Prepared for

Crisp County Power Commission
202 S. 7th Street
Cordele, Georgia 31015

ANNUAL GROUNDWATER MONITORING REPORT

PLANT CRISP ASH POND
CRISP COUNTY POWER COMMISSION

961 Power Dam Road
Warwick, Georgia 31796

Prepared by

Geosyntec consultants

engineers | scientists | innovators

1255 Roberts Boulevard, Suite 200
Kennesaw, Georgia 30144

January 2018

Geosyntec
consultants

CERTIFICATION BY QUALIFIED PROFESSIONAL ENGINEER

I certify that the Annual Groundwater Report was prepared by me or under my direct supervision, and meets the requirements of Section 40 CFR §257 of the Federal Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule (40 CFR §257) and the Georgia EPD Solid Waste Management Rule for Coal Combustion Residuals (391-3-4-.10). The Annual Groundwater Report includes statistical methods and narrative description appropriate for evaluating the groundwater monitoring data for the CCR management area.

CUNEYT GOKMEN
Printed Name of Qualified Professional Engineer

28504
Registration No.

GEORGIA
Registration State

01/31/2018

Stamp/Signature/Date

Geosyntec
consultants

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ACRONYMS

CCPC	Crisp County Power Commission
CCR	Coal Combustion Residual
CFR	Code of Federal Regulations
DO	Dissolved Oxygen
GA EPD	Georgia Environmental Protection Division
ORP	Oxidation Reduction Potential
PL	Prediction Limit
MCL	Maximum Contaminant Level
MDC	Minimum Detectable Concentration
MDL	Method Detection Limit
MW	Megawatt
SESD	Science and Ecosystem Support Division
SOP	Standard Operating Procedure
SSI	Statistically Significant Increase
PQL	Practical Quantitation Limit
TDS	Total Dissolved Solids
USEPA	United States Environmental Protection Agency

1.0 INTRODUCTION

Geosyntec Consultants (Geosyntec) of Kennesaw, Georgia, at the request of Crisp County Power Commission (CCPC), prepared this Annual Groundwater Monitoring Report for the ash pond located at CCPC's Plant Crisp. Plant Crisp is located in Warwick, Georgia on the southern end of Lake Blackshear. A site location map is provided on **Figure 1**. CCPC installed a groundwater monitoring well network in February 2017 in compliance with the requirements of the 40 CFR §257.91 as well the Section 391-3-4-.10(6) of the Georgia Environmental Protection Division (GA EPD) CCR Rule. A detection groundwater monitoring program has been performed between February and September 2017 in compliance with the requirements of the 40 CFR §257.94. This report has been prepared to present a summary of groundwater monitoring activities and the monitoring results. The report has been prepared to meet the annual reporting requirements of 40 CFR §257.90 (e) and a semi-annual reporting requirements of 391-3-4-.10(6) (c).

1.1 Site Location and History

Plant Crisp is a dual-fuel (coal and natural gas) electrical generation facility, with a 12.5-megawatt (MW) capacity coal-fired unit and 5 MW capacity natural gas combustion turbine. The byproducts of power generation from the combustion of coal (commonly referred to as Coal Combustion Residuals or CCRs) at Plant Crisp included mainly fly ash and bottom ash. The CCRs were disposed into a 6.1-acre ash pond located within the plant property using wet sluicing method. The ash pond was constructed in the mid-1970s, as an unlined pond [CDM Smith, 2014] and started to receive sluiced ash in 1976. The coal burning and resulting sluicing operation was reduced significantly after August 2015. The coal burn unit was de-activated in 2017. CCPC has submitted notification of closure in accordance with 40 CFR Part 257.

The electrical generation facility, ash pond, and hydroelectric dam are located on approximately 100 acres of CCPC property near Lake Blackshear and the Flint River (Figure 1). The ash pond has embankments on the western and partially southern and northern sides. The maximum embankment height is on the west end and is approximately 22 feet high [Rizzo Associates, 2015]. The Plant Crisp ash pond was classified as a low hazard unit during the USEPA's coal combustion residuals impoundment assessment, dated February 2014 and conducted by CDM Smith [CDM Smith, 2014].

1.2 Background

In compliance with the detection monitoring program of the CCR rule 40 CFR §257.94, CCPC has collected eight independent groundwater samples from each background and downgradient well from the Plant Crisp ash pond monitoring well network between February and September 2017. The groundwater monitoring well network includes one monitoring well (MW-U1) located upgradient of the ash pond, representing background groundwater conditions, and three monitoring wells (MW-D1, MW-D2, and MW-D3) located downgradient of the ash pond. The locations of the monitoring wells are shown on Figure 1. The monitoring wells are screened in the uppermost aquifer underlying the ash pond, which is composed of gravel, sand, and clay (Quaternary alluvial sediments). The groundwater monitoring system was designed and constructed to meet the requirements of the groundwater monitoring system 40 CFR §257.91. A groundwater monitoring system certification was prepared in June 2017 (**Appendix A**). Well construction diagrams of the monitoring wells are presented in **Appendix B**. The groundwater samples were analyzed for constituents listed in appendix III to Part §257 (referred herein as appendix III constituents) and appendix IV to part §257 (referred herein as appendix IV constituents).

Section 2 of this report presents a discussion of eight background groundwater sampling events and laboratory analysis. Groundwater analytical results from the eight monitoring events and a summary of statistical data analysis for appendix III constituents are provided in Section 3. The groundwater monitoring and statistical analysis were performed consistent with the Groundwater Monitoring and Statistical Analysis Plan prepared for the Plant Crisp ash pond in October 2017 (**Appendix C**).

2.0 GROUNDWATER SAMPLING AND LABORATORY ANALYSIS

The detection groundwater monitoring program involved eight sampling events. The groundwater samples were collected in accordance with the USEPA Science and Ecosystem Support Division (SESD, Athens, Georgia) Standard Operating Procedure (SOP), dated 6 March 2013. Prior to sampling, depth to groundwater and total well depth were measured for each monitoring well using an electrical water level indicator. **Figure 2** presents a potentiometric surface map from the March 2017 monitoring event. Based on the groundwater level readings, groundwater flow direction is from southeast towards northwest and the hydraulic gradient is approximately 0.015 ft/ft. Groundwater sampling was performed using a low-flow sampling method. To ensure that the samples collected are representative of the groundwater in the aquifer, field water quality parameters were measured during purging using a Horiba U-53 water quality meter. These parameters include temperature, pH, conductivity, oxidation-reduction potential (ORP), dissolved oxygen (DO) and turbidity. Measurements were taken within an enclosed flow-through cell to minimize effects of contact with air. Purging was considered complete when groundwater pH, conductivity and turbidity measurements equilibrated (as defined by USEPA Science and Ecosystem Support Division SOP) or at least three well volumes were removed. Field groundwater sampling forms are provided in **Appendix E.**

The groundwater samples were collected in laboratory provided containers. Following sampling, the bottles were sealed, labeled, packed in ice, and shipped under chain-of-custody protocol to Test America Laboratories in Pensacola, FL, a certified laboratory pursuant to the Georgia State Program. The groundwater samples were analyzed for the constituents listed in appendix III and appendix IV constituent lists. The metal constituents were analyzed as total recoverable as the samples were not field filtered. Laboratory analytical results from the eight groundwater monitoring events are summarized in **Table 1a** through **Table 1h**. Laboratory analytical reports are provided as **Appendix F**.

3.0 DETECTION MONITORING STATISTICAL DATA ANALYSIS

Statistical analysis of the groundwater data collected during the detection monitoring was performed in accordance with the methods listed in the October 2017 Groundwater Monitoring and Statistical Analysis Plan. The statistical methods meet the requirements of the methods specified in 40 CFR §257.93(f) (1) through (5) and the performance standards specified in 40 CFR §257.93(g). Statistical analysis was performed using Sanitas™ v.9.5.32 software for appendix III constituents (boron, calcium, chloride, fluoride, pH, sulfate, and total dissolved solids). An interwell statistical method, which compares groundwater quality from a downgradient monitoring wells (MW-D1, MW-D2, and MW-D3) to groundwater quality in the background monitoring well (MW-U1) was selected because: (i) downgradient monitoring wells MW-D1, MW-D2, and MW-D3 do not have any pre-CCR groundwater quality data; and (ii) monitoring well MW-U1 is a located upgradient of the ash pond and provided background groundwater conditions.

Prior to the interwell statistical analysis, the groundwater data from the background well was screened for potential outlier (anomalous) data. In addition to visual inspection using time-series plots, statistical methods such as the EPA 1989 Outlier Screening method were used to identify outliers in the background well data (when data was normally distributed) or Tukey's Outlier Screening method was used when background well data was not normally distributed. When outliers in the background data were identified, the data were further evaluated for trend using Mann-Kendall/Sen's Slope trend test at 95% confidence level. Data distribution was checked using Shapiro Wilk method at 99% confidence level. This method is appropriate for a sample size of less than 50.

The interwell prediction limit method was used to identify concentrations of appendix III constituents in the downgradient wells that are statistically higher than concentrations in the background well. The CCR Rule listed the prediction limit method as one of the methods acceptable for CCR data analysis. In addition, the USEPA Unified Guidance (USEPA, 2009) recommended prediction limits combined with retesting for maintaining a low site wide false positive rate while providing high statistical power. The prediction limit method generally consisted of the following procedures:

- Parametric prediction limits were constructed when the background data followed a normal or transformed-normal distribution.

- Non-parametric prediction limits were calculated for data sets with greater than 50% non-detect values, and for data sets which do not follow a normal or transformed-normal distribution.

- For prediction interval, background data were used to construct a prediction limit (PL), which is defined as the upper limit of possible future values based on the background data set. The PL was then compared to observations from the downgradient wells. The acceptable range of concentrations includes all values that are lower than the prediction limit. The prediction interval had the form [0, PL], with the upper limit PL as the comparison of importance. If a sample does not exceed the calculated PL, then it can be concluded that a statistically significant increase (SSI) has not occurred. If the sample exceeds the PL, then an SSI can be concluded.

- If all of the background data were non-detect, then the Double Quantification Rule was used. If a sample and verification resample both exceed the practical quantitation limit (PQL), then an SSI can be concluded.

4.0 STATISTICAL ANALYSIS RESULTS

The statistical analysis results are summarized in **Table 2**, which shows the (i) ratio of non-detects to total number of samples; (ii) basic statistics for each constituent in a monitoring well such as minimum, maximum, mean, median, and standard deviation; (iii) results of outlier testing and trend test; (iv), upper prediction limit of each constituent constructed based on the eight background well data; and (v) results of the statistical analysis. The Table also identifies statistically significant increases (SSI) where concentrations of Appendix III constituents in the downgradient monitoring wells are statistically higher than the concentrations in the background monitoring wells. Two pH values (5.07 from the 6/19/2017 monitoring event and 6.37 from the 7/17/2017 monitoring event) were identified as suspected outliers. However, these values were not removed from the analysis because they are within the range of pH values in groundwater from the surficial sediments of the Georgia coastal plain physiographic province (Railsback et al., 1996). One TDS value (44 mg/L from the 4/24/2017 monitoring event) in the background well was also identified as a suspected outlier. When this value was removed from the background data set prior to construction the upper prediction limit for TDS, a PL value of 136.3 mg/L was calculated. When the 44 mg/L was included in the background data set, a PL of 144.8 mg/L was calculated. A more conservative PL value of 136.3 mg/L was used to compare TDS values detected in the downgradient wells. Statistically significant increases (SSIs) from background concentrations were identified for the following constituents, all of which do not have a maximum contaminant level (MCL), in the following downgradient wells:

- Boron in MW-D1, MW-D2, and MW-D3;
- Calcium in MW-D2 and MW-D3;
- Chloride in MW-D1, MW-D2, and MW-D3;
- Fluoride in MW-D1, MW-D2, and MW-D3;
- Sulfate in MW-D1, MW-D2, and MW-D3; and
- TDS in MW-D2 and MW-D3.

Groundwater pH in the downgradient monitoring wells were within the prediction limits calculated from the background measurements. Sanitas™ statistical calculations and time-series graphs for each constituent are provided in **Appendix D**.

5.0 FUTURE GROUNDWATER MONITORING PROGRAM

Data collected during the detection monitoring indicated that statistically significant increases were identified for appendix III constituents over background. In compliance with 40 CFR §257.95(a), CCPC will initiate an assessment monitoring program for the ash pond. The first assessment monitoring will be performed by 30 March 2018, within 90 days of triggering an assessment monitoring program on 30 December 2017. However, in light of the low levels in both background and downgradient samples, CCPC will be conferring with GA EPD and other regulatory entities to determine whether continuation of assessment monitoring is necessary. No sample exceeded a MCL, which is typically the most stringent cleanup level for groundwater under the USEPA and GA EPD requirements for various environmental programs and statutes. As applicable, the monitoring wells will be sampled and analyzed for Appendix IV constituents during the first assessment monitoring event. The following monitoring events will be performed in accordance with 40 CFR §257.95(b) and (d). Details of the groundwater monitoring, laboratory analysis and statistical analysis during assessment monitoring are presented in the Groundwater Monitoring and Statistical Analysis Plan (Appendix C).

6.0 REFERENCES

CDM Smith. (2014). "Assessment of Dam Safety of Coal Combustion Surface Impoundments – Final Report: Crisp County Power Commission Plant Crisp Warwick, Georgia." Prepared for U.S. Environmental Protection Agency Washington, D.C., Rev. 1, February 2014.

Railsback et al. (1996). A survey of the major-element geochemistry of. Georgia groundwater: Southeastern. Geology, v. 36, p. 99-122.

Rizzo Associates. (2015). "Dam Safety Assessment Report Plant Crisp Coal Combustion Waste Impoundment." Submitted to Crisp County Power Commission, 14-5232, Rev. 0, January 2015.

USEPA (2009). Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance.

USEPA (2013). Science and Ecosystem Support Division (SESD, Athens, Georgia) Standard Operating Procedure (SOP) (SESDPROC-301-R3).

TABLES

Table 1a. Crisp County Power Commission
Analytical Data Summary - First Background Groundwater Sampling Event
Sampling Performed on 28 February 2017

Appendix III to 40 CFR Part 257 - Constituents for Detection Monitoring

Constituent	Unit	MCL[1,2]	MDL[3]	Upgradient Well ID	Downgradient Well ID		
				MW-U1	MW-D1	MW-D2	MW-D3
Boron	mg/L	N/A	0.021	ND	0.065	0.13	0.24
Calcium	mg/L	N/A	0.13[4]	34	20	160	110
Chloride	mg/L	N/A	0.60	2.2	2.9	5.7 F1 F2	3.9
Fluoride	mg/L	4	0.032	0.060 J	0.060 J	0.060 J	0.13
pH	std	N/A	--	7.74	6.67	6.85	6.87
Sulfate	mg/L	N/A	1.4	2.8 J	10	19	27
TDS	mg/L	N/A	3.4	80	76	360	330

Appendix IV to 40 CFR Part 257 - Constituents for Assessment Monitoring

Constituent	Unit	MCL[1,2]	MDL[3]	Upgradient Well ID	Downgradient Well ID		
				MW-U1	MW-D1	MW-D2	MW-D3
Antimony	mg/L	0.006	0.0010	ND ^ *	ND ^ *	ND ^ * F1	ND ^ *
Arsenic	mg/L	0.01	0.00046	ND	ND	ND	0.0015
Barium	mg/L	2	0.00049	0.0034	0.011	0.087	0.22
Beryllium	mg/L	0.004	0.00034	ND	ND	ND	ND
Cadmium	mg/L	0.005	0.00034	ND	ND	ND	ND
Chromium	mg/L	0.1[5]	0.0011	0.0051	0.0034	0.0038	0.0029
Cobalt	mg/L	N/A	0.00040	ND	ND	0.00047 J	0.0011 J
Fluoride	mg/L	4	0.032	0.060 J	0.060 J	0.060 J	0.13
Lead	mg/L	0.015[6]	0.00035	ND	ND ^	0.00050 J	ND ^
Lithium	mg/L	N/A	0.0032	ND	ND	ND	ND
Mercury	mg/L	0.002[7]	0.000070	0.000099 J B	0.000077 J B	0.00018 J B	0.00011 J B
Molybdenum	mg/L	N/A	0.00085	ND	ND	0.0012 J	0.0088 J
Radium 226 and 288 Combined	pCi/L	5	--[8]	0.117 U	0.421	0.506	0.522
Selenium	mg/L	0.05	0.00024	ND	ND	ND	0.0028
Thallium	mg/L	0.002	0.000085	ND	ND	0.00011 J	0.00013 J

Notes:

ND - the substance was not detected above the analytical method detection limit.

J - result is less than the reporting level but greater than or equal to the MDL and the concentration is an approximate value.

B - compound was found in the blank and sample.

TDS - total dissolved solids.

F1- matrix spike (MS) and/or matrix spike duplicate (MSD) recovery is outside acceptance limits.

F2 - MS/MSD RPD exceeds control limits.

^ indicates ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA, DLCK or MRL standard: Instrument related QC is outside acceptance limits.

* indicates LCS or LCSD is outside acceptance limits.

U - result is less than the sample detection limit.

1. MCLs indicate USEPA maximum contaminant levels. MCLs are promulgated pursuant to the Safe Drinking Water Act for potable water use.
2. N/A indicates a substance does not have an MCL.
3. MDL indicates minimum detection limit, which is the minimum concentration of analyte that can be measured and reported.
4. Due to dilution of the sample, the MDL for calcium in MW-D2 is 0.63 mg/L.
5. MCL value for total chromium.
6. Lead Treatment Technology Action Level for drinking water is 0.015 mg/L.
7. Value for inorganic mercury.
8. For radium, each sample has a different MDC. The MDCs were as follows: 0.367 pCi/L for MW-U1, 0.413 pCi/L for MW-D1, 0.389 pCi/L for MW-D2, and 0.347 pCi/L for MW-D3.

Table 1b. Crisp County Power Commission
Analytical Data Summary - Second Background Groundwater Sampling Event
Sampling Performed on 27 March 2017

Appendix III to 40 CFR Part 257 - Constituents for Detection Monitoring

Constituent	Unit	MCL[1,2]	MDL[3]	Upgradient Well ID	Downgradient Well ID		
				MW-U1	MW-D1	MW-D2	MW-D3
Boron	mg/L	N/A	0.021	ND	0.066	0.12	0.24
Calcium	mg/L	N/A	0.13	32	22	120	110
Chloride	mg/L	N/A	0.60	2.1	3.4	5.4	3.8
Fluoride	mg/L	4	0.032	0.040 J	0.050 J	0.050 J	0.11
pH	std	N/A	--	7.78	6.55	6.83	6.92
Sulfate	mg/L	N/A	1.4	2.4 J	10	23	27
TDS	mg/L	N/A	3.4	120	110	390	360

Appendix IV to 40 CFR Part 257 - Constituents for Assessment Monitoring

Constituent	Unit	MCL[1,2]	MDL[3]	Upgradient Well ID	Downgradient Well ID		
				MW-U1	MW-D1	MW-D2	MW-D3
Antimony	mg/L	0.006	0.0010	ND	ND	ND	ND
Arsenic	mg/L	0.01	0.00046	ND	ND	ND	ND
Barium	mg/L	2	0.00049	0.0026	0.0099	0.11	0.23
Beryllium	mg/L	0.004	0.00034	ND	ND	ND	ND
Cadmium	mg/L	0.005	0.00034	ND	ND	ND	ND
Chromium	mg/L	0.1[4]	0.0011	0.0017 J	ND	ND	ND
Cobalt	mg/L	N/A	0.00040	ND	ND	ND	0.00079 J
Fluoride	mg/L	4	0.032	0.040 J	0.050 J	0.050 J	0.11
Lead	mg/L	0.015[5]	0.00035	ND	ND	ND	ND
Lithium	mg/L	N/A	0.0032	ND	ND	ND	ND
Mercury	mg/L	0.002[6]	0.000070	ND	ND	0.00011 J	ND
Molybdenum	mg/L	N/A	0.00085	ND	ND	ND	0.0023 J
Radium 226 and 288 Combined[8]	pCi/L	5	--[7]	-0.0198 U	0.655	1.28	0.557
Selenium	mg/L	0.05	0.00024	ND	ND	ND	ND
Thallium	mg/L	0.002	0.000085	ND	ND	ND	0.00011 J

Notes:

ND - the substance was not detected above the analytical method detection limit.

J - result is less than the reporting level but greater than or equal to the MDL and the concentration is an approximate value.

TDS - total dissolved solids.

U - result is less than the sample detection limit.

1. MCLs indicate USEPA maximum contaminant levels. MCLs are promulgated pursuant to the Safe Drinking Water Act for potable water use.
2. N/A indicates a substance does not have an MCL.
3. MDL indicates minimum detection limit, which is the minimum concentration of analyte that can be measured and reported.
4. MCL value for total chromium.
5. Lead Treatment Technology Action Level for drinking water is 0.015 mg/L.
6. Value for inorganic mercury.
7. For radium, each sample has a different MDC. The MDCs were as follows: 0.423 pCi/L for MW-U1, 0.503 pCi/L for MW-D1, 0.389 pCi/L for MW-D2, and 0.351 pCi/L for MW-D3.
8. A negative results occurs when limitations in the measurement process cause the measured value for the sample sample to be less than that of the laboratory blank or background, which is subtracted from the sample measurement.

Table 1c. Crisp County Power Commission
Analytical Data Summary - Third Background Groundwater Sampling Event
Sampling Performed on 24 April 2017

Appendix III to 40 CFR Part 257 - Constituents for Detection Monitoring

Constituent	Unit	MCL[1,2]	MDL[3]	Upgradient Well ID	Downgradient Well ID		
				MW-U1	MW-D1	MW-D2	MW-D3
Boron	mg/L	N/A	0.021	ND	0.079	0.14	0.23
Calcium	mg/L	N/A	0.13[4]	40	24	140	120
Chloride	mg/L	N/A	0.60	1.8 J	4.2	5.6	3.8
Fluoride	mg/L	4	0.032	0.060 J	0.070 J	0.070 J	0.12
pH	std	N/A	--	7.45	7.50	7.10	7.03
Sulfate	mg/L	N/A	1.4	1.4 J	12	21 F1	26
TDS	mg/L	N/A	3.40	44	62	390	330

Appendix IV to 40 CFR Part 257 - Constituents for Assessment Monitoring

Constituent	Unit	MCL[1,2]	MDL[3]	Upgradient Well ID	Downgradient Well ID		
				MW-U1	MW-D1	MW-D2	MW-D3
Antimony	mg/L	0.006	0.0010	ND	ND	ND	ND
Arsenic	mg/L	0.01	0.00046	ND	ND	0.00083 J	0.00052 J
Barium	mg/L	2	0.00049	0.0022 J	0.011	0.15	0.20
Beryllium	mg/L	0.004	0.00034	ND	ND	ND	ND
Cadmium	mg/L	0.005	0.00034	ND	ND	ND	ND
Chromium	mg/L	0.1[5]	0.0011	0.0014 J	ND	ND	ND
Cobalt	mg/L	N/A	0.00040	ND	ND	ND	0.0010 J
Fluoride	mg/L	4	0.032	0.060 J	0.070 J	0.070 J	0.12
Lead	mg/L	0.015[6]	0.00035	ND	ND	ND	ND
Lithium	mg/L	N/A	0.0032	ND	ND	ND	ND
Mercury	mg/L	0.002[7]	0.000070	ND	ND	ND	ND
Molybdenum	mg/L	N/A	0.00085	ND	ND	ND	0.0018 J
Radium 226 and 288 Combined	pCi/L	5	--[8]	0.190 U	0.212 U	0.756	0.572
Selenium	mg/L	0.05	0.00024	ND	ND	ND	ND
Thallium	mg/L	0.002	0.000085	ND	ND	ND	0.000095 J

Notes:

ND - the substance was not detected above the analytical method detection limit.

J - result is less than the reporting level but greater than or equal to the MDL and the concentration is an approximate value.

TDS - total dissolved solids.

U - result is less than the sample detection limit.

