1505 East High Street
Jefferson City, Missouri 65101
Telephone (573) 659-9078
www.ger-inc.biz

GREDELL Engineering Resources, Inc.

Sikeston Power Station

2020 Annual Groundwater Monitoring Report for Fly Ash Pond Compliance with USEPA 40 CFR 257.90(e)

Prepared for:

BMU Sikeston
Board of Municipal Utilities

Sikeston Power Station
1551 West Wakefield Avenue
Sikeston, Missouri 63801

August 2020

Sikeston Power Station
2020 Annual Groundwater Monitoring Report for Fly Ash Pond
Compliance with USEPA 40 CFR 257.90(e)

Prepared for:

Sikeston Board of Municipal Utilities
1551 West Wakefield Avenue
Sikeston, Missouri 63801

August 2020

Prepared by:
GREDELL Engineering Resources, Inc.
1505 East High Street
Jefferson City, Missouri 65101
Phone: (573) 659-9078
www.ger-inc.biz

Sikeston Power Station
2020 Annual Groundwater Monitoring Report
for Fly Ash Pond
Compliance with USEPA 40 CFR 257.90(e)

August 2020

Table of Contents

1.0 INTRODUCTION 1

2.0 GROUNDWATER MONITORING SYSTEM 2

3.0 FIELD SAMPLING SUMMARY 3

3.1 Field Quality Assurance/Quality Control 3

4.0 ANALYTICAL SUMMARY 5

4.1 Laboratory Quality Control 5

4.2 Precision and Accuracy 5

4.3 Representativeness 6

4.4 Comparability 6

4.5 Completeness 6

5.0 STATISTICAL ANALYSIS 8

5.1 Statistical Results 9

6.0 SUMMARY 10

7.0 LIMITATIONS 11

8.0 REFERENCES 12

List of Figures

Figure 1 –Groundwater Contour Map – September 24, 2019

List of Tables

Table 1 – Groundwater Monitoring Well Summary – Fly Ash Pond
Table 2 – Historical Groundwater Level Summary
Table 3 – Water Levels and Field Parameter Summary
Table 4 – Groundwater Monitoring Constituents
Table 5 – Relative Percent Difference Summary
Table 6 – Intra-Well Prediction Limit Summary

List of Appendices

Appendix 1 – Field Sampling Notes
Appendix 2 – Laboratory Analytical Results
Appendix 3 – Laboratory Quality Assurance/Quality Control Data
Appendix 4 – Fly Ash Pond Groundwater Quality Data Base
Appendix 5 – Statistical Power Curve
Appendix 6 – Time Series Plots
Appendix 7 – Box and Whiskers Plots
Appendix 8 – Prediction Limit Charts
Appendix 9 – Alternate Source Demonstration - March 20, 2020

1.0 INTRODUCTION

The Sikeston Power Station (SPS), owned and operated by the Sikeston Board of Municipal Utilities (SBMU), is an electric power producer and distributor located within the western city limits of Sikeston, in southern Scott County, Missouri. The SBMU-SPS began operation in 1981 and produces approximately 235 megawatts of electricity. Coal combustion residuals (approximately 10,000 tons per annum) are currently sold or placed in the facility's two coal ash surface impoundments located immediately east of the power station. Both impoundments are on properties owned and controlled by SBMU. One coal ash impoundment measuring approximately 61 acres in size is actively used for bottom ash disposal. The second coal ash impoundment measuring approximately 30 acres in size is primarily used for fly ash disposal. It is subject to the alternate compliance schedule specified by the United States Environmental Protection Agency (USEPA) under 40 CFR Part 257.100(e)(5)(ii) due to its initial inactive status and the Response to Partial Vacatur (the Direct Final Rule). This report pertains specifically to the Fly Ash Pond.

Pursuant to USEPA's 40 CFR Part 257 (§257) Federal Criteria for Classification of Solid Waste Disposal Facilities and Practices, Subpart D – Standards for Disposal of Coal Combustion Residuals (CCR) in Landfills and Surface Impoundments (ponds), the establishment of a groundwater monitoring system and routine detection sampling and reporting is required at all coal ash surface impoundments. The purpose of a monitoring well system is to evaluate the quality of groundwater as it passes beneath the waste mass within an impoundment. Groundwater samples are collected and analyzed on a semi-annual basis in accordance with §257.93, or as otherwise detailed in a site-specific Groundwater Monitoring and Sampling Plan (GMSAP). Analytical data also are subjected to statistical analysis in accordance with §257.93(f), with the results included in an Annual Groundwater Monitoring Report in accordance with §257.90(e). If results suggest that a statistically significant increase (SSI) in one or more constituents for detection monitoring listed in Appendix III of §257 has occurred, a written demonstration is required to determine if the SSI is attributable to alternate causative factors. If a successful demonstration is not made, an assessment monitoring program must be initiated as required under §257.95.

This report describes the results of the second semi-annual detection groundwater sampling event conducted at the SPS Fly Ash Pond on September 24, 2019. Included is a description of the sampling event, groundwater elevations, water table surface, field activities summary, analytical results, and statistical analysis results. Field sampling and reporting activities were conducted in accordance with the site-specific GMSAP (Gredell Engineering, 2018). Statistical analysis was performed in accordance with §257.93(f) using the statistical analysis method as filed in the SBMU-SPS operating record on April 15, 2019. The third semi-annual groundwater sampling field activities were completed on May 21, 2020, but data analysis was not complete at the time of this report and will therefore be included in the next Annual Groundwater Monitoring Report.

2.0 GROUNDWATER MONITORING SYSTEM

The groundwater monitoring system for the Fly Ash Pond consists of five wells. Well locations are depicted on Figure 1. The wells are identified as MW-1, MW-2, MW-3, MW-7, and MW-9. MW-2 and MW-3 are located hydraulically upgradient of the Fly Ash Pond, whereas MW-1, MW-7, and MW-9 are hydraulically downgradient of the Fly Ash Pond. Monitoring wells MW-1, MW-2, and MW-3 were installed on April 26 and 27, 2016 by Smith & Company of Poplar Bluff, Missouri during characterization of the site (Gredell Engineering, 2017). Monitoring wells MW-7 and MW-9 were installed on April 18, 2017 and November 13, 2017, respectively, by Bulldog Drilling, Inc. of Dupo, Illinois to serve as additional downgradient monitoring wells. Well construction activities were performed under the direction of a Registered Geologist in the State of Missouri. Well design and installation techniques were completed in accordance with 10 CSR 23-4, which is consistent with the standards summarized in 40 CFR 257.91(e). Well depths are between 30 and 35.5 feet below ground surface. All five wells monitor uppermost groundwater, which is within the alluvial aquifer at the Fly Ash Pond site. Each well yields sufficient quantities of water for the purposes of sampling and analysis.

Table 1 presents a construction summary of the wells comprising the Fly Ash Pond groundwater monitoring system. Figure 1 depicts well locations and a groundwater contour map of the uppermost aquifer for the September 2019 semi-annual sampling event. This map confirms that water in the uppermost aquifer continues to move in a west-southwesterly direction, consistent with the conclusions of the Site Characterization Report (Gredell Engineering, 2017). All groundwater wells are equipped with dedicated tubing for use with a peristaltic pump. This system has been used for chemical sampling since inception of groundwater sampling for the Fly Ash Pond. The Fly Ash Pond groundwater monitoring system is described in more detail in the site-specific GMSAP for this facility (Gredell Engineering, 2018).

3.0 FIELD SAMPLING SUMMARY

SPS environmental staff performed groundwater sampling on September 24, 2019. This sampling event was the second semi-annual detection groundwater sampling event conducted at the SPS Fly Ash Pond. Following the September 24, 2019 sampling event, groundwater at MW-1 was resampled for Sulfate, Calcium and Total Dissolved Solids (TDS) on October 22, 2019. The third semi-annual groundwater sampling field activities were completed on May 21, 2020, but data analysis was not complete at the time of this report. Therefore, analytical data (and evaluation) for the third event will be included in the next Annual Groundwater Monitoring Report. Field procedures for all three sampling events were conducted in the manner described in the following paragraphs and the GMSAP for this facility (Gredell Engineering, 2018).

Groundwater samples were collected using low-flow sampling techniques and dedicated sampling equipment. Field tests of indicator parameters were performed using an In-Situ, Inc. SmarTROLL TM MP flow cell unit and HF Scientific MicroTPI field portable turbidimeter. Each groundwater sample was subsequently analyzed for the constituents listed in §257 Appendix III. All monitoring wells produced sufficient volume of groundwater for full analysis.

The environmental staff inspected each monitoring well upon arrival. Wells appeared to be in satisfactory condition and had locks in place. Staff initially gauged water levels in the monitoring wells using a standard electronic water level meter graduated in increments of 0.01 feet. Static water levels were recorded on forms provided in the GMSAP. Each well was then purged, while staff monitored water quality until indicator parameters (pH and specific conductance) stabilized in accordance with the criteria in the GMSAP. Additional indicator parameters (turbidity, temperature, dissolved oxygen, and oxidation/reduction potential) were monitored for stability prior to groundwater sample collection. Following stabilization of all indicator parameters, final pH was recorded and groundwater samples were then collected.

Field notes documenting the September 24, 2019 sampling event and the October 22, 2019 resampling event and a copies of chain-of-custody forms are presented in Appendix 1. Field sampling notes are summarized in Table 3, including initial and final water level measurements, purge volumes, and pH. Raw analytical laboratory data sheets for each sample, including the field blanks and sample duplicates, are included in Appendix 2. Quality Assurance/Quality Control (QA/QC) documentation is presented in Appendix 3. A summary of background and detection monitoring analytical data and field parameters is presented in Appendix 4.

3.1 Field Quality Assurance/Quality Control

Field QA/QC during each sampling event included the collection of one field blank and one field duplicate sample. The duplicate during the September 24 event was collected at MW-2 and the duplicate during the October 22 resample event was collected at MW-1 (duplicate results are summarized in Table 5). Rinsate blanks were not collected because dedicated sampling equipment was used. Samples were shipped to PDC Laboratories' primary facility located in Peoria, Illinois using standard chain-of-custody documentation/procedures.

Samples collected during the September 24 event were received by the primary facility on September 26, 2019 and subsequently analyzed for the six detection monitoring constituents listed in §257 Appendix III and required under §257.94(b) (Table 4). Final hard copy analytical results were received from PDC Laboratories on October 9, 2019.

Samples collected during the October 22 resample event were received by the primary facility on October 25, 2019 and subsequently analyzed for Sulfate, Calcium and TDS. Final hard copy analytical results were received from PDC Laboratories on November 11, 2019

4.0 ANALYTICAL SUMMARY

Hard copy analytical data for each monitoring well sampled during the September 2019 detection monitoring event and the October 2019 resample event are provided in Appendix 2. The data pertain to water quality results from the uppermost aquifer in the area bordering the Fly Ash Pond, along with sample duplicate and field blank results.

4.1 Laboratory Quality Control

Laboratory analysis of the September and October 2019 groundwater samples was completed by PDC Laboratories, Inc., of Peoria, Illinois. The results were accompanied by appropriate QA/QC documentation. That documentation is presented in Appendix 3.

4.2 Precision and Accuracy

Precision is a measure of the reproducibility of analytical results, generally expressed as a Relative Percent Difference (RPD). 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. Accuracy is defined as the degree of agreement between the measured amount of a species and the amount actually known to be present, expressed as a percentage. It is generally determined by calculating the percent recoveries for analyses of surrogate compounds, laboratory control samples, continuing calibration check standards and matrix spike samples. Acceptable percent recoveries are established for SW-846 and USEPA methods. Field and laboratory blank analyses are also used to address measurement bias.

The analyses for detection monitoring samples were performed within appropriate hold times and both initial and continuing calibrations met acceptance criteria for all analyses. Similarly, method blanks and LCS analyses met acceptance criteria. The case narratives for the September and October 2019 groundwater samples indicate that all quality controls met acceptance criteria except the TDS batch QC sample RPDs were outside the acceptance criteria and were flagged with “M”.

Additional QA/QC comments include the following:

- *Field Duplicates:* Analyses of duplicate samples are used to define the total variability of the sampling/analytical system as a whole. One field duplicate from MW-2 was collected during the detection monitoring event and one field duplicate was collected from MW-1 during the resample. The RPD was calculated for all detected chemical parameters. Accordingly, RPDs were calculated for all parameters during the September detection sampling event except Fluoride, which was not reported in a concentration above the detection limit. RPDs were calculated for Sulfate, Calcium and TDS during the October resampling event. A summary table showing the results of the RPD calculations is

included as Table 5. Using a tolerance level of ±20 percent, all calculated RPDs were within acceptable ranges for each parameter except Boron.

- *Field Blank:* One field blank was incorporated into the data set for the detection sampling event and one field blank was incorporated into the data set for the resample. Results for the field blanks showed that they contained no reportable concentrations except for Boron and Calcium during the detection sampling event.
- *Laboratory Blanks:* Method blanks, artificial, and matrix-less samples are analyzed to monitor the laboratory system for interferences and contamination from glassware, reagents, etc. Method blanks are taken throughout the entire sample preparation process. They are included with each batch of extractions or digestions prepared, or with each 20 samples, whichever was more frequent. Reference to Appendix 3 should be made for comments related to these and other laboratory control samples.

4.3 Representativeness

Representativeness expresses the degree to which sample data accurately and precisely reflect site conditions. Representativeness of the data is determined by comparing actual sampling procedures to those delineated in the field sampling plan, comparing results from field duplicate samples and reviewing the results of field blanks.

Approved sampling procedures are described in the GMSAP (Gredell Engineering, 2018). Procedures specified in that plan have been followed. Approved sampling procedures should be reviewed annually. Groundwater monitoring data are evaluated using an intrawell statistical analysis methodology and is conducted separately for each constituent in each monitoring well using prediction limits in accordance with §257.93(f)(3) and the performance standards in §257.93(g). The stated statistical approach, along with supporting documentation and engineering certification, are available in the SBMU-SPS On-Site Operating Record.

4.4 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.

4.5 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

(Appendix 3). Furthermore, the sample must have been analyzed within the specified holding time and in such a manner that analytical QC acceptance criteria are met.

5.0 STATISTICAL ANALYSIS

The statistical analysis method used to evaluate groundwater within the uppermost aquifer for the Fly Ash Pond groundwater monitoring system at SBMU-SPS consists of intra-well analysis using prediction limits. The analysis is conducted separately for each constituent in each of the five monitoring wells for each sampling event in accordance with §257.93(f)(3). This statistical method complies with the accepted performance standards listed in §257.93(g).

A complete background data set has been obtained for groundwater, representing the uppermost aquifer, moving below the Fly Ash Pond at the SPS. The background data used to evaluate current groundwater quality is based on eight rounds of groundwater sampling of the five wells spanning March 2018 to December 2018. The background data set may be updated every two years but SSIs will not be included in background unless they are unconfirmed in accordance with Unified Guidance (USEPA, 2009).

Statistical analysis was performed in accordance with §257.93 using Sanitas© for Ground Water (Version 9.6.14; 2019). Intra-well prediction intervals were compared at the 99 percent confidence level for each Appendix III constituent. The groundwater analytical results from the September 2019 detection monitoring event were compared to the prediction limits (Table 6) to determine if SSIs over background exist in the data set.

If the number of reportable concentrations of a given constituent in a background data set for a given well is not sufficient to permit parametric analysis, non-parametric prediction interval analysis is conducted. Both parametric and non-parametric prediction limit analysis were performed for the Fly Ash Pond groundwater monitoring system data. Prediction intervals are based on the background monitoring data sets (Appendix 4), including results reported as less than detection limits. Initially, outlier analysis was performed for the background data set using Exploratory Data Analysis (EDA) with Sanitas©, time-series plots, and box and whiskers plots. However, because the background data span a collection period of less than one year, variance in the data set may be attributable to natural seasonal variation. Therefore, all background data have been retained as recommended by Unified Guidance (USEPA, 2009) when no basis for likely error or discrepancy can be identified. Following future updates to the background data set, the identification of potential outliers will be re-evaluated.

The results of the statistical analysis for the September 2019 sampling event are described below. A complete database summarizing the sample results, dates of sampling, and the purpose of sampling event, as per §257.90(e)(3), is provided in Appendix 4. A statistical power curve, based on the background data, is provided in Appendix 5. Trend analysis (time-series) plots of background data for all detection monitoring constituents are presented in Appendix 6. Box and whiskers plots of background data are presented in Appendix 7. Prediction limit charts are provided in Appendix 8.

5.1 Statistical Results

The statistical analysis for the Fly Ash Pond groundwater monitoring system suggest three suspected SSIs in the September 24, 2019 data set. They are specific to MW-1 and include Sulfate, Calcium and TDS. The prediction limits for Sulfate, Calcium and TDS in MW-1 are 31.57 mg/L, 45.18 mg/L, and 223.2 mg/L, respectively whereas the reported concentrations were 35 mg/L, 47 mg/L, and 230 mg/L, respectively. MW-1 was resampled on October 22, 2019 and the initial results for Sulfate and Calcium were confirmed on November 11, 2019. The subsequent results for Sulfate, Calcium, and TDS were 41 mg/L, 47 mg/L, and 180 mg/L, respectively. A duplicate MW-1 sample during the October resample was tested and concentrations of 42 mg/L, 49 mg/L, and 170 mg/L were reported for Sulfate, Calcium, and TDS, respectively.

In accordance with §257.94, an Alternate Source Demonstration (ASD) has been prepared to address the two confirmed SSIs for Sulfate and Calcium and is included as Appendix 9 to this report. The ASD was completed successfully and certified in accordance with §257.94(e)(2) on March 20, 2020. The ASD report documents that the SSIs of Sulfate and Calcium in MW-1 resulted from an alternate source originating as precipitation runoff/infiltration in the coal storage area. As a result of the successful ASD, detection monitoring in accordance with §257.94 has continued on a semi-annual basis as specified in §257.94(b).

6.0 SUMMARY

The second semi-annual sampling event was conducted by SPS environmental staff on September 24, 2019. Resampling was conducted on October 22, 2019 to confirm suspected SSIs in MW-1 for Sulfate, Calcium, and TDS. Results received on November 11, 2019 confirmed the suspected SSIs for Sulfate and Calcium. In response, an ASD was prepared and successfully completed demonstrating that the source of the SSIs originates in the coal storage area (Appendix 9). Consequently, the statistical analysis results for samples obtained during the second semi-annual groundwater detection monitoring event do not indicate SSIs associated with the Fly Ash Pond. Therefore it is recommended that detection monitoring of the Fly Ash Pond groundwater monitoring system continue on a semi-annual basis in accordance with §257.94(b).

The third semi-annual groundwater sampling field activities were completed on May 21, 2020, but data analysis was not complete at the time of this report. Therefore, analytical data (and evaluation) for the May event will be included in the next Annual Groundwater Monitoring Report.

7.0 LIMITATIONS

This report has been prepared for the exclusive use of the client and GREDELL Engineering Resources, Inc. for the specific project discussed in accordance with generally accepted environmental practices common to this locale at this time. No other warranties, expressed or implied, are provided.

Interpretations of data and recommendations made in this report are based on observations of data that were available and referred to in this report unless otherwise noted. The report is applicable only to this specific project and known site conditions as they existed at the time of report preparation.

This report is not a guarantee of subsurface conditions. Variations in subsurface conditions may be present that were not identified during this or previous investigations. The use of this report and interpretations of data or conclusions developed by others are the sole responsibility of those firms or individuals.

8.0 REFERENCES

GREDELL Engineering Resources, Inc., 2017, *Sikeston Power Station Site Characterization for Compliance with Missouri State Operating Permit #MO-0095575*, dated May 2017.

GREDELL Engineering Resources, Inc., 2018, *Sikeston Power Station Groundwater Monitoring and Sampling Plan for Compliance with Missouri State Operating Permit #MO-0095575*, dated September 2018.

Sanitas Statistical Software, © 1992-2019 SANITAS TECHNOLOGIES, Alamosa Colorado 81101-0012.

U.S. Environmental Protection Agency, March 2009, Statistical Analysis of Groundwater Monitoring *Data at RCRA Facilities Unified Guidance*: USEPA 530/R-09-007, Office of Resource Conservation and Recovery, Program Implementation and Information Division, Washington, D.C.

FIGURES

N

SCALE: 1" = 400'

0 200 400

LEGEND

PROPERTY LINE	PL
GROUNDWATER CONTOUR (DASHED WHERE INFERRED)	
MONITORING WELL	MW
UP GRADIENT MONITORING LOCATION	UG
DOWN GRADIENT MONITORING LOCATION	DG
GENERAL FLOW DIRECTION	

NOTES:
1. IMAGE PROVIDED BY BING MAPS.
2. MONITORING WELL LOCATIONS, CASING ELEVATIONS & UNDERGROUND CULVERT ELEVATIONS SURVEYED BY BOWEN ENGINEERING & SURVEYING.
3. GROUNDWATER ELEVATIONS MEASURED BY SIKESTON POWER STATION STAFF ON SEPTEMBER 24, 2019.
4. MAP DEVELOPMENT BASED ON CONTOURS GENERATED BY SURFER® SOFTWARE.
5. RANGE OF GROUNDWATER FLOW GRADIENT AS DETERMINED BY SURFER® SOFTWARE 0.0001 FT./FT. TO 0.001 FT./FT.

MONITORING WELL ID	GROUNDWATER ELEVATION (FEET)	CASING ELEVATION (FEET)	NORTHING	EASTING
MW-1	296.09	312.77	383119.51	1078467.90
MW-2	297.53	308.01	383207.42	1079751.30
MW-3	297.05	308.55	381130.00	1079946.62
MW-7	295.98	315.03	381584.50	1078847.00
MW-9	296.33	314.68	382429.94	1078825.60

THE GEOLOGIST WHO REVIEWED AND APPROVED THIS REPORT ASSUMES RESPONSIBILITY ONLY FOR GEOLOGIC INTERPRETATIONS OF DATA APPEARING ON THE PAGE AND DISCLAIMS PURSUANT TO SECTION 256.456 RSMO ANY RESPONSIBILITY FOR ALL OTHER PLANS, SPECIFICATIONS, ESTIMATES, REPORTS OR OTHER DOCUMENTS OR INSTRUMENTS NOT PREPARED UNDER THE SUPERVISION OF THE GEOLOGIST RELATING TO OR INTENDED TO BE USED FOR ANY PART OR PARTS OF THE PROJECT TO WHICH THIS FIGURE REFERS.

FIGURE 1
GROUNDWATER CONTOUR MAP
SEPTEMBER 24, 2019

SHEET # 1 OF 1
FILE NAME GWCONT FAP 2020
PROJECT NAME SIKESTON/GWMAP/FAP
SCALE AS NOTED
DATE 7/2020
APPROVED MCC
CHECKED KE
DRAWN CP
DESIGNED NA
SURVEYED NA

SIKESTON POWER STATION
FLY ASH POND
2020 ANNUAL GROUNDWATER
MONITORING & REPORT

GREDELL Engineering Resources, Inc.
ENVIRONMENTAL ENGINEERING LAND - AIR - WATER
1505 East High Street
Jefferson City, Missouri
Telephone: (573) 659-9078
Facsimile: (573) 659-9079
MO CORP. ENGINEERING LICENSE NO. E-2006101164940

TABLES

Annual Groundwater Monitoring Report for Fly Ash Pond
USEPA 40 CFR 257.90(e)
SBMU - Sikeston Power Station
Scott County, Missouri

Table 1
Groundwater Monitoring Well Summary - Fly Ash Pond

Monitoring Well ID[1,2]	Northing Location[3,4]	Easting Location[3,4]	Ground Surface Elevation[3,4] (feet)	Top of Riser Elevation[3,4] (feet)	Well Depth[5] (feet)	Base of Well Elevation[6] (feet)	Screen Length[7] (feet)	Top of Screen Elevation (feet)
MW-1	383119.51	1078467.90	310.41	312.77	37.84	274.93	10	285.1
MW-2	383207.42	1079751.30	305.53	308.01	37.42	270.59	10	280.8
MW-3	381130.00	1079946.62	306.11	308.55	37.21	271.34	10	281.5
MW-7	381584.50	1078847.00	312.70	315.03	37.37	277.66	10	287.9
MW-9	382429.94	1078825.60	311.85	314.68	37.28	277.40	10	287.6

NOTES:

1. Refer to Figure 1 for monitoring well locations.
2. Refer to Sikeston Power Station On-Site Operating Record for well construction diagrams.
3. Monitoring well survey data provided by Bowen Engineering & Surveying, Inc.
4. Horizontal Datum: Missouri State Plane Coordinates - NAD 83 (Feet), Vertical Datum: NAVD 88 (Feet).
5. Depth measurements relative to surveyed point on top of well casing.
6. Sump installed at base of screen (0.2 feet length).
7. Actual screen length (9.7 feet) is the machine-slotted section of the 10-foot length of Schedule 40 PVC pipe.

Annual Groundwater Monitoring Report for Fly Ash Pond
USEPA 40 CFR 257.90(e)
SBMU - Sikeston Power Station
Scott County, Missouri

Table 2
Historical Groundwater Level Summary

Well ID	MW-1	MW-2	MW-3	MW-7	MW-9
Date	Groundwater Elevation (feet MSL)				
05/12/16	297.50	298.66	298.13	NM	NM
06/28/16	296.60	298.01	297.58	NM	NM
07/15/16	296.57	297.86	297.37	NM	NM
08/08/16	295.62	297.06	297.05	NM	NM
09/08/16	296.06	297.27	296.76	NM	NM
10/05/16	295.86	296.96	296.40	NM	NM
11/01/16	295.47	296.66	296.10	NM	NM
11/30/16	295.45	296.60	296.03	NM	NM
01/24/17	NM	NM	296.35	NM	NM
01/26/17	295.77	296.76	296.35	NM	NM
02/22/17	NM	NM	296.00	NM	NM
02/24/17	295.47	296.40	296.00	NM	NM
03/20/17	296.11	296.96	296.45	NM	NM
04/19/17	296.04	296.86	296.35	NM	NM
04/27/17	NM	NM	296.72	NM	NM
05/17/17	NM	NM	297.81	NM	NM
06/08/17	NM	NM	297.81	NM	NM
07/13/17	NM	NM	296.98	NM	NM
10/31/17	NM	NM	295.22	NM	NM
03/21/18	295.92	296.96	296.65	295.83	296.13
04/15/18	297.07	297.86	297.60	296.95	297.18
05/23/18	296.78	298.01	297.62	296.66	296.98
06/13/18	NM	NM	297.33	NM	NM
06/27/18	296.37	297.61	297.21	296.26	296.56
08/01/18	295.22	296.60	296.15	295.08	295.48
09/05/18	294.79	296.11	295.68	294.71	295.01
11/06/18	295.01	296.21	295.74	294.85	295.17
11/26/18	NM	NM	295.63	NM	NM
12/12/18	295.12	296.21	295.79	295.06	295.36
01/08/19	295.66	296.72	296.38	295.53	295.80
02/05/19	NM	NM	296.73	NM	NM
02/22/19	297.70	298.67	298.35	297.59	297.84
03/27/19	297.69	298.93	298.51	297.58	297.93
04/16/19	298.15	299.29	298.93	298.01	298.38
05/14/19	298.27	299.66	299.25	298.15	298.52
05/28/19	NM	NM	298.95	NM	NM
06/12/19	297.82	299.24	298.82	297.76	298.10
07/17/19	297.32	298.77	298.38	297.25	297.55
07/24/19	297.40	298.80	298.41	297.33	297.65
08/14/19	296.61	298.15	297.80	296.65	296.96
08/28/19	NM	NM	297.55	NM	NM
09/16/19	296.24	297.70	297.22	296.14	296.50
09/24/19	296.09	297.53	297.05	295.98	296.33
10/10/19	295.92	297.29	296.84	295.80	296.13
10/22/19	295.92	297.24	296.80	295.74	296.12
11/04/19	NM	NM	297.34	NM	NM
01/28/20	297.61	298.73	298.34	297.42	297.80
02/18/20	NM	NM	299.00	NM	NM
03/30/20	NM	NM	300.09	NM	NM
04/06/20	299.16	300.40	300.00	298.99	299.41
05/21/20	298.50	300.02	299.55	NM	298.71

NOTES:

1. Refer to Figure 1 for monitoring well locations.
2. Refer to Sikeston Power Station On-Site Operating Record for well construction diagrams.
3. NM - Not Measured.
4. Maximum and minimum groundwater elevations are shaded.

Prepared by: GREDELL Engineering Resources, Inc.

