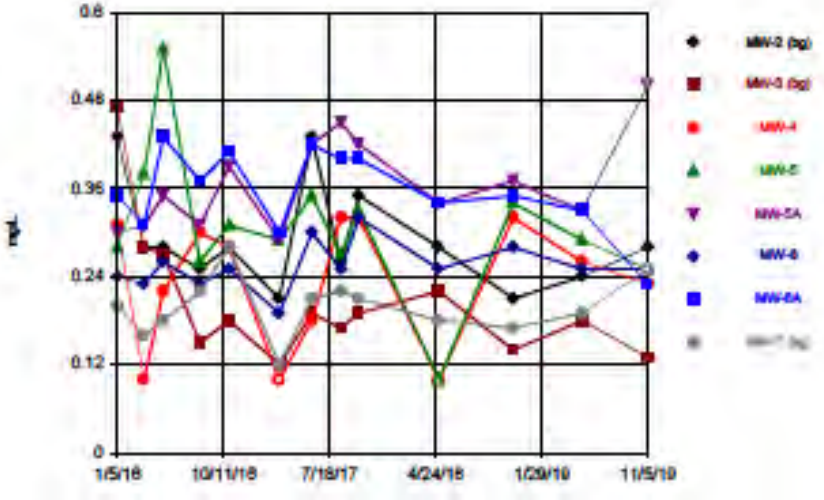
Chloride



Time Series Analysis Run 12/4/2019 2:28 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

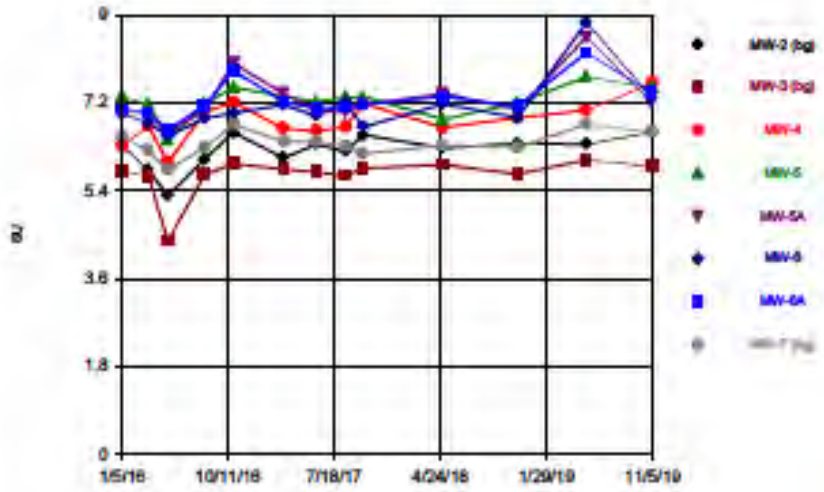
Fluoride



Time Series Analysis Run 12/4/2019 2:28 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

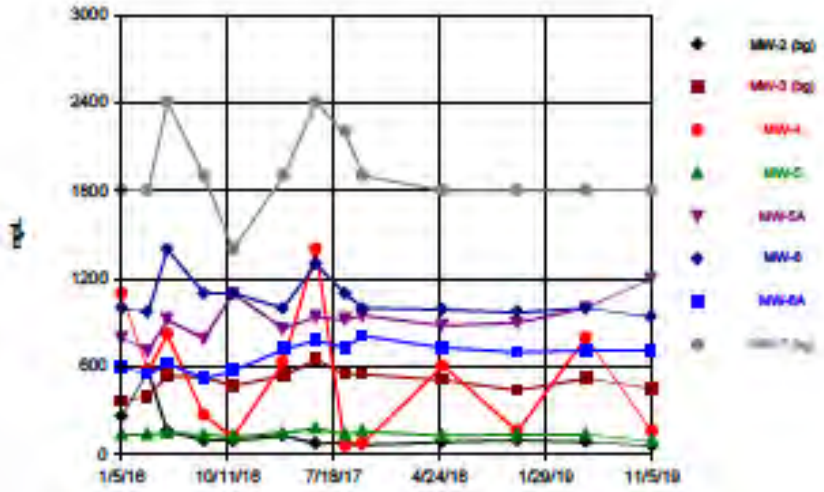
pH



Time Series Analysis Run 12/4/2019 2:28 PM

The Engine District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

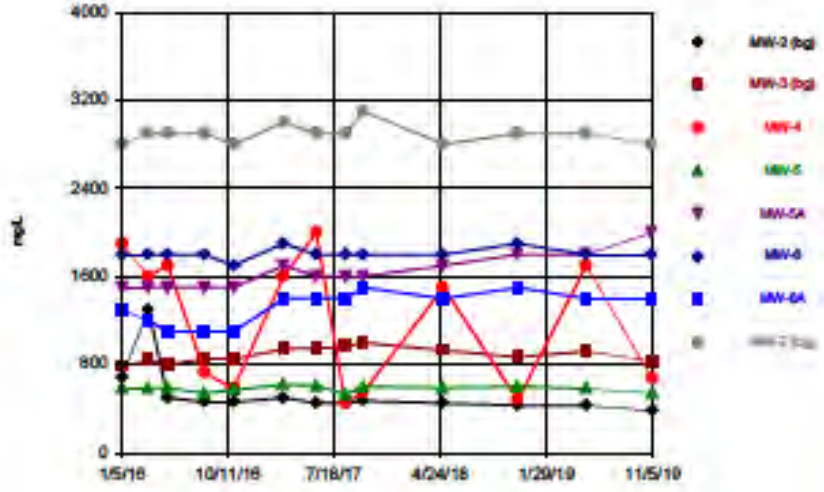
Sulfate



Time Series Analysis Run 12/4/2019 2:28 PM

The Engine District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Total Dissolved Solids



Time Series Analysis Run 12/4/2019 2:28 PM

The Engine District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Midwest Environmental CONSULTANTS

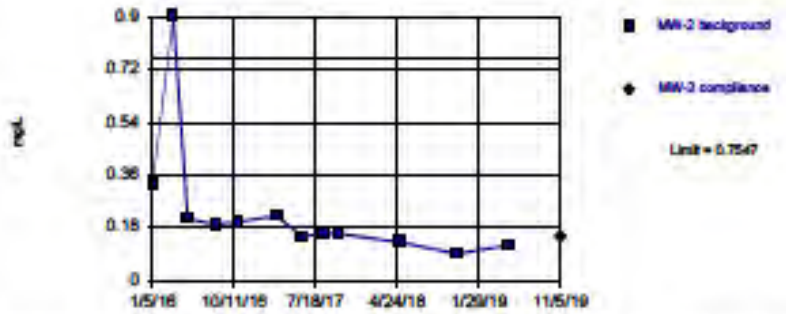
Sanitas™ Output – Sampling Event

Prediction Limits

Within Limit

Boron

Intrawell Parametric



Background Data Summary (based on natural log transformation): Mean=-1.64, Std. Dev.=0.585, n=12. Insufficient data to test for seasonality; data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8545, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

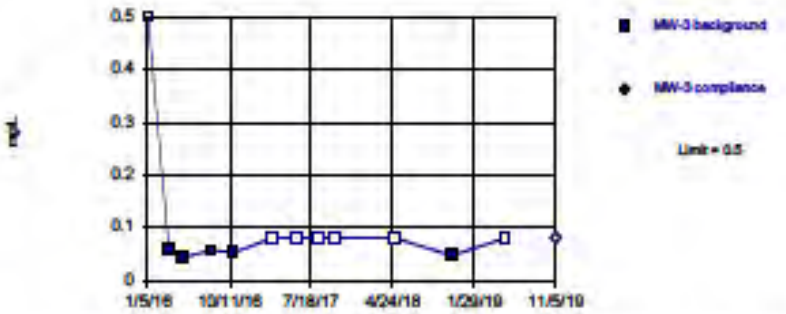
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Boron

Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 12 background values. 58.33% NDs. Well-constituent pair annual alpha = 0.02143. Individual comparison alpha = 0.01077 (1 of 2). Insufficient data to test for seasonality; data were not deseasonalized.

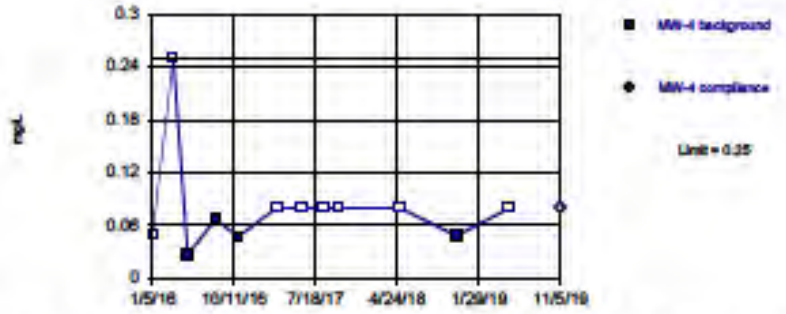
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Boron

Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. Limit is highest of 12 background values. 66.67% NDs. Well-constituent pair annual alpha = 0.02143. Individual comparison alpha = 0.01077 (1 of 2). Insufficient data to test for seasonality; data were not deseasonalized.

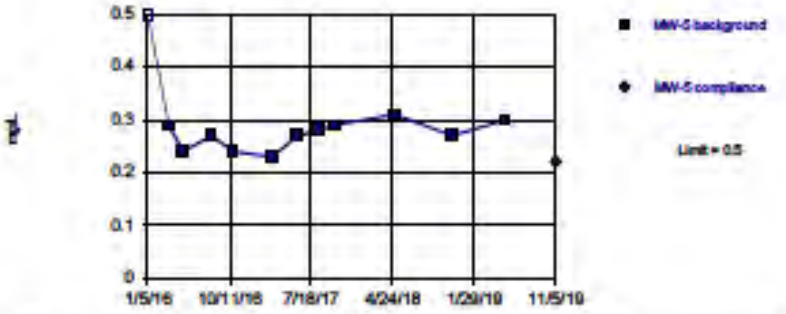
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Boron

Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 12 background values. 8.333% NDs. Well-constituent pair annual alpha = 0.02143. Individual comparison alpha = 0.01077 (1 of 2). Insufficient data to test for seasonality; data were not deseasonalized.

Prediction Limit Analysis Run 12/4/2019 2:30 PM

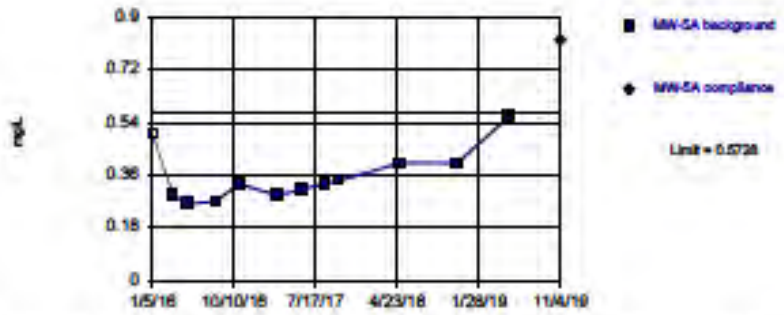
The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Hollow symbols indicate censored values.

Exceeds Limit

Boron

Intrawell Parametric



Background Data Summary: Mean=0.3567, Std. Dev.=0.09306, n=12, 8.333% NDs. Insufficient data to test for seasonality; data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8631, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

Prediction Limit Analysis Run 12/4/2019 2:30 PM

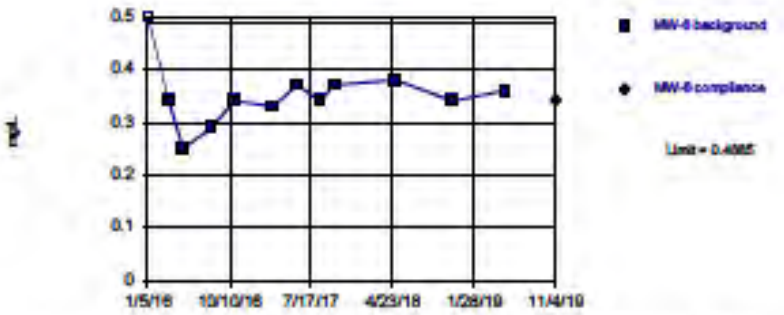
The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Hollow symbols indicate censored values.

Within Limit

Boron

Intrawell Parametric



Background Data Summary: Mean=0.3508, Std. Dev.=0.05931, n=12, 8.333% NDs. Insufficient data to test for seasonality; data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8535, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

Prediction Limit Analysis Run 12/4/2019 2:30 PM

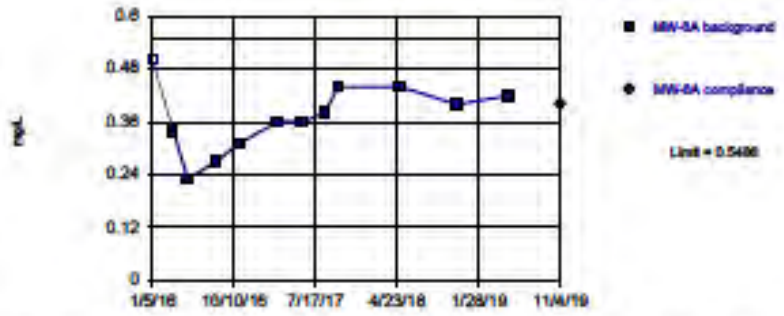
The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Hollow symbols indicate censored values.

Within Limit

Boron

Intrawell Parametric



Background Data Summary: Mean=0.3708, Std. Dev.=0.07657, n=12, 8.333% NDs. Insufficient data to test for seasonality; data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9835, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

Prediction Limit Analysis Run 12/4/2019 2:30 PM

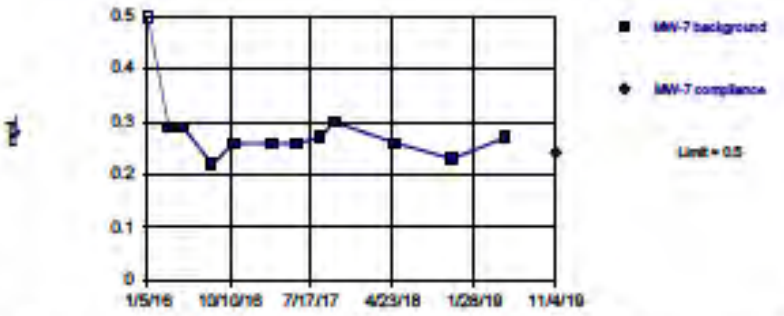
The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Hollow symbols indicate censored values.

Within Limit

Boron

Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 12 background values. 8.333% NDs. Well-constituent pair annual alpha = 0.02143. Individual comparison alpha = 0.01077 (1 of 2). Insufficient data to test for seasonality; data were not deseasonalized.

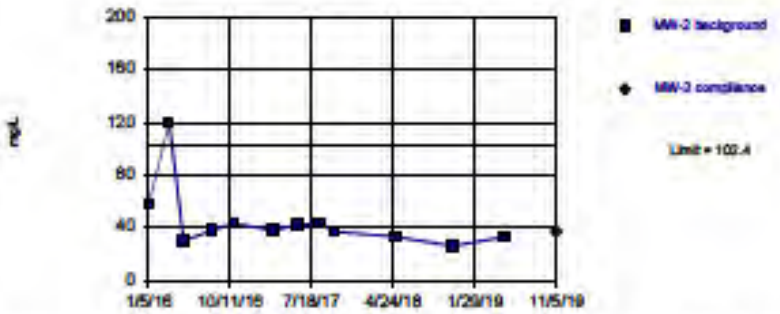
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Calcium

Intrawell Parametric



Background Data Summary (based on natural log transformation): Mean=3.719, Std. Dev.=0.3917, n=12. Insufficient data to test for seasonality; data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8062, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

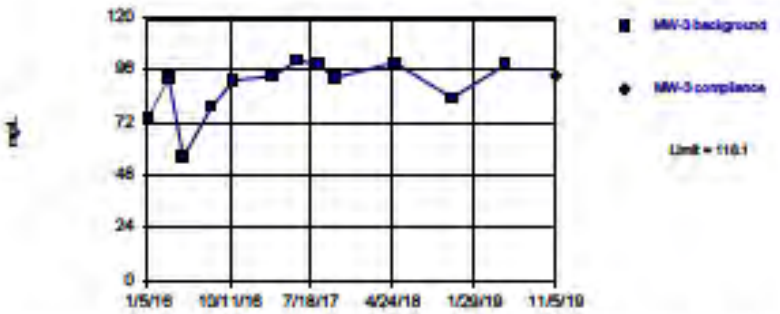
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Calcium

Intrawell Parametric



Background Data Summary: Mean=87.92, Std. Dev.=12.99, n=12. Insufficient data to test for seasonality; data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8371, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

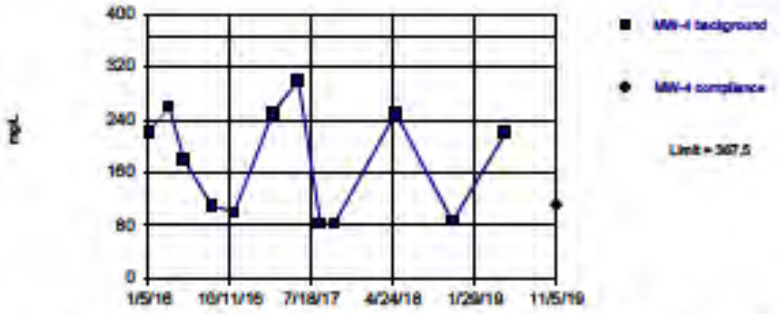
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Calcium

Intrawell Parametric



Background Data Summary: Mean=178.4, Std. Dev.=61.42, n=12. Insufficient data to test for seasonality; data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8598, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

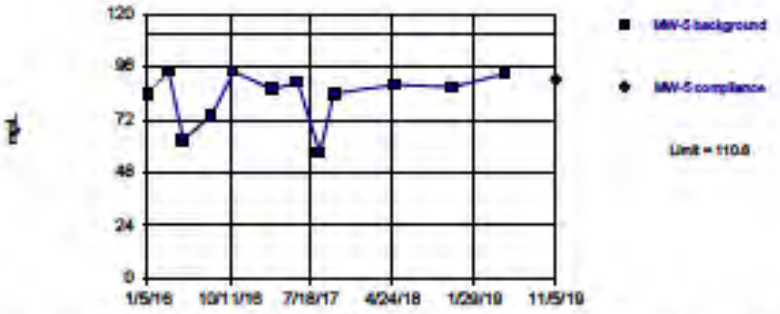
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Calcium

Intrawell Parametric



Background Data Summary: Mean=82.75, Std. Dev.=12.01, n=12. Insufficient data to test for seasonality; data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8269, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

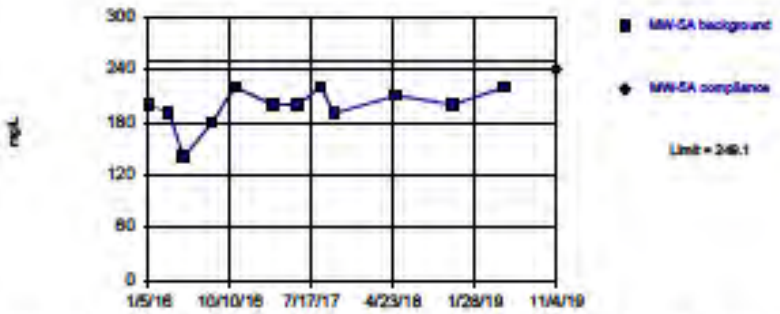
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Calcium

Intrawell Parametric



Background Data Summary: Mean=197.5, Std. Dev.=22.21, n=12. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8352, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

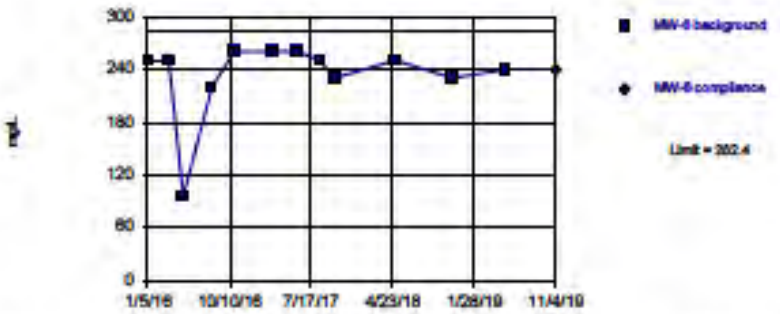
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Calcium

Intrawell Parametric



Background Data Summary (based on x^4 transformation): Mean=3.4e9, Std. Dev.=1.3e9, n=12. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8214, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

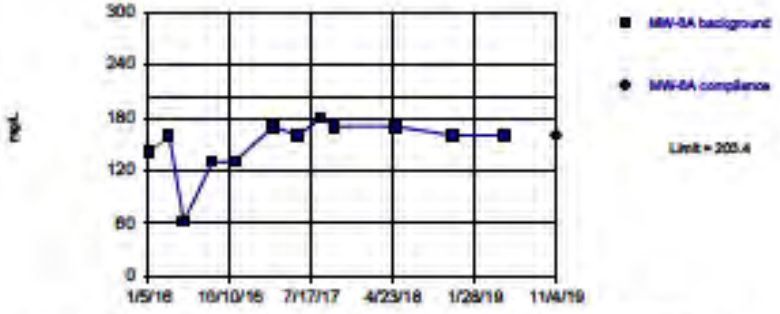
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Calcium

Intrawell Parametric



Background Data Summary (based on square transformation): Mean=23229, Std. Dev.=7817, n=12. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.851, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

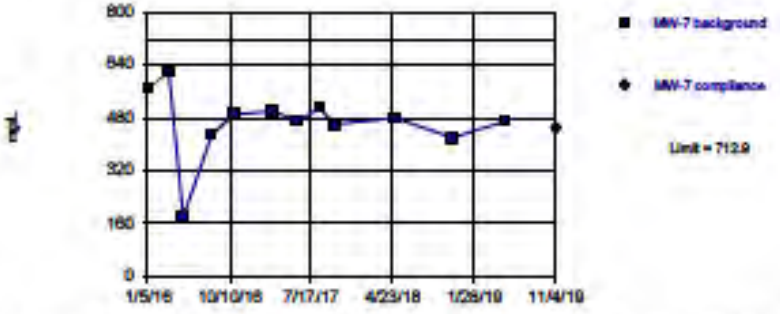
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Calcium

Intrawell Parametric



Background Data Summary: Mean=466.7, Std. Dev.=105, n=12. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8179, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

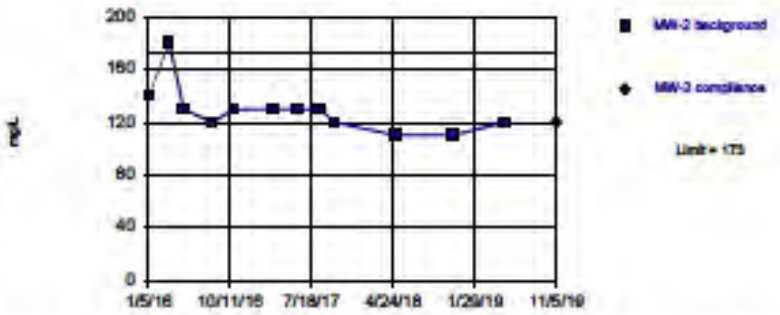
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Chloride

Intrawell Parametric



Background Data Summary (based on natural log transformation): Mean=4.853, Std. Dev.=0.1293, n=12. Insufficient data to test for seasonality; data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8216, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

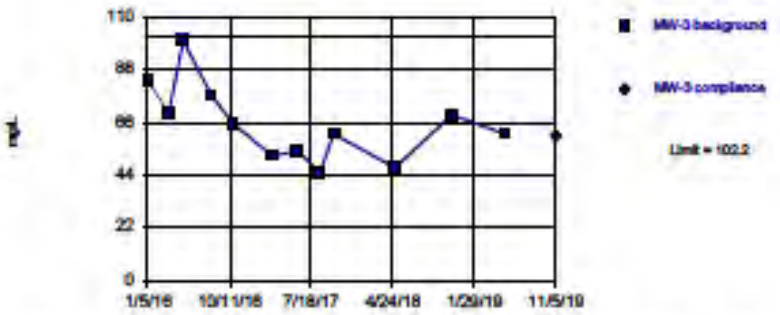
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Chloride

Intrawell Parametric



Background Data Summary: Mean=65.33, Std. Dev.=15.89, n=12. Insufficient data to test for seasonality; data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9468, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

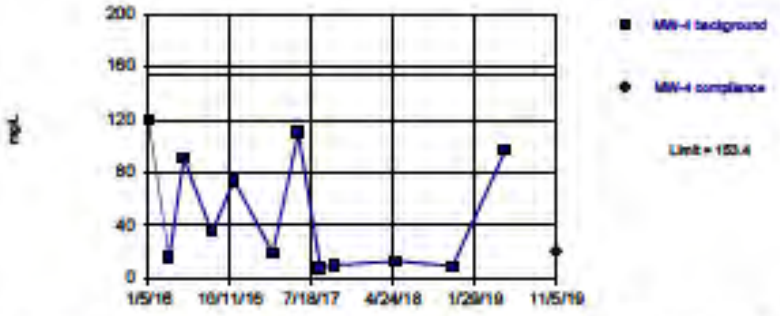
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Chloride

Intrawell Parametric



Background Data Summary: Mean=50.11, Std. Dev.=44.48, n=12. Insufficient data to test for seasonality; data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8186, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

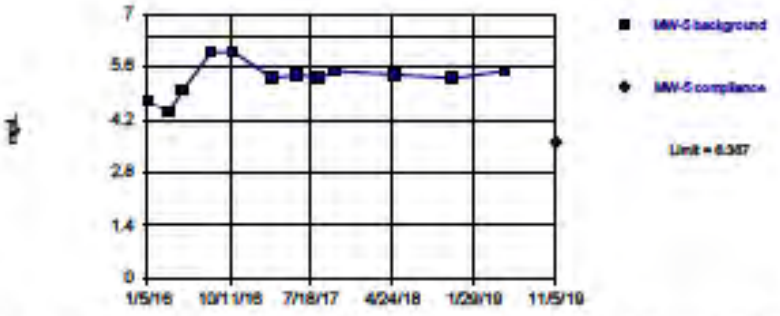
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Chloride

Intrawell Parametric



Background Data Summary: Mean=5.317, Std. Dev.=0.4609, n=12. Insufficient data to test for seasonality; data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9242, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

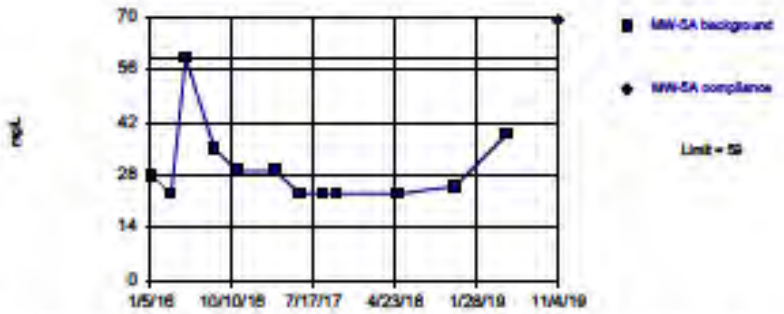
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Exceeds Limit

Chloride

Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 12 background values. Well-constituent pair annual alpha = 0.02143. Individual comparison alpha = 0.01077 (1 of 2). Insufficient data to test for seasonality: data were not deseasonalized.