1. MCLs indicate USEPA maximum contaminant levels. MCLs are promulgated pursuant to the Safe Drinking Water Act for potable water use.
2. N/A indicates a substance does not have an MCL.
3. MDL indicates minimum detection limit, which is the minimum concentration of analyte that can be measured and reported.
4. Due to dilution of the sample, the MDL for calcium in MW-D2 and MW-D3 is 0.25 mg/L.
5. MCL value for total chromium.
6. Lead Treatment Technology Action Level for drinking water is 0.015 mg/L.
7. Value for inorganic mercury.
8. For radium, each sample has a different MDC. The MDCs were as follows: 0.367 pCi/L for MW-U1, 0.335 pCi/L for MW-D1, 0.343 pCi/L for MW-D2, and 0.379 pCi/L for MW-D3.

Table 1d. Crisp County Power Commission
Analytical Data Summary - Fourth Background Groundwater Sampling Event
Sampling Performed on 22 May 2017

Appendix III to 40 CFR Part 257 - Constituents for Detection Monitoring

Constituent	Unit	MCL[1,2]	MDL[3]	Upgradient Well ID	Downgradient Well ID		
				MW-U1	MW-D1	MW-D2	MW-D3
Boron	mg/L	N/A	0.021	ND	0.10	0.15	0.25
Calcium	mg/L	N/A	0.13[4]	36	26	140	130
Chloride	mg/L	N/A	0.60	2.6	5.9	6.0	4.6
Fluoride	mg/L	4	0.032	0.060 J	0.070 J	0.060 J	0.11
pH	std	N/A	--	7.77	6.39	6.86	6.88
Sulfate	mg/L	N/A	1.4	1.5 J	17	21	28
TDS	mg/L	N/A	3.4	100	100	390	370

Appendix IV to 40 CFR Part 257 - Constituents for Assessment Monitoring

Constituent	Unit	MCL[1,2]	MDL[3]	Upgradient Well ID	Downgradient Well ID		
				MW-U1	MW-D1	MW-D2	MW-D3
Antimony	mg/L	0.006	0.0010	ND	ND	ND	ND
Arsenic	mg/L	0.01	0.00046	ND	ND	0.00048 J	0.00092 J
Barium	mg/L	2	0.00049	0.0020 J	0.013	0.12	0.21
Beryllium	mg/L	0.004	0.00034	ND	ND	ND	ND
Cadmium	mg/L	0.005	0.00034	ND	ND	ND	ND
Chromium	mg/L	0.1[5]	0.0011	0.0014 J	ND	ND	ND
Cobalt	mg/L	N/A	0.00040	ND	ND	ND	0.0012 J
Fluoride	mg/L	4	0.032	0.060 J	0.070 J	0.060 J	0.11
Lead	mg/L	0.015[6]	0.00035	0.00065 J	ND	ND	ND
Lithium	mg/L	N/A	0.0032	ND	ND	ND	ND
Mercury	mg/L	0.002[7]	0.000070	ND	ND	ND	ND
Molybdenum	mg/L	N/A	0.00085	ND	ND	0.0025 J	0.0031 J
Radium 226 and 288 Combined	pCi/L	5	--[8]	0.133 U	0.186 U	0.333 U	0.457
Selenium	mg/L	0.05	0.00024	0.00076 J	ND	0.0010 J	0.00037 J
Thallium	mg/L	0.002	0.000085	ND	ND	0.00011 J	0.00011 J

Notes:

ND - the substance was not detected above the analytical method detection limit.

J - result is less than the reporting level but greater than or equal to the MDL and the concentration is an approximate value.

TDS - total dissolved solids.

U - result is less than the sample detection limit.

1. MCLs indicate USEPA maximum contaminant levels. MCLs are promulgated pursuant to the Safe Drinking Water Act for potable water use.
2. N/A indicates a substance does not have an MCL.
3. MDL indicates minimum detection limit, which is the minimum concentration of analyte that can be measured and reported.
4. Due to dilution of the sample, the MDL for calcium in MW-D2 and MW-D3 is 0.25 mg/L.
5. MCL value for total chromium.
6. Lead Treatment Technology Action Level for drinking water is 0.015 mg/L.
7. Value for inorganic mercury.
8. For radium, each sample has a different MDC. The MDCs were as follows: 0.384 pCi/L for MW-U1, 0.390 pCi/L for MW-D1, 0.354 pCi/L for MW-D2, and 0.334 pCi/L for MW-D3.

Table 1e. Crisp County Power Commission
Analytical Data Summary - Fifth Background Groundwater Sampling Event
Sampling Performed on 19 June 2017

Appendix III to 40 CFR Part 257 - Constituents for Detection Monitoring

Constituent	Unit	MCL[1,2]	MDL[3]	Upgradient Well ID	Downgradient Well ID		
				MW-U1	MW-D1	MW-D2	MW-D3
Boron	mg/L	N/A	0.021	ND	0.091	0.14	0.24
Calcium	mg/L	N/A	0.13[4]	38	22	140	120
Chloride	mg/L	N/A	0.60	1.9 J	3.7	5.0	4.0
Fluoride	mg/L	4	0.032	0.060 J	0.080 J	0.060 J	0.12
pH	std	N/A	--	5.07	5.66	6.22	6.47
Sulfate	mg/L	N/A	1.4	1.8 J	10	18	25
TDS	mg/L	N/A	3.4	92	62	380	330

Appendix IV to 40 CFR Part 257 - Constituents for Assessment Monitoring

Constituent	Unit	MCL[1,2]	MDL[3]	Upgradient Well ID	Downgradient Well ID		
				MW-U1	MW-D1	MW-D2	MW-D3
Antimony	mg/L	0.006	0.0010	ND	ND	ND	ND
Arsenic	mg/L	0.01	0.00046	ND	ND	ND	0.00097 J
Barium	mg/L	2	0.00049	0.0021 J	0.012	0.11	0.21
Beryllium	mg/L	0.004	0.00034	ND	ND	ND	ND
Cadmium	mg/L	0.005	0.00034	ND	ND	ND	ND
Chromium	mg/L	0.1[5]	0.0011	0.0014 J	ND	ND	ND
Cobalt	mg/L	N/A	0.00040	ND	ND	ND	0.0015 J
Fluoride	mg/L	4	0.032	0.060 J	0.080 J	0.060 J	0.12
Lead	mg/L	0.015[6]	0.00035	ND	ND	ND	ND
Lithium	mg/L	N/A	0.0032	ND	ND	ND	ND
Mercury	mg/L	0.002[7]	0.000070	ND	ND	ND	ND
Molybdenum	mg/L	N/A	0.00085	ND	ND	0.0016 J	0.0043 J
Radium 226 and 288 Combined	pCi/L	5	--[8]	0.135 U	0.156 U	0.388	0.780
Selenium	mg/L	0.05	0.00024	0.00062 J B	ND	0.00059 J B	0.0010 J B
Thallium	mg/L	0.002	0.000085	ND	ND	0.00011 J	0.00012 J

Notes:

ND - the substance was not detected above the analytical method detection limit.

J - result is less than the reporting level but greater than or equal to the MDL and the concentration is an approximate value.

TDS - total dissolved solids.

U - result is less than the sample detection limit.

1. MCLs indicate USEPA maximum contaminant levels. MCLs are promulgated pursuant to the Safe Drinking Water Act for potable water use.
2. N/A indicates a substance does not have an MCL.
3. MDL indicates minimum detection limit, which is the minimum concentration of analyte that can be measured and reported.
4. Due to dilution of the sample, the MDL for calcium in MW-D2 and MW-D3 is 0.25 mg/L.
5. MCL value for total chromium.
6. Lead Treatment Technology Action Level for drinking water is 0.015 mg/L.
7. Value for inorganic mercury.
8. For radium, each sample has a different MDC. The MDCs were as follows: 0.352 pCi/L for MW-U1, 0.401 pCi/L for MW-D1, 0.347 pCi/L for MW-D2, and 0.300 pCi/L for MW-D3.

Table 1f. Crisp County Power Commission
Analytical Data Summary - Sixth Background Groundwater Sampling Event
Sampling Performed on 17 July 2017

Appendix III to 40 CFR Part 257 - Constituents for Detection Monitoring

Constituent	Unit	MCL[1,2]	MDL[3]	Upgradient Well ID	Downgradient Well ID		
				MW-U1	MW-D1	MW-D2	MW-D3
Boron	mg/L	N/A	0.021	ND	0.094	0.13	0.25
Calcium	mg/L	N/A	0.13[4]	37 B	19 B	140	120
Chloride	mg/L	N/A	0.60	2.2	3.9	5.2	4.4
Fluoride	mg/L	4	0.032	0.060 J	0.11	0.060 J	0.060 J
pH	std	N/A	--	6.37	6.20	6.68	7.01
Sulfate	mg/L	N/A	1.4	2.8 J	13	17	25
TDS	mg/L	N/A	3.40	78	54	380	350

Appendix IV to 40 CFR Part 257 - Constituents for Assessment Monitoring

Constituent	Unit	MCL[1,2]	MDL[3]	Upgradient Well ID	Downgradient Well ID		
				MW-U1	MW-D1	MW-D2	MW-D3
Antimony	mg/L	0.006	0.0010	ND	ND	ND	ND
Arsenic	mg/L	0.01	0.00046	0.00046 J	ND	0.00095 J	0.0016
Barium	mg/L	2	0.00049	0.0025	0.012	0.16	0.20
Beryllium	mg/L	0.004	0.00034	ND	ND	ND	ND
Cadmium	mg/L	0.005	0.00034	ND	ND	ND	ND
Chromium	mg/L	0.1[3]	0.0011	0.0014 J	ND	ND	ND
Cobalt	mg/L	N/A	0.00040	ND	ND	ND	0.0014 J
Fluoride	mg/L	4	0.032	0.060 J	0.11	0.060 J	0.060 J
Lead	mg/L	0.015[4]	0.00035	ND	ND	ND	ND
Lithium	mg/L	N/A	0.0032	ND	ND	ND	ND
Mercury	mg/L	0.002[5]	0.000070	ND	ND	ND	ND
Molybdenum	mg/L	N/A	0.00085	ND	ND	ND	0.0027 J
Radium 226 and 288 Combined	pCi/L	5	--[8]	0.190 U	0.153 U	0.534	0.409
Selenium	mg/L	0.05	0.00024	0.00070 J	0.00033 J	0.00033 J	ND
Thallium	mg/L	0.002	0.000085	ND	ND	0.00011 J	0.00012 J

Notes:

ND - the substance was not detected above the analytical method detection limit.

J - result is less than the reporting level but greater than or equal to the MDL and the concentration is an approximate value.

TDS - total dissolved solids.

U - result is less than the sample detection limit.

1. MCLs indicate USEPA maximum contaminant levels. MCLs are promulgated pursuant to the Safe Drinking Water Act for potable water use.
2. N/A indicates a substance does not have an MCL.
3. MDL indicates minimum detection limit, which is the minimum concentration of analyte that can be measured and reported.
4. Due to dilution of the sample, the MDL for calcium in MW-D2 and MW-D3 is 0.25 mg/L.
5. MCL value for total chromium.
6. Lead Treatment Technology Action Level for drinking water is 0.015 mg/L.
7. Value for inorganic mercury.
8. For radium, each sample has a different MDC. The MDCs were as follows: 0.309 pCi/L for MW-U1, 0.338 pCi/L for MW-D1, 0.336 pCi/L for MW-D2, and 0.329 pCi/L for MW-D3.

Table 1g. Crisp County Power Commission
Draft Analytical Data Summary - Seventh Background Groundwater Sampling Event
Sampling Performed on 14 August 2017

Appendix III to 40 CFR Part 257 - Constituents for Detection Monitoring

Constituent	Unit	MCL[1,2]	MDL[3]	Upgradient Well ID	Downgradient Well ID		
				MW-U1	MW-D1	MW-D2	MW-D3
Boron	mg/L	N/A	0.021	ND	0.11	0.13	0.24
Calcium	mg/L	N/A	0.13[4]	33	21	130	110
Chloride	mg/L	N/A	0.60	2.0	3.9	5.4	4.7
Fluoride	mg/L	4	0.032	0.050 J	0.070 J	0.060 J	0.12
pH	std	N/A	--	7.45	6.36	6.81	6.86
Sulfate	mg/L	N/A	1.4	2.6 J	22	20	27
TDS	mg/L	N/A	3.40	86	76	380	350

Appendix IV to 40 CFR Part 257 - Constituents for Assessment Monitoring

Constituent	Unit	MCL[1,2]	MDL[3]	Upgradient Well ID	Downgradient Well ID		
				MW-U1	MW-D1	MW-D2	MW-D3
Antimony	mg/L	0.006	0.0010	ND	ND	ND	ND
Arsenic	mg/L	0.01	0.00046	ND	ND	ND	0.00048 J
Barium	mg/L	2	0.00049	0.0020 J	0.014	0.13	0.18
Beryllium	mg/L	0.004	0.00034	ND	ND	ND	ND
Cadmium	mg/L	0.005	0.00034	ND	ND	ND	ND
Chromium	mg/L	0.1[3]	0.0011	0.0012 J	ND	ND	ND
Cobalt	mg/L	N/A	0.00040	ND	ND	ND	0.0013 J
Fluoride	mg/L	4	0.032	0.050 J	0.070 J	0.060 J	0.12
Lead	mg/L	0.015[4]	0.00035	ND	0.00080 J	0.00037 J	ND
Lithium	mg/L	N/A	0.0032	ND	ND	ND	ND
Mercury	mg/L	0.002[5]	0.000070	ND	ND	ND	ND
Molybdenum	mg/L	N/A	0.00085	ND	ND	ND	0.0017 J
Radium 226 and 288 Combined	pCi/L	5	--[8]	0.302 U	0.287 U	0.452	0.339 U
Selenium	mg/L	0.05	0.00024	0.00058 J	ND	ND	ND
Thallium	mg/L	0.002	0.000085	ND	ND	0.00013 J	0.00011 J

Notes:

ND - the substance was not detected above the analytical method detection limit.

J - result is less than the reporting level but greater than or equal to the MDL and the concentration is an approximate value.

TDS - total dissolved solids.

U - result is less than the sample detection limit.

1. MCLs indicate USEPA maximum contaminant levels. MCLs are promulgated pursuant to the Safe Drinking Water Act for potable water use.
2. N/A indicates a substance does not have an MCL.
3. MDL indicates minimum detection limit, which is the minimum concentration of analyte that can be measured and reported.
4. Due to dilution of the sample, the MDL for calcium in MW-D2 is 0.25 mg/L.
5. MCL value for total chromium.
6. Lead Treatment Technology Action Level for drinking water is 0.015 mg/L.
7. Value for inorganic mercury.
8. For radium, each sample has a different MDC. The MDCs were as follows: 0.367 pCi/L for MW-U1, 0.320 pCi/L for MW-D1, 0.373 pCi/L for MW-D2, and 0.349 pCi/L for MW-D3.

Table 1h. Crisp County Power Commission
Analytical Data Summary - Eighth Background Groundwater Sampling Event
Sampling Performed on 13 September 2017

Appendix III to 40 CFR Part 257 - Constituents for Detection Monitoring

Constituent	Unit	MCL[1,2]	MDL[3]	Upgradient Well ID	Downgradient Well ID		
				MW-U1	MW-D1	MW-D2	MW-D3
Boron	mg/L	N/A	0.021	ND	0.15	0.15	0.26
Calcium	mg/L	N/A	0.13[4]	35	22	130	120
Chloride	mg/L	N/A	0.60	2.2	3.1	5.5	4.5
Fluoride	mg/L	4	0.032	0.058 J	0.075 J	0.061 J	0.12
pH	std	N/A	--	7.63	5.88	6.44	6.56
Sulfate	mg/L	N/A	1.4	3.1 J	23	20	29
TDS	mg/L	N/A	3.40	110	92	390	390

Appendix IV to 40 CFR Part 257 - Constituents for Assessment Monitoring

Constituent	Unit	MCL[1,2]	MDL[3]	Upgradient Well ID	Downgradient Well ID		
				MW-U1	MW-D1	MW-D2	MW-D3
Antimony	mg/L	0.006	0.0010	ND	ND	ND	ND
Arsenic	mg/L	0.01	0.00046	ND	ND	ND	0.00079 J
Barium	mg/L	2	0.00049	0.0023 J	0.014	0.14	0.18
Beryllium	mg/L	0.004	0.00034	ND	ND	ND	ND
Cadmium	mg/L	0.005	0.00034	ND	ND	ND	ND
Chromium	mg/L	0.1[3]	0.0011	0.0014 J	ND	ND	ND
Cobalt	mg/L	N/A	0.00040	ND	ND	ND	0.0014 J
Fluoride	mg/L	4	0.032	0.058 J	0.075 J	0.061 J	0.12
Lead	mg/L	0.015[4]	0.00035	ND	ND	ND	ND
Lithium	mg/L	N/A	0.0032	ND	ND	ND	ND
Mercury	mg/L	0.002[5]	0.000070	ND	ND	ND	ND
Molybdenum	mg/L	N/A	0.00085	ND	ND	ND	0.0021 J
Radium 226 and 288 Combined	pCi/L	5	--[8]	0.614	0.816	0.453	1.28
Selenium	mg/L	0.05	0.00024	0.00041 J	ND	ND	ND
Thallium	mg/L	0.002	0.000085	ND	ND	0.00012 J	0.00013 J

Notes:

ND - the substance was not detected above the analytical method detection limit.

J - result is less than the reporting level but greater than or equal to the MDL and the concentration is an approximate value.

TDS - total dissolved solids.

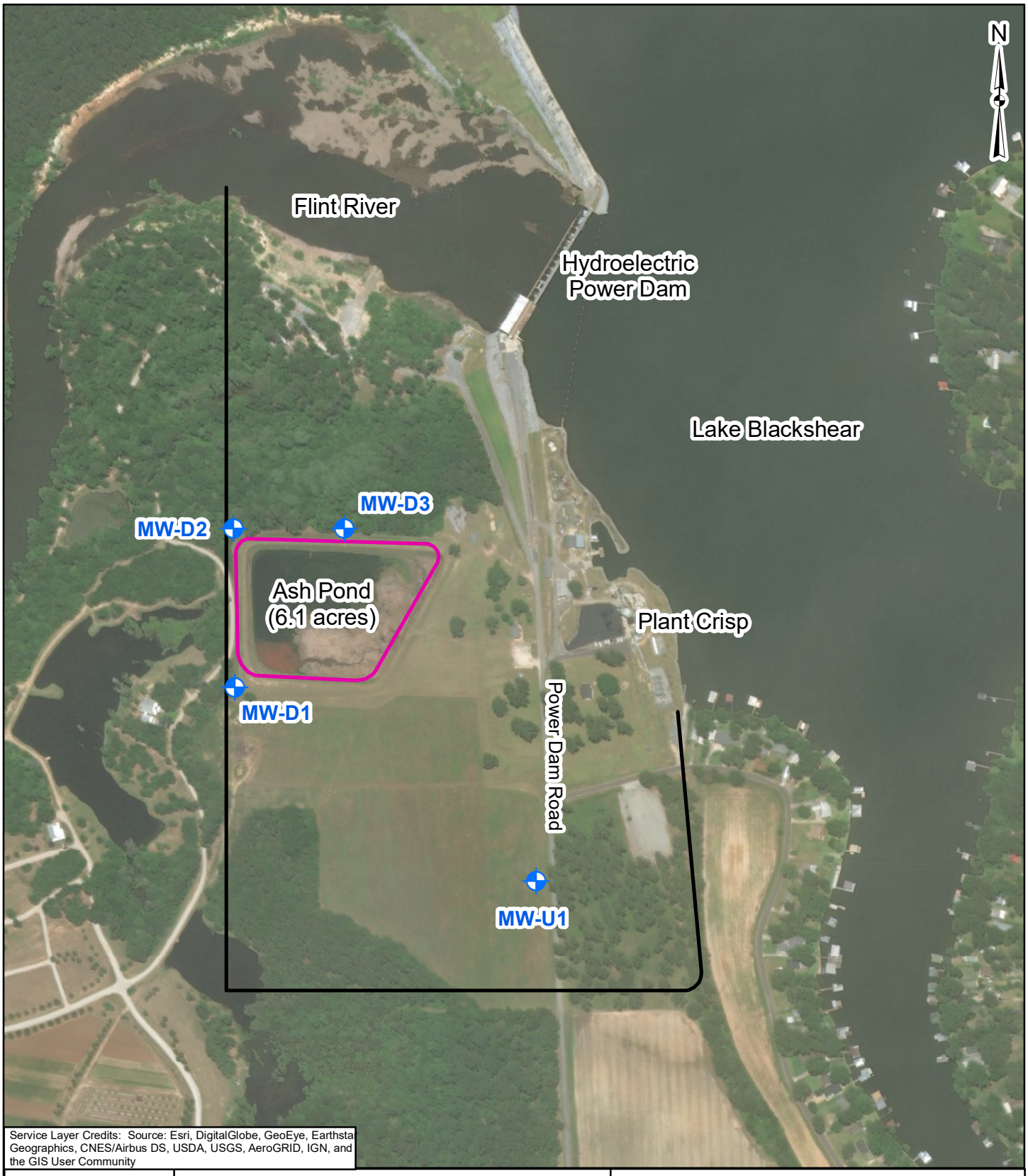
1. MCLs indicate USEPA maximum contaminant levels. MCLs are promulgated pursuant to the Safe Drinking Water Act for potable water use.
2. N/A indicates a substance does not have an MCL.
3. MDL indicates minimum detection limit, which is the minimum concentration of analyte that can be measured and reported.
4. Due to dilution of the sample, the MDL for calcium in MW-D2 and MW-D3 is 0.25 mg/L.
5. MCL value for total chromium.
6. Lead Treatment Technology Action Level for drinking water is 0.015 mg/L.
7. Value for inorganic mercury.
8. During the analysis of radium, background concentrations are substracted, thus each sample have a different MDC. The MDCs were as follows: 0.344 pCi/L for MW-U1, 0.345 pCi/L for MW-D1, 0.349 pCi/L for MW-D2, and 0.433 pCi/L for MW-D3.

Table 2. Summary of Statistical Analysis Results

Appendix III to Part 257 - Constituents for Detection Monitoring	Well ID	Number of Samples	Number of Non-detects	% Non-detects	Minimum	Maximum	Mean	Median	Standard Deviation	EPA 1989 Outlier Screening or Tukey's Outlier for Non-normal Data	Mann-Kendall Trend Test	Upper Prediction Limit	Interwell Prediction Limit
										Outliers in the Background Well Data	Background Data has Trend at 95% Confidence Level?		Concentrations in Downgradient Well Show Statistically Significant Increase (SSI) Above Concentrations in Background Well?
Boron [mg/L]	MW-U1	8	8	100%	<0.021	<0.021	<0.021	<0.021	0.000	No Outlier	No	0.021	Background Well
	MW-D1	8	0	0%	0.065	0.150	0.094	0.093	0.027				**Yes***
	MW-D2	8	0	0%	0.120	0.150	0.136	0.135	0.011				**Yes***
	MW-D3	8	0	0%	0.230	0.260	0.244	0.240	0.009				**Yes***
Calcium [mg/L]	MW-U1	8	0	0%	32.000	40.000	35.630	35.500	2.669	No Outlier	No	42.07	Background Well
	MW-D1	8	0	0%	19.000	26.000	22.000	22.000	2.204				No
	MW-D2	8	0	0%	120.000	160.000	137.500	140.000	11.650				**Yes**
	MW-D3	8	0	0%	110.000	130.000	117.500	120.000	7.071				**Yes**
Chloride [mg/L]	MW-U1	8	0	0%	1.800	2.600	2.125	2.150	0.244	No Outlier	No	2.713	Background Well
	MW-D1	8	0	0%	2.900	5.900	3.875	3.800	0.927				**Yes**
	MW-D2	8	0	0%	5.000	6.000	5.475	5.450	0.306				**Yes**
	MW-D3	8	0	0%	3.800	4.700	4.213	4.200	0.376				**Yes**
Fluoride [mg/L]	MW-U1	8	0	0%	0.040	0.060	0.056	0.060	0.007	No Outlier	No	0.06	Background Well
	MW-D1	8	0	0%	0.050	0.110	0.073	0.070	0.018				**Yes**
	MW-D2	8	0	0%	0.050	0.070	0.060	0.060	0.005				**Yes**
	MW-D3	8	0	0%	0.060	0.130	0.111	0.120	0.022				**Yes**
Field pH [std]	MW-U1	8	0	0%	5.070	7.780	7.158	7.540	0.962	5.07 (6/19/2017) and 6.37 (7/17/2017)	No	Between 4.4 and 8.8 Standard Unit	Background Well
	MW-D1	8	0	0%	5.660	7.500	6.401	6.375	0.556				No
	MW-D2	8	0	0%	6.220	7.100	6.724	6.820	0.275				No
	MW-D3	8	0	0%	6.470	7.030	6.825	6.875	0.203				No
Sulfate [mg/L]	MW-U1	8	0	0%	1.400	3.100	2.300	2.500	0.648	No Outlier	No	3.866	Background Well
	MW-D1	8	0	0%	10.000	23.000	14.630	12.500	5.397				**Yes**
	MW-D2	8	0	0%	17.000	23.000	19.880	20.000	1.885				**Yes**
	MW-D3	8	0	0%	25.000	29.000	26.750	27.000	1.389				**Yes**
Total Dissolved Solids (TDS) [mg/L]	MW-U1	8	0	0%	44.000	120.000	88.750	89.000	23.200	44 mg/L (4/24/2017)	No	136.30	Background Well
	MW-D1	8	0	0%	54.000	110.000	79.000	76.000	19.970				No
	MW-D2	8	0	0%	360.000	390.000	382.500	385.000	10.350				**Yes**
	MW-D3	8	0	0%	330.000	390.000	351.300	350.000	21.670				**Yes**

Notes
mg/L = milligrams per liter
std = standard units
*: The Double Quantification Rule is used for background data sets with no detections.
MW-U1 is background well.