Prepared by: KAE
Checked by: MCC

Annual Groundwater Monitoring Report for Fly Ash Pond
USEPA 40 CFR 257.90(e)
SBMU - Sikeston Power Station
Scott County, Missouri

Table 3
Water Levels and Field Parameter Summary
September 24, 2019

Monitoring Well I.D.	Hydraulic Position	Initial Water Level (ft, BTOC[2])	Final Water Level (ft, BTOC[2])	Minimum[3] Purge Vol. (ml[4])	Actual Purge Vol. (ml[4])	pH (S.U.[5])
MW-1	Downgradient	16.68	16.68	300	2,280	7.0
MW-2	Upgradient	10.48	10.48	300	2,180	6.1
MW-3	Upgradient	11.50	11.50	300	4,320	6.5
MW-7	Downgradient	19.05	19.05	300	2,920	7.3
MW-9	Downgradient	18.35	18.35	300	2,220	7.4

NOTES:

1. Sequence of sampling is MW-3, MW-2, MW-1, MW-7, then MW-9.
2. BTOC: Below Top of Casing
3. Purge calculations based on 1/4" ID tubing and complete evacuation of single tubing volume.
4. ml: milliliter
5. S.U.: Standard Unit.

Water Levels and Field Parameter Summary
October 22, 2019

Monitoring Well I.D.	Hydraulic Position	Initial Water Level (ft, BTOC[2])	Final Water Level (ft, BTOC[2])	Minimum[3] Purge Vol. (ml[4])	Actual Purge Vol. (ml[4])	pH (S.U.[5])
MW-1	Downgradient	16.85	16.85	300	6,020	7.1

NOTES:

1. Sequence of sampling is MW-1.
2. BTOC: Below Top of Casing
3. Purge calculations based on 1/4" ID tubing and complete evacuation of single tubing volume.
4. ml: milliliter
5. S.U.: Standard Unit.

Annual Groundwater Monitoring Report for Fly Ash Pond
USEPA 40 CFR 257.90(e)
SBMU - Sikeston Power Station
Scott County, Missouri

Table 4
Groundwater Monitoring Constituents

USEPA 40 CFR 257			
Appendix III - Constituents for Detection Monitoring		**Appendix IV - Constituents for Assessment Monitoring**	
Chemical Constituent	**Method**	**Chemical Constituent**	**Method**
pH (S.U.)	Field	Antimony (µg/L)	SW 6020
Boron (µg/L)	SW 6020	Arsenic (µg/L)	SW 6020
Calcium (mg/L)	SW 6020	Barium (µg/L)	SW 6020
Chloride (mg/L)	EPA 300.0	Beryllium (µg/L)	SW 6020
Fluoride (mg/L)	EPA 300.0	Cadmium (µg/L)	SW 6020
Sulfate (mg/L)	EPA 300.0	Chromium (µg/L)	SW 6020
Total Dissolved Solids (mg/L)	SM 2540C	Cobalt (µg/L)	SW 6020
		Fluoride (mg/L)	EPA 300
		Lead (µg/L)	SW 6020
		Lithium (µg/L)	SW 6020
		Mercury (µg/L)	SW 6020
		Molybdenum (µg/L)	SW 6020
		Selenium (µg/L)	SW 6020
		Thallium (µg/L)	SW 6020
		Radium 226 and 228 combined (pCi/L)	EPA 903.1 & 904.0

NOTES:
1. S.U. = Standard Unit.
2. µg/L = micrograms per liter.
3. mg/L = milligrams per liter.
4. pCi/L = picocurie per liter.

Annual Groundwater Monitoring Report for Fly Ash Pond
USEPA 40 CFR 257.90(e)
SBMU - Sikeston Power Station
Scott County, Missouri

Table 5
Relative Percent Differences Summary -
September 24, 2019

Chemical Parameter	Units	MW-2	DUP	Relative Percent Difference
pH	S.U.	6.1	6.1	0.00
Chloride	µg/L	6.6	6.6	0.00
Fluoride	mg/L	<0.250	0.261	N/A
Sulfate	mg/L	17	17	0.00
Total Dissolved Solids	mg/L	130	140	7.41
Boron	mg/L	58	120	69.66
Calcium	mg/L	22	22	0.00

NOTES:
1. S.U. = Standard Unit.
2. µg/L = micrograms per liter.
3. mg/L = milligrams per liter.
4. Relative Percent Difference tolerance = 20%.
5. N/A = Not applicable - parameter concentration below reporting limit.

Relative Percent Differences Summary -
October 22, 2019

Chemical Parameter	Units	MW-1	DUP	Relative Percent Difference
pH	S.U.	7.1	7.1	0.00
Sulfate	mg/L	41	42	2.41
Total Dissolved Solids	mg/L	180	170	5.71
Calcium	mg/L	47	49	4.17

NOTES:
1. S.U. = Standard Unit.
2. mg/L = milligrams per liter.
3. Relative Percent Difference tolerance = 20%.

Annual Groundwater Monitoring Report for Fly Ash Pond
USEPA 40 CFR 257.90(e)
SBMU - Sikeston Power Station
Scott County, Missouri

Table 6
Intra-Well Prediction Limit Summary

Chemical Parameter	Units	MW-1	MW-2	MW-3	MW-7	MW-9
40 CFR 257 Appendix III Constituents for Detection Monitoring						
pH Upper	S.U.	7.5	6.5	6.6	7.4	7.4
pH Lower	S.U.	6.9	5.9	6.4	7.2	7.3
Boron	µg/L	544.6	60.53	32.7	2385	6236
Calcium	mg/L	45.18	25.29	19.49	152.9	95.09
Chloride	mg/L	12.2	8.15	1.598	15.22	23.28
Fluoride	mg/L	0.313	0.335	0.4083	0.8677	1.14
Sulfate	mg/L	31.57	22.33	21.97	259.2	301.1
Total Dissolved Solids	mg/L	223.2	169.4	177.8	617.2	630.8

NOTES:

1. Prediction limits based on eight rounds of background data spanning March 2018 to December 2018.

APPENDICES

Appendix 1
Field Sampling Notes

Field Instrumentation Calibration Log

Facility: SBMU SPS CCR Groundwater Sampling

Calibrated by: Ashish Patel

Field Instruments: In-Situ smarTROLL Field Meter

S/N #: 474247

HF scientific, Inc. Micro TPI Field Portable Turbidimeter

S/N #: 201607366

	Date	Time	pH Standards		pH Measurements	Specific Conductance Standard (µS/cm)		Specific Conductance Measurement (µS/cm)	Oxidation Reduction Potential Standard (mV)				Oxidation Reduction Potential Measurement (mV)	Dissolved Oxygen (%)			Turbidity Standards (NTU)		Turbidity Measurements (NTU)
Beginning of Day Calibration	09/24/19	0627	4.00	=	4.0	1413	=	1412.3	Temperature (°C)	=	21.58	=	229.2	Temperature (°C)	=	21.81	0.02	=	0.02
			7.00	=	7.0				Standard (mV)	=	229.0			Tap Water Source	=	Sikeston City	10.0	=	10.0
			10.00	=	10.0									Barometric Pressure (mm/Hg)	=	1005.7	1000	=	1000.0
														Measurement	=	99.9			
End of Day Check	09-24-19	1332	4.00	=	4.1	1413	=	1380.1	Temperature (°C)	=	22.87	=	227.5	Temperature (°C)	=	24.56	0.02	=	0.02
			7.00	=	7.1				Standard (mV)	=	229.0			Tap Water Source	=	Sikeston City	10.0	=	10.06
			10.00	=	10.0									Barometric Pressure (mm/Hg)	=	1004.9	1000	=	1005.0
														Measurement	=	98.24			

Notes: The Multi-Probe Field Meter measures Temperature, Specific Conductance, Dissolved Oxygen, pH, and Oxidation Reduction Potential.

The HF scientific, inc. Micro TPI Field Portable Turbidimeter measures Turbidity.

Dissolved oxygen is calibrated via % saturation method; however, field measurements are recorded as mg/L.

I certify that the aforementioned meters were calibrated within the manufacturers specifications.

Date: 09/24/19 By: Ashish Patel

Monitoring Well Field Inspection

Facility: SBMU SPS – CCR Groundwater Monitoring
Monitoring Well ID: MW 3
Name (Field Staff): A Patel D Dillinghum
Date: 09-24-19

Access:
Accessibility: Good ✓ Fair ___ Poor ___
Well clear of weeds and/or debris?: Yes ✓ No ___
Well identification clearly visible?: Yes ✓ No ___
Remarks:

Concrete Pad:
Condition of Concrete Pad: Good ✓ Inadequate ___
Depressions or standing water around well?: Yes ___ No ✓
Remarks:

Protective Outer Casing: Material = 4" x 4" Steel Hinged Casing with Hasp
Condition of Protective Casing: Good ✓ Damaged ___
Condition of Locking Cap: Good ✓ Damaged ___
Condition of Lock: Good ✓ Damaged ___
Condition of Weep Hole: Good ✓ Damaged ___
Remarks:

Well Riser: Material = 2" Diameter, Schedule 40 PVC, Flush Threaded
Condition of Riser: Good ✓ Damaged ___
Condition of Riser Cap: Good ✓ Damaged ___
Measurement Reference Point: Yes ✓ No ___
Remarks:

Dedicated Purging/Sampling Device: Type = ¼ " ID Semi-Rigid Polyethylene & 0.170" ID Flexible Silicone Tubing
Condition: Good ✓ Damaged ___ Missing ___
Remarks:

Monitoring Well Locked/Secured Post Sampling?: Yes ✓ No ___
Remarks:

Field Certification Ashish Patel (Signed) Lab Tech (Title) 09-24-19 (Date)

Field Sampling Log

Monitoring Well ID: MW 3 Facility: SBMU Sikeston Power Station - Groundwater Monitoring

Initial Water Level (feet btoc): 11.50 Date: 09-24-19

Initial Groundwater Elevation (NAVD88): _____ Air Pressure in Well? Y / (N)

PURGE INFORMATION

Date: 09-24-19

Name (Sample Collector): D Dillingham

Method of Well Purge: Low Flow Perstaltic Pump Dedicated Tubing? (Y) / N

Time Purging Initiated: 0724 One (1) Well Volume (mL): NA

Beginning Water Level (feet btoc): 11.50 Total Volume Purged (mL): 4320

Beginning Groundwater Elevation (NAVD88): _____ Well Purged To Dryness? Y / (N)

Well Total Depth (feet btoc): 36.99 Water Level after Sampling (feet btoc): 11.50 (i.e., pump is off)

Casing Diameter (feet): 2" Sch 40 PVC Time Sampling Completed: 0748

PURGE STABILIZATION DATA

Time	Purge Rate (mL/min)	Cumulative Volume (mL)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Oxidation Reduction Potential (mV)	Turbidity (NTU)	Water Level (feet btoc)	Notes (e.g., opacity, color, odor)
0726		300	18.97	197.98	1.13	6.4	105.3	16.89	11.50	Red Flake, no odor
0728	260	820	17.72	199.14	0.82	6.3	91.2	12.24	11.50	" "
0730	240	1300	17.37	197.95	0.75	6.3	80.6	12.11	11.50	" "
0732	250	1800	17.11	198.55	0.70	6.4	75.5	5.09	11.50	clear, no odor
0734	250	2300	17.08	197.69	0.64	6.4	71.5	3.80	11.50	" "
0736	260	2820	17.01	195.53	0.61	6.4	67.2	4.32	11.50	" "
0738	240	3300	16.96	194.23	0.58	6.4	64.9	2.23	11.50	" "
0740	260	3820	16.97	192.43	0.58	6.4	62.1	2.09	11.50	" "
0742	250	4320	17.07	191.38	0.53	6.5	58.1	2.28	11.50	" "

btoc - below top of casing

Prepared by: GREDELL Engineering Resources, Inc.

January 2017

Field Sampling Log

Facility: SBMU Sikeston Power Station - CCR Groundwater Monitoring Monitoring Well ID: MW 3

Sampling Information:

Method of Sampling: Low Flow - Perstaltic Pump & Tubing Dedicated: (Y) / N

Water Level @ Sampling (feet btoc): 11.50

Monitoring Event: Annual ( ) Semi-Annual (X) Quarterly ( ) Monthly ( ) Other ( )

Final Purge Stablization Sampling Data:

Date Sample Time	Sample Rate (mL/min)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Oxidation Reduction Potential (mV)	Turbidity (NTU)
09-24-19 0742	250	17.07	191.38	0.53	6.5	58.1	2.28

Instrument Calibration Data:

See instrument calibration log of daily calibration data for the following instruments:

1 - In-Situ SmarTroll Multi-Probe Field Meter (Temperature, Specific Conductance, Dissolved Oxygen, pH, Oxidation Reduction Potentia

2 - HF scientific, inc. Micro TPI Field Portable Turbidimeter

General Information:

Weather Conditions @ time of sampling: Sunny 54 °F

Sample Characteristics: Clear, Colorless, Odorless

Sample Collection Order: Per SAP

Comments and Observations:

I certify that sampling procedures were in accordance with applicable EPA and State protocols.

Date: 09-24-19 By: [signature] Title: Lab Tech

Monitoring Well Field Inspection

Facility: SBMU SPS – CCR Groundwater Monitoring
Monitoring Well ID: MW 2
Name (Field Staff): A Patel D Dillingham
Date: 09-24-19

Access:
Accessibility: Good ✓ Fair ___ Poor ___
Well clear of weeds and/or debris?: Yes ✓ No ___
Well identification clearly visible?: Yes ✓ No ___
Remarks:

Concrete Pad:
Condition of Concrete Pad: Good ✓ Inadequate ___
Depressions or standing water around well?: Yes ___ No ✓
Remarks:

Protective Outer Casing: Material = 4" x 4" Steel Hinged Casing with Hasp
Condition of Protective Casing: Good ✓ Damaged ___
Condition of Locking Cap: Good ✓ Damaged ___
Condition of Lock: Good ✓ Damaged ___
Condition of Weep Hole: Good ✓ Damaged ___
Remarks:

Well Riser: Material = 2" Diameter, Schedule 40 PVC, Flush Threaded
Condition of Riser: Good ✓ Damaged ___
Condition of Riser Cap: Good ✓ Damaged ___
Measurement Reference Point: Yes ✓ No ___
Remarks:

Dedicated Purging/Sampling Device: Type = ¼" ID Semi-Rigid Polyethylene & 0.170" ID Flexible Silicone Tubing
Condition: Good ✓ Damaged ___ Missing ___
Remarks:

Monitoring Well Locked/Secured Post Sampling?: Yes ✓ No ___
Remarks:

Field Certification Ashish Patel (Signed) Lab Tech (Title) 09-24-19 (Date)

Field Sampling Log

Monitoring Well ID: MW2 Facility: SBMU Sikeston Power Station - Groundwater Monitoring

Initial Water Level (feet btoc): 10.48 Date: 09-24-19

Initial Groundwater Elevation (NAVD88): _____ Air Pressure in Well? Y / (N)

PURGE INFORMATION

Date: 09-24-19

Name (Sample Collector): D Dillingham

Method of Well Purge: Low Flow Perstaltic Pump Dedicated Tubing? (Y) / N

Time Purging Initiated: 0809 One (1) Well Volume (mL): NA

Beginning Water Level (feet btoc): 10.48 Total Volume Purged (mL): 2180

Beginning Groundwater Elevation (NAVD88): _____ Well Purged To Dryness? Y / (N)

Well Total Depth (feet btoc): 37.17 Water Level after Sampling (feet btoc): 10.48 (i.e., pump is off)

Casing Diameter (feet): 2" Sch 40 PVC Time Sampling Completed: 0831

PURGE STABILIZATION DATA

Time	Purge Rate (mL/min)	Cumulative Volume (mL)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Oxidation Reduction Potential (mV)	Turbidity (NTU)	Water Level (feet btoc)	Notes (e.g., opacity, color, odor)
0811		300	18.98	189.27	0.76	6.3	80.5	5.23	10.48	clear, no odor
0813	250	800	18.55	190.44	0.67	6.1	75.1	2.85	10.48	" "
0815	220	1240	18.52	190.40	0.61	6.1	72.2	1.14	10.48	" "
0817	230	1700	18.56	189.98	0.64	6.1	71.5	1.31	10.48	" "
0819	240	2180	18.75	189.43	0.61	6.1	71.3	1.16	10.48	" "

btoc - below top of casing

Field Sampling Log

Facility: SBMU Sikeston Power Station - CCR Groundwater Monitoring Monitoring Well ID: MW2

Sampling Information:

Method of Sampling: Low Flow - Perstaltic Pump & Tubing Dedicated: (Y) / N

Water Level @ Sampling (feet btoc): 10.48

Monitoring Event: Annual ( ) Semi-Annual (x) Quarterly ( ) Monthly ( ) Other ( )

Final Purge Stablization Sampling Data:

Date Sample Time	Sample Rate (mL/min)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Oxidation Reduction Potential (mV)	Turbidity (NTU)
09-24-19 0819	240	18.75	189.43	0.61	6.1	71.3	1.16

Instrument Calibration Data:

See instrument calibration log of daily calibration data for the following instruments:

1 - In-Situ SmarTroll Multi-Probe Field Meter (Temperature, Specific Conductance, Dissolved Oxygen, pH, Oxidation Reduction Potentia

2 - HF scientific, inc. Micro TPI Field Portable Turbidimeter

General Information:

Weather Conditions @ time of sampling: Sunny 58°F

Sample Characteristics: Clear, colorless, odorless

Sample Collection Order: Per SAP

Comments and Observations:

Collect Duplicate

I certify that sampling procedures were in accordance with applicable EPA and State protocols.

Date: 09-24-19 By: [illegible] Patel Title: Lab Tech

Monitoring Well Field Inspection

Facility: SBMU SPS – CCR Groundwater Monitoring
Monitoring Well ID: MW 1
Name (Field Staff): A Patel D Dillingham
Date: 09-24-19

Access:
Accessibility: Good ✓ Fair ___ Poor ___
Well clear of weeds and/or debris?: Yes ✓ No ___
Well identification clearly visible?: Yes ✓ No ___
Remarks:

Concrete Pad:
Condition of Concrete Pad: Good ✓ Inadequate ___
Depressions or standing water around well?: Yes ___ No ✓
Remarks:

Protective Outer Casing: Material = 4" x 4" Steel Hinged Casing with Hasp
Condition of Protective Casing: Good ✓ Damaged ___
Condition of Locking Cap: Good ✓ Damaged ___
Condition of Lock: Good ✓ Damaged ___
Condition of Weep Hole: Good ✓ Damaged ___
Remarks:

Well Riser: Material = 2" Diameter, Schedule 40 PVC, Flush Threaded
Condition of Riser: Good ✓ Damaged ___
Condition of Riser Cap: Good ✓ Damaged ___
Measurement Reference Point: Yes ✓ No ___
Remarks:

Dedicated Purging/Sampling Device: Type = ¼ " ID Semi-Rigid Polyethylene & 0.170" ID Flexible Silicone Tubing
Condition: Good ✓ Damaged ___ Missing ___
Remarks:

Monitoring Well Locked/Secured Post Sampling?: Yes ✓ No ___
Remarks:

Field Certification Ashish Patel (Signed) Lab Tech (Title) 9-24-19 (Date)

Prepared by: GREDELL Engineering Resources, Inc. January 2017

Field Sampling Log

Monitoring Well ID: MW 1 Facility: SBMU Sikeston Power Station - Groundwater Monitoring

Initial Water Level (feet btoc): 16.68 Date: 04-24-19

Initial Groundwater Elevation (NAVD88): _____ Air Pressure in Well? Y / (N)

PURGE INFORMATION

Date: 09-24-19

Name (Sample Collector): D Dillinghum

Method of Well Purge: Low Flow Perstaltic Pump Dedicated Tubing? (Y) / N

Time Purging Initiated: 0926 One (1) Well Volume (mL): NA

Beginning Water Level (feet btoc): 16.68 Total Volume Purged (mL): 2280

Beginning Groundwater Elevation (NAVD88): _____ Well Purged To Dryness? Y / (N)

Well Total Depth (feet btoc): 37.64 Water Level after Sampling (feet btoc): 16.68 (i.e., pump is off)

Casing Diameter (feet): 2" Sch 40 PVC Time Sampling Completed: 0942

PURGE STABILIZATION DATA

Time	Purge Rate (mL/min)	Cumulative Volume (mL)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Oxidation Reduction Potential (mV)	Turbidity (NTU)	Water Level (feet btoc)	Notes (e.g., opacity, color, odor)
0928		320	20.29	357.18	0.79	6.7	-120.3	1.22	16.68	CLEAR, NO ODOR
0930	250	820	18.89	363.11	0.61	6.8	-122.5	0.96	16.68	" "
0932	240	1300	18.44	368.16	0.57	6.9	-123.9	0.68	16.68	" "
0934	250	1800	18.27	375.53	0.47	6.9	-122.6	0.53	16.68	" "
0936	240	2280	18.22	372.91	0.56	7.0	-127.5	0.52	16.68	" "

btoc - below top of casing

Field Sampling Log

Facility: SBMU Sikeston Power Station - CCR Groundwater Monitoring Monitoring Well ID: MW 1

Sampling Information:

Method of Sampling: Low Flow - Perstaltic Pump & Tubing Dedicated: (Y) / N

Water Level @ Sampling (feet btoc): 16.68

Monitoring Event: Annual ( ) Semi-Annual (X) Quarterly ( ) Monthly ( ) Other ( )

Final Purge Stablization Sampling Data:

Date Sample Time	Sample Rate (mL/min)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Oxidation Reduction Potential (mV)	Turbidity (NTU)
09-24-19 0936	240	18.22	372.91	0.56	7.0	-127.5	0.52

Instrument Calibration Data:

See instrument calibration log of daily calibration data for the following instruments:

1 - In-Situ SmarTroll Multi-Probe Field Meter (Temperature, Specific Conductance, Dissolved Oxygen, pH, Oxidation Reduction Potentia

2 - HF scientific, inc. Micro TPI Field Portable Turbidimeter

General Information:

Weather Conditions @ time of sampling: Sunny 70°F

Sample Characteristics: Clear, colorless, odorless

Sample Collection Order: Per SAP

Comments and Observations: Coal train running HP @ 100 feet from sampling

I certify that sampling procedures were in accordance with applicable EPA and State protocols.

Date: 09-24-19 By: Ashish Patel Title: Lab Tech

Monitoring Well Field Inspection

Facility: SBMU SPS – CCR Groundwater Monitoring
Monitoring Well ID: MW 7
Name (Field Staff): A Patel D Dillingham
Date: 09-24-19

Access:
Accessibility: Good ✓ Fair ___ Poor ___
Well clear of weeds and/or debris?: Yes ✓ No ___
Well identification clearly visible?: Yes ✓ No ___
Remarks:

Concrete Pad:
Condition of Concrete Pad: Good ✓ Inadequate ___
Depressions or standing water around well?: Yes ___ No ✓
Remarks:

Protective Outer Casing: Material = 4" x 4" Steel Hinged Casing with Hasp
Condition of Protective Casing: Good ✓ Damaged ___
Condition of Locking Cap: Good ✓ Damaged ___
Condition of Lock: Good ✓ Damaged ___
Condition of Weep Hole: Good ✓ Damaged ___
Remarks:

Well Riser: Material = 2" Diameter, Schedule 40 PVC, Flush Threaded
Condition of Riser: Good ✓ Damaged ___
Condition of Riser Cap: Good ✓ Damaged ___
Measurement Reference Point: Yes ✓ No ___
Remarks:

Dedicated Purging/Sampling Device: Type = ¼ " ID Semi-Rigid Polyethylene & 0.170" ID Flexible Silicone Tubing
Condition: Good ✓ Damaged ___ Missing ___
Remarks:

Monitoring Well Locked/Secured Post Sampling?: Yes ✓ No ___
Remarks:

Field Certification Abhijit Patel (Signed) Lab Tech (Title) 09-24-19 (Date)

Field Sampling Log

Monitoring Well ID: MW 7 Facility: SBMU Sikeston Power Station - Groundwater Monitoring

Initial Water Level (feet btoc): 19.05 Date: 09-24-19

Initial Groundwater Elevation (NAVD88): _____ Air Pressure in Well? Y / (N)

PURGE INFORMATION

Date: 09-24-19

Name (Sample Collector): D Dillingham

Method of Well Purge: Low Flow Perstaltic Pump Dedicated Tubing? (Y) / N

Time Purging Initiated: 1011 One (1) Well Volume (mL): NA

Beginning Water Level (feet btoc): 19.05 Total Volume Purged (mL): 2920

Beginning Groundwater Elevation (NAVD88): _____ Well Purged To Dryness? Y / (N)

Well Total Depth (feet btoc): 37.23 Water Level after Sampling (feet btoc): 19.05 (i.e., pump is off)

Casing Diameter (feet): 2" Sch 40 PVC Time Sampling Completed: 1028

PURGE STABILIZATION DATA

Time	Purge Rate (mL/min)	Cumulative Volume (mL)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Oxidation Reduction Potential (mV)	Turbidity (NTU)	Water Level (feet btoc)	Notes (e.g., opacity, color, odor)
1013		360	22.38	720.85	0.87	7.1	76.0	5.19	19.05	clear, no odor
1015	270	900	19.89	747.76	0.33	7.3	99.1	4.37	19.05	" "
1017	250	1400	19.24	756.21	0.44	7.3	107.1	1.58	19.05	" "
1019	260	1920	19.09	755.16	0.38	7.3	112.3	0.99	19.05	" "
1021	250	2420	18.93	757.71	0.37	7.3	116.1	0.68	19.05	" "
1023	250	2920	18.88	761.65	0.31	7.3	119.0	0.59	19.05	" "

btoc - below top of casing

Field Sampling Log

Facility: SBMU Sikeston Power Station - CCR Groundwater Monitoring Monitoring Well ID: MW 7

Sampling Information:

Method of Sampling: Low Flow - Perstaltic Pump & Tubing Dedicated: (Y) / N

Water Level @ Sampling (feet btoc): 19.05

Monitoring Event: Annual ( ) Semi-Annual (X) Quarterly ( ) Monthly ( ) Other ( )

Final Purge Stablization Sampling Data:

Date Sample Time	Sample Rate (mL/min)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Oxidation Reduction Potential (mV)	Turbidity (NTU)
09-24-19 1023	250	18.88	751.65	0.31	7.3	119.0	0.59

Instrument Calibration Data:

See instrument calibration log of daily calibration data for the following instruments:

1 - In-Situ SmarTroll Multi-Probe Field Meter (Temperature, Specific Conductance, Dissolved Oxygen, pH, Oxidation Reduction Potentia

2 - HF scientific, inc. Micro TPI Field Portable Turbidimeter

General Information:

Weather Conditions @ time of sampling: Sunny 73° F

Sample Characteristics: Clear, Colorless, Odorless

Sample Collection Order: Per SAP

Comments and Observations:

Collect Field Blank

I certify that sampling procedures were in accordance with applicable EPA and State protocols.