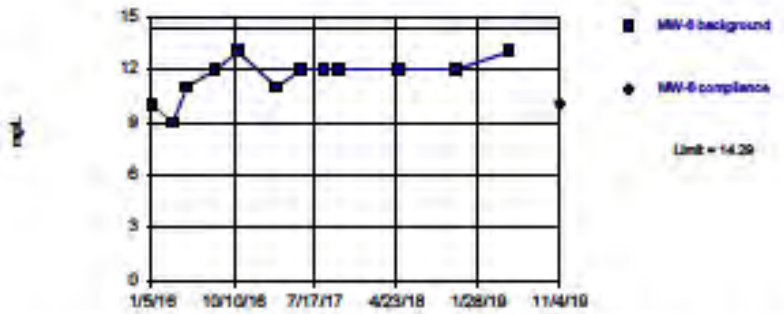
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Chloride

Intrawell Parametric



Background Data Summary: Mean=11.58, Std. Dev.=1.165, n=12. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8596, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

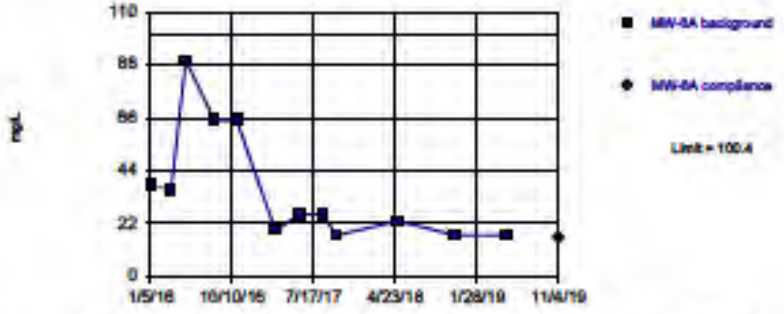
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Chloride

Intrawell Parametric



Background Data Summary (based on square root transformation): Mean=5.791, Std. Dev.=1.822, n=12. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8494, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

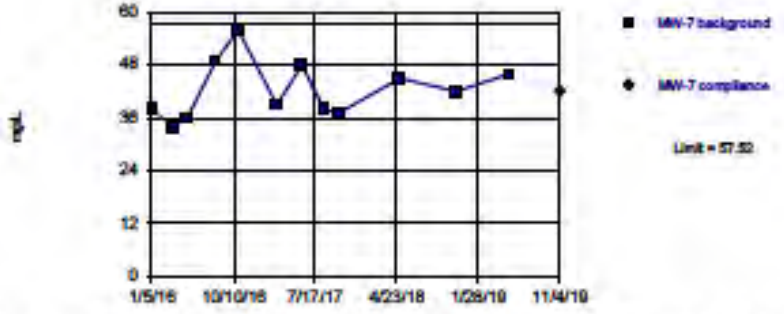
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Chloride

Intrawell Parametric



Background Data Summary: Mean=42.33, Std. Dev.=6.541, n=12. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9329, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

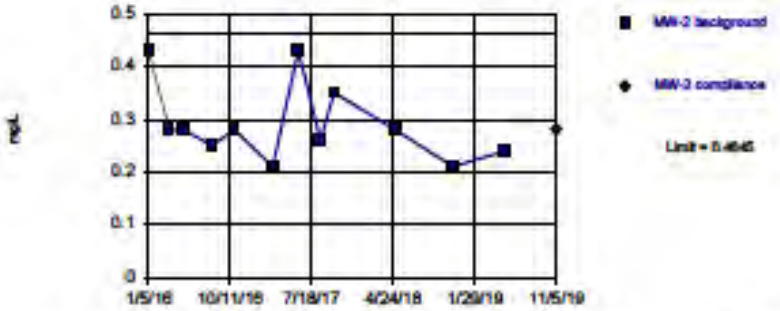
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Fluoride

Intrawell Parametric



Background Data Summary: Mean=0.2917, Std. Dev.=0.07445, n=12. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8379, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

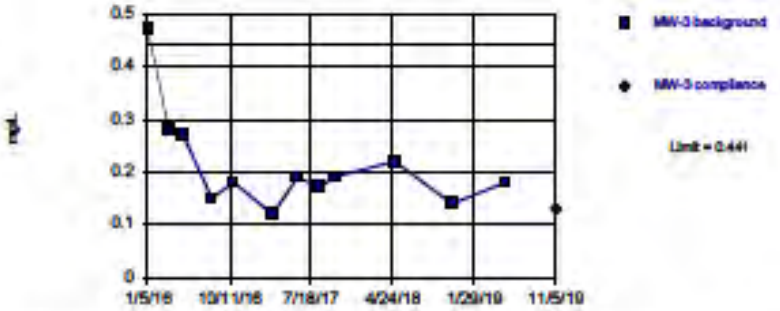
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Fluoride

Intrawell Parametric



Background Data Summary (based on square root transformation): Mean=0.4537, Std. Dev.=0.09063, n=12. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8596, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

Prediction Limit Analysis Run 12/4/2019 2:30 PM

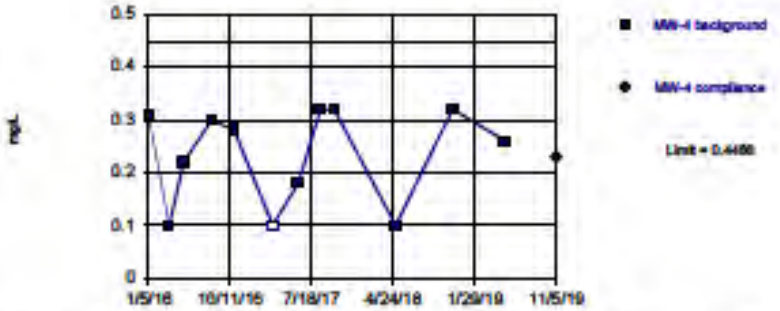
The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Hollow symbols indicate censored values.

Within Limit

Fluoride

Intrawell Parametric



Background Data Summary: Mean=0.2342, Std. Dev.=0.0915, n=12, 8.333% NDs. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8142, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

Prediction Limit Analysis Run 12/4/2019 2:30 PM

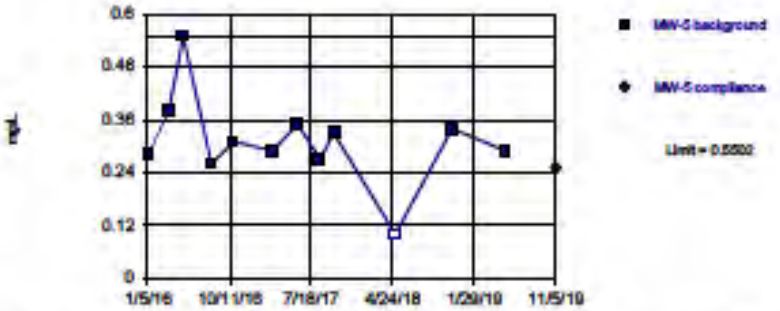
The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Hollow symbols indicate censored values.

Within Limit

Fluoride

Intrawell Parametric



Background Data Summary: Mean=0.3125, Std. Dev.=0.1023, n=12, 8.333% NDs. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8824, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

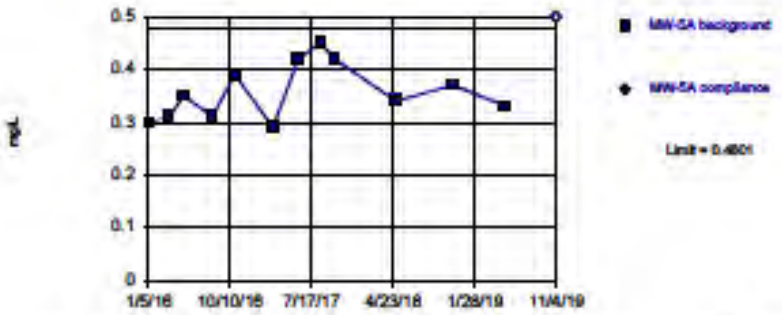
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Fluoride

Intrawell Parametric



Background Data Summary: Mean=0.3567, Std. Dev.=0.05314, n=12. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9302, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Fluoride

Intrawell Parametric

Background Data Summary: Mean=0.2542, Std. Dev.=0.03397, n=12. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9425, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

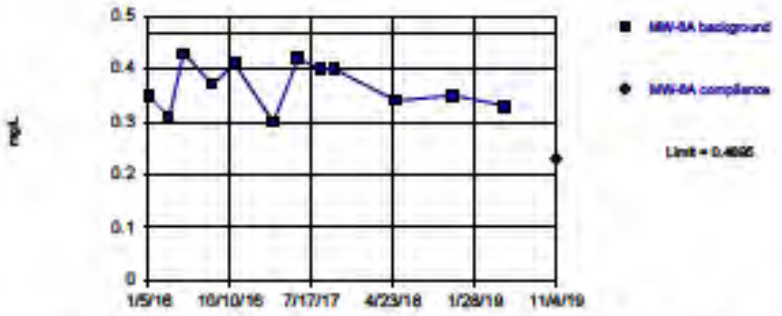
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Fluoride

Intrawell Parametric



Background Data Summary: Mean=0.3675, Std. Dev.=0.04393, n=12. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9401, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

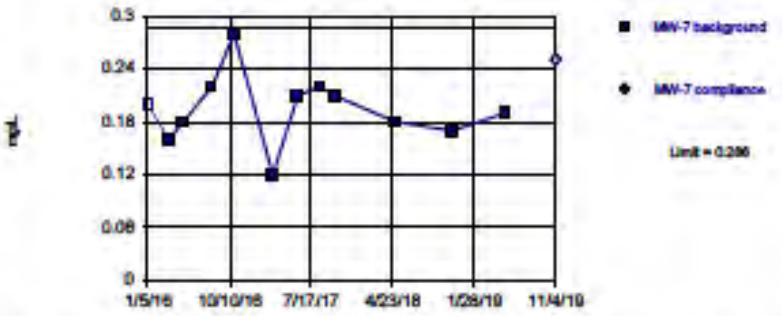
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Fluoride

Intrawell Parametric



Background Data Summary: Mean=0.195, Std. Dev.=0.0392, n=12, 8.333% NDs. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9561, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

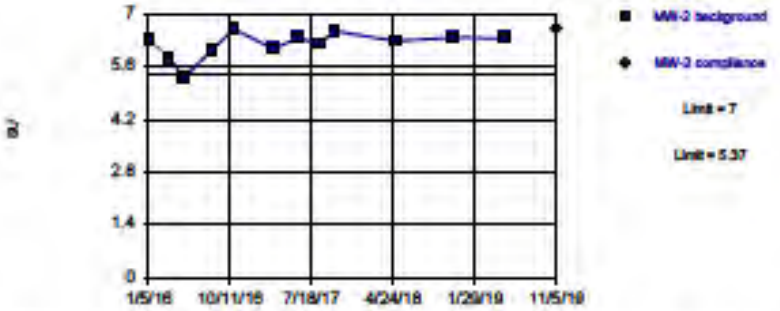
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limits

pH

Intrawell Parametric



Background Data Summary: Mean=6.185, Std. Dev.=0.3509, n=12. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8626, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

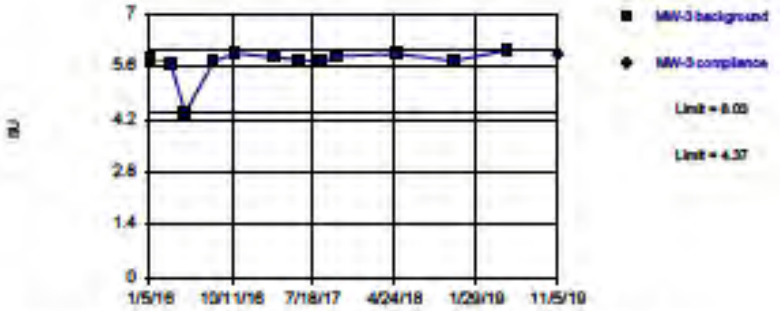
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limits

pH

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 12 background values. Well-constituent pair annual alpha = 0.04286. Individual comparison alpha = 0.02155 (1 of 2). Insufficient data to test for seasonality: data were not deseasonalized.

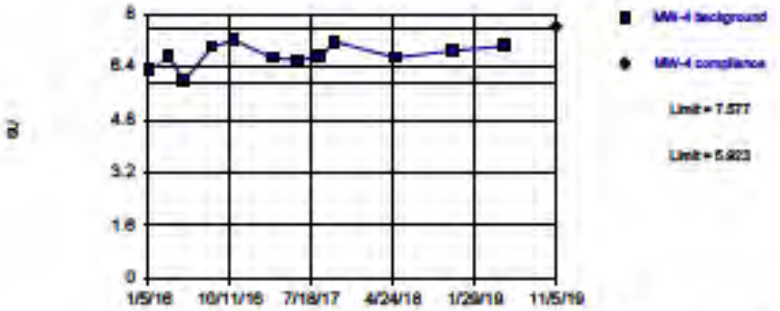
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Exceeds Limits

pH

Intrawell Parametric



Background Data Summary: Mean=6.75, Std. Dev.=0.3561, n=12. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9286, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

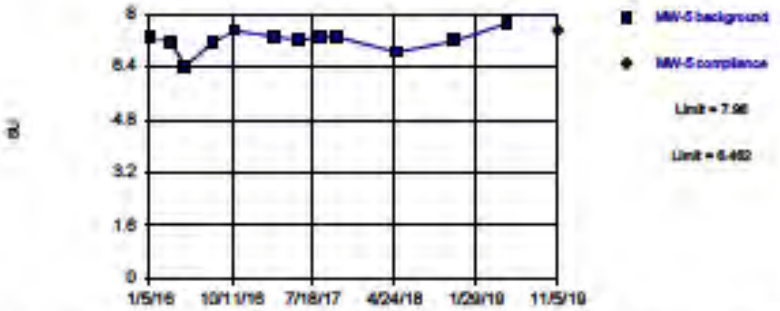
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limits

pH

Intrawell Parametric



Background Data Summary: Mean=7.211, Std. Dev.=0.3224, n=12. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.889, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

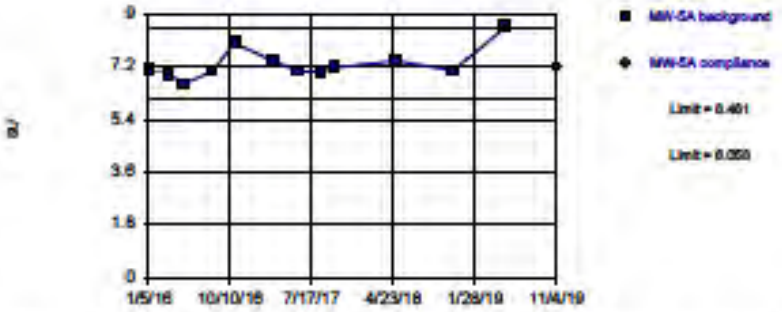
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limits

pH

Intrawell Parametric



Background Data Summary: Mean=7.269, Std. Dev.=0.5218, n=12. Insufficient data to test for seasonality; data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8226, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

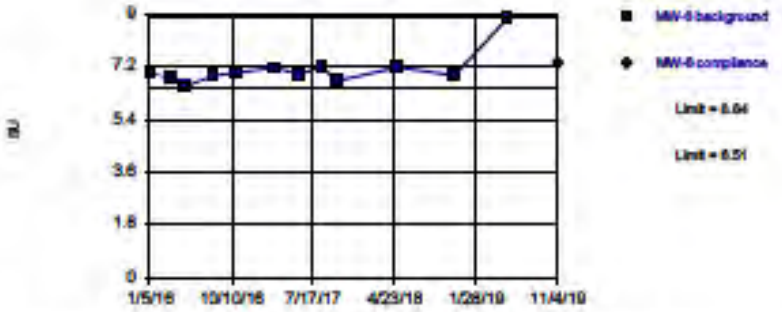
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limits

pH

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 12 background values. Well-constituent pair annual alpha = 0.04286. Individual comparison alpha = 0.02155 (1 of 2). Insufficient data to test for seasonality; data were not deseasonalized.

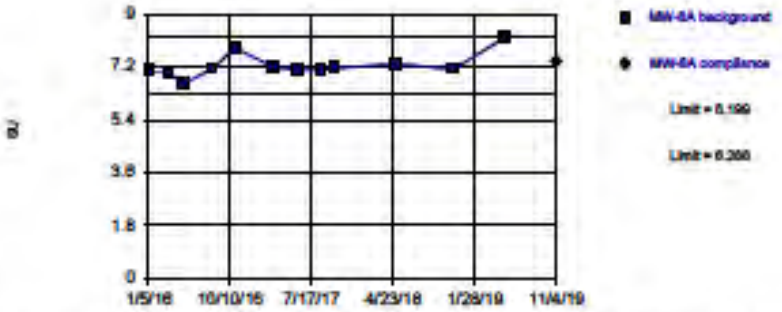
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limits

pH

Intrawell Parametric



Background Data Summary: Mean=7.243, Std. Dev.=0.4115, n=12. Insufficient data to test for seasonality; data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8158, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

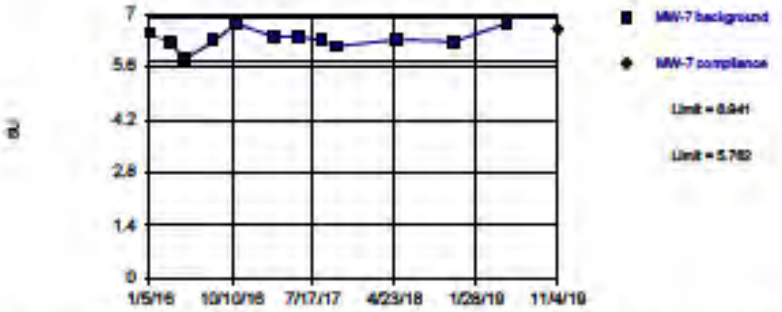
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limits

pH

Intrawell Parametric



Background Data Summary: Mean=6.362, Std. Dev.=0.2539, n=12. Insufficient data to test for seasonality; data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9343, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

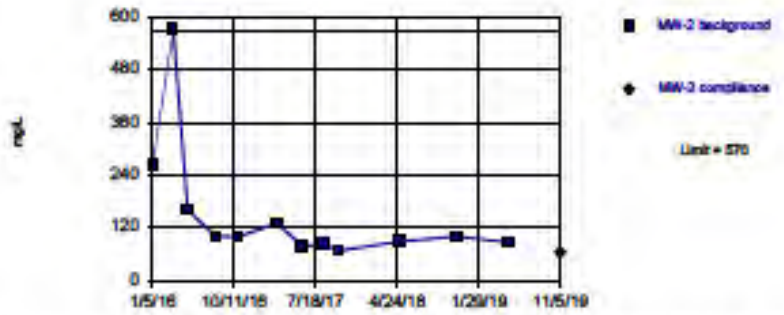
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Sulfate

Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 12 background values. Well-constituent pair annual alpha = 0.02143. Individual comparison alpha = 0.01077 (1 of 2). Insufficient data to test for seasonality: data were not deseasonalized.

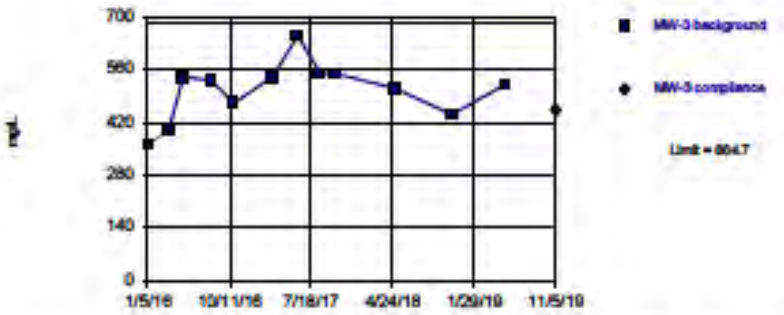
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Sulfate

Intrawell Parametric



Background Data Summary: Mean=505, Std. Dev.=77.4, n=12. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9381, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

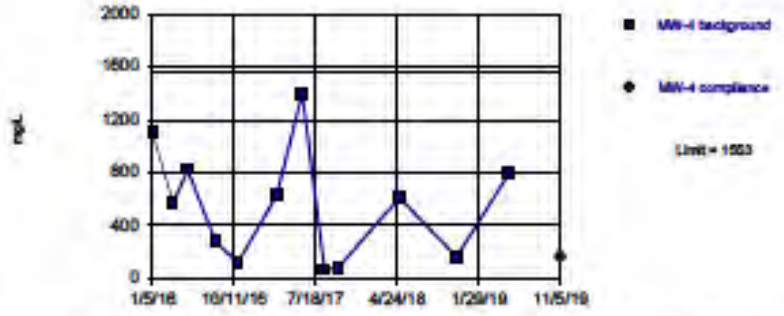
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Sulfate

Intrawell Parametric



Background Data Summary: Mean=552, Std. Dev.=431, n=12. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9199, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

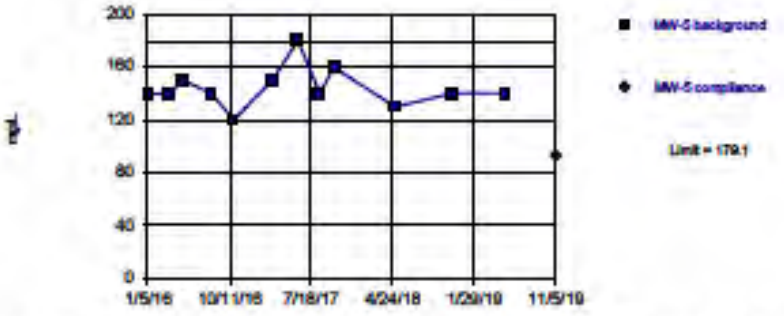
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Sulfate

Intrawell Parametric



Background Data Summary: Mean=144.2, Std. Dev.=15.05, n=12. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8774, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

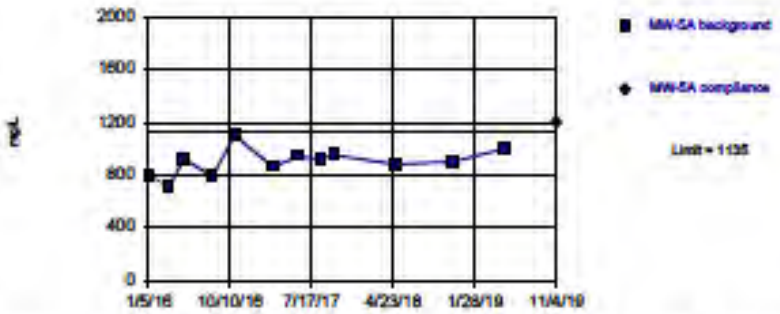
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Exceeds Limit

Sulfate

Intrawell Parametric



Background Data Summary: Mean=897.5, Std. Dev.=102.3, n=12. Insufficient data to test for seasonality; data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9788, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

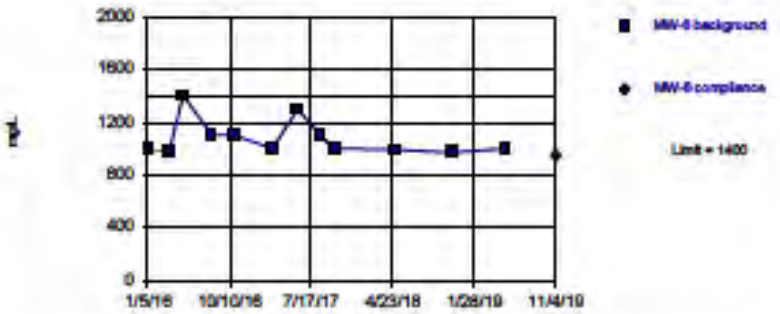
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Sulfate

Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 12 background values. Well-constituent pair annual alpha = 0.02143. Individual comparison alpha = 0.01077 (1 of 2). Insufficient data to test for seasonality; data were not deseasonalized.