FIGURES



Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthsta Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Groundwater Monitoring Well
- Ash Pond Limits
- CCPC Property Boundary

0 250 500 1,000 Feet

Groundwater Monitoring Well Location Map

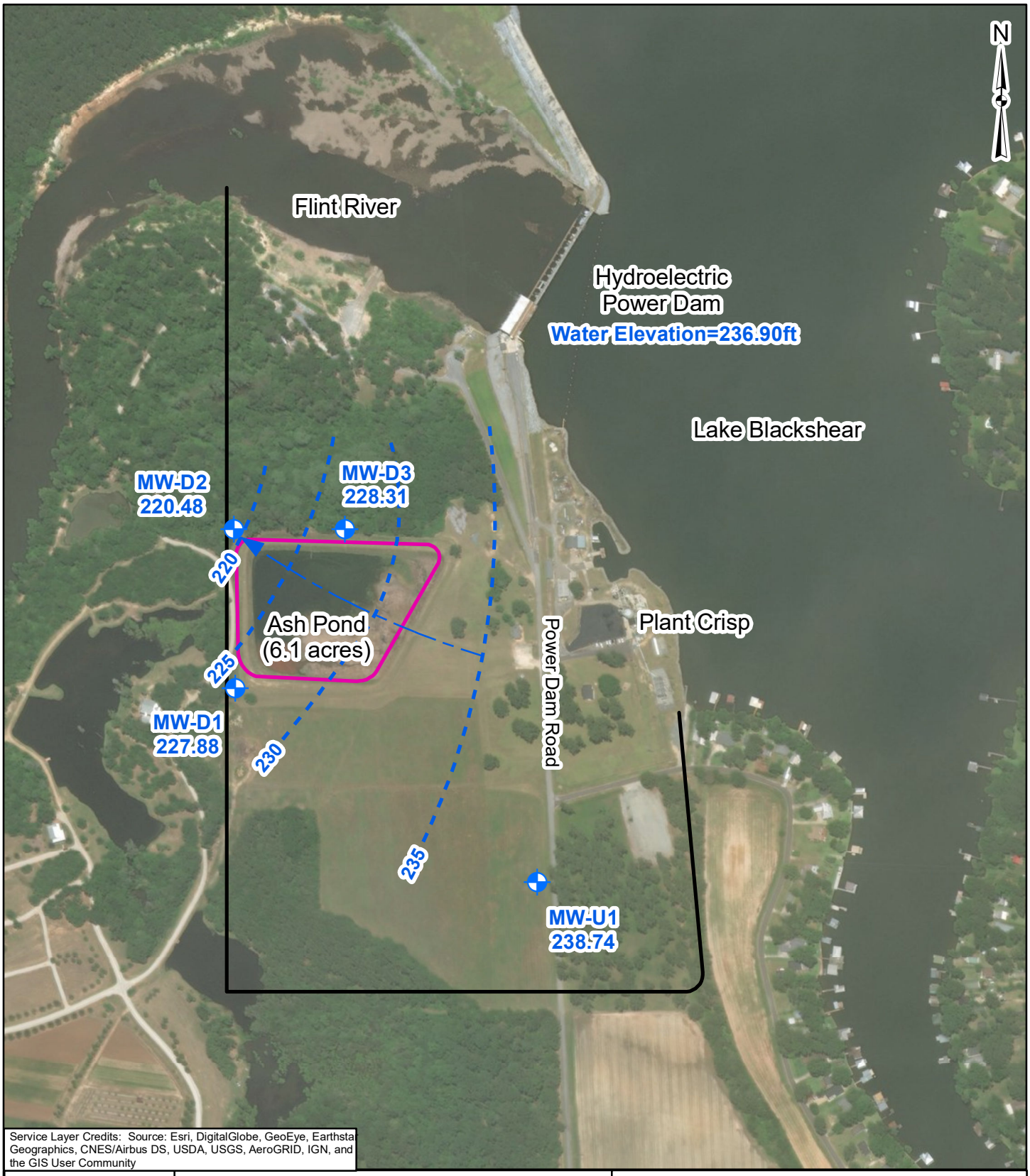
Crisp County Power Commission
Warwick, Georgia

Geosyntec consultants

KENNESAW, GA

DATE:	JANUARY 2018
PROJECT NO.	GW6152
DOCUMENT NO.	GA 180043
FILE NO.	GW MONITORING WELL LOCATION MAP.MXD
FIGURE NO.	1

N:\Crisp County\GIS\MXD\2018\GW Monitoing Well Location Map.mxd 1/23/2018 2:41:19 PM DY



Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthsta Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Groundwater Monitoring Well
- Groundwater Elevation Contour - 27 March 2017 (ft)
- Groundwater Flow Direction
- Ash Pond Limits
- CCPC Property Boundary

0 250 500 1,000 Feet

Potentiometric Surface Map
27 March 2017

Crisp County Power Commission
Warwick, Georgia

Geosyntec consultants
KENNESAW, GA

DATE:	JANUARY 2018
PROJECT NO.	GW6152
DOCUMENT NO.	GA 180043
FILE NO.	POTENTIOMETRIC SURFACE MAP.MXD
FIGURE NO.	2

N:\Crisp County\GIS\MXD\2018\Potentiometric Surface Map.mxd 1/23/2018 2:40:47 PM NT

APPENDIX A

Groundwater Monitoring System Certification

Geosyntec consultants

1255 Roberts Blvd Suite 200
Kennesaw, Georgia 30144
PH 678.202.9500
www.geosyntec.com

14 June 2017

Mr. Steve Rentfrow
General Manager, Crisp County Power Commission
Cordele, GA 31015

Subject: 40 CFR Part 257, Subpart D, Section 257.91(f) Groundwater Monitoring System Certification Crisp County Power Commission (CCPC) Ash Pond, Warwick, GA

Dear Mr. Rentfrow,

According to Title 40 Code of Federal Regulations (40 CFR) Part 257, Subpart D, Section 257.91(f); the owner or operator of a coal combustion residual (CCR) management unit must obtain a certification from a qualified professional engineer stating that the groundwater monitoring system at the CCR management unit has been designed and constructed to meet the requirements of Section 257.91. Further, Section 257.91 requires that the system monitor the uppermost aquifer and include a minimum of one upgradient and three downgradient monitoring wells, and that if the uppermost aquifer monitoring system includes the minimum number of wells, the basis supporting use of the minimum must be documented.

Upon review of the site conditions (i.e., location, configuration of the CCPC ash pond, site topography, surface water bodies, and geologic setting) a groundwater monitoring system that meets the minimum requirements of Section 257.91 has been designed and installed for the CCPC ash pond. The groundwater monitoring system includes the following monitoring wells:

- Upgradient: MW-U1 (approximately 1,000 feet upgradient to the southeast)
- Downgradient: MW-D1, MW-D2, and MW-D3 (immediately downgradient of the ash pond to the southwest, northwest, and north, respectively)

The CCPC ash pond is a relatively small ash pond, with an approximate reservoir area of 6.5 acres, and is situated between two main water bodies, Lake Blackshear (located east/southeast and upgradient of the pond) and the Flint River (located north/northwest and downgradient of the pond). Additionally, two smaller ponds are located on the adjoining property west of the CCPC pond. The groundwater was anticipated to flow generally from the east/southeast to the north/northwest direction and disperse radially from the ash pond as driven by the hydraulic head of the pond created during its operation. The three-well downgradient monitoring system was designed based on these conditions and provides good coverage of the downgradient flow from the 6.5-acre ash pond.

Provided herein, as required by Section 257.91(f), is certification from a qualified professional engineer that the groundwater monitoring system at CCPC Ash Pond meets the requirements of Section 257.91.

I, Cuneyt Gokmen, a qualified professional engineer, certify that the groundwater monitoring system at Crisp County Power Commission Ash Pond is designed to detect groundwater contamination and constructed to meet the requirements set forth in Section 257.91 of the United States Environmental Protection Agency's Final Rule to Regulate the Disposal of Coal Combustion Residuals from Electric Utilities as Solid Waste under Subtitle D of the Resource Conservation and Recovery Act.

14 JUNE 2017

Cuneyt Gokmen, P.E.
Professional Engineer No. 28504
State of Georgia

APPENDIX B

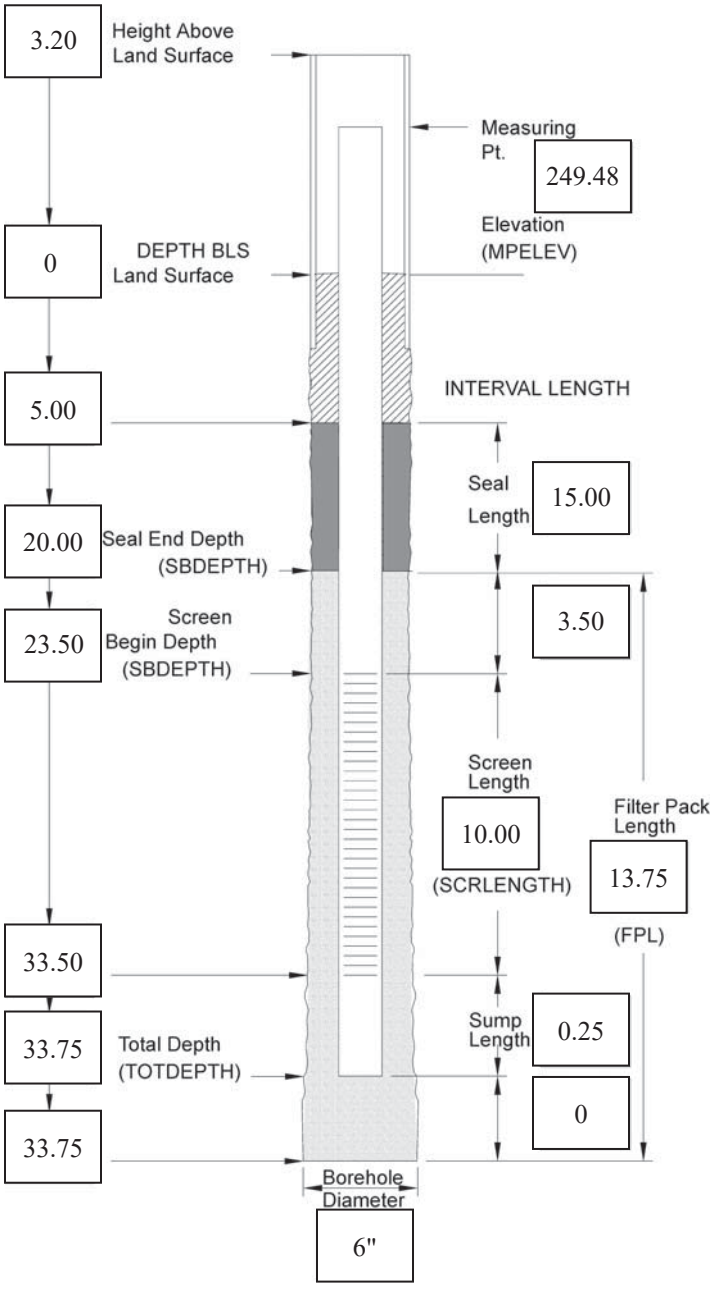
Monitoring Well Construction Diagrams

WELL CONSTRUCTION LOG
ABOVE GROUND COMPLETION

Well I.D.: MW-U1

Drilling Company: EMServices
Drillers: Jason William
Geologist/Engineer: Jeremy Gasser
Signature: Jeremy Gasser Digitally signed by Jeremy Gasser Date: 2018.01.23 09:29:57 -05'00'

Site: Crisp County Power Plant, Warwick, Georgia
Project Number: GW6152
Installation Method: Hallow Stem Auger
Casing Installation Date: 2/23/2017
Well Type: Sch 40 PVC 2" (Monitoring Well)
Well Completion Method: Stickup with Pad and Bollards
Geologic Completion Zone: Sand with Clay



Comments

Northing: 669996.79, Easting: 2366420.55
Ground Elevation: 246.28
Datums: NAD83/Georgia West Zone, NAVD88

Well Completion
Guard Posts **YES** Date: 2/23/2017
Surface Pad Size: 2 ft x 2 ft
Protective Casing or Cover
Diameter/Type: 4" Aluminum
Depth BGS: 1 ft Weep Hole **NO**
Grout
Composition/Proportions: Type 1 Portland Cement with Bentonite Powder Mix
Placement Method: Pour

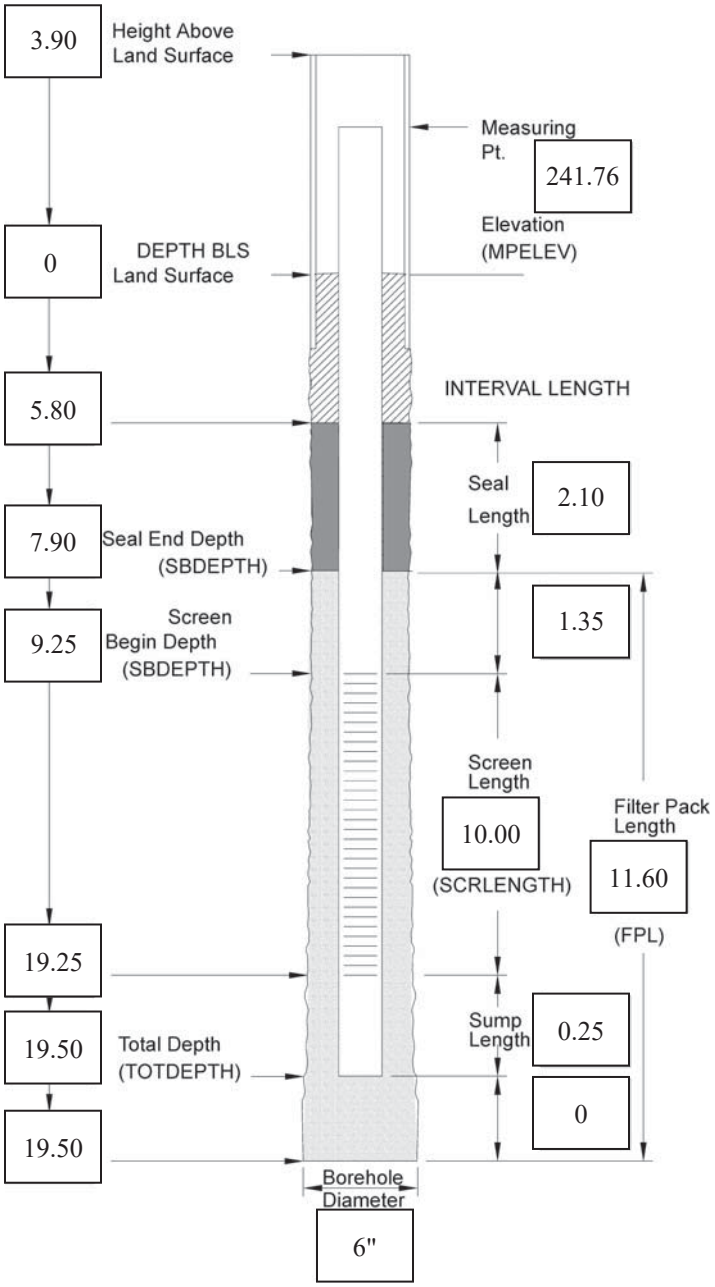
Seal Date: 02/23/2017
Type: Bentonite Pellets, Coated
Source: N/A
Set-up/Hydration Time: 10-hours
Placement Method: Pour
Vol. Fluid Added: N/A
Filter Pack
Type: Grade 1 Sand
Source: N/A
Amount Used: 2.50 cf
Placement Method: Pour
Well Riser Pipe
Casing Material: Sch 40 PVC
Casing Inside Diameters: 2 in.
Screen
Material: Sch 40 PVC
Inside Diameter: 2 in.
Screen Slot Size: 0.010 in.
Percent Open Area: N/A
Sump or Bottom Cap **YES**
Type/Length: 0.25' Threaded
Backfill Plug NO
Material: N/A
Placement Method: N/A
Set-up/Hydration Time: N/A
Total Water Volume During Construction
Introduced (Gal): N/A Recovered (Gal): N/A
Reviewed
By: Chris Livingston Date: 03/06/2017

WELL CONSTRUCTION LOG
ABOVE GROUND COMPLETION

Well I.D.: MW-D1

Drilling Company: EMServices
Drillers: Jason William
Geologist/Engineer: Jeremy Gasser
Signature: Jeremy Gasser Digitally signed by Jeremy Gasser Date: 2018.01.23 09:25:13 -05'00'

Site: Crisp County Power Plant, Warwick, Georgia
Project Number: GW6152
Installation Method: Hallow Stem Auger
Casing Installation Date: 2/22/2017
Well Type: Sch 40 PVC 2" (Monitoring Well)
Well Completion Method: Stickup with Pad and Bollards
Geologic Completion Zone: Sand with Clay



Comments

Northing: 670708.47, Easting: 2365315.12
Ground Elevation: 238.10
Datums: NAD83/Georgia West, NAVD88

Well Completion
Guard Posts **YES** Date: 2/23/2017
Surface Pad Size: 2 ft x 2 ft
Protective Casing or Cover
Diameter/Type: 4" Aluminum
Depth BGS: 1 ft Weep Hole **NO**
Grout
Composition/Proportions: Type 1 Portland Cement with Bentonite Powder Mix
Placement Method: Pour

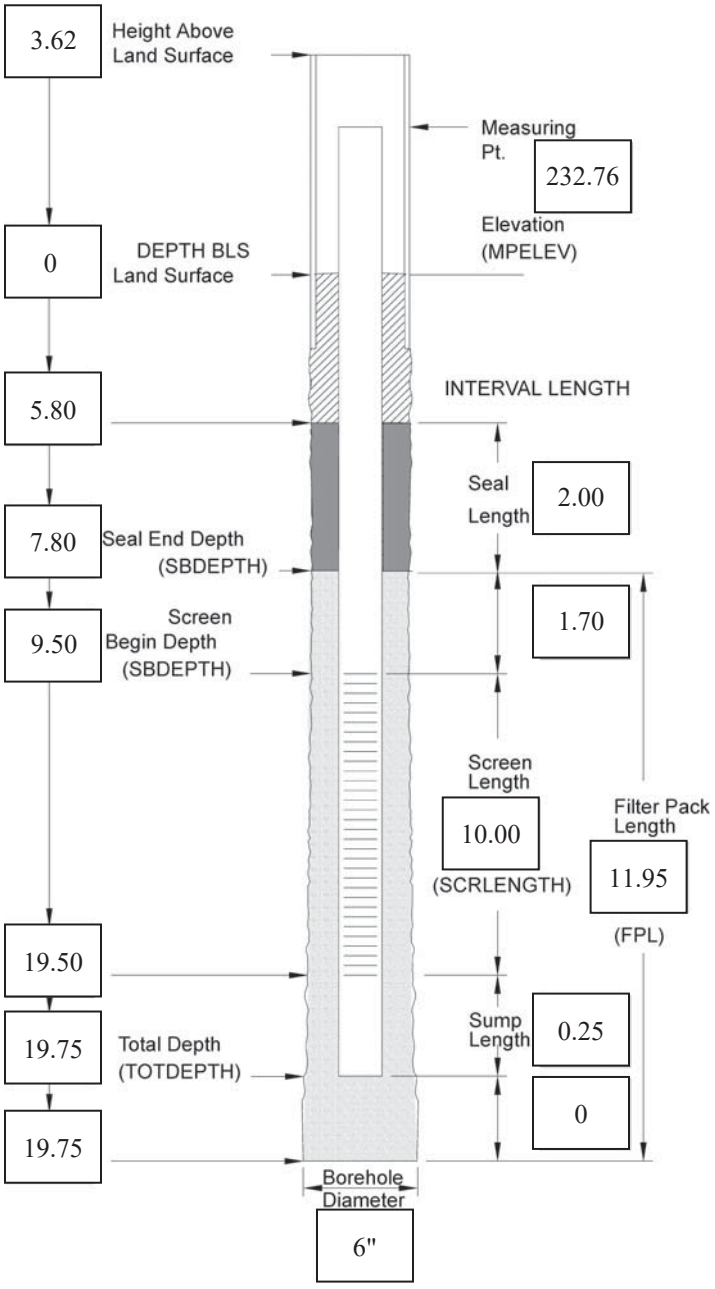
Seal Date: 2/22/2017
Type: Bentonite Pellets, Coated
Source: N/A
Set-up/Hydration Time: 24-hours
Placement Method: Pour
Vol. Fluid Added: N/A
Filter Pack
Type: Grade 1 Sand
Source: N/A
Amount Used: 2.00 cf
Placement Method: Pour
Well Riser Pipe
Casing Material: Sch 40 PVC
Casing Inside Diameters: 2 in.
Screen
Material: Sch 40 PVC
Inside Diameter: 2 in.
Screen Slot Size: 0.010 in.
Percent Open Area: N/A
Sump or Bottom Cap **YES**
Type/Length: 0.25' Threaded
Backfill Plug NO
Material: N/A
Placement Method: N/A
Set-up/Hydration Time: N/A
Total Water Volume During Construction
Introduced (Gal): N/A Recovered (Gal): N/A
Reviewed
By: Chris Livingston Date: 03/06/2017

WELL CONSTRUCTION LOG
ABOVE GROUND COMPLETION

Well I.D.: MW-D2

Drilling Company: EMServices
Drillers: Jason William
Geologist/Engineer: Jeremy Gasser
Signature: Jeremy Gasser Digitally signed by Jeremy Gasser Date: 2018.01.23 09:25:35 -05'00'

Site: Crisp County Power Plant, Warwick, Georgia
Project Number: GW6152
Installation Method: Hallow Stem Auger
Casing Installation Date: 2/21/2017
Well Type: Sch 40 PVC 2" (Monitoring Well)
Well Completion Method: Stickup with Pad and Bollards
Geologic Completion Zone: Sand with Clay



Comments

Northing: 671291.61, Easting: 2365308.73
Ground Elevation: 229.14
Datums: NAD83/Georgia West, NAVD88

Well Completion
Guard Posts **YES** Date: 2/23/2017
Surface Pad Size: 2 ft x 2 ft
Protective Casing or Cover
Diameter/Type: 4" Aluminum
Depth BGS: 1 ft Weep Hole **NO**
Grout
Composition/Proportions: Type 1 Portland Cement with Bentonite Powder Mix
Placement Method: Pour