Date: 9-24-19 By: Abhisk Patel Title: Lab Tech

Monitoring Well Field Inspection

Facility: SBMU SPS – CCR Groundwater Monitoring
Monitoring Well ID: MW 9
Name (Field Staff): A Patel D Dillingham
Date: 9-24-19

Access:
Accessibility: Good ✓ Fair ___ Poor ___
Well clear of weeds and/or debris?: Yes ✓ No ___
Well identification clearly visible?: Yes ✓ No ___
Remarks:

Concrete Pad:
Condition of Concrete Pad: Good ✓ Inadequate ___
Depressions or standing water around well?: Yes ___ No ✓
Remarks:

Protective Outer Casing: Material = 4" x 4" Steel Hinged Casing with Hasp
Condition of Protective Casing: Good ✓ Damaged ___
Condition of Locking Cap: Good ✓ Damaged ___
Condition of Lock: Good ✓ Damaged ___
Condition of Weep Hole: Good ✓ Damaged ___
Remarks:

Well Riser: Material = 2" Diameter, Schedule 40 PVC, Flush Threaded
Condition of Riser: Good ✓ Damaged ___
Condition of Riser Cap: Good ✓ Damaged ___
Measurement Reference Point: Yes ✓ No ___
Remarks:

Dedicated Purging/Sampling Device: Type = ¼ " ID Semi-Rigid Polyethylene & 0.170" ID Flexible Silicone Tubing
Condition: Good ✓ Damaged ___ Missing ___
Remarks:

Monitoring Well Locked/Secured Post Sampling?: Yes ✓ No ___
Remarks:

Field Certification Abhishek Patel (Signed) Lab Tech (Title) 09-24-19 (Date)

Field Sampling Log

Monitoring Well ID: MW 9 Facility: SBMU Sikeston Power Station - Groundwater Monitoring

Initial Water Level (feet btoc): 18.35 Date: 9-24-19

Initial Groundwater Elevation (NAVD88): _____ Air Pressure in Well? Y / (N)

PURGE INFORMATION

Date: 9-24-19

Name (Sample Collector): D Dillingham

Method of Well Purge: Low Flow Perstaltic Pump Dedicated Tubing? (Y) / N

Time Purging Initiated: 1126 One (1) Well Volume (mL): NA

Beginning Water Level (feet btoc): 18.35 Total Volume Purged (mL): 2220

Beginning Groundwater Elevation (NAVD88): _____ Well Purged To Dryness? Y / (N)

Well Total Depth (feet btoc): 37.11 Water Level after Sampling (feet btoc): 18.35 (i.e., pump is off)

Casing Diameter (feet): 2" Sch 40 PVC Time Sampling Completed: 1142

PURGE STABILIZATION DATA

Time	Purge Rate (mL/min)	Cumulative Volume (mL)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Oxidation Reduction Potential (mV)	Turbidity (NTU)	Water Level (feet btoc)	Notes (e.g., opacity, color, odor)
1128		360	22.96	847.65	1.12	7.5	9.8	0.53	18.35	clear, no odor
1130	230	820	20.48	886.91	0.66	7.4	27.2	0.66	18.35	" "
1132	230	1280	19.70	901.76	0.54	7.4	33.8	0.66	18.35	" "
1134	230	1740	19.39	898.78	0.53	7.4	36.4	0.34	18.35	" "
1136	240	2220	19.25	891.52	0.41	7.4	38.3	0.60	18.35	" "

btoc - below top of casing

Field Sampling Log

Facility: SBMU Sikeston Power Station - CCR Groundwater Monitoring Monitoring Well ID: MW 9

Sampling Information:

Method of Sampling: Low Flow - Perstaltic Pump & Tubing Dedicated: (Y) / N

Water Level @ Sampling (feet btoc): 18.35

Monitoring Event: Annual ( ) Semi-Annual (X) Quarterly ( ) Monthly ( ) Other ( )

Final Purge Stablization Sampling Data:

Date Sample Time	Sample Rate (mL/min)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Oxidation Reduction Potential (mV)	Turbidity (NTU)
09-24-19 1136	240	19.25	891.52	0.41	7.4	38.3	0.62

Instrument Calibration Data:

See instrument calibration log of daily calibration data for the following instruments:

1 - In-Situ SmarTroll Multi-Probe Field Meter (Temperature, Specific Conductance, Dissolved Oxygen, pH, Oxidation Reduction Potentia

2 - HF scientific, inc. Micro TPI Field Portable Turbidimeter

General Information:

Weather Conditions @ time of sampling: Sunny 77 °F

Sample Characteristics: Clear, Colorless, Odorless

Sample Collection Order: Per SAP

Comments and Observations:

I certify that sampling procedures were in accordance with applicable EPA and State protocols.

Date: 9-24-19 By: Ashish Patel Title: Lab Tech

PDC LABORATORIES, INC.
WWW.PDCLAB.COM

REGULATORY PROGRAM (CIRCLE):	NPDES
MORBCA	RCRA
CCDD	TACO: RES OR IND/COMM

CHAIN OF CUSTODY RECORD

STATE WHERE SAMPLE COLLECTED _____

ALL HIGHLIGHTED AREAS MUST BE COMPLETED BY CLIENT (PLEASE PRINT)

(1) CLIENT	PROJECT NUMBER	PROJECT LOCATION	PURCHASE ORDER #
Sikeston Power Station	Fly Ash CCR		
ADDRESS	**PHONE NUMBER**	**E-MAIL**	**DATE SHIPPED**
1551 West Wakefield			
CITY STATE ZIP	**SAMPLER (PLEASE PRINT)**	**MATRIX TYPES:**	
Sikeston, Mo 63801	Daniel Dillingham	WW- WASTEWATER DW- DRINKING WATER GW- GROUND WATER WWSL- SLUDGE NAS- NON AQUEOUS SOLID LCHT-LEACHATE OIL-OIL SO-SOIL SOL-SOLID	
CONTACT PERSON	**SAMPLER'S SIGNATURE**		
Luke St. Mary / Ken Fenner			

(3) ANALYSIS REQUESTED: SVOA, TDS, Ca

(4) (FOR LAB USE ONLY)
LOGIN # _____
LOGGED BY: _____
CLIENT: _____
PROJECT: _____
PROJ. MGR.: _____
CUSTODY SEAL #: _____

(2) SAMPLE DESCRIPTION (UNIQUE DESCRIPTION AS IT WILL APPEAR ON THE ANALYTICAL REPORT)	DATE COLLECTED	TIME COLLECTED	SAMPLE TYPE GRAB	SAMPLE TYPE COMP	MATRIX TYPE	BOTTLE COUNT	PRES CODE CLIENT PROVIDED	REMARKS
Field Blank	10-22-19		X		DI	2		
Duplicate	10-22-19		X		GW	2		
MW-1	10-22-19	1025	X		GW	2		

CHEMICAL PRESERVATION CODES:	1 – HCL	2 – H2SO4	3 – HNO3	4 – NAOH	5 – NA2S2O3	6 – UNPRESERVED	7 – OTHER

(5) TURNAROUND TIME REQUESTED (PLEASE CIRCLE) NORMAL RUSH
(RUSH TAT IS SUBJECT TO PDC LABS APPROVAL AND SURCHARGE)
DATE RESULTS NEEDED
RUSH RESULTS VIA (PLEASE CIRCLE) EMAIL PHONE
EMAIL IF DIFFERENT FROM ABOVE: PHONE # IF DIFFERENT FROM ABOVE:

(6) *I understand that by initialing this box I give the lab permission to proceed with analysis, even though it may not meet all sample conformance requirements as defined in the receiving facility's Sample Acceptance Policy and the data will be qualified. Qualified data may NOT be acceptable to report to all regulatory authorities.*
PROCEED WITH ANALYSIS AND QUALIFY RESULTS: (INITIALS) _____

(7) RELINQUISHED BY: (SIGNATURE)	DATE / TIME	RECEIVED BY: (SIGNATURE)	DATE / TIME
Kenneth McGuirk	10-24-19 0800		
RELINQUISHED BY: (SIGNATURE)	DATE / TIME	RECEIVED BY: (SIGNATURE)	DATE / TIME
RELINQUISHED BY: (SIGNATURE)	DATE / TIME	RECEIVED BY: (SIGNATURE)	DATE / TIME

(8) COMMENTS: (FOR LAB USE ONLY)
SAMPLE TEMPERATURE UPON RECEIPT _____ °C
CHILL PROCESS STARTED PRIOR TO RECEIPT Y OR N
SAMPLE(S) RECEIVED ON ICE Y OR N
SAMPLE ACCEPTANCE NONCONFORMANT REPORT IS NEEDED Y OR N
DATE AND TIME TAKEN FROM SAMPLE BOTTLE _____

Field Instrumentation Calibration Log

Facility: SBMU SPS CCR Groundwater Sampling Calibrated by: Hunter McGill

Field Instruments: In-Situ smarTROLL Field Meter HF scientific, inc. Micro TPI Field Portable Turbidimeter

S/N #: 479247 S/N #: 20160736b

	Date	Time	pH Standards		pH Measurements	Specific Conductance Standard (µS/cm)		Specific Conductance Measurement (µS/cm)	Oxidation Reduction Potential Standard (mV)				Oxidation Reduction Potential Measurement (mV)	Dissolved Oxygen (%)			Turbidity Standards (NTU)		Turbidity Measurements (NTU)
Beginning of Day Calibration	10-22-2019	0623	4.00	=	4.00	1413	=	1412	Temperature (°C)	=	21.96	=	229.4	Temperature (°C)	=	20.35	0.02	=	0.02
			7.00	=	7.00				Standard (mV)	=	225			Tap Water Source	=	Silver Lake City	10.0	=	10.0
			10.00	=	10.00									Barometric Pressure (mm/Hg)	=	1001.0	1000	=	1000
														Measurement	=	99.3%			
End of Day Check	10-22-2019	1350	4.00	=	4.01	1413	=	1451.4	Temperature (°C)	=	20.25	=	229.3	Temperature (°C)	=	18.38	0.02	=	0.01
			7.00	=	7.07				Standard (mV)	=	229			Tap Water Source	=	Silver Lake City	10.0	=	9.86
			10.00	=	10.01									Barometric Pressure (mm/Hg)	=	1003.0	1000	=	992.3
														Measurement	=	99.7%			

Notes: The Multi-Probe Field Meter measures Temperature, Specific Conductance, Dissolved Oxygen, pH, and Oxidation Reduction Potential.

The HF scientific, inc. Micro TPI Field Portable Turbidimeter measures Turbidity.

Dissolved oxygen is calibrated via % saturation method; however, field measurements are recorded as mg/L.

I certify that the aforementioned meters were calibrated within the manufacturers specifications.

Date: 10-22-2019 By: Hunter McGill

Monitoring Well Field Inspection

Facility: SBMU SPS – CCR Groundwater Monitoring
Monitoring Well ID: MW-1
Name (Field Staff): H. McGill D. Dillingham
Date: 10-22-19

Access:
Accessibility: Good ✓ Fair ___ Poor ___
Well clear of weeds and/or debris?: Yes ✓ No ___
Well identification clearly visible?: Yes ✓ No ___
Remarks:

Concrete Pad:
Condition of Concrete Pad: Good ✓ Inadequate ___
Depressions or standing water around well?: Yes ___ No ✓
Remarks:

Protective Outer Casing: Material = 4" x 4" Steel Hinged Casing with Hasp
Condition of Protective Casing: Good ✓ Damaged ___
Condition of Locking Cap: Good ✓ Damaged ___
Condition of Lock: Good ✓ Damaged ___
Condition of Weep Hole: Good ✓ Damaged ___
Remarks:

Well Riser: Material = 2" Diameter, Schedule 40 PVC, Flush Threaded
Condition of Riser: Good ✓ Damaged ___
Condition of Riser Cap: Good ✓ Damaged ___
Measurement Reference Point: Yes ✓ No ___
Remarks:

Dedicated Purging/Sampling Device: Type = ¼ " ID Semi-Rigid Polyethylene & 0.170" ID Flexible Silicone Tubing
Condition: Good ✓ Damaged ___ Missing ___
Remarks:

Monitoring Well Locked/Secured Post Sampling?: Yes ✓ No ___
Remarks:

Field Certification H. McGill Leadman 10-22-19
Signed Title Date

Prepared by: GREDELL Engineering Resources, Inc. January 2017

Field Sampling Log

Monitoring Well ID: MW-1 Facility: SBMU Sikeston Power Station - Groundwater Monitoring

Initial Water Level (feet btoc): 16.85' Date: 10-22-19

Initial Groundwater Elevation (NAVD88): _____ Air Pressure in Well? Y / (N)

PURGE INFORMATION

Date: 10-22-19

Name (Sample Collector): D. Dillingham

Method of Well Purge: Low Flow Perstaltic Pump Dedicated Tubing? (Y) / N

Time Purging Initiated: 0957 One (1) Well Volume (mL): NA

Beginning Water Level (feet btoc): 16.85' Total Volume Purged (mL): 6020

Beginning Groundwater Elevation (NAVD88): _____ Well Purged To Dryness? Y / (N)

Well Total Depth (feet btoc): 37.63 Water Level after Sampling (feet btoc): 16.85' (i.e., pump is off)

Casing Diameter (feet): 2" Sch 40 PVC Time Sampling Completed: 1057

PURGE STABILIZATION DATA 111

Time	Purge Rate (mL/min)	Cumulative Volume (mL)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Oxidation Reduction Potential (mV)	Turbidity (NTU)	Water Level (feet btoc)	Notes (e.g., opacity, color, odor)
0959		320	17.65	405.97	1.02	6.5	-103.1	2.22	16.85'	clear
1001	220	760	17.19	409.35	0.61	6.7	-110.4	2.73	"	"
1003	230	1220	17.05	411.38	0.51	6.9	-112.7	2.04	"	"
1005	230	1680	17.03	411.25	0.45	7.0	-114.7	2.93	"	"
1007	230	2140	17.01	411.74	0.42	7.0	-114.5	1.02	"	"
1009	220	2580	17.01	411.24	0.39	7.0	-115.0	2.31	"	"
1011	220	3020	17.03	412.29	0.36	7.0	-114.6	1.25	"	"
1013	220	3460	17.07	413.97	0.36	7.0	-114.8	1.95	"	"
1015	270	4000	17.09	415.67	0.34	7.1	-113.8	1.15	"	"
1017	220	4440	17.14	417.93	0.33	7.1	-112.3	1.86	"	"
1019	230	4900	17.12	417.87	0.32	7.1	-113.0	0.97	"	"
1021	220	5340	17.13	415.82	0.32	7.1	-112.9	0.95	"	"
1023	230	5700	17.13	416.38	0.32	7.1	-112.7	0.98	"	"
1025	160	6020	17.10	417.97	0.32	7.1	-113.4	0.96	"	"

btoc - below top of casing

Field Sampling Log

Facility: SBMU Sikeston Power Station - CCR Groundwater Monitoring Monitoring Well ID: MW-1

Sampling Information:

Method of Sampling: Low Flow - Perstaltic Pump & Tubing Dedicated: (Y) / N

Water Level @ Sampling (feet btoc): 16.85'

Monitoring Event: Annual ( ) Semi-Annual ( ) Quarterly (x) Monthly ( ) Other ( )

Final Purge Stablization Sampling Data:

Date Sample Time	Sample Rate (mL/min)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Oxidation Reduction Potential (mV)	Turbidity (NTU)
10-22-19 1025	160	17.10	417.97	0.32	7.1	-113.4	0.96

Instrument Calibration Data:

See instrument calibration log of daily calibration data for the following instruments:

1 - In-Situ SmarTroll Multi-Probe Field Meter (Temperature, Specific Conductance, Dissolved Oxygen, pH, Oxidation Reduction Potentia

2 - HF scientific, inc. Micro TPI Field Portable Turbidimeter

General Information:

Weather Conditions @ time of sampling: Sunny, 51°F, Windy

Sample Characteristics: Clear, colorless, odorless

Sample Collection Order: Per SAP

Comments and Observations:

Field Blank taken

Duplicate taken

I certify that sampling procedures were in accordance with applicable EPA and State protocols.

Date: 10-22-19 By: Heath McGill Title: Leadman

Appendix 2

Laboratory Analytical Results

Appendix 2

Laboratory Analytical Results
September 24, 2019

PDC Laboratories, Inc.
PROFESSIONAL • DEPENDABLE • COMMITTED

October 09, 2019

Luke St Mary
Sikeston BMU, Sikeston Power Station
1551 W Wakefield
Sikeston, MO 63801

RE: Sikeston BMU-CCR Fly Ash Wells

Dear Luke St Mary:

Please find enclosed the analytical results for the **7** sample(s) the laboratory received on **9/26/19 10:00 am** and logged in under work order **9095133**. All testing is performed according to our current TNI accreditations unless otherwise noted. This report cannot be reproduced, except in full, without the written permission of PDC Laboratories, Inc.

If you have any questions regarding your report, please contact your project manager. Quality and timely data is of the utmost importance to us.

PDC Laboratories, Inc. appreciates the opportunity to provide you with analytical expertise. We are always trying to improve our customer service and we welcome you to contact the Director of Client Services, Lisa Grant, with any feedback you have about your experience with our laboratory at 309-683-1764 or lgrant@pdclab.com.

Sincerely,

Kurt Stepping
Senior Project Manager
(309) 692-9688 x1719
kstepping@pdclab.com

ANALYTICAL RESULTS

Sample: 9095133-01
Name: MW-3
Matrix: Ground Water - Regular Sample

Sampled: 09/24/19 07:42
Received: 09/26/19 10:00
PO #: 20927

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
Anions - PIA									
Chloride	1.2	mg/L		09/30/19 21:28	1	1.0	09/30/19 21:28	CRD	EPA 300.0
Fluoride	0.332	mg/L		09/30/19 21:28	1	0.250	09/30/19 21:28	CRD	EPA 300.0
Sulfate	16	mg/L		09/30/19 21:46	5	5.0	09/30/19 21:46	CRD	EPA 300.0
General Chemistry - PIA									
Solids - total dissolved solids (TDS)	130	mg/L		09/30/19 07:20	1	26	09/30/19 09:57	TMS	SM 2540C
Total Metals - PIA									
Boron	26	ug/L		10/01/19 13:31	5	10	10/02/19 13:12	JMW	SW 6020
Calcium	17000	ug/L		10/01/19 13:31	5	100	10/02/19 09:28	JMW	SW 6020

Sample: 9095133-02
Name: MW-2
Matrix: Ground Water - Regular Sample

Sampled: 09/24/19 08:19
Received: 09/26/19 10:00
PO #: 20927

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
Anions - PIA									
Chloride	6.6	mg/L		09/30/19 22:04	1	1.0	09/30/19 22:04	CRD	EPA 300.0
Fluoride	< 0.250	mg/L		09/30/19 22:04	1	0.250	09/30/19 22:04	CRD	EPA 300.0
Sulfate	17	mg/L		09/30/19 22:23	5	5.0	09/30/19 22:23	CRD	EPA 300.0
General Chemistry - PIA									
Solids - total dissolved solids (TDS)	130	mg/L		10/01/19 14:13	1	17	10/01/19 14:44	TMS	SM 2540C
Total Metals - PIA									
Boron	58	ug/L		10/01/19 13:31	5	10	10/02/19 13:16	JMW	SW 6020
Calcium	22000	ug/L		10/01/19 13:31	5	100	10/02/19 09:31	JMW	SW 6020

ANALYTICAL RESULTS

Sample: 9095133-03
Name: MW-1
Matrix: Ground Water - Regular Sample

Sampled: 09/24/19 09:36
Received: 09/26/19 10:00
PO #: 20927

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
Anions - PIA									
Chloride	4.3	mg/L		09/30/19 22:41	1	1.0	09/30/19 22:41	CRD	EPA 300.0
Fluoride	0.260	mg/L		09/30/19 22:41	1	0.250	09/30/19 22:41	CRD	EPA 300.0
Sulfate	35	mg/L		09/30/19 22:59	5	5.0	09/30/19 22:59	CRD	EPA 300.0
General Chemistry - PIA									
Solids - total dissolved solids (TDS)	230	mg/L	M	09/30/19 07:20	1	26	09/30/19 09:57	TMS	SM 2540C
Total Metals - PIA									
Boron	500	ug/L		10/01/19 13:31	5	10	10/02/19 13:20	JMW	SW 6020
Calcium	47000	ug/L		10/01/19 13:31	5	100	10/02/19 10:05	JMW	SW 6020

Sample: 9095133-04
Name: MW-7
Matrix: Ground Water - Regular Sample

Sampled: 09/24/19 10:23
Received: 09/26/19 10:00
PO #: 20927

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
Anions - PIA									
Chloride	3.9	mg/L		09/30/19 23:53	1	1.0	09/30/19 23:53	CRD	EPA 300.0
Fluoride	0.684	mg/L		09/30/19 23:53	1	0.250	09/30/19 23:53	CRD	EPA 300.0
Sulfate	150	mg/L		10/01/19 00:29	25	25	10/01/19 00:29	CRD	EPA 300.0
General Chemistry - PIA									
Solids - total dissolved solids (TDS)	470	mg/L		09/30/19 07:20	1	26	09/30/19 09:57	TMS	SM 2540C
Total Metals - PIA									
Boron	1900	ug/L		10/01/19 13:31	5	10	10/02/19 13:23	JMW	SW 6020
Calcium	120000	ug/L		10/01/19 13:31	5	100	10/02/19 10:09	JMW	SW 6020

ANALYTICAL RESULTS

Sample: 9095133-05
Name: MW-9
Matrix: Ground Water - Regular Sample

Sampled: 09/24/19 11:36
Received: 09/26/19 10:00
PO #: 20927

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
Anions - PIA									
Chloride	16	mg/L		10/01/19 01:06	5	5.0	10/01/19 01:06	CRD	EPA 300.0
Fluoride	0.847	mg/L		10/01/19 00:48	1	0.250	10/01/19 00:48	CRD	EPA 300.0
Sulfate	220	mg/L		10/01/19 01:24	25	25	10/01/19 01:24	CRD	EPA 300.0
General Chemistry - PIA									
Solids - total dissolved solids (TDS)	540	mg/L		09/30/19 07:20	1	26	09/30/19 09:57	TMS	SM 2540C
Total Metals - PIA									
Boron	5000	ug/L		10/01/19 13:31	5	10	10/02/19 13:27	JMW	SW 6020
Calcium	87000	ug/L		10/01/19 13:31	5	100	10/02/19 10:12	JMW	SW 6020

Sample: 9095133-06
Name: DUPLICATE WELL
Matrix: Ground Water - Field Duplicate

Sampled: 09/24/19 00:00
Received: 09/26/19 10:00
PO #: 20927

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
Anions - PIA									
Chloride	6.6	mg/L		10/01/19 01:42	1	1.0	10/01/19 01:42	CRD	EPA 300.0
Fluoride	0.261	mg/L		10/01/19 01:42	1	0.250	10/01/19 01:42	CRD	EPA 300.0
Sulfate	17	mg/L		10/01/19 02:00	5	5.0	10/01/19 02:00	CRD	EPA 300.0
General Chemistry - PIA									
Solids - total dissolved solids (TDS)	140	mg/L		09/30/19 07:20	1	26	09/30/19 09:57	TMS	SM 2540C
Total Metals - PIA									
Boron	120	ug/L		10/01/19 13:31	5	10	10/02/19 13:31	JMW	SW 6020
Calcium	22000	ug/L		10/01/19 13:31	5	100	10/02/19 10:16	JMW	SW 6020

ANALYTICAL RESULTS

Sample: 9095133-07
Name: FIELD BLANK
Matrix: Ground Water - Field Blank

Sampled: 09/24/19 00:00
Received: 09/26/19 10:00
PO #: 20927

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
Anions - PIA									
Chloride	< 1.0	mg/L		10/01/19 02:36	1	1.0	10/01/19 02:36	CRD	EPA 300.0
Fluoride	< 0.250	mg/L		10/01/19 02:36	1	0.250	10/01/19 02:36	CRD	EPA 300.0
Sulfate	< 1.0	mg/L		10/01/19 02:36	1	1.0	10/01/19 02:36	CRD	EPA 300.0
General Chemistry - PIA									
Solids - total dissolved solids (TDS)	< 17	mg/L		09/30/19 07:20	1	17	09/30/19 09:57	TMS	SM 2540C
Total Metals - PIA									
Boron	75	ug/L		10/01/19 13:31	5	10	10/02/19 13:34	JMW	SW 6020
Calcium	150	ug/L		10/01/19 13:31	5	100	10/02/19 10:20	JMW	SW 6020

Appendix 2

Laboratory Analytical Results
October 22, 2020 Resample

November 11, 2019

Luke St Mary
Sikeston BMU, Sikeston Power Station
1551 W Wakefield
Sikeston, MO 63801

RE: Sikeston BMU-CCR Fly Ash Wells

Dear Luke St Mary:

Please find enclosed the analytical results for the **3** sample(s) the laboratory received on **10/25/19 9:30 am** and logged in under work order **9105201**. All testing is performed according to our current TNI accreditations unless otherwise noted. This report cannot be reproduced, except in full, without the written permission of PDC Laboratories, Inc.

If you have any questions regarding your report, please contact your project manager. Quality and timely data is of the utmost importance to us.

PDC Laboratories, Inc. appreciates the opportunity to provide you with analytical expertise. We are always trying to improve our customer service and we welcome you to contact the Director of Client Services, Lisa Grant, with any feedback you have about your experience with our laboratory at 309-683-1764 or lgrant@pdclab.com.

Sincerely,

Kurt Stepping
Senior Project Manager
(309) 692-9688 x1719
kstepping@pdclab.com

ANALYTICAL RESULTS

Sample: 9105201-01
Name: FIELD BLANK
Matrix: Ground Water - Regular Sample

Sampled: 10/22/19 00:00
Received: 10/25/19 09:30
PO #: 20927

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
Anions - PIA									
Sulfate	< 1.0	mg/L		10/28/19 10:35	1	1.0	10/28/19 10:35	CRD	EPA 300.0
General Chemistry - PIA									
Solids - total dissolved solids (TDS)	< 17	mg/L		10/28/19 08:04	1	17	10/28/19 09:50	TMS	SM 2540C
Total Metals - PIA									
Calcium	< 100	ug/L		10/29/19 14:18	5	100	10/31/19 12:04	JMW	SW 6020

Sample: 9105201-02
Name: DUPLICATE WELL
Matrix: Ground Water - Regular Sample

Sampled: 10/22/19 00:00
Received: 10/25/19 09:30
PO #: 20927

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
Anions - PIA									
Sulfate	42	mg/L		10/28/19 11:11	5	5.0	10/28/19 11:11	CRD	EPA 300.0
General Chemistry - PIA									
Solids - total dissolved solids (TDS)	170	mg/L		10/28/19 08:06	1	26	10/28/19 09:46	TMS	SM 2540C
Total Metals - PIA									
Calcium	49000	ug/L		10/29/19 14:18	5	100	10/31/19 12:08	JMW	SW 6020

ANALYTICAL RESULTS

Sample: 9105201-03
Name: MW-1
Matrix: Ground Water - Regular Sample

Sampled: 10/22/19 10:25
Received: 10/25/19 09:30
PO #: 20927

Parameter	Result	Unit	Qualifier	Prepared	Dilution	MRL	Analyzed	Analyst	Method
Anions - PIA									
Sulfate	41	mg/L		10/28/19 12:05	5	5.0	10/28/19 12:05	CRD	EPA 300.0
General Chemistry - PIA									
Solids - total dissolved solids (TDS)	180	mg/L		10/28/19 08:06	1	26	10/28/19 09:46	TMS	SM 2540C
Total Metals - PIA									
Calcium	47000	ug/L		10/31/19 12:56	5	100	11/05/19 08:24	JMW	SW 6020

Appendix 3

Laboratory Quality Assurance/Quality Control Data

Appendix 3

Laboratory Quality Assurance/Quality Control Data
September 24, 2020

QC SAMPLE RESULTS

Parameter	Result	Unit	Qual	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch B922319 - No Prep - SM 2540C									
Blank (B922319-BLK1)				Prepared & Analyzed: 09/30/19					
Solids - total dissolved solids (TDS)	< 17	mg/L							
LCS (B922319-BS1)				Prepared & Analyzed: 09/30/19					
Solids - total dissolved solids (TDS)	80.0	mg/L		90.00		89	67.9-132		
Duplicate (B922319-DUP1)	**Sample: 9095133-03**			Prepared & Analyzed: 09/30/19					
Solids - total dissolved solids (TDS)	210	mg/L	M		230			9	5
Duplicate (B922319-DUP2)	**Sample: 9095520-02**			Prepared & Analyzed: 09/30/19					
Solids - total dissolved solids (TDS)	410	mg/L			405			1	5
MRL Check (B922319-MRL1)				Prepared & Analyzed: 09/30/19					
Solids - total dissolved solids (TDS)	113	mg/L		90.00		126	0-200		
MRL Check (B922319-MRL2)				Prepared & Analyzed: 09/30/19					
Solids - total dissolved solids (TDS)	70.0	mg/L		90.00		78	0-200		
Batch B922474 - IC No Prep - EPA 300.0									
Calibration Blank (B922474-CCB1)				Prepared & Analyzed: 09/30/19					
Sulfate	0.00	mg/L							
Chloride	0.00	mg/L							
Fluoride	0.00	mg/L							
Calibration Check (B922474-CCV1)				Prepared & Analyzed: 09/30/19					
Chloride	4.82	mg/L		5.000		96	90-110		
Sulfate	5.00	mg/L		5.000		100	90-110		
Fluoride	4.93	mg/L		5.000		99	90-110		
Batch B922516 - SW 3015 - SW 6020									
Blank (B922516-BLK1)				Prepared: 10/01/19 Analyzed: 10/02/19					
Boron	< 10	ug/L							
Calcium	< 100	ug/L							
LCS (B922516-BS1)				Prepared: 10/01/19 Analyzed: 10/02/19					
Boron	583	ug/L		555.6		105	80-120		
Calcium	5270	ug/L		5556		95	80-120		
Matrix Spike (B922516-MS1)	**Sample: 9095191-02**			Prepared: 10/01/19 Analyzed: 10/02/19					
Calcium	15800	ug/L		5556	10300	99	75-125		
Matrix Spike Dup (B922516-MSD1)	**Sample: 9095191-02**			Prepared: 10/01/19 Analyzed: 10/02/19					
Calcium	16200	ug/L		5556	10300	106	75-125	2	20
Batch B922528 - No Prep - SM 2540C									
Blank (B922528-BLK1)				Prepared & Analyzed: 10/01/19					
Solids - total dissolved solids (TDS)	< 17	mg/L							
LCS (B922528-BS1)				Prepared & Analyzed: 10/01/19					
Solids - total dissolved solids (TDS)	110	mg/L		90.00		122	67.9-132		
Duplicate (B922528-DUP1)	**Sample: 9100169-02**			Prepared & Analyzed: 10/01/19					
Solids - total dissolved solids (TDS)	1590	mg/L			1590			0.2	5

NOTES

Specific method revisions used for analysis are available upon request.