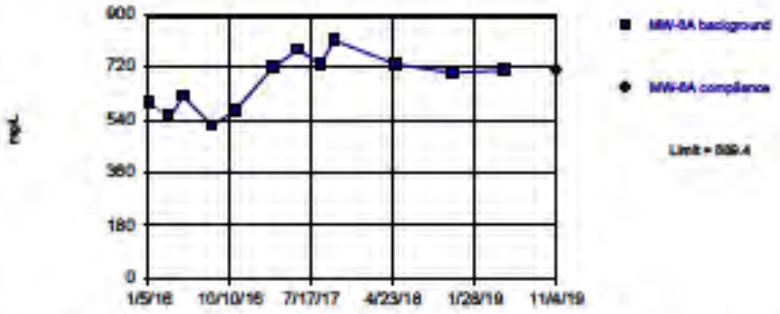
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Sulfate

Intrawell Parametric



Background Data Summary: Mean=670, Std. Dev.=94.48, n=12. Insufficient data to test for seasonality; data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9346, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

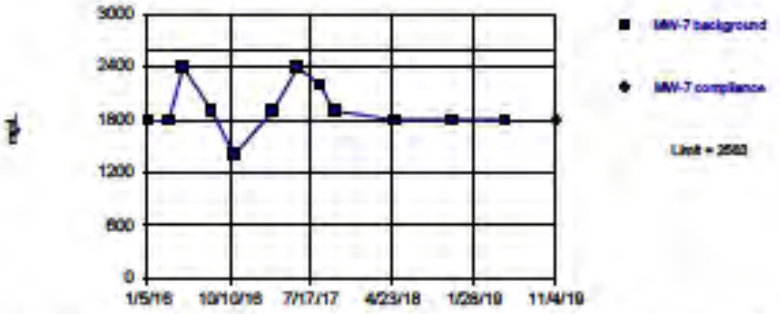
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Sulfate

Intrawell Parametric



Background Data Summary: Mean=1925, Std. Dev.=283.2, n=12. Insufficient data to test for seasonality; data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8557, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

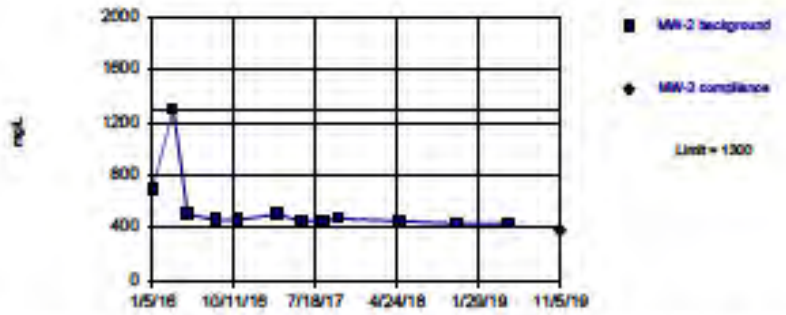
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Total Dissolved Solids

Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 12 background values. Well-constituent pair annual alpha = 0.02143. Individual comparison alpha = 0.01077 (1 of 2). Insufficient data to test for seasonality; data were not deseasonalized.

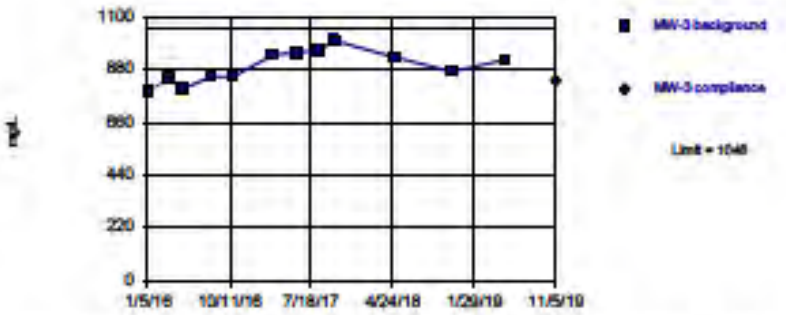
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Total Dissolved Solids

Intrawell Parametric



Background Data Summary: Mean=891.7, Std. Dev.=67.26, n=12. Insufficient data to test for seasonality; data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9475, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

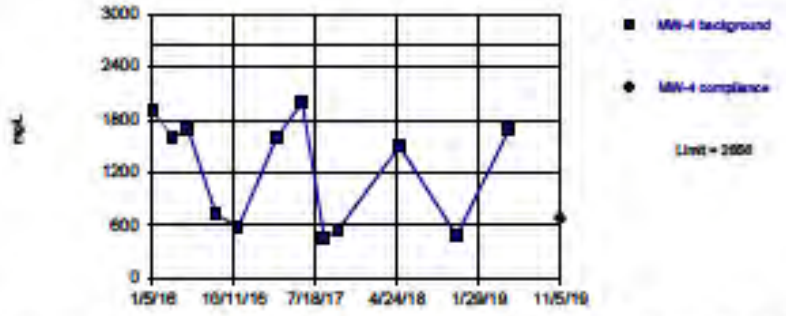
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Total Dissolved Solids

Intrawell Parametric



Background Data Summary: Mean=1233, Std. Dev.=613.2, n=12. Insufficient data to test for seasonality; data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8289, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

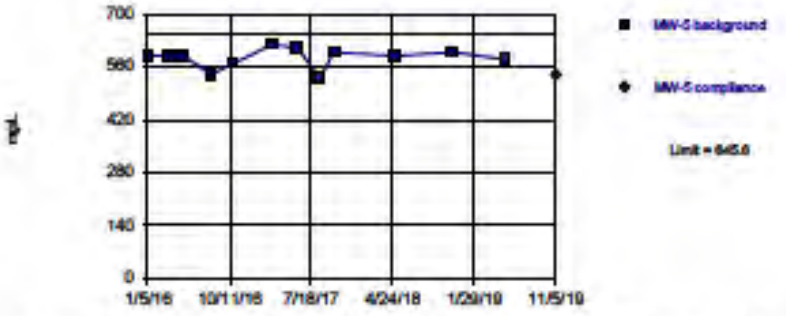
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Total Dissolved Solids

Intrawell Parametric



Background Data Summary: Mean=584.2, Std. Dev.=26.44, n=12. Insufficient data to test for seasonality; data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8905, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

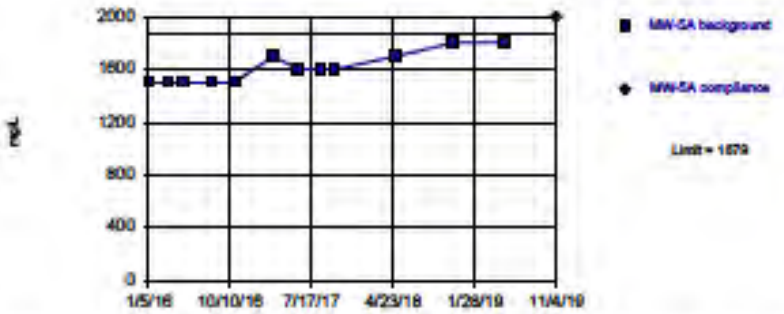
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Exceeds Limit

Total Dissolved Solids

Intrawell Parametric



Background Data Summary: Mean=1608, Std. Dev.=116.5, n=12. Insufficient data to test for seasonality; data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8301, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

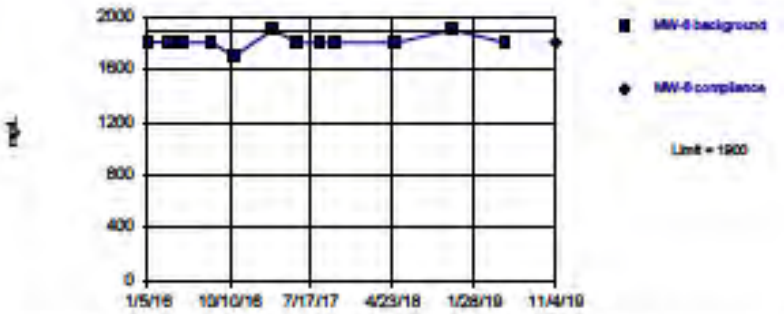
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Total Dissolved Solids

Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 12 background values. Well-constituent pair annual alpha = 0.02143. Individual comparison alpha = 0.01077 (1 of 2). Insufficient data to test for seasonality; data were not deseasonalized.

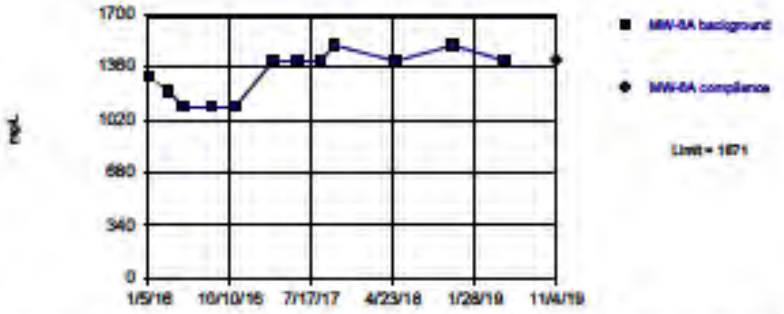
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Total Dissolved Solids

Intrawell Parametric



Background Data Summary: Mean=1317, Std. Dev.=152.8, n=12. Insufficient data to test for seasonality; data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8365, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

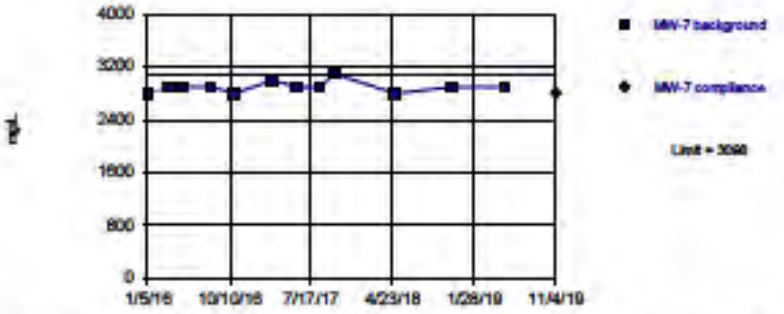
Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Total Dissolved Solids

Intrawell Parametric



Background Data Summary: Mean=2900, Std. Dev.=85.28, n=12. Insufficient data to test for seasonality; data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8078, critical = 0.805. Kappa = 2.322 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.001504.

Prediction Limit Analysis Run 12/4/2019 2:30 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Prediction Limit

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background Printed 12/4/2019, 2:32 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	%NDs	Transform	Alpha	Method
Boron (mg/L)	MW-2	0.7547	n/a	11/5/2019	0.15	No	12	0	ln(x)	0.001504	Param Intra 1 of 2
Boron (mg/L)	MW-3	0.5	n/a	11/5/2019	0.08ND	No	12	58.33	n/a	0.01077	NP Intra (NDs) 1 of 2
Boron (mg/L)	MW-4	0.25	n/a	11/5/2019	0.08ND	No	12	66.67	n/a	0.01077	NP Intra (NDs) 1 of 2
Boron (mg/L)	MW-5	0.5	n/a	11/5/2019	0.22	No	12	8.333	n/a	0.01077	NP Intra (normality) ...
Boron (mg/L)	**MW-5A**	**0.6728**	**n/a**	**11/4/2019**	**0.82**	**Yes**	**12**	**8.333**	**No**	**0.001604**	**Param Intra 1 of 2**
Boron (mg/L)	MW-6	0.4885	n/a	11/4/2019	0.34	No	12	8.333	No	0.001504	Param Intra 1 of 2
Boron (mg/L)	MW-6A	0.5486	n/a	11/4/2019	0.4	No	12	8.333	No	0.001504	Param Intra 1 of 2
Boron (mg/L)	MW-7	0.5	n/a	11/4/2019	0.24	No	12	8.333	n/a	0.01077	NP Intra (normality) ...
Calcium (mg/L)	MW-2	102.4	n/a	11/5/2019	37	No	12	0	ln(x)	0.001504	Param Intra 1 of 2
Calcium (mg/L)	MW-3	118.1	n/a	11/5/2019	93	No	12	0	No	0.001504	Param Intra 1 of 2
Calcium (mg/L)	MW-4	367.5	n/a	11/5/2019	110	No	12	0	No	0.001504	Param Intra 1 of 2
Calcium (mg/L)	MW-5	110.6	n/a	11/5/2019	90	No	12	0	No	0.001504	Param Intra 1 of 2
Calcium (mg/L)	MW-5A	249.1	n/a	11/4/2019	240	No	12	0	No	0.001504	Param Intra 1 of 2
Calcium (mg/L)	MW-6	282.4	n/a	11/4/2019	240	No	12	0	x^4	0.001504	Param Intra 1 of 2
Calcium (mg/L)	MW-6A	203.4	n/a	11/4/2019	160	No	12	0	x^2	0.001504	Param Intra 1 of 2
Calcium (mg/L)	MW-7	712.9	n/a	11/4/2019	450	No	12	0	No	0.001504	Param Intra 1 of 2
Chloride (mg/L)	MW-2	173	n/a	11/5/2019	120	No	12	0	ln(x)	0.001504	Param Intra 1 of 2
Chloride (mg/L)	MW-3	102.2	n/a	11/5/2019	60	No	12	0	No	0.001504	Param Intra 1 of 2
Chloride (mg/L)	MW-4	153.4	n/a	11/5/2019	20	No	12	0	No	0.001504	Param Intra 1 of 2
Chloride (mg/L)	MW-5	6.387	n/a	11/5/2019	3.6	No	12	0	No	0.001504	Param Intra 1 of 2
Chloride (mg/L)	**MW-5A**	**68**	**n/a**	**11/4/2019**	**69**	**Yes**	**12**	**0**	**n/a**	**0.01077**	**NP Intra (normality) ...**
Chloride (mg/L)	MW-6	14.29	n/a	11/4/2019	10	No	12	0	No	0.001504	Param Intra 1 of 2
Chloride (mg/L)	MW-6A	100.4	n/a	11/4/2019	16	No	12	0	sqrt(x)	0.001504	Param Intra 1 of 2
Chloride (mg/L)	MW-7	57.52	n/a	11/4/2019	42	No	12	0	No	0.001504	Param Intra 1 of 2
Fluoride (mg/L)	MW-2	0.4645	n/a	11/5/2019	0.28	No	12	0	No	0.001504	Param Intra 1 of 2
Fluoride (mg/L)	MW-3	0.441	n/a	11/5/2019	0.13	No	12	0	sqrt(x)	0.001504	Param Intra 1 of 2
Fluoride (mg/L)	MW-4	0.4466	n/a	11/5/2019	0.23	No	12	8.333	No	0.001504	Param Intra 1 of 2
Fluoride (mg/L)	MW-5	0.5502	n/a	11/5/2019	0.25	No	12	8.333	No	0.001504	Param Intra 1 of 2
Fluoride (mg/L)	MW-5A	0.4801	n/a	11/4/2019	0.5ND	No	12	0	No	0.001504	Param Intra 1 of 2
Fluoride (mg/L)	MW-6	0.333	n/a	11/4/2019	0.25ND	No	12	0	No	0.001504	Param Intra 1 of 2
Fluoride (mg/L)	MW-6A	0.4695	n/a	11/4/2019	0.23	No	12	0	No	0.001504	Param Intra 1 of 2
Fluoride (mg/L)	MW-7	0.286	n/a	11/4/2019	0.25ND	No	12	8.333	No	0.001504	Param Intra 1 of 2
pH (SU)	MW-2	7	5.37	11/5/2019	6.6	No	12	0	No	0.000752	Param Intra 1 of 2
pH (SU)	MW-3	6.03	4.37	11/5/2019	5.9	No	12	0	n/a	0.02155	NP Intra (normality) ...
pH (SU)	**MW-4**	**7.677**	**6.823**	**11/6/2019**	**7.8**	**Yes**	**12**	**0**	**No**	**0.000752**	**Param Intra 1 of 2**
pH (SU)	MW-5	7.96	6.462	11/5/2019	7.5	No	12	0	No	0.000752	Param Intra 1 of 2
pH (SU)	MW-5A	8.481	6.058	11/4/2019	7.2	No	12	0	No	0.000752	Param Intra 1 of 2
pH (SU)	MW-6	8.84	6.51	11/4/2019	7.3	No	12	0	n/a	0.02155	NP Intra (normality) ...
pH (SU)	MW-6A	8.199	6.288	11/4/2019	7.4	No	12	0	No	0.000752	Param Intra 1 of 2
pH (SU)	MW-7	6.941	5.762	11/4/2019	6.6	No	12	0	No	0.000752	Param Intra 1 of 2
Sulfate (mg/L)	MW-2	570	n/a	11/5/2019	62	No	12	0	n/a	0.01077	NP Intra (normality) ...
Sulfate (mg/L)	MW-3	684.7	n/a	11/5/2019	450	No	12	0	No	0.001504	Param Intra 1 of 2
Sulfate (mg/L)	MW-4	1553	n/a	11/5/2019	160	No	12	0	No	0.001504	Param Intra 1 of 2
Sulfate (mg/L)	MW-5	179.1	n/a	11/5/2019	93	No	12	0	No	0.001504	Param Intra 1 of 2
Sulfate (mg/L)	**MW-5A**	**1136**	**n/a**	**11/4/2019**	**1200**	**Yes**	**12**	**0**	**No**	**0.001604**	**Param Intra 1 of 2**
Sulfate (mg/L)	MW-6	1400	n/a	11/4/2019	940	No	12	0	n/a	0.01077	NP Intra (normality) ...
Sulfate (mg/L)	MW-6A	889.4	n/a	11/4/2019	710	No	12	0	No	0.001504	Param Intra 1 of 2
Sulfate (mg/L)	MW-7	2583	n/a	11/4/2019	1800	No	12	0	No	0.001504	Param Intra 1 of 2
Total Dissolved Solids (mg/L)	MW-2	1300	n/a	11/5/2019	380	No	12	0	n/a	0.01077	NP Intra (normality) ...
Total Dissolved Solids (mg/L)	MW-3	1048	n/a	11/5/2019	830	No	12	0	No	0.001504	Param Intra 1 of 2

Prediction Limit

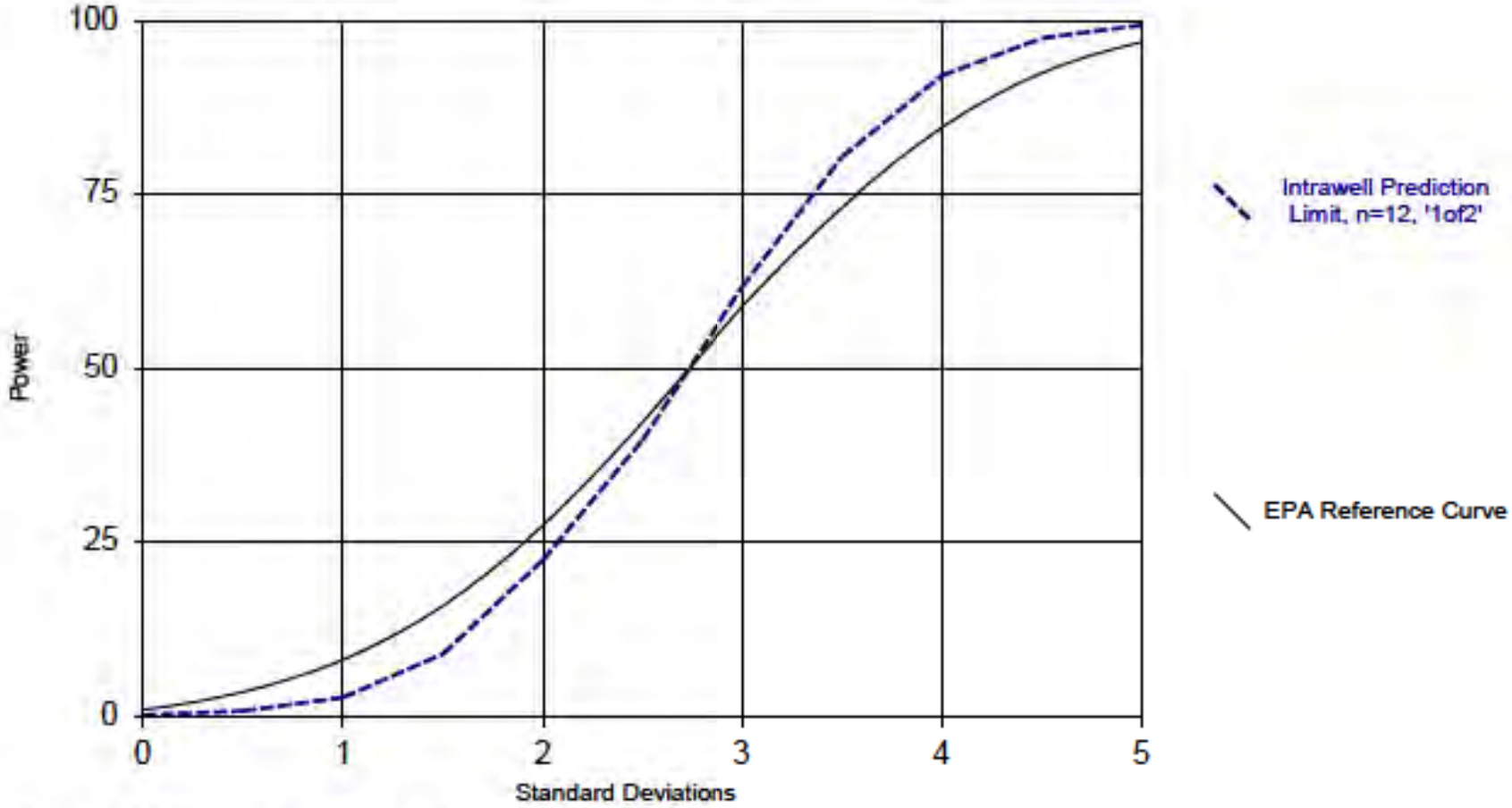
The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background Printed 12/4/2019, 2:32 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	%NDs	Transform	Alpha	Method
Total Dissolved Solids (mg/L)	MW-4	2656	n/a	11/5/2019	670	No	12	0	No	0.001504	Param Intra 1 of 2
Total Dissolved Solids (mg/L)	MW-5	645.6	n/a	11/5/2019	540	No	12	0	No	0.001504	Param Intra 1 of 2
Total Dissolved Solids (mg/L)	**MW-6A**	**1879**	**n/a**	**11/4/2019**	**2000**	**Yes**	**12**	**0**	**No**	**0.001504**	**Param Intra 1 of 2**
Total Dissolved Solids (mg/L)	MW-6	1900	n/a	11/4/2019	1800	No	12	0	n/a	0.01077	NP Intra (normality) ...
Total Dissolved Solids (mg/L)	MW-6A	1671	n/a	11/4/2019	1400	No	12	0	No	0.001504	Param Intra 1 of 2
Total Dissolved Solids (mg/L)	MW-7	3098	n/a	11/4/2019	2800	No	12	0	No	0.001504	Param Intra 1 of 2

Sanitas™ Output – Sampling Event

Power Curve

Power Curve



Kappa = 2.686, based on 12 compliance wells and 7 constituents, evaluated semi-annually (this report reflects annual total).

Analysis Run 12/4/2019 2:34 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

APPENDIX C

Alternative Source Demonstration

2019 Groundwater Monitoring, Sampling & Statistics Per EPA CCR Rule (CFR § 257.90-.98)

Alternative Source Demonstration

Asbury Generating Station CCR Impoundment
Jasper County, MO

February 2020

Prepared For:
The Empire District Electric Company
602 S. Joplin Avenue
Joplin, Missouri 64801

Midwest Environmental Consultants

2009 E. McCarty St., Ste. 2Jefferson City, MO 65101 (573) 636-9454 www.mecpc.com

TABLE OF CONTENTS

1.0 INTRODUCTION

The EPA Coal Combustion Residual Regulations (40 CFR Part 257) (CCR Rule) require groundwater monitoring of CCR impoundment. This Asbury Generating Station CCR impoundment Alternative Source Demonstration report is in accordance with the EPA CCR Rule.