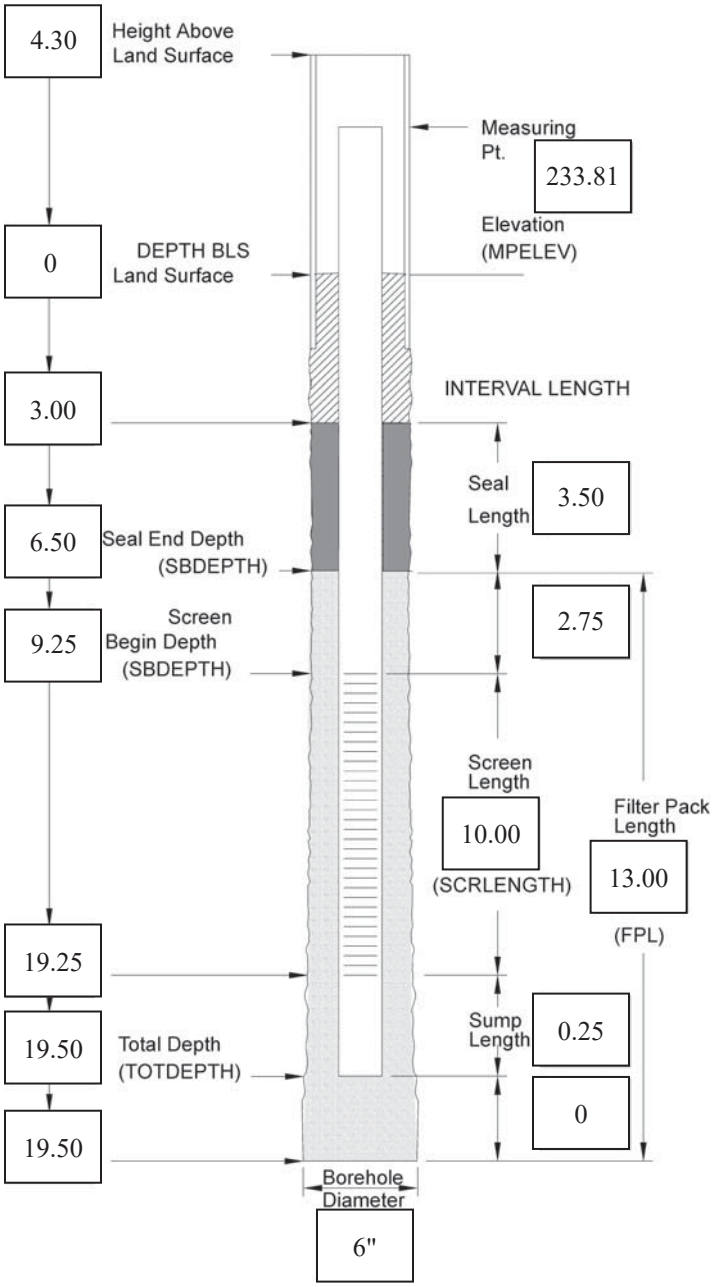
Seal Date: 2/21/2017
Type: Bentonite Pellets, Coated
Source: N/A
Set-up/Hydration Time: 24-hours
Placement Method: Pour
Vol. Fluid Added: N/A
Filter Pack
Type: Grade 1 Sand
Source: N/A
Amount Used: 2.00 cf
Placement Method: Pour
Well Riser Pipe
Casing Material: Sch 40 PVC
Casing Inside Diameters: 2 in.
Screen
Material: Sch 40 PVC
Inside Diameter: 2 in.
Screen Slot Size: 0.010 in.
Percent Open Area: N/A
Sump or Bottom Cap **YES**
Type/Length: 0.25' Threaded
Backfill Plug NO
Material: N/A
Placement Method: N/A
Set-up/Hydration Time: N/A
Total Water Volume During Construction
Introduced (Gal): N/A Recovered (Gal): N/A
Reviewed
By: Chris Livingston Date: 03/06/2017

WELL CONSTRUCTION LOG
ABOVE GROUND COMPLETION

Well I.D.: MW-D3

Drilling Company: EMServices
Drillers: Jason William
Geologist/Engineer: Jeremy Gasser
Signature: Jeremy Gasser Digitally signed by Jeremy Gasser Date: 2018.01.23 09:28:37 -05'00'

Site: Crisp County Power Plant, Warwick, Georgia
Project Number: GW6152
Installation Method: Hallow Stem Auger
Casing Installation Date: 2/22/2017
Well Type: Sch 40 PVC 2" (Monitoring Well)
Well Completion Method: Stickup with Pad and Bollards
Geologic Completion Zone: Sand with Clay



Well Completion
Guard Posts **YES** Date: 2/23/2017
Surface Pad Size: 2 ft x 2 ft
Protective Casing or Cover
Diameter/Type: 4" Aluminum
Depth BGS: 1 ft Weep Hole **NO**
Grout
Composition/Proportions: Type 1 Portland Cement with Bentonite Powder Mix
Placement Method: Pour

Seal Date: 2/22/2017
Type: Bentonite Pellets, Coated
Source: N/A
Set-up/Hydration Time: 24-hours
Placement Method: Pour
Vol. Fluid Added: N/A
Filter Pack
Type: Grade 1 Sand
Source: N/A
Amount Used: 2.25 cf
Placement Method: Pour
Well Riser Pipe
Casing Material: Sch 40 PVC
Casing Inside Diameters: 2 in.
Screen
Material: Sch 40 PVC
Inside Diameter: 2 in.
Screen Slot Size: 0.010 in.
Percent Open Area: N/A
Sump or Bottom Cap **YES**
Type/Length: 0.25' Threaded
Backfill Plug NO
Material: N/A
Placement Method: N/A
Set-up/Hydration Time: N/A
Total Water Volume During Construction
Introduced (Gal): N/A Recovered (Gal): N/A
Reviewed
By: Chris Livingston Date: 03/06/2017

Comments
Northing: 671291.07, Easting: 2365715.53
Ground Elevation: 229.77
Datums: NAD83/Georgia West, NAVD88

APPENDIX C

Groundwater Monitoring and Statistical Analysis Plan

Prepared for

Crisp County Power Commission
202 S. 7th Street
Cordele, Georgia 31015

GROUNDWATER MONITORING AND STATISTICAL ANALYSIS PLAN

PLANT CRISP ASH POND
CRISP COUNTY POWER COMMISSION

961 Power Dam Road
Warwick, GA 31796

Prepared by

Geosyntec consultants

engineers | scientists | innovators

1255 Roberts Boulevard, Suite 200
Kennesaw, Georgia 30144

Project Number GW6152

October 2017

Geosyntec
consultants

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

COMMONLY USED ACRONYMS

ANOVA	Analysis of Variance
CCPC	Crisp County Power Commission
CCR	Coal Combustion Residuals
CFR	Code of Federal Regulations
DO	Dissolved Oxygen
MCL	Maximum Contaminant Level
MW	Megawatt
NTU	Nephelometric Turbidity Unit
ORP	Oxidation Reduction Potential
PL	Upper Prediction Limit
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SOP	Standard Operating Procedure
SSI	Statistically Significant Increase
SSL	Statistically Significant Level
SWFPR	Site-wide False Positive Rate
USEPA	United States Environmental Protection Agency
UTL	Upper Tolerance Limit

1. INTRODUCTION

In April 2015, the United States Environmental Protection Agency (USEPA) issued new regulations regarding the disposal of coal combustion residuals (CCR) under 40 CFR §257, Subpart D, referred to as the "USEPA CCR Rule". Facilities regulated under the CCR Rule are required to develop and sample a groundwater monitoring well network to evaluate if the CCR disposal units are impacting downgradient groundwater quality. As part of the evaluation, the analytical data collected during the sampling events must undergo statistical analysis to evaluate if any statistically significant increases (SSIs) in analyte concentrations above background levels exist. A description of acceptable statistical programs is provided in USEPA's document *Statistical Analysis of Groundwater Data at RCRA Facilities, Unified Guidance* (USEPA, 2009), which is commonly referred to as the "Unified Guidance".

The USEPA CCR Rule is not prescriptive regarding what statistical analysis should be selected to ensure groundwater data are interpreted in a consistent matter and the results meet certification requirements. Geosyntec Consultants, Inc. (Geosyntec) prepared this Groundwater Monitoring and Statistical Analysis Plan on behalf of Crisp County Power Commission (CCPC) to develop a process regarding the selection of the appropriate statistical analysis of groundwater data collected from the site. The Groundwater Monitoring and Statistical Analysis Plan provides: (i) groundwater sampling methods; (ii) analytical methods; and (iii) a narrative description of the statistical approach and methods to be used in accordance with the USEPA CCR Rule reporting requirements [40 CFR §257.93(f)(6)]. The document describes procedures for collecting, preserving, shipping, and laboratory analysis of groundwater samples as well as statistical procedures to be used to establish background conditions, implement detection monitoring, and implement assessment monitoring (as needed) for the CCPC ash impoundment. This document does not include statistical procedures for corrective action monitoring which should be developed when a corrective action groundwater monitoring program is established, if remedial action is necessary.

2. SITE LOCATION AND BACKGROUND

Crisp County Power Commission (CCPC) Plant Crisp is a dual-fuel (coal and natural gas) electrical generation facility located in Worth County, Georgia. The byproducts of power generation through the combustion of coal (commonly referred to as Coal Combustion Residuals or CCRs) at Plant Crisp included mainly fly ash and bottom ash. The CCRs were disposed into a 6.1-acre ash pond located within the plant property using wet sluicing method. The coal burning and resulting sluicing operation was completed in August 2015. The coal burn unit was briefly re-activated for testing or to use up the remaining, low volume coal in the facility in 2017. CCPC has submitted notification of closure in accordance with 40 CFR Part 257.

In June 2017, Geosyntec prepared and submitted a Groundwater Monitoring System Certification in compliance with the requirements of 40 CFR §257.91(f). The groundwater monitoring system includes one upgradient monitoring well (MW-U1) and three monitoring wells (MW-D1, MW-D2, and MW-D3) located immediately downgradient of the ash pond to the southwest, northwest, and north, respectively. The locations of the monitoring wells are shown on **Figure 1**. Monitoring well construction details are provided in **Table 1**. Groundwater is anticipated to flow generally from east/southeast to the north/northwest direction and disperse radially from the ash pond as driven by the hydraulic head of the pond created during its operation.

3. GROUNDWATER SAMPLING AND ANALYSIS PROGRAM

According to 40 CFR §257.93(a) the groundwater monitoring program should include consistent sampling and analysis procedures to provide accurate representation of groundwater quality at the background and downgradient wells as required. CCPC's groundwater monitoring program has been designed to collect groundwater from the uppermost aquifer that accurately represent the quality of background groundwater that has not been affected by leakage from a CCR unit, and accurately represents the quality of groundwater passing the waste boundary of the CCR unit. Figure 1 shows the location of the background well and three downgradient waste boundary wells. Sampling frequency will be consistent with requirements of CCR rule [40 CFR §257.94(b) and 40 CFR §257.95(d)(1)].

The sampling and analysis program as outlined below includes procedures and techniques for: (i) sample collection; (ii) sample preservation and shipment; (iii) quality assurance and quality control; (iv) chain of custody control; and (v) laboratory analytical methods.

3.1 Groundwater Sampling Procedures

In compliance with 40 CFR §257.93(c) groundwater levels will be measured in each monitoring well immediately prior to purging, each time groundwater is sampled. Groundwater levels will be measured to the nearest 0.01 feet using an electrical water level indicator and used to determine rate and direction of groundwater flow each time groundwater is sampled. A potentiometric surface map for the uppermost aquifer will be generated using the measured water levels, except during establishing the background conditions. The potentiometric surface maps will allow for a quantitative assessment of groundwater flow rate and direction.

Groundwater sampling from monitoring wells will be performed in accordance with the USEPA Science and Ecosystem Support Division (SESD, Athens, Georgia) Standard Operating Procedure (SOP), dated 6 March 2013 (SESDPROC-301-R3). Groundwater samples will be collected using a low-flow sampling method. The peristaltic pump tubing will be placed in the approximate mid-portion of the screened interval of the well. To ensure that the samples collected are representative of the groundwater in the aquifer, field parameters will be measured during purging after purging one well volume. Temperature, pH, conductivity, oxidation-reduction potential (ORP), dissolved oxygen (DO), and turbidity will be measured using a Horiba U-53 water quality meter or

equivalent and a HACH 2100P or equivalent Turbidity Meter. Measurements will be taken within an enclosed flow-through cell to minimize effects of contact with air. Purging will be considered complete when groundwater pH, conductivity and turbidity measurements (below 10 NTU) equilibrated (as defined by USEPA Science and Ecosystem Support Division SOP) or at least three well volumes were removed. The groundwater samples will be collected in laboratory provided containers. Following sampling, the bottles will be sealed, labeled, packed in ice, and shipped under chain-of-custody protocol to a certified laboratory. For quality assurance and quality control, one duplicate sample will be collected and shipped to the laboratory for analysis.

3.2 Groundwater Analysis

In compliance with 40 CFR §257.93(b), the groundwater samples will be analyzed for constituents listed in Appendices III and IV of Part §257 of the CCR rule (referred herein as Appendix III and Appendix IV constituents). For detection monitoring, these constituents include boron, calcium, chloride, fluoride, pH, sulfate, and total dissolved solids from Appendix III Part §257 (Table III-2); and for assessment monitoring these constituents include antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, fluoride, lead, lithium, mercury, molybdenum, selenium, thallium, and radium 226 & 228 combined from Appendix IV Part §257 (Table III-3). All constituents will be analyzed as total recoverable, where samples are not field filtered. **Table 2** presents the list of Appendix III and Appendix IV constituents and the laboratory analytical methods.

4. STATISTICAL ANALYSIS DURING DETECTION MONITORING

Groundwater sampling frequency during the detection monitoring shall be at least semi-annual [40 CFR §257.95(b)] except when there is no adequate groundwater flow to sample wells semi-annually. The alternative frequency shall be no less than annual [40 CFR 257.94(d)].

According to 40 CFR §257.93(f), the owner or operator of the CCR unit must select one of the statistical methods specified in paragraphs (f)(1) through (5) of this section to be used in evaluating groundwater monitoring data for each specified constituent. The statistical test chosen shall be conducted separately for each constituent in each monitoring well. CCPC will use the following statistical methods to analyze groundwater data collected during the detection monitoring.

4.1 Testing for Outliers

Outliers are extreme data points that may represent an anomaly or error. Data sets will be visually inspected for outliers using a time-series plot or statistical methods such as EPA 1989 Outlier Screening method or Tukey's Outlier Screening method. Potential outliers will be evaluated for potential sources of error or evidence that the data point is not representative. Errors will be corrected prior to further statistical analysis. Non-representative data points may be excluded from the statistical analysis based on professional judgment.

4.2 Testing for Normality

Data will be tested for normal distribution using the Shapiro-Wilk test (for sample size up to 50) or the Shapiro-Francia test (for sample sizes greater than 50). If the data appear not to be normally distributed, then data may be transformed mathematically (e.g., log, natural log, square root, cube root) such that the transformed data follow a normal distribution (the data will be transformed because many statistical analyses assumes that the sample data are normally distributed). Alternatively, a non-parametric test (i.e., a test that does not assume a particular data distribution) may be used.

4.3 Establishing Background

By October 17, 2017, eight independent background samples were collected and analyzed for Appendix III and IV constituents from each background and downgradient monitoring

well as part of the initial monitoring period [40 CFR §257.94(b)]. Initially, background data will be evaluated for statistically significant temporal trends using Theil-Sen slope estimator with Mann-Kendall trend test ($\alpha = 0.05$). The trend test will be used to estimate the rate of change (increasing, no change, or decreasing) over time for each constituent. Statistically significant increases in background data (or decreasing trend in pH) could indicate an existing release from the CCR unit or another source, and further investigation may be needed.

When a trend test shows no statistically significant trend in background data, the data will be tested for normality using the methods outlined in Section 4.2. In compliance with 40 CFR §257.93 (g)(1), when the data follows a normal or transformed normal distribution, parametric methods will be used. When the data do not follow a normal or transformed normal distribution, or when more than 50% of the data are non-detect, non-parametric methods may be used.

4.4 Evaluating Statistically Significant Increases (SSIs)

The USEPA CCR Rule specifically lists four methods acceptable for statistical analysis: Analysis of variance (ANOVA), tolerance intervals, prediction intervals, and control charts [40 CFR §257.93(f)]. Of these methods, the Unified Guidance recommends prediction limits combined with retesting for maintaining a low site wide false positive rate (SWFPR) while providing high statistical power. ANOVA is not recommended as the USEPA CCR Rule mandates a minimum type I error (α) of 0.05, at which it would be difficult to maintain an annual SWFPR less than 10% (Unified Guidance). Control charts are acceptable as long as parametric methods can be used since there is no nonparametric counterpart to the control chart.

Prediction interval and control charts can be used for interwell comparison (data from pooled background monitoring wells used for background data set). Interwell comparison will be used when there are no statistically significant trends in the background data. For prediction interval, background data are used to construct a concentration limit PL, which is then compared to one or more observations from the downgradient well. The acceptable range of concentrations includes all values that are lower than the prediction limit. The prediction interval will have the form [0, PL], with the upper limit PL as the comparison of importance.

If a sample does not exceed the calculated PL (or control limit), then it can be concluded that an SSI has not occurred. If the initial sample exceed the PL (or control limit), then a resample should be collected prior to the next regularly scheduled sampling event. If both the initial result and the subsequent resample exceed the PL (or control limit), then an SSI can be concluded.

If the statistical evaluation indicates an SSI for one or more Appendix III constituent, the data should be evaluated to assess whether the SSI is caused by a release from the CCR unit. If the evaluation demonstrates that the SSI is caused by natural variability, sampling, analysis or statistical error, or a release from another source, the demonstration will be made in writing and certified by a qualified professional engineer within 90 days of detecting an SSI [40 CFR §257.94(3)(2)]. If a successful demonstration is not completed within the 90-day period, CCPC will initiate an assessment monitoring program as required under 40 CFR §257.95.

4.4.1. Handling Non-Detects in Background Data

When at least half of the data are non-detect, non-parametric prediction intervals with retesting should be used. If all of the background data are non-detect, then the Double Quantification Rule should be used. According to this rule, if a sample and verification resample both exceed the practical quantitation limit (PQL), then an SSI can be concluded.

5. STATISTICAL ANALYSIS DURING ASSESSMENT MONITORING

In compliance with 40 CFR §257.95(a), assessment monitoring is required when an SSI is identified over background levels for one or more of the constituents listed in Appendix III. Within 90 days of triggering an assessment monitoring program and annually thereafter, the monitoring wells must be sampled and analyzed for Appendix IV constituents [40 CFR §257.95(b)]. Within 90 days of obtaining the results from this sampling event and on at least on a semi-annual basis thereafter, all monitoring wells must be sampled for all parameters in Appendix III and for those constituents in appendix IV that were detected during the initial assessment monitoring event [40 CFR §257.95(d)(1)].

Groundwater protection standards (GWPSs) must be established for each constituent in Appendix IV detected in groundwater [40 CFR §257.95(h)]. The GWPS shall be a maximum contaminant level (MCL) if an MCL has been established. If an MCL has not been established for a constituent (such as cobalt, lithium, and molybdenum), the background concentration shall be the GWPS for the constituent. For constituents for which the background level is higher than the MCL, the background concentration will be the GWPS [40 CFR §257.95(h)(3)]. The background concentration calculated as the upper tolerance limit is often used as the GWPS. If a constituent is not detected in background groundwater, then the Double Quantification Rule can be used, in which case the GWPS is the most recent reporting limit or PQL, and two consecutive downgradient concentrations higher than the GWPS will constitute a statistically significant level.

After the GWPS is established, the data will be evaluated to determine whether they are statistically significantly higher than the GWPS. To compare the new data with the fixed standard of the GWPS, the Unified Guidance recommends using confidence intervals around the mean or median. Confidence intervals around the mean will be used when the data follows a normal or transformed normal distribution. Confidence interval around the median will be used when data distributions are non-normal. When at least 50% of the recent data set is non-detect, a parametric confidence interval should not be used. Instead, non-parametric prediction or tolerance intervals should be used. In these cases, the upper prediction limit or upper tolerance limit is set either the highest or second highest concentration measured in the background dataset.

6. CERTIFICATION BY QUALIFIED PROFESSIONAL ENGINEER

I certify that the Statistical Analysis Plan was prepared by me or under my direct supervision, and meets the requirements of Section 40 CFR §257.93 of the Federal Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule (40 CFR 257) and the Georgia EPD Solid Waste Management Rule (391-3-4-.10). The Statistical Analysis Plan includes statistical methods and narrative description appropriate for evaluating the groundwater monitoring data for the CCR management area.

CUNEYT GOKMEN
Printed Name of Qualified Professional Engineer

28504
Registration No.

GEORGIA
Registration State

Stamp/Signature/Date

7. REFERENCES

USEPA (2015). Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule (40 CFR Part 257).

GA EPD (2016). Georgia Solid Waste Management Rules and Regulations (391-3-4).

USEPA (2009). Statistical Analysis of Groundwater Data at RCRA Facilities: Unified Guidance. EPA 503/R-09-007.

USEPA (2013). Science and Ecosystem Support Division (SESD, Athens, Georgia) Standard Operating Procedure (SOP) (SESDPROC-301-R3).

USEPA (1986). Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846.

TABLES

Table 1. Monitoring Well Construction Details

Well ID	Northing (ft)	Easting (ft)	Ground Surface Elevation (ft msl)	Top of Casing Elevation (ft msl)	Total Well Depth (ft)	Screen Interval (ft msl)
MW-D1	670708.5	2365315.1	238.1	241.80	19.50	228.9-218.9
MW-D2	671291.6	2365308.7	229.1	232.80	19.75	219.6-209.6
MW-D3	671291.1	2365715.5	229.8	233.80	19.50	220.6-210.6
MW-U1	669996.8	2366420.6	246.3	249.50	33.75	222.8-212.8

Table 2. Monitored Constituents and Laboratory Analytical Methods

Appendix III to 40 CFR §257 - Constituents for Detection Monitoring	
Analyte	**Laboratory Analytical Method**
Boron	EPA Method 6020
Calcium	EPA Method 6020
Chloride	EPA Method SM 4500 Cl- E
Fluoride	EPA Method SM 4500 F C
pH	Field Sampling
Sulfate	EPA Method SM 4500 SO4 E
Total Dissolved Solids (TDS)	EPA Method SM 2540C

Appendix IV to 40 CFR §257 - Constituents for Assessment Monitoring	
Analyte	**Laboratory Analytical Method**
Antimony	EPA Method 6020
Arsenic	EPA Method 6020
Barium	EPA Method 6020
Berylium	EPA Method 6020
Cadmium	EPA Method 6020
Chromium	EPA Method 6020
Cobalt	EPA Method 6020
Fluoride	EPA Method SM 4500
Lead	EPA Method 6020
Lithium	EPA Method 6020
Mercury	EPA Method 7470A
Molybdenum	EPA Method 6020
Selenium	EPA Method 6020
Thallium	EPA Method 6020
Radium 226 and 228 Combined	EPA Method 9315 & 9320

FIGURE

NOTES:

1. GRID COORDINATES CORRESPOND TO NORTH AMERICAN DATUM (NAD) 1983 HIGH ACCURACY REFERENCE NETWORK (HARN) DATUM. ELEVATIONS ARE IN FEET ABOVE SEA LEVEL, NORTH AMERICAN VERICAL DATUM (NAVD) 1988.
2. THE AERIAL PHOTOGRAPH SHOWN IN THIS DRAWING WAS OBTAINED FROM GOOGLE EARTH PRO AND IS DATED 29 DECEMBER 2016.
3. TOPOGRAPHY AND EXISTING SITE FEATURES (I.E., BOREHOLES, DRAINAGE PIPES, ETC.) ARE APPROXIMATE AND BASED ON THE TOPOGRAPHIC SURVEY CONDUCTED BY J.B. FAIRCLOTH & ASSOCIATES P.C., DATED 20 MAY 2014 AND MAY NOT REFLECT CURRENT SITE CONDITIONS. BOREHOLES WERE ABANDONED WITH GROUT AND/OR BENTONITE CHIPS BY RIZZO ASSOCIATES, AS DESCRIBED IN "DAM SAFETY ASSESSMENT REPORT" DATED 16 JANUARY 2015.
4. THE SITE BOUNDARY LINE AND MONITORING WELLS SHOWN IN THIS DRAWING ARE BASED UPON A BOUNDARY SURVEY PERFORMED BY J.B. FAIRCLOTH AND ASSOCIATES ON 22 MARCH 2017.