* Not a TNI accredited analyte

Certifications

CHI - McHenry, IL - 4314 W Crystal Lake Road A, McHenry, IL 60050
TNI Accreditation for Drinking Water, Wastewater, Fields of Testing through IL EPA Lab No. 100279
Illinois Department of Public Health Bacteriological Analysis in Drinking Water Approved Laboratory Registry No. 17556

PIA - Peoria, IL - 2231 W Altorfer Drive, Peoria, IL 61615
TNI Accreditation for Drinking Water, Wastewater, Hazardous and Solid Wastes Fields of Testing through IL EPA Lab No. 100230
Illinois Department of Public Health Bacteriological Analysis in Drinking Water Approved Laboratory Registry No. 17553
Drinking Water Certifications: Iowa (240); Kansas (E-10338); Missouri (870)
Wastewater Certifications: Arkansas (88-0677); Iowa (240); Kansas (E-10338)
Hazardous/Solid Waste Certifications: Arkansas (88-0677); Iowa (240); Kansas (E-10338)

SPIL - Springfield, IL - 1210 Capitol Airport Drive, Springfield, IL 62707
TNI Accreditation through IL EPA Lab No. 100323

SPMO - Springfield, MO - 1805 W Sunset Street, Springfield, MO 65807
USEPA DMR-QA Program

STL - St. Louis, MO - 3278 N Highway 67, Florissant, MO 63033
TNI Accreditation for Wastewater, Hazardous and Solid Wastes Fields of Testing through KS Lab No. E-10389
TNI Accreditation for Wastewater, Hazardous, and Solid Waste Analysis through IL EPA No. 200080
Illinois Department of Public Health Bacteriological Analysis in Drinking Water Approved Laboratory Registry No. 171050
Missouri Department of Natural Resources
Microbiological Laboratory Service for Drinking Water

Qualifiers

M Analyte failed to meet the required acceptance criteria for duplicate analysis.

Certified by: Kurt Stepping, Senior Project Manager

DATA PACKAGE

CLIENT; Sikeston BMU

PROJECT: Sikeston Power Station

PDC LAB WORKORDER: 9095133

DATE ISSUED: October 9, 2019

CASE NARRATIVE –

PDC Work Order 9095133

PDC Laboratories, Inc. received 7 water samples on September 26, 2019 in good condition at our Peoria, IL facility. This sample set was designated as work order 9095133.

Sample ID's		Date	
Field	**Lab ID**	**Collected**	**Received**
MW-3	9095133-01	9/24/19	9/26/19
MW-2	9095133-02	9/24/19	9/26/19
MW-1	9095133-03	9/24/19	9/26/19
MW-7	9095133-04	9/24/19	9/26/19
MW-9	9095133-05	9/24/19	9/26/19
Duplicate One	9095133-06	9/24/19	9/26/19
Field Blank	9095133-07	9/24/19	9/26/19

QC Summary:

All items met acceptance criteria with the following noted exceptions:

TDS batch QC sample flagged with M, RPD outside acceptance criteria

Certification

Signature:  Name: Kurt Stepping

Date: October 9, 2019 Title: Senior Project Manager

PDC LABORATORIES, INC.
2231 WEST ALTORFER DRIVE
PEORIA, IL 61615

PHONE # 800-752-6651
FAX # 309-692-9689

CHAIN OF CUSTODY RECORD

State where samples collected ____________

ALL HIGHLIGHTED AREAS MUST BE COMPLETED BY CLIENT (PLEASE PRINT) · ***(SAMPLE ACCEPTANCE POLICY ON REVERSE)***

1 CLIENT: Sikeston Power Station
PROJECT NUMBER: CCR Fly Ash
P.O. NUMBER: App III
MEANS SHIPPED:
ADDRESS: 1551 W Wakefield
PHONE NUMBER:
FAX NUMBER:
DATE SHIPPED:
CITY STATE ZIP: Sikeston, MO 63801
SAMPLER (PLEASE PRINT): Daniel Dillingham
SAMPLER'S SIGNATURE: Daniel A. Dillingham
CONTACT PERSON: Luke St. Mary / Ken Ewers

MATRIX TYPES: WW-WASTEWATER, DW-DRINKING WATER, GW-GROUND WATER, WWSL-SLUDGE, NAS-SOLID, LCHT-LEACHATE, OTHER:

3 ANALYSIS REQUESTED

4 (FOR LAB USE ONLY)
LOGIN # 9095733-7
LOGGED BY: [initials]
LAB PROJ #:
TEMPLATE:
PROJ. MGR.:

2 SAMPLE DESCRIPTION AS YOU WANT ON REPORT	DATE COLLECTED	TIME COLLECTED	SAMPLE TYPE GRAB	SAMPLE TYPE COMP	MATRIX TYPE	BOTTLE COUNT	Cl, F, SO4	B, Ca, TDS	REMARKS
MW 3	9-24-19	0742	X		GW	2	X	X	
MW 2	9-24-19	0819	X		GW	2	X	X	
MW 1	9-24-19	0936	X		GW	2	X	X	
MW 7	9-24-19	1023	X		GW	2	X	X	
MW 9	9-24-19	1136	X		GW	2	X	X	
Field Duplicate	9-24-19		X		GW	2	X	X	
Field Blank	9-24-19		X		DI	2	X	X	

5 TURNAROUND TIME REQUESTED (PLEASE CIRCLE) NORMAL RUSH
(RUSH TAT IS SUBJECT TO PDC LABS APPROVAL AND SURCHARGE)
DATE RESULTS NEEDED
RUSH RESULTS VIA (PLEASE CIRCLE) FAX PHONE E-MAIL
FAX # PHONE # EMAIL ADDRESS

6 *The sample temperature will be measured upon receipt at the lab. By initialing this area you request that the lab notify you, before proceeding with analysis, if the sample temperature is outside of the range of 0.1-6.0°C. By not initialing this area you allow the lab to proceed with analytical testing regardless of the sample temperature.* ____

7 RELINQUISHED BY: (SIGNATURE) Ashish Patel — DATE 9-25-19 TIME 0730 — RECEIVED BY: (SIGNATURE) — DATE — TIME
RELINQUISHED BY: (SIGNATURE) — DATE — TIME — RECEIVED BY: (SIGNATURE) — DATE — TIME
RELINQUISHED BY: (SIGNATURE) — DATE — TIME — RECEIVED AT LAB BY: (SIGNATURE) [signature] — DATE 9/25/19 — TIME 11:20

8 COMMENTS: (FOR LAB USE ONLY)
SAMPLE TEMPERATURE UPON RECEIPT ____ °C
CHILL PROCESS STARTED PRIOR TO RECEIPT (Y) OR N
SAMPLE(S) RECEIVED ON ICE (Y) OR N
PROPER BOTTLES RECEIVED IN GOOD CONDITION (Y) OR N
BOTTLES FILLED WITH ADEQUATE VOLUME (Y) OR N
SAMPLES RECEIVED WITHIN HOLD TIME(S) (EXCLUDES TYPICAL FIELD PARAMETERS) (Y) OR N
DATE AND TIME TAKEN FROM SAMPLE BOTTLE

Copies: white should accompany samples to PDC Lab...

Appendix 3

Laboratory Quality Assurance/Quality Control Data
October 22, 2020 Resample

QC SAMPLE RESULTS

Parameter	Result	Unit	Qual	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch B924996 - No Prep - SM 2540C									
Blank (B924996-BLK1)				Prepared & Analyzed: 10/28/19					
Solids - total dissolved solids (TDS)	< 17	mg/L							
LCS (B924996-BS1)				Prepared & Analyzed: 10/28/19					
Solids - total dissolved solids (TDS)	960	mg/L		1000		96	67.9-132		
Duplicate (B924996-DUP2)	**Sample: 9105193-01**			Prepared & Analyzed: 10/28/19					
Solids - total dissolved solids (TDS)	240	mg/L	M		220			9	5
Batch B924997 - No Prep - SM 2540C									
Blank (B924997-BLK1)				Prepared & Analyzed: 10/28/19					
Solids - total dissolved solids (TDS)	< 17	mg/L							
LCS (B924997-BS1)				Prepared & Analyzed: 10/28/19					
Solids - total dissolved solids (TDS)	950	mg/L		1000		95	67.9-132		
Duplicate (B924997-DUP1)	**Sample: 9104743-01**			Prepared & Analyzed: 10/28/19					
Solids - total dissolved solids (TDS)	3490	mg/L			3530			1	5
Batch B925174 - IC No Prep - EPA 300.0									
Calibration Blank (B925174-CCB1)				Prepared & Analyzed: 10/28/19					
Sulfate	0.166	mg/L							
Calibration Check (B925174-CCV1)				Prepared & Analyzed: 10/28/19					
Sulfate	4.88	mg/L		5.000		98	90-110		
Batch B925201 - SW 3015 - SW 6020									
Blank (B925201-BLK1)				Prepared: 10/29/19 Analyzed: 10/31/19					
Calcium	< 100	ug/L							
LCS (B925201-BS1)				Prepared: 10/29/19 Analyzed: 10/31/19					
Calcium	5430	ug/L		5556		98	80-120		
Matrix Spike (B925201-MS1)	**Sample: 9104880-03**			Prepared: 10/29/19 Analyzed: 10/31/19					
Calcium	22400	ug/L		5556	17100	95	75-125		
Matrix Spike Dup (B925201-MSD1)	**Sample: 9104880-03**			Prepared: 10/29/19 Analyzed: 10/31/19					
Calcium	22400	ug/L		5556	17100	95	75-125	0.07	20
Batch B925441 - SW 3015 - SW 6020									
Blank (B925441-BLK1)				Prepared: 10/31/19 Analyzed: 11/05/19					
Calcium	< 100	ug/L							
LCS (B925441-BS1)				Prepared: 10/31/19 Analyzed: 11/05/19					
Calcium	5280	ug/L		5556		95	80-120		
Matrix Spike (B925441-MS1)	**Sample: 9105201-03**			Prepared: 10/31/19 Analyzed: 11/05/19					
Calcium	52200	ug/L		5556	47300	88	75-125		
Matrix Spike Dup (B925441-MSD1)	**Sample: 9105201-03**			Prepared: 10/31/19 Analyzed: 11/05/19					
Calcium	52400	ug/L		5556	47300	91	75-125	0.3	20

NOTES

Specifications regarding method revisions and method modifications used for analysis are available upon request. Please contact your project manager.

* Not a TNI accredited analyte

Certifications

CHI - McHenry, IL - 4314 W Crystal Lake Road A, McHenry, IL 60050
TNI Accreditation for Drinking Water, Wastewater, Fields of Testing through IL EPA Lab No. 100279
Illinois Department of Public Health Bacteriological Analysis in Drinking Water Approved Laboratory Registry No. 17556

PIA - Peoria, IL - 2231 W Altorfer Drive, Peoria, IL 61615
TNI Accreditation for Drinking Water, Wastewater, Hazardous and Solid Wastes Fields of Testing through IL EPA Lab No. 100230
Illinois Department of Public Health Bacteriological Analysis in Drinking Water Approved Laboratory Registry No. 17553
Drinking Water Certifications: Iowa (240); Kansas (E-10338); Missouri (870)
Wastewater Certifications: Arkansas (88-0677); Iowa (240); Kansas (E-10338)
Hazardous/Solid Waste Certifications: Arkansas (88-0677); Iowa (240); Kansas (E-10338)

SPIL - Springfield, IL - 1210 Capitol Airport Drive, Springfield, IL 62707
TNI Accreditation through IL EPA Lab No. 100323

SPMO - Springfield, MO - 1805 W Sunset Street, Springfield, MO 65807
USEPA DMR-QA Program

STL - St. Louis, MO - 3278 N Highway 67, Florissant, MO 63033
TNI Accreditation for Wastewater, Hazardous and Solid Wastes Fields of Testing through KS Lab No. E-10389
TNI Accreditation for Wastewater, Hazardous, and Solid Waste Analysis through IL EPA No. 200080
Illinois Department of Public Health Bacteriological Analysis in Drinking Water Approved Laboratory Registry No. 171050
Missouri Department of Natural Resources
Microbiological Laboratory Service for Drinking Water

Qualifiers

M Analyte failed to meet the required acceptance criteria for duplicate analysis.

Certified by: Kurt Stepping, Senior Project Manager

PDC Laboratories, Inc.

DATA PACKAGE

CLIENT; Sikeston BMU

PROJECT: Sikeston Power Station

PDC LAB WORKORDER: 9105201

DATE ISSUED: November 11, 2019

CASE NARRATIVE –

PDC Work Order 9105201

PDC Laboratories, Inc. received 3 water samples on October 22, 2019 in good condition at our Peoria, IL facility. This sample set was designated as work order 9105201.

Sample ID's		Date	
Field	**Lab ID**	**Collected**	**Received**
MW-1	9105201-03	10/22/19	10/25/19
Duplicate One	9105201-02	10/22/19	10/25/19
Field Blank	9105201-01	10/22/19	10/25/19

QC Summary:

All items met acceptance criteria with the following noted exceptions:

TDS batch QC sample flagged with M, RPD outside acceptance criteria

Certification

Signature: Kurt Stepping Name: Kurt Stepping

Date: November 11, 2019 Title: Senior Project Manager

PDC LABORATORIES, INC.
WWW.PDCLAB.COM

MORBCA	RCRA
CCDD	TACO: RES OR IND/COMM

CHAIN OF CUSTODY RECORD

STATE WHERE SAMPLE COLLECTED_____

ALL HIGHLIGHTED AREAS MUST BE COMPLETED BY CLIENT (PLEASE PRINT)

1 CLIENT	PROJECT NUMBER	PROJECT LOCATION	PURCHASE ORDER #
Sikeston Power Station	Fly Ash CCR		
ADDRESS	**PHONE NUMBER**	**E-MAIL**	**DATE SHIPPED**
1551 West Wakefield			
CITY STATE ZIP	**SAMPLER (PLEASE PRINT)**	**MATRIX TYPES:**	
Sikeston, Mo 63801	Daniel Dillingham	WW- WASTEWATER DW- DRINKING WATER GW- GROUND WATER WWSL- SLUDGE NAS- NON AQUEOUS SOLID LCHT-LEACHATE OIL-OIL SO-SOIL SOL-SOLID	
CONTACT PERSON	**SAMPLER'S SIGNATURE**		
Luke St. Mary / Ken Ewer	Daniel Dillingham		

2 SAMPLE DESCRIPTION (UNIQUE DESCRIPTION AS IT WILL APPEAR ON THE ANALYTICAL REPORT)	DATE COLLECTED	TIME COLLECTED	SAMPLE TYPE GRAB	SAMPLE TYPE COMP	MATRIX TYPE	BOTTLE COUNT	PRES CODE CLIENT PROVIDED	3 ANALYSIS REQUESTED: SO4, TDS, Ca	REMARKS
Field Blank	10-22-19		X		DI	2		X	
Duplicate	10-22-19		X		GW	2		X	
MW-1	10-22-19	1025	X		GW	2		X	

4 (FOR LAB USE ONLY)	
LOGIN #	9105201-03
LOGGED BY:	DCW
CLIENT:	
PROJECT:	Fly Ash App III/IV
PROJ. MGR.:	
CUSTODY SEAL #:	

CHEMICAL PRESERVATION CODES: 1 – HCL | 2 – H2SO4 | 3 – HNO3 | 4 – NAOH | 5 – NA2S2O3 | 6 – UNPRESERVED | 7 – OTHER

5 TURNAROUND TIME REQUESTED (PLEASE CIRCLE) NORMAL RUSH
(RUSH TAT IS SUBJECT TO PDC LABS APPROVAL AND SURCHARGE)

RUSH RESULTS VIA (PLEASE CIRCLE) EMAIL PHONE

DATE RESULTS NEEDED

EMAIL IF DIFFERENT FROM ABOVE: PHONE # IF DIFFERENT FROM ABOVE:

6 *I understand that by initialing this box I give the lab permission to proceed with analysis, even though it may not meet all sample conformance requirements as defined in the receiving facility's Sample Acceptance Policy and the data will be qualified. Qualified data may NOT be acceptable to report to all regulatory authorities.*

PROCEED WITH ANALYSIS AND QUALIFY RESULTS: (INITIALS) _____

7 RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME
Heath McGill	10-24-19	0800			
RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME
RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME
				10/25/19	930

8 COMMENTS: (FOR LAB USE ONLY)

SAMPLE TEMPERATURE UPON RECEIPT 2 °C

CHILL PROCESS STARTED PRIOR TO RECEIPT Y OR N
SAMPLE(S) RECEIVED ON ICE Y OR N
SAMPLE ACCEPTANCE NONCONFORMANT Y OR N
REPORT IS NEEDED Y OR N

DATE AND TIME TAKEN FROM SAMPLE BOTTLE _____

Appendix 4

Fly Ash Pond Groundwater Quality Data Base

Sikeston Board of Municipal Utilities
Sikeston Power Station
Fly Ash Pond Scott County, Missouri
CCR Groundwater Data Base

			Field Parameters						Appendix III Monitoring Constituents (Detection)						Appendix IV Monitoring Constituents (Assessment)											
Well ID	Date	Monitoring Purpose	Spec. Cond.	pH	Temp.	ORP	D.O.	Turbidity	Chloride	Fluoride	Sulfate	TDS	Boron	Calcium	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium	Radium 226/228 (Combined)
			µmhos/cm	S.U.	°C	mV	mg/L	NTU	mg/L	mg/L	mg/L	mg/L	ug/L	mg/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	pCi/L
MW-1 (DG)	3/21/2018	Background	249.6	7.3	16.33	-108.8	0.32	28.35	3.0	<0.250	22	150	360	21	<3.0	<1.0	120	<1.0	<1.0	<4.0	<2.0	<1.0	<10	<0.20	<1.0	<1.0	<1.0	0.353 (ND)
	4/15/2018	Background	233.8	7.4	15.17	-122.7	0.60	14.46	2.8	0.316	22	120	450	29	<3.0	<1.0	120	<1.0	<1.0	<4.0	<2.0	<1.0	<10	<0.20	<1.0	<1.0	<1.0	0.478 (ND)
	5/23/2018	Background	220.0	7.4	18.42	-133.3	0.54	12.11	3.3	<0.250	20	140	420	25	<3.0	<1.0	120	<1.0	<1.0	<4.0	<2.0	<1.0	<10	<0.20	<1.0	<1.0	<1.0	0.378 (ND)
	6/27/2018	Background	227.4	7.3	18.59	-149.3	0.30	11.07	6.9	<0.250	20	120	470	28	<3.0	<1.0	140	<1.0	<1.0	<4.0	<2.0	<1.0	<10	<0.20	<1.0	<1.0	<1.0	1.065 (ND)
	8/1/2018	Background	264.3	7.2	18.26	-138.0	0.56	7.52	5.6	<0.250	23	190	440	30	<3.0	<1.0	140	<1.0	<1.0	<4.0	<2.0	<1.0	<10	<0.20	<1.0	<1.0	<1.0	0.893(ND)
	9/5/2018	Background	281.3	7.1	18.70	-132.1	0.41	3.20	7.0	0.252	24	140	490	34	<3.0	<1.0	150	<1.0	<1.0	<4.0	<2.0	<1.0	<10	<0.20	<1.0	<1.0	<1.0	1.100
	11/6/2018	Background	311.8	7.1	17.86	-128.8	1.00	1.30	9.0	0.262	26	200	480	38	<3.0	<1.0	170	<1.0	<1.0	<4.0	<2.0	<1.0	<10	<0.20	<1.0	<1.0	<1.0	1.282
	12/12/2018	Background	317.5	7.1	16.30	-96.3	0.45	2.27	9.1	0.256	30	140	440	38	<3.0	<1.0	180	<1.0	<1.0	<4.0	<2.0	<1.0	<10	<0.20	<1.0	<1.0	<1.0	1.423 (ND)
	3/27/2019	Detection	361.2	7.1	16.60	-101.9	0.36	53.91	7.9	<0.250	27	210	440	41	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	9/24/2019	Detection	372.9	7.0	18.22	-127.5	0.56	0.53	4.3	0.260	35	230	500	47	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/22/2019	Det/RESAMPLE	418.0	7.1	17.10	-113.4	0.32	0.96	NA	NA	41	180	NA	47	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-2 (UG)	3/21/2018	Background	157.8	6.4	15.86	65.3	2.72	3.41	3.4	<0.250	16	110	28	16	<3.0	<1.0	130	<1.0	<1.0	<4.0	<2.0	<1.0	<10	<0.20	<1.0	<1.0	<1.0	0.896 (ND)
	4/15/2018	Background	159.8	6.4	14.04	64.7	0.87	4.05	2.3	0.335	18	63	23	14	<3.0	<1.0	120	<1.0	<1.0	<4.0	<2.0	<1.0	<10	<0.20	<1.0	<1.0	<1.0	0.483 (ND)
	5/23/2018	Background	175.3	6.2	17.40	121.7	0.58	1.72	4.2	<0.250	20	100	36	18	<3.0	<1.0	170	<1.0	<1.0	<4.0	<2.0	<1.0	<10	<0.20	<1.0	<1.0	<1.0	1.199 (ND)
	6/27/2018	Background	172.1	6.2	18.38	243.8	0.27	5.30	4.7	<0.250	18	87	42	19	<3.0	<1.0	180	<1.0	<1.0	<4.0	<2.0	<1.0	<10	<0.20	<1.0	1.4	<1.0	1.006 (ND)
	8/1/2018	Background	184.2	6.1	18.48	80.7	0.75	2.61	5.9	<0.250	19	140	43	20	<3.0	<1.0	200	<1.0	<1.0	<4.0	<2.0	<1.0	<10	<0.20	<1.0	2.0	<1.0	0.751(ND)
	9/5/2018	Background	187.9	6.1	19.26	83.8	0.68	2.58	6.8	<0.250	18	110	46	22	<3.0	<1.0	220	<1.0	<1.0	<4.0	<2.0	<1.0	<10	<0.20	<1.0	2.2	<1.0	1.734
	11/6/2018	Background	174.3	6.2	17.77	79.7	0.60	1.19	4.2	0.272	19	100	43	20	<3.0	<1.0	170	<1.0	<1.0	<4.0	<2.0	<1.0	<10	<0.20	<1.0	<1.0	<1.0	1.583
	12/12/2018	Background	186.3	6.1	16.78	82.3	0.67	5.78	5.5	0.254	21	140	48	21	<3.0	<1.0	210	<1.0	<1.0	<4.0	2.0	<1.0	<10	<0.20	<1.0	<1.0	<1.0	1.18 (ND)
	3/27/2019	Detection	165.9	6.3	15.87	70.4	0.72	2.60	3.3	<0.250	20	130	31	17	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	9/24/2019	Detection	189.4	6.1	18.75	71.3	0.61	1.16	6.6	<0.250	17	130	58	22	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-3 (UG)	3/21/2018	Background	220.7	6.6	15.22	40.7	0.38	14.88	1.4	0.274	18	120	17	19	<3.0	<1.0	96	<1.0	<1.0	<4.0	<2.0	<1.0	<10	<0.20	<1.0	<1.0	<1.0	1.240 (ND)
	4/15/2018	Background	224.7	6.5	14.05	39.2	0.45	10.81	1.5	0.386	20	120	25	18	<3.0	<1.0	100	<1.0	<1.0	<4.0	<2.0	<1.0	<10	<0.20	<1.0	<1.0	<1.0	1.475 (ND)
	5/23/2018	Background	221.3	6.5	17.77	43.2	0.39	13.39	1.4	<0.250	20	100	20	18	<3.0	<1.0	100	<1.0	<1.0	<4.0	<2.0	<1.0	<10	<0.20	<1.0	<1.0	<1.0	0.994 (ND)
	6/27/2018	Background	198.7	6.5	17.81	123.8	0.45	17.03	1.2	<0.250	17	110	27	18	<3.0	<1.0	100	<1.0	<1.0	<4.0	<2.0	<1.0	<10	<0.20	<1.0	<1.0	<1.0	0.214 (ND)
	8/1/2018	Background	209.2	6.6	16.74	41.4	0.43	10.96	1.3	<0.250	17	150	21	18	<3.0	<1.0	91	<1.0	<1.0	<4.0	<2.0	<1.0	<10	<0.20	<1.0	<1.0	<1.0	0.315(ND)
	9/5/2018	Background	196.8	6.5	17.62	56.8	0.46	6.21	1.2	0.308	15	100	22	17	<3.0	<1.0	98	<1.0	<1.0	<4.0	<2.0	<1.0	<10	<0.20	<1.0	<1.0	<1.0	0.860(ND)
	11/6/2018	Background	206.7	6.5	16.84	63.3	0.49	2.37	1.3	0.313	16	130	26	17	<3.0	<1.0	100	<1.0	<1.0	<4.0	<2.0	<1.0	<10	<0.20	<1.0	<1.0	<1.0	1.339
	12/12/2018	Background	195.6	6.5	15.39	48.7	0.40	3.10	1.4	0.334	18	160	28	17	<3.0	<1.0	99	<1.0	<1.0	<4.0	<2.0	<1.0	<10	<0.20	<1.0	<1.0	<1.0	0.8 (ND)
	3/27/2019	Detection	196.0	6.4	15.07	52.2	0.84	12.50	1.5	<0.250	19	140	22	16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	9/24/2019	Detection	191.4	6.5	17.07	58.1	0.53	2.28	1.2	0.332	16	130	26	17	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Appendix 4
Prepared by: KAE
Checked by: MCC

Sikeston Board of Municipal Utilities
Sikeston Power Station
Fly Ash Pond Scott County, Missouri
CCR Groundwater Data Base