The EPA CCR Rule requires the annual groundwater report be completed by January 31st of the following year and posted on-line within 30 days. The first report was due January 31, 2018. This report was prepared in general accordance with the EPA CCR Rule for groundwater requirements. These regulations outline groundwater monitoring requirements and data evaluation methods. The annual groundwater report for the 2019 sampling events was completed by January 31, 2020 and must be posted on-line within 30 days.

The purpose of the Alternative Source Demonstration is to comply with the EPA CCR Rule 40 CFR 257.94(e)(2) *"The owner or operator may demonstrate that a source other than the CCR unit caused the statistically significant increase over background levels for a constituent or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. The owner or operator must complete the written demonstration within 90 days of detecting a statistically significant increase over background levels to include obtaining a certification from a qualified professional engineer verifying the accuracy of the information in the report. If a successful demonstration is completed within the 90-day period, the owner or operator of the CCR unit may continue with a detection monitoring program under this section as required under § 257.95. The owner or operator must also include the demonstration in the annual groundwater monitoring and corrective action report required by § 257.90(e), in addition to the certification by a qualified professional engineer."*

The November 2019 sampling event report indicated confirmed intrawell prediction limits exceedances. Intrawell prediction limits were utilized per the facility's 2018 Groundwater Statistical Analysis Plan. The Annual Report recommending the site move into assessment monitoring was stamped on January 23, 2020 and submitted to the facility. However, in February MEC received an email from the facility. MDNR had forwarded EPA correspondence requesting that the site change their statistical evaluation method to interwell prediction limits. This report is in response to EPA's requested changes. EPA CCR Rule 40 CFR § 257.94(e)(2) allows at alternative source demonstration to be completed if the statistically significant increases are result of the statistical evaluation rather than from a release from the facility. **Appendix 1** contains the MDNR/EPA correspondence.

Prediction interval analyses compare one or more observations to a limit set by background data. Interwell analyses compare observations from background wells, which include upgradient and sidegradient wells per EPA Unified Guidance definitions, and their relation to the observations for the downgradient wells. Intrawell analyses compare background observations to current observations of the same well. In order to appropriately characterize the groundwater beneath the site, the statistical methods utilized at the facility consider the following facts as they relate to site:

- Potential differences in geochemical characteristics of the groundwater caused by the differing lithologies in contact with the screened interval from well to well.
- Potential impacts of surface infiltration into the groundwater environment.

Due to varying geology in the state of Missouri, intrawell analyses had initially been deemed a more appropriate method. Municipal and demolition waste landfills in Missouri typically utilize intrawell prediction limits per MDNR. However, it was noted that the power curve for these analyses was not considered strong yet. The data set consisted of only 13 sampling events from January 2016 to November 2019. EPA Unified Guidance recommends 20 or more sampling events for background data for intrawell prediction limits. A small data set triggers an SSI when there is even a slight increase in concentration. Sanitas also note to each exceedance *"Insufficient data to test for seasonality: data were not deseasonalized."* Minor increases in concentration noted in the May and November 2019 sampling events did not result in any primary MCLs to be exceeded by any of the prediction limit exceedances during the sampling event, demonstrating that the groundwater has not been contaminated.

The EPA Unified Guidance Chapter 5.2.3 states *"In groundwater data collection and testing, background conditions may not be static over time. Caution should be observed in removing observations which may signal a change in natural groundwater quality. Even when conditions have not changed, an apparently extreme measurement may represent nothing more than a portion of the background distribution that has yet to be observed. This is particularly true if the background data set contains fewer than 20 samples."* Chapter 5.2.4 states *"With such a small background sample, it can be difficult to develop an adequately powerful intrawell prediction level or control chart, even when retesting is employed (Chapter 19). Thus, additional background data will be needed to augment compliance well samples"*. Minor increases in concentrations did not result in any primary MCLs to be exceeded by any of the prediction limit exceedances during the sampling event, demonstrating that the groundwater has not been contaminated.

MDNR made several requests per EPA in the correspondence located in **Appendix 1** which included the EPA review of the groundwater reports as seen in **Table 1**. The requested boring logs from the site's Groundwater Monitoring Plan are included in **Appendix 2**. The revised November 2019 statistics utilizing inter-well prediction limits are included in **Appendix 3**.

Table 1 – EPA Review of Groundwater Reports

Facility	Location	Owner	Units	Geology	Problematic Use of Intra Well Comparisons	Problematic Alternate Source Determinations	Conclusions
Asbury Power Plant	Asbury, MO	Empire District Electric Company	Upper Pond-unlined South Pond-unlined Lower Pond-unlined	Surficial unit of clay, clayey sand, and silt approximately 15 to 25 feet thick underlain by Warner Sandstone approximately 25-30 feet thick in the southern portion of the site and the Riverton Shale in the northern area of the site	Analytical results indicate consistent differences in contaminant concentrations between upgradient and downgradient wells. Consequently, inter well comparisons are feasible and would be preferable in the absence of compelling reasons to use intra well analysis		While there are no boring logs in the documents to confirm that the wells are screened in the same geologic unit, consistency in the field parameters and the description of the geology suggest that the wells are screened in the sandstone. The analytical results indicate consistent differences in contaminant concentrations between upgradient and downgradient wells, consequently, interwell comparisons are feasible and would be preferable in the absence of compelling reasons to use intra wells analyses

2.0 SITE LOCATION

The site occupies the north half of Section 17, Township 30 North, and Range 33 West on the Asbury 7.5-Minute Quadrangle Map as seen in **Figure 1**. The site is located approximately 5.5 miles north-northeast of Asbury, Missouri, about 14 miles north-northwest of Joplin, Missouri. A map showing the locations of the monitoring wells is on **Figure 2**.

2.1 History

In March 1996, five (5) groundwater monitoring wells, MW-1 through MW-5, were installed around the perimeter of the Asbury Generating Station CCR impoundment. Monitoring wells MW-1, MW-2 and MW-3 were installed to a total depth of between 27.0 to 28.5 feet below ground surface (bgs). Monitoring wells MW-4 and MW-5 were installed to a total depth of 48 feet bgs. Each of the five monitoring wells was equipped with 10.0-foot well screens. The five wells were then developed, purged, and sampled in 1996.

In 2003, two (2) additional groundwater monitoring wells were installed and identified as MW-6 and MW-7. Both wells had 2-inch diameter PVC well casings installed to an approximate total depth of 44 feet below ground surface. Both wells were installed with an above ground steel protective cover. No other construction details such as well screen lengths were available for these two (2) wells. In December 2015, two (2) additional groundwater monitoring wells were installed and identified as MW-5A and MW-6A. Well logs are included in **Appendix 2**.

All wells are registered with MDNR – Missouri Geological Survey Program.

2.2 Site Geology

Drilling and subsurface investigation activities at the Site and as part of the MDNR approved CCR landfill Detailed Site Investigation (DSI) for the adjacent landfill area identified three (3) primary geologic units at the Site. These geologic units include the surficial soil layer, Warner Sandstone (uppermost aquifer), and Riverton Shale (confining unit). The information presented herein includes the primary elements of a site characterization work plan consistent with the MDNR guidance.

Surficial Soil. Soils at the site consist of a surficial unit of cohesive soils (e.g., CL, SC, ML, and CH) underlain by Pennsylvanian-age bedrock. Soil thickness at the Site ranges from approximately 15-25 feet.

Warner Sandstone. The Warner Sandstone (Sandstone) is the uppermost bedrock unit in south portion of the Site. In the north area of the Site, the Sandstone is overlain by the Riverton Shale (Shale). Based on the DSI information, the Sandstone and Shale can occur as alternating layers. The Sandstone and Shale are gradational in places and transition from shaley sandstone to sandy shale. According to the MDNR publication on the Pennsylvanian Subsystem in Missouri, the Warner Sandstone formation is described as follows: "Generally, the lower part is interbedded, very fine grained sandstone and claystone. The upper part is largely medium-bedded to massive channel fill sandstone. In places, the Warner consists primarily of shale and claystone, with only minor amounts of sandstone" and "ranges in thickness from 0 to 15m (49.2 ft.)."

The Sandstone is more than 25-30 feet thick in places and is generally medium hard and thin to medium bedded with occasional shale partings. The degree of induration of the Sandstone varies and generally increases with depth. Slug tests performed at selected DSI piezometers screened in

the Sandstone exhibited hydraulic conductivities ranging from approximately 1.3x10-4 cm/sec to 5.9x10-6 cm/sec. The slug test results are consistent with values for sandstone and shaley sandstone. The groundwater gradient is towards the east and Blackberry Creek.

Riverton Shale. Layers of the Riverton Shale (Shale) exhibited thicknesses ranging from approximately one foot to more than 10 feet. The Shale is generally dark gray to light gray. The Shale is mainly thin bedded with hardness ranging from soft to hard. Six packer tests were performed during the DSI to assess the hydraulic conductivity of the Shale. The packer test results ranged from approximately $3.2x10^{-6}$ cm/sec to $4.9x10^{-8}$ cm/sec. The packer test data indicates that the Shale is an effective confining unit.

According to the MDNR publication on the Pennsylvanian Subsystem in Missouri, the Riverton Shale formation is described as "dark gray to black, fine-grained, relatively brittle shale and contains as many as three coal beds, each of which is underlain by underclay" and "varies in thickness from a featheredge to more than 90 feet".

Unnamed Coal. The Shale includes coal seams in places that range in thickness from a few inches to approximately 1.5 feet. The coal is generally black to dark gray.

2.3 Groundwater Monitoring Network Design

The groundwater monitoring system for the CCR impoundment consist of nine (9) groundwater monitoring wells. Two (2) wells are considered upgradient. Two (2) wells are considered sidegradient; one is only monitored for groundwater elevation. The remaining five (5) wells are considered downgradient.

The groundwater monitoring wells (MWs) at the Asbury Generating Station is equipped with individual dedicated poly tubing to be connected to a peristaltic pump/controller at the surface. Low-flow, micro-purge and sampling techniques and technology are utilized to collect groundwater samples from the subject wells. The groundwater sampling procedures are discussed in further detail below.

2.4 Groundwater Monitoring Network

The locations of the monitoring wells are shown on **Figure 2**. The groundwater monitoring system for the site consists of the following monitoring wells:

- MW-1 Sidegradient (water level only)
- MW-2 Upgradient
- MW-3 Upgradient
- MW-4 Downgradient
- MW-5 Downgradient
- MW-5A Downgradient
- MW-6 Downgradient
- MW-6A Downgradient
- MW-7 Sidegradient

2.5 Seasonal Variation

Historical groundwater elevation data has been limited. However, adequate lengths of well screen have been utilized during the construction of the wells to accommodate typical seasonal groundwater elevation variations seen in southwest Missouri.

2.6 Groundwater Flow Direction

Historically, the seasonally high potentiometric surface indicated the groundwater flow direction to the east. **Figure 3** is a potentiometric map for November 2019 sampling event.

Originally MW-7 was thought to be a downgradient well but review of the potentiometric mapping from the eight background sampling events revealed that the well is actually a sidegradient well. Therefore, the designation for MW-7 has been changed from a downgradient to a sidegradient well for compliance monitoring.

3.0 BASELINE GROUNDWATER DATA

3.1 Baseline Data Collection

Per EPA CCR Rule § 257.94(b), the site initiated the detection monitoring program in January 2016 to include obtaining a minimum of eight (8) independent samples for each background and downgradient well. The eight (8) independent groundwater samples were obtained and analyzed as required by the CCR Rule under per the baseline groundwater monitoring plan. Background groundwater data was collected from January 2016 to August 2017.

Groundwater Monitoring Reports were completed for each sampling event and have been placed in the Operating Record. A listing of each event is below:

- January 2016
- March 2016
- May 2016
- August 2016
- October 2016
- March 2017
- June 2017
- August 2017

Initial baseline monitoring was required at all monitoring wells. The sampling frequency was quarterly or more frequently for the first two (2) years. After the background data plus the first semi-annual sampling events, a reduced lower sampling frequency replaced the quarterly events to semi-annual events. This lessened sampling frequency will be completed during the months of May and October.

The initial two (2) years of baseline and the first semi-annual detection monitoring included parameters listed in Appendix III and Appendix IV of the EPA CCR Rule. The constituents listed in Appendix IV were eliminated from the overall semi-annual detection monitoring plan after review of the first semi-annual groundwater sampling event analytical results in January 2018, according to the EPA CCR Rule.

3.2 Background Data Analysis

Sanitas™ for Ground Water Version 9.2.13 was used to run the statistical analyses with settings used as recommended by the Sanitas™ training course and user manual. The background data consisted of eight sampling events between January 2016 and August 2017 for both the Appendix III and IV constituents. Eight background events are needed for statistical analysis. Trending was found in Boron (MW-3) and Total Dissolved Solids (MW-3). MW-3 is an up-gradient well. Trending was not removed at that time; otherwise the site would be below the minimum of eight background samples needed to run statistics.

Four more sets of background data were available to add to the background data set for the November 2019 sampling event. No trending was found in the additional four sets of data so they were added to the baseline data set to increase the statistical power of the background data.

4.0 STATISTICAL ANALYSIS

4.1 Sampling Results

The constituents with results above the laboratory reporting limits are included in **Table 2**. The Test America laboratory analytical results are included in November 2019 Groundwater Report.

Table 2 – Constituents Identified Above Laboratory Reporting Limits During November 2019 Sampling Event

Constituent	Units	MCL	MW-2	MW-3	MW-4	MW-5	MW-5A	MW-6	MW-6A	MW-7
Appendix III										
Boron	mg/L	NA	0.15	<0.08J	<0.08J	0.22	0.82	0.34	0.4	0.24
Calcium	mg/L	NA	37	93	110	90	240	240	160	450
Chloride	mg/L	NA	120	60	20	3.6	69	10	16	42
Fluoride	mg/L	4.0	0.28	0.13	0.23	0.25	<0.5J	<0.25J	0.23	<0.25J
pH	SU	NA	6.6	5.9	7.6	7.5	7.2	7.3	7.4	6.6
Sulfate	mg/L	NA	62	450	160	93	1200	940	710	1800
Total Dissolved Solids	mg/L	NA	380	830	670	540	2000	1800	1400	2800

NA = Not Applicable
<x = Less than reporting limit (nondetectable)
J = Trace value seen above minimum detection limit but below reporting limit (trace)

No constituents were detected above the Federal Safe Drinking Water maximum contaminant level (MCL) during the sampling event.

4.2 Statistical Analysis

Sanitas™ for Ground Water Version 9.6.25 was used to run the statistical analyses with settings used as recommended by the Sanitas™ training course and user manual. Interwell prediction intervals were run per EPA's request (**Appendix 1**). The Sanitas™ output is included in **Appendix 3**.

Statistical analysis was then performed on the Appendix III constituents from the November 2019 sampling event compared to the updated background dataset. Prediction interval analyses compare one or more observations to a limit set by background data. Interwell analyses compare observations from background wells and their relation to the observations for the downgradient wells. Intrawell analyses compare background observations to current observations of the same well. Due to varying geology in the state of Missouri, intrawell analyses had initially been deemed a more appropriate method. However, EPA has requested the site utilize interwell prediction limits.

Statistical analysis results are presented below for those constituents determined to have an exceeded a prediction limit. However, EPA's "*Unified Guidance Document: Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities*," March 2009, EPA 530/R-09-007 is referenced multiple times in the preamble of the EPA CCR regulations for groundwater sampling and analysis requirements. According to the EPA Unified Guidance, a prediction limit exceedance is not considered a statistically significant increase (SSI) until it is confirmed through retesting. SSIs generated by non-detectable results or with less than eight background events are considered statistically invalid.

Table 3 lists the parameters with exceedances of interwell prediction limits during the November 2019 sampling event, the associated monitoring wells, if the exceedance is initial versus confirmed, the predicted limit, the measured concentration, and the MCL set forth in the National Drinking Water Regulations. The MCL is the highest level of a contaminant that is allowed in drinking water.

Table 3 – Interwell Prediction Limit Exceedances Observed During November 2019 Sampling Event

Constituent	Monitoring Well	Initial vs. Confirmed	Predicted Limit (SU)	Measured Concentration (SU)	Drinking Water MCLs (SU)
pH	MW-4	Initial	6.864	7.6	NA
pH	MW-5	Initial	6.864	7.5	NA
pH	MW-5A	Initial	6.864	7.2	NA
pH	MW-6	Initial	6.864	7.3	NA
pH	MW-6A	Initial	6.864	7.4	NA

NA = Not Applicable

4.3 Results Interpretation

The results of the EPA requested interwell prediction limit statistical analysis of the November 2019 sampling event indicate that the site is in compliance. Initial interwell prediction exceedances in pH (MW-4, MW-5, MW-5A, MW-6 and MW-6A) were noted but have not been confirmed. There is no current primary (health based) Maximum Contamination Level (MCL) for pH. Trending was not found to be significant for pH in any well during the analysis of the background data set.

4.4 Proposed Actions

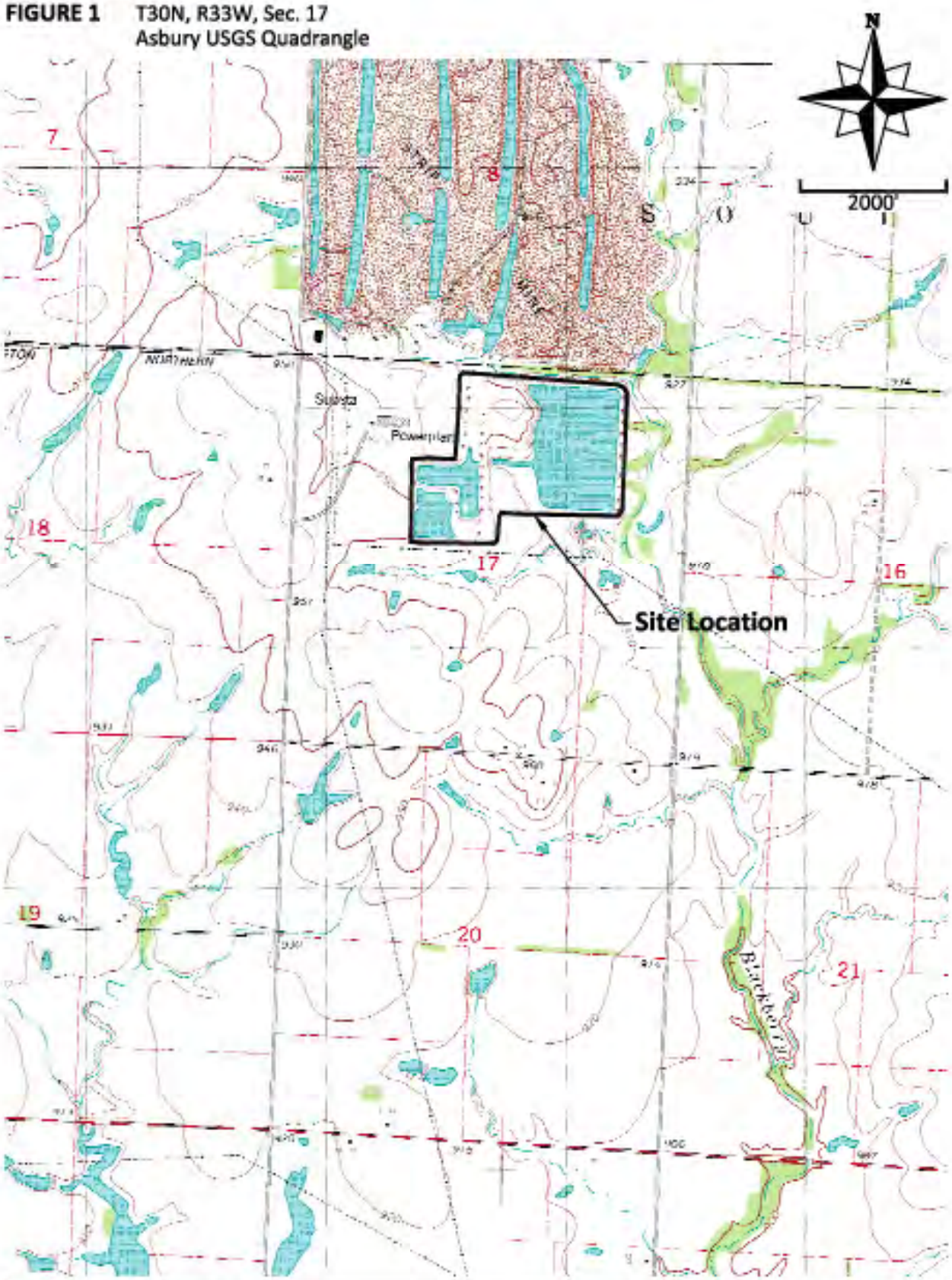
EPA CCR Rule 40 CFR § 257.94(e)(2) allows at alternative source demonstration to be completed if the statistically significant increases are result of the statistical evaluation rather than from a release from the facility. The change from intrawell to interwell prediction limits per EPA's request resulted in no confirmed statistical significant increases for the November 2019 sampling event. Therefore, the site no longer needs to move into the assessment monitoring program and will continue with the detection monitoring program per the EPA CCR Rule (§ 257.94) on a semi-annual basis. Future statistical analysis will be completed with interwell prediction limits per EPA's request.