N

0 40 80

SCALE: 1" = 40'

WELL ID	NORTHING (FT)	EASTING (FT)	GROUND SURFACE EL (FT MSL)	TOP OF CASING EL (FT MSL)
MW-D1	670708.5	2365315.1	238.1	241.8
MW-D2	671291.6	2365308.7	229.1	232.8
MW-D3	671291.1	2365715.5	229.8	233.8
MW-U1	669996.8	2366420.6	246.3	249.5

1 2 TABLE MONITORING WELLS

LEGEND

- 230 — EXISTING GROUND ELEVATION (FT NAVD 88) (NOTE 2)
- EXISTING DITCH
- SITE BOUNDARY
- ST — EXISTING PIPE
- LIMITS OF ASH
- N-1 ABANDONED BOREHOLE (NOTE 2)
- MW-D1 EXISTING MONITORING WELL

DRAFT

REV	DATE	DESCRIPTION	DRN	APP
A	06.20.17	DRAFT FOR CRISP COUNTY POWER COMMISSION REVIEW	JHS	MI

Geosyntec consultants
1255 ROBERTS BOULEVARD, N.W., SUITE 200
KENNESAW, GEORGIA 30144 USA
PHONE: 678.202.9500

TITLE: SITE LAYOUT

PROJECT: CRISP COUNTY POWER COMMISSION
ASH POND CLOSURE AND SITE RESTORATION

SITE: PLANT CRISP
WARWICK, GEORGIA

THIS DRAWING MAY NOT BE ISSUED FOR PROJECT TENDER OR CONSTRUCTION, UNLESS SEALED.

SIGNATURE

DATE

DESIGN BY:	MCS	DATE:	JUNE 2017
DRAWN BY:	JHS	PROJECT NO.:	GW6152
CHECKED BY:	JWE	FILE:	6152-002
REVIEWED BY:	MI	FIGURE NO.:	
APPROVED BY:	CG		1 OF 1

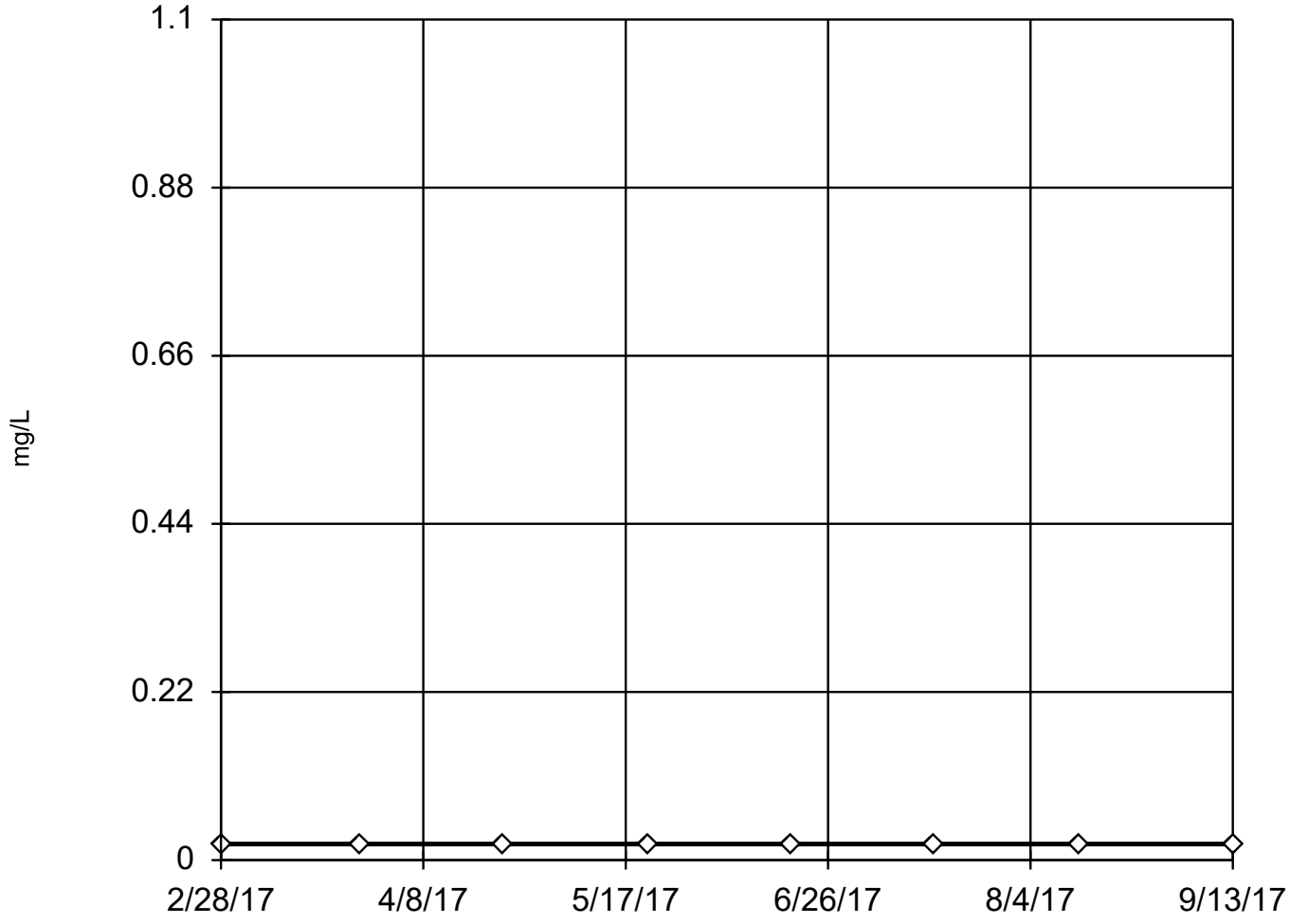
L:\CAD\CC\CRISP COUNTY\DRAWINGS\6152-002

APPENDIX D

Statistical Calculations and Time-series Graphs

Tukey's Outlier Screening

MW-U1 (bg)



n = 8

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.01 alpha level.

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

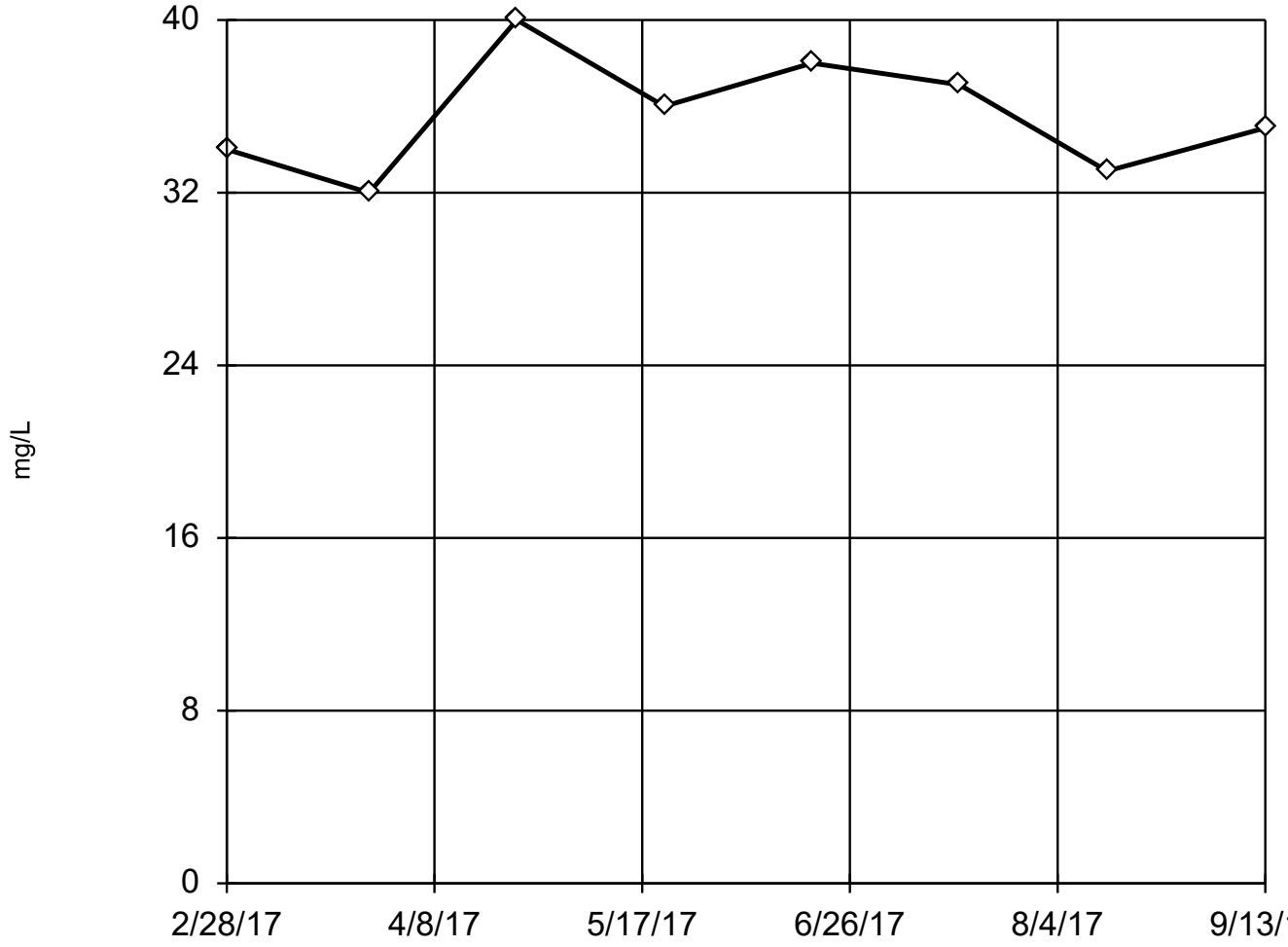
The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Boron Analysis Run 10/3/2017 8:44 AM

CCPC Plant Crisp Ash Pond Site Client: Geosyntec Data: Sanitas_Statistics

EPA 1989 Outlier Screening

MW-U1 (bg)



n = 8

No statistical outliers.
Mean 35.63, std. dev. 2.669, critical Tn 2.032

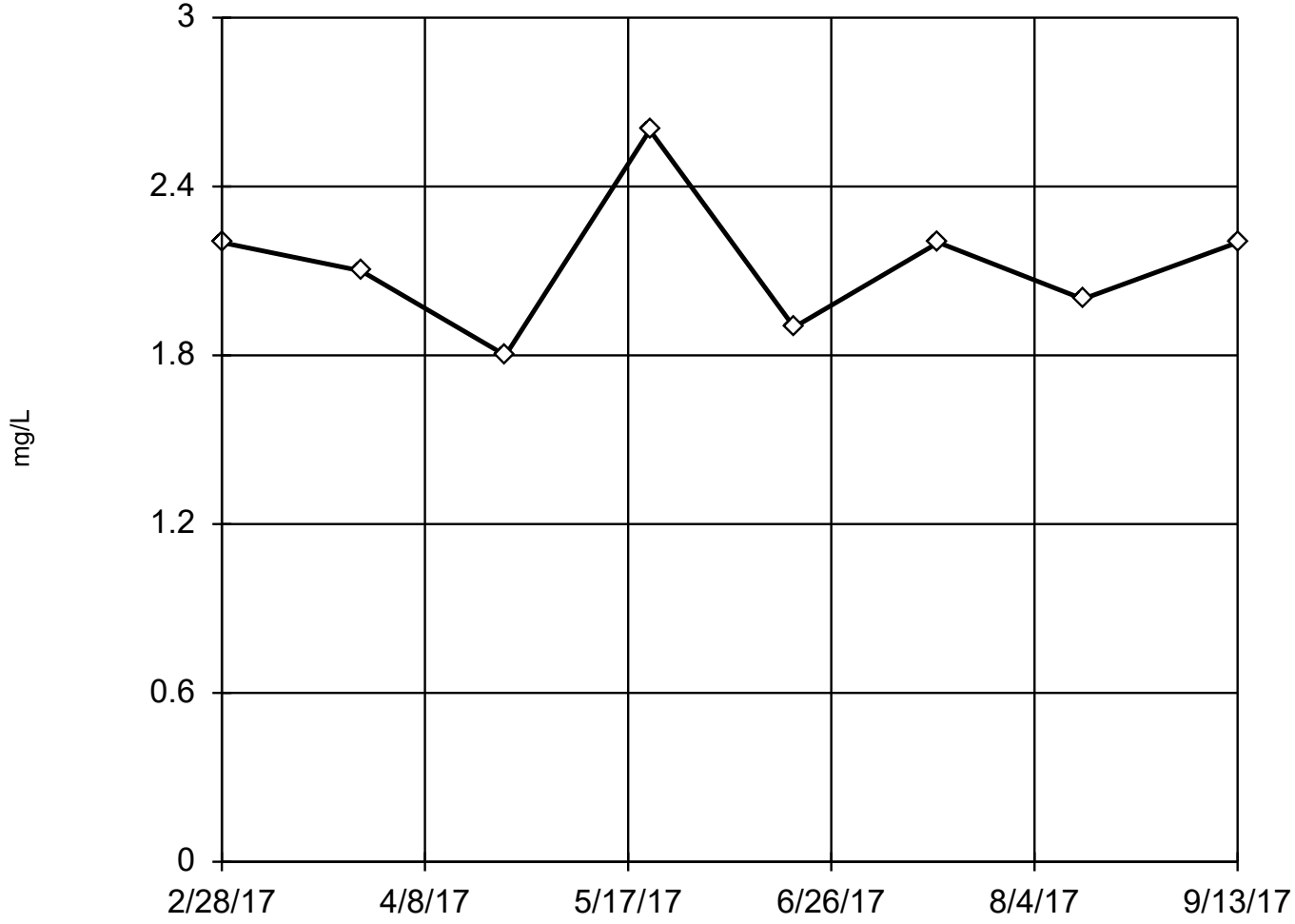
Normality test used:
Shapiro Wilk@alpha = 0.01
Calculated = 0.9832
Critical = 0.749
The distribution was found to be normally distrib-uted.

Constituent: Calcium Analysis Run 1/30/2018 12:09 PM

CCPC Plant Crisp Ash Pond Site Client: Geosyntec Data: Sanitas_Statistics

EPA 1989 Outlier Screening

MW-U1 (bg)



n = 8

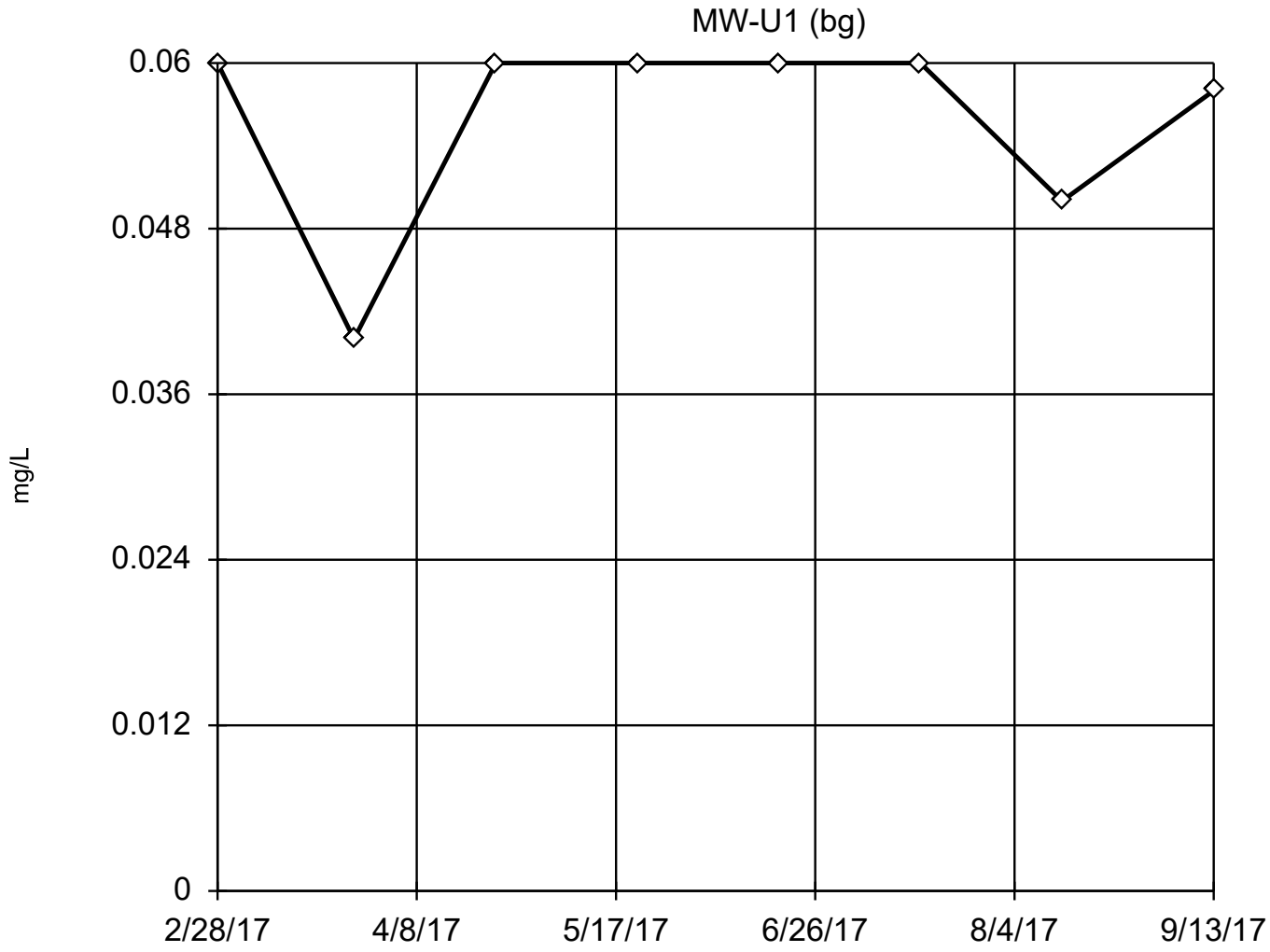
No statistical outliers.
Mean 2.125, std. dev. 0.2435, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.01
Calculated = 0.9249
Critical = 0.749
The distribution was found to be normally distrib-uted.

Constituent: Chloride Analysis Run 10/3/2017 8:47 AM

CCPC Plant Crisp Ash Pond Site Client: Geosyntec Data: Sanitas_Statistics

Tukey's Outlier Screening



n = 8

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.01 alpha level.

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

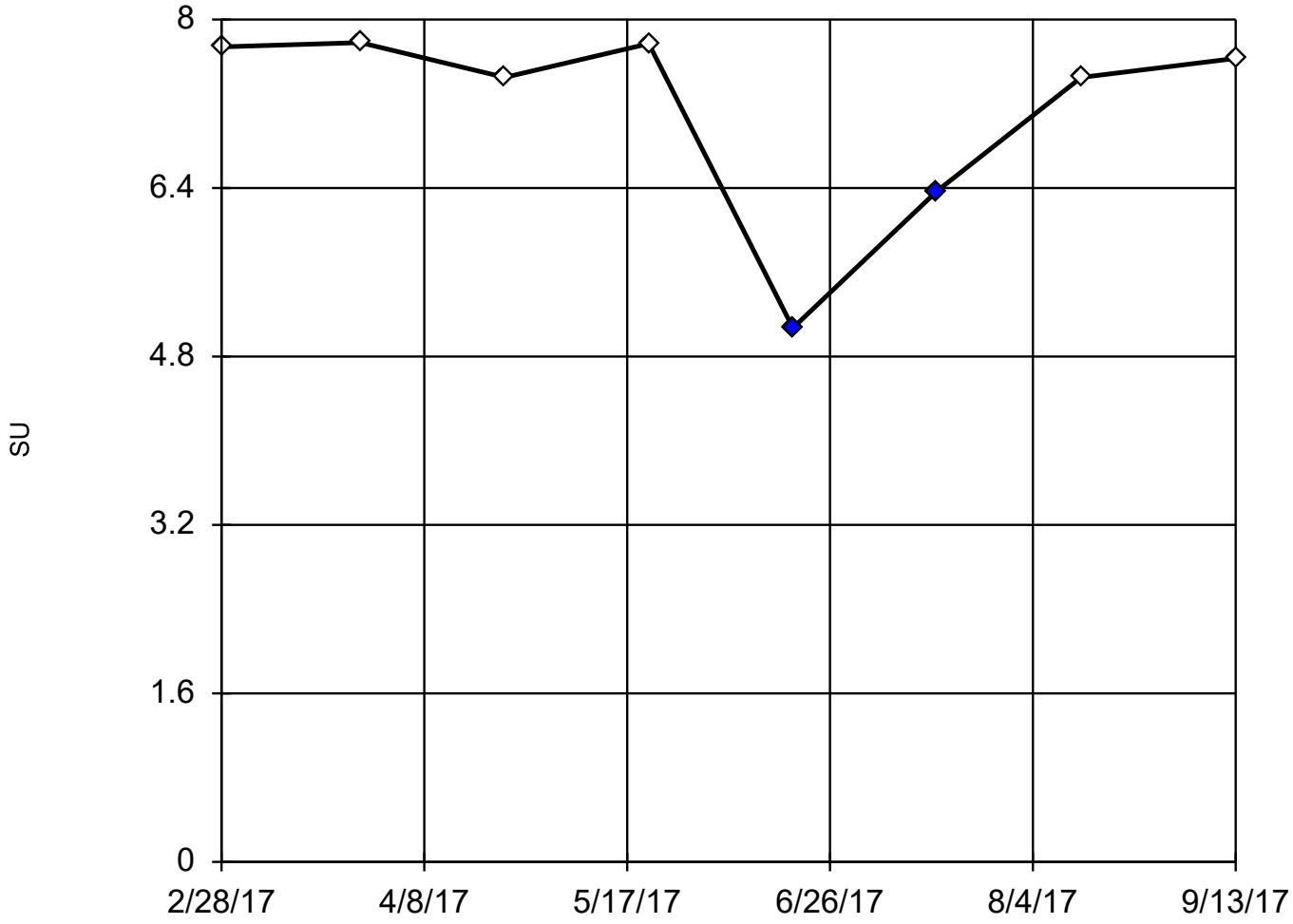
High cutoff = 0.0688, low cutoff = -0.05651, based on IQR multiplier of 3.

Constituent: Fluoride Analysis Run 10/3/2017 8:48 AM

CCPC Plant Crisp Ash Pond Site Client: Geosyntec Data: Sanitas_Statistics

EPA 1989 Outlier Screening

MW-U1 (bg)



n = 8

Statistical outliers are drawn as solid.
Mean 7.158, std. dev. 0.9617, critical Tn 2.032.
After removing suspect data: mean 7.456, std. dev. 0.499, Tn 1.938; mean 7.637, std. dev. 0.1541, Tn 1.822.