			Field Parameters						Appendix III Monitoring Constituents (Detection)						Appendix IV Monitoring Constituents (Assessment)												
Well ID	Date	Monitoring Purpose	Spec. Cond.	pH	Temp.	ORP	D.O.	Turbidity	Chloride	Fluoride	Sulfate	TDS	Boron	Calcium	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium	Radium 226/228 (Combined)
			µmhos/cm	S.U.	°C	mV	mg/L	NTU	mg/L	mg/L	mg/L	mg/L	ug/L	mg/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	pCi/L
MW-7 (DG)	3/21/2018	Background	901.8	7.3	14.85	41.8	0.58	1.61	12	0.752	190	440	1900	110	<3.0	<1.0	41	<1.0	<1.0	<4.0	<2.0	<1.0	25	<0.20	160	5.4	<1.0	0.883 (ND)
	4/15/2018	Background	936.4	7.2	14.04	40.0	0.51	0.96	12	0.794	210	420	1900	110	<3.0	<1.0	43	<1.0	<1.0	<4.0	2.0	<1.0	19	<0.20	170	2.3	<1.0	0.0619 (ND)
	5/23/2018	Background	899.1	7.3	18.05	46.5	0.38	0.25	11	0.650	220	480	1800	120	<3.0	<1.0	44	<1.0	<1.0	<4.0	<2.0	<1.0	22	<0.20	170	28	<1.0	0.896 (ND)
	6/27/2018	Background	891.4	7.2	17.91	66.4	0.22	5.84	11	0.592	220	500	2000	140	<3.0	<1.0	48	<1.0	<1.0	<4.0	2.1	<1.0	26	<0.20	160	53	<1.0	1.153 (ND)
	8/1/2018	Background	958.3	7.2	18.03	53.0	0.28	1.77	9.1	0.608	230	590	2300	140	<3.0	<1.0	47	<1.0	<1.0	<4.0	2.2	<1.0	30	<0.20	160	54	<1.0	0.884(ND)
	9/5/2018	Background	873.3	7.3	19.46	69.3	0.28	2.29	10	0.700	220	520	2100	130	<3.0	<1.0	47	<1.0	<1.0	<4.0	2.0	<1.0	27	<0.20	150	42	<1.0	0.652(ND)
	11/6/2018	Background	787.9	7.4	18.12	344.4	0.44	0.44	6.3	0.693	170	450	2000	120	<3.0	<1.0	43	<1.0	<1.0	<4.0	2.0	<1.0	26	<0.20	150	15	<1.0	1.478
	12/12/2018	Background	784.8	7.3	17.26	51.6	1.05	0.41	6.8	0.746	180	440	1800	120	<3.0	<1.0	44	<1.0	<1.0	<4.0	2.1	<1.0	26	<0.20	150	11	<1.0	0.975 (ND)
	3/27/2019	Detection	797.4	7.3	16.39	52.6	0.32	2.37	6.6	0.670	170	480	1800	110	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	9/24/2019	Detection	751.7	7.3	18.88	119.0	0.31	0.59	3.9	0.684	150	470	1900	120	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-9 (DG)	3/21/2018	Background	979.8	7.4	14.98	25.1	0.52	1.60	17	0.929	230	480	4700	65	<3.0	<1.0	49	<1.0	<1.0	<4.0	<2.0	<1.0	19	<0.20	630	<1.0	<1.0	0.491 (ND)
	4/15/2018	Background	972.7	7.4	14.63	24.9	1.73	2.32	21	1.09	240	460	5100	57	<3.0	1.2	49	<1.0	<1.0	<4.0	<2.0	<1.0	11	<0.20	680	<1.0	<1.0	0.982 (ND)
	5/23/2018	Background	1020.5	7.3	18.70	25.9	0.48	0.64	17	1.05	240	520	5800	55	<3.0	<1.0	45	<1.0	<1.0	8.1	<2.0	<1.0	15	<0.20	840	<1.0	<1.0	0.359 (ND)
	6/27/2018	Background	902.9	7.3	19.33	25.2	0.42	4.97	15	0.910	220	520	4600	73	<3.0	<1.0	47	<1.0	<1.0	<4.0	<2.0	<1.0	15	<0.20	560	<1.0	<1.0	0.327 (ND)
	8/1/2018	Background	942.6	7.3	19.10	20.7	0.47	2.03	16	0.916	220	560	4500	76	<3.0	<1.0	47	<1.0	<1.0	<4.0	<2.0	<1.0	18	<0.20	500	<1.0	<1.0	0.418(ND)
	9/5/2018	Background	829.2	7.3	19.85	20.9	0.45	2.68	16	0.957	180	420	4400	80	<3.0	<1.0	48	<1.0	<1.0	<4.0	<2.0	<1.0	17	<0.20	460	<1.0	<1.0	0.707(ND)
	11/6/2018	Background	732.8	7.3	18.19	428.8	0.60	0.45	11	0.885	130	410	3800	79	<3.0	<1.0	47	<1.0	<1.0	<4.0	<2.0	<1.0	13	<0.20	420	<1.0	<1.0	1.473(ND)
	12/12/2018	Background	742.9	7.3	16.95	36.5	0.48	0.63	12	0.972	170	360	3700	78	<3.0	<1.0	53	<1.0	<1.0	<4.0	<2.0	<1.0	17	<0.20	420	<1.0	<1.0	1.232 (ND)
	3/27/2019	Detection	673.2	7.4	16.74	22.1	0.51	0.96	11	0.827	120	440	3100	70	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	9/24/2019	Detection	891.5	7.4	19.25	38.3	0.41	0.62	16	0.847	220	540	5000	87	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

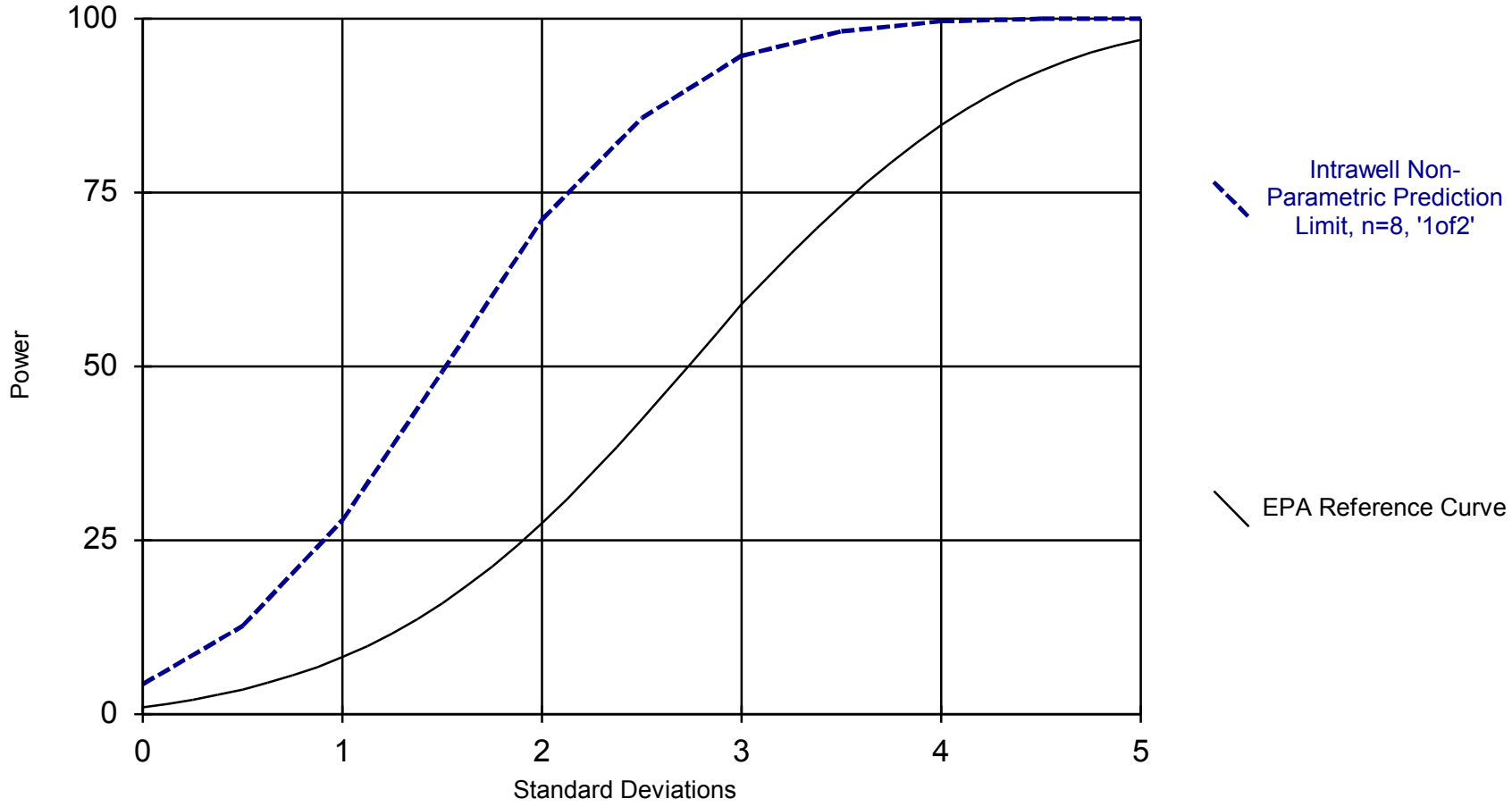
1. All data transcribed from analytical lab data sheets or field notes.
2. Less than (<) symbol denotes concentration below reportable limits.
3. (ND) denotes Radium 226 and 228 (combined) concentration not detected above Minimum Detectable Concentration.
4. (NA) denotes analysis not conducted, or not available at time of report.
5. Background monitoring per USEPA 40 CFR 257.93.
6. Detection monitoring per USEPA 40 CFR 257.94.
7. Assessment monitoring per USEPA 40 CFR 257.95.

Appendix 4
Prepared by: KAE
Checked by: MCC

Appendix 5

Statistical Power Curve

Power Curve MW-1, 2, 3, 7 & 9



This report reflects annual total based on two evaluations per year.

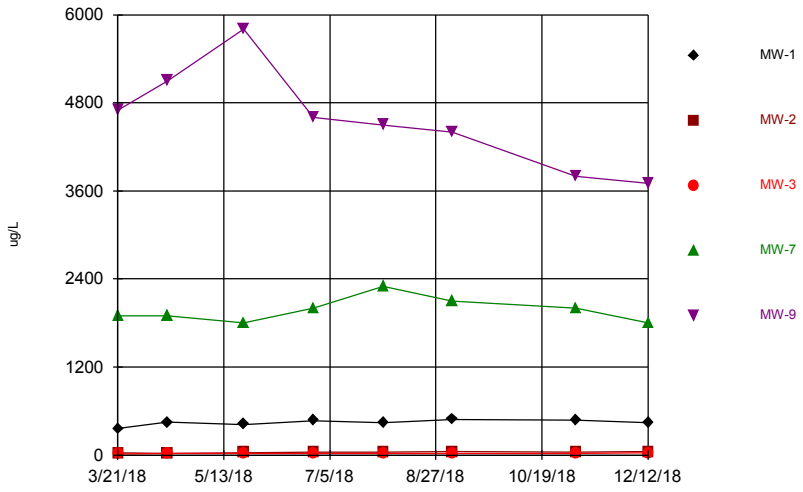
Analysis Run 5/31/2019 2:59 PM

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Appendix 6

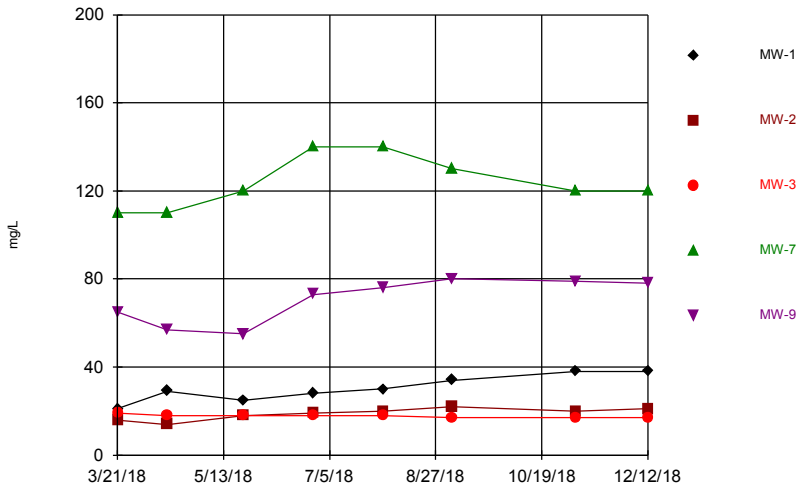
Time Series Plots

Boron



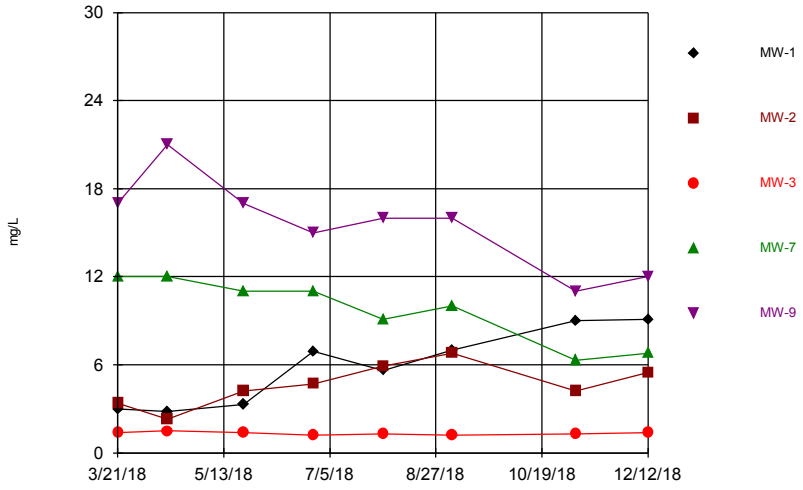
Time Series Analysis Run 7/18/2019 8:57 AM View: AppIII
SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Calcium



Time Series Analysis Run 7/18/2019 8:57 AM View: AppIII
SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

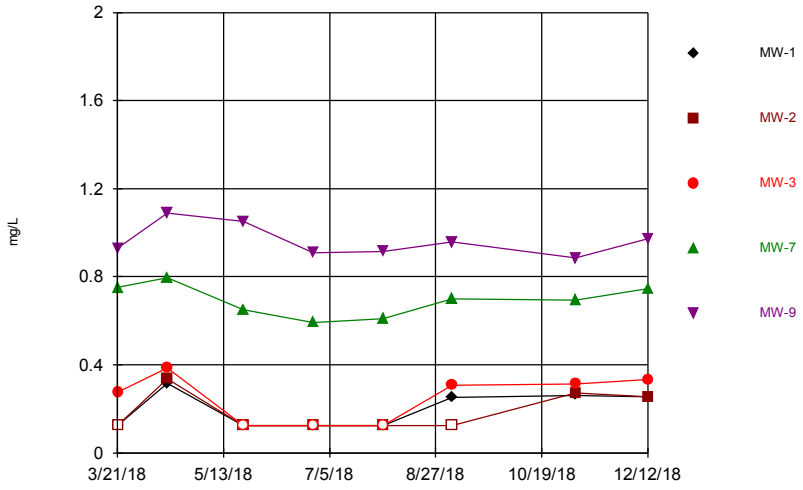
Chloride



Time Series Analysis Run 7/18/2019 8:57 AM View: AppIII
SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

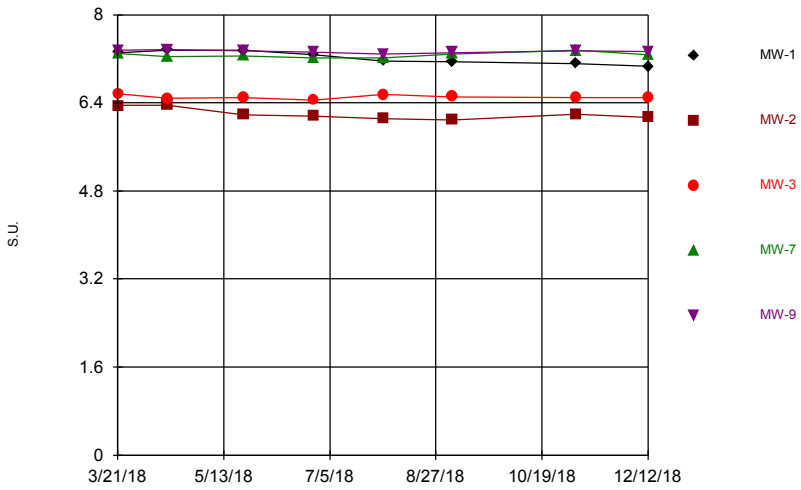
Hollow symbols indicate censored values.

Fluoride



Time Series Analysis Run 7/18/2019 8:57 AM View: AppIII
SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

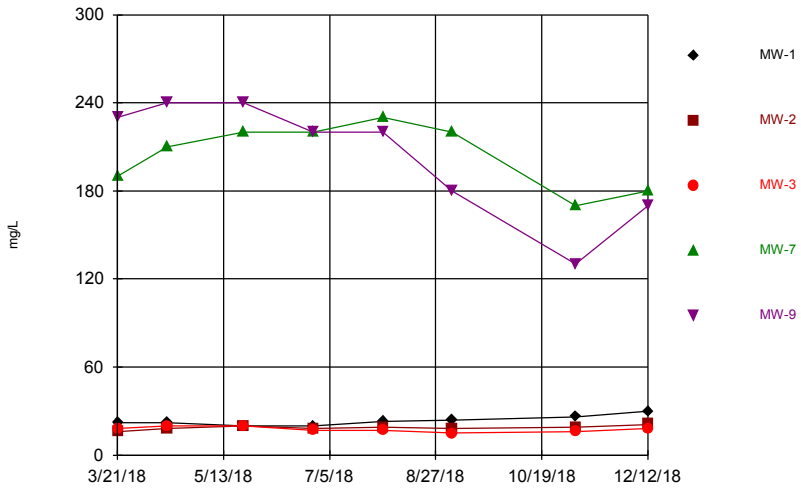
pH



Time Series Analysis Run 7/18/2019 8:57 AM View: AppIII
SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Sanitas™ v.9.6.18 Sanitas software licensed to GREDELL Engineering only. UG

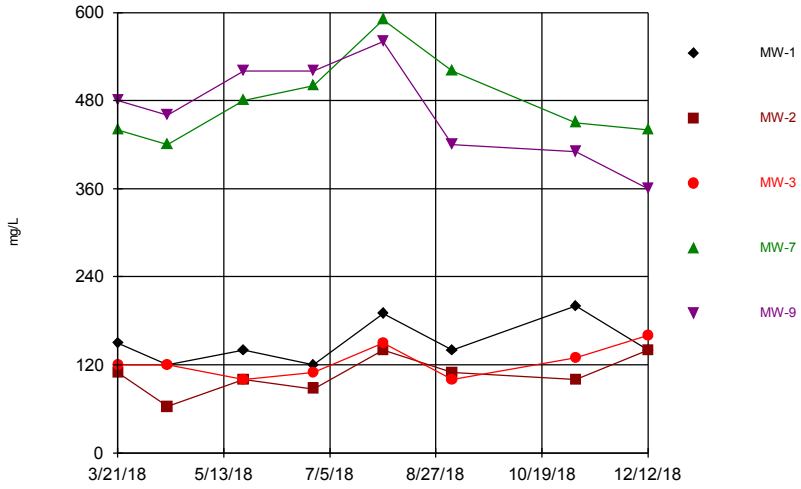
Sulfate



Time Series Analysis Run 7/18/2019 8:57 AM View: AppIII
SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Sanitas™ v.9.6.18 Sanitas software licensed to GREDELL Engineering only. UG

Total Dissolved Solids



Time Series Analysis Run 7/18/2019 8:57 AM View: AppIII
SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Appendix 7

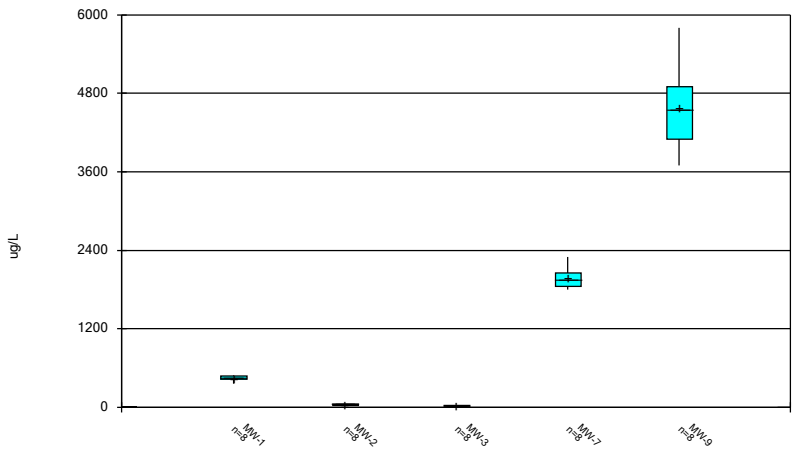
Box and Whiskers Plots

Box & Whiskers Plot (MW-1, 2, 3, 7, & 9)

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background Printed 7/18/2019, 9:02 AM

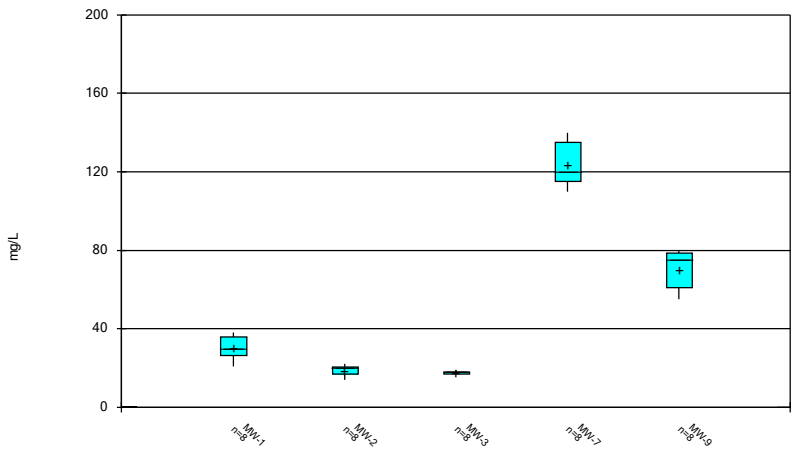
Constituent	Well	N	Mean	Median	Lower Q.	Upper Q.	Min.	Max.	%NDs
Boron (ug/L)	MW-1	8	443.8	445	430	475	360	490	0
Boron (ug/L)	MW-2	8	38.63	42.5	32	44.5	23	48	0
Boron (ug/L)	MW-3	8	23.25	23.5	20.5	26.5	17	28	0
Boron (ug/L)	MW-7	8	1975	1950	1850	2050	1800	2300	0
Boron (ug/L)	MW-9	8	4575	4550	4100	4900	3700	5800	0
Calcium (mg/L)	MW-1	8	30.38	29.5	26.5	36	21	38	0
Calcium (mg/L)	MW-2	8	18.75	19.5	17	20.5	14	22	0
Calcium (mg/L)	MW-3	8	17.75	18	17	18	17	19	0
Calcium (mg/L)	MW-7	8	123.8	120	115	135	110	140	0
Calcium (mg/L)	MW-9	8	70.38	74.5	61	78.5	55	80	0
Chloride (mg/L)	MW-1	8	5.838	6.25	3.15	8	2.8	9.1	0
Chloride (mg/L)	MW-2	8	4.625	4.45	3.8	5.7	2.3	6.8	0
Chloride (mg/L)	MW-3	8	1.338	1.35	1.25	1.4	1.2	1.5	0
Chloride (mg/L)	MW-7	8	9.775	10.5	7.95	11.5	6.3	12	0
Chloride (mg/L)	MW-9	8	15.63	16	13.5	17	11	21	0
Fluoride (mg/L)	MW-1	8	0.1983	0.1885	0.125	0.259	0.125	0.316	50
Fluoride (mg/L)	MW-2	8	0.1858	0.125	0.125	0.263	0.125	0.335	62.5
Fluoride (mg/L)	MW-3	8	0.2488	0.291	0.125	0.3235	0.125	0.386	37.5
Fluoride (mg/L)	MW-7	8	0.6919	0.6965	0.629	0.749	0.592	0.794	0
Fluoride (mg/L)	MW-9	8	0.9636	0.943	0.913	1.011	0.885	1.09	0
pH (S.U.)	MW-1	8	7.22	7.215	7.125	7.33	7.06	7.36	0
pH (S.U.)	MW-2	8	6.196	6.17	6.12	6.27	6.09	6.36	0
pH (S.U.)	MW-3	8	6.505	6.495	6.485	6.53	6.45	6.57	0
pH (S.U.)	MW-7	8	7.268	7.26	7.23	7.295	7.22	7.35	0
pH (S.U.)	MW-9	8	7.33	7.335	7.315	7.345	7.28	7.37	0
Sulfate (mg/L)	MW-1	8	23.38	22.5	21	25	20	30	0
Sulfate (mg/L)	MW-2	8	18.63	18.5	18	19.5	16	21	0
Sulfate (mg/L)	MW-3	8	17.63	17.5	16.5	19	15	20	0
Sulfate (mg/L)	MW-7	8	205	215	185	220	170	230	0
Sulfate (mg/L)	MW-9	8	203.8	220	175	235	130	240	0
Total Dissolved Solids (mg/L)	MW-1	8	150	140	130	170	120	200	0
Total Dissolved Solids (mg/L)	MW-2	8	106.3	105	93.5	125	63	140	0
Total Dissolved Solids (mg/L)	MW-3	8	123.8	120	105	140	100	160	0
Total Dissolved Solids (mg/L)	MW-7	8	480	465	440	510	420	590	0
Total Dissolved Solids (mg/L)	MW-9	8	466.3	470	415	520	360	560	0

Boron



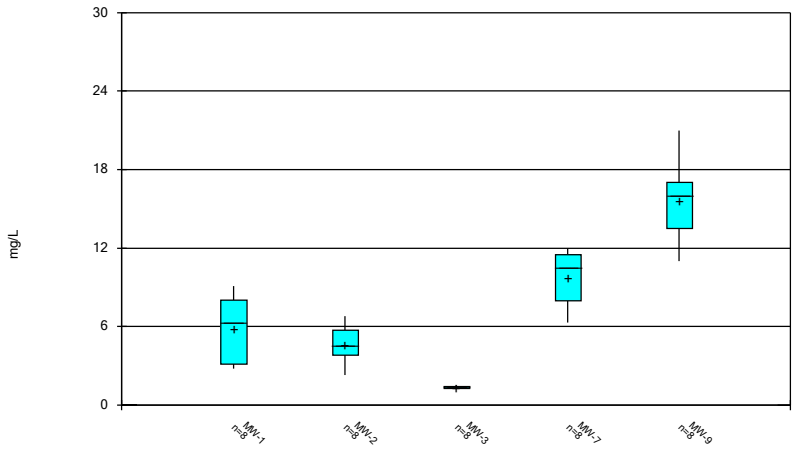
Box & Whiskers Plot Analysis Run 7/18/2019 9:00 AM View: AppIII
SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Calcium



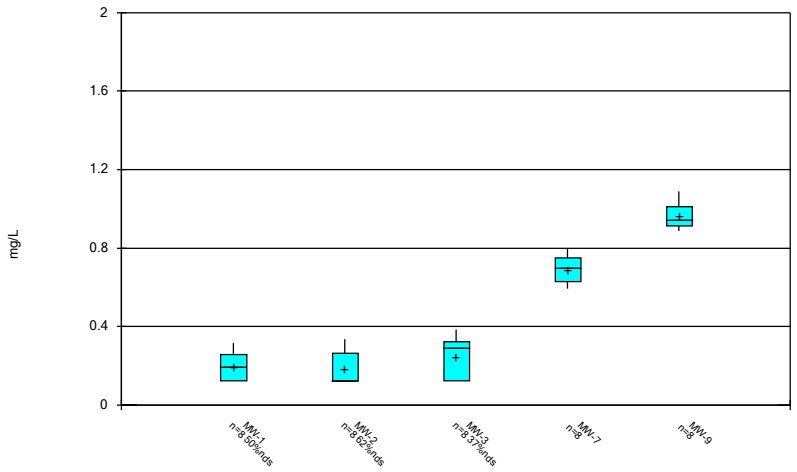
Box & Whiskers Plot Analysis Run 7/18/2019 9:00 AM View: AppIII
SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Chloride



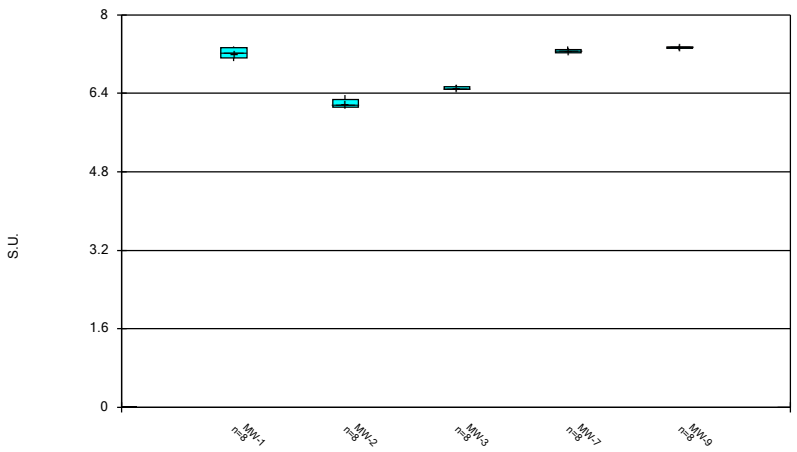
Box & Whiskers Plot Analysis Run 7/18/2019 9:00 AM View: AppIII
SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Fluoride



Box & Whiskers Plot Analysis Run 7/18/2019 9:00 AM View: AppIII
SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

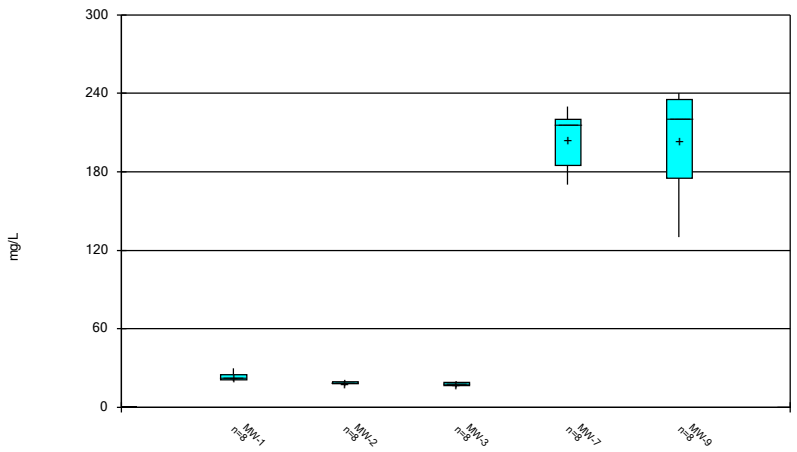
pH



Box & Whiskers Plot Analysis Run 7/18/2019 9:00 AM View: AppIII
SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Sanitas™ v.9.6.18 Sanitas software licensed to GREDELL Engineering only. UG