FIGURES

Midwest Environmental Consultants

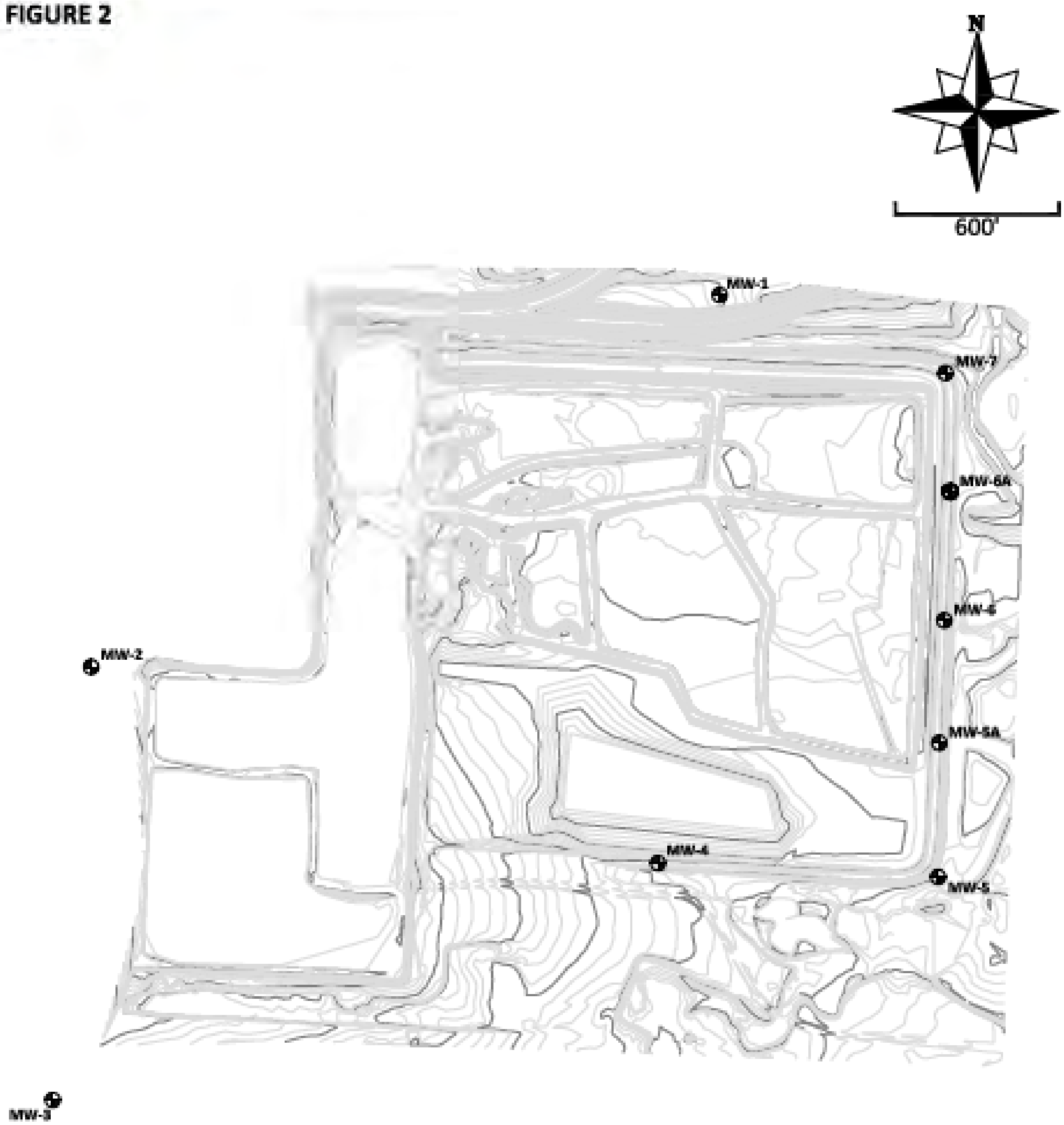
Asbury Generating Station CCR Impoundment
Groundwater Sampling Event - November 2019
Site Location Map

FIGURE 1 T30N, R33W, Sec. 17
Asbury USGS Quadrangle



January 2020

FIGURE 2



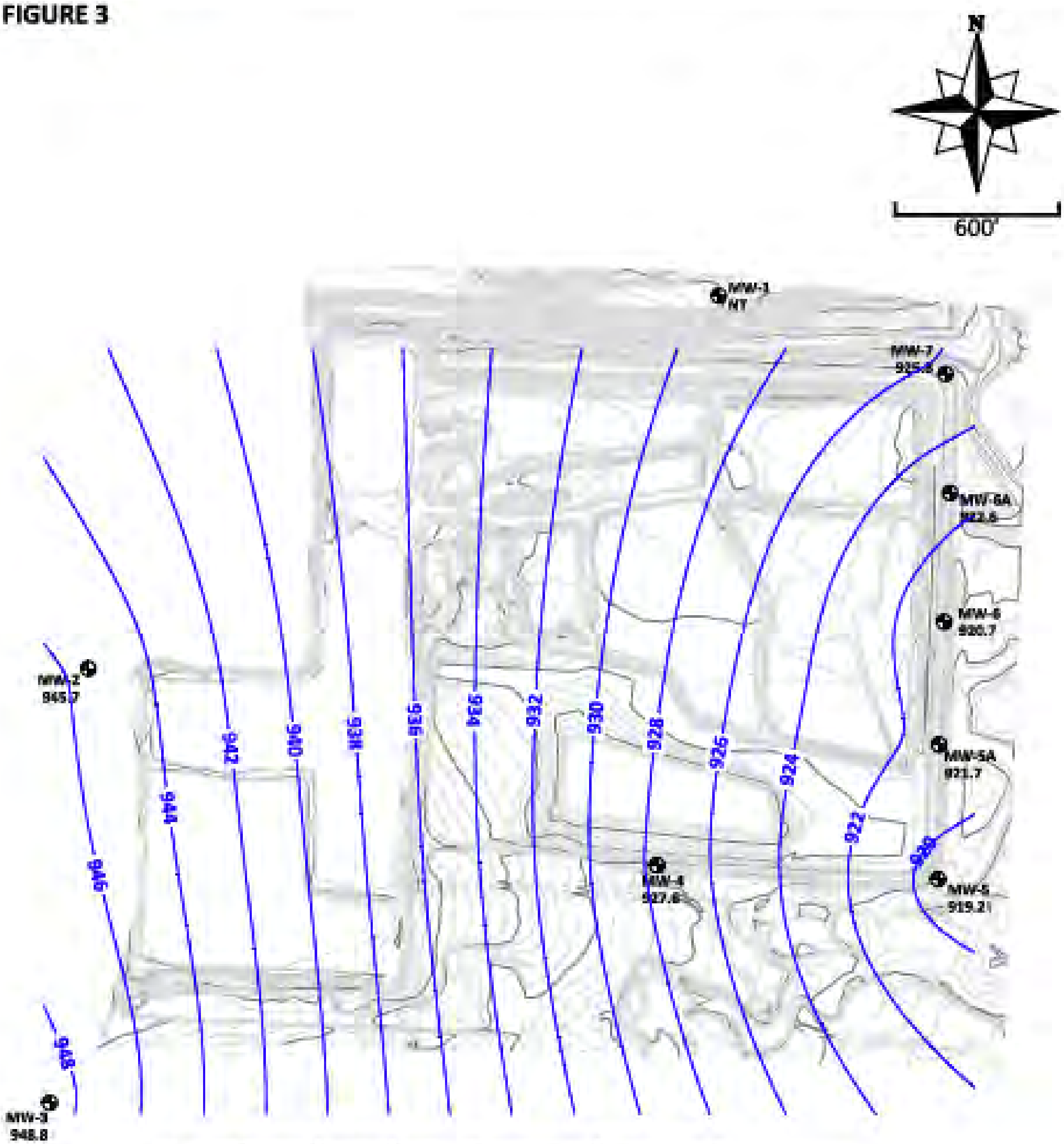
Well ID	Northing	Easting
MW-1	435791.18 *	2765155.35 *
MW-2	434428.48	2761661.27
MW-3	432842.77	2761720.86
MW-4	432728.39	2764020.99
MW-5	432659.37	2765969.23
MW-5A	434150.09	2765969.78
MW-6	434602.46	2765987.98
MW-6A	435071.40	2766010.00
MW-7	435335.42	2765993.13

* Coordinate location is approximate

Legend

Monitoring Well

FIGURE 3



Well ID	Northing	Easting	Top Of Casing	Static Water Level (BTOC)	Static Water Level
MW-1	[illegible]	[illegible]	932.4	NT	NT
MW-2	[illegible]	[illegible]	947.8	2.1	945.7
MW-3	[illegible]	[illegible]	948.8	0.0	948.8
MW-4	[illegible]	[illegible]	932.6	5.0	927.6
MW-5	[illegible]	[illegible]	925.2	6.0	919.2
MW-5A	[illegible]	[illegible]	929.3	7.6	921.7
MW-6	[illegible]	[illegible]	928.0	7.3	920.7
MW-6A	[illegible]	[illegible]	929.3	6.7	922.6
MW-7	[illegible]	[illegible]	933.6	8.1	925.5

Legend

Monitoring Well

APPENDIX 1

MDNR/EPA Correspondence

Drew Landoll

From: Snellen, Greg <greg.snellen@dnr.mo.gov>
Sent: Tuesday, January 21, 2020 3:34 PM
To: Drew Landoll
Cc: aston.robert@epa.gov; Nagel, Chris; Snellen, Greg
Subject: RE: EPA Request for Information regarding CCR Units

Good afternoon Drew,

The Environmental Protection Agency (EPA) has been working to verify data on facility specific CCR websites required by 40 CFR 257 at the national level. EPA headquarters provided a list of inquiries to the EPA regions and requested they work with the states to answer their questions. States were given a choice as to the amount of involvement they could have with the information gathering. Missouri elected to take the lead on contacting the facilities in the state, providing the information requested by the EPA and relaying the answers back.

For your company, the EPA has questions about facilities and units which may be seeking an extension under the alternate closure provisions in 2020 and what type of extension may be requested.

They provided the following list of units:

Region	State	Part A Extension	Plant Name	Unit Name	Unit Type	Op Status	Unit Class	NOI Type	NOI Date	Alterr NOI
7	MO		Asbury	Lower Pond	Surface Impoundment	Active	Existing			
7	MO		Asbury	Upper Pond	Surface Impoundment	Active	Existing			
7	MO		Asbury	South Pond	Surface Impoundment	Active	Existing			

EPA has requested a response on extensions by February 14, 2020.

Additionally, the EPA has the following question related to groundwater monitoring:

Facility	Location	Owner	Units	Geology	Problematic Use of Intra Well Comparisons	Problematic Alternate Source Determinations	Conclusions
Asbury Power Plant	Asbury MO	Empire District Electric Company	Upper Pond-unlined South Pond-unlined Lower Pond-unlined	Surficial unit of clay, clayey sand, and silt approximately 15 to 25 feet thick underlain by Warner Sandstone approximately 25-30 feet thick in the southern portion of the site and the Riverton Shale in the northern area of the site	Analytical results indicate consistent differences in contaminant concentrations between upgradient and downgradient wells. Consequently, inter well comparisons are feasible and would be preferable in the absence of compelling reasons to use intra well analysis		While there are no boring logs in the documents to confirm that the wells are screened in the same geologic unit, consistency in the field parameters and the description of the geology suggest that the wells are screened in the sandstone. The analytical results indicate consistent differences in contaminant concentrations

Region	State	Part A Extension	Plant Name	Unit Name	Unit Type	Op Status	Unit Class	NOI Type	NOI Date	Alternative _Closure_ Provisions NOI	Liner Type	Liner_ Posting_ Date	Location Restrictions	Groundwater Monitoring Status
7	MO		Asbury	Lower Pond	Surface Impoundment	Active	Existing				Unlined	10/17/2016	Fail Aquifer Only	Detection Monitoring - No SSIs
7	MO		Asbury	Upper Pond	Surface Impoundment	Active	Existing				Unlined	10/17/2016	Fail Aquifer Only	Detection Monitoring - No SSIs
7	MO		Asbury	South Pond	Surface Impoundment	Active	Existing				Unlined	10/17/2016	Fail Aquifer Only	Detection Monitoring - No SSIs

Facility	Location	Owner	Units	Geology	Problematic Use of Intra Well Comparisons	Problematic Alternate Source Determinations	Conclusions
							between upgradient and downgradient wells, consequently, interwell comparisons are feasible and would be preferable in the absence of compelling reasons to use intra wells analyses

At this time, there is not a deadline for this request.

Please let the Department know if you have any questions. You can also direct inquires to Bob Aston with EPA Region 7 who is copied on this email.

Thank you

Greg Snellen
Environmental Supervisor
Waste Management Program
573-526-8779

We'd like your feedback on the service you received from the Missouri Department of Natural Resources. Please consider taking a few minutes to complete the department's Customer Satisfaction Survey at https://www.surveymonkey.com/r/MoDNRsurvey. Thank you.

From: Aston, Robert
Sent: Friday, January 10, 2020 7:48 AM
To: Nagel, Chris <Christopher.Nagel@dnr.mo.gov>; Snellen, Greg <greg.snellen@dnr.mo.gov>
Cc: Martin, Mike <Martin.Mike@epa.gov>; Kloeckner, Jane <Kloeckner.Jane@epa.gov>; Catlin, Kelley <Catlin.Kelley@epa.gov>; Werner, Leslye <Werner.Leslye@epa.gov>; Hayworth, Brad <Hayworth.Brad@epa.gov>
Subject: CCR workload

Chris and Greg,

As a follow-up to our call on Wednesday

On Monday December 2, 2019 EPA published in the Federal Register a proposed rule for the Disposal of Coal Combustion Residuals From Electric Utilities: A Holistic Approach to Closure Part A: Deadline To Initiate Closure. The major elements of this proposed rule include:

- Definition of Lined Unit (removing a clay-lined unit from the definition),
- New initiation of Closure and Cease Receipt of Waste Deadline of August 31, 2020,
- New Alternate Closure Provisions for surface impoundment: Extensions to the initiation of closure

Nationally, EPA is gathering data to determine the number of facilities and units which may be seeking an extension under the alternate closure provisions in 2020 and is tasking the regions to work with our state partners and the facilities to determine the number of such facilities and units and what type of extension may be requested. Region 7 is seeking the state's assistance in gathering this information.

To be eligible for an extension the surface impoundment needs to be:

- An existing surface impoundment (eligible inactive surface impoundments should already be closing)
- An unlined or "clay-lined" surface impoundment
- Passed all location restrictions or only failed the uppermost aquifer restriction
  - Those that failed multiple location restrictions or did not post should have ceased receipt of waste in April 2019

This proposed rule offers facilities three options with regards to an extension

1.) Three month self-implementing extension (§ 257.103(e)(1)). Under this provision the surface impoundment must cease receipt of waste no later than November 30, 2020, and the facility must document certain conditions and certify "that the CCR and/or non-CCR waste streams must continue to be managed in that CCR surface impoundment to allow the facility to complete the measures necessary to provide alternative disposal capacity, either on-site or off-site of the facility" on its publicly available website no later than August 31, 2020.

2.) Site specific alternative to initiation of closure deadline due to lack of disposal capacity (§ 257.103(f)(1)). This provision allows facilities to submit demonstrations to EPA for approval for a specific amount of time to be able to continue to use their surface impoundment while developing alternate capacity for the CCR and non-CCR waste streams. This extension allows the facility to continue to use a unit (surface impoundment) for a maximum of 5 years, until October 15, 2023. Under this extension, facilities are required to submit their demonstrations to EPA no later than June 30, 2020.

3.) Site specific alternative to initiation of closure deadline due to Permanent Cessation of Coal Fired Boiler(s) by a Date Certain (§ 257.103(f)(2)): If a facility is ceasing generation of coal fired boiler(s) by a date certain, then the facility must complete closure by October 17, 2023 for surface impoundments less than 40 acres and by October 17, 2028 for surface impoundments larger than 40 acres. The facility is required to submit a demonstration to EPA for approval to continue to use their CCR surface impoundments. Under this extension, demonstrations are required to be submitted to EPA for approval no later than May 15, 2020.

As you can see above, the deadlines for requesting extensions are approaching quickly and will become effective when the proposed rule is final. EPA is requesting assistance from the regions, states, and facilities to estimate the number and types of extensions facility owners/operators may be requesting. EPA headquarters has developed a list (attached) of facilities which may be eligible for extensions by EPA Region and State. This list was developed by examining information included on individual facility web sites which are required as part of the CCR regulations. The list of potential sites in Missouri has been attached (attached Excel file) to this email. EPA headquarters has requested that individual regions reach out to their state counterparts to identify facility contacts and reach out to those contacts to determine which facilities and units may be requesting an extension and which type of extension may be requested. EPA headquarters has requested that this information be collected by February 14, 2020.

As part of the effort to determine what type of an extension a facility may need, EPA would also like the state's assistance in obtaining input regarding an estimate of the length of the extension that may be requested by the facility owners/operators. As part of the discussions, we need an estimate regarding the length of the extension. For example, EPA needs to estimate the following:

- Facilities that will not need an extension
- Facilities that will only need till November 2020 (short term extension)
- Longer than November – need about 6 months more
- Longer than November – need about 1 year
- Longer than November – need longer than 18 months

EPA is collecting this data in order to estimate the potential workload which could be associated with reviewing the above mentioned extension requests.

In addition, EPA headquarters routinely reviews the information posted on individual facility web sites. As part of that review EPA headquarters has identified sites in each region where specific facility information which is required to be posted is either missing, incomplete or technical questions exist. As part of this review EPA has developed two lists. See attached. One list deals with compliance issues related to documents which are, or in some cases are not, posted on the specific facility websites. The second list deals with groundwater questions related to Alternate Source Demonstrations and Intrawell analyses. With regards to the list dealing with compliance issues related to documents, EPA headquarters has requested that the regions work with their state counterparts to identify the appropriate facility contact. The plan is that EPA Headquarters would take the lead in coordination with the regions and states to contact the facilities to discuss and remedy the identified issues. With regards to the second list dealing with Alternate Source Demonstrations, EPA headquarters has requested that the regions work with their state counterparts to identify the appropriate facility contacts. The regions and or the states would then take the lead to address any identified issues. No specific timeframe has been established to address the questions related to either of the above lists. Region 7 anticipates working closely with the state in addressing these issues.

It should be noted that EPA headquarters routinely reviews CCR facility websites and could identify additional questions. If that should occur Region 7 would again reach out to the states.

At your convenience I would like to follow-up with you on the above issues sometime next week to discuss Missouri's perspective and any comments you may have. If you have any questions please do not hesitate to call or email me.

Thanks

Bob Aston
USEPA Region 7
(913)551-7392

APPENDIX 2

Well Boring Logs

MISSOURI DEPARTMENT OF NATURAL RESOURCES
GEOLOGICAL SURVEY PROGRAM

MONITORING WELL CERTIFICATION RECORD

OFFICE USE ONLY	DATE RECEIVED	
REFERENCE NO.		
C.R. NO.	CHECK NO.	
STATE WELL NUMBER	REVENUE NO.	
ENTERED Ph1 Ph2 Ph3	APPROVED BY	ROUTE

INFORMATION SUPPLIED BY PRIMARY CONTRACTOR OR DRILLING CONTRACTOR

NOTE: THIS FORM IS NOT TO BE USED FOR NESTED WELLS

OWNER NAME	CONTACT NAME	VARIANCE GRANTED BY DNR
Empire District Electric Company - Asbury Power Plant	Kavan Stull	

OWNER ADDRESS	CITY	STATE	ZIP CODE	NUMBER
602 Joplin Street	Joplin	MO	64801	

SITE NAME	WELL NUMBER	COUNTY
Asbury Power Plant	MW-1	Jasper

SITE ADDRESS	CITY	STATIC WATER LEVEL
21133 Uphill Road	Asbury	?

SURFACE COMPLETION

TYPE: ☑ ABOVE GROUND ☐ FLUSH MOUNT

LENGTH AND DIAMETER OF SURFACE COMPLETION: LENGTH 5 FT. DIAMETER 4 IN.

DIAMETER AND DEPTH OF THE HOLE SURFACE COMPLETION WAS PLACED: DIAMETER 8 IN. LENGTH 2 FT.

SURFACE COMPLETION GROUT: ☑ CONCRETE ☐ OTHER

LOCATION OF WELL (D/M/S FORMAT ONLY)

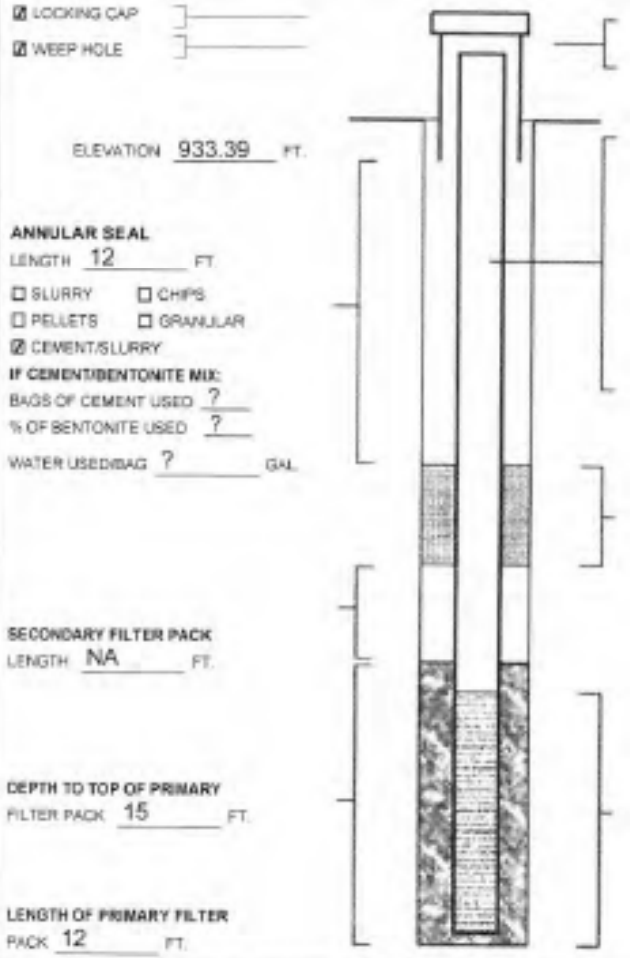
LAT. ? ° ' "

LONG ? ° ' "

SMALLEST ¼ NE ¼ LARGEST ¼ NE ¼

SECTION 17 TOWNSHIP 30 NORTH

RANGE 33 ☐ EAST ☑ WEST



MONITORING FOR: (CHECK ALL THAT APPLY)

☐ RADIONUCLIDES ☐ PETROLEUM PRODUCTS ONLY
☐ EXPLOSIVES ☑ METALS ☑ VOC
☑ SVOCS ☐ PESTICIDES/HERBICIDES

PROPOSED USE OF WELL

☐ GAS MIGRATION WELL ☑ OBSERVATION
☐ EXTRACTION WELL ☐ OPEN HOLE
☐ PIEZOMETERS ☐ INJECTION WELL
☐ DIRECT PUSH

DEPTH TO	DEPTH FROM	FORMATION DESCRIPTION
3	1	silty clay
12.5	3	sandy clay
14	12.5	sandy clay
22	14	shales
26	22	sandstone
27	26	shale
TOTAL DEPTH:		27

FOR CASED WELLS, SUBMIT ADDITIONAL AS BUILT DIAGRAMS SHOWING WELL CONSTRUCTION DETAILS INCLUDING TYPE & SIZE OF ALL CASING, HOLE DIAMETER & GROUT USED.

SIGNATURE (PRIMARY CONTACTOR)	PERMIT NUMBER	DATE WELL DRILLING WAS COMPELTED
	3857-M	03/11/1996

I HEREBY CERTIFY THAT THE MONITORING WELL HEREIN DESCRIBED WAS CONSTRUCTED IN ACCORDANCE WITH MISSOURI DEPARTMENT OF NATURAL RESOURCES REQUIREMENTS FOR THE CONSTRUCTION OF MONITORING WELLS. ☐ PUMP INSTALLED

SIGNATURE (WELL DRILLER)	PERMIT NUMBER	SIGNATURE (OF APPRENTICE)	APPRENTICE PERMIT NUMBER

MO 780-1415 (07-11)

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MISSOURI DEPARTMENT OF NATURAL RESOURCES
GEOLOGICAL SURVEY PROGRAM

MONITORING WELL CERTIFICATION RECORD

OFFICE USE ONLY	DATE RECEIVED	
REFERENCE NO.		
C.R. NO.	CHECK NO.	
STATE WELL NUMBER	REVENUE NO.	
ENTERED Ph1 Ph2 Ph3	APPROVED BY	ROUTE

INFORMATION SUPPLIED BY PRIMARY CONTRACTOR OR DRILLING CONTRACTOR

NOTE: THIS FORM IS NOT TO BE USED FOR NESTED WELLS

OWNER NAME	CONTACT NAME	VARIANCE GRANTED BY DNR
Empire District Electric Company - Asbury Power Plant	Kavan Stull	

OWNER ADDRESS	CITY	STATE	ZIP CODE	NUMBER
602 Joplin Street	Joplin	MO	64801	

SITE NAME	WELL NUMBER	COUNTY
Asbury Power Plant	MW-2	Jasper

SITE ADDRESS	CITY	STATIC WATER LEVEL
21133 Uphill Road	Asbury	0.6'

SURFACE COMPLETION

TYPE: ☑ ABOVE GROUND ☐ FLUSH MOUNT

LENGTH AND DIAMETER OF SURFACE COMPLETION: LENGTH 5 FT. DIAMETER 4 IN.

DIAMETER AND DEPTH OF THE HOLE SURFACE COMPLETION WAS PLACED: DIAMETER 8 IN. LENGTH 2 FT.

SURFACE COMPLETION GROUT: ☑ CONCRETE ☐ OTHER

LOCATION OF WELL (D/M/S FORMAT ONLY)

LAT. 37 · 21 · 35 ·

LONG 94 · 34 · 43 ··

SMALLEST ¼ ¼ LARGEST NE ¼

SECTION 17 TOWNSHIP 30 NORTH

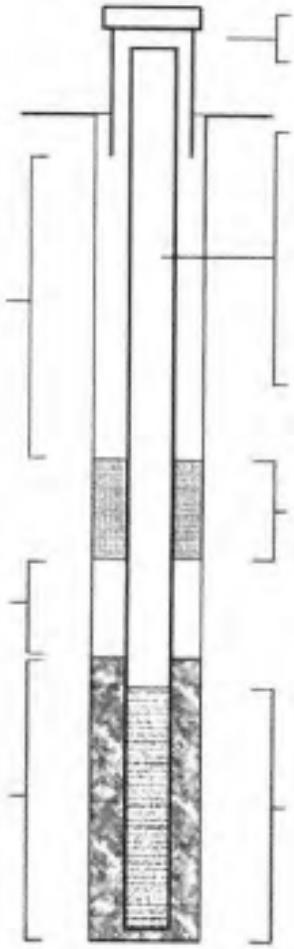
RANGE 33 ☐ EAST ☑ WEST

MONITORING FOR: (CHECK ALL THAT APPLY)

☐ RADIONUCLIDES ☐ PETROLEUM PRODUCTS ONLY
☐ EXPLOSIVES ☑ METALS ☑ VOC
☑ SVOCS ☐ PESTICIDES/HERBICIDES

PROPOSED USE OF WELL

☐ GAS MIGRATION WELL ☑ OBSERVATION
☐ EXTRACTION WELL ☐ OPEN HOLE
☐ PIEZOMETERS ☐ INJECTION WELL
☐ DIRECT PUSH



☑ LOCKING CAP
☑ WEEP HOLE

ELEVATION 947.8 FT.

ANNULAR SEAL
LENGTH 11 FT.
☐ SLURRY ☐ CHIPS
☐ PELLETS ☐ GRANULAR
☑ CEMENT/SLURRY
IF CEMENT/BENTONITE MIX:
BAGS OF CEMENT USED ?
% OF BENTONITE USED ?
WATER USED/BAG ? GAL.

SECONDARY FILTER PACK
LENGTH NA FT.

DEPTH TO TOP OF PRIMARY FILTER PACK 15 FT.

LENGTH OF PRIMARY FILTER PACK 12 FT.

SURFACE COMPLETION
☑ STEEL ☐ ALUMINUM ☐ PLASTIC

RISER
RISER PIPE DIAMETER 2 IN.
RISER PIPE LENGTH 20 FT.
DIAMETER OF DRILL HOLE 8 IN.
WEIGHT OR SDR# 40

MATERIAL
☐ STEEL ☑ THERMOPLASTIC (PVC)
☐ OTHER

BENTONITE SEAL
LENGTH 4
☐ CHIPS ☑ PELLETS ☐ GRANULAR ☐ SLURRY
☐ SATURATED ZONE ☐ HYDRATED

SCREEN
SCREEN DIAMETER 2 IN.
SCREEN LENGTH 10 FT.
DIAMETER OF DRILL HOLE 8 IN.
DEPTH TO TOP 17 FT.