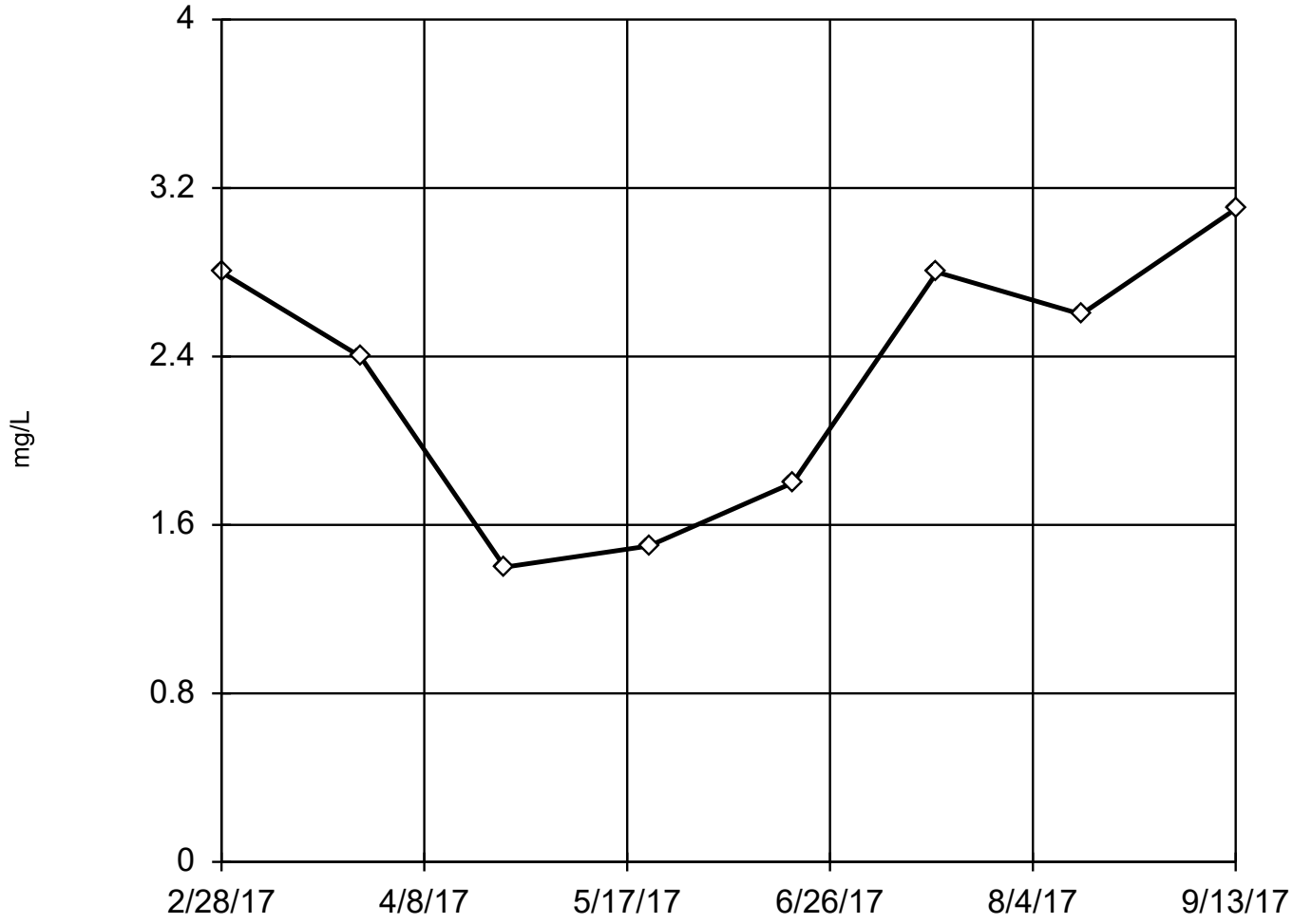
Normality test used: Shapiro Wilk@alpha = 0.01
Calculated = 0.818
Critical = 0.713
The distribution, after removal of suspect values, was found to be normally distributed.

Constituent: Field pH Analysis Run 10/3/2017 8:57 AM

CCPC Plant Crisp Ash Pond Site Client: Geosyntec Data: Sanitas_Statistics

EPA 1989 Outlier Screening

MW-U1 (bg)



n = 8

No statistical outliers.
Mean 2.3, std. dev. 0.6481,
critical Tn 2.032

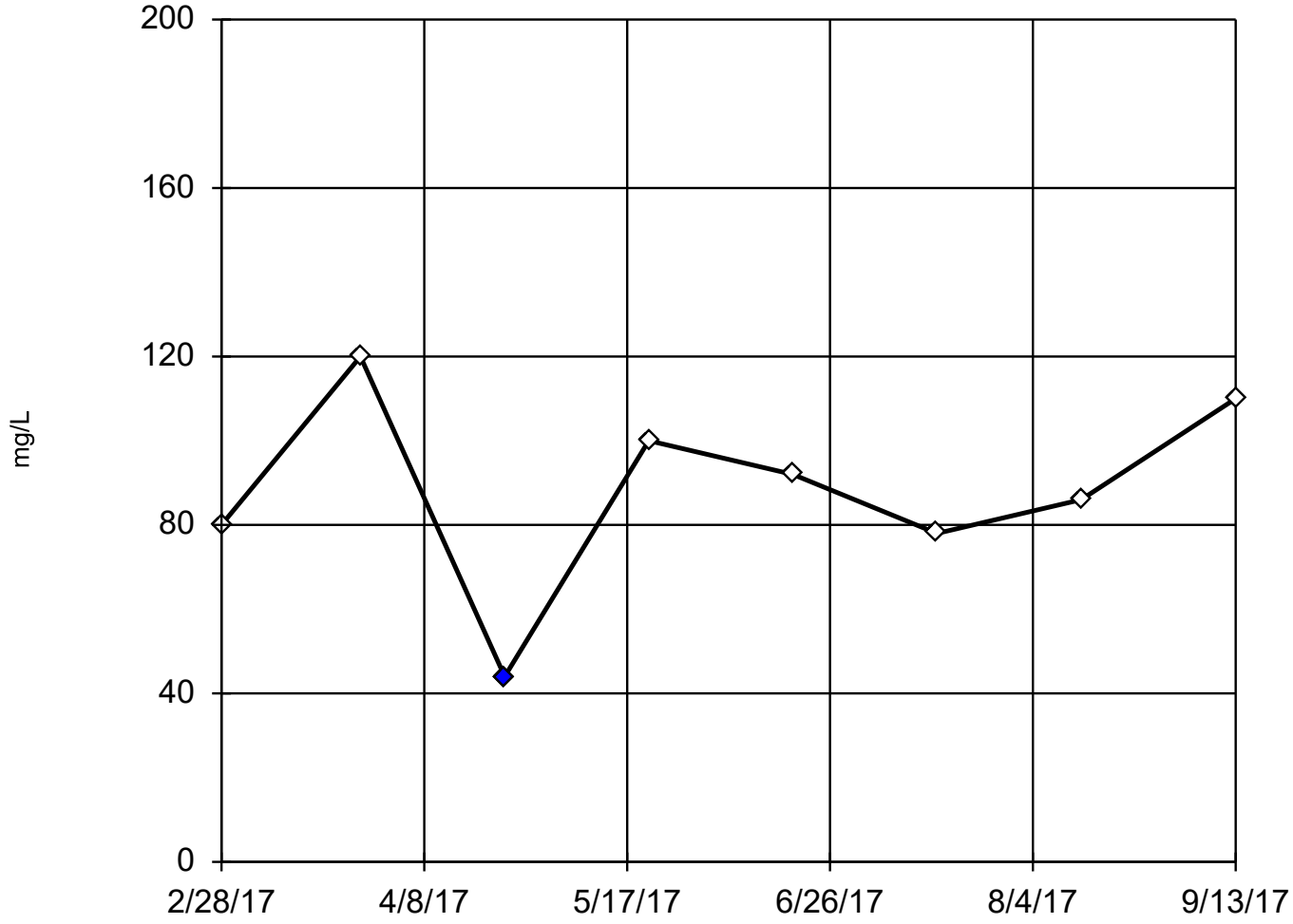
Normality test used:
Shapiro Wilk@alpha =
0.01
Calculated = 0.8989
Critical = 0.749
The distribution was found
to be normally distrib-
uted.

Constituent: Sulfate Analysis Run 10/3/2017 8:58 AM

CCPC Plant Crisp Ash Pond Site Client: Geosyntec Data: Sanitas_Statistics

EPA 1989 Outlier Screening

MW-U1 (bg)



n = 8

Statistical outlier is drawn as solid.
Mean 88.75, std. dev. 23.2, critical Tn 2.032.
After removing suspect data: mean 95.14, std. dev. 15.7, Tn 1.938.

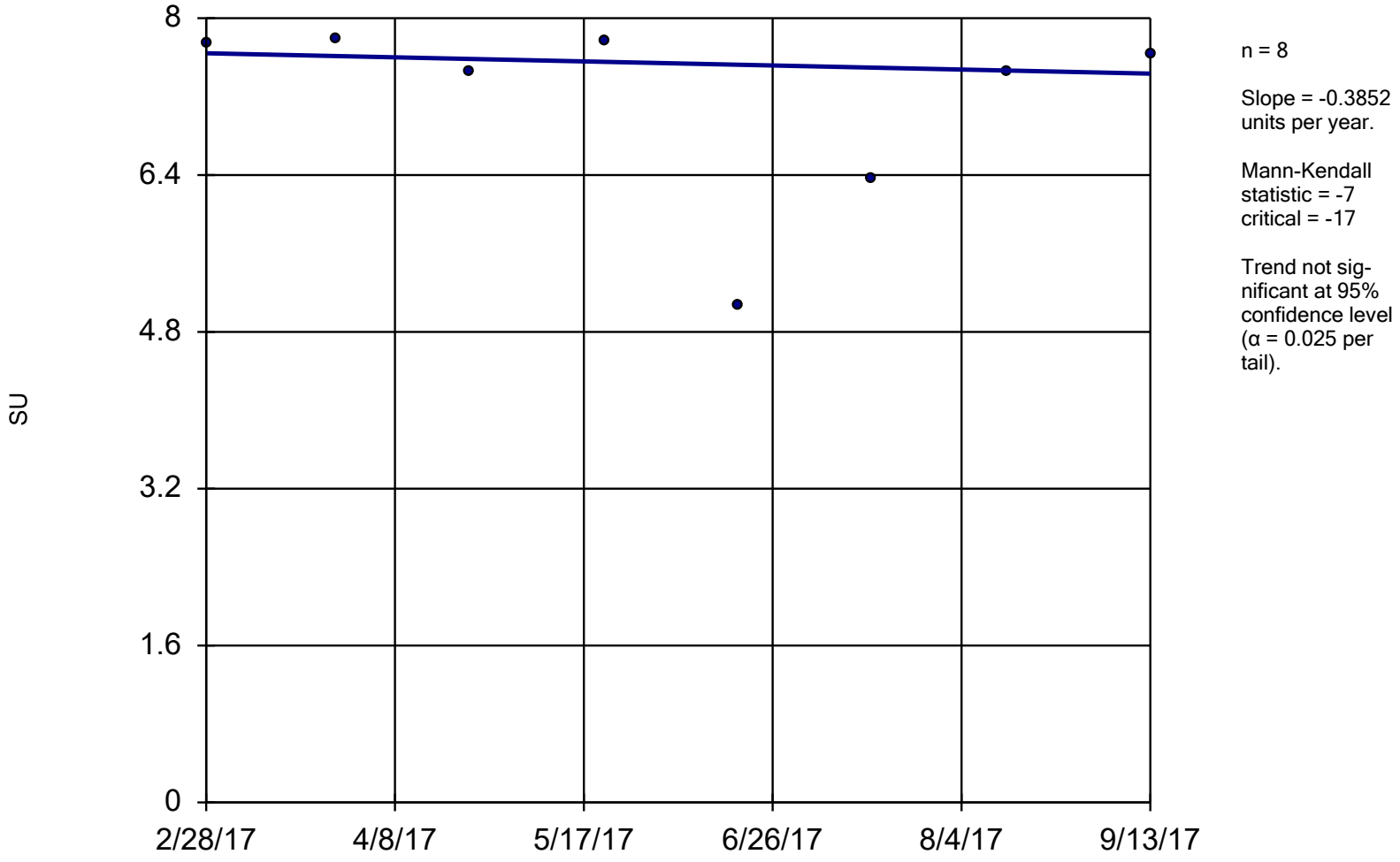
Normality test used:
Shapiro Wilk@alpha = 0.01
Calculated = 0.9374
Critical = 0.73
The distribution, after removal of suspect value, was found to be normally distributed.

Constituent: Total Dissolved Solids Analysis Run 10/3/2017 8:58 AM

CCPC Plant Crisp Ash Pond Site Client: Geosyntec Data: Sanitas_Statistics

Sen's Slope Estimator

MW-U1 (bg)



n = 8

Slope = -0.3852 units per year.

Mann-Kendall statistic = -7
critical = -17

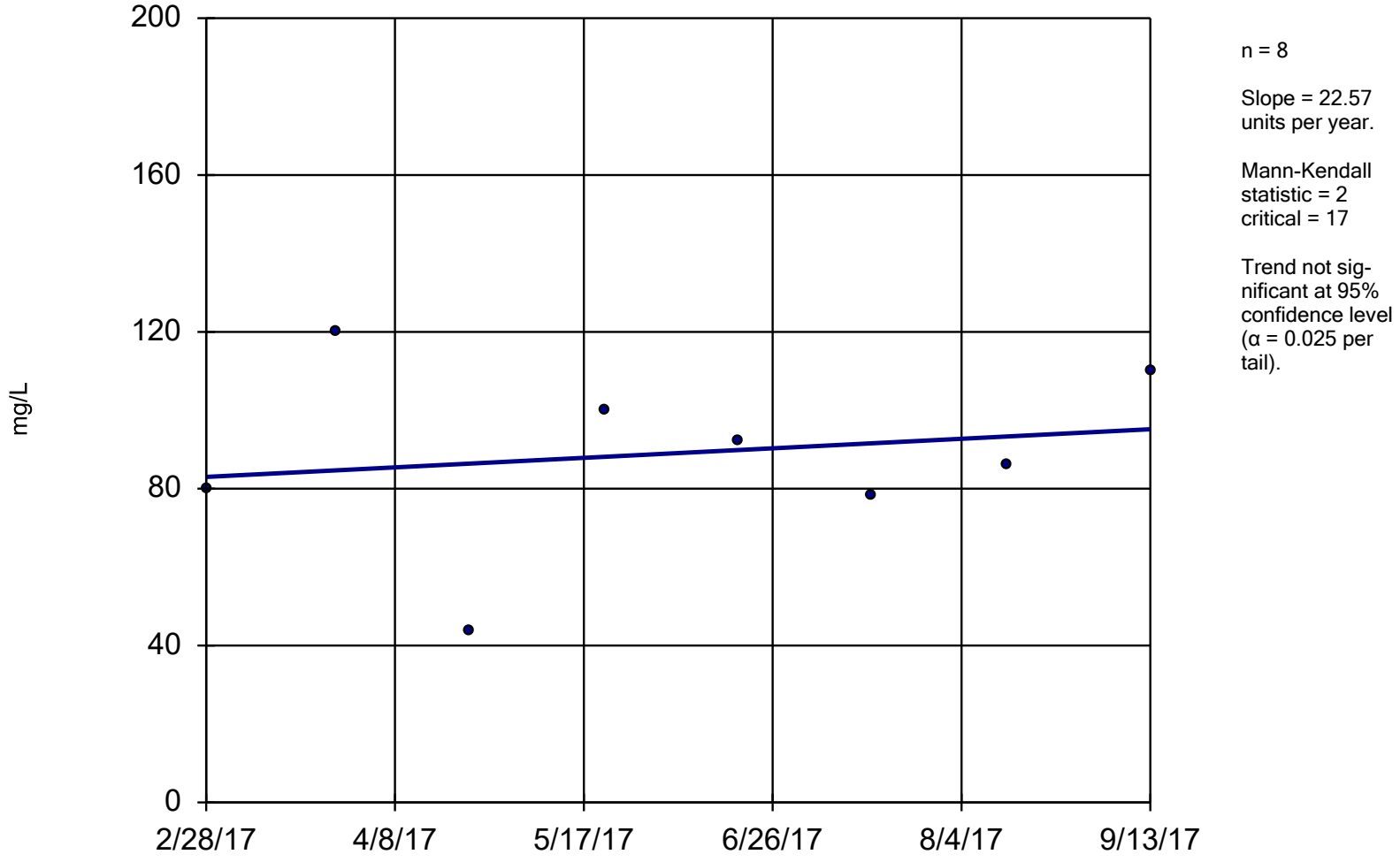
Trend not significant at 95% confidence level (α = 0.025 per tail).

Constituent: Field pH Analysis Run 10/3/2017 9:04 AM

CCPC Plant Crisp Ash Pond Site Client: Geosyntec Data: Sanitas_Statistics

Sen's Slope Estimator

MW-U1 (bg)



n = 8

Slope = 22.57 units per year.

Mann-Kendall statistic = 2
critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

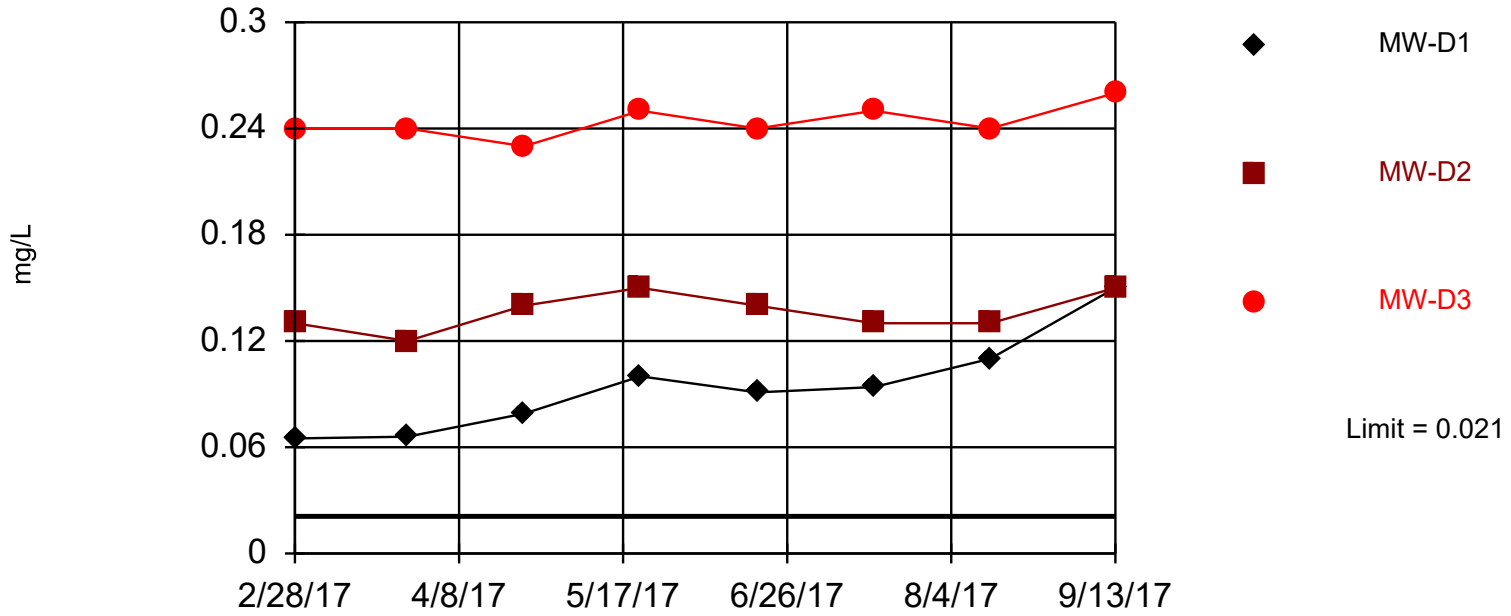
Constituent: Total Dissolved Solids Analysis Run 10/3/2017 9:02 AM

CCPC Plant Crisp Ash Pond Site Client: Geosyntec Data: Sanitas_Statistics

Exceeds Limit: MW-D1, MW-D2, MW-D3

Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. All background values (n = 8) were censored; limit is most recent reporting limit. Annual per-constituent alpha = 0.1077. Individual comparison alpha = 0.01882 (1 of 2). Comparing 3 points to limit. Insufficient data to test for seasonality; data will not be deseasonalized.

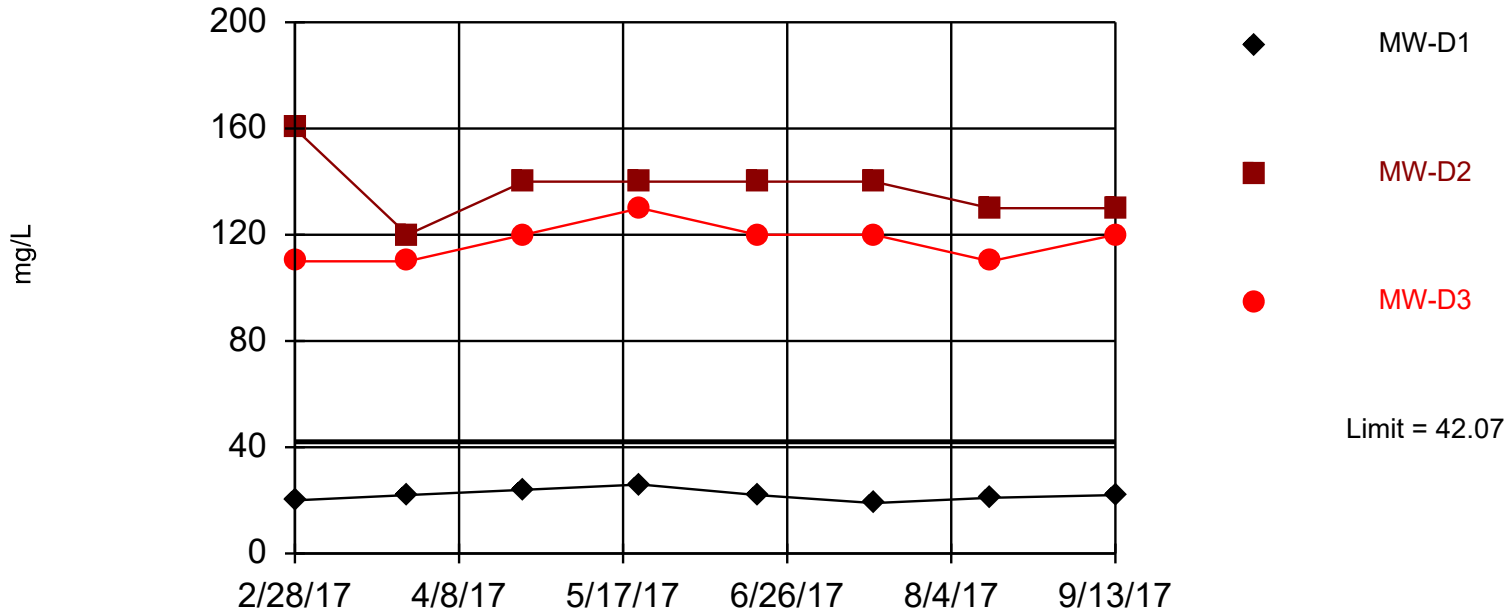
Constituent: Boron Analysis Run 10/2/2017 3:04 PM

CCPC Plant Crisp Ash Pond Site Client: Geosyntec Data: Sanitas_Statistics

Exceeds Limit: MW-D2, MW-D3

Prediction Limit

Interwell Parametric



Background Data Summary: Mean=35.63, Std. Dev.=2.669, n=8. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9832, critical = 0.749. Kappa = 2.416 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.002505. Comparing 3 points to limit.