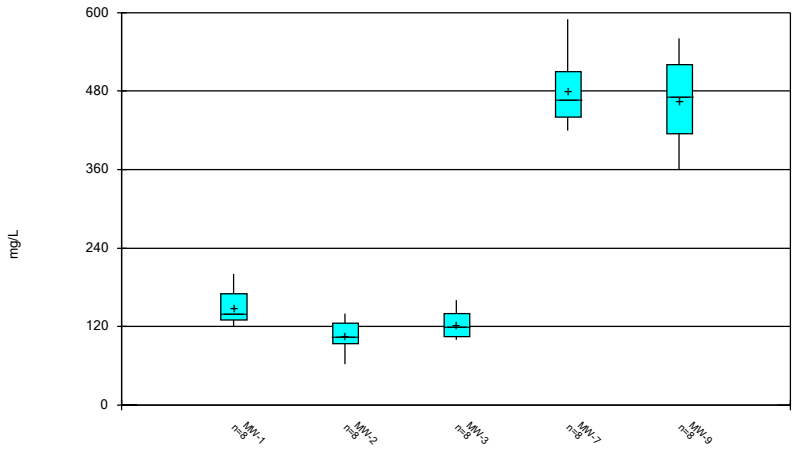
Sulfate



Box & Whiskers Plot Analysis Run 7/18/2019 9:00 AM View: AppIII
SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Sanitas™ v.9.6.18 Sanitas software licensed to GREDELL Engineering only. UG

Total Dissolved Solids



Box & Whiskers Plot Analysis Run 7/18/2019 9:00 AM View: AppIII
SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Appendix 8

Prediction Limit Charts

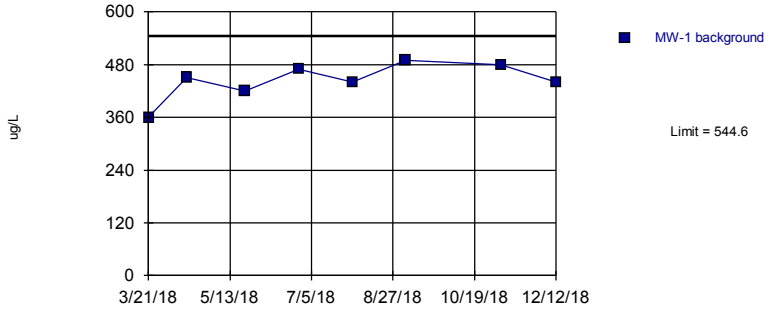
Prediction Limits - (MW-1, 2, 3, 7, & 9)

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background Printed 7/18/2019, 9:05 AM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	%NDs	Transform	Alpha	Method
Boron (ug/L)	MW-1	544.6	n/a	n/a	1 future	n/a	8	0	No	0.002505	Param Intra 1 of 2
Boron (ug/L)	MW-2	60.53	n/a	n/a	1 future	n/a	8	0	No	0.002505	Param Intra 1 of 2
Boron (ug/L)	MW-3	32.7	n/a	n/a	1 future	n/a	8	0	No	0.002505	Param Intra 1 of 2
Boron (ug/L)	MW-7	2385	n/a	n/a	1 future	n/a	8	0	No	0.002505	Param Intra 1 of 2
Boron (ug/L)	MW-9	6236	n/a	n/a	1 future	n/a	8	0	No	0.002505	Param Intra 1 of 2
Calcium (mg/L)	MW-1	45.18	n/a	n/a	1 future	n/a	8	0	No	0.002505	Param Intra 1 of 2
Calcium (mg/L)	MW-2	25.29	n/a	n/a	1 future	n/a	8	0	No	0.002505	Param Intra 1 of 2
Calcium (mg/L)	MW-3	19.49	n/a	n/a	1 future	n/a	8	0	No	0.002505	Param Intra 1 of 2
Calcium (mg/L)	MW-7	152.9	n/a	n/a	1 future	n/a	8	0	No	0.002505	Param Intra 1 of 2
Calcium (mg/L)	MW-9	95.09	n/a	n/a	1 future	n/a	8	0	No	0.002505	Param Intra 1 of 2
Chloride (mg/L)	MW-1	12.2	n/a	n/a	1 future	n/a	8	0	No	0.002505	Param Intra 1 of 2
Chloride (mg/L)	MW-2	8.15	n/a	n/a	1 future	n/a	8	0	No	0.002505	Param Intra 1 of 2
Chloride (mg/L)	MW-3	1.598	n/a	n/a	1 future	n/a	8	0	No	0.002505	Param Intra 1 of 2
Chloride (mg/L)	MW-7	15.22	n/a	n/a	1 future	n/a	8	0	No	0.002505	Param Intra 1 of 2
Chloride (mg/L)	MW-9	23.28	n/a	n/a	1 future	n/a	8	0	No	0.002505	Param Intra 1 of 2
Fluoride (mg/L)	MW-1	0.313	n/a	n/a	1 future	n/a	8	50	No	0.002505	Param Intra 1 of 2
Fluoride (mg/L)	MW-2	0.335	n/a	n/a	1 future	n/a	8	62.5	n/a	0.02144	NP Intra (NDs) 1 of 2
Fluoride (mg/L)	MW-3	0.4083	n/a	n/a	1 future	n/a	8	37.5	No	0.002505	Param Intra 1 of 2
Fluoride (mg/L)	MW-7	0.8677	n/a	n/a	1 future	n/a	8	0	No	0.002505	Param Intra 1 of 2
Fluoride (mg/L)	MW-9	1.14	n/a	n/a	1 future	n/a	8	0	No	0.002505	Param Intra 1 of 2
pH (S.U.)	MW-1	7.5	6.9	n/a	1 future	n/a	8	0	No	0.001253	Param Intra 1 of 2
pH (S.U.)	MW-2	6.5	5.9	n/a	1 future	n/a	8	0	No	0.001253	Param Intra 1 of 2
pH (S.U.)	MW-3	6.6	6.4	n/a	1 future	n/a	8	0	No	0.001253	Param Intra 1 of 2
pH (S.U.)	MW-7	7.4	7.2	n/a	1 future	n/a	8	0	No	0.001253	Param Intra 1 of 2
pH (S.U.)	MW-9	7.4	7.3	n/a	1 future	n/a	8	0	No	0.001253	Param Intra 1 of 2
Sulfate (mg/L)	MW-1	31.57	n/a	n/a	1 future	n/a	8	0	No	0.002505	Param Intra 1 of 2
Sulfate (mg/L)	MW-2	22.33	n/a	n/a	1 future	n/a	8	0	No	0.002505	Param Intra 1 of 2
Sulfate (mg/L)	MW-3	21.97	n/a	n/a	1 future	n/a	8	0	No	0.002505	Param Intra 1 of 2
Sulfate (mg/L)	MW-7	259.2	n/a	n/a	1 future	n/a	8	0	No	0.002505	Param Intra 1 of 2
Sulfate (mg/L)	MW-9	301.1	n/a	n/a	1 future	n/a	8	0	No	0.002505	Param Intra 1 of 2
Total Dissolved Solids (mg/L)	MW-1	223.2	n/a	n/a	1 future	n/a	8	0	No	0.002505	Param Intra 1 of 2
Total Dissolved Solids (mg/L)	MW-2	169.4	n/a	n/a	1 future	n/a	8	0	No	0.002505	Param Intra 1 of 2
Total Dissolved Solids (mg/L)	MW-3	177.8	n/a	n/a	1 future	n/a	8	0	No	0.002505	Param Intra 1 of 2
Total Dissolved Solids (mg/L)	MW-7	617.2	n/a	n/a	1 future	n/a	8	0	No	0.002505	Param Intra 1 of 2
Total Dissolved Solids (mg/L)	MW-9	630.8	n/a	n/a	1 future	n/a	8	0	No	0.002505	Param Intra 1 of 2

Boron

Intrawell Parametric, MW-1



Background Data Summary: Mean=443.8, Std. Dev.=41.04, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9079, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

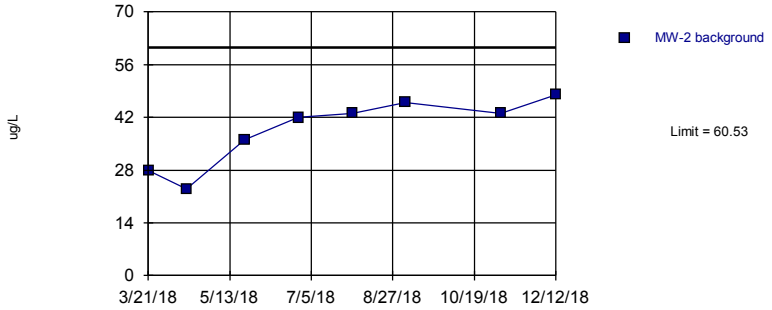
Prediction Limit Analysis Run 7/18/2019 9:03 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Sanitas™ v.9.6.18 Sanitas software licensed to GREDELL Engineering only. UG

Boron

Intrawell Parametric, MW-2



Background Data Summary: Mean=38.63, Std. Dev.=8.911, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8787, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

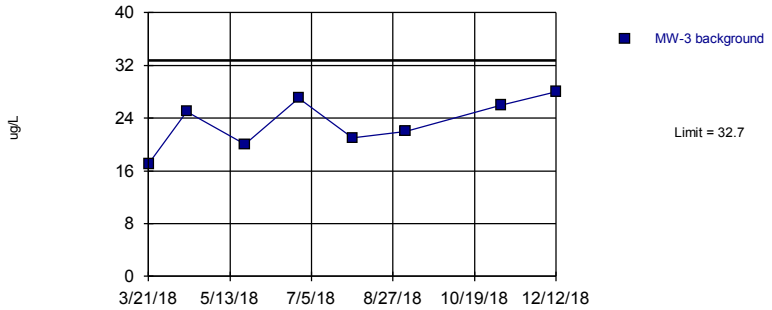
Prediction Limit Analysis Run 7/18/2019 9:03 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Sanitas™ v.9.6.18 Sanitas software licensed to GREDELL Engineering only. UG

Boron

Intrawell Parametric, MW-3



Background Data Summary: Mean=23.25, Std. Dev.=3.845, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9492, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

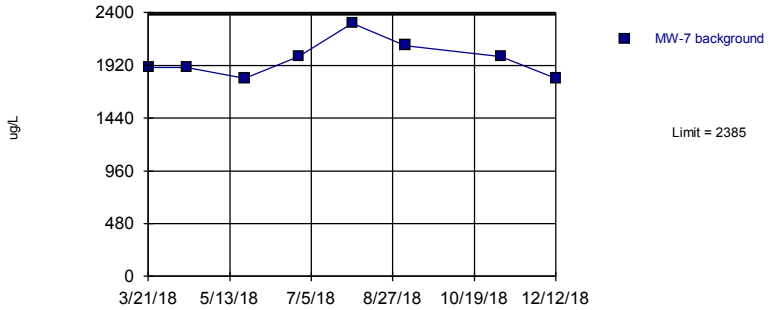
Prediction Limit Analysis Run 7/18/2019 9:03 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Sanitas™ v.9.6.18 Sanitas software licensed to GREDELL Engineering only. UG

Boron

Intrawell Parametric, MW-7



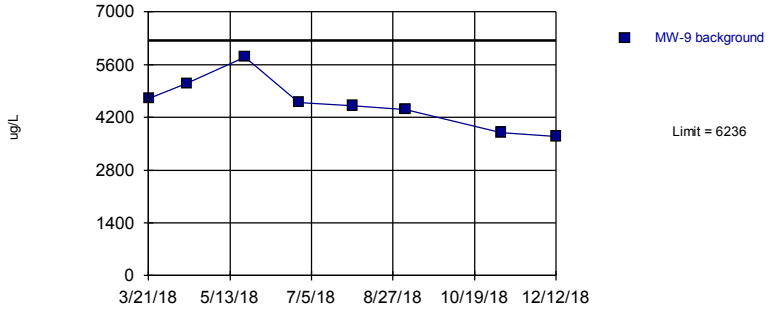
Background Data Summary: Mean=1975, Std. Dev.=166.9, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.907, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Prediction Limit Analysis Run 7/18/2019 9:03 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Boron

Intrawell Parametric, MW-9



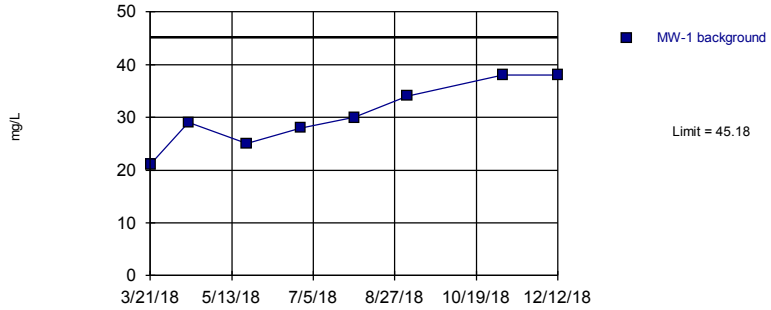
Background Data Summary: Mean=4575, Std. Dev.=675.6, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9478, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Prediction Limit Analysis Run 7/18/2019 9:03 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Calcium

Intrawell Parametric, MW-1



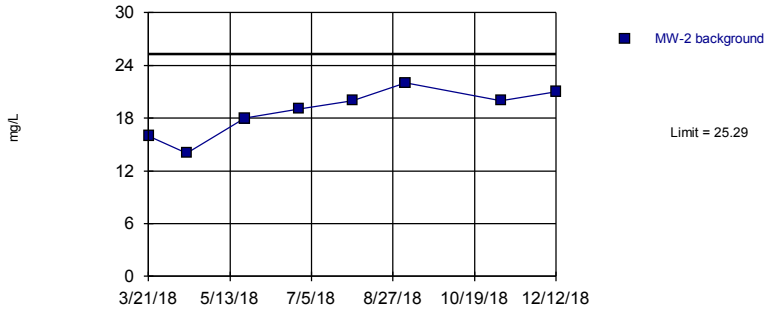
Background Data Summary: Mean=30.38, Std. Dev.=6.022, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9468, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Prediction Limit Analysis Run 7/18/2019 9:03 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Calcium

Intrawell Parametric, MW-2



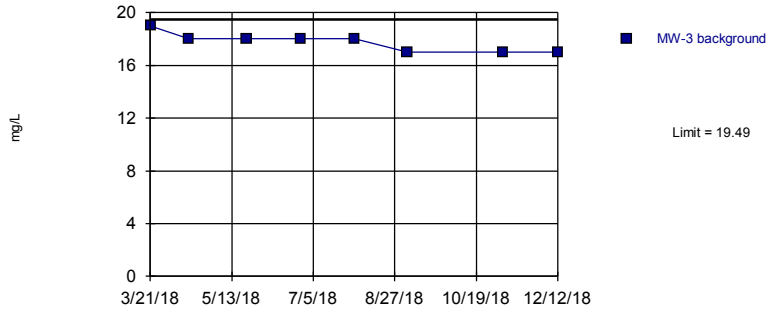
Background Data Summary: Mean=18.75, Std. Dev.=2.659, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9419, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Prediction Limit Analysis Run 7/18/2019 9:03 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Calcium

Intrawell Parametric, MW-3



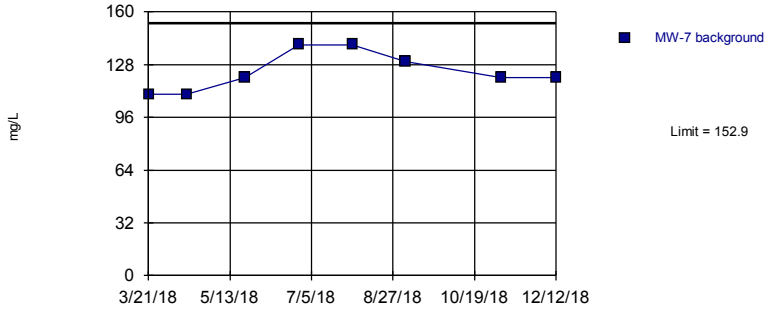
Background Data Summary: Mean=17.75, Std. Dev.=0.7071, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8268, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Prediction Limit Analysis Run 7/18/2019 9:03 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Calcium

Intrawell Parametric, MW-7



Background Data Summary: Mean=123.8, Std. Dev.=11.88, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8748, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

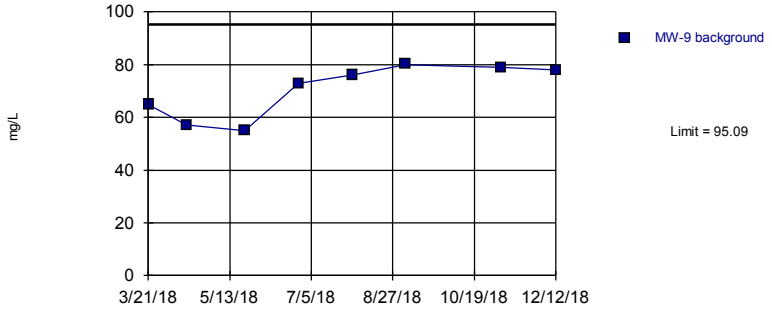
Prediction Limit Analysis Run 7/18/2019 9:03 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Sanitas™ v.9.6.18 Sanitas software licensed to GREDELL Engineering only. UG

Calcium

Intrawell Parametric, MW-9



Background Data Summary: Mean=70.38, Std. Dev.=10.06, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8497, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

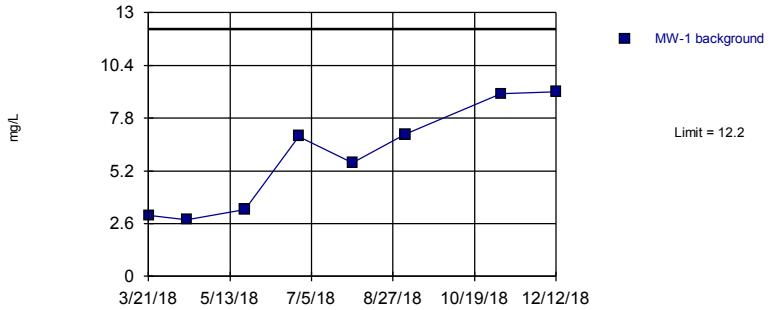
Prediction Limit Analysis Run 7/18/2019 9:03 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Sanitas™ v.9.6.18 Sanitas software licensed to GREDELL Engineering only. UG

Chloride

Intrawell Parametric, MW-1



Background Data Summary: Mean=5.838, Std. Dev.=2.588, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8813, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

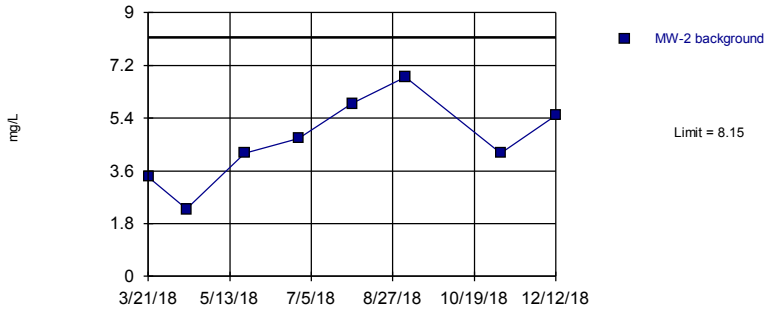
Prediction Limit Analysis Run 7/18/2019 9:03 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Sanitas™ v.9.6.18 Sanitas software licensed to GREDELL Engineering only. UG

Chloride

Intrawell Parametric, MW-2



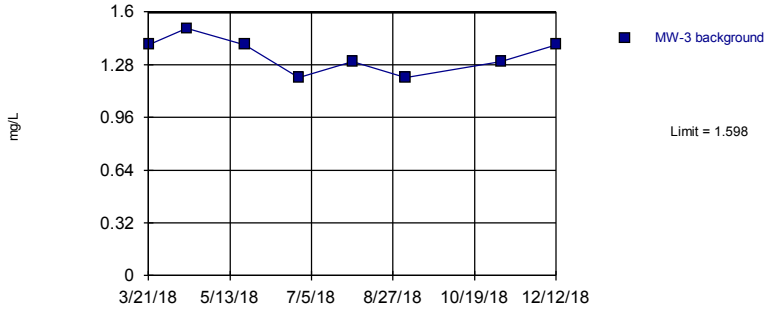
Background Data Summary: Mean=4.625, Std. Dev.=1.434, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9868, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Prediction Limit Analysis Run 7/18/2019 9:03 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Chloride

Intrawell Parametric, MW-3



Background Data Summary: Mean=1.338, Std. Dev.=0.1061, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9112, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

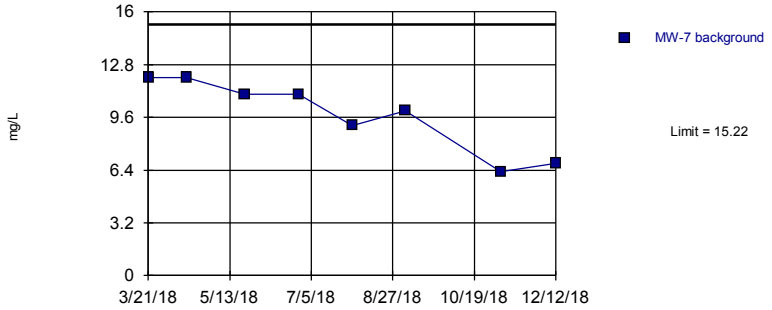
Prediction Limit Analysis Run 7/18/2019 9:03 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Sanitas™ v.9.6.18 Sanitas software licensed to GREDELL Engineering only. UG

Chloride

Intrawell Parametric, MW-7



Background Data Summary: Mean=9.775, Std. Dev.=2.215, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8753, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

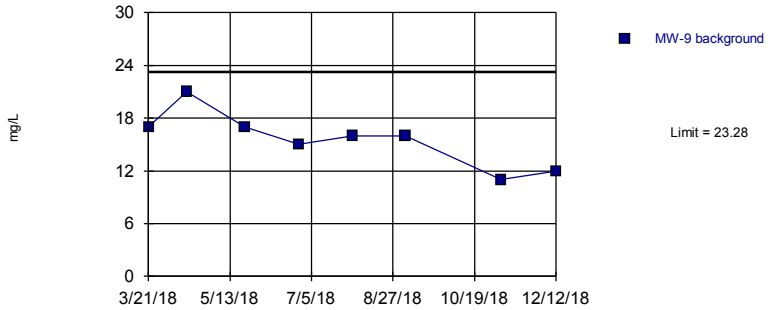
Prediction Limit Analysis Run 7/18/2019 9:03 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Sanitas™ v.9.6.18 Sanitas software licensed to GREDELL Engineering only. UG

Chloride

Intrawell Parametric, MW-9



Background Data Summary: Mean=15.63, Std. Dev.=3.114, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9388, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

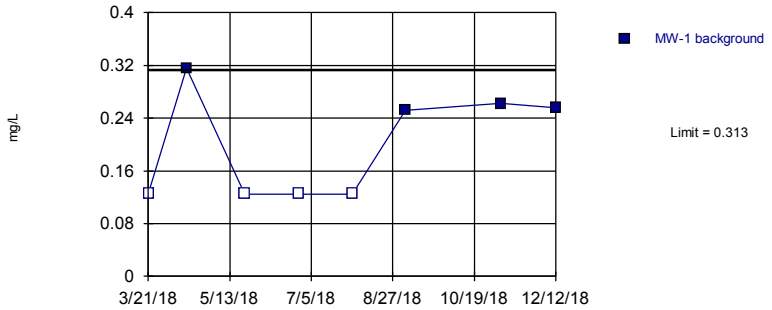
Prediction Limit Analysis Run 7/18/2019 9:03 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Sanitas™ v.9.6.18 Sanitas software licensed to GREDELL Engineering only. UG
Hollow symbols indicate censored values.

Fluoride

Intrawell Parametric, MW-1



Background Data Summary (after Kaplan-Meier Adjustment): Mean=0.2608, Std. Dev.=0.02126, n=8, 50% NDs. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.7822, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

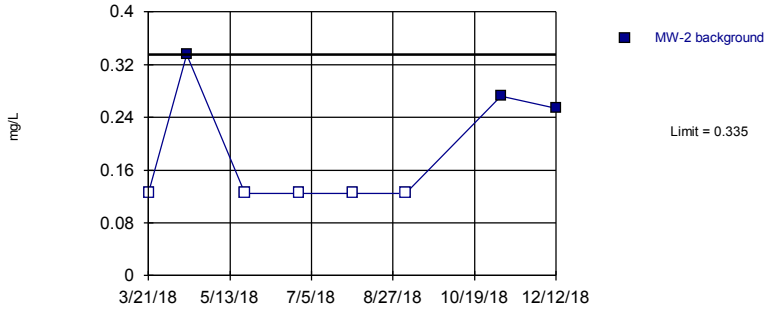
Prediction Limit Analysis Run 7/18/2019 9:03 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Hollow symbols indicate censored values.

Fluoride

Intrawell Non-parametric, MW-2



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). Assumes 1 future value. Insufficient data to test for seasonality: data were not deseasonalized.

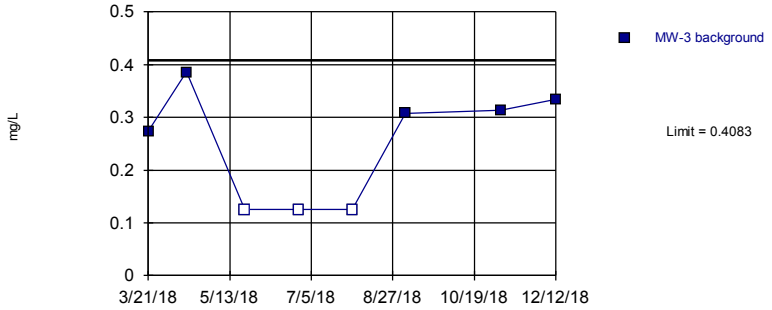
Prediction Limit Analysis Run 7/18/2019 9:03 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Hollow symbols indicate censored values.