SCREEN MATERIAL
☐ STEEL ☑ THERMOPLASTIC (PVC)
☐ OTHER

DEPTH TO	DEPTH FROM	FORMATION DESCRIPTION
12	1	silty clay
16	12	sandstone
28	16	shale
TOTAL DEPTH:		27

FOR CASED WELLS, SUBMIT ADDITIONAL AS BUILT DIAGRAMS SHOWING WELL CONSTRUCTION DETAILS INCLUDING TYPE & SIZE OF ALL CASING, HOLE DIAMETER & GROUT USED.

SIGNATURE (PRIMARY CONTACTOR)	PERMIT NUMBER	DATE WELL DRILLING WAS COMPELTED
	3857-M	03/06/1996

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MISSOURI DEPARTMENT OF NATURAL RESOURCES
GEOLOGICAL SURVEY PROGRAM

MONITORING WELL CERTIFICATION RECORD

OFFICE USE ONLY	DATE RECEIVED	
REFERENCE NO.		
C.R. NO.	CHECK NO.	
STATE WELL NUMBER	REVENUE NO.	
ENTERED Ph1 Ph2 Ph3	APPROVED BY	ROUTE

INFORMATION SUPPLIED BY PRIMARY CONTRACTOR OR DRILLING CONTRACTOR

NOTE: THIS FORM IS NOT TO BE USED FOR NESTED WELLS

OWNER NAME	CONTACT NAME			VARIANCE GRANTED BY DNR
Empire District Electric Company - Asbury Power Plant	Kavan Stull			
OWNER ADDRESS	**CITY**	**STATE**	**ZIP CODE**	**NUMBER**
602 Joplin Street	Joplin	MO	64801	
SITE NAME		**WELL NUMBER**		**COUNTY**
Asbury Power Plant		MW-3		Jasper
SITE ADDRESS	**CITY**			**STATIC WATER LEVEL**
21133 Uphill Road	Asbury			0.0' (artisan)

SURFACE COMPLETION

TYPE: ☑ ABOVE GROUND ☐ FLUSH MOUNT

LENGTH AND DIAMETER OF SURFACE COMPLETION: LENGTH 5 FT. DIAMETER 4 IN.

DIAMETER AND DEPTH OF THE HOLE SURFACE COMPLETION WAS PLACED: DIAMETER 8 IN. LENGTH 2 FT.

SURFACE COMPLETION GROUT: ☑ CONCRETE ☐ OTHER

LOCATION OF WELL (DMS FORMAT ONLY)

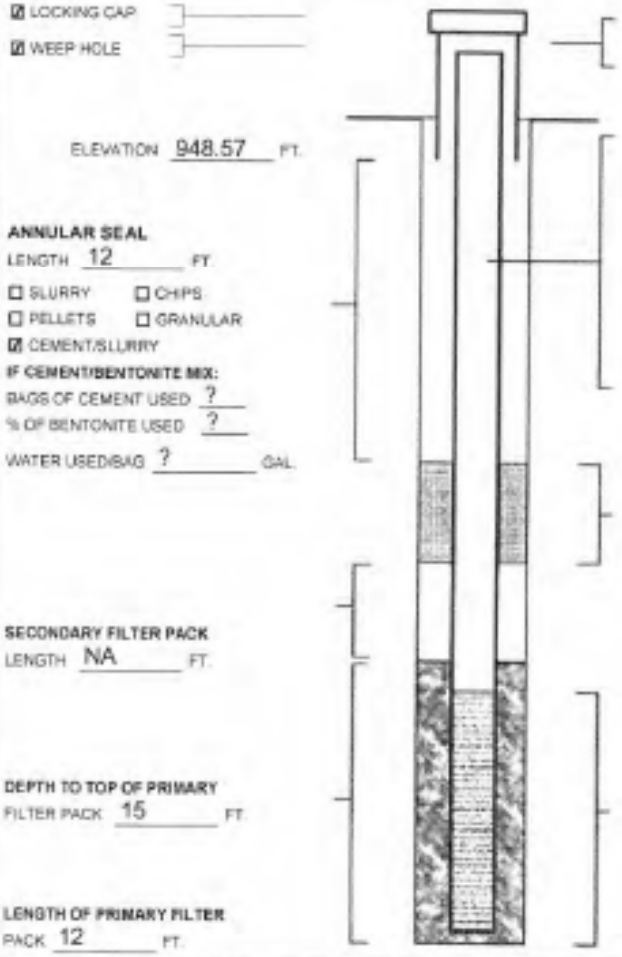
LAT. 37 · 21 · 35 ·

LONG. 94 · 34 · 43 ·

SMALLEST ___ % ___ % LARGEST NE ¼

SECTION 17 TOWNSHIP 30 NORTH

RANGE 33 ☐ EAST ☑ WEST



SURFACE COMPLETION
☑ STEEL ☐ ALUMINUM ☐ PLASTIC

RISER
RISER PIPE DIAMETER 2 IN.
RISER PIPE LENGTH 20 FT.
DIAMETER OF DRILL HOLE 8 IN.
WEIGHT OR SCH# 40

MATERIAL
☐ STEEL ☑ THERMOPLASTIC (PVC)
☐ OTHER

BENTONITE SEAL
LENGTH 3
☐ CHIPS ☑ PELLETS ☐ GRANULAR
☐ SLURRY
☐ SATURATED ZONE ☐ HYDRATED

SCREEN
SCREEN DIAMETER 2 IN.
SCREEN LENGTH 10 FT.
DIAMETER OF DRILL HOLE 8 IN.
DEPTH TO TOP 17 FT.

SCREEN MATERIAL
☐ STEEL ☑ THERMOPLASTIC (PVC)
☐ OTHER

MONITORING FOR: (CHECK ALL THAT APPLY)
☐ RADIONUCLIDES ☐ PETROLEUM PRODUCTS ONLY
☐ EXPLOSIVES ☑ METALS ☑ VOC
☑ SVOCS ☐ PESTICIDES/HERBICIDES

PROPOSED USE OF WELL
☐ GAS MIGRATION WELL ☑ OBSERVATION
☐ EXTRACTION WELL ☐ OPEN HOLE
☐ PIEZOMETERS ☐ INJECTION WELL
☐ DIRECT PUSH

DEPTH TO	DEPTH FROM	FORMATION DESCRIPTION
12	1	silty clay
22	12	shale
27	22	shale - coal mix
TOTAL DEPTH:		27

FOR CASED WELLS, SUBMIT ADDITIONAL AS BUILT DIAGRAMS SHOWING WELL CONSTRUCTION DETAILS INCLUDING TYPE & SIZE OF ALL CASING, HOLE DIAMETER & GROUT USED.

SIGNATURE (PRIMARY CONTACTOR)	PERMIT NUMBER	DATE WELL DRILLING WAS COMPELTED
	3857-M	03/07/1996

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MISSOURI DEPARTMENT OF NATURAL RESOURCES
GEOLOGICAL SURVEY PROGRAM

MONITORING WELL CERTIFICATION RECORD

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C.R. NO.	CHECK NO.	
STATE WELL NUMBER	REVENUE NO.	
ENTERED Ph1 Ph2 Ph3	APPROVED BY	ROUTE

INFORMATION SUPPLIED BY PRIMARY CONTRACTOR OR DRILLING CONTRACTOR

NOTE: THIS FORM IS NOT TO BE USED FOR NESTED WELLS

OWNER NAME	CONTACT NAME	VARIANCE GRANTED BY DNR
Empire District Electric Company - Asbury Power Plant	Kavan Stull	

OWNER ADDRESS	CITY	STATE	ZIP CODE	NUMBER
602 Joplin Street	Joplin	MO	64801	

SITE NAME	WELL NUMBER	COUNTY
Asbury Power Plant	MW-4	Jasper

SITE ADDRESS	CITY	STATIC WATER LEVEL
21133 Uphill Road	Asbury	5.46'

SURFACE COMPLETION

TYPE: ☑ ABOVE GROUND ☐ FLUSH MOUNT

LENGTH AND DIAMETER OF SURFACE COMPLETION: LENGTH 5 FT. DIAMETER 4 IN.

DIAMETER AND DEPTH OF THE HOLE SURFACE COMPLETION WAS PLACED: DIAMETER 8 IN. LENGTH 2 FT.

SURFACE COMPLETION GROUT: ☑ CONCRETE ☐ OTHER

LOCATION OF WELL (D/M/S FORMAT ONLY)

LAT. 37 · 21 · 35 ·

LONG. 94 · 34 · 43 ·

SMALLEST ¼ LARGEST NE ¼

SECTION 17 TOWNSHIP 30 NORTH

RANGE 33 ☐ EAST ☑ WEST

MONITORING FOR: (CHECK ALL THAT APPLY)

☐ RADIONUCLIDES ☐ PETROLEUM PRODUCTS ONLY
☐ EXPLOSIVES ☑ METALS ☑ VOC
☑ SVOCS ☐ PESTICIDES/HERBICIDES

PROPOSED USE OF WELL

☐ GAS MIGRATION WELL ☑ OBSERVATION
☐ EXTRACTION WELL ☐ OPEN HOLE
☐ PIEZOMETERS ☐ INJECTION WELL
☐ DIRECT PUSH

☑ LOCKING CAP
☑ WEEP HOLE

ELEVATION 932.56 FT.

ANNULAR SEAL

LENGTH 32 FT.

☐ SLURRY ☐ CHIPS
☐ PELLETS ☐ GRANULAR
☑ CEMENT/SLURRY

IF CEMENT/BENTONITE MIX:

BAGS OF CEMENT USED 7

% OF BENTONITE USED 7

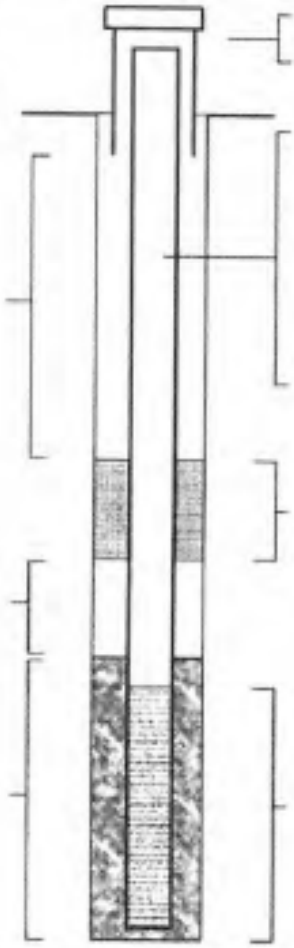
WATER USED/BAG 7 GAL.

SECONDARY FILTER PACK

LENGTH NA FT.

DEPTH TO TOP OF PRIMARY FILTER PACK 35 FT.

LENGTH OF PRIMARY FILTER PACK 12 FT.



SURFACE COMPLETION

☑ STEEL ☐ ALUMINUM ☐ PLASTIC

RISER

RISER PIPE DIAMETER 2 IN.

RISER PIPE LENGTH 40 FT.

DIAMETER OF DRILL HOLE 8 IN.

WEIGHT OR SDR# 40

MATERIAL

☐ STEEL ☑ THERMOPLASTIC (PVC)

☐ OTHER

BENTONITE SEAL

LENGTH 3

☐ CHIPS ☑ PELLETS ☐ GRANULAR
☐ SLURRY

☐ SATURATED ZONE ☐ HYDRATED

SCREEN

SCREEN DIAMETER 2 IN.

SCREEN LENGTH 10 FT.

DIAMETER OF DRILL HOLE 8 IN.

DEPTH TO TOP 37 FT.

SCREEN MATERIAL

☐ STEEL ☑ THERMOPLASTIC (PVC)

☐ OTHER

DEPTH TO	DEPTH FROM	FORMATION DESCRIPTION
26	1	silty clay
36	26	Sandstone
48	36	shale
TOTAL DEPTH:		47

FOR CASED WELLS, SUBMIT ADDITIONAL AS BUILT DIAGRAMS SHOWING WELL CONSTRUCTION DETAILS INCLUDING TYPE & SIZE OF ALL CASING, HOLE DIAMETER & GROUT USED.

SIGNATURE (PRIMARY CONTACTOR)	PERMIT NUMBER	DATE WELL DRILLING WAS COMPELTED
	3857-M	03/06/1996

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SIGNATURE (WELL DRILLER)	PERMIT NUMBER	SIGNATURE (OF APPRENTICE)	APPRENTICE PERMIT NUMBER

MO 780-1415 (07-11)

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MISSOURI DEPARTMENT OF NATURAL RESOURCES
GEOLOGICAL SURVEY PROGRAM

MONITORING WELL CERTIFICATION RECORD

OFFICE USE ONLY	DATE RECEIVED	
REFERENCE NO.		
C.R. NO.	CHECK NO.	
STATE WELL NUMBER	REVENUE NO.	
ENTERED Ph1 Ph2 Ph3	APPROVED BY	ROUTE

INFORMATION SUPPLIED BY PRIMARY CONTRACTOR OR DRILLING CONTRACTOR

NOTE: THIS FORM IS NOT TO BE USED FOR NESTED WELLS

OWNER NAME	CONTACT NAME	VARIANCE GRANTED BY DNR
Empire District Electric Company - Asbury Power Plant	Kavan Stull	

OWNER ADDRESS	CITY	STATE	ZIP CODE	NUMBER
602 Joplin Street	Joplin	MO	64801	

SITE NAME	WELL NUMBER	COUNTY
Asbury Power Plant	MW-5	Jasper

SITE ADDRESS	CITY	STATIC WATER LEVEL
21133 Uphill Road	Asbury	1.90'

SURFACE COMPLETION

TYPE	LENGTH AND DIAMETER OF SURFACE COMPLETION	DIAMETER AND DEPTH OF THE HOLE SURFACE COMPLETION WAS PLACED	SURFACE COMPLETION GROUT
☑ ABOVE GROUND ☐ FLUSH MOUNT	LENGTH 5 FT. DIAMETER 4 IN.	DIAMETER 8 IN. LENGTH 2 FT.	☑ CONCRETE ☐ OTHER

LOCATION OF WELL (D/M/S FORMAT ONLY)

LAT. 37 · 21 · 35 ·

LONG. 94 · 34 · 43 ·

SMALLEST ¼ ¼ LARGEST NE ¼

SECTION 17 TOWNSHIP 30 NORTH

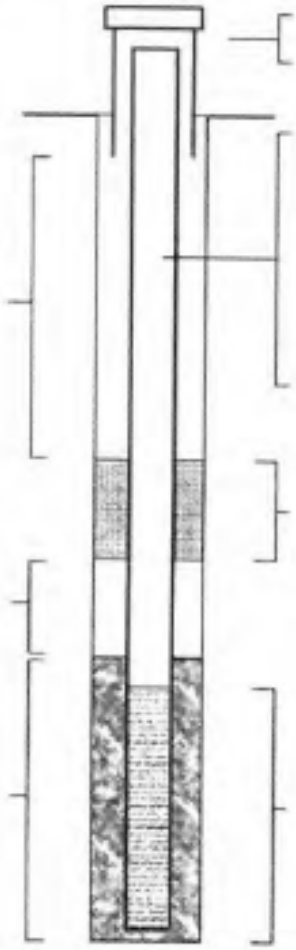
RANGE 33 ☐ EAST ☑ WEST

MONITORING FOR: (CHECK ALL THAT APPLY)

☐ RADIONUCLIDES ☐ PETROLEUM PRODUCTS ONLY
☐ EXPLOSIVES ☑ METALS ☑ VOC
☑ SVOCS ☐ PESTICIDES/HERBICIDES

PROPOSED USE OF WELL

☐ GAS MIGRATION WELL ☑ OBSERVATION
☐ EXTRACTION WELL ☐ OPEN HOLE
☐ PIEZOMETERS ☐ INJECTION WELL
☐ DIRECT PUSH



☑ LOCKING CAP
☑ WEEP HOLE

ELEVATION 919.23 FT.

ANNULAR SEAL
LENGTH 32 FT.
☐ SLURRY ☐ CHIPS
☐ PELLETS ☐ GRANULAR
☑ CEMENT/SLURRY
IF CEMENT/BENTONITE MIX:
BAGS OF CEMENT USED ?
% OF BENTONITE USED ?
WATER USED/BAG ? GAL.

SECONDARY FILTER PACK
LENGTH NA FT.

DEPTH TO TOP OF PRIMARY FILTER PACK 35 FT.

LENGTH OF PRIMARY FILTER PACK 12 FT.

SURFACE COMPLETION
☑ STEEL ☐ ALUMINUM ☐ PLASTIC

RISER
RISER PIPE DIAMETER 2 IN.
RISER PIPE LENGTH 40 FT.
DIAMETER OF DRILL HOLE 8 IN.
WEIGHT OR SCH# 40

MATERIAL
☐ STEEL ☑ THERMOPLASTIC (PVC)
☐ OTHER

BENTONITE SEAL
LENGTH 3
☐ CHIPS ☑ PELLETS ☐ GRANULAR
☐ SLURRY
☐ SATURATED ZONE ☐ HYDRATED

SCREEN
SCREEN DIAMETER 2 IN.
SCREEN LENGTH 10 FT.
DIAMETER OF DRILL HOLE 8 IN.
DEPTH TO TOP 37 FT.

SCREEN MATERIAL
☐ STEEL ☑ THERMOPLASTIC (PVC)
☐ OTHER

DEPTH TO	DEPTH FROM	FORMATION DESCRIPTION
4	1	silty clay
12	4	sandy clay
44	12	sandstone
48	44	silty shale
TOTAL DEPTH:		47

FOR CASED WELLS, SUBMIT ADDITIONAL AS BUILT DIAGRAMS SHOWING WELL CONSTRUCTION DETAILS INCLUDING TYPE & SIZE OF ALL CASING, HOLE DIAMETER & GROUT USED.

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MISSOURI DEPARTMENT OF NATURAL RESOURCES
GEOLOGICAL SURVEY PROGRAM

MONITORING WELL CERTIFICATION RECORD

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ENTERED Ph1 Ph2 Ph3	APPROVED BY	ROUTE

INFORMATION SUPPLIED BY PRIMARY CONTRACTOR OR DRILLING CONTRACTOR

NOTE: THIS FORM IS NOT TO BE USED FOR NESTED WELLS

OWNER NAME	CONTACT NAME	VARIANCE GRANTED BY DNR
Empire District Electric Company - Asbury Power Plant	Kavan Stull	

OWNER ADDRESS	CITY	STATE	ZIP CODE	NUMBER
602 Joplin Street	Joplin	MO	64801	

SITE NAME	WELL NUMBER	COUNTY
Asbury Power Plant	MW-6	Jasper

SITE ADDRESS	CITY	STATIC WATER LEVEL
21133 Uphill Road	Asbury	7.98'

SURFACE COMPLETION

TYPE: ☑ ABOVE GROUND ☐ FLUSH MOUNT

LENGTH AND DIAMETER OF SURFACE COMPLETION: LENGTH _____ FT. DIAMETER _____ IN.

DIAMETER AND DEPTH OF THE HOLE SURFACE COMPLETION WAS PLACED: DIAMETER _____ IN. LENGTH _____ FT.

SURFACE COMPLETION GROUT: ☑ CONCRETE ☐ OTHER _____

LOCATION OF WELL (DNR'S FORMAT ONLY)

LAT. 37 - 21 - 35 -

LONG. 94 - 34 - 43 -

SMALLEST ¼ ¼ LARGEST NE ¼

SECTION 17 TOWNSHIP 30 NORTH

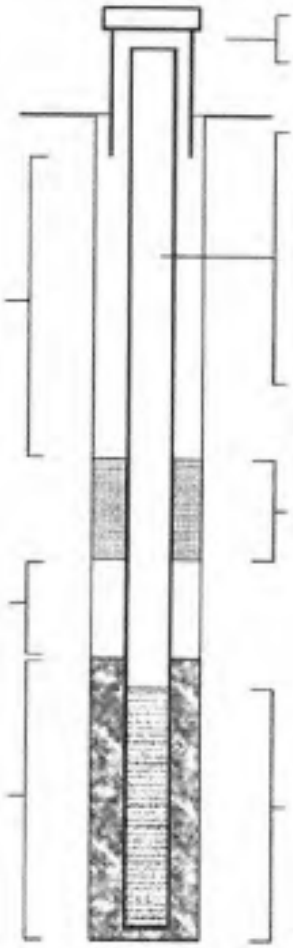
RANGE 33 ☐ EAST ☑ WEST

MONITORING FOR: (CHECK ALL THAT APPLY)

☐ RADIONUCLIDES ☐ PETROLEUM PRODUCTS ONLY
☐ EXPLOSIVES ☑ METALS ☑ VOC
☑ SVOCS ☐ PESTICIDES/HERBICIDES

PROPOSED USE OF WELL

☐ GAS MIGRATION WELL ☑ OBSERVATION
☐ EXTRACTION WELL ☐ OPEN HOLE
☐ PIEZOMETERS ☐ INJECTION WELL
☐ DIRECT PUSH



☑ LOCKING CAP
☑ WEEP HOLE

ELEVATION unk FT.

ANNULAR SEAL
LENGTH unk FT.
☐ SLURRY ☐ CHIPS
☐ PELLETS ☐ GRANULAR
☑ CEMENT/SLURRY
IF CEMENT/BENTONITE MIX:
BAGS OF CEMENT USED ?
% OF BENTONITE USED ?
WATER USED/BAG ? GAL.

SECONDARY FILTER PACK
LENGTH unk FT.

DEPTH TO TOP OF PRIMARY FILTER PACK unk FT.

LENGTH OF PRIMARY FILTER PACK unk FT.

SURFACE COMPLETION
☑ STEEL ☐ ALUMINUM ☐ PLASTIC

RISER
RISER PIPE DIAMETER 2 IN.
RISER PIPE LENGTH _____ FT.
DIAMETER OF DRILL HOLE _____ IN.
WEIGHT OR SDR# 40

MATERIAL
☐ STEEL ☑ THERMOPLASTIC (PVC)
☐ OTHER _____

BENTONITE SEAL
LENGTH unk
☐ CHIPS ☐ PELLETS ☐ GRANULAR
☐ SLURRY
☐ SATURATED ZONE ☐ HYDRATED

SCREEN
SCREEN DIAMETER 2 IN.
SCREEN LENGTH _____ FT.
DIAMETER OF DRILL HOLE _____ IN.
DEPTH TO TOP _____ FT.

SCREEN MATERIAL
☐ STEEL ☑ THERMOPLASTIC (PVC)
☐ OTHER _____

DEPTH TO	DEPTH FROM	FORMATION DESCRIPTION
		unknown
TOTAL DEPTH:		40

FOR CASED WELLS, SUBMIT ADDITIONAL AS BUILT DIAGRAMS SHOWING WELL CONSTRUCTION DETAILS INCLUDING TYPE & SIZE OF ALL CASING, HOLE DIAMETER & GROUT USED.

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OFFICE USE ONLY	DATE RECEIVED	
REFERENCE NO.		
C.R. NO.	CHECK NO.	
STATE WELL NUMBER	REVENUE NO.	
ENTERED Ph1 Ph2 Ph3	APPROVED BY	ROUTE

INFORMATION SUPPLIED BY PRIMARY CONTRACTOR OR DRILLING CONTRACTOR

NOTE: THIS FORM IS NOT TO BE USED FOR NESTED WELLS

OWNER NAME	CONTACT NAME	VARIANCE GRANTED BY DNR
Empire District Electric Company - Asbury Power Plant	Kavan Stull	

OWNER ADDRESS	CITY	STATE	ZIP CODE	NUMBER
602 Joplin Street	Joplin	MO	64801	

SITE NAME	WELL NUMBER	COUNTY
Asbury Power Plant	MW-7	Jasper

SITE ADDRESS	CITY	STATIC WATER LEVEL
21133 Uphill Road	Asbury	3.25

SURFACE COMPLETION

TYPE	LENGTH AND DIAMETER OF SURFACE COMPLETION	DIAMETER AND DEPTH OF THE HOLE SURFACE COMPLETION WAS PLACED	SURFACE COMPLETION GROUT
☑ ABOVE GROUND ☐ FLUSH MOUNT	LENGTH _____ FT. DIAMETER _____ IN.	DIAMETER _____ IN. LENGTH _____ FT.	☑ CONCRETE ☐ OTHER _____

LOCATION OF WELL (D/M/S FORMAT ONLY)

LAT. 37 · 21 · 35 ·

LONG. 94 · 34 · 43 ·

SMALLEST ____ ¼ ____ ¼ LARGEST NE ¼

SECTION 17 TOWNSHIP 30 NORTH

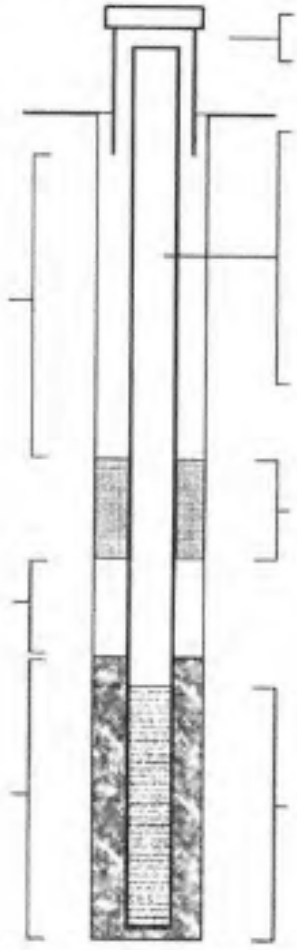
RANGE 33 ☐ EAST ☑ WEST

MONITORING FOR: (CHECK ALL THAT APPLY)

☐ RADIONUCLIDES ☐ PETROLEUM PRODUCTS ONLY
☐ EXPLOSIVES ☑ METALS ☑ VOC
☑ SVOCS ☐ PESTICIDES/HERBICIDES

PROPOSED USE OF WELL

☐ GAS MIGRATION WELL ☑ OBSERVATION
☐ EXTRACTION WELL ☐ OPEN HOLE
☐ PIEZOMETERS ☐ INJECTION WELL
☐ DIRECT PUSH



☑ LOCKING CAP
☑ WEEP HOLE

ELEVATION unk FT.