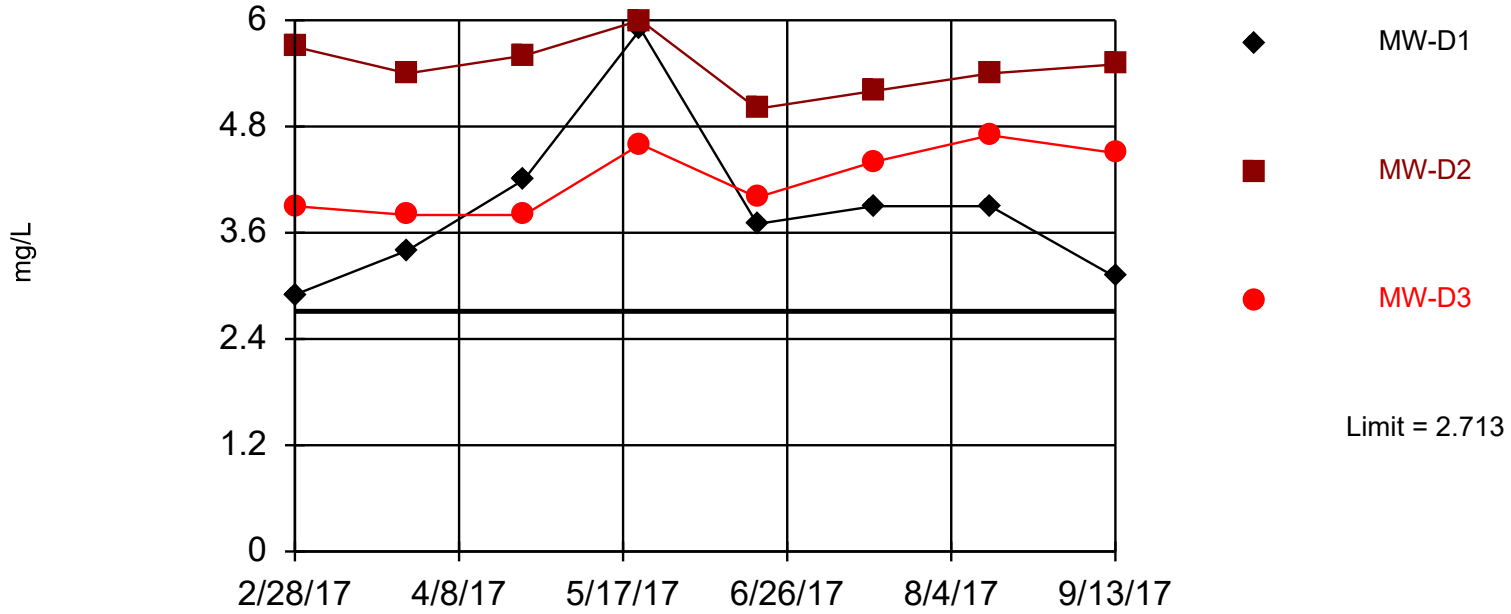
Constituent: Calcium Analysis Run 10/2/2017 3:06 PM

CCPC Plant Crisp Ash Pond Site Client: Geosyntec Data: Sanitas_Statistics

Exceeds Limit: MW-D1, MW-D2, MW-D3

Prediction Limit

Interwell Parametric



Background Data Summary: Mean=2.125, Std. Dev.=0.2435, n=8. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9249, critical = 0.749. Kappa = 2.416 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.002505. Comparing 3 points to limit.

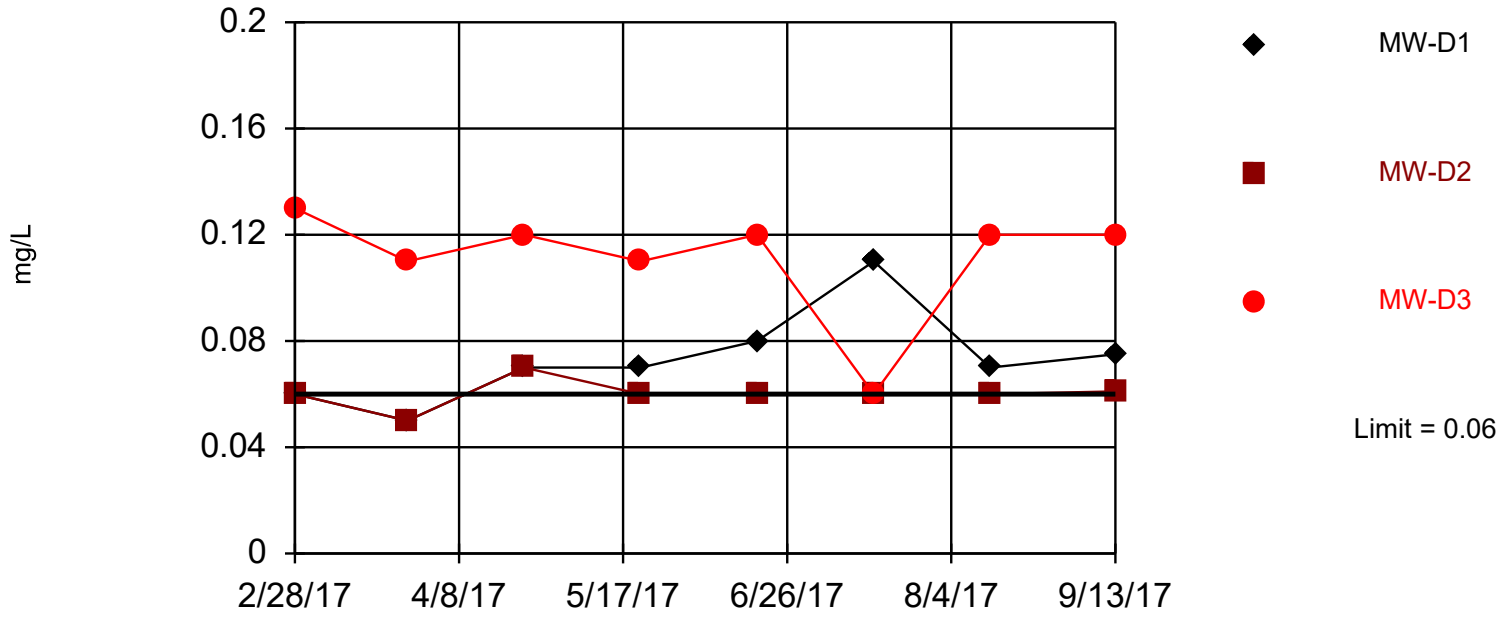
Constituent: Chloride Analysis Run 10/2/2017 3:07 PM

CCPC Plant Crisp Ash Pond Site Client: Geosyntec Data: Sanitas_Statistics

Exceeds Limit: MW-D1, MW-D2, MW-D3

Prediction Limit

Interwell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 8 background values. Annual per-constituent alpha = 0.1077. Individual comparison alpha = 0.01882 (1 of 2). Comparing 3 points to limit. Insufficient data to test for seasonality; data will not be deseasonalized.

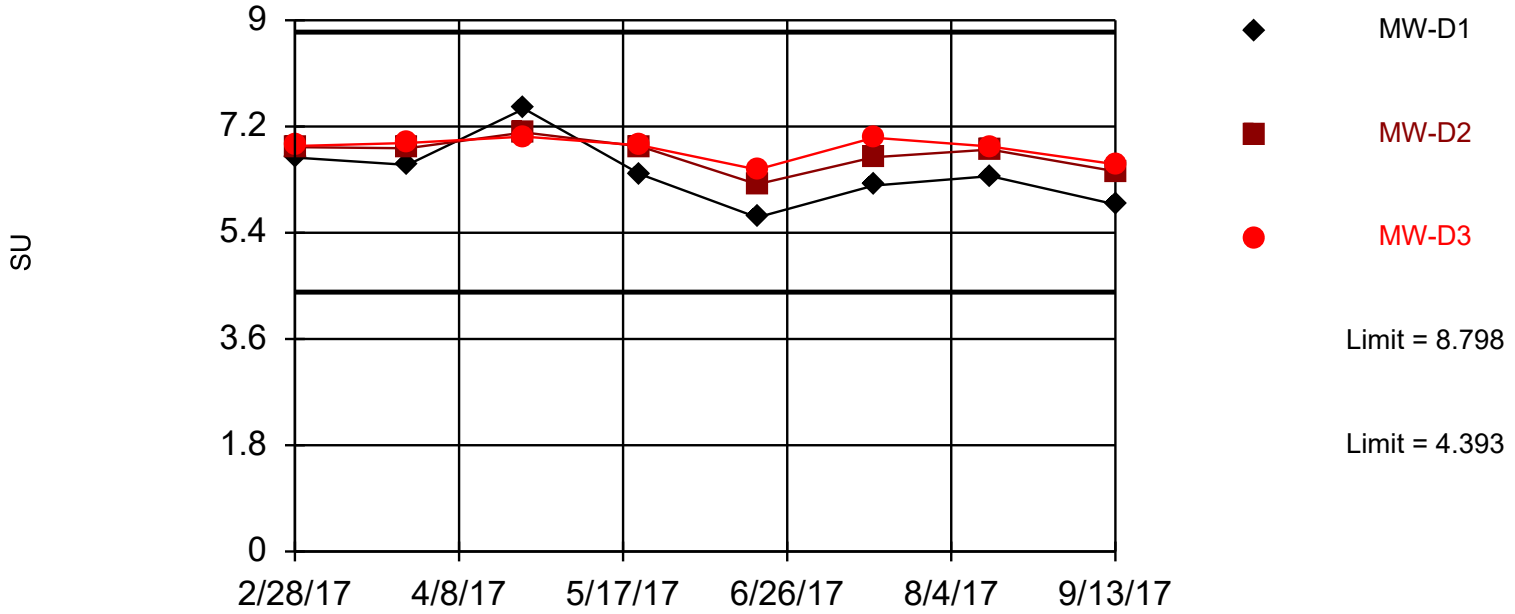
Constituent: Fluoride Analysis Run 10/2/2017 3:08 PM

CCPC Plant Crisp Ash Pond Site Client: Geosyntec Data: Sanitas_Statistics

Within Limits

Prediction Limit

Interwell Parametric



Background Data Summary (based on cube transformation): Mean=383, Std. Dev.=123.4, n=8. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.7525, critical = 0.749. Kappa = 2.416 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.001253. Comparing 3 points to limit.

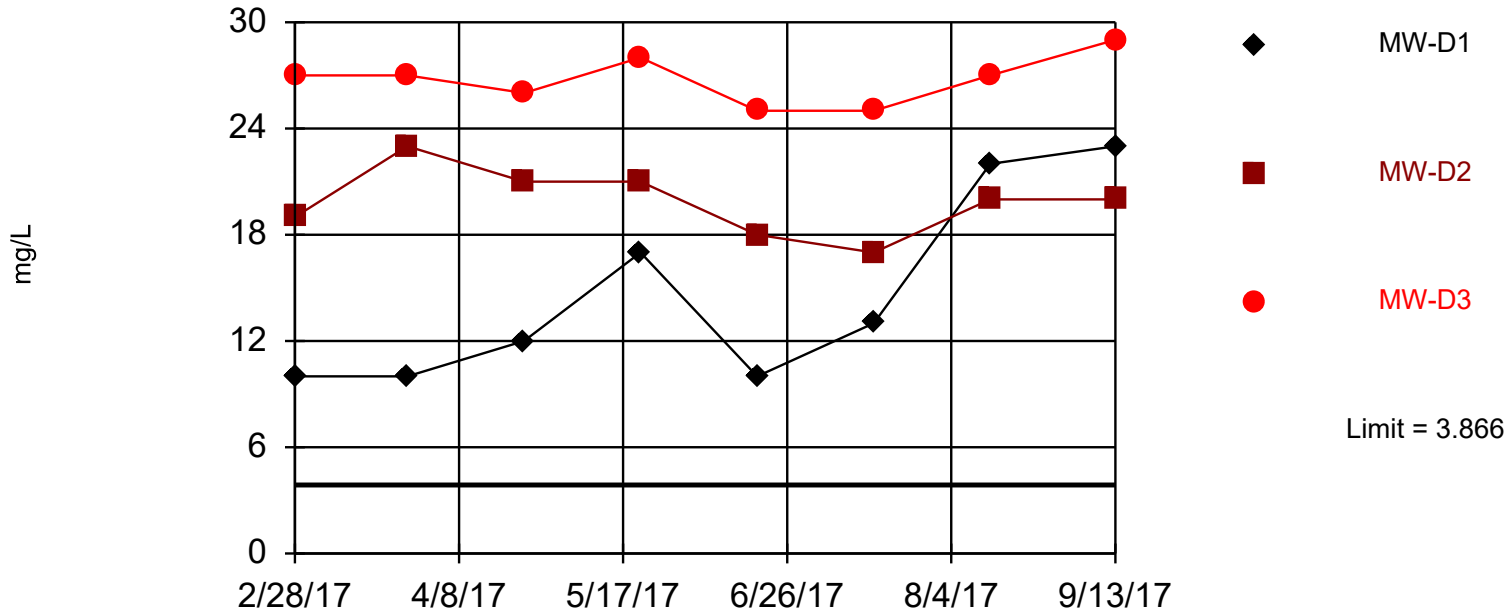
Constituent: Field pH Analysis Run 10/2/2017 3:08 PM

CCPC Plant Crisp Ash Pond Site Client: Geosyntec Data: Sanitas_Statistics

Exceeds Limit: MW-D1, MW-D2, MW-D3

Prediction Limit

Interwell Parametric



Background Data Summary: Mean=2.3, Std. Dev.=0.6481, n=8. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8989, critical = 0.749. Kappa = 2.416 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.002505. Comparing 3 points to limit.

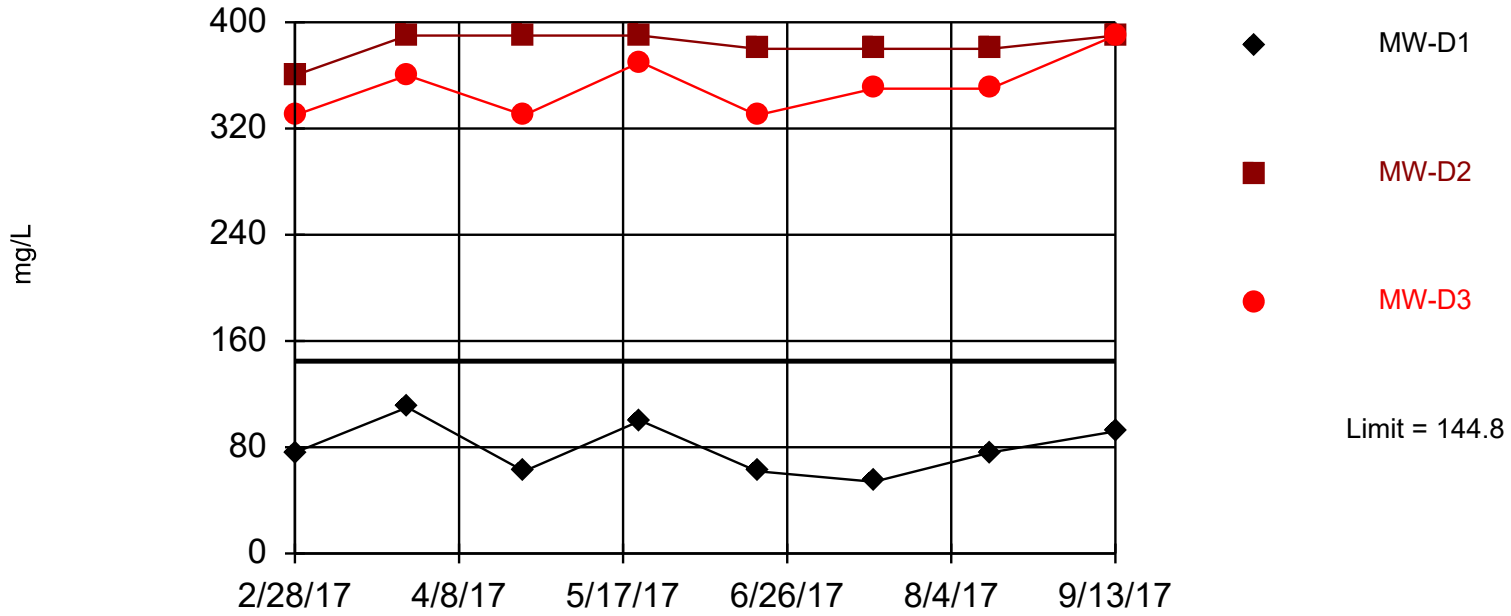
Constituent: Sulfate Analysis Run 10/2/2017 3:09 PM

CCPC Plant Crisp Ash Pond Site Client: Geosyntec Data: Sanitas_Statistics

Exceeds Limit: MW-D2, MW-D3

Prediction Limit

Interwell Parametric



Background Data Summary: Mean=88.75, Std. Dev.=23.2, n=8. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9537, critical = 0.749. Kappa = 2.416 (c=7, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.002505. Comparing 3 points to limit.

Constituent: Total Dissolved Solids Analysis Run 10/2/2017 3:10 PM

CCPC Plant Crisp Ash Pond Site Client: Geosyntec Data: Sanitas_Statistics

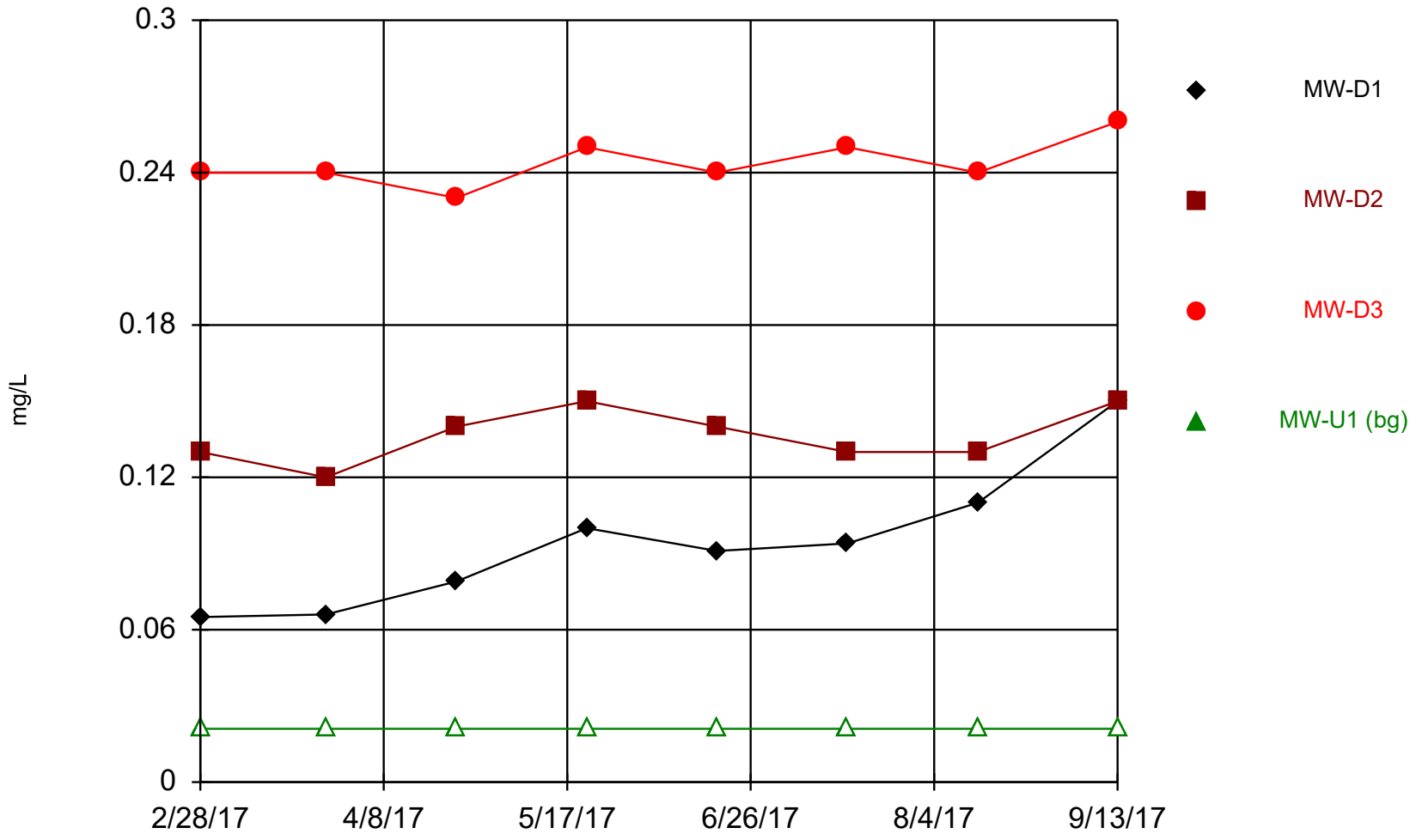
Interwell Prediction Limit

CCPC Plant Crisp Ash Pond Site Client: Geosyntec Data: Sanitas_Statistics Printed 10/2/2017, 3:59 PM

Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	%NDs	Transform	Alpha	Method
Boron (mg/L)	**MW-D1**	**0.021**	**n/a**	**9/13/2017**	**0.15**	**Yes**	**8**	**100**	**n/a**	**0.01882**	**NP Inter (NDs) 1 of 2**
Boron (mg/L)	**MW-D2**	**0.021**	**n/a**	**9/13/2017**	**0.15**	**Yes**	**8**	**100**	**n/a**	**0.01882**	**NP Inter (NDs) 1 of 2**
Boron (mg/L)	**MW-D3**	**0.021**	**n/a**	**9/13/2017**	**0.26**	**Yes**	**8**	**100**	**n/a**	**0.01882**	**NP Inter (NDs) 1 of 2**
Calcium (mg/L)	MW-D1	42.07	n/a	9/13/2017	22	No	8	0	No	0.002505	Param Inter 1 of 2
Calcium (mg/L)	**MW-D2**	**42.07**	**n/a**	**9/13/2017**	**130**	**Yes**	**8**	**0**	**No**	**0.002505**	**Param Inter 1 of 2**
Calcium (mg/L)	**MW-D3**	**42.07**	**n/a**	**9/13/2017**	**120**	**Yes**	**8**	**0**	**No**	**0.002505**	**Param Inter 1 of 2**
Chloride (mg/L)	**MW-D1**	**2.713**	**n/a**	**9/13/2017**	**3.1**	**Yes**	**8**	**0**	**No**	**0.002505**	**Param Inter 1 of 2**
Chloride (mg/L)	**MW-D2**	**2.713**	**n/a**	**9/13/2017**	**5.5**	**Yes**	**8**	**0**	**No**	**0.002505**	**Param Inter 1 of 2**
Chloride (mg/L)	**MW-D3**	**2.713**	**n/a**	**9/13/2017**	**4.5**	**Yes**	**8**	**0**	**No**	**0.002505**	**Param Inter 1 of 2**
Fluoride (mg/L)	**MW-D1**	**0.06**	**n/a**	**9/13/2017**	**0.075**	**Yes**	**8**	**0**	**n/a**	**0.01882**	**NP Inter (normality) ...**
Fluoride (mg/L)	**MW-D2**	**0.06**	**n/a**	**9/13/2017**	**0.061**	**Yes**	**8**	**0**	**n/a**	**0.01882**	**NP Inter (normality) ...**
Fluoride (mg/L)	**MW-D3**	**0.06**	**n/a**	**9/13/2017**	**0.12**	**Yes**	**8**	**0**	**n/a**	**0.01882**	**NP Inter (normality) ...**
Field pH (SU)	MW-D1	8.798	4.393	9/13/2017	5.88	No	8	0	x^3	0.001253	Param Inter 1 of 2
Field pH (SU)	MW-D2	8.798	4.393	9/13/2017	6.44	No	8	0	x^3	0.001253	Param Inter 1 of 2
Field pH (SU)	MW-D3	8.798	4.393	9/13/2017	6.56	No	8	0	x^3	0.001253	Param Inter 1 of 2
Sulfate (mg/L)	**MW-D1**	**3.866**	**n/a**	**9/13/2017**	**23**	**Yes**	**8**	**0**	**No**	**0.002505**	**Param Inter 1 of 2**
Sulfate (mg/L)	**MW-D2**	**3.866**	**n/a**	**9/13/2017**	**20**	**Yes**	**8**	**0**	**No**	**0.002505**	**Param Inter 1 of 2**
Sulfate (mg/L)	**MW-D3**	**3.866**	**n/a**	**9/13/2017**	**29**	**Yes**	**8**	**0**	**No**	**0.002505**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	MW-D1	144.8	n/a	9/13/2017	92	No	8	0	No	0.002505	Param Inter 1 of 2
Total Dissolved Solids (mg/L)	**MW-D2**	**144.8**	**n/a**	**9/13/2017**	**390**	**Yes**	**8**	**0**	**No**	**0.002505**	**Param Inter 1 of 2**
Total Dissolved Solids (mg/L)	**MW-D3**	**144.8**	**n/a**	**9/13/2017**	**390**	**Yes**	**8**	**0**	**No**	**0.002505**	**Param Inter 1 of 2**

Hollow symbols indicate censored values.