Fluoride

Intrawell Parametric, MW-3



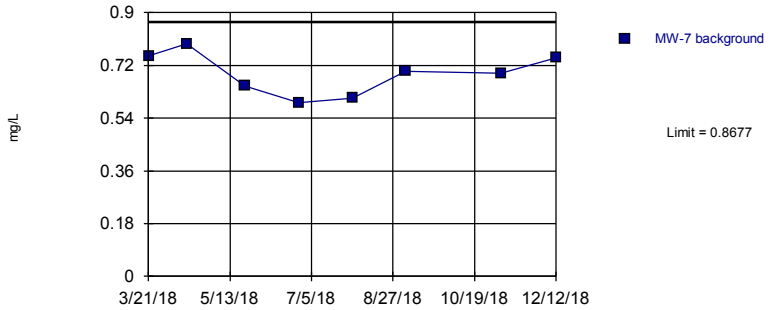
Background Data Summary (after Kaplan-Meier Adjustment): Mean=0.2956, Std. Dev.=0.04584, n=8, 37.5% NDs. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8336, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Prediction Limit Analysis Run 7/18/2019 9:03 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Fluoride

Intrawell Parametric, MW-7



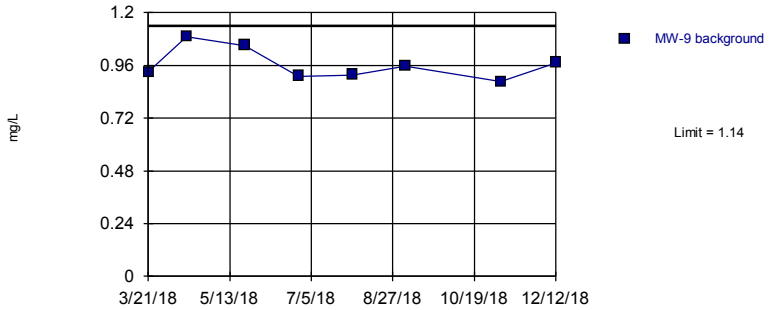
Background Data Summary: Mean=0.6919, Std. Dev.=0.07152, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9552, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Prediction Limit Analysis Run 7/18/2019 9:03 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Fluoride

Intrawell Parametric, MW-9



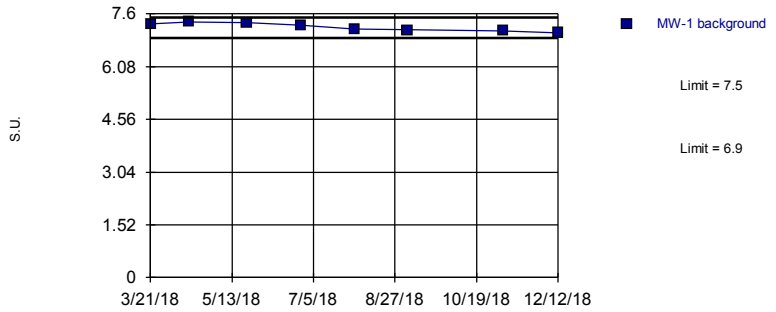
Background Data Summary: Mean=0.9636, Std. Dev.=0.07178, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8952, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Prediction Limit Analysis Run 7/18/2019 9:03 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

pH

Intrawell Parametric, MW-1



Background Data Summary: Mean=7.22, Std. Dev.=0.1164, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9074, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

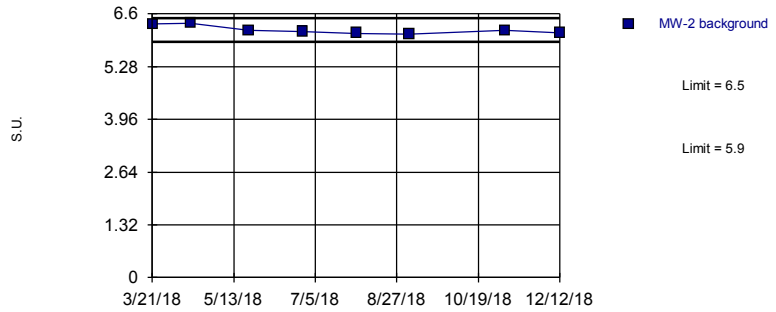
Prediction Limit Analysis Run 7/18/2019 9:03 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Sanitas™ v.9.6.18 Sanitas software licensed to GREDELL Engineering only. UG

pH

Intrawell Parametric, MW-2



Background Data Summary: Mean=6.196, Std. Dev.=0.1036, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8374, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

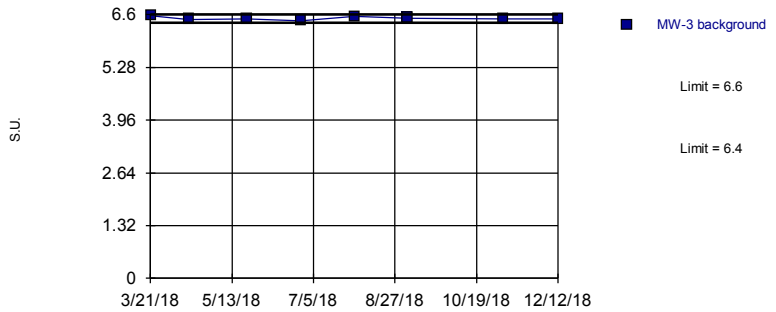
Prediction Limit Analysis Run 7/18/2019 9:03 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Sanitas™ v.9.6.18 Sanitas software licensed to GREDELL Engineering only. UG

pH

Intrawell Parametric, MW-3



Background Data Summary: Mean=6.505, Std. Dev.=0.03854, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.939, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

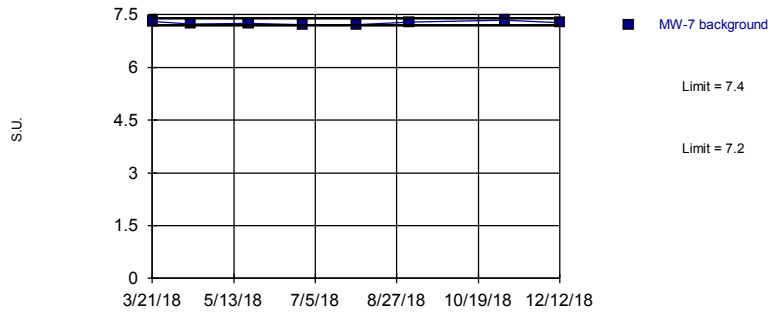
Prediction Limit Analysis Run 7/18/2019 9:03 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Sanitas™ v.9.6.18 Sanitas software licensed to GREDELL Engineering only. UG

pH

Intrawell Parametric, MW-7



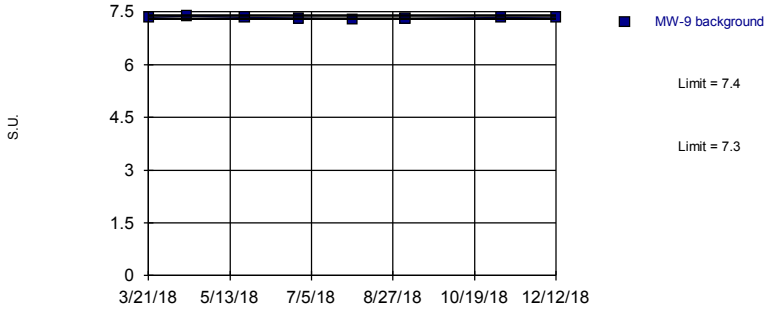
Background Data Summary: Mean=7.268, Std. Dev.=0.04464, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9288, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Prediction Limit Analysis Run 7/18/2019 9:03 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

pH

Intrawell Parametric, MW-9



Background Data Summary: Mean=7.33, Std. Dev.=0.02726, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9741, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

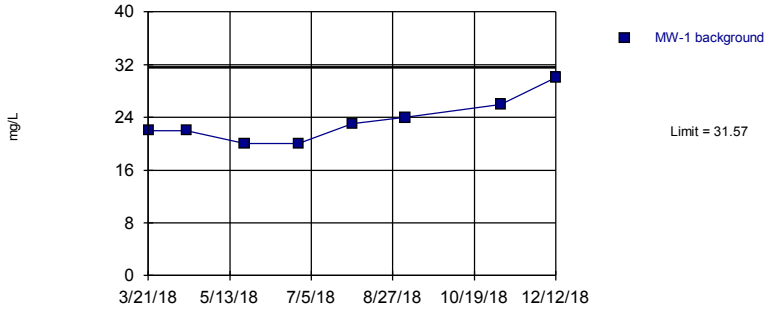
Prediction Limit Analysis Run 7/18/2019 9:04 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Sanitas™ v.9.6.18 Sanitas software licensed to GREDELL Engineering only. UG

Sulfate

Intrawell Parametric, MW-1



Background Data Summary: Mean=23.38, Std. Dev.=3.335, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8964, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

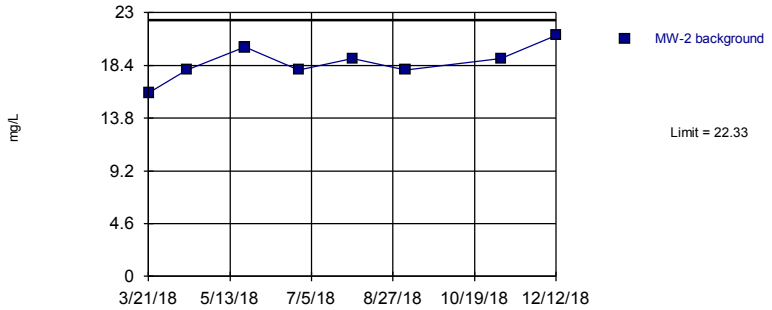
Prediction Limit Analysis Run 7/18/2019 9:04 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Sanitas™ v.9.6.18 Sanitas software licensed to GREDELL Engineering only. UG

Sulfate

Intrawell Parametric, MW-2



Background Data Summary: Mean=18.63, Std. Dev.=1.506, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9528, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

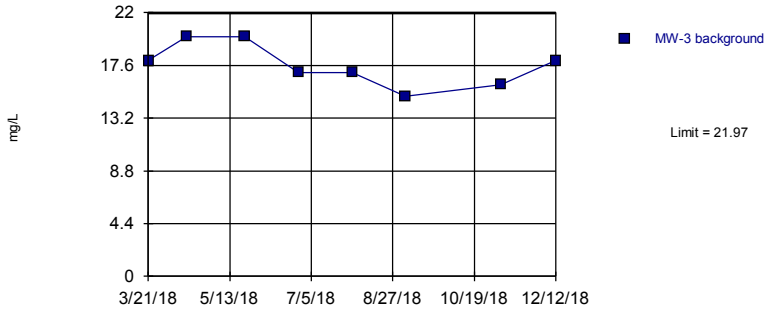
Prediction Limit Analysis Run 7/18/2019 9:04 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Sanitas™ v.9.6.18 Sanitas software licensed to GREDELL Engineering only. UG

Sulfate

Intrawell Parametric, MW-3



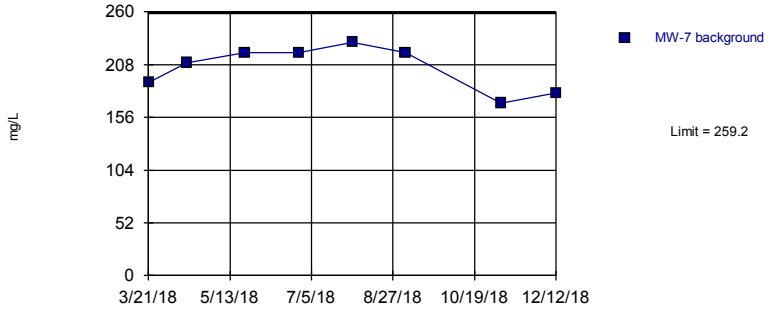
Background Data Summary: Mean=17.63, Std. Dev.=1.768, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9348, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Prediction Limit Analysis Run 7/18/2019 9:04 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Sulfate

Intrawell Parametric, MW-7



Background Data Summary: Mean=205, Std. Dev.=22.04, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8819, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

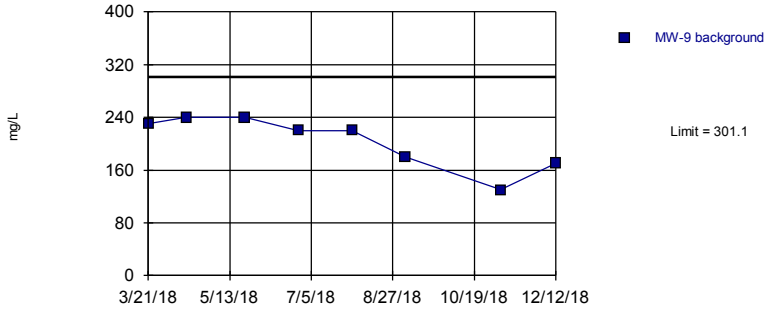
Prediction Limit Analysis Run 7/18/2019 9:04 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Sanitas™ v.9.6.18 Sanitas software licensed to GREDELL Engineering only. UG

Sulfate

Intrawell Parametric, MW-9



Background Data Summary: Mean=203.8, Std. Dev.=39.62, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.864, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

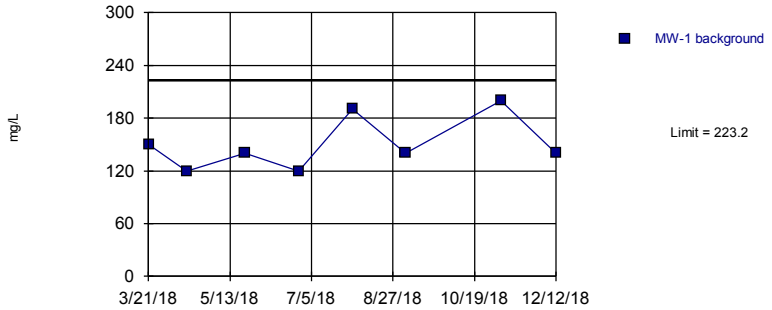
Prediction Limit Analysis Run 7/18/2019 9:04 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Sanitas™ v.9.6.18 Sanitas software licensed to GREDELL Engineering only. UG

Total Dissolved Solids

Intrawell Parametric, MW-1



Background Data Summary: Mean=150, Std. Dev.=29.76, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8433, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

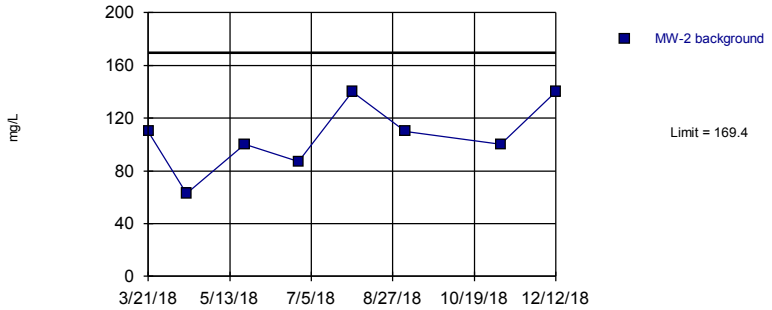
Prediction Limit Analysis Run 7/18/2019 9:04 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Sanitas™ v.9.6.18 Sanitas software licensed to GREDELL Engineering only. UG

Total Dissolved Solids

Intrawell Parametric, MW-2



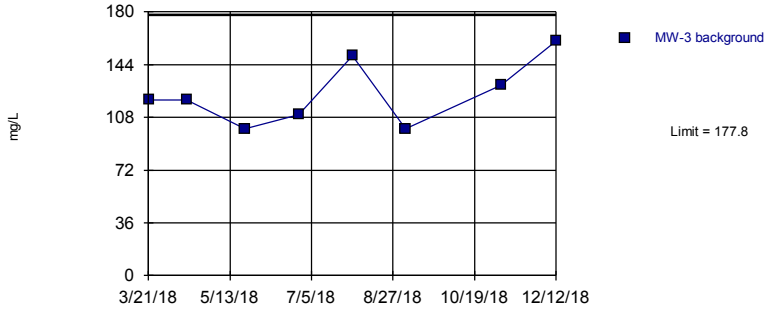
Background Data Summary: Mean=106.3, Std. Dev.=25.71, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9324, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Prediction Limit Analysis Run 7/18/2019 9:04 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Total Dissolved Solids

Intrawell Parametric, MW-3



Background Data Summary: Mean=123.8, Std. Dev.=22, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9132, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

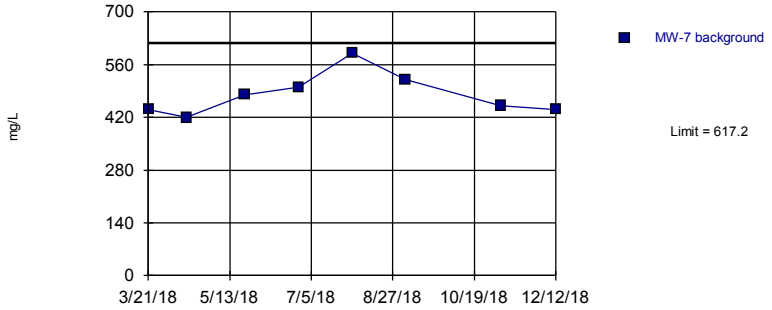
Prediction Limit Analysis Run 7/18/2019 9:04 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Sanitas™ v.9.6.18 Sanitas software licensed to GREDELL Engineering only. UG

Total Dissolved Solids

Intrawell Parametric, MW-7



Background Data Summary: Mean=480, Std. Dev.=55.81, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9034, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

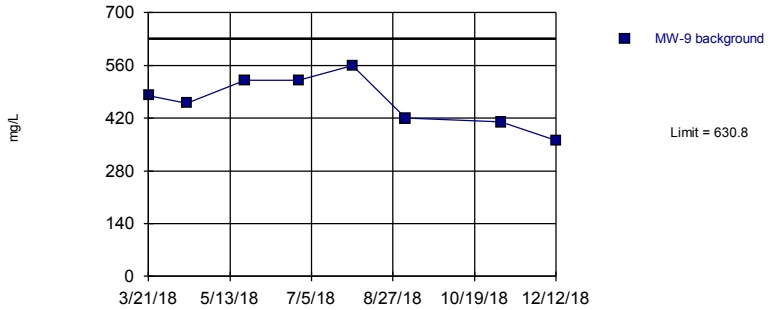
Prediction Limit Analysis Run 7/18/2019 9:04 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Sanitas™ v.9.6.18 Sanitas software licensed to GREDELL Engineering only. UG

Total Dissolved Solids

Intrawell Parametric, MW-9



Background Data Summary: Mean=466.3, Std. Dev.=66.96, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.969, critical = 0.749. Kappa = 2.458 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002505. Assumes 1 future value.

Prediction Limit Analysis Run 7/18/2019 9:04 AM View: AppIII

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: SikestonFAP Background

Appendix 9

Alternate Source Demonstration
March 20, 2020

1505 East High Street
Jefferson City, Missouri 65101
Telephone (573) 659-9078
Facsimile (573) 659-9079

GREDELL Engineering Resources, Inc.

Sikeston Board of Municipal Utilities
Sikeston Power Station
Detection Monitoring Program for
Fly Ash Pond
Alternate Source Demonstration

Prepared for:

BMU Board of Municipal Utilities

Sikeston Power Station
1551 West Wakefield Avenue
Sikeston, MO 63801

March 20, 2020

PROFESSIONAL ENGINEER'S CERTIFICATION

40 CFR 257.94(e)(2) Alternate Source Demonstration

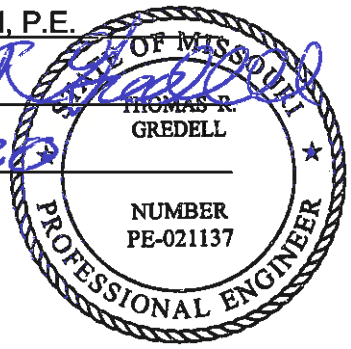
I, Thomas R. Gredell, P.E., a professional engineer licensed in the State of Missouri, hereby certify in accordance with 40 CFR 257.94(e)(2) to the accuracy of the alternate source demonstration described in the following report for the Sikeston Board of Municipal Utilities, Sikeston Power Station, Fly Ash Pond CCR unit. The report demonstrates that the statistically significant increase of sulfate, and calcium in MW-1 resulted from a source other than the CCR unit. This demonstration successfully meets the requirements of 40 CFR 257.94(e) as found in federal regulation 40 CFR 257, Subpart D – Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments. In addition, the demonstration was made using generally accepted methods.

Name: Thomas R. Gredell, P.E.

Signature: _____

Date: 03-20-20

Registration Number: PE-021137
State of Registration: Missouri



Sikeston Board of Municipal Utilities
Sikeston Power Station
Detection Monitoring Program for
Fly Ash Pond
Alternate Source Demonstration

March 2020

Table of Contents

1.0 INTRODUCTION....1
2.0 OBSERVATIONS AND DATA COLLECTION....2
3.0 SUMMARY OF DATA ANALYSIS AND FINDINGS....4
4.0 CONCLUSIONS AND RECOMMENDATIONS....6
5.0 REFERENCES....7

List of Figures

Figure 1 – Site Map and Sampling Locations
Figure 2 – MW-1 Hydrograph and Annual Precipitation
Figure 3 – Diversion Ditch Photo February 2020 - Looking West
Figure 4 – Diversion Ditch Photo February 2020 - Looking Northwest
Figure 5 – Diversion Ditch Photo November 2017 - Looking Northwest
Figure 6 – Piper Trilinear Plot

List of Tables

Table 1 – MW-1 Detection Monitoring Results and Prediction Limits
Table 2 – Alternate Source Demonstration Sampling Results Summary
Table 3 – MW-1 Alternate Source Demonstration Results and Prediction Limits

1.0 INTRODUCTION

This Alternate Source Demonstration Report has been prepared to address the results of the semi-annual sampling event conducted on September 24, 2019 at the Sikeston Board of Municipal Utilities (SBMU) Sikeston Power Station's (SPS) Fly Ash Pond, a coal combustion residual (CCR) surface impoundment. Following receipt of final analytical data, statistical analysis was performed by GREDELL Engineering Resources, Inc. (Gredell Engineering) for the parameters listed in Appendix III to Part 257 – Constituents for Detection Monitoring. The results of the statistical evaluation suggested three apparent statistically significant increases (SSIs) in monitoring well MW-1 (Sulfate, Total Dissolved Solids (TDS), and Calcium). Two of the three SSIs (Sulfate and Calcium) were confirmed by subsequent analytical data following resampling on October 22, 2019. As a consequence, SBMU-SPS requested that Gredell Engineering investigate the results and conduct an alternate source demonstration.

As stated in §257.94(e)(2), an owner or operator may demonstrate that a source other than the CCR unit caused the apparent SSI over background levels for a constituent. The owner or operator must complete the written demonstration within 90 days of detecting an apparent SSI 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 of the CCR unit may continue with a detection monitoring program. The owner or operator must also include the certified demonstration in the annual groundwater monitoring and corrective action report required by §257.90(e).

Gredell Engineering has completed an evaluation of the groundwater sampling event, analytical data results, and other potential factors, for the SBMU SPS Fly Ash Pond groundwater monitoring well system to determine if an alternate source is the cause of the apparent SSIs in MW-1. This report presents the results of that evaluation and includes supporting documentation.

Monitoring well MW-1 is located west of the Fly Ash Pond and within the containment area of the coal storage area (Figure 1). The well is situated between the north edge of the coal pile and the coal pile runoff diversion ditch. MW-1 was originally installed in April 2016 as a piezometer for the hydrogeologic characterization (Gredell, 2017) of the uppermost aquifer flowing beneath the Fly Ash and Bottom Ash Ponds at the site. This piezometer was converted to a downgradient monitoring well and retained for routine groundwater elevation monitoring and NPDES compliance sampling. Additional sampling locations were proposed, and two additional downgradient wells (MW-7 and MW-9) were installed for Fly Ash Pond monitoring in April 2017 and November 2017, respectively. Groundwater elevation monitoring since 2016 has consistently demonstrated that flow direction is to the west-southwest, as indicated on Figure 1.

2.0 OBSERVATIONS AND DATA COLLECTION

The September 24, 2019 detection monitoring event and the October 22, 2019 resample event were preceded by abnormally heavy precipitation in the previous months. This is demonstrated by Figure 2, which is a hydrograph of groundwater elevations in MW-1 overlaid on a bar graph of total annual precipitation for 2016 through 2019 (obtained from National Oceanic & Atmospheric Administration Station: Sikeston Power Station, MO US GHCND: US00237772). The data summarized in this figure document 57.38 inches of precipitation at the site in 2019, which represents a 30 to 45 percent increase over the previous three years (44.39 inches in 2018, 39.78 inches in 2017, and 41.50 inches in 2016). This abnormally heavy precipitation is manifested on the hydrograph during the months of February through May 2019 by groundwater elevations in MW-1 that exceed previously recorded measurements by a foot or more.

During periods of abnormal rainfall, infiltration to an aquifer is maximal and groundwater mounding may result. Rainfall that exceeds the infiltration capacity becomes surface runoff. Within the coal storage area, this surface runoff moves toward the unlined perimeter diversion ditch (Figure 1). Runoff concentrates in this unlined diversion and flows counterclockwise around the coal storage area within close proximity to MW-1. Because the diversion is unlined, additional infiltration and aquifer recharge is expected to occur. The excessive runoff in 2019 is illustrated by the photographs presented as Figures 3 and 4. They show considerable coal sediment in the diversion ditch, which is not apparent in photograph dating from November 2017 (Figure 5), nor was it apparent during other field activities conducted by Gredell Engineering in 2016 through 2018.

The analytical data for Sulfate, TDS, and Calcium in MW-1 for the September sampling event, and subsequent resampling data, including the collection of a replicate sample, are summarized on Table 1.

Table 1 - MW-1 Detection Monitoring Results and Prediction Limits

	Sulfate (mg/L)	TDS (mg/L)	Calcium (mg/L)
Detection Sampling 9-24-2019	35	230	47
Resample / Replicate 10/22/2019	41 / 42	180 / 170	47 / 49
Prediction Limit	31.57	223.2	45.18

Sulfate, TDS, and Calcium concentrations in the MW-1 sample from the September sampling event exceeded their respective prediction limits as identified in the 2019 Annual Groundwater Monitoring Report, dated August 1, 2019, and prepared in compliance with USEPA Part 257.90(e)

(Gredell Engineering, 2019). In October, a resampling event was conducted that incorporated a replicate sample for groundwater from MW-1. The resample and replicate concentrations of Sulfate and Calcium confirmed the apparent SSIs. However, the resample and replicate concentrations did not confirm the apparent SSI for TDS.

In response to the apparent SSIs for Sulfate and Calcium, additional sampling was conducted to evaluate a potential alternate source (Figure 1). Two temporary borings (ASD-1 and ASD-2) were advanced along the margin of the existing coal pile to allow sampling of the shallow groundwater between the coal pile and the underlying aquifer. Groundwater was sampled at MW-1, along with a surface water sample collected from the Fly Ash Pond (FAP-SW). Each sample was analyzed for major anions and cations to conduct geochemical analysis. A Piper Trilinear Plot (Piper, 1944) was developed with Sanitas™ Water (Version 9.6.24; 2019) to identify similarities/variations in hydrochemical facies (Freeze and Cherry. 1979). The reported concentrations are summarized on Table 2. These data were used to evaluate geochemical relationships between the samples with the objective of identifying the most plausible source for the apparent SSIs at MW-1.

Table 2 - Alternate Source Demonstration Sampling Results Summary

	ASD-1	ASD-2	MW-1	FAP-SW
Calcium (mg/L)	79.1	120	43.0	18.4
Sulfate (mg/L)	151	152	25	21
TDS (mg/L)	860	700	170	175
Magnesium (mg/L)	28.7	27.4	9.06	4.96
Potassium (mg/L)	9.74	9.46	1.72	18.7
Sodium (mg/L)	151	135	7.40	36.7
Bicarbonate (mg/L)	350	508	128	172
Carbonate (mg/L)	0	0	0	0
Chloride (mg/L)	35	20	5	5

3.0 SUMMARY OF DATA ANALYSIS AND FINDINGS

The U.S. Environmental Protection Agency (USEPA) provides Unified Guidance for statistical analysis of groundwater monitoring data (USEPA, 2009). This Unified Guidance was reviewed to assess the validity of the apparent SSIs. Chapter 4 of the Unified Guidance discusses groundwater monitoring programs and statistical analysis of the associated data. A key component of statistical analysis is "*to determine whether or not the increase is actually due to a contaminant release*". The following discussion is intended to assess the validity of apparent SSIs of Calcium and Sulfate associated with MW-1 and demonstrate if they are the result of a contaminant release from the Fly Ash Pond or caused by an alternate source.

A release from a plausible source will contribute water with elevated concentrations of indicator constituents to the aquifer, where it mixes with, and is diluted by, the natural (un-impacted) groundwater, which is characterized by relatively low (background) concentrations of these indicator constituents. The data summarized in Table 2 demonstrate that the concentrations of Calcium, Sulfate, and TDS in samples collected from ASD-1 and ASD-2 are at least four times greater than what was reported for the sample from the Fly Ash Pond, and considerably higher than what was reported in the sample from MW-1. This suggests that water from the coal storage area is a more plausible source for these constituents in MW-1 than water derived from the Fly Ash Pond.

The area of change in groundwater geochemistry as it flows away from a source is referred to as a mixing zone. A Piper Trilinear Plot is a common and convenient tool for showing the effects of mixing waters. The mixing zone will plot on a straight line joining the source to the receiving water (Freeze and Cherry, 1979).

The cation/anion data in Table 2 was used to produce the Piper Trilinear Plot in Figure 5. The concentrations presented in Table 2 for each constituent are first converted from mg/L to milliequivalents per liter (mEq/L) through a calculation based on their valence charge and molecular weight. The concentrations of these major anions and cations in mEq/L are then expressed in relative percentages on the trilinear plot to assess the geochemistry of the sample. Hydrochemical facies can be assessed based on the location of each point, or cluster of points, on the Piper Trilinear Plot.

Major anion data are summarized by the triangular plot on the right side of Figure 5, which indicates that all samples plot in a similar area or facies, with separation owing to minor differences in Bicarbonate concentrations (Carbonate was absent in all samples). Most notable, however, is that the anion fingerprint in MW-1 is more similar to ASD-1 and ASD-2 than it is to the sample from the Fly Ash Pond. The triangular plot on the left side summarizes the major cation data and indicates that the samples cluster in three different areas or facies (MW-1 in "Calcium-type", FAP-SW in "Sodium- or Potassium-type", and ASD-1 and ASD-2 in "No dominant type" (Freeze and Cherry, 1979)). The anion and cation data can be considered collectively with the diamond portion of the Piper Trilinear Plot to assess if all samples plot collinearly.