ANNULAR SEAL
LENGTH unk FT.
☐ SLURRY ☐ CHIPS
☐ PELLETS ☐ GRANULAR
☑ CEMENT/SLURRY
IF CEMENT/BENTONITE MIX:
BAGS OF CEMENT USED ?
% OF BENTONITE USED ?
WATER USED/BAG ? GAL.

SECONDARY FILTER PACK
LENGTH unk FT.

DEPTH TO TOP OF PRIMARY FILTER PACK unk FT.

LENGTH OF PRIMARY FILTER PACK unk FT.

SURFACE COMPLETION
☑ STEEL ☐ ALUMINUM ☐ PLASTIC

RISER
RISER PIPE DIAMETER 2 IN.
RISER PIPE LENGTH ____ FT.
DIAMETER OF DRILL HOLE ____ IN.
WEIGHT OR SCH# 40

MATERIAL
☐ STEEL ☑ THERMOPLASTIC (PVC)
☐ OTHER _____

BENTONITE SEAL
LENGTH unk
☐ CHIPS ☐ PELLETS ☐ GRANULAR
☐ SLURRY
☐ SATURATED ZONE ☐ HYDRATED

SCREEN
SCREEN DIAMETER 2 IN.
SCREEN LENGTH ____ FT.
DIAMETER OF DRILL HOLE ____ IN.
DEPTH TO TOP ____ FT.

SCREEN MATERIAL
☐ STEEL ☑ THERMOPLASTIC (PVC)
☐ OTHER _____

DEPTH TO	DEPTH FROM	FORMATION DESCRIPTION
		unknown
TOTAL DEPTH:		40

FOR CASED WELLS, SUBMIT ADDITIONAL AS BUILT DIAGRAMS SHOWING WELL CONSTRUCTION DETAILS INCLUDING TYPE & SIZE OF ALL CASING, HOLE DIAMETER & GROUT USED

SIGNATURE (PRIMARY CONTACTOR)	PERMIT NUMBER	DATE WELL DRILLING WAS COMPLETED
	3857-M	

I HEREBY CERTIFY THAT THE MONITORING WELL HEREIN DESCRIBED WAS CONSTRUCTED IN ACCORDANCE WITH MISSOURI DEPARTMENT OF NATURAL RESOURCES REQUIREMENTS FOR THE CONSTRUCTION OF MONITORING WELLS. ☐ PUMP INSTALLED

SIGNATURE (WELL DRILLER)	PERMIT NUMBER	SIGNATURE (OF APPRENTICE)	APPRENTICE PERMIT NUMBER

MO 780-1415 (07-11)

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MISSOURI DEPARTMENT OF NATURAL RESOURCES
GEOLOGICAL SURVEY PROGRAM

MONITORING WELL CERTIFICATION RECORD

OFFICE USE ONLY	DATE RECEIVED
REFERENCE NO.	
C.R. NO.	CHECK NO.
STATE WELL NUMBER	REVENUE NO.
ENTERED Ph1 Ph2 Ph3	APPROVED BY / ROUTE

INFORMATION SUPPLIED BY PRIMARY CONTRACTOR OR DRILLING CONTRACTOR

NOTE: THIS FORM IS NOT TO BE USED FOR NESTED WELLS

OWNER NAME	CONTACT NAME	VARIANCE GRANTED BY DNR
Empire District Electric Company - Asbury Power Plant	Kavan Stull	
OWNER ADDRESS	**CITY**	**STATE / ZIPCODE**
602 Joplin Street	Joplin	MO 64801
SITE NAME	**WELL NUMBER**	**COUNTY**
Asbury Power Plant	MW-5A	Jasper
SITE ADDRESS	**CITY**	**STATIC WATER LEVEL**
21133 Uphill Road	Asbury	

SURFACE COMPLETION

TYPE: ☑ ABOVE GROUND ☐ FLUSH MOUNT

LENGTH AND DIAMETER OF SURFACE COMPLETION: LENGTH 5 FT. DIAMETER 4 IN.

DIAMETER AND DEPTH OF THE HOLE SURFACE COMPLETION WAS PLACED: DIAMETER 18 IN. LENGTH 2 FT.

SURFACE COMPLETION GROUT: ☑ CONCRETE ☐ OTHER

☑ LOCKING CAP
☑ WEEP HOLE

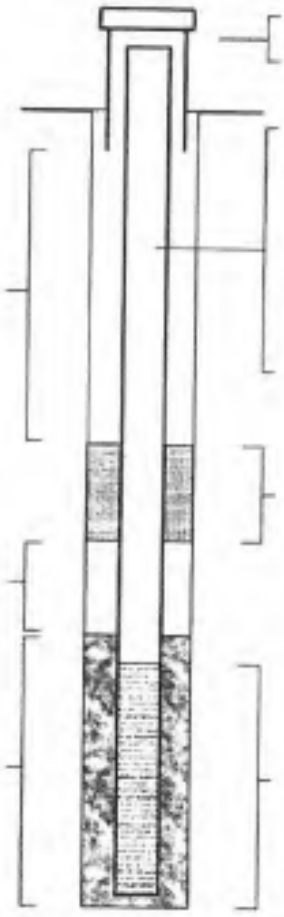
ELEVATION 926.90 FT.

ANNULAR SEAL
LENGTH 33 FT.
☑ SLURRY ☐ CHIPS ☐ PELLETS ☐ GRANULAR ☐ CEMENT/SLURRY
IF CEMENT/BENTONITE MIX:
BAGS OF CEMENT USED ____
% OF BENTONITE USED ____
WATER USED/BAG 30 GAL

SECONDARY FILTER PACK
LENGTH NA FT.

DEPTH TO TOP OF PRIMARY FILTER PACK 39 FT.

LENGTH OF PRIMARY FILTER PACK 7 FT.



SURFACE COMPLETION
☑ STEEL ☐ ALUMINUM ☐ PLASTIC

RISER
RISER PIPE DIAMETER 2 IN.
RISER PIPE LENGTH 43.5 FT.
DIAMETER OF DRILL HOLE 8 IN.
WEIGHT OR SCH# 40

MATERIAL
☐ STEEL ☑ THERMOPLASTIC (PVC) ☐ OTHER

BENTONITE SEAL
LENGTH 4
☑ CHIPS ☐ PELLETS ☐ GRANULAR ☐ SLURRY
☐ SATURATED ZONE ☑ HYDRATED

SCREEN
SCREEN DIAMETER 2 IN.
SCREEN LENGTH 5 FT.
DIAMETER OF DRILL HOLE 8 IN.
DEPTH TO TOP 41 FT.

SCREEN MATERIAL
☐ STEEL ☑ THERMOPLASTIC (PVC) ☐ OTHER

LOCATION OF WELL (DMS FORMAT ONLY)
LAT 37 ° 21 ' 32.95 "
LONG -94 ° 34 ' 41.65 "

SMALLEST NW ¼ SE ¼ LARGEST NE ¼
SECTION 17 TOWNSHIP 30 NORTH
RANGE 33 ☐ EAST ☑ WEST

MONITORING FOR (CHECK ALL THAT APPLY)
☐ RADIONUCLIDES ☐ PETROLEUM PRODUCTS ONLY
☐ EXPLOSIVES ☑ METALS ☑ VOC
☑ SVOCS ☐ PESTICIDES/HERBICIDES

PROPOSED USE OF WELL
☐ GAS MIGRATION WELL ☑ OBSERVATION
☐ EXTRACTION WELL ☐ OPEN HOLE
☐ PIEZOMETERS ☐ INJECTION WELL
☐ DIRECT PUSH

DEPTH TO	DEPTH FROM	FORMATION DESCRIPTION
13.5	0	shaley clay
18.5	13.5	silty clay
29.2	18.5	clayey silt
30.1	29.2	silty shale
46	30.1	sandstone
TOTAL DEPTH		46

FOR CASED WELLS, SUBMIT ADDITIONAL AS BUILT DIAGRAMS SHOWING WELL CONSTRUCTION DETAILS INCLUDING TYPE & SIZE OF ALL CASING, HOLE DIAMETER & GROUT USED

SIGNATURE (PRIMARY CONTACTOR)	PERMIT NUMBER	DATE WELL DRILLING WAS COMPLETED
	004605-M	12/03/2015

I HEREBY CERTIFY THAT THE MONITORING WELL HEREIN DESCRIBED WAS CONSTRUCTED IN ACCORDANCE WITH MISSOURI DEPARTMENT OF NATURAL RESOURCES REQUIREMENTS FOR THE CONSTRUCTION OF MONITORING WELLS. ☐ PUMP INSTALLED

SIGNATURE (WELL DRILLER)	PERMIT NUMBER	SIGNATURE OF APPRENTICE	APPRENTICE PERMIT NUMBER
Richard A. Dunn	001220-MH		004592-M

MO 780-1415 (07-13)

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MISSOURI DEPARTMENT OF NATURAL RESOURCES
GEOLOGICAL SURVEY PROGRAM

MONITORING WELL CERTIFICATION RECORD

OFFICE USE ONLY	DATE RECEIVED	
REFERENCE NO		
C.R. NO	CHECK NO	
STATE WELL NUMBER	REVENUE NO	
ENTERED Ph1 Ph2 Ph3	APPROVED BY	ROUTE

INFORMATION SUPPLIED BY PRIMARY CONTRACTOR OR DRILLING CONTRACTOR

NOTE: THIS FORM IS NOT TO BE USED FOR NESTED WELLS

OWNER NAME	CONTACT NAME	VARIANCE GRANTED BY DNR
Empire District Electric Company - Asbury Power Plant	Kavan Stull	

OWNER ADDRESS	CITY	STATE	ZIP CODE	NUMBER
602 Joplin Street	Joplin	MO	64801	

SITE NAME	WELL NUMBER	COUNTY
Asbury Power Plant	MW-6A	Jasper

SITE ADDRESS	CITY	STATIC WATER LEVEL
21133 Uphill Road	Asbury	

SURFACE COMPLETION

TYPE: ☑ ABOVE GROUND ☐ FLUSH MOUNT

LENGTH AND DIAMETER OF SURFACE COMPLETION: LENGTH 5 FT; DIAMETER 4 IN

DIAMETER AND DEPTH OF THE HOLE SURFACE COMPLETION WAS PLACED: DIAMETER 18 IN; LENGTH 2 FT

SURFACE COMPLETION GROUT: ☑ CONCRETE ☐ OTHER

LOCATION OF WELL (DMS FORMAT ONLY)

LAT 37 - 21 - 42.06

LONG -94 - 34 - 41.16

SMALLEST NW ¼ SE ¼ LARGEST NE ¼

SECTION 17 TOWNSHIP 30 NORTH

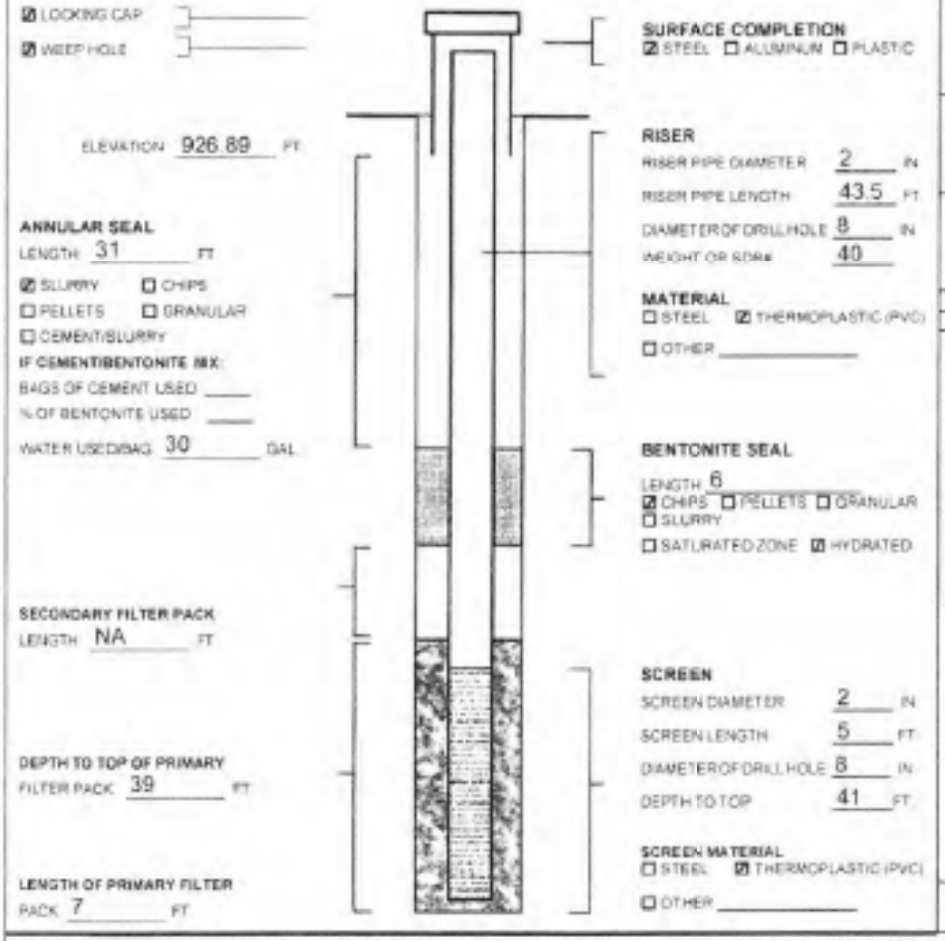
RANGE 33 ☐ EAST ☑ WEST

MONITORING FOR: (CHECK ALL THAT APPLY)

☐ RADIONUCLIDES ☐ PETROLEUM PRODUCTS ONLY
☐ EXPLOSIVES ☑ METALS ☑ VOC
☑ SVOCS ☐ PESTICIDES/HERBICIDES

PROPOSED USE OF WELL

☐ GAS MIGRATION WELL ☑ OBSERVATION
☐ EXTRACTION WELL ☐ OPEN HOLE
☐ PIEZOMETERS ☐ INJECTION WELL
☐ DIRECT PUSH



DEPTH TO	DEPTH FROM	FORMATION DESCRIPTION
4	0	shaley clay
7	4	silty clay
9	7	silty shaley clay
21	9	silty clay
22	21	silty shale
46	22	sandstone
TOTAL DEPTH:		46

FOR CASED WELLS, SUBMIT ADDITIONAL AS BUILT DIAGRAMS SHOWING WELL CONSTRUCTION DETAILS INCLUDING TYPE & SIZE OF ALL CASING, HOLE DIAMETER & GROUT USED

SIGNATURE (PRIMARY CONTRACTOR)	PERMIT NUMBER	DATE WELL DRILLING WAS COMPELTED
	004605-M	12/03/2015

I HEREBY CERTIFY THAT THE MONITORING WELL HEREIN DESCRIBED WAS CONSTRUCTED IN ACCORDANCE WITH MISSOURI DEPARTMENT OF NATURAL RESOURCES REQUIREMENTS FOR THE CONSTRUCTION OF MONITORING WELLS. ☐ PUMP INSTALLED

SIGNATURE (WELL DRILLER)	PERMIT NUMBER	SIGNATURE (OF APPRENTICE)	APPRENTICE PERMIT NUMBER
Brian D. Dunn	001220 - MH		004591-M

MO 780-1419 (07-11)

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DRILLING LOG

Project Name		Project Number	Boring Number
Empire District Electric Company – Asbury, Missouri Power Plant		08 95036.00	MW-1
Boring Location Description	**Boring Location**		**Page**
North of east fly ash pond.	NE 1/4, Sec. 17, T 30 N, R 33 W		1 of 2
Ground Surface Elevation	**Top of Well Casing Elevation**	**Boring Location Coordinates**	**Total Footage**
930.3 ft above NGVD (surv.)	933.39 ft above NGVD (surv.)	5947.48 North 3520.31 East	27.0 ft.

Drilling Method (s)	Borehole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water
Air Rotary	8"	14.0 Feet	13.0 Feet	None	None	See Remarks

Drilling Co. Layne-Western, St. Louis, Missouri	**Driller (s)** John Phillips, Gary Mills
Drilling Rig Schramm Rotadrill TH660 Truck Mounted	**Type of Sampler** None
Date Started 03/11/96 **Date Completed** 03/11/96	**Field Observer (s)** Carmelo Blazekovic

Depth in Feet	Description	USCS Class.	Blow Count	Recovery	Depth in Feet	Sample No.	PID (ppm)	Remarks
1	SILTY CLAY, brown, soft, moist, high plasticity.	CH			1			Start at 08:00 am
2					2			NGVD = National Geodetic Vertical Datum
3	SANDY CLAY, reddish brown, soft, moist, high plasticity, fine sand in clay matrix.				3			
4					4			
5					5			
6					6			
7					7			
8		CL			8			
9					9			
10					10			
11					11			
12					12			
13					13			
14					14			

SCS ENGINEERS
Kansas City, Missouri

Drilling Log, continued

Project Name	Project No.	Boring Number
Empire District Electric Company – Asbury, Missouri Power Plant	08 95036.00	MW-1
Boring Location Description	**Boring Location**	**Page**
North of east fly ash pond.	NE 1/4, Sec. 17, T 30 N, R 33 W	2 of 2

Depth in Feet	Description	USCS Class.	Blow Count	Recovery	Depth in Feet	Sample No.	PID (ppm)	Remarks
15	SHALE, clayey, light brown, weathered, weak, moist,	CL			15			
	SHALE, silty with minor coal, dark brown, weathered, weak, moist.							
16					16			
17					17			
18					18			
19					19			
20		SH			20			
21					21			
22	SHALE, blueish gray, fresh, moderately strong, moist, with some silt and trace fine sand.				22			
23					23			
24					24			
25					25			Circulating air @ 27 feet below grade. After 2 minutes borehole is producing water @ 0.2 gallons per minute. Circulated air for 15 minutes.
26	SANDSTONE, blueish gray, fresh, strong, fine grained, well cemented	SS			26			
27	SHALE, blueish gray, fresh, moderately strong, moist, with minor silt.	SH			27			
28	TOTAL DEPTH = 27.0 Feet				28			
29					29			Monitoring well installed at 10:30 am.
30					30			
31					31			

SCS ENGINEERS

Kansas City, Missouri

07/19/1996

DRPDEL08

DRILLING LOG

Project Name		Project Number	Boring Number
Empire District Electric Company – Asbury, Missouri Power Plant		08 95036.00	MW-2
Boring Location Description	**Boring Location**		**Page**
South of power plant.	NE 1/4, Sec. 17, T 30 N, R 33 W		1 of 2
Ground Surface Elevation	**Top of Well Casing Elevation**	**Boring Location Coordinates**	**Total Footage**
945.3 ft above NGVD (surv.)	947.80 ft above NGVD (surv.)	4482.06 North 1276.85 East	28.5 ft.

Drilling Method (s)	Borehole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water
Air Rotary	8"	12.0 Feet	16.5 Feet	None	None	See Remarks

Drilling Co. Layne-Western, St. Louis, Missouri	**Driller (s)** John Phillips, Gary Mills
Drilling Rig Schramm Rotedrill TH660 Truck Mounted	**Type of Sampler** None
Date Started 03/06/96 **Date Completed** 03/06/96	**Field Observer (s)** Carmelo Blazekovic

Depth in Feet	Description	USCS Class.	Blow Count	Recovery	Depth in Feet	Sample No.	PID (ppm)	Remarks
1–5	SILTY CLAY, yellowish brown, soft, moist, high plasticity.	CH			1–5			Start at 04:00 pm NGVD = National Geodetic Vertical Datum
5–10	SANDY CLAY, reddish brown, medium to stiff, moist, high plasticity, fine and medium sand in clay matrix.	CL			5–10			
10–12	SILTY CLAY, dark brown, stiff, damp, high plasticity, laminated.	CH			10–12			
12–14	SHALE, silty, dark bluish gray, weathered, weak, moist.	SH			12–14			

SCS ENGINEERS
Kansas City, Missouri

Drilling Log, continued

Project Name	Project No.	Boring Number
Empire District Electric Company – Asbury, Missouri Power Plant	08 95036.00	MW-2
Boring Location Description: South of power plant.	**Boring Location**: NE 1/4, Sec. 17, T 30 N, R 33 W	**Page**: 2 of 2

Depth in Feet	Description	USCS Class.	Blow Count	Recovery	Depth in Feet	Sample No.	PID (ppm)	Remarks
15	SANDSTONE, orange brown, weathered, moderately strong, medium grained, well graded, well cemented, very moist.	SH			15			
16					16			
17	SANDSTONE, dark brownish gray, weathered, weak, medium to coarse grained, well graded, poorly cemented, with minor clay, wet.	SS			17			Producing minor water at 17 feet below grade.
18					18			
19					19			
20					20			
21	SHALE, dark gray, weathered, weak, moist, with coal.				21			
22	SHALE, dark blueish gray, silty, fresh, moderately strong, moist.				22			
23					23			
24					24			
25		SH			25			Circulating air @ 28.5 feet below grade. After 2 minutes borehole is producing water @ 0.5 gallons per minute. Circulated air for 20 minutes.
26					26			
27					27			
28					28			
29	TOTAL DEPTH = 28.5 Feet				29			Monitoring well installed at 08:00 pm.
30					30			
31					31			

SCS ENGINEERS
Kansas City, Missouri

07/19/1996

OFFDELOG

DRILLING LOG

Project Name	Project Number	Boring Number
Empire District Electric Company – Asbury, Missouri Power Plant	08 95036.00	MW-3

Boring Location Description	Boring Location	Page
South of south fly ash ponds.	NE 1/4, Sec. 17, T 30 N, R 33 W	1 of 2

Ground Surface Elevation	Top of Well Casing Elevation	Boring Location Coordinates	Total Footage
945.5 ft above NGVD (surv.)	948.57 ft above NGVD (surv.)	2893.63 North 1208.83 East	27.0 ft.

Drilling Method (s)	Borehole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water
Air Rotary	8"	12.0 Feet	15.0 Feet	None	None	See Remarks

Drilling Co. Layne-Western, St. Louis, Missouri	Driller (s) John Phillips, Gary Mills
Drilling Rig Schramm Rotadrill TH660 Truck Mounted	Type of Sampler None
Date Started 03/07/96 / Date Completed 03/07/96	Field Observer (s) Carmelo Blazekovic

Depth in Feet	Description	USCS Class.	Blow Count	Recovery	Depth in Feet	Sample No.	PID (ppm)	Remarks
1–6	SANDY CLAY, reddish brown, soft, moist, medium plasticity, fine sand in clay matrix.	CL						Start at 03:00 pm NGVD = National Geodetic Vertical Datum
12–14	SHALE, brown, weathered, weak, moist.	SH						

SCS ENGINEERS
Kansas City, Missouri

Drilling Log, continued

Project Name	Project No.	Boring Number
Empire District Electric Company – Asbury, Missouri Power Plant	08 95038.00	MW-3
Boring Location Description	**Boring Location**	**Page**
South of south fly ash ponds.	NE 1/4, Sec. 17, T 30 N, R 33 W	2 of 2

Depth in Feet	Description	USCS Class.	Blow Count	Recovery	Depth in Feet	Sample No.	PID (ppm)	Remarks
15	SHALE, brown, weathered, weak, moist.				15			
16					16			
17					17			
18	SHALE, blueish gray, fresh, moderately strong, with minor silt and fine grained sand.				18			
19					19			
20		SH			20			
21					21			
22	SHALE and coal, dark gray to black, slightly weathered, moderately strong, wet.				22			
23					23			
24					24			
25					25			Circulating air @ 27.0 feet below grade. After 2 minutes borehole is producing water @ 0.5 gallons per minute. Circulated air for 15 minutes.
26					26			
27	TOTAL DEPTH = 27.0 Feet				27			
28					28			
29					29			Monitoring well installed at 06:00 pm.
30					30			
31					31			

SCS ENGINEERS
Kansas City, Missouri

DRILLING LOG

Project Name	Project Number	Boring Number
Empire District Electric Company – Asbury, Missouri Power Plant	08.95036.00	MW-4

Boring Location Description	Boring Location	Page
South of east fly ash pond.	NE 1/4, Sec. 17, T 30 N, R 33 W	1 of 3

Ground Surface Elevation	Top of Well Casing Elevation	Boring Location Coordinates	Total Footage
929.8 ft above NGVD (surv.)	932.56 ft above NGVD (surv.)	3859.05 North 3384.99 East	48.0 ft.