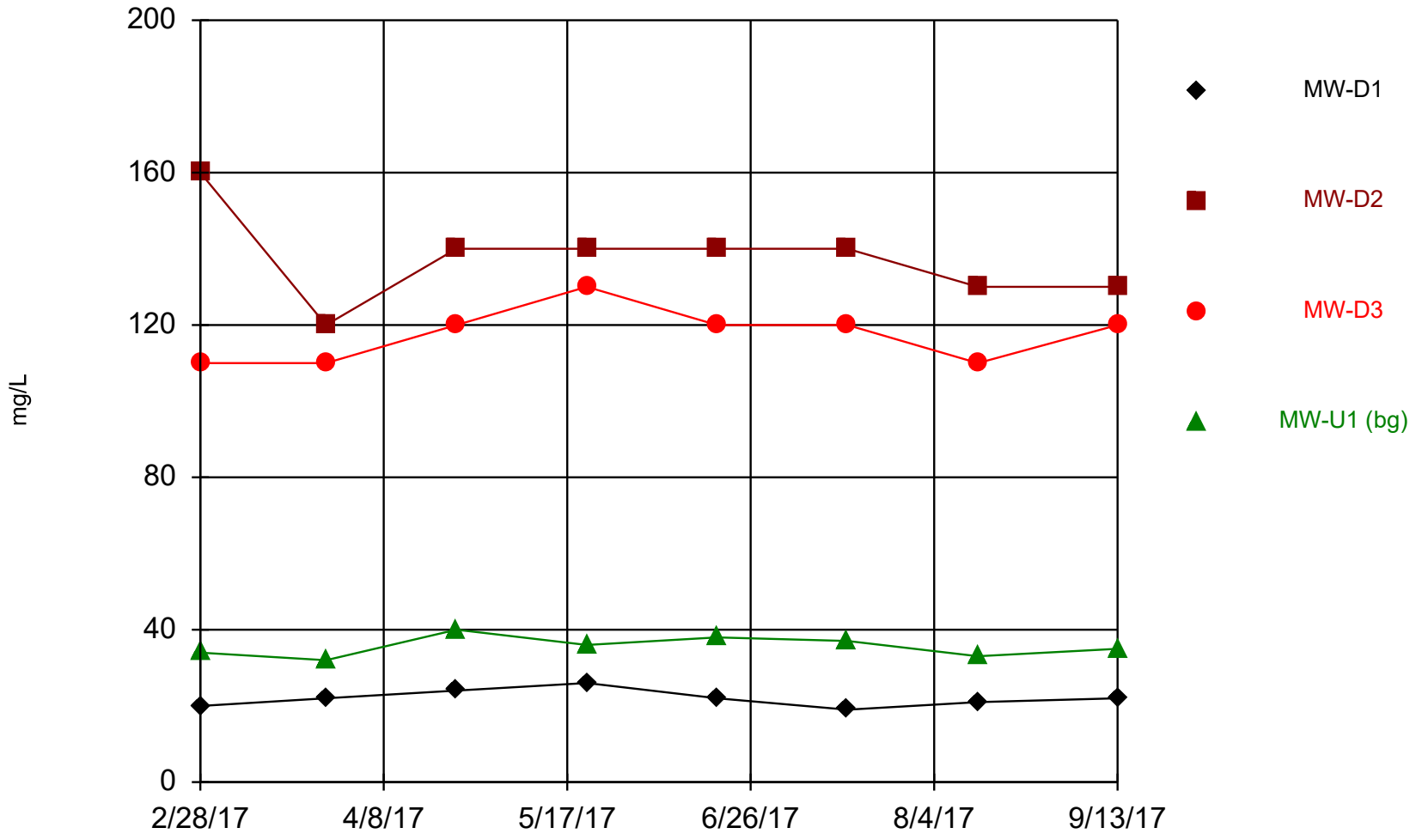
Time Series



Constituent: Boron Analysis Run 10/2/2017 4:40 PM

CCPC Plant Crisp Ash Pond Site Client: Geosyntec Data: Sanitas_Statistics

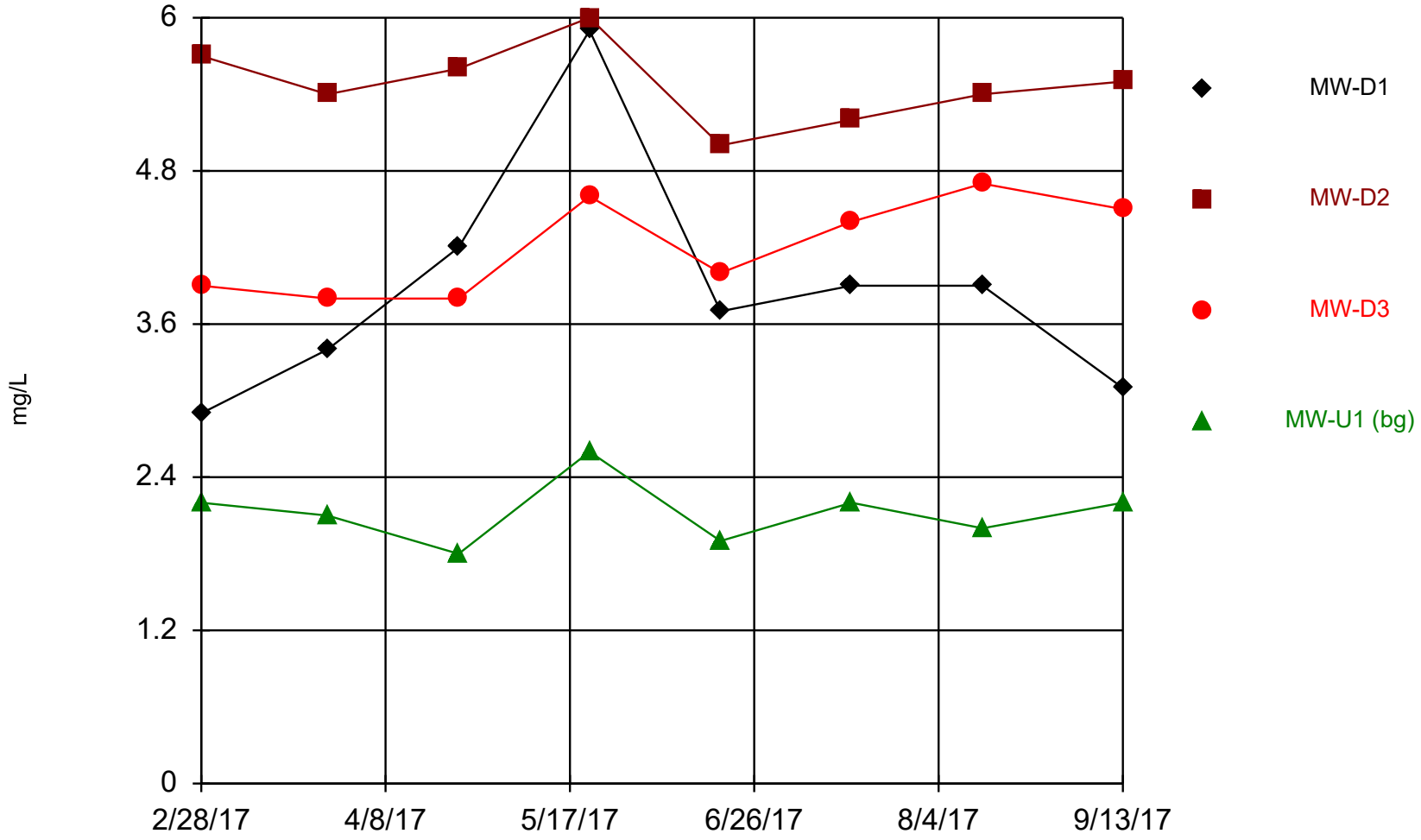
Time Series



Constituent: Calcium Analysis Run 10/2/2017 4:41 PM

CCPC Plant Crisp Ash Pond Site Client: Geosyntec Data: Sanitas_Statistics

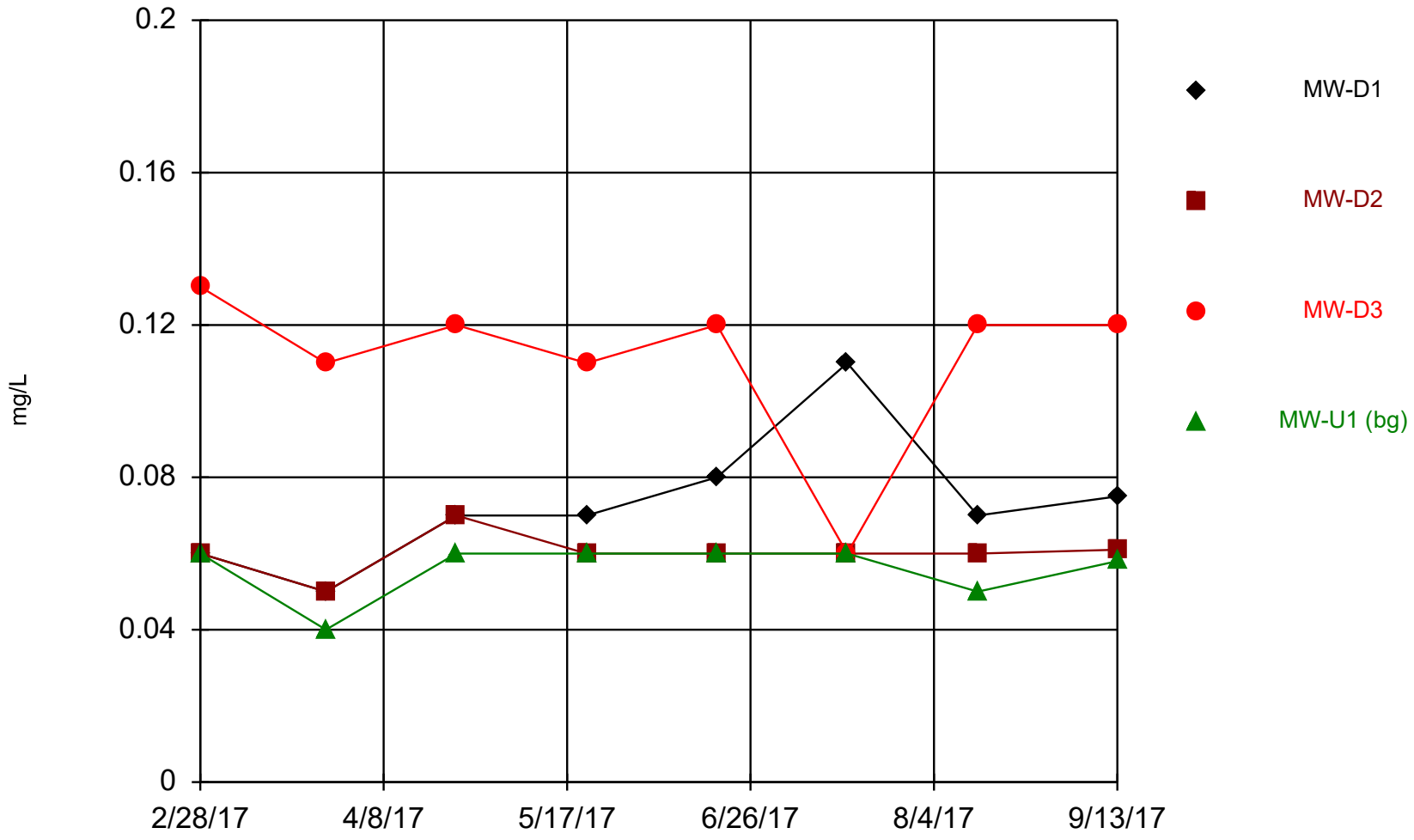
Time Series



Constituent: Chloride Analysis Run 10/2/2017 4:42 PM

CCPC Plant Crisp Ash Pond Site Client: Geosyntec Data: Sanitas_Statistics

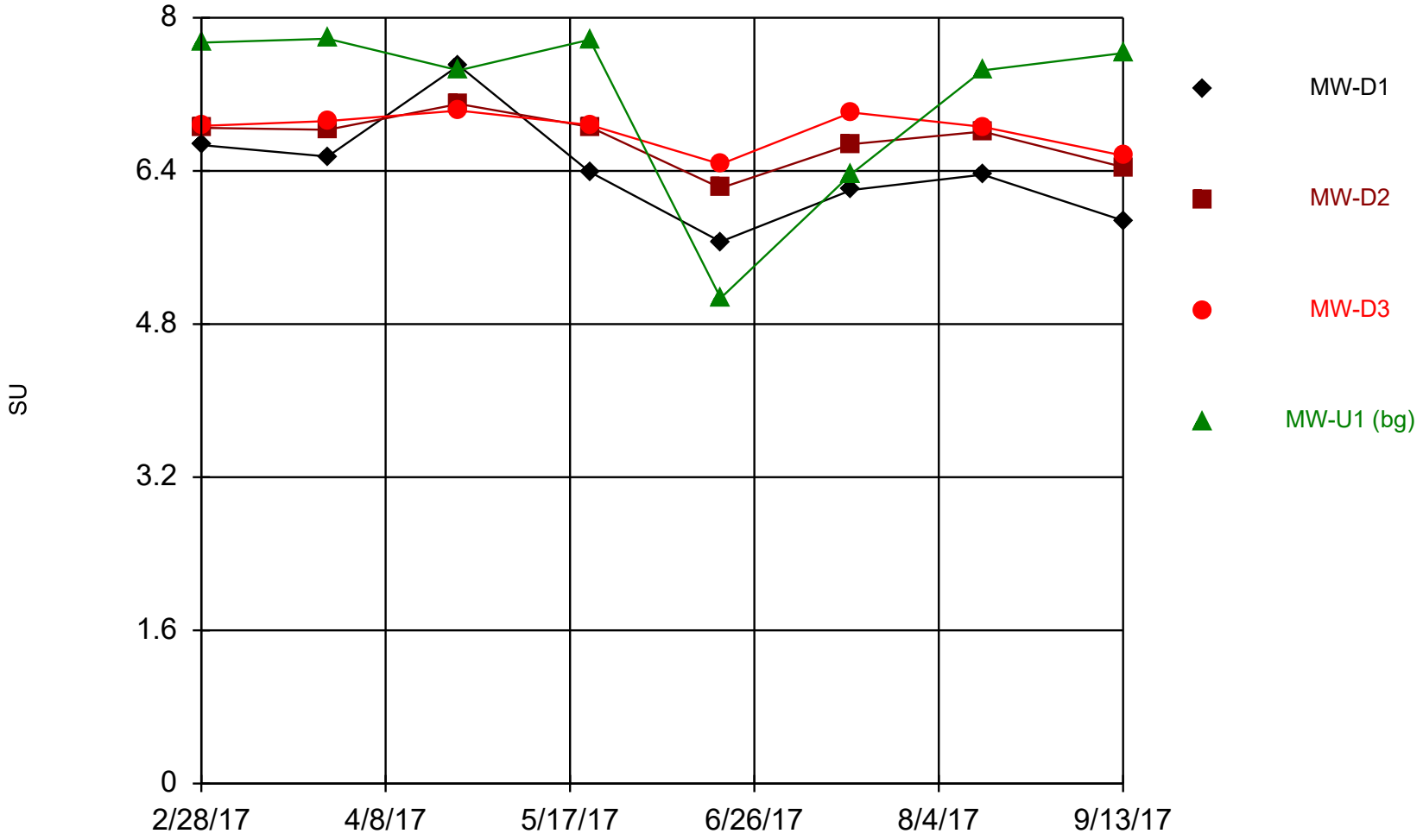
Time Series



Constituent: Fluoride Analysis Run 10/2/2017 4:43 PM

CCPC Plant Crisp Ash Pond Site Client: Geosyntec Data: Sanitas_Statistics

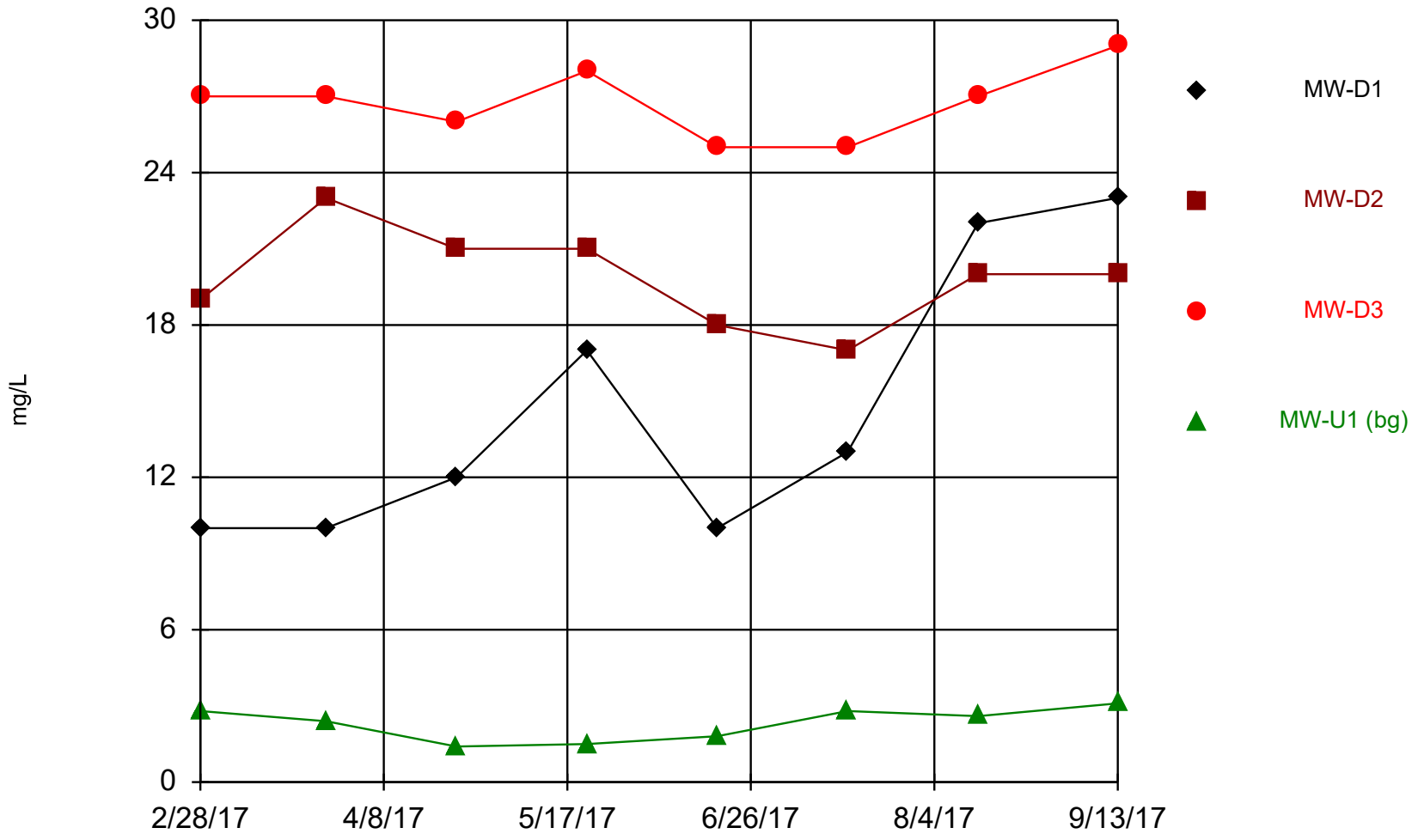
Time Series



Constituent: Field pH Analysis Run 10/2/2017 4:44 PM

CCPC Plant Crisp Ash Pond Site Client: Geosyntec Data: Sanitas_Statistics

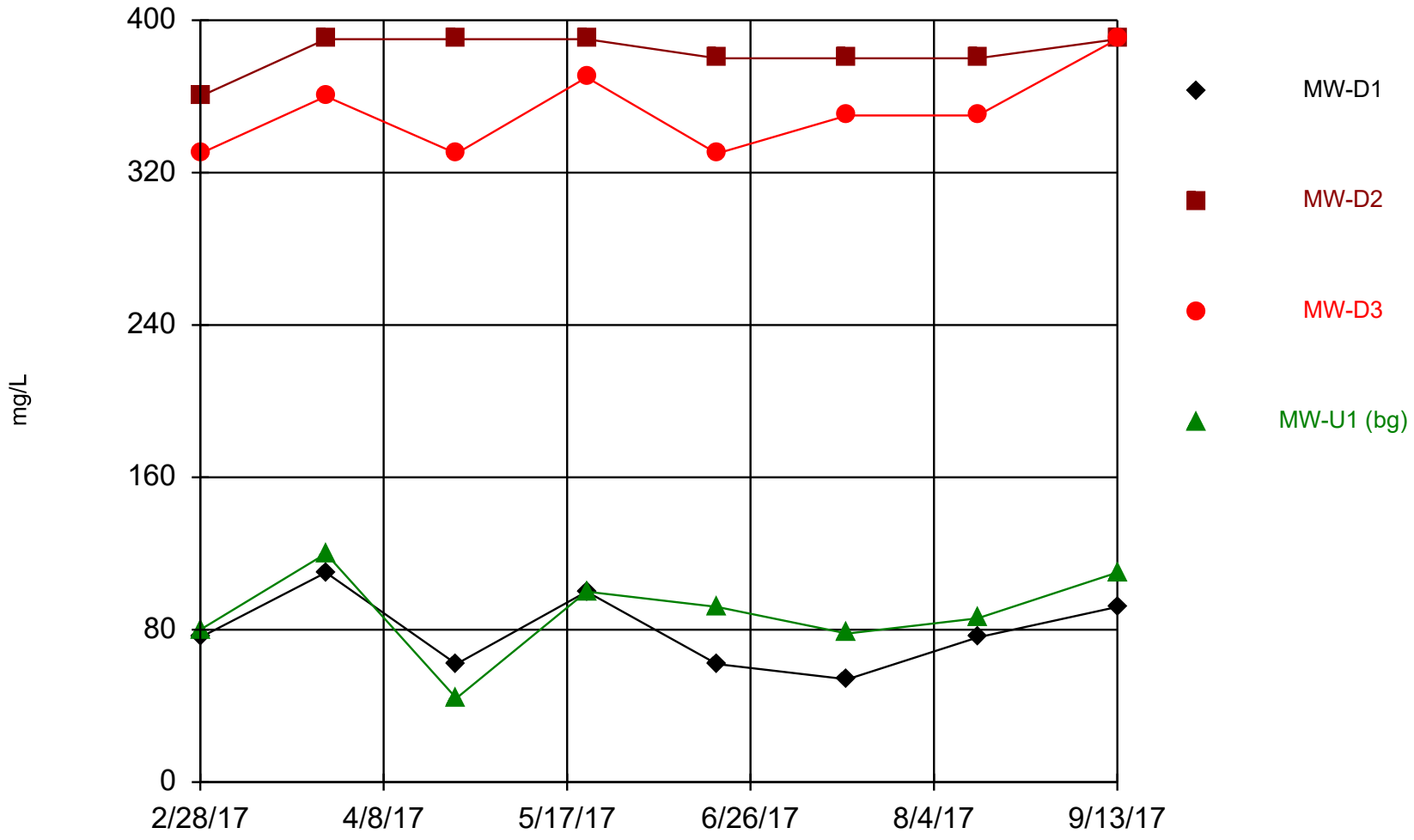
Time Series



Constituent: Sulfate Analysis Run 10/2/2017 4:45 PM

CCPC Plant Crisp Ash Pond Site Client: Geosyntec Data: Sanitas_Statistics

Time Series



Constituent: Total Dissolved Solids Analysis Run 10/2/2017 4:45 PM

CCPC Plant Crisp Ash Pond Site Client: Geosyntec Data: Sanitas_Statistics