The Piper Trilinear Plot suggests three separate geochemical populations defined by the samples from the coal storage area (ASD-1 and ASD-2), the Fly Ash Pond (FAP-SW), and MW-1. A sample from a chemical source should plot collinear with samples associated with the mixing zone. ASD-1 and ASD-2 plot closer to MW-1 and are therefore more geochemically similar to MW-1. Conversely FAP-SW plots farther from MW-1 and is less geochemically similar to MW-1. Additionally, FAP-SW plots along a different straight line with MW-1 than ASD-1 and ASD-2.

Relevant data from the alternate source demonstration sampling event for MW-1 (Table 2) were compared to the respective prediction limits for Sulfate, TDS, and Calcium. This comparison is summarized in Table 3. These data demonstrate that Sulfate, TDS, and Calcium concentrations were below their respective prediction limits for the February 27, 2020 sampling event. This demonstrates that the apparent SSIs noted during the September 2019 sampling event are not indicative of a persistent condition affecting groundwater quality in the aquifer near MW-1.

Table 3 - MW-1 Alternate Source Demonstration Results and Prediction Limits

	Sulfate (mg/L)	TDS (mg/L)	Calcium (mg/L)
Demonstration 2-27-2020	25	170	43
Prediction Limit	31.57	223.2	45.18

The hydrograph for MW-1 and annual precipitation data summarized on Figure 2 demonstrate that 2019 was considerably wetter than the previous three years. Moreover, this abnormal precipitation led to excessive runoff and sedimentation from the stockpiled coal into the perimeter diversion that flows near MW-1, as presented in Figures 1, 3, and 4. A photograph of the same area taken in November 2017 (Figure 5) shows no excessive sedimentation, suggesting that the atypically heavy precipitation experienced in 2019 is a changed condition resulting in the increased probability of infiltration of coal-impacted surface water downward into the groundwater environment.

4.0 CONCLUSIONS AND RECOMMENDATIONS

On the basis of this investigation, Gredell Engineering concludes that the apparent SSIs of Sulfate and Calcium in MW-1, detected following the September 24, 2019 sampling event, are attributable to an alternate source originating in the coal storage area and not evidence of a release from the Fly Ash Pond. The following supports this conclusion:

- Groundwater samples collected from ASD-1 and ASD-2 in the coal storage area have elevated concentrations of Sulfate, TDS, and Calcium relative to MW-1 and the Fly Ash Pond.
- Sulfate, TDS, and Calcium concentrations derived from the Fly Ash Pond are not high enough to be mixed with (and diluted by) natural (un-impacted) groundwater and exceed their respective prediction limits for MW-1.
- Piper Trilinear Plot analysis demonstrates that groundwater from MW-1 is geochemically more similar to groundwater under the coal storage area than water in the Fly Ash Pond, and the groundwater under the coal storage area represents a different mixing zone than would result from waters in the Fly Ash Pond.
- Higher than normal precipitation in the months preceding the groundwater monitoring events in September and October 2019 resulted in excessive runoff from the coal storage area that was conveyed as surface runoff into the unlined diversion ditch that lies in close proximity to MW-1. This excessive runoff and coal sedimentation increases the likelihood that infiltration of coal impacted surface water into the groundwater environment had a deleterious effect on the sample results from MW-1. The abnormal precipitation and excessive runoff experienced in 2019 is viewed as a temporary changed condition, as evidenced by a comparison of the photographs of the perimeter diversion ditch presented as Figures 3, 4, and 5.
- Analytical results for Sulfate, TDS, and Calcium in MW-1 obtained following the February 27, 2020 alternate source demonstration sampling event are below their respective prediction limit values, indicating that the apparent SSIs noted previously are not indicative of a persistent or chronic condition impacting groundwater quality in the alluvial aquifer near MW-1.

Based on these conclusions, Gredell Engineering recommends that semi-annual detection monitoring continue in accordance with §257.94. As subsequent analytical results are received for Sulfate, TDS, and Calcium concentrations in MW-1, they should be reviewed and appropriate steps taken if prediction limit values are exceeded. Additionally, periodic inspection and maintenance of the diversion ditch enclosing the coal storage area will ensure excess sediment from the coal stockpiles is removed.

5.0 REFERENCES

Freeze, R.A. and Cherry J.A., 1979, *Groundwater*: Prentice-Hall, Inc. Englewood Cliffs, New Jersey, 604 p.

GREDELL Engineering Resources, Inc., 2017, Sikeston Power Station Site Characterization for Compliance with Missouri State Operating Permit #MO-0095575. Prepared for Sikeston Board of Municipal Utilities, May 31, 2017.

GREDELL Engineering Resources, Inc., 2019, Sikeston Power Station 2019 Annual Groundwater Monitoring Report for Fly Ash Pond for Compliance with USEPA 40 CFR 257.90(e). Prepared for Sikeston Board of Municipal Utilities, August 1, 2019.

Piper, A. M., 1944. A Graphical Procedure in the Geochemical Interpretation of Water Analyses. Trans. Amer. Geophys. Union, 25, pp 914-923.

Sanitas Statistical Software, © 1992-2019 SANITAS TECHNOLOGIES, Alamosa Colorado 81101-0012.

USEPA, 2009, Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Unified Guidance: EPA 530/R-09-007, Office of Resource Conservation and Recovery, Program Implementation and Information Division, Washington, D.C.

FIGURES

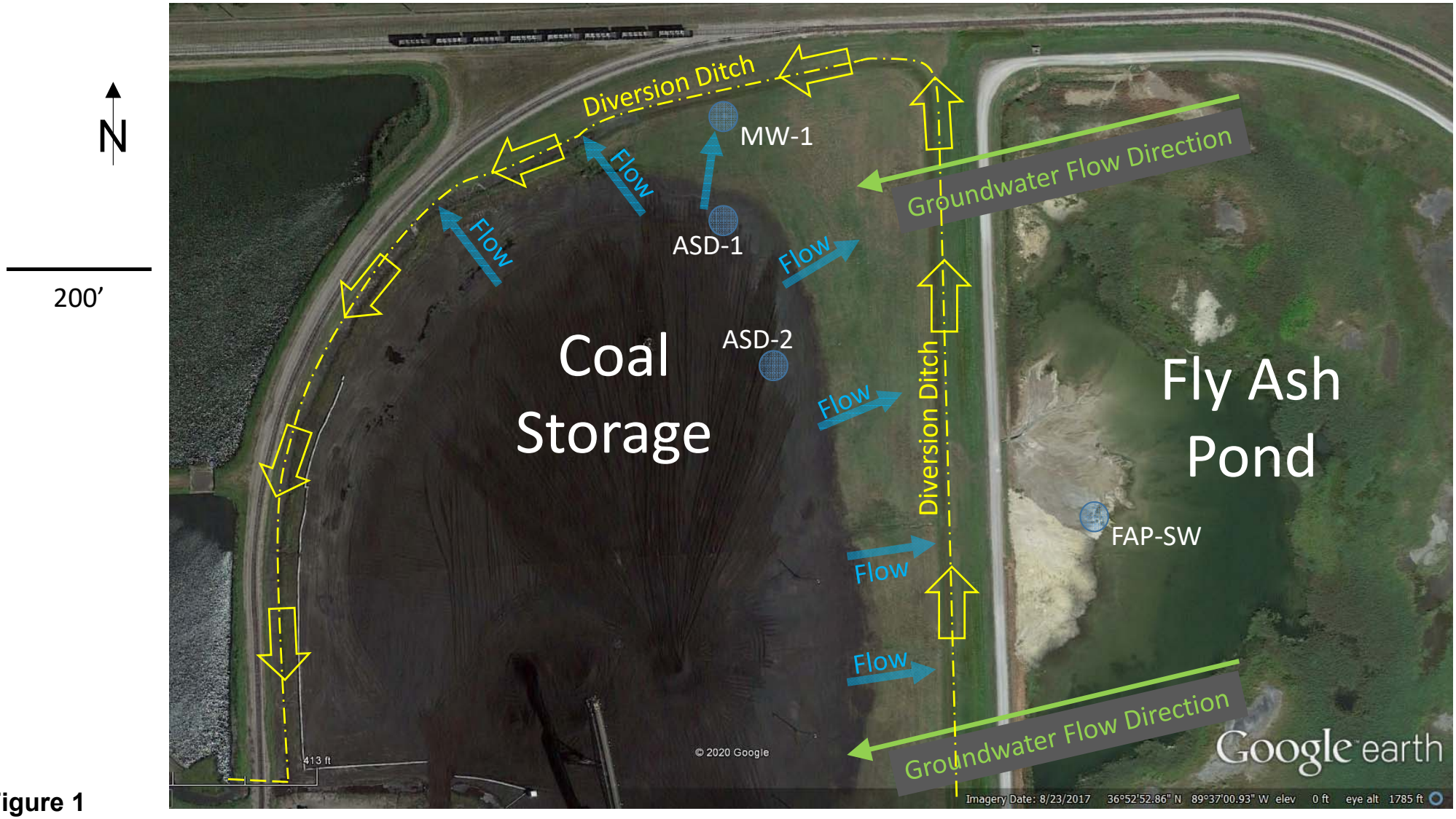


Figure 1
Site Map and Sampling Locations

Prepared by: GREDELL Engineering Resources, Inc.

Note: MW-1 groundwater elevations do not indicate sampling occurred.

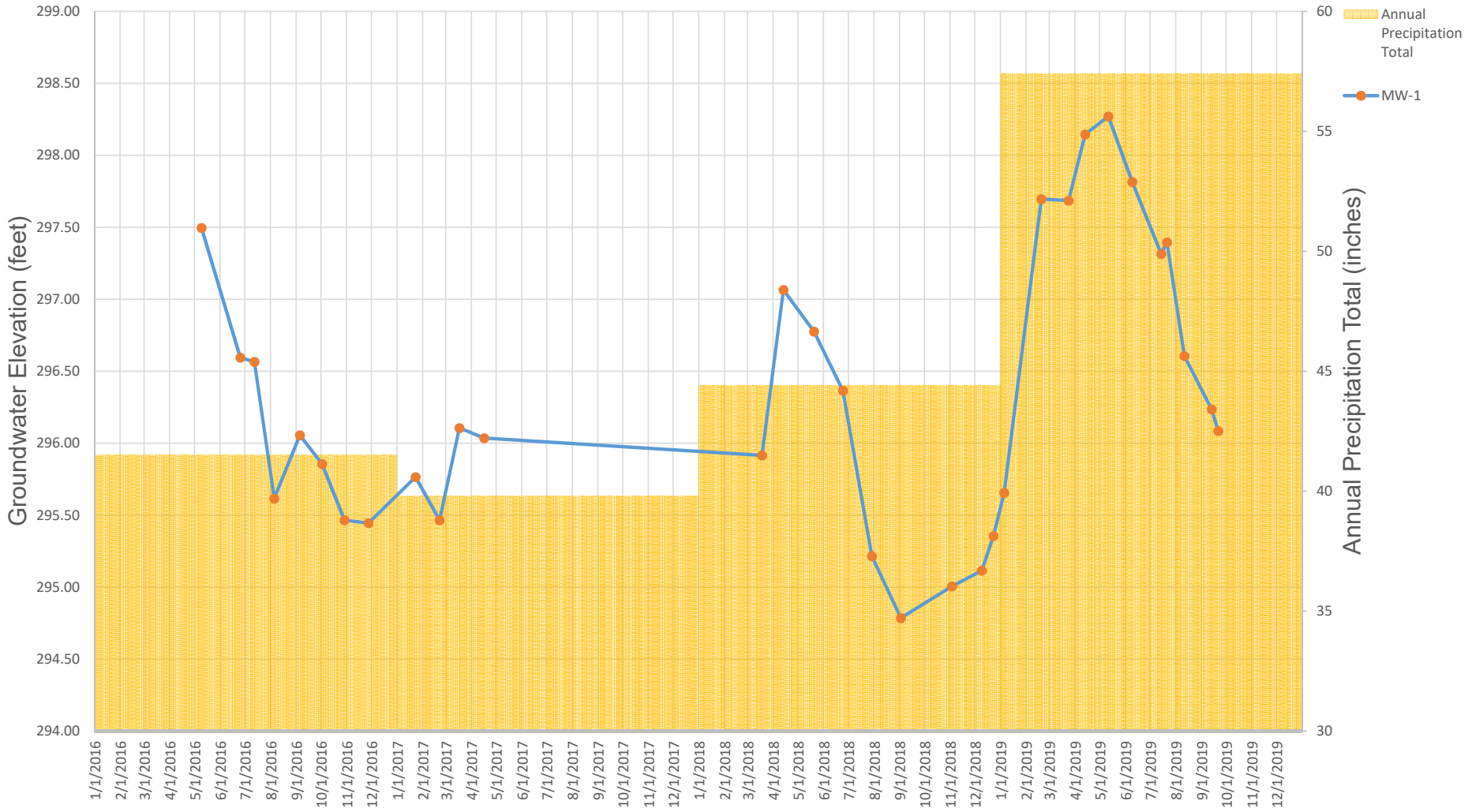


Figure 2
MW-1 Hydrograph and Annual Precipitation

Prepared by: GREDELL Engineering Resources, Inc.

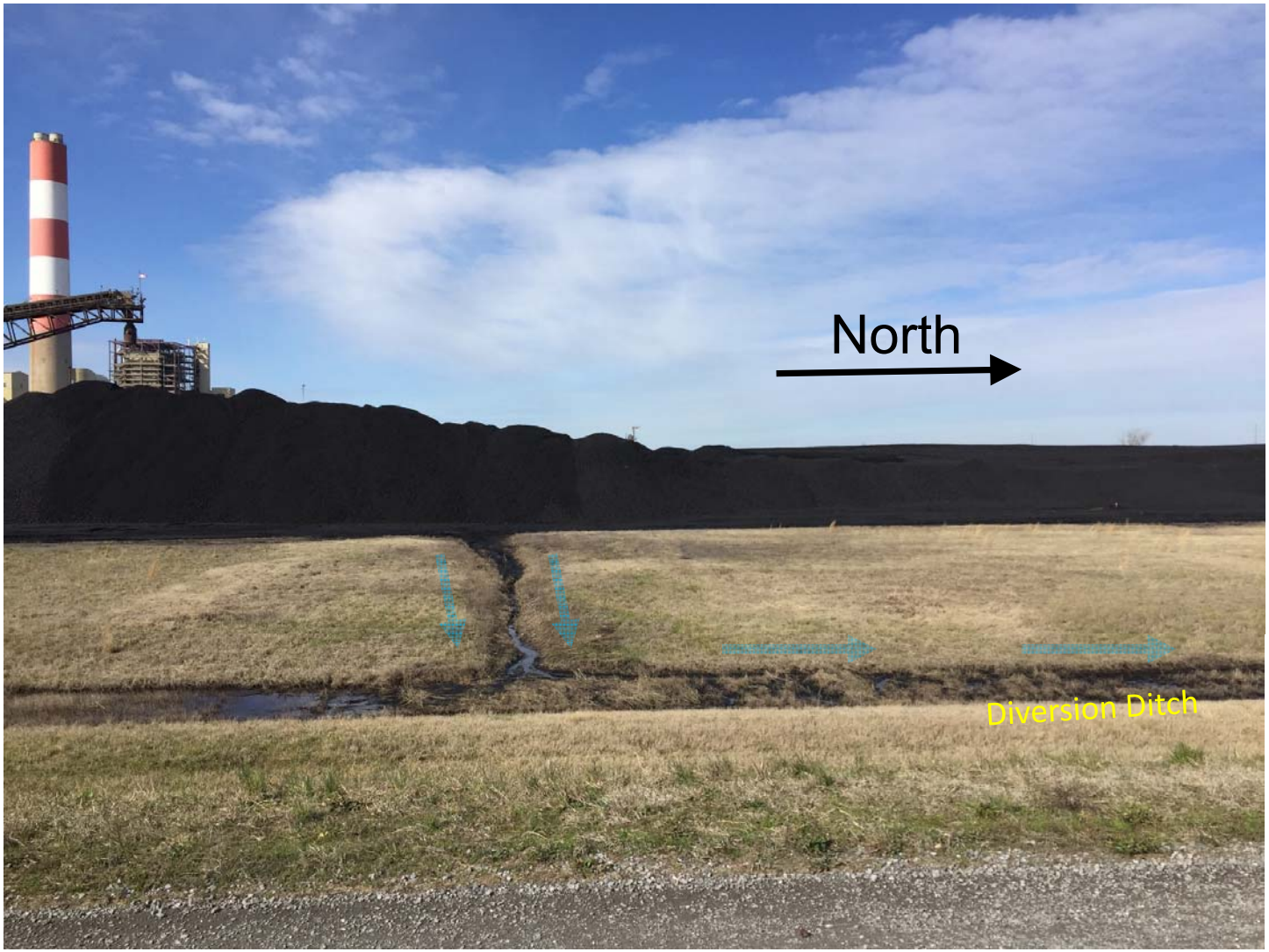


Figure 3
Diversion Ditch Photo February 2020 - Looking West

Prepared by: GREDELL Engineering Resources, Inc.

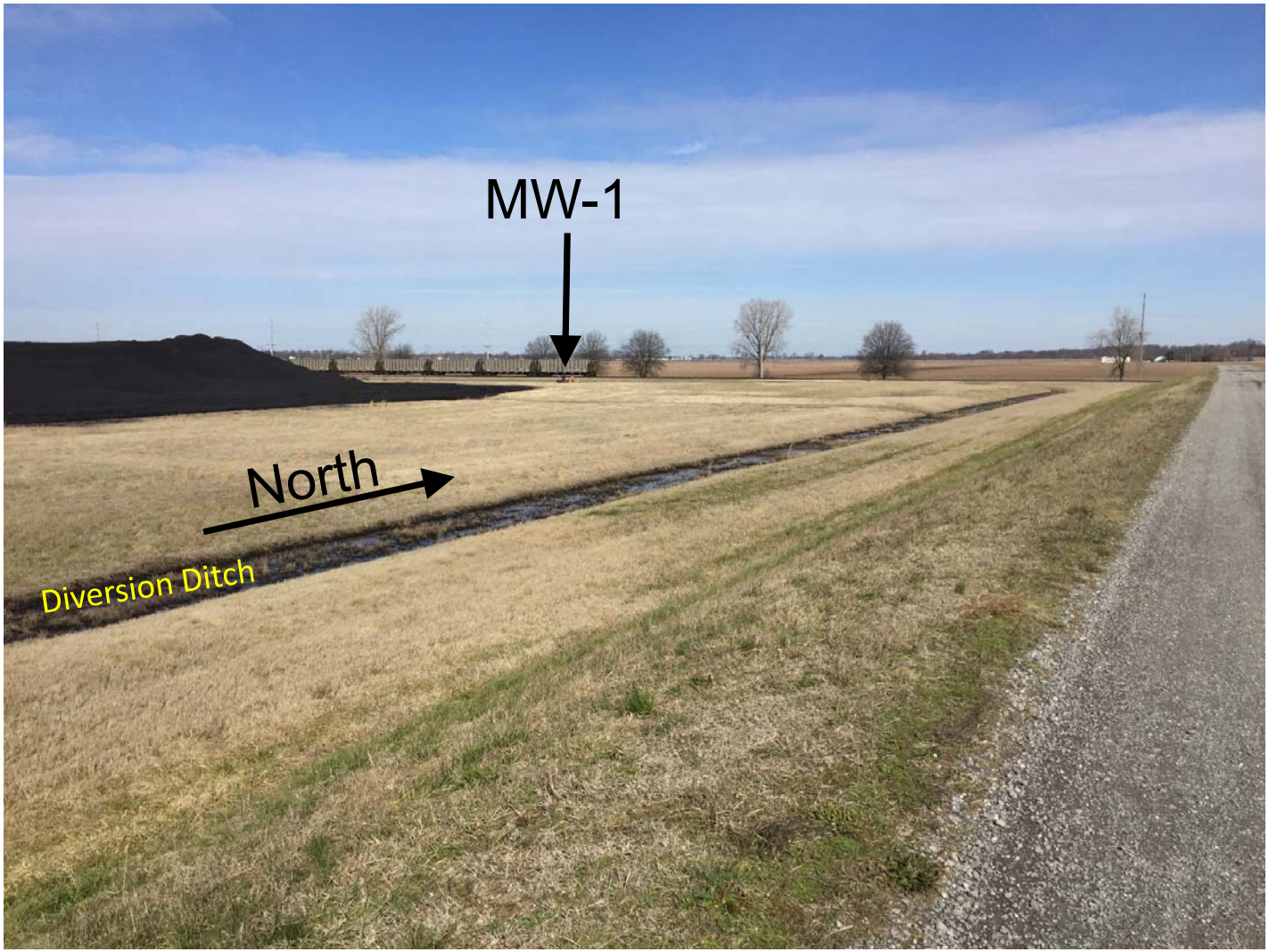
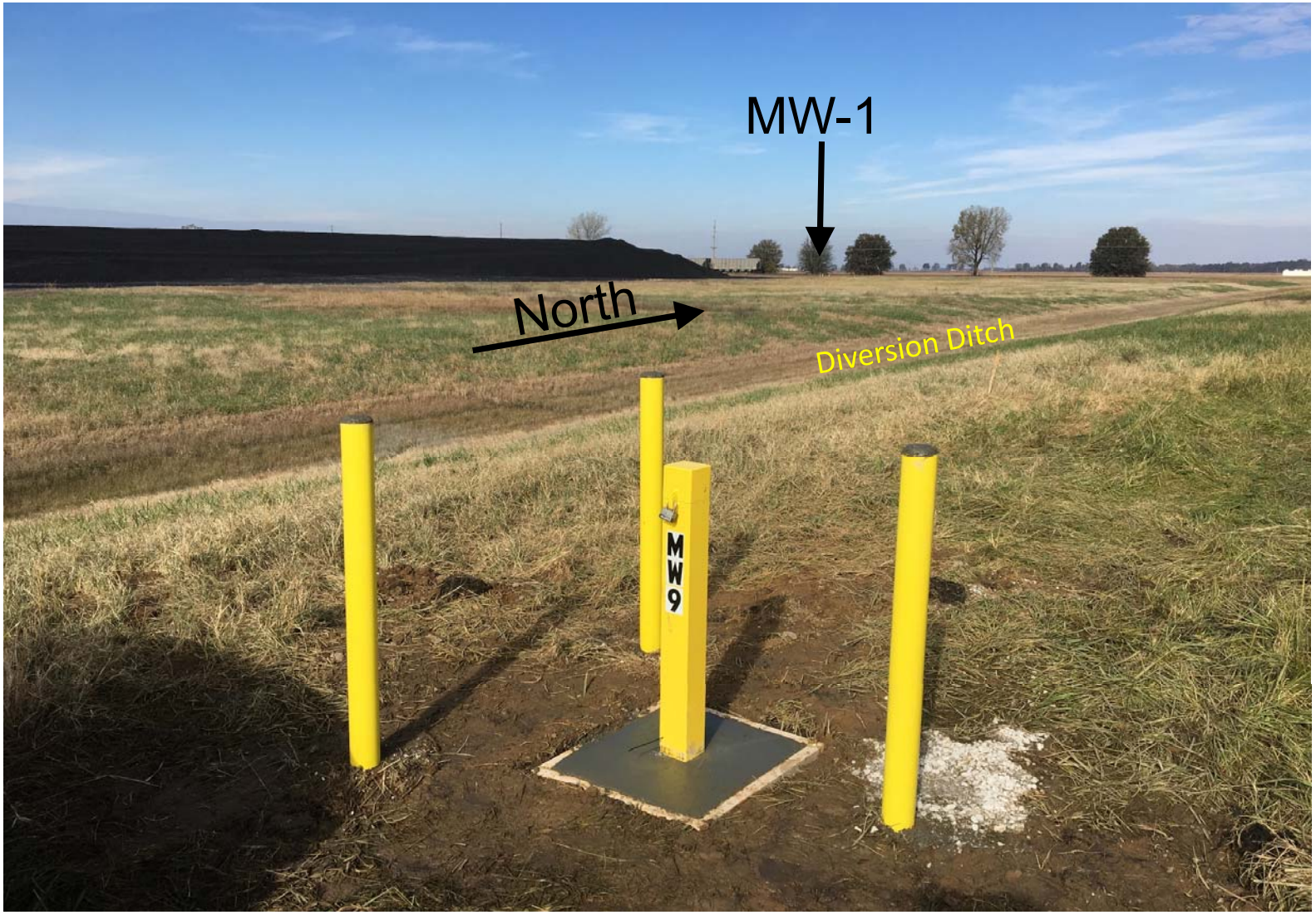


Figure 4
Diversion Ditch Photo February 2020 - Looking Northwest

Prepared by: GREDELL Engineering Resources, Inc.

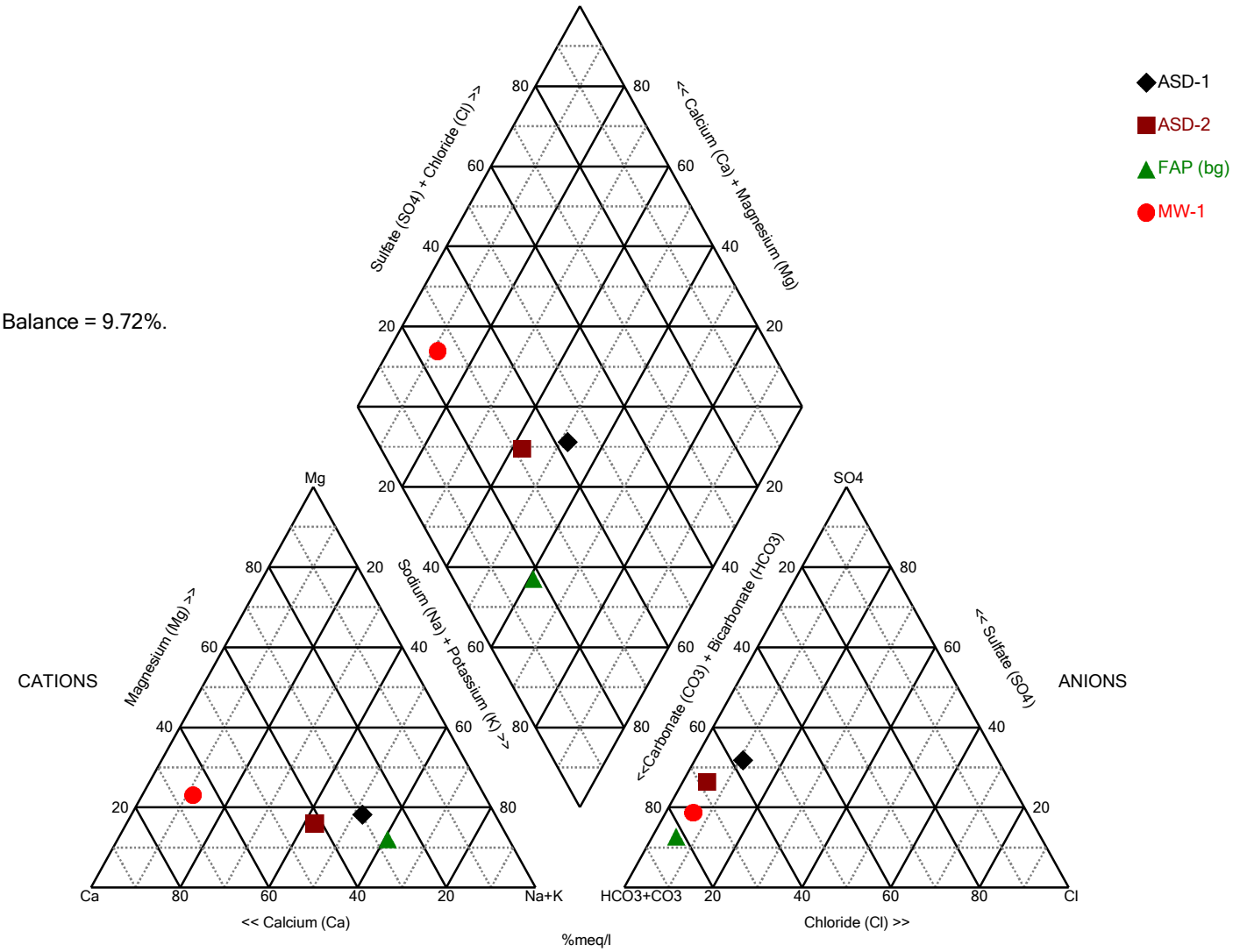


11-13-2017

Figure 5
Diversion Ditch Photo November 2017 - Looking Northwest

Prepared by: GREDELL Engineering Resources, Inc.

Cation-Anion Balance = 9.72%.



Analysis Run 3/11/2020 9:57 AM

SBMU-Sikeston Power Station Client: GREDELL Engineering Data: ASDEDD

Figure 6
Piper Trilinear Plot

Prepared by: GREDELL Engineering Resources, Inc.