Drilling Method (s)	Borehole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water
Air Rotary	8"	26.0 Feet	22.0 Feet	None	None	See Remarks

Drilling Co. Layne-Western, St. Louis, Missouri	Driller (s) John Phillips, Gary Mills
Drilling Rig Schramm Rotadrill TH660 Truck Mounted	Type of Sampler None
Date Started 03/06/96 Date Completed 03/06/96	Field Observer (s) Carmelo Blazekovic

Depth in Feet	Description	USCS Class.	Blow Count	Recovery	Depth in Feet	Sample No.	PID (ppm)	Remarks
1–14	SILTY CLAY, yellowish brown, soft, moist, high plasticity.	CH			1–14			Start at 10:00 am NGVD = National Geodetic Vertical Datum

SCS ENGINEERS

Kansas City, Missouri

Drilling Log, continued

Project Name	Project No.	Boring Number
Empire District Electric Company – Asbury, Missouri Power Plant	08 95036.00	MW-4
Boring Location Description	**Boring Location**	**Page**
South of east fly ash pond.	NE 1/4, Sec. 17, T 30 N, R 33 W	2 of 3

Depth in Feet	Description	USCS Class.	Blow Count	Recovery	Depth in Feet	Sample No.	PID (ppm)	Remarks
15	SANDY CLAY, reddish brown, soft, moist, high plasticity, fine and medium sand in clay matrix.	CH			15			
16					16			
17					17			
18					18			
19					19			
20		CL			20			
21					21			
22					22			
23					23			
24					24			
25					25			
26	SANDSTONE, dark blueish gray, weathered, weak, moist, medium grained, poorly cemented, well graded.				26			
27					27			
28		SS			28			
29					29			
30	SANDSTONE, blueish gray, fresh, moderately strong, moist, medium grained, well graded, well cemented.				30			
31					31			

Drilling Log, continued

Project Name	Project No.	Boring Number
Empire District Electric Company – Asbury, Missouri Power Plant	08 95038.00	MW-4
Boring Location Description	**Boring Location**	**Page**
South of east fly ash pond.	NE 1/4 Sec. 17, T 30 N, R 33 W	3 of 3

Depth in Feet	Description	USCS Class.	Blow Count	Recovery	Depth in Feet	Sample No.	PID (ppm)	Remarks
32–36	SANDSTONE, blueish gray, fresh, moderately strong, moist, medium grained, well graded, well cemented.	SS			32–36			
36–39	SHALY SANDSTONE, dark blueish gray, slightly weathered, moderately strong, medium grained, well graded, poorly cemented, wet.	SS			36–39			
39–48	SHALE, dark gray, slightly weathered, weak, moist.	SH			39–48			Circulating air @ 47.0 feet below grade. After 2 minutes borehole is producing water @ 1 gallon per minute. Circulated air for 15 minutes. Monitoring well installed at 01:00 pm.
48	TOTAL DEPTH = 48.0 Feet				48			

SCS ENGINEERS

Kansas City, Missouri

DRILLING LOG

Project Name		Project Number	Boring Number
Empire District Electric Company – Asbury, Missouri Power Plant		08 95036.00	MW-5
Boring Location Description	**Boring Location**		**Page**
Near southeast corner of east fly ash pond.	NE 1/4, Sec. 17, T 30 N, R 33 W		1 of 3
Ground Surface Elevation	**Top of Well Casing Elevation**	**Boring Location Coordinates**	**Total Footage**
918.3 ft above NGVD (surv.)	919.23 ft above NGVD (surv.)	3855.21 North 4413.68 East	48.0 ft.

Drilling Method (s)	Borehole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Core Boxes	Depth to Water
Air Rotary	8"	12.0 Feet	36.0 Feet	None	None	See Remarks

Drilling Co. Layne-Western, St. Louis, Missouri	**Driller (s)** John Phillips, Gary Mills
Drilling Rig Schramm Rotadrill TH660 Truck Mounted	**Type of Sampler** None
Date Started 03/05/98 **Date Completed** 03/05/98	**Field Observer (s)** Carmelo Blazekovic

Depth in Feet	Description	USCS Class.	Blow Count	Recovery	Depth in Feet	Sample No.	PID (ppm)	Remarks
0–4	SILTY CLAY, reddish brown, soft, moist, high plasticity.	CH						Start at 10:30 am NGVD = National Geodetic Vertical Datum
4–12	SANDY CLAY, orange brown, soft, moist, high plasticity, fine grained sand in clay matrix.	CL						
12–14	SANDSTONE, light blueish gray, fresh, moderately strong, damp, fine to very fine quartz grains with mica, well graded, well cemented.	SS						

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Drilling Log, continued

Project Name	Project No.	Boring Number
Empire District Electric Company – Asbury, Missouri Power Plant	08 95036.00	MW-5
Boring Location Description	**Boring Location**	**Page**
Near southeast corner of east fly ash pond.	NE 1/4, Sec. 17, T 30 N, R 33 W	2 of 3

Depth in Feet	Description	USCS Class.	Blow Count	Recovery	Depth in Feet	Sample No.	PID (ppm)	Remarks
15	SANDSTONE, light blueish gray, fresh, moderately strong, damp, fine to very fine quartz grains with mica, well graded, well cemented.	SS			15			
16					16			
17					17			
18					18			
19					19			
20					20			
21					21			
22					22			
23					23			
24					24			
25					25			
26					26			
27					27			
28					28			
29					29			
30					30			
31					31			

Drilling Log, continued

Project Name	Project No.	Boring Number
Empire District Electric Company – Asbury, Missouri Power Plant	08 95036.00	MW-5
Boring Location Description	**Boring Location**	**Page**
Near southeast corner of east fly ash pond.	NE 1/4, Sec. 17, T 30 N, R 33 W	3 of 3

Depth in Feet	Description	USCS Class.	Blow Count	Recovery	Depth in Feet	Sample No.	PID (ppm)	Remarks
32	SANDSTONE and SHALE, light blueish gray, fresh, moderately strong, moist, fine grained quartz grains with mica, well graded, well cemented sandstone with blueish gray silty shale lenses.	SS			32			
33					33			
34					34			
35					35			
36					36			
37					37			
38					38			
39					39			
40					40			
41					41			
42					42			
43					43			
44	SILTY SHALE, blueish gray, slightly weathered, moderately strong, medium grained, well graded, poorly cemented, wet, with blueish gray, fine grained sandstone lenses.	SH			44			12:00 pm Circulating air @ 47.0 feet below grade. After 2 minutes borehole is producing water @ 0.2 gallons per minute. Circulated air for 5 minutes. Break for lunch. 1:00 pm free water in borehole at 42.0 feet below grade. Monitoring well installed at 01:30 pm.
45					45			
46					46			
47					47			
48	TOTAL DEPTH = 46.0 Feet				48			

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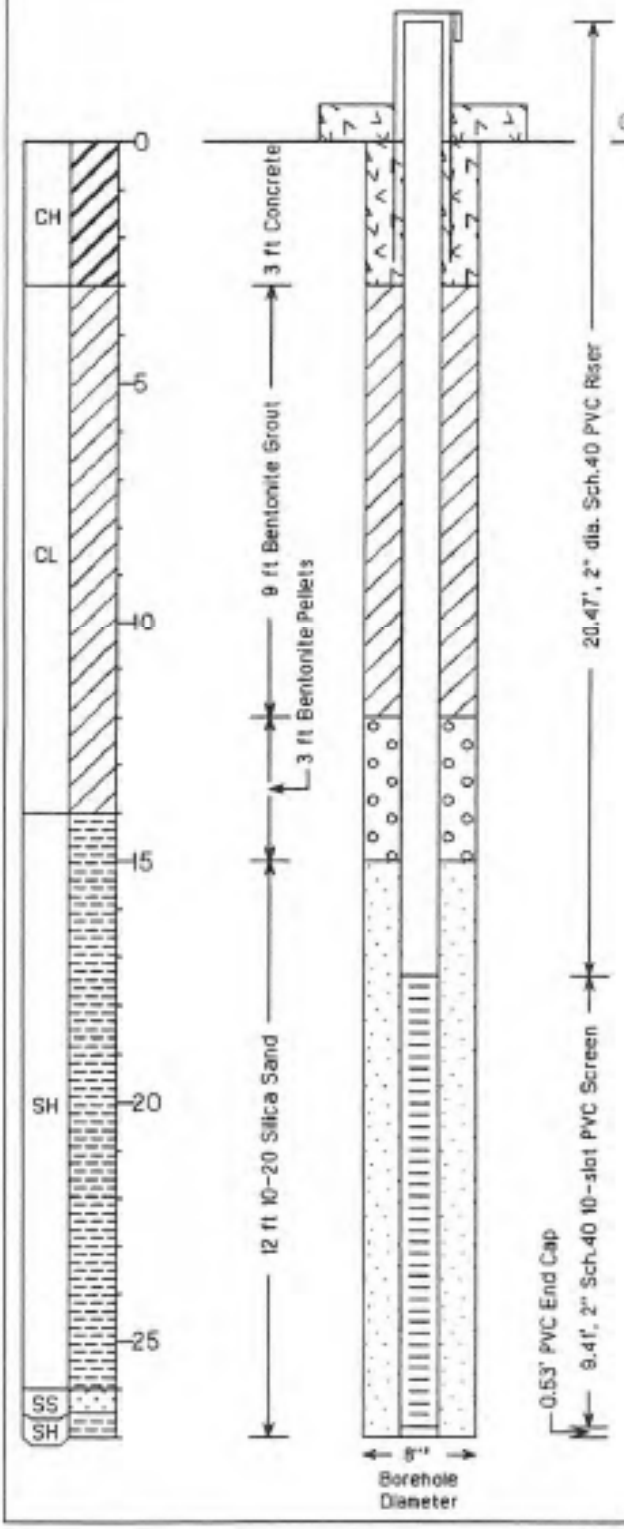
MONITORING WELL CONSTRUCTION RECORD

Project Name		Project Number	Well Number
Empire District Electric Company – Asbury, Missouri Power Plant		08 95036.00	MW-1
Location Description	**Location**		**Total Depth (TOC)**
North of east fly ash pond.	NE 1/4, Sec. 17, T 30 N, R 33 W		30.41 feet
Ground Surface Elevation	**Marker in Concrete Well Pad El.**	**Boring Location Coordinates**	**Date Installed**
930.3 ft above NGVD		5947.48 North 3520.31 East	03/11/98



Elevation Top of Well Casing:	933.39 ft above NGVD
Elevation Top of Well Screen:	912.92 ft above NGVD
Elevation Bot. of Well Screen:	903.51 ft above NGVD
Total Depth of Boring:	27.0 ft below GS
Total Depth of Well:	27.32 ft below GS
Well Casing Above GS:	3.09 feet

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APPENDIX 3

Statistical Analysis

Midwest Environmental Consultants

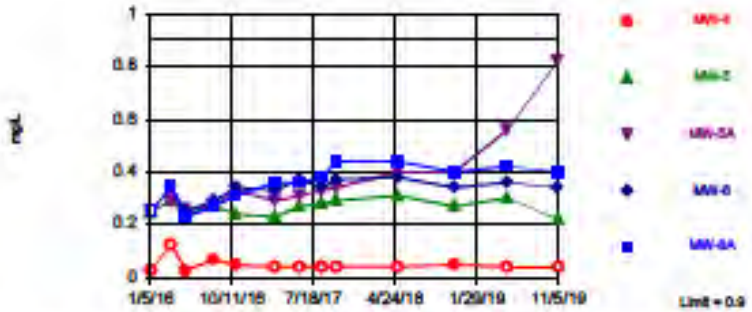
Sanitas™ Output – November 2019 Sampling Event

Interwell Prediction Limits

Within Limit

Boron

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 39 background values. 23.08% NDs. Annual per-constituent alpha = 0.01194. Individual comparison alpha = 0.0012 (1 of 2). Comparing 5 points to limit. Seasonality was not detected with 95% confidence.

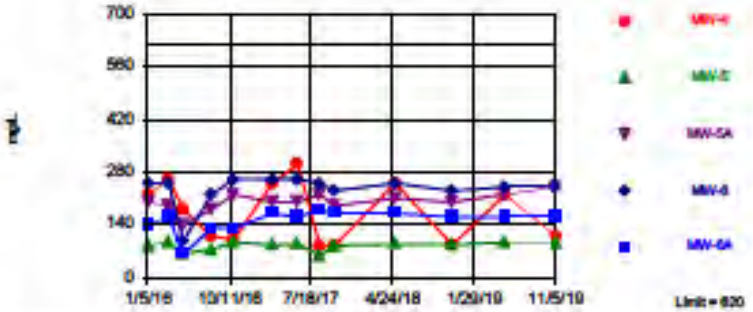
Prediction Limit Analysis Run 2/18/2020 4:55 PM

The Duplin District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Calcium

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 39 background values. Annual per-constituent alpha = 0.01194. Individual comparison alpha = 0.0012 (1 of 2). Comparing 5 points to limit. Seasonality was not detected with 95% confidence.

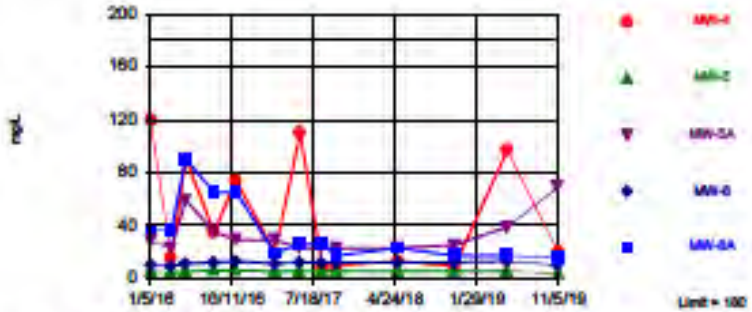
Prediction Limit Analysis Run 2/18/2020 4:55 PM

The Duplin District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Chloride

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 39 background values. Annual per-constituent alpha = 0.01194. Individual comparison alpha = 0.0012 (1 of 2). Comparing 5 points to limit. Seasonality was not detected with 95% confidence.

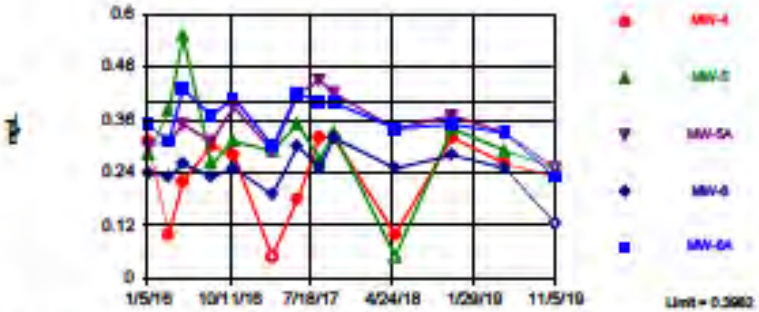
Prediction Limit Analysis Run 2/18/2020 4:55 PM

The Duplin District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Fluoride

Interwell Parametric



Background Data Summary (based on square root transformation): Mean=0.4684, Std. Dev.=0.0858, n=39, 5.128% NDs. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9481, critical = 0.917. Kappa = 1.895 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.001504. Comparing 5 points to limit.

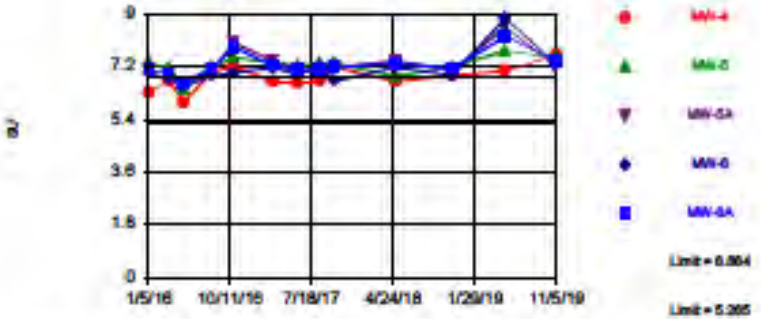
Prediction Limit Analysis Run 2/18/2020 4:55 PM

The Duplin District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Exceeds Limits: MW-4, MW-5, MW-5A, MW-6, MW-6A

pH

Interwell Parametric



Background Data Summary (based on square transformation): Mean=37.42, Std. Dev.=5.115, n=39. Seasonality was not detected with 95% confidence. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9264, critical = 0.917. Kappa = 1.696 (c=7, w=5, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.000752. Comparing 5 points to limit.

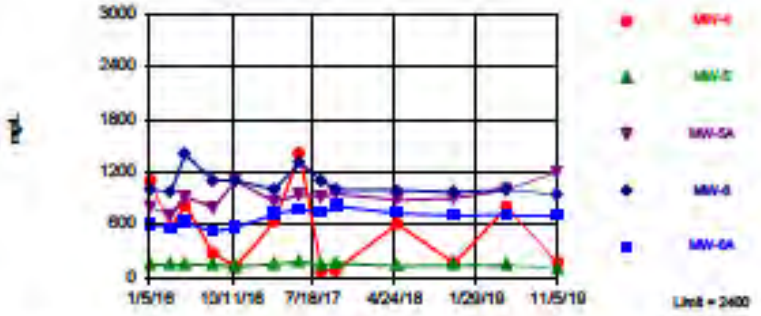
Prediction Limit Analysis Run 2/18/2020 4:55 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Sulfate

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 39 background values. Annual per-constituent alpha = 0.01194. Individual comparison alpha = 0.0012 (1 of 2). Comparing 5 points to limit. Seasonality was not detected with 95% confidence.

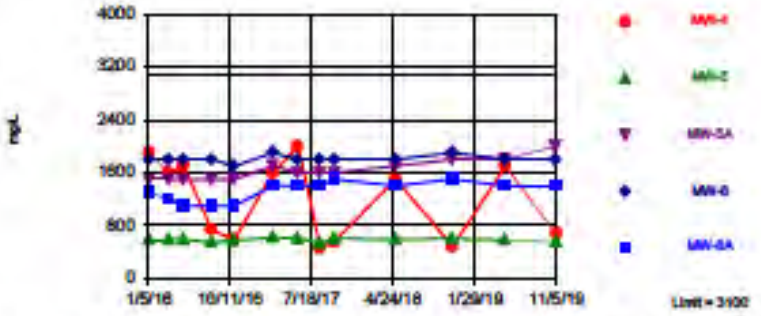
Prediction Limit Analysis Run 2/18/2020 4:55 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Within Limit

Total Dissolved Solids

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 39 background values. Annual per-constituent alpha = 0.01194. Individual comparison alpha = 0.0012 (1 of 2). Comparing 5 points to limit. Seasonality was not detected with 95% confidence.

Prediction Limit Analysis Run 2/18/2020 4:55 PM

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background

Interwell Prediction Limit

The Empire District Client: Midwest Environmental Consultants Data: 11-19 App 3 Asbury ponds with background Printed 2/18/2020, 4:55 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	%NDs	Transform	Alpha	Method
Boron (mg/L)	MW-4	0.9	n/a	11/5/2019	0.04ND	No	39	23.08	n/a	0.0012	NP (normality) 1 of 2
Boron (mg/L)	MW-5	0.9	n/a	11/5/2019	0.22	No	39	23.08	n/a	0.0012	NP (normality) 1 of 2
Boron (mg/L)	MW-5A	0.9	n/a	11/4/2019	0.82	No	39	23.08	n/a	0.0012	NP (normality) 1 of 2
Boron (mg/L)	MW-6	0.9	n/a	11/4/2019	0.34	No	39	23.08	n/a	0.0012	NP (normality) 1 of 2
Boron (mg/L)	MW-6A	0.9	n/a	11/4/2019	0.4	No	39	23.08	n/a	0.0012	NP (normality) 1 of 2
Calcium (mg/L)	MW-4	620	n/a	11/5/2019	110	No	39	0	n/a	0.0012	NP (normality) 1 of 2
Calcium (mg/L)	MW-5	620	n/a	11/5/2019	90	No	39	0	n/a	0.0012	NP (normality) 1 of 2
Calcium (mg/L)	MW-5A	620	n/a	11/4/2019	240	No	39	0	n/a	0.0012	NP (normality) 1 of 2
Calcium (mg/L)	MW-6	620	n/a	11/4/2019	240	No	39	0	n/a	0.0012	NP (normality) 1 of 2
Calcium (mg/L)	MW-6A	620	n/a	11/4/2019	160	No	39	0	n/a	0.0012	NP (normality) 1 of 2
Chloride (mg/L)	MW-4	180	n/a	11/5/2019	20	No	39	0	n/a	0.0012	NP (normality) 1 of 2
Chloride (mg/L)	MW-5	180	n/a	11/5/2019	3.6	No	39	0	n/a	0.0012	NP (normality) 1 of 2
Chloride (mg/L)	MW-5A	180	n/a	11/4/2019	69	No	39	0	n/a	0.0012	NP (normality) 1 of 2
Chloride (mg/L)	MW-6	180	n/a	11/4/2019	10	No	39	0	n/a	0.0012	NP (normality) 1 of 2
Chloride (mg/L)	MW-6A	180	n/a	11/4/2019	16	No	39	0	n/a	0.0012	NP (normality) 1 of 2
Fluoride (mg/L)	MW-4	0.3982	n/a	11/5/2019	0.23	No	39	5.128	sqrt(x)	0.001504	Param 1 of 2
Fluoride (mg/L)	MW-5	0.3982	n/a	11/5/2019	0.25	No	39	5.128	sqrt(x)	0.001504	Param 1 of 2
Fluoride (mg/L)	MW-5A	0.3982	n/a	11/4/2019	0.25ND	No	39	5.128	sqrt(x)	0.001504	Param 1 of 2
Fluoride (mg/L)	MW-6	0.3982	n/a	11/4/2019	0.125ND	No	39	5.128	sqrt(x)	0.001504	Param 1 of 2
Fluoride (mg/L)	MW-6A	0.3982	n/a	11/4/2019	0.23	No	39	5.128	sqrt(x)	0.001504	Param 1 of 2
pH (SU)	**MW-4**	**8.884**	**6.286**	**11/5/2019**	**7.8**	**Yes**	**39**	**0**	**x^2**	**0.000762**	Param 1 of 2
pH (SU)	**MW-5**	**8.884**	**6.286**	**11/5/2019**	**7.6**	**Yes**	**39**	**0**	**x^2**	**0.000762**	Param 1 of 2
pH (SU)	**MW-5A**	**8.884**	**6.286**	**11/4/2019**	**7.2**	**Yes**	**39**	**0**	**x^2**	**0.000762**	Param 1 of 2
pH (SU)	**MW-8**	**8.884**	**6.286**	**11/4/2019**	**7.3**	**Yes**	**39**	**0**	**x^2**	**0.000762**	Param 1 of 2
pH (SU)	**MW-8A**	**8.884**	**6.286**	**11/4/2019**	**7.4**	**Yes**	**39**	**0**	**x^2**	**0.000762**	Param 1 of 2
Sulfate (mg/L)	MW-4	2400	n/a	11/5/2019	160	No	39	0	n/a	0.0012	NP (normality) 1 of 2
Sulfate (mg/L)	MW-5	2400	n/a	11/5/2019	93	No	39	0	n/a	0.0012	NP (normality) 1 of 2
Sulfate (mg/L)	MW-5A	2400	n/a	11/4/2019	1200	No	39	0	n/a	0.0012	NP (normality) 1 of 2
Sulfate (mg/L)	MW-6	2400	n/a	11/4/2019	940	No	39	0	n/a	0.0012	NP (normality) 1 of 2
Sulfate (mg/L)	MW-6A	2400	n/a	11/4/2019	710	No	39	0	n/a	0.0012	NP (normality) 1 of 2
Total Dissolved Solids (mg/L)	MW-4	3100	n/a	11/5/2019	670	No	39	0	n/a	0.0012	NP (normality) 1 of 2
Total Dissolved Solids (mg/L)	MW-5	3100	n/a	11/5/2019	540	No	39	0	n/a	0.0012	NP (normality) 1 of 2
Total Dissolved Solids (mg/L)	MW-5A	3100	n/a	11/4/2019	2000	No	39	0	n/a	0.0012	NP (normality) 1 of 2
Total Dissolved Solids (mg/L)	MW-6	3100	n/a	11/4/2019	1800	No	39	0	n/a	0.0012	NP (normality) 1 of 2
Total Dissolved Solids (mg/L)	MW-6A	3100	n/a	11/4/2019	1400	No	39	0	n/a	0.0012	NP (normality) 1 of